

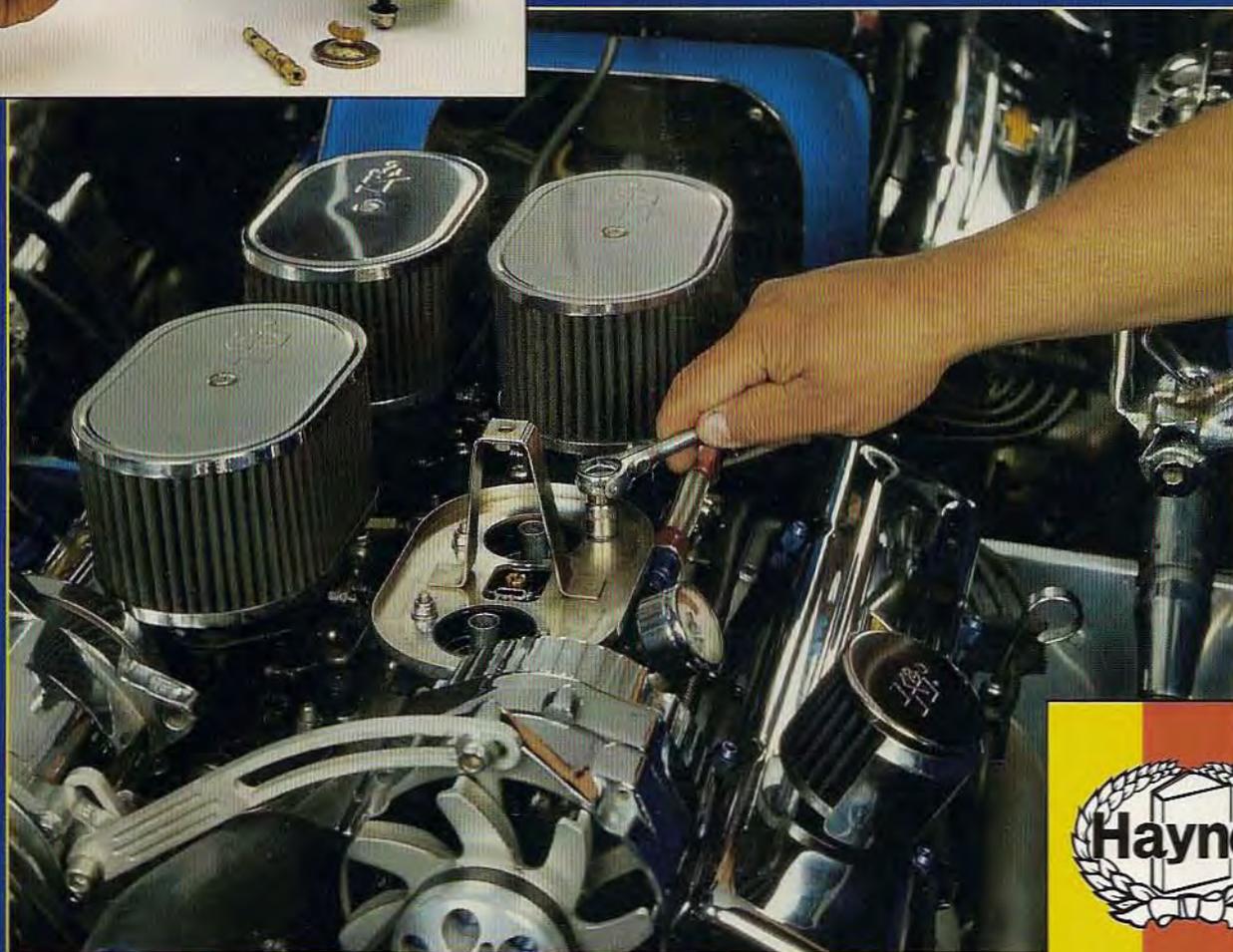
# Haynes TECHBOOK<sup>®</sup>

# WEBER CARBURETOR MANUAL



Including Zenith Stromberg  
and SU carburetors

- Theory and operation
- Maintenance and tune-up
- Detailed overhaul procedures
- Application and reference tables



TECHBOOK



# The Haynes Weber Carburetor Manual

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by A K Legg LAE MIMI, Don Peers,  
Robert Maddox and  
John H Haynes

Member of the Guild of Motoring Writers

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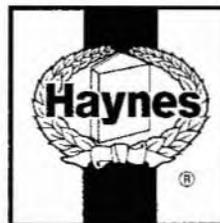
**Models covered:**

**Weber carburetor types:** DAF, DCD, DFA, DFV, DFD, DFE, DFM, DFT, DGV, DIF, IDA, IDF, IDS, IDT, DCFN, DCOE, DFAV, DFTA, DGAS, DGAV, IDAP and IDTP

**Zenith Stromberg carburetor types:** CD, CDS, CD-2S, CDSE, CD-2SE, CDST and CDSET

**SU carburetor types:** H, HD, HS, HIF  
(including electronic) and auxiliary starting devices

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K

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## About this manual

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This is a manual written for the do-it-yourself car owner whose vehicle is fitted with a Weber, Zenith Stromberg or SU carburetor. Because the carburetor is a fine precision instrument, the book has to assume the reader has a basic familiarity of carburetors. For example it assumes that the owner has a basic understanding of the mechanical systems of a vehicle, where the carburetor is fitted and how to adjust the ignition timing (if the owner does not possess this knowledge, it can easily be obtained from the Haynes Automotive Repair Manual for the particular vehicle in question). This manual discusses the operation of the carburetor, isolating it from the remainder of the automobile, explaining its function in detail and relating it to other systems when necessary. This is a comprehensive manual for the indicated types of Weber, Zenith Stromberg and SU carburetors.

A great deal of mystique surrounds the carburetor, its function and tuning. This manual explodes that mystique and guides the owner

through theory, maintenance, overhaul and tuning, using only the necessary tools any reasonably equipped home workshop will possess. It does not over-complicate the issue by giving superfluous information which is of no practical use. By definition it is not possible to dictate to you when to service your carburetor, nor whether the law allows you to alter any settings (in some locations environmental agencies specifically forbid it). This manual simply provides a guide and the needed information should servicing the carburetor become necessary.

Every effort has been made to ensure that this manual is up-to-date. However, it should be noted that modifications in design and production are often an on-going process and differences in your carburetor may exist. While extreme care is taken to ensure that the technical information in this manual is correct, no liability can be accepted by the authors or publishers for loss, damage or injury caused by any errors in, or omissions from, the information given.

## Conversion factors

### Length (distance)

Inches (in)	X 25.4	= Millimetres (mm)	X 0.0394	= Inches (in)
Feet (ft)	X 0.305	= Metres (m)	X 3.281	= Feet (ft)
Miles	X 1.609	= Kilometres (km)	X 0.621	= Miles

### Volume (capacity)

Cubic inches (cu in; in <sup>3</sup> )	X 16.387	= Cubic centimetres (cc; cm <sup>3</sup> )	X 0.061	= Cubic inches (cu in; in <sup>3</sup> )
Imperial pints (Imp pt)	X 0.568	= Litres (l)	X 1.76	= Imperial pints (Imp pt)
Imperial quarts (Imp qt)	X 1.137	= Litres (l)	X 0.88	= Imperial quarts (Imp qt)
Imperial quarts (Imp qt)	X 1.201	= US quarts (US qt)	X 0.833	= Imperial quarts (Imp qt)
US quarts (US qt)	X 0.946	= Litres (l)	X 1.057	= US quarts (US qt)
Imperial gallons (Imp gal)	X 4.546	= Litres (l)	X 0.22	= Imperial gallons (Imp gal)
Imperial gallons (Imp gal)	X 1.201	= US gallons (US gal)	X 0.833	= Imperial gallons (Imp gal)
US gallons (US gal)	X 3.785	= Litres (l)	X 0.264	= US gallons (US gal)

### Mass (weight)

Ounces (oz)	X 28.35	= Grams (g)	X 0.035	= Ounces (oz)
Pounds (lb)	X 0.454	= Kilograms (kg)	X 2.205	= Pounds (lb)

### Force

Ounces-force (ozf; oz)	X 0.278	= Newtons (N)	X 3.6	= Ounces-force (ozf; oz)
Pounds-force (lbf; lb)	X 4.448	= Newtons (N)	X 0.225	= Pounds-force (lbf; lb)
Newtons (N)	X 0.1	= Kilograms-force (kgf; kg)	X 9.81	= Newtons (N)

### Pressure

Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )	X 0.070	= Kilograms-force per square centimetre (kgf/cm <sup>2</sup> ; kg/cm <sup>2</sup> )	X 14.223	= Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )
Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )	X 0.068	= Atmospheres (atm)	X 14.696	= Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )
Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )	X 0.069	= Bars	X 14.5	= Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )
Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )	X 6.895	= Kilopascals (kPa)	X 0.145	= Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )
Kilopascals (kPa)	X 0.01	= Kilograms-force per square centimetre (kgf/cm <sup>2</sup> ; kg/cm <sup>2</sup> )	X 98.1	= Kilopascals (kPa)
Millibar (mbar)	X 100	= Pascals (Pa)	X 0.01	= Millibar (mbar)
Millibar (mbar)	X 0.0145	= Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )	X 68.947	= Millibar (mbar)
Millibar (mbar)	X 0.75	= Millimetres of mercury (mmHg)	X 1.333	= Millibar (mbar)
Millibar (mbar)	X 0.401	= Inches of water (inH <sub>2</sub> O)	X 2.491	= Millibar (mbar)
Millimetres of mercury (mmHg)	X 0.535	= Inches of water (inH <sub>2</sub> O)	X 1.868	= Millimetres of mercury (mmHg)
Inches of water (inH <sub>2</sub> O)	X 0.036	= Pounds-force per square inch (psi; lbf/in <sup>2</sup> ; lb/in <sup>2</sup> )	X 27.68	= Inches of water (inH <sub>2</sub> O)

### Torque (moment of force)

Pounds-force inches (lbf in; lb in)	X 1.152	= Kilograms-force centimetre (kgf cm; kg cm)	X 0.868	= Pounds-force inches (lbf in; lb in)
Pounds-force inches (lbf in; lb in)	X 0.113	= Newton metres (Nm)	X 8.85	= Pounds-force inches (lbf in; lb in)
Pounds-force inches (lbf in; lb in)	X 0.083	= Pounds-force feet (lbf ft; lb ft)	X 12	= Pounds-force inches (lbf in; lb in)
Pounds-force feet (lbf ft; lb ft)	X 0.138	= Kilograms-force metres (kgf m; kg m)	X 7.233	= Pounds-force feet (lbf ft; lb ft)
Pounds-force feet (lbf ft; lb ft)	X 1.356	= Newton metres (Nm)	X 0.738	= Pounds-force feet (lbf ft; lb ft)
Newton metres (Nm)	X 0.102	= Kilograms-force metres (kgf m; kg m)	X 9.804	= Newton metres (Nm)

### Power

Horsepower (hp)	X 745.7	= Watts (W)	X 0.0013	= Horsepower (hp)
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### Velocity (speed)

Miles per hour (miles/hr; mph)	X 1.609	= Kilometres per hour (km/hr; kph)	X 0.621	= Miles per hour (miles/hr; mph)
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### Fuel consumption\*

Miles per gallon, Imperial (mpg)	X 0.354	= Kilometres per litre (km/l)	X 2.825	= Miles per gallon, Imperial (mpg)
Miles per gallon, US (mpg)	X 0.425	= Kilometres per litre (km/l)	X 2.352	= Miles per gallon, US (mpg)

### Temperature

Degrees Fahrenheit = (°C x 1.8) + 32                      Degrees Celsius (Degrees Centigrade; °C) = (°F - 32) x 0.56

\* It is common practice to convert from miles per gallon (mpg) to litres/100 kilometres (l/100km), where mpg (Imperial) x l/100 km = 282 and mpg (US) x l/100 km = 235

# Safety first

Regardless of how enthusiastic you may be about getting on with the job at hand, take the time to ensure that your safety is not jeopardized. A moment's lack of attention can result in an accident, as can failure to observe certain simple safety precautions. The possibility of an accident will always exist, and the following points should not be considered a comprehensive list of all dangers. Rather, they are intended to make you aware of the risks and to encourage a safety conscious approach to all work you carry out on your vehicle.

## Essential DOs and DON'Ts

**DON'T** rely on a jack when working under the vehicle. Always use approved jackstands to support the weight of the vehicle and place them under the recommended lift or support points.

**DON'T** attempt to loosen extremely tight fasteners (i.e. wheel lug nuts) while the vehicle is on a jack - it may fall.

**DON'T** start the engine without first making sure that the transmission is in Neutral (or Park where applicable) and the parking brake is set.

**DON'T** remove the radiator cap from a hot cooling system - let it cool or cover it with a cloth and release the pressure gradually.

**DON'T** attempt to drain the engine oil until you are sure it has cooled to the point that it will not burn you.

**DON'T** touch any part of the engine or exhaust system until it has cooled sufficiently to avoid burns.

**DON'T** siphon toxic liquids such as gasoline, antifreeze and brake fluid by mouth, or allow them to remain on your skin.

**DON'T** inhale brake lining dust - it is potentially hazardous (see *Asbestos* below)

**DON'T** allow spilled oil or grease to remain on the floor - wipe it up before someone slips on it.

**DON'T** use loose fitting wrenches or other tools which may slip and cause injury.

**DON'T** push on wrenches when loosening or tightening nuts or bolts. Always try to pull the wrench toward you. If the situation calls for pushing the wrench away, push with an open hand to avoid scraped knuckles if the wrench should slip.

**DON'T** attempt to lift a heavy component alone - get someone to help you.

**DON'T** rush or take unsafe shortcuts to finish a job.

**DON'T** allow children or animals in or around the vehicle while you are working on it.

**DO** wear eye protection when using power tools such as a drill, sander, bench grinder, etc. and when working under a vehicle.

**DO** keep loose clothing and long hair well out of the way of moving parts.

**DO** make sure that any hoist used has a safe working load rating adequate for the job.

**DO** get someone to check on you periodically when working alone on a vehicle.

**DO** carry out work in a logical sequence and make sure that everything is correctly assembled and tightened.

**DO** keep chemicals and fluids tightly capped and out of the reach of children and pets.

**DO** remember that your vehicle's safety affects that of yourself and others. If in doubt on any point, get professional advice.

## Asbestos

Certain friction, insulating, sealing, and other products - such as brake linings, brake bands, clutch linings, torque converters, gaskets, etc. - contain asbestos. Extreme care must be taken to avoid inhalation of dust from such products, since it is hazardous to health. If in doubt, assume that they do contain asbestos.

## Fire

Remember at all times that gasoline is highly flammable. Never smoke or have any kind of open flame around when working on a vehicle. But the risk does not end there. A spark caused by an electrical short circuit, by two metal surfaces contacting each other, or even by static electricity built up in your body under certain conditions, can ignite gasoline vapors, which in a confined space are highly explosive. Do not, under any circumstances, use gasoline for cleaning parts. Use an approved safety solvent.

Always disconnect the battery ground (-) cable at the battery before working on any part of the fuel system or electrical system. Never risk spilling fuel on a hot engine or exhaust component. It is strongly recommended that a fire extinguisher suitable for use on fuel and electrical fires be kept handy in the garage or workshop at all times. Never try to extinguish a fuel or electrical fire with water.

## Fumes

Certain fumes are highly toxic and can quickly cause unconsciousness and even death if inhaled to any extent. Gasoline vapor falls into this category, as do the vapors from some cleaning solvents. Any draining or pouring of such volatile fluids should be done in a well ventilated area.

When using cleaning fluids and solvents, read the instructions on the container carefully. Never use materials from unmarked containers.

Never run the engine in an enclosed space, such as a garage. Exhaust fumes contain carbon monoxide, which is extremely poisonous. If you need to run the engine, always do so in the open air, or at least have the rear of the vehicle outside the work area.

If you are fortunate enough to have the use of an inspection pit, never drain or pour gasoline and never run the engine while the vehicle is over the pit. The fumes, being heavier than air, will concentrate in the pit with possibly lethal results.

## The battery

Never create a spark or allow a bare light bulb near a battery. They normally give off a certain amount of hydrogen gas, which is highly explosive.

Always disconnect the battery ground (-) cable at the battery before working on the fuel or electrical systems.

If possible, loosen the filler caps or cover when charging the battery from an external source (this does not apply to sealed or maintenance-free batteries). Do not charge at an excessive rate or the battery may burst.

Take care when adding water to a non maintenance-free battery and when carrying a battery. The electrolyte, even when diluted, is very corrosive and should not be allowed to contact clothing or skin.

Always wear eye protection when cleaning the battery to prevent the caustic deposits from entering your eyes.

## Household current

When using an electric power tool, inspection light, etc., which operates on household current, always make sure that the tool is correctly connected to its plug and that, where necessary, it is properly grounded. Do not use such items in damp conditions and, again, do not create a spark or apply excessive heat in the vicinity of fuel or fuel vapor.

## Secondary ignition system voltage

A severe electric shock can result from touching certain parts of the ignition system (such as the spark plug wires) when the engine is running or being cranked, particularly if components are damp or the insulation is defective. In the case of an electronic ignition system, the secondary system voltage is much higher and could prove fatal.

# Part 1 Introduction

## Chapter 1 Basic carburation

### Contents

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### 1 Function of a carburetor

The modern internal combustion engine has been developed considerably from its original concept in a number of ways, including increased power output, greater flexibility and more efficient combustion of fuel. As a direct result of this, the role of the carburetor has become an increasingly important factor, requiring frequent modification and the introduction of many previously unheard of devices to improve its function.

Carburetor technology is, of course, a vast subject, and to cover all aspects would require a volume of books: however, it will be helpful for the reader to be acquainted with the basic factors concerning carburation. It will then be easier to understand the function of the various components which make up the Weber carburetor.

The prime objective of any carburetor is to meter a mixture of fuel and air to the engine in a form that can be burnt quickly and completely. In practice this is rarely achieved, although the modern carburetor is much improved on its original counterpart and there is every indication of further advancement. Ideally, for complete combustion, the air/fuel mixture must be supplied to the engine in vapor form. This leads us to the secondary objective of the carburetor, which is to break up or atomize the fuel and disperse it into the air passing into the engine. The efficiency with which the carburetor carries out this process largely determines the efficiency of combustion within the engine.

The third objective of the carburetor in the automotive field is necessary, owing to the constant change of engine speed resulting from the vehicle accelerating and decelerating. The carburetor must be able to vary the amount of fuel supplied to the engine in order to cope with the different speed and power requirements encountered. This also requires that the quantity of air be varied, along with the fuel, to provide a combustible mixture.

### 2 Air/fuel ratio variation

The theoretical air/fuel ratio for complete combustion is called the stoichiometric A/F ratio and under laboratory conditions is in the region of 15:1 by weight. When the fuel is fully vaporized, the ratio by volume is between 50:1 and 60:1 because fuel vapor is denser than air. However, fuel will tolerate a wide range of mixture ratios varying from about 8:1 to 22:1 by weight.

The stoichiometric A/F ratio does not give maximum power or minimum fuel consumption, these two requirements being obtained with A/F ratios of 12.5:1 and 16:1 respectively, as shown in Fig. 1.1. The curves of the graph are important with regard to the tuning of a

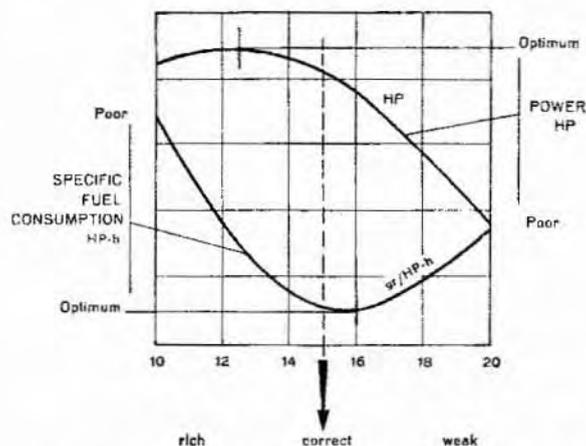


Fig. 1.1 Curves showing the effect of the variation of the air/fuel ratio on power output and fuel consumption

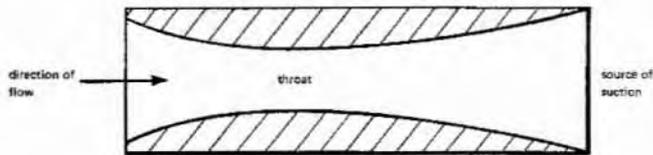


Fig. 1.2 The principle of the venturi

carburetor, as they enable the operator to tune the engine for maximum power or maximum economy within defined limits.

It should be observed that an engine will run with A/F ratios outside the 12.5:1 and 16:1 limits, such as when starting (1:1 A/F ratio weakening to 4:1 A/F ratio, but under normal conditions the ratio should be within the limits in order to obtain optimum power or fuel consumption. There are additional adverse effects which occur as a result of A/F ratios outside the limits.

A weak mixture burns considerably slower within the combustion chamber and as a result may still be burning when the piston reaches the end of its power stroke. This leads to overheating and, in extreme cases, burnt valves and piston crowns.

A rich mixture will cause carbon to form rapidly on the combustion chamber and piston crown surfaces. This will necessitate a premature de-carbonizing procedure on the pistons and valves. Spark plug performance will be impaired and excess fuel will contaminate the engine lubricating oil and cause rapid wear of the cylinder walls.

Excessively rich or lean mixtures also increase the amount of toxic emissions in the exhaust gases. In some countries this has led to the design and introduction of emission control systems. It will therefore be appreciated that mixture control is extremely critical over the complete range of engine speeds and loads, and the correct functioning of the carburetor is therefore an important if not essential factor.

The mixture content of a particular engine can be tested by using an exhaust gas analyzer to determine the amount of carbon monoxide (CO) present. The instrument is particularly helpful when adjusting idle

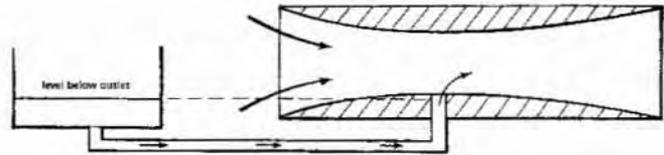


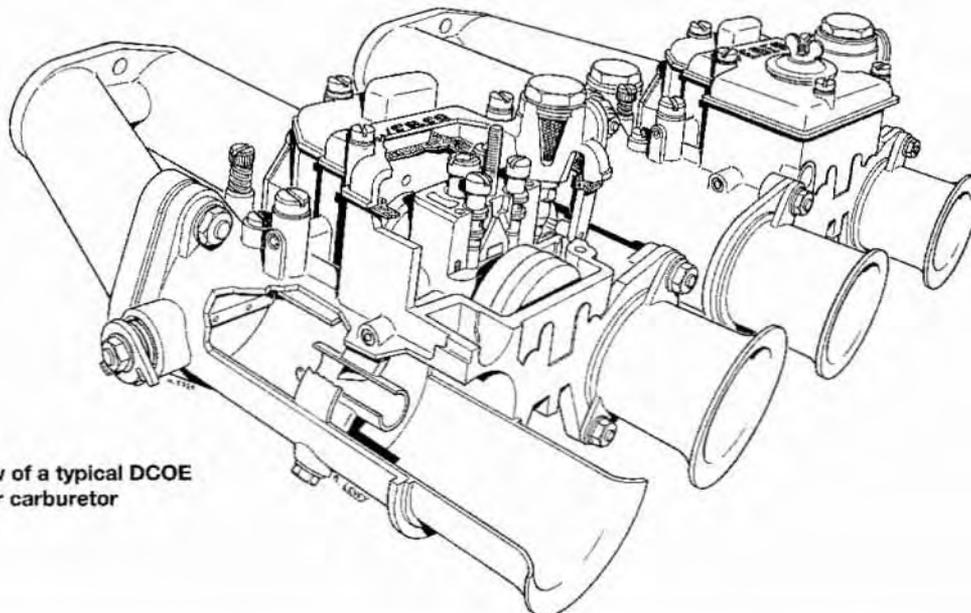
Fig. 1.3 The principle of fuel flow into a venturi. Large arrows indicate air flow, small arrows indicate fuel flow

mixture screws in order to supply the correct A/F mixture necessary for good combustion. Exhaust gas analyzers are available from special tool companies and their use may very well become compulsory in the future in view of the trend towards tighter regulations regarding air pollution.

### 3 The simple carburetor

All modern carburetors are designed around one basic principle. This is illustrated in Fig. 1.2 which is a cross-section of a tube having a curved restriction within it. The restriction in a carburetor is termed a venturi. If air is drawn through the component it will increase in speed in proportion to the cross-sectional diameter of the venturi. Since the air density decreases progressively to a point where its velocity is greatest, the air pressure at the smallest section of the venturi will be considerably less than atmospheric.

In the carburetor, this phenomenon is exploited by inserting a fuel outlet or nozzle into the venturi, this being supplied by a reservoir or float chamber (Fig. 1.3). Note that under static conditions, the fuel level in the float chamber is just below the nozzle outlet in order to prevent fuel from leaking into the nozzle; also the air pressure in the float chamber is identical to that at the nozzle, i.e. atmospheric. When air is drawn through the venturi arrangement it will be observed that, due to the difference in air pressure at the float chamber and outlet nozzle, the fuel will flow out of the nozzle and mix with the air. On an engine, the resulting mixture is drawn into the cylinders and combustion takes place.



Cutaway view of a typical DCOE  
Weber carburetor

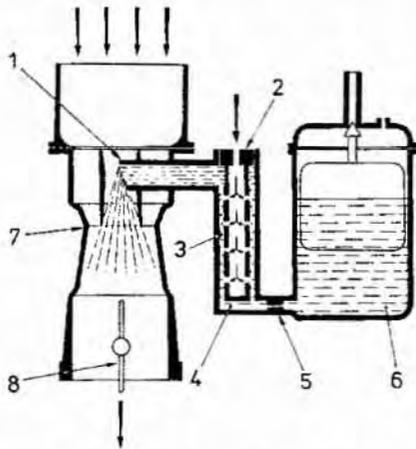


Fig. 1.4 The Weber air bleed correction system

- |                 |                  |
|-----------------|------------------|
| 1 Nozzle        | 5 Main fuel jet  |
| 2 Air bleed jet | 6 Float chamber  |
| 3 Emulsion tube | 7 Venturi        |
| 4 Reserve well  | 8 Throttle valve |

In order to maintain the level of the fuel just below the nozzle outlet, a float controlled inlet valve is incorporated into the float chamber. As the fuel flows out of the nozzle its level drops and the float opens the valve; when the correct level is reached the valve shuts.

To regulate the amount of mixture admitted to the engine, the carburetor is provided with a throttle valve which, when closed, completely seals the engine side of the venturi.

Unfortunately, the simple carburetor has one fault which renders it unsuitable for use in the road vehicle where the engine is operated at variable speeds and loads. In its present form, the air/fuel mixture will be consistent provided the air flow remains at a constant speed. If the air flow is increased, its density will decrease in far greater proportion to the liquid fuel, with the result that the mixture becomes progressively richer. If the air flow is decreased the mixture will progressively weaken.

Another fault is that the simple carburetor makes no provision for engine idling, acceleration, or cold starting. It is therefore obvious that additional modifications must be made in order to adapt the carburetor for automotive use.

#### 4 The Weber carburetor

Carburetor manufacturers have overcome the deficiencies of the simple carburetor in various ways. With the use of sophisticated test equipment, Weber has developed their carburetors to a very high standard and have proved to be leaders in the field of carburetor manufacture.

To overcome the mixture enriching phenomenon mentioned in Section 4, the Weber carburetor is equipped with an air bleed system. Reference to Fig. 1.4 shows that as the fuel flows from the float chamber to the nozzle in the venturi, it passes a tube called the emulsion tube, which is vented to atmospheric pressure and additionally has a number of holes drilled throughout its length. The effect of the depression acting on the nozzle will not only draw fuel into the carburetor but also air through the air bleed jet and into the fuel via the holes in the emulsion tube. As the engine speed increases, the fuel level inside the emulsion tube lowers with the result that more air is released into the fuel. The fact that the fuel becomes emulsified also results in better atomization at the nozzle.

In the Weber carburetor the emulsion tube is removable and by varying its diameter, location of holes and diameter of the air bleed jet, the mixture strength for a particular engine can be adjusted to fine limit.

At engine idling speed there is insufficient vacuum in the venturi

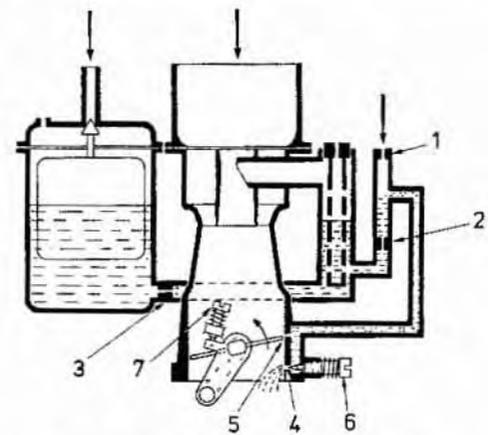


Fig. 1.5 The Weber idling speed system

- |                              |                                       |
|------------------------------|---------------------------------------|
| 1 Air jet                    | 5 Progression orifice                 |
| 2 Fuel jet                   | 6 Idle mixture adjusting screw        |
| 3 Main fuel jet              | 7 Throttle idle speed adjusting screw |
| 4 Idle speed mixture orifice |                                       |

to draw any fuel from the nozzle; so a separate supply of fuel is channelled to the engine side of the throttle valve where there will be greater vacuum, since the throttle is closed. Fig. 1.5 illustrates a typical idling speed circuit and it will be observed that a fuel jet and air corrector jet is incorporated to provide a combustible mixture; the air jet also prevents a syphoning effect through the circuit. A volume of mixture adjustment is also incorporated, so that it is possible to vary the mixture strength as necessary in cooperation with the throttle valve adjustment screw, which controls the amount of air allowed past the throttle valve at idling.

It should be noted that the idle circuit is supplied from the lower region of the emulsion tube. This arrangement ensures that the idle circuit ceases or is in some instances reversed when the main fuel system is in operation.

The Weber carburetor also includes what is termed as a progression function. When the throttle valve is open slightly after being in the idling position, there is a tendency for the mixture to lean-out and thus cause the engine to misfire. To overcome this problem, one or more transition orifices are drilled into the idling circuit on the inlet side of the throttle valve and in the carburetor barrel. Reference to Fig. 1.6 will show that the vacuum on the engine side of the throttle valve is progressively introduced to the transition orifices and extra fuel is thus provided to cover this stage of increasing engine speed. When the engine reaches sufficient speed to draw fuel from the main nozzle, the progression function will cease.

Where the throttle valve is opened fully and quickly, even the progression orifices are insufficient to enrich the mixture enough. In

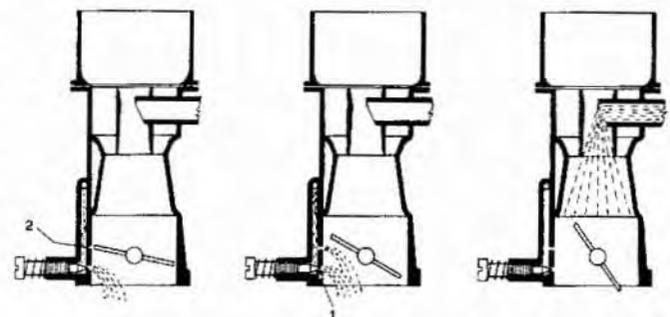


Fig. 1.6 The Weber progression system

- |                              |                       |
|------------------------------|-----------------------|
| 1 Idle speed mixture orifice | 2 Progression orifice |
|------------------------------|-----------------------|

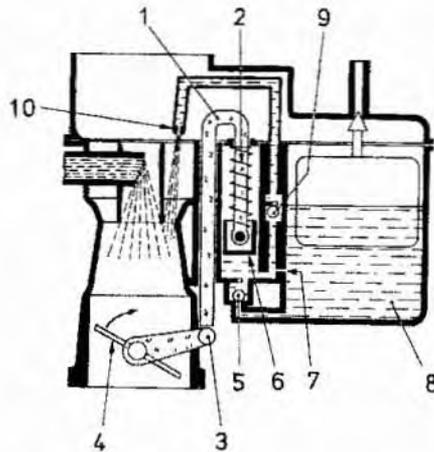


Fig. 1.7 The Weber piston type accelerator pump

- |                  |                  |
|------------------|------------------|
| 1 Operating rod  | 6 Pump piston    |
| 2 Spring         | 7 Discharge jet  |
| 3 Control lever  | 8 Float chamber  |
| 4 Throttle valve | 9 Delivery valve |
| 5 Intake valve   | 10 Pump jet      |

this case an accelerator pump must be used. Figs. 1.7 and 1.8 show the two types of accelerator pump used on Weber carburetors.

With the piston type pump, fuel is drawn from the float chamber when the throttle is closed, because this action lifts the pump operating rod by way of a lever. When the throttle is opened, the operating rod is free to move the piston down its bore under the action of the accelerator pump spring. Fuel is channelled past a one-way ball valve, through the pump jet, and thus mixes with the air being drawn into the engine. The fuel is prevented from re-entering the float chamber by a ball and seat in the intake valve, but in order to calibrate the amount of fuel injected, a discharge hole allows a certain amount of fuel to return to the float chamber. The discharge hole also prevents fuel being injected during slow throttle movement.

The diaphragm type pump operates in a similar manner, except that a spring tensioned diaphragm is used instead of a piston.

The final failure of the simple carburetor concerns cold starting. In this respect there are two main methods employed in the Weber carburetor.

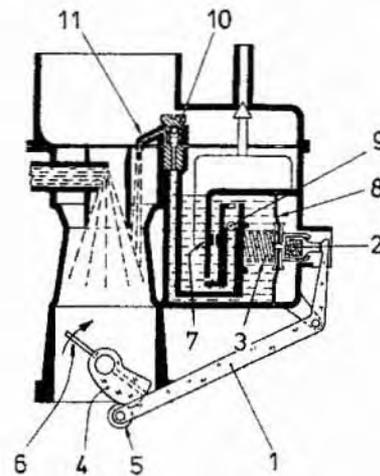


Fig. 1.8 The Weber diaphragm type accelerator pump

- |                    |                   |
|--------------------|-------------------|
| 1 Operating lever  | 7 Discharge jet   |
| 2 Pump spring      | 8 Diaphragm       |
| 3 Diaphragm spring | 9 Intake valve    |
| 4 Cam lever        | 10 Delivery valve |
| 5 Roller           | 11 Pump jet       |
| 6 Throttle valve   |                   |

The first method employs what is best described as a separate carburetor within the main carburetor. Fig. 1.9 shows the system in basic form. It will be observed that the system can be introduced or regulated by means of a manually controlled valve. The system is designed to give the necessary enrichment of mixture for starting with the throttle valves in the idling position.

The second method is shown in Fig. 1.10 and is termed the strangler or shutter valve type. With this system, an offset valve is positioned in the carburetor inlet and by restricting the amount of air admitted to the carburetor, the quantity of fuel emerging from the nozzle is increased, thus enriching the mixture for starting. Once the engine has started, the mixture must be weakened and this is automatically taken care of by the offset design of the strangler valve. As soon as the vacuum below it reaches a predetermined level, the larger area of the valve will be drawn downwards against the tension of a calibrated spring and additional air will thus be admitted.

The strangler valve may be operated manually or automatically, but in either case must be returned to its fully open position as soon as the engine reaches its normal operating temperature.

The range of Weber carburetors includes variations of the functions so far described. Where necessary there will be further descriptions in detail in the relevant Chapters of this manual dealing with the individual carburetor types.

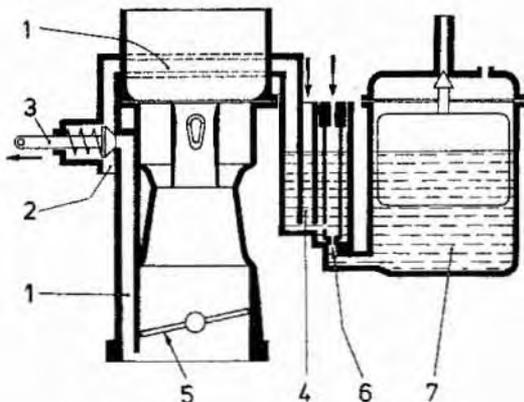


Fig. 1.9 The Weber jet type choke

- |                            |                     |
|----------------------------|---------------------|
| 1 Starting mixture channel | 4 Reserve well      |
| 2 Starting air jet         | 5 Throttle valve    |
| 3 Valve                    | 6 Starting fuel jet |
|                            | 7 Float chamber     |

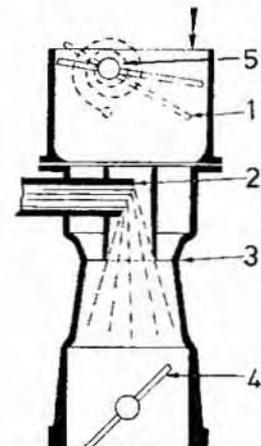
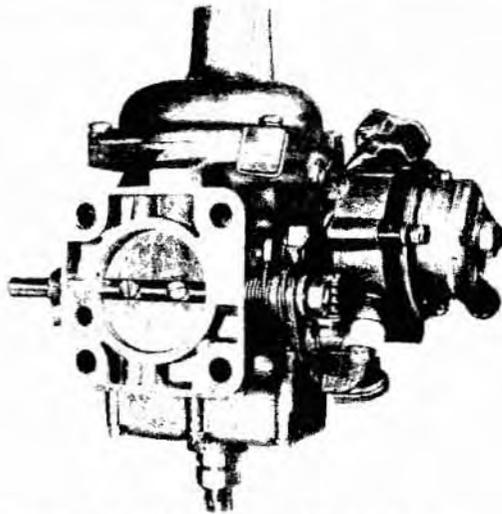
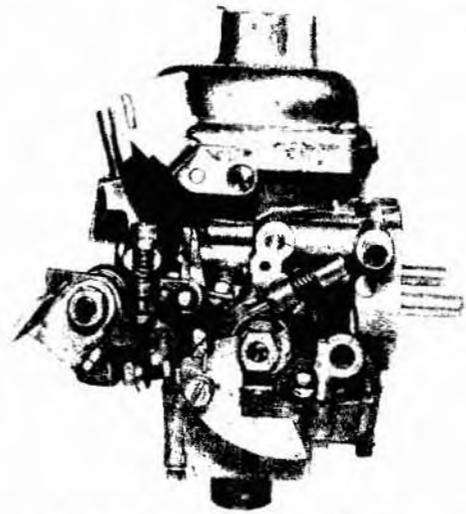


Fig. 1.10 The Weber strangler type choke

- |                     |
|---------------------|
| 1 Choke valve       |
| 2 Nozzle            |
| 3 Venturi           |
| 4 Throttle valve    |
| 5 Calibrated spring |



One of the most sophisticated Stromberg CD carburetors, the CDSET



Equally sophisticated but without the thermostatic starter, the CDSE

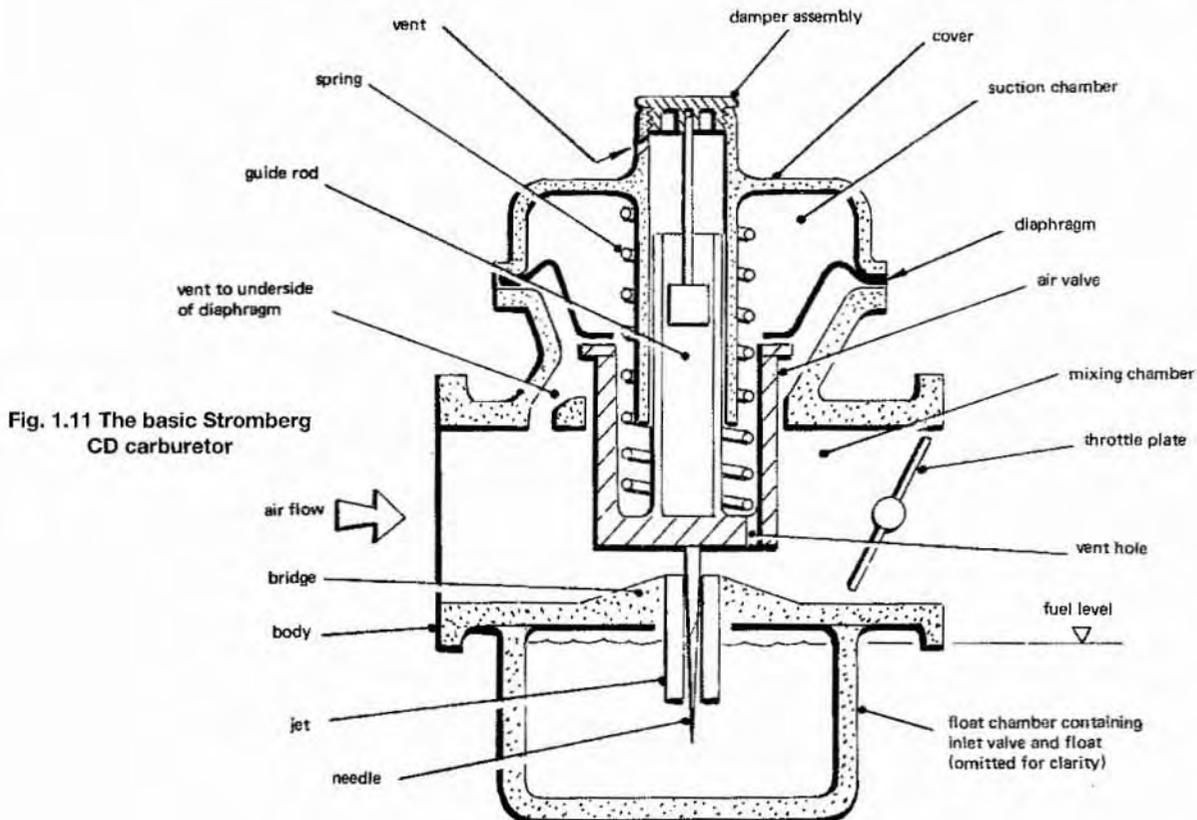


Fig. 1.11 The basic Stromberg CD carburetor

## 5 The Zenith Stromberg carburetor

Zenith Stromberg carburetors are engineered with a new approach to the basic fundamentals of carburetor design. If the airflow can be increased without increasing the depression and the fuel flow can be controlled by automatically varying the size of the jet, then the mixture ratio can be maintained constant over a large range of airflow characteristics.

The air valve presents a constriction in the bore of the body and forms a "venturi". It moves in a circular hole in the top of the bore which is machined to give a very close fit on the air valve without

actually touching it. The air valve has a central extension, the guide rod which slides in a sleeve in the cover. A flexible diaphragm, trapped at its outer edge between the top of the body and the cover and secured at center to the air valve, forms a suction chamber with the cover. The suction chamber is in communication with the downstream (engine) side of the air valve via a vent hole in the base of the valve. A circular throttle plate hinges in bearings at each side of the choke bore downstream of the air valve. A float chamber containing the inlet valve and float mechanism below the body, supplies fuel to a jet fixed in the bottom of the choke bore at the raised bridge. The jet receives the lower end of a tapered needle fitted to the underside of the air valve (refer to Fig 1.11). A vent passage connects the area below the

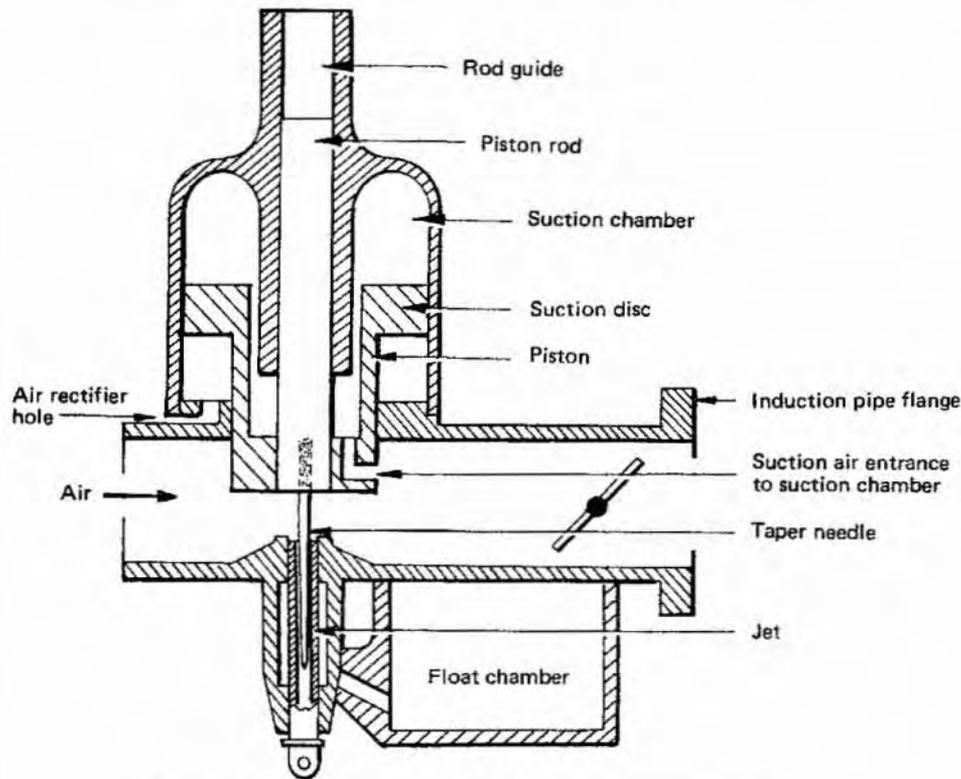


Fig. 1.12 The basic SU carburetor in simplified cross-section

diaphragm with atmosphere.

Airflow past the air valve creates a reduced pressure in the mixing chamber (the part of the choke bore between the air valve and the throttle) which is sensed in the suction chamber. The air valve rises to a height which is governed by the magnitude of the depression in the suction chamber balanced by the weight of the air valve (and the expansion force of the spring, when fitted). These forces (upward and downward) must always be in balance. Because the air valve is free to rise or fall it will hunt for a position where the two forces are in equilibrium. If the airflow is increased, (by opening the throttle), the suction developed in the mixing chamber will be sensed in the suction chamber. As this suction force is greater than the weight of the air valve (plus the spring load) the valve will lift, increasing the area of the choke. This allows more air to pass but as the choke area is larger the velocity remains the same and the depression is unchanged. Movement of the air valve causes the tapered needle attached to it to be withdrawn from the jet, thus increasing the annular area around it and permitting more fuel to pass. The rate of increase of fuel flow with needle lift is determined by the taper of the needle.

This description of the operation of the constant depression (CD) carburetor applies for normal running (engine completely warm) and running at part or full throttle

## 6 The SU carburetor

SU carburetors are engineered with a new approach to the basic fundamentals of carburetor design. If the airflow can be increased without increasing the depression and the fuel flow can be controlled by automatically varying the size of the jet, then the mixture ratio can be maintained constant over a large range of airflow characteristics. The practical expression of this concept takes the form shown in Fig. 1.12.

The piston presents a constriction in the pipe and forms a venturi. It slides within the chamber which is in communication with the

downstream side of the piston, through a port in the piston. Airflow past the piston creates a reduced pressure in the mixing chamber (the part of the pipe downstream of the piston), which is sensed in the suction chamber. The piston rises to a height which is governed by the magnitude of the depression in the suction chamber balanced by the weight of the piston. These two values must always be in balance. As the piston is free to rise or fall it will hunt for a position where the two forces are in equilibrium. If the airflow is increased, (by opening the throttle), the suction developed in the mixing chamber will be sensed in the suction chamber. As this suction force is greater than the weight of the piston, the piston will rise, increasing the area of the choke. This allows more air to pass but as the choke area is larger the velocity remains the same and the depression is unchanged. Movement of the piston causes the tapered needle attached to it to be withdrawn from the jet, thus increasing the annular area around it and permitting more fuel to pass. The rate of increase of fuel flow with needle lift is easily regulated by the design of the taper of the needle.

This is the principle of operation of the SU carburetor and it is termed a *constant depression*, or *variable choke*, instrument.

The four types of SU carburetors dealt with in this manual - H, HD, HS and HIF - are all of horizontal type, i.e. the bore of the carburetor is horizontal, and the axis of the piston and suction chamber is therefore vertical, when mounted on the engine

Some vehicles which have very restricted engine bay space may have the carburetor mounted at an angle, when viewed from the side of the unit, to facilitate installation and/or servicing. The angle, normally 20° or 30°, is achieved by the use of an adapter or curved intake manifold, the carburetor being basically a horizontal type. (The flange faces are still at right angles to the bore.) This type of installation geometry is termed 'semi-downdraft'.

Carburetors may be right- or left-handed according to the position of the choke and throttle interconnection. The unit is right-handed if the linkage is on the right-hand side when looking into the inlet, and vice versa. Note that on types H and HD the float chamber may be on either side, and that its position is not relevant in the handing of the unit.

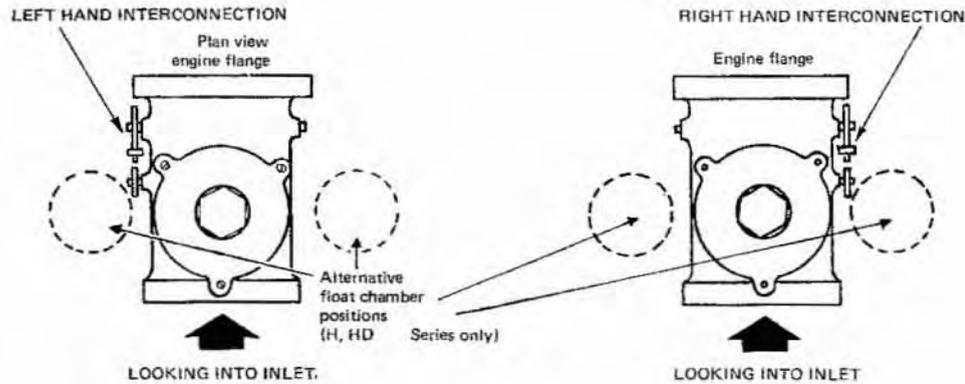


Fig. 1.13 Float chamber positions on the SU carburetors

The float chamber is normally mounted in front of the carburetor. In this position, flooding at the jet when going downhill, and starving the jet when going uphill, is prevented (refer to Fig 1.13).

## 7 Weber By-Pass idle carburetors

A more recent Weber development is the bypass idle carburetor which has been introduced as a result of legislation concerning atmospheric pollution. Weber carburetors equipped with this function have two independent idle systems: the first is the basic idle system which is fitted to all carburetors and the second is the bypass idle system.

Reference to Fig. 1.14 will show the operation of the bypass idle system. Fuel from the float chamber is drawn through the secondary main jet (A) to the secondary idle jet (R) where it becomes emulsified with air drawn through the calibrated orifice (C). The mixture is then drawn through internal channels and a calibrated drilling and mixes with air supplied through the drilling (D) in the primary choke. The bypass idle adjustment screw (E) controls the amount of mixture admitted to the discharge apertures (F and G) which then is drawn through the inlet manifold and into the engine.

On some by-pass idle carburetors there is a fuel return system to prevent the fuel in the float chamber from being heated excessively, which could otherwise enrich the idle mixture. With this system there is a continuous flow of fuel from the fuel tank to the carburetor inlet and back to the fuel tank.

Another feature included on bypass idle carburetors is the anti-stall or low vacuum enrichment device, which is normally fitted to vehicles with automatic transmission where there is a tendency for the engine to stall when moving the selector. The device comprises a spring tensioned diaphragm and cover, usually located in the vicinity of the float chamber opposite the accelerator pump. Under normal operating conditions, engine vacuum holds the diaphragm against the spring pressure and fuel is drawn into the chamber of the device. If the engine tends to stall, the vacuum will decrease and the spring tension will compress the diaphragm and eject fuel from the chamber. The device is connected by internal channels to the accelerator pump delivery valve and jet, and the fuel is injected into the primary barrel thus providing mixture enrichment in order to overcome the stall.

## 8 Thermostatically controlled air cleaner

This type of air cleaner ensures a constant temperature of the intake air so that fuel atomization in the carburetor takes place using air at the correct temperature. The air cleaner incorporates two inlets; one with fresh air at ambient temperature and the other with air heated

by the exhaust manifold. An internal flap determines the quantity of heated or cool air to admit to the carburetor and is controlled by a heat sensor and vacuum assistance.

When the engine is cold, heated air is directed from the exhaust manifold into the air cleaner, but as the engine warms up, cold air is progressively mixed with this heated air. At high ambient temperatures the hot air intake is closed off completely.

## 9 Tamperproof carburetors

A further recent development as a result of atmospheric pollution control, is the tamperproof carburetor on which various adjustment screws are sealed with plastic plugs. The type of tamperproofing varies according to the carburetor and in some instances special tools are required in order to remove the seals. However before removing them, the owner is advised to be aware of any legislation which may be contravened by removing the seals and making adjustments. In some territories a colored seal, only available to garages, must replace the removed seal. In this instance, it is recommended that the owner entrusts his car to a suitably equipped technician to carry out any adjustments to the carburetor.

## 10 USA carburetors

Carburetors used in the USA may have some or all of the following items fitted to them; the exact line-up will depend on local legal requirements:

### *Deceleration valve*

During deceleration this valve supplies an additional flow of air/fuel mixture into the inlet manifold in order to improve combustion within the engine; this in turn lowers the hydrocarbon emission in the exhaust gases. The valve is mounted on the inlet manifold and consists of a spring loaded diaphragm, a control valve, and two ports. Under all driving conditions except deceleration, the spring holds the valve shut, but during deceleration the additional vacuum opens the valve and extra mixture is supplied to the engine. To prevent over-enrichment during the engine warm-up period when the choke is in operation, the control valve, which is temperature sensitive to the cooling system, only operates the deceleration valve when normal operating temperature has been reached.

### *Evaporative emission control*

This system prevents unburnt hydrocarbons in the form of fuel vapor from escaping from the vehicle fuel system into the atmosphere.

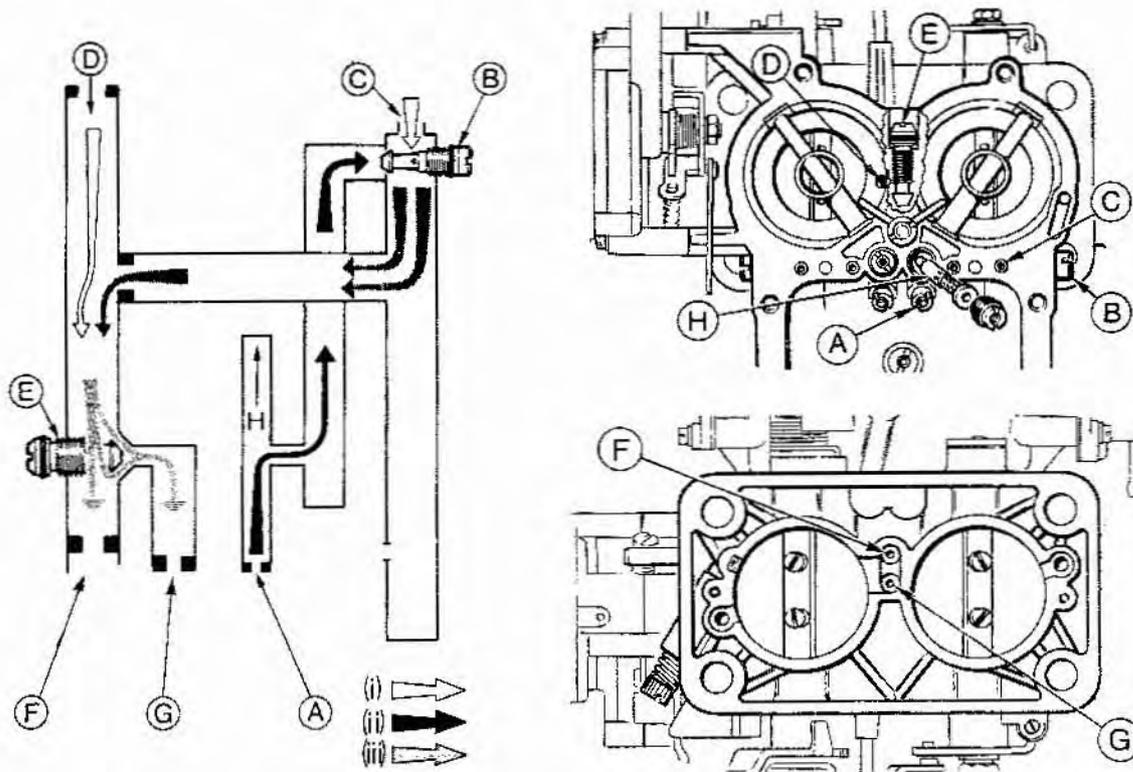


Fig. 1.14 The Weber bypass idle system

- (i) Air supply
- (ii) Fuel supply
- (iii) Air/fuel mixture
- A Secondary main jet
- B Secondary idle jet
- C Air bleed

- D Plain air supply
- E Bypass idle adjustment screw
- F Fixed discharge aperture
- G Bypass discharge aperture
- H Secondary emulsion tube

The fuel system is sealed and the carburetor is vented internally so that the fuel vapor cannot escape when the vehicle is stationary. The build up of vapor in the fuel tank and carburetor is channelled via pipes to a canister containing activated carbon particles which absorb the vapor. When the engine is running, the activated carbon releases the vapor which is then drawn into the air cleaner from where it passes into the engine.

### Exhaust Gas Recirculation (EGR) system

This system reduces the emission of nitrogen oxides from the vehicle exhaust pipe by introducing a small amount of inert exhaust gas into the inlet manifold. The effect of this is to reduce the peak temperatures reached in the combustion chambers, which are responsible for the emission of nitrogen oxides.

The EGR valve is usually operated by vacuum from the carburetor and sometimes uses the same vacuum take-off port as that used for the distributor advance, although normally a separate port is provided.

### Ignition advance and retard ports

On some engines the ignition is advanced and retarded by vacuum from the carburetor and inlet manifold. On some carburetors both take-off ports may be incorporated into the carburetor.

### Dashpot

This device can be fitted to most carburetors as a bolt-on extra. Its purpose is to retard the action of the throttle lever as it returns to the

idling position after releasing the throttle. This prevents an over weak mixture, particularly during deceleration and therefore reduces the emission of certain harmful gases from the exhaust system.

### Idle speed step-up valves

On vehicles fitted with air conditioning equipment, a valve is usually incorporated into the carburetor to increase the engine idle speed setting during the period when the air conditioning compressor is in operation. This is necessary because the additional load on the engine would normally cause it to stall. The adjustment of this valve will depend on the type of engine it is fitted to and therefore this information should be obtained from the vehicle manufacturer. However, the overall effect of the step-up valve is to retain the original engine idle speed when the air conditioning compressor is in operation.

A similar type of step-up valve is sometimes fitted to vehicles equipped with automatic transmission, in order to prevent stalling when the selector lever is moved.

### Idle cut-off valve

This valve stops the flow of fuel or fuel/air mixture in the idle circuit immediately the ignition is switched off, thus eliminating any tendency for the engine to run-on or 'diesel'. This is particularly important where low octane lead free fuel is used, because the run-on characteristics are more prominent with this type of fuel.

# Part 1 Introduction

## Chapter 2 Carburetor installation

### Contents

	Section		Section
Accelerator and choke controls .....	5	Introduction .....	1
Air cleaners and air horns.....	4	The intake manifold.....	3
Carburetor positioning .....	2	Vacuum take-off points.....	7
Fuel lines and hoses.....	6		

### 1 Introduction

Due to the multitude of applications incorporating Weber, Zenith Stromberg and SU carburetors, no attempt will be made in this Chapter to detail all the possible arrangements. An outline of the more common arrangements of a particular carburetor is to be found in the relevant chapter of this manual covering the carburetor in question.

In this chapter we will consider the general installation requirements of Weber carburetors, which will already have been catered for if the carburetor is standard equipment on a particular engine. The information will be of special interest to those wishing to install a Weber carburetor as a non-standard component.

### 2 Carburetor positioning

The carburetor must be positioned so that air will have unimpaird access to the intake and, to prevent turbulence affecting mixture ratios, it is preferable for the air to have as direct a path of entry as is possible. With sidedraft carburetors, such as the Weber DCOE range, it is permissible for the carburetor to be inclined upwards by 5 degrees from horizontal (refer to Fig. 2.1); the angle being measured from the engine side flange face through the center-line of the barrels. Where two or more sidedraft carburetors are installed, rubber fuel proof distance pieces should be installed between the flange faces of the carburetor and intake manifold. The outer ends of the carburetors should be supported with a support rod and bracket, also with rubber mountings. The support rod should be attached to the carburetor at one end and the engine block at the other end.

Considering downdraft carburetors, it is important that they are installed with the barrels vertical, even on engines which are inclined (because of hood height for instance). The float chamber should face the front of the vehicle with the float fulcrum pin axis across the vehicle; this will diminish the effect of acceleration, braking and hill

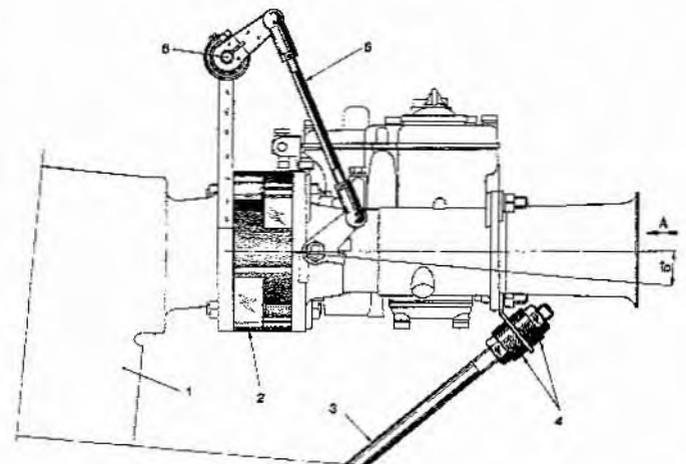
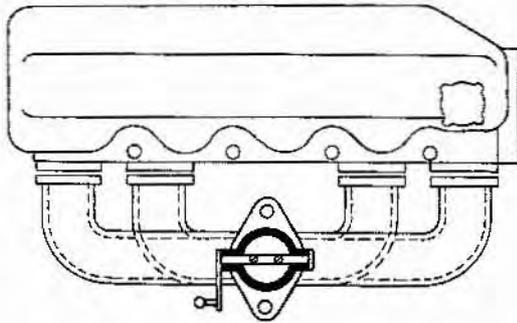


Fig. 2.1 Typical Weber sidedraft carburetor

- |                         |                                   |
|-------------------------|-----------------------------------|
| 1 Cylinder head         | 5 Adjustable throttle control rod |
| 2 Anti-vibration flange | 6 Auxiliary shaft and bearings    |
| 3 Support rod           |                                   |
| 4 Rubber mounting       |                                   |



**Fig. 2.2** Correct location of a single carburetor feeding four cylinders, showing the position of the throttle spindle

climbing on the fuel level in the float chamber (refer to Fig. 2.2).

Where a carburetor barrel feeds more than one cylinder, the throttle spindle should be parallel to the crankshaft, otherwise there will be unequal distribution of the air/fuel mixture to the cylinders. This applies particularly to in-line engines where the carburetor is mounted on one side of the cylinder head.

### 3 The intake manifold

The purpose of the intake manifold is to convey the previously prepared air/fuel mixture from the carburetor to the engine cylinders, while at the same time keeping the composition of the mixture uniform. In general terms, the speed of the mixture should be maintained at the identical velocity with which it leaves the carburetor; too large a manifold diameter will cause the mixture to slow down and this may cause condensation of fuel on the manifold walls.

The length of the intake manifold branches should be as short as possible and as equal in length as possible to ensure that each cylinder receives equal quantities of mixture. The branch bores must have a smooth or even polished surface and all bends must be kept to minimum angles. The use of excessively long horizontal sections of intake manifold may result in carburation problems when cornering and must therefore be kept to a minimum (refer to Fig. 2.3).

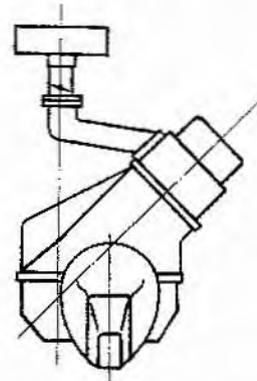
In modern engine applications the intake manifold is sometimes heated in order to promote vaporization of the air/fuel mixture. The best method to do this is by passing water from the engine cooling system through a section of the manifold just below the carburetor. This arrangement also has the advantage that it makes possible the use of leaner mixtures throughout the complete engine speed range.

It is important to make sure that each branch of the intake manifold locates exactly with the intake bores in the cylinder head and that manifold gaskets do not obstruct the free passage of air. Failure to take these precautions can lead to quite serious carburation faults.

Although the previous comments are correct for most applications, the design of the intake manifold is a complicated process involving the use of a dynamometer and the completing of many engine tests. A poor design may result in unsatisfactory vaporization, unequal mixture distribution, or even insufficient mixture supply and for this reason it is not recommended that a manifold be made up by an inexperienced person. It is a much better idea to purchase a manifold from a conversion specialist who is well versed in the subject.

### 4 Air cleaners and air horns

The function of the air cleaner is obvious, but it has to perform quite a difficult task and has therefore been the subject of thorough



**Fig. 2.3** The length of horizontal inlet manifold on this arrangement may cause carburation problems when cornering

testing and modification. Where an air cleaner is installed as original equipment, no attempt should be made to alter it in any way as it is usually matched to the particular application on which it is installed.

Some air cleaners incorporate a vent, whereby fuel vapors which accumulate in the float chamber with the engine stationary are vented to the atmosphere. An alternative method is to provide a drain tube in the intake manifold to disperse condensed fuel (refer to Fig. 2.4).

Normally the air cleaner should be mounted on the engine. The use of rubber mountings will prevent vibration being transmitted to the carburetor.

Air horns are installed to carburetors mainly to prevent turbulence at the air intake, which would otherwise cause varying mixtures and uneven charging of the combustion chambers. Their purpose is also to reduce the effect of a blow back through the carburetor and in fact, some air horns house a flame trap. On racing applications, the air horns also help to contain fuel mist spraying from the mouth of the carburetor. This phenomenon is sometimes referred to as "stand-off" and may be attributed to a harmonic effect within the intake manifold; although where air horns are mounted externally on the vehicle, the effect can be due to air passing across the mouth of the air horn.

A number of different shapes and sizes of air horns are available for the Weber range of carburetors and the choice will, in most cases, depend on the installation space available. Angled air horns can be obtained for the more popular sidedraft DCOE carburetors (refer to Fig. 2.5).

Where an air cleaner is installed, there is normally no need for an air horn, consequently the usual application is on sports engines where maximum air supply is important.

### 5 Accelerator and choke controls

All controls must be strong enough to cope with the loads they will be subjected to. When the accelerator pedal is depressed or the choke operated, the throttle valve or choke device must move smoothly and fully as required. Where multiple carburetors are concerned, the action of the control on each carburetor must be identical. For this purpose it is essential to have some form of adjustment incorporated into the control.

One of the main problems with carburetor controls is that engine vibration is sometimes transmitted to the carburetor, with the result that the fuel in the float chamber becomes emulsified. This phenomenon can generate a number of adverse characteristics and should be avoided at all costs. To prevent this, it is preferable to use cable rather than rod for the carburetor controls, but only where the prevailing loads will allow this (Fig. 2.6).

On a typical rod control arrangement, an auxiliary shaft is mounted along the length of the engine. This shaft must be of 0.4-in to 0.5-in (10 mm to 12 mm) outer diameter and must incorporate two or

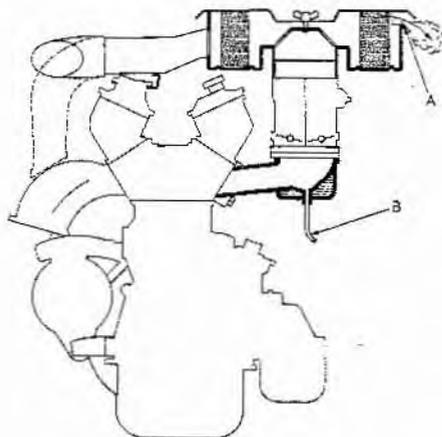


Fig. 2.4 Two methods of dispersing float chamber fuel evaporation

A Air cleaner vent

B Drain tube

three self-aligning ball bearings, depending on the linkage length. Each of the operating levers must be identical in length and the balljoints should preferably have spring-loaded end clearance limitation.

It is important to note that the auxiliary shaft should be mounted on the engine and not on the body of the vehicle.

## 6 Fuel lines and hoses

The fuel line should be arranged so that its highest point is always the intake union on the carburetor. By doing this there is less chance of an air-lock occurring within the fuel line.

The use of flexible hose should be adopted, particularly where the engine fuel line connects with the body fuel line, in order to lessen the effect of engine vibration and prevent fracturing.

Where the vehicle has completed a high mileage, it is possible that the fuel tank and fuel lines may be corroded and sediment may therefore be deposited within the carburetor resulting in its malfunction. In these circumstances it is recommended that a fuel filter be incorporated into the fuel line near the carburetor(s), but it is important that it will be able to pass the quantity of fuel proportionate to the highest fuel consumption likely to be encountered.

## 7 Vacuum take-off points

On Weber carburetors not installed with a vacuum take off point or spark port for actuation of the ignition advance or retard mechanism on the distributor, no attempt should be made to adapt the carburetor in any way. The vacuum capsule should be removed from the distributor and the apertures blocked, then the centrifugal advance mechanism should be "recurved" to cover the speed range of the engine. This will entail installing different centrifugal weights and springs and is therefore best entrusted to a suitable firm specializing in conversions who will have the necessary equipment for testing the distributor.

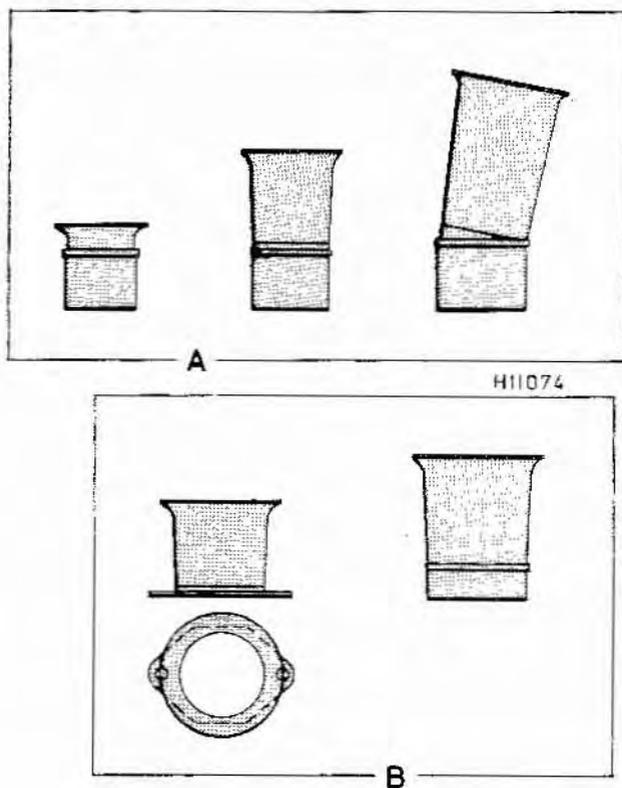


Fig. 2.5 Selection of air horns available for Weber carburetors

A Sidedraft carburetors

B Downdraft carburetors

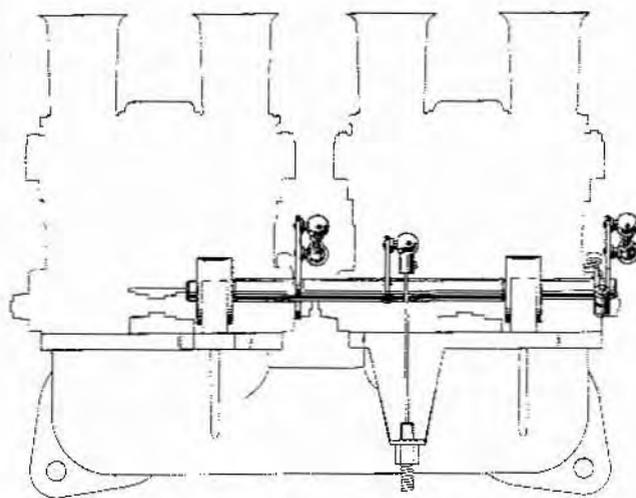


Fig. 2.6 Typical cable and rod throttle control

**Notes**

# Part 1 Introduction

## Chapter 3 Maintenance and servicing

### Contents

	<i>Section</i>		<i>Section</i>
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### 1 Introduction

Maintenance and servicing procedures for all Weber, Zenith Stromberg, and SU carburetors are identical and are of a straight-forward nature. Engine malfunctions are comparatively rare as a result of carburetor faults and when they are traced to the carburetor, there is often an outside factor at work, ie. sediment in the fuel. It is these factors which will be mainly considered in this chapter; any specific points in connection with a particular carburetor being detailed in the relevant chapter of this manual.

The object of the procedures is to maintain the carburetion equipment in first class condition, which will also result in good engine performance.

### 2 Intervals

Where the carburetor is standard equipment, servicing and maintenance should be carried out in accordance with the manufacturer's recommendations: in the absence of this, the procedures should be made every 6,000 miles (9600 km).

However, if the engine is operated at high speeds for long periods or in adverse conditions such as dusty terrain, the procedures must be made more frequently.

### 3 Cleaning

This is one of the major requirements of the fuel and carburetion system. Before attending to any other component it is essential to clean the exterior of the air cleaner, carburetor, inlet manifold and, if necessary, the engine. To do this, brush on a degreasing agent such as Gunk, but where an air cleaner is not installed, seal the carburetor apertures with masking tape before applying the agent. If the engine is

being cleaned, place a polythene bag over the distributor and seal any apertures with masking tape. The degreasing agent can be washed away with clean water, together with the dirt and oil deposits.

Remove all masking tape when cleaning is completed; then, on non-air cleaner types, wipe around the air intakes with a clean lint free cloth.

### 4 Fuel lines and hoses

1 Check all fuel line unions for security and any signs of leaking, which, if present, will necessitate the fitting of new sealing washers (refer to Fig. 3.1 and Fig. 3.2)

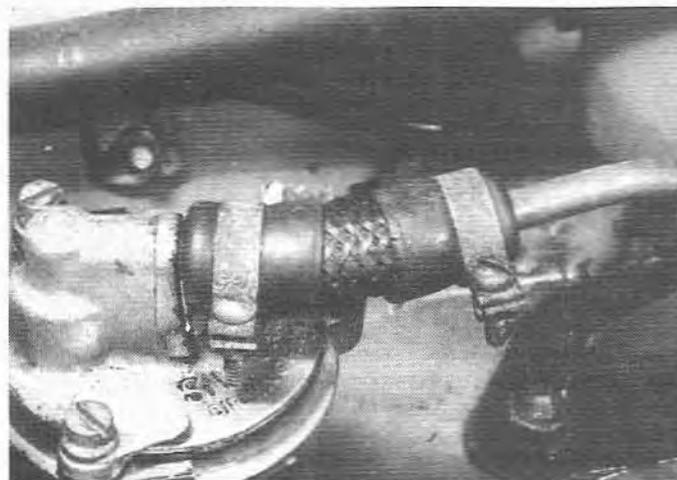


Fig. 3.1 Checking the fuel supply hose on a SU carburetor

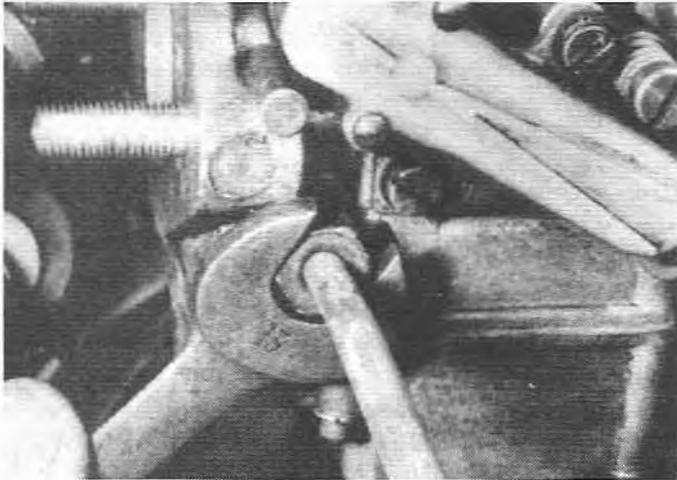


Fig. 3.2 Checking the fuel connections on a Stromberg carburetor

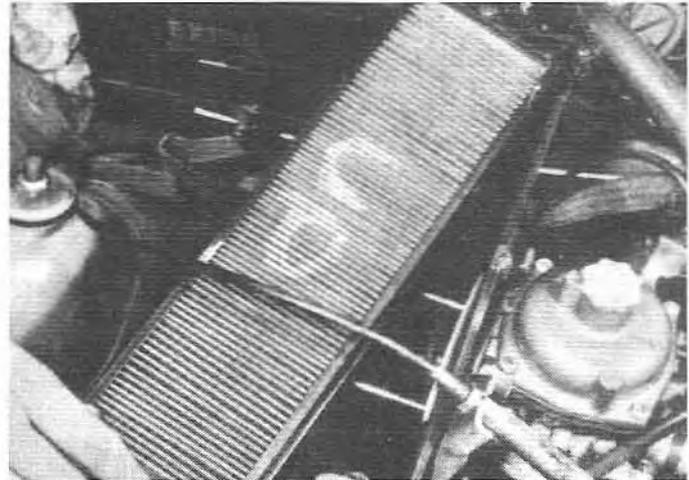


Fig. 3.3 Check that the air filter is clean and there are no leaks into the carburetor (Stromberg carburetor shown)



Fig. 3.4 Checking the air filter element in a SU carburetor

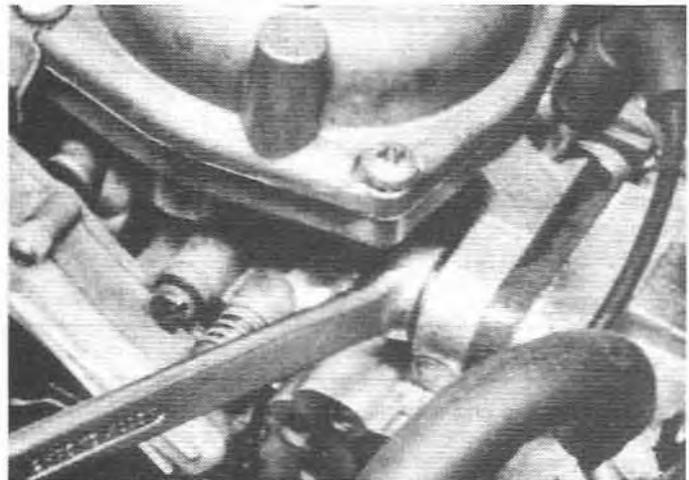


Fig. 3.5 Check the carburetor mounting bolts for the correct torque

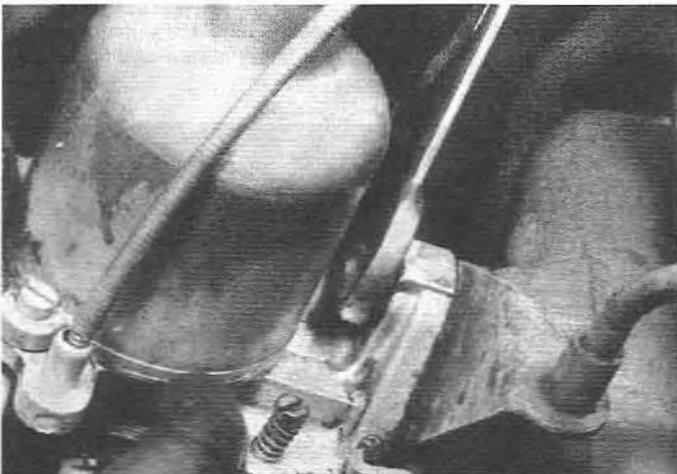


Fig. 3.6 Checking the carburetor mounting bolts on a SU carburetor

2 Check all flexible hoses for deterioration and chafing and renew them if necessary. Check the security of all retaining clips and if any appear to be seized, renew them.

3 Check that all fuel lines and hoses do not rub against any sharp

objects or contact any hot surfaces, such as the exhaust system.

4 Where fitted, the fuel pump filter and carburetor fuel inlet filter should be removed and brushed clean using clean fuel.

## 5 Air cleaner

1 Where installed, the air filter should be removed from the air cleaner and cleaned. The fire resistant foam type are best cleaned in a household liquid detergent and water solution and left to dry without the use of any additional heat. The paper type should be shaken to remove any accumulated dust and dirt (refer to Fig. 3.3 and Fig. 3.4).

2 Clean the interior of the air cleaner with a fuel moistened cloth, then wipe dry with a further lint free cloth.

3 Check the security of the air cleaner and air duct if fitted, making sure that there is no indication of leaking gaskets.

4 Where a crankcase breather hose communicates with the air cleaner, it should be cleaned, together with the breather valve.

## 6 Intake manifold

1 Check the security of the carburetor mounting nuts and the inlet manifold mounting nuts on the cylinder head (refer to Fig. 3.5 and Fig. 3.6).

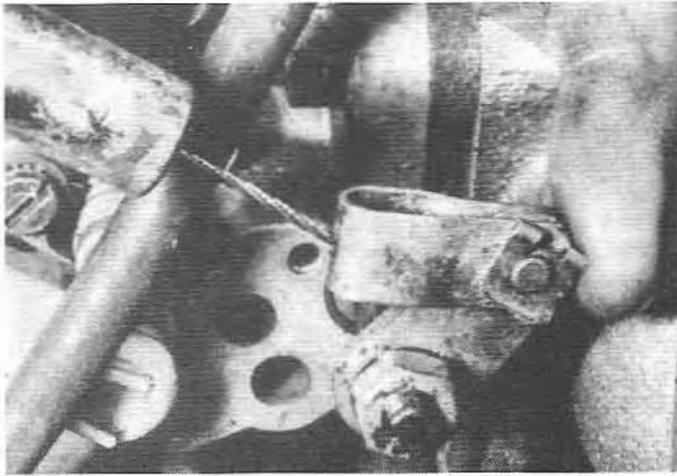


Fig. 3.7 Check that all carburetor controls are free and work through their full field of travel



Fig. 3.8 On Stromberg carburetors, check that the damper is full of the proper oil and tighten the cap securely

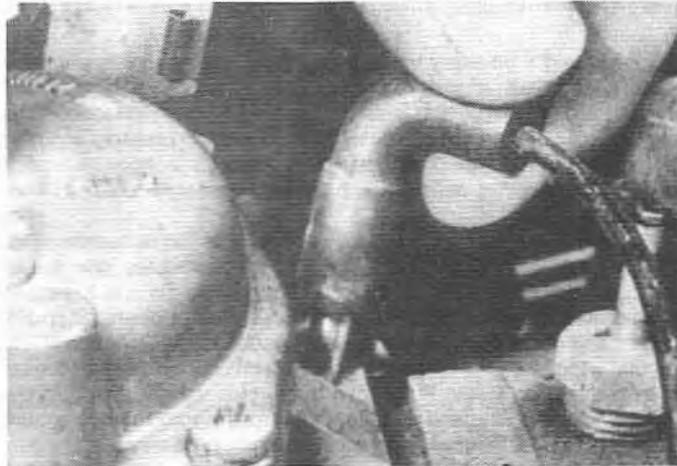


Fig. 3.9 Make sure the vacuum connections on the carburetor are secure and there are no leaks

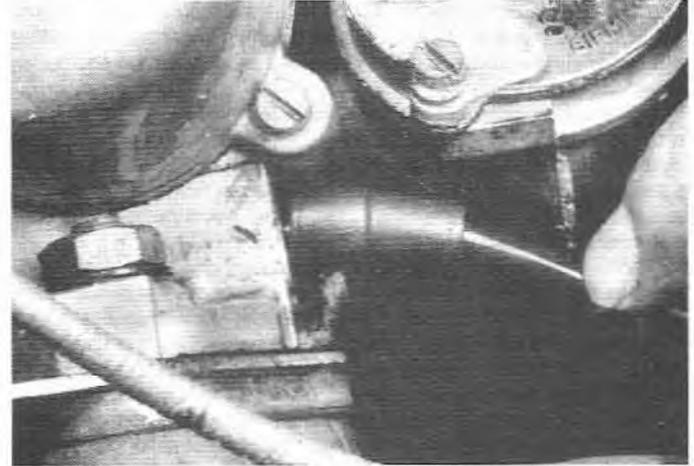


Fig. 3.10 Checking the ignition advance vacuum line on a SU carburetor

2 Examine the inlet manifold for fractures and for signs of leaking gaskets, which will often show up as stains on the adjacent metallic surfaces. To detect minor gasket leaks, professional mechanics sometimes use a can of aerosol carburetor cleaner. With the engine idling, a small quantity of the cleaner is sprayed around inlet manifold joints and the carburetor throttle spindle exterior locations: if a leak exists, the engine will speed-up as a result of the mixture being enriched. Extreme care must be exercised when using this method in the interests of fire safety and in any case, the procedure must be carried out in an open space.

3 If the inlet manifold is heated by the engine coolant, check the condition and security of the water hoses, tightening the retaining clips as necessary.

## 7 Throttle and choke controls

- 1 Check all controls for smooth and complete action and renew any control rods or frayed cables as necessary (refer to Fig. 3.7).
- 2 Check all balljoints and ball-bearings for signs of deterioration or seizure as well as excessive clearances.
- 3 Check the tightness of all mounting pedestal nuts and balljoint retaining nuts.
- 4 Lubricate all bearing surfaces of the complete throttle and choke control linkages, including any carburetor accessory devices with moving parts.

## 8 Carburetor body

- 1 Check the security of all fittings and the tightness of all nuts and screws.
- 2 Check the damper oil on Stromberg carburetors. (refer to Fig. 3.8).
- 3 Where an automatic choke is fitted, check the condition and security of the water hoses and tighten the retaining clips as necessary. Also check that there are no signs of water leakage: if there is, the gasket must be renewed.
- 4 Check that ignition vacuum connections where fitted, are secure and that the rubber tube is not perished or cracked (refer to Fig. 3.9 and Fig. 3.10).
- 5 Examine the underside of the carburetor for fuel leaks.

## 9 Tuning

Tuning is probably the most talked about aspect of car maintenance, yet it so often misunderstood and misinterpreted. For instance, carburetors are often spoken of as going 'out of tune', but this is not usually the case, as there are few moving parts which could alter the function of the carburetor to warrant regular 'tuning-up'. Only at high mileages is there significant wear in a carburetor and at this time a complete overhaul must be made. What in fact happens is that the mechanical condition of the engine deteriorates or alters and the

carburetor, being a very sensitive instrument, is adversely affected. As shown in Chapter 1, even a change of fuel could influence a carburetor's performance due to an incorrect A/F mixture ratio being delivered.

It is not always appreciated that a change of ambient temperature or air density will influence the operation of the carburetor. For this reason the carburetor may require more frequent tuning than the 6000 mile (9600 km) interval recommended in Section 2.

When tuning a carburetor, the complete procedure should be carried out as given in the relevant chapter of this manual and, particularly with multiple fittings, it is not advisable to cut short the procedure by trying to guess the correct settings.

## 10 Engine condition

Carburetor performance depends to a great extent on the condition of the engine. Carburetor adjustments and tuning are only accurate if the general condition of the engine is good. However the average serviceable engine will respond well to carburetor tuning, as this compensates for general wear of the engine components. For example, worn valve guides will admit additional air to the inlet valves and this can be compensated for by adjusting the carburetor slightly richer. Uneven wear in the engine cylinders may result in uneven idling characteristics and this can be corrected by slightly increasing the idling speed adjustment.

The engine components responsible for 'breathing' are of course most important from the point of view of carburetion. These include the cylinder head, valves and valve guides, camshaft and cam followers, valve operating gear, piston rings and cylinder bores, and inlet and exhaust systems. Any malfunction of these items must be rectified before accurate carburetor tuning is possible.

With the main engine components in good condition, it is recommended that the ignition timing and valve clearances are checked and adjusted in accordance with the manufacturer's instructions before tuning the carburetor. Spark plugs should be removed, cleaned, and regapped with a feeler gauge. In the absence of manufacturer's data, the average spark plug gap should be set to 0.024 inch (0.6 mm), however with electronic ignition fittings, a different gap may be recommended. If possible, always try to obtain the correct spark plug gap for the particular application. It is always helpful to check the appearance of the spark plugs after removing them, as this will give a reliable indication of the general engine operating condition. Refer to the inside back cover for examples of spark plug appearance related to carburetor adjustment and engine condition.

Another accurate method of assessing engine condition is to use a compression tester. This instrument is basically a pressure gauge



Fig. 3.11 A compression gauge with a threaded fitting for the spark plug hole is preferred over the type that require hand pressure to maintain the seal

incorporating a one-way valve. It registers the maximum pressure generated in an engine cylinder. This pressure is termed the compression pressure and is related to the compression ratio. If the engine is of standard specification, the compression pressure and ratio will normally be stated in the manufacturer's handbook and a comparison can then be made with the actual readings obtained from the engine.

Compression testers are available in various forms, but the more common types are screwed into the spark plug apertures (refer to Fig. 3.11). Before taking readings, the engine should be run until it reaches the normal operating temperature (i.e. thermostat open). Stop the engine and disconnect the high tension lead from the ignition coil and ground it to the engine block. Remove the first spark plug and screw in the compression tester. Fully open the throttle valves, then spin the engine with the starter motor and record the maximum pressure obtained. Repeat the procedure on the remaining cylinders.

If the compression pressure is more than 20% below the specified amount, or if the difference between the cylinder readings is greater than 14.0 psi to 21.0 psi, engine repairs are indicated and should be carried out before attempting to tune the carburetor.

If the engine is proved to be in satisfactory condition, the carburetor may be tuned once all the procedures have been carried out as given in the previous sections of this Chapter.

# Part 1 Introduction

## Chapter 4 Overhaul

### Contents

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Cleaning .....	6	Spare parts .....	4
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Fiber washers and diaphragms .....	17	Throttle spindles and choke spindles .....	10
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### 1 Introduction

Overhauling of the carburetor becomes necessary when the component parts are worn to such an extent that they are no longer serviceable or efficient in operation. The manufacturers recommend a general overhaul interval of 60,000 miles (97,000 km) but much will depend on the operating conditions and this may well have to be reduced in certain circumstances. However, if the maintenance and servicing procedures as given in Chapter 3 have been regularly carried out from new, this interval is a good guide to work to.

At the time of the overhaul the carburetor must be removed, disassembled, cleaned, inspected, repaired as necessary, reassembled and reinstalled. This Chapter includes the general overhaul procedures which apply to all carburetors but any special procedures, particularly those including the use of specialized tools, are included in the chapters dealing with specific carburetor types.

The work involved is within the capabilities of most home mechanics, although in order to effect a first class overhaul it is important not to rush the work. Weber, Zenith Stromberg and SU carburetors are manufactured to a high degree of workmanship and therefore must be treated as precision instruments; although they are manufactured to withstand the most adverse road conditions they also incorporate some extremely sensitive mechanisms.

Extensive workshop equipment is not required and the majority of work can be carried out using the normal tools contained in a motorist's tool kit. However there are certain instances where a special tool is required and these are quoted in the relevant chapters of this Manual.

Before starting work it is recommended that the home mechanic reads all the relevant Chapters of this Manual in order to acquaint himself with all the necessary procedures and spare parts required. By obtaining the spares and tools beforehand, the overhaul will be

completed in the shortest time, and there will be little inconvenience due to the car being off the road.

### 2 Tools

**Note:** In addition to the following list the tools necessary to carry out any special overhaul procedures as given in the relevant Chapter of this Manual, must be obtained. (refer to Fig. 1 through 4)

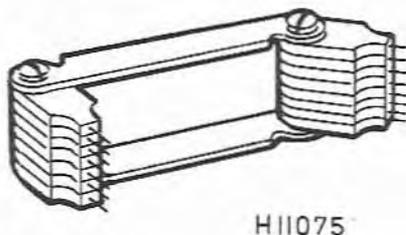
Wrenches, open-ended metric  
 Wrenches, ring metric  
 Screwdrivers, large medium and small (flat bladed)  
 Curved metal scraper  
 Surface plate or thick piece of plate glass  
 Steel straight-edge  
 Hard bristle brush  
 Small feeler gauges  
 Vernier calipers or depth gauge  
 Large clean tray  
 Open-topped containers suitable for gasoline  
 Pipe cleaners  
 Foot-operated tire pump  
 Light hammer  
 Center punch  
 Small files, flat and round  
 Hand drill  
 Flat metal scraper

Where necessary, the following tools should be obtained from a specialty tool shop:

Set of jet gauges  
 Thread tap and tap holder  
 Thread die and die holder



Fig. 4.1 Flat metal scraper



H11075

Fig. 4.2 Set of micron plug jet gauges

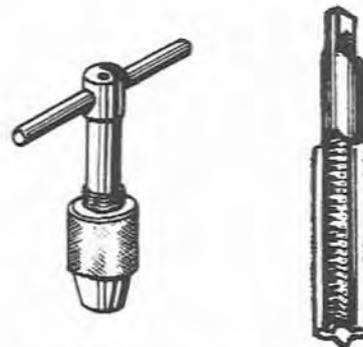


Fig. 4.3 Thread tap and tap holder



Fig. 4.4 Typical thread die

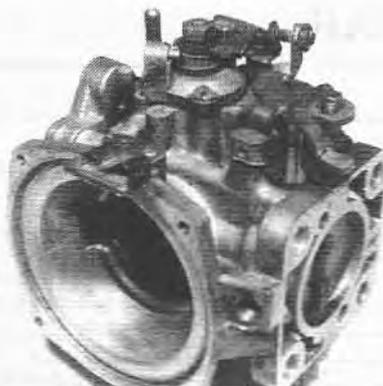


Fig. 4.5 Typical Stromberg CD carburetor body

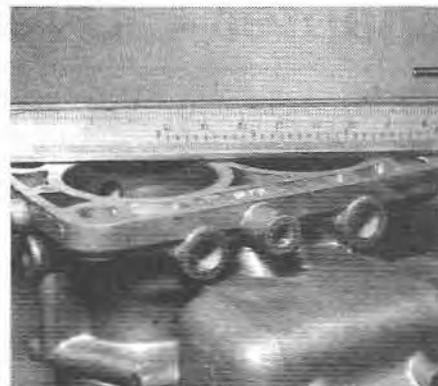


Fig. 4.6 Checking the carburetor flange with a straight edge

It is important that all tools are in first class order to prevent damage to the carburetor components. This is particularly relevant to screwdrivers which should be ground flat and square before use. Always enter screwdrivers fully into screw slots and similarly fully engage wrenches before attempting to turn them.

### 3 Materials

Before commencing the overhaul procedure it is advisable to obtain the following materials:

*Degreasing fluid (paint stripper or thinners will do) \*  
*Gasoline*  
*Clean lint-free cloth*  
*Emery cloth (fine)*  
*Engine oil (SAE 10W-30)*  
*Lithium based grease*  
*Fine grinding paste*  
*Liquid locking agent*  
*Metal polish*  
*Hand cleanser*

### 4 Spare parts

The total amount of spare parts required for the overhaul will not be apparent until the carburetor has been completely dismantled, but at the minimum a gasket set should be obtained prior to commencing work.

The manufacturers currently supply three basic overhaul kits:

- a) gasket set
- b) tune-up kit
- c) master repair kit

The tune-up kit contains the gasket set plus needle valve, float, float fulcrum and accelerator pump diaphragms (if required). The master repair kit contains the tune-up kit plus main jets, air corrector jets, throttle shafts (oversize as necessary), throttle valves and ball bearings (if fitted).

When ordering parts from the manufacturers or agents, it is important to give as much information as you can concerning the carburetor and its application, including jet sizes and carburetor type numbers.

### 5 Disassembly

The main disassembly procedure is given in the relevant chapter of this manual, but it is recommended that the location of the various jets and the position of throttle valves and levers is noted on paper as each component is removed. This will be particularly helpful during the assembly procedure and is essential when working on the progressive or differential type carburetors, where a jet fitted in the incorrect position will completely upset the performance of the carburetor.

If more than one carburetor is being overhauled, it is advisable to work on one unit at a time to prevent accidental interchanging of components.

It is essential to have a large, clear area of the workbench available when disassembling the carburetor and each item should be placed in order of removal as far as possible. The workbench must, of course, be scrupulously clean.

Where bypass idle carburetors, tamperproof carburetors and carburetors for use in the USA are fitted, the disassembly procedure may be slightly different to that given in Part 2, 3 or 4. USA type carburetors will be fitted with some or all of the items mentioned in Chapter 1 in connection with emission control.



Fig. 4.7 A bad case of corrosion in a Weber 40 IDA 3C carburetor

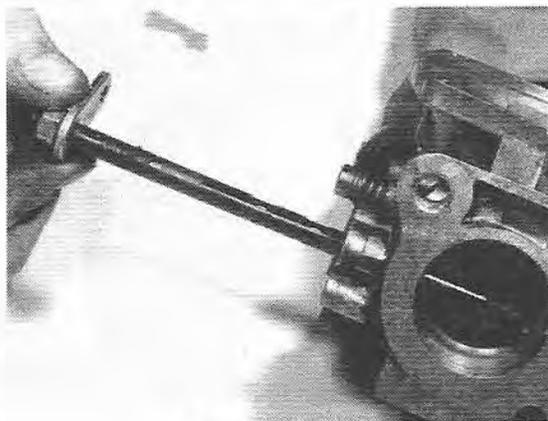
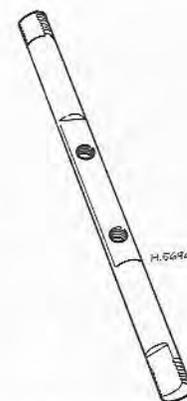


Fig. 4.8 Removing a spindle in a Stromberg carburetor



## 6 Cleaning

This is possibly the most important aspect of overhauling the carburetor as dirt or sediment can lead to many diverse malfunctions. It should be carried out in a well ventilated area and sufficient precautions should be taken to prevent the possibility of fire.

The carburetor body and covers may be cleaned with a degreasant, but only after removing all components such as fiber and rubber washers and seals which may be adversely affected. All traces of gasket should be removed from the flange faces and the internal channels should be blown clear to remove the degreasant. It is advisable to completely immerse the components in carburetor cleaner as an extra precaution.

The remaining carburetor components should be cleaned in carburetor cleaner and allowed to dry on a clean tray. In extreme cases, the use of paint thinners will remove the more obstinate accumulation of dirt and sediment.

## 7 Inspection and repair

With all components cleaned and set out, they must now be inspected for wear and deterioration, in order to decide which are fit for further service, which have to be repaired and which must be renewed.

Special overhaul procedures are given in the relevant chapter of this manual but the following sections give general procedures applicable to all carburetors.

## 8 Carburetor body and covers

**Note:** The body and, on some types, the covers are the only parts of the carburetor which cannot be supplied as spares and therefore, where these items are damaged beyond repair, a new carburetor must be obtained.

1 Check internally and externally for cracks (refer to Fig. 4.5). These are most likely to be found in the vicinity of the flange mounting holes and are due to overtightening or excessive vibration. On aluminum alloy carburetors it may be possible for a welding specialist to carry out a suitable repair, provided that none of the internal jets and passages are affected. However, great care must be taken to prevent distortion. Carburetors made from zinc alloy (Mazak) cannot be repaired in this way and will either require replacement parts or a new carburetor.

2 Check the flange faces for flatness using a straight-edge (refer to Fig. 4.6). If any undulation or distortion is evident, lap the flange on a sheet of fine emery cloth placed on a surface plate. Where applicable, the carburetor covers may be checked and rectified using the same procedure.

3 Check all tapped (internally threaded) holes for the condition of

the thread. It will be observed that the more frequently used threads are fitted with brass inserts and these do not normally deteriorate, but where the thread is tapped directly into the main body the threads may fracture. To repair the latter type of thread, an insert (sometimes called a Helicoil or Cross insert) must be fitted. This is a job best entrusted to a suitably equipped machine shop. An alternative method of repairing the thread is to drill out the threads completely and then tap an oversize thread, but this is only possible in some cases, as the attaching component must be non-standard and it may be necessary to drill adjacent components oversize.

4 Scrape away any corrosion which may have attacked the carburetor metal (refer to Fig. 4.7). This will normally be found in the vicinity of the float chamber on carburetors which have been out of service for a long time. Finish the surface with fine emery cloth but take care not to enlarge any internal bores or channels as this may affect the calibration of the carburetor.

5 Clean any carbon deposits from the carburetor barrels using a curved scraper but ensuring that the barrel walls are not in any way damaged. On differential type carburetors it will be found that the primary barrel is particularly susceptible to carbon build-up which will adversely affect the carburetor performance if not removed. After cleaning, the barrels may be polished lightly with metal polish but make sure that all traces of the polish are removed when the operation is completed.

6 Where a piston type accelerator pump is fitted, check the bore in the carburetor body for scoring and damage. Although the bores are inserted on assembly they cannot be obtained as a spare, and unless a machine shop can effectively repair a faulty bore, a new carburetor must be obtained.

7 Where applicable, check the condition of all studs fitted to the carburetor body and cover and renew them if necessary.

## 9 Venturis and chokes

1 Check the auxiliary venturis and chokes for damage; depending on where it is, minor damage may be removed with a fine file and emery cloth, otherwise renew them.

2 Using a tire pump, blow through the auxiliary venturi internal channel and nozzle to make sure that it is unobstructed.

3 Where fitted, check that the locating springs are intact and firmly fitted to the auxiliary venturi and choke.

## 10 Throttle spindles and choke spindles

1 Check the throttle spindles for wear by temporarily refitting them to the body and moving them laterally. If wear is evident, an oversize spindle should be obtained and the body reduced as described in the relevant chapter of this manual (refer to Fig. 4.8).

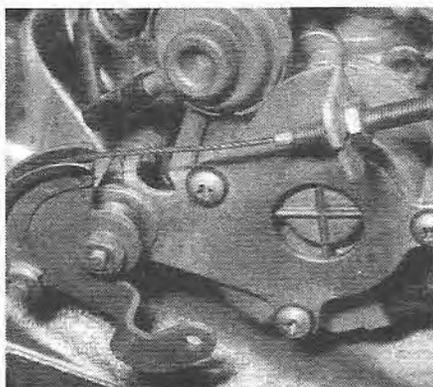


Fig. 4.9 Throttle cable connections on a SU HIF carburetor

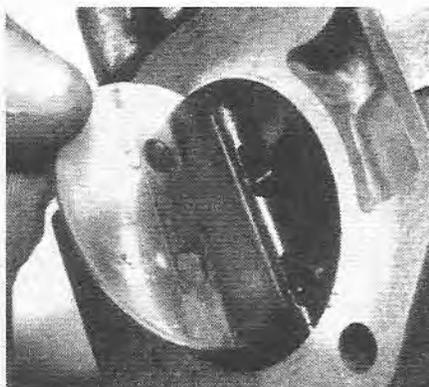


Fig. 4.10 Throttle plate on a SU carburetor

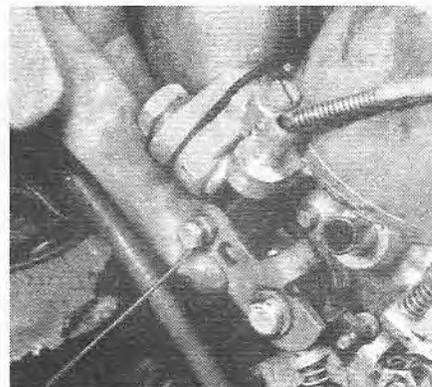


Fig. 4.11 Disconnecting the choke cable on a typical SU carburetor



Fig. 4.12 Complete jet assemblies on a typical Stromberg carburetor

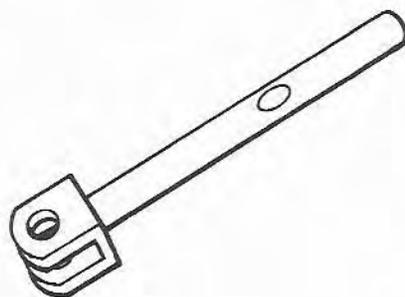


Fig. 4.13 SU type H jet

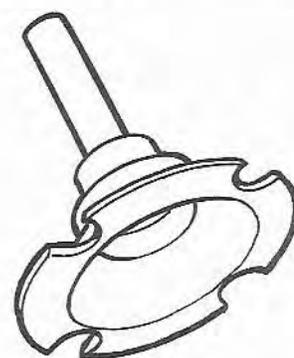


Fig. 4.14 SU type HD jet

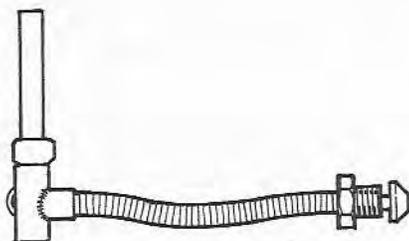


Fig. 4.15 SU type HS jet

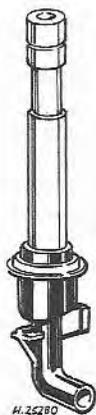


Fig. 4.16 SU type HIF jet

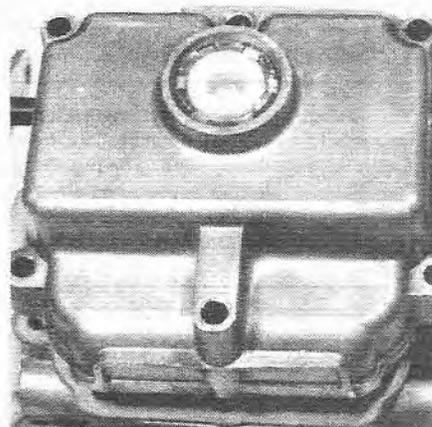


Fig. 4.17 Float chamber on a typical Stromberg carburetor

- 2 Where ball bearings are fitted, spin them by hand and check for any roughness or excessive clearance. The bearing dust seals should be renewed at every overhaul.
- 3 If the spindle incorporates a cam for operation of the accelerator pump, check this for security and wear.
- 4 Examine the throttle valve slots in the spindle for signs of distortion: if evident, renew the spindle.
- 5 Choke spindles (where fitted) should be checked in a similar manner.
- 6 Check the valve retaining screw threads in the spindle for damage and clear them with a suitable tap if necessary.

- 7 Where the spindle is discolored or has score marks, clean it with fine emery tape.

### 11 Throttle levers and return springs

- 1 Check all throttle levers and pivots for wear and damage and renew them where necessary.
- 2 On differential type carburetors, check that the lever slots and associated tags are not excessively worn.
- 3 Examine the throttle lever retaining nut locktabs for fracturing

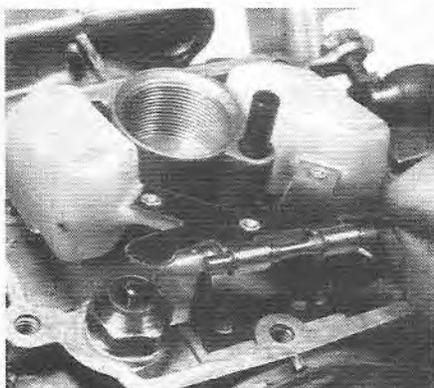


Fig. 4.18 Float removal on a typical Stromberg carburetor

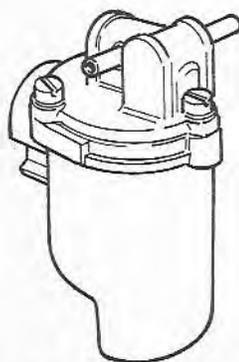


Fig. 4.19 SU type HS float chamber

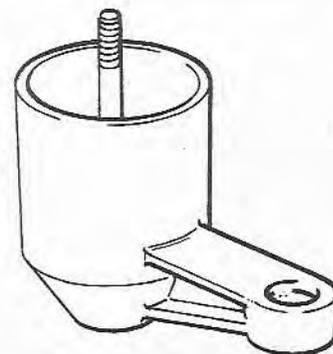


Fig. 4.20 SU type H float chamber

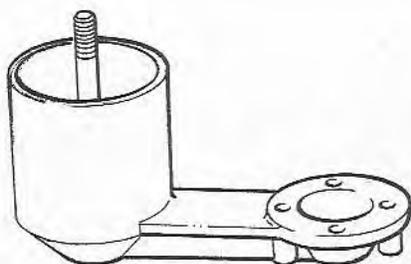


Fig. 4.21 SU type HD float chamber

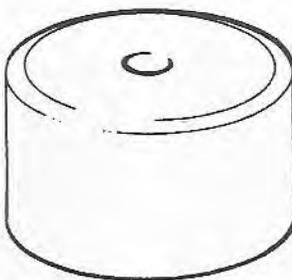


Fig. 4.22 SU type H and HD float

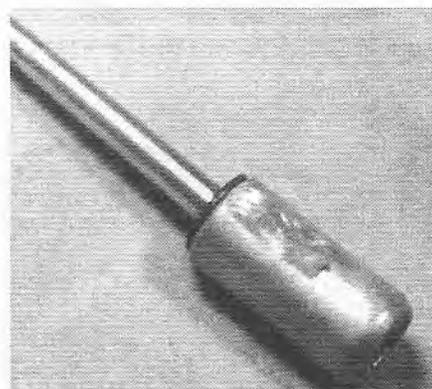


Fig. 4.23 Typical needle in a SU or Stromberg carburetor

and, if the tabs appear to be weak, renew them.

4 Check the return springs for damage and renew them if necessary. The springs do not normally lose their tension, but it is worth checking that they return the relevant throttle lever fully when the carburetor is completely assembled.

## 12 Throttle valves

1 The throttle valves are not normally subject to wear, but the outer periphery of each should be examined for damage which could prevent it fully seating in the barrel (refer to Fig. 4.9 and 4.10).

2 If the throttle lever retaining nut has been tightened with the throttle valve closed, it is possible for the valve to be buckled. To check this, view the valve along its axis and if any distortion is evident, renew it.

3 Polish the throttle valves with metal polish or fine grinding paste to remove any carbon deposits.

## 13 Choke valves

1 Check that the choke valves are not distorted and that the periphery is not damaged. Use a fine file if necessary, as irregularities on the periphery may cause the valve to stick shut (refer to Fig. 4.11).

## 14 Jets and emulsion tubes

1 After cleaning, all jets should be cleared by blowing through them and finally looking through them to check that they are unobstructed

(refer to Fig. 4.12 through 4.16). **Note:** Never use wire to clean a jet.

2 On accelerator pump intake and delivery valves, check that the internal ball is free to move by shaking the valve.

3 Emulsion tubes should be cleaned then blown through with air from a tire pump.

## 15 Float assemblies

1 Due to the fact that the float is normally half submerged in fuel, it will not usually require cleaning; however if the carburetor has been out of service for a long time, some corrosion may have accumulated and this should be wiped away.

2 Check visually for any punctures (refer to Fig. 4.17 through 4.22): if fuel has found its way into the float this can be ascertained by shaking it. If any doubt exists, immerse the float in boiling water: a stream of bubbles will issue from the puncture.

3 If a puncture exists, it is usually preferable to renew the float, as the extra weight of any internal fuel and solder used for repair will result in a higher fuel level. However, the weight of the float is usually stamped on the fulcrum tab and if a repair can be effected without exceeding this limit, it is in order to solder the puncture as follows:

4 Thoroughly clean the area around the puncture with fine emery cloth, then immerse the float in boiling water until bubbles cease to issue from the hole. Immediately remove the float, wipe dry, and solder the hole with flux and a lower melting point solder. Remove any excess solder with a small file and emery cloth.

5 Check the float fulcrum pin for wear and renew it if necessary.

6 Where the float assembly consists of two semi-floats, check that they are both level with each other and are at 90° to the fulcrum pin, otherwise in some instances they may foul the sides of the float chamber.

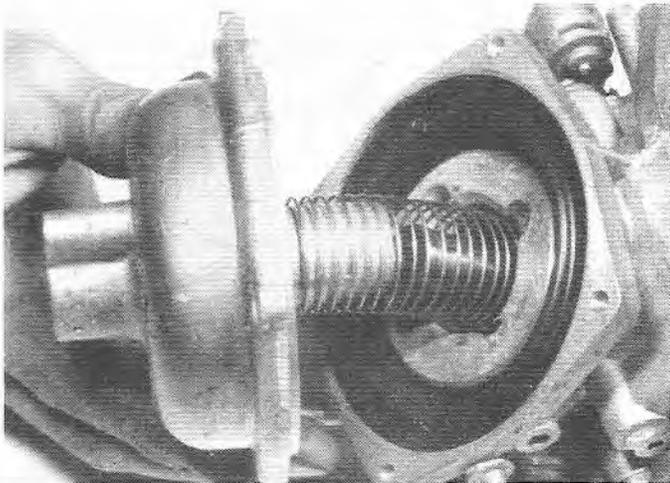


Fig. 4.24 Suction chamber cover on a Stromberg carburetor

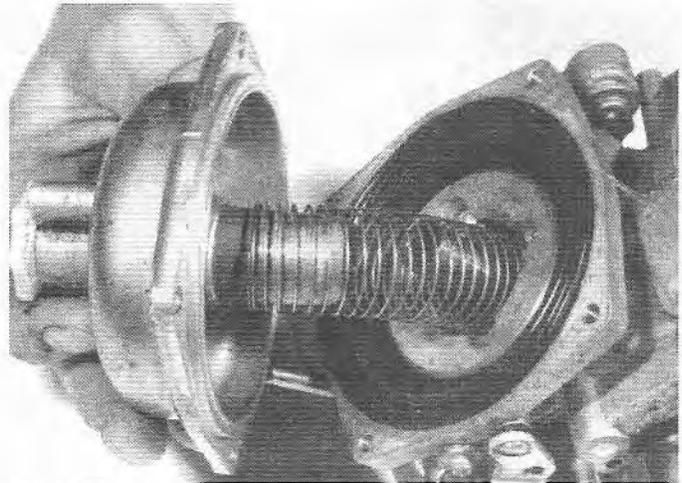


Fig. 4.25 Spring assembly

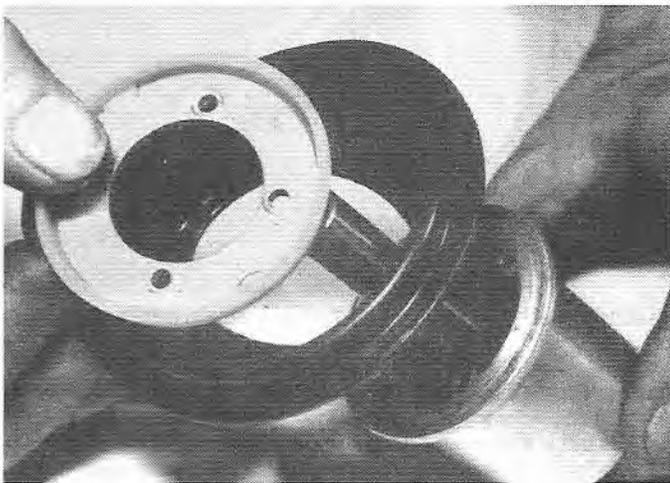


Fig. 4.26 Removing the diaphragm on a Stromberg

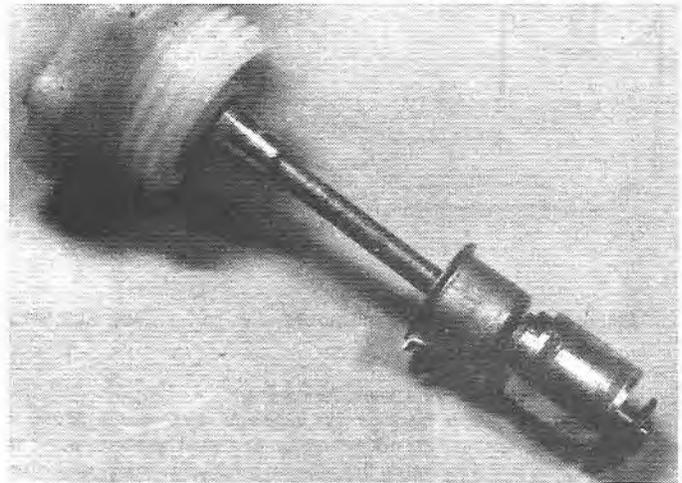


Fig. 4.27 Removing the damper rod

## 16 Needle valves

- 1 After cleaning the needle and needle valve seat, dry them and blow through the needle valve seat with air to clear any obstruction.
- 2 Check the contact surfaces of the needle and seat for wear and if a groove is evident on the needle, renew the complete valve.
- 3 Check that the ball in the end of the needle is tensioned by the internal spring and that it moves in and out freely.
- 4 Check the hooked spring on the end of the needle (if fitted); if the original needle valve is being refitted, it is best to fit the hook the same way round as removed but if a new valve is fitted, the hook can be fitted either way round.
- 5 On SU and Stromberg carburetors, check the condition of the needle for corrosion and straightness (refer to Fig. 4.23).

## 17 Fiber washers and diaphragms

- 1 All fiber washers should be renewed whenever the carburetor is

overhauled. Always use genuine washers particularly on the fuel inlet unions, otherwise there is the possibility of a fire risk if a leakage should occur.

- 2 Examine all diaphragms (accelerator pump, automatic choke, full power valve, etc.) for fractures and renew them if necessary (refer to Fig. 4.24 through 4.27). If the full power valve diaphragm requires renewal, it will be necessary to obtain the complete valve assembly. If the accelerator pump diaphragm requires renewal, the return spring should be renewed at the same time.

## 18 Accelerator pumps

- 1 On piston types, check the piston for scoring and damage and check the operating rod for wear and distortion.
- 2 On diaphragm types, check the mating surfaces of the cover, body and carburetor body. If any corrosion or irregularities are evident remove them with metal polish.
- 3 Check the operating arm roller (if fitted) for wear and, if worn, obtain a new cover.

# Part 1 Introduction

## Chapter 5 Converting to Weber carburetors

### Contents

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Dyno testing the Weber carburetor .....	4	Weber carburetor kits.....	3
Installing a Weber dual carburetor kit on a VW engine .....	5	Weber carburetor tips .....	6

### 1 Introduction

Weber carburetors are manufactured as original equipment on many foreign automobiles and also as replacement (conversion) carburetors for many domestic and foreign models introduced into the USA. First produced for Italian racing vehicles, Weber carburetors soon branched into Jaguar, Aston Martin, Lotus and other European racing models. These performance vehicles are equipped with original equipment Weber carburetors not to be confused with conversion kits designed as a substitute. As the Weber line expanded, carburetors

were designed for aftermarket conversion on many foreign and domestic engines. Weber also continued research into performance carburetor replacement for early Bosch CIS fuel injected models.

Over the years Weber Carburetor Company has produced many different types and sizes of carburetors. Read the section on Weber carburetor kits for a general idea of the most common carburetors. For complete information on the Weber carburetors available for your year and model, it is best to consult with the local automotive parts person that handles the sale of Weber carburetors. Many foreign automotive parts stores and specialty racing and performance shops have the types and kit numbers the Weber dealer supplies in your area.

## 2 Vehicle registration with Weber conversions

After researching your carburetor conversion, the question arrives "is it possible to register my vehicle at the DMV with my new Weber carburetor set-up?". The first item to consider is the exact status of the particular kit you are dealing with. Weber carburetor parts experts have information on the various kits and the general category of each kit. The kits are listed in these general categories:

**Legal Performance Carburetors** - These carburetors have been researched and tested at the Weber testing facility and pre-approved by the California Air Resource Board (CARB). Each kit is stamped and given an Executive Order Number designating that it is legal for California emissions standards which, at this time, is the most strict test in the fifty states. These standards could change in time, so it is a good idea to pre-approve the kit with the Bureau of Automotive Repair (BAR) in your area before installing it.

**Downdraft Conversions Kits** - The DGV and DFV Series carburetors are designed specifically for off-road and racing. Using this type of Weber set-up on the highway in California is illegal on pollution controlled vehicles. In the other 49 States (non-California), their use would have to be approved by the Bureau of Automotive Repair (BAR) in the specific area.

**Competition Conversion Kits** - The sidedraft DCOE carburetor set-ups are designed specifically for the racing enthusiast. These carburetors can be used at classic automobile shows, racing events and museums. Contact the Bureau of Automotive Repair (BAR) in your area for more information. Do not be confused with original Weber carburetor(s) on early racing vehicles such as Porsche, Lotus, Ferrari, Alfa Romeo, Aston Martin etc. These vehicles were originally designed with Weber carburetors and consequently they will be easily approved at the local DMV.

**Volkswagen/Porsche Conversion Kits** - The Weber Carburetor Company has designed many different style carburetors for VW performance. Most of these are not street legal. However, the boost in performance are tremendous for such activities as Baja racing, shows, off-road use and other competitive events. Contact your local Weber representative for detailed information.

**Fuel Injection Throttle Bodies** - These systems convert many original European fuel injection systems with an approved throttle body fuel injection system. These systems are not covered in this manual. Consult your local parts store for information.

**Street V8 Racing Conversion Kits** - These IDA carburetor set-ups are designed to increase horsepower, torque and performance on V8 engines. Strictly for racing, these carburetor kits include a custom intake manifold, linkage and components.

The second most important consideration when registering your vehicle is the geographical location of your home versus the manufacturer's designation for the original emission control and fuel system installed in the production year of the vehicle. Do not be confused with original Weber carburetor(s) on early racing vehicles such as Porsche, Lotus, Ferrari, Alfa Romeo, Aston Martin etc. These vehicles were originally designed with Weber carburetors and consequently they will be easily approved at the local DMV. In North America, your vehicle is either 50 states, 49 States (except California), California or Canada. New York has recently been grouped with California. The difficulty here rests in the confusion with the original emission control system and the title of the vehicle. For example, if your automobile has recently been purchased from an out-of-state owner and you wish to register the vehicle in your state, or if you are moving to another state, the emissions and chassis inspection may be stricter than where the vehicle was originally destined. It is a good idea to first register the vehicle with all the original equipment before starting any Weber carburetor conversion because of the complications of changing registration and title. Because of the variation in regulations from state-to-state, it will be necessary to contact your local Bureau of Automotive Repair (BAR) for specific, detailed information.

Although most types of vehicles that are easily converted to Weber carburetors were made between 1960 and 1979, there are others that fall into later dates. Look carefully at the emissions label or vehicle identification label to correctly identify the year and

geographical destination for your vehicle. If necessary, investigate the ID number with a dealer parts department to pinpoint the exact geographical area of destination. Call the Bureau of Automotive Repair (B.A.R.) in your area armed with all the necessary information and explain to the representative the details of your Weber carburetor conversion. The B.A.R. will tell you if the vehicle in question will be able to operate on the highway or if it will be restricted to off-road use.

Also, consult with the parts salesperson concerning the legality of the conversion and the exact use the carburetor is designed for. Performance carburetors are often designed specifically for off-road use. This includes track racing, shows, private roads and sometimes remote driving areas. Weber carburetors that are designed to replace existing carburetors and have been completely tested for emissions levels have been pre-approved by the state, include a sticker that designates an Executive Order Number by the ARB (Air Resource Board). This number pre-qualifies that particular carburetor for emissions legal approval. The owner simply drives to the local emissions inspection station and asks for an inspection. It is a good idea to bring the Executive Order Number with you to the facility for easy reference. Keep this with the other paperwork for the emissions inspection.

If the kit does not have an Executive Order Number or if there are any doubts concerning the legality of the conversion, there are a few steps the enthusiast can take to verify the legality of a particular carburetor.

- a) *First, contact a Weber representative and give them all the information concerning your vehicle, engine size, year, make and model. Tell them what type of carburetor you wish to install. They have catalogs that list the various applications and emissions requirements for your area.*
- b) *Next, call the air resource board in your area for a complete list of the local regulations.*
- c) *Finally, call the Bureau of Automotive Repair (B.A.R.) closest to you and consult with the bureau official to make sure the Weber carburetor you wish to install is legal.*

Although the phone calls and leg work may be time consuming, it is best to check with these agencies to save you trouble later after the carburetor is installed and running.

If you have built a kit car and wish to install Weber carburetors onto the engine, be sure to check with the Bureau of Automotive Repair (B.A.R.) before you even get started. Laws and legislation are constantly changing for many state governments. Some states dictate that although kit cars resemble engineering designs from the past, they will be subject to the emissions standards for the current year of production. This could be very disappointing to the kit car owner who thought that the law would be lenient.

Weber carburetors have been tested and streamlined to the point where most of the carburetors that are available for conversion have been through the rigorous emissions tests set forth. Just the same, it is better to be safe than sorry by contacting the necessary agencies concerning your vehicle and double checking the legal status of the Weber carburetor of choice.

## 3 Weber carburetor kits

Weber carburetor kits are available for many different types and sizes of engines. Before calling your local parts store or Weber representative, make a list of the various engine parameters that directly affect the performance of the engine. List engine size (displacement), camshaft lift and duration, type of transmission, emission equipment originally installed on your engine, ignition type, performance additions, altitude of the area and any other item that might be of importance. Discuss these parameters with the parts expert to arrive at the proper kit for your vehicle. Often this preliminary legwork will allow better communication between yourself and the parts person. Ultimately, the engine will be fitted with the correct type of Weber carburetor. **Note:** Refer to the list at the end of this Chapter for a list of Weber carburetor suppliers and installers.

Here is a list of the most common type Weber carburetor kits and their applications.

**Street Legal Performance Replacement Carburetors\***

**Note:** These carburetors do not fall into the category of original production Weber carburetors produced for early racing vehicles such as Porsche, Lotus, Ferrari, Alfa Romeo, Aston Martin etc. Ask the Weber carburetor parts expert concerning information and availability.

Vehicles	Weber models	Kit numbers
Audi (1970 through 1974) with Solex 32/35 TDID	32/36 DGAV 33 B1	K 8201
Austin Healey Sprite (1958 through 1967) with SU	32/36 DGAV 33B1	K 8058
Chevrolet LUV (1972 through 1983) with Hitachi carburetors	32/34 DFT	K 8602, K8662 or K 8663
Chrysler Arrow, Challenger, D-50 (1979 through 1984) with Solex 30/32 DIDTA	32/36 DGAV 33B1	K 8806
Datsun Z cars (1970 through 1974) with Hitachi	32/36 DGV (double)	K 8688
Ford Fiesta (1978 through 1980) with Ford 740 carburetors	32/34 DFT	K 8454
Ford Escort, Lynx (1981 and 1982) with Holley carburetors	32/34 DFT	K 8461
Mercedes Benz (1964 through 1967) with Zenith carburetors	32/36 DGAV 33B1	K 8245
Toyota 3TC engines (1980 through 1983) with Aisin carburetors	32/34 DFT	K 8750
Toyota 22R engines (1981 through 1983) with Aisin carburetors	32/36 DGAV 33 B1	K 8748
VW (1952 through 1966) with Solex 28 PICT	222.008	30 DFV
VW (1967 through 1969) with Solex 30 PICT	223.065	34 DFV
VW Rabbit (1975 and 1976) with Zenith 2 B2	32/34 DFT	K 8408

\* Be sure to ask for the Executive Order Number when purchasing these carburetors

**Downdraft Conversion Carburetor Kits For Racing \*\***

Vehicles	Weber models	Kit numbers
Audi (1970 through 1974) with Solex	32/36 DGAV	K 201
Chevrolet LUV (1972 through 1975) with Hitachi	32/36 DGV	K 602
Datsun Z cars (1970 through 1974) with Hitachi	32/36 DGV (double)	K 688
Ford Capri, Pinto, Bobcat, Mustang II, Fairmont (1972 and 1973) with 2600 cc engine	32/36 DFAV	K 8456
Mazda Pick-up (1972 through 1978) with B1600 or B 1800 engine	32/36 DGV	K 602
MGA, MGB (all)	32/36 DGV	K 050
Porsche (1970 through 1975) with EFI	32/36 DFEV	K 297
Toyota 22R engines (1981 through 1984)	32/36 DGEV-ICU	K 748
VW single and dual port (1952 through 1970)	32/36 DFEV	K 400

**Sidedraft Conversion Carburetor Kits For Racing \*\***

Vehicles	Weber models	Kit numbers
Alfa Romeo (1969 through 1981)	40 DCOE	K 501
BMW (1968 through 1976) 1600, 1800, 2000, 2002	45 DCOE (double)	K 205
BMW (1969 through 1974) Bavaria	40 DCOE (triple)	K 208
Datsun Z cars (1970 through 1978)	40 DCOE (triple)	K 659
Jaguar XKE (1962 through 1971)	45 DCOE (triple)	K 111
MGB (1976 through 1979)	45 DCOE (single)	K 044

\*\* Legal in California only for racing vehicles which may never be driven on the highway

**Pro Street V8 Conversion Carburetor Kits \*\*\***

Vehicles	Weber models	Kit numbers
Chevrolet 282, 302, 307, 327, 350, 400	IDA	K 9502
Chevrolet 396, 427, 454	IDA	K 9505
Ford 289 or 302	IDA	K 9107
Ford 289 or 302 (Cobra style)	IDA	K 9103
Ford 351C	IDA	K 9110
Ford 351W	IDA	K 9116
Ford 390, 406, 427, 428 (vertical carburetors)	IDA	K 9119
Ford 390, 406, 427, 428 (angled carburetors)	IDA	K 9122

\*\*\* Weber IDA kits are complete with intake manifold, throttle linkage, components and accessories

**4 Dyno testing the Weber carburetor**

Now that the carburetor(s) are installed and running but the performance is not quite up to its potential, it is possible to have the vehicle driven onto a dynamometer for complete inspection of the engine at operating speeds. The engine dynamometer will monitor the horsepower, torque, combustion efficiency, and engine temperature through all the driving ranges while the engine is accelerating (under load) and decelerating. This performance test will give accurate and detailed information regarding the actual gains the Weber carburetor has added to the engine. Of course, dyno time is expensive and time

consuming but for the right person and vehicle, the engine can be tuned to its full potential.

Here is a good example of some Weber carburetor specs from a V8 engine hooked up to the Valley Head Service's Superflow 901 dynamometer. A big block Chevrolet equipped with four 2-barrel 44 IDA Weber carburetors and a custom Weiland dual plane manifold produced a healthy 367 horsepower at 5,000 rpm and a respectable 418 ft-lbs. of torque at 4,000 rpm. **Note:** These test results are discussed in detail in *Hot Rod Magazine*, November 1989 issue. It is a good idea to read up on various Weber combinations and their proven dynamometer results before venturing into V8 hotrod carburetor conversions.

Advanced Engine Management in Gardena, California specializes in dynamometer testing for all different types of Weber carburetors. They also function as a testing center for Weber carburetor products. The staff consists of professional engineers and technicians experienced in installing and tuning Weber carburetors. Advanced Engine Management specializes in many types of repair and dynamometer tests. The company prepares conversions for state emissions tests, performance tunes race engines, diagnoses flat spots or balance problems and pinpoints most driveability malfunctions. Since smog laws are becoming more strict across the United States and Canada, dynamometer and performance tuning will always be in demand to help produce cleaner air.

Depending upon the actual symptoms of the carburetor in question, there are several different jetting combinations that can be changed to help carburetor performance. The technician will recommend certain changes to help smooth out carburetor operation through all driving ranges. Here is a list of carburetor components that directly affect the performance of the Weber carburetor.

The **air correction jet** meters air to the emulsion tube and, due to the fact that air is less dense than fuel, the size of the jet affects the higher engine speeds rather than the lower speeds. The air correction jet also works in conjunction with the main fuel jet and both components are therefore calibrated together.

Air correction jet sizes range from 0.70 mm to 3.40 mm and as a starting point a 2.00 mm size will be in order. On differential type carburetors, the 2.00 mm size air correction jet should be installed to the primary main circuit and, as a starting point, a 1.80 mm air correction jet should be installed to the secondary main circuit.

The **main fuel jet** meters fuel to the nozzle in the auxiliary venturi via the emulsion tube. Its size will depend on the requirements of the engine. As it works in direct relationship with the choke, the size of the main jet will vary in relation to the size of the choke. The graph (refer to Fig. 5.1) will enable the main jet size to be chosen, although this graph assumes that the air correction jet size is 2.00 mm.

The final size of the main fuel jet and the air correction jet can be chosen after testing the carburetor.

The **emulsion tube** emulsifies air from the air correction jet with fuel from the main fuel jet and therefore controls the mixture emanating from the nozzle at all engine speeds with the main circuit in operation.

The controlling factors of the emulsion tube are its diameter and the location of the emulsion holes. These factors are included in the code number of the emulsion tube which is always preceded by the letter F. Unfortunately the code numbers do not follow any particular sequence which would indicate the applicable characteristics.

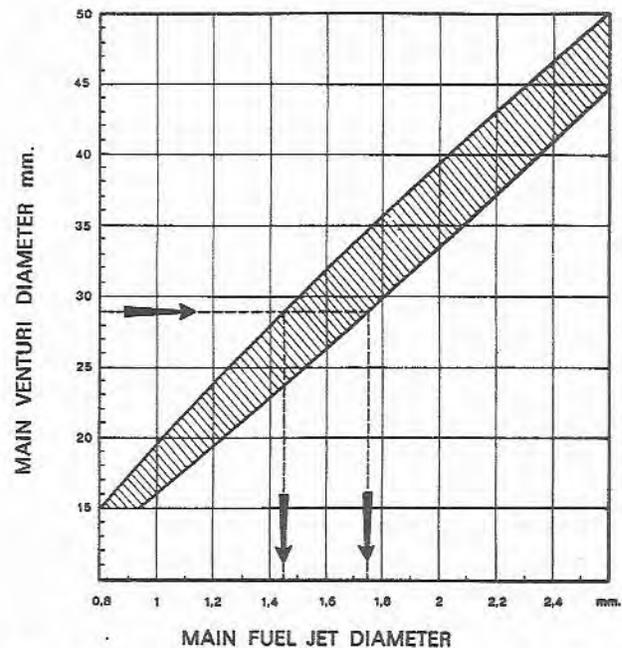
It will be observed that where the emulsion holes are located on the upper section of the tube, the emulsifying action will begin at lower engine speeds. Where the holes are towards the lower section of the tube, the action will begin at higher engine speeds. The diameter of the emulsion tube determines the reserve of fuel in the emulsion tube well; a thin tube will give a large reserve and vice versa. This reserve of fuel has a great effect on the acceleration of the engine and is therefore an important factor.

Due to the number of emulsion tubes available, it is recommended that the advice of a Weber dealer is sought, particularly if there is more than one carburetor, as a wrong choice could prove very expensive.

The **idling jet** meters fuel to the idling and progression circuits and, as this circuit is generally used for a large percentage of driving, the size of the jet is quite critical both in the interests of economy and engine flexibility.

Since the choice of idling jet determines the lower to middle engine speed range driveability to a large extent, the final size will be decided during the calibration of the carburetor. However, as a starting point, a 0.50 mm size fuel jet should be installed.

Finally, after determining the correct size main jets, emulsion tubes and air correction jets for your Weber, the only step remaining is synchronizing the multiple carburetors. Although seemingly difficult, the task can be performed with patience and understanding. It is a good idea to purchase synchronizer tools for tuning when a dynamometer is not available. Engine performance tuning is typically a one-time appointment that determines the correct settings for your



5.1 This main jet selection chart selects the correct size main jet according to the main venturi diameter and the air correction jet (2.00 mm standard). Where one choke feeds two cylinders, multiply the main jet size by 0.90. Where one choke feeds a single cylinder, multiply the jet size by 0.75

Weber, unless, of course, the vehicle is going to be raced on different tracks, race events or chassis arrangements. It is a good idea to write down all the sizes of the main jets, emulsion tubes, air correction jets and any other important carburetor specifications and retain them for your records.

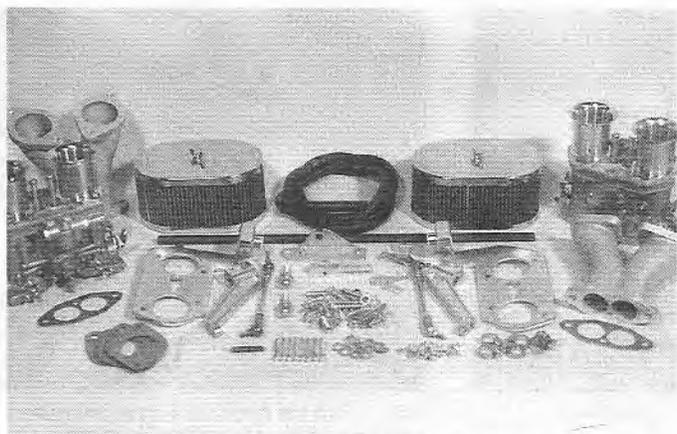
## 5 Installing a Weber dual carburetor kit on a VW engine

### Installing dual Weber 44 IDF Carburetors

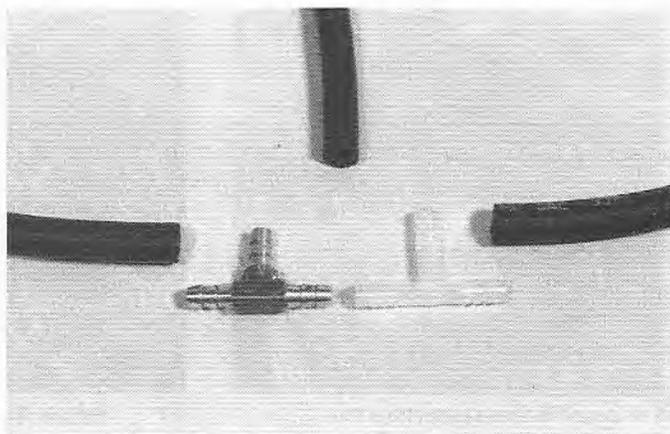
The following article involves a complete step-by-step installation of a Weber carburetor kit (44 IDF) on a 1971 Volkswagen Beetle. The article is courtesy of *Hot VW magazine* and appears in the **November and December issues of 1995**. The conversion may appear simple to many VW owners, but patience during the installation, and mechanical understanding are paramount for smooth, trouble-free operation.

Although this Weber conversion installation is specific to this style and size VW engine, there are many similarities to all Weber conversions that can be drawn from this article. Follow the instructions carefully and organize the workplace to the point where every part and tool is accounted for. Don't force any bolts or nuts into or over an incorrect thread pitch and make sure all gasket surfaces are clean and free of old material.

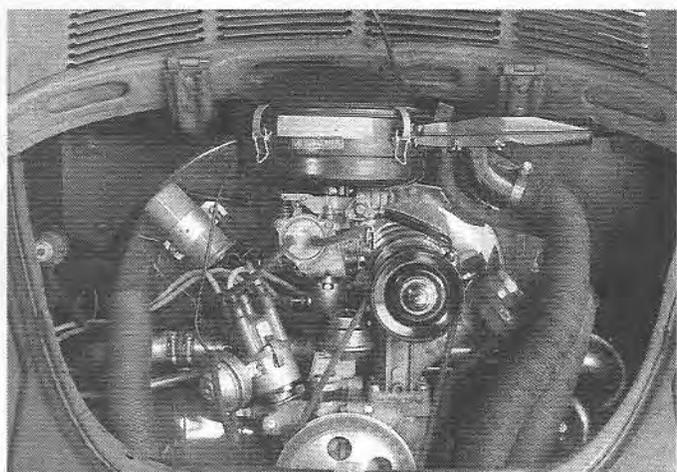
Technically, installing a well-engineered dual Weber carburetor kit on your Volkswagen Bug is not all that complicated. In most cases, the kits have all the necessary components and hardware required to complete the conversion, eliminating any inconvenient extra trips to the auto parts store during the process. This makes the procedure relatively simple due to the fact that detailed instructions are generally included in the box, along with all the components. Sounds like it's a straight forward and simple operation at this point. But, like many things these days, there are a few surprises waiting around the corner for unsuspecting VW owners taking this route. And, the unexpected proof surfaced, as it usually does, when many of our readers decided to send us feedback claiming it's a lot more complex to install a dual Weber carburetor kit than it's cracked up to be. This coupled with the fact that we've received word from several Weber carburetor dealers



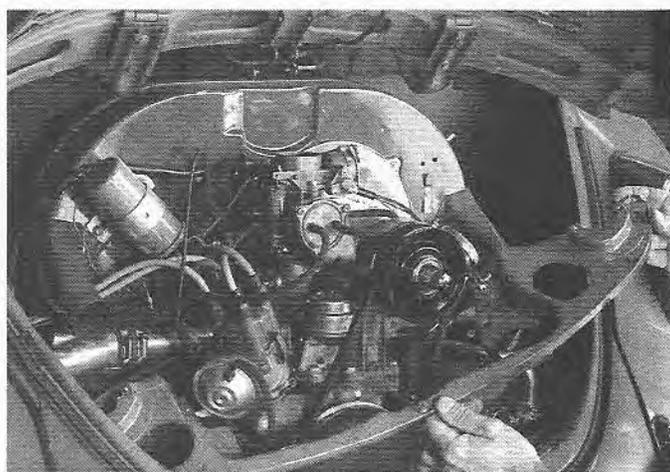
5.2 Layout of a complete 44 IDF "PLUS" Weber dual carburetor kit



5.3 Use a brass T-section in place of the plastic part



5.4 The project engine is a mostly stock VW 1600 engine with dual port heads



5.5 Remove the cooling tin breast plate

claiming the main Weber distributor has substantially improved the dual 40 and 44 IDF kits and that they now have a better linkage system. This necessitated a current installation feature in our magazine, prompting us to probe deeper into the subject. What we did next was contact one of California's largest Weber dealers, Fast Freddy's, located at 2604 Harbor Blvd., Santa Ana, CA 92704; (714) 540-3801, and made arrangements to take delivery of their 44 IDF XE "Plus" kits (refer to Fig. 5.2), along with an STE synchrometer carburetor flow meter, a mandatory tool needed for tuning the carburetors.

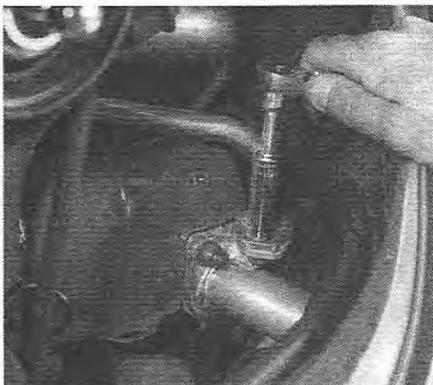
This would be a good time to add that if you're looking for a drastic increase in horsepower by simply bolting a dual carburetor kit onto your stock 1600 cc VW engine, you've got another think coming. Keep in mind that a professionally-assembled performance engine has a "built-in" balance between cylinder heads, cam profile, exhaust system and carburetion. In other words, if you're looking for the best results from a dual Weber carburetor kit, we'd recommend that the engine displaces at least 1700 cc, has a mild profile cam and some degree of head work, along with an aftermarket header system, and, of course, you'll need a mechanical advance distributor (in our case we'll be using a Bosch 009), as opposed to a vacuum advance system that's used on stock VW engines.

The best way to begin is by laying out all the parts in the kit and take account of everything. At this point, you will immediately notice that you need a few more parts, as we did. That's when we headed down to Kymco Motorsports, in Costa Mesa, CA, to round up some extra parts as well as pick their brains as to any additional suggestions they had for improving the installation. At this point you will also need to make the decision of whether you want to retain the stock fuel

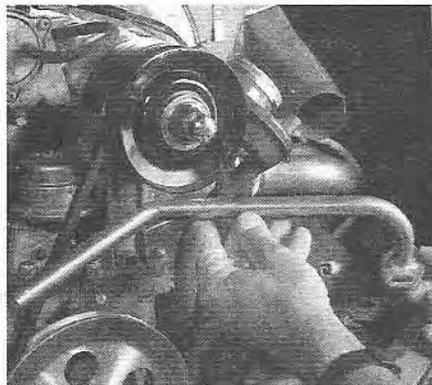
pump, or switch over to an electric pump. If you choose to use an electric pump, Facet offers an electric fuel pump rated in different fuel flow increments. Weber carburetors require 1-1/2 to 3 PSI of delivery, maximum. Therefore, the Facet UN 750-0614 is the choice part, and you will also need four 1/8-inch NPT fittings with 1/4-inch hose barbs to complete the conversion.

An electric fuel pump should be mounted as close to the fuel tank as possible, and beneath it as well, and should be mounted using some sort of rubber insulated padding. It just so happens that a pair of VW Rabbit radiator mounts (part # 171 121 275E) work well and will make the pump appear to run much quieter from inside the car. If you decide to retain the stock fuel pump, which is perfectly fine, you will need a mechanical fuel pressure regulator stabilized between 1-1/2 and 3 PSI for optimum results. While we were at Kymco we also picked up a brass T-fitting and about 3 feet of stock fuel line, in addition to a see-through fuel filter, which doubles as a junction for the smaller 5-mm fuel line and the larger 5/16-inch line to the carburetors. The Weber kit includes a plastic T-section, but after a short period of use, they are notorious for cracking; we all know how dangerous a fuel leak is near the VW engine, which is why we opted for a brass unit (refer to Fig. 5.3).

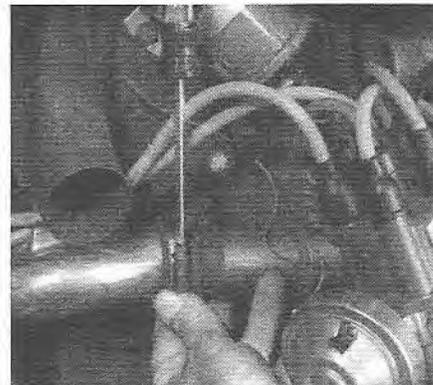
Now that you have everything you need, you can begin working on the car (refer to Fig. 5.4). The previous mentioned order of operation is very important, especially if you happen to be working on your only form of transportation and otherwise have no way of retrieving needed parts. Begin by removing the gas cap, and disconnecting the battery cables as well as the throttle cable. The next order of business is removing the air filter and cooling tin breast plate (refer to Fig. 5.5).



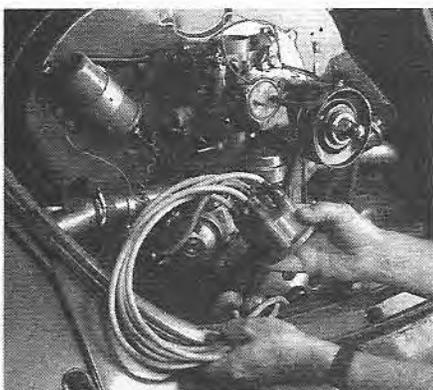
5.6 Unbolt the heat risers from the muffler and . . .



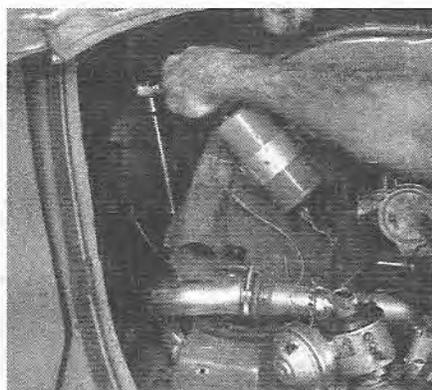
5.7 . . . remove them from the intake manifold



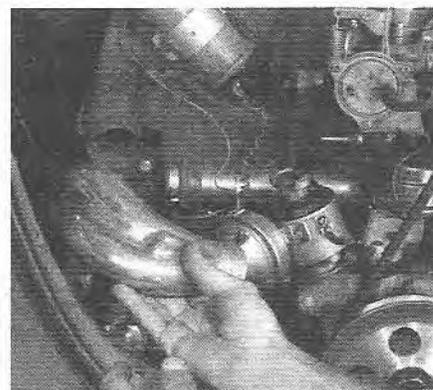
5.8 Loosen the boot clamp from the end casting section of the intake manifold



5.9 Remove the distributor cap and ignition wires from the engine compartment



5.10 Remove the nuts that retain the end sections to the cylinder heads



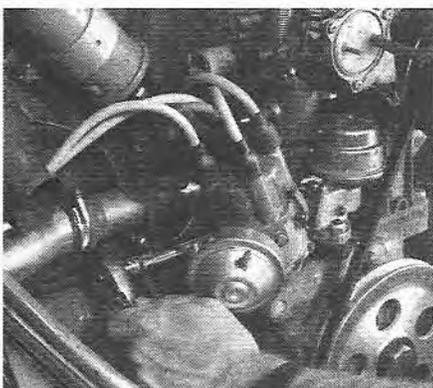
5.11 Remove the end casting from the engine

Now, depending upon whether you have a stock or aftermarket intake manifold (ours was a two-piece aftermarket version), removal of the intake manifold and carburetor assembly will vary.

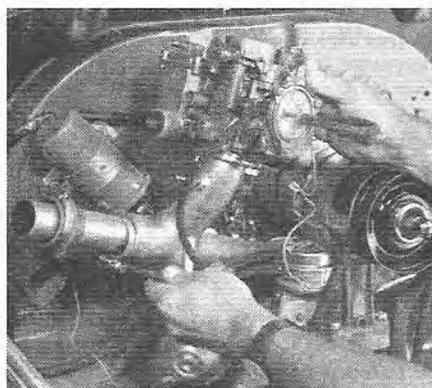
If you have a two-piece assembly, you can unbolt the heat risers from the header system (refer to Fig. 5.6) and remove them from the main center section (refer to Fig. 5.7), allowing you to unbolt the end castings from the heads and remove them from the manifold center-section without having to remove the generator or alternator and fan housing first (refer to Fig. 5.8 through 5.11). At this point you should disconnect the vacuum lines and fuel line from the fuel pump, plugging it to keep gas from leaking out. As stated, if you have a stock intake manifold you will need to loosen the side bolts on the fan housing, disconnect the wires from generator, remove the strap and lift the generator and fan housing far enough to remove the intake manifold

and carburetor as a complete unit (refer to Fig. 5.12 and 5.13). Then, thoroughly clean the intake mounting surfaces using a gasket scraping tool. Go ahead and replace the fan shroud and generator in their original position, replacing the generator pulley, strap, nut and fan belt.

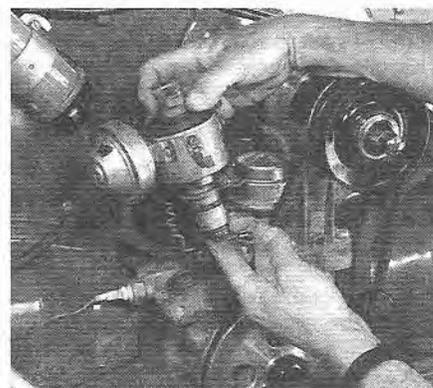
Replace the rear cooling tin, or breast plate, and then you will need to relocate the coil and mounting bracket so that it doesn't interfere with the dual carburetor linkage cross bar and arms. The dual carburetor kit comes with a bracket that allows you to mount it off the base of the fuel pump, secured to the engine case. However, in our case we decided to secure the bracket to one of the fan housing sheet metal screws. As per the Weber installation instructions, if you use their bracket, you will need to place the coil adapter over the rear fuel pump stud and reinstall the fuel pump nut and case nut to secure the bracket. Torque the case nut/bolt to 15 ft.-lbs. Reuse the original



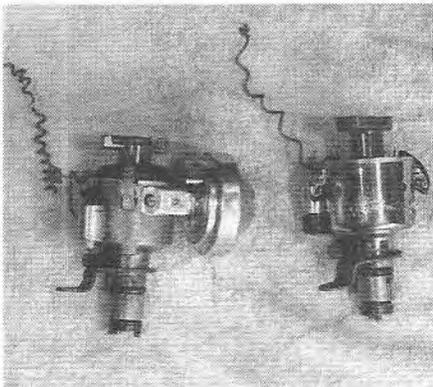
5.12 Remove the intake manifold center bolt and . . .



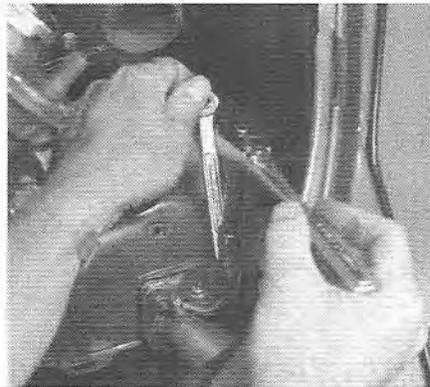
5.13 . . . lift the carburetor/intake manifold assembly from the engine



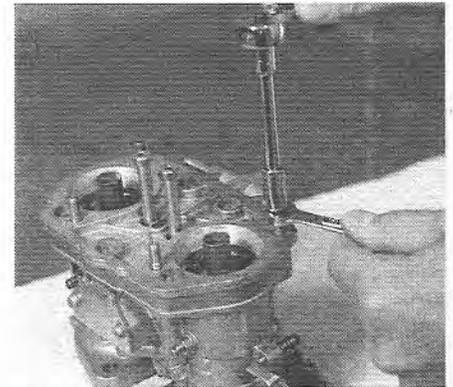
5.14 Remove the stock distributor from the engine



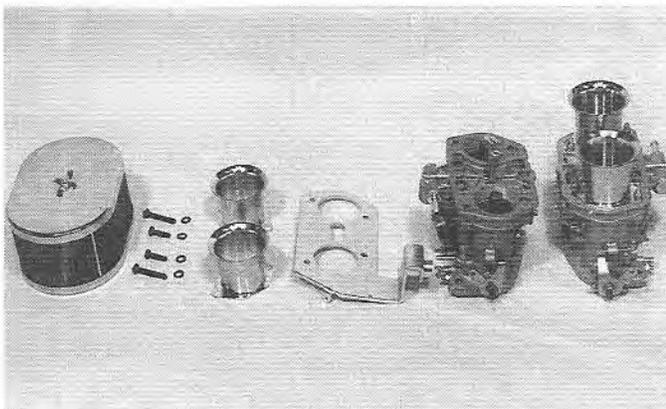
5.15 A mechanical advance ignition system is preferred over the vacuum advance system originally equipped on these engines



5.16 Install custom plates over the heat riser ports left on the stock muffler



5.17 Double nut the studs for removal



5.18 Each carburetor is identical from Weber therefore it will be necessary to change several components on one to be able to mount it to the opposite side

screws to install the coil on the adapter, facing the wire terminals towards the number 3 and number 4 cylinders. Reconnect the coil wires, and if you choose to do so, install new spark plugs at this time as it is most convenient to access them now. And while you're at it, massage some grease or Vaseline into the intake manifold gaskets, and install them on the cylinder heads. Do not use the stock stamped metal OEM gaskets.

Another thing you will need to do is be sure that your cylinder heads do not have the locating dowel by the intakes, otherwise this will interfere with installation of the Weber manifolds. If the dowel is present, remove it with a pair of vise grips or pliers. This would also be

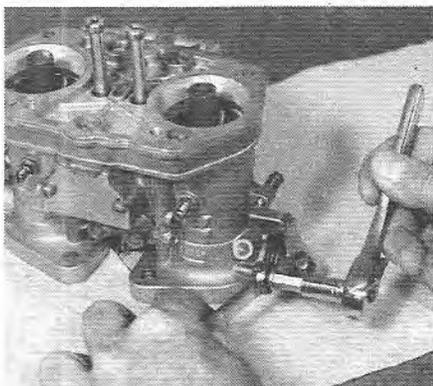
a good time to remove your stock vacuum advance distributor and install the new mechanical advance ignition system (refer to Fig. 5.14 and 5.15). Then, reinstall the distributor cap and ignition wires. If you find that working in the engine compartment is a little tight, it may help to remove the decklid as this will provide extra working space.

Last but not least, install the custom plates over the heat riser ports on the muffler (refer to Fig. 5.16). Use a small amount of heat applicable silicon sealer between the two surfaces.

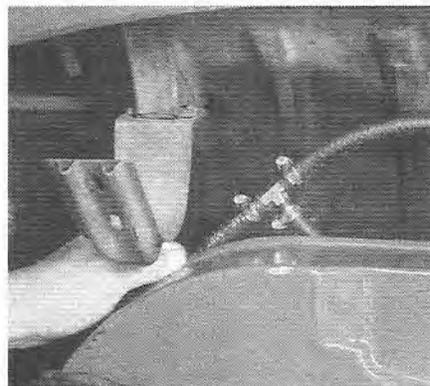
#### Carburetor bench assembly

For the most part, the general instructions that accompany the kit are fairly complete, but it's at this point that certain procedures need to take place which are not mentioned in the Weber installation instructions. For instance, you will need to remove the air horns, or velocity stacks, and double nut the threaded studs (refer to Fig. 5.17), removing all eight from the pair of carburetors as they are not long enough to extend through the linkage bracket, velocity stacks and air cleaner base. However, new hardware is supplied with the kit to handle the assembly, which occurs later on.

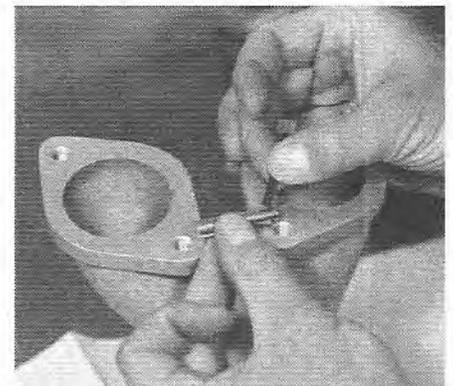
As you will notice by looking at the carburetors, they are identical, with fuel inlets, linkage arms and etc. all on the same side (refer to Fig. 5.18). To install them on a VW Bug, you will need to set them up as a right and left side unit. This is done by keeping the fuel inlet to the outside position. In our case, it was the left carburetor that needed to be modified. The fuel inlet and plug locations needed to be swapped, as do the throttle stop and linkage arm pieces (refer to Fig. 5.19 and 5.20). Then, install the throttle lever spacers and lock nuts on each carburetor. Install the threaded studs into the manifolds using the supplied locking compound, or Loctite if you prefer (refer to Fig. 5.21), and tighten the stud into the manifold flange. Next, you can bolt the carburetors to the manifolds using the wavy washers and nuts supplied in the kit (refer to Fig. 5.22).



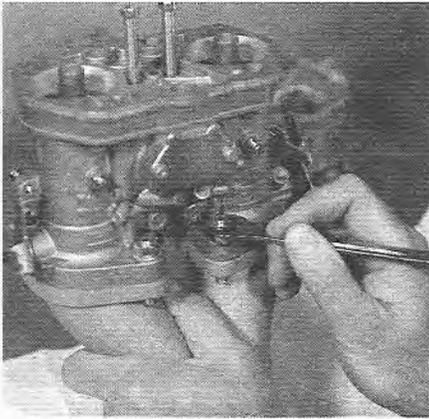
5.19 Reverse the throttle stop and linkage arms on the left carburetor



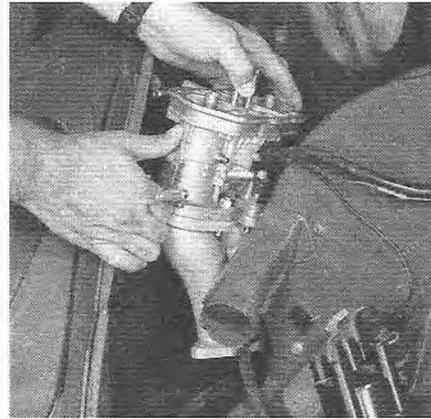
5.20 Make sure the fuel inlet locations face the same direction to ease fuel line installation



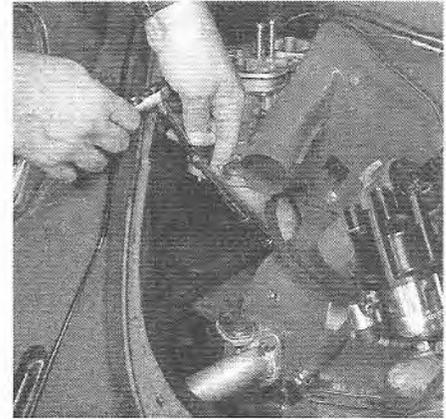
5.21 Apply Loctite onto the lower threads of the stud before installing them into the intake manifolds



5.22 Tighten the carburetor-to-intake manifold bolts



5.23 Install the left side carburetor first



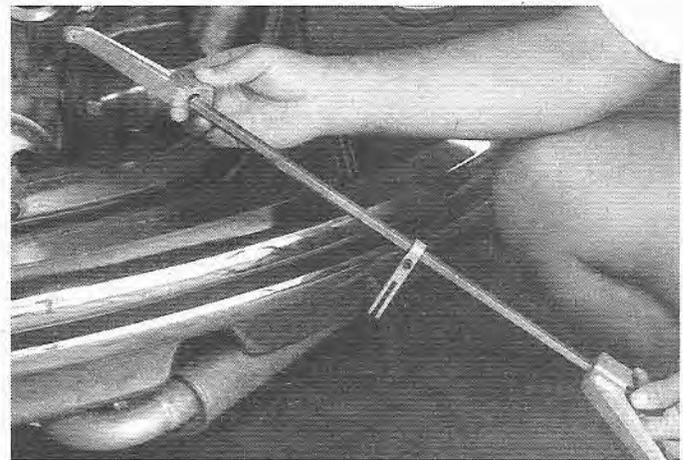
5.24 Tighten the manifolds onto the cylinder heads using a speed wrench and extensions

The instructions tell you to assemble the cross bar bracket, flange gaskets, air filter base and air horns at this time, but due to limited space in the engine compartment we'd suggest doing that after the carburetor and manifold assembly are installed. Our suggestion is in alignment with the Weber instructions, as they mention the fact that due to the length required for the crossbar to seat properly in the bracket, the right and left side parts can not be assembled simultaneously. We simply assembled them in the car and encountered no problem whatsoever.

#### Final assembly

When it comes time to install the carburetor assemblies on the motor, the left, or driver's side unit, should be installed first (refer to Fig. 5.23). Installation is made easy by using a ratchet with a 10- to 12-inch extension and universal swivel connector between the extension and socket (refer to Fig. 5.24). Secure the manifold in place, then install the right side manifold and carburetor in the same manner. Next, hook up the fuel lines from the fuel pump to the carburetors, being sure to tighten each hose clamp. Now, slide the center pull lever and the left and right extension arms onto the cross-bar so there is a 60° angle between the centerline of the components (refer to Fig. 5.25). Install the jam nuts onto the ball ends and thread the ball-ends into each end of the cross-bar shaft. This is a good time to install the complete air horn assemblies, as mentioned earlier and shown in the exploded view in the instructions, leaving the right side semi-loose as to allow you to install the cross-bar shaft. Then, install the cross-bar self-centering spring in the left bracket bushing, and insert the left hand ball-end into the left bracket bushing and spring, first, then do the same for the right side, before tightening everything down (refer to Fig. 5.26 through 5.28).

Once the cross-bar has seated in the bushings, secure the air horn assembly (refer to Fig. 5.29). Make sure there is 1/32-inch

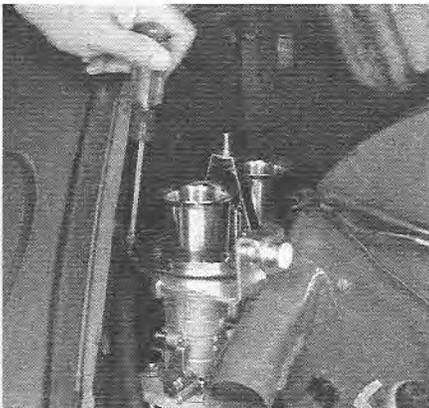


5.25 Install the extension arms with a 60-degree angle to each other

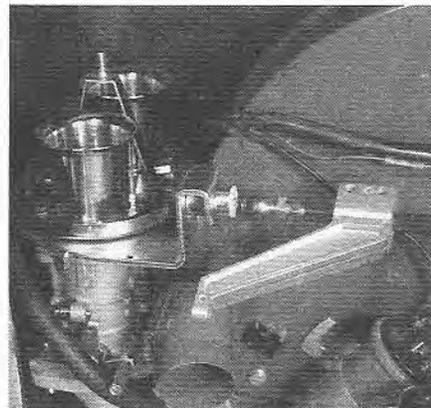
clearance between the bushing flange and ball flange. Now you can install the carburetor linkage rods to each of the extension arms, checking to be sure that they are as close to vertical as possible and that the operation of the linkage is totally smooth and not binding in any way at all (refer to Fig. 5.30 through 5.32).

#### Tuning

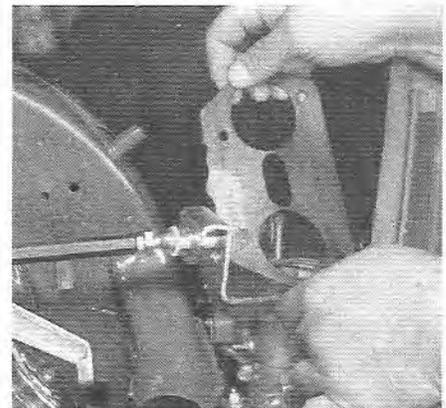
Before starting the engine to synchronize the carburetors, be sure the carburetor linkage is moving freely and the ignition wires are installed in the correct firing order. You can now replace the gas cap



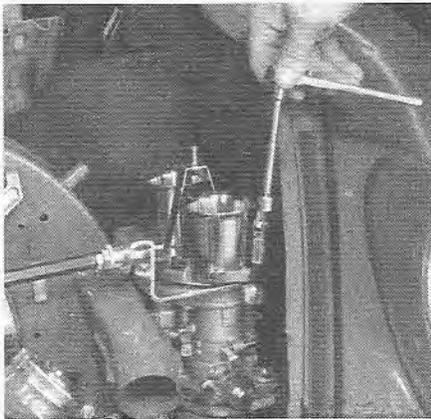
5.26 Install the air horn assembly onto the left side carburetor, . . .



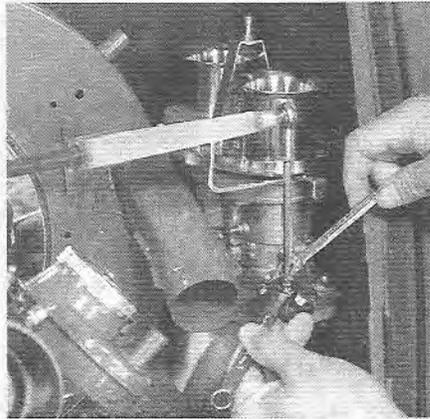
5.27 . . . install the cross bar self-centering spring into the left bracket bushing and . . .



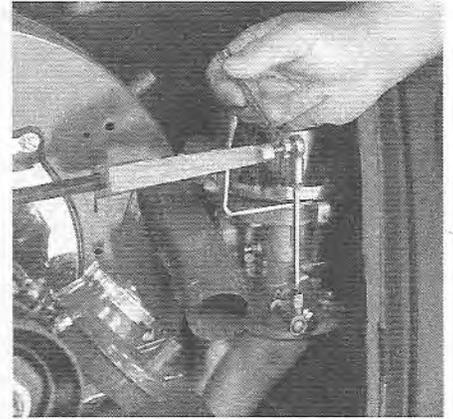
5.28 . . . finally install the right side air horn assembly gasket



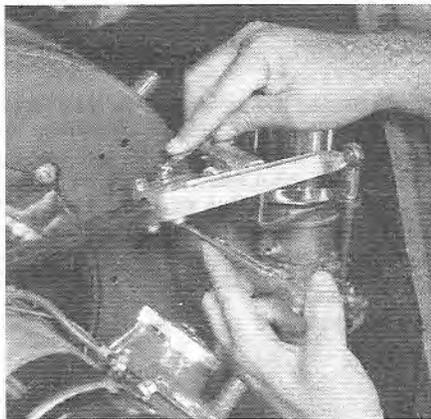
5.29 After the linkage has been completely installed, tighten the right side air horn



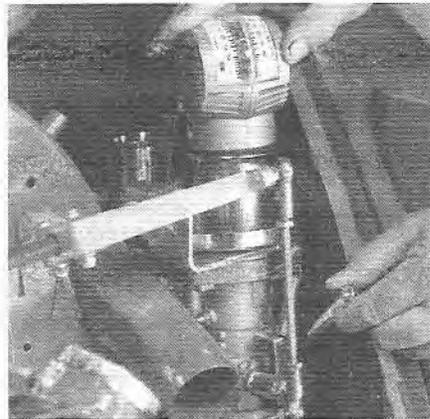
5.30 Install the linkage arms to the extension arms



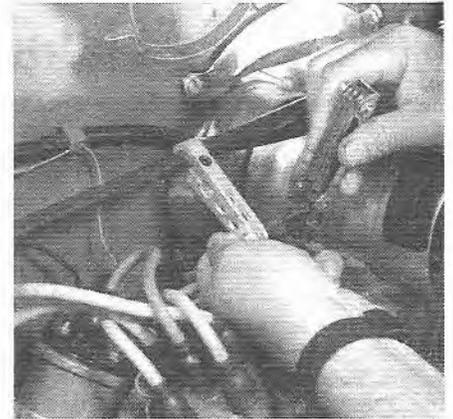
5.31 Tightening the upper linkage arm adjustment nut



5.32 Last, tighten the extension arms to the cross bar



5.33 Use a special tool available from Weber to synchronize the carburetors

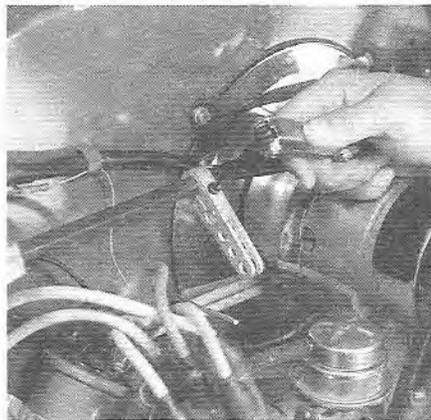


5.34 Install the throttle cable into the union piece

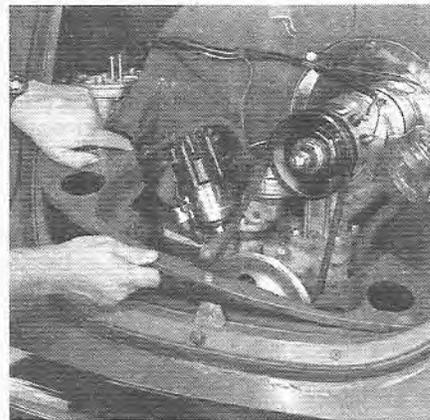
and hook up the battery cables. Reset the timing on the mechanical distributor using the static method to get the timing close before initial start up. Start the engine and check for any vacuum leaks, if none seem to be present, use a timing light to properly set the total advance. Synchronize and set the idle mixture using the Weber instructions (refer to Fig. 5.33). A simplified method can be performed by removing the linkage rods, and synchronizing the idle speed screws. Install and adjust the linkage rods, and then adjust the back barrel air bypass to match flow of front barrels. If they need more fine tuning, or if problems seem to be affecting performance, consult with the Weber

troubleshooting guide.

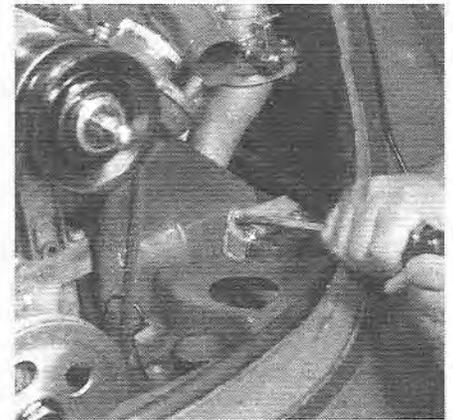
With the synchronizing process complete, turn the engine off and proceed with the throttle cable installation (refer to Fig. 5.34 and 5.35). Depending upon the type of cable you have, the kit comes with two different union pieces which should work for most applications. If you need to cut your cable, be sure the cable is allowed to move freely through the entire linkage travel, and that you have allowed enough cable to fit through the shorter piece and it is securely in place. Then, complete the installation of the air cleaner elements, bottom breast plate and top plates (refer to Fig. 5.36 and 5.37). Have an assistant



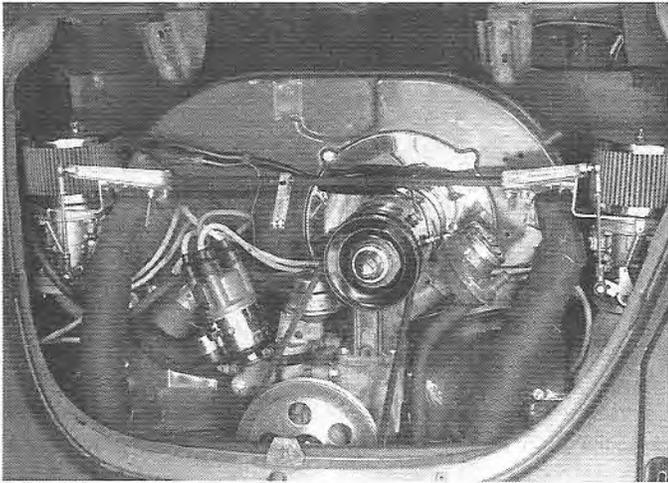
5.35 Tighten the union piece to allow maximum linkage travel



5.36 Install the breast plate into the engine compartment



5.37 Tighten the mounting hardware



5.38 Using an assistant, depress the accelerator pedal and make sure the carburetor linkage reaches wide open throttle without binding or hesitation

depress the accelerator and check for binding linkage (refer to Fig. 5.38). Also, check for adequate hood clearance before closing the decklid. If everything looks good, head down the road for a test drive.

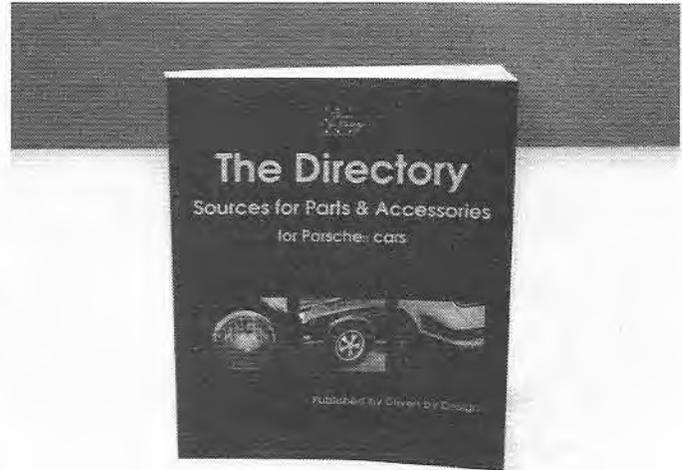
## 6 Weber carburetor tips

The do-it-yourselfer will always have questions concerning his/her Weber carburetor installation and it is best to know a shop and technician that is knowledgeable concerning your particular type of vehicle. Refer to the list at the end of this Section for a complete list of the Weber representatives in your area. For example, Alfa Romeo racing enthusiasts should discuss their carburetor idiosyncrasies with a trained Alfa Romeo technician who has multiple hours experience with installation and tuning Weber conversions. These specialty shops have knowledge and access to many of the carburetor and manifold parts that are necessary for the complete job.

Many of the early model Porsche 911s came with original equipment Weber carburetors and a large percentage of the CIS mechanical injection models are converted to Weber carburetion. PMO in Santa Monica, California has technical expertise concerning Porsche/Weber installations. Questions arise such as "why do the spark plugs foul quickly with my particular size idle jets?". "What type of fuel additive is best for the Weber conversion on my Porsche 911?". "What are the best main jet, air jet, idle jet, emulsion tube, choke combinations for my size engine using the Weber 40 IDA 3C(1) set-up?" All these questions require a trained expert who has come across the problems and solved them many times before. Don't be afraid to learn as much as possible about your carburetor set-up especially if you plan to race the vehicle or drive it for performance.

Weber Carburetor company has moved its aftermarket carburetor operations to Spain and is now concentrating on producing fuel injection systems. Although the Weber company continues to build quality carburetors, the bulk of the production is being shifted into fuel injection. Eventually many of the three barrel Porsche carburetors will be phased out. As a result of this change in policy, PMO in Santa Monica will soon start production of its own three barrel carburetor for Porsche 911 engines. Contact PMO (1-310-393-5423) for complete details.

Weber carburetor conversions have gathered its own group of specialty shops and organizations that handle anything dealing with this performance equipment. These businesses range from V8 hotrod shops to racing and speed testing facilities for Ferrari and Porsche. It is a good idea to locate many of these specialty shops by looking through magazines and advertisements to gather as much information possible about your "custom or classic automobile".



5.39 The Directory published by Driven by Design, lists complete information on parts suppliers, restoration shops, upholstery outlets, etc. concerning Porsche models

Considering the difficulty finding the correct parts, labor and information for your restoration, Driven by Design Publications in Carmel, California has created a complete list of all the Weber specialty shops on the west coast. This book lists anything from Weber carburetor suppliers to restoration experts. The title, *The Directory* (refer to Fig. 5.39), lists specialty shops, distributors, experts etc. for the restoration of Porsche models. This complete listing directory is available through Driven by Design 1-408-625-9342.

### Weber carburetor suppliers and installers

#### ALFA RICAMBI

6644 San Fernando Road  
Glendale, Ca. 91201  
1-818-956-7933

Weber carburetors for Alfa Romeo

#### DRIVEN BY DESIGN

8440 Carmel Valley Road  
Carmel, California 93923  
1-408-625-1393

Publishers of directory information on Porsche and Weber suppliers

#### OTTO'S

41 Venice Beach Blvd.  
Venice Beach, Ca.  
1-310-399-3221

Weber performance installations and testing

#### FAST FREDDY'S

2604 South Harbor Blvd.  
Santa Ana, Ca. 92704  
1-714-540-3801

Weber kits for foreign and domestic engine conversions

#### WORLDPACK (REDLINE)

303 West Artesia Blvd.  
Compton, Ca. 90224  
1-310-604-8200

Factory distributors for Weber carburetors

#### ADVANCED ENGINE MANAGEMENT

15606 South Broadway Center  
Gardena, Ca. 90248  
1-310-327-9336

Performance dyno testing, conversions and installation

#### P.M.O.

135 17th street  
Santa Monica, Ca 90402  
1-310-393-5423

Porsche Weber and custom carburetor specialists

**PRECISION MOTORWORKS**

930 East Orangethorp Avenue  
Anaheim, Ca. 92801  
1-714-879-9072  
Porsche Weber carburetor performance specialists

**PERFORMANCE PARTS**

150 Wireless Blvd.  
Hauppauge, N.Y. 11788  
1-800-654-2778  
Weber kits and parts supplier

**GREENFIELD IMPORTED CAR PARTS**

335 High Street  
Greenfield, Mass. 01301  
1-413-774-2819  
Weber kits and parts supplier. Expert technicians available

**INTERCO**

150 Wireless Blvd.  
Hauppauge, N.Y. 11788  
1-516-434-1818  
1-800-645-7488  
Weber kits and parts supplier

**MOTORSPORT AUTO**

1139 West Collins Avenue  
Orange, Ca. 92667  
1-800-633-6331  
1-714-639-2620  
Weber DGV kits for Z cars

**EUROPEAN RACING**

2899 West 190th Street  
Redondo Beach, Ca. 90278  
1-310-370-3815  
Weber kits and parts supplier specializing in VW and Porsche

**JAM ENGINEERING**

886 Abrego Street  
Monterey, Ca. 93942  
1-408-372-1787  
1-800-431-3533 (outside California)  
Weber kits for BMW and Mercedes Benz

**PIERCE MANIFOLDS**

Mike Pierce owner  
8901 Murray Avenue  
Gilroy, Ca. 95020  
1-408-842-6667  
Largest distributor of Weber carburetors and manifolds. Specializing in overseas and Canadian production models

**N.A.R.W.**

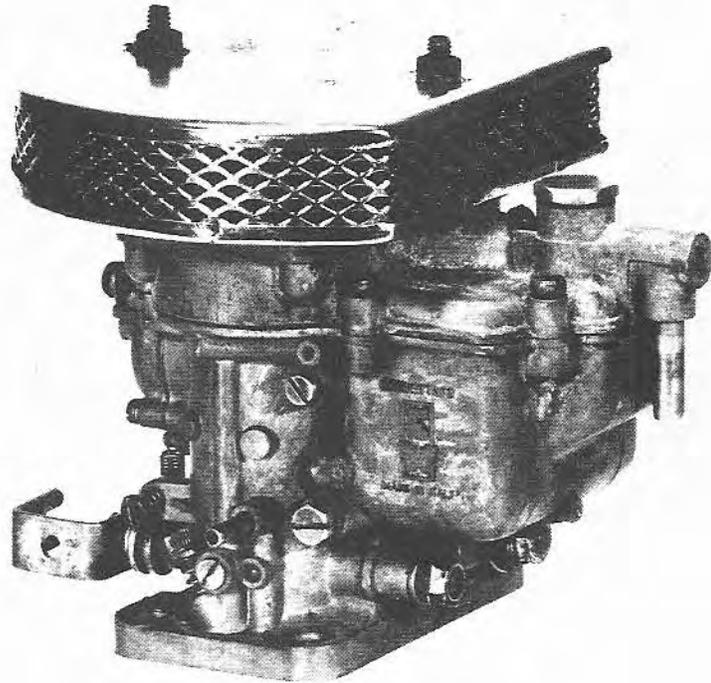
7355 Canby Road  
Reseda, Ca.  
1-818-881-1222  
Weber installations and performance tuning on Porsches

**CENTERLINE PRODUCTS**

4715 North Broadway  
Boulder, Co. 80302  
1-303-447-0239  
Weber kits for Alfa Romeo

**MOTORSPORT AUTO**

1139 West Collins Avenue  
Orange, Ca. 92667  
1-800-633-6331  
Weber conversion kits for Nissan Z cars



## Part 2 Weber Carburetors

### Chapter 6 Type 28/36 DCD

#### Contents

	<i>Section</i>		<i>Section</i>
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Construction .....	2	Removal and refitting .....	4
Disassembly .....	5	Special overhaul procedures .....	6
Fault diagnosis .....	9	Tuning .....	8
Introduction .....	1		

#### Adjustment data

Float level setting dimensions	in (mm)
Closed position .....	0.197 (5.0)
Open position .....	0.531 (13.5)
Stroke .....	0.335 (8.5)

## 1 Introduction

The Weber 28/36 carburettor is of the downdraught type and has two barrels to supply the primary and secondary functions; the primary barrel is of 28.0 mm diameter at the throttle valve location and the secondary barrel is of 3.60 mm diameter. Each throttle valve is mounted on separate shafts and the valves are of the differential or progressive choke type. The linkage between the two throttle valves is arranged so that the secondary throttle valve does not commence to open until the primary throttle valve is  $\frac{2}{3}$  open.

The carburettor is normally fitted to the engine as a single unit with both barrels feeding a common inlet manifold, the most common arrangements being as follows:

- 1 One unit on a four-cylinder in-line engine
- 2 One unit on a six-cylinder in-line engine

The carburettor identification mark is located on the lower flange outer surface.

## 2 Construction

The main body and cover of the Weber 28/36 DCD carburettor are made of die-cast aluminium or zinc alloy (Mazak), the mounting flange being machined flat for fitting on the inlet manifold. The upper face of the cover is also machined flat and incorporates four threaded holes for the fitting of an air cleaner (photo).

The throttle valves and shafts are of brass and the shafts run directly in the carburettor body. All fuel and air jets and emulsion tubes are of brass construction and are screw fittings into the main body.

Internal channels of the main body and cover are mostly drilled and are sealed with lead plugs where necessary.

The fuel float assembly comprises two semi-floats which are each of two halves soldered together; they are made of thin brass sheet.

## 3 Operation

### Cold starting

The starting device fitted to type DCD carburetors operates independently of the main circuit and may be considered as a separate carburettor within the main carburettor.

When the choke cable is pulled, the starting device operating lever turns the control shaft which lifts the starting valve off of its seat. Reference to Fig. 6.3 will show that fuel from the float chamber (7) is driven through the channel (53) to arrive at the starter fuel jet (52). Air entering through the air correction jet (51) and the bypass channel emulsifies the fuel as it is drawn through the starting jet emulsion holes and the bypass channel. The mixture is then drawn through the channel (48) and past the starter valve (50) where additional air from the channel (49) weakens the mixture. The final mixture is drawn through the channel (54) and into both the primary and secondary carburettor barrels at the engine side of the throttle valves.

Once the engine starts, the vacuum in the channels (54) and (57) increases to such an extent that the starter plunger (56) is pulled against spring pressure from the seat (55). Additional air is thus admitted to the mixture to allow the engine to continue running.

The starting device has a progressive action made possible by the tapered shape of the valve head. Lowering the valve will reduce the amount of mixture admitted to the engine. The supply will cease when the valve is completely shut.

### Idling and progression

Refer to Fig. 6.4 and note that when the engine is idling the secondary throttle valve (37) is completely shut, but the primary

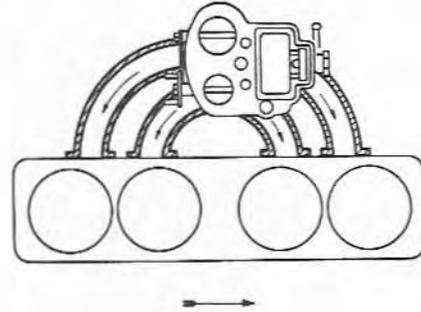


Fig. 6.1 Single carburettor fitted to a four-cylinder in-line engine (Sec 1)

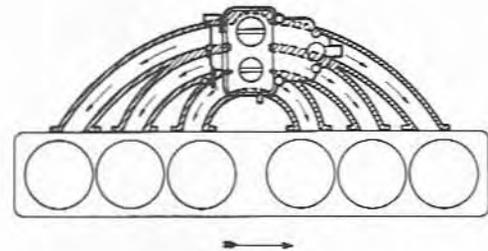
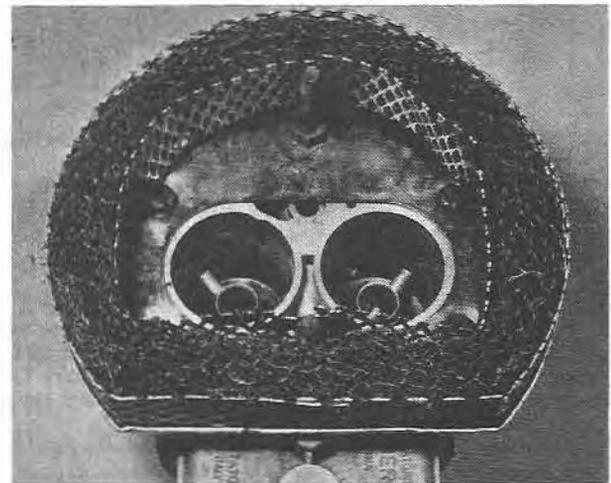


Fig. 6.2 Single carburettor fitted to a six-cylinder in-line engine (Sec 1)



2.0 Typical air cleaner with the cover removed

throttle (13) is slightly open, according to the throttle idling adjustment screw setting. Fuel is drawn from the float chamber through an internal channel to the fuel jet in the idling jet (34). On passing through the fuel jet, air is introduced to the fuel from the calibrated bush (35) and the holes in the idling jet tube. The fuel then becomes emulsified.

The mixture then passes through the channel (32), past the idling mixture adjustment screw (20), through the idling feed hole (31) and into the primary carburettor throat at the engine side of the throttle valve. The idling adjustment screw (20) has a tapered end and can therefore be adjusted to admit more or less fuel/air mixture as necessary.

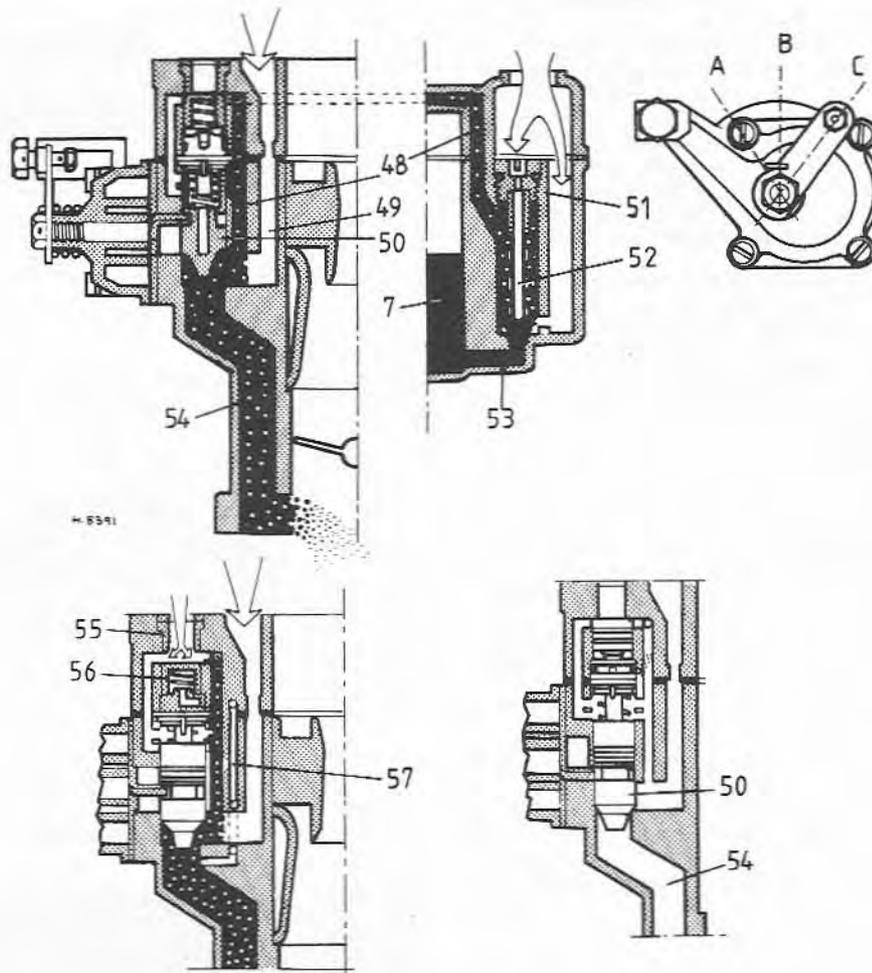


Fig. 6.3 Cold starting device operation (Sec 3)

7 Float chamber  
48 Channel  
49 Air channel  
50 Starter valve

51 Air correction jet  
52 Starting jet  
53 Fuel channel  
54 Emulsion channel

55 Starter air valve seat  
56 Starter air valve  
57 Transfer channel

A Cold starting position  
B Warming up position  
C Closed position

When the primary throttle valve (13) is opened slightly to increase the engine speed, the progression hole (36) is brought into action to provide additional fuel. This is necessary to prevent a flat spot occurring before the main primary fuel supply system comes into operation.

When the primary throttle valve (13) is approximately  $\frac{2}{3}$  open, the secondary throttle valve (37) will commence to open. This action causes the secondary progression hole (38) to be brought under engine vacuum. Fuel is then drawn from the float chamber to the secondary idling jet (27), where air is introduced from the calibrated bush (26). The mixture passes through the channel (29) and thus emerges from the progression hole (38).

With either throttle valve fully open, the progression system for the particular carburettor barrel ceases.

#### Normal running

Under full throttle and high speed cruising conditions, the throttle plates will be sufficiently far from the idling and progression holes to prevent them from admitting fuel and the main fuel supply circuits will be brought into action.

Refer to Fig. 6.5 and note that fuel from the float chamber (7) passes through the main jets (8) and channels (9) to the

emulsion tube wells (11). At the same time, air is drawn through the air corrector jets (1), through the centre of the emulsion tubes (12) and via the emulsion tube holes to the fuel. The fuel then becomes emulsified and is drawn through the nozzles (17) and auxiliary venturis (16) and thus mixes with the main air supply as it is drawn through the chokes (15) and into the engine.

Under static conditions the level of fuel in the float chamber and emulsion tube will be identical; however, as the engine speed increases and the fuel flow is faster, the fuel level in the emulsion tube drops. By providing additional holes in the lower part of the emulsion tube, the necessary air correction is made possible at the higher engine speeds.

The main fuel supply circuits of the primary and secondary carburettor barrels operate progressively and there is a certain amount of overlapping as each circuit is brought into action.

#### Acceleration

To provide the engine with a rich mixture when accelerating, the carburettor is equipped with an acceleration pump which is operated by the primary throttle of the carburettor and injects only into the primary venturi. Reference to Fig. 6.6 will

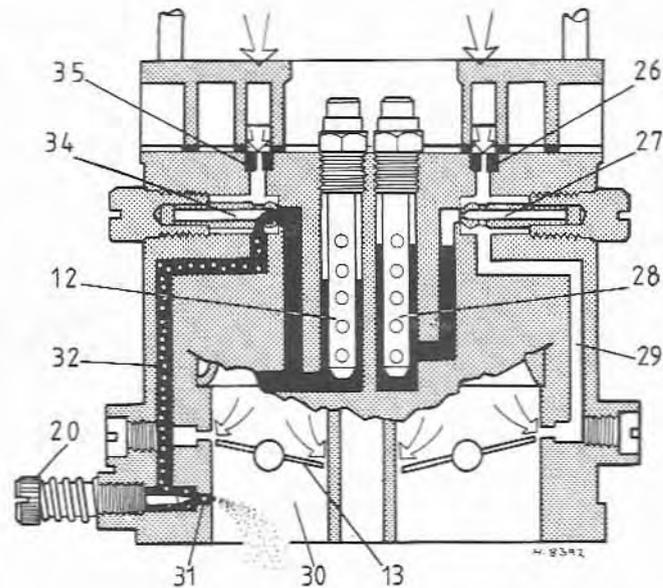
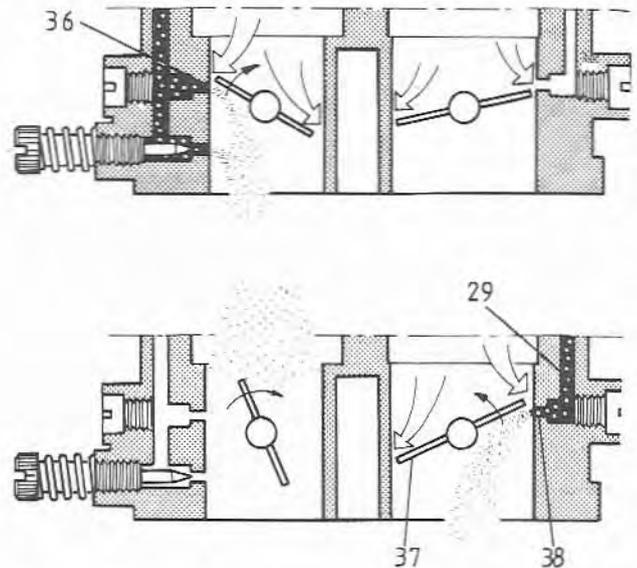


Fig. 6.4 Carburettor idling and progression phase (Sec 3)

- 12 Primary emulsion tube
- 13 Primary throttle valve
- 20 Idling mixture control screw
- 26 Secondary air jet
- 27 Secondary idling jet
- 28 Secondary emulsion tube
- 29 Secondary progression channel
- 30 Primary barrel
- 31 Idle feed orifice
- 32 Primary idling and progression channel
- 34 Primary idling jet
- 35 Primary air jet
- 36 Primary progression hole
- 37 Secondary throttle valve
- 38 Secondary progression hole



show that when the primary throttle valve is closed, the lever (45) lifts the operating rod (44) under the action of the coil spring. The piston (42) is pulled up the piston bore against the pressure of the spring (41) and fuel is drawn from the float chamber (7) through the intake valve (47).

When the primary throttle valve is opened, the lever (45) moves away from the operating rod (44) and allows the piston (42) to move down the bore under the action of the spring (41). The ball in the intake valve (47) prevents fuel returning to the float chamber (7) and the fuel is forced along the internal channel (43), past the delivery valve (4), through the pump jet (39) and into the primary venturi. The inlet valve (47) may or may not incorporate a discharge orifice according to the application, but where there is one, a certain amount of fuel is discharged back into the float chamber during the acceleration pump piston stroke. By fine calibration of the discharge orifice, it is possible to determine the exact quantity of fuel injected by the acceleration pump.

#### 4 Removal and refitting

**Note:** The following procedure gives a general rather than a specific method of removing and refitting the carburettor, as much will depend on the location within the vehicle.

- 1 Unscrew and remove the retaining nuts and withdraw the air cleaner cover and filter gauze. Unscrew the air cleaner retaining screws, being very careful not to drop them into the carburettor barrels.
- 2 Loosen the fuel supply hose clip and pull the hose from the inlet pipe.
- 3 Slacken the choke cable retaining screws on the starting device and pull the cable clear.
- 4 Disconnect the throttle control rod from the throttle lever.
- 5 Pull the ignition advance tube from the vacuum pipe on the side of the carburettor.

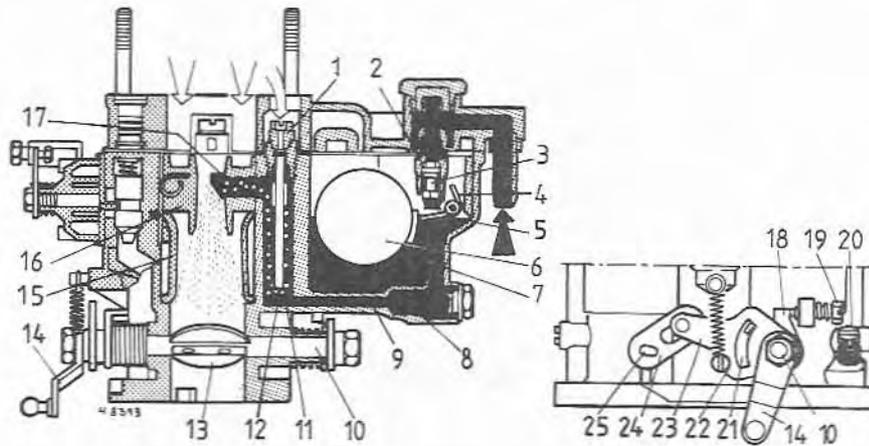


Fig. 6.5 Carburettor normal phase (Sec 3)

- |                     |                       |                                    |                             |
|---------------------|-----------------------|------------------------------------|-----------------------------|
| 1 Air corrector jet | 8 Main jet            | 15 Choke                           | 21 Slot                     |
| 2 Needle valve seat | 9 Channel             | 16 Auxiliary venturi               | 22 Sector lug               |
| 3 Needle valve      | 10 Throttle shaft     | 17 Discharge nozzle                | 23 Link sector              |
| 4 Spring hook       | 11 Emulsion tube well | 18 Throttle sector                 | 24 Secondary lever          |
| 5 Fulcrum pin       | 12 Emulsion tube      | 19 Idling adjustment screw         | 25 Secondary throttle shaft |
| 6 Float             | 13 Throttle valve     | 20 Idling mixture adjustment screw |                             |
| 7 Float chamber     | 14 Throttle lever     |                                    |                             |

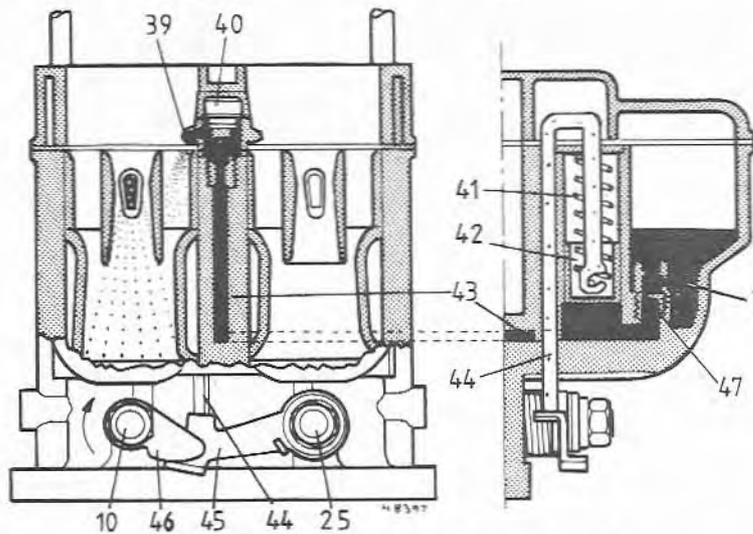


Fig. 6.6 Carburettor acceleration phase (Sec 3)

- |                             |                            |                  |                               |
|-----------------------------|----------------------------|------------------|-------------------------------|
| 7 Float chamber             | 40 Delivery valve          | 43 Fuel channel  | 46 Operating cam              |
| 10 Primary throttle shaft   | 41 Accelerator pump spring | 44 Operating rod | 47 Intake and discharge valve |
| 25 Secondary throttle shaft | 42 Pump piston             | 45 Lever         |                               |
| 39 Pump jet                 |                            |                  |                               |

- 6 Where fitted, disconnect the automatic transmission controls from the carburettor.
- 7 Unscrew and remove the carburettor mounting nuts then withdraw the unit over the mounting studs.
- 8 Remove the inlet manifold gasket and clean all traces from the contact faces of the inlet manifold and carburettor.
- 9 Protect the inlet manifold from ingress of foreign matter whilst the carburettor is removed, by sealing it with masking tape.
- 10 Refitting is a reversal of removal, but the following additional points should be noted:

- (a) Always fit a new gasket and tighten the four retaining nuts in diagonal sequence.
- (b) When refitting the choke (starting device) cable, first fit the outer cable to the starting device cover, then insert the inner cable into the operating lever nut and push the instrument panel control knob fully in. Tighten the inner cable retaining screw with the operating lever fully released.
- (c) The idling adjustment screws should be set as described in Section 7 and finally tuned as described in Section 8.

## 5 Disassembly

- 1 Thoroughly clean the carburettor exterior and wipe dry.
- 2 Referring to Fig. 6.7, unscrew the filter inspection plug (11), remove the gasket (10) and extract the fuel filter (8) (photos).
- 3 Using a suitable screwdriver, unscrew the carburettor cover retaining screws (3) together with the spring washers, then carefully withdraw the cover (1) from the carburettor body (77). With a new carburettor this is straightforward, but where the seat of the starter plunger spring (7) is a loose fit in the cover (1), it may easily fall out together with the spring (7) and plunger (6) (photo).
- 4 Remove the gasket (12) from the carburettor cover (1).
- 5 Invert the carburettor cover (1) so that the float assembly is uppermost, then use a suitable diameter pin punch to release the float fulcrum pin (15) from the two posts.
- 6 Using a pair of flat pliers, extract the fulcrum pin (15), then carefully withdraw the float (16), at the same time disconnecting the long tab on the float arm from the spring hook on the end of the needle valve needle (photo).
- 7 Lift the needle from the needle valve (14) seating (photo).
- 8 Using a 10 mm socket, unscrew the needle valve seating and remove the gasket (13).
- 9 If the starter plunger spring seat is still retained in the cover (1), use a plastic rod entered through the lockwasher (4) and tap out the seating, spring (7), and plunger (6).
- 10 The lockwasher (4) is retained in the carburettor cover (1) by local peening and unless the starter plunger seat (5) requires renewal (see overhaul Section 6) neither item should be removed. If removal is necessary, extract the lockwasher (4) and use a small file to remove the peening; the plunger seat (5) can then be driven out from below by using a suitable diameter drift.
- 11 Unscrew and remove the main jet holders (39) together with the gaskets (37) and place them in separate containers

marked 'primary' and 'secondary' as necessary (photo).

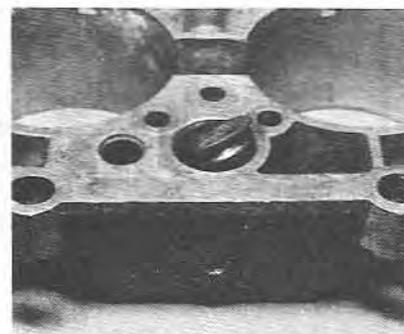
- 12 Unscrew the main jets (38 and 38A) from their respective holders (photo).
- 13 Unscrew and remove the idling jet holders (36) together with the sealing rings (35) and place them in separate containers marked 'primary' and 'secondary' as necessary (photo).
- 14 Separate the idling jets (34 and 34A) from their respective holders by pulling apart (photo).
- 15 Using an 8 mm ring or box spanner, unscrew and remove the emulsion tube assemblies (74 and 74A), keeping them identified for correct refitting (photos).
- 16 Unscrew the air corrector jets (73 and 73A) from the emulsion tubes (74 and 74A), again keeping them identified for correct refitting (photo).
- 17 Unscrew and remove the throttle idling adjustment screw (44) and spring (43).
- 18 Unscrew and remove the idling mixture adjusting screw (41) and spring (42) (photo).
- 19 Unscrew the accelerator pump delivery valve (70) and withdraw it together with the gaskets (71) and pump jet (72), then separate the jet (72) and gaskets (71) from the valve (70) (photos).
- 20 Prise the accelerator pump retaining plate (17) from the carburettor body, or alternatively lift the operating rod (18) until the retaining plate (17) comes away (photo). Lift the accelerator pump operating rod (18) from the carburettor body (77) together with the spring (19) and piston (22).
- 21 Pull the spring (19) away from the piston (22) then unhook the piston by turning it through 90°. Remove the piston (22), spring (19) and retaining plate (17) from the operating rod (18).
- 22 Unscrew and remove the intake and discharge valve (23) from the bottom of the float chamber (photo).
- 23 Unscrew and remove the starting air jet (20) and fuel jet (21) assembly, then separate the two components by pulling them apart (photos).



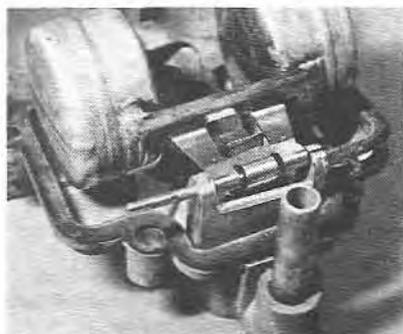
5.2a Removing the filter inspection plug



5.2b Removing the fuel filter



5.3 Example of a loose starter plunger spring seat



5.6 Removing the float fulcrum pin



5.7 Removing the needle from the needle valve



5.11 Removing a main jet holder

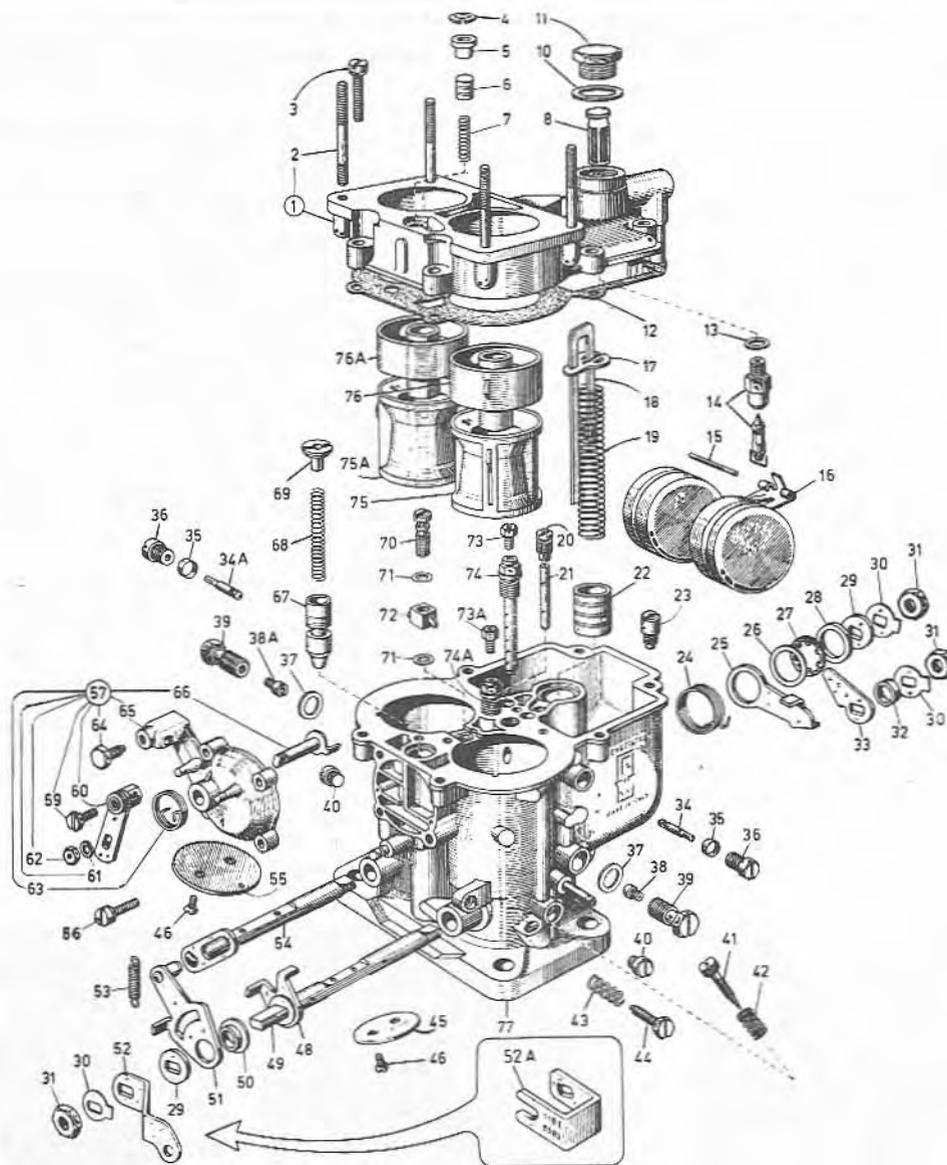


Fig. 6.7 Exploded view of the DCD carburettor (typical) (Sec 5)

- |                           |                               |                                              |                                 |
|---------------------------|-------------------------------|----------------------------------------------|---------------------------------|
| 1 Carburettor cover       | 23 Intake and discharge valve | 41 Idle mixture adjusting screw              | 61 Spring washer                |
| 2 Stud                    | 24 Return spring              | 42 Spring                                    | 62 Nut                          |
| 3 Cover retaining screw   | 25 Pump control lever         | 43 Spring                                    | 63 Return spring                |
| 4 Lockwasher              | 26 Washer                     | 44 Throttle adjusting screw                  | 64 Screw                        |
| 5 Starter plunger seat    | 27 Toothed ring               | 45 Primary throttle                          | 65 Starting device cover        |
| 6 Starter plunger         | 28 Washer                     | 46 Throttle retaining screw                  | 66 Shaft                        |
| 7 Spring                  | 29 Spacer                     | 47 Return spring                             | 67 Starting valve               |
| 8 Filter                  | 30 Lockwasher                 | 48 Stop sector                               | 68 Spring                       |
| 10 Gasket                 | 31 Retaining nut              | 49 Primary shaft                             | 69 Spring guide and retainer    |
| 11 Filter plug            | 32 Spacer bush                | 50 Bush                                      | 70 Pump delivery valve          |
| 12 Cover gasket           | 33 Pump control cam           | 51 Primary sector                            | 71 Gasket                       |
| 13 Needle valve gasket    | 34 Primary idling jet         | 52 and 52A Alternate throttle control levers | 72 Pump jet                     |
| 14 Needle valve           | 34A Secondary idling jet      | 53 Return spring                             | 73 Primary air corrector jet    |
| 15 Fulcrum pin            | 35 Sealing ring               | 54 Secondary shaft                           | 73A Secondary air corrector jet |
| 16 Float                  | 36 Idle jet holder            | 55 Secondary throttle                        | 74 Primary emulsion tube        |
| 17 Spring retaining plate | 37 Gasket                     | 56 Retaining screw                           | 74A Secondary emulsion tube     |
| 18 Operating rod          | 38 Primary main jet           | 57 Starting device                           | 75 Primary choke                |
| 19 Spring                 | 38A Secondary main jet        | 59 Screw                                     | 75A Secondary auxiliary venturi |
| 20 Starting air jet       | 39 Main jet holder            | 60 Control lever                             | 77 Carburettor body             |
| 21 Starting fuel jet      | 40 Progression hole           |                                              |                                 |
| 22 Pump piston            |                               |                                              |                                 |



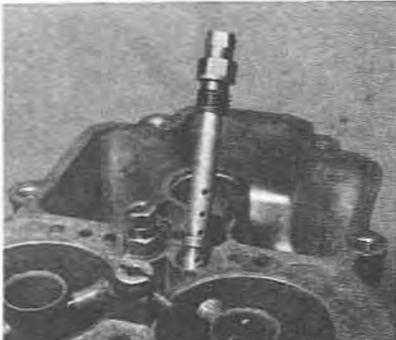
5.12 Location of a main jet in its holder



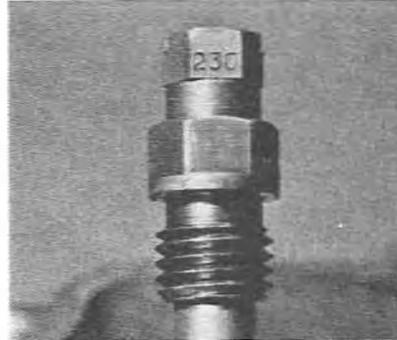
5.13 Removing an idling jet holder



5.14 Location of an idling jet in its holder



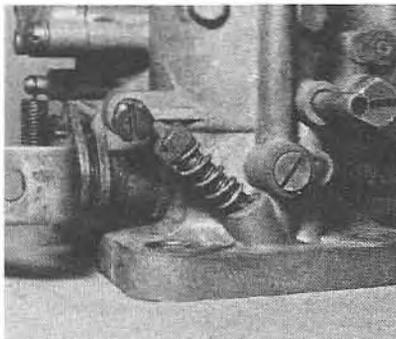
5.15a Removing an emulsion tube assembly



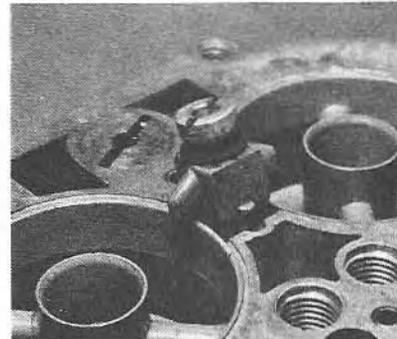
5.15b An emulsion tube air corrector jet identification number



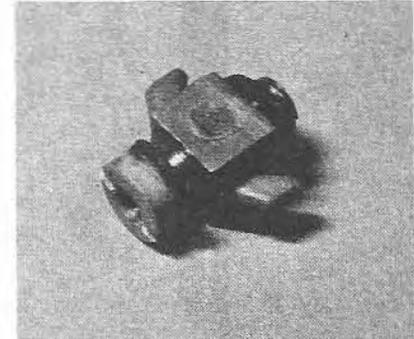
5.16 Location of an air corrector jet in an emulsion tube



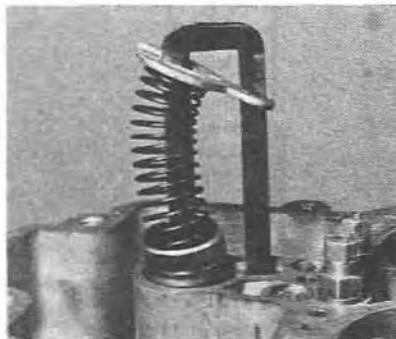
5.18 Removing the idling mixture adjusting screw



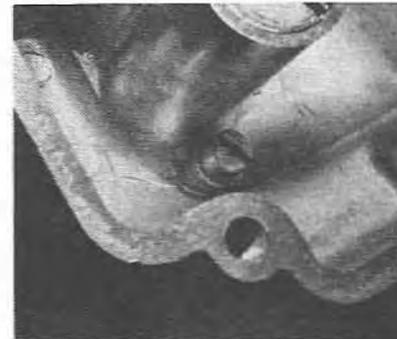
5.19a Withdrawing the accelerator pump valve and jet



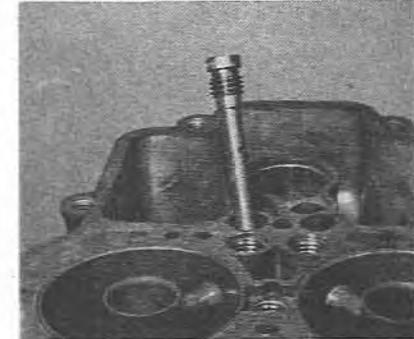
5.19b The accelerator pump valve and jet



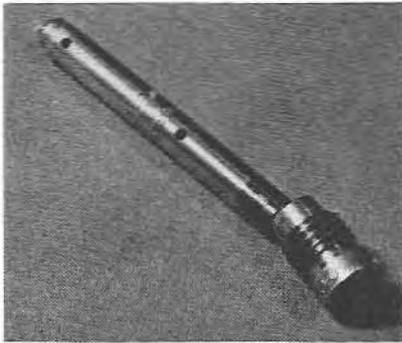
5.20 Removing the accelerator pump assembly



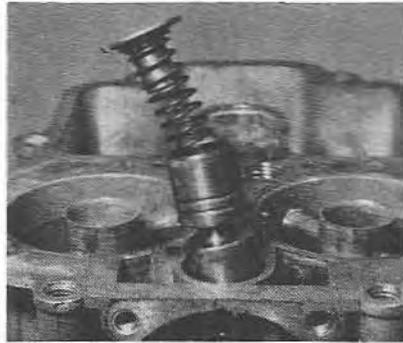
5.22 Location of the accelerator pump intake and discharge valve



5.23a Removing the starting jet assembly



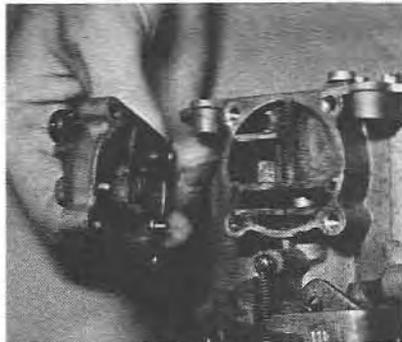
5.23b The starting air and fuel jets



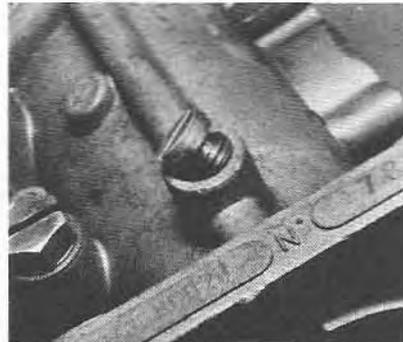
5.24a Removing the starting valve components



5.24b Showing the tapered starting valve head, spring and retainer



5.26 Removing the starting device



5.31 Progression hole inspection screw plug location



Fig. 6.8 Choke removing tool (Sec 5)

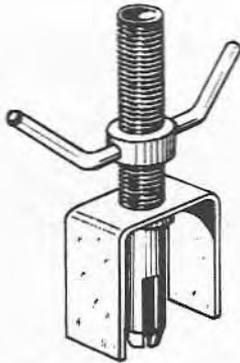
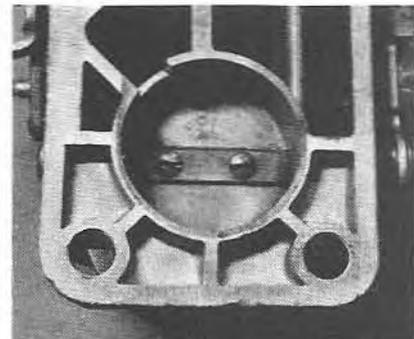


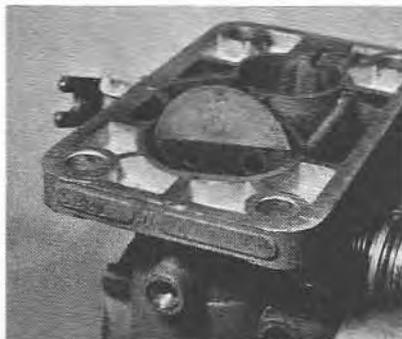
Fig. 6.9 Auxiliary venturi removing tool (Sec 5)



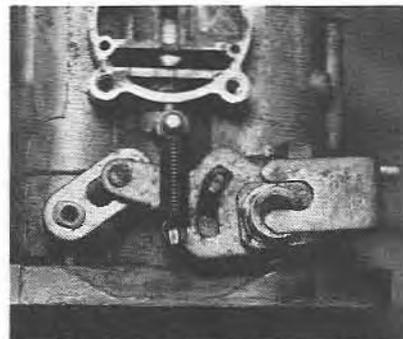
5.33 Typical choke, showing diameter identification mark



5.35 Location of the secondary throttle valve retaining screws



5.36 Removing the secondary throttle valve



5.37 Primary sector return spring location



Fig. 6.10 Throttle shaft retaining tool (Sec 5)

24 Using a hooked length of welding rod or similar object, pull the starting valve spring guide and retainer (69) from the carburettor body (77) (photos).

25 Extract the retainer (69) and spring (68) from the starting valve.

26 Unscrew and remove the starting device retaining screws (56) and withdraw the starting control (57) (photo); note the spring washers fitted to the retaining screws (56).

27 Dismantle the starting device by unscrewing the nut (62) and removing the spring washer (61). Lift the control lever (60) over the stop lug, release the spring tension and withdraw it from the shaft (66).

28 Remove the coil spring (63), then withdraw the shaft (66) from the cover (65), noting the relative position of the starting valve operating lug.

29 Unscrew the cable retaining screws (59 and 64).

30 Invert the carburettor body (77) and remove the starting valve (67); if for any reason the valve is difficult to remove, a plastic drift may be inserted from underneath the carburettor and the valve tapped upwards with a light hammer.

31 Unscrew and remove the progression hole inspection screw plugs (40) (photo).

32 Remove the auxiliary venturi (76) and choke (75) from the primary barrel and place them in a suitably marked container. If they will not come out with hand pressure, it will be necessary to obtain Weber tools nos 98009 200 and 98009 100.

33 Remove the auxiliary venturi (76A) and choke (75A) (photo) from the secondary barrel, using the procedure given in paragraph 32. Place them in a suitably marked container.

34 Invert the carburettor and note the location of each throttle plate, marking them with a pencil if necessary.

35 Unscrew and remove the throttle plate retaining screws (46) with the throttle closed, making sure that unnecessary pressure is not exerted on the throttle spindles (49 and 54) as this could distort them (photo).

36 Fully open the throttle and extract the two throttle valves (45 and 55) from their respective spindles using a pair of flat pliers (photo).

37 Unhook the primary sector return spring (53) from the anchoring post and the sector (51) (photo).

38 Bend back the tab washers (30) at both ends of the primary shaft (49) and unscrew the retaining nuts (31). Provided the nuts are not too tight the boss shaft (49) will not be buckled, but if there is any doubt on this matter, it will be necessary to obtain Weber tool no 98011 700 to hold the centre section of the spindle stationary whilst loosening the nuts (photo).

39 Remove the nut (31), tab washer (30), spacer (32) and accelerator pump control cam (33) from the primary shaft (49), then pull the shaft (49) from the carburettor body (77), together with the throttle lever and components and spring (if fitted).

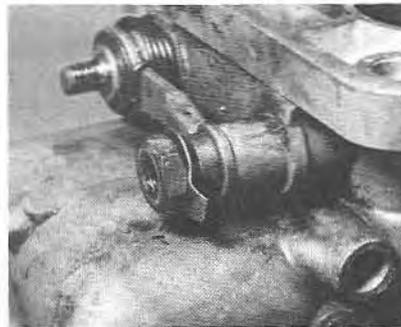
40 Remove the nut (31), tab washer (30), throttle control lever (52 or 52A), spacer (29), primary sector (51), bush (50) and stop sector (48) from the primary shaft (49).

41 Bend back the tab washer (30) at the float chamber end of the secondary shaft (54) and unscrew the retaining nut (31) whilst holding the other end of the shaft stationary (photo). Take care not to buckle the brass shaft (54). If the nut appears to be excessively tight, obtain Weber tool no 98011 700 to hold the centre section of the spindle stationary whilst loosening the nut.

42 Remove the nut (31), tab washer (30) and spacer (29) from the end of the secondary shaft (54). Withdraw the shaft (54) from the carburettor body (77) (photo).

43 If the accelerator pump control lever (25) moves freely on its bearing and the coil spring (24) is not broken, it is recommended that these components are not removed as it is not an easy task to refit them. However, if either component requires renewal, first obtain a new toothed ring (27), otherwise the repair will be in vain, then remove the washer (28) (photo).

44 Using a narrow screwdriver, prise the toothed ring (27) from the bearing lug, edging around the ring a little at a time.



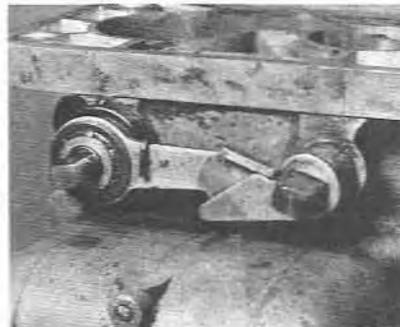
5.38 Removing a primary shaft retaining nut



5.41 Removing the secondary shaft retaining nut



5.42 Withdrawing the secondary shaft from the carburettor body



5.43 Location of the accelerator pump control lever, spring, and toothed ring

45 Prise the spring end from the carburettor body (77) to release all tension, then withdraw the washer (26), control lever (25), and spring (24); it is advisable to place a cloth over the components when prising out the spring, to stop them springing

onto the floor.

46 The brass bearing supporting the control lever (25) may be prised from the carburettor body (77), although it cannot be obtained as a spare part.

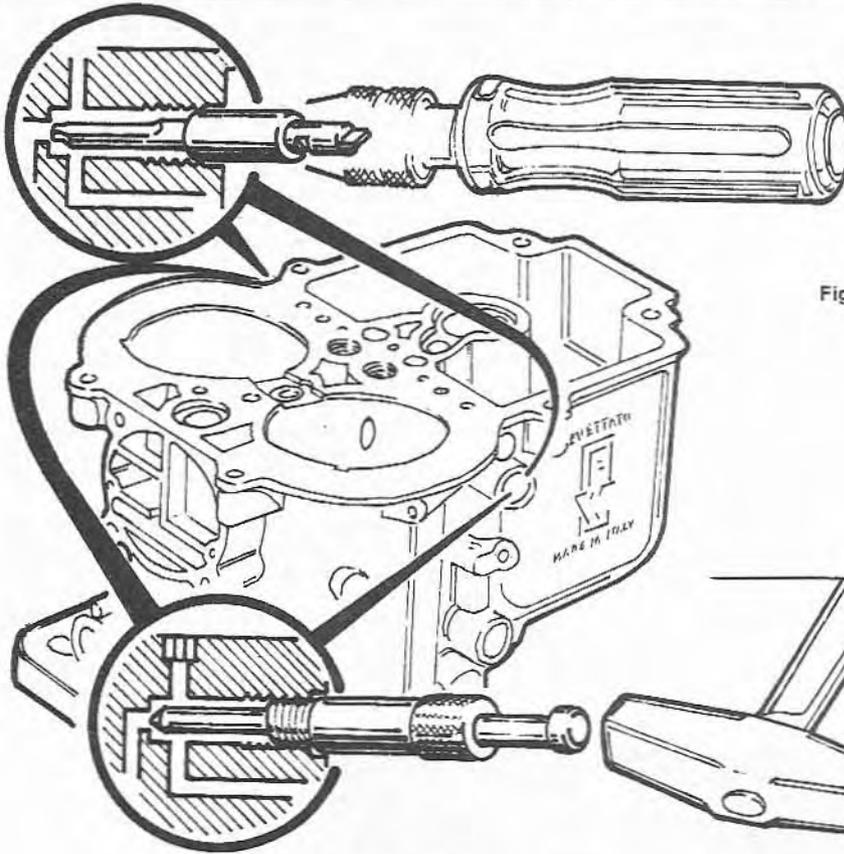
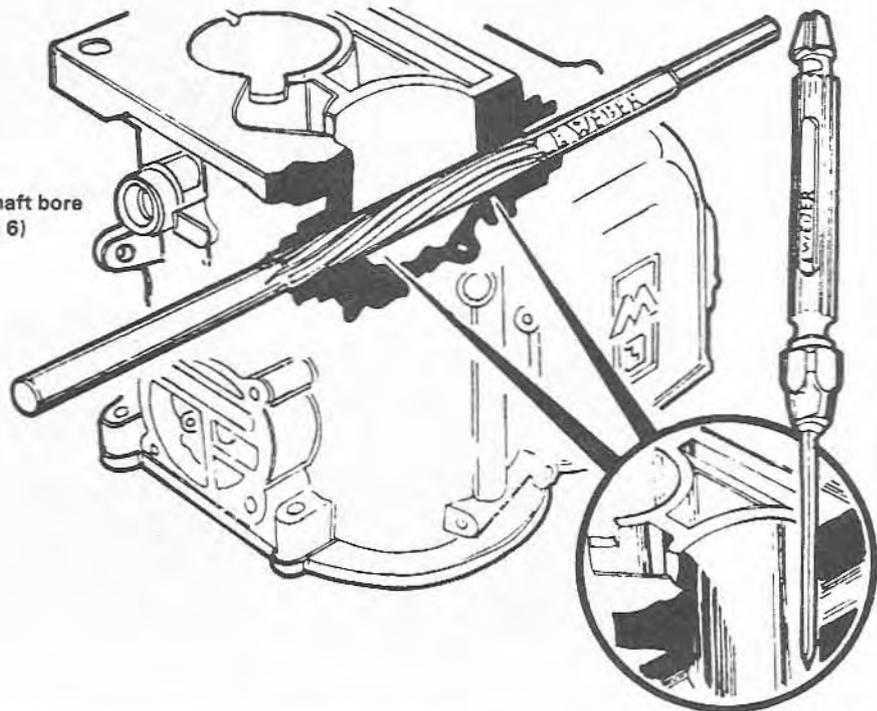


Fig. 6.11 Idling jet seats overhaul procedure (Sec 6)

Fig. 6.12 Removing the throttle shaft bore and deburring the barrel (Sec 6)



### 6 Special overhaul procedures

After carrying out the general overhaul procedures given in Chapter 4, the following special procedures should be made:

- 1 Using a hand chuck and Weber tool no 98005 900, reform the idling jet seatings in the carburettor body by carefully rotating the tool in alternate directions. Finish the seatings by inserting Weber tool 98010 500 and gently tapping the centre pin whilst rotating it.
- 2 Using the same procedure as described in paragraph 1, reform the starter valve seat and bush, using Weber tools nos 98004 100 and 98002 650.
- 3 Using the same procedure as described in paragraph 1, reform the starting jet seat, using Weber tool nos 98006 300 and 98010 600.
- 4 If the emulsion tube bores are discoloured and show signs of sediment build up, ream them clear again using Weber tool no 98005 300. Rotate the tool slowly with a hand chuck until it moves quite freely, then remove it whilst still rotating it.
- 5 If, on disassembly, the throttle shafts (49 and 54) are a tight fit in the carburettor body (77) and they are of original diameter (8.0 mm), use Weber tool no 98003 600 to ream the shaft bores clear with the aid of a hand chuck. Should the shaft bores be excessively worn, oversize shafts of 8.5 mm diameter must be fitted and the bores should be reamed using Weber tool no 98003 500. Note that normally the shaft itself will wear

quicker than its bore, in which case it will only be necessary to renew the shaft.

6 Using a small file, remove any burrs that have formed at the end of the shaft bores as a result of reaming.

7 Check the internal channels of the carburettor body (77) and cover (1), for blockage by injecting fuel with a syringe and observing that it emerges freely from the particular channel being tested. If any are blocked, the lead plugs as shown in Fig. 6.13 must be drilled out and the channels cleared and checked with the special Weber tool.

8 The channels are of three diameters, viz 1.0 mm, 1.5 mm and 2.0 mm. The corresponding tools are Weber tool nos 98014 300, 98014 400, and 98014 500.

9 The carburettor body and cover should be thoroughly cleaned after overhaul to remove swarf and dirt, preferably using clean fuel and air pressure. The lead plugs should be renewed and retained in position by using the Weber tool no 98010 800 as a punch until the plug is expanded into its bore.

10 Check the semi-floats of the float unit for damage and leakage. The seams around each float should be at 90° to the fulcrum pin axis. Check for leakage by shaking the floats and listening for any fuel which may have entered them. If fuel is present, the float assembly must be renewed.

11 Check the contact faces of the starter air valve and seat in the carburettor cover; if either of these components is excessively worn both must be renewed.

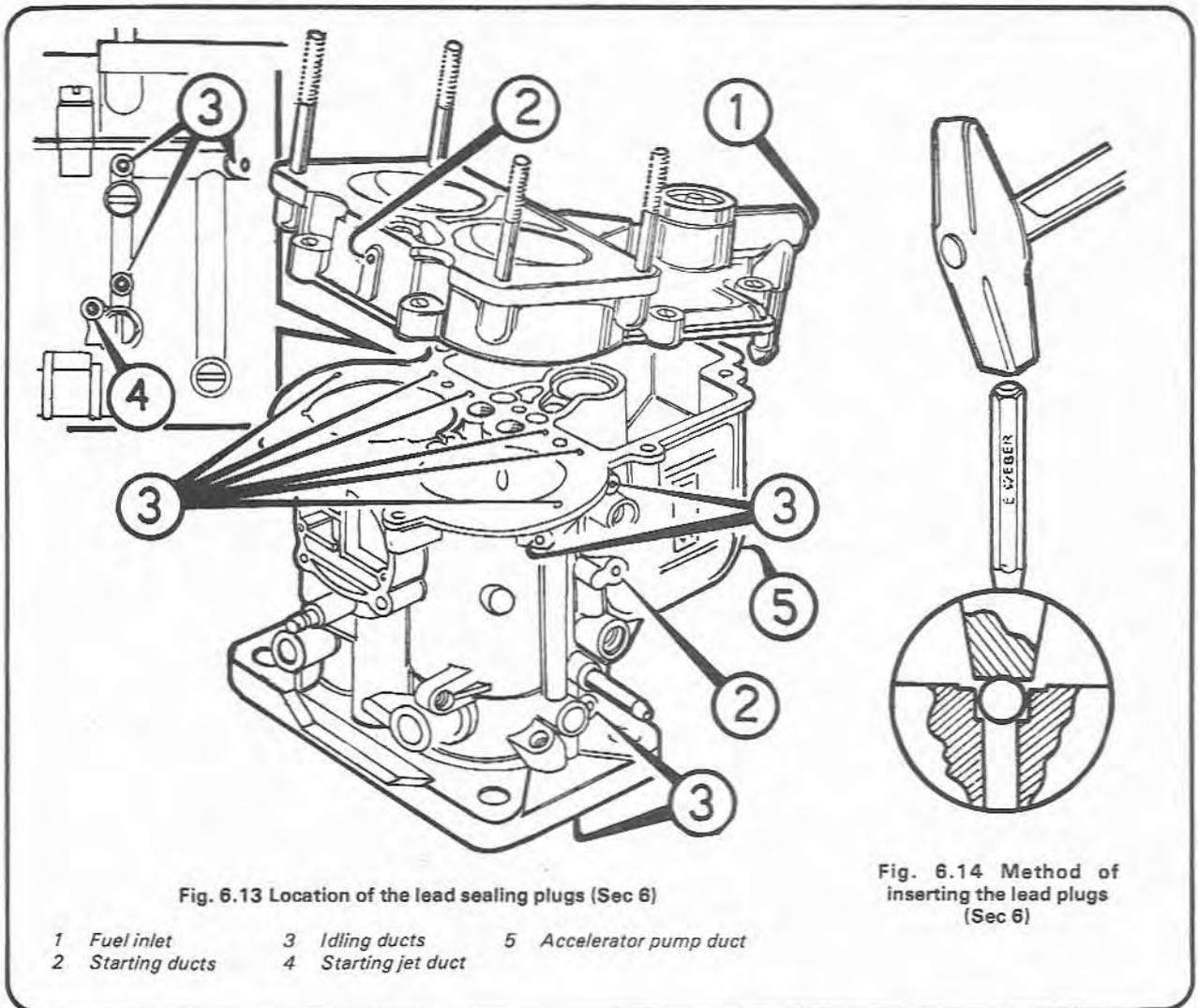


Fig. 6.13 Location of the lead sealing plugs (Sec 6)

- |                  |                     |                         |
|------------------|---------------------|-------------------------|
| 1 Fuel inlet     | 3 Idling ducts      | 5 Accelerator pump duct |
| 2 Starting ducts | 4 Starting jet duct |                         |



Fig. 6.14 Method of inserting the lead plugs (Sec 6)

## 7 Assembly

**Note:** All components should be clean and dry before starting the assembly procedure.

- 1 Press the brass bearing which supports the control lever (25) onto the carburettor body (77), largest diameter first.
- 2 Place the coil return spring (24) over the bearing and insert its straight end into the retaining hole provided in the body (77).
- 3 The coil spring (24) must now be tensioned so that the control lever (25) can be inserted under the hooked end. One of two methods may be used to do this. Much will depend on the tension of the spring fitted as to how easy its fittings will be. The first method involves one large and one small screwdriver. With the large screwdriver, pass the hooked end of the spring onto the bore of the float chamber, then insert the small screwdriver from the primary shaft end and pass the hook onto the small screwdriver. Lever the small screwdriver around until the hooked end faces the primary shaft; it will be necessary to reposition the spring coils onto the carburettor body using the large screwdriver during the procedure. The second method involves using a length of thin wire firmly secured to the hooked end of the coil spring; the wire is wrapped once around the carburettor body lug and simply pulled to tension the spring.
- 4 With the coil spring (24) suitably tensioned, fit the control lever (25) onto its bearing, making sure that the square section tab is below the accelerator pump rod (18) aperture, then ease the coil spring hook onto the lever (25).
- 5 Fit the washer (26), then fit the new toothed ring (27); the teeth of the ring must initially face the carburettor body (77) and the ring should be driven into position using a suitable internal diameter tube (photo).
- 6 Lightly lubricate the secondary throttle shaft (54) with engine oil then insert it into the bore from the starting device end.
- 7 Locate the spacer (29), tab washer (30) and nut (31) onto the shaft (54). Tighten the nut (31) whilst holding the other end of the shaft stationary. There is no need to overtighten the nut, but if Weber tool no 98011 700 is available, use this to restrain movement of the shaft (54).
- 8 Lock the nut (31) by bending the locktab (30).
- 9 Fit the stop sector (48) to the primary shaft (49) in the position shown in Fig. 6.7, followed by the bush (50), primary sector (51), spacer (29), throttle control lever (52 or 52A), tab washer (30) and retaining nut (31).
- 10 Where a primary throttle shaft return spring is fitted, locate it on the shaft (49) and hook it over the stop sector (48).
- 11 Lightly lubricate the primary throttle shaft (49) with engine oil, then insert it into the bore from the starting device end.
- 12 Pull the spring, if fitted, and tension it before pushing the shaft (49) fully home.
- 13 Engage the primary sector (51) with the slot in the end of the secondary throttle shaft (54) (photo).
- 14 Fit the accelerator pump control cam (33) to the primary shaft (49), lift the control lever (25) and push the cam (33) fully onto the shaft, making sure that its angled section abuts the control lever (25).
- 15 Fit the spacer (32), tab washer (30) and nut (31) to the shaft (49), then tighten both nuts (31). If necessary use the special tool as described in paragraph 7.
- 16 Lock the nuts (31) by bending the locktabs (30).
- 17 Hook the primary sector return spring (53) to the anchoring post and the sector (51).
- 18 With both throttle shafts in the open position, fit the throttle valves (45 and 55) into their respective locations, then close the throttle shafts to allow the valves to centralise within the barrels. Make sure that the valves (45 and 55) are fitted the correct way round so that the angled perimeters seat correctly; the hole in the secondary valve (55) should face the primary barrel, ie opposite the progression orifices (photo).
- 19 Insert the throttle plate retaining screws (46) and tighten them finger tight, then move each throttle shaft in turn until both shafts and valves are centralised. Tighten the screws (46)

evenly without exerting excessive pressure on the shafts. It is recommended that new screws are always fitted as it is quite easy to cross-thread previously peened screws. Lock the screws (46) by peening with Weber tool no 98010 900 whilst supporting the shafts with a length of wood. Alternatively, coat the screw threads with a liquid locking agent (fuel resistant) prior to inserting them.

- 20 Check that both throttle valves operate smoothly and fully without any trace of binding or sticking.
- 21 Fit the choke (75A) and auxiliary venturi (76A) into the secondary barrel, locating the springs into the location groove; make sure that the choke identification number faces away from the throttle valve and the long centre section of the auxiliary venturi faces the throttle valve (photos).
- 22 Fit the choke (75) and auxiliary venturi (76) into the primary barrel using the same method as described in paragraph 21.
- 23 Fit and tighten the progression hole inspection screw plugs (40).
- 24 With the carburettor upright, insert the starting valve (67) into its bore.
- 25 Assemble the shaft (66) to the starting device cover (65) with the operating lug facing away from the cover extension (photo).
- 26 Fit the coil spring (63) to the cover (65) and insert the straight end in the location hole.
- 27 Tension the coil spring (63), then fit the control lever (60) with the cable securing nut facing the cover.
- 28 Fit the spring washer (61) and tighten the nut (62).
- 29 Fit the cable retaining screws (59 and 64).
- 30 Offer the starting device (57) up to the carburettor body (77) and locate the operating lug in the starting valve groove; check for correct engagement by operating the lever and checking that the valve moves up and down (photo).
- 31 Insert the retaining screws (56) together with the spring washers and tighten them in diagonal sequence; check the operation of the device again.
- 32 Fit the spring (68) to the starting valve (67), then fit the retainer (69) and press it into the carburettor body using the flat blade of a screwdriver.
- 33 Press the starting fuel jet (21) into the air jet (20), then screw it into the carburettor body (77) and tighten.
- 34 Screw the intake and discharge valve (23) into the bottom of the float chamber.
- 35 Fit the retaining plate (17) to the accelerator pump operating rod (18) with the spring location facing downwards, then fit the spring (19).
- 36 Compress the spring (19), then fit the piston (22) to the operating rod (18) by turning it through 90°; release the spring (19) into the piston (22).
- 37 Fit the accelerator pump to the carburettor body (77), then press the retaining plate (17) into the body, using the flat blade of a screwdriver. Check the operation of the pump by operating the throttle lever; there must be no signs of sticking.
- 38 Fit a gasket (71) to the accelerator pump delivery valve (70), followed by the pump jet (72) with the hole facing downwards and a further gasket (71). Locate the assembly into the carburettor body (77) with the locating lug in the corresponding cut-out, then tighten the valve (70). Note that the ball in the valve must move freely.
- 39 There is no accelerator pump stroke checking procedure for the 28/36 DCD carburettor as it is identical on all versions and cannot be adjusted.
- 40 Fit the spring (42) to the idling mixture adjusting screw (41) and screw it into the carburettor body (77).
- 41 Fit the spring (43) to the throttle idling adjustment screw (44) and screw it into the carburettor body (77).
- 42 Tighten the air corrector jets (73 and 73A) into the tops of the emulsion tubes (74 and 74A) keeping them identified as when removed.
- 43 Using an 8 mm ring or box spanner, tighten the emulsion tube assemblies (74 and 74A) into their respective locations in the carburettor body (77).
- 44 Press the idling jets (34 and 34A) into their respective



7.5 Correct assembled position of the accelerator pump control lever



7.13 Correct assembled position of the primary sector

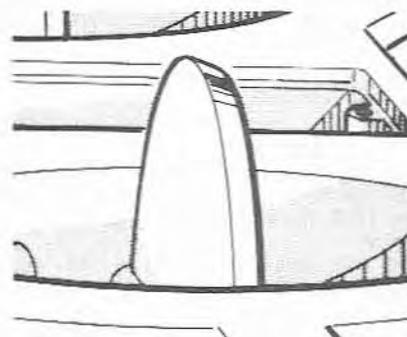
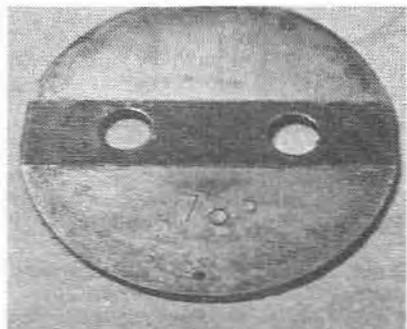
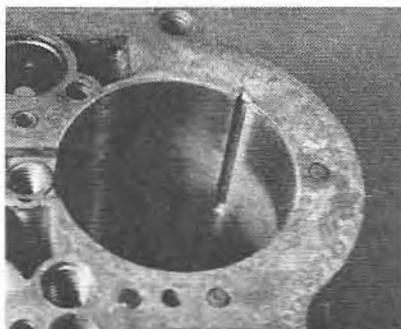


Fig. 6.15 Angled perimeter of the throttle valves (Sec 7)



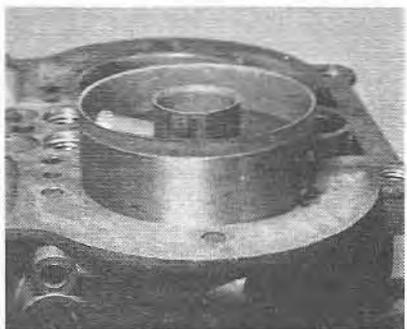
7.18 Showing the bypass hole in the secondary throttle valve



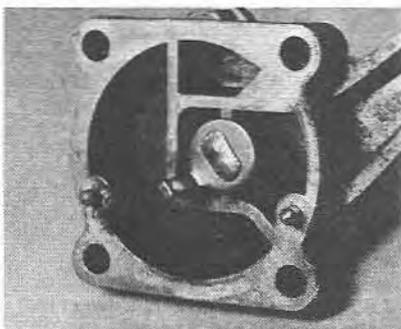
7.21a The choke and auxiliary venturi locating groove



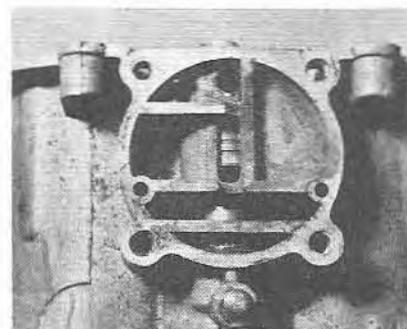
7.21b Fitting a choke



7.21c Fitting an auxiliary venturi



7.25 The correct location of the starter device operating lug



7.30 Starter valve control grooves (upper) and operating lug groove (lower dark area)

holders (36), then tighten each holder into the carburettor body (77) making sure that the nylon seals (35) are positioned correctly and that the correct jet is fitted to both the primary and secondary locations.

45 Tighten the main jets (38 and 38A) into the main jet holders (39), keeping them identified as when removed.

46 Locate a new gasket (37) to each main jet holder (39), then tighten them into their respective locations in the carburettor body (77).

47 If the starter plunger seat (5) has been removed, fit the new seat and insert the lockwasher (4). Retain the lockwasher (4) by local peening in two or three places.

48 Invert the carburettor cover (1) and insert the starter plunger (6) followed by the spring (7). The spring seat is a press fitting and should be fitted by pressing with a flat blade screwdriver. If the seat is a loose fit as a result of continual removal, extra care must be exercised to locate it when fitting the cover (1) to the body (77).

49 Fit a new gasket (13) to the needle valve (14) seating, then tighten it into the carburettor cover (1) using a 10 mm socket or ring spanner.

50 Insert the needle into the needle valve (14) seating with the spring hook aligned across the cover (1).

51 Carefully locate the float (16) into position, at the same time inserting the long tab under the needle spring hook.

52 Fit the fulcrum pin (15) through the float arm and two posts and very carefully pinch the split post to secure the pin using a pair of pliers.

53 The float level adjustment must now be checked in the following manner. Hold the carburettor cover (1) vertically so that the floats are hanging from the fulcrum and the float level arm is in light contact with the needle ball (ie without the ball being depressed). Obtain a drill or dowel rod of 5.0 mm diameter and check that the distance from the cover surface to the nearest part of the floats is correct (Fig. 6.16). The annular seams of the semi-floats should not be taken into consideration,

and for this reason two small grooves must be filed on the checking rod (photo).

54 If the dimension is not correct, bend the long tab on the float arm accordingly.

55 Tilt the cover (1) so that the floats move away from the cover and the short tab makes contact with the needle valve seating. Now, using the same method as described in paragraph 53, check the needle valve fully open dimension which should be 13.5 mm and if necessary, bend the short tab to correct (photo).

56 The difference between the dimensions checked in paragraphs 53 and 55 is the needle valve stroke which must be 8.5 mm.

57 Fit a new gasket (12) to the carburettor cover (1), then lower the cover (1) onto the carburettor body (77). Make sure that the gasket is located correctly and aligns with the various drillings in the cover. Where the starter plunger spring seating is loose, it is better to fit the gasket to the top of the carburettor body, then to place the seating on the gasket before lowering the cover (1) (photo).

58 Insert the cover retaining screws (3) together with spring washers and tighten them evenly in diagonal sequence.

59 Fit the fuel filter (8) into the cover (1), fit a new gasket (10) to the filter inspection plug (11) and tighten the plug into the cover (1).

60 With the carburettor completely assembled, the idling adjustment screws should be turned to their preliminary settings. To do this, first screw in the throttle idling adjustment screw (44) until it just touches the throttle lever lug, then continue turning for a further  $\frac{1}{2}$  turn. Working on the idling mixture volume screw (41), fully screw it in until it is in light contact with its seat, then back it off 2 full turns. Final adjustments will be necessary when the carburettor is fitted on the engine (refer to Section 8).

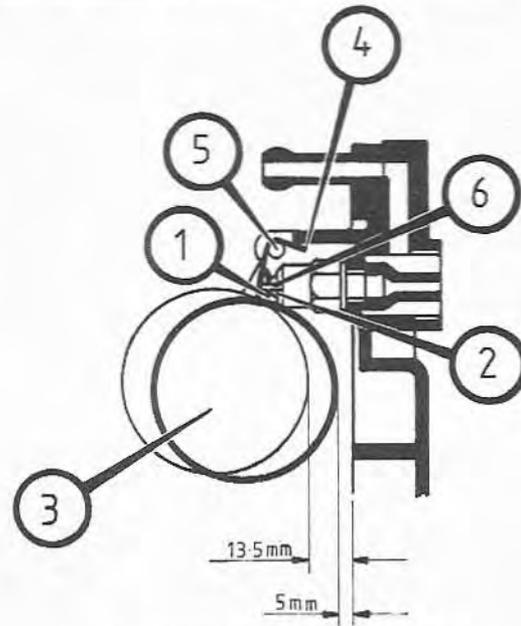
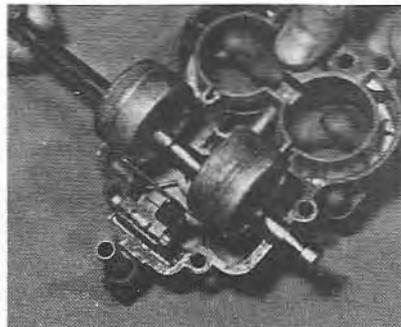


Fig. 6.16 Float level adjustment (Sec 7)

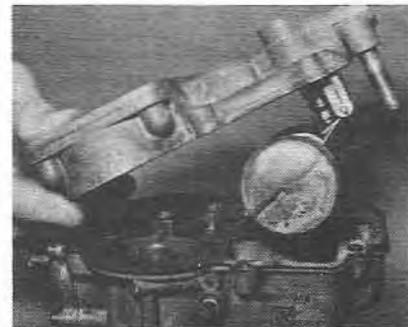
- |                         |                       |
|-------------------------|-----------------------|
| 1 Long adjusting tab    | 4 Short adjusting tab |
| 2 Spring tensioned ball | 5 Fulcrum pin         |
| 3 Float                 | 6 Spring hook         |



7.53 Checking the closed position of the floats using a length of dowel rod



7.55 Checking the open position of the floats using a length of dowel rod



7.57 Lowering the carburettor cover assembly onto the carburettor body

## 8 Tuning

**Note:** Refer to Chapter 3 for general notes on tuning.

- 1 The idling adjustment screws should be set to their preliminary positions as described in Section 7 paragraph 60.
- 2 Connect a tachometer to the engine in accordance with the manufacturer's instructions.
- 3 Start the engine and run until normal operating temperature has been reached (ie the thermostat has opened).

4 Turn the throttle valve adjusting screw so that the engine runs at the recommended idling speed for the particular engine being worked on; this will be between 600 and 800 rpm for touring models and approximately 1000 rpm for sports car models.

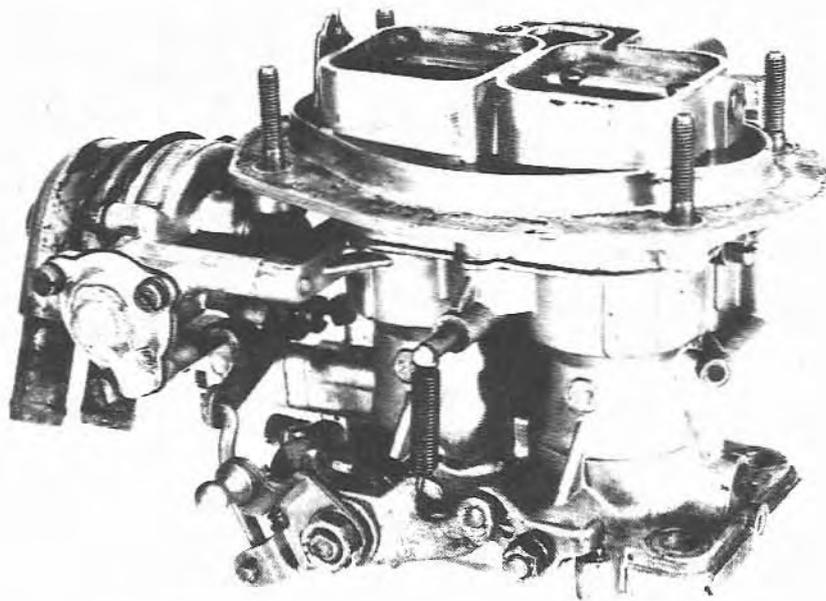
5 Turn the idle mixture adjustment screw in or out until the engine runs at the highest rpm.

6 Re-adjust the throttle valve adjusting screw if necessary, to bring the engine speed within limits.

7 Repeat the procedure given in paragraphs 5 and 6, then switch off the engine and remove the tachometer.

**9 Fault diagnosis**

Symptom	Reason/s
Engine will not start	Faulty starter device Blocked fuel filter or jets Starter air valve sticking
Uneven idling	Leaking manifold or carburettor flange gasket Loose idling jets Excessive sediment or water in carburettor Starter valve not seating Starter device not returning Throttle spindle or carburettor body excessively worn Secondary throttle valve partially sticking open Leaking ignition advance vacuum tube
Carburettor floods	Worn needle valve Leaking or damaged semi-floats Incorrect float level adjustments Excessive sediment in fuel
Engine lacks performance	Incorrect tuning adjustments Incorrect float level adjustments Excessive sediment in fuel Throttle valves do not fully open Accelerator pump jamming
Excessive fuel consumption	Faulty starter device Needle valve not seating Leaking or damaged semi-floats Incorrect float level adjustments Choked air filter



## Part 2 Weber carburetors

### Chapter 7 Type 32 DFD, 32 DFE, 32 DFM, 32 DIF, 32 DAF, 32 DGV, 32/36 DFV, 32/36 DGV, 32/36 DFAV, 32/36 DGAV

#### Contents

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Carburettor adjustments .....	8	Operation .....	3
Construction .....	2	Removal and refitting .....	4
Disassembly .....	5	Special overhaul procedures .....	6
Fault diagnosis .....	10	Tuning .....	9

**Adjustment data****Manual choke types**

Fast idle primary throttle valve opening:	in (mm)
32 DFD .....	0.04 (1.0)
32 DFE .....	0.035 (0.9)
32 DFM .....	0.04 (1.0)
32 DIF .....	0.047 (1.2)
32 DGV .....	0.03 (0.8)
32/36 DFV .....	0.047 (1.2)
32/36 DGV .....	0.033 (0.85)

**Automatic choke types**

Fast idle primary throttle valve opening	in (mm)
32/36 DGAV type:	
Series 1A, 01A, 1B, 01B .....	0.03 to 0.035 (0.8 to 0.9)
Series 2A, 02A, 2B, 02B, 11A, 011A, 12A, 012A, 13A, 013A .....	0.039 to 0.043 (0.95 to 1.05)
Series 3A, 03A, 3B, 03B, 4A, 04A, 4B, 04B .....	0.04 to 0.045 (1.0 to 1.10)
Series 6A, 06A .....	0.03 to 0.033 (0.8 to 0.85)
Series 8A, 08A, 10A, 010A .....	0.035 to 0.04 (0.9 to 1.0)
Series 9A, 09A .....	0.045 to 0.049 (1.15 to 1.25)
DFAV and DAF types .....	0.049 (1.25)

**Spindle to shaft clearance**

32/36 DGAV (except series 3A) .....	in (mm)
32/36 DGAV (series 3A) .....	0.008 to 0.016 (0.2 to 0.4)
32/36 DFAV and DAF .....	0.008 to 0.1 (0.2 to 2.5)
	0.008 (0.2) min

**Choke valve clearance**

At minimum shaft travel	in (mm)
DGAV types:	
Series 1A, 01A, 1B, 01B .....	0.18 ± 0.006 (4.5 ± 0.15)
Series 2A, 02A, 2B, 02B, 9A, 09A .....	0.12 ± 0.006 (3.0 ± 0.15)
Series 3A, 03A, 3B, 03B, 4A, 04A, 4B, 04B, 8A, 08A, 10A, 010A, 11A, 011A, 12A, 012A, 13A, 013A .....	0.16 ± 0.006 (4.0 ± 0.15)
Series 6A, 06A .....	0.14 ± 0.006 (3.5 ± 0.15)
At maximum shaft travel	
Series 1A, 01A, 1B, 01B, 2A, 02A, 2B, 02B, 12A, 012A, 13A, 013A .....	0.26 ± 0.02 (6.5 ± 0.5)
Series 3A, 03A, 3B, 03B, 4A, 04A, 4B, 04B, 8A, 08A, 9A, 09A, 10A, 010A, 11A, 011A .....	0.24 ± 0.02 (6.0 ± 0.5)
Series 6A, 06A .....	0.22 ± 0.02 (5.5 ± 0.5)

**Choke valve pull down**

32/36 DFAV and DAF .....	in (mm)
	0.187 to 0.207 (4.75 to 5.25)

**Choke valve opening**

Low fast idle cam position	in (mm)
32/36 DGAV types:	
Series 1A to 06A inclusive .....	0.08 to 0.1 (2.0 to 2.5)
Series 8A to 011A inclusive .....	0.06 to 0.08 (1.5 to 2.0)
Series 12A to 13A inclusive .....	0.1 to 0.12 (2.5 to 3.0)

**Float level setting dimensions**

	Closed position (A) in (mm)	Stroke (B) in (mm)
32 DFD .....	0.256 (6.5)	0.315 (8.0)
32 DFE .....	0.285 (7.25)	0.315 (8.0)
32 DFM .....	0.256 (6.5)	0.315 (8.0)
32 DAF, 32 DIF .....	0.276 (7.0)	0.315 (8.0)
32 DGV .....	1.535 (39.0)	0.433 (11.0)
32/36 DFV, 32/36 DFAV .....	1.437 (36.5)	0.394 (10.0)
32/36 DGV, 32/36 DGAV .....	1.535 (39.0)	0.433 (11.0)

**1 Introduction**

The carburettor types covered in this Chapter are all of downdraught design and are of dual barrel construction to supply the primary and secondary functions.

Each throttle valve is mounted on a separate shaft and they

are of differential or progressive choke type. The linkage between the two throttle valves is arranged so that the secondary valve does not commence to open until the primary throttle valve is  $\frac{2}{3}$  open.

DAF, DFAV and DGAV types are equipped with a semi-automatic choke control.

The carburettor is normally fitted to the engine as a single

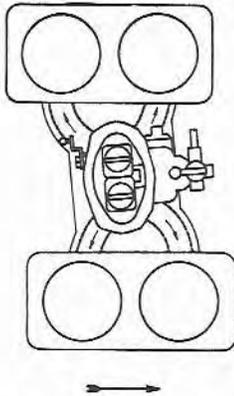


Fig. 7.1 Single carburettor fitted to a four-cylinder V-engine (Sec 1)

unit with both barrels feeding a common inlet manifold, the most common arrangements being as follows:

- 1 One unit on a four-cylinder in-line engine
- 2 One unit on a four-cylinder V engine

The carburettor identification mark is located on the lower flange outer surface.

## 2 Construction

The main body and cover of the carburettor types covered in this Chapter are of die-cast aluminium or zinc alloy (Mazak) construction. The mounting flange is machined flat for fitting purposes. The cover incorporates a mounting flange for the air

cleaner assembly and is equipped with four mounting studs.

The throttle valves are of brass and the throttle shafts, which run directly in the carburettor body, are of steel.

All fuel and air jets are of brass construction and are screwed into the main body; the emulsion tubes are also of brass.

Internal channels of the main body and cover are mostly drilled and are sealed with lead plugs where necessary.

Single fuel float assemblies are fitted to 32 DFD, 32 DFE, 32 DFM, 32 DIF and 32 DAF types and are of brass construction; two semi-floats are fitted to remaining types and they are of plastic or brass construction.

## 3 Operation

### Cold starting – manually operated choke

Refer to Fig. 7.2 and note that when the lever (53) is moved to position A, the choke valves (50) close the air intake. At the same time the fast idle lever (55) partially opens the primary throttle valve (35).

When the engine is cranked, a rich mixture is drawn from the nozzle (9) to facilitate starting. As soon as the engine fires, the additional vacuum causes the choke valves (50) to partially open, due to the offset pivot shaft, against the tension of the spring (51).

As the engine warms up the control cable is progressively shut, until at position B the choke valves are fully open and the primary throttle (35) is returned to its idling position. The choke valves (50) are held open by the lever extension (52).

### Cold starting – automatically operated choke

Refer to Fig. 7.3 and note that when the engine is cold and the throttle pedal has been depressed once, the bi-metallic

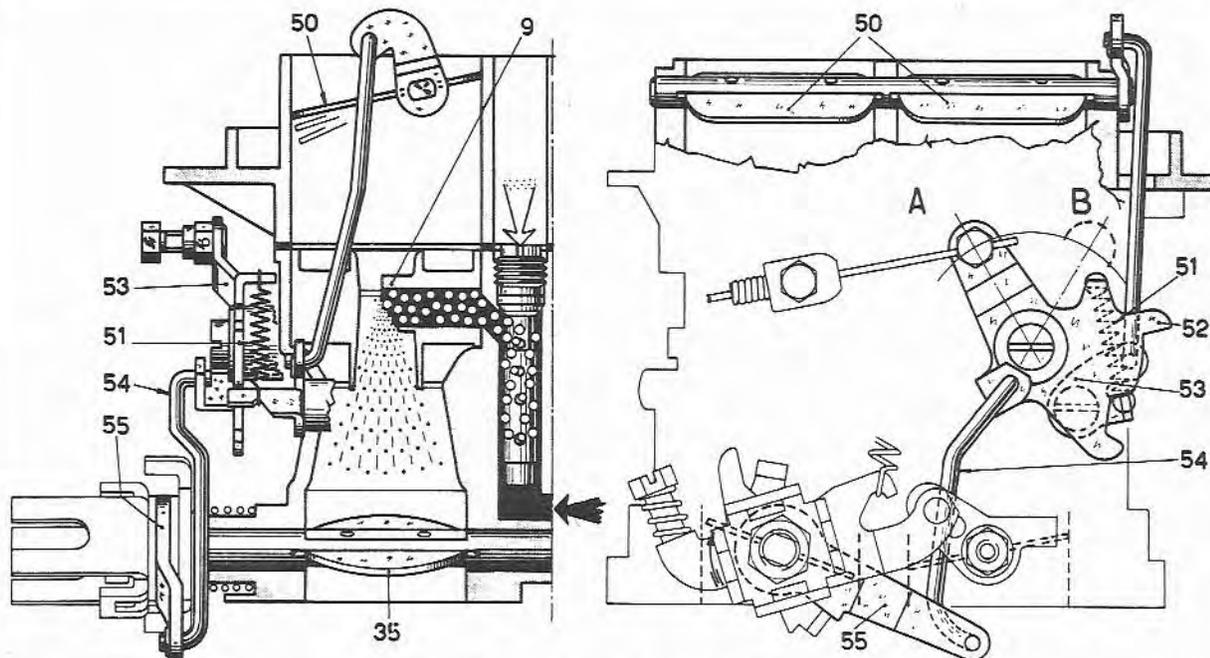


Fig. 7.2 Manual choke operation (Sec 3)

9 Nozzle  
35 Throttle valve  
50 Choke valve

51 Spring  
52 Lower extension  
53 Lever

54 Fast idle rod  
55 Lever

A Cold starting position  
B Fully open position

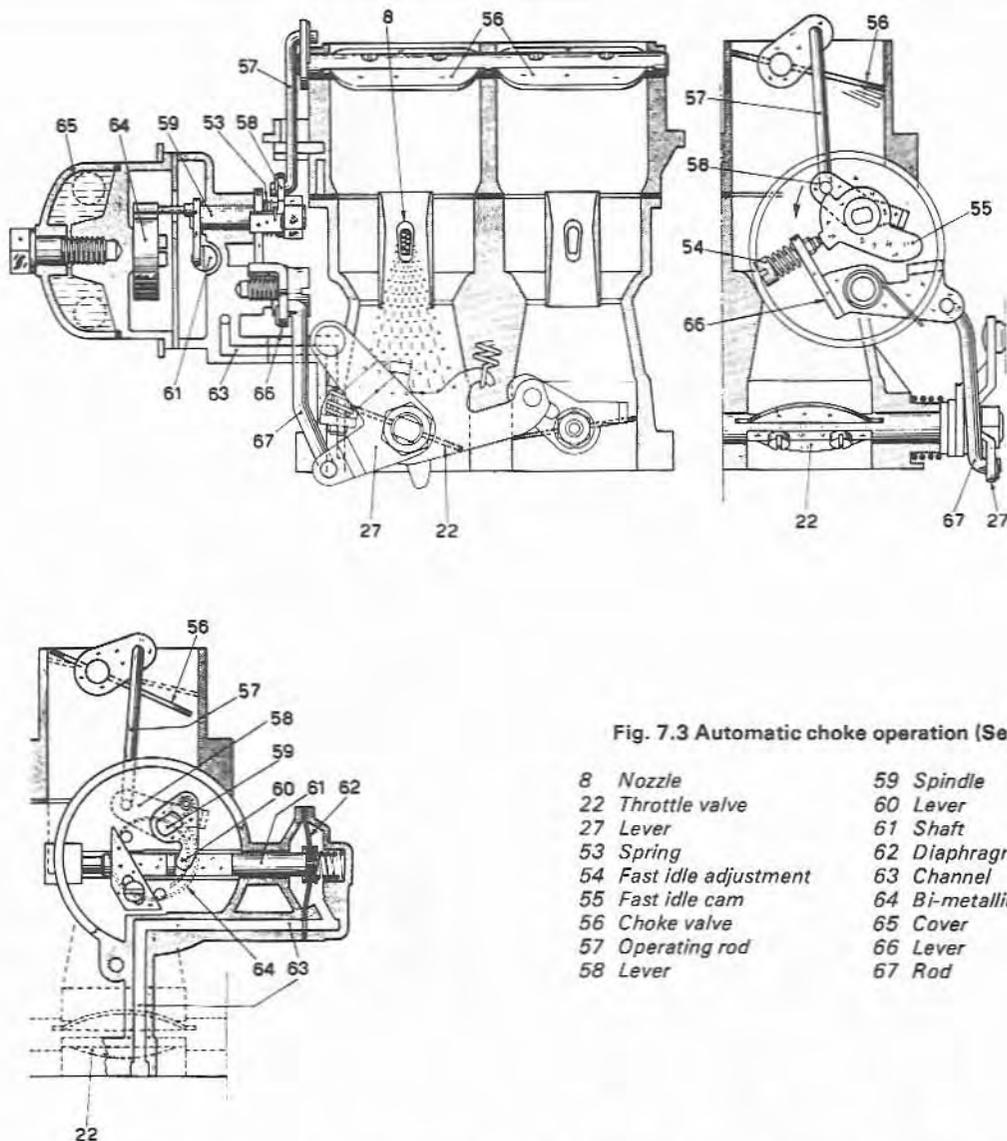


Fig. 7.3 Automatic choke operation (Sec 3)

8 Nozzle	59 Spindle
22 Throttle valve	60 Lever
27 Lever	61 Shaft
53 Spring	62 Diaphragm
54 Fast idle adjustment	63 Channel
55 Fast idle cam	64 Bi-metallic spring
56 Choke valve	65 Cover
57 Operating rod	66 Lever
58 Lever	67 Rod

spring (64) rotates the spindle (59) and closes the choke valves (56). At the same time, the fast idle cam (55) prevents the throttle valve (22) from completely closing.

When the engine is cranked, a rich mixture is drawn from the nozzle (8) to facilitate starting. As soon as the engine fires, vacuum from below the throttle valve is relayed through channel (63) to diaphragm (62) and the shaft (61) moves and partially opens the choke valves (56) against the action of the bi-metallic spring (64). If the throttle is opened at this stage, the vacuum will cease and the choke valves (56) will close; however, the passage of air will open the choke valves against the action of the bi-metallic spring (64) and the auxiliary spring (53).

As the engine warms up, the bi-metallic spring (64) progressively opens the choke valves (56), until at normal operating temperature they are held fully open. The fast idling screw (54) does not now rest on the fast idling cam (55) since the latter has been rotated by the bi-metallic spring and therefore the throttle valve (22) is free to return it to its normal idling position.

#### Idling and progression

Refer to Fig. 7.4 and note that when the engine is idling both throttle valves (12 and 22) are shut. Fuel is drawn from the

float chamber, through an internal channel to the primary well (14) and then passes along the channel (36) to the idling jet (37) where air is introduced from the calibrated bush (38). The fuel and air is now an emulsion and continues through channel (35), past the idling mixture control screw (34) through the idling feed hole (33) and into the primary carburettor throat at the engine side of the throttle valve (22).

Refer to Fig. 7.5 and note that 32 DFD, 32 DFE and 32 DFM type carburetors have idling channels to both primary and secondary carburettor barrels and the mixture adjusting screw is located in the secondary barrel.

When the primary throttle valve is opened slightly to increase the engine speed, the progression holes (Fig. 7.4) (39) are brought into action to provide extra fuel.

When the primary throttle valve (22) is  $\frac{2}{3}$  open, the secondary throttle valve (12) will commence to open and the secondary progression holes provide mixture to the secondary barrel.

When either throttle valve is sufficiently open, the idling and progression system ceases and the main fuel supply system operates.

#### Normal running

Under full throttle and high speed cruising conditions, the



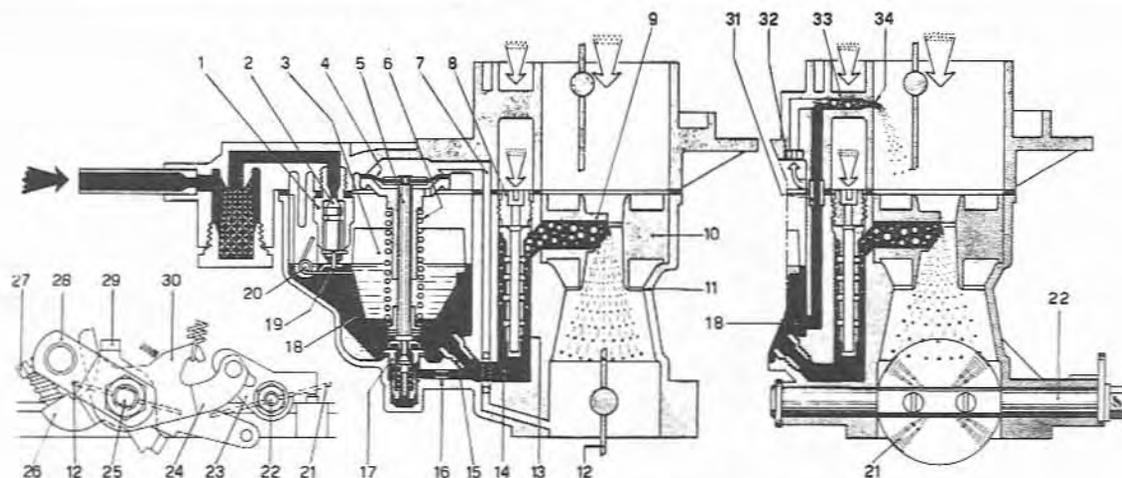


Fig. 7.6 Carburettor normal phase (Sec 3)

- |               |                      |                       |                       |
|---------------|----------------------|-----------------------|-----------------------|
| 1 Needle seat | 10 Auxiliary venturi | 19 Spring hook        | 27 Adjusting screw    |
| 2 Needle      | 11 Choke             | 20 Pivot              | 28 Lever              |
| 3 Float       | 12 Throttle valve    | 21 Secondary throttle | 29 Lever              |
| 4 Diaphragm   | 13 Emulsion tube     | 22 Shaft              | 30 Lever              |
| 5 Rod         | 14 Well              | 23 Lever              | 31 Calibrated bush    |
| 6 Spring      | 15 Main jet          | 24 Lever              | 32 Calibrated bush    |
| 7 Channel     | 16 Calibrated bush   | 25 Shaft              | 33 Channel            |
| 8 Air jet     | 17 Full power valve  | 26 Lever              | 34 Calibrated orifice |
| 9 Nozzle      | 18 Float chamber     |                       |                       |

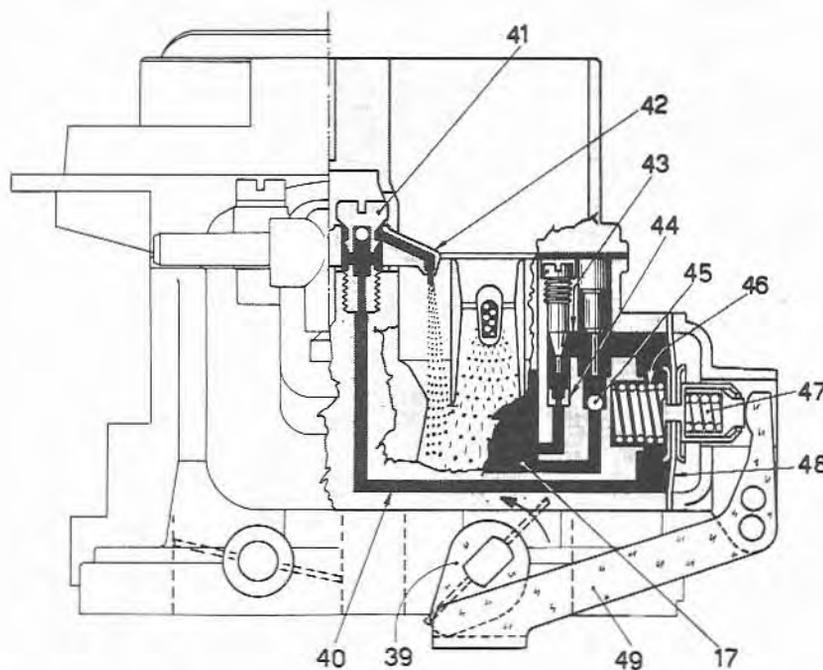


Fig. 7.7 Carburettor acceleration phase (Sec 3)

- |                       |
|-----------------------|
| 17 Float chamber      |
| 39 Throttle shaft cam |
| 40 Channel            |
| 41 Delivery valve     |
| 42 Jet                |
| 43 Channel            |
| 44 Calibrated bush    |
| 45 Ball               |
| 46 Return spring      |
| 47 Buffer spring      |
| 48 Diaphragm          |
| 49 Lever              |

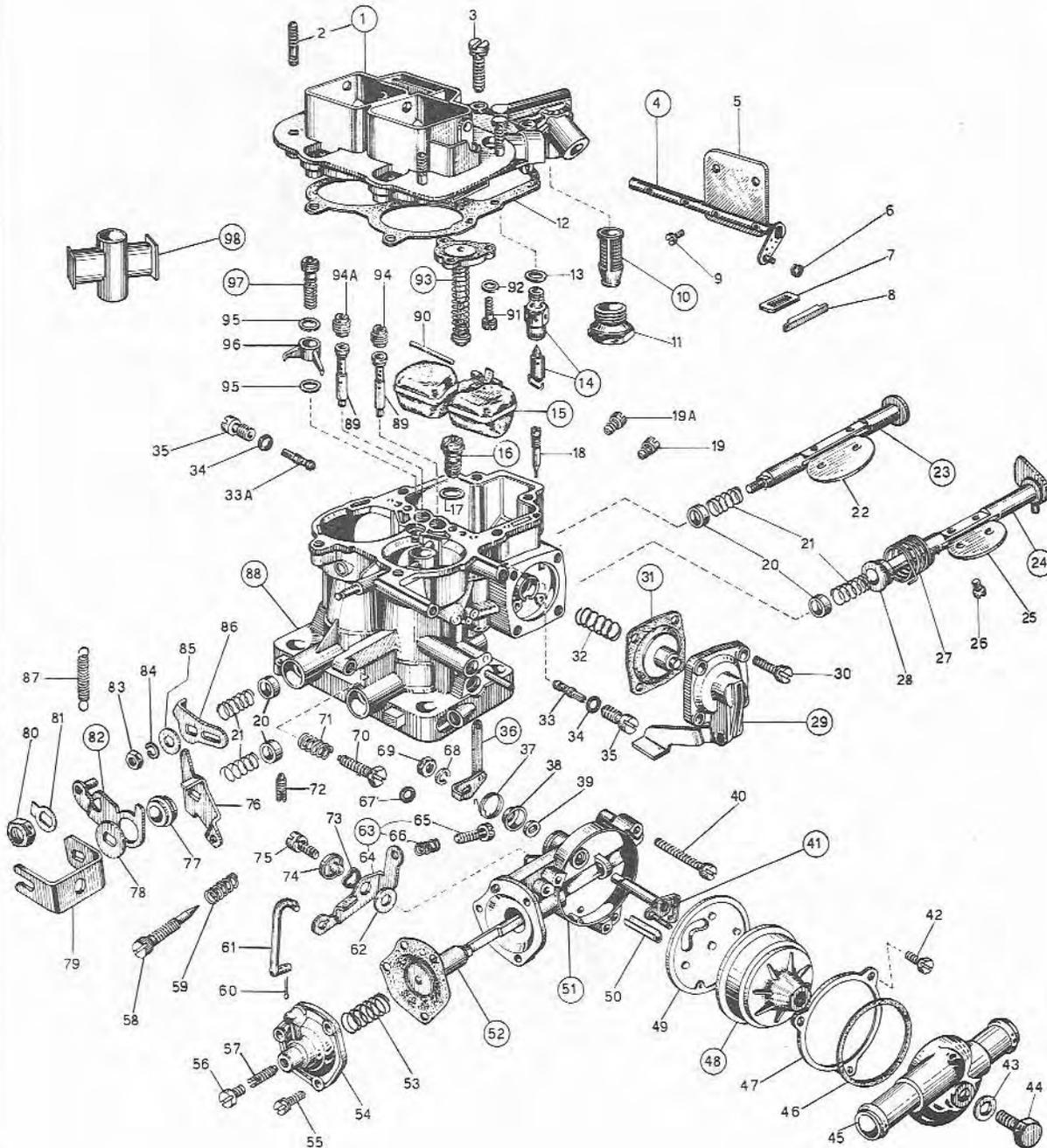
circuit does not include air correction and on 32 DFE and 32DFM types the circuit emerges directly above the secondary nozzle.

DFV, DFAV, DGV and DGAV carburetors are also equipped with a full power valve which operates immediately the primary throttle valve is opened quickly. Under these conditions the vacuum through channel (7) is insufficient to draw the diaphragm (4) against the spring (6) and the operating rod (5) therefore opens the full power valve (17). The fuel level in the primary emulsion tube well (14) immediately rises and the mixture drawn from the nozzle (9) is enriched. When the

primary throttle valve is partially open, the vacuum through channel (7) overcomes the tension of the spring (6) and the full power valve shuts.

#### Acceleration

To provide the engine with a rich mixture when accelerating, the carburetor is provided with a diaphragm type acceleration pump which is operated by the primary throttle shaft and injects only into the primary venturi. Reference to Fig. 7.7 will show that when the primary throttle valve is closed, the accelerator pump diaphragm (48) draws fuel from the float



chamber (17), through the ball valve (45) into the pump chamber. When the primary throttle valve is opened, the cam (39) moves the lever (49) and fuel is forced along the channel (40), through the delivery valve (41) and out of the pump jet (42). The spring (47) absorbs the initial movement of the lever (49) and extends the fuel delivery period. Excess fuel and any accumulated air is discharged into the float chamber (17) through the channel (43) and calibrated bush (44). The lever (49) incorporates two pivot holes by which the pump stroke may be varied.

#### 4 Removal and refitting

**Note:** The following procedure gives a general rather than a specific method of removing and refitting the carburettor, as much will depend on the location within the vehicle.

- 1 Unscrew and remove the retaining nuts and withdraw the air cleaner cover (screws are fitted to some models).
- 2 Lift out the air filter element.
- 3 Bend back the locktabs and unscrew the air cleaner body retaining nuts.
- 4 Unscrew and remove the mounting bracket bolts and remove the air cleaner together with the reinforcement plate.
- 5 On automatic choke models, partially drain the cooling system and disconnect the two water hoses.
- 6 On manual choke models, disconnect the choke cable.
- 7 Disconnect the fuel supply pipe and return pipe where fitted.
- 8 Release the distributor automatic advance pipe from the side of the carburettor.
- 9 Disconnect the throttle control shaft from the throttle lever.

10 Unscrew and remove the carburettor mounting nuts then withdraw the unit over the mounting studs.

11 Remove the inlet manifold gasket and clean all traces of gasket from the contact faces of the inlet manifold and carburettor.

12 Protect the inlet manifold from ingress of foreign matter by sealing it with masking tape.

13 Refitting is a reversal of removal, but the following additional points should be noted:

- (a) Always fit a new gasket and tighten the four retaining nuts in diagonal sequence
- (b) When refitting the choke cable, first secure the outer cable then insert the inner cable fully and tighten the retaining screw
- (c) On automatic choke models, refill the cooling system in accordance with the manufacturer's instructions
- (d) The idling adjustment screws should be set as described in Section 8 and finally tuned as described in Section 9

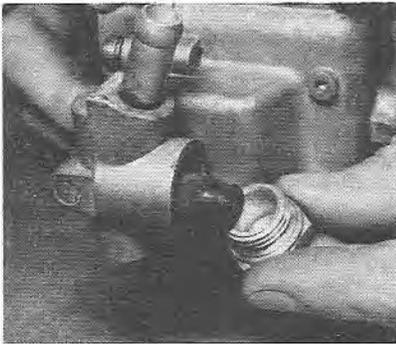
#### 5 Disassembly

**Note:** Throughout the disassembly and assembly Sections, reference will be made to the illustrations of 32/36 DGAV, 32/36 DGV and 32 DFE/DFM carburettors. The remaining carburettor types covered in this Chapter are very similar in construction although the individual components may be located in different areas, or in some instances omitted.

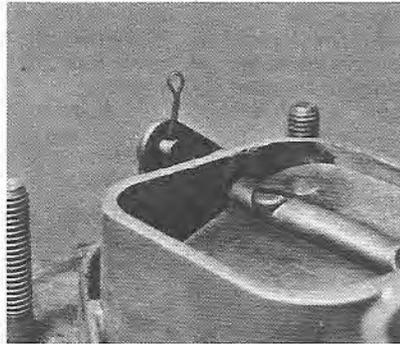
- 1 Thoroughly clean the carburettor exterior and wipe dry.
- 2 Referring to Fig. 7.8, unscrew and remove the fuel filter inspection plug (11) and extract the filter (10) (photo).

Fig. 7.8 Exploded view of the 32/36 DGAV carburettor (typical) (Sec 5)

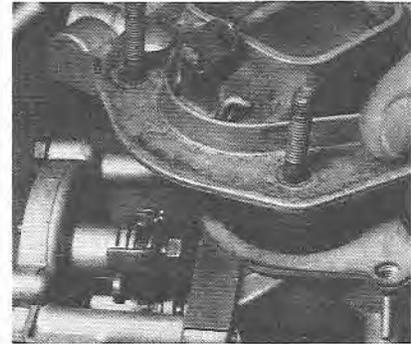
1 Carburettor cover assy	33 Primary idle jet	66 Spring
2 Stud bolt	33A Secondary idle jet	67 Auto-choke O-ring seal
3 Cover fixing screw	34 Gasket for idling jet holder	68 Spring washer
4 Choke shaft and lever assy	35 Idling jet holder	69 Throttle shaft fixing nut
5 Starting throttle valve	36 Choke control lever assy	70 Primary throttle adjusting screw
6 Spring ring	37 Spring for fast idle cam	71 Spring for throttle adjusting screw
7 Dust seal plate	38 Spring retaining cover	72 Secondary throttle adjusting screw
8 Dust seal plug	39 Washer for shaft	73 Wave washer for loose lever
9 Choke plates fixing screw	40 Choke fixing screw	74 Bushing for loose lever
10 Strainer assy	41 Auto-choke shaft and lever assy	75 Loose lever fixing screw
11 Strainer inspection plug	42 Plate screw	76 Primary throttle control lever
12 Cover gasket	43 Washer for water cover fixing screw	77 Bushing for loose lever
13 Needle valve gasket	44 Water cover fixing screw	78 Washer for loose lever
14 Needle valve assy	45 Auto-choke water chamber	79 Throttle valve control lever
15 Float assy	46 Water chamber seal gasket	80 Throttle shaft fixing nut
16 Full power needle valve assy	47 Thermostat assy locking ring	81 Lockwasher
17 Power valve gasket	48 Auto-choke thermostat assy	82 Loose lever assy
18 Pump discharge blanking needle	49 Gasket to auto-choke body	83 Secondary shaft fixing nut
19 Primary main jet	50 Plate for choke shaft	84 Spring washer
19A Secondary main jet	51 Auto-choke body assy	85 Washer for loose lever
20 Shafts retaining bush	52 Choke diaphragm assy	86 Secondary throttle control lever
21 Bush retaining spring	53 Diaphragm loading spring	87 Spring for loose lever
22 Secondary throttle valve	54 Auto-choke cover	88 Carburettor body
23 Secondary shaft	55 Auto-choke cover fixing screw	89 Emulsifying tube
23 Secondary shaft assy oversize	56 Screw plug	90 Float fixing pin
24 Primary shaft	57 Diaphragm adjusting screw	91 Control valve retaining screw
24 Primary shaft assy oversize	58 Idle adjusting screw	92 Washer for control valve screw
25 Primary throttle valve	59 Spring for idle adjusting screw	93 Power valve assy
26 Throttle plates fixing screw	60 Split pin	94 Primary air corrector jet
27 Shaft return spring	61 Fast idling control rod	94A Secondary air corrector jet
28 Spacer	62 Washer for loose lever	95 Pump jet gasket
29 Accelerator pump cover assy	63 Fast idling loose lever assy	96 Accelerator pump jet
30 Pump cover fixing screw	64 Lever	97 Pump delivery valve assy
31 Accelerator pump diaphragm assy	65 Screw	98 Auxiliary venturi
32 Pump loading spring		



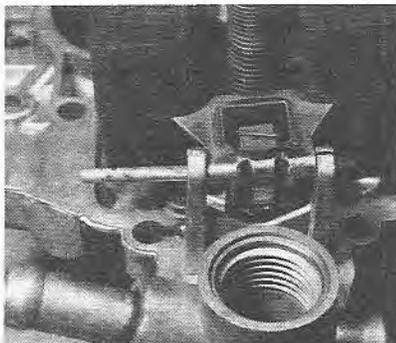
5.2 Removing the fuel filter inspection plug and filter



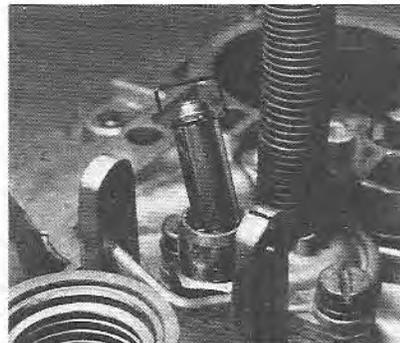
5.3 Disconnecting the choke operating rod



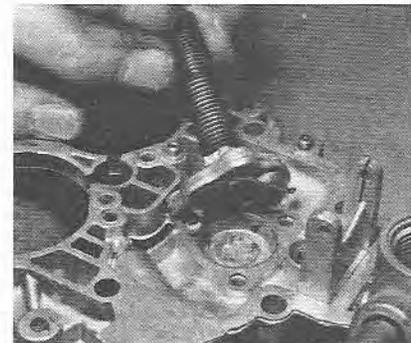
5.4 Removing the carburettor cover (DFAV type shown)



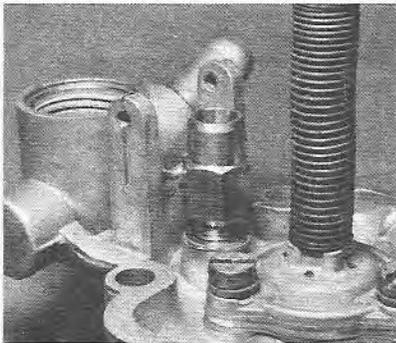
5.5a Withdrawing the float fulcrum pin ...



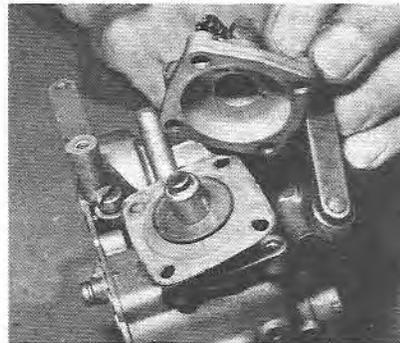
5.5b ... needle valve and return hook



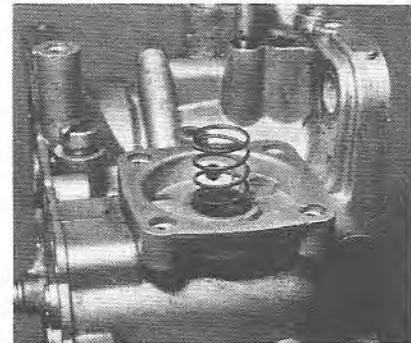
5.8 Removing the full power valve assembly



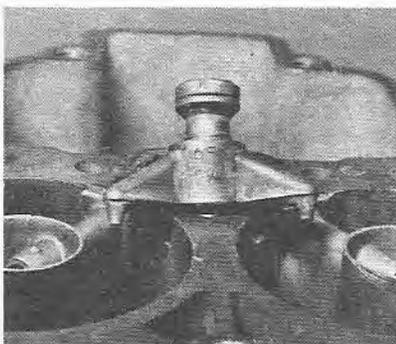
5.9 Removing the needle valve seating



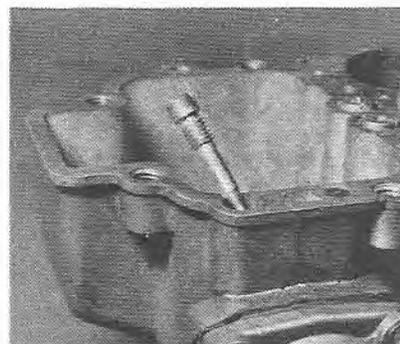
5.10a Withdrawing the accelerator pump cover ...



5.10b ... and spring



5.11 Removing the accelerator pump delivery valve and jet



5.13 The accelerator pump discharge blanking needle

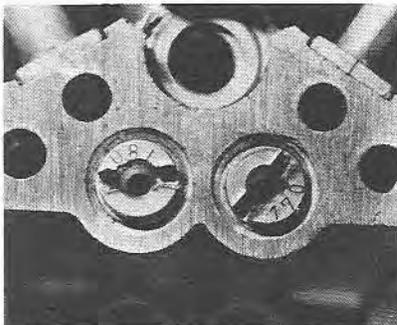


5.14 Removing the primary main jet

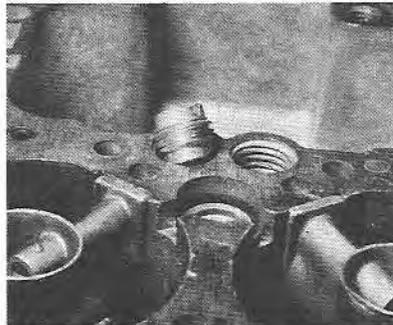
- 3 Disconnect the choke plate operating rod (36) at its upper end by removing the split pin or prising off the circlip (6). On automatic types, slightly open the throttle if necessary to allow the choke plates to fully close (photo).
- 4 Unscrew and remove the carburettor cover retaining screws (3) together with the spring washers, then carefully lift the cover (1) from the main body (88) at the same time disengaging the choke operating rod (36) by tilting the cover (photo).
- 5 Invert the carburettor cover (1) so that the float assembly is uppermost, then extract the float fulcrum pin (90) and withdraw the float assembly (15) together with the needle of the needle valve (14). If necessary, use a suitable diameter pin punch to tap the pin from the two posts. **Note:** *On no account prise the slotted post apart (photos).*
- 6 Unhook the needle from the float assembly (15).
- 7 Lift the gasket (12) from the cover (1).
- 8 Where fitted, unscrew the three screws (91) and remove them together with the spring washers (92), then lift the power valve assembly (93) from the cover (1) being careful not to damage the thin diaphragm (photo).
- 9 Using a 10 mm box spanner or socket, unscrew the needle valve (14) seating and remove the gasket (13) (photo).
- 10 Unscrew the four screws (3) and withdraw the accelerator pump cover (29) from the carburettor body (88) together with the diaphragm (31) and spring (32). If necessary, carefully peel the diaphragm assembly (31) from the cover (29) (photos).
- 11 Unscrew the accelerator pump delivery valve (97) and remove it together with the pump jet (96) and gaskets (95). Note that on some types with an upper tapered seating, only one lower gasket is fitted (photo).
- 12 Separate the delivery valve (97), gaskets (95) and pump jet (96).
- 13 Unscrew and remove the accelerator pump discharge blanking needle (18) (photo).
- 14 Unscrew the primary (19) and secondary (19A) main jets

from the bottom of the float chamber, noting their correct locations (photo).

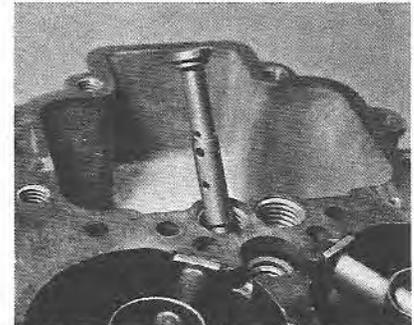
- 15 Unscrew the primary (94) and secondary (94A) air corrector jets from the carburettor body (88), noting their correct locations (photos).
- 16 Invert the carburettor body and extract the primary and secondary emulsion tubes (89); if these are tight due to over-tightening of the air corrector jets, use a self-tapping screw to remove them, but take care not to damage the tubes (photo).
- 17 Unscrew the idling jet holders (35) from each side of the carburettor and place them in separate marked containers (photo).
- 18 Remove the gaskets (34) if fitted, then separate the idling jets (33 and 33A) from their holders (photo).
- 19 Unscrew and remove the idling mixture adjusting screw (58) and spring (59). Where fitted, remove the plug from the opposite end of the carburettor flange (photo).
- 20 Unscrew and remove the throttle idling adjustment screw (70) and spring (71); on some types these are located on the throttle linkage.
- 21 Note the location of each choke valve (5) and mark them if necessary with a pencil.
- 22 Unscrew the retaining screws (9) and remove the choke valves (5) from the shaft (4), then remove the shaft (4) from the cover (1) (photo). Note that some types are fitted with brushes and circlips.
- 23 Where fitted, prise the dust cover (8) from the cover (1) then extract the dust seal (7).
- 24 *On manually operated choke types follow paragraphs 25 or 26 as applicable:*
- 25 Refer to Fig. 7.9 and, on DGV type carburetors, unscrew the retaining screw (46) and withdraw the bush (45), control lever (41) and return spring (44), together with the choke operating rod (7). Detach the rod (7) from the lever and remove the screw (43). Extract the split pin (50) and detach the fast idle



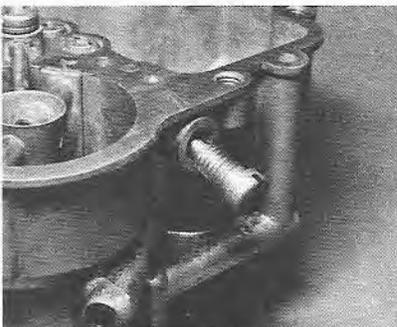
5.15a Location of the primary and secondary air corrector jets



5.15b Removing the primary air corrector jet



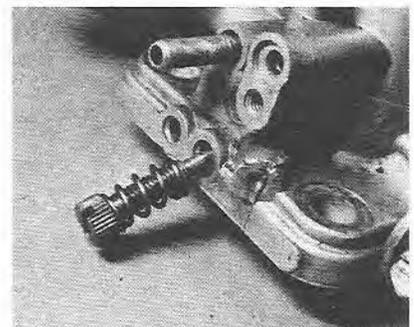
5.16 Removing the primary emulsion tube



5.17 An idling jet holder location



5.18 An idling jet separated from its holder



5.19 Removing the idling mixture adjusting screw

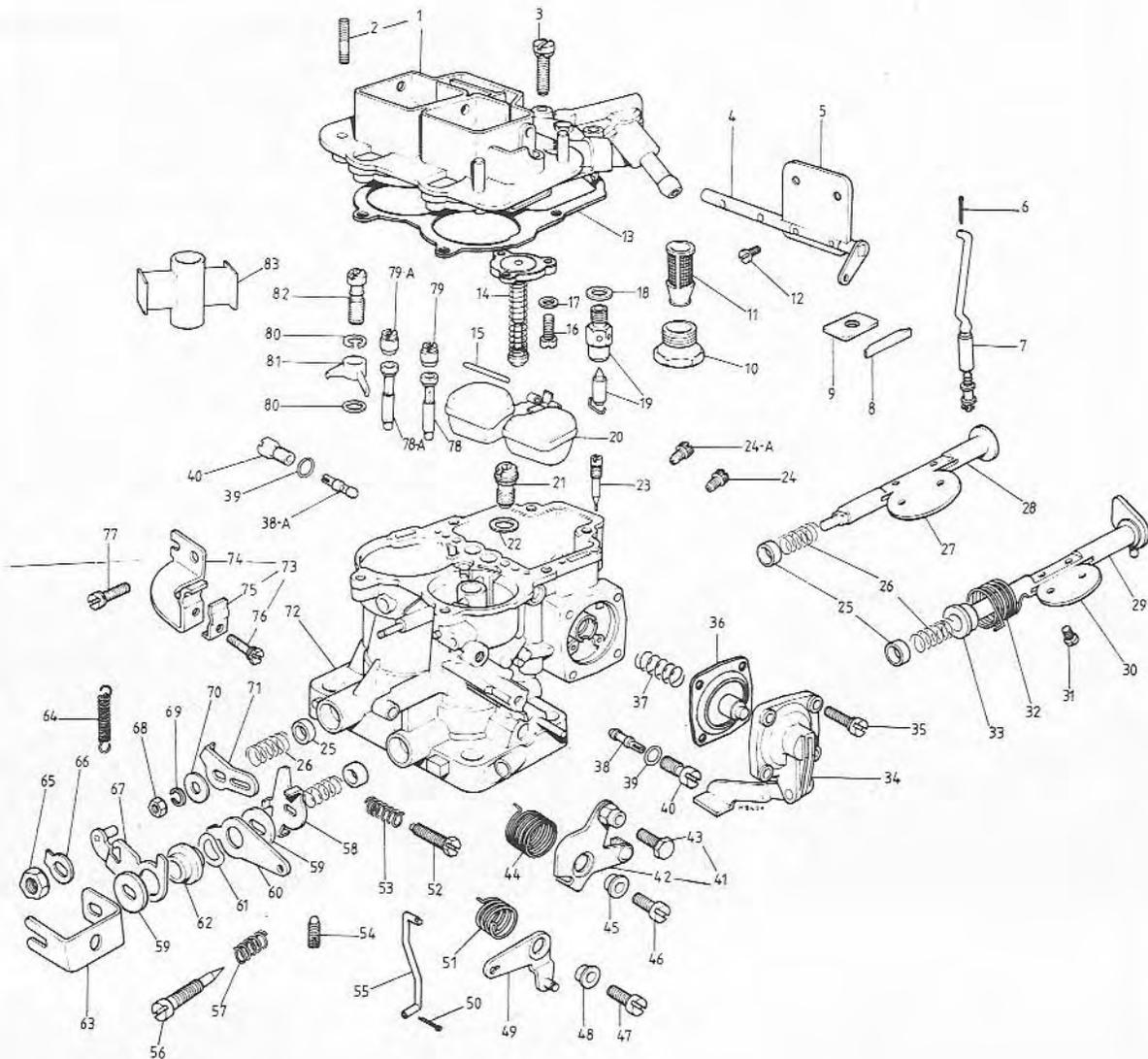
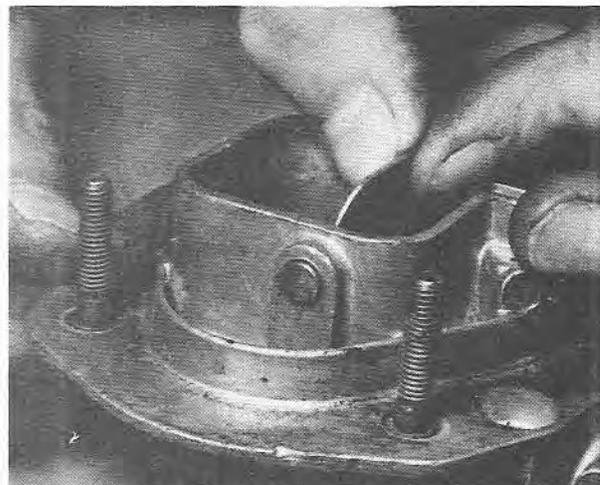


Fig. 7.9 Exploded view of the 32/36 DGV carburettor (typical) (Sec 5)

- |                                    |                                        |
|------------------------------------|----------------------------------------|
| 1 Carburettor cover assy           | 42 Lever                               |
| 2 Stud bolt                        | 43 Screw securing wire                 |
| 3 Cover fixing screw               | 44 Spring for choke lever              |
| 4 Choke shaft and lever assy       | 45 Bushing for choke lever             |
| 5 Choke throttle valve             | 46 Choke lever fixing screw            |
| 6 Split pin                        | 47 Square lever fixing screw           |
| 7 Choke rod                        | 48 Bushing for square lever            |
| 8 Dust seal plug                   | 49 Fast idle control square lever assy |
| 9 Dust seal plate                  | 50 Split pin                           |
| 10 Strainer inspection plug        | 51 Spring for square lever             |
| 11 Strainer assy                   | 52 Primary throttle adjusting screw    |
| 12 Choke plates fixing screw       | 53 Spring for throttle adjusting screw |
| 13 Cover gasket                    | 54 Secondary throttle adjusting screw  |
| 14 Power valve assy                | 55 Fast idling control rod             |
| 15 Float fixing pin                | 56 Idle adjusting screw                |
| 16 Control valve retaining screw   | 57 Spring for idle adjusting screw     |
| 17 Washer for control valve screw  | 58 Primary throttle control lever      |
| 18 Needle valve gasket             | 59 Washer for loose lever              |
| 19 Needle valve assy               | 60 Fast idling loose lever             |
| 20 Float assy                      | 61 Wave washer                         |
| 21 Full power needle valve assy    | 62 Bushing for loose lever             |
| 22 Power valve gasket              | 63 Throttle valve control lever        |
| 23 Pump discharge blanking needle  | 64 Spring for loose lever              |
| 24 Primary main jet                | 65 Throttle shaft fixing nut           |
| 24A Secondary main jet             | 66 Lockwasher                          |
| 25 Shaft retaining bush            | 67 Loose lever assy                    |
| 26 Bush retaining spring           | 68 Secondary shaft fixing nut          |
| 27 Secondary throttle valve        | 69 Spring washer                       |
| 28 Secondary shaft                 | 70 Washer for loose lever              |
| 28 Secondary shaft assy oversize   | 71 Secondary throttle control lever    |
| 29 Primary shaft                   | 72 Carburettor body                    |
| 29 Primary shaft assy oversize     | 73 Sheat support assy                  |
| 30 Primary throttle valve          | 74 Sheat support                       |
| 31 Throttle plates fixing screw    | 75 Sheat securing plate                |
| 32 Shaft return spring             | 76 Sheat support fixing screw          |
| 33 Spacer                          | 77 Sheat support fixing screw          |
| 34 Accelerator pump cover assy     | 78 Primary emulsifying tube            |
| 35 Pump cover fixing screw         | 78A Secondary emulsifying tube         |
| 36 Accelerator pump diaphragm assy | 79 Primary air corrector jet           |
| 37 Pump loading spring             | 79A Secondary air corrector jet        |
| 38 Primary idle jet                | 80 Pump jet gasket                     |
| 38A Secondary idle jet             | 81 Accelerator pump jet                |
| 39 Gasket for idling jet holder    | 82 Pump delivery valve assy            |
| 40 Idling jet holder               | 83 Auxiliary venturi                   |
| 41 Choke control lever assy        |                                        |



5.22 Removing a choke valve

rod from the lever (60), then remove the retaining screw (47) and withdraw the brush (48), lever (49) and spring (51). Disengage the fast idle rod (55) from the lever (49).

26 Refer to Fig. 7.10 and, on all but DGV type carburetors, extract the split pin (6) and detach the fast idle rod (40) from the lever (50). Unscrew the retaining screw (34) and unhook the spring (27). Remove the washer (33), lever assembly (30) and spring (29) from carburettor body, then disengage the rod (40) from the lever (31) and remove the screw (32). Extract the split pin (6), remove the washer (67) and detach the operating rod (9) from the lever (26). Extract the split pin (6A), remove the washer (28) and withdraw the lever (26) from the carburettor body.

27 On automatically operated choke types, follow paragraphs 28 to 40 inclusive.

28 Unscrew and remove the three screws (42) and lift the automatic choke thermostat assembly (48) away from the body (51) (photo).

29 Remove the gasket (49), then unscrew and remove the three retaining screws (40) and spring washers. Withdraw the automatic choke body (51), at the same time disengage the fast idling control rod (61) from the throttle lever (76). Note that some models have a retaining split pin (60) instead of an offset lug (photos).

30 Unscrew the water housing retaining bolt (44) together with the gasket (43), then separate the housing (45) from the thermostat assembly (48); cut the gasket (46) from the assembly if it is stuck.

31 Remove the retaining ring (47).

32 Note the location of the individual components of the automatic choke body (51) before dismantling them.

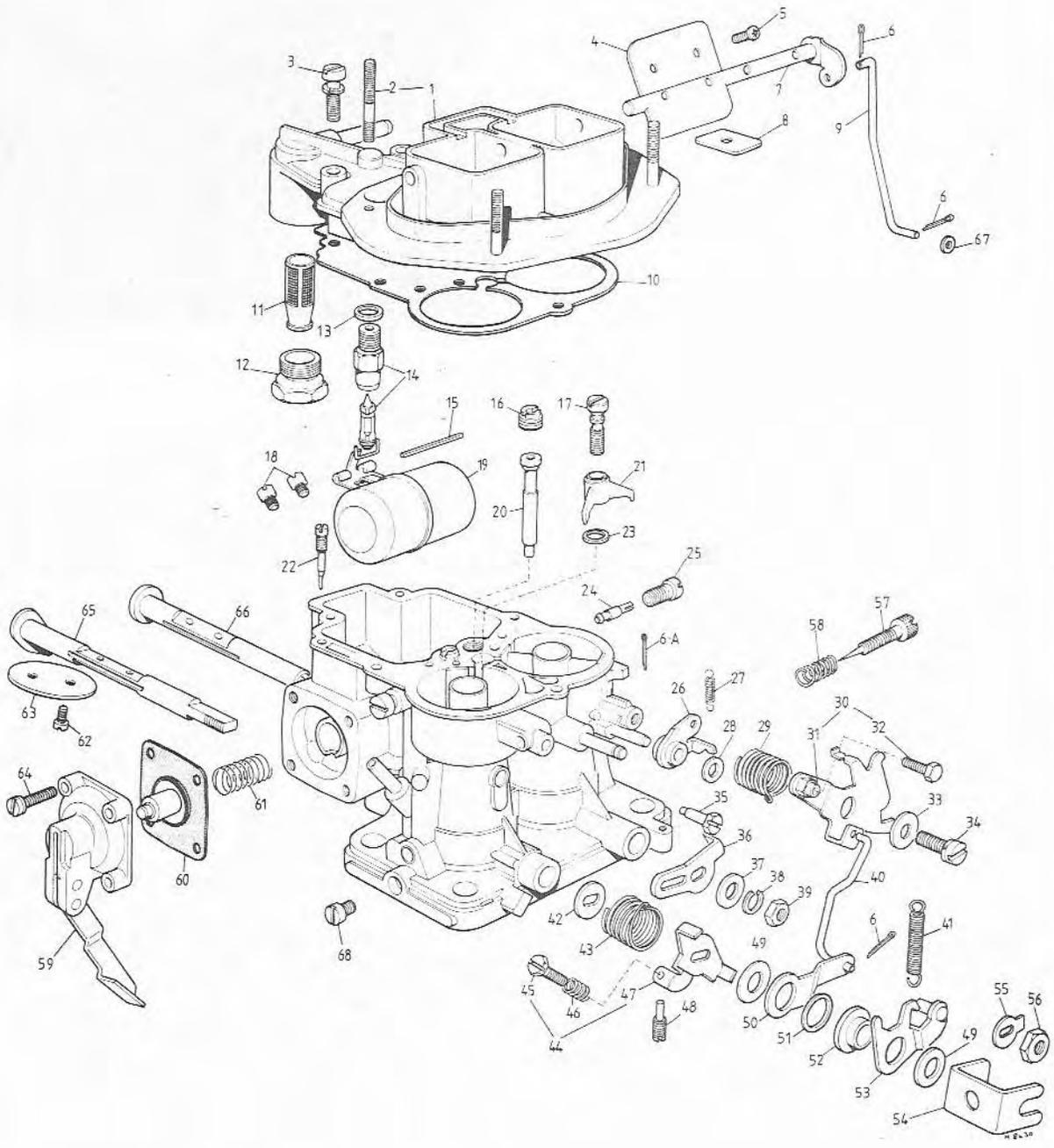
33 Prise the O-ring seal (67) from the rear of the unit.

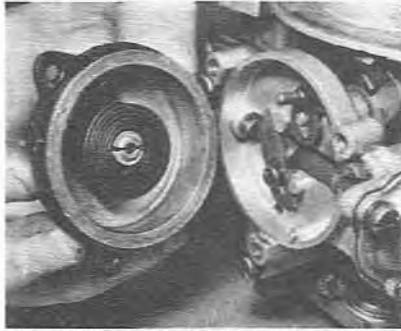
34 Unscrew and remove the retaining nut (69) and spring washer (68), then withdraw the lever (36), spring (37), cover (38), if fitted, and spacer (39). The shaft (41) can now be removed (photos) extract the split pin and separate the rod from the lever (36) where these are separate items.

36 Unscrew the screw (75) and remove it together with the spring washer and fast idling lever (63), then remove the brush (74), wave washer (73) where fitted, washer (62), adjusting screw (65) and spring (66) (photo).

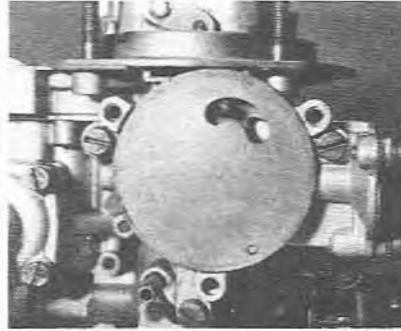
37 On 32/36 DFAV and 32 DAF types, mark the location of the adjusting stop plate in the automatic choke body, then remove the screw and lift the plate out (photo).

38 On all types, unscrew the diaphragm cover retaining screws (55) and lift off the cover (54) and spring (53). Where fitted, remove the screw plug (56) and adjusting screw (57), noting how many turns are necessary to remove the plug (photo).

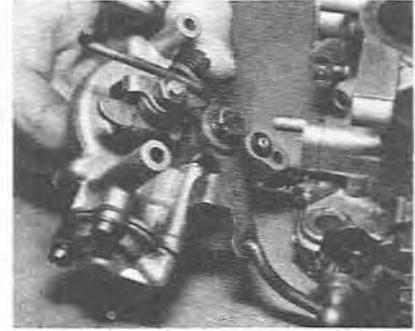




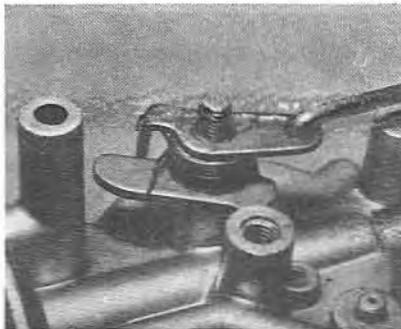
5.28 Withdrawing the automatic choke thermostats assembly (DFAV type shown)



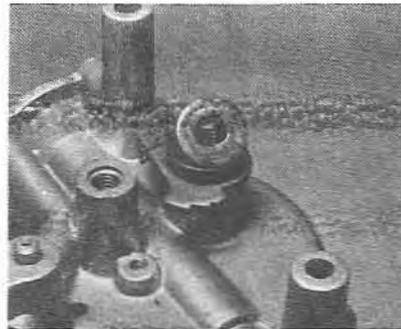
5.29a Location of the automatic choke disc gasket (DFAV type shown)



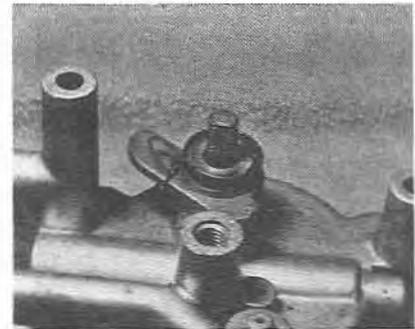
5.29b Disengaging the fast idle control rod (DFAV type shown)



5.34a Removing the automatic choke lever ...



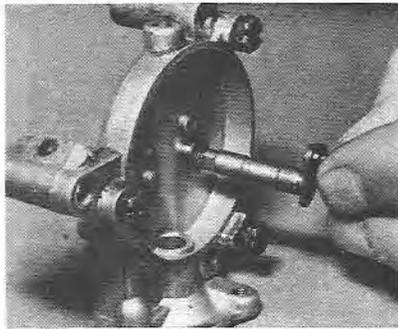
5.34b ... spacer ...



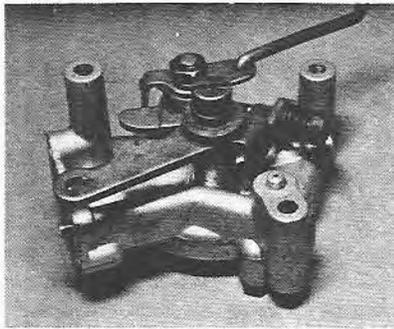
5.34c ... spring ...

Fig. 7.10 Exploded view of the 32 DFE and 32 DFM carburettor (typical) (Sec 5)

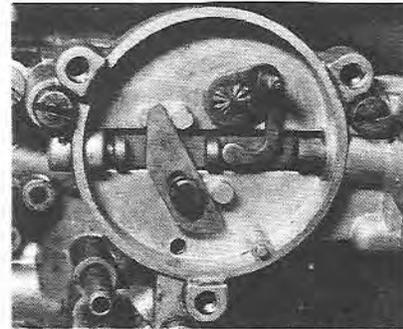
- |                                                |                                                   |                                                   |
|------------------------------------------------|---------------------------------------------------|---------------------------------------------------|
| 1 Air horn and plugs assy                      | 22 Accelerator pump discharge blanking needle     | 44 Fast idle adjustment lever assy                |
| 2 Air cleaner retaining stud                   | 23 Nozzle bar gasket                              | 45 Screw                                          |
| 3 Horn and plug assy fixing screw and washer   | 24 Idling jet (Primary)                           | 46 Spring                                         |
| 4 Choke plate                                  | 24A Idling jet (Secondary)                        | 47 Lever                                          |
| 5 Choke plate screw                            | 25 Idling jet holder                              | 48 Screw                                          |
| 6 Control rod split pin                        | 26 Choke lever assy                               | 49 Primary throttle shaft assy washer             |
| 6 Choke/throttle interconnecting rod split pin | 27 Choke lever spring                             | 50 Choke/throttle interconnecting lever           |
| 6A Choke lever pivot split pin                 | 28 Choke lever pivot washer                       | 51 Throttle shaft (Primary) wave washer           |
| 7 Choke shaft and lever assy                   | 29 Choke lever return spring                      | 52 Throttle shaft bushing                         |
| 8 Air cleaner dust seal                        | 30 Choke control lever assy                       | 53 Throttle control lever                         |
| 9 Choke control rod                            | 31 Lever                                          | 54 Throttle lever                                 |
| 10 Air horn to throttle body gasket            | 32 Screw securing wire                            | 55 Throttle shaft (Primary) tab washer            |
| 11 Fuel inlet strainer assy                    | 33 Washer                                         | 56 Throttle shaft (Primary) nut                   |
| 12 Fuel inlet strainer plug                    | 34 Screw and washer                               | 57 Idle adjustment needle                         |
| 13 Fuel intake valve washer                    | 35 Screw securing sheath                          | 58 Idle adjusting needle spring                   |
| 14 Fuel inlet valve and seat assy              | 36 Full throttle stop lever                       | 59 Accelerator pump cover assy                    |
| 15 Float lever shaft                           | 37 Geared sector adjusting screw washer           | 60 Accelerator pump diaphragm assy                |
| 16 Starting air adjusting jet (Primary)        | 38 Auto-choke lever fixing nut spring washer      | 61 Accelerator pump rod spring                    |
| 16A Starting air adjusting jet (Secondary)     | 39 Auto-choke lever fixing nut                    | 62 Throttle plate screw                           |
| 17 Accelerator pump discharge valve assy       | 40 Fast idle rod                                  | 63 Throttle plate                                 |
| 18 Main primary jet                            | 41 Throttle control return spring (RH Secondary)  | 64 Accelerator pump cover fixing screw and washer |
| 19 Float assy                                  | 42 Throttle lever and shaft assy washer (Primary) | 65 Throttle shaft assy (LH Primary)               |
| 20 Emulsion tube                               | 43 Throttle control return spring (LH)            | 66 Throttle shaft assy (RH Secondary)             |
| 21 Pump discharge nozzle                       |                                                   | 67 Rod/choke control washer                       |
|                                                |                                                   | 68 Idle primary duct plug                         |



5.34d ... and shaft (DFAV type shown)



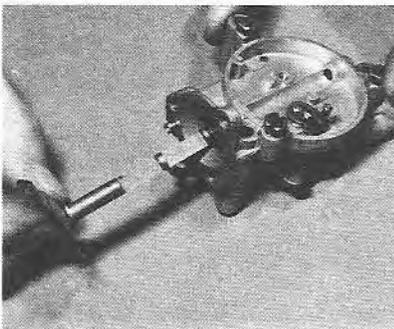
5.36 Automatic choke control levers (DFAV type shown)



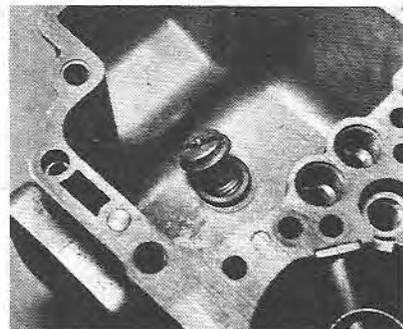
5.37 Location of the automatic choke adjusting stop plate (DFAV type shown)



5.38 Removing the automatic choke diaphragm cover and spring (DFAV type shown)



5.39 Withdrawing the automatic choke operating rod (DFAV type shown)



5.41 Removing the full power valve from the float chamber

39 Carefully release the thin diaphragm, then withdraw the operating rod (52) from the body (51) (photo).

40 The automatic choke body (51) is supplied complete with the fast idle cam and shaft bush and it is therefore of no consequence to remove the bush and cam.

41 Where fitted, unscrew the full power valve (16) from the base of the float chamber and remove the gasket (17) (photo).

42 Mark the position and location of the auxiliary venturis (98), then remove them from the primary and secondary barrels. If they are tight, open each throttle valve in turn and use a plastic or wooden rod to tap them out. Failure of this method to remove the auxiliary venturis will necessitate obtaining Weber tool no 9610 150 0035 (photo).

43 Unhook the spring (87) from the lever (82) and the carburettor body, then bend back the tab washer (81) and unscrew the nut (80) from the end of the primary throttle shaft. If the nut is tight, Weber tool no 9610 315 1514 should be used to hold the shaft stationary, otherwise the shaft could be buckled (photo).

44 Remove the nut (80), tab washer (81), lever (79), washer (78), lever (82), bush (77), lever (76) and return spring (27). On DGV and DGAV types, the return spring (27) is located on the opposite end of the primary shaft and cannot be removed until the shaft has been removed (photos).

45 Remove the spring (21) and bush (20) on DGV and DGAV types. Remove the spacer on all other types (photo).

46 With the primary throttle valve closed, unscrew and remove the retaining screws (26), then mark the valve (25) with a pencil so that it can be refitted in its original position.

47 Fully open the primary throttle and remove the valve (25) from the shaft (24), then withdraw the primary shaft (25) from the carburettor body (88) (photos).

48 On DGV and DGAV types, remove the bush (20), spring (21), spacer (28) and spring (27).

49 Unscrew the nut (83) from the end of the secondary throttle

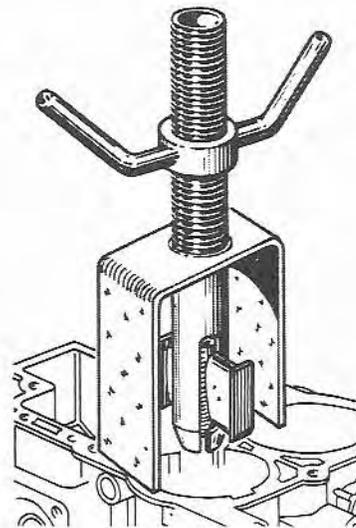
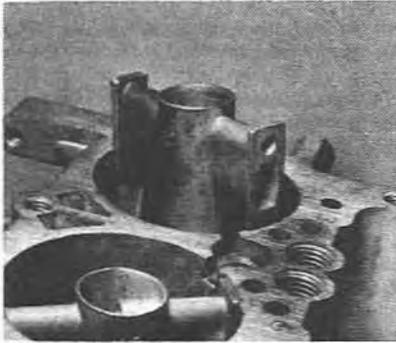


Fig. 7.11 Removing the primary auxiliary venturi with the special tool (Sec 5)

shaft (23); if it is tight, use Weber tool no 9610 315 1514 to hold the shaft stationary (photo).

50 Remove the nut (83), spring washer (84), plain washer (85), and lever (86); additionally on DGV and DGAV types, remove the bush (20) and spring (21).

51 With the secondary throttle valve closed, unscrew and remove the retaining screws (26) then mark the valve (22) with a pencil to identify its location and position (photo).



5.42 Withdrawing the primary auxiliary venturi

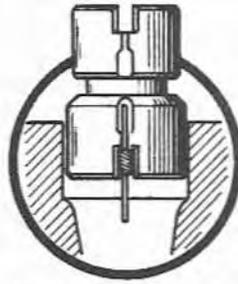
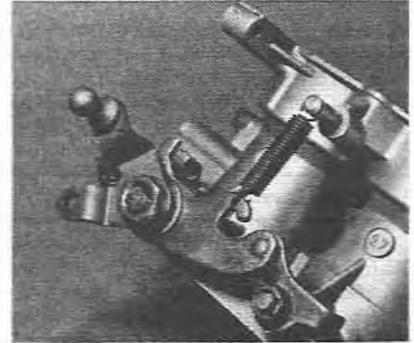
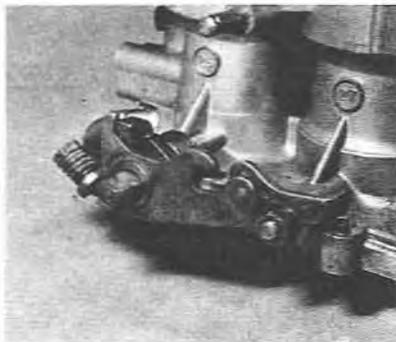


Fig. 7.12 Using the special tool to hold the throttle shaft stationary (Sec 5)



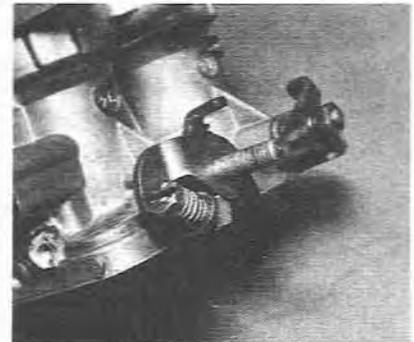
5.43 Primary throttle lever components



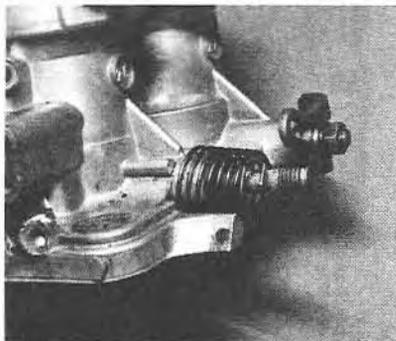
5.44a Removing the primary throttle shaft lever ...



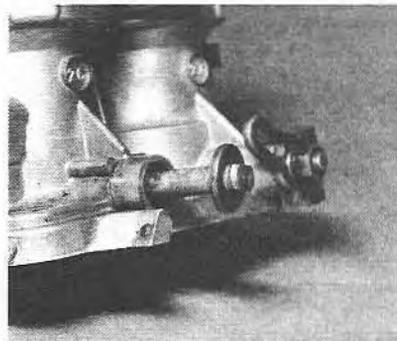
5.44b ... bush ...



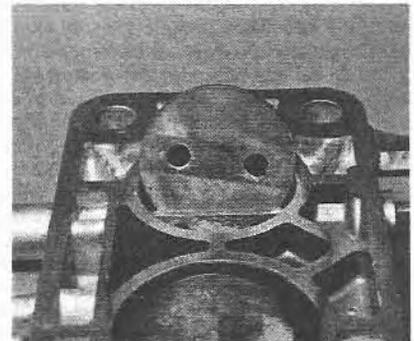
5.44c ... idling lever ...



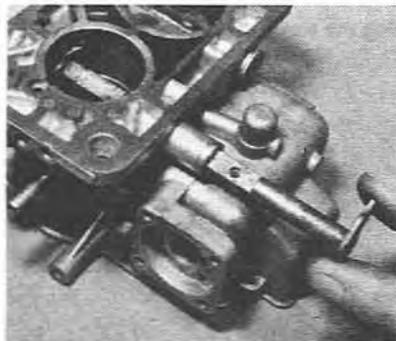
5.44d ... and return spring



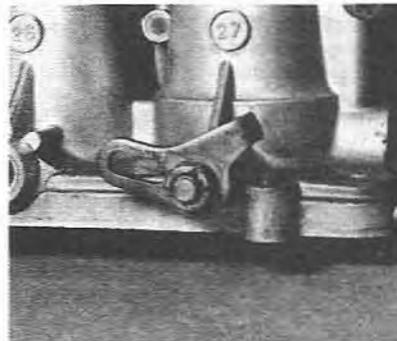
5.45 Removing the primary throttle shaft spacer



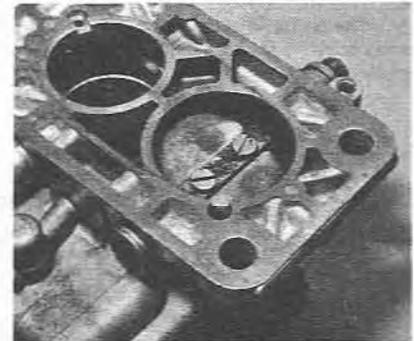
5.47a Removing the primary throttle valve ...



5.47b ... and throttle shaft



5.49 Secondary throttle lever components



5.51 Secondary throttle valve retaining screws

52 Fully open the secondary throttle and remove the valve (22) from the shaft (23), then withdraw the secondary shaft (23) from the carburettor body (88).

53 On DGV and DGAV types, remove the bush (20) and spring (21) from the shaft (23).

## 6 Special overhaul procedures

After carrying out the general overhaul procedures given in Chapter 4, the following special procedures should be made.

1 Using a hand chuck and Weber tool no 9600 325 1047, reform the idling jet seats by carefully rotating the tool in alternate directions. Finish the seatings by inserting Weber tool no 9610 315 1202 and gently tapping the top of the tool whilst rotating it.

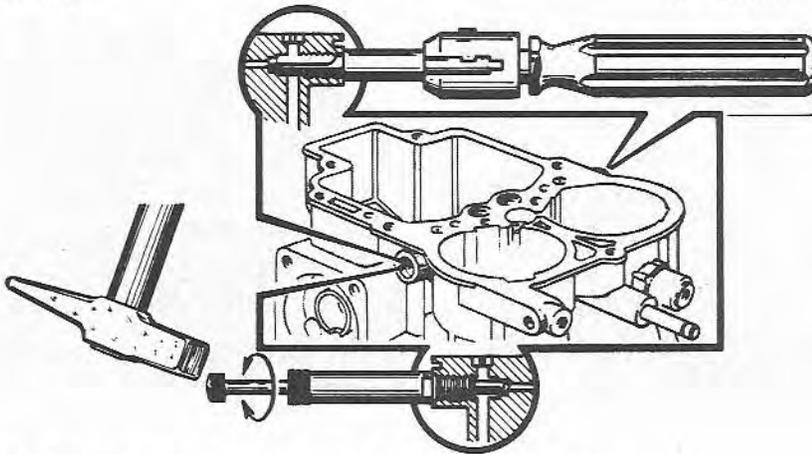


Fig. 7.13 Overhauling the idling jet seats (Sec 6)

2 If the emulsion tube bores are discoloured and show signs of sediment build up, ream them clear again using Weber tool no 9600 325 0765. Rotate the tool slowly with a hand chuck until it moves quite freely, then remove it while still rotating it.

3 If on disassembly, the choke shaft (4) (Fig. 7.8) is a tight fit in the carburettor cover (1) and it is of original diameter (6.0 mm), use Weber tool no 9600 035 0540 to ream the shaft bore clear with the aid of a hand chuck. Should the shaft bores be excessively worn, a new carburettor cover (1) must be obtained, but note that normally, the shaft itself will wear quicker than its bore, in which case a new shaft will cure the problem.

4 If on disassembly, the throttle shafts (23 and 24) are a tight fit in the carburettor body (88) and they are of original diameter (8.0 mm), use Weber tool no 9600 035 0407 to ream the shaft bores clear with the aid of a hand chuck. Should the shaft bores be excessively worn, oversize shafts of 8.5 mm diameter must be fitted and the bores should be reamed using Weber tool no 9600 035 0406.

5 Using a small file remove any burrs, which have been formed as a result of reaming as described in paragraphs 3 and 4.

6 Check the internal channels of the carburettor body (88) and cover (1) for blockage, by injecting fuel with a syringe and observing that it emerges freely from the particular channel

being tested. If any are blocked, the lead plugs must be drilled out and the channels cleared and checked with the special Weber tool.

7 The channels are of three diameters (1.0 mm, 1.5 mm, and 2.0 mm) and the corresponding tools are Weber tool nos 98014 300, 98014 400 and 98014 500. Fig. 7.17 shows the location of the various channels.

8 The carburettor body and cover should be thoroughly cleaned after overhaul to remove swarf and dirt, preferably using clean fuel and air pressure. The lead plugs should be renewed and retained in position by using Weber tool nos 9610 315 0822 and 9610 315 0823 to expand them into their bores.

9 Check the float unit for damage and leakage; shake the float to determine whether fuel has entered. If the float is damaged or fuel is present, it must be renewed.

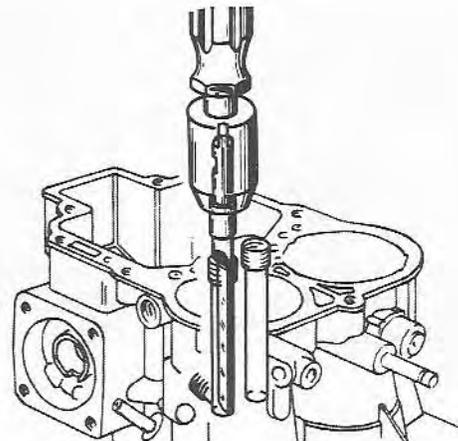


Fig. 7.14 Reaming the emulsion tube bores (Sec 6)

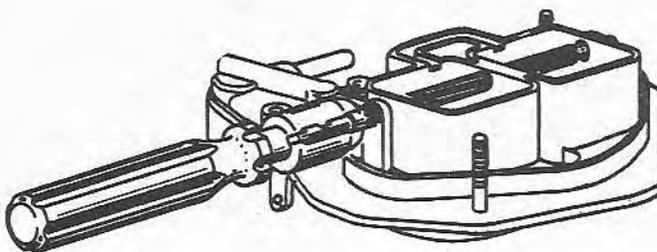


Fig. 7.15 Reaming the choke shaft bore (Sec 6)

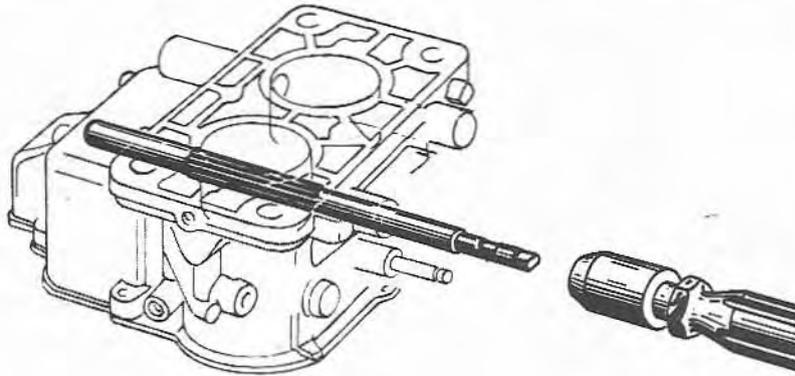


Fig. 7.16 Reaming the throttle shaft bore (Sec 6)

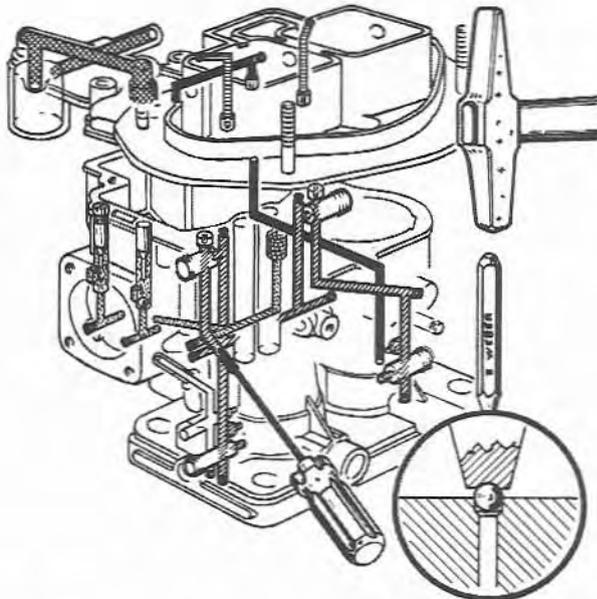


Fig. 7.17 Location of the carburettor internal channels and method of fitting the lead plugs (Sec 6)

10 Where a power valve is fitted, check the condition of the diaphragm seat in the carburettor cover. If necessary clean the seat with a little metal polish.

11 During the manufacture of the carburettor a ball is inserted into the accelerator pump channel and retained by a brass plug (see Fig. 7.18). To check that this ball is free and unobstructed, shake the carburettor body (88) and listen to the ball movement.

12 On carburetors fitted with an automatic choke, check that the internal channel of the automatic choke body (51) is free and unobstructed. Also check that the diaphragm (52) and corresponding surfaces are serviceable; if necessary clean the surfaces with metal polish.

13 Check the accelerator pump diaphragm and corresponding surfaces in the same manner to that described in paragraph 12.

14 Renew the diaphragm assemblies checked in paragraphs 12 and 13 if necessary.

15 Check the accelerator pump lever for wear, especially on the type fitted with a roller bearing and renew it as necessary.

16 Check the walls of the choke intake, where the choke valves rest when they are fully shut; if there is a deep wear ridge, this could cause the valves to temporarily stick shut especially after an engine 'blowback' (photo). The ridge should be removed using fine emery tape.

## 7 Assembly

**Note:** All components should be clean and dry before starting the assembly procedure.

1 On DGV and DGAV types, fit the spring (21) (Fig. 7.8) to the secondary shaft (23) followed by the bush (20).

2 Insert the shaft (23) into the carburettor body (88) from the float chamber end.

3 On DGV and DGAV types, fit the spring (21) and bush (20) to the remaining end of the secondary shaft (23).

4 Fit the lever (86), plain washer (85), spring washer (84) and nut (83) to the secondary shaft (23) and tighten the nut (83). If available, use the Weber tool no 9610 315 1514 to hold the shaft stationary while the nut is tightened.

5 Insert the secondary valve (22) into the shaft slot, then turn the lever (86) onto the adjusting screw (72) or stop. Check that the angled perimeter of the valve (22) seats correctly in the secondary barrel. If necessary loosen the screw (72) during this procedure.

6 With the throttle valve (22) held closed, insert the valve retaining screws (26) and tighten them evenly but without exerting excessive pressure on the shaft. It is recommended that new screws are always fitted as it is quite easy to cross-thread previously peened screws. Lock the screws (26) by peening with Weber tool no 98010 900 while supporting the shaft (23) with a block of wood. Alternatively, coat the screw threads with a liquid locking agent (fuel resistant) prior to inserting them (Figs. 7.19 and 7.20).

7 On DGV and DGAV types, fit the spring (27), spacer (28), spring (21) and bush (20) to the primary throttle shaft (24).

8 Insert the shaft (24) into the carburettor body (88) from the float chamber end and tension the spring (27) where fitted.

9 On DGV and DGAV types, fit the bush (20) and spring (21) to the remaining end of the primary shaft (24); on all other types, fit the spacer and return spring.

10 Fit the lever (76) and bush (77), then fit the lever (82) and enter its lug into the secondary lever (86).

11 Fit the washer (78), lever (79), tab washer (81) and nut (80). Note that the accelerator pump cam on the end of the primary shaft (24) should be facing the well at the bottom of the float chamber while fitting the components.

12 Tighten the nut (80) and lock it by bending the tab washer (81); if available, use the Weber tool no 9610 315 1514 to hold the shaft stationary.

13 Insert the primary valve (25) into the shaft slot and check that when it is closed the angled perimeter seats correctly in the primary barrel (photo).

14 With the throttle valve (25) held closed, insert the valve retaining screws (26) and tighten them evenly but without exerting excessive pressure on the shaft. Refer to paragraph 6 for details of locking the screws.

15 Hook the spring (87) to the lever (82) and the carburettor body extension.

16 Check that both the primary and secondary throttle valves

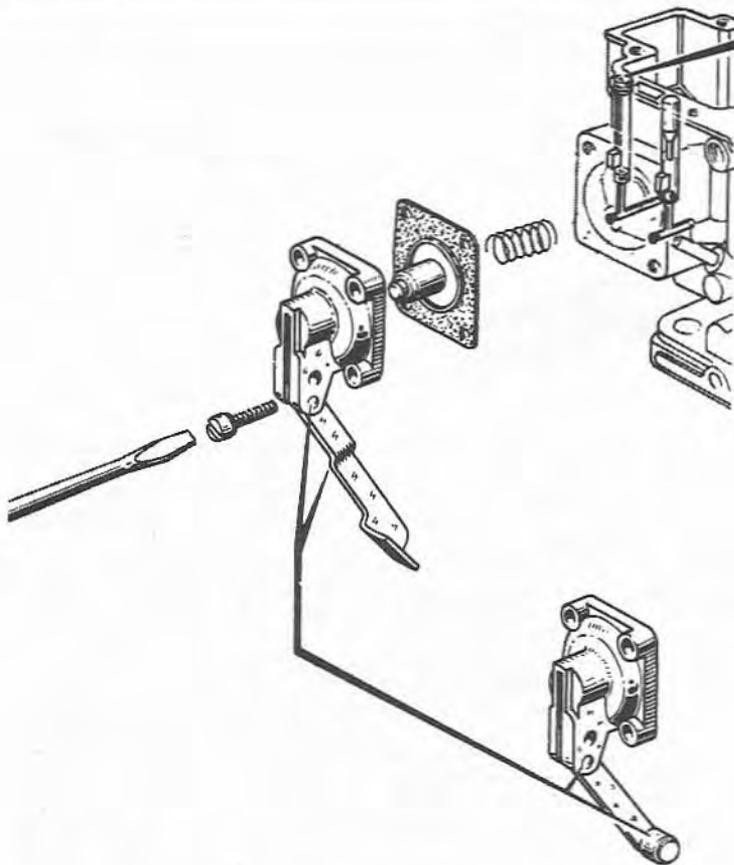


Fig. 7.18 Location of the accelerator pump inlet ball valve (Sec 6)

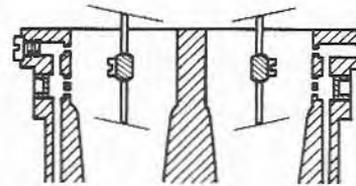
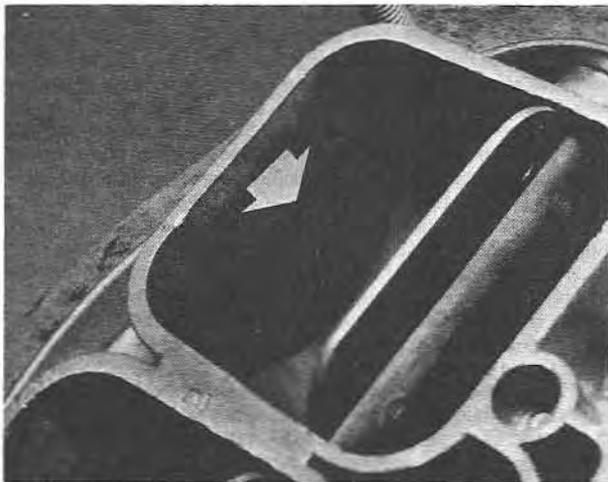


Fig. 7.19 Correct attitude of the throttle valve angled perimeters when fitted to the carburettor (Sec 7)



6.16 Showing the wear ridge on the choke intake walls

operate smoothly and fully without any signs of sticking.

17 Fit the auxiliary venturis (98) into their respective positions as noted previously, making sure that the supply channels are adjacent and that the extended venturis face the throttle valves.

18 Fit the gasket (17) to the full power valve (16) then tighten the valve into the base of the float chamber (where this component is fitted).

19 *On automatically operated choke types follow paragraphs 20 to 37 inclusive:*

20 Lubricate the operating rod (52) with a little engine oil, then insert it into the automatic choke body (51) and locate the

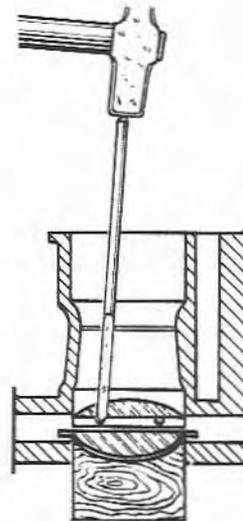


Fig. 7.20 Peening the throttle valve retaining screws (Sec 7)

diaphragm over the brass tube.

21 Locate the spring (53) into the cover (54) then fit it over the diaphragm making sure that the spring seats correctly in the diaphragm plate.

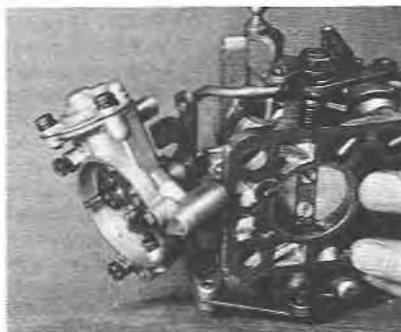
22 Press the operating rod (52) towards the cover (54) and insert the retaining screws (55) and spring washers; tighten the screws evenly.

23 Fit the adjusting screw (57) and plug (56), where fitted, to the previously noted adjustment.

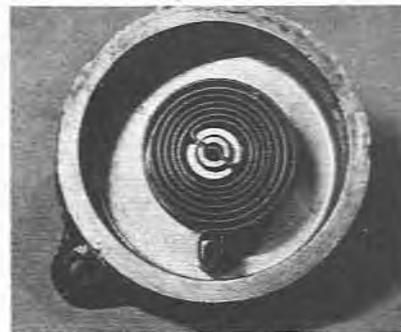
24 Check that the diaphragm is sealing properly by placing a finger over the brass entry pipe after lifting the operating rod



7.13 The primary throttle valve (the angle relates to the total movement of the valve)



7.34 Refitting the fast idling control rod and the automatic choke assembly



7.36 Location of the automatic choke bi-metal spring

(52) against the spring (53); it should hold its position, but if it slowly moves to the rest position, a leak is indicated.

25 On 32/36 DFAV types, fit the adjustment stop plate to its previously noted position and tighten the retaining screw.

26 Fit the adjustment screw (65) and spring (66) to the fast idling lever (63), then fit the screw (75) to the lever together with the bush (74), wave washer (73) where fitted, and washer (62).

27 Tighten the screw (75) into the body (51) and check that the adjustment screw (65) locates on the fast idle cam correctly.

28 Where applicable, fit the rod to the lever (36) and insert the split pin, bending the legs back to secure.

29 Lubricate the shaft (41) with engine oil then insert it into the body (51) and locate the lever against the operating rod (52).

30 Fit the spacer (39), cover (38) if fitted, spring (37), lever (36), spring washer (68) and nut (69). Hook the spring (37) onto the lever (36) and tighten the nut (69). Position the cam towards the adjusting screw (65) during this operation and make sure that the lug of the lever (36) locates on top of the smooth part of the fast idle cam.

31 Press the rubber O-ring seal (67) to the rear of the unit.

32 Fit the retaining ring (47) to the thermostat assembly (48), then fit the gasket (46).

33 Locate the housing (45) to the assembly (48), then insert and tighten the retaining bolt (44) and gasket (43) making sure that the inlet and outlet pipes are facing the correct way.

34 Engage the fast idling control rod (61) to the lever (64) making sure that the single retaining lug end is fitted, then engage the remaining end with the throttle lever (76) and fit the split pin where necessary (photo).

35 Fit the auto-choke body (51) to the carburettor body (88) and tighten the retaining screws (40) and spring washers, noting that they are different lengths.

36 Locate the gasket (49) over the operating shaft arm and the location peg. Fit the thermostat assembly (48), at the same time locating the bi-metal spring end over the shaft arm (photo).

37 Align the marks on the thermostat assembly (48) and body (51), then insert the screws (42) and tighten them evenly. It may be necessary to reposition the housing (45) during this operation. If a new body (51) has been fitted, it will be necessary to make the fast idle adjustments given in Section 8, then to make an alignment mark using Weber tool no 98028 600, at the same time keeping the choke valves completely shut.

38 *On manually operated choke types paragraphs 39 or 40 as applicable:*

39 Refer to Fig. 7.10 and, on all but DGV type carburetors, fit the lever (26) to the carburettor body followed by the washer (28) and split pin (6). Fit the operating rod (9) to the lever (26), then locate the washer (67) and split pin (6). Insert the screw (32) into the lever (31), then engage the rod (40) to the lever (31) and fit the spring (29), lever assembly (30) and washer (33)

to the carburettor body. Insert and tighten the screw (34) and spring washer, then hook the spring (27) to the lever assembly (30) and lever (26). Locate the rod (40) to the lever (50) and fit the split pin (6).

40 Refer to Fig. 7.9 and, on DGV type carburetors, engage the fast idle rod (55) to the lever (49) then fit the bush (48) and lever (49) to the retaining screw (47). Mount the spring (51) to the carburettor, then fit and tighten the screw (47); hook the spring (51) over the lever (49). Locate the lower end of the rod (55) to the lever (60) and fit the split pin (50). Insert the screw (43) through the lever (42), then fit the rod (7) to the lever (42). Mount the return spring (44) to the carburettor body and fit the lever (41), bush (45) and retaining screw (46). Tighten the screw (46), hook the spring (44) to the lever (41) and make sure that the cam abuts the peg on the lever (49).

41 Referring to Fig. 7.8, fit the dust seal (7) and dust cover (8) to the carburettor cover (1).

42 Lubricate the choke shaft (4) with a little engine oil and insert it into the cover (1), together with bushes and circlips where fitted.

43 With the choke shaft (4) in the open position, fit the choke valves (5) into their location slots, then close the shaft to allow the valves to centralise (photo).

44 Holding the shaft closed, insert the valve retaining screws (9) and tighten them evenly without exerting excessive pressure on the brass shaft (4). It is recommended that new screws are always fitted as it is quite easy to cross-thread previously peened screws. Lock the screws (9) by peening with Weber tool no 9610 315 0833, or alternatively by coating the threads with a liquid locking agent (fuel resistant) prior to inserting them. If the tool method is used, support the shaft (4) with a piece of wood.

45 Fit the spring (71) to the throttle idling adjustment screw (70) and locate the screw in the carburettor body or linkage as applicable.

46 Fit the spring (59) to the idling mixture adjusting screw (58) and locate the screw in the carburettor body.

47 Where fitted, tighten the plug into the carburettor flange.

48 Prise the idling jets (33 and 33A) into their respective holders (35) and fit the gaskets (34) if fitted.

49 Tighten each idling jet into their primary and secondary locations in the carburettor body (88).

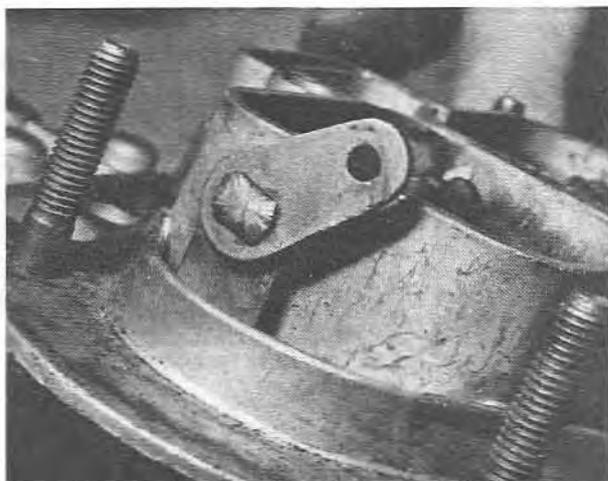
50 Insert the primary and secondary emulsion tubes (89) into the carburettor body (88), then fit and tighten the primary (94) and secondary (94A) air corrector jets.

51 Fit and tighten the primary (19) and secondary (19A) main jets to the bottom of the float chamber.

52 Fit and tighten the accelerator pump discharge blanking needle (18).

53 Fit a gasket (95) to the accelerator pump delivery valve (97) followed by the pump jet (96) and a further gasket (95). Note that on some types the upper gasket is omitted.

54 Fit and tighten the delivery valve (97) to the carburettor body (88).



7.43 Choke lever position with the valves shut

55 Locate the diaphragm (31) to the accelerator pump cover (29) and insert the screws (30) through the cover and diaphragm.

56 Place the carburettor body on end and locate the spring (32) into the housing, then lower the diaphragm and cover into the spring and tighten the retaining screws in diagonal sequence. Make sure that the roller or arm, as applicable, locates on the primary shaft (24) cam.

57 Fit the gasket (13) to the needle valve (14) seating then tighten it into the carburettor cover (1) using a 10 mm box spanner or socket.

58 Locate the power valve (93) (where fitted) on the inverted cover (1) then depress the valve with one hand and lift the valve cover slightly to settle the diaphragm. While keeping the valve depressed, insert and tighten the retaining screws (91) together with spring washers (92). Check the operation of the valve by depressing it and placing a finger over the brass connecting channel; the valve should remain in the closed position but, if it

moves, a leak is indicated in the diaphragm.

59 On all but DFV, DFAV, DGV and DGAV type carburetors, locate the gasket (12) to the carburettor cover (1). On the types given, the gasket is fitted after checking the float level.

60 Hook the needle onto the wide tab of the float (15), then lower both items into position and insert the fulcrum pin (90) into the two posts. Lightly pinch the slotted post with a pair of flat pliers to retain the pin.

61 The float level adjustment must now be checked in the following manner, remembering that DFV, DFAV, DGV and DGAV types must *not* have the gasket (12) in position. Hold the carburettor cover vertically so that the float(s) is hanging from the fulcrum pin and the float arm is in light contact with the needle ball (ie the ball is not depressed).

62 On DFV, DFAV, DGV and DGAV types, use vernier calipers to determine the distance from the cover to the further edge of the floats as indicated in Fig. 7.21. On all other types obtain a drill or dowel rod of diameter equal to the closed checking dimension and check that the distance from the cover gasket to the nearest part of the float is correct. The annular seam must not be taken into consideration for the check and for this reason a groove must be filed in the checking rod.

63 If the dimension obtained in paragraph 62 is not correct, carefully bend the wide tab on the float as necessary.

64 Tilt the carburettor cover so that the float(s) moves away from the cover and the narrow tab makes contact with the needle valve seating. Now, using the same methods as described in paragraph 62, check the needle valve fully-open dimension. The difference between the dimension and the closed dimension is the needle valve stroke. If this is not correct, bend the narrow tab as necessary.

65 On DFV, DFAV, DGV and DGAV types, place the gasket (12) onto the cover (1) making sure that it is the correct way round.

66 Tilt the cover (1) and insert the choke operating rod (36) through the dust seal (7), then lower the cover (1) onto the carburettor body (88) (photo).

67 Fit the retaining screws (3) together with the spring washers and tighten then evenly in diagonal sequence.

68 Engage the choke plate operating rod (36) to the choke shaft (4) and retain with the circlip (6) or split pin as applicable.

69 Fit the fuel filter (10) and tighten the inspection plug (11) into the cover (1).

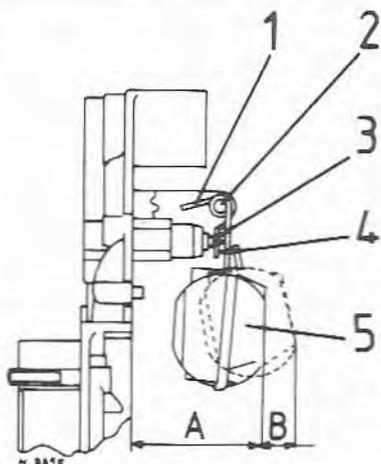


Fig. 7.21 Checking the float level adjustment (DFV, DFAV, DGV, DGAV types) (Sec 7)

- |                |                    |
|----------------|--------------------|
| 1 Stop tab     | 5 Float            |
| 2 Fulcrum pin  | A Closed dimension |
| 3 Contact tab  | B Stroke           |
| 4 Needle valve |                    |

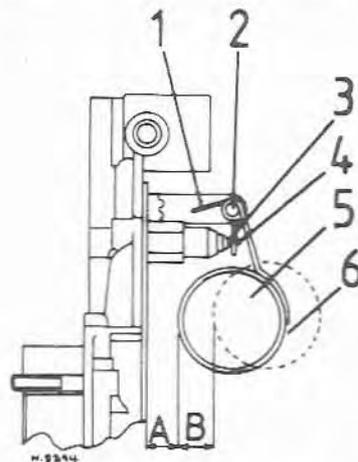
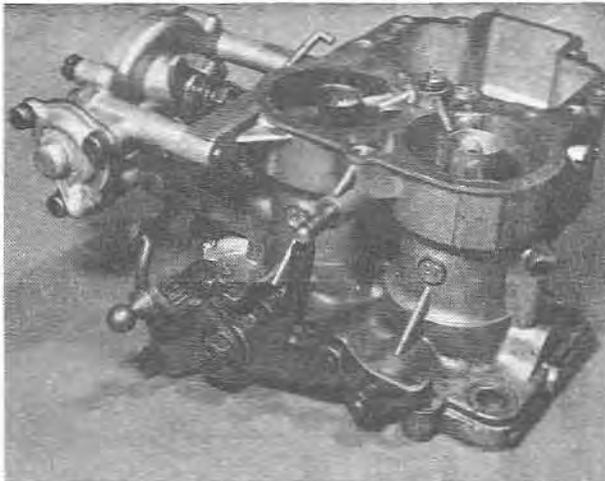


Fig. 7.22 Checking the float level adjustment (DFD, DFE, DFM, DIF, DAF types) (Sec 7)

- |                |                    |
|----------------|--------------------|
| 1 Stop tab     | 5 Float            |
| 2 Fulcrum pin  | 6 Seam             |
| 3 Contact tab  | A Closed dimension |
| 4 Needle valve | B Stroke           |



7.66 The main carburettor body ready for assembly of the cover (DFAV type shown)

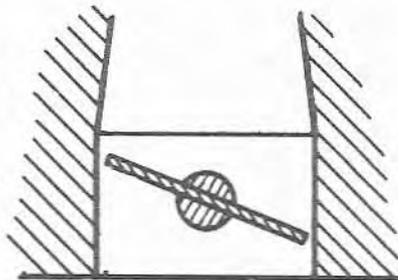


Fig. 7.23 Fast idle throttle opening checking location (Sec 8)

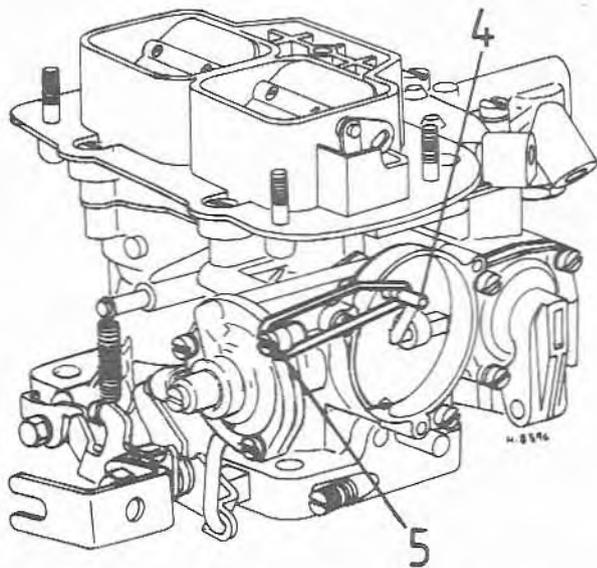


Fig. 7.24 Checking the automatic choke shaft setting on DGAV type carburetors (Sec 8)

4 Spindle arm

5 Elastic band

## 8 Carburettor adjustments

With the carburettor completely assembled, the following adjustments must be made prior to fitting it to the engine:

- 1 Turn the throttle idling adjustment screw until it just touches the throttle lever (DGV and DGAV types) or carburettor lug (all other types), then continue to screw it in 2 further turns. On automatic choke types, it will be necessary to first open the throttle fully, hold the choke valves open, then release the throttle; it is preferable to hold the choke valves open while making the adjustment.
- 2 Turn the idling mixture screw in until it is in light contact with its seat, then back it off 1 complete turn.
- 3 Turn the secondary throttle adjustment stop until a gap of 0.05 mm (0.002 in) exists between the outer edge of the secondary throttle valve and the secondary barrel. Check the gap with feeler gauges.

### Fast idle adjustment – manual choke

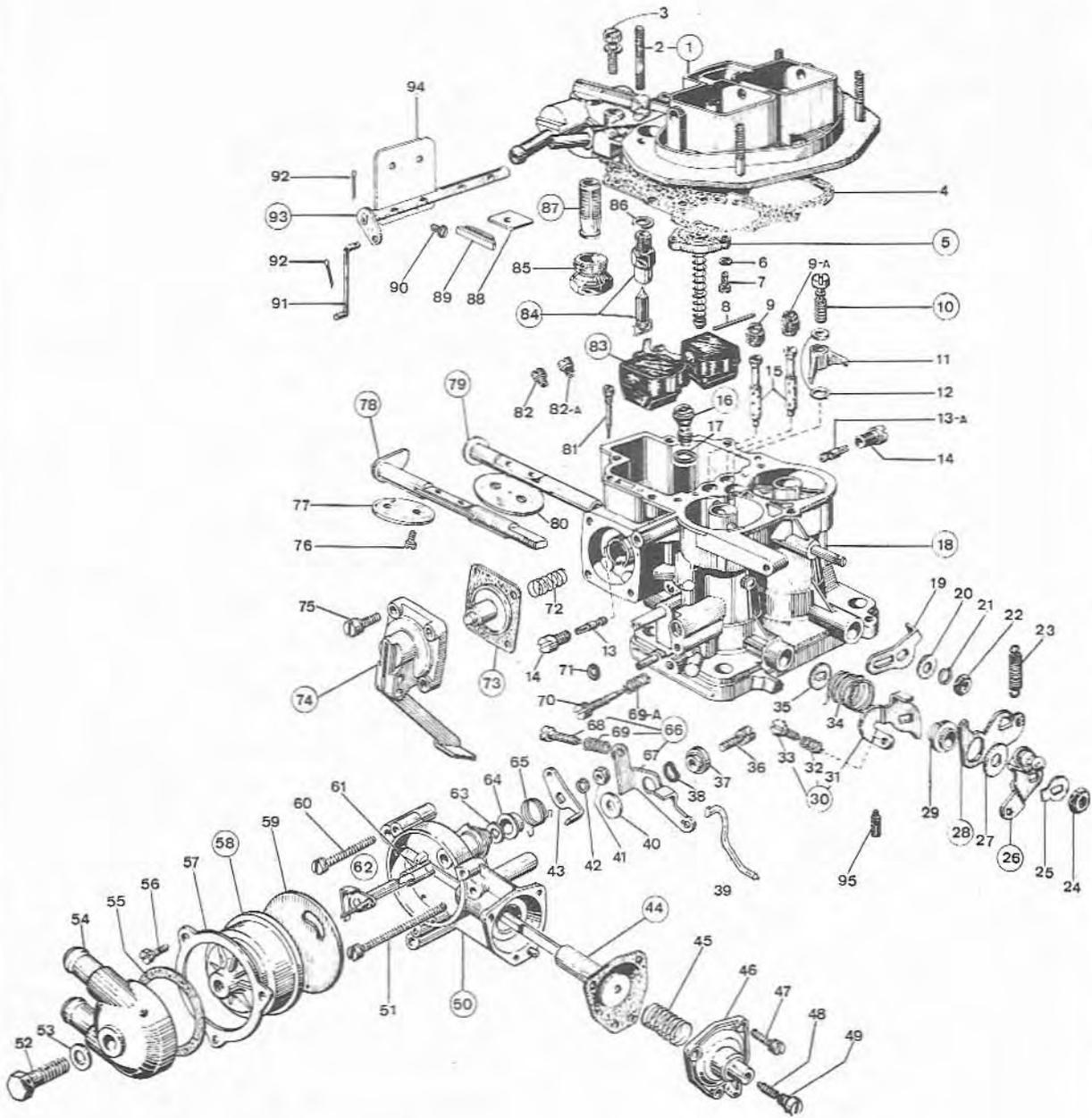
- 4 Fully operate the choke lever and, while keeping the lever stationary, check that the gap between the primary throttle valve and the outer primary barrel bore is as given in the adjustment data. If not, bend the fast idle operating rod accordingly. Check the gap with a drill of the correct diameter inserted into the barrel.

### Fast idle adjustment – DGAV automatic choke

- 5 Fully open and close the throttle and check that the fast idling adjustment screw (Fig. 7.8) (65) is resting on the high part of the fast idle cam.
- 6 Refer to the adjustment data and determine the fast idle throttle opening for the carburettor being worked on, then obtain a drill or length of dowel rod of the same diameter and insert it between the primary throttle valve and the outer barrel wall. Turn the adjusting screw as necessary to obtain the correct clearance.
- 7 Fully open the throttle, then hold the choke valves open and release the throttle. Slowly release the choke valves until the fast idle adjusting screw rests on the lower part of the fast idle cam (against the step).
- 8 Refer to the adjustment data and determine the correct choke valve opening, then check the clearance between the longest choke valve section and the intake wall using a drill or length of dowel rod. If necessary, bend the lever which contacts the fast idle cam to obtain the correct clearance.

### Choke valve pull down – DGAV automatic choke

- 9 Remove the thermostat housing (Fig. 7.8) (48) and the gasket disc.
- 10 Open and close the throttle so that the choke valves fully close under finger pressure, then holding the choke valves shut, check that there is a clearance between the diaphragm spindle (Fig. 7.8) (52) and the shaft arm (Fig. 7.8) (41) equal to the dimension given in the adjustment data. If not, the diaphragm may be stretched or the shaft arm bent. Check and rectify both of these items before proceeding.
- 11 Connect an elastic band between the shaft arm and the diaphragm cover so that the choke valves are held shut.
- 12 Open and close the throttle so that the choke valves shut, then using a small electrician's screwdriver or length of welding rod, push the outer diameter of the diaphragm spindle hard against the adjustment screw by inserting it into the spindle bore. The tension of the elastic band must be sufficient to overcome the tension of the spring inside the diaphragm spindle. This can be checked by temporarily opening the choke valves and observing whether the visible section of the spindle moves.
- 13 Check that the clearance between the longest section of the choke valve and the intake wall is not less than the dimension given in the adjustment data. If it is, use a narrow screwdriver to adjust the setting screw (Fig. 7.8) (57).
- 14 Using the blade of a screwdriver, press both sections of the spindle hard against the adjustment screw; the clearance



between the lower edge of the choke valves and the intake wall should now be as given in the adjustment data. If not, the internal spring of the spindle is faulty and the spindle should be renewed.

15 Remove the elastic band and refit the gasket and thermostat housing.

#### Fast idle adjustment – DAF and DFAV automatic choke

16 Fully open and close the throttle and check that the fast idling adjustment screw (Fig. 7.25) (68) is resting on the high part of the fast idle cam.

17 Refer to the adjustment data and determine the fast idle throttle opening for the carburettor being worked on, then obtain a drill or length of dowel rod of the same diameter and insert it between the primary throttle valve and the outer barrel well. Turn the adjusting screw as necessary to obtain the correct clearance.

#### Choke valve pull down – DAF and DFAV automatic choke

18 Remove the thermostat housing (Fig. 7.25) (58) and the gasket disc.

19 Open and close the throttle so that the choke valves fully close under finger pressure, then holding the choke valves shut, check that there is a clearance between the diaphragm spindle (Fig. 7.25) (62) and the shaft arm (Fig. 7.25) (44) of at least 0.008 in (0.2 mm). Make the check with feeler gauges and, if incorrect, check the shaft arm or linkage for damage. If any damage is found, they should be bent back to the original shape; alternatively the diaphragm may be found to be damaged.

20 Using an elastic band, hold the primary throttle valve fully

open, then move the diaphragm spindle so that it abuts the stop plate. Move the shaft arm against the spindle central stop and check that the clearance between the choke valve longest section and the intake well is between 0.187 in (4.75 mm) and 0.207 in (5.25 mm). Use a drill to make the check and if incorrect, adjust the position of the stop plate as necessary.

21 Remove the elastic band and refit the gasket and thermostat housing.

## 9 Tuning

**Note:** Refer to Chapter 3 for general notes on tuning.

1 The idling adjustment screws should be set to their preliminary positions as described in Section 8 paragraphs 1 and 2.

2 Connect a tachometer to the engine in accordance with the manufacturer's instructions.

3 Start the engine and run until normal operating temperature has been reached (ie the thermostat has opened).

4 Turn the throttle valve adjusting screw so that the engine runs at the recommended idling speed for the particular engine being worked on; this will be between 600 and 800 rpm for touring models and approximately 1000 rpm for sports car models.

5 Turn the idle mixture adjustment screw in or out until the engine runs at the highest rpm commensurate with even running.

6 Re-adjust the throttle valve adjusting screw if necessary, to bring the engine speed within limits.

7 Repeat the procedure given in paragraphs 5 and 6, then switch off the engine and remove the tachometer.

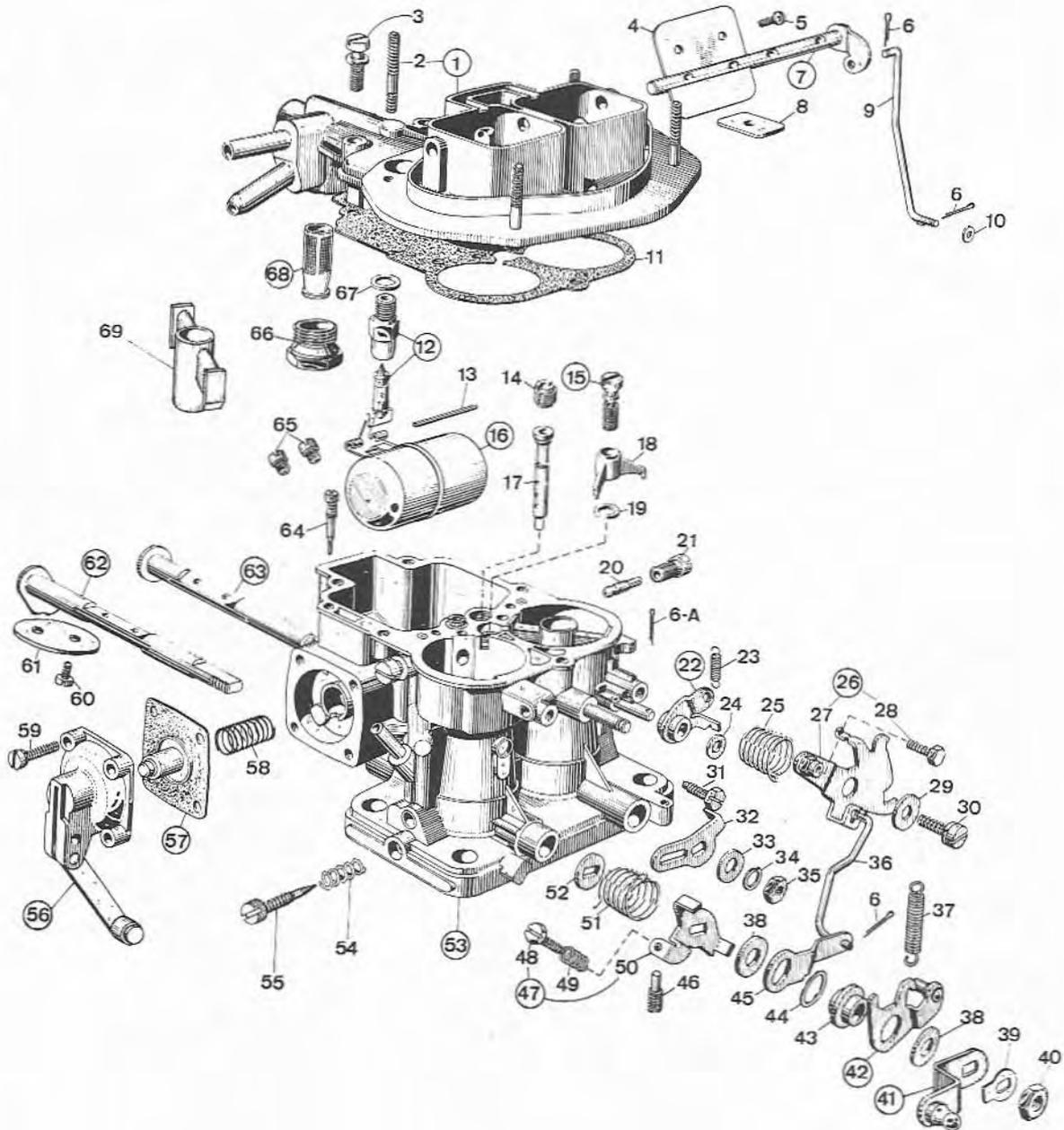
8 On bypass idle type carburetors, the procedure is similar but the bypass idle adjustment screw should first be fully

Fig. 7.25 Exploded view of the 32/36 DFAV carburettor (typical) (Sec 8)

1 Carburettor cover assy	33 Screw	67 Lever
2 Stud bolt	34 Primary shaft return spring	68 Screw
3 Cover fixing screw	35 Washer	69 Spring
4 Cover gasket	36 Loose lever fixing screw	69A Spring for idle adjusting screw
5 Power valve	37 Bushing for loose lever	70 Idle adjusting screw
6 Washer for power valve screws	38 Wave washer	71 Auto-choke O-ring seal
7 Control valve retaining screw	39 Fast idling control rod	72 Pump loading spring
8 Float fixing pin	40 Washer for loose lever	73 Accelerator pump diaphragm assy
9 Primary air corrector jet	41 Shaft fixing nut	74 Accelerator pump cover assy
9A Secondary air corrector jet	42 Spring washer	75 Pump cover fixing screw
10 Pump delivery valve assy	43 Lever for rod	76 Throttle plates fixing screw
11 Pump jet	44 Choke diaphragm assy	77 Primary throttle valve
12 Pump jet gasket	45 Spring for diaphragm	78 Primary shaft assy
13 Primary idling jet	46 Cover for diaphragm	78 Primary shaft assy oversize
13A Secondary idling jet	47 Diaphragm cover fixing screw	79 Secondary shaft assy
14 Idling jet holder	48 Diaphragm adjusting screw	79 Secondary shaft assy oversize
15 Emulsifying tube	49 Screw plug	80 Secondary throttle valve
16 Full power needle valve assy	50 Auto-choke body assy	81 Pump discharge blanking needle
17 Power valve gasket	51 Auto-choke fixing screw	82 Primary main jet
18 Carburettor body assy	52 Water cover fixing screw	82A Secondary main jet
19 Secondary throttle control lever	53 Gasket for water cover	83 Float assy
20 Washer for lever	54 Auto-choke water chamber	84 Needle valve assy
21 Spring washer	55 Water chamber seal gasket	85 Strainer inspection plug
22 Secondary shaft fixing nut	56 Plate fixing screw	86 Gasket for needle valve
23 Spring for loose lever	57 Thermostat assy locking ring	87 Strainer assy
24 Primary shaft fixing nut	58 Auto-choke thermostat assy	88 Dust seal plate
25 Lockwasher	59 Gasket for auto-choke body	89 Dust seal plug
26 Throttle valve control lever assy	60 Auto-choke cover fixing screw	90 Choke plates fixing screw
27 Washer for loose lever	61 Plate for choke shaft	91 Choke control rod
28 Primary loose lever assy	62 Auto-choke shaft and lever assy	92 Split pin
29 Bushing for loose lever	63 Washer for shaft	93 Choke shaft and lever assy
30 Idle adjusting screw lever assy	64 Spring retaining cover	94 Choke throttle valve
31 Lever	65 Spring for fast idle cam	95 Secondary throttle adjusting screw
32 Spring	66 Fast idle loose lever assy	

screwed in, then screwed out 1 full turn. The basic idle adjustment is then made in the normal way and the bypass idle adjustment used for any final adjustment of speed. If an exhaust

analyser is available, the percentage of CO should be made on the basic idle adjustment, prior to making the final speed adjustment on the bypass idle screw.

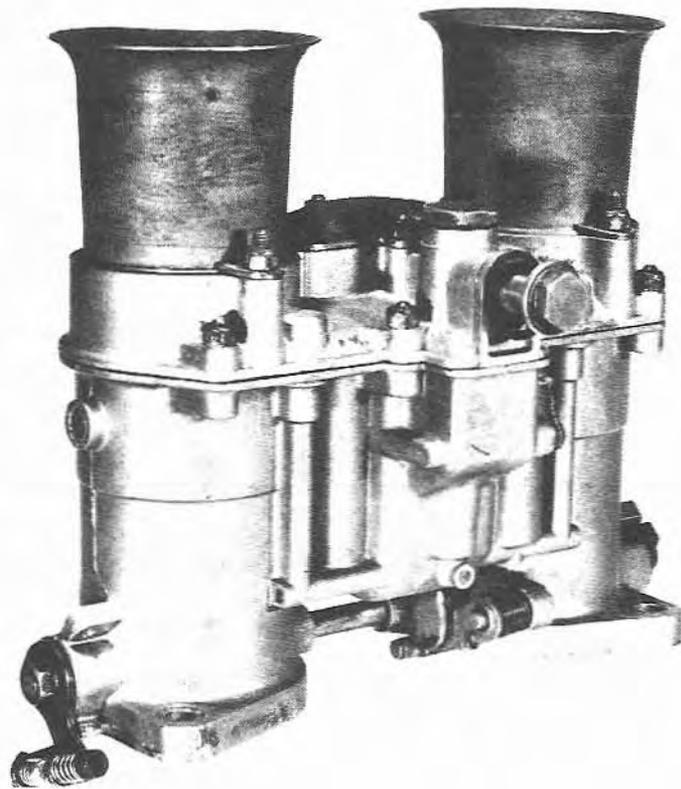


## 10 Fault diagnosis

Symptom	Reason/s
Engine will not start	Faulty choke linkage Faulty automatic choke Blocked fuel filter or jets
Uneven idling	Leaking carburettor flange or manifold gasket Loose idling jets or auxiliary venturis Excessive sediment or water in carburettor Throttle spindle or carburettor body excessively worn Secondary throttle valve partially sticking open Leaking ignition advance tube
Carburettor floods	Worn needle valve Leaking or damaged float assembly Incorrect float level adjustments Excessive sediment in fuel
Engine lacks performance	Incorrect tuning adjustments Incorrect float level adjustments Excessive sediment in fuel Acceleration pump seized Throttle valves do not fully open
Excessive fuel consumption	Needle valve not seating Choked air filter Leaking or damaged float assembly Faulty automatic choke (when fitted) Incorrect float level adjustments

Fig. 7.26 Exploded view of the 32 DIF carburettor (typical) (Sec 9)

1 Air horn and plugs assy	26 Choke control lever assy	49 Spring
2 Air cleaner retaining stud	27 Lever	50 Lever
3 Horn and plug assy fixing screw and washer	28 Screw securing wire	51 Throttle control return spring (LH Primary)
4 Choke plate	29 Choke control lever assy retaining washer	52 Throttle lever and shaft assy (Primary) washer
5 Choke plate screw	30 Choke control lever assy retaining screw and washer	53 Carburettor body
6 Choke control rod split pin	31 Screw securing sheath	54 Fast idle adjusting screw spring
6A Choke lever pivot split pin	32 Full throttle stop lever	55 Idle adjustment needle
7 Choke shaft and lever assy	33 Full throttle stop washer	56 Accelerator pump cover assy
8 Air cleaner dust seal	34 Full throttle stop lockwasher	57 Accelerator pump diaphragm assy
9 Choke control rod	35 Full throttle stop nut	58 Accelerator pump rod spring
10 Choke rod washer	36 Fast idle rod	59 Accelerator pump cover fixing screw and washer
11 Air horn to throttle body gasket	37 Throttle control return spring (RH Secondary)	60 Throttle plate screw
12 Fuel inlet valve and seat assy	38 Primary throttle shaft assy washer	61 Throttle plate
13 Float lever shaft	39 Throttle shaft (Primary) tab washer	62 Throttle shaft assy oversize (LH Primary)
14 Starting air adjusting jet	40 Throttle shaft (Primary) nut	63 Throttle shaft assy (RH Secondary)
15 Accelerator pump discharge valve assy	41 Throttle lever	64 Accelerator pump discharge blanking needle
16 Float assy	42 Throttle control lever	65 Main primary jet
17 Fuel jet	43 Throttle shaft bushing	65A Main secondary jet
18 Pump discharge nozzle	44 Throttle shaft (Primary) wave washer	66 Fuel inlet strainer plug
19 Nozzle bar gasket	45 Choke/throttle interconnecting lever	67 Fuel intake valve washer
20 Idling secondary jet	46 Fast idling adjustment screw	68 Fuel inlet strainer assy
21 Idling jet holder	47 Fast idle adjustment lever assy	69 Fuel discharge units
22 Choke lever assy	48 Screw	
23 Choke lever spring		
24 Choke lever pivot washer		
25 Choke lever return spring		



## Part 2 Weber carburetors

### Chapter 8 Type 46 IDA, 48 IDA, 40 IDA 3C, 40 IDS 3C, 40 IDT 3C, 46 IDA 3C, 40 IDAP 3C, 40 IDTP 3C, 40 IDTP 13C

#### Contents

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Assembly (triple choke types) .....	9	Operation .....	3
Construction .....	2	Removal and refitting .....	4
Disassembly (46 IDA and 48 IDA types) .....	5	Special overhaul procedures .....	7
Disassembly (triple choke types) .....	6	Tuning .....	10
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## 1 Introduction

The carburetors covered by this Chapter are of the vertical downdraught type and each barrel of the carburettor is of an identical diameter.

The throttle valves are of the synchronized, simultaneous operation type.

The carburettor may be fitted on the engine in several different arrangements, the most common being listed as follows:

- 1 Two twin choke units on a four-cylinder horizontally opposed engine, ie one barrel to each cylinder
- 2 Two triple choke units on a six-cylinder horizontally opposed engine, ie one barrel to each cylinder
- 3 Four twin choke units on an eight-cylinder V-configuration engine, ie one barrel to each cylinder

The carburettor identification mark is located on the side of the main body.

## 2 Construction

The main body and cover of the carburetors covered in this Chapter are of die-cast aluminium construction. The mounting flanges are machined flat for fitting on the inlet manifold assemblies.

The throttle spindles are made of steel and the throttle valves of brass. The retaining screws on 46 IDA and 48 IDA types are made of brass; on triple choke types however, they are made of steel.

The air intake horns are of steel construction and are attached to the carburettor cover by studs and nuts.

All fuel and air jets and emulsion tubes are of brass construction and, with the exception of the emulsion tubes on triple choke types, are screw fittings into the main body.

The internal channels of the main body are mainly drilled and where necessary, sealed with lead plugs.

On twin choke types, the throttle spindles are supported by two ball-bearings mounted in the main body. Spring tensioned seals are incorporated at each end of the spindle to prevent air being drawn through the bearings.

On triple choke types, the throttle spindles run directly in the carburettor body.

The fuel float assemblies are constructed of thin brass sheet and comprise two halves soldered together.

On twin choke types, the accelerator pump is of the piston type and the piston is of brass construction.

On triple choke types, the accelerator pump is of the diaphragm type and the housing and cover are of die-cast aluminium.

## 3 Operation

### Idling and progression

#### 46 IDA and 48 IDA types

Refer to Fig. 8.3 and note that when the engine is idling with the throttle valves (19) closed, fuel is drawn from the float chamber (13) to the idling jets (15) where it becomes emulsified with air entering through the calibrated orifices in the idling jet holders (14). The mixture then travels through the channel (16), past the adjustable mixture screws (17), through the idling feed holes (18) and into the carburettor throats at the engine side of the throttle valves. The idling mixture screws (17) have tapered ends and can therefore be adjusted to admit more or less mixture as necessary.

When the throttle valves are opened slightly to increase the engine speed, the progression holes (20) are brought into action to provide additional fuel and to enable the engine to reach the speed when the main system starts to function.

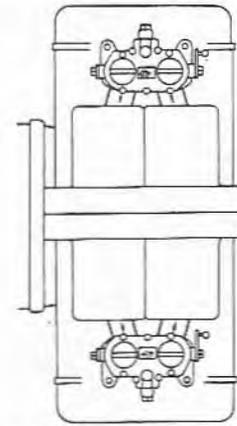


Fig. 8.1 Two carburetors fitted to a 4-cylinder opposed engine (Sec 1)

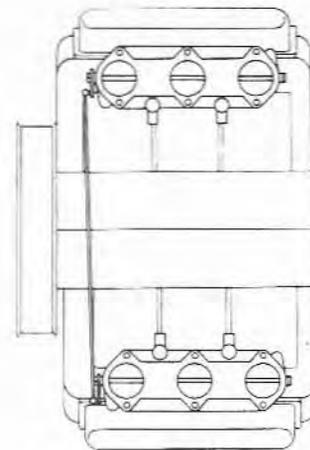


Fig. 8.2 Two carburetors fitted to a 6-cylinder opposed engine (Sec 1)

### Triple choke types

Refer to Fig. 8.4 and note that when the engine is idling with the throttle valves (18) closed, fuel is drawn from the emulsion tube wells (12), along the channel (22) to the idling jets (23) where it becomes emulsified with air entering through the calibrated orifices (24). The mixture then passes through the channel (21), past the mixture screws (20), through the idling feed holes (19) and into the carburettor throats at the engine side of the throttle valves. The idling mixture screws (20) have tapered ends and can be adjusted to admit more or less mixture as necessary.

When the throttle valves are opened slightly to increase the engine speed, the progression holes (15) are brought into action to provide additional fuel until the main system starts to function.

In order to ensure that each carburettor barrel passes identical amounts of air, three air compensation adjustment screws (16) are incorporated whereby air can bypass the throttle valves. This system ensures identical vacuum below each throttle valve and the idling and progression mixtures in each barrel are therefore identical.

### Normal running

#### 46 IDA and 48 IDA types

Refer to Fig. 8.5 and note that under full throttle and cruise conditions, fuel is drawn from the float chamber (13), through the channel (12) and main jets (11) and then through the orifices in the emulsion tubes (8).

The fuel then becomes emulsified with air drawn in through

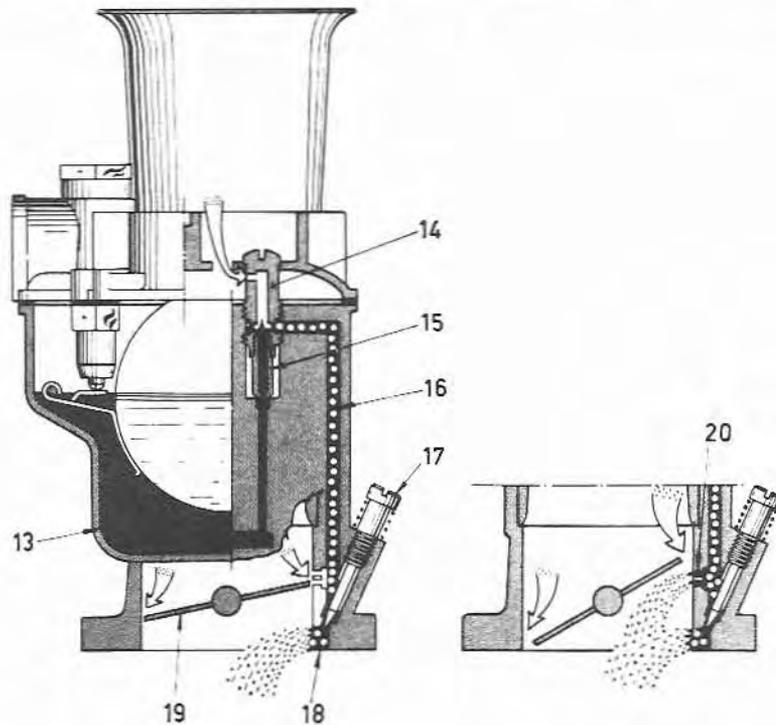


Fig. 8.3 Idling and progression phase (46 IDA and 48 IDA) (Sec 3)

- 13 Float chamber
- 14 Idling jet holders
- 15 Idling jets
- 16 Channel
- 17 Mixture volume screw
- 18 Idling feed holes
- 19 Throttle valves
- 20 Progression holes

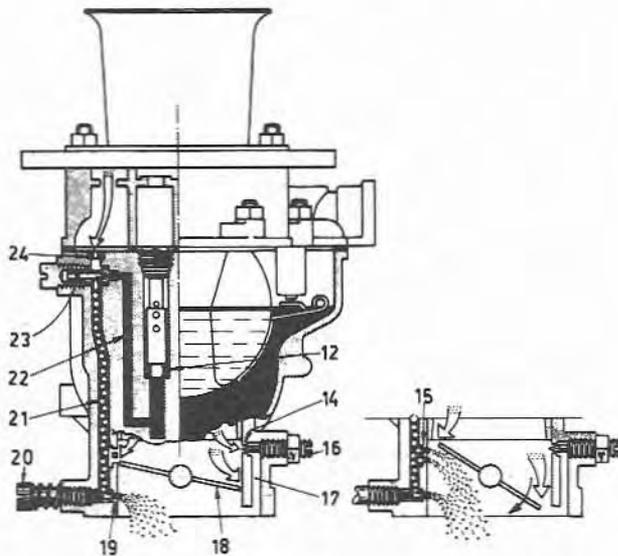


Fig. 8.4 Idling and progression phase (triple choke types) (Sec 3)

- 12 Wells
- 14 Air compensation jet
- 15 Progression holes
- 16 Adjustment screw
- 17 Channel
- 18 Throttle valve
- 19 Idling feed holes
- 20 Idling mixture screw
- 21 Channel
- 22 Channel
- 23 Idling jets
- 24 Calibrated bush

the air corrector jets (5) and is then drawn through the nozzles (6) and chokes (9) and into the engine.

#### Triple choke types

Refer to Fig. 8.6 and note that under full throttle and cruise

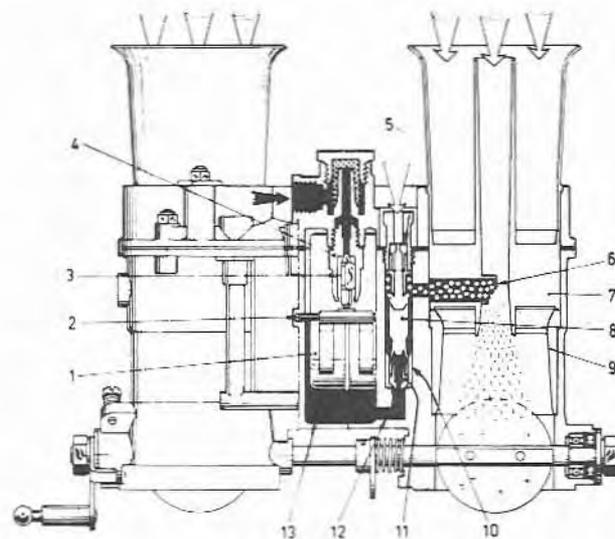


Fig. 8.5 Normal phase (46 IDA and 48 IDA) (Sec 5)

- 1 Float
- 2 Fulcrum pin
- 3 Needle valve
- 4 Needle valve seat
- 5 Air corrector jet
- 6 Nozzle
- 7 Auxiliary venturi
- 8 Emulsion tube
- 9 Choke
- 10 Well
- 11 Main jet
- 12 Channel
- 13 Float chamber

conditions, fuel is drawn from the float chambers (6) through the main jets (10) and channels (11) to the emulsion tube wells (12). The fuel becomes emulsified with air drawn in through the air corrector jets (3) and, after leaving the emulsion tubes (4), is drawn through the nozzles (2) and chokes (13) into the engine.

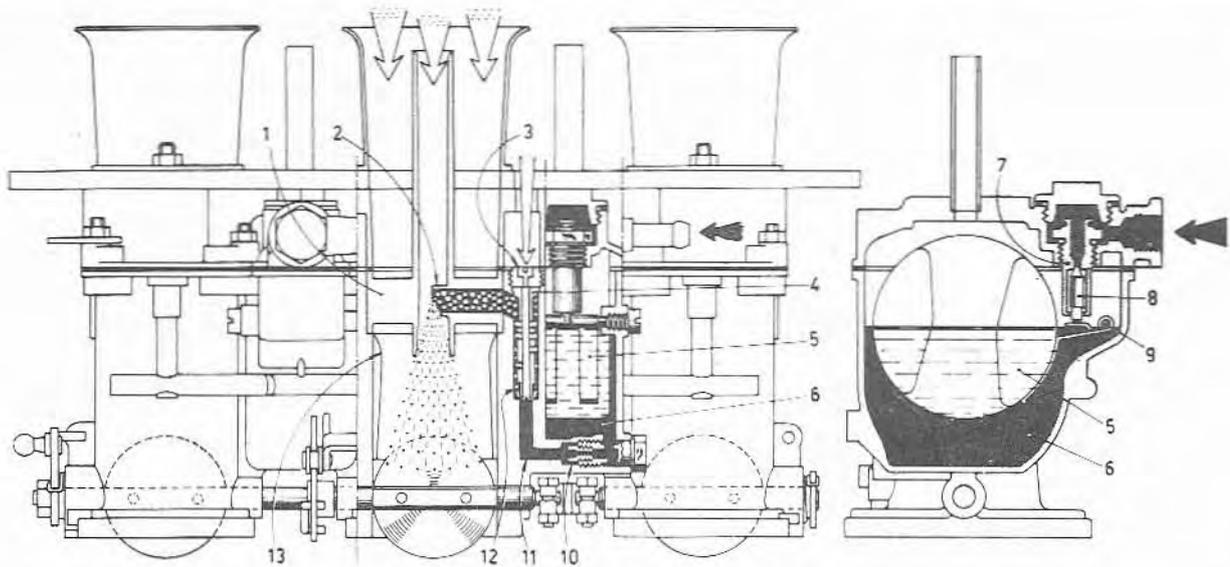


Fig. 8.6 Normal phase (triple choke types) (Sec 3)

- |                     |                     |                |            |
|---------------------|---------------------|----------------|------------|
| 1 Auxiliary venturi | 5 Float             | 8 Needle valve | 11 Channel |
| 2 Nozzle            | 6 Float chamber     | 9 Fulcrum pin  | 12 Well    |
| 3 Air corrector jet | 7 Needle valve seat | 10 Main jet    | 13 Choke   |
| 4 Emulsion tube     |                     |                |            |

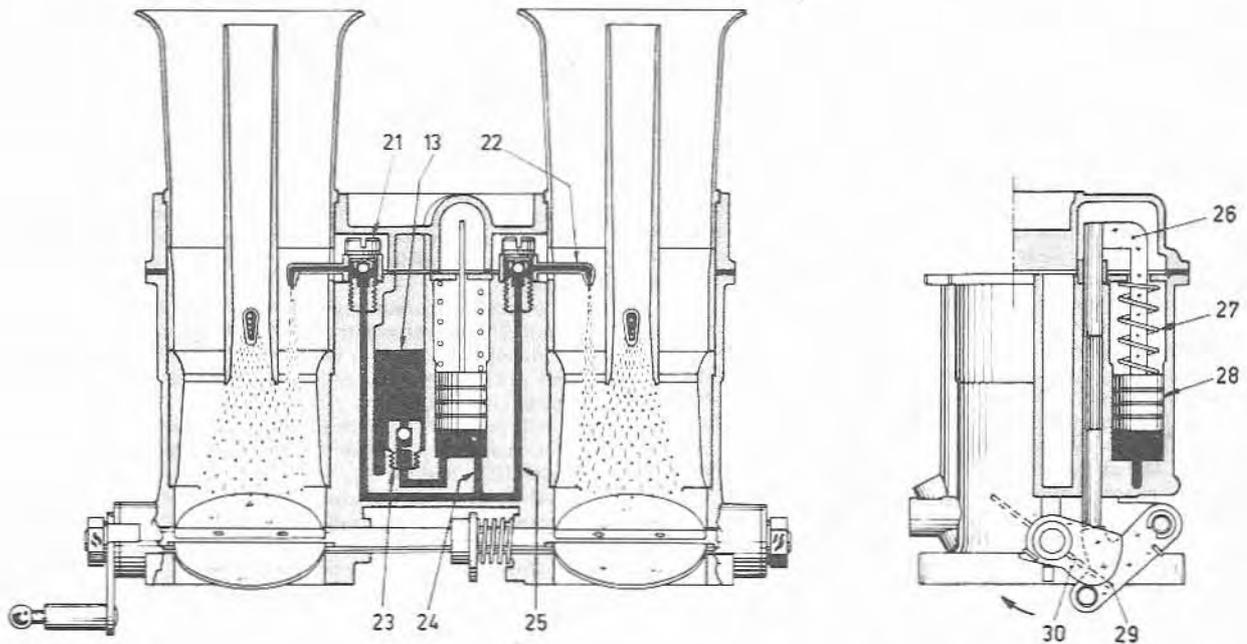


Fig. 8.7 Acceleration phase (46 IDA and 48 IDA) (Sec 3)

- |                   |                              |                  |          |
|-------------------|------------------------------|------------------|----------|
| 13 Float chamber  | 23 Inlet and discharge valve | 26 Operating rod | 29 Lever |
| 21 Delivery valve | 24 Channel                   | 27 Spring        | 30 Cam   |
| 22 Pump jet       | 25 Channel                   | 28 Piston        |          |

**Acceleration**  
46 IDA and 48 IDA types

Refer to Fig. 8.7 and note that when the throttle valves are closed, the lever (29) under the action of its spring, lifts the accelerator pump operating rod (26). Fuel is then drawn from

the float chamber (13) through the inlet valve (23) into the pump chamber. When the throttle valves are opened, the cam (30) moves the lever (29) away from the bottom of the operating rod (26) and the piston (28) moves down the pump bore under the action of the spring (27). The inlet valve ball then

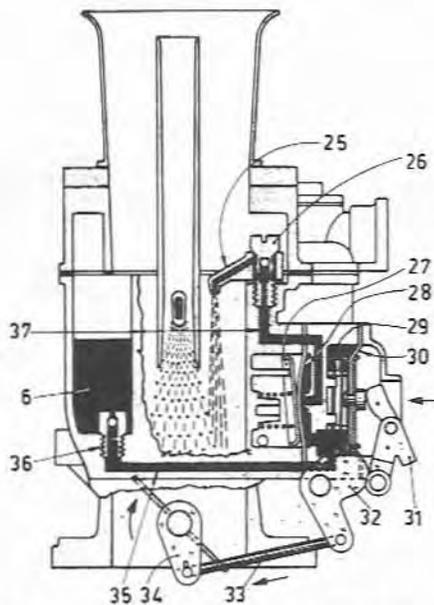


Fig. 8.8 Acceleration (triple choke types) (Sec 3)

6 Float chamber	31 Operating lever
25 Pump jet	32 Cam
26 Delivery valve	33 Linkage
27 Release plate	34 Lever
28 Diaphragm	35 Channel
29 Spring	36 Inlet and discharge valve
30 Diaphragm	37 Channel

closes and fuel is forced through the channels (24 and 25), through the delivery valves (21) and pump jets (22) into the barrels in the vicinity of the auxiliary venturis. The inlet valve (23) may incorporate a calibrated discharge hole whereby some fuel returns to the float chamber; by varying the size of the discharge hole according to the application, the amount of fuel injected by the pump jets (22) can be varied.

#### Triple choke types

Refer to Fig. 8.8 and note that when the throttle valves are closed, the spring (29) pushes the diaphragm (30) outwards and fuel is drawn from the float washers (6), through the inlet valves (36), along the channels (35) and into the pump chamber. When the throttle valves are opened, the lever (34) pulls the linkage (33) and the cam (32) causes the lever (31) to depress the diaphragm (30) against the tension of the spring (29). Fuel is forced past the release diaphragm (28) when the plate (27) moves against the reaction spring and then travels through the channels (37) to the delivery valves (26). It is then injected through the pump jets (25) into the carburetor barrels in the vicinity of the auxiliary venturis. The inlet valve(s) (23) may incorporate a calibrated discharge hole whereby some fuel returns to the float chambers; the size of the hole depending on the particular application.

IDS type carburetors are equipped with booster jets located at the mouth of each auxiliary venturi. Their purpose is to provide mixture enrichment during high speed conditions.

#### 4 Removal and refitting

**Note:** The following procedure gives a general rather than a specific method of removing and refitting the carburettor, as much will depend on the location of the carburettor within the

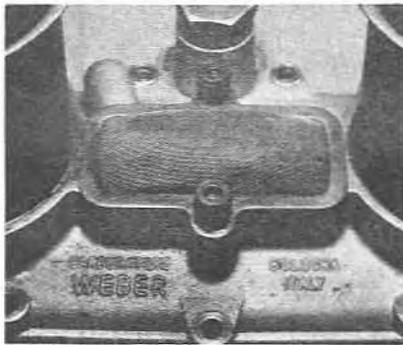
vehicle. On some applications for instance, the retaining nuts may not be accessible without removing surrounding components.

- 1 Disconnect all hoses from the air cleaner, if fitted. Remove the air cleaner cover and extract the air cleaner element.
- 2 Detach the air cleaner base from the carburettor, if fitted.
- 3 Disconnect the throttle linkage from the throttle lever.
- 4 Disconnect the fuel inlet hose or pipe (withdraw the filter on triple choke types).
- 5 Unscrew and remove the carburettor retaining nuts and spring washers and withdraw the carburettor complete over the mounting studs.
- 6 Remove the gaskets from the inlet manifold and clean all traces of gasket from the contact faces of the manifold and carburettor.
- 7 Protect the inlet manifold from ingress of foreign matter whilst the carburettor is removed by sealing it with masking tape.
- 8 Refitting is a reversal of removal but the following additional points should be noted:

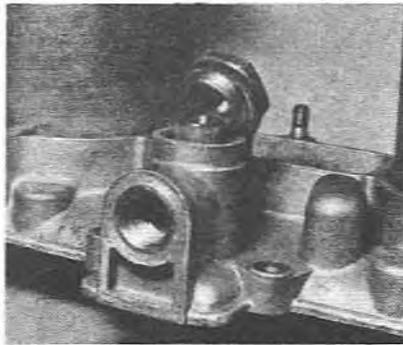
- (a) Always fit new gaskets and tighten the retaining nuts evenly in diagonal sequence
- (b) The idling adjustment screws should be set as described in Sections 8 and 9, and finally tuned as described in Section 10

#### 5 Disassembly (46 IDA and 48 IDA types)

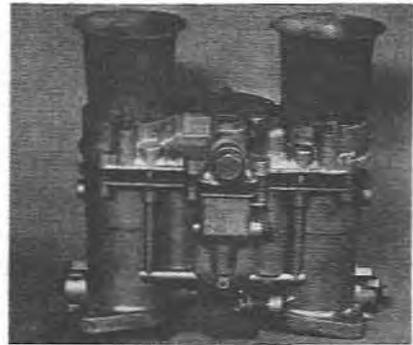
- 1 Thoroughly clean the carburettor exterior and wipe dry.
- 2 Referring to Fig. 8.9, unscrew and remove the retaining nuts (61) and withdraw the filter gauze (64) (photo).
- 3 Unscrew and remove the retaining nuts (60), remove the plates (59) and withdraw the air intake horns (58).
- 4 Unscrew and remove the filter inspection plug (57), remove the washer (56) and extract the fuel filter (55) and retaining bush (63) (photo).
- 5 Unscrew and remove the carburettor cover retaining nuts (62) and carefully lift the cover from the carburettor body (65), making sure that the gasket (14) is not broken (photo).
- 6 Unscrew the gasket (14) from the carburettor body (65). If it is necessary to retain the gasket for any reason and it has become shrunk, it is recommended that the emulsion tube holders (48) and idling jet holders (50) are removed before removing the gasket.
- 7 Invert the carburettor cover (1) and unscrew the needle valve (12), then remove the washer (13) (photo).
- 8 Remove the locking wire from the float fulcrum pin screw head (17), then unscrew and remove it together with the washer (16) (photos).
- 9 Lift the float (15) from the float chamber.
- 10 Unscrew and remove the float chamber drain plug (23) and washer (22) (photo).
- 11 Unscrew and remove the accelerator pump inlet and discharge valve (11) from the bottom of the float chamber (photo).
- 12 Unscrew the emulsion tube holders (48) from the carburettor body (65) and lift out the emulsion tube assemblies (photo).
- 13 Separate the emulsion tubes (46) from the holders (48) and then pull the main jets (45) and air corrector jets (47) from the emulsion tubes (46). Take care not to damage the jets when removing them and if pliers are used, interpose a piece of paper or card to prevent the brass being scratched (photo).
- 14 Unscrew the idling jet holders and air corrector jets (50) from the carburettor body (65) and then separate the idling jets (49) (photos).
- 15 Unscrew and remove the accelerator pump delivery valves (8) together with the pump jets (10) and washers (9), then separate the washers and jets from the valves (photos).
- 16 Lift the accelerator pump operating rod (4) against the tension of the spring (6) until the retainer (5) is released from the carburettor body (65), then withdraw the complete



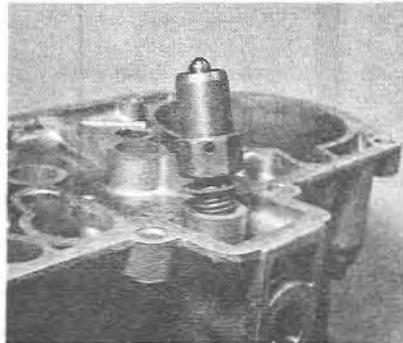
5.2 Removing the filter gauze (twin choke type)



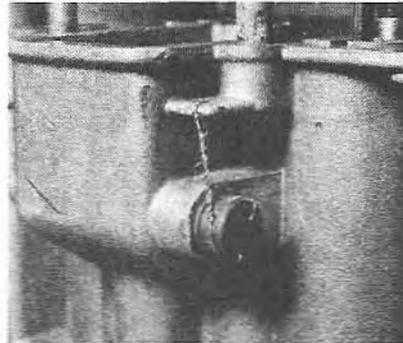
5.4 Removing the fuel filter (twin choke type)



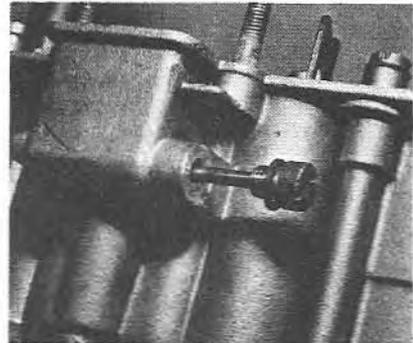
5.5 Removing the carburettor cover (twin choke type)



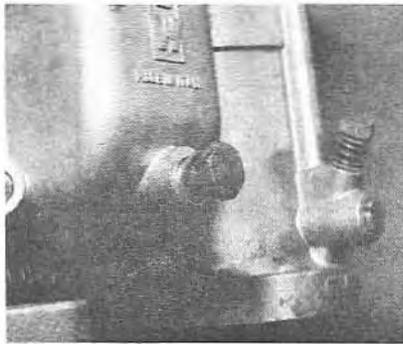
5.7 Removing the needle valve (twin choke type)



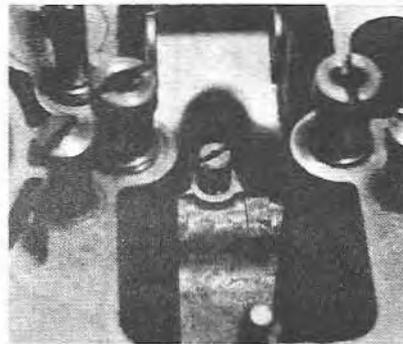
5.8a Fulcrum pin locking wire location (twin choke type)



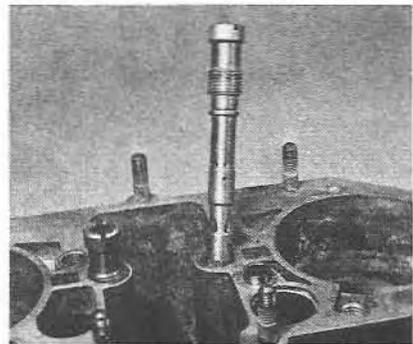
5.8b Removing the float fulcrum pin (twin choke type)



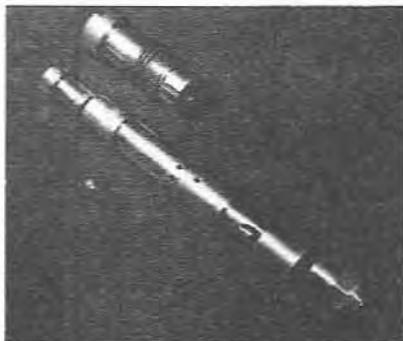
5.10 Removing the float chamber drain plug (twin choke type)



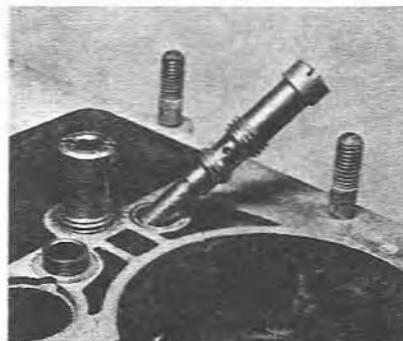
5.11 Location of the pump inlet and discharge valve (twin choke type)



5.12 Removing an emulsion tube (twin choke type)



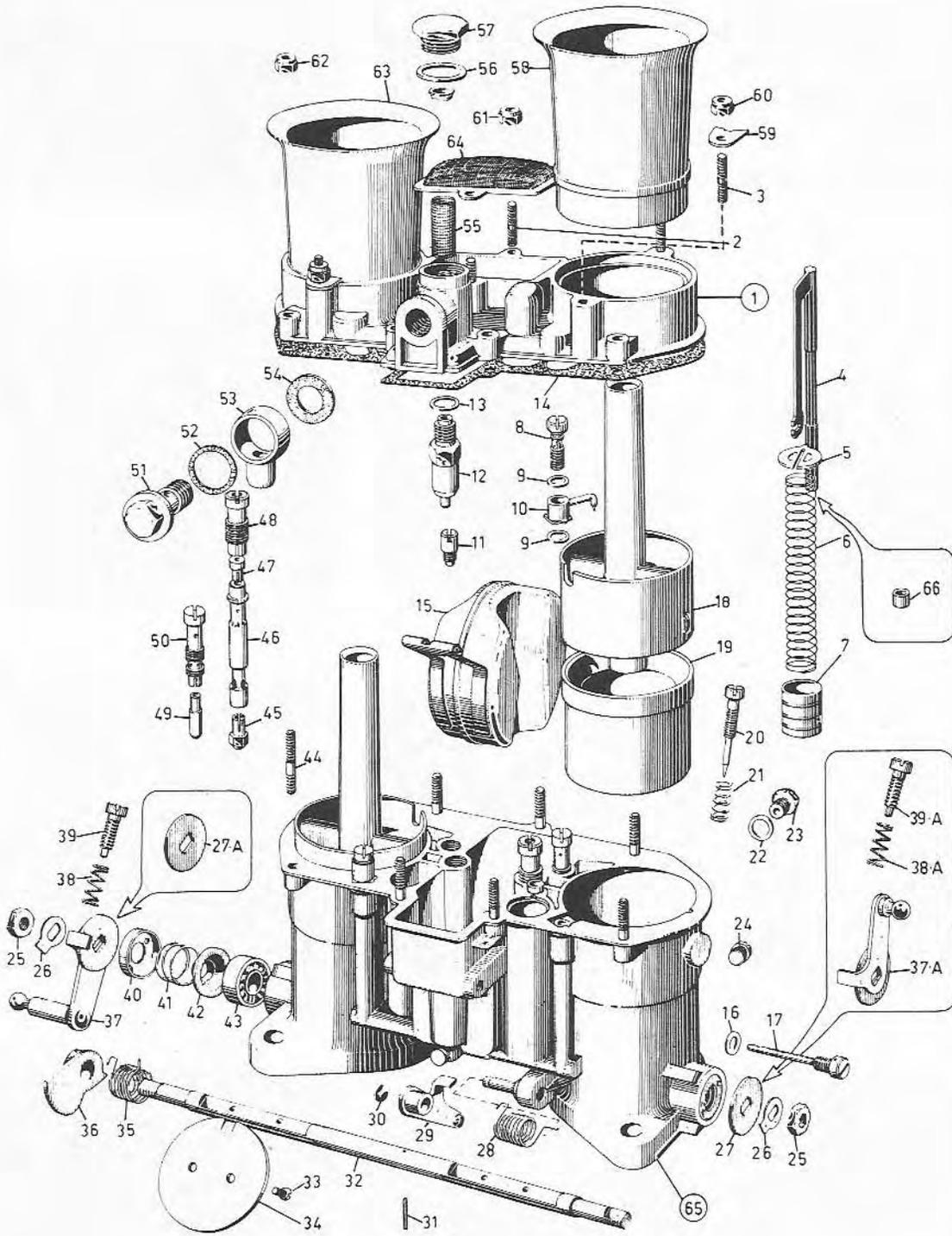
5.13 Emulsion tube components (twin choke type)



5.14a Removing the idling jets (twin choke type)

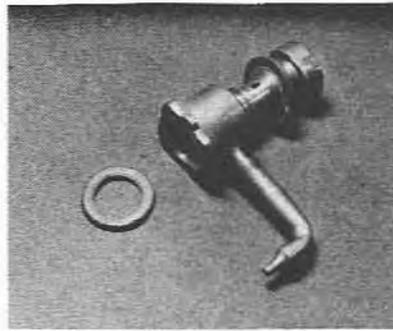


5.14b The idling jet and holder (twin choke type)





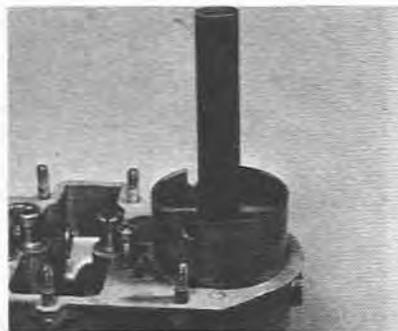
5.15a Location of the accelerator pump delivery valve (twin choke type)



5.15b Pump delivery valve and jet components (twin choke type)



5.17 Accelerator pump components (twin choke type)



5.19 Removing the auxiliary venturis (twin choke type)

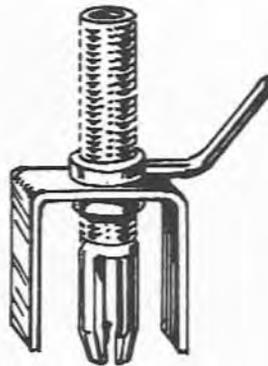
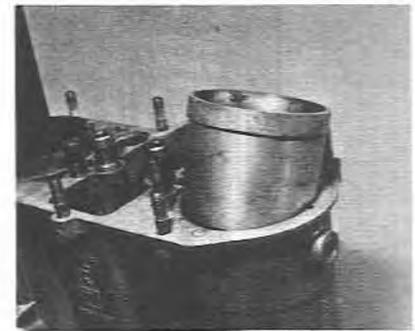


Fig. 8.10 Auxiliary venturi removal tool (Sec 5)



5.20a Removing the chokes (twin choke type)

accelerator pump assembly.

17 Lift the accelerator pump piston (7) against the spring (6) and disconnect it from the operating rod by turning it through 90°. Remove the piston (7), spring (6) and retainer (5) from the operating rod (4) (photo).

18 On 46 IDA types, remove the accelerator pump operating rod bush (66).

19 Note the location of the auxiliary venturis (18) and mark them, if necessary, with a pencil to ensure correct refitting, then withdraw them from the carburettor body (65) (photo). If necessary, use a wooden or plastic dowel rod inserted from the throttle valve end of the barrel, to tap the auxiliary venturis free. If they are excessively tight, it will be necessary to obtain Weber tool no 9610 150 0035.

20 Remove the chokes (19), noting that the end with the

smaller internal diameter is uppermost (photos). If these are excessively tight it will be necessary to obtain Weber tool no 9610 150 0034.

21 Unscrew and remove the idling mixture adjusting screws (20) and springs (21) from the carburettor body (65) (photo).

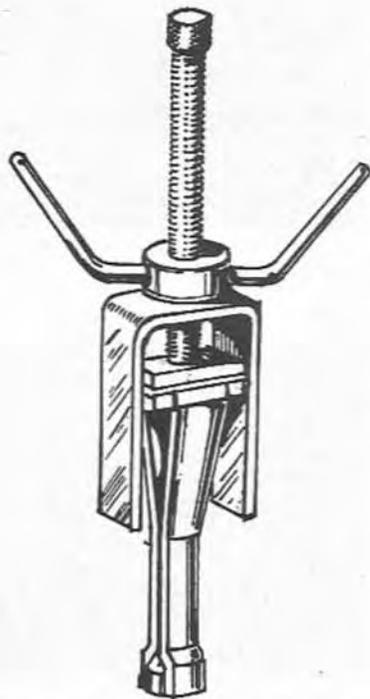
22 Unscrew and remove the idling adjusting screw (39 or 39A) and spring (38 or 38A) from the carburettor body (65).

23 Bend back the locktabs (26) on each end of the throttle spindle (32) and unscrew the nuts (25) (photo). If the nuts are tight, use Weber tool no 98023 700 to hold the spindle while the nut is loosened; if this precaution is not taken, the spindle (32) may become buckled. **Note:** Under no circumstances should the nuts be loosened or tightened with the throttle valves being forced against the barrel walls.

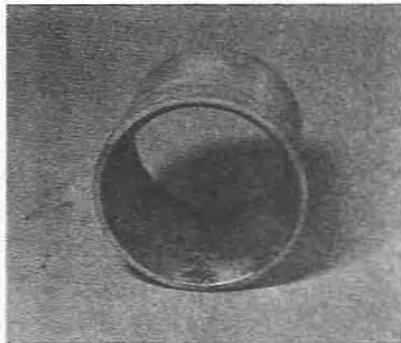
24 Remove the nuts (25), tab washers (26), spacer (27 or 27A)

Fig. 8.9 Exploded view of the 46 IDA and 48 IDA carburettor (Sec 5)

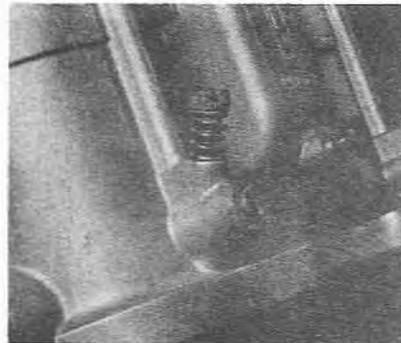
1 Cover	18 Auxiliary venturi	34 Throttle valve	50 Holder
2 Stud	19 Choke	35 Spring	51 Bolt
3 Stud	20 Mixture adjustment screw	36 Cam	52 Washer
4 Pump rod	21 Spring	37 and 37A Lever	53 Union
5 Retainer	22 Washer	38 and 38A Spring	54 Washer
6 Spring	23 Plug	39 and 39A Idling adjustment screw	55 Fuel filter
7 Piston	24 Progression hole inspection plug	40 Retainer	56 Washer
8 Delivery valve	25 Nut	41 Spring	57 Plug
9 Washers	26 Tab washer	42 Dust seal	58 Air intake horn
10 Pump jet	27 and 27A Spacer	43 Bearing	59 Plate
11 Inlet and discharge valve	28 Spring	44 Stud	60 Nut
12 Needle valve	29 Lever	45 Main jet	61 Nut
13 Washer	30 Clip	46 Emulsion tube	62 Nut
14 Gasket	31 Roll pin	47 Air corrector jet	63 Bush
15 Float	32 Throttle spindle	48 Holder	64 Filter gauze
16 Washer	33 Screw	49 Idling jet	65 Carburettor body
17 Fulcrum pin			66 Bush



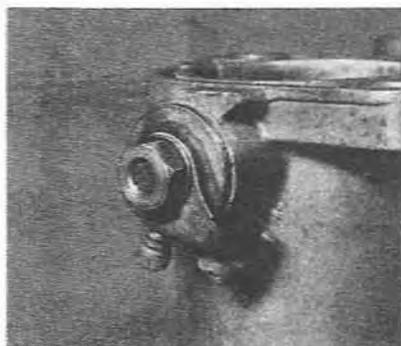
**Fig. 8.11 Choke removal tool (Sec 5)**



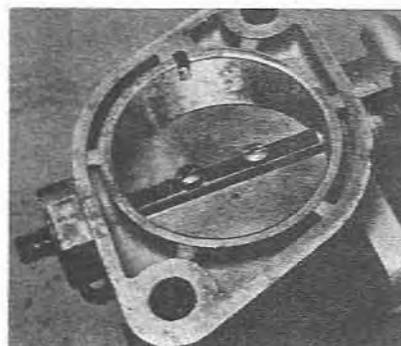
**5.20b Choke diameter size location (twin choke type)**



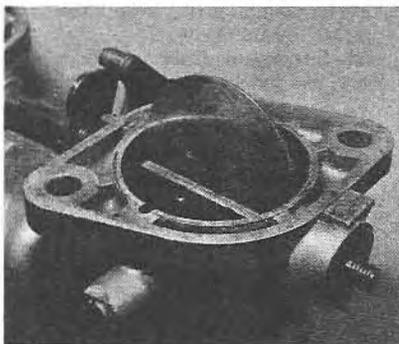
**5.21 Idling mixture screw location (twin choke type)**



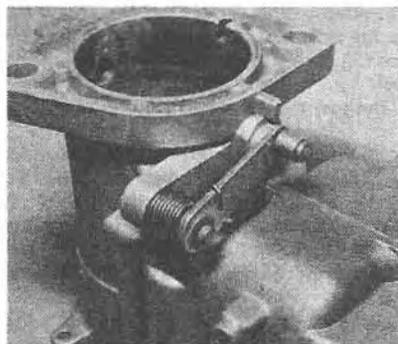
**5.23 Throttle spindle stop lever location (twin choke type)**



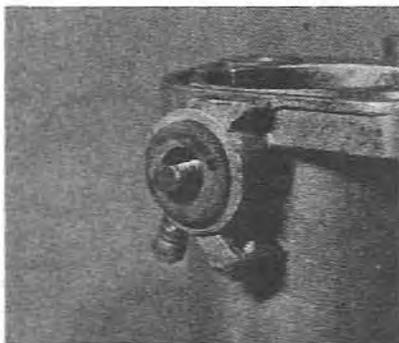
**5.25 Throttle valve retaining screw location (twin choke type)**



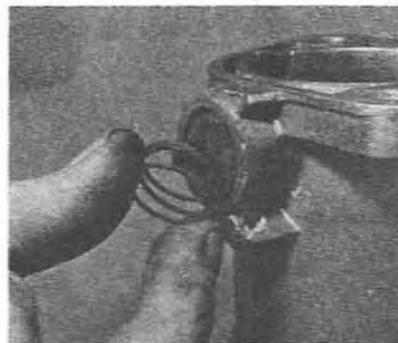
**5.27 Removing a throttle valve (twin choke type)**



**5.28 Accelerator pump lever location (twin choke type)**



**5.30 Removing the spring retainers (twin choke type)**



**5.31 Removing the throttle shaft springs (twin choke type)**

and lever (37 or 37A) from the throttle spindle (32).

25 Unscrew and remove the throttle valve retaining screws (33), being careful not to exert excessive pressure on the spindle (32) (photo).

26 Note the position of the throttle valves in relation to the barrels, and if necessary mark them with a pencil.

27 Turn the spindle to the fully open position and withdraw the two throttle valves (34) from their location slots (photo).

28 Using a small screwdriver, prise the C-clip (30) from the accelerator pump lever pivot then withdraw the lever (29) and spring (28) (photo).

29 Using a suitable pin punch, drive the roll pin (31) through the cam (36) and spindle (32). To ensure correct refitting, mark the cam and spindle in relation to each other.

30 Remove the spring retainers (40) from each end of the throttle spindle by inserting two self-tapping screws into the holes and pulling them with pliers (photo).

31 Remove the springs (41) and dust seals (42) (photo).

32 Using a plastic or wooden mallet, tap one end of the spindle (32) until the bearing (43) emerges from the opposite end of the carburettor body (65).

33 Continue to drive the spindle out with a length of dowel rod, at the same time recover the cam (36) and spring (35).

34 Mount the spindle loosely in a soft jaw vice, then tap the spindle (32) through the bearing (43).

35 Temporarily reinsert the spindle (32) into the carburettor body and remove the remaining bearing (43) using the method described in paragraphs 32, 33, and 34.

36 If the bearings are excessively worn, it is possible for the inner race to separate from the outer race leaving the latter in the carburettor body. If this happens, gently heat the body with a gas blow lamp until the race can be removed. On no account use excessive heat, otherwise the main body may be permanently distorted. It is not possible to obtain this component as a spare.

## 6 Disassembly (triple choke types)

1 Thoroughly clean the carburettor exterior and wipe dry.

2 Referring to Fig. 8.12, unhook the throttle lever return spring (where fitted), then unscrew and remove the carburettor cover retaining nuts (4A) and spring plate (where fitted) (photo).

3 Lift the cover (1) from the carburettor body, being careful not to break the gasket (11) (photo).

4 On 46 IDA 3C types, remove the screws (77) and lift off the gauze filters (76).

5 Unscrew and remove the retaining nuts (4) and withdraw the three air intake horns (3) and gasket (where fitted) (photo).

6 Carefully lift the gasket (11) from the carburettor body.

7 Unscrew both fuel inlet union bolts (14) and withdraw the unions (9 and 10) from the cover (1). Separate the sealing washers (8 and 13) from the unions and bolts and withdraw the fuel filter gauzes (12).

8 Pull the intermediate hose from the inlet unions (9 and 10).

9 Unscrew and remove the needle valve housing plugs (7) and washers (6) (photo).

10 Unscrew and remove the needle valves (5), noting the quantity of washers (75) fitted to them (photo).

11 Remove the locking wire from the float fulcrum pin screw heads (18), then remove the fulcrum pins together with the washers (17) (photo).

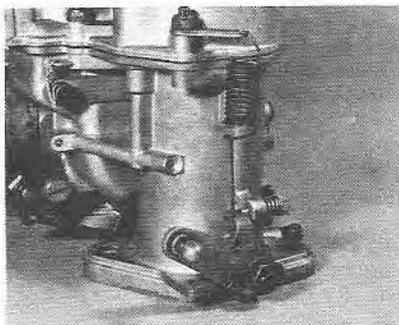
12 Lift the two floats (15) from the float chambers.

13 Unscrew and remove the drain plugs (64) and washers (63) (photo).

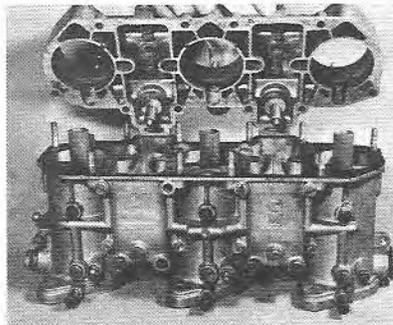
14 Unscrew and remove the main jet holders (61) and washers (59), then unscrew the main jets (60) from the holders (61) (photos).

15 Unscrew and remove the idling jet holders (66), then pull out the idling jets (65) (photos).

16 Unscrew and remove the air corrector jets (74), then invert



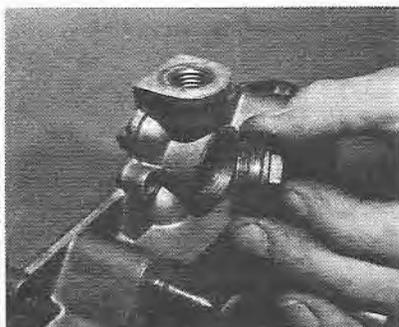
6.2 Throttle lever return spring location (triple choke type)



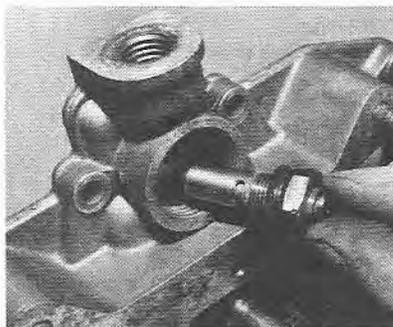
6.3 Removing the carburettor cover (triple choke type)



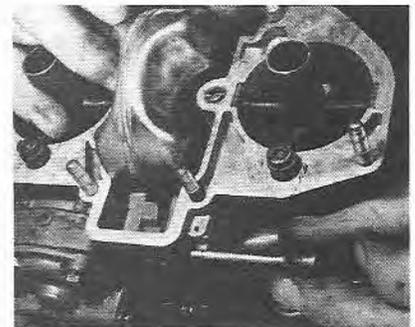
6.5 Removing the air intake horns (triple choke type)



6.9 Removing the needle valve housing plug (triple choke type)



6.10 Removing the needle valves (triple choke type)



6.11 Removing the float fulcrum pin (triple choke type)

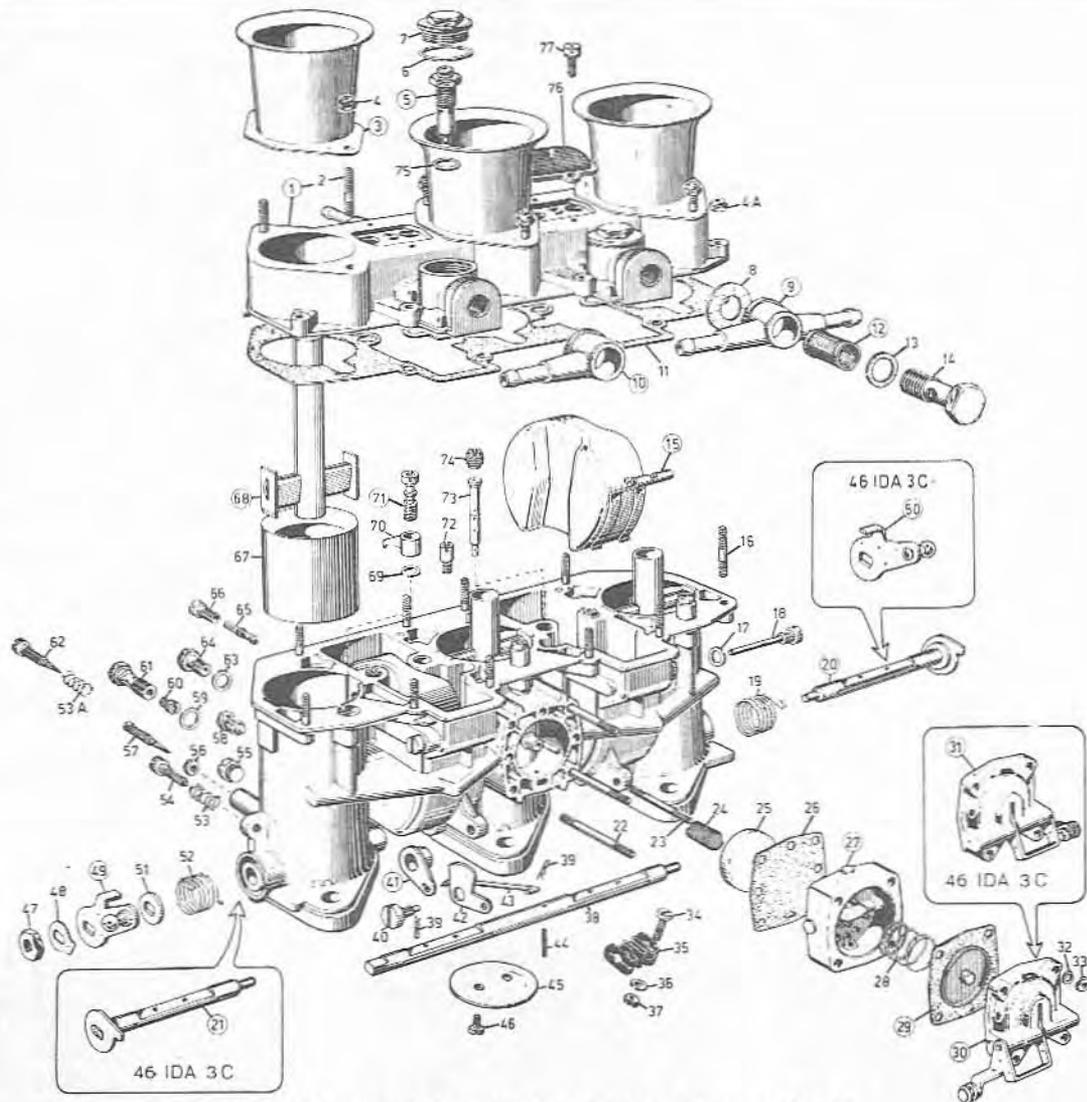
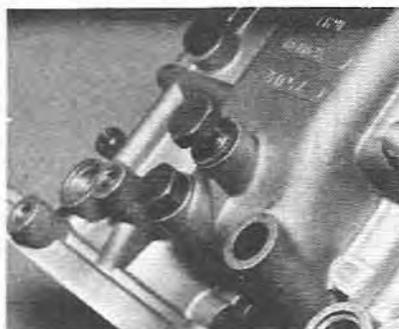
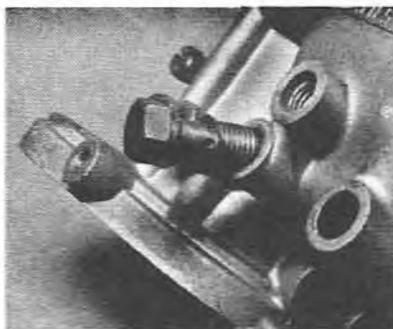


Fig. 8.12 Exploded view of the 46 IDA 3C carburettor (Sec 6)

- |                             |                     |                                      |
|-----------------------------|---------------------|--------------------------------------|
| 1 Cover                     | 28 Spring           | 53 and 53A Spring                    |
| 2 Stud                      | 29 Diaphragm        | 54 Idling adjustment screw           |
| 3 Air horn                  | 30 Cover            | 55 Progression hole inspection plug  |
| 4 and 4A Nut                | 31 Cover            | 56 Locknut                           |
| 5 Needle valve              | 32 Spring washer    | 57 Air compensating adjustment screw |
| 6 Washer                    | 33 Nut              | 58 Choke retaining screw             |
| 7 Plug                      | 34 Screw            | 59 Washer                            |
| 8 Washer                    | 35 Linkage          | 60 Main jet                          |
| 9 Union                     | 36 Washer           | 61 Holder                            |
| 10 Union                    | 37 Nut              | 62 Mixture adjustment screw          |
| 11 Gasket                   | 38 Throttle spindle | 63 Washer                            |
| 12 Fuel filter              | 39 Clip             | 64 Drain plug                        |
| 13 Washer                   | 40 Pivot            | 65 Idling jet                        |
| 14 Bolt                     | 41 Arm              | 66 Holder                            |
| 15 Float                    | 42 Cam              | 67 Choke                             |
| 16 Stud                     | 43 Linkage          | 68 Auxillary venturi                 |
| 17 Washer                   | 44 Roll pin         | 69 Washer                            |
| 18 Fulcrum pin              | 45 Throttle valve   | 70 Pump jet                          |
| 19 Spring                   | 46 Screw            | 71 Delivery valve                    |
| 20 Throttle spindle         | 47 Nut              | 72 Inlet and discharge valve         |
| 21 Throttle spindle         | 48 Tab washer       | 73 Emulsion tube                     |
| 22 and 23 Stud              | 49 Lever            | 74 Air corrector jet                 |
| 24 Spring                   | 50 Lever            | 75 Washer                            |
| 25 Plate                    | 51 Spacer           | 76 Filter gauze                      |
| 26 Diaphragm                | 52 Spring           | 77 Screw                             |
| 27 Accelerator pump housing |                     |                                      |



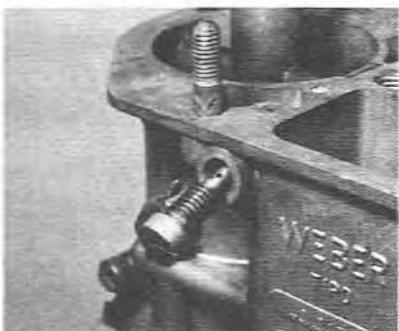
6.13 Removing the drain plugs (triple choke type)



6.14a Removing a main jet (triple choke type)



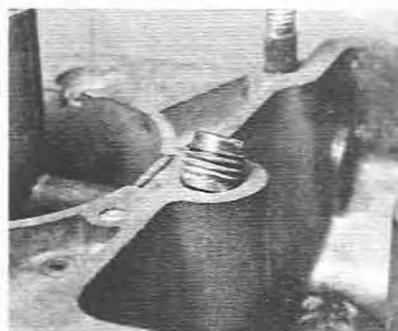
6.14b A main jet and holder (triple choke type)



6.15a Removing an idling jet (triple choke type)



6.15b An idling jet and holder (triple choke type)



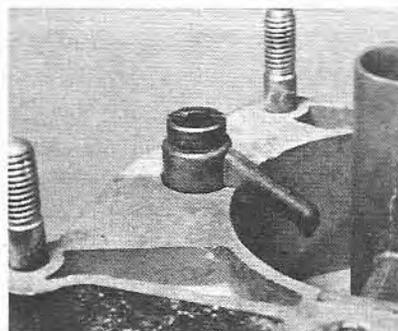
6.16a Removing the air corrector jets (triple choke type)



6.16b Removing an emulsion tube (triple choke type)



6.17 Location of an accelerator pump inlet and discharge valve (triple choke type)



6.18 Location of an accelerator pump delivery valve (triple choke type)

the carburetor body and extract the emulsion tubes (73). If they are a tight fit due to overtightening of the air jets, careful use of a selftapping screw may be necessary to extract the emulsion tubes (photos).

17 Unscrew and remove the accelerator pump inlet valves (72) from the bottom of the float chambers (photo).

18 Unscrew the accelerator pump delivery valves (71) and remove them together with the washers (69) (photo).

19 Withdraw the washers (69) and pump jets (70), then, on IDS types, remove the retaining screws and withdraw the booster jet assemblies.

20 Unscrew the accelerator pump retaining nuts (33) and remove them together with the spring washers (32) (photo).

21 Withdraw the accelerator pump cover (30) and body (27) over the location studs; at the same time recover the reaction spring (24) and plate (25) (photo).

22 Carefully remove the release diaphragm (26) from the body (27).

23 Separate the cover (30) from the body (27) and remove the return spring (28).

24 Carefully peel the pump diaphragm (29) from the cover (30).

25 Remove the locking wire from the choke retaining screws (58) then unscrew and remove them.

26 Note the location of the auxiliary venturis (68) and mark them with a pencil if necessary to ensure correct refitting; then withdraw them from the carburetor body (photos). If necessary, use a wooden or plastic dowel rod inserted from the throttle valve end of the barrel to tap the auxiliary venturis free but, if they are excessively tight, it will be necessary to obtain Weber tool no 9610 150 0035.

27 Remove the chokes (67), noting that the end with the

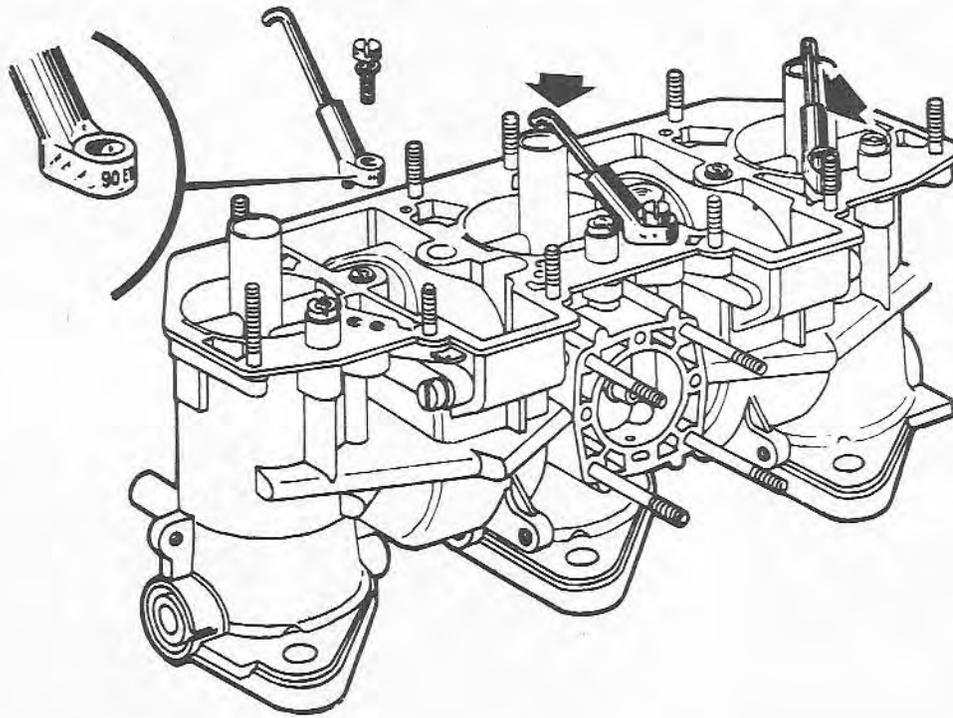
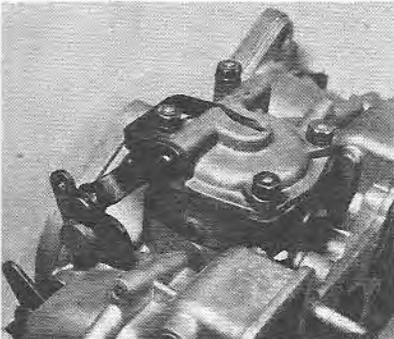
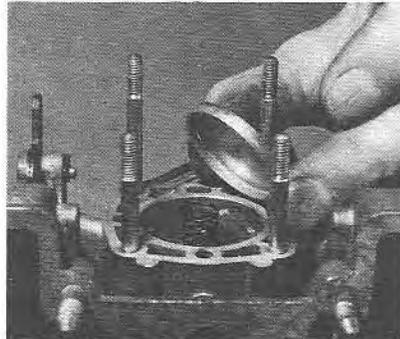


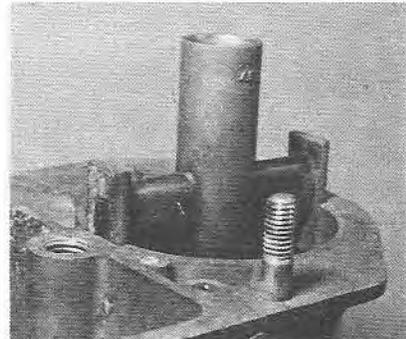
Fig. 8.13 Location of the booster jets on IDS types (Sec 6)



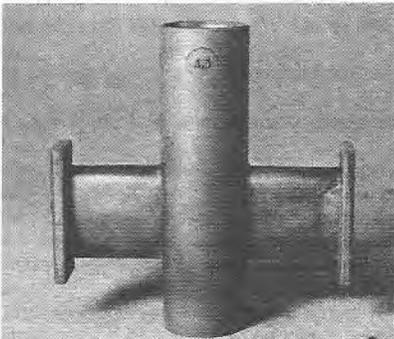
6.20 Accelerator pump cover location (triple choke type)



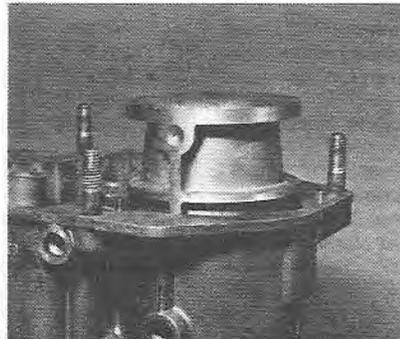
6.21 Removing the pump reaction plate and spring (triple choke type)



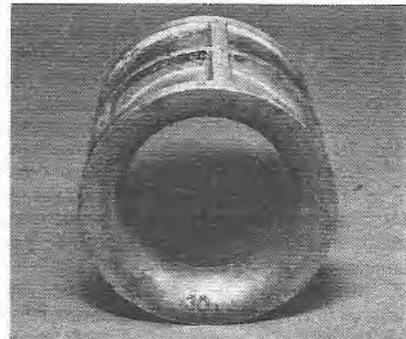
6.26a Removing an auxiliary venturi (triple choke type)



6.26b Auxiliary venturi and size identification (triple choke type)



6.27a Removing a choke (triple choke type)



6.27b Choke and size identification (triple choke type)

smaller internal diameter is uppermost (photos). If these are excessively tight it will be necessary to obtain Weber tool no 9610 150 0034.

28 Unscrew and remove the throttle valve retaining screws (46), being careful not to exert excessive pressure on the spindles (20 and 38) (photo).

29 Turn the spindles to the fully open position and withdraw the three throttle valves (45) from their location slots (photos).

30 Slacken the intermediate linkage screws (34) and withdraw the short spindle (20) from the carburettor body (photo). Note that on some types the linkage incorporates grub screws instead of nuts.

31 Remove the return spring (19) from the spindle (20).

32 Remove the linkage (35) from the long spindle (38).

33 Extract the spring clip (39) from the linkage (43) then detach the linkage from the lever (41) (where applicable).

34 Extract the spring clip (39) and unscrew the pivot (40) then withdraw the accelerator pump cam (42) (photo).

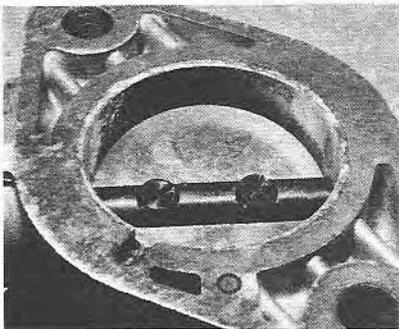
35 Using a suitable pin punch, drive the roll pin (44) through the spindle (38), at the same time mark the lever (41) and spindle (38) in relation to each other to facilitate refitting.

36 With a suitable length of dowel rod, carefully tap the spindle (38) out of the carburettor body and through the lever (41).

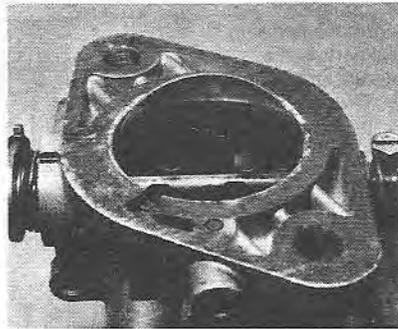
37 Bend back the locktab (48) and unscrew the nut (47). If necessary, mount the spindle in a soft jaw vice during this operation.

38 Remove the nut (47), tab washer (48), lever (49), spacer (51) and spring (52) from the spindle (38), noting the relative position of the lever.

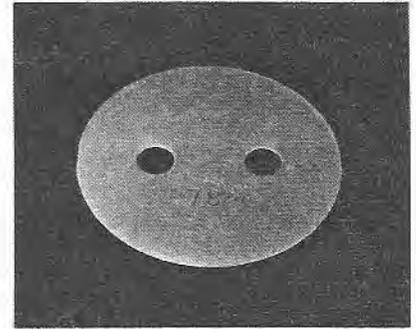
39 On some types the location of the short and long throttle spindles is reversed and it is therefore important to note the



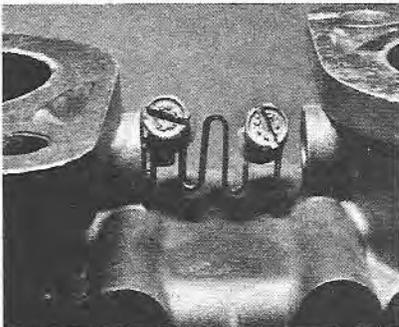
6.28 Throttle valve retaining screw location (triple choke type)



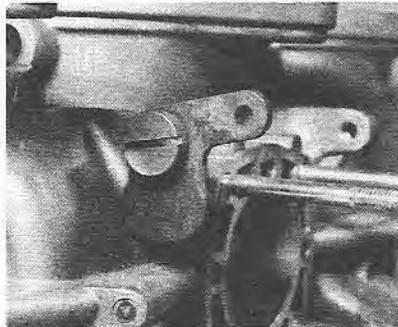
6.29a Removing a throttle valve (triple choke type)



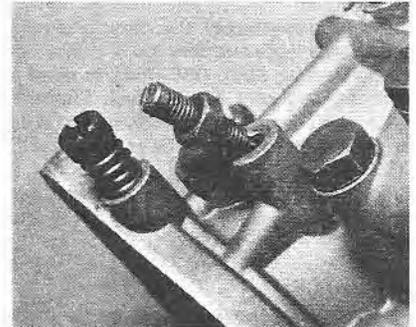
6.29b A throttle valve (triple choke type)



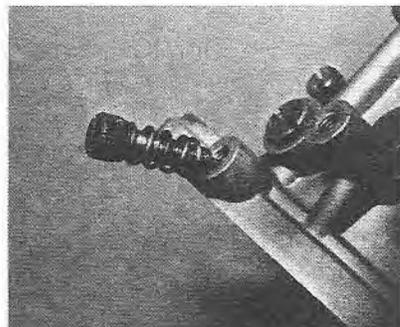
6.30 Intermediate linkage (triple choke type)



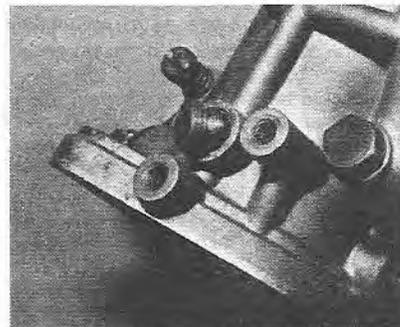
6.34 Accelerator pump cam location (triple choke type)



6.40 Removing the air compensation adjustment screws (triple choke type)



6.41 Removing the idling mixture screws (triple choke type)



6.42 Removing the progression hole inspection plugs (triple choke type)

correct fitted position of these items.

40 Loosen the locknuts (56) then unscrew and remove the air compensation adjustment screws (57) (photo).

41 Unscrew and remove the idling mixture adjustment screws (62) and springs (53A); on some models a plain washer and seal are fitted to the screws (photo).

42 Unscrew and remove the progression hole inspection plugs (55) (photo).

43 Unscrew and remove the idling adjustment screw (54) and spring (53).

### 7 Special overhaul procedures

After carrying out the general overhaul procedures given in Chapter 4, the following special procedures should be followed:

#### 46 IDA and 48 IDA types

1 Using a hand chuck and the special Weber tool, reform the main jet seatings at the bottom of the emulsion tube housing wells by carefully rotating the tool in alternate directions. Finish the seatings by inserting the further Weber tool and gently tapping the top of the tool whilst rotating it.

2 Using the same procedure as described in paragraph 1 reform the idling jet seats.

#### Triple choke types

3 Using a hand chuck and Weber tool no 9600 325 0767, reform the idling jet seats by carefully rotating the tool in alternate directions. Finish the seatings by inserting Weber tool no 9610 315 0816 and gently tapping the top of the tool whilst rotating it.

4 If the emulsion tube wells are discoloured and considerable sediment has accumulated, the bores must be reamed using Weber tool no 9600 325 0762 and a hand chuck. Turn the tool carefully until it moves freely then continue turning it whilst removing it.

5 If on disassembly, the throttle spindles are a tight fit in the carburettor body and they are of original diameter (8.0 mm), use Weber tool no 9600 035 0542 to ream the spindle bores clear with the aid of a hand chuck. Should the spindle bores be excessively worn, oversize spindles of 8.5 mm diameter must be fitted. The bores should be reamed using Weber tool no 9600 035 0556.

6 Using a small file, remove any burrs which have been formed as a result of reaming as described in paragraphs 4 and 5.

#### All types

7 Check the internal channels for blockage by injecting fuel from a syringe and observing whether it emerges freely from the particular channel being tested. If any are blocked, it will be necessary to drill out the lead plugs as shown in Fig. 8.15, 8.16 and 8.17.

8 The channels are of the diameters viz 1.0 mm, 1.5 mm and 2.0 mm. The Weber tool nos 9620 175 1846, 9620 175 1847 and 9620 175 1848 should be used to check that the channels are clear from their full lengths.

9 The carburettor body should be thoroughly cleaned after overhaul to remove any swarf and dirt, preferably using clean fuel and air pressure. The lead plugs should be renewed and retained in position by using the Weber tool no 9610 315 0823 as a punch until the plugs are expanded into their bores.

10 Check the throttle spindles for high spots which could cause them to seize and if necessary, clean the spindles with fine emery tape.

### 8 Assembly (46 IDA and 48 IDA types)

**Note:** All components should be clean and dry before starting the assembly procedure.

1 Using a suitable diameter length of tubing, drive one

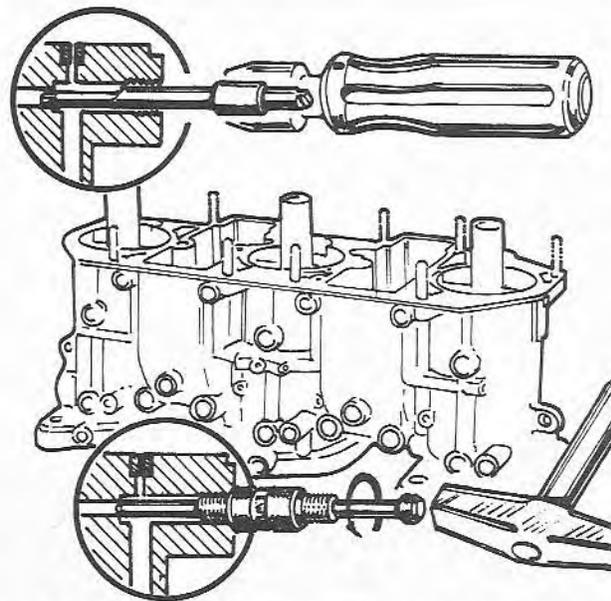


Fig. 8.14 Overhauling the idling jet seats (triple choke types) (Sec 7)

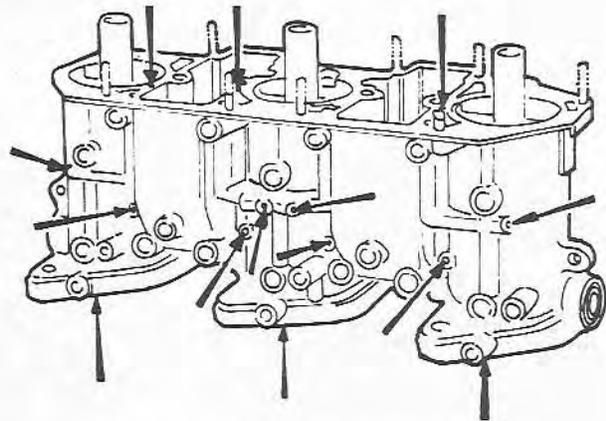


Fig. 8.15 Lead plug location points (Sec 7)

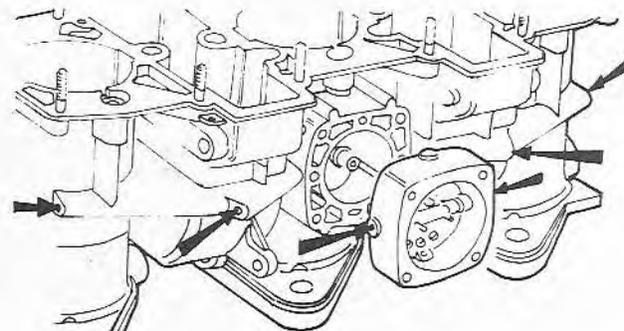


Fig. 8.16 Accelerator pump channel lead plug location points (Sec 7)

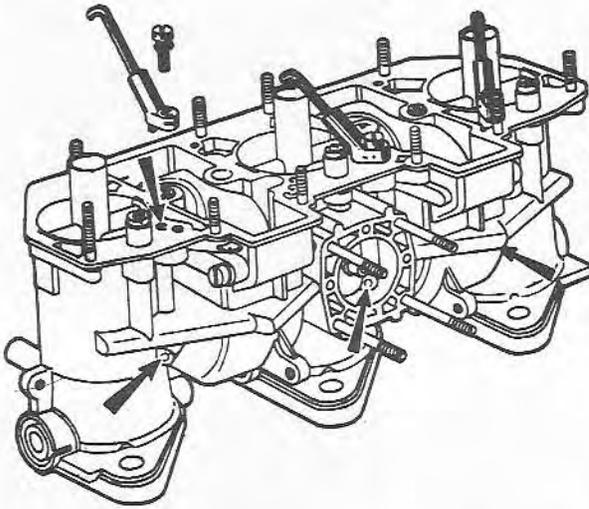


Fig. 8.17 Booster jet channel lead plug location points (IDS types) (Sec 7)

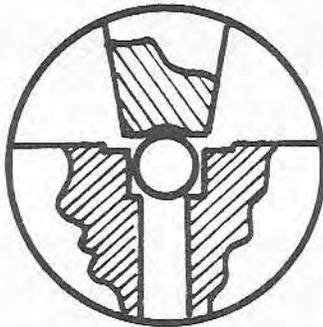


Fig. 8.18 Method of retaining the lead plugs (Sec 7)

bearing (43) fully into the carburettor body (65) (Fig. 8.9).

2 Mount the spindle (32) in a soft jaw vice and drive the remaining bearing (43) onto the spindle (32) with tubing located on the inner diameter. Make sure that it is fitted to the correct end so that the roll pin hole is towards the lever (29) end of the carburettor.

3 If a new cam (36) or spindle (32) is being fitted, ream the cam as necessary so that it is a firm sliding fit on the spindle.

4 Lightly lubricate the spindle (32) and bearings (43) with engine oil, then insert the spindle into the carburettor body (65) and through the spring (35) and cam (36). Make sure that the spring and cam are located correctly so that they will operate the lever (29) (photo).

5 Drive the bearing (43) into the carburettor body using tubing located on the outer diameter; if necessary support the opposite bearing during this operation to ensure that both bearings are fully entered (photo).

6 Fit the dust seals (42) and springs (41) over each end of the spindle (32), then tap the spring retainers into the carburettor body (65).

7 If the original spindle (32) and cam (36) are being refitted, align the previously made marks and drive the roll pin (31) into the spindle until it is in a central position, then locate the spring (35) (photo).

8 Turn the spindle (32), against the tension of the spring (35) if already fitted, until the throttle valve slots can be seen from the flange end of the carburettor; then insert the throttle valves (34), entering the indented ends first, and close the spindle. Make sure that the throttle valves are fitted the correct way round so that the angled perimeters seat in the bores and the indentations are adjacent to the barrel progression holes.

9 Snap the valves shut several times in order to centralise them, then insert and tighten the valve retaining screws (33) without exerting excessive pressure on the spindle. It is recommended that new screws are always fitted, as it is quite easy to cross-thread previously peened screws. Lock the screws (33) by peening with Weber tool no 98010 900 whilst supporting the spindle with a length of wood. Alternatively, coat the threads with a liquid locking agent (fuel resistant) prior to inserting them.

10 If a new spindle (32) or cam (36) is being fitted, both must be drilled with a 0.078 in (2.0 mm) drill to accommodate the roll pin (31). To do this it is essential to obtain the special Weber fixture. Drive in the roll pin when completed until it is in a central position, then locate the spring (35).

11 Fit the spring (28) to the accelerator pump lever pivot, followed by the lever (29) with the lug uppermost. Press the C-clip onto the pivot and then check that the lever moves freely when the throttle spindle is turned.

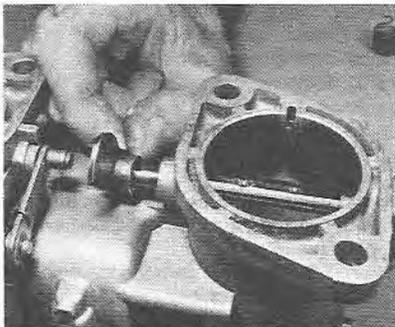
12 Fit the throttle lever (37 or 37A), spacer (27 or 27A), tab washers (26) and nuts (25) to their respective ends of the spindle (32). Tighten the nuts and lock them by bending the locktabs (26) (photo). Do not overtighten the nuts and under no circumstances force the throttle valves against the barrel walls.

13 Fit the spring (38 or 38A) to the idling adjustment screw (39 or 39A) and fit it to the carburettor body.

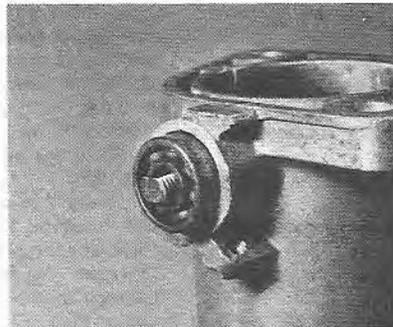
14 Fit the springs (21) to the idling mixture adjustment screws (20) and fit them to the carburettor body.

15 Insert the chokes (19) into the barrels with the smaller diameters and choke reference numbers uppermost.

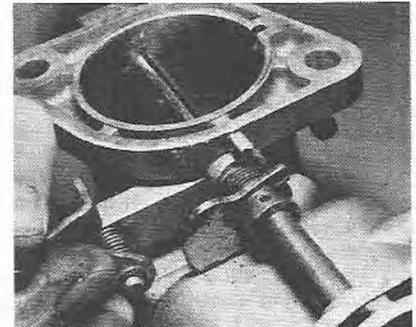
16 Fit the auxiliary venturis (18), making sure that the location springs engage with the grooves in the barrels and that the



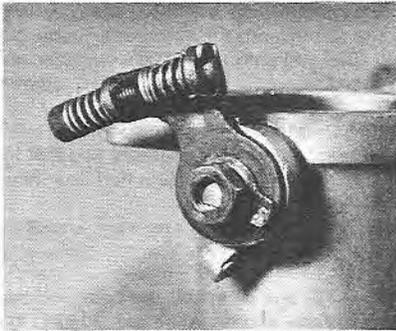
8.4 Fitting the throttle shaft (twin choke type)



8.5 Fitting the throttle shaft bearing (twin choke type)



8.7 Correct location of the accelerator pump cam (twin choke type)



8.12 Fitting a throttle lever (twin choke type)

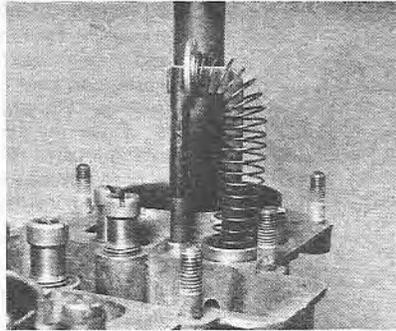
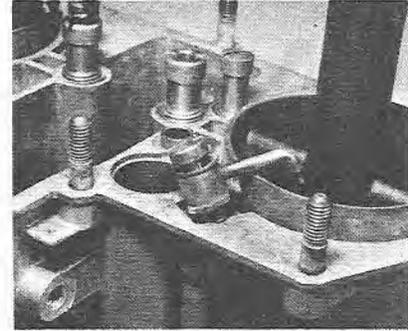
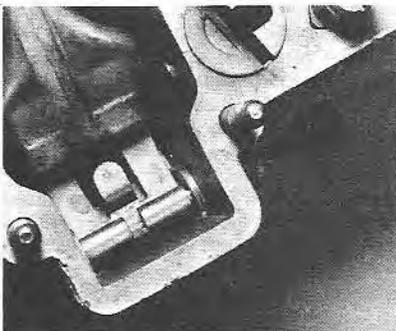


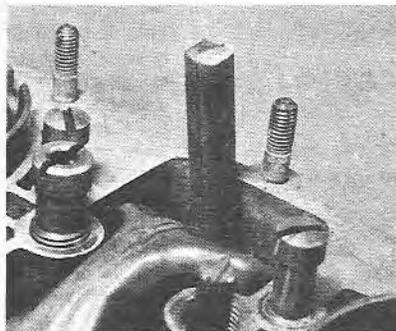
Fig. 8.19 Fitting the accelerator pump (twin choke type)



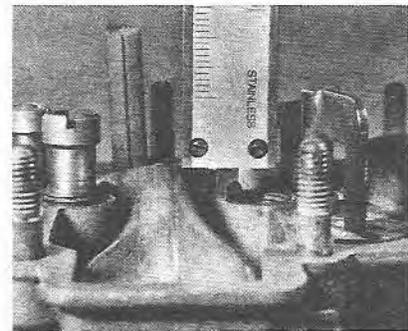
8.20 Fitting the accelerator pump delivery valves (twin choke type)



8.26 Fitting the float (twin choke type)



8.27a Using a rubber wedge to set the float (twin choke type)



8.27b Checking the float level (twin choke type)

supply channels are in alignment with those in the carburettor body (65). The extended venturis must also be uppermost.

17 On 46 IDA types, fit the accelerator pump operating rod bush (66).

18 Fit the spring (6) to the operating rod (4) followed by the piston (7); engage the piston with the rod by turning it through 90°.

19 Fit the retainer (5) over the spring (6) with the tab facing the operating rod, then lower the assembly into the carburettor body (65) and press the retainer into its location with the flat side of a screwdriver (photo). If the retainer refuses to hold, it should be gently prised apart to give it the necessary tension.

20 Fit a washer (9) to the accelerator pump delivery valves (8) followed by the pump jets (10) and a further washer (9), then fit and tighten the assemblies into the carburettor body (65) (photo).

21 Press the idling jets (49) into the holders (50) and tighten the holders into the carburettor body (65).

22 Press the main jets (45) and air corrector jets (47) into each end of the emulsion tubes (46), then press the emulsion tubes (46) into the holders (48).

23 Insert the emulsion tube assemblies into the carburettor body (65) and tighten them.

24 Fit and tighten the accelerator pump inlet and discharge valve (11) to the bottom of the float chamber.

25 Fit the washer (22) to the drain plug (23) and tighten the plug into the carburettor body (65).

26 Lower the float (15) into the float chamber with the operating tube facing upwards, then fit and tighten the fulcrum pin (17) together with the washer (16) (photo). Lock the pin with locking wire threaded through the adjacent holes in the body.

27 The float level adjustment must now be checked in the following manner: Obtain a rubber or plastic wedge approximately 0.25 in (6.4 mm) thick (tubing is ideal for the

procedure). Insert the wedge between the float and the outer carburettor body, then lift the float until the distance from the carburettor upper face to the float tab is 0.953 in (24.2 mm) (photo). If a depth gauge is not available, use vernier calipers and a feeler gauge as shown in photo 9.33b but make allowance for the thickness of the feeler. With the float held in this position by the wedge, check that the distance from the carburettor upper face to the top of the float is between 0.216 in and 0.236 in (5.5 mm and 6.0 mm). Make the check at the highest point of the float perimeter but not on the annular seam (photo). If the dimension obtained is incorrect, carefully bend the float tab as necessary and remove the wedge when the checking is complete.

28 Screw the needle valve (12) into the carburettor cover (1) without any washers. Check the distance from the cover face to the needle ball apex with the needle valve in the closed position and without the needle ball being depressed. Make the check with vernier calipers and deduct the result from 0.984 in (25.0 mm) to give the thickness of washers required.

29 Fit the washer(s) (13) to the needle valve (12) and tighten it into the carburettor cover (1). Check that the dimension described in paragraph 28 is still 0.984 in (25.0 mm).

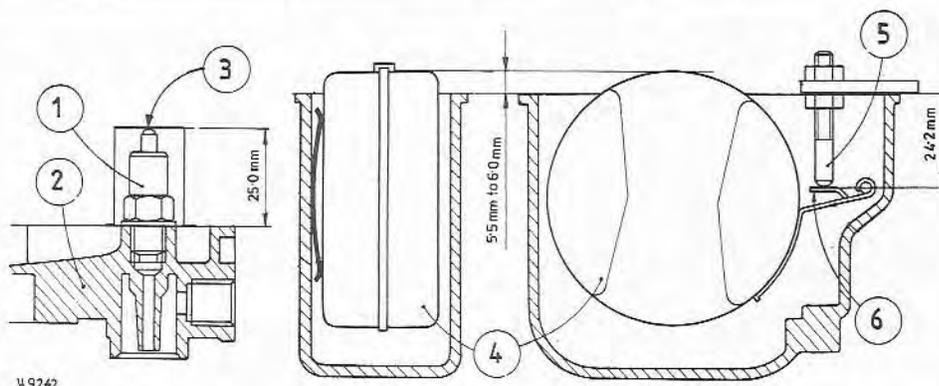
30 Place the gasket (14) onto the top face of the carburettor body (65).

31 Lower the carburettor cover (1) onto the main body and over the studs, then fit the retaining nuts (62) and tighten them a little at a time in diagonal sequence.

32 Insert the fuel filter (55) into the carburettor cover (1), followed by the retaining bush (63), washer (56) and filter inspection plug (57); tighten the plug into the cover.

33 Fit the air intake horns (58) to the cover (1). Fit the plates (59) and tighten the retaining nuts (60).

34 Locate the filter gauze (64) over the cover studs (2) and fit and tighten the retaining nuts (61).



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Fig. 8.19 Float level adjustment dimensions on 46 IDA and 48 IDA types (Sec 8)

- |                |               |         |
|----------------|---------------|---------|
| 1 Needle valve | 3 Needle ball | 5 Gauge |
| 2 Cover        | 4 Float       | 6 Tab   |

35 With the carburettor completely assembled, the idling adjustment screws should be turned to their preliminary settings. To do this, first screw in the throttle idling adjustment screw until it just touches the throttle lever, then continue turning for a further 2 turns. Working on the idling mixture volume screws in turn, fully screw them in until they are in firm contact with their seats, then back them off 2 complete turns. Final adjustments will be necessary when the carburettor is fitted on the engine (refer to Section 10).

## 9 Assembly (triple choke types)

**Note:** All components should be clean and dry before starting the assembly procedure.

- 1 Fit the spring (53) (Fig. 8.12) to the idling adjustment screw (54) and fit the screw to the carburettor body, turning it on two or three threads only.
- 2 Fit and tighten the progression hole inspection plugs (55).
- 3 Fit the springs (53A) to the idling mixture adjustment screws (62) together with the plain washers and seals where fitted, then fit the screws into the carburettor body.
- 4 Fit the air compensating adjustments screws (57) fully, then fit and tighten the locknuts (56).
- 5 Fit the spring (52) to the spindle (38) followed by the spacer (51), lever (49), tab washer (48) and nut (47). Make sure that the lever is in its correct position as previously noted and tighten the nut with the spindle mounted in a soft jaw vice. Lock the nut by bending the tab washer.
- 6 If a new lever (41) or spindle (38) is being fitted, ream the lever as necessary so that it is a firm sliding fit on the spindle.

7 Lightly lubricate the throttle spindle (38) with engine oil, then insert it into the carburettor body, at the same time locating the lever (41) between the two barrels. If the original lever (41) is being refitted, make sure that it is the correct way round as previously noted, then insert the roll pin (44) and drive it through the lever and spindle until it is in a central position (photos).

8 Fit the accelerator pump cam (42) to the pivot (40). Fit the pivot and insert the spring clip (39). On IDAP and IDTP types, it will first be necessary to engage the linkage to the lever (41) but, if a new lever (41) or spindle (38) is being fitted, delay fitting the cam (42) until the roll pin hole has been drilled.

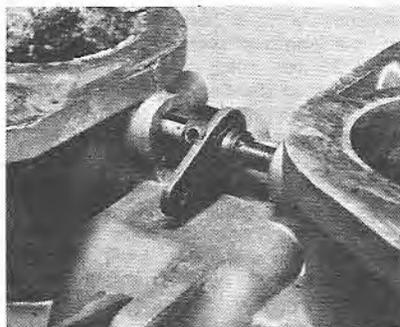
9 Fit the linkage (35) to the long spindle (38) but do not tighten the screws at this stage.

10 Fit the return spring (19) to the short spindle (20) and lubricate the spindle with a little engine oil.

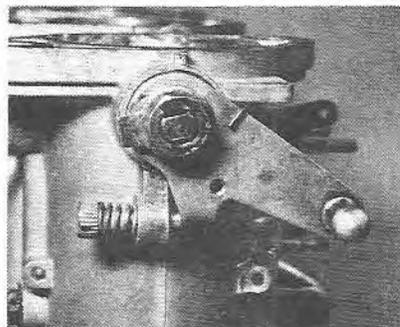
11 Insert the short spindle (20) into the carburettor body and locate it into the linkage (35).

12 Make sure that the return springs (19 and 52) are correctly located (photo), then turn each spindle in turn to their fully open positions and insert the throttle valves (45) into their location slots. Close the throttle valves and allow them to centralise within the barrels; make sure that they are fitted the correct way round so that the angled perimeters seat in the bores.

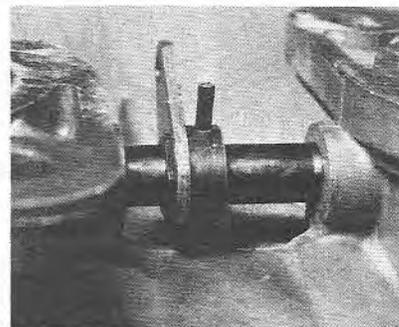
13 Insert and tighten the valve retaining screws (39) without exerting excessive pressure on the spindles. It is recommended that new screws are always fitted as it is quite easy to cross-thread previously peened screws. Lock the screws (39) by peening with Weber tool no 98010 900 whilst supporting the spindle with a length of wood. Alternatively, coat the threads with a liquid locking agent (fuel resistant) prior to inserting them.



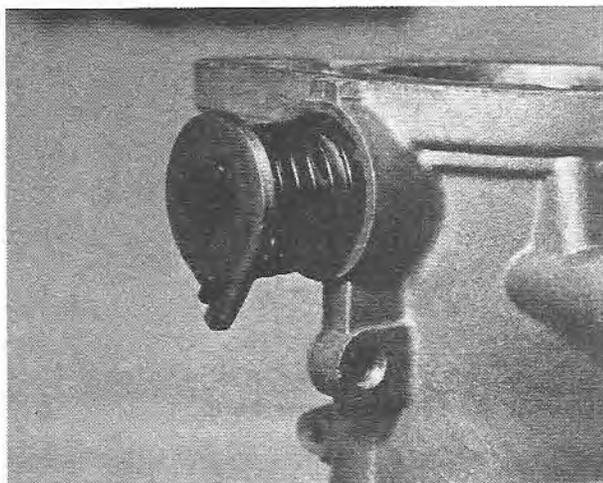
9.7a Fitting the long throttle spindle (triple choke type)



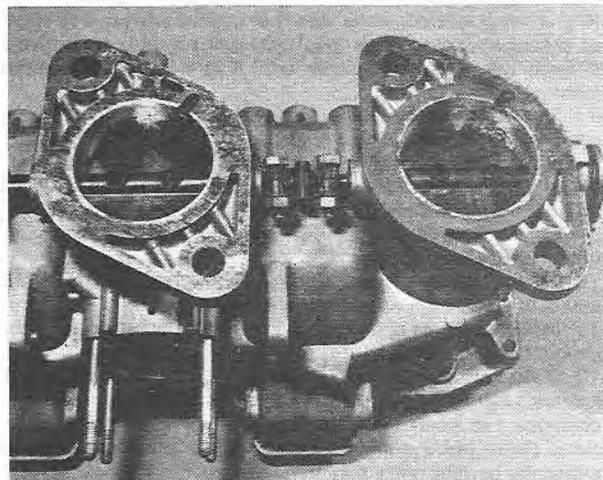
9.7b Correct location of the throttle lever (triple choke type)



9.7c Inserting the roll pin into the spindle (triple choke type)



9.12 Correct location of the short throttle spindle return spring (triple choke type)



9.14 Fitting the intermediate linkage (triple choke type)

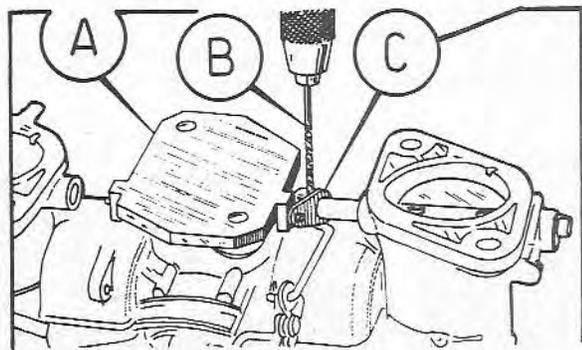


Fig. 8.20 Drilling the throttle spindle (triple choke types) (Sec 9)

A Gauge

B Drill

C Arm

14 With the throttle valves (45) fully closed, tighten the intermediate linkage screws (34) (photo).

15 If a new lever (41) or spindle (38) is being fitted, the spindle must be drilled with a 0.079 in (2.0 mm) drill to accommodate the roll pin (44). To do this it is essential to obtain the Weber

gauge no 9620 175 2949. Fit the gauge to the central barrel flange with the lever (41) attached to the location peg, then drill through the lever and spindle whilst holding the throttle valves fully shut.

16 Insert the roll pin (44) and drive it through the lever and spindle until it is in a central position.

17 On IDAP and IDTP types, engage the cam and linkage to the lever (41), fit the cam to the pivot (40), tighten the pivot and fit the retaining spring clip (39). On all other types, engage the linkage (43) to the lever (41) then connect the remaining end to the cam (42) and fit the retaining spring clip (39).

18 Insert the chokes (67) into the barrels with the smaller inside diameters and choke reference numbers uppermost. Make sure that the location drillings coincide with the retaining screw (58) holes (photo).

19 Insert and tighten the choke retaining screws (58), then lock them with locking wire threaded through the holes in the carburettor body (photo).

20 Fit the auxiliary venturis (68), making sure that the supply channels are in alignment with those in the carburettor body and also that the cut away sections of the nozzles face the throttle valves.

21 With the carburettor body on its side, locate the reaction spring (24) into the accelerator pump chamber and locate the plate (25) onto the spring, concave side towards the body (photo).

22 Place the release diaphragm (26) onto the plate and the accelerator pump body (27) onto the diaphragm with the spring locating pegs facing outwards as shown in Fig. 8.12 (photos).

23 Fit the return spring (28) over the pegs, followed by the diaphragm (29) and cover (30) (photos).

24 Make sure that the accelerator pump lever roller is seated on the cam (42), then depress the cover and fit the retaining nuts (33) and spring washers (32) (photo). Tighten the nuts (33) in diagonal sequence then check the operation of the pump by operating the throttle lever.

25 On IDS types, fit the booster jet assemblies and tighten the retaining screws.

26 Fit the pump jets (70) to the accelerator pump delivery valves (71) followed by the washers (69), then fit and tighten the assemblies into the carburettor body.

27 Fit and tighten the accelerator pump inlet valve(s) (72) to the bottom of the float chamber(s).

28 Insert the emulsion tubes (73) into the carburettor body then fit and tighten the air corrector jets (74).

29 Press the idling jets (65) into their holders (66) and tighten the holders into the carburettor body.

30 Tighten the main jets (60) into the holders (61) and tighten the holders into the carburettor body.

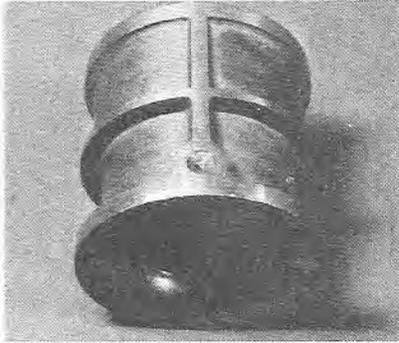
31 Fit the washers (63) to the drain plugs (64), then tighten the plugs into the carburettor body.

32 Lower the floats (15) into the float chambers with the operating tabs facing upwards, then fit and tighten the fulcrum pins (18) together with washers (17). Lock the pins with locking wire threaded through the adjacent holes in the body (photo).

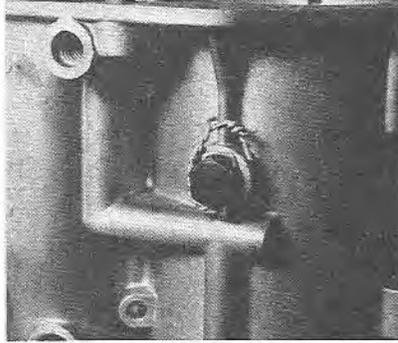
33 The float level adjustment must now be checked in the following manner: obtain a length of rubber or a plastic wedge approximately 0.25 in (6.35 mm) thick (tubing is ideal for the procedure). Insert the rubber or plastic between the float and the outer carburettor body, then lift the float until the distance from the carburettor upper face to the float tab is 0.709 in (18.0 mm) (photos). If a depth gauge is not available, use vernier calipers and a feeler gauge as shown in photo 9.33b but make allowance for the thickness of the feeler. With the float held in this position by the wedge, check that the distance from the carburettor upper face to the top of the float is between 0.492 in and 0.512 in (12.5 mm and 13.0 mm) (photo). Do not take into consideration the float seam and make the check at the highest point of the float perimeter. If the dimension obtained is incorrect, carefully bend the float tab accordingly (Fig. 8.21).

34 Check and adjust the float level adjustments of both floats using the procedure described in paragraph 33.

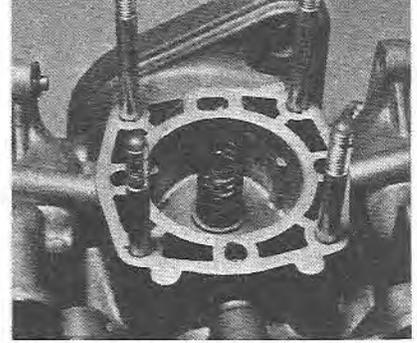
35 Screw the needle valves (5) into the carburettor cover (1)



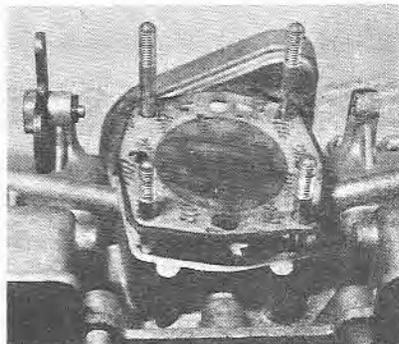
9.18 The choke and locating hole (triple choke type)



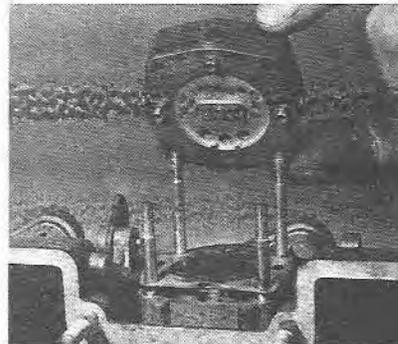
9.19 Locking wire attached to the choke retaining screw (triple choke type)



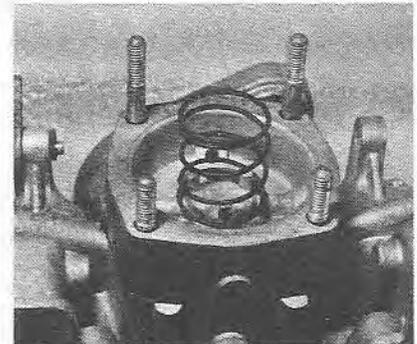
9.21 Correct location of the accelerator pump reaction spring (triple choke type)



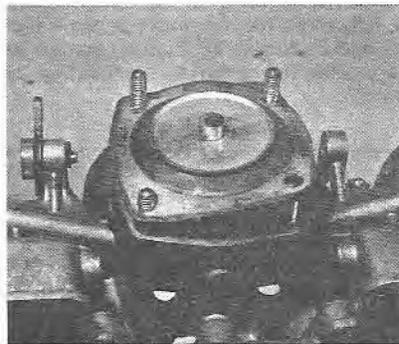
9.22a Fitting the accelerator pump release diaphragm ...



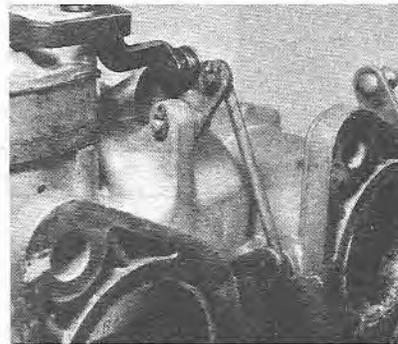
9.22b ... and body (triple choke type)



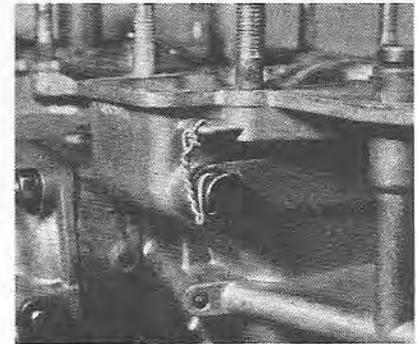
9.23a Fitting the accelerator pump return spring (triple choke type)



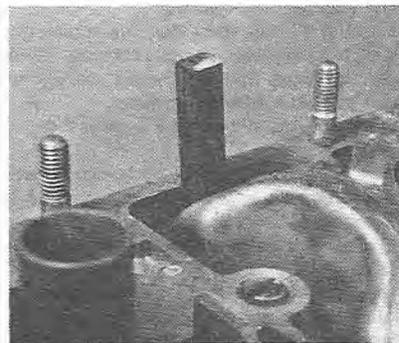
9.23b Fitting the accelerator pump diaphragm (triple choke type)



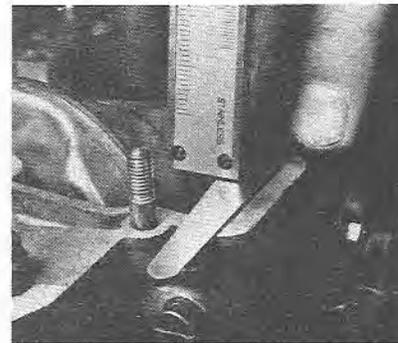
9.24 Correct location of the accelerator pump lever and cam (triple choke type)



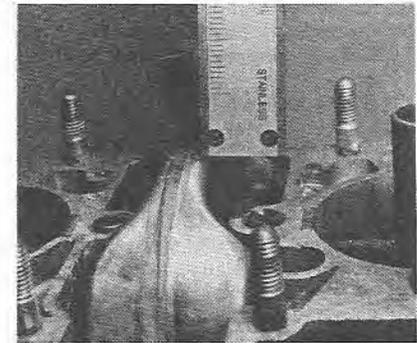
9.32 Float fulcrum pin locking wire location (triple choke type)



9.33a Using a rubber wedge to set the float height (triple choke type)



9.33b Checking the float tab height with a vernier and feeler gauge (triple choke type)



9.33c Checking the float height (triple choke type)

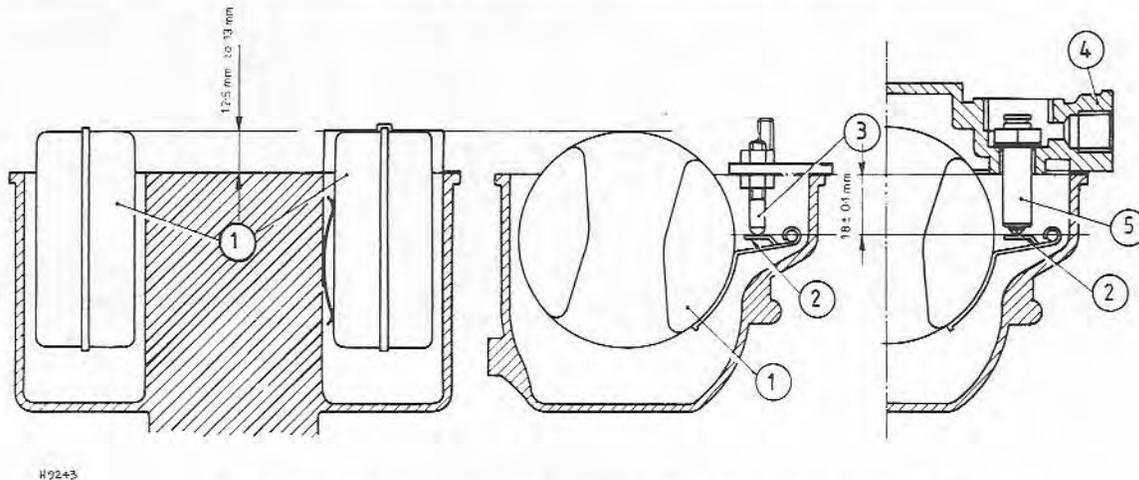


Fig. 8.21 Float level adjustment dimensions on triple choke types (Sec 9)

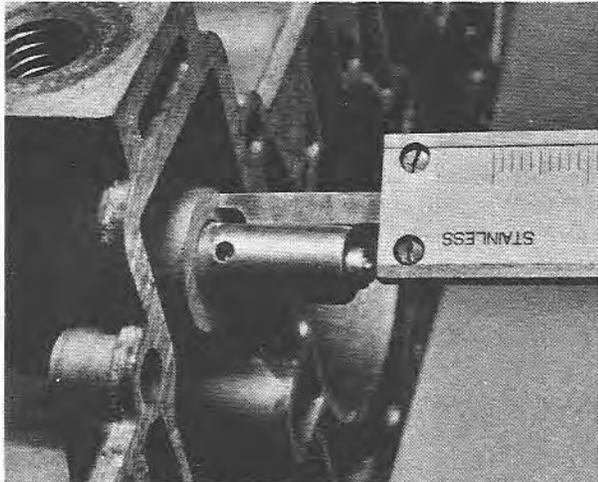
1 Floats

2 Tab

3 Gauge

4 Cover

5 Needle valve



9.35 Checking the needle valve height (triple choke type)

without any washers and check the distance from the cover face to the needle ball apex with the needle valves in the closed position and without the needle balls being depressed. Make the check with vernier calipers and deduct the result from 0.709 in (18.0 mm) to give the thickness of washers required (photo).

36 Fit the washers (75) to the needle valves (5) and tighten them into the carburettor cover (1). Check that the dimensions described in paragraph 35 are now  $0.709 \pm 0.004$  in ( $18.0 \pm 0.1$  mm).

37 Fit the washers (6) to the needle valve housing plugs (7) and tighten them into the carburettor cover (1).

38 Connect the intermediate hose to the fuel inlet unions (9 and 10).

39 Fit the washers (13) to the inlet union bolts (14) followed by the filter gauzes (12), then fit the bolt assemblies to the unions (9 and 10) and fit the sealing washers (8).

40 Locate the fuel unions to the carburettor cover (1) and tighten the union bolts (14).

41 Carefully locate the gasket (11) to the carburettor body over the studs (16).

42 Lower the carburettor cover (1) over the locating studs and onto the gasket, then fit the retaining nuts (4A) and spring plate

(where fitted). Tighten the nuts a little at a time in diagonal sequence.

43 Where fitted, locate the gasket over the cover (1).

44 Fit the air intake horns (3) and tighten the retaining nuts (4).

45 On 46 IDA 3C types, fit the gauze filters (76) and tighten the retaining screws (77).

46 Hook the throttle lever return spring to the throttle lever and spring plate (where fitted).

47 With the carburettor completely assembled, the idling adjustment screws should be turned to their preliminary settings. To do this, first screw in the throttle idling adjustment screw until it just touches the throttle lever, then continue turning for a further 2 turns. Working on the idling mixture volume screws in turn, fully screw them in until they are in light contact with their seats then back them off 2 turns. Final adjustments will be necessary when the carburettor is fitted on the engine (refer to Section 10).

## 10 Tuning

**Note:** Refer to Chapter 3 for general notes on tuning.

1 The idling adjustment screws should be set to their preliminary positions as described in Sections 8 and 9.

2 Connect a tachometer to the engine in accordance with the manufacturer's instructions.

3 The carburettors must be synchronized in order to deliver equal amounts of air/fuel mixture to each individual cylinder. To check the adjustment it will be necessary to obtain a length of tubing of approximately 1 metre in length and of about 5 mm to 10 mm (0.25 in to 0.05 in) internal diameter. Alternatively and preferably, a synchronizer may be used (photo).

4 Remove the air cleaner(s) if fitted, then start the engine and run until normal operating temperature has been reached (ie the thermostat has opened). To ensure that the engine is really hot enough, drive it hard over at least a 5 mile distance.

5 Switch off the engine and disconnect the accelerator rod connections from each carburettor.

6 Start the engine and if necessary, adjust each idling speed adjusting screw by equal amounts until the engine is idling at the approximate recommended idling speed (usually between 600 and 800 rpm for touring models and approximately 1000 rpm for sports car models).

7 On triple choke types only, loosen the three compensation adjustment screw locknuts and screw the adjustment screws in until they are in light contact with their seats. If the engine falters as a result, turn the idle speed adjustment screw on each carburettor by equal amounts until the engine runs evenly



10.3 Weber carburettor synchronizer

again. Place one end of the synchronizing tube in the middle of one air intake and listen at the other end to the amount of hiss present. Alternatively, use the synchronizer to record the air flow of the air intake. Check each air intake of the carburettor to determine which one is passing the greatest volume of air, then adjust the remaining carburettor barrels to give identical volumes and finally tighten the adjustment locknuts. Carry out this procedure independently on each carburettor fitted to the engine.

8 On all carburettor types, each carburettor must now be synchronized with the remaining carburetors. To do this, allow the engine to idle and check the volume of air flowing through one air intake of each carburettor using the length of tube or the synchronizer. Determine the carburettor which is passing the

medium volume of air and adjust the idle speed adjustment screws of the remaining carburetors until they also pass identical volumes of air. Where the throttle linkage is arranged from a common shaft, the individual throttle levers will have to be adjusted by loosening the locknuts.

9 If necessary, turn each idling speed adjustment screw by equal amounts to bring the engine speed within the recommended idling limits.

10 The mixture screw adjustments on each carburettor must now be set and synchronized. Since each screw was turned to its preliminary setting, we must assume that they are reasonably synchronized to start with. With the engine idling, turn each screw by equal amounts ( $\frac{1}{2}$  a turn initially) and observe whether the engine speed falls or increases. Make several adjustments in a similar manner until the engine runs at the highest speed commensurate with even firing.

11 If necessary, again turn each idling speed adjustment screw by equal amounts to bring the engine speed within the recommended idling limits.

12 The final mixture screw synchronization can be determined by allowing the engine to idle, then to remove each spark plug lead in turn and observe the reduction in engine rpm on the tachometer. The reduction should be identical for each cylinder, then proving that the mixture strength is also identical for each cylinder. A further check can be made by removing the spark plugs after the engine has been idling for approximately 15 minutes, then checking that they are all in identical condition. Any with black sooty deposits indicate that the particular cylinder is running rich.

13 If necessary, adjust the idling speed screws on each carburettor by equal amounts to bring the engine speed within the recommended limits.

14 Note that on some applications it may be advisable to fit 'hotter' spark plugs while adjusting the carburetors to prevent misfiring, but the original plugs must always be refitted after completing the adjustment.

15 Switch off the engine and reconnect the throttle linkages, making adjustments as necessary to prevent the carburettor settings from being affected.

16 Remove the tachometer from the engine and refit the air cleaner(s) if fitted.

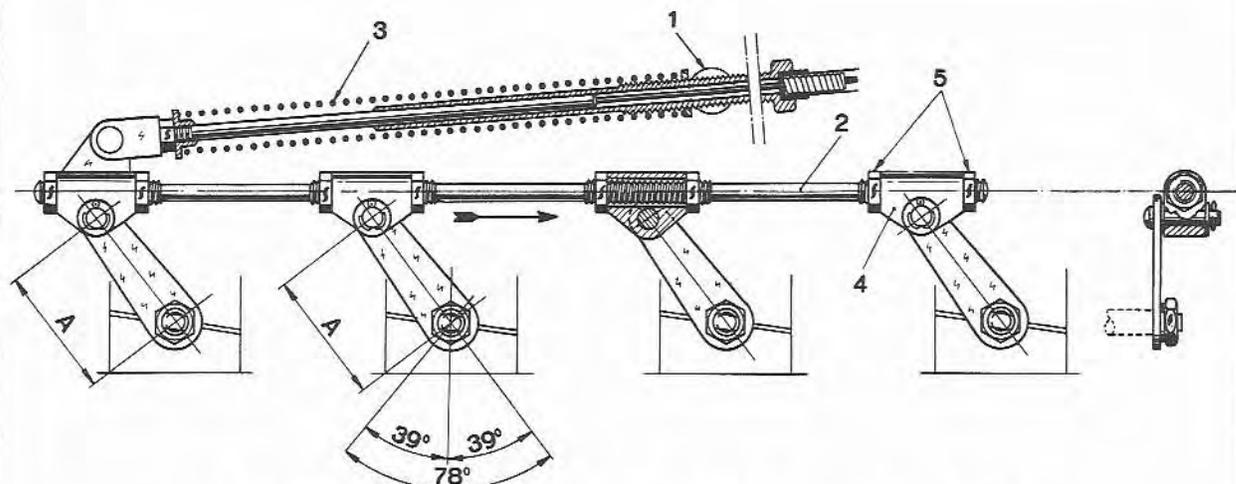


Fig. 8.22 Typical throttle linkage arrangement for a four-carburettor fitting (Sec 10)

1 Adjuster

2 Rod

3 Spring

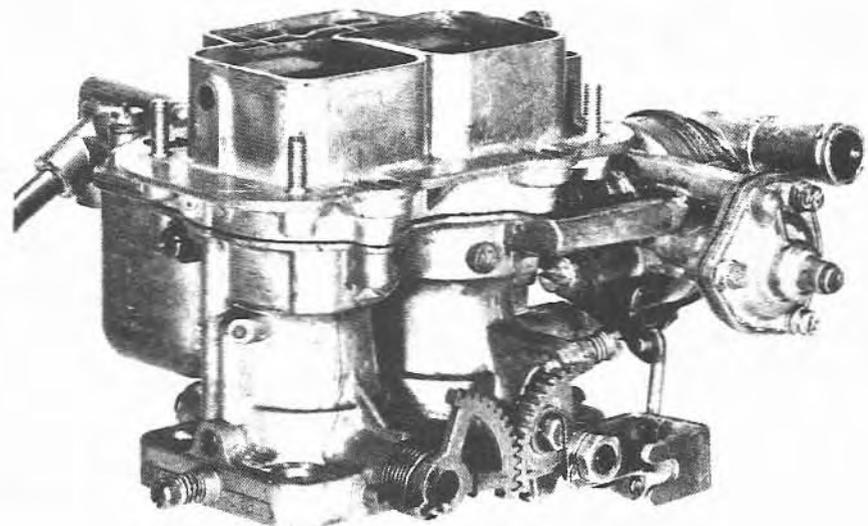
4 Adjuster block

5 Locknuts

Note: Dimensions A and lever angles must all be identical

## 11 Fault diagnosis

Symptom	Reason/s
Engine will not start	Blocked fuel filter or jets Flooded engine as a result of depressing accelerator pedal
Uneven idling	Leaking manifold or carburettor flange gaskets Loose idling jets or auxiliary venturis Excessive sediment or water in carburettor Throttle spindle dust covers broken (46 IDA and 48 IDA) Throttle spindles worn Incorrect tuning adjustments
Carburettor floods	Worn needle valve(s) Leaking or damaged float(s) Incorrect float level adjustments Excessive sediment in fuel
Engine lacks performance	Incorrect tuning adjustments Incorrect float level adjustments Excessive sediment in fuel Throttle valves not fully opening Accelerator pump faulty Accelerator pump leaking (triple choke types)
Excessive fuel consumption	Needle valve not seating Leaking or damaged float(s) Incorrect float level adjustments Choked air filter (if fitted)



## Part 2 Weber carburetors

### Chapter 9 Type 40 DFA, 40 DFAV, 34 DGAS, 38 DGAS

#### Contents

	<i>Section</i>		<i>Section</i>
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Assembly (34 DGAS and 38 DGAS types) .....	9	Operation .....	3
Construction .....	2	Removal and refitting .....	4
Disassembly (40 DFA and 40 DFAV types) .....	5	Special overhaul procedures .....	7
Disassembly (34 DGAS and 38 DGAS types) .....	6	Tuning .....	10
Fault diagnosis .....	11		

## Adjustment data

## Fast idle throttle valve opening

High cam position:

40 DFA and 40 DFAV types ..... 0.029 to 0.031 (0.75 to 0.80)

34 DGAS and 38 DGAS types:

38 DGAS 1A ..... 0.026 to 0.028 (0.65 to 0.70)

38 DGAS 7A ..... 0.025 to 0.027 (0.65 to 0.70)

38 DGAS 3A and 34 DGAS ..... 0.027 to 0.029 (0.70 to 0.75)

38 DGAS 4A ..... 0.029 to 0.031 (0.75 to 0.80)

Low cam position:

38 DGAS 4A ..... 0.080 to 0.100 (2.05 to 2.55)

38 DGAS 7A ..... 0.080 to 0.100 (2.05 to 2.55)

38 DGAS 1A ..... 0.100 to 0.120 (2.55 to 3.05)

38 DGAS 3A ..... 0.100 to 0.120 (2.55 to 3.05)

## Choke valve pull down clearance

38 DGAS types:

Minimum:

All types ..... 0.112 to 0.124 (2.85 to 3.15)

Maximum:

38 DGAS 4A and 7A ..... 0.177 to 0.216 (4.5 to 5.5)

38 DGAS 1A and 3A ..... 0.196 to 0.236 (5.0 to 6.0)

## Float level setting dimension

40 DFA and 40 DFAV types ..... 0.236 in (6.0 mm)

34 DGAS and 38 DGAS types (brass float) ..... 1.57 in (40.0 mm)

34 DGAS and 38 DGAS types (plastic float) ..... 1.35 in (34.3 mm)

in (mm)

0.029 to 0.031 (0.75 to 0.80)

0.026 to 0.028 (0.65 to 0.70)

0.025 to 0.027 (0.65 to 0.70)

0.027 to 0.029 (0.70 to 0.75)

0.029 to 0.031 (0.75 to 0.80)

0.080 to 0.100 (2.05 to 2.55)

0.080 to 0.100 (2.05 to 2.55)

0.100 to 0.120 (2.55 to 3.05)

0.100 to 0.120 (2.55 to 3.05)

in (mm)

0.112 to 0.124 (2.85 to 3.15)

0.177 to 0.216 (4.5 to 5.5)

0.196 to 0.236 (5.0 to 6.0)

Closed position	Open position	Stroke
0.236 in (6.0 mm)	0.551 in (14.0 mm)	0.315 in (8.0 mm)
1.57 in (40.0 mm)	1.968 in (50.0 mm)	0.393 in (10.0 mm)
1.35 in (34.3 mm)	1.744 in (44.3 mm)	0.393 in (10.0 mm)

## 1 Introduction

The carburettor types covered in this Chapter are of dual downdraught design. Each throttle valve is mounted on a separate shaft, but the shafts are linked by toothed sectors and their action is synchronised.

Semi-automatic choke controls are fitted to all carburettor types included in this Chapter.

The carburettor is normally fitted to the engine as a single unit, the most common arrangements being as follows:

- 1 One unit on a six-cylinder in-line engine, ie each barrel feeds three cylinders separately
- 2 One unit on a six-cylinder V-engine, ie each barrel feeds one bank of three cylinders

The carburettor identification mark is located on the lower flange outer surface.

## 2 Construction

The main body and cover of the carburettor types covered in this Chapter are of die cast aluminium construction and the mounting flange is machined flat for fitting purposes. The cover incorporates a mounting flange for the air cleaner assembly and is equipped with four mounting studs.

The throttle valves are of brass and the throttle shafts are of steel. The throttle shafts run on Teflon (PTFE) bearings mounted in the main body. The choke valves are cadmium plated steel and the choke shaft is of steel on DGAS types and brass on DFA and DFAV types.

All fuel and air jets are of brass construction and are screwed into the main body. The emulsion tubes are also constructed of brass.

Internal channels of the main body and cover are mostly drilled and are sealed with lead plugs where necessary.

The fuel float assemblies are of brass construction; DFA and DFAV types have a single float and DGAS types have two semi-floats.

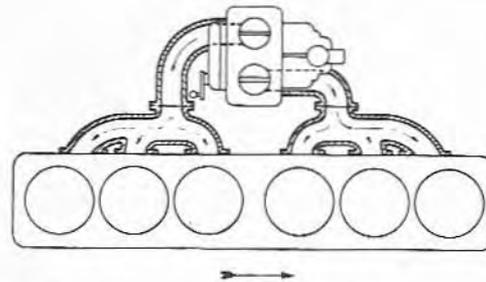


Fig. 9.1 Single carburettor fitted to a six-cylinder in-line engine (Sec 1)

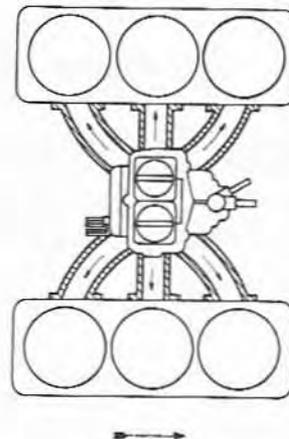


Fig. 9.2 Single carburettor fitted to a six-cylinder V-engine (Sec 1)

3 Operation

*Cold starting*

Refer to Fig. 9.3 and note that when the engine is cold and the throttle pedal has been depressed once, the bi-metallic spring (51) rotates the spindle (52) and closes the choke valves (55). At the same time the fast idle cam (59) prevents the throttle valves (12) from completely closing.

When the engine is cranked, a rich mixture is drawn from the nozzle (9) to facilitate starting. As soon as the engine fires, vacuum from below the throttle valve is relayed through the channel (53) to the diaphragm (47). The shaft (50) then moves and partially opens the choke valves (55) against the action of the bi-metallic spring (51). If the throttle is opened at this stage,

the vacuum will cease and the choke valves (55) will close, however the passage of air will open the choke valves against the action of the bi-metallic spring (51) due to the offset construction of the choke valves (55). On DGAS types, the action of the shaft (50) is modulated by an internal spring (49).

As the engine warms up, the bi-metallic spring (51) progressively opens and the choke valves (55), until at normal operating temperature they are held fully open. The fast idling screw (62) does not now rest on the fast idling cam (59) since the latter has been rotated by the bi-metallic spring and therefore the throttle valves (12) are free to return to the normal idling position.

*Idling and progression*

Refer to Fig. 9.4 and note that when the engine is idling, the

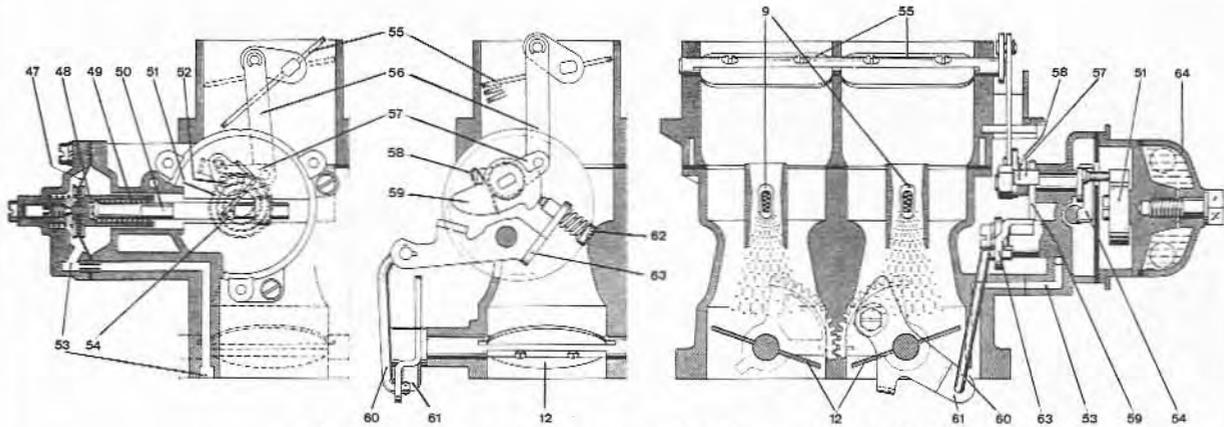


Fig. 9.3 Automatic choke operation (DGAS type shown) (Sec 3)

- |                    |                       |                 |                    |
|--------------------|-----------------------|-----------------|--------------------|
| 9 Nozzles          | 50 Rod                | 55 Choke valves | 60 Linkage         |
| 12 Throttle valves | 51 Bi-metallic spring | 56 Lever        | 61 Lever           |
| 47 Diaphragm       | 52 Shaft              | 57 Lever        | 62 Adjusting screw |
| 48 Bush            | 53 Channel            | 58 Spring       | 63 Lever           |
| 49 Modulating      | 54 Lever              | 59 Cam          | 64 Housing         |

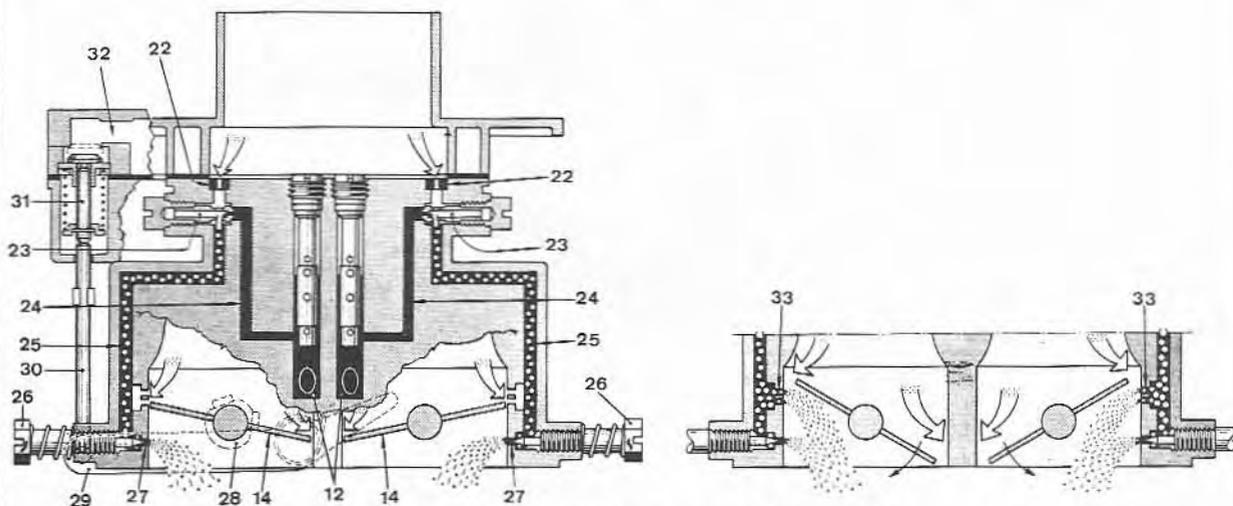
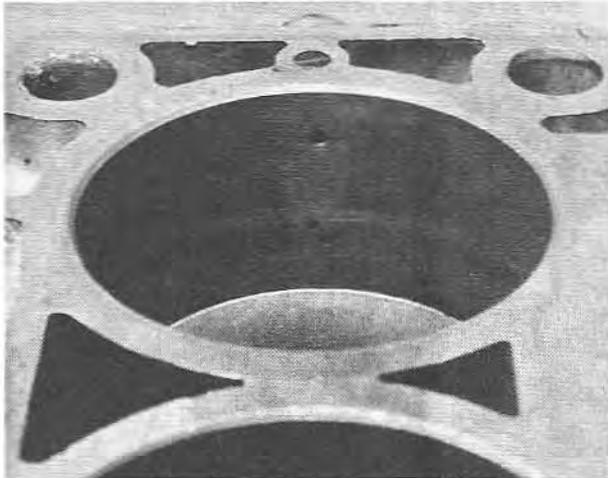


Fig. 9.4 Carburettor idling and progression phase (Sec 3)

- |                    |                      |                               |                           |
|--------------------|----------------------|-------------------------------|---------------------------|
| 12 Wells           | 24 Channel           | 28 Cam                        | valve                     |
| 14 Throttle valves | 25 Channel           | 29 Lever                      | 32 Channel                |
| 22 Calibrated hole | 26 Mixture screw     | 30 Rod                        | 33 Progression feed holes |
| 23 Idling jet      | 27 Idling feed holes | 31 Vent and air bleed control |                           |

throttle valves (14) are shut. Fuel is drawn from the float chamber through internal channels to the emulsion tube wells (12) and then passes along the channels (24) to the idling jets (23) where air is introduced through the calibrated bushes (22). The fuel and air is now an emulsion and continues through the channels (25), past the idling mixture control screws (26), through their idling feed holes (27) and into the carburettor throats at the engine side of the throttle valves (14) (photo). When the throttle valves (14) are opened slightly to increase the engine speed, the progression holes (33) are brought into action to provide extra fuel. Note that on DGAS types, three progression holes are provided in each barrel.

When the throttle valves (14) are sufficiently open, the



3.2 Location of the idling and progression holes (40 DFAV type)

idling and progression system ceases and the main fuel supply system operates.

DFAV types are provided with a float chamber vapour discharge valve (31) which prevents the build up of vapour within the float chamber. The valve is open when the throttle valves are fully shut or fully open and additionally controls the overfeed enrichment air bleed.

**Normal running**

Under full throttle and high speed cruise conditions, the main fuel supply circuit is brought into action. Refer to Fig. 9.5 and note that fuel from the float chamber (9) passes through the main jets (10) to the emulsion tube wells (12). Air is drawn through the air corrector jets (2), through the holes in the emulsion tubes (13) and emulsifies the fuel which is then drawn through the nozzles (18) and auxiliary venturis (17). The mixture then combines with the main air supply as it is drawn through the chokes (16) and into the engine.

At high engine speeds with the throttle valves (14) open, the overfeed enrichment circuit is brought into action (not 40 DFA types) and additional fuel is supplied through the calibrated tubes (1) via the calibrated bushes (4).

DGAS type carburetors are also equipped with a full power valve which operates immediately the throttle valves are opened quickly. Refer to Fig. 9.6 and note that under these conditions the vacuum through the channel (7) is insufficient to draw the diaphragm (4) against the spring (6). The operating rod (5) therefore opens the full power valve (17). The fuel level in the emulsion tube wells (14) immediately rises and the mixture drawn from the nozzle (9) is enriched. When the throttle valves (12) are partially open, the vacuum through the channel (7) overcomes the tension of the spring (6) and the full power valve shuts.

**Acceleration**

To provide the engine with a rich mixture when accelerating, the carburettor is provided with a diaphragm type acceleration pump which is operated by the primary throttle shaft but

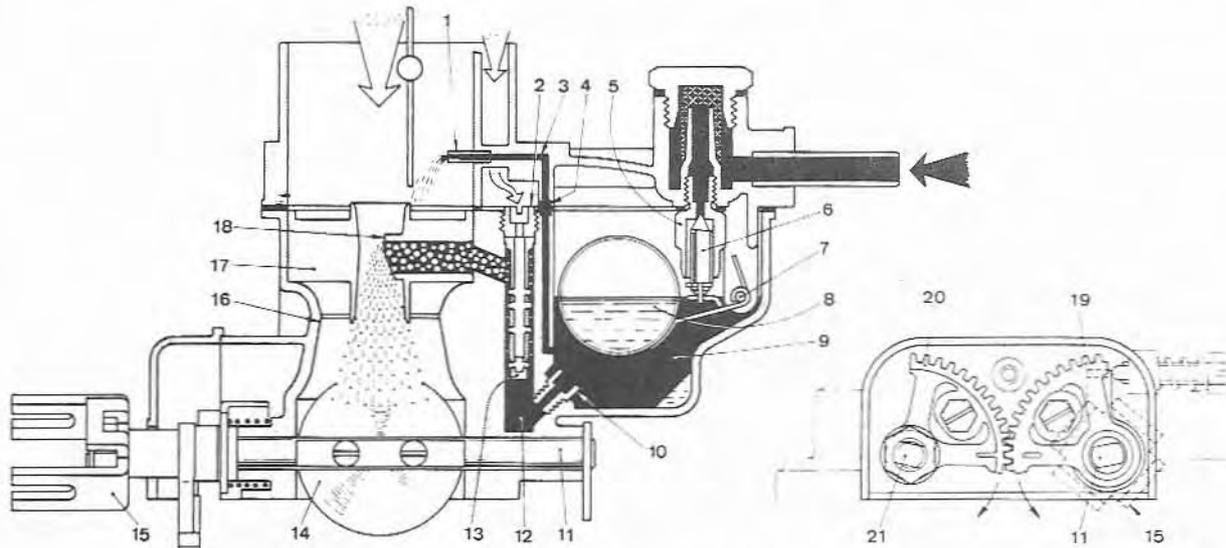


Fig. 9.5 Carburettor normal phase (DFAV types) (Sec 3)

- |                        |                   |                   |                      |
|------------------------|-------------------|-------------------|----------------------|
| 1 Enrichment tube      | 7 Fulcrum pin     | 12 Well           | 17 Auxiliary venturi |
| 2 Air corrector jet    | 8 Float           | 13 Emulsion tube  | 18 Nozzle            |
| 3 Channel              | 9 Float chamber   | 14 Throttle valve | 19 Primary sector    |
| 4 Calibrated bush      | 10 Main jet       | 15 Lever          | 20 Secondary sector  |
| 5 Needle valve seating | 11 Throttle shaft | 16 Choke          | 21 Throttle shaft    |
| 6 Needle               |                   |                   |                      |



remove the air cleaner together with the reinforcement plate and gasket.

5 Partially drain the cooling system and disconnect the two water hoses.

6 Disconnect the fuel supply pipe and return pipe (where fitted) and release the vent tube from the top of the float chamber.

7 Release the distributor automatic advance pipe from the side of the carburettor.

8 Disconnect the throttle control shaft from the throttle lever.

9 Disconnect the crankcase ventilation pipe from the heat insulator spacer, if fitted.

10 Unscrew and remove the carburettor mounting nuts then withdraw the unit over the mounting studs.

11 Remove the inlet manifold gasket and spacer (if fitted) and clean all traces of gasket from the inlet manifold and carburettor flange.

12 Protect the inlet manifold from ingress of foreign matter by sealing it with masking tape.

13 Refitting is a reversal of removal, but the following additional points should be noted:

(a) Always fit new gaskets and tighten the mounting nuts in diagonal sequence

(b) Note that on some fittings the lower gasket has two metal V-notches which must locate within the inlet manifold

(c) Refill the cooling system in accordance with the manufacturer's instructions

(d) The idling adjustment screws should be set as described in Sections 8 and 9 and finally tuned as described in Section 10

#### 5 Disassembly (40 DFA and 40 DFAV types)

1 Thoroughly clean the carburettor exterior and wipe dry.

2 Referring to Fig. 9.8, unscrew and remove the fuel filter inspection plug (4) and extract the filter (5) (photo).

3 Disconnect the choke plate operating rod (16) from the lever (39) by removing the split pin (15).

4 Unscrew and remove the carburettor cover retaining screws (3) together with the spring washers, then carefully lift the cover (1) from the main body (photo).

5 Invert the carburettor cover (1) so that the float assembly is uppermost, then extract the float fulcrum pin (14) and withdraw the float assembly (13) together with the needle of the needle valve (12). If necessary, use a suitable diameter pin punch to tap the pin from the two posts, but on no account prise the slotted post apart (photo).

6 Unhook the needle from the float assembly (13).

7 Lift the gasket (9) from the cover (1).

8 On 40 DFAV types only, unscrew and remove the vent and power valve (92) from the cover (1) (photo).

9 Unscrew and remove the needle valve (12) seating and

remove the gasket (11) (photo).

10 Unscrew the two main jets (17) and remove them from the bottom of the float chamber in the main body (photos).

11 Unscrew the idling jet holders (83) from each side of the carburettor body, then separate the idling jets (84) from their holders (photos).

12 Unscrew and remove the air corrector jets (88) from the carburettor body (photos).

13 Invert the body and extract the emulsion tubes (89). If these are tight due to overtightening of the air corrector jets, use a selftapping screw to remove them but take care not to damage the tubes (photos).

14 Unscrew and remove the idling adjusting screws (81) and springs (82) from the body.

15 Unscrew and remove the throttle idling adjustment screw (28) and spring (27).

16 Unscrew the accelerator pump delivery valve (87) and remove it together with the pump jet (86) and gasket (85), then separate the gasket and jet from the valve (photos).

17 Unscrew and remove the accelerator pump discharge blanking plug (18) (photo).

18 Unscrew the four screws (26) and withdraw the accelerator cover (25) together with the diaphragm (24) and spring (23). If necessary, peel the diaphragm assembly (24) from the cover (25) (photos).

19 Working on the carburettor cover (1), extract the split pin (15) and detach the operating rod (16) from the choke spindle arm.

20 Pull the rod (16) through the seal (10), then prise the plug (101) and seal (10) from the cover (1) (photo).

21 Note the location of each choke valve (7) and if necessary, mark them with a pencil.

22 Unscrew the retaining screws (6) and remove the choke valves (7) from the shaft (8), then remove the shaft (8) from the cover (1).

23 Working on the carburettor body, unscrew the automatic choke water housing retaining bolt (58) and remove it together with the gasket (57).

24 Remove the cover (56) and gasket (54); cut the gasket from the thermostat assembly (53) if it is stuck.

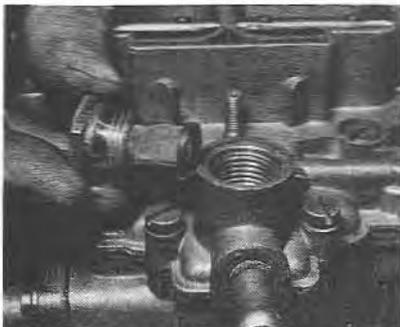
25 Unscrew and remove the retaining screws (59) and lift the automatic choke thermostat assembly (53) from the body (47), then remove the retaining ring (55) (photo).

26 Remove the disc gasket (52), then unscrew and remove the three retaining screws (51) and spring washers. Withdraw the automatic choke body (47) at the same time disengage the fast idling control rod (61) from the throttle lever (71) by extracting the split pin (60) (photos).

27 Disconnect the rod (61) from the fast idle lever (29) by extracting the split pin (60), if fitted.

28 Note the location of the individual components on the automatic choke body (47) before dismantling them.

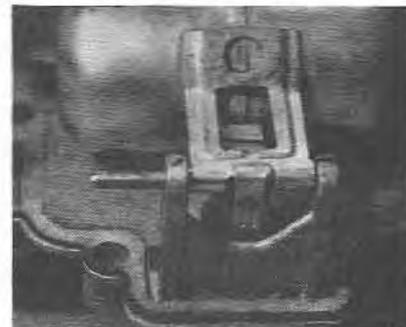
29 Prise the O-ring seal (35) from the side of the carburettor (photo).



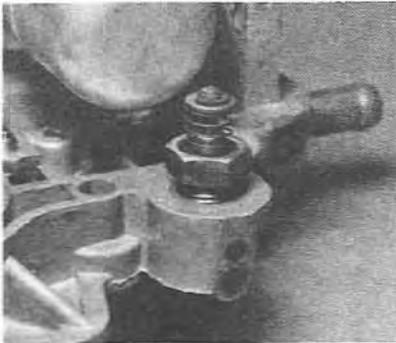
5.2 Removing the fuel filter (DFAV type)



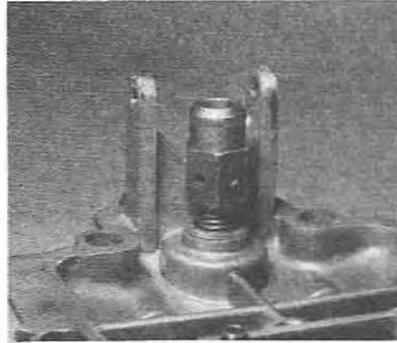
5.4 Removing the carburettor cover (DFAV type)



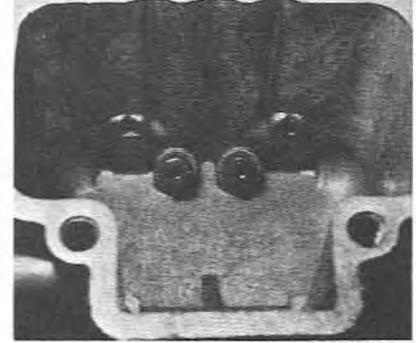
5.5 Withdrawing the float fulcrum pin (DFAV type)



5.8 Location of the vent and air bleed valve (DFAV type)



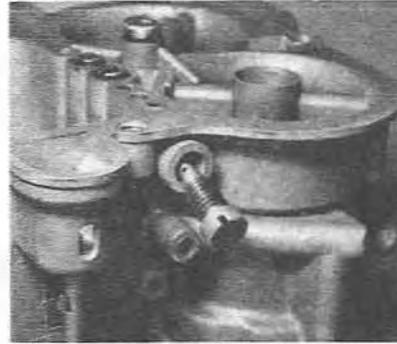
5.9 Removing the needle valve seat (DFAV type)



5.10a Location of the main jets (DFAV type)



5.10b Location of the main jet size (DFAV type)



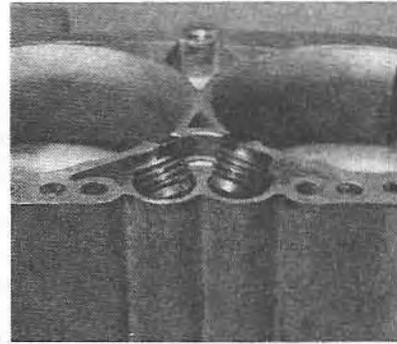
5.11a Removing the idling jets (DFAV type)



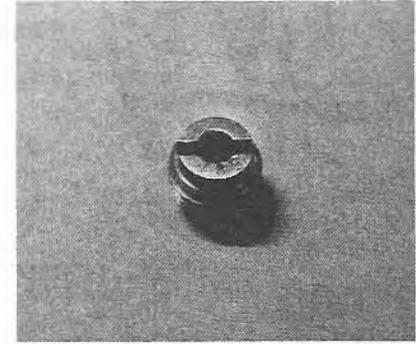
5.11b Idling jet and holder (DFAV type)



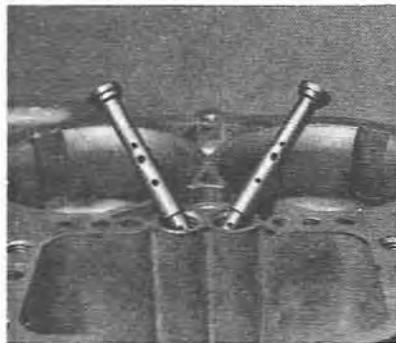
5.11c Idling jet size location (DFAV type)



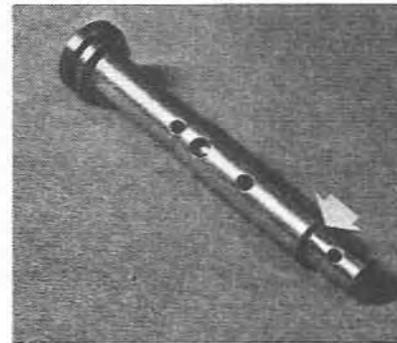
5.12a Removing the air connector jets (DFAV type)



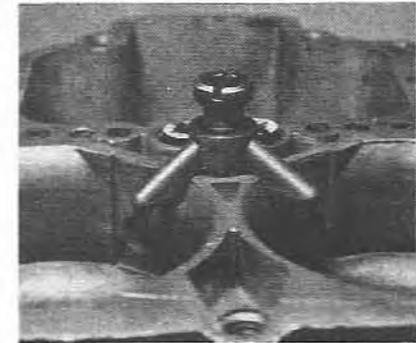
5.12b Air corrector jet size location (DFAV type)



5.13a Removing the emulsion tubes (DFAV type)



5.13b Emulsion tube size location (DFAV type)



5.16a Removing the accelerator pump delivery valve (DFAV type)

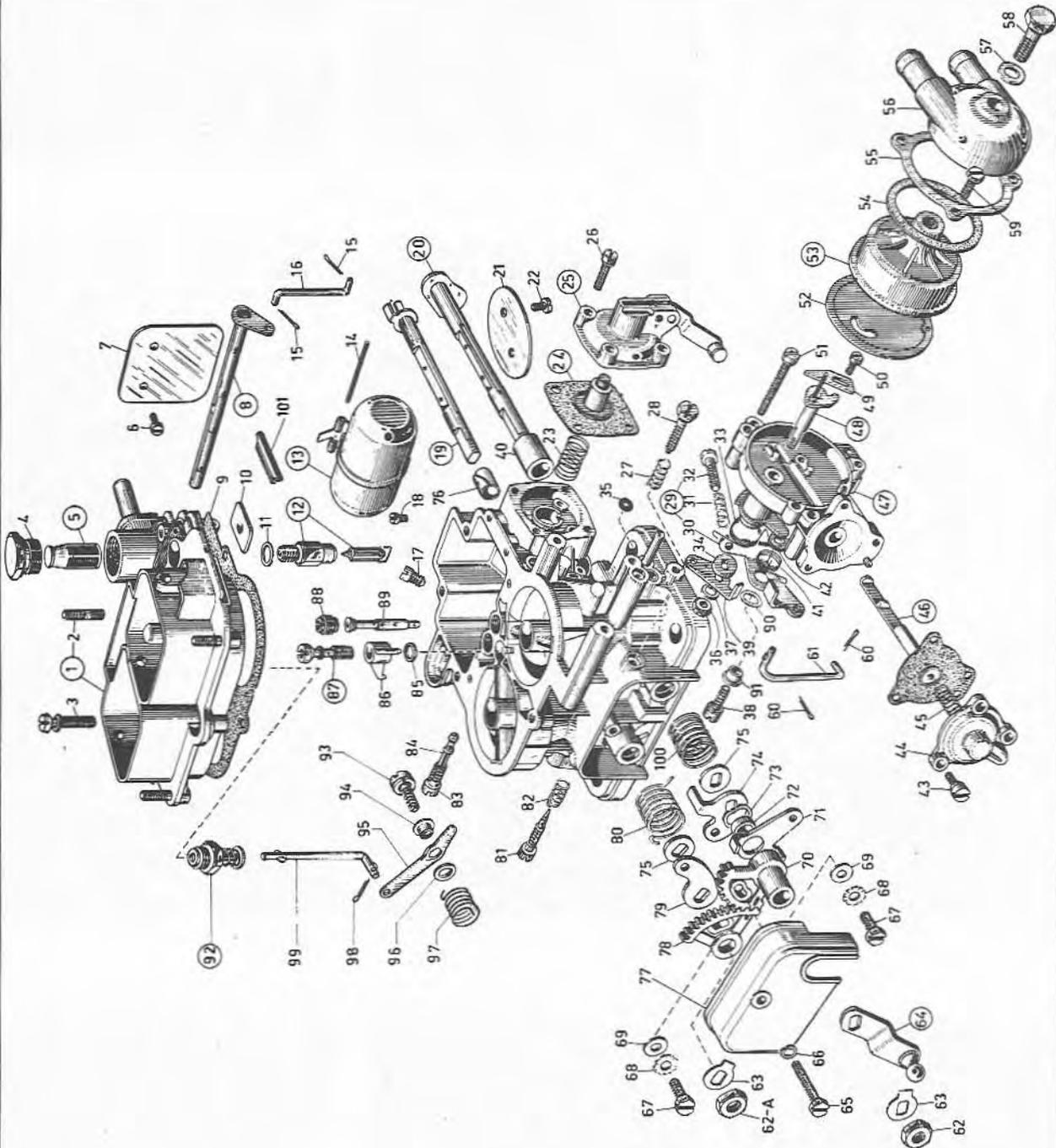
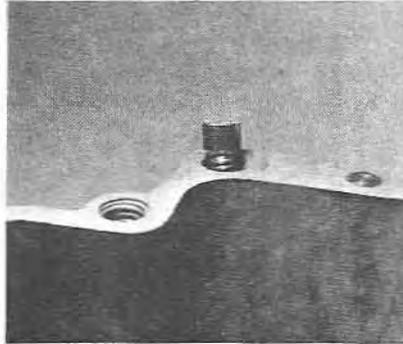


Fig. 9.8 Exploded view of the 40 DFAV carburettor (typical) (Sec 5)

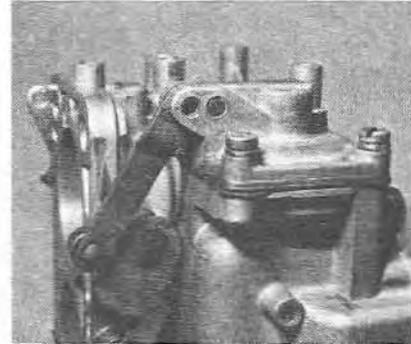
1 Carburettor cover assembly	27 Idling adjusting screw spring	51 Auto-choke body to throttle body screw and washer	76 Throttle shaft bearing
2 Carburettor to air cleaner stud	28 Idling adjustment screw	52 Auto-choke body gasket	77 Geared sectors cover
3 Cover screw and washer	29 Fast idling adjusting lever assy	53 Auto-choke thermostat assy	78 Geared sector (left-hand)
4 Strainer inspection plug	30 Lever	54 Water chamber to thermostat assy	79 Geared sector adjusting lever
5 Fuel inlet strainer assy	31 Spring	55 Locking ring	80 Throttle control return spring (left-hand)
6 Choke plate screw	32 Screw	56 Water chamber	81 Idle adjustment needle screw
7 Choke plate	33 Auto-choke shaft spring	57 Washer	82 Spring
8 Choke shaft and lever assy	34 Auto-choke shaft spacer	58 Bolt	83 Idling jet holder
9 Cover to throttle body gasket	35 Auto-choke body O-ring seal	59 Screw	84 Idle jet
10 Air cleaner dust seal	36 Auto-choke lever fixing nut	60 Fast idle rod split pin	85 Nozzle bar gasket
11 Fuel intake valve gasket	37 Spring washer	61 Fast idle rod	86 Accelerator pump jet
12 Fuel inlet needle valve assy	38 Fast idle lever pivot screw and washer	62 Throttle shaft nut	87 Accelerator pump valve assy
13 Float assy	39 Auto-choke lever	63 Lockwasher	88 Air corrector jet
14 Float lever shaft	40 Right-hand shaft spacer	64 Throttle lever	89 Emulsion tube
15 Auto-choke control rod split pin	41 Fast idle lever spring	65 Geared sector cover screw	90 Auto-choke wave washer
16 Auto-choke operating rod	42 Fast idle lever washer	66 Spring washer	91 Fast idling adjusting lever bush
17 Main jet	43 Auto-choke cover screw and washer	67 Geared sector adjusting screw	92 Power valve
18 Accelerator plug discharge plug	44 Auto-choke cover	68 External tooth washer	93 Lever fixing screw
19 Throttle left-hand shaft	45 Auto-choke vacuum diaphragm spring	69 Washer	94 Bushing
20 Throttle right-hand shaft assy	46 Auto-choke vacuum diaphragm and shaft assy	70 Geared sector (right-hand)	95 Valve control lever
21 Throttle plate	47 Auto-choke body assy	71 Fast idling lever	96 Washer
22 Throttle plate screw	48 Auto-choke shaft and lever assy	72 Throttle shaft bushing	97 Spring
23 Accelerator pump self-loading spring	49 Auto-choke shaft adjusting plate	73 Wave washer	98 Split pin
24 Accelerator pump diaphragm assy	50 Screw	74 Full throttle stop lever	99 Valve control rod
25 Accelerator pump cover assy		75 Washer	100 Return spring (right shaft)
26 Accelerator pump cover screw and washer			101 Dust seal plug



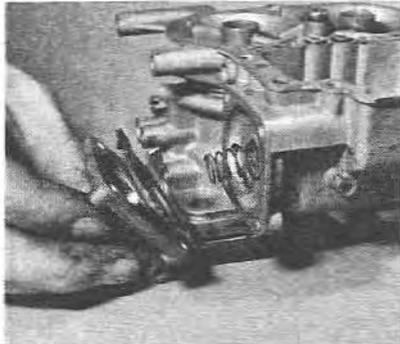
5.16b Accelerator pump jet size location (DFAV type)



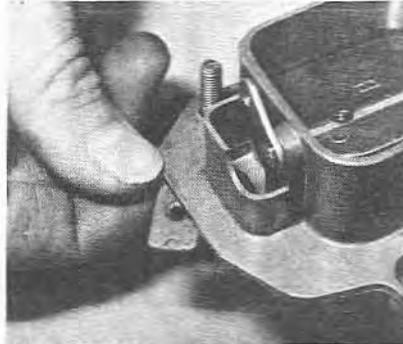
5.17 Removing the accelerator pump discharge plug (DFAV type)



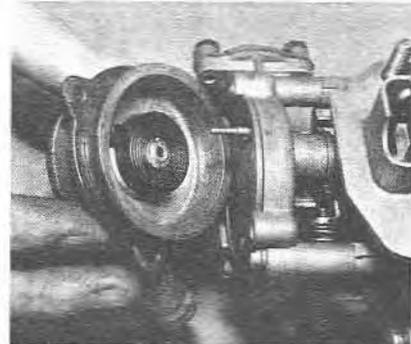
5.18a Accelerator pump location (DFAV type)



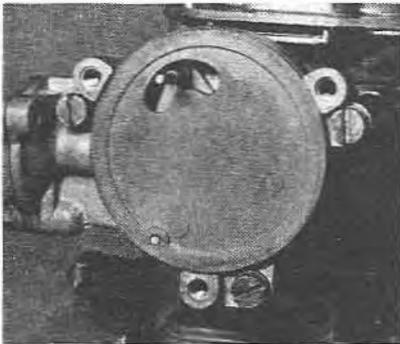
5.18b Removing the accelerator pump cover (DFAV type)



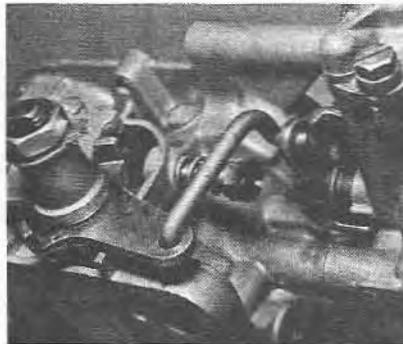
5.20 Removing the cover dust seal (DFAV type)



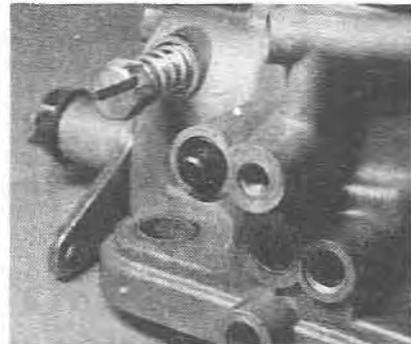
5.25 Withdrawing the thermostat housing (DFAV type)



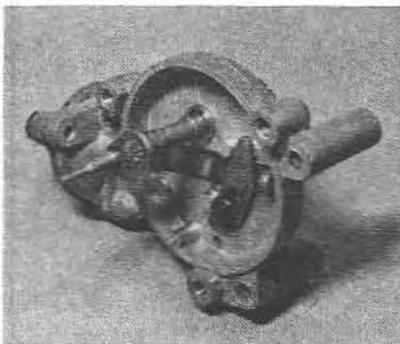
5.26a Insulation gasket location (DFAV type)



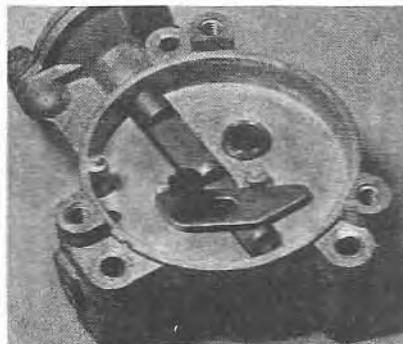
5.26b Location of the fast idling control rod (DFAV type)



5.29 Automatic choke O-ring seal location (DFAV type)



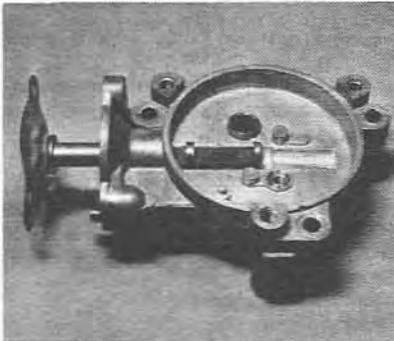
5.33 Removing the automatic choke shaft (DFAV type)



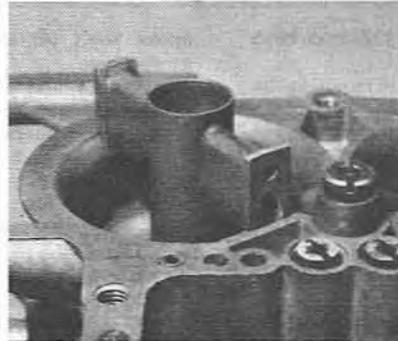
5.34 Removing the stop plate (DFAV type)



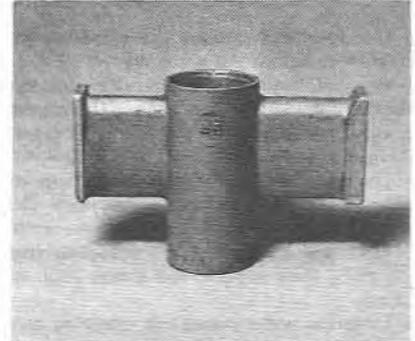
5.35 Removing the diaphragm cover (DFAV type)



5.36 Withdrawing the diaphragm rod (DFAV type)



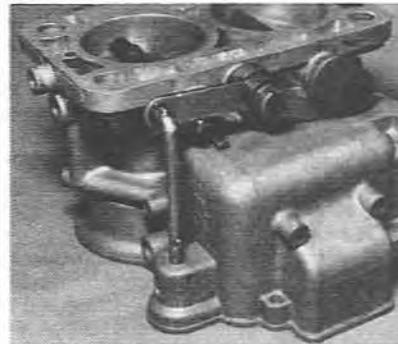
5.39a Removing the auxiliary venturi (DFAV type)



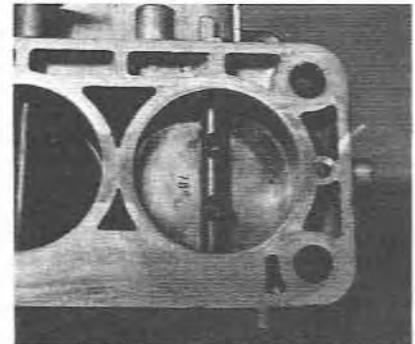
5.39b Auxiliary venturi size location (DFAV type)



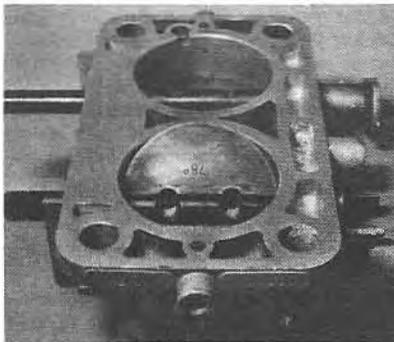
Fig. 9.9 Tool for holding throttle shaft (DFA and DFAV types) (Sec 5)



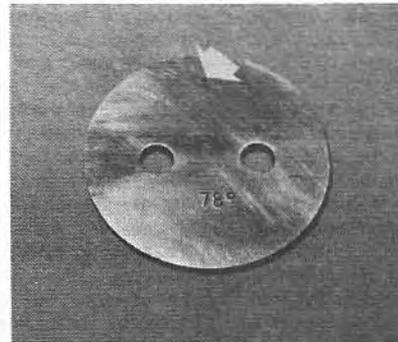
5.46 Vent valve operating arm location (DFAV type)



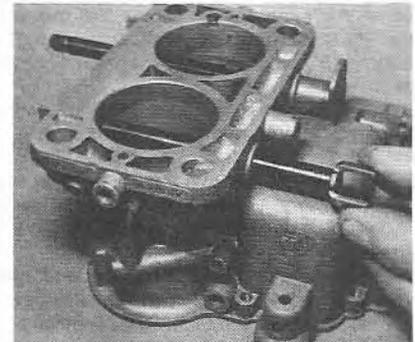
5.48 Throttle valve retaining screw location (DFAV type)



5.49a Removing a throttle valve (DFAV type)



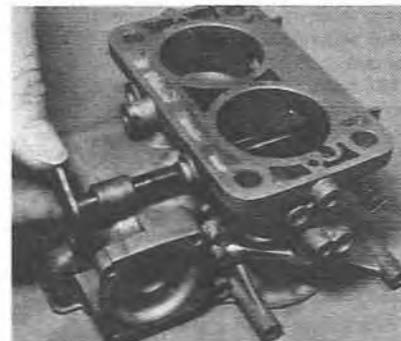
5.49b Throttle valve showing the idle bleed hole (DFAV type) (arrowed)



5.50a Removing a throttle shaft (DFAV type)



5.50b Removing a Teflon bush (DFAV type)



5.51 Removing the primary throttle shaft (DFAV type)

30 Unscrew and remove the retaining screw (38) and bush (91) then withdraw the wave washer (90).

31 Remove the fast idle lever (29) and spring (41) noting the position of the latter, then remove the washer (42).

32 Unscrew and remove the adjusting screw (32) and spring (31) from the lever (30).

33 Unscrew and remove the retaining nut (36) and spring washer (37), then withdraw the lever (39), spring (33) and spacer (34). The shaft (48) can now be removed (photo).

34 Mark the location of the adjusting stop plate (49) on the body (47), then remove the screw (50) and lift the plate out (photo).

35 Unscrew and remove the retaining screws (43) lift off the cover (44) and spring (45) (photo).

36 Carefully release the thin diaphragm, then withdraw the operating rod (46) from the body (47) (photo).

37 Unscrew and remove the starting duct inspection plug from the bottom of the body (47).

38 The automatic choke body is supplied complete with the fast idle cam and it is therefore not necessary to dismantle this item. However if a second-hand part is being fitted, the cam and bush may be driven out of the body using a suitable diameter metal drift.

39 Mark the position and location of the auxiliary venturis, then remove them from the carburettor barrels. If they are tight, open the throttle valves and use a plastic or wooden rod to tap them out. Failure of this method to remove the auxiliary venturis will necessitate obtaining Weber tool no 9610 150 0035 (photos).

40 Unscrew and remove the retaining screw (65) and spring washer (66) then withdraw the cover (77).

41 Invert the carburettor body, then bend back the tab washers (63).

42 Unscrew and remove the nuts (62 and 62A) from the ends of each throttle shaft. If they are tight, Weber tool no 9610 315 1201 should be used to hold the shaft stationary, otherwise the shaft could be buckled.

43 From the throttle shaft (20) located at the automatic choke side of the carburettor, remove the tab washer (63), throttle lever (64), toothed sector (70), lever (71), bush (72), wave washer (73), stop lever (74), spacer (75) and spring (100), if fitted.

44 From the throttle shaft (19) located furthest from the automatic choke mounting, remove the tab washer (63), toothed sector (78), lever (79), spacer (75) and spring (80).

45 Unscrew and remove the adjustment screws (67) from the toothed sectors, together with the lock washers (68) and plain washers (69), in order to separate the levers from the toothed sectors.

46 On DFAV types only, unscrew and remove the retaining screw (93) and withdraw the vent valve operating arm (95) and rod (99). Remove the bush (94), washer (96) and spring (97), then separate the rod from the arm by extracting the split pin (98) (photo).

47 Close each throttle valve in turn and mark the valves (21) with a pencil so that they can be refitted in their original positions.

48 Unscrew and remove the retaining screws (22) (photo).

49 Fully open the throttles and remove the valves (21) from the shafts (19 and 20) (photos).

50 Remove the shaft (19) from the carburettor body, then extract the Teflon bushes and mark them relative to their locations (photos).

51 Remove the shaft (20) from the carburettor body, withdraw the spacer (40), then extract the Teflon bushes and again mark them relative to their locations (photo).

#### 6 Disassembly (34 DGAS and 38 DGAS types)

1 Thoroughly clean the carburettor exterior and wipe dry.

2 Referring to Fig. 9.10, unscrew and remove the fuel filter inspection plug (11) and extract the filter (10).

3 Disconnect the choke plate operating lever (37) from the

choke shaft (4) after prising out the C-clip with a small screwdriver.

4 Unscrew and remove the carburettor cover retaining screws (3) together with the spring washers, then carefully lift the cover (1) from the main body (86) (photo).

5 Invert the carburettor cover (1) so that the float assembly (15) is uppermost, then extract the float fulcrum pin (90) and withdraw the float assembly (15) together with the needle of the needle valve (14). If necessary, use a suitable diameter pin punch to tap the pin from the two posts, but on no account prise the slotted post apart (photo).

6 Unhook the needle from the float assembly (15).

7 Lift the gasket (12) from the cover (1).

8 Unscrew and remove the retaining screws (91) and spring washers (92) and lift the power valve assembly (93) from the cover (1), taking care not to damage the diaphragm (photo).

9 Using a 10 mm socket or ring spanner, unscrew and remove the needle valve (14) seating and remove the gasket (13) (photo).

10 Unscrew the two main jets (19) and remove them from the bottom of the float chamber in the main body (photo).

11 Unscrew the idling jet holders (36) from each side of the carburettor body, then separate the idling jets (34) from their holders and remove the gaskets (35) (photos).

12 Unscrew and remove the air corrector jets (94) from the carburettor body (photo).

13 Invert the body and extract the emulsion tubes (89). If these are tight due to overtightening of the air corrector jets, use a selftapping screw to remove them but take care not to damage the tubes (photos).

14 Unscrew and remove the idling mixture adjusting screws (87) and springs (88) from the body (photo).

15 Unscrew and remove the throttle idling adjustment screw (73) and spring (74).

16 Unscrew and remove the full power valve (18) and gasket (17) from the bottom of the float chamber (photo).

17 Unscrew the accelerator pump delivery valve (97) and remove it together with the pump jet (96) and gaskets (95), then separate the gaskets and jet from the valve (photo).

18 Unscrew and remove the accelerator pump discharge blanking needle (16) (photo).

19 Unscrew the four screws (31) and withdraw the accelerator pump cover (41) together with the diaphragm (32) and spring (33). If necessary, peel the diaphragm assembly (32) from the cover (41) (photos).

20 Working on the carburettor cover (1), prise out the plug (8) and seal (7) using a screwdriver.

21 Note the location of each choke valve (5) and if necessary, mark them with a pencil.

22 Unscrew and remove the retaining screws (9), then withdraw the choke valves (5) from the shaft (4); the shaft (4) can now be removed from the cover (1).

23 Working on the carburettor body, unscrew the automatic choke water housing retaining bolt (46) and remove it together with the gasket (45) (photo).

24 Remove the cover (47) and gasket (48). Cut the gasket from the thermostat assembly (50) if it is stuck.

25 Unscrew and remove the retaining screws (44) and lift the automatic choke thermostat assembly (50) from the body (53), then remove the retaining ring (49) (photo).

26 Remove the disc gasket (51), then unscrew and remove the three retaining screws (42) and spring washers. Withdraw the automatic choke body (53), at the same time disengage the fast idling control rod (61) from the lever (64) (photo).

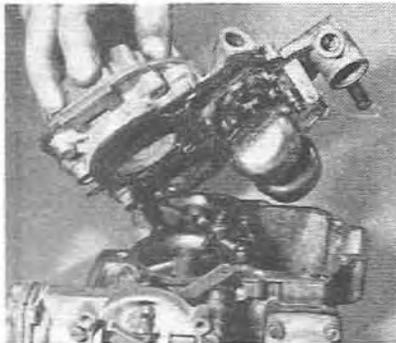
27 Disconnect the rod (61) from the fast idle lever (75) by extracting the split pin (60) (photo).

28 Note the location of the individual components of the automatic choke before dismantling them.

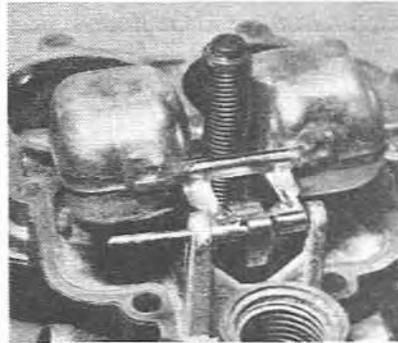
29 Prise the O-ring seal (69) from the side of the carburettor (photo).

30 Unscrew and remove the retaining screw (72) together with the lever (63) and washers (photo).

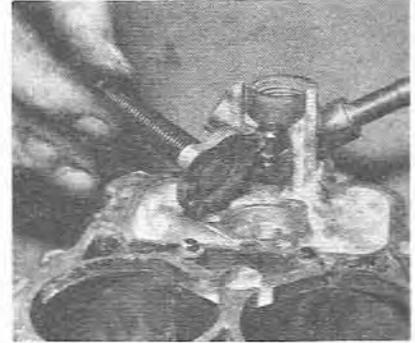
31 Separate the washer (62), lever (63), wave washer (70) and



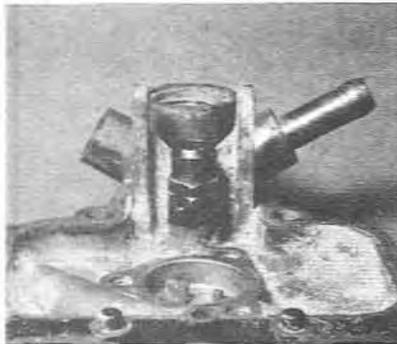
6.4 Removing the carburettor cover (DGAS type)



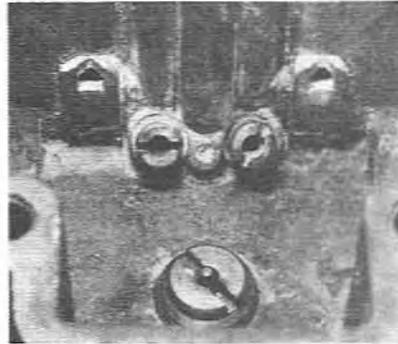
6.5 Withdrawing the float fulcrum pin (DGAS type)



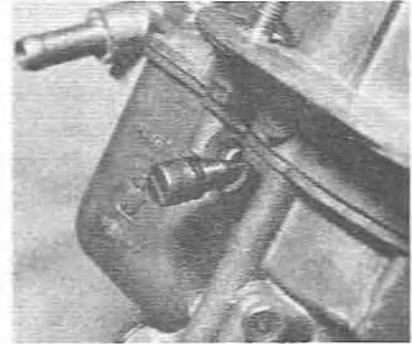
6.8 Removing the full power valve assembly (DGAS type)



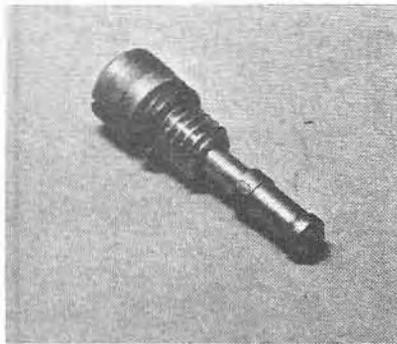
6.9 Needle valve seating (DGAS type)



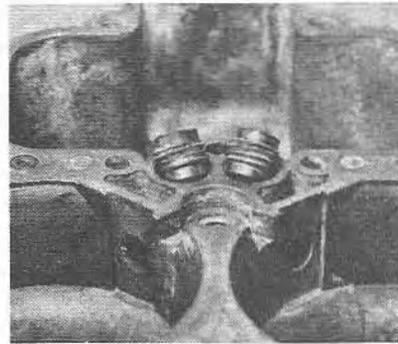
6.10 Main jet location (DGAS type)



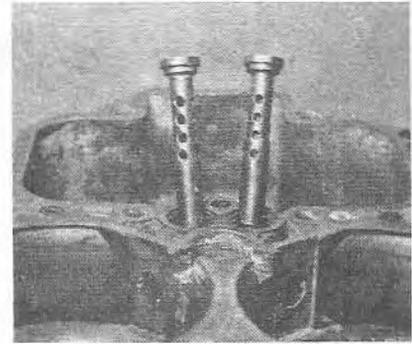
6.11a Removing an idling jet (DGAS type)



6.11b Idling jet and holder (DGAS type)



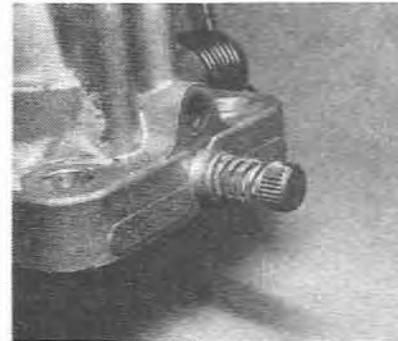
6.12 Removing the air corrector jets (DGAS type)



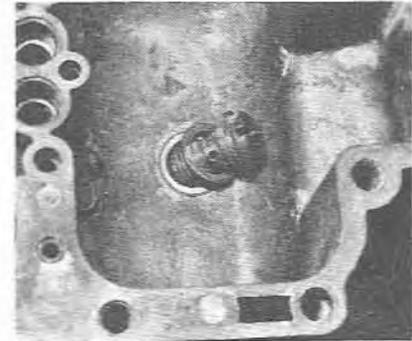
6.13a Removing the emulsion tubes (DGAS type)



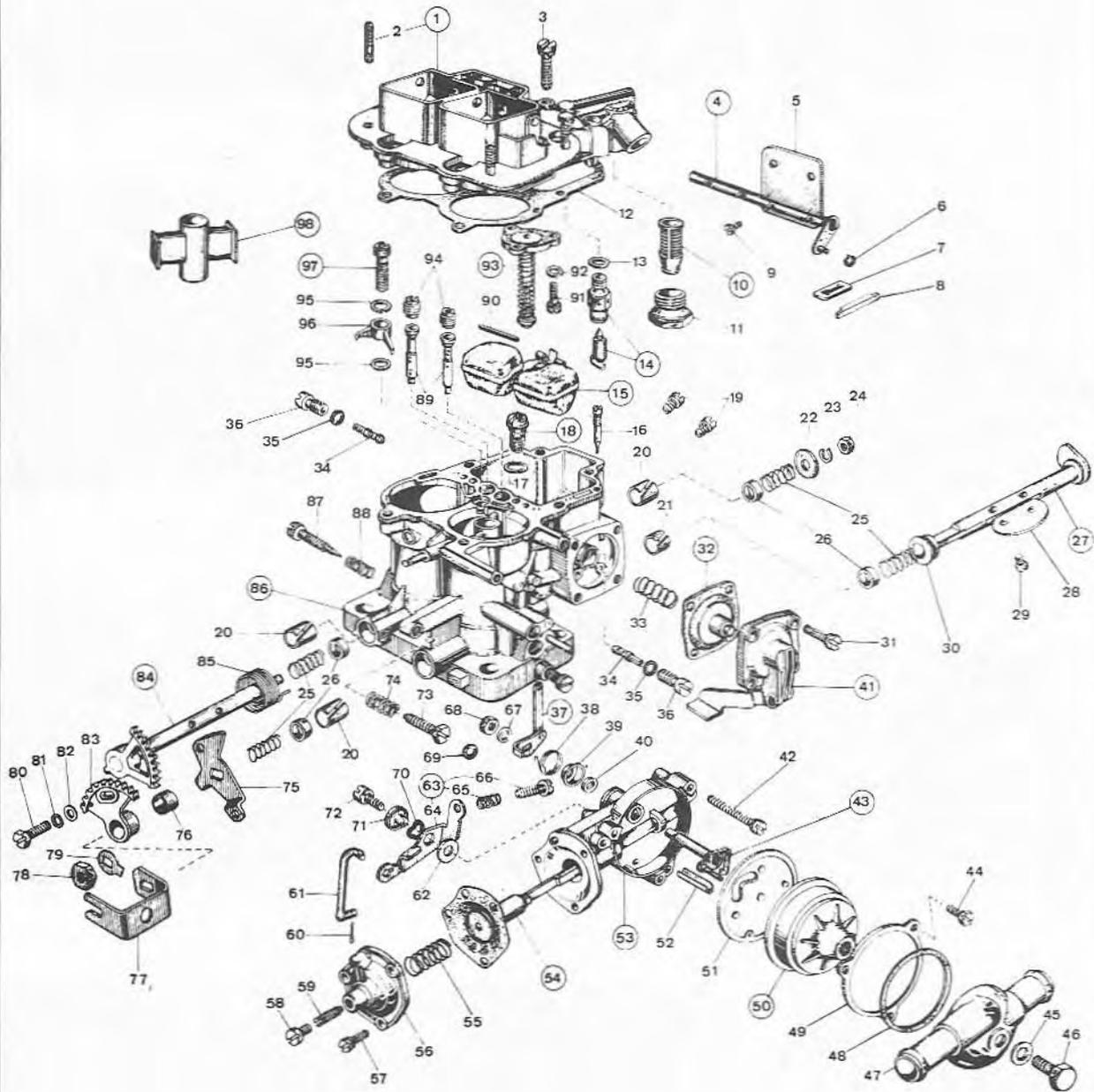
6.13b The emulsion tube (DGAS type)

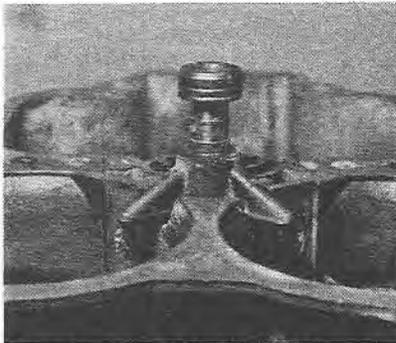


6.14 Location of an idling mixture adjusting screw (DGAS type)

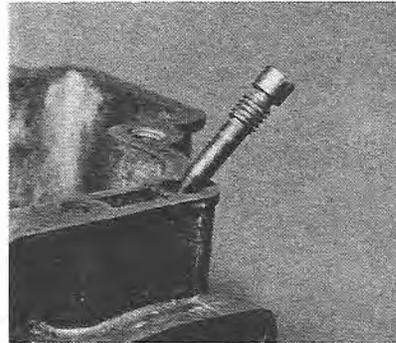


6.16 Removing the full power valve (DGAS type)

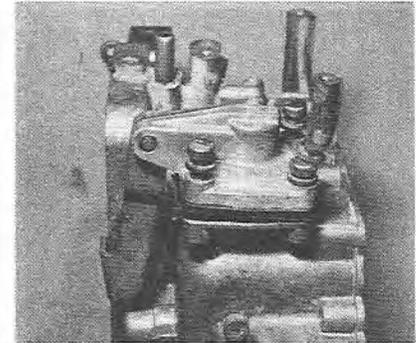




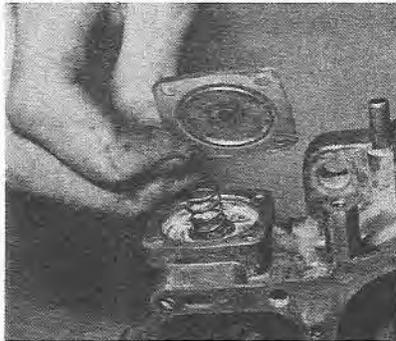
6.17 Removing the accelerator pump delivery valve (DGAS type)



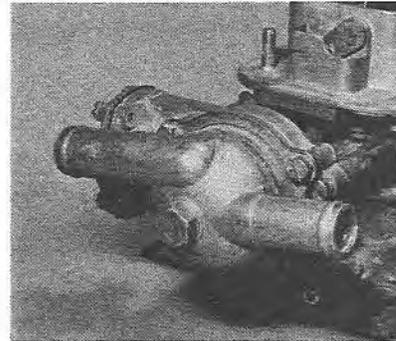
6.18 Removing the discharge blanking needle (DGAS type)



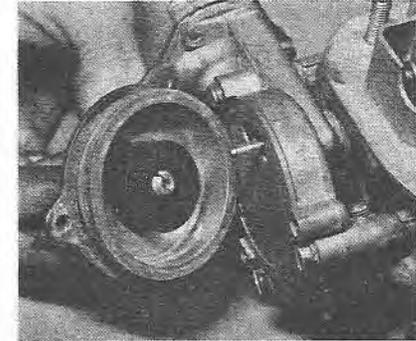
6.19a Acceleration pump cover location (DGAS type)



6.19b Removing the accelerator pump cover (DGAS type)



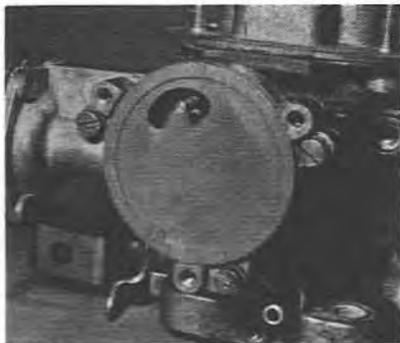
6.23 Automatic choke cover location (DGAS type)



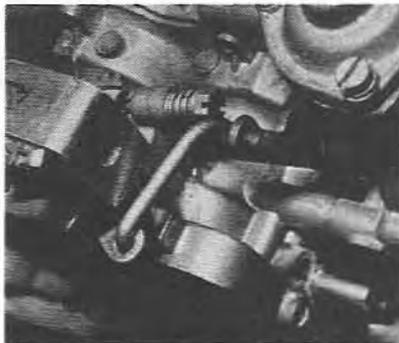
6.25 Removing the thermostat assembly (DGAS type)

Fig. 9.10 Exploded view of the 38 DGAS carburettor (typical) (Sec 6)

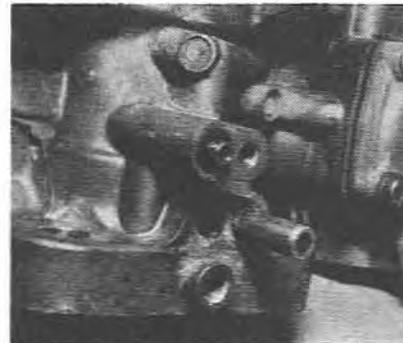
- |                                    |                                      |                                         |
|------------------------------------|--------------------------------------|-----------------------------------------|
| 1 Carburettor cover assy           | 34 Idling jet                        | 67 Spring washer                        |
| 2 Stud                             | 35 Gasket for idling jet holder      | 68 Throttle shaft fixing nut            |
| 3 Carburettor cover fixing screw   | 36 Idling jet holder                 | 69 Auto-choke O-ring seal               |
| 4 Choke shaft and lever assy       | 37 Choke control lever assy          | 70 Washer for idle loose lever          |
| 5 Choke throttle valve             | 38 Spring for fast idle cam          | 71 Bushing for idle loose lever         |
| 6 Lock ring                        | 39 Spring retaining cover            | 72 Screw securing fast idle loose lever |
| 7 Dust seal plate                  | 40 Washer for shaft                  | 73 Throttles adjusting screw            |
| 8 Dust seal plug                   | 41 Accelerator pump cover assy       | 74 Spring for throttle adjusting screw  |
| 9 Choke plates fixing screw        | 42 Choke fixing screw                | 75 Toothed sector control lever         |
| 10 Strainer assy                   | 43 Auto-choke shaft and lever assy   | 76 Bushing for toothed sector           |
| 11 Strainer inspection plug        | 44 Screw for plate                   | 77 Throttle control lever               |
| 12 Carburettor cover gasket        | 45 Seal for water cover fixing screw | 78 Primary shaft fixing nut             |
| 13 Gasket for needle valve         | 46 Water cover fixing screw          | 79 Lockwasher                           |
| 14 Needle valve assy               | 47 Auto-choke water chamber          | 80 Toothed sector fixing screw          |
| 15 Float assy                      | 48 Water cover gasket                | 81 Wave washer                          |
| 16 Pump discharge blanking needle  | 49 Thermostat assy locking ring      | 82 Flat washer                          |
| 17 Gasket for power valve          | 50 Auto-choke thermostat assy        | 83 Primary toothed sector               |
| 19 Main jet                        | 51 Gasket for auto-choke body        | 84 Secondary main shaft assy            |
| 20 Plate for shafts                | 52 Plate for auto-choke shaft        | 85 Shaft return spring                  |
| 21 Plate for shafts                | 53 Auto-choke body assy              | 86 Carburettor body                     |
| 22 Washer for secondary shaft      | 54 Choke diaphragm assy              | 87 Idle adjusting screw                 |
| 23 Spring washer                   | 55 Spring for diaphragm              | 88 Spring for idle adjusting screw      |
| 24 Secondary shaft fixing nut      | 56 Auto-choke cover                  | 89 Emulsifying tube                     |
| 25 Bush retaining spring           | 57 Screw securing auto-choke cover   | 90 Float fixing pin                     |
| 26 Bushing for shafts              | 58 Plug                              | 91 Screw securing power valve           |
| 27 Primary main shaft assy         | 59 Diaphragm adjusting screw         | 92 Flat washer                          |
| 28 Throttle valve                  | 60 Pin for fast idle rod             | 93 Power valve assy                     |
| 29 Throttle valve fixing screw     | 61 Fast idling control rod           | 94 Air corrector jet                    |
| 30 Spacer                          | 62 Washer for fast idle loose lever  | 95 Pump jet gasket                      |
| 31 Screw securing pump cover       | 63 Fast idle loose lever assy        | 96 Pump jet                             |
| 32 Accelerator pump diaphragm assy | 64 Lever                             | 97 Pump delivery valve assy             |
| 33 Pump loading spring             | 65 Spring                            | 98 Auxiliary venturi                    |
|                                    | 66 Screw                             |                                         |



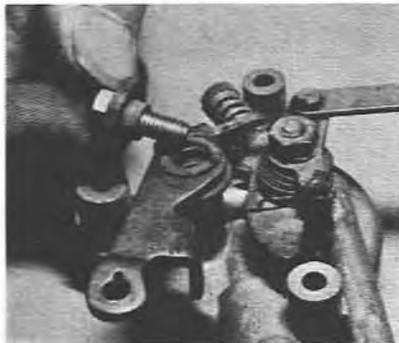
6.26 Insulation disc gasket location (DGAS type)



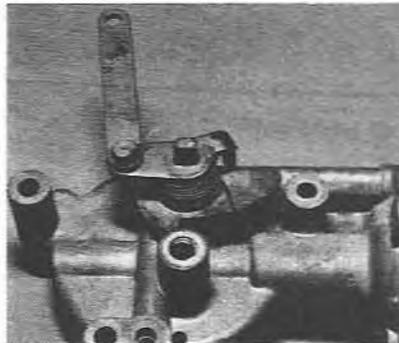
6.27 Location of the fast idle rod (DGAS type)



6.29 Automatic choke O-ring location (DGAS type)



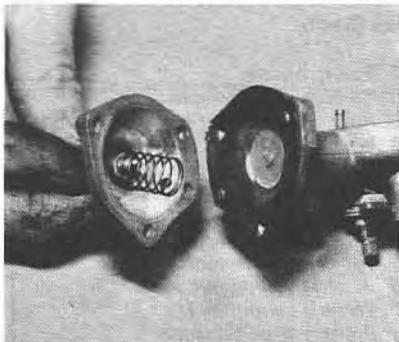
6.30 Removing the fast idle lever (DGAS type)



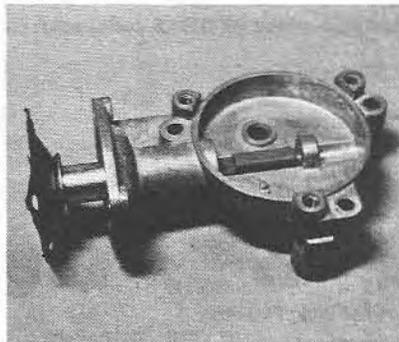
6.33a Removing the choke lever and spring (DGAS type)



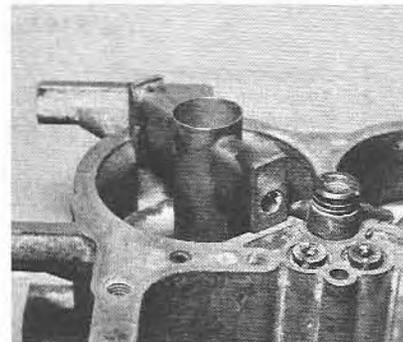
6.33b Removing the shaft cover (DGAS type)



6.34 Removing the diaphragm cover and spring (DGAS type)



6.35 Removing the operating rod (DGAS type)



6.38 Removing the auxiliary venturi (DGAS type)

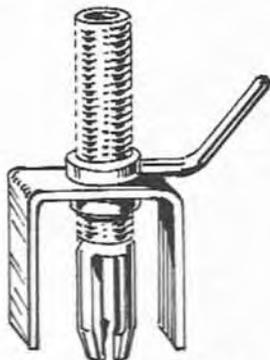
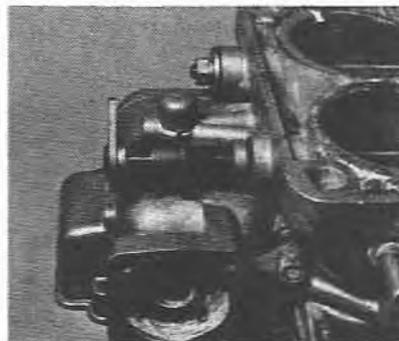
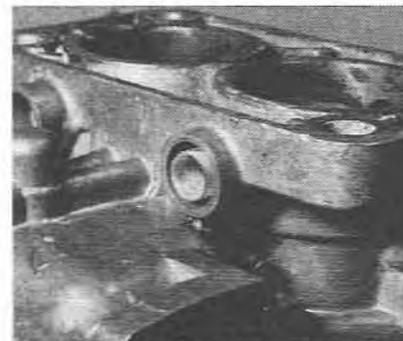


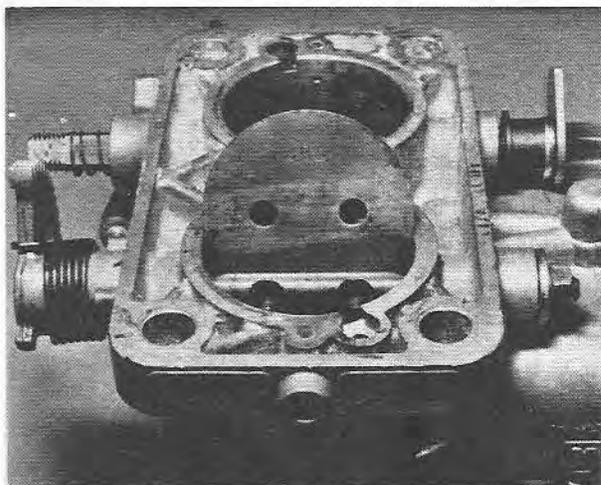
Fig. 9.11 Tool for removing the auxiliary venturis (Sec 6)



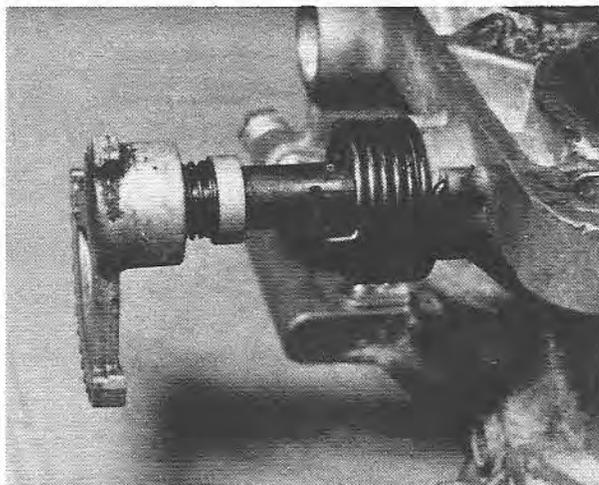
6.44 Withdrawing the primary throttle shaft (DGAS type)



6.45 Location of the Teflon bushes (DGAS type)



6.47 Removing a throttle valve (DGAS type)



6.50 Removing the secondary throttle shaft (DGAS type)

bush (71) from the screw (72).

32 Unscrew and remove the adjusting screw (66) and spring (65) from the lever (64).

33 Unscrew and remove the retaining nut (68) and spring washer (67), then withdraw the lever (37), spring (38), cover (39) and spacer (40). The shaft (43) can now be removed and the bearing (52) extracted from the body (53) (photos).

34 Unscrew and remove the retaining screws (57) and lift off the cover (56) and spring (55) (photo).

35 Carefully release the thin diaphragm, then withdraw the operating rod (54) from the body (53) (photo).

36 Unscrew and remove the plug (58) and adjusting screw (59) from the cover (56), noting the position of the screw.

37 The automatic choke body is supplied complete with the fast idle cam and it is therefore not necessary to dismantle this item. However if a second-hand part is being fitted, the cam, bush and spacer may be prised from the body using a wide blade screwdriver.

38 Mark the position and location of the auxiliary venturis (98) then remove them from the carburettor barrels (photo). If they are tight, open the throttle valves and use a plastic or wooden rod to tap them out. Failure of this method to remove the auxiliary venturis will necessitate obtaining Weber tool no 9610 150 0035.

39 Invert the carburettor body then bend back the tab washer (79).

40 Unscrew the nut (78). Provided that the lug on the fast idle lever (75) is intact, no harm can be done to the throttle valves or shaft; however if the lug is broken, the special Weber tool must be used to hold the shaft stationary while the nut is loosened.

41 Remove the nut (78), tab washer (79), lever (77) (noting its location), toothed sector assembly (83), spring (25) and bush (26). Gently tap the body to remove the bush (26) if necessary.

42 Unscrew and remove the sector screw (80), lock washer (81) and plain washer (82). Separate the lever (75) and bush (76) from the toothed sector (83).

43 Unscrew and remove the throttle valve retaining screws (29) from the throttle shaft with the accelerator pump cam fitted. Withdraw the throttle valve, noting which way round it is located. Mark it with a pencil if necessary.

44 Remove the throttle shaft (27) from the body, then remove the bush (26), spring (25) and spacer (30) (photo).

45 Extract the Teflon bushes (20 and 21) from the body and mark them relative to their locations (photo).

46 Hold the remaining throttle valve (28) closed and unscrew the nut (24). If this nut is excessively tight, it will be necessary to obtain the special Weber tool to hold the shaft stationary while the nut is loosened.

47 Unscrew and remove the throttle valve retaining screws (29), then open the valve against the spring tension and remove the throttle valve (28) (photo).

48 Release the spring tension and note the location of the return spring (85).

49 Remove the nut (24), spring washer (23), washer (22) and spring (25) and gently tap the body to remove the bush (26).

50 Remove the throttle shaft (84) from the body, then remove the bush (26), spring (25) and return spring (85) (photo).

51 Extract the Teflon bushes (20) from the body and mark them relative to their locations.

## 7 Special overhaul procedures

After carrying out the general overhaul procedures given in Chapter 4, the following special procedures should be made:

1 Using a hand chuck and Weber tool no 9600 325 1047, reform the idling jet seats by carefully rotating the tool. Finish the seatings by inserting Weber tool no 9610 315 1202 and gently tapping the top of the tool whilst rotating it (Fig. 9.12).

2 If the emulsion tube bores are discoloured and have signs of sediment build up, ream them clear again using Weber tool no 9600 325 0765. Rotate the tool slowly with a hand chuck until it moves quite freely, then remove it whilst still rotating it.

3 If on disassembly the choke shaft (8) is a tight fit in the carburettor cover (1) and it is of original diameter (6.0 mm), use Weber tool no 9600 035 0540 to ream the shaft bore clear with the aid of a hand chuck (Fig. 9.14). Should the shaft bores be excessively worn, a new carburettor cover (1) must be obtained, but note that normally the shaft itself will wear quicker than its bore, in which case a new shaft will cure the problem.

4 If the Teflon bushes which support the throttle shafts are worn, they should be renewed.

5 Check the internal channels of the carburettor body and cover for blockage by injecting fuel with a syringe and observing that it emerges freely from the particular channel being tested. If any are blocked, the lead plugs must be drilled out and the channels cleared and checked with the special Weber tool.

6 The channels are of three diameters, viz 1.0 mm, 1.5 mm and 2.0 mm. The corresponding tools are Weber tool nos 9620 175 1846, 9620 175 1847 and 9620 175 1848. Fig. 9.15 shows the location of the various channels.

7 The carburettor body and cover should be thoroughly cleaned after overhaul to remove swarf and dirt, preferably using clean fuel and air pressure. The lead plugs should be renewed and retained in position by using Weber tool nos 9610

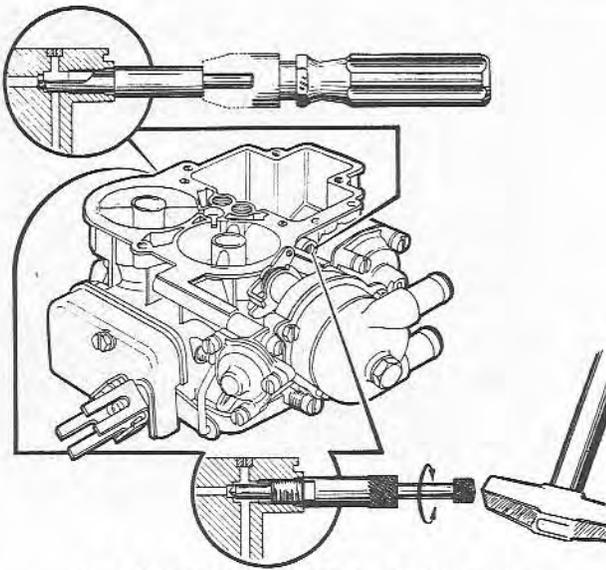


Fig. 9.12 Reforming the idling jet seats (Sec 7)

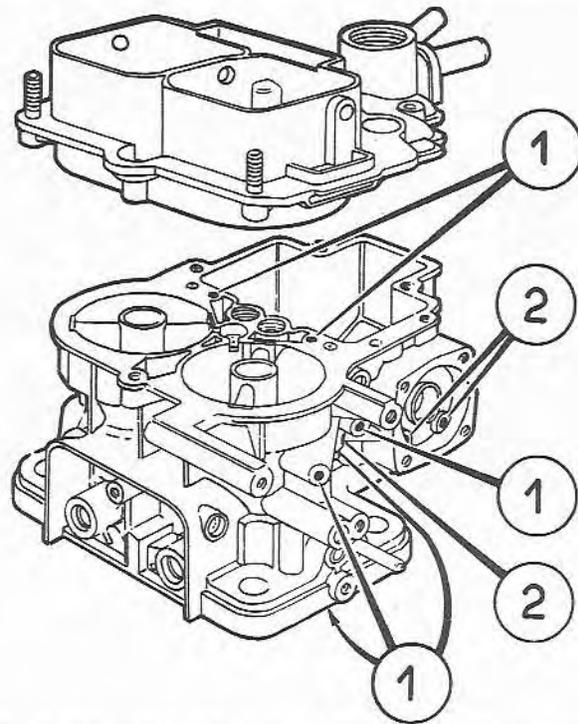


Fig. 9.15 Location of the internal channels of the carburettor body (Sec 7)

1 Idling channels

2 Accelerator pump channels

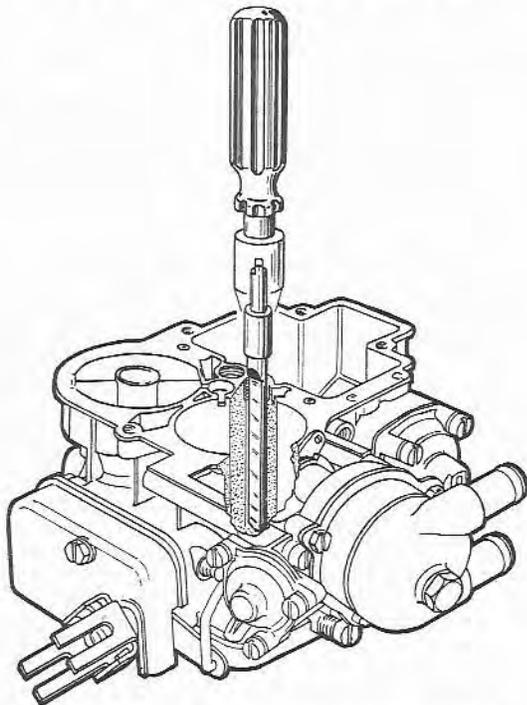


Fig. 9.13 Reaming the emulsion tube bores (Sec 7)

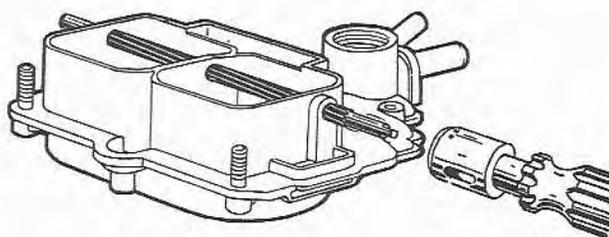


Fig. 9.14 Reaming the choke shaft bore (Sec 7)

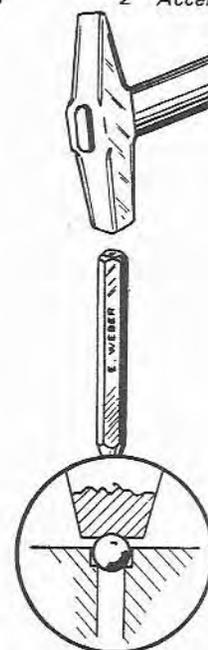


Fig. 9.16 Method of fitting the lead plugs (Sec 7)

315 0822 and 9610 315 0823 to expand them into their bores.

8 On 38 DGAS types, check the condition of the power valve diaphragm and diaphragm seat; if necessary, clean the seat with a little metal polish.

9 During the manufacture of the carburettor, a ball is inserted into the accelerator pump channel and retained by a brass plug (see Fig. 9.17). To check that this ball is free and unobstructed, shake the carburettor body and listen to the ball movement.

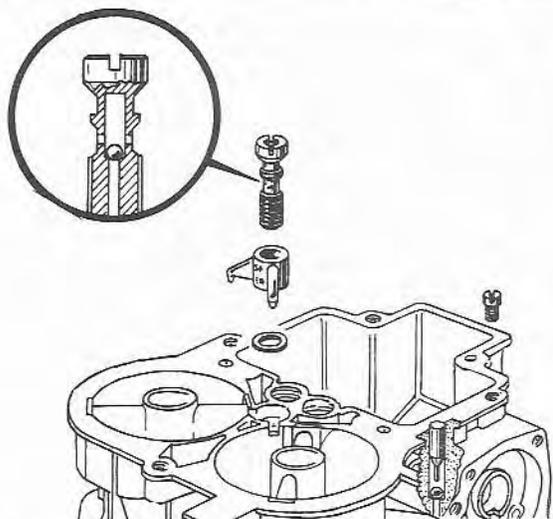
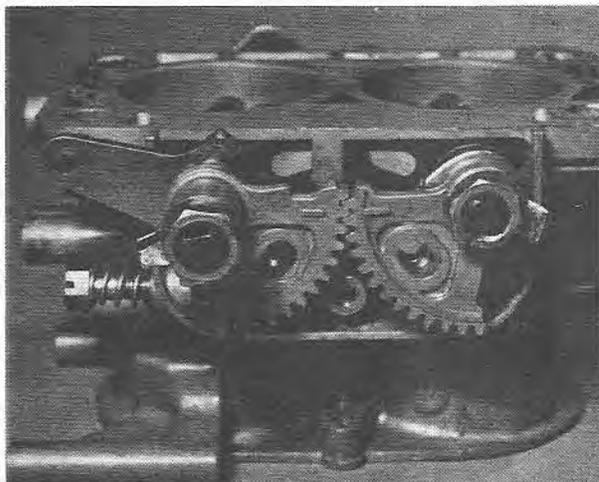
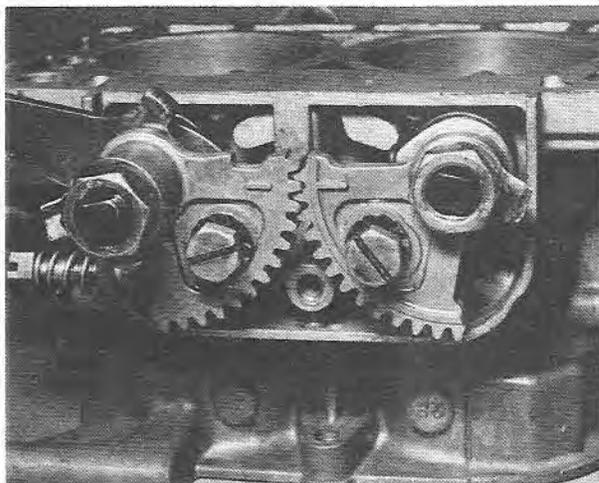


Fig. 9.17 Location of the accelerator pump ball valve (Sec 7)



8.9 Correct toothed sector alignment (DFAV type)



8.11 Fitting the sector adjustment screws (DFAV type)

10 Check that the internal channel of the automatic choke body is free and unobstructed. Also check that the diaphragm and corresponding surfaces are serviceable; if necessary clean the surfaces with metal polish.

11 Check the accelerator pump diaphragm and corresponding surfaces in the same manner to that described in paragraph 10.

12 Renew the diaphragm assemblies checked in paragraph 10 and 11 if necessary.

13 Check the accelerator pump lever for wear, especially on the type fitted with a roller bearing. Renew the lever if necessary.

14 Check the walls of the choke intake, where the choke valves rest when they are fully shut. If there is a deep wear ridge, this could cause the valves to temporarily stick shut, especially after an engine 'blow back'. The ridge should be removed using fine emery tape.

15 On 38 DGAS types, check the automatic choke shaft Teflon bush for wear and renew it if necessary.

### 8 Assembly (40 DFA and 40 DFAV types)

**Note:** All components should be clean and dry before starting the assembly procedure.

1 Fit the spacer (40) to the throttle shaft (20).

2 Insert the four Teflon bushes (76) into the carburettor body and lightly lubricate them with engine oil.

3 Insert the throttle shafts (19 and 20) into their correct locations in the carburettor body, making sure that the Teflon bushes are not displaced.

4 With the carburettor body inverted and the largest section of the accelerator pump cam on the shaft (20) uppermost, insert the throttle valve (21) and turn the shaft until the valve is shut. Make sure that the angled perimeter of the valve seats correctly in the barrel. The by-pass hole in the valve should be adjacent to the idling and progression holes in the barrel.

5 Insert the valve retaining screws (22) and tighten them evenly but without exerting excessive pressure on the shaft. It is recommended that new screws are always fitted as it is quite easy to cross thread previously peened screws. Lock the screws (22) by peening with Weber tool no 98010 900 whilst supporting the shaft (20) with a block of wood. Alternatively, coat the screw threads with a liquid locking agent (fuel resistant) prior to inserting them.

6 Insert the throttle shaft (19) and fit the throttle valve (21) in the same manner as described in paragraphs 4 and 5. On 40 DFAV types, the valve must be fitted with the vent operating lugs uppermost (with the carburettor inverted).

7 On DFAV types only, locate the vent operating rod (99) in the body, then fit it to the arm (95) and retain with the split pin (98). Locate the spring (97) to the body, then fit the bush (94), operating arm (95) and washer (96) to the retaining screw (93) and tighten the screw into the body. Tension the spring (97) and hook it over the arm (95) which should now rest on the lugs at the end of the throttle shaft.

8 Fit to the throttle shaft (19), the spring (80), spacer (75), lever (79), toothed sector (78) and tab washer (63); then fit and tighten the nut (62A) finger tight.

9 Fit to the throttle shaft (20) the spring (100) (if fitted), spacer (75), stop lever (74), bush (72), wave washer (73) and lever (71); then with both throttle valves shut, fit the toothed sector (70) so that the alignment marks on both sectors face each other (photo).

10 Fit the throttle lever (64), tab washer (63) and nut (62), tightening the latter finger tight only.

11 With both throttle valves held fully closed and the alignment marks on the two sectors facing each other, insert and tighten the two screws (67) together with the lockwashers (68) and plain washers (69) (photo).

12 Tighten the retaining nuts (62 and 62A) and lock them by bending the tab washers (63); if available, use the Weber tool no 9610 315 1201 to hold the shafts stationary. Alternatively, insert and tighten the idling adjustment screw (28) whilst

tightening the nuts.

13 Check that the two throttle shafts operate smoothly and that both throttle valves are synchronised exactly. If not, it will be necessary to loosen the nuts (62) and reset the adjustment screws (67).

14 Tension the return springs (80 and 100) (if fitted), using a length of welding rod hooked at one end and locate them onto the levers (74 and 79). Make sure that the springs are tensioned sufficiently and that no coils are trapped between the spacers and the main body.

15 Lubricate the toothed sectors with a little grease, then locate the cover (77) onto the body and tighten the retaining screw (65) together with the spring washer (66).

16 Fit the auxiliary venturis into their respective positions as noted previously, making sure that the supply channels are adjacent and that the nozzle cut away sections face the throttle valves.

17 Fit the fast idle cam and bush into the automatic choke body (47) if removed, making sure that the cam is positioned as shown in Fig. 9.8 (photo). Use a suitable diameter metal drift and support the body on a block of wood.

18 Insert and tighten the starting duct inspection plug into the bottom of the body (47).

19 Insert the operating rod (46) into the body (47) and locate the diaphragm over the brass dowel peg.

20 Locate the spring (45) and press the cover (44) onto the body (47), then insert and tighten the retaining screws (43) evenly.

21 Check that the operating rod (46) moves freely with the blade of a screwdriver.

22 Fit the adjusting stop plate (49) to the body (47) in its previously marked location, then tighten the retaining screw (50).

23 Lightly lubricate the shaft (48) with engine oil then insert it into the body (47).

24 Rotate the shaft (48) until it contacts the operating rod

(46), then fit the spacer (34), spring (33), lever (39), spring washer (37) and retaining nut (36). Make sure that the lever is positioned as shown in Fig. 9.8 then tighten the nut (36) (photo).

25 Hook the spring (33) over the fast idle cam and the lever (39) lug so that both are kept in contact by the spring tension.

26 Fit the adjusting screw (36) and spring (31) to the fast idle lever (30).

27 Locate the bush (91) on the retaining screw (38), followed by the wave washer (90), lever (29), spring (41) and washer (42), then tighten the screw (38) into the body (47). Make sure that the spring (41) is located correctly so that the tension moves the adjusting screw (32) off of the fast idle cam (photo).

28 Press the O-ring seal (35) onto the brass dowel at the side of the carburettor.

29 Engage the rod (61) to the front idle lever (29) and then insert the split pin (60) (if fitted) and bend the legs to retain it.

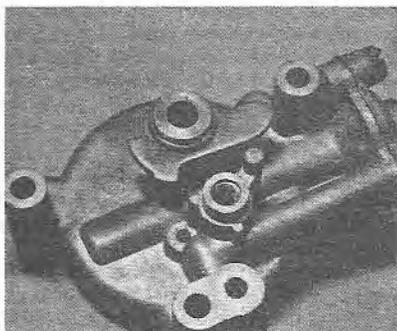
30 Locate the automatic choke to the carburettor body, insert the three retaining screws (51) and spring washers, and tighten the screws evenly (photos).

31 Engage the fast idling control rod (61) with the throttle lever (71), insert the split pin (60), and bend the legs to retain it.

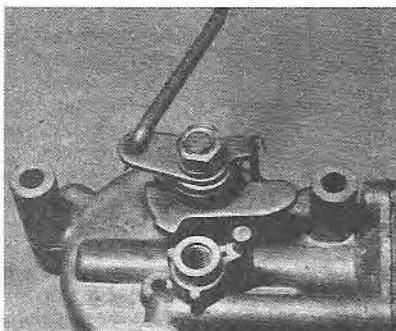
32 Working on the carburettor cover (1), lightly lubricate the choke shaft (8) with engine oil then insert it into the cover.

33 With the choke shaft (8) in the open position, fit the choke valves (7) into their location slots, then close the shaft to allow the valves to centralise.

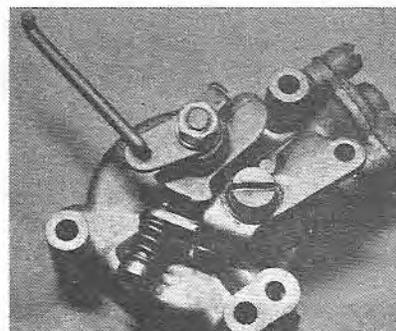
34 Holding the shaft closed, insert the valve retaining screws (6) and tighten them evenly without exerting excessive pressure on the brass shaft (8). It is recommended that new screws are always fitted as it is quite easy to cross-thread previously peened screws. Lock the screws (6) by peening with Weber tool no 98010 900, or alternatively by coating the threads with a liquid locking agent (fuel resistant) prior to inserting them. If the tool method is used, support the shaft (8) with a piece of wood.



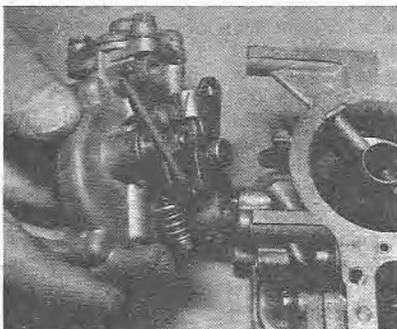
8.17 Correct positioning of fast idle cam (DFAV type)



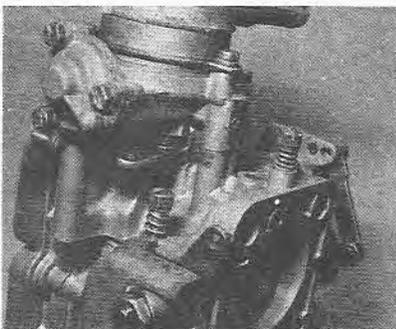
8.24 Fitting the choke rod and lever (DFAV type)



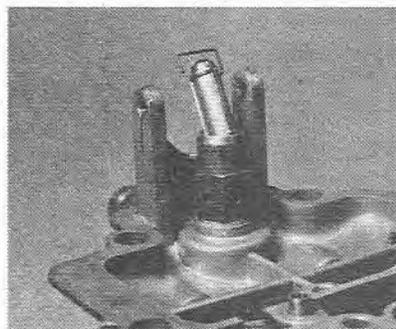
8.27 Correct positioning of fast idle lever (DFAV type)



8.30a Fitting the automatic choke body (DFAV type)



8.30b Location of the fast idle levers (DFAV type)



8.49 Inserting the needle into the valve seat (DFAV type)

- 35 Fit the seal (10) and plug (101) into the cover (1).
- 36 Insert the choke operating rod (16) through the seal (10) and engage it with the choke spindle arm, then retain it by inserting the split pin (15) and bending the pin legs.
- 37 Locate the diaphragm assembly (24) to the accelerator pump cover (25) then, with the carburettor body on end, fit the spring (23) into the pump chamber and lower the diaphragm and cover onto it.
- 38 Insert the accelerator pump cover retaining screws (26), depress the cover and tighten the screws in diagonal sequence. Make sure that the roller locates on the throttle shaft cam.
- 39 Fit and tighten the accelerator pump discharge blanking plug (18).
- 40 Fit the pump jet (86) to the accelerator pump delivery valve (87) followed by the gasket (85), then locate the pump jet into the carburettor body and tighten the delivery valve (87).
- 41 Fit the spring (27) to the throttle idling adjustment screw (28) and locate the screw in the carburettor body.
- 42 Fit the springs (82) to the idling mixture adjusting screws (81) and locate them in the carburettor body.
- 43 Insert the emulsion tubes (89) into the body then fit and tighten the air corrector jets (88).
- 44 Press the idling jets (84) into their respective holders (83) then tighten the holders into the carburettor body.
- 45 Fit and tighten the main jets (17) to the bottom of the float chamber.
- 46 Fit the gasket (11) to the needle valve (12) seating and tighten the seating into the carburettor cover (1).
- 47 On 40 DFAV types only, fit and tighten the vent and power valve (92) to the cover (1).
- 48 With the cover (1) inverted, fit the gasket (9).
- 49 Lower the needle into the needle valve (12) seating then insert the float tab beneath the needle hook and insert the fulcrum pin (14) through the two posts and float (photo).
- 50 The float level adjustment must now be checked in the following manner: Obtain a drill or dowel rod of 0.236 in (6.0 mm) diameter. Hold the carburettor cover vertically so that the float hangs from the fulcrum pin and the float arm is in light contact with the needle ball (ie the ball is not depressed). Using the drill, check that the distance from the cover gasket to the nearest part of the float is 0.236 in (6.00 mm). The annular seam must not be included in the distance and for this reason a groove must be filed or ground in the drill (photo).
- 51 If the dimension obtained in paragraph 50 is not correct, carefully bend the wide tab on the float as necessary.
- 52 Tilt the carburettor cover so that the float moves away from the cover and the narrow tab makes contact with the needle valve seating. Now, using a drill or dowel rod of 0.551 in (14.0 mm) diameter, check the needle valve fully open dimension using the method described in paragraph 50 (photo).
- 53 If the dimension obtained in paragraph 52 is not correct, carefully bend the narrow tab on the float as necessary (photo).
- 54 The difference between the dimension obtained in paragraphs 50 and 52 represents the needle valve stroke which

should be 0.315 in (8.0 mm).

- 55 Lower the carburettor cover (1) onto the main body, making sure that the vent valve operating rod (99) locates on the vent valve (92).
- 56 Fit the cover retaining screws (3) together with the spring washers and tighten them evenly in diagonal sequence.
- 57 Engage the choke plate operating rod (16) with the lever (39) and retain with the split pin (15) by bending the pin legs.
- 58 Fit the fuel filter (5) and tighten the inspection plug (4) into the cover (1).
- 59 With the carburettor completely assembled, the automatic choke and idling adjustments must be made. To do this, first turn the throttle idling adjustment screw (28) until it just touches the throttle lever (74), then continue to screw it in 2 complete turns. Note that if this adjustment is being made with the automatic choke completely assembled, it will be necessary to first open the throttle fully, hold the choke valves open and release the throttle. It is preferable to hold the choke valves open while making the adjustment.
- 60 Turn both idling mixture screws (81) until they are in light contact with their seats, then back them off one complete turn each.
- 61 To adjust the automatic choke, first operate the throttle and hold the choke valves in their closed position. Using a 0.008 in

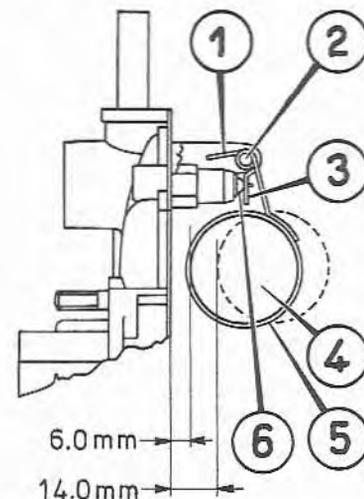
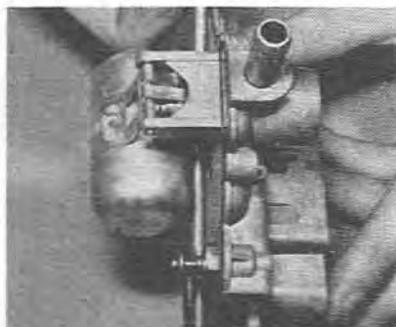
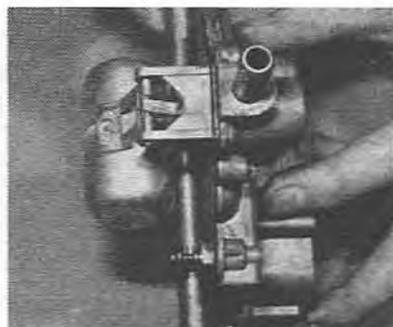


Fig. 9.18 Float level adjustment diagram (40 DFA and 40 DFAV types) (Sec 8)

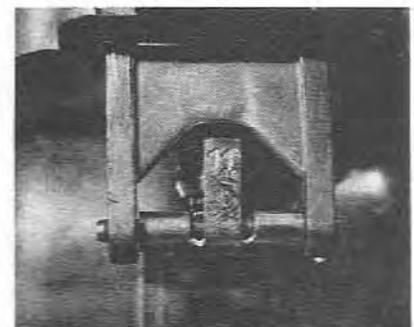
- |                     |          |
|---------------------|----------|
| 1 Stroke adjustment | 4 Float  |
| 2 Fulcrum pin       | 5 Seam   |
| 3 Closed adjustment | 6 Needle |



8.50 Checking the closed float level clearances (DFAV type)



8.52 Checking the open float level clearance (DFAV type)



8.53 Float arm narrow tab location and float weight (DFAV type)



return spring (85) in the special hole.

3 Fit the bush (26), spring (25), washer (22), spring washer (23) and nut (24) to the end of the throttle shaft (84), then tighten the nut (84) whilst holding the shaft stationary with a screwdriver inserted through the toothed sector.

4 Tension the spring (85) by turning the toothed sector, then insert the throttle valve into the throttle shaft (84) and close the valve. Make sure that the angled perimeter of the valve seats correctly in the barrel and allow it to snap shut several times to centralise it.

5 Insert the throttle valve retaining screws (29) and tighten them evenly but without exerting excessive pressure on the shaft. It is recommended that new screws are always fitted to avoid cross-threading previously peened screws. Lock the screws (29) by peening with Weber tool no 98010 900 whilst supporting the shaft with a block of wood. Alternatively, coat the screw threads with a liquid locking agent (fuel resistant) prior to inserting them.

6 Insert the Teflon bushes (20 and 21) into the primary throttle shaft bore of the carburettor body (86) and lightly lubricate them with a little engine oil. Note that the smaller bush (21) is located at the float chamber end.

7 Locate the spacer (30), spring (25) and bush (26) to the primary throttle shaft (27) with the smaller diameter of the spacer against the accelerator pump operating cam.

8 Insert the throttle shaft (27) into the carburettor body from the float chamber side, making sure that the Teflon bushes are not displaced (photo).

9 With the accelerator pump cam facing the centre of the float chamber, fit the bush (26), spring (25) and lever (75), making sure that the threaded hole in the lever (75) is towards the secondary toothed sector (photos).

10 Fit the bush (76) to the throttle shaft (27) then press on the toothed sector (83) and mesh it with the secondary sector so that the alignment marks are in line (photo).

11 Fit the lever (77), tab washer (79) and nut (78).

12 Locate the spring (74) on the throttle idling adjustment screw (73), then insert the screw into the carburettor body and screw it in as far as it will go. The nut (78) may now be fully tightened and the locktab (79) bent. Fully unscrew the adjustment screw (73) but leave it in the carburettor body.

13 Open the primary throttle shaft (27) and insert the throttle valve (28), observing the procedure given in paragraphs 4 and 5 to centralise it. Fit the retaining screws (29).

14 Insert the sector screw (80) with lockwasher (81) and plain washer (82) and tighten it whilst holding both throttle valves completely shut; this will synchronise the throttle valves (photo).

15 Lubricate the toothed sectors with a little grease and check that the throttle valves operate smoothly and fully.

16 Fit the auxiliary venturis (98) into their respective positions as noted previously, making sure that the supply channels are adjacent and that the nozzle cut away sections face the throttle valves.

17 If removed, locate the fast idle cam on the bush followed by the spacer, then press the bush onto the rear of the automatic choke body (53) using a suitable diameter length of tubing. Note that when fitted the round contour of the cam must face the diaphragm end of the body with the flat edge uppermost (photo).

18 Fit the screw (59) and plug (58) to the cover (56), positioning the screw as previously noted.

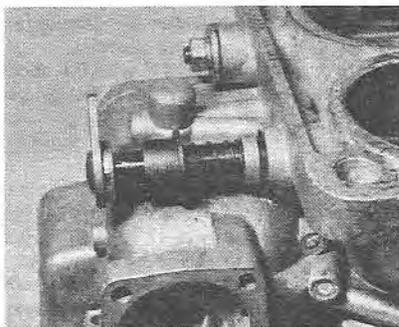
19 Fit the operating rod (54) to the body (53), at the same time locate the diaphragm over the brass dowel.

20 Locate the spring (55) into the cover (56) then fit the cover to the body making sure that the spring locates in the diaphragm plate.

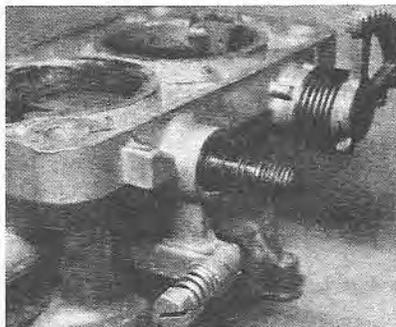
21 Insert and tighten the retaining screws (57) evenly.

22 Insert the Teflon bearing (52) into the body (53).

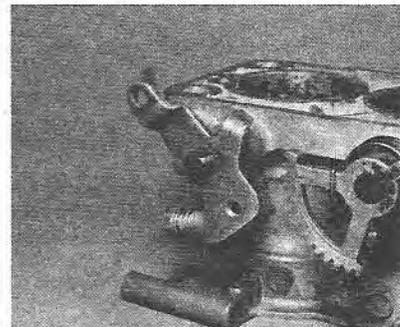
23 Lightly lubricate the shaft (43) with engine oil and fit it in



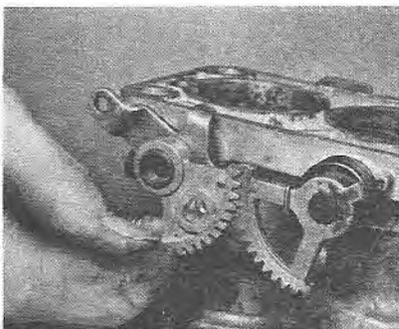
9.8 Inserting the primary throttle shaft (DGAS type)



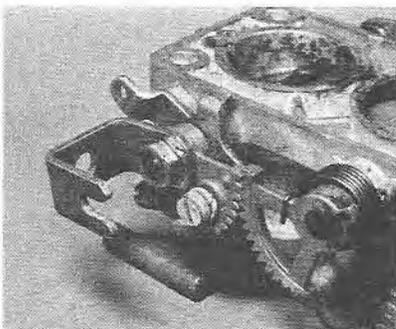
9.9a Fitting the spring to the primary throttle shaft (DGAS type)



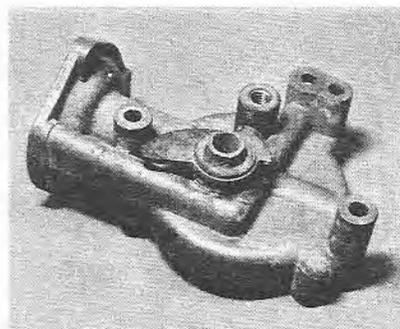
9.9b Fitting the lever to the primary throttle shaft (DGAS type)



9.10 Aligning the toothed sectors (DGAS type)



9.14 Fitting the sector adjustment screw (DGAS type)



9.17 Correct location of the fast idle cam (DGAS type)

the body (53) (photo).

24 Fit the spacer (40), cover (39), spring (38), lever (37), spring washer (67) and nut (68). Tighten the nut, being careful not to bend the arm on the end of the shaft (43). Make sure that the lever and spring are assembled as shown in Fig. 9.10 with the lever resting on the flat edge of the fast idle cam.

25 Fit the spring (65) to the adjusting screw (66) and fit the screw to the lever (64).

26 Locate the spring washer, bush (71), wave washer (70), lever (63) and washer (62) to the retaining screw (72), then tighten the screw into the body (53). Make sure that the fast idle screw (66) can locate on the stepped edge of the fast idle cam (photo).

27 Press the O-ring seal (69) to the side of the carburettor.

28 Engage the rod (61) to the fast idle lever (75) and retain it with the split pin (60).

29 Engage the rod (61) with the fast idle lever (64), then fit the automatic choke body (53) to the carburettor body (86). Insert the retaining screws (42) and spring washers and tighten them evenly.

30 Working on the carburettor cover (1), lightly lubricate the choke shaft (4) with engine oil and insert it into the cover.

31 With the choke shaft (4) in the open position, fit the choke valves (5) into their location slots, then close the shaft to allow the valves to centralise.

32 Holding the shaft closed, insert the valve retaining screws (9) and tighten them evenly without exerting excessive pressure on the shaft (4). It is recommended that new screws are always fitted to avoid cross-threading previously peened screws. Lock the screws (9) by peening with Weber tool no 98010 900 or alternatively, by coating the threads with a liquid locking agent (fuel resistant) prior to inserting them. If the tool method is used, support the shaft (4) with a piece of wood.

33 Fit the seal (7) and plug (8) into the carburettor cover (1).

34 Locate the accelerator pump diaphragm assembly (32) to the cover (41) then, with the carburettor body on end, fit the spring (33) into the pump chamber and lower the diaphragm and cover onto it.

35 Insert the accelerator pump cover retaining screws (31), depress the cover and tighten the screws in diagonal sequence, making sure that the pump lever locates on the throttle shaft cam.

36 Fit and tighten the accelerator pump discharge blanking needle (16).

37 Fit a gasket (95) to the accelerator pump delivery valve (97) followed by the pump jet (96) and a further gasket (95), then locate the pump jet into the carburettor body and tighten the delivery valve (97).

38 Fit and tighten the full power valve (18) and gasket (17) to the bottom of the float chamber.

39 Fit the springs (88) to the idling adjusting screws (87) and locate them in the carburettor body.

40 Lower the emulsion tubes (89) into the body (86) then fit and tighten the air corrector jets (94).

41 Press the idling jets (34) into their holders (36) and fit the gaskets (35), then tighten the holders (36) into the body (86).

42 Fit and tighten the main jets (19) to the bottom of the float chamber.

43 Fit the gasket (13) to the needle valve (14) seating and tighten the seating into the carburettor cover (1) using a 10 mm socket or ring spanner.

44 With the cover (1) inverted, locate the power valve assembly (93), then depress the valve with one hand and lift the valve cover slightly to settle the diaphragm. While keeping the valve depressed, insert and tighten the retaining screws (91) complete with spring washers (92).

45 Lower the needle into the needle valve (14) seating, then locate the float assembly (15) and insert the float tab beneath the needle hook (photo).

46 Insert the fulcrum pin (90) through the two posts and float.

47 The float level adjustment must now be checked in the following manner. Hold the carburettor cover vertically so that the float assembly hangs from the fulcrum pin and the float arm is in light contact with the needle ball (ie the ball is not depressed). Using vernier calipers, check that the distance from the cover to the furthest part of the two semi-floats is as given in the adjustment data. If not, carefully bend the wide tab on the float arm as necessary (photo).

48 Tilt the carburettor cover so that the float assembly moves away from the cover and the narrow tab makes contact with the needle valve seating. The distance from the cover to the furthest part of the two semi-floats should now be as given in the adjustment data. If not, carefully bend the narrow tab on the float arm as necessary (photo).

49 The difference between the dimensions obtained in paragraphs 47 and 48 represents the needle valve stroke which should be 0.393 in (10.0 mm).

50 Locate the gasket (12) onto the carburettor body (86) then lower the carburettor cover (1) onto the main body (86), at the same time inserting the choke control lever (37) through the dust seal (7).

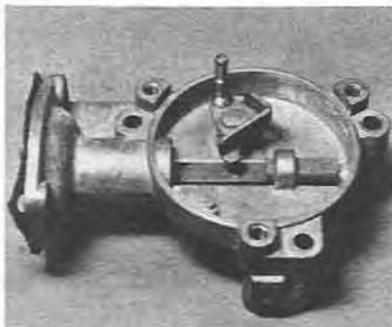
51 Fit the cover retaining screws (3) together with the spring washers and tighten them evenly in diagonal sequence.

52 Engage the choke plate operating lever (37) with the choke shaft (4) and retain by pressing the C-clip into the groove (photo).

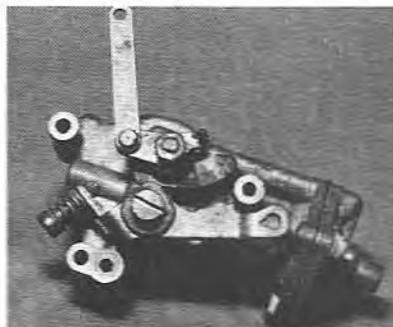
53 Fit the fuel filter (10) and tighten the inspection plug (11) into the cover (1).

54 With the carburettor completely assembled, the idling and automatic choke adjustments must be made. To do this, first turn the throttle idling adjustment screw (73) until it just touches the fast idle lever (75), then continue to screw it in 2 complete turns. Note that if this adjustment is being made with the automatic choke completely assembled, it will be necessary to first open the throttle fully, hold the choke valves open and release the throttle. It is preferable to hold the choke valves open whilst making the adjustment.

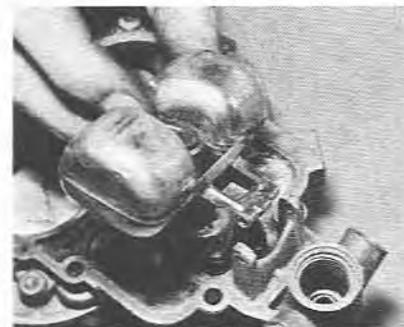
55 Turn both idling mixture screws (87) until they are in light



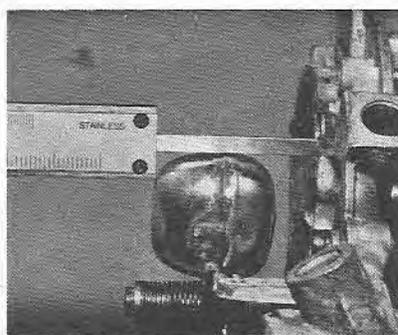
9.23 Fitting the automatic choke shaft (DGAS type)



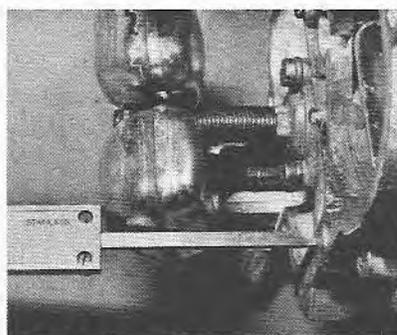
9.26 Fitting the fast idle lever (DGAS type)



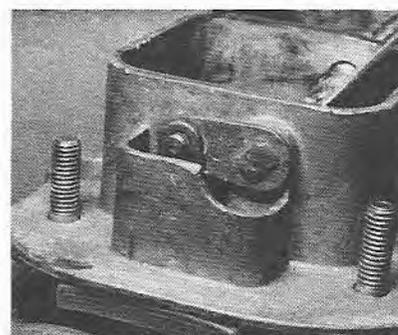
9.45 Fitting the float (DGAS type)



9.47 Checking the closed float level adjustment (DGAS type)



9.48 Checking the open float lever adjustment (DGAS type)



9.52 Fitting the choke operating lever (DGAS type)

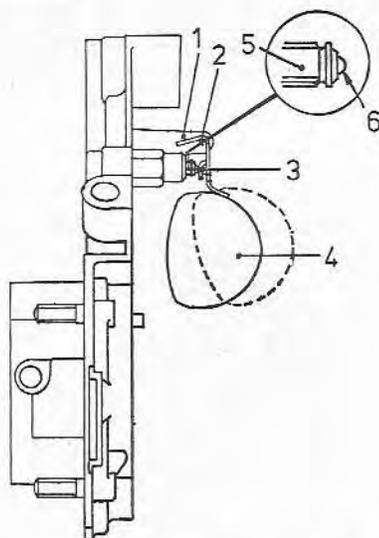


Fig. 9.21 Float level adjustment diagram (34 DGAS and DGAS types) (Sec 9)

- |                     |                         |
|---------------------|-------------------------|
| 1 Stroke adjustment | 4 Float                 |
| 2 Fulcrum pin       | 5 Needle                |
| 3 Closed adjustment | 6 Spring tensioned ball |

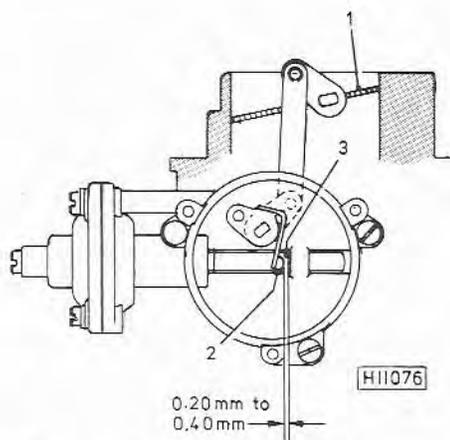


Fig. 9.22 Checking the shaft arm to rod clearance (DGAS types) (Sec 9)

- |                |                |
|----------------|----------------|
| 1 Choke valves | 3 Rod abutment |
| 2 Shaft arm    |                |

contact with their seats, then back them off one complete turn each.

56 To adjust the automatic choke, first fully unscrew the fast idle adjustment screw (66). The choke valve pull down dimension must now be checked.

57 Connect an elastic band between the automatic choke shaft (43) and the diaphragm cover (56) so that the choke valves are held shut. With the operating rod (54) in the rest position, the clearance between the shaft (43) arm and the rod (54) abutment must be between 0.007 in and 0.015 in (0.2 mm and 0.4 mm). Make the check with a feeler gauge. If it is not correct the diaphragm may be stretched or the shaft arm bent. Check and rectify both of these items before proceeding (photo).

58 Using a small electrician's screwdriver or length of welding rod, push the outer diameter of the operating rod (54) hard against the adjustment screw (59) by inserting it into the rod bore. The tension of the elastic band must be sufficient to overcome the tension of the spring inside the operating rod (54). This can be checked by temporarily opening the choke valves and observing whether the visible section of the rod (54) moves. Check that the distance from the lower edge of the choke valves to the intake wall is between 0.112 in and 0.124 in (2.85 mm and 3.15 mm). Make the check using a drill shank and if not correct, adjust the screw (59) as necessary, after first removing the plug (58) (photo).

59 Using the blade of a screwdriver, press both sections of the rod (54) hard against the screw (59). The distance from the lower edge of the choke valves to the intake well should now be the maximum choke valve gap given in the adjustment data. Make the check using a drill shank and if not correct, renew the operating rod (54) (photo).

60 If a new automatic choke body (53) has been fitted, the alignment mark must now be stamped on the top of the body. To do this it is essential to obtain Weber tool no 98028 600. The mark is made while keeping the choke valves completely shut by applying light pressure on the tool.

61 Fit and tighten the plug (58) into the diaphragm cover (56).

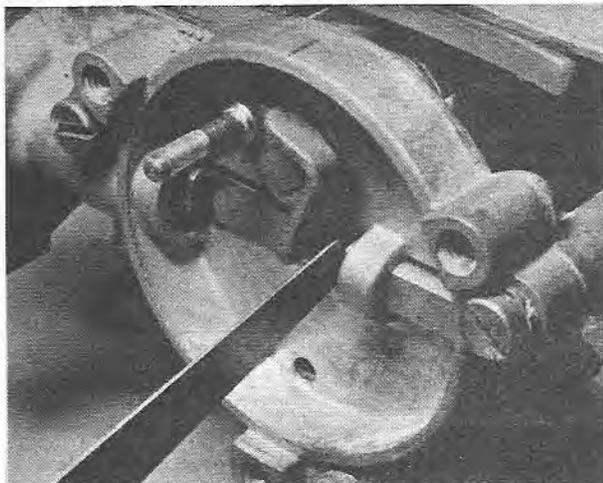
62 Fit the disc gasket (51) to the automatic choke body (53).

63 Fit the thermostat assembly (50) to the body (53), at the same time locating the bi-metallic spring onto the shaft (43), then fit the retaining ring (49) and insert the three screws (44) (photo).

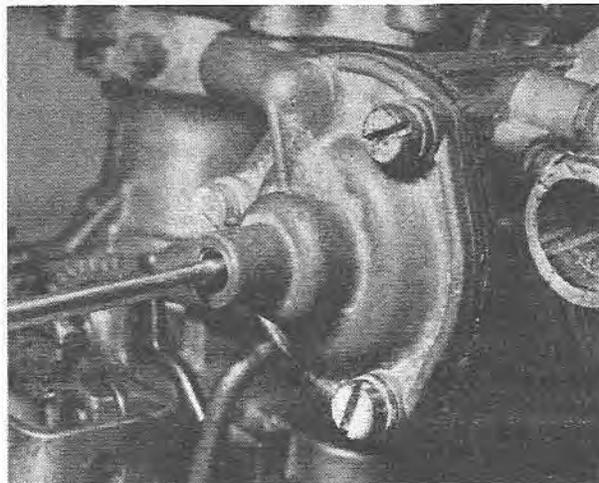
64 Whilst holding the thermostat assembly (50) so that the alignment mark is opposite the mark on the body (53), tighten the three screws (44) evenly (photo).

65 Fit the gasket (48) and the cover (47), then insert and tighten the retaining bolt (46) with the gasket (45).

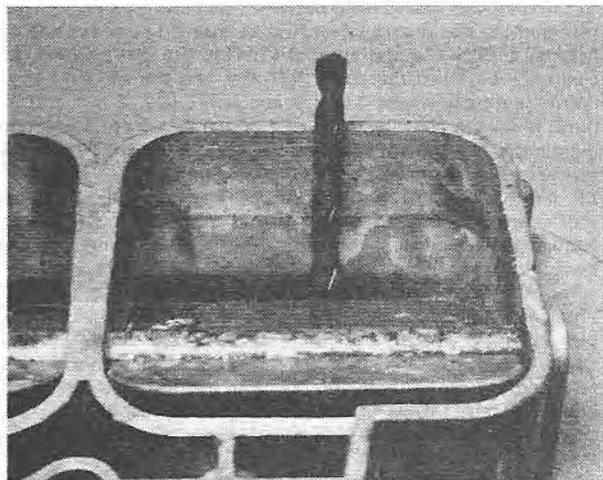
66 The automatic choke fast idling adjustment must now be made. Open and close the throttles and make sure that the fast idling adjustment screw (66) is against the fast idle cam highest point with the choke valves completely shut. Using a small drill or a feeler gauge, check that the distance from the throttle valves to the outer wall of the barrels by the progression holes is as given in the adjustment data. If not, adjust the fast idling



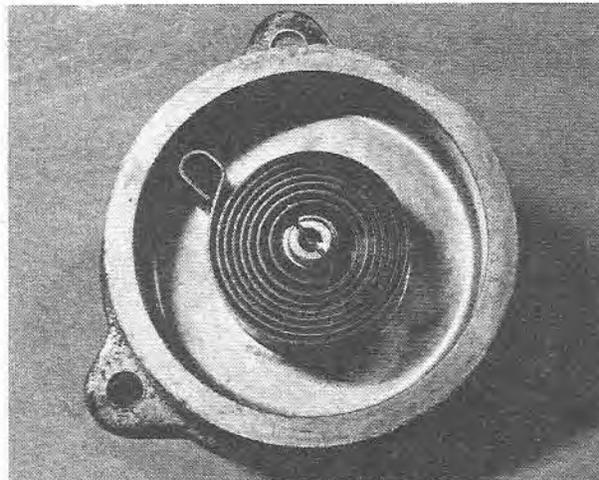
9.57 Checking the shaft arm to rod clearance (DGAS type)



9.58 Adjusting the rod stop screw (DGAS type)



9.59 Checking the choke valve clearance with a drill (DGAS type)



9.63 Automatic choke thermostat bi-metallic spring (DGAS type)



9.64 Automatic choke alignment marks (DGAS type)

screw (66) to give the correct clearance.

67 Slightly open the throttles and, by moving the choke valves, position the adjustment screw (66) into the step on the fast idling cam. The distance from the lower edge of the choke valves to the intake walls must now be as given in the adjustment data.

68 Fully open the throttles and slowly close the choke valves. The fast idle cam should rotate until the adjustment screw (66) rests against the step. If not, re-check the idling screw (73) adjustment and the fast idling screw (66) adjustment and correct so that the above check is achieved.

## 10 Tuning

**Note:** Refer to Chapter 3 for general notes on tuning.

- 1 The idling adjustment screws should be set to their preliminary positions as described in Sections 8 and 9.
- 2 Connect a tachometer to the engine in accordance with the manufacturer's instructions.
- 3 Start the engine and run until normal operating temperature has been reached (ie the thermostat has opened).

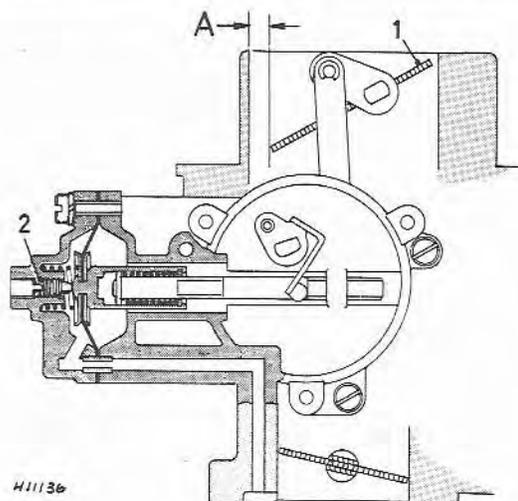


Fig. 9.23 Automatic choke minimum gap setting (DGAS types) (Sec 9)

- 1 Choke valves                      A Choke valve clearance
- 2 Adjustment screw

4 Turn the throttle valve idling adjusting screw so that the engine runs at the recommended idling speed for the particular engine being worked on; this will be between 600 rpm and 800 rpm for touring models and approximately 1000 rpm for sports car models.

5 Turn the idle mixture adjustment screws in or out by equal amounts until the engine runs at the highest rpm commensurate with even running.

6 Re-adjust the throttle valve adjusting screw, if necessary, to bring the engine speed within limits.

7 Ideally a vacuum gauge should be used to make the adjustment described in paragraph 5, in which case the mixture

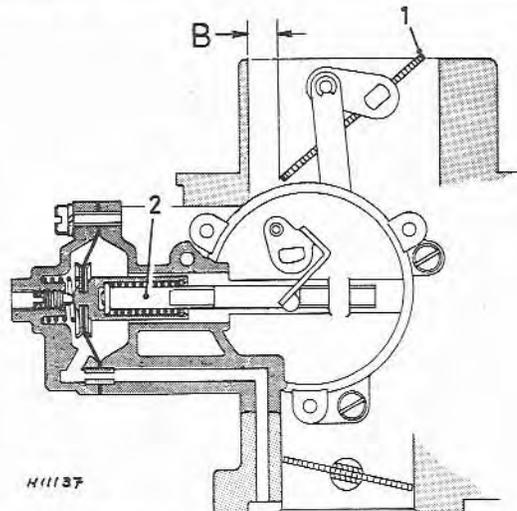


Fig. 9.24 Automatic choke maximum gap setting (DGAS types) (Sec 9)

- 1 Choke valves                      B Choke valve clearance
- 2 Operating rod

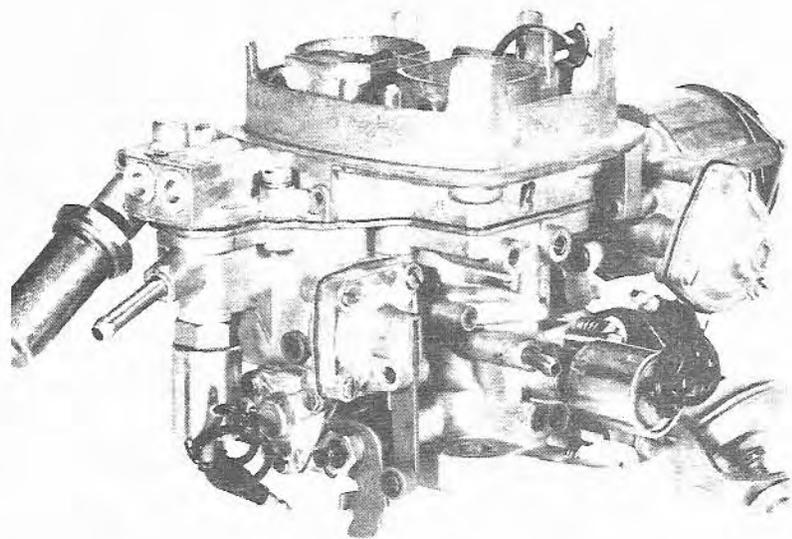
adjustment screws are adjusted to give the maximum vacuum reading.

8 When the adjustment is completed, switch off the engine and remove the tachometer and vacuum gauge if fitted.

9 On bypass idle type carburetors, the procedure is similar but the bypass idle adjustment screw should be first fully screwed in, then screwed out 1 full turn. The basic idle adjustment is then made in the normal way and the bypass idle adjustment used for any final adjustment of speed. If an exhaust analyser is available, the percentage of CO should be made on the basic idle adjustment, prior to making the final speed adjustment on the bypass idle screw.

11 Fault diagnosis

Symptom	Reason/s
Engine will not start	Faulty automatic choke Blocked fuel filter or jets
Uneven idling	Leaking carburettor flange or manifold gasket Loose idling jets or auxiliary venturis Excessive sediment or water in carburettor Throttle shafts and bearings or carburettor body excessively worn Faulty automatic choke Leaking ignition advance tube
Carburettor floods	Worn needle valve Leaking or damaged float assembly Incorrect float level adjustments Excessive sediment in fuel
Engine lacks performance	Incorrect tuning adjustments Incorrect float level adjustments Excessive sediment in fuel Faulty acceleration pump Throttle valves do not fully open
Excessive fuel consumption	Needle valve not seating Leaking or damaged float assembly Incorrect float level adjustments Faulty automatic choke Choked air filter



# Part 2 Weber carburetors

## Chapter 10 Type 32 DFT, 32 DFTA, 32 DFTA1

**Contents**

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Carburettor adjustments .....	8	Operation .....	3
Construction .....	2	Removal and refitting .....	4
Disassembly .....	5	Special overhaul procedures .....	6
Fault diagnosis .....	10	Tuning .....	9

## Adjustment data

## Float level setting dimensions

	Closed position	Open position	Stroke
32 DFT type (UK) .....	0.315 in (8.0 mm)	0.630 in (16.0 mm)	0.315 in (8.0 mm)
32 DFTA and 740 types (USA) .....	0.276 in (7.0 mm)	0.630 in (16.0 mm)	0.354 in (9.0 mm)

## Automatic electric choke vacuum pull down

	Maximum	Minimum
32 DFT type .....	0.197 in to 0.236 in (5.0 mm to 6.0 mm)	0.128 in to 0.148 in (3.25 mm to 3.75 mm)
32 DFTA type .....		0.108 in to 0.128 in (2.75 mm to 3.25 mm)
740 type .....	0.196 in to 0.198 in (4.98 mm to 5.02 mm)	

## Automatic electric choke phasing

32 DFT and 32 DFTA types .....	0.157 in to 0.177 in (4.0 mm to 4.5 mm)
--------------------------------	-----------------------------------------

## Automatic electric choke de-choke

	in (mm)
32 DFT type .....	0.157 to 0.236 (4.0 to 6.0)
32 DFTA type .....	0.118 to 0.197 (3.0 to 5.0)
740 type .....	0.157 (4.0) minimum

## Automatic electric choke fast idle primary throttle valve opening

	in (mm)
32 DFT type .....	0.020 to 0.022 (0.50 to 0.55)
32 DFTA type .....	0.024 to 0.026 (0.60 to 0.65)
740 type .....	0.078 to 0.080 (1.98 to 2.02)

## Dashpot positive opening

32 DFTA and 740 types .....	0.020 in to 0.022 in (0.50 mm to 0.55 mm)
-----------------------------	-------------------------------------------

## Approximate CO percentage at idle speed

(Refer to engine manufacturer's specification for correct amount) .....	1.5%
-------------------------------------------------------------------------	------

## 1 Introduction

The carburettor types covered in this Chapter are all of downdraught design and are of dual barrel construction to supply the primary and secondary functions.

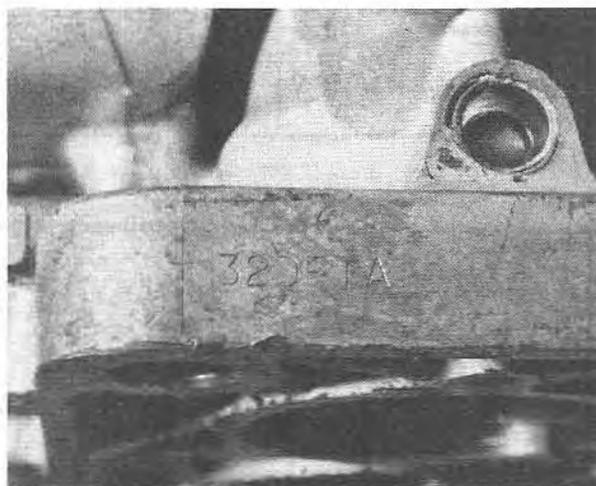
Each throttle valve is mounted on a separate shaft and is of differential or progressive choke type. The linkage between the two throttle valve shafts is arranged so that the secondary valve does not commence to open until the primary throttle valve is  $\frac{3}{4}$  open.

A semi-automatic fully electric choke control is incorporated and the idle circuit includes a solenoid operated cut-off valve.

The USA version incorporates a solenoid operated vent valve, an additional vacuum take off point and a dashpot.

The carburettor is fitted to the engine as a single unit with both barrels feeding a common inlet manifold. The most common fitting is on a transverse, four-cylinder in-line engine.

The carburettor identification mark is located on the lower flange outer surface (photo).



1.6 Carburettor identification location

## 2 Construction

The main body and cover are of die-cast zinc alloy (Mazak) construction. The mounting flange is machined flat for fitting purposes. The cover incorporates a mounting flange for the air cleaner assembly.

The throttle valves are of brass and the throttle shafts, which run in Teflon (PTFE) bushes, are of steel. The choke valves are of cadmium plated steel. The choke shafts, which also run in Teflon bushes, are also of steel.

With the exception of the accelerator pump delivery valve and jet which is die cast, all fuel and air jets are of brass construction and are screwed into the main body.

Internal channels of the main body and cover are mostly drilled and are sealed with lead plugs where necessary.

The float assembly comprises two plastic semi-floats.

### 3 Operation

#### Cold starting

Refer to Fig. 10.5. When the engine is cold and the throttle pedal has been depressed once, the bi-metallic spring in the electric choke housing (19) rotates the shaft (15) and closes the choke valves. At the same time, the fast idle cam within the automatic choke housing (27) prevents the primary throttle valve (59) from completely closing.

When the engine is cranked, a rich mixture is drawn from the nozzle in the auxiliary venturi (88) to facilitate starting. As soon as the engine fires, vacuum from below the throttle valve is relayed through a channel to the diaphragm (26). The shaft (15) then moves and partially opens the choke valves against the action of the bi-metallic spring. If the throttle is opened at this stage, the vacuum will cease and the choke valves will close; however, the passage of air will open the choke valves against the action of the bi-metallic spring and the internal auxiliary spring, due to the valve fulcrums being offset.

As soon as the engine is running, current from the alternator is relayed to the electric choke and a heating element commences to heat the bi-metallic spring which progressively opens the choke valves over a predetermined engine warm-up period. At the end of this period the choke valves are held fully open and the fast idle cam is rotated so that the throttle valve (59) and lever (46) is free to return to its normal idling position.

#### Idling and progression

When the engine is idling, fuel is drawn from the float chamber, through internal channels to the primary well. It is

then drawn through the primary idle fuel jet and is emulsified with air entering through a calibrated bush. The fuel and air is then drawn past the idling mixture adjustment screw (66), through the idling feed hole and into the primary carburettor throat at the engine side of the primary throttle valve (59).

When the primary throttle valve is opened slightly to increase the engine speed, the progression holes are brought into action to provide extra fuel.

When the primary throttle valve is  $\frac{2}{3}$  open, the secondary throttle valve will commence to open. The secondary progression holes will then provide mixture to the secondary barrel through the secondary idle jet and calibrated bush.

When either throttle valve is sufficiently open, the idling and progression system ceases and the main fuel supply system operates.

#### Normal running

Under normal cruising conditions the main fuel supply circuit is brought into action. Fuel flows from the float chamber to the primary emulsion tube well, through the main jet (38) and is emulsified with air entering through the air corrector jet (34) and through the holes in the emulsion tube (35). The fuel/air mixture is then drawn through the nozzle in the auxiliary venturi (88) and mixes with the main air supply as it is drawn through the primary choke into the engine.

The secondary main fuel supply operates in an identical manner as the primary, but commences at a higher engine speed.

With both throttle valves fully open, the overfeed enrichment circuit is brought into action to provide full power. Under these conditions the air velocity through the carburettor is high

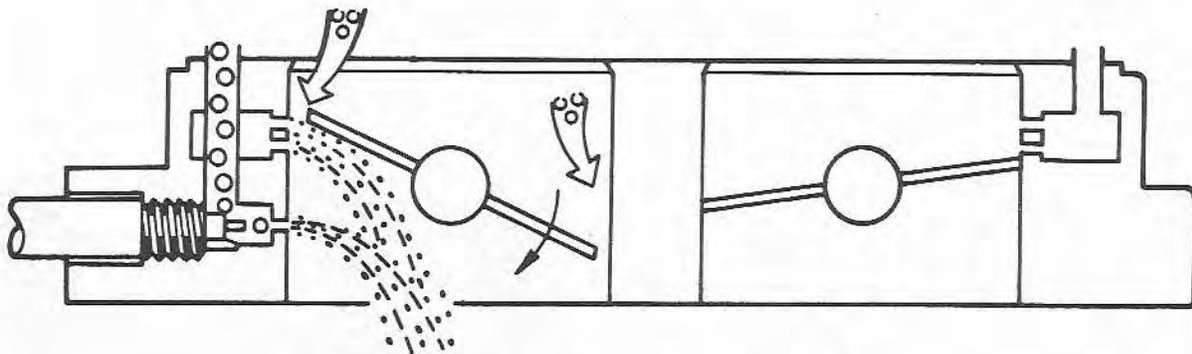


Fig. 10.1 Carburettor primary progression phase (Sec 3)

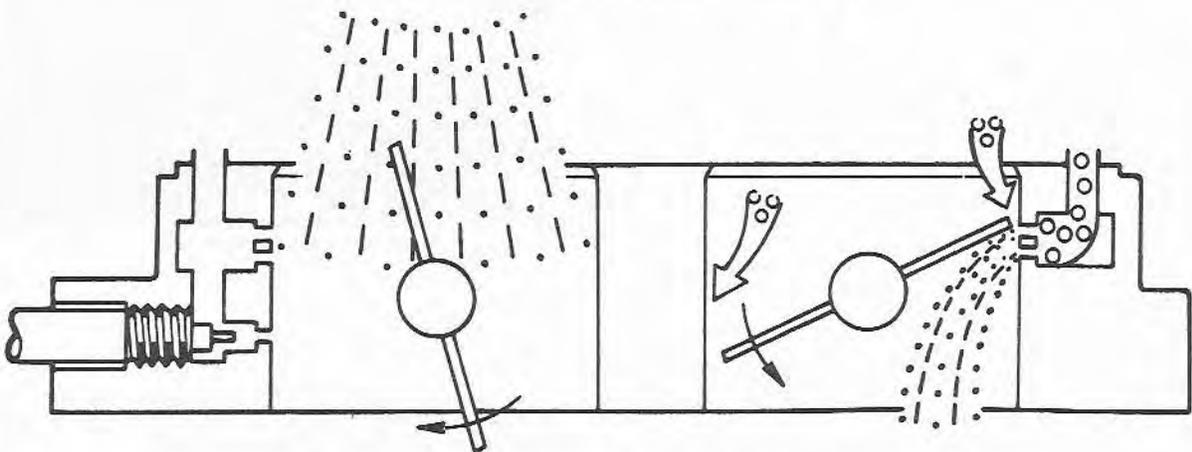


Fig. 10.2 Carburettor secondary progression phase (Sec 3)

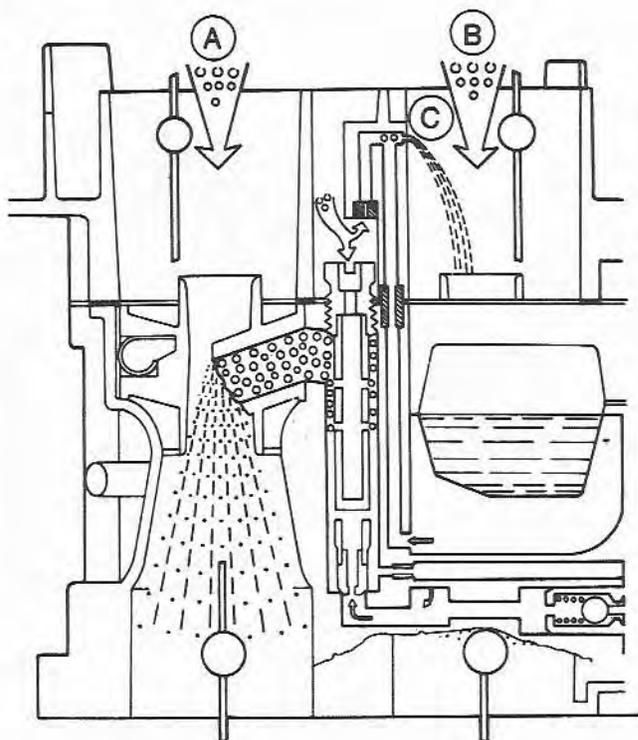


Fig. 10.3 Carburettor full power overfeed phase (Sec 3)

- A Primary barrel
- B Secondary barrel
- C Enrichment aperture

and extra fuel is drawn out of the orifice located at the top of the secondary intake horn. At the same time air is drawn through a calibrated bush to emulsify the fuel.

To provide full power immediately the primary throttle valve is opened quickly, the carburettor incorporates a full power valve. Under these conditions the vacuum through an internal channel is insufficient to draw the diaphragm (78) against the spring (77) and the full power valve is therefore opened. The fuel level in the primary emulsion tube well immediately rises and the mixture drawn from the primary nozzle is enriched. When the primary throttle valve is partially open, the vacuum at the engine side of the secondary throttle valve is relayed through the internal channel and is now sufficient to overcome the tension of the spring (77). The full power valve then shuts and the spring-loaded ball contacts the valve seat.

### Acceleration

To provide the engine with a rich mixture when accelerating, the carburettor is provided with a diaphragm type acceleration pump which is operated by the primary throttle shaft and injects only into the primary venturi.

When the primary throttle valve is closed, the accelerator pump diaphragm draws fuel from the float chamber through an internal ball-valve and into the pump chamber. When the primary throttle valve is opened, the cam (74) moves the lever on the cover (70) and fuel is forced along a channel and through the delivery valve and pump jet (87). A spring in the diaphragm assembly (71) absorbs the initial movement of the lever and extends the fuel delivery period. Excess fuel and any accumulated air is discharged into the float chamber through a channel and calibrated bush.

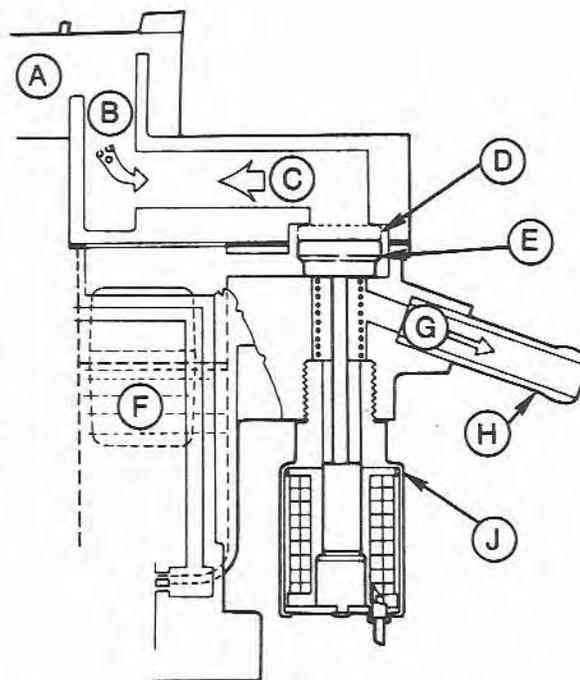


Fig. 10.4 Float chamber vent valve operation (Sec 3)

- A Carburettor intake
- B and C Vapour movement with ignition on
- D Valve seat position with ignition off
- E Valve seat
- F Float
- G Vapour movement with ignition off
- H Canister tube connection
- J Solenoid

### Idle cut-off valve operation

As soon as the ignition is switched off, this valve stops the flow of fuel mixture from the idle circuit. With the ignition switched on, the idle circuit operates normally.

The valve eliminates any tendency for the engine to run on when the ignition is switched off.

### Float chamber vent valve operation (USA types only)

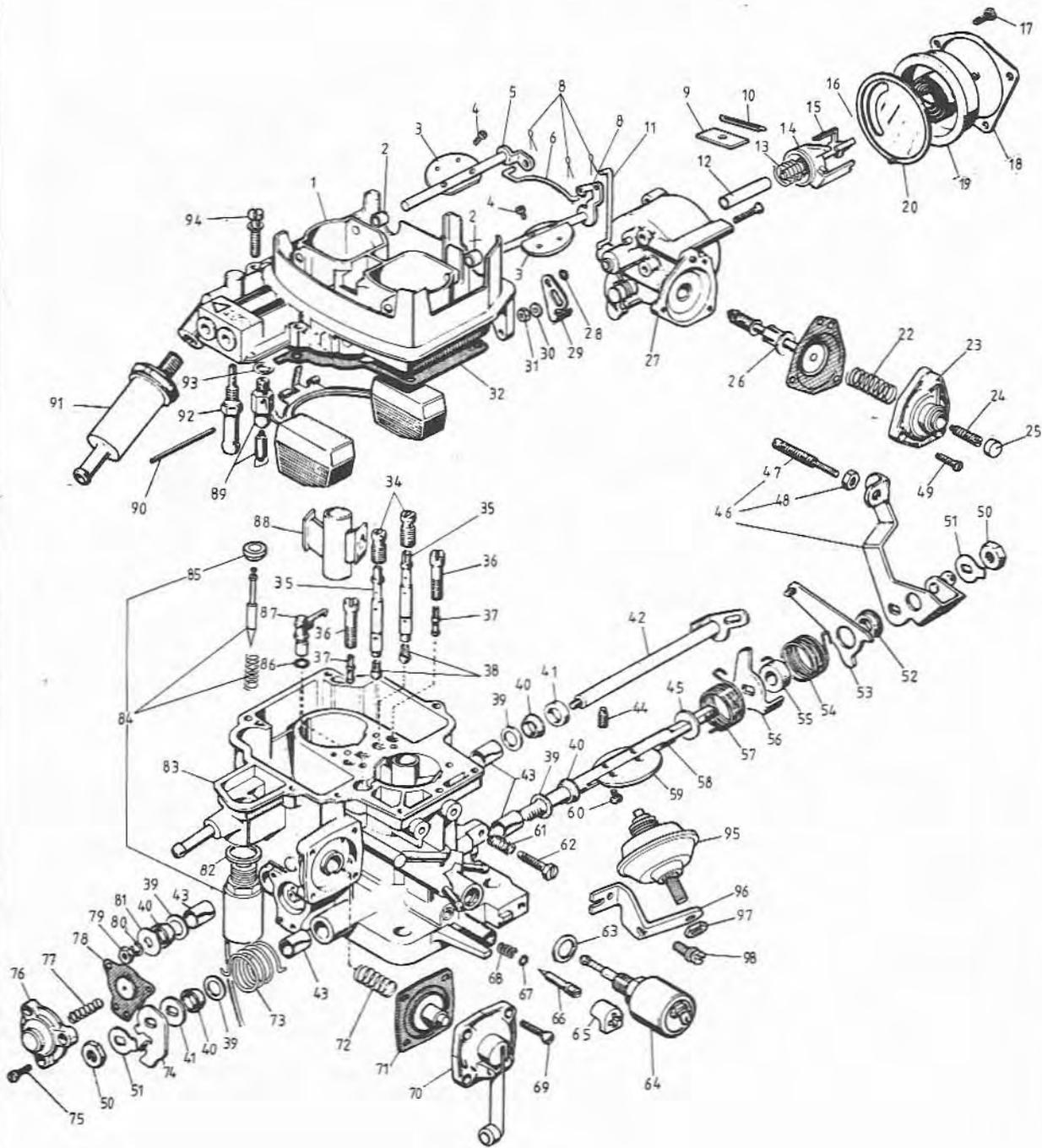
The valve controls two separate vent circuits. When the ignition is on and the engine running, the float chamber is vented to the air cleaner through an internal channel. In this condition the valve solenoid is energised and the rubber seating is pulled against the tension of the return spring. When the ignition is switched off, the solenoid is de-energised and the spring then pushes the seating to shut the air cleaner vent passage and open the passage to the evaporative emission carbon canister.

### Dashpot operation (USA types only)

When the throttle valve is released, the dashpot retards the action of the throttle as it approaches the idling position; this prevents an over weak mixture and therefore reduces the emission of certain harmful gases from the exhaust system.

## 4 Removal and refitting

**Note:** The following procedure gives a general rather than a specific method of removing and refitting the carburettor, as the fitting may vary with different vehicle models.



- 1 Disconnect the battery earth lead.
- 2 Remove the air cleaner cover, air filter element and air cleaner body.
- 3 Disconnect the accelerator cable from the carburettor throttle lever.
- 4 Pull off the distributor and EGR valve vacuum pipes as applicable.
- 5 Pull off the external vent pipe, if fitted.
- 6 Disconnect the fuel inlet hose and return hose.
- 7 Disconnect the electric choke and idle cut off solenoid supply wires.
- 8 Disconnect the vent valve solenoid supply wire, where fitted.
- 9 Unscrew and remove the carburettor mounting nuts and spring washers then withdraw the unit over the mounting studs.
- 10 Remove the inlet manifold gasket and clean all traces from the contact faces of the inlet manifold and carburettor.
- 11 Protect the inlet manifold from the ingress of foreign matter by sealing it with masking tape.
- 12 Refitting is a reversal of removal, but the following additional points should be noted:

(a) Always fit a new gasket and tighten the four retaining nuts in diagonal sequence

(b) The idling adjustment screws should be set as described in Section 8 and finally tuned as described in Section 9

## 5 Disassembly

**Note:** Throughout the disassembly and assembly Sections, reference will be made to the illustration of the 32 DTFA carburettor which is fitted on vehicles operating in the USA. The 32 DFT carburettor (UK type) is basically the same, although some of the external control components are not fitted.

- 1 Thoroughly clean the carburettor exterior and wipe dry.
- 2 Referring to Fig. 10.5, unscrew and remove the fuel filter (91) (photo).

- 3 Unscrew the carburettor cover retaining screws (94) together with the spring washers. Open the throttle so that the fast idle adjusting screw (47) clears the automatic choke aperture and carefully lift the cover (1) from the main body (83) (photo).

- 4 Invert the carburettor cover (1) so that the float assembly is uppermost, then extract the float fulcrum pin (90) and withdraw the float assembly (33) together with the needle of the needle valve (89). If necessary, use a suitable diameter pin punch to tap the pin from the two posts, but on no account prise the slotted post apart (photos).

- 5 Unhook the needle from the float assembly (33).

- 6 Lift the gasket (32) from the cover (1).

- 7 Using a box spanner or socket, unscrew the needle valve (89) seating and remove the gasket (93).

- 8 Unscrew and remove the fuel return pipe check valve (92).

- 9 Unscrew the electric cable retaining screws (17) and withdraw the retaining ring (18) and housing (19) (photos).

- 10 Remove the insulation disc (20) (photo), then unscrew and remove the automatic choke housing retaining screws (21). It will be necessary to rotate the choke valve mechanism in order to reach all of the screws.

- 11 Disengage the choke lever (29) from the primary choke link (11) and withdraw the automatic choke assembly (photo).

- 12 Prise the rubber O-ring seal (28) from the rear of the housing (27) (photo).

- 13 Unscrew and remove the choke pull down cover retaining screws (49) and withdraw the cover (23) and spring (22) (photo).

- 14 Carefully release the thin diaphragm then withdraw the operating rod and diaphragm assembly (26) (photos).

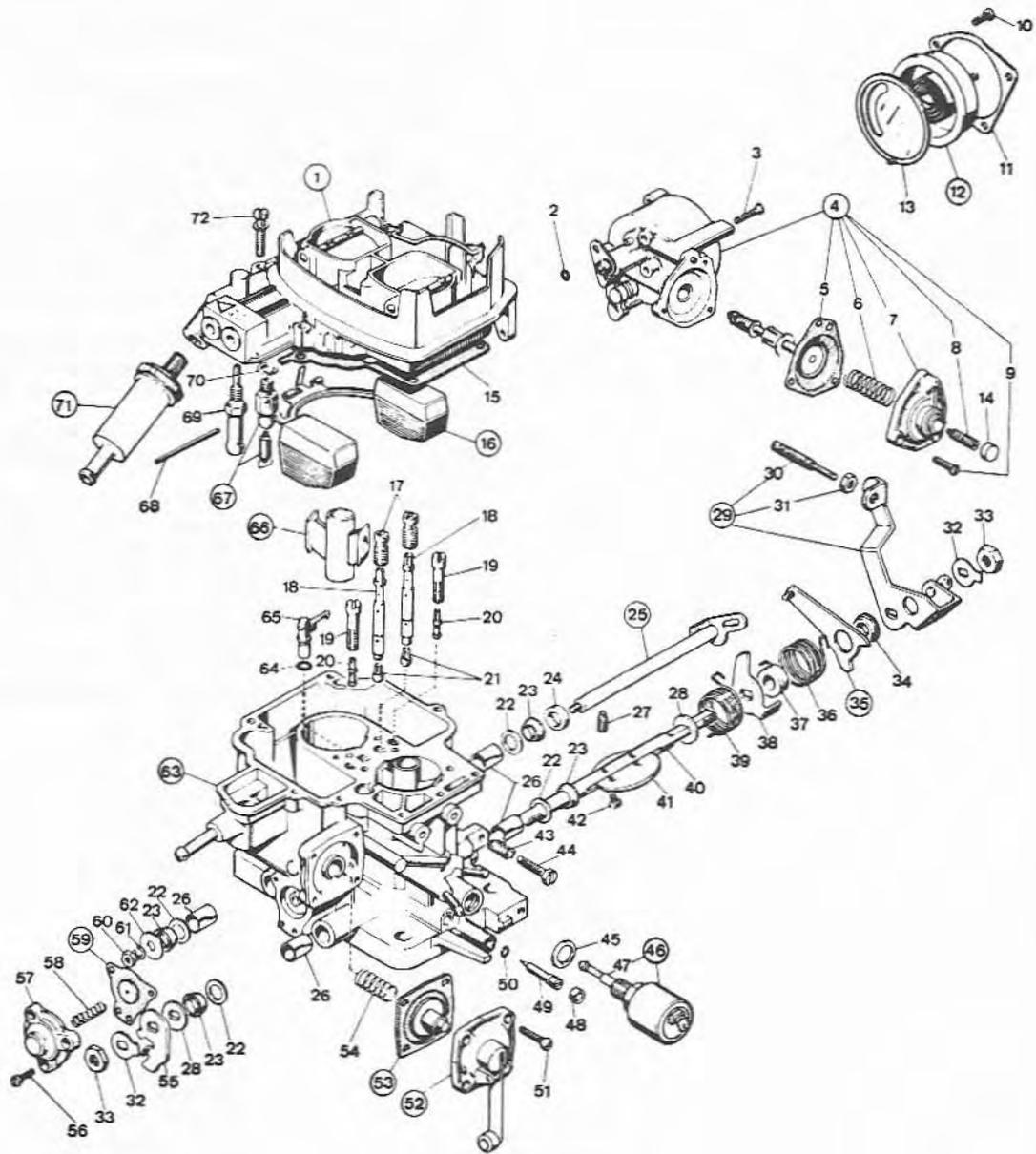
- 15 Note the location of the internal components of the automatic choke, then unscrew and remove the shaft nut (31) and lockwasher (30).

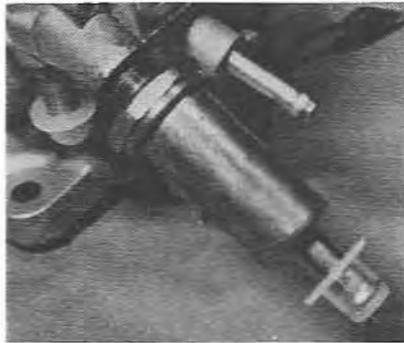
- 16 Remove the choke lever (29) then withdraw the shaft (15) and remove the Teflon (PTFE) sleeve (12).

- 17 Withdraw the lever (14) together with the fast idle cam

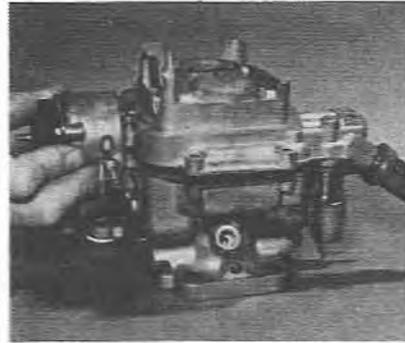
Fig. 10.5 Exploded view of the 32 DFTA carburettor (Sec 5)

1 Cover	34 Air corrector jets	67 O-ring seal
2 Bush	35 Emulsion tubes	68 Spring
3 Choke valves	36 Idle jet holders	69 Screw
4 Retaining screws	37 Idle jets	70 Accelerator pump cover
5 Secondary choke shaft	38 Main jets	71 Diaphragm
6 Link	39 Washer	72 Spring
7 Spring clips	40 Teflon seal	73 Return spring
8 Primary choke shaft	41 Secondary shaft spacer	74 Pump cam
9 Seal	42 Secondary throttle shaft	75 Screw
10 Plug	43 Teflon bushes	76 Power valve cover
11 Link	44 Secondary throttle stop screw	77 Spring
12 Teflon sleeve	45 Spacers	78 Diaphragm
13 Spring	46 Throttle lever	79 Nut
14 Choke lever	47 Fast idle adjustment screw	80 Lockwasher
15 Choke shaft	48 Locknut	81 Washer
16 Auxiliary spring	49 Screw	82 Washer
17 Screw	50 Nut	83 Main body
18 Retaining ring	51 Locktab	84 Vent valve assembly
19 Electric choke unit	52 Bush	85 Valve seat
20 Insulator	53 Intermediate lever	86 O-ring seal
21 Screw	54 Return spring	87 Pump delivery valve and jet
22 Spring	55 Spacer	88 Auxiliary venturi
23 Pull down cover	56 Stop	89 Needle valve
24 Adjusting screw	57 Return spring	90 Fulcrum pin
25 Seal	58 Primary throttle shaft	91 Fuel filter
26 Diaphragm and spindle assembly	59 Throttle valve	92 Fuel return check valve
27 Choke housing	60 Retaining screw	93 Gasket
28 O-ring seal	61 Spring	94 Screw
29 Lever	62 Idle speed screw	95 Dashpot
30 Lockwasher	63 Washer	96 Bracket
31 Nut	64 Idle cut-off solenoid	97 Locknut
32 Gasket	65 Limiter cap	98 Screw
33 Float	66 Idle mixture screw	

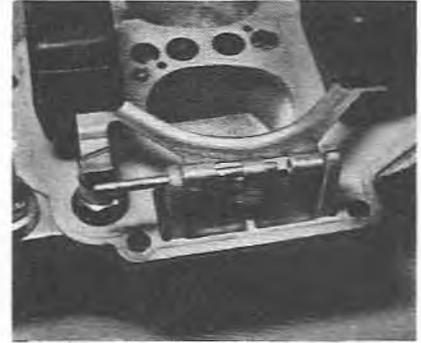




5.2 Removing the fuel filter



5.3 Lifting the carburettor cover



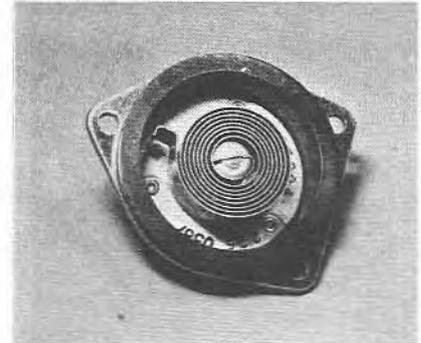
5.4a Extracting the float fulcrum pin



5.4b Removing the float and needle valve



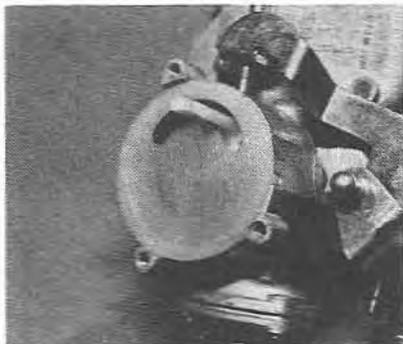
5.9a Removing the electric choke housing



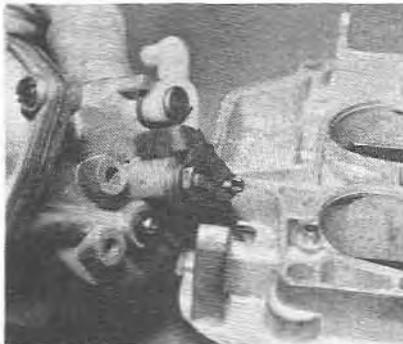
5.9b Showing the location of the electric choke bi-metallic spring

Fig. 10.6 Exploded view of the 32 DFT carburettor (Sec 5)

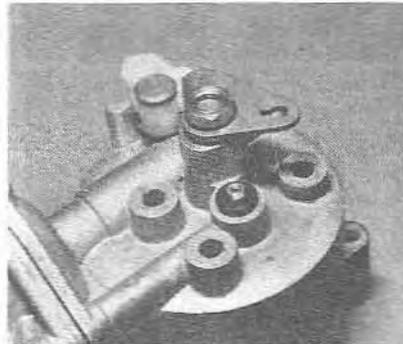
- |                                    |                                  |                                 |
|------------------------------------|----------------------------------|---------------------------------|
| 1 Cover                            | 25 Secondary throttle shaft      | 49 Idle mixture adjusting screw |
| 2 O-ring seal                      | 26 Teflon bushes                 | 50 O-ring seal                  |
| 3 Screw                            | 27 Secondary throttle stop screw | 51 Screw                        |
| 4 Automatic choke                  | 28 Spacer                        | 52 Accelerator pump cover       |
| 5 Diaphragm and spindle assembly   | 29 Throttle lever                | 53 Diaphragm assembly           |
| 6 Spring                           | 30 Adjustment screw              | 54 Spring                       |
| 7 Cover                            | 31 Locknut                       | 55 Pump cam                     |
| 8 Adjusting screw                  | 32 Tab washer                    | 56 Screw                        |
| 9 Screw                            | 33 Nut                           | 57 Power valve cover            |
| 10 Screw                           | 34 Bush                          | 58 Spring                       |
| 11 Retaining ring                  | 35 Intermediate lever            | 59 Diaphragm                    |
| 12 Electric choke unit             | 36 Return spring                 | 60 Nut                          |
| 13 Insulator                       | 37 Spacer                        | 61 Lockwasher                   |
| 14 Seal                            | 38 Stop lever                    | 62 Washer                       |
| 15 Gasket                          | 39 Return spring                 | 63 Main body                    |
| 16 Float assembly                  | 40 Primary throttle shaft        | 64 O-ring seal                  |
| 17 Air corrector jets              | 41 Throttle valve                | 65 Pump delivery valve and jet  |
| 18 Emulsion tubes                  | 42 Retaining screw               | 66 Auxiliary venturi            |
| 19 Idle jet holders                | 43 Spring                        | 67 Needle valve                 |
| 20 Idle jets                       | 44 Idle speed screw              | 68 Fulcrum pin                  |
| 21 Main jets                       | 45 Washer                        | 69 Fuel return check valve      |
| 22 Washer                          | 46 Idle cut-off valve            | 70 Gasket                       |
| 23 Teflon seal                     | 47 Needle                        | 71 Fuel filter                  |
| 24 Secondary throttle shaft spacer | 48 Tamperproof seal              | 72 Screw                        |



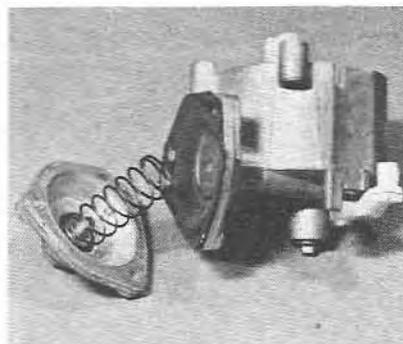
5.10 Electric choke heat insulation disc location



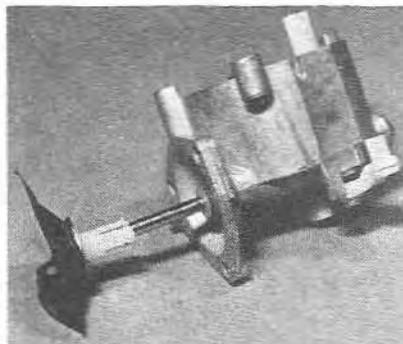
5.11 Disengaging the electric choke lever



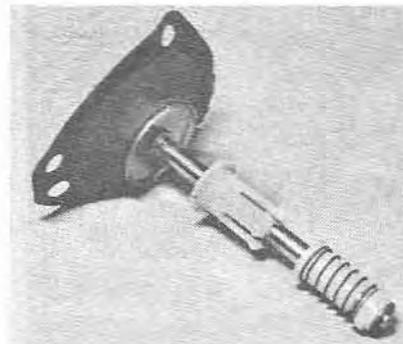
5.12 O-ring seal location on the rear of the electric choke



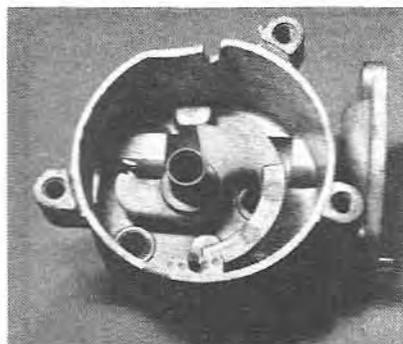
5.13 Removing the choke pull down cover and spring



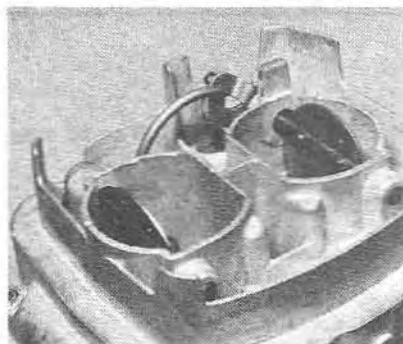
5.14a Withdrawing the electric choke operating rod



5.14b Locking bush location on the electric choke operating rod



5.18 Location of the electric choke fast idle cam and weight



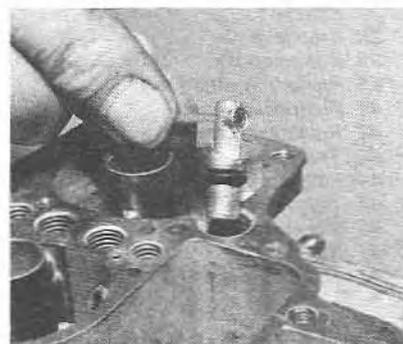
5.19 Choke link locations on the carburetor cover



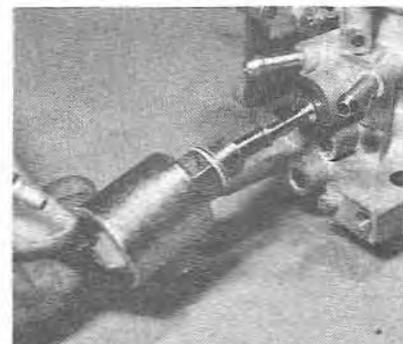
5.24a Removing the accelerator pump cover ...



5.24b ... diaphragm and spring



5.25 Extracting the accelerator pump delivery valve and jet



5.26 Removing the idle cut-off valve

spring (13), then remove the spring (13) from the slot in the lever.

18 Using a suitable diameter metal rod, drive the bush through the automatic choke housing and remove the fast idle cam and weight (photo).

19 Extract the spring clips (7) from the choke links (6 and 11) and remove the links (photo). The lower link (6) must be turned behind the automatic choke mounting before it can be removed.

20 Note the location of each choke valve (3) and mark them, if necessary, with a pencil.

21 Close each choke valve (3) in turn and unscrew the retaining screws (4).

22 Withdraw the choke valves (3) and remove the choke shafts (5 and 8) together with the Teflon bushes (2). Keep the shafts and bushes separate to ensure correct refitting.

23 Using a screwdriver, prise the plug (10) and seal (9) from the cover (1).

24 Unscrew and remove the accelerator pump cover retaining screws (69), then withdraw the cover (70), gasket and diaphragm (71) and spring (72) (photos). *Do not attempt to separate the gasket from the diaphragm as these items are adhered together on manufacture.*

25 Using a screwdriver, prise the accelerator pump delivery valve and jet (87) from the main body (photo), then prise the O-ring seal (86) from the valve.

26 Unscrew and remove the idle cut-off valve (64) and note the number of gaskets (63). Remove the needle from the valve (photo).

27 On USA types only, unscrew and remove the float chamber vent solenoid (84) and washer (82) and withdraw the rod and spring. Pull the rubber seal (85) from the rod (photos).

28 Unscrew and remove the power valve retaining screws (75) and withdraw the cover (76), spring (77) and diaphragm (78) (photos). Take care not to damage the diaphragm (78) and if necessary, ease it away with a thin screwdriver. Do not attempt

to remove the brass insert from the main body.

29 Where fitted on USA types, unscrew the dashpot mounting screw (98) and spring washer and remove the assembly (photo). If necessary, unscrew the nut (97) and remove the dashpot (95) from the bracket (96).

30 Pull the idle limiter cap (65) from the idle mixture adjusting screw (66), then unscrew and remove the screw (66) and spring (68) (photo).

31 Prise the O-ring seal (67) from the adjusting screw (66).

32 Mark the position and location of the auxiliary venturis (88), then remove them from the primary and secondary barrels (photos). If they are tight, open each throttle valve in turn and use a plastic or wooden rod to tap them out. Failure of this method to remove the auxiliary venturis will necessitate obtaining a special Weber removal tool.

33 Unscrew the primary and secondary idle jet holders (36) from the carburettor body and place them in separate marked containers.

34 Separate the idle jets (37) from the holders (36) by pulling them apart (photos).

35 Unscrew the primary and secondary air corrector jets (34), remove them and place them in separate marked containers.

36 Separate the air corrector jets (34), emulsion tubes (35) and main jets (38) by pulling them apart (photo). If they are tight, pliers may be used, but interpose a piece of wood to avoid damaging the surface of the jets.

37 Unscrew and remove the idle speed adjustment screw (62) and spring (61).

38 Bend back the tab washer (51) and unscrew the nut (50) from the end of the primary throttle shaft (58) (photo). If the nut is excessively tight, temporarily fit the idle speed adjustment screw (62) less the spring (61), and turn it almost fully in; this will prevent any damage to the primary throttle valve (59) and shaft (58).

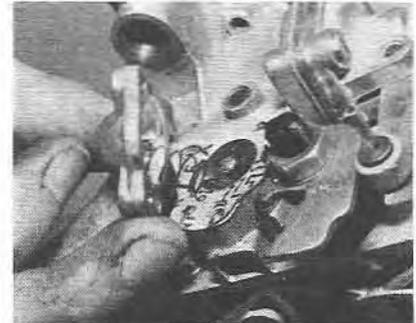
39 Remove the nut (50), tab washer (51), throttle lever (46),



5.27a Removing the float chamber vent solenoid (USA type)



5.27b Removing the vent solenoid valve (USA types)



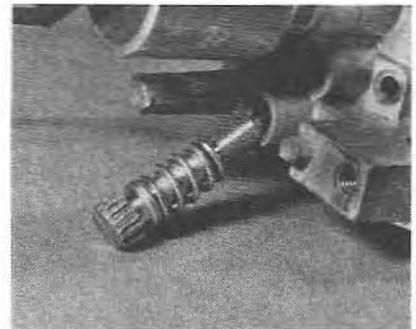
5.28a Lifting off the power valve cover, spring ...



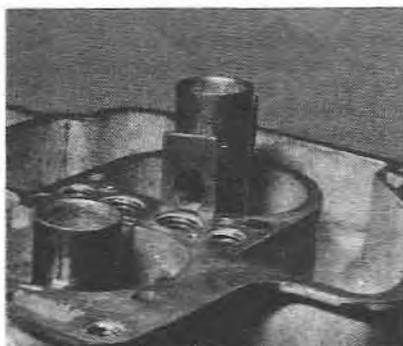
5.28b ... and diaphragm



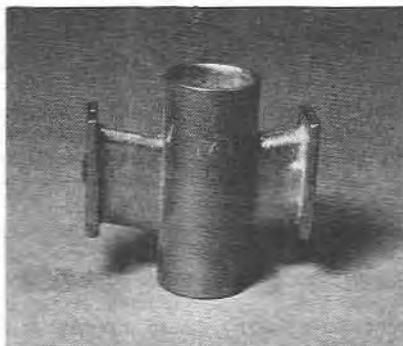
5.29 Dashpot location (USA types)



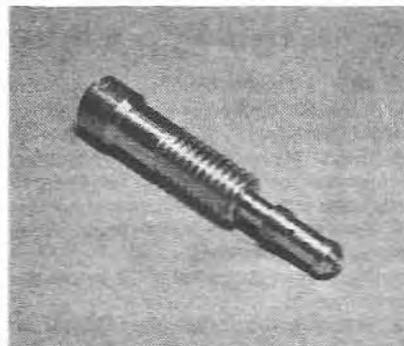
5.30 Idle mixture adjusting screw



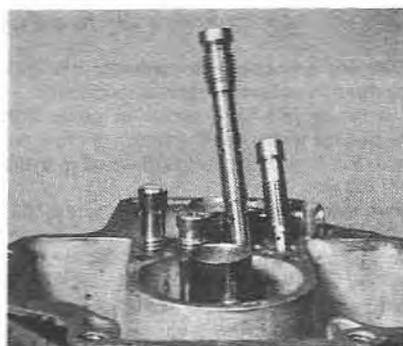
5.32a Removing an auxiliary venturi



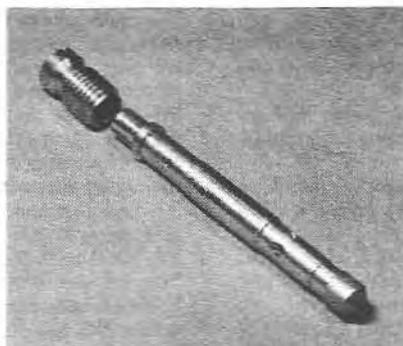
5.32b An auxiliary venturi showing size identification



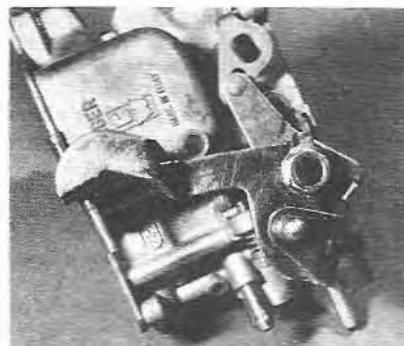
5.34a Idle jet components



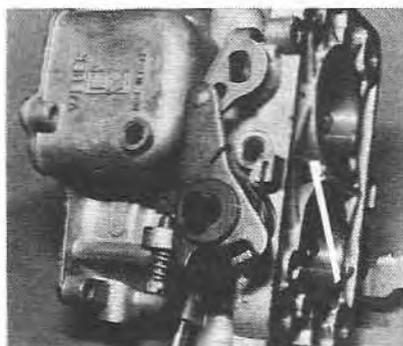
5.34b Idle jet and emulsion tube locations in the main body



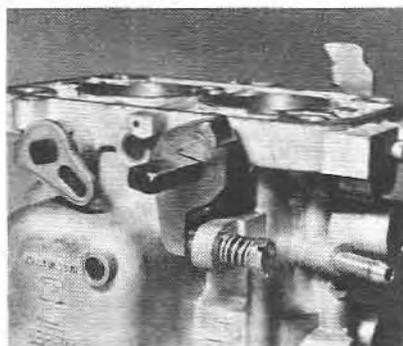
5.36 An air corrector jet and emulsion tube



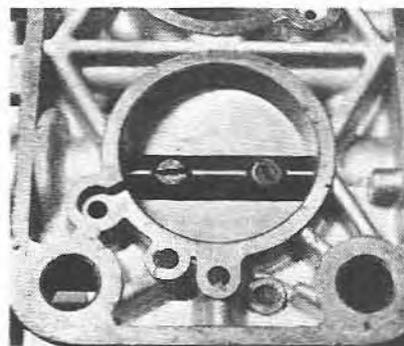
5.38 Primary throttle shaft tab washer and lever location



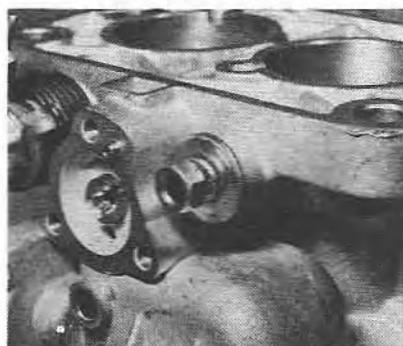
5.39 Primary throttle shaft with lever removed



5.40 Primary throttle shaft stop lever location



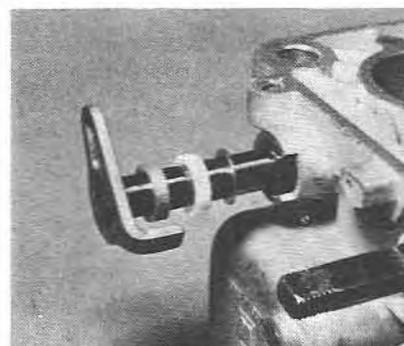
5.42 Primary throttle valve and retaining screws



5.51 Removing the secondary throttle shaft nut



5.52 Removing the secondary throttle valve retaining screws



5.55 Showing the correct location of the secondary throttle shaft spacer, seal and washer

lever (53) and bush (52). It will be necessary to disengage the lever (53) from the return spring (54) (photo).

40 Remove the spring (54) and spacer (55), then remove the stop lever (56) whilst tensioning it against the spring (57) (photo).

41 Disengage the stop lever (56) then withdraw the spring (57) and spacer (45).

42 Mark the primary throttle valve (59) with a pencil so that it can be refitted in its original position, then unscrew and remove the retaining screws (60) (photo).

43 Fully open the primary throttle and remove the valve (59) from the shaft (58) whilst holding the shaft against the tension of the spring (73).

44 Check that the throttle shaft (58) is not damaged where the retaining screws have been peened; if it is, carefully file the shaft with a fine file. If this precaution is not taken, the Teflon bushes (43) may be damaged when the shaft is removed. If the retaining screws (60) are tight due to previous peening, use a file to remove the ends of the screws completely; this will also prevent damage to the shaft (58).

45 Carefully withdraw the primary throttle shaft (58) from the main body, at the same time release the tension on the spring (73).

46 Remove the return spring (73), then prise the outer Teflon seals (40) and washers (39) from the main body.

47 Using a screwdriver, extract the Teflon bushes (43) from the main body; identify them for refitting.

48 Mount the primary throttle shaft (58) in a shaft jaw vice and note the position of the accelerator pump cam.

49 Bend back the tab washer (51) and unscrew the nut (50).

50 Remove the nut (50), tab washer (51), pump cam (74) and spacer washer (45).

51 Unscrew and remove the secondary throttle shaft nut (79) and remove the spring washer (80) and spacer (81) (photo).

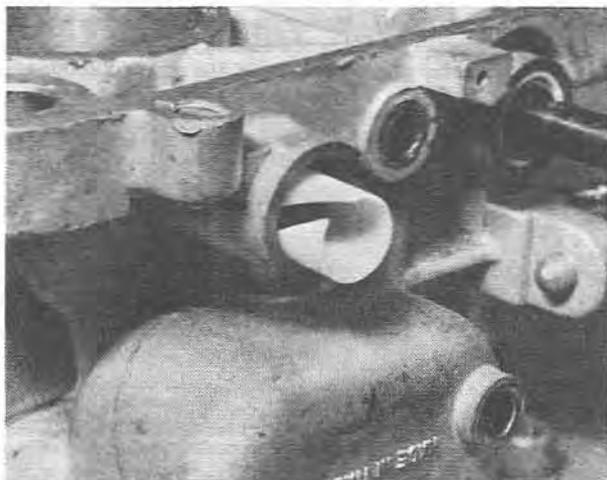
52 Close the secondary throttle and mark it with a pencil so that it can be refitted in its original position, then unscrew and remove the retaining screws (60) (photo). If they are tight, remove the peened ends of the screws with a file.

53 Fully open the secondary throttle and remove the valve (59) from the shaft (42).

54 Check the secondary throttle shaft (42) for damage in the vicinity of the retaining screw holes. Use a fine file to remove any irregularities.

55 Withdraw the secondary throttle shaft (42) from the main body, then prise out the outer Teflon seals (40) and washers (39). Remove the spacer (41) (photo).

56 Using a screwdriver, extract the Teflon bushes (43) from the secondary shaft bore in the main body. Identify them so that they can be refitted in their original locations (photo).



5.56 Removing a Teflon bush from the secondary throttle shaft bore

## 6 Special overhaul procedures

After carrying out the general overhaul procedures given in Chapter 4, the following special procedures should be made:

1 Reform the idling jet seats using the special Weber tool, carefully rotating it in alternate directions. Finish the seatings with the further Weber tool by gently tapping the tool whilst rotating it.

2 Reform the main jet seats at the bottom of the emulsion tube bores using the same procedure described in paragraph 1.

3 Check the Teflon bushes and seals of the choke and throttle valve shaft bores for deterioration and wear and renew them if necessary.

4 Check the choke and throttle shafts for distortion (as a result of peening) in the area around the valve retaining screws. Use a small file to remove any irregularities.

5 Check the internal channels of the main body and cover for blockage by injecting fuel with a syringe and observing that it emerges freely from the particular channel being tested. If any are blocked in the main body, the lead plugs must be drilled out and the channels cleared and checked with Weber tool nos 98014 300, 98014 400 and 98014 500. The channels are of three diameters, ie 1.0 mm, 1.5 mm and 2.0 mm.

6 The main body and cover should be thoroughly cleaned after overhaul, preferably using clean fuel and air pressure. The lead plugs should be renewed and retained in position by using a flat punch to expand them into their bores.

7 Check the condition of the power valve and accelerator pump diaphragms and internal surfaces and renew the diaphragms as necessary. Remove any corrosion or deposits from internal surfaces with a little metal polish.

8 During the manufacture of the carburettor, a ball is inserted into the accelerator pump channel and retained by a brass plug. Check that this ball is free and unobstructed by shaking the carburettor and listening to the ball movement.

9 Check the internal channel of the automatic choke for freedom of blockage. Make sure that the diaphragm and corresponding surfaces are serviceable; if necessary, clean the surfaces with metal polish.

10 Check the roller fitted to the accelerator pump lever for wear and renew it if necessary.

11 It is recommended that the in-line fuel filter is renewed every time the carburettor is dismantled for major overhaul.

12 Check the idle cut-off valve needle and vent valve seating (USA types only) for wear and deterioration. The valve solenoids can be checked for correct operation by connecting a 12 volt positive supply to the lead wires and negative supply to the solenoid bodies. If either valve is proved faulty, renew it.

13 Check the operation of the dashpot (USA types only) and renew it if necessary.

14 Check that the power valve ball and spring are free to operate when depressed with a screwdriver. If the valve is defective, it cannot be renewed and the only course of action is to obtain a new carburettor.

## 7 Assembly

**Note:** All components should be clean and dry before starting the assembly procedure.

1 Insert the Teflon bushes (43) into the secondary shaft bore in the main body. To do this, curl them into a small diameter and expand them into the bores making sure that they are fully entered.

2 Fit the washers (39) and outer Teflon seals (40) making sure that the closed ends of the latter are entered first (photo).

3 Fit the spacer (41) to the secondary throttle shaft (42), then fit the shaft to the main body so that the lever lug locates against the secondary throttle stop screw (44).

4 Fit the spacer (81), spring washer (80), and secondary throttle shaft nut (79). Tighten the nut (79) with the lever against the bottom of the float chamber.

5 Close the secondary throttle shaft against the stop screw then open it approximately 90°.

6 Insert the secondary throttle valve (59) into the shaft slot, then close the valve and check that the angled perimeter seats correctly in the secondary barrel.

7 With the throttle valve (59) held firmly closed, insert the retaining screws (60) and tighten them evenly. It is recommended that new screws are always fitted as it is quite easy to cross-thread previously peened screws. Lock the screws (60) by peening with the Weber tool no 98010 900 whilst supporting the shaft (42) with a block of wood. Alternatively, coat the screw threads with a liquid locking agent (fuel resistant) prior to inserting them.

8 Mount the primary throttle shaft (58) in a soft jaw vice with the short cutaway uppermost, then fit the spacer washer (45), pump cam (74), tab washer (51) and nut (50); tightening the latter finger tight.

9 Insert the Teflon bushes (43) into the primary bore of the main body using the procedure given in paragraph 1.

10 Fit the washers (39) and outer Teflon seals (40) making sure that the closed ends of the latter are entered first.

11 Check that the pump cam (74) on the primary shaft (58) is facing the same way as the countersunk valve retaining screw holes.

12 Fit the return spring (73) (the thick, heavy spring) to the main body making sure that the angled end is fully entered in the locating hole.

13 Insert the primary throttle shaft (58) from the accelerator pump end of the carburettor. At the same time engage the pump cam with the hooked end of the spring (photo).

14 Tension the spring (73) through approximately 180°, fully enter the shaft and release it so that it rests against the power valve casting.

15 Fit the spacer (45) and spring (57), making sure that the angled end of the latter is fully entered in the locating hole.

16 Locate the stop lever (56) over the primary throttle shaft (58), push it fully on and turn it to position the flat edge against the idle speed adjusting screw (62) aperture.

17 Using a small screwdriver, tension the return spring (57) and hook it over the stop lever (56).

18 Fit the spacer (55) and spring (54), making sure that the angled end of the latter is fully entered in the locating hole.

19 Locate the intermediate lever (53) over the primary throttle shaft (58) and engage it with the hooked end of the spring (54).

20 Turn the lever (53) to tension the spring (54), then insert the dowel on the end of the lever (53) into the elongated hole on the end of the secondary throttle shaft (42).

21 Fit the bush (52) into the lever (53) and press both items fully onto the shaft (58), making sure that no coils of the spring (54) are trapped behind the lever.

22 Fit the throttle lever (46), tab washer (51) and nut (50); tightening the latter finger tight.

23 Fully open the primary throttle shaft (58) and insert the primary throttle valve (59) into the shaft slot. Close the valve

and check that the angled perimeter seats correctly in the primary barrel.

24 With the throttle valve (59) held firmly closed, insert the retaining screws (60) and tighten them evenly. Refer to paragraph 7 for details of recommendations for the fitting of the retaining screws.

25 Hold the throttle lever (46) stationary in the closed position and tighten the shaft nuts (50). Do not overtighten the nuts.

26 Bend the tab washers (51) to lock the nuts. Check that the primary and secondary throttle valves operate smoothly and fully.

27 Locate the spring (61) to the idle speed adjustment screw (62) and fit the screw into the main body.

28 Press the main jets (38) fully into the bottom of the emulsion tubes (35), then press the top of the emulsion tubes (35) fully into the air corrector jets (34) making sure that the primary and secondary components are kept separate and identified.

29 Insert the emulsion tubes into their correct locations in the main body and tighten the air corrector jets (34).

30 Press the idle jets (37) fully into their holders (36) keeping the primary and secondary components separate.

31 Insert the idle jets into their correct locations in the main body and tighten the holders (36).

32 Fit the auxiliary venturis (88) into their respective positions as noted previously, making sure that the supply channels are adjacent and that the nozzle cutaway apertures face the throttle valves. Press the auxiliary venturis fully home (photo).

33 Locate the O-ring seal (67) in the groove on the idle mixture adjusting screw (66).

34 Locate the spring (68) on the idle mixture adjusting screw (66), then fit the screw (66) to the main body.

35 Where applicable on USA types, fit the dashpot (95) to the bracket (96), then fit and tighten the nut (97). Locate the bracket (96) to the main body and tighten the retaining screw (98) and spring washer. The dashpot must be adjusted as described later in Section 8.

36 Locate the power valve diaphragm (78) onto the main body with the small dowel entered against the valve ball.

37 With the carburettor on its side, place the spring (77) in the centre of the diaphragm plate and lower the cover (76).

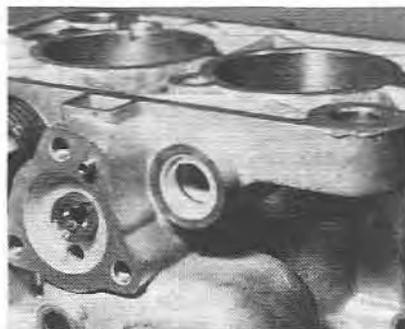
38 Press the cover (76) against the diaphragm, then insert and tighten the retaining screws (75).

39 On USA types only, locate the washer (82) onto the float chamber vent solenoid (84), then tighten the solenoid into the main body. Press the rubber seal (85) over the rod and locate the spring onto the rod, then lower the rod into the valve solenoid from the top of the carburettor.

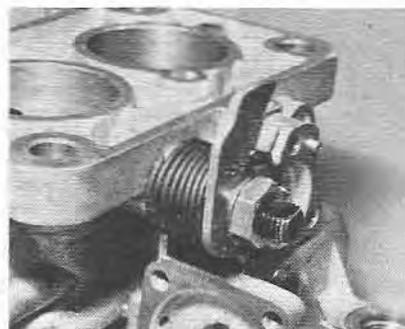
40 Insert the needle into the idle cut-off valve (64) and fit the gaskets (63) in the same quantity as previously noted, then tighten the valve (64) into the main body.

41 Locate the O-ring seal (86) onto the accelerator pump delivery valve and jet (87), then press the jet (87) firmly into the main body, using the flat blade of a screwdriver if necessary.

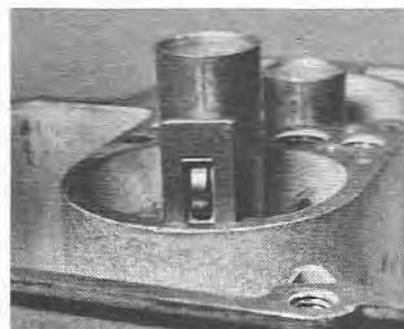
42 With the carburettor on end, insert the spring (72) into the



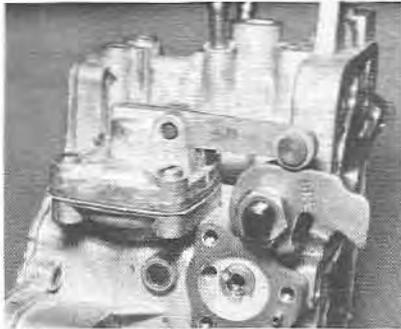
7.2 Assembled seals and washer in the secondary throttle shaft bore



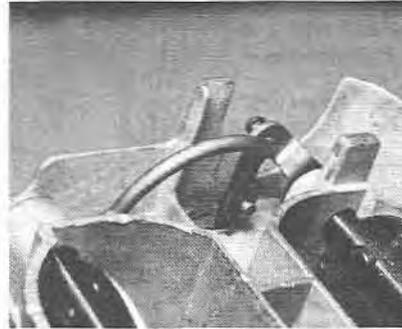
7.13 Engaging the primary throttle shaft return spring with the accelerator pump cam



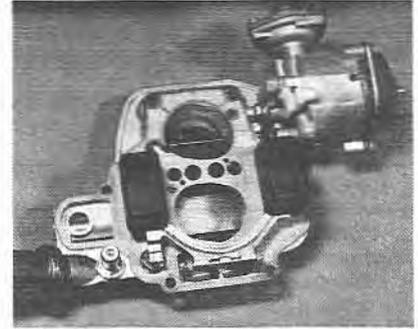
7.32 Inserting an auxiliary venturi



7.43 Correct fitted position of the accelerator pump cover



7.47 Correct fitted position of the choke links



7.67 Float assembly location on the carburettor cover

accelerator pump chamber, then position the gasket and diaphragm (71) onto the spring with the extended section uppermost.

43 Lower the cover (70) onto the gasket and press it firmly against the main body, then insert and tighten the retaining screws (69) evenly and in diagonal sequence (photo).

44 Insert the seal (9) into the cover (1) and retain by pressing the plug (10) into the slot.

45 Insert the Teflon bushes (2) in the choke shaft bores, locating the shorter ones at the inlet end of the cover.

46 Insert the choke shafts (5 and 8) into their correct locations as previously noted; refer to Fig. 10.5 if necessary.

47 Fit the choke links (6 and 11) and retain with the spring clips (7). Make sure the links are entered from the correct sides as shown in Fig. 10.5 (photo).

48 With the choke shafts (5 and 8) in the fully open position, fit the choke valves (3) into their location slots, then close the valves to allow them to centralise. Make sure that the valves are fitted in their previously noted positions with the flat edge facing downward; the stamped line should be uppermost with the valves closed.

49 Insert the valve retaining screws (4) and tighten them evenly. It is recommended that new screws are always fitted as it is quite easy to cross-thread previously peened screws. Lock the screws (4) by peening with the special Weber tool whilst supporting the shafts with a piece of wood. Alternatively, coat the screw threads with a liquid locking agent (fuel resistant) prior to inserting them.

50 Check that the choke valves and links operate fully and smoothly.

51 Locate the automatic choke fast idle cam and weight on the bush and drive the bush fully into the choke housing (27) using a hammer and a plastic or wooden dowel.

52 Insert the spring (13) into the slot in the lever (14), making sure that the angled end locates fully in the special hole.

53 Hold the housing (27) vertical with the cam weight at the bottom, then fit the lever (14) with the plastic prong at the 2 o'clock position, ie the spring extension must be to the left of the internal lever.

54 Locate the Teflon sleeve (12) over the shaft (15), then insert the shaft into the housing (27) so that the short arm engages the slot in the lever (14) and is located below the fast idle cam serrations, ie adjacent to the weight.

55 Hook the spring onto the dowel in the housing, then fit the choke lever (29), lockwasher (30) and nut (31). Note that the lever (29) must be positioned so that it can contact the stop abutment.

56 Tighten the nut (31) whilst holding the plastic lever on the rear of the housing against the spring tension. If this precaution is not taken it is possible to distort the internal arms.

57 Turn the lever (14) anti-clockwise, then insert the operating rod and diaphragm (26) and press the bush firmly into the housing. The diaphragm must be located over the brass dowel.

58 With the housing (27) on end, position the spring (22) on

the diaphragm (26) then lower the cover (23) and press it onto the diaphragm.

59 Insert and tighten the retaining screws (49).

60 Press the rubber O-ring seal (28) to the rear of the housing (27).

61 Engage the choke lever (29) with the primary choke link (11), then insert and tighten the automatic choke housing retaining screws (21).

62 Insert and tighten the fuel return pipe check valve (92) into the carburettor cover (1).

63 Fit the gasket (93) to the needle valve (89) seating then tighten it into the carburettor cover (1).

64 Invert the cover (1) and fit the gasket (32) making sure that it is correctly located.

65 Lower the needle into the needle valve (89) seating.

66 Fit the float assembly (33) between the two fulcrum pivot posts, at the same time insert the tab under the needle hook.

67 Insert the fulcrum pin (90) through the posts and float arm and, if necessary, lightly pinch the slotted post with a pair of flat pliers to retain the pin (photo).

68 The float level adjustment must now be checked in the following manner: Hold the carburettor cover vertically so that the floats hang from the fulcrum pin with the float arm in light contact with the needle ball (ie the ball is not depressed). Obtain a drill or dowel rod of diameter equal to the closed checking dimension (see Adjustment data) and check that the distance from the cover gasket (32) to the nearest part of the floats is correct.

69 If the dimension checked in paragraph 68 is not correct, carefully bend the tab in contact with the needle as necessary.

70 Tilt the carburettor cover so that the floats move away from the cover and the tab on the float arm contacts the needle valve seating. Now, using the same method described in paragraph 68, check the needle valve fully-open dimension (see Adjustment data).

71 If the dimension checked in paragraph 70 is not correct, carefully bend the angled tab as necessary.

72 The difference between the dimensions obtained in paragraphs 68 and 70 is the needle valve stroke, which must be as given in the Adjustment data.

73 Hold the throttle lever open and lower the cover (1) onto the main body, then release the throttle.

74 Insert the cover retaining screws (94) together with spring washers and tighten them evenly in diagonal sequence.

75 Fit and tighten the fuel filter (91).

76 The carburettor is now completely assembled except for the automatic electric choke housing (19). Before fitting this component, the adjustments as given in Section 8 must first be made.

77 To complete the automatic choke assembly, first fit the insulation disc (20) with the location peg at the bottom.

78 Locate the thermostat assembly (19) over the disc, at the same time engage the bi-metallic spring with the choke lever (14).

- 79 Fit the retaining ring (18) and insert the screws (17).  
 80 Align the marks on the thermostat assembly (19) and housing (27) (ie centre mark), then tighten the retaining screws (17).  
 81 Press the limiter cap (65) onto the idle mixture screw (66) with the extension pointing away from the main body abutment.

## 8 Carburettor adjustments

With the carburettor completely assembled, the following adjustments must be made prior to fitting it to the engine:

- 1 Fully open the throttle, hold the choke valves fully open and release the throttle. Turn the throttle idling adjustment screw (62) until it just touches the idle stop lever (56), then continue to screw it in 1 complete turn.
- 2 Turn the idling mixture screw (66) in until it is in light contact with its seat, then back it off 1 complete turn.
- 3 Turn the secondary throttle adjustment stop (44) until a gap of 0.05 mm (0.002 in) exists between the outer edge of the secondary throttle valve and the secondary barrel. Check the gap with feeler gauges.

### Vacuum pull down

- 4 Fit an elastic band to the choke lever (14) and over the cover (1) so that it holds the choke valves (3) shut. Open the throttle to allow the choke valves to fully close.
- 5 Using a small electrician's screwdriver, push the contact ring on the diaphragm spindle until the spindle is in firm contact with the adjustment screw (24). Using a drill or metal dowel, check that the distance between the choke valve straight edges and the intake walls is as given in the Adjustment data under maximum vacuum pull down.
- 6 To check the minimum vacuum pull down, use long nose pliers to hold the diaphragm spindle in firm contact with the adjustment screw (24), but make sure that the modulator spring is compressed fully. Use a drill to make the check in the identical manner to that given in paragraph 5. Note that on some carburettor types the minimum vacuum pull down can be checked by inserting a screwdriver through a hole in the housing (27); on other models this hole is blanked off.
- 7 If any of the dimensions checked in paragraphs 5 and 6 are not correct, the adjustment screw (24) must be turned as necessary. This will necessitate removing the seal (25) and the owner must be satisfied that no legislation is being contravened by this action.

### Choke phasing

- 8 Open the throttle then release it and position the fast idle adjusting screw (47) on the middle step of the fast idle cam.
- 9 Close the choke valves as far as possible by turning the choke lever (14) anti-clockwise. Using a drill, check that the distance between the choke valve straight edges and the intake walls is as given in the Adjustment data. If not, carefully bend the short arm on the shaft (15) as necessary (ie the internal arm).

### Dechoke adjustment

- 10 Open the throttle and fully close the choke valves by turning the choke lever (14) anti-clockwise. While holding the lever (14), fully open the throttle. The distance between the choke valve straight edges and the intake walls should be as given in the Adjustment data when checked with a suitable drill. If not, bend the choke lever (29) as necessary.

### Fast idle adjustment

- 11 Open the throttle and position the fast idle adjusting screw (47) on the highest section of the fast idle cam. Using a feeler gauge, check that the distance between the primary throttle valve and the outer barrel wall is as given in the Adjustment data. If not, loosen the locknut (48) and turn the adjusting screw (47) as necessary; tighten the locknut when the adjustment is completed (photo).

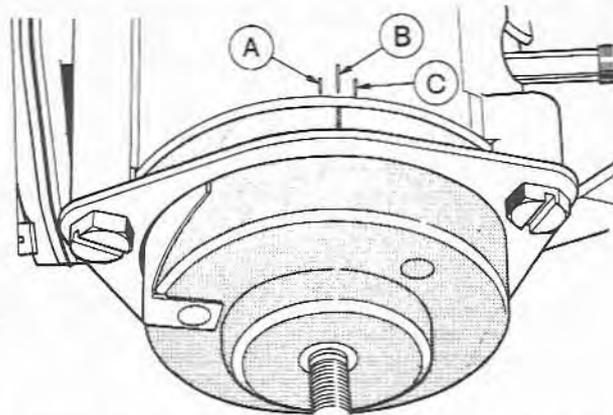


Fig. 10.7 The automatic choke alignment marks (Sec 7)

- A Rich position  
 B Normal position  
 C Lean position

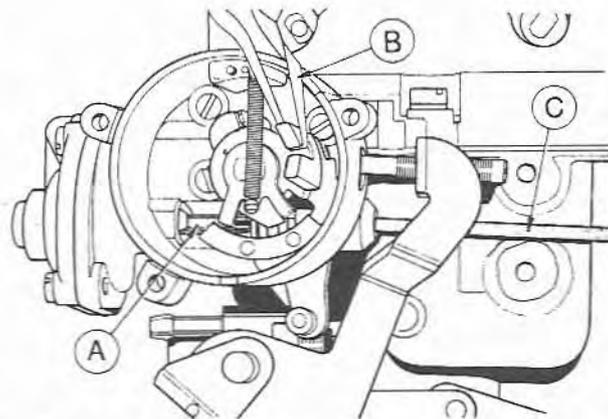


Fig. 10.8 Checking the vacuum pull down adjustment (Sec 8)

- A Diaphragm spindle C Screwdriver (only possible on some types)  
 B Elastic band

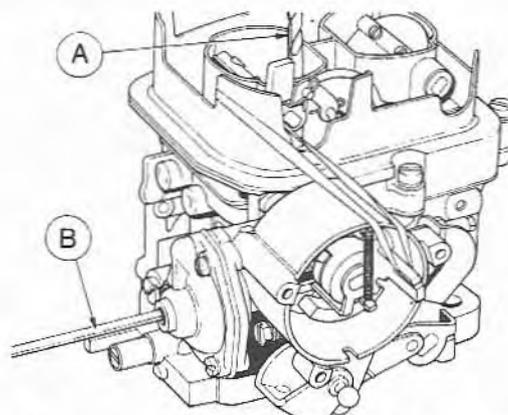


Fig. 10.9 Using a drill to check the vacuum pull down dimension (Sec 8)

- A Drill  
 B Screwdriver

**Dashpot adjustment (USA types)**

- 12 Determine the primary throttle opening for adjustment of the dashpot from the Adjustment data.
- 13 Open the primary throttle, insert the correct size feeler gauge and close the valve onto the gauge.
- 14 Loosen the dashpot locknut (97) and adjust the dashpot so that its plunger is just touching the throttle lever, then tighten the locknut.
- 15 Remove the feeler gauge.

**9 Tuning**

**Note:** Refer to Chapter 3 for general notes on tuning.

- 1 The idling adjustment screws should be set to their preliminary positions as described in Section 8 paragraphs 1 and 2.
- 2 Refer to Part 1 of this Manual for information on tamperproofed carburetors.
- 3 Connect a tachometer to the engine in accordance with the manufacturer's instructions.
- 4 Connect an exhaust gas analyser to the exhaust pipe in accordance with the manufacturer's instructions.
- 5 Where an electric fan is fitted, disconnect the sensor wires and connect them together with a further length of wire to ensure that the fan is working continually during the adjustment procedure.
- 6 Start the engine and run until normal operating temperature has been reached (ie the thermostat has opened).
- 7 Turn the idling speed adjustment screw so that the engine runs at the recommended idling speed for the particular engine being worked on; this will be approximately 800 rpm.
- 8 Turn the idle mixture adjustment screw in or out until the engine runs at the highest rpm commensurate with even running. Check that the CO level indicated on the analyser is within the manufacturer's recommended limits and make any fine adjustments to the mixture screw as necessary.
- 9 If necessary, re-adjust the idle speed screw to bring the engine speed within limits.
- 10 Switch off the engine and remove the tachometer and



8.11 Showing the throttle lever and the fast idle adjusting screw

analyser, then reconnect the electric fan connections.

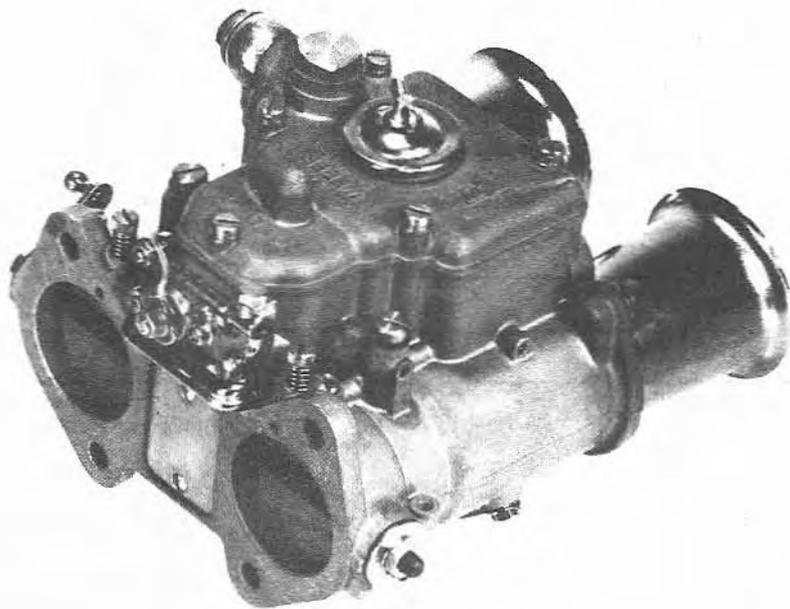
11 The automatic choke fast idle setting can be checked if necessary with the engine running. First remove the air cleaner and set the fast idling adjustment screw on the high cam position by fully opening the throttle lever, closing the valves manually and then releasing the throttle. From this stage onward, do not touch the throttle lever otherwise the fast idle cam may move.

12 With the engine at operating temperature and a tachometer connected, check the fast idle engine speed which should be approximately 1800 to 2000 rpm according to the manufacturer's recommendations. If not, loosen the locknut and adjust the fast idle adjusting screw as necessary. When rechecking the speed, always make sure that the adjusting screw is located on the highest section of the fast idle cam.

13 Tighten the locknut, and remove the tachometer.

**10 Fault diagnosis**

Symptom	Reason
Engine will not start	Faulty automatic choke Blocked fuel filter or jets
Uneven idling	Leaking carburettor flange or manifold gasket Loose idling jets or auxiliary venturis Excessive sediment or water in carburettor Worn throttle shaft bushes and seals Secondary throttle valve partially sticking open Leaking ignition advance tube or EGR tube (USA type) Faulty idle cut-off valve Faulty vent valve (USA type)
Carburettor floods	Worn needle valve Leaking or damaged float assembly Incorrect float level adjustment Excessive sediment in fuel
Engine lacks performance	Incorrect tuning adjustments Incorrect float level adjustments Excessive sediment in fuel Faulty acceleration pump Throttle valves not fully opening Faulty vent valves (USA type)
Excessive fuel consumption	Needle valve not seating Leaking or damaged float assembly Incorrect float level adjustments Choked air filter Faulty automatic choke



## Part 2 Weber carburetors

### Chapter 11 Type 38 to 48 DCOE

#### Contents

	<i>Section</i>		<i>Section</i>
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Construction .....	2	Removal and refitting .....	4
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Introduction .....	1		

**Adjustment data**

*Note: The following information applies to standard Weber fittings only and is not necessarily correct for non-standard fittings.*

**Accelerator pump stroke**

	in (mm)
40 DCOE Series 2, 4, 24, 27, 28, 32, 33 .....	0.551 (14.0)
45 DCOE Series 15/16 .....	0.551 (14.0)
40 DCOE Series 18, 22/23, 29/30 .....	0.394 (10.0)
42 DCOE Series 8 .....	0.394 (10.0)
45 DCOE Series 9, 14, 14/18, 17 .....	0.394 (10.0)
40 DCOE Series 31, 34/35, 44/45, 76/77 .....	0.630 (16.0)
45 DCOE Series 38/39, 62/63, 68/69 .....	0.630 (16.0)
40 DCOE Series 72/73, 80/81 .....	0.709 (18.0)

**Float level setting dimension**

	Closed position	Open position	Stroke
40 DCOE Series 2, 4, 18, 22/23, 24, 27, 28, 31, 32, 33, 34/35 .....	0.335 in (8.5 mm)	0.591 in (15.0 mm)	0.256 in (6.5 mm)
45 DCOE Series 14, 14/18, 17 .....	0.335 in (8.5 mm)	0.591 in (15.0 mm)	0.256 in (6.5 mm)
40 DCOE Series 29/30 .....	0.197 in (5.0 mm)	0.453 in (11.5 mm)	0.256 in (6.5 mm)
40 DCOE Series 44/45 .....	0.276 in (7.0 mm)	0.551 in (14.0 mm)	0.276 in (7.0 mm)
40 DCOE Series 72/73, 76/77, 80/81 .....	0.295 in (7.5 mm)	0.551 in (14.0 mm)	0.256 in (6.5 mm)
45 DCOE Series 15/16 .....	0.295 in (7.5 mm)	0.551 in (14.0 mm)	0.256 in (6.5 mm)
42 DCOE Series 8 .....	0.197 in (5.0 mm)	0.532 in (13.5 mm)	0.335 in (8.5 mm)
45 DCOE Series 9: Aston Martin DB4 Vantage GT and Maserati 3500 GT Speciale .....	0.197 in (5.0 mm)	0.532 in (13.5 mm)	0.335 in (8.5 mm)
Alfa Romeo and Aston Martin DB5 .....	0.276 in (7.0 mm)	0.532 in (13.5 mm)	0.256 in (6.5 mm)
45 DCOE Series 38/39, 62/63, 68/69 .....	0.197 in (5.0 mm)	0.551 in (14.0 mm)	0.354 in (9.0 mm)

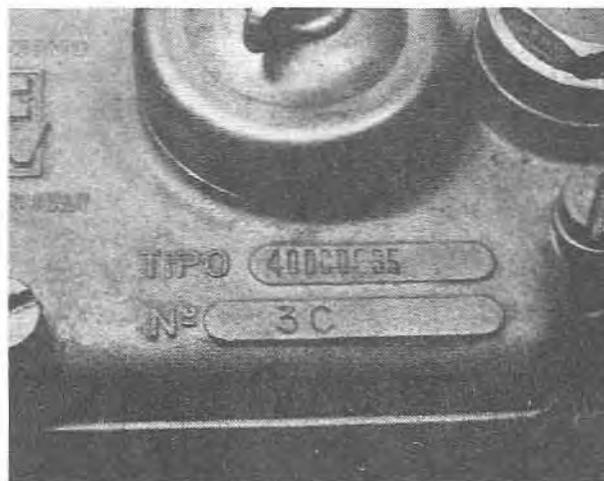
**1 Introduction**

The Weber DCOE carburettor is of the horizontal, side-draught type and has two identical barrels fed by a common centrally located float chamber. The throttle valves are mounted on a common spindle and are of the synchronised, simultaneous operation type.

The carburettor may be fitted on the engine in several different arrangements, the most common being listed as follows:

- 1 One unit on a four-cylinder in-line engine, ie each barrel feeds two cylinders
- 2 Two units on a four-cylinder in-line engine, ie each barrel feeds one cylinder via short inlet manifolds
- 3 Two units on a four-cylinder V-configuration engine, ie each barrel feeds one cylinder
- 4 Three units on a six-cylinder in-line engine, ie each barrel feeds one cylinder
- 5 Two units on a six-cylinder in-line engine with one inlet manifold for each carburettor, ie each carburettor feeds three cylinders

The carburettor identification mark is located on the upper cover (photo).



1.3 Identification mark location

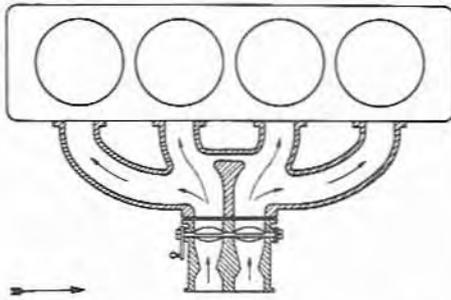


Fig. 11.1 One carburettor fitted to a four-cylinder in-line engine (Sec 1)

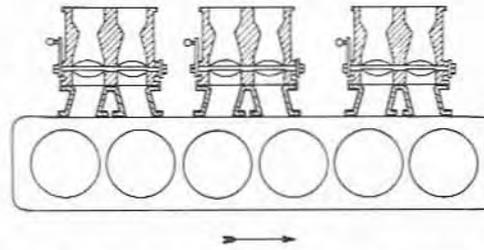


Fig. 11.4 Three carburetors fitted to a six-cylinder in-line engine (Sec 1)

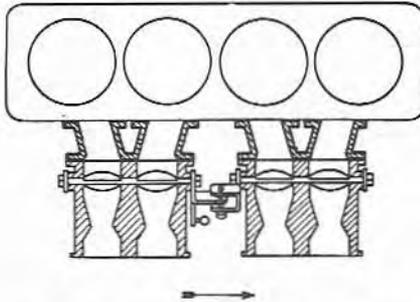


Fig. 11.2 Two carburetors fitted to a four-cylinder in-line engine (Sec 1)

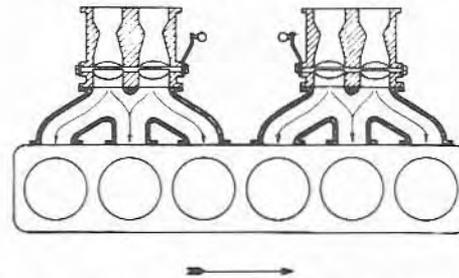


Fig. 11.5 Two carburetors fitted to a six-cylinder in-line engine (Sec 1)

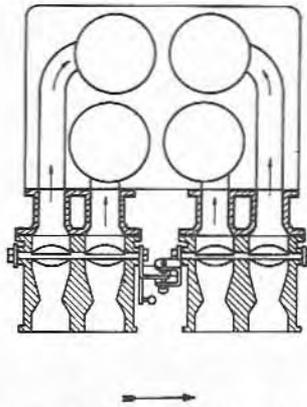


Fig. 11.3 Two carburetors fitted to a four-cylinder V-engine (Sec 1)

2 Construction

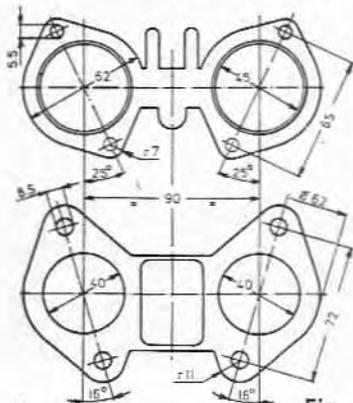
The main body and covers of the Weber DCOE carburettor are of die-cast aluminium construction. The two mounting flanges are machined flat for fitting on the inlet manifold.

Early types are fitted with a brass throttle spindle. Later types have a steel spindle which incorporates two slots to accommodate the two brass throttle valves.

The air horns are of steel construction and are attached to the carburettor body by studs and nuts.

All fuel and air jets and emulsion tubes are of brass construction and are screw fittings into the main body. The internal channels of the main body are mostly drilled and where necessary, sealed with lead plugs.

The throttle spindle is supported by two ball-bearings in most types and spring tensioned seals are incorporated at each end of the spindle to prevent air being drawn through the bearings.



\* ALL DIMENSIONS IN MILLIMETRES

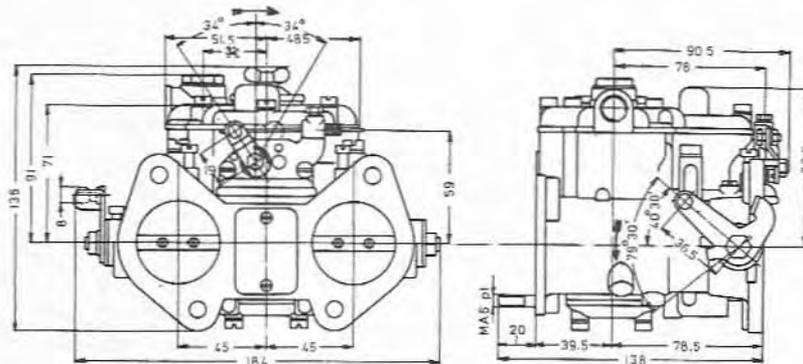


Fig. 11.6 Overall dimensions of the DCOE carburettor (Sec 2)

The fuel float assembly comprises two semi-floats constructed of thin brass sheet. Each float consists of two halves soldered together.

### 3 Operation

#### Cold starting

Not all of the DCOE range of carburetors are fitted with starting devices, the 40 DCOE 20 to 22 and 45 DCOE 12 types being the exception. Where fitted, the starter circuits operate independent of the main circuits and may be considered as separate carburetors within the main carburettor. The system functions as follows:

Operation of the choke (or to be precise cold start) cable moves the starter device lever which, through two intermeshed sector gears, lifts the two starter valves off their seats. Reference to Fig. 11.7 will show that fuel from the float chamber (4) is drawn through the channels (32) to arrive at the starter fuel jets. Air entering the carburettor through hole (29) passes through the top and bottom of the starter jets (30) and emulsifies the fuel which is then drawn through the channels (31), past the starter valves (35), through the channels (33) and into the carburettor throats at the engine side of the throttle valves. It will be observed that additional air is introduced to the emulsified fuel through the starter valve spring retainer guide and through the starter device air filter and channels (34).

Partial operation of the starter device (ie when the engine is warming up) will reduce the amount of fuel admitted to the engine by lowering the starter valves (35) onto their seats and, when completely shut, the supply will cease.

#### Idling and progression

Refer to Fig. 11.8 and note that when the engine is idling with the throttle valves (17) closed, fuel is drawn from the float chamber (4), through the channels (15) to the bottom of the idling jets (14). On passing through the idling jets, air is introduced through the channels (13) and the holes in the sides of the idling jets and the fuel then becomes emulsified.

The mixture then passes through the channels (20), past the idling adjusting screws (19), through the idling feed holes (18) and into the carburettor throats at the engine side of the throttle valves. The idling adjusting screws (19) have tapered

ends and can therefore be adjusted to admit more or less mixture as necessary.

When the throttle valves are opened slightly to increase the engine speed, the progression holes (16) are brought into action to provide additional fuel. This is necessary in order to prevent a flat spot occurring before the main fuel supply system comes into operation.

#### Normal running

Under full throttle and high speed cruise conditions, the throttle plates will be sufficiently far from the idling and progression holes to prevent them from admitting fuel and the main supply circuit will be brought into action. Refer to Fig. 11.9 and note that fuel from the float chamber (4) passes through the apertures (6) to the main jets (5) which are located in the bottom of the emulsion tubes (12). Air is drawn through the air corrector jets (11), through the emulsion tube holes and emulsifies the fuel which then passes through the channels (10) to the auxiliary venturis (8). The fuel mixture then passes through the nozzles (7) and mixes with the main air supply as it is drawn through the chokes (9) and into the engine.

It will be observed that under static engine conditions, the fuel levels in the emulsion tubes will be identical to that in the float chambers. As the engine speed increases and the fuel flow is faster, the fuel levels in the emulsion tubes drop. By providing additional holes in the lower part of the emulsion tubes, the necessary air correction is made possible at the higher engine speeds.

#### Acceleration

To provide the engine with a rich mixture when accelerating, the carburettor is equipped with an accelerator pump. Reference to Fig. 11.10 will show that when the throttle valves are closed, the lever (25) will lift the operating rod (27) against the pressure of the spring (28) and the piston (26) will draw fuel through the intake valve (23), along the channel and into the piston chamber. When the throttle valves are opened, the lever (25) allows the operating rod (27), together with the piston (26), to move down the piston bore under the action of the spring (28). Fuel is therefore forced along the internal channels (22), past the delivery valves (21) and through the pump jets (24) into the carburettor throats. During the pump delivery, the intake valve (23) is closed by the action of the internal ball but a certain amount of fuel is discharged back into the float chamber

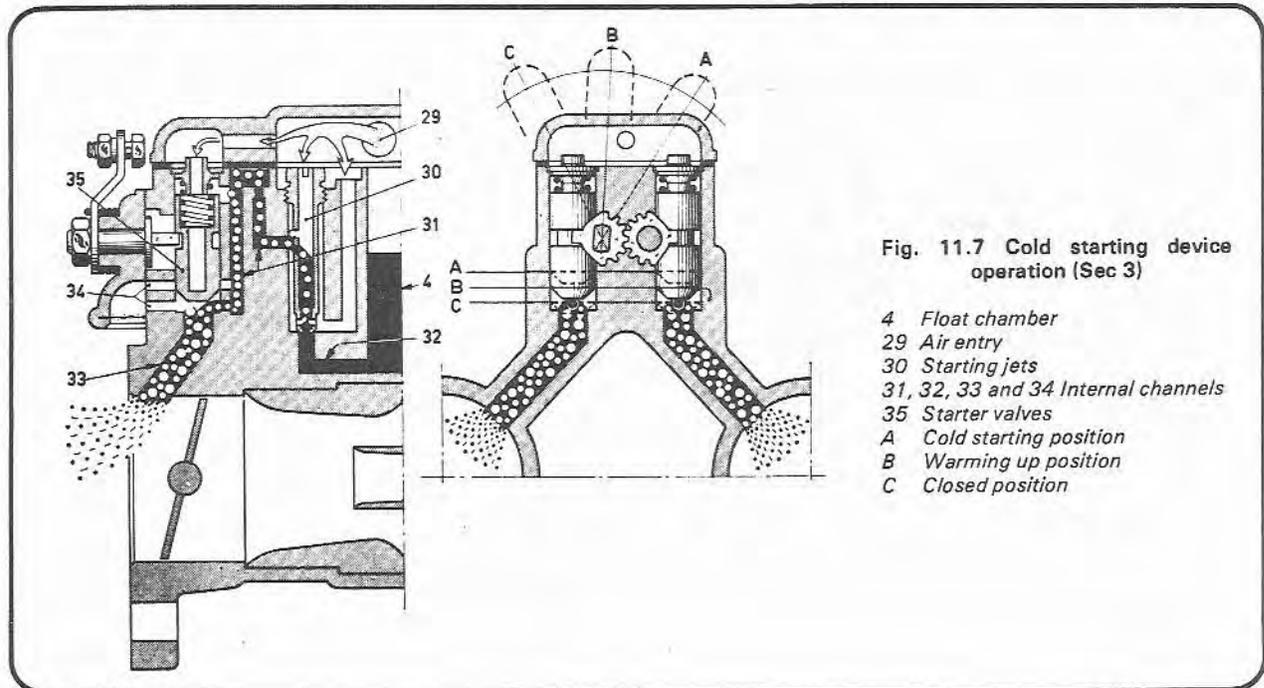
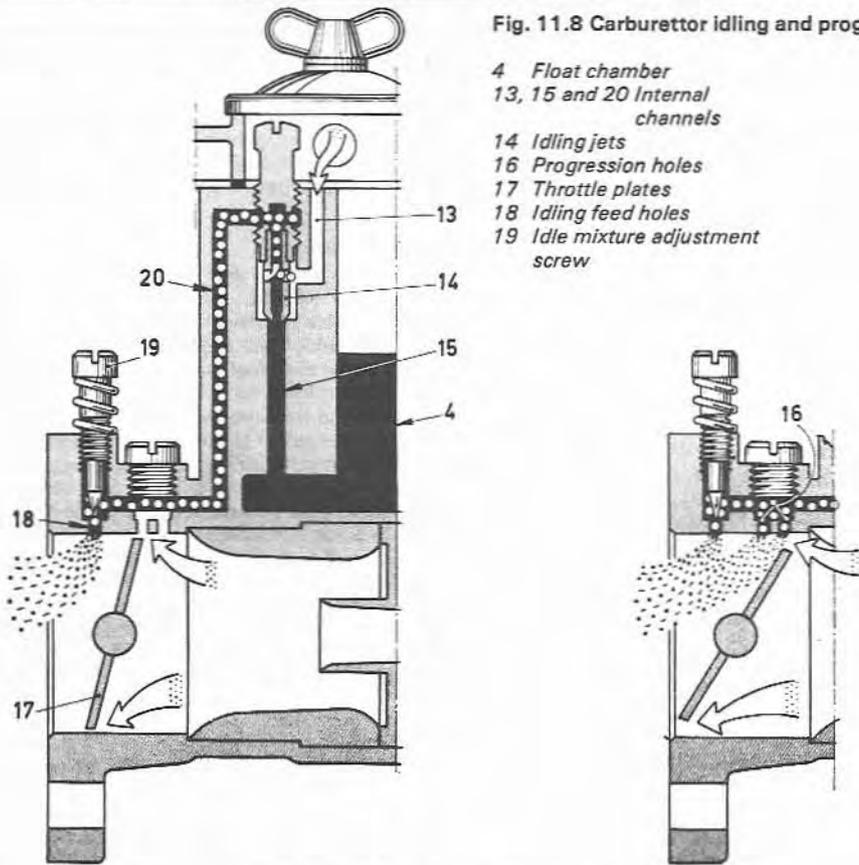


Fig. 11.7 Cold starting device operation (Sec 3)

- 4 Float chamber
- 29 Air entry
- 30 Starting jets
- 31, 32, 33 and 34 Internal channels
- 35 Starter valves
- A Cold starting position
- B Warming up position
- C Closed position

Fig. 11.8 Carburettor idling and progression phase (Sec 3)



- 4 Float chamber
- 13, 15 and 20 Internal channels
- 14 Idling jets
- 16 Progression holes
- 17 Throttle plates
- 18 Idling feed holes
- 19 Idle mixture adjustment screw

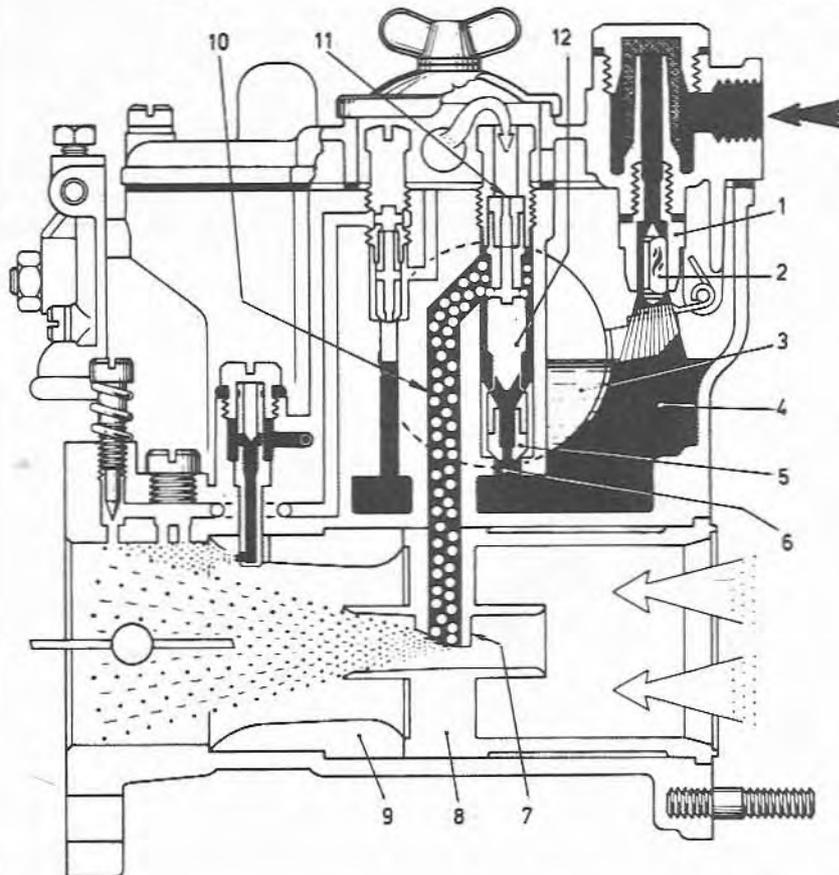


Fig. 11.9 Carburettor normal phase (Sec 3)

- 1 Needle valve seating
- 2 Needle valve
- 3 Float
- 4 Float chamber
- 5 Main jets
- 6 Channels
- 7 Nozzles
- 8 Auxiliary venturis
- 9 Chokes
- 10 Channels
- 11 Air corrector jets
- 12 Emulsion tubes

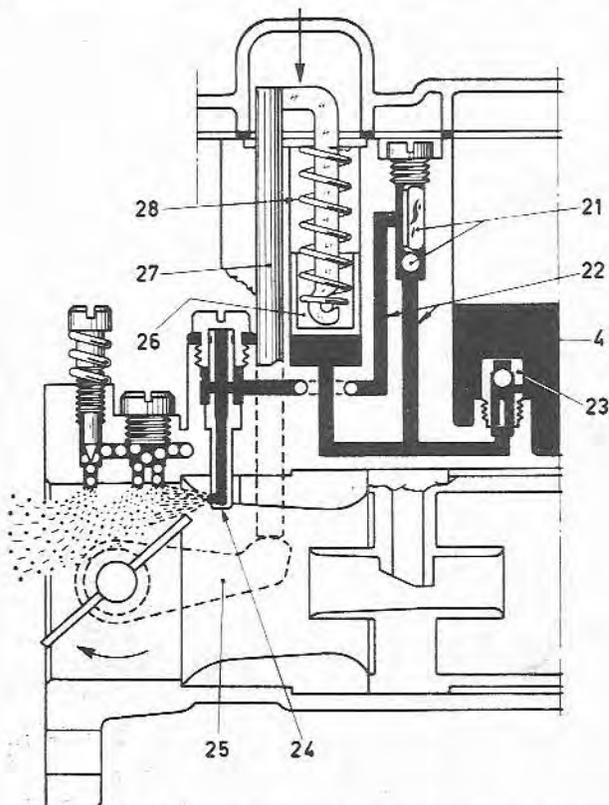


Fig. 11.10 Carburettor acceleration phase (Sec 3)

- |                               |                          |
|-------------------------------|--------------------------|
| 4 Float chamber               | 24 Pump jets             |
| 21 Delivery valves            | 25 Pump control lever    |
| 22 Channels                   | 26 Piston                |
| 23 Intake and discharge valve | 27 Control rod           |
|                               | 28 Pump operating spring |

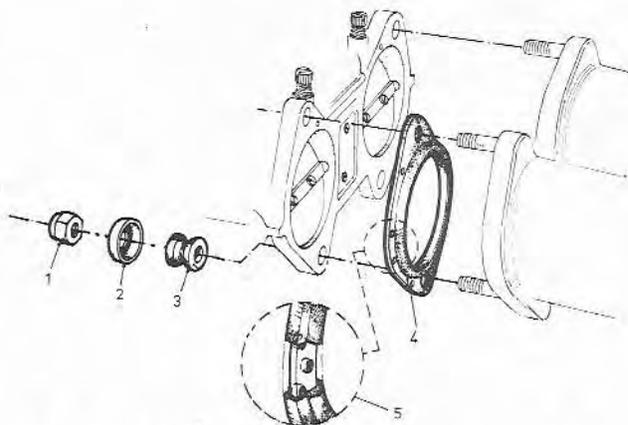


Fig. 11.11 Anti-vibration mounting components (Sec 4)

- |                 |                                  |
|-----------------|----------------------------------|
| 1 Nylon locknut | 4 O-ring gasket                  |
| 2 Grommet cover | 5 Cross-section of O-ring gasket |
| 3 Grommet       |                                  |

through the discharge hole. By fine calibration of this hole it is possible to determine the exact quantity of fuel injected by the accelerator pump.

#### 4 Removal and refitting

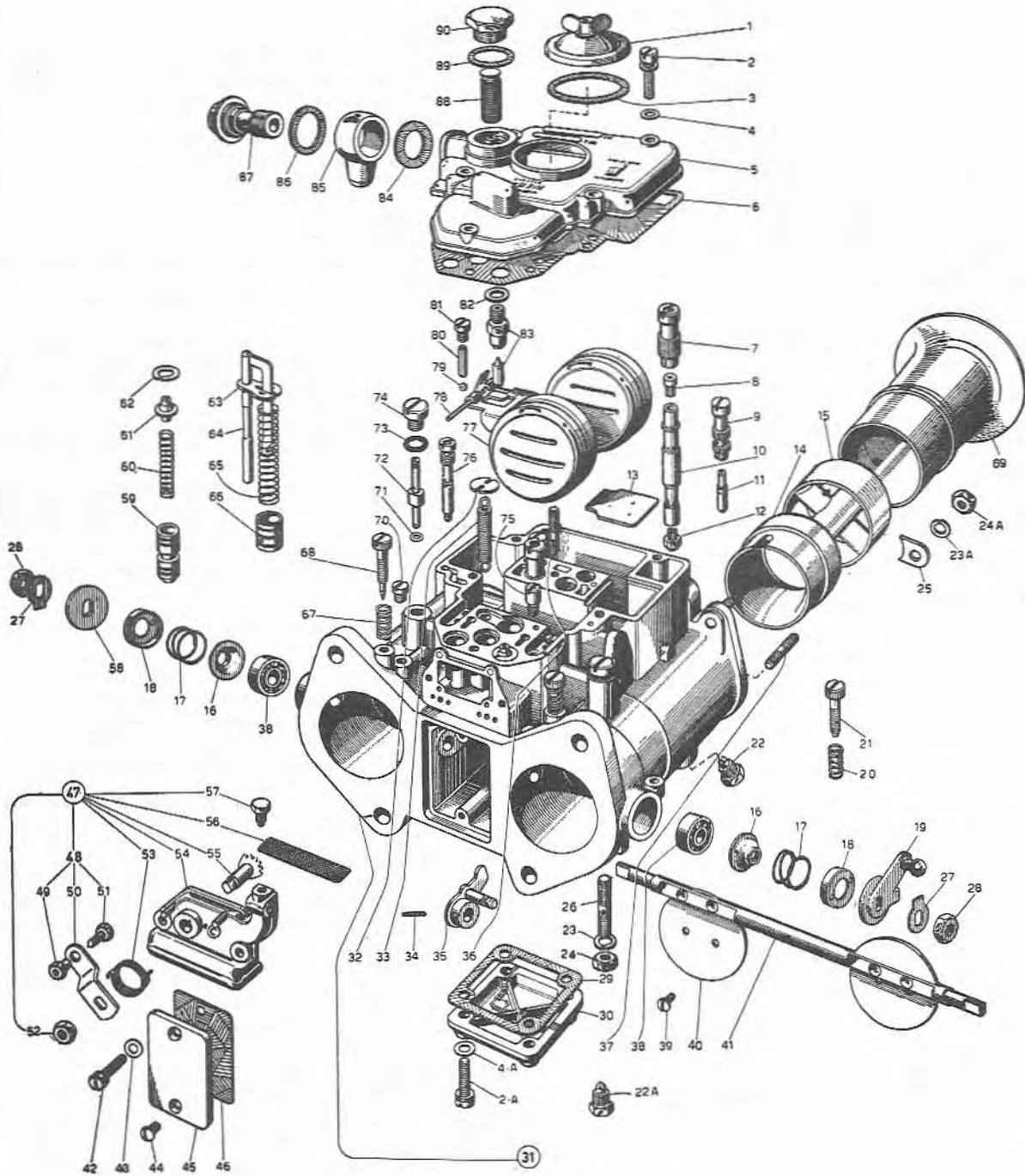
**Note:** The following procedure gives a general rather than a specific method of removing and refitting the carburettor, as much will depend on the location of the carburettor within the vehicle. On some applications for instance, the retaining nuts may not be accessible without removing surrounding components.

- 1 Unscrew and remove the retaining nuts and withdraw the air cleaner assembly (if fitted).
- 2 Disconnect the throttle lever operating rod at the lever end by unscrewing the retaining nut.
- 3 Where necessary, detach the air intake support bracket.
- 4 Slacken the starter inner cable securing screw and the outer cable securing screw and withdraw the starter cable complete from the carburettor.
- 5 Unscrew the fuel inlet union bolt and withdraw it together with the two gaskets.
- 6 Where a common air intake is fitted to more than one carburettor, repeat the procedure given in paragraphs 2 to 5 inclusive on the remaining carburettor(s) and subsequently detach the air intake on the bench.
- 7 Unscrew and remove the carburettor retaining nuts and spring washers, then carefully withdraw the unit over the mounting studs.
- 8 Remove the inlet manifold gaskets and clean all traces of gasket from the contact faces of the inlet manifold and carburettor.
- 9 Protect the inlet manifold from ingress of foreign matter whilst the carburettor is removed by sealing it with masking tape.
- 10 Refitting is a reversal of removal but the following additional points should be noted:

- (a) Always use new gaskets and spring washers and tighten the retaining nuts in diagonal sequence
- (b) Where Thackeray double-coil spring washers are fitted, new self-locking nuts must be used. Tighten the self-locking nut to maintain approximately 0.020 in (0.50mm) clearance between adjacent coils of the washer
- (c) Where an anti-vibration mounting is fitted, first fit both O-ring gaskets, then locate the carburettor over the mounting studs and fit the rubber grommets, covers and locknuts. Tighten the locknuts in diagonal sequence until the covers just contact the grommets which should also be in contact with the carburettor flanges. Now tighten each locknut a further  $1\frac{1}{2}$  turns and check that the V-section of each rubber grommet is equal
- (d) The idling adjustment screws should be set as described in Section 7 and finally turned as described in Section 8

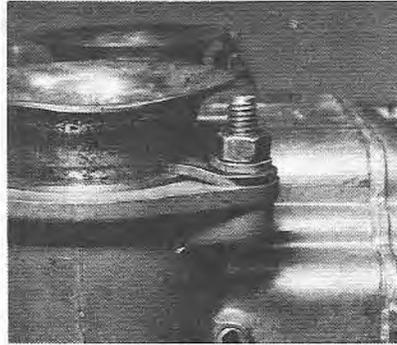
#### 5 Disassembly

- 1 Thoroughly clean the carburettor exterior and wipe dry.
- 2 Referring to Fig. 11.12, unscrew the filter inspection plug (90), remove the gasket (89) and extract the filter and retaining bush (88) (photo).
- 2 Unscrew the air horn retaining nuts (24A), remove the washers (23A) and retaining plates (25) and withdraw the air intake horns (69) (photo).
- 4 Unscrew the wing nut and remove the jet inspection cover (1) and gasket (3) (photo) together with the serrated ring (where fitted).
- 5 Using a large screwdriver, unscrew the carburettor cover retaining screws (2) together with the spring and plain washers (4), then lift off the cover (5) (photo).
- 6 Remove the plate (13) from the carburettor bowl, then

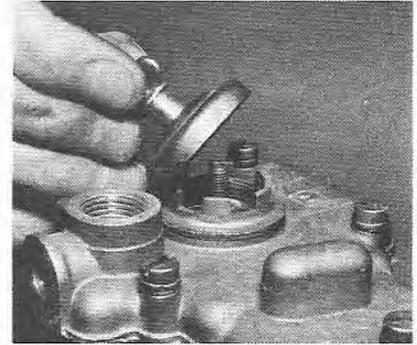




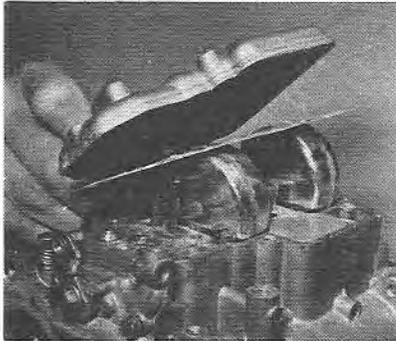
5.2 Removing the fuel filter



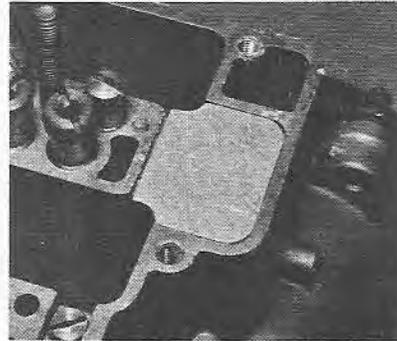
5.3 Air horn retaining nuts



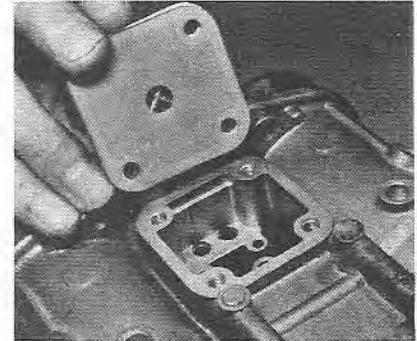
5.4 Removing the jet inspection cover



5.5 Lifting the carburettor cover



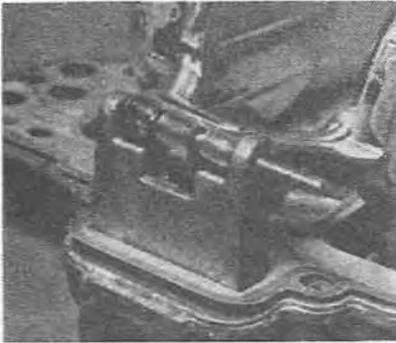
5.6 Location of the carburettor bowl baffle plate



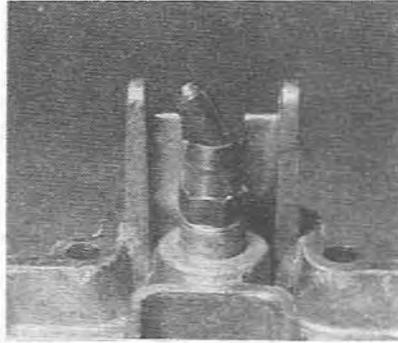
5.7 Removing the well bottom cover

Fig. 11.12 Exploded view of the DCOE carburettor (typical) (Sec 5)

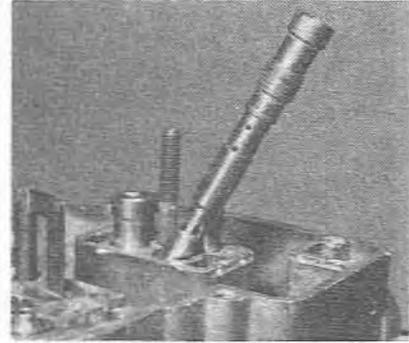
- |                                      |                          |                                      |
|--------------------------------------|--------------------------|--------------------------------------|
| 1 Jet inspection cover               | 30 Well bottom cover     | 61 Spring retainer and guide         |
| 2 and 2A Screw                       | 31 Carburettor body      | 62 Spring washer                     |
| 3 Gasket                             | 32 Anchoring plate       | 63 Retaining plate                   |
| 4 and 4A Washer                      | 33 Spindle return spring | 64 Accelerator pump control rod      |
| 5 Carburettor cover                  | 34 Lever fixing pin      | 65 Spring                            |
| 6 Gasket                             | 35 Pump control lever    | 66 Pump piston                       |
| 7 Emulsion tube holder               | 36 and 37 Stud           | 67 Spring                            |
| 8 Air corrector jet                  | 38 Ball-bearing          | 68 Idling adjustment screw           |
| 9 Idle jet holder                    | 39 Screw                 | 69 Air intake horn                   |
| 10 Emulsion tube                     | 40 Throttle valve        | 70 Progression hole inspection screw |
| 11 Idling jet                        | 41 Spindle               | 71 Gasket                            |
| 12 Main jet                          | 42 Screw                 | 72 Pump jet                          |
| 13 Plate                             | 43 Washer                | 73 Seal                              |
| 14 Choke                             | 44 Screw                 | 74 Screw plug                        |
| 15 Auxiliary venturi                 | 45 Cover                 | 75 Intake and discharge valve        |
| 16 Dust cover                        | 46 Gasket                | 76 Starter jet                       |
| 17 Spring                            | 47 Starter device        | 77 Float                             |
| 18 Spring cover                      | 48 Lever                 | 78 Fulcrum pin                       |
| 19 Throttle lever                    | 49 Nut                   | 79 Valve ball                        |
| 20 Spring                            | 50 Lever                 | 80 Stuffing ball                     |
| 21 Throttle adjusting screw          | 51 Screw                 | 81 Screw plug                        |
| 22 Auxiliary venturi retaining screw | 52 Nut                   | 82 Washer                            |
| 22A Choke retaining screw            | 53 Return spring         | 83 Needle valve                      |
| 23 and 23A Spring washer             | 54 Cover                 | 84 and 86 Washer                     |
| 24 and 24A Nut                       | 55 Sector shaft          | 85 Union                             |
| 25 Retaining plate                   | 56 Air filter            | 87 Union bolt                        |
| 26 Stud                              | 57 Screw                 | 88 Fuel filter                       |
| 27 Lockwasher                        | 58 Washer                | 89 Washer                            |
| 28 Nut                               | 59 Starter valve         | 90 Filter inspection plug            |
| 29 Gasket                            | 60 Spring                |                                      |



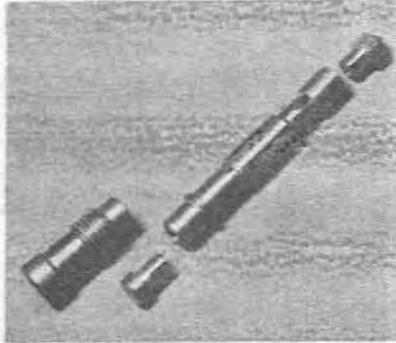
5.8 Extracting the float fulcrum pin



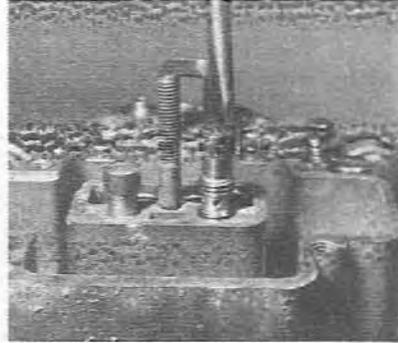
5.9 Removing the needle and ball from the needle valve seating (40 DCOE 35 type)



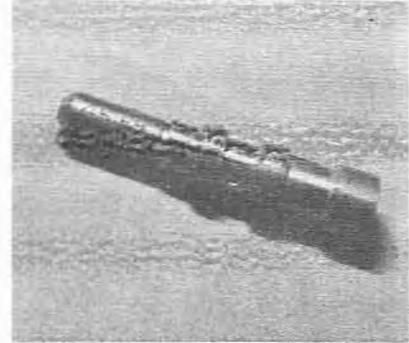
5.11a Removing an emulsion tube



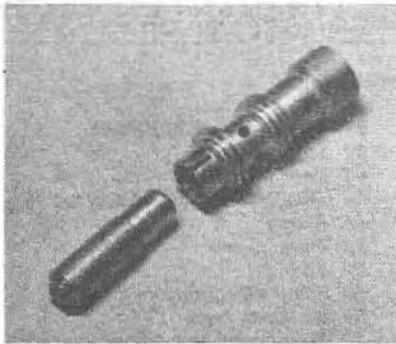
5.11b Emulsion tube components



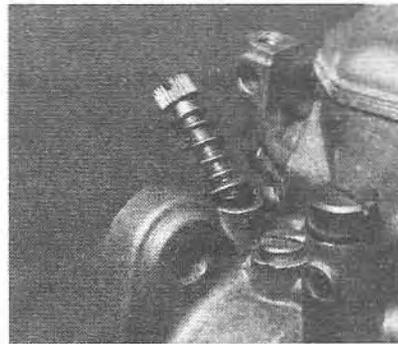
5.12a Removing an idling jet



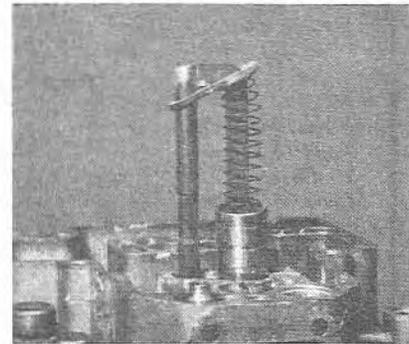
5.12b Idling jet sections assembled



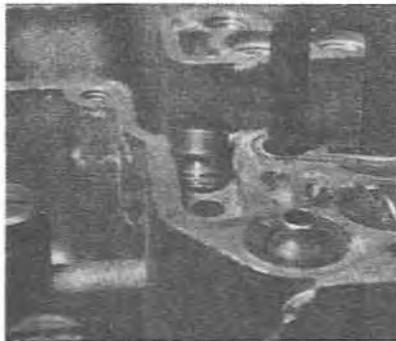
5.12c Idling jet components



5.14 Removing an idling mixture adjusting screw



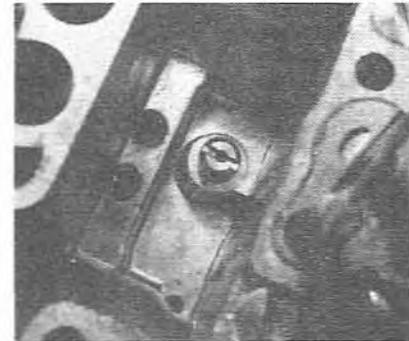
5.15 Removing the accelerator pump



5.17a Removing a stuffing ball retaining screw



5.17b Removing a stuffing ball



5.18 Location of the intake and discharge valve

invert the carburettor and unscrew the well bottom cover retaining screws (2A), together with the spring washers and plain washers (4A) (photo).

7 Withdraw the well bottom cover (30) and gasket (29) (photo).

8 Invert the carburettor cover (5) so that the float assembly is uppermost, then extract the float fulcrum pin (78) and withdraw the float assembly (77). If necessary, use a suitable diameter pin punch to tap the pin from the two posts (photo).

9 Remove the needle valve needle and the cover gasket (6) (photo).

10 Using a 10 mm socket, unscrew the needle valve seating (83) and remove the gasket (82).

11 Using a suitable screwdriver, unscrew the emulsion tube assemblies, then separate the tube holders (7), air corrector jets (8), emulsion tubes (10) and main jets (12). Although these parts are a tight fit they must preferably be removed by hand only (photos).

12 Unscrew the idling jet holders (9) and separate the idling jets (11) (photos).

13 Unscrew and remove the throttle idling adjustment screw (21) and spring (20).

14 Unscrew and remove the idling mixture adjusting screws (68) and springs (67) together with the conical washers and O-rings (photo).

15 Carefully prise the accelerator pump retaining plate (63) from the carburettor body and lift out the pump assembly (photo).

16 Disengage the accelerator pump piston (66) from the operating rod (64) and remove the spring (65) and plate (63).

17 Unscrew the stuffing ball retaining screws (81), invert the carburettor body and extract the stuffing balls (80) and the balls for the valves (79) (photos).

18 Unscrew and remove the intake and discharge valve (75) from the bottom of the float chamber (photo).

19 Unscrew the screw plugs (74) and remove the seals (73), pump jets (72) and gaskets (71) (photos).

20 Where a starter device is not fitted, unscrew the retaining screws and remove the blanking plate.

21 Where a starter device is fitted, unscrew and remove the starter jets (76), separate the two sections and follow paragraphs 22 to 25 (photos).

22 Unscrew the starter device retaining screws together with the spring and plain washer and withdraw the starter device assembly (47) from the carburettor (photo).

23 Dismantle the starter device by unscrewing the nut (52) from the shaft (55), then carefully remove the lever (48) and spring (53). Unscrew the cable clamp nut (49) and screw (51), then remove the shaft (55) and filter gauze (56) (photo).

24 Unscrew and remove the progression hole inspection screw plugs (70) (photo).

25 Whilst depressing the starter valve spring retaining guides (61) in turn, prise the spring washers (62) from the carburettor body, then release the guides (61) and extract the return springs (60) and starter valves (59). Note from which bore each valve was taken so that they can be refitted in their original locations (photo).

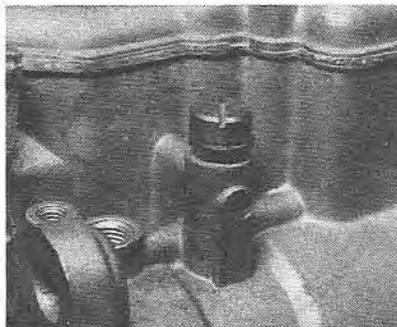
26 Unscrew and remove the pump opening cover plate retaining screws (44) and withdraw the plate (45) and gasket (46) (photo).

27 Note the location of each throttle plate and mark them if necessary, with a pencil.

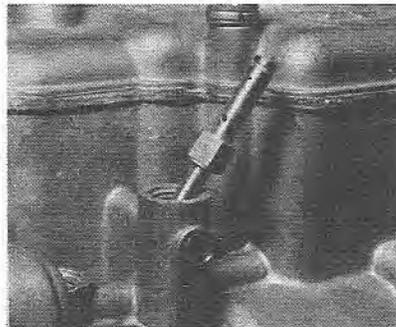
28 Unscrew and remove the throttle plate retaining screws (39) with the throttle closed, then open the throttle and withdraw the plates (40) from the spindle (41). If a brass spindle is fitted, be careful not to exert excessive pressure with the screwdriver otherwise the spindle will be distorted (photo).

29 Using a pair of pliers, grip the top of the spindle return spring (33), lift it and remove the spring anchoring plate (32).

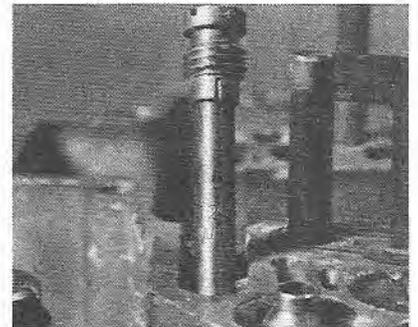
30 Drive out the lever roll pin (34) with a suitable pin punch; if



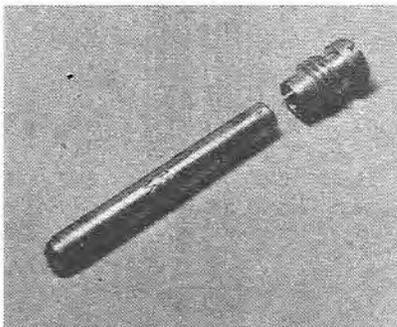
5.19a A pump jet retaining screw



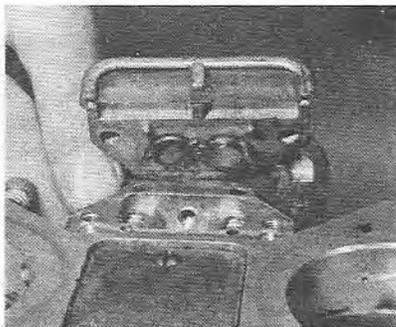
5.19b Removing a pump jet



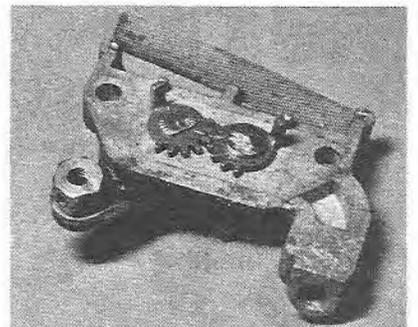
5.21a Removing a starter jet



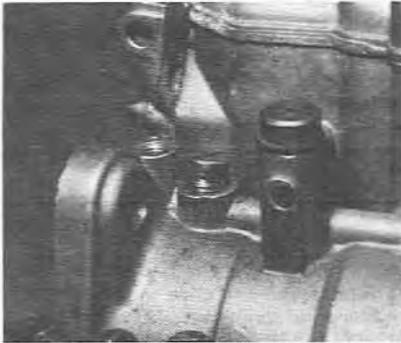
5.21b The starter jet components



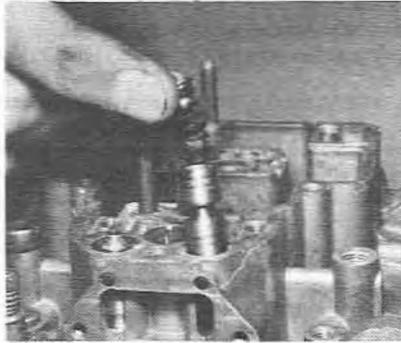
5.22 Removing the starter device, showing the locating lugs



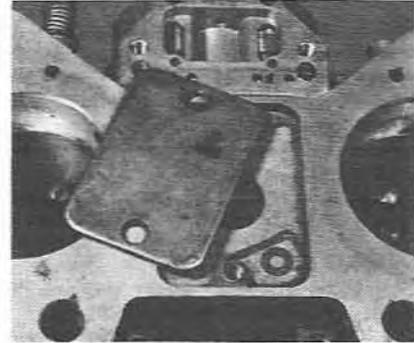
5.23 Removing the starter device air filter gauge, also showing sector alignment marks



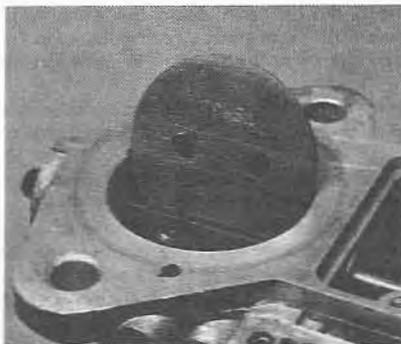
5.24 Removing a progression hole inspection screw plug



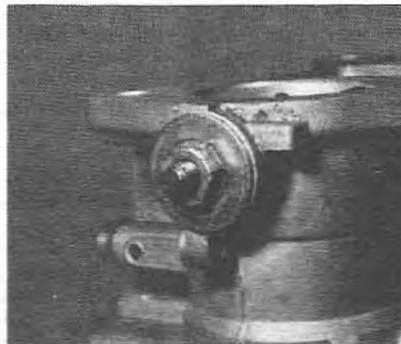
5.25 Extracting a starter valve, spring and guide



5.26 Removing the accelerator pump opening cover plate and gasket



5.28 Withdrawing a throttle valve from the spindle



5.31 Throttle spindle outer retaining nut and locktab



5.32 Removing a spring cover from the throttle spindle

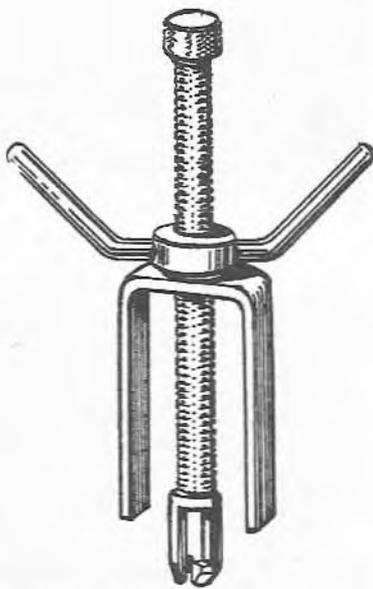
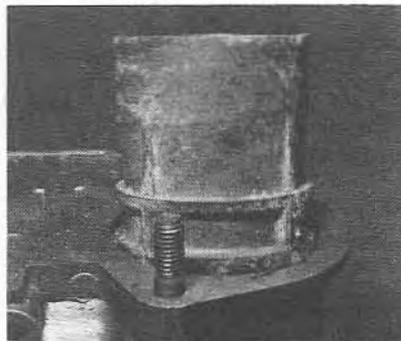


Fig. 11.13 Auxiliary venturi extracting tool (Sec 5)



5.37 Removing an auxiliary venturi, showing the locating spring



5.38 Removing a choke from the carburetor barrel

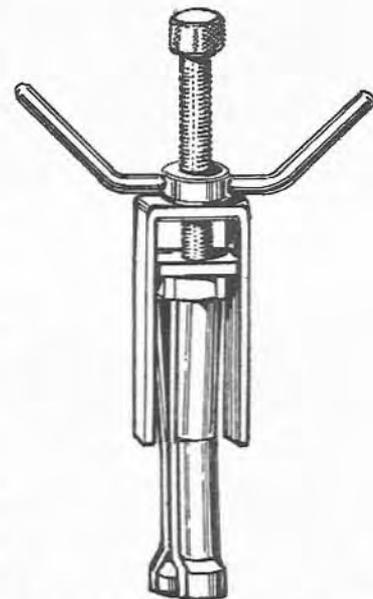


Fig. 11.14 Choke extracting tool (Sec 5)

one is not available obtain the special Weber tool no 98011 400.

31 Bend back the tab washers (27) and unscrew the nuts (28) from each end of the spindle (41). If the nuts are tight use Weber tool no 98023 700 to hold the spindle while the nut is loosened. If this precaution is not taken it is quite possible to distort the spindle, especially if it is a brass one. Should the special tool be unavailable, it is possible to strengthen the spindle by cutting the throttle plates and clamping the middle sections on the spindles while the nuts are loosened. Although the throttle plates will be ruined, they will not cost as much as a new spindle (photo).

32 Remove the nuts (28), tab washers (27), washer (58), lever (19), spring covers (18), springs (17) and dust covers (16) (photo).

33 Using a plastic or hide hammer, tap the spindle (41) out of the carburettor body together with one ball-bearing (38). At the same time withdraw the pump control lever (35) from the carburettor.

34 Place the spindle (41) and bearing (38) loosely in a vice and tap the spindle from the bearing, then reassemble the spindle to the carburettor and tap out the remaining bearing.

35 If the bearings are excessively worn, it is possible for the inner race to separate from the outer race leaving the latter in the carburettor body. If this happens, gently heat the body with a gas blow lamp until the race can be removed. On no account use excessive heat, otherwise the main body may be distorted and this is the only part which is not available as a spare.

36 On series 45 DCOE carburetors, unscrew and remove the auxiliary venturi retaining screws (22).

37 Extract the auxiliary venturis (15) from the carburettor barrels. In most cases these can be pulled out with the fingers, or alternatively Weber tool no 98009 200 can be used (photo).

38 Using Weber tool no 98009 100, extract the chokes (14) from the carburettor barrels. Note from which barrel the auxiliary venturis and chokes are removed in order to ensure

correct refitting, also mark them in relation to the top of the carburettor so that they can be correctly refitted to the locating grooves (photo).

## 6 Special overhaul procedures

After carrying out the general overhaul procedures given in Chapter 4, the following special procedures should be made:

1 Using a hand chuck and Weber tool no 98006 100, reform the main jet seatings at the bottom of the emulsion tube housing wells by carefully rotating the tool in alternate directions. Finish the seatings by inserting Weber tool no 98010 400 and gently tapping the top of the tool whilst rotating it.

2 Using the same procedure as described in paragraph 1, reform the idling jet seats with Weber tool nos. 98005 800 and 98010 600.

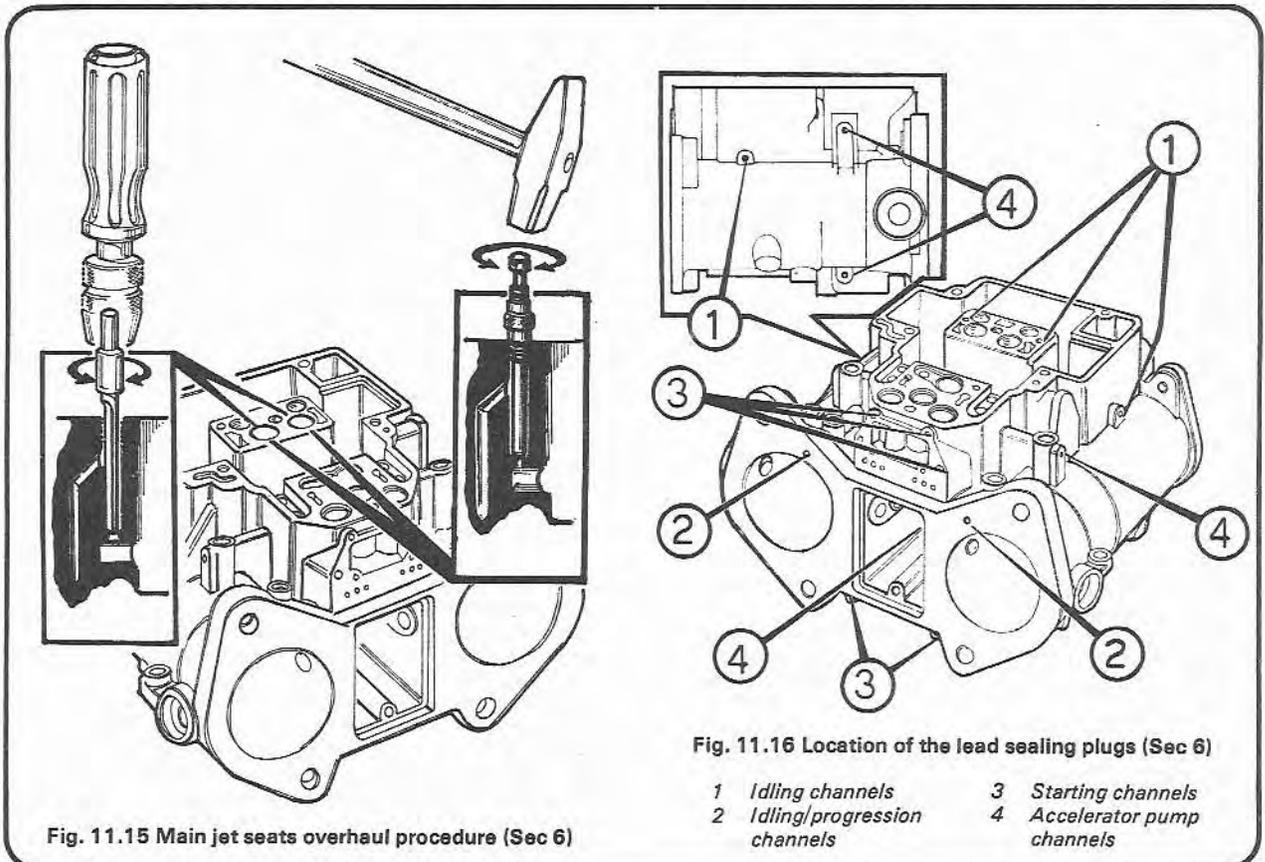
3 Using the same procedure as described in paragraph 1, reform the starter valve seats with Weber tool nos 98004 000 and 98010 400.

4 Using the same procedure as described in paragraph 1, reform the starter jet seats with Weber tool nos 98006 300 and 98010 600.

5 If the internal channels are suspected of being blocked, it will be necessary to drill out the lead plugs as shown in Fig. 11.16, remembering that on 40 DCOE 20 to 22 and 45 DCOE 12 carburetors, the starter device and relative channels are missing. The channels can be checked for obstructions before removing the lead plugs by injecting fuel with a syringe and observing that it emerges freely from the particular channel being tested.

6 The channels are of three diameters, viz 1.0 mm, 1.5 mm and 2.0 mm. The Weber tool nos 98014 300, 98014 400 and 98014 500 should be used to check that the channels are clear for their full lengths.

7 The carburettor body should be thoroughly cleaned after



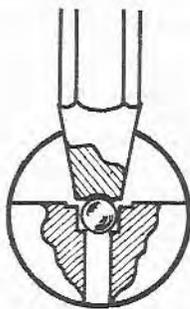
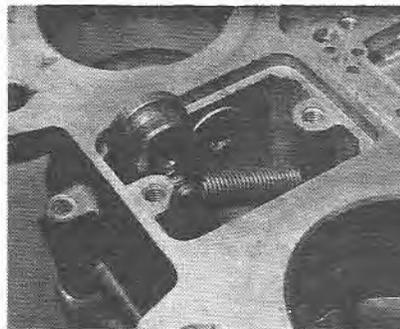


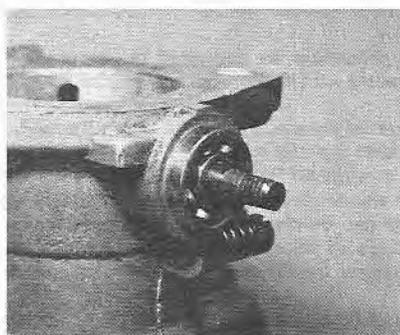
Fig. 11.17 Method of inserting the lead plugs (Sec 6)



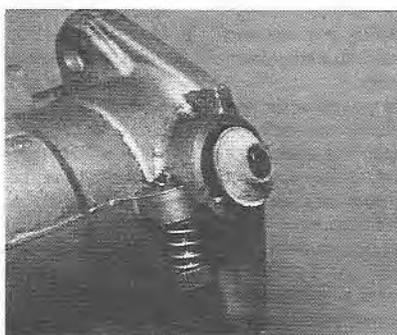
7.4a Inserting the throttle spindle return spring and accelerator pump lever



7.4b Fitting the throttle spindle



7.5 Fitting a spindle bearing



7.6 Fitting a throttle spindle dust cover

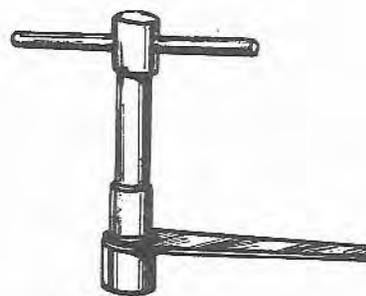


Fig. 11.18 Throttle spindle nut tightening tool (Sec 7)

overhaul to remove any swarf and dirt, preferably using clean fuel and air pressure. The lead plugs should be renewed and retained in position by using the Weber tool no 98010 800 as a punch until the plug is expanded into its bore.

## 7 Assembly

**Note:** All components should be clean and dry before starting the assembly procedure.

1 If a new spindle (41) or pump control lever (35) is being fitted, first assemble the lever to the spindle to ascertain its fit. If the lever is too tight, use a  $\frac{5}{16}$  in expanding reamer to enlarge the lever bore until the spindle is a firm sliding fit.

2 Fit one ball-bearing (38) to the throttle spindle (41) by placing the bearing on an open vice and gently tapping the spindle into it.

3 Fit the remaining ball-bearing (38) into the carburettor body using a plastic hammer and suitable diameter tubing on the outer race.

4 Insert the pump control lever (35) with spring (33) assembled, into the carburettor body, then press the throttle spindle (41) through the locating bore at the same time entering it through the pump control lever (35), making sure that the lever is facing inwards (photos).

5 Tap the spindle bearing (38) into the carburettor body and check that the opposite bearing has not been displaced (photo).

6 Smear a little grease over the spindle bearings (38), then fit the dust covers (16) using a suitable diameter tube to ensure they are correctly seated (photo).

7 Assemble the springs (17), spring covers (18), lever (19), washer (58) and tab washers (27) to their respective ends of the spindle (41), then screw on the nuts (28) finger tight.

8 Screw the throttle adjusting screw (21) and spring (20) into the carburettor body, then tighten the nuts (28) onto the spindle (41). Use the special Weber tool no 98023 700 to do this, but if

not available, tighten the nuts just sufficient to hold the washer (58) and lever (19) firmly on the spindle (41).

9 Lock the nuts (28) by bending the locktabs (27) (photo).

10 With the throttle spindle (41) in the open position, fit the throttle valves (40) into their location slots then close the spindle to allow the valves to centralise within the barrels. Make sure that the valves (40) are fitted the correct way round so that the angled perimeters seat on the bore.

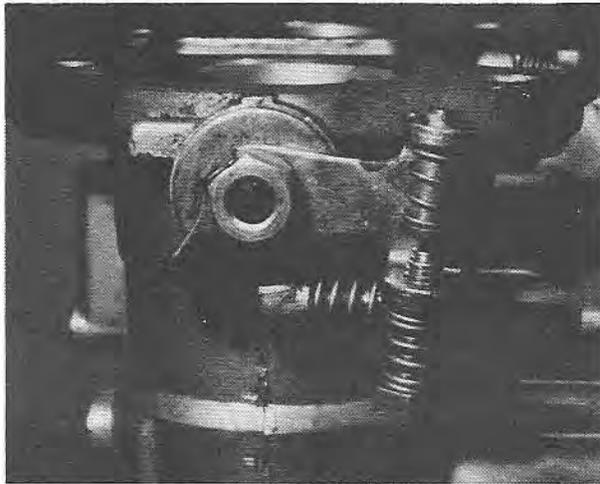
11 With the throttle spindle (41) held closed, insert the valve retaining screws (39) and tighten them evenly but without exerting excessive pressure on the spindle. It is recommended that new screws are always fitted as it is quite easy to cross-thread previously peened screws. Lock the screws (39) by peening with Weber tool no 98010 900 or alternatively, by coating the threads with a liquid locking agent (fuel resistant) prior to inserting them.

12 If a new pump lever (35) or spindle (41) has been fitted, it will be necessary to drill them in order to fit the fixing pin (34). This can be carried out by one of two methods. First by using the gauge no 98015 600 and spacer no 98007 800 and drilling the lever and spindle whilst holding the throttle valves shut. Secondly by fitting the pump rod and piston assembly as described in paragraph 32, then retaining the rod with a bulldog clamp so that the distance from the face of the carburettor body to the underside of the pump rod arch is equal to the pump stroke. By closing the throttle valves and holding the lever (35) against the pump rod (64) the spindle can be drilled using a 2.0 mm or no 46 drill.

13 Drive in the fixing pin (34) using a suitable punch (photo).

14 With a pair of long nose pliers, grip the spindle return spring (33), lift it out of the carburettor body, insert the anchoring plate (32) and locate the plate in its location recess (photo).

15 Check that the spindle operates smoothly, indicating that the bearings are not binding. If there is any tendency to bind, the bearings may not be properly aligned. This may be rectified by gently tapping the carburettor body in their vicinity.



7.9 Throttle lever fitted to the spindle

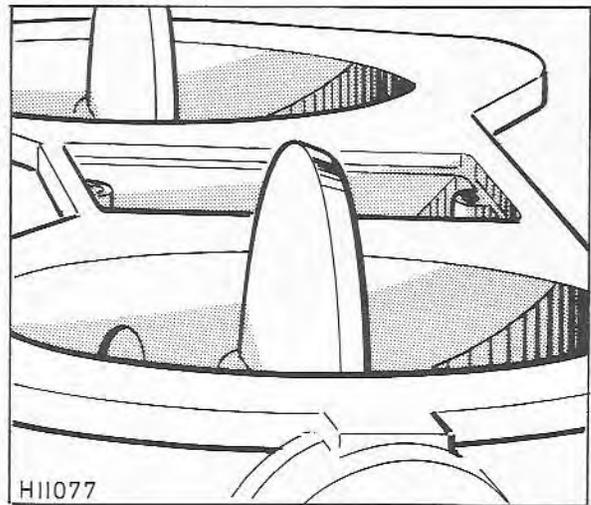


Fig. 11.19 Angled perimeter of the throttle valves (Sec 7)

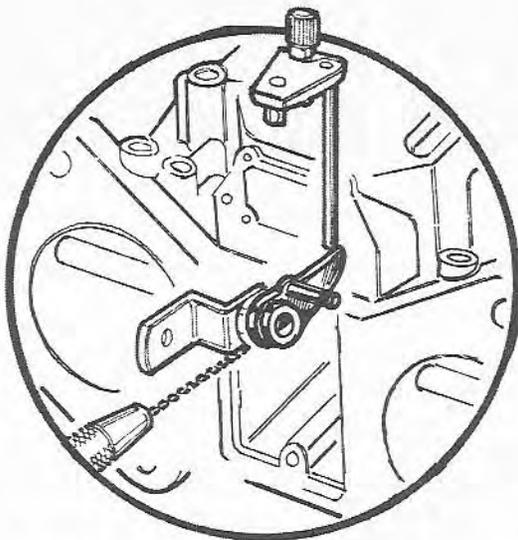


Fig. 11.20 Drilling the throttle spindle using Weber tools (Sec 7)

16 Fit the chokes (14) into the carburettor barrels, making sure that they are located in their original positions and do not obstruct the pump jet (72) apertures (photos).

17 Fit the auxiliary venturis (15) into the carburettor barrels, making sure that the jet cutaway sections are facing the throttle valves.

18 On series 45 DCOE carburetors, fit and tighten the auxiliary venturi retaining screws (22).

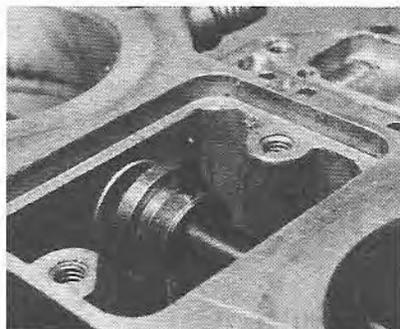
19 Fit the pump opening cover plate (45) with a new gasket (46) and tighten the retaining screws (44) evenly.

20 Fit the starter valves (59) into their respective bores, followed by the return springs (60) and retainers (61) (photo).

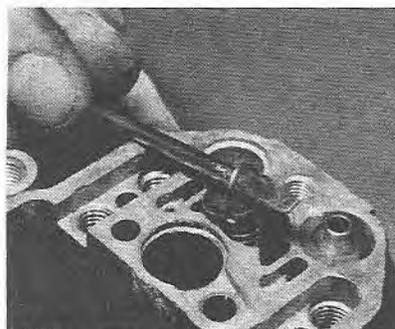
21 Depress the retainers (61) in turn and locate the spring washers (62) in the carburettor recesses. To do this, first enter the lower leading edge then, whilst keeping this pressed down, close the spring washer and enter the remaining edge.

22 Fit and tighten the progression hole inspection screw plugs (70).

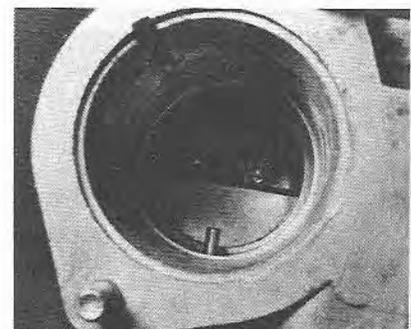
23 Assemble the shaft (55) to the starter device (where fitted) so that the alignment lines on each sector are facing each other, then fit the coil spring (53) locating it in the location hole. Fit the lever (50) over the shaft (55) at the same time hook the end of the spring (53) over the lever, then locate the washer and nut (52) and tighten the nut.



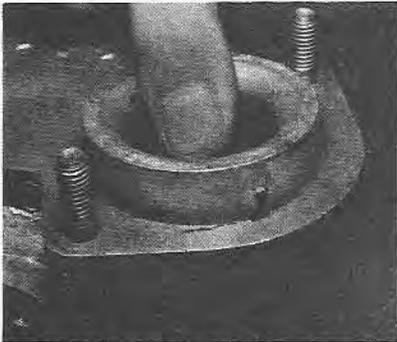
7.13 Fitting the accelerator pump lever fixing pin



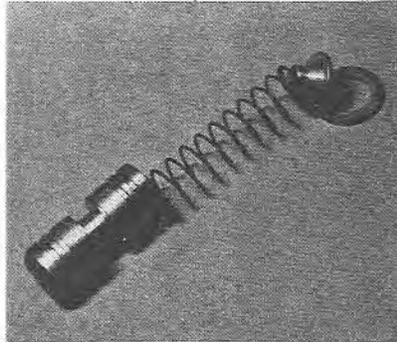
7.14 Fitting the throttle spindle return spring anchoring plate



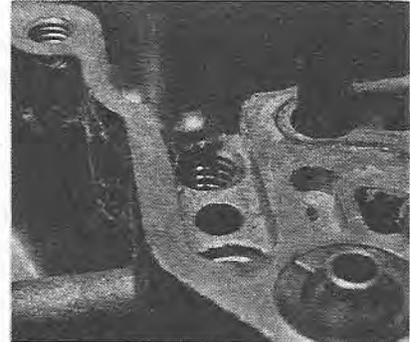
7.16a A carburettor barrel with auxiliary venturi and choke removed showing location groove and accelerator pump jet



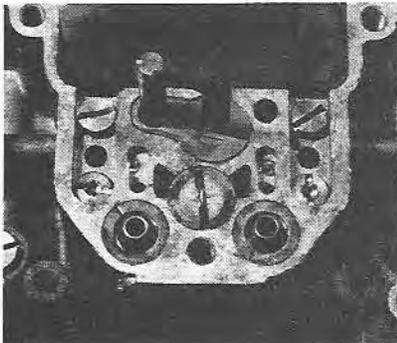
7.16b Fitting a choke, showing the location lug



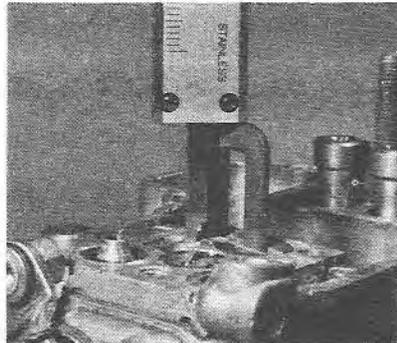
7.20 Starter valve components



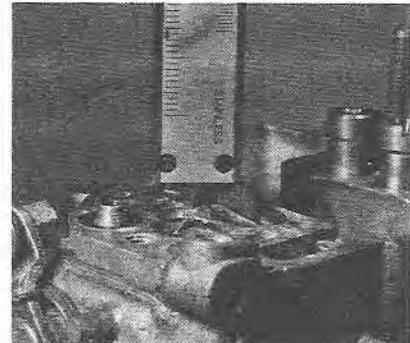
7.30 Fitting an accelerator pump delivery valve ball



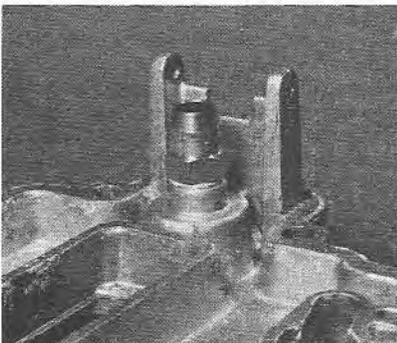
7.32 Fitted position of the accelerator pump



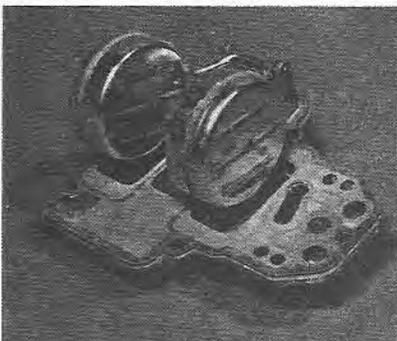
7.34a Checking the closed-throttle extension of the accelerator pump operating rod with vernier calipers



7.34b Checking the open-throttle extension of the accelerator pump operating rod with vernier calipers



7.38 Needle valve seating location in the carburettor cover



7.40 Gasket and float assembly fitted on the carburettor cover

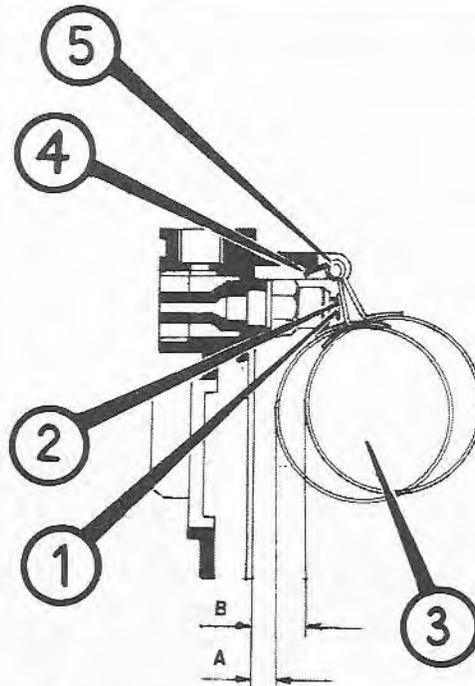
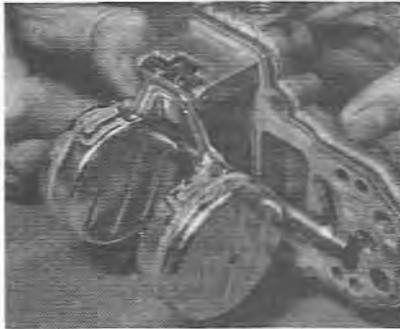
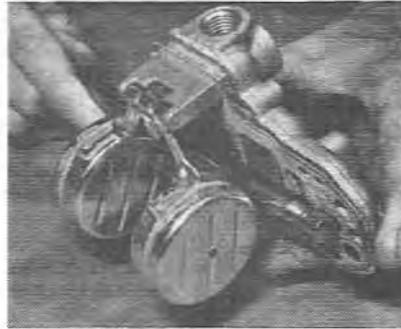


Fig. 11.21 Float level adjustment (Sec 7)

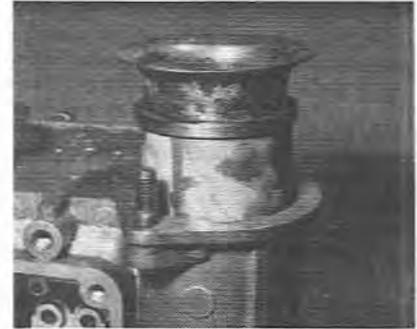
- |                                                   |                      |
|---------------------------------------------------|----------------------|
| 1 Short adjusting tab                             | 4 Long adjusting tab |
| 2 Spring tensioned ball (not fitted to all types) | 5 Fulcrum pin        |
| 3 Semi-floats                                     | A Closed dimension   |
|                                                   | B Open dimension     |



7.41 Checking the closed position of the floats using a length of dowel rod



7.43 Checking the open position of the floats using a length of dowel rod



7.49 Fitting an air intake horn

24 Check the operation of the starter device, then fit the cable securing screw (51) and filter gauze (56).

25 Offer the starter device up to the carburettor body and make sure that the sector lugs locate in the starter valve (59) grooves; then insert the retaining screws together with spring and plain washers and tighten them.

26 Check the operation of the starter device and valves then fit and tighten the starter jets (76).

27 Where a starter device is not fitted, fit the blanking plate and tighten the retaining screws.

28 Fit the small gaskets (71) to the pump jets (72), then fit them into the carburettor body and tighten the screw plugs (74) together with new seals (73).

29 Fit and tighten the intake and discharge valve (75) to the bottom of the float chamber.

30 Insert the accelerator pump delivery valve balls (79) and stuffing balls (80), then tighten the retaining screws (81) (photo).

31 Fit the plate (63) and spring (65) to the accelerator pump operating rod (64), compress the spring and engage the piston (66) over the rod.

32 Fit the accelerator pump assembly to the carburettor body and press in the retaining plate (63) using the flat side of a screwdriver blade (photo).

33 Operate the throttle lever and check that the accelerator pump moves freely.

34 The accelerator pump stroke should now be checked using vernier calipers. With the throttle valves shut, measure the distance from the face of the carburettor body to the top of the pump operating rod. Now fully open the throttle and again measure the distance; the difference is the pump stroke which should be as stated in the adjustment data. If the correct stroke is known but the actual reading obtained is incorrect, the length of the operating rod must not be shortened to decrease the stroke by filing, otherwise the hardening will be removed and rapid wear will result; instead a shorter or longer operating rod must be obtained (photos).

35 Fit the conical washers and O-rings together with the springs (67) to the idling mixture adjusting screws (68), then screw them into the carburettor body.

36 Press the idling jets (11) into the holders (9) and tighten them into the carburettor body.

37 Press the air corrector jets (8) into the tops of the emulsion tubes (10) and the main jets (12) into the bottoms of the emulsion tubes, then press the holders (7) to the emulsion tubes and tighten both assemblies into the carburettor body.

38 Tighten the needle valve seating (83) together with a new gasket (82) into the carburettor cover (5) (photo).

39 With the cover (5) inverted, fit the needle then place a new gasket (6) in position.

40 Locate the float assembly (77) and insert the fulcrum pin (78) fully into the two posts. Very carefully pinch the split post to secure the pin using a pair of pliers (photo).

41 The float level adjustment must now be checked in the following manner: Hold the carburettor cover vertical so that the floats are hanging from the fulcrum and the float level arm is in light contact with the needle ball (ie without the ball being depressed). Obtain a drill or dowel rod of diameter equal to the needle valve closed checking dimension and check that the distance from the cover gasket to the nearest part of the floats is correct. The annular seam of the floats should not be taken into consideration for the check and for this reason two small grooves must be filed on the checking rod (photo).

42 If the dimension is not correct, carefully bend the small tab on the float arm accordingly.

43 Tilt the cover so that the floats move away from the cover and the long tab makes contact with the needle valve seating. Now, using the same method as described in paragraph 41, check the needle valve fully open dimension and if necessary bend the long tab to correct (photo).

44 The difference between the dimensions checked in paragraphs 41 and 43 is the needle valve stroke which should be as given in the adjustment data.

45 Fit the well bottom cover (30) with a new gasket (29) to the carburettor body and tighten the retaining screws, (2A) together with the spring washers and plain washers (4A), in diagonal sequence.

46 Press the plate (13) into the top of the carburettor bowl.

47 Lower the cover assembly (5) onto the carburettor body and tighten the retaining screws (2), together with the spring and plain washers (4), in diagonal sequence.

48 Fit the gasket (3) or serrated ring to the cover (5) and tighten the cover (1) with the wing nut.

49 Fit both air intake horns (69), retaining plates (25) and washers (23A), then tighten the retaining nuts (24A) (photo).

50 Insert the fuel filter and retaining bush (88) into the cover (5) and tighten the filter inspection plug (90) fitted with a new gasket (89).

51 With the carburettor completely assembled, the idling adjustment screws should be turned to their preliminary settings. To do this, first screw in the throttle idling adjustment screw until it just touches the throttle lever lug, then continue turning for a further  $\frac{1}{2}$  turn. Working on the idling mixture volume screws in turn, fully screw them in until they are in light contact with their seats, then back them off  $\frac{3}{4}$  turn. Final adjustments will be necessary when the carburettor is fitted on the engine (refer to Section 8).

## 8 Tuning

**Note:** Refer to Chapter 3 for general notes on tuning.

1 The idling adjustment screws should be set to their preliminary positions as described in Section 7 paragraph 51.

2 Connect a tachometer to the engine in accordance with the manufacturer's instructions.

**Single carburettor unit fittings**

- 3 Start the engine and run until normal operating temperature has been reached (ie the thermostat has opened).
- 4 Turn the throttle valve adjusting screw so that the engine runs at the recommended idling speed for the particular engine being worked on; this will be between 600 and 800 rpm for touring models and 1000 rpm plus for sports car models.
- 5 Turn one idle mixture adjustment screw in or out until the engine runs at the highest rpm, then repeat the process on the remaining adjustment screw.
- 6 Re-adjust the throttle valve adjusting screw if necessary, to bring the engine speed within limits.
- 7 Repeat the procedure given in paragraphs 5 and 6, switch off the engine and remove the tachometer.

**Multiple carburettor fittings (without idle air compensation)**

- 8 The carburetors must be synchronised in order to deliver equal amounts of air/fuel mixture to each individual cylinder. To check the adjustment it will be necessary to obtain a length of tubing (approximately 1 metre long) of about 5 mm to 10 mm (0.25 in to 0.5 in) internal diameter. Alternatively, a synchroniser as shown in Chapter 8 may be used.
- 9 Remove the air cleaner(s) if fitted, then start the engine and run until normal operating temperature has been reached (ie the thermostat has opened).
- 10 Switch off the engine and disconnect the accelerator rod connections from the carburetors.
- 11 Start the engine and place one end of the tube in one air intake of one carburettor, then listen to the amount of hiss present which will indicate the volume of air being passed. Alternatively, press the synchroniser over one of the air intakes and adjust the ring until the air flow indicator is midway up the

calibrated tube.

12 Move the tube to the next carburettor and turn the throttle adjustment screw or intermediate synchronising screw until the hiss of the air intakes is identical to that of the original carburettor. If using the synchroniser, turn the screw until the flow indicator is midway up the tube without altering the instrument ring.

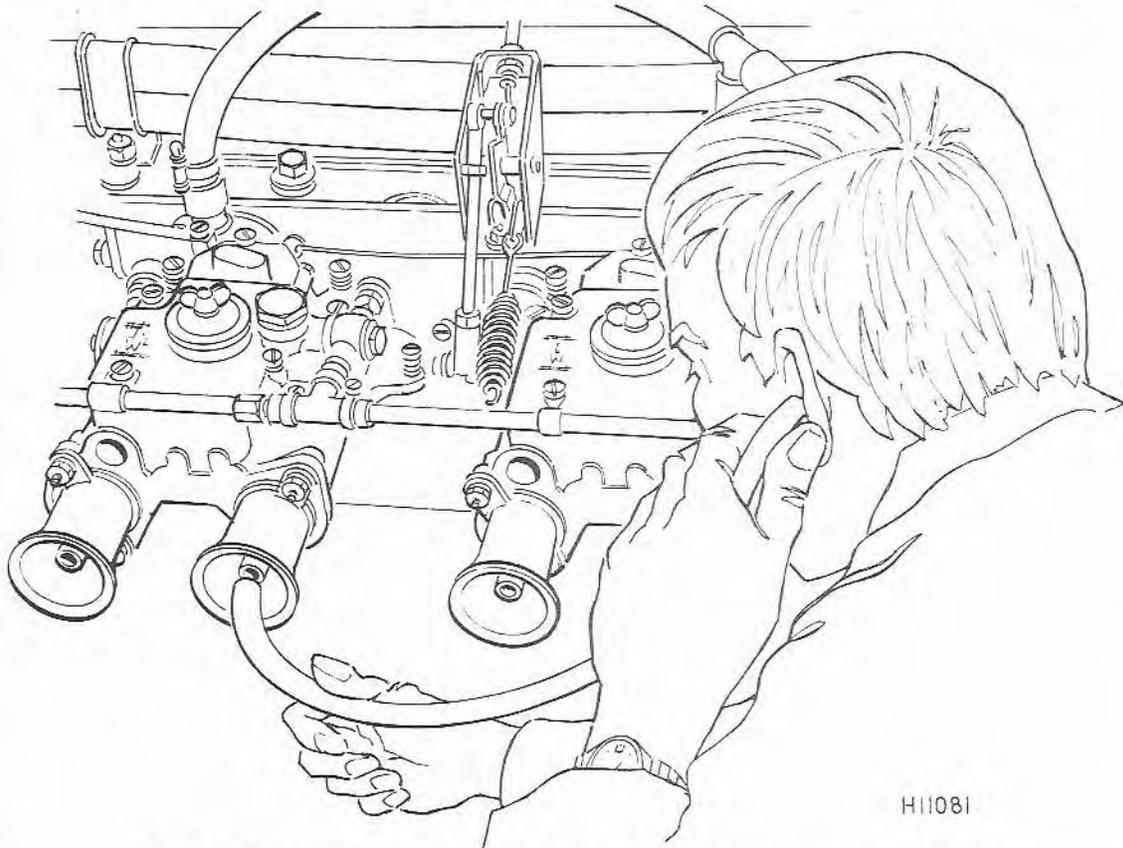
13 The procedure given in paragraph 12 must be repeated on all carburetors until all throttle valves are synchronised.

14 Check the engine speed on the tachometer and if necessary, adjust each carburettor adjusting screw by equal amounts to give the correct rpm. Note that where an intermediate synchronizing screw is fitted, it will only be necessary to adjust the carburettor with the fixed adjusting screw; the remaining carburettor will be automatically adjusted.

15 The mixture adjusting screws (2 per carburettor) must all deliver identical amounts of mixture. If necessary, due to uneven engine idling, the screws should be turned half a turn clockwise and the engine rpm noted. This action will weaken the mixture and may cause the engine to stall; if it does, turn each screw anti-clockwise by half a turn. When an adjustment has been reached which gives the highest engine speed, the setting is correct, although it may be necessary to readjust the engine speed on the throttle adjusting screws as previously described.

16 To check that each barrel is delivering equal amounts of idling mixture, temporarily remove each spark plug lead in turn and note the drop in rpm which should be identical on each cylinder.

17 After completing the adjustment procedure, switch off the engine, remove the tachometer and if fitted, fit the air cleaner(s). Finally connect the accelerator rod(s) to the carburettor(s).



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Fig. 11.22 Using a length of tube to adjust the carburettor throttle settings (Sec 8)

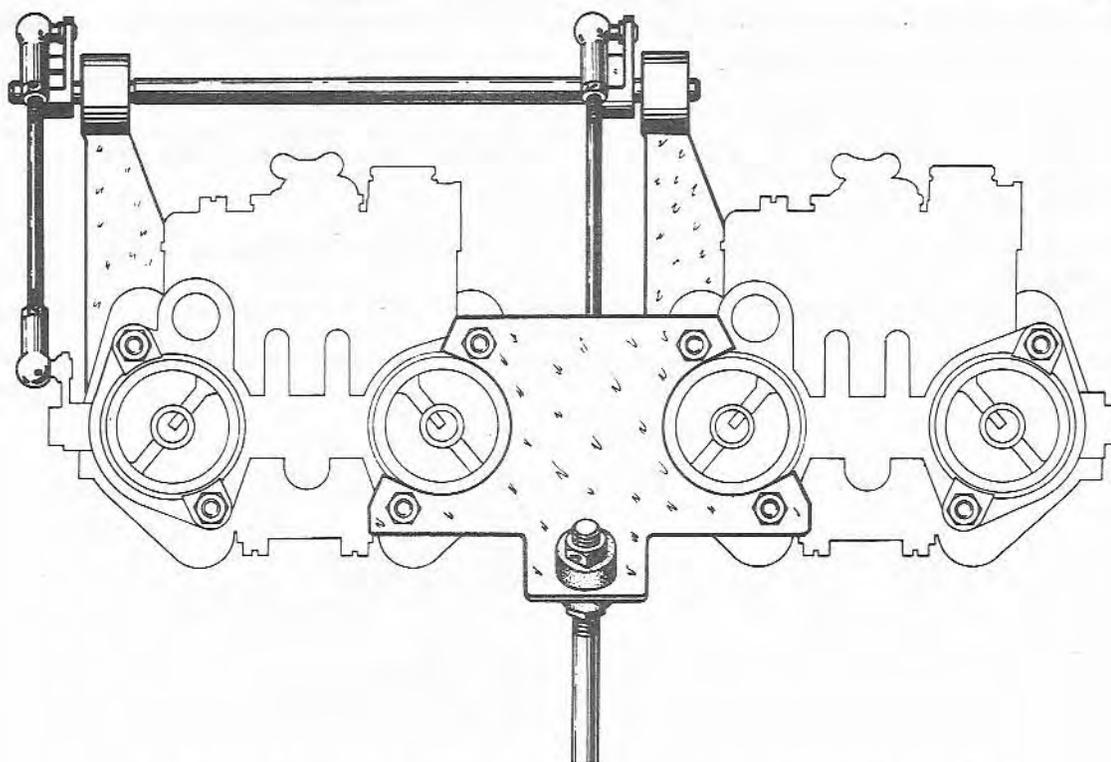


Fig. 11.23 Individual accelerator rod arrangement on a dual carburettor fitting (Sec 8)

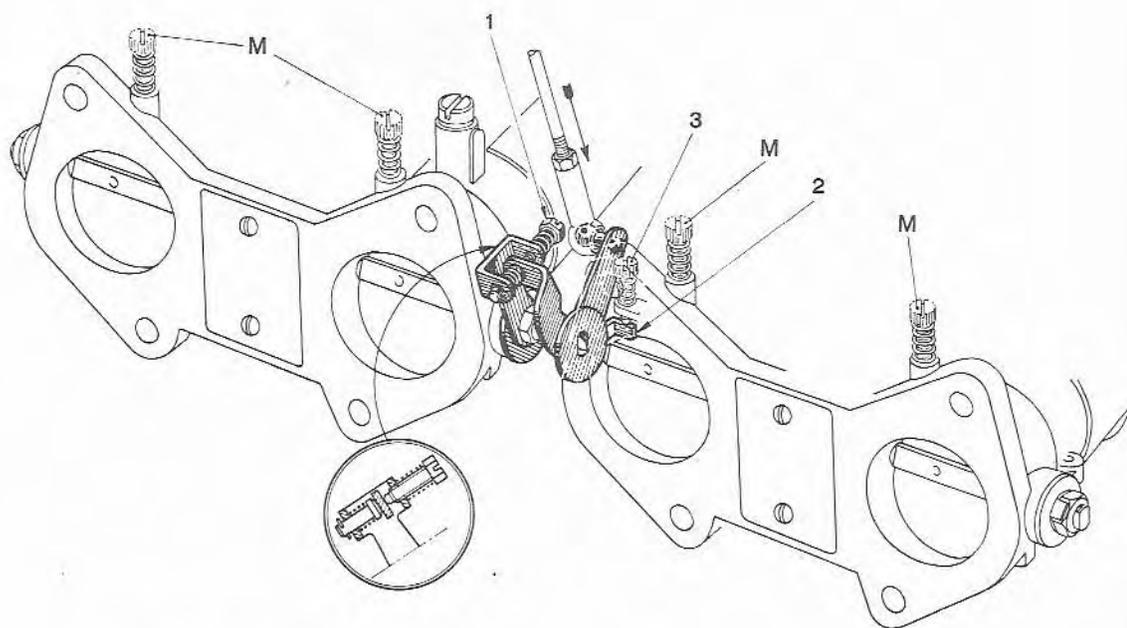


Fig. 11.24 Linked throttle accelerator rod arrangement on a dual carburettor fitting (Sec 8)

- 1 Synchroniser screw
- 2 Throttle lever
- 3 Adjusting screw

M Idle mixture adjusting screws

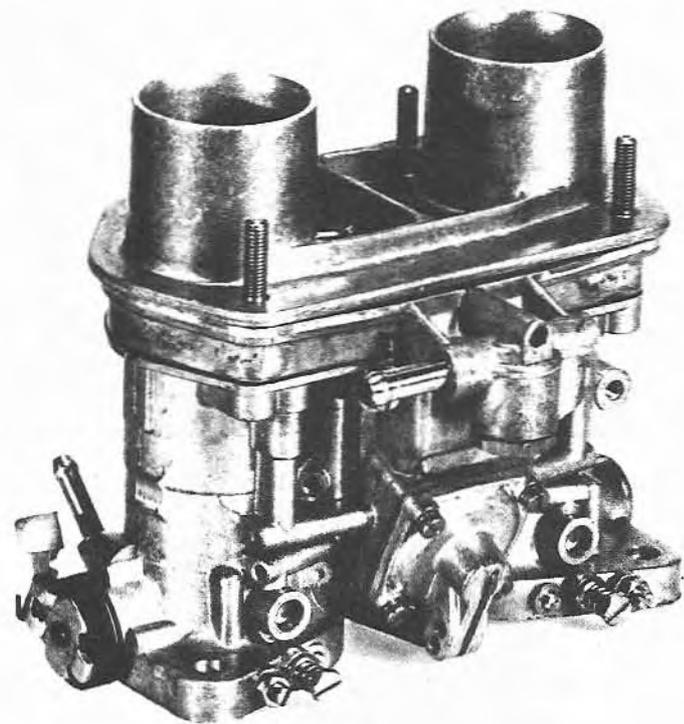
**Multiple carburettor fitting (with idle air compensation)**

18 Some carburettor types are equipped with adjustable idle air compensation screws which regulate the amount of air bypassing the throttle valves. Where these are fitted, the procedure given in paragraphs 8 to 17 inclusive will apply, but, before starting the two barrels of each carburettor should be syn-

chronised together. To do this, first loosen the locknuts and fully screw in each compensation screw. Start the engine and listen to the hiss from each barrel. Determine the barrel which is passing the greatest volume of air and adjust the compensating screw on the remaining barrel to give an identical volume of air. Finally tighten the locknuts.

**9 Fault diagnosis**

Symptom	Reason/s
Engine will not start	Faulty starter device Blocked fuel filter or jets
Uneven idling	Leaking manifold or carburettor flange gaskets Loose idling jets Excessive sediment or water in carburettor Starter valves not seating Starter device not returning Throttle spindle dust covers broken
Carburettor floods	Worn needle valve Lacking or damaged semi-floats Incorrect float level adjustments Excessive sediment in fuel
Engine lacks performance	Incorrect tuning adjustments Incorrect float level adjustments Excessive sediment in fuel Throttle valves do not fully open Accelerator pump jamming or stroke incorrect
Excessive fuel consumption	Faulty starter device Needle valve not seating Leaking or damaged semi-floats Incorrect float level adjustments Choked air filter



## Part 2 Weber carburetors

### Chapter 12 Type 40 IDF, 44 IDF, 48 IDF

#### Contents

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Construction .....	2	Removal and refitting .....	4
Disassembly .....	5	Special overhaul procedures .....	6
Fault diagnosis .....	9	Tuning .....	8
Introduction .....	1		

### 1 Introduction

The carburetors covered by this chapter are of the vertical downdraught type and each barrel of the carburettor is of identical diameter.

The throttle valves are of the synchronised, simultaneous operation type and are located on a single shaft.

The identification mark is located on the side of the main body just below the fuel inlet filter plug.

### 2 Construction

The main body and cover of the Weber IDF carburettor are of die-cast aluminium or zinc alloy (Mazak) construction. The mounting flanges are machined flat for fitting on the inlet manifold.

The throttle spindle is of steel and the throttle valve plates of brass.

All fuel and air jets and emulsion tubes are of brass construction and are secured to the main body by screw fittings.

The internal channels of the main body are mainly drilled and where necessary, sealed with lead plugs.

The throttle spindle is supported by two ball-bearings mounted in the main body. Washers are located at each end of the spindle to prevent air being drawn through the bearings.

The fuel float assembly is constructed of plastic and comprises two sections.

The accelerator pump is of the diaphragm type and the operating lever is actuated by a cam attached to the centre section of the throttle spindle.

### 3 Operation

#### Cold starting

The starting device fitted to type IDF carburetors operates independently of the main circuit and may be considered as a

separate carburettor within the main carburettor.

Refer to Fig. 12.1 and note that when the choke cable is pulled the starting device operating lever turns the control shafts, thereby lifting the starting valves off their seats. Fuel from the float chamber (2) is drawn through channels (44) to the starting jets (43) where it is emulsified with air entering through the top of the starting jets (43). The mixture is then drawn through channels (45) where it is further emulsified with air from the hole (50). After passing the starter valves (49) where additional air from the holes (48) weakens the mixture, the final mixture is drawn through channels (47) into the engine below the throttle valves.

The starting device has a progressive action made possible by the tapered end of the valve heads. Lowering the valves will reduce the amount of mixture admitted to the engine until, when shut, the supply will cease.

#### Idling and progression

Refer to Fig. 12.2 and note that when the engine is idling with the throttle valves (15) closed, fuel is drawn through the main jets and emulsion tube wells (17) to the idling jets (24) where it becomes emulsified with air entering through the calibrated bushes (26). The mixture then travels through the channels (26), past the adjustable mixture screws (27), through the idling feed holes (28) and into the carburettor throats at the engine side of the throttle valves (15). The idling mixture screws (27) have tapered ends and can therefore be adjusted to admit more or less mixture as necessary.

When the throttle valves are opened slightly to increase the engine speed, the progression holes (32) are brought into action to provide additional fuel and to enable the engine to reach the speed when the main system starts to function.

In order to ensure that each carburettor barrel passes identical amounts of air, in particular when the engine is idling, air compensation screws (31) are incorporated in each barrel whereby air can bypass the throttle valves (15). This system ensures identical vacuum below each throttle valve and therefore ensures identical mixtures during idling and progression.

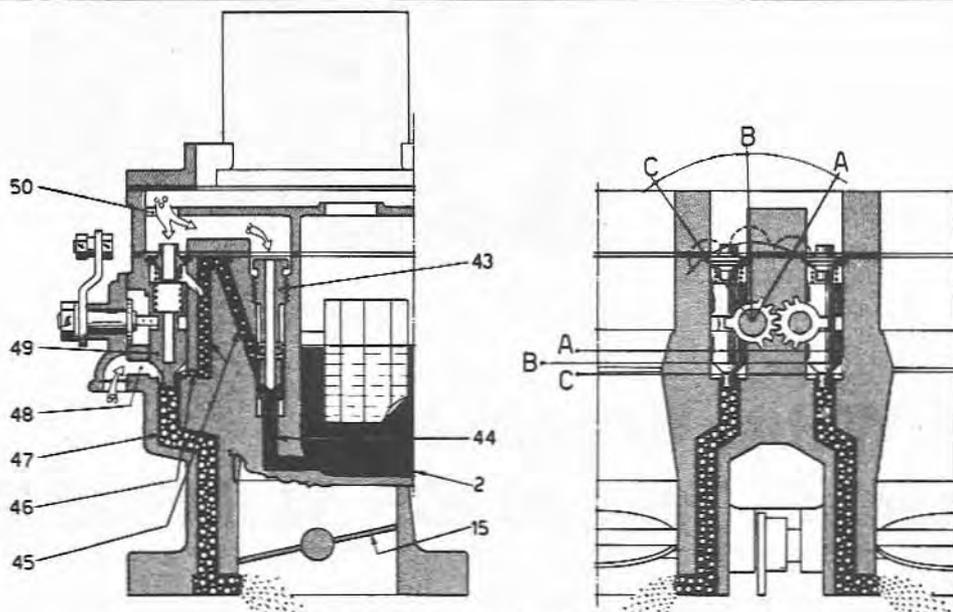
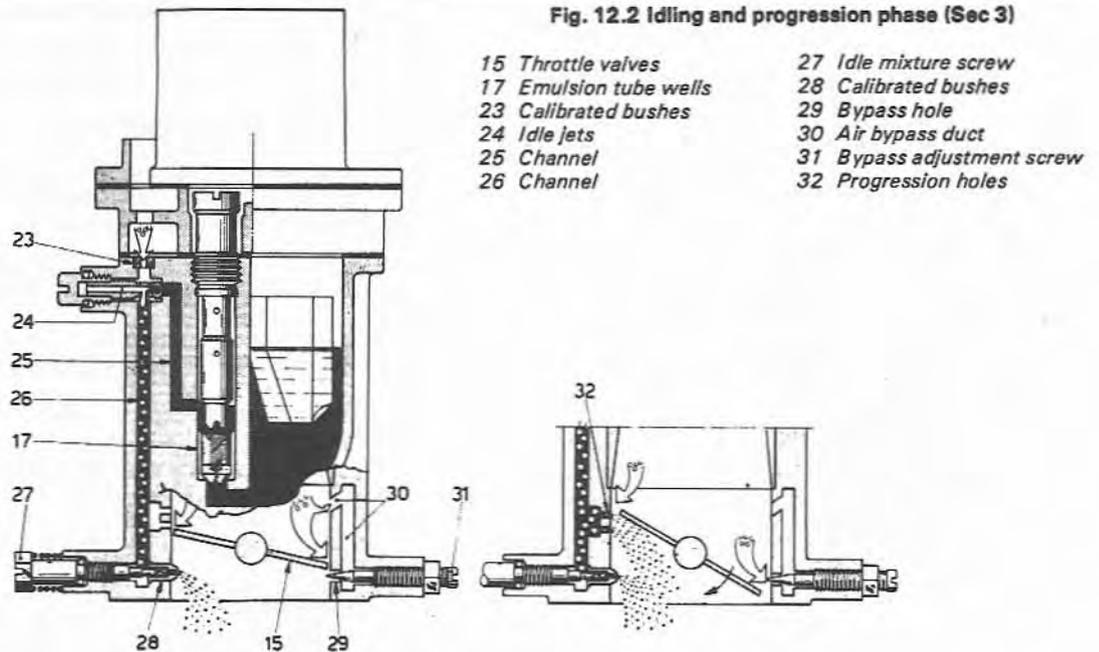


Fig. 12.1 Cold starting phase (Sec 3)

2 Float chamber  
15 Throttle valves  
43 Starting jets  
44 Channel

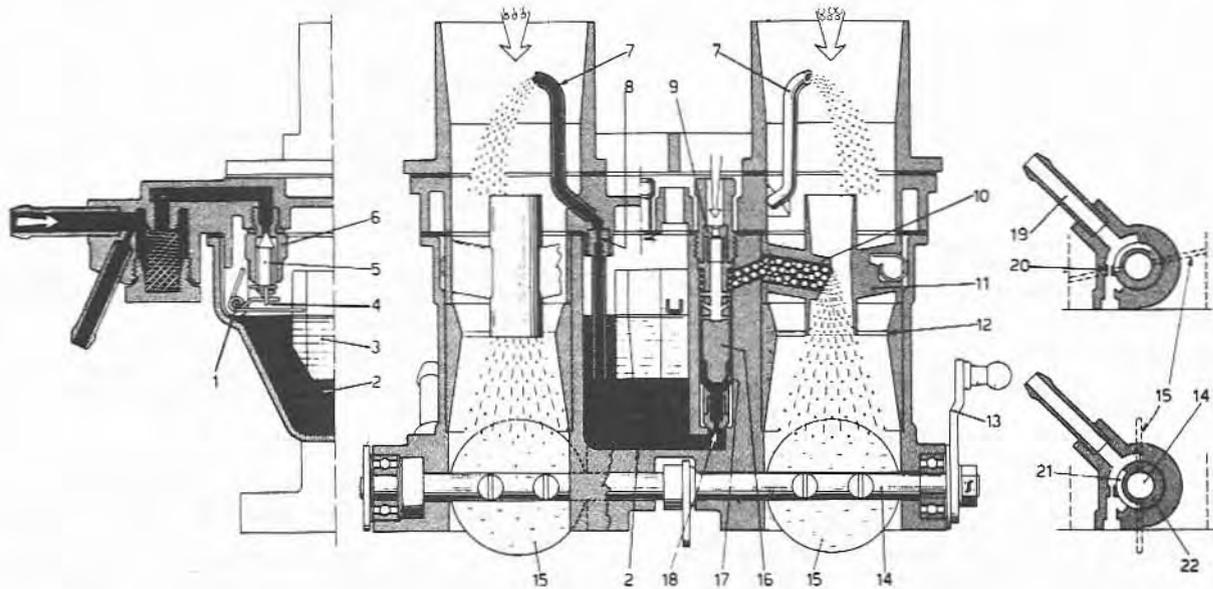
45 Channel  
46 Transfer hole  
47 Channel

48 Air inlet  
49 Starter valves  
50 Air inlet hole



**Fig. 12.2 Idling and progression phase (Sec 3)**

15 Throttle valves	27 Idle mixture screw
17 Emulsion tube wells	28 Calibrated bushes
23 Calibrated bushes	29 Bypass hole
24 Idle jets	30 Air bypass duct
25 Channel	31 Bypass adjustment screw
26 Channel	32 Progression holes



**Fig. 12.3 Normal phase (Sec 3)**

1 Fulcrum pin	7 Mixture enrichment tubes	13 Throttle lever	18 Main jets
2 Float chamber	8 Calibrated holes	14 Throttle shaft	19 Crankcase emission tube
3 Float	9 Air corrector jets	15 Throttle valves	20 Calibrated hole
4 Return hook	10 Nozzles	16 Emulsion tubes	21 Crankcase emission valve slot
5 Needle	11 Auxiliary venturis	17 Emulsion tube wells	22 Rotary blanking disc
6 Needle valve seating	12 Chokes		

**Normal running**

Refer to Fig. 12.3 and note that under full throttle and high speed cruise conditions, fuel is drawn from the float chamber (2) through the main jets (18) to the emulsion tube wells (17) and then past the holes in the emulsion tubes (16). The fuel becomes emulsified with air drawn through the air corrector jets (9) and is then drawn through the nozzle (10), auxiliary venturis

(11) and chokes (12) into the engine.

The carburetor also incorporates a high speed mixture enrichment system. Fuel from the float chamber (2) is drawn through the calibrated orifice (8) and spray tubes (7) into the air horns of the carburetor.

The crankcase emission control system is incorporated into one of the carburetor barrels and consists of a rotary blanking

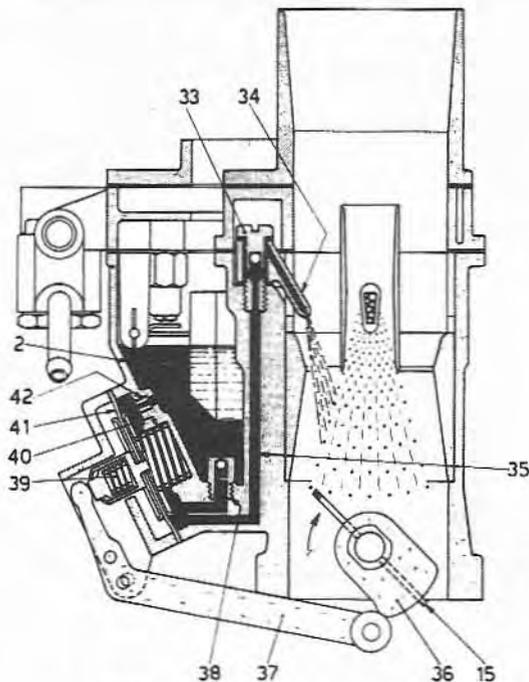


Fig. 12.4 Acceleration phase (Sec 3)

2 Float chamber	37 Lever
15 Throttle valves	38 Inlet and discharge valve
33 Delivery valves	39 Reaction spring
34 Jet nozzles	40 Return spring
35 Channel	41 Diaphragm
36 Cam	42 Calibrated discharge hole

disc (22). With the throttle valves (15) closed, crankcase blow-by gas is metered through the calibrated hole (20). As the throttle valves are progressively opened, the slot (21) admits more gas to the engine.

### Acceleration

Refer to Fig. 12.4 and note that when the throttle valves are closed, the spring (40) pushes the diaphragm (41) outwards and fuel is drawn from the float chamber (2), through the inlet valve (38) into the pump chamber. When the throttle valves are opened, the cam (36) operates the lever (37) and the diaphragm (41) is depressed against the tension of the spring (40). Fuel is forced along the channels (35) to the delivery valves (33) and is injected through the pump jets (34) into the carburettor barrels in the vicinity of the auxiliary venturis. The spring (39) dampens any sudden opening of the throttle valves and prolongs the fuel delivery. The calibrated discharge hole (42) determines the maximum pressure of fuel injected into the carburettor and also allows any accumulated air and vapour to escape into the float chamber. The inlet valve (38) may also incorporate a calibrated discharge hole, whereby a further amount of fuel returns to the float chamber. By fine calibration of this hole it is possible to determine the exact quantity of fuel injected by the accelerator pump.

### 4 Removal and refitting

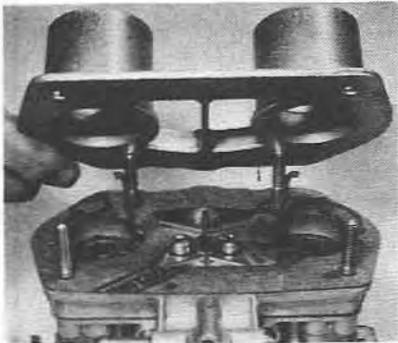
**Note:** The following procedure gives a general rather than a specific method of removing and refitting the carburettor, as much will depend on the location of the carburettor within the vehicle. On some applications for instance, the retaining nuts may not be accessible without removing surrounding components.

- 1 Where fitted, remove the air cleaner assembly from the carburettor.
- 2 Disconnect the throttle linkage where necessary.
- 3 Disconnect the inner and outer choke cable from the starting device.
- 4 Disconnect the fuel inlet hose; and return hoses where fitted.
- 5 Remove the crankcase emission hose from the carburettor.
- 6 Unscrew and remove the carburettor retaining nuts and spring washers and withdraw the carburettor complete over the mounting studs.
- 7 Remove the gaskets from the inlet manifold and clean all traces of gasket from the contact faces of the manifold and carburettor.
- 8 Protect the inlet manifold from ingress of foreign matter whilst the carburettor is removed, by sealing it with masking tape.
- 9 Refitting is a reversal of removal, but the following additional points should be noted:

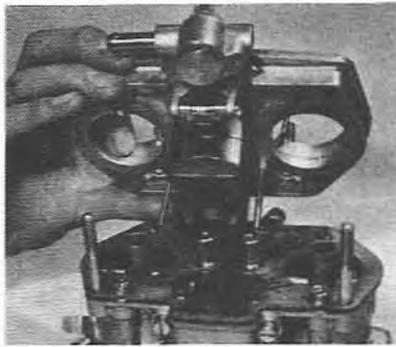
- (a) Always fit new gaskets and tighten the retaining nuts evenly in diagonal sequence
- (b) The idling adjustment screws should be set as described in Section 7 and finally tuned as described in Section 8
- (c) When refitting the choke (starting device) cable, first secure the outer cable to the support, then insert the inner cable into the operating lever screw and push the instrument panel control knob fully in. Tighten the inner cable retaining nut with the operating lever fully released.

### 5 Disassembly

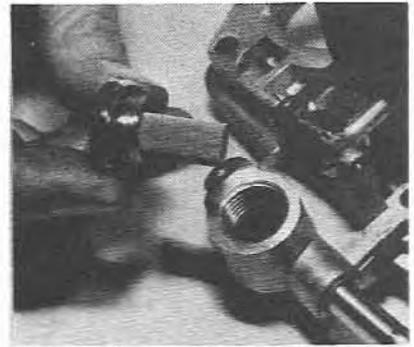
- 1 Thoroughly clean the carburettor exterior and wipe dry.
- 2 Referring to Fig. 12.5, lift the air horns (1) and gasket (2) from the carburettor top cover (photo). Where fitted extract the two split pins and remove the starter device control rod and control lever from the carburettor top cover (82).
- 3 Unscrew and remove the retaining screws (85) and washers (84) in diagonal sequence and lift the carburettor top cover (82) from the carburettor body (49), making sure that the gasket (81) is not broken (photo).
- 4 Lift the gasket (81) from the carburettor body (49).
- 5 Invert the carburettor cover (82) and unscrew the filter cover plug (6) using a 19 mm ring spanner and socket. Remove the washer (5) (photo).
- 6 Remove the filter gauze (3) and, if necessary, extract the base (4).
- 7 Using a suitable diameter metal drift, tap the fulcrum pin (7) from the support posts. Do not attempt to prise the split post apart (photo).
- 8 Note which way round the needle valve return hook is positioned, then lift the float assembly (77) and needle from the cover (photo). Unhook the needle from the float arm.
- 9 Unscrew and remove the needle valve (78) and washer (79) (photo).
- 10 Place the carburettor cover (82) to one side, taking care not to damage the high speed enrichment tubes.
- 11 Unscrew and remove the retaining screws (40A) and washers (71). Remove the starter device (59) from the carburettor (photo).
- 12 Dismantle the starter device by unscrewing the nut (61) from the shaft (69) together with the washer (62), then carefully remove the lever (65) and spring (67). Unscrew the cable clamp nut (64) and screw (66), then remove the shaft (69) and filter gauze (70).
- 13 Unscrew and remove the accelerator pump inlet and discharge valve (17) from the bottom of the float chamber (photo).
- 14 Unscrew the emulsion tube holders (8) from the carburettor body (49) and lift out the emulsion tube assemblies (photos).
- 15 Separate the emulsion tubes (10) from the holders (8) then



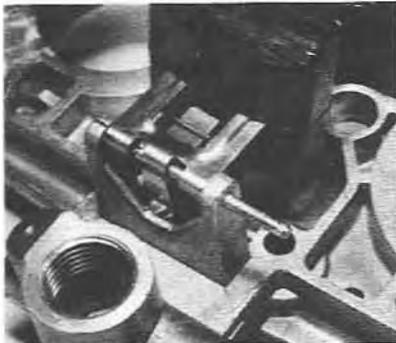
5.2 Removing the air horns



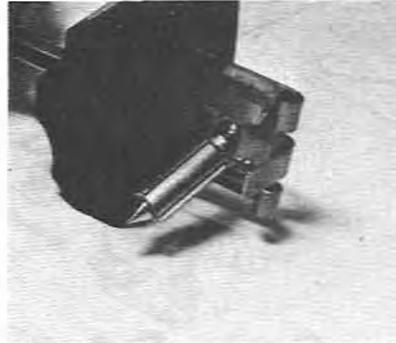
5.3 Removing the carburetor top cover



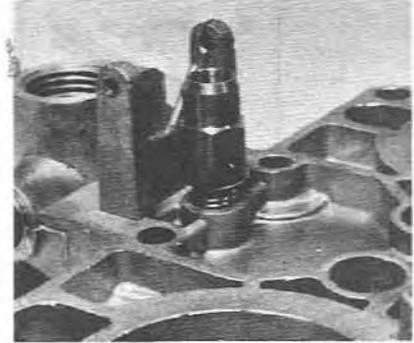
5.5 Removing the fuel filter and plug



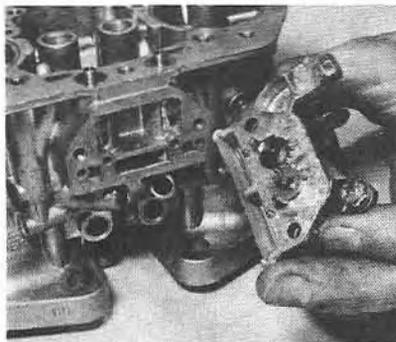
5.7 Removing the float fulcrum pin



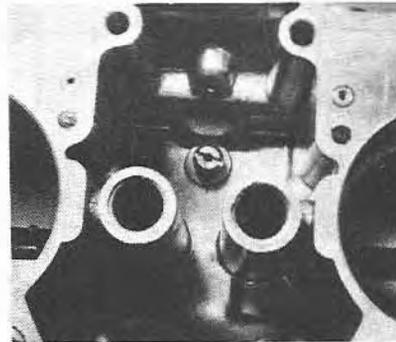
5.8 Position of the needle valve on the float assembly



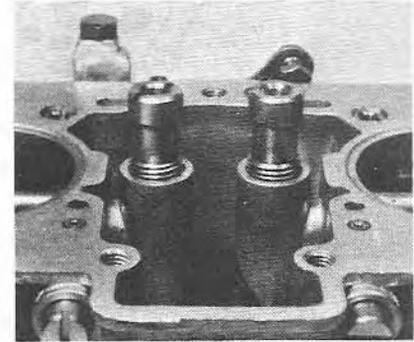
5.9 Needle valve seating location



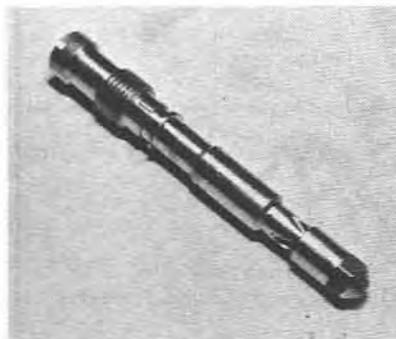
5.11 Removing the starter device



5.13 Accelerator pump inlet and discharge valve location



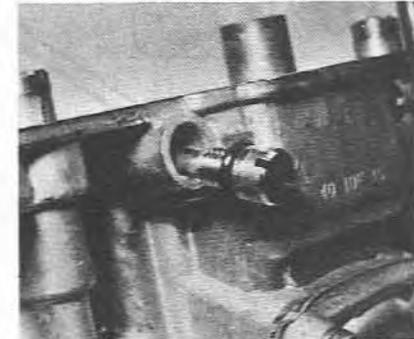
5.14a Emulsion tube holders location



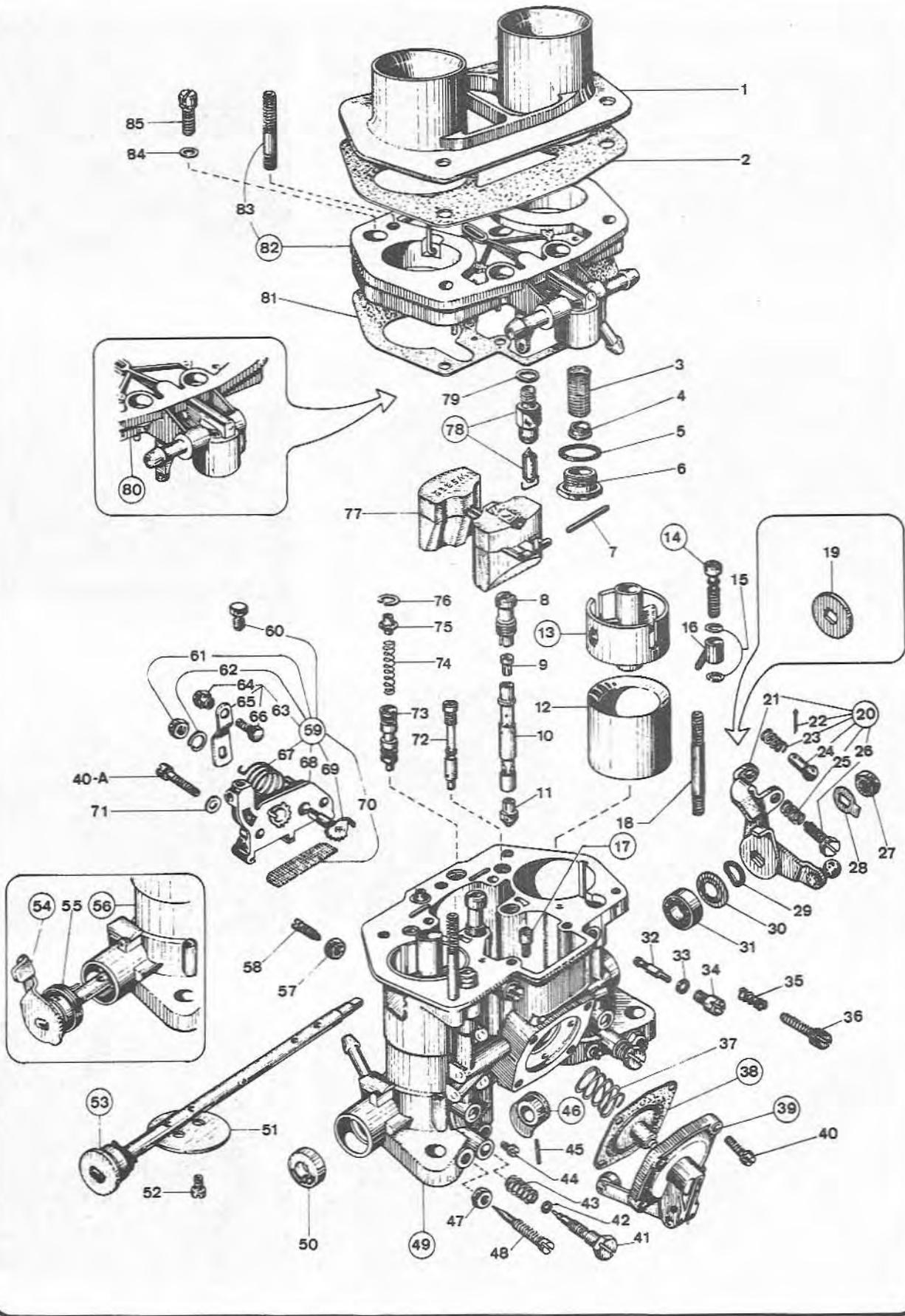
5.14b The emulsion tube assembly



5.15 Component parts of the emulsion tube assembly



5.16a Removing the idling jets



pull the main jets (11) and air corrector jets (9) from the emulsion tubes (10) (photo). Take care not to damage the jets when removing them and, if pliers are used, interpose a piece of paper or card to prevent the brass being scratched.

16 Unscrew the idling jet holders (34) from the side of the carburettor body (49), remove the rubber O-rings (33), then separate the idling jets (32) (photos).

17 Whilst depressing the starter valve spring retaining guides (75) in turn, prise the spring washers (76) from the carburettor body, then release the guides (75) and extract the return springs (74) and starter valves (73) (photos). Note from which bore each valve is taken so that they can be refitted in their original locations. Do not force the valves if they will not come out freely; occasionally a burr may exist at the top of the bore, this must be removed with a fine file.

18 Unscrew and remove the starter jets (72) (photo).

19 Unscrew and remove the accelerator pump delivery valves (14) together with the pump jets (16) and washers (15) (photo), then separate the washers and jets from the valves.

20 Unscrew the retaining screws and washers (40) and carefully prise the pump cover (39) from the carburettor body (photo). Take care not to damage the diaphragm and if necessary, use a blunt knife to release it.

21 Remove the diaphragm (38) and spring (37).

22 Note the location of the auxiliary venturis (13) and mark them if necessary with a pencil to ensure correct refitting, then withdraw them from the carburettor body (49) (photo). If necessary, use a wooden or plastic dowel rod inserted from the throttle valve end of the barrel to tap the auxiliary venturis free. In the unlikely event of their being excessively tight, it will be necessary to obtain the special Weber tool no 9610 150 0035.

23 Loosen the locknuts (57) with a 9 mm ring spanner and unscrew the locking screws (58) (photo).

24 Note the locations of each choke (12) then remove them from the carburettor barrels (photo). Note that the choke ends with the smaller internal diameter are uppermost. If the chokes are excessively tight, it will be necessary to obtain Weber tool no 98009 100.

25 Unscrew and remove the idling mixture adjusting screws (41) together with the springs (43), washers and rubber O-rings (42) (photo).

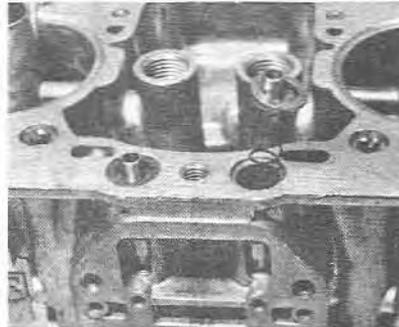
26 Unscrew and remove the idle speed screw (36) and spring (35), where fitted.

27 Unscrew and remove the blanking screws (44) (photo).

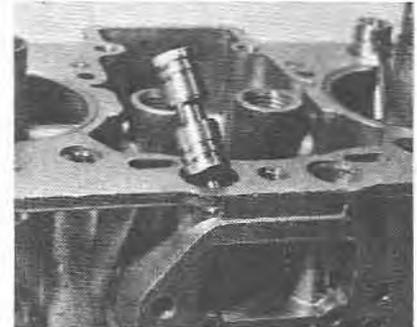
28 Loosen the locknuts (47) with an 8 mm ring spanner, then unscrew and remove the air bypass screws (48) (photo).



5.16b Separating an idling jet from its holder



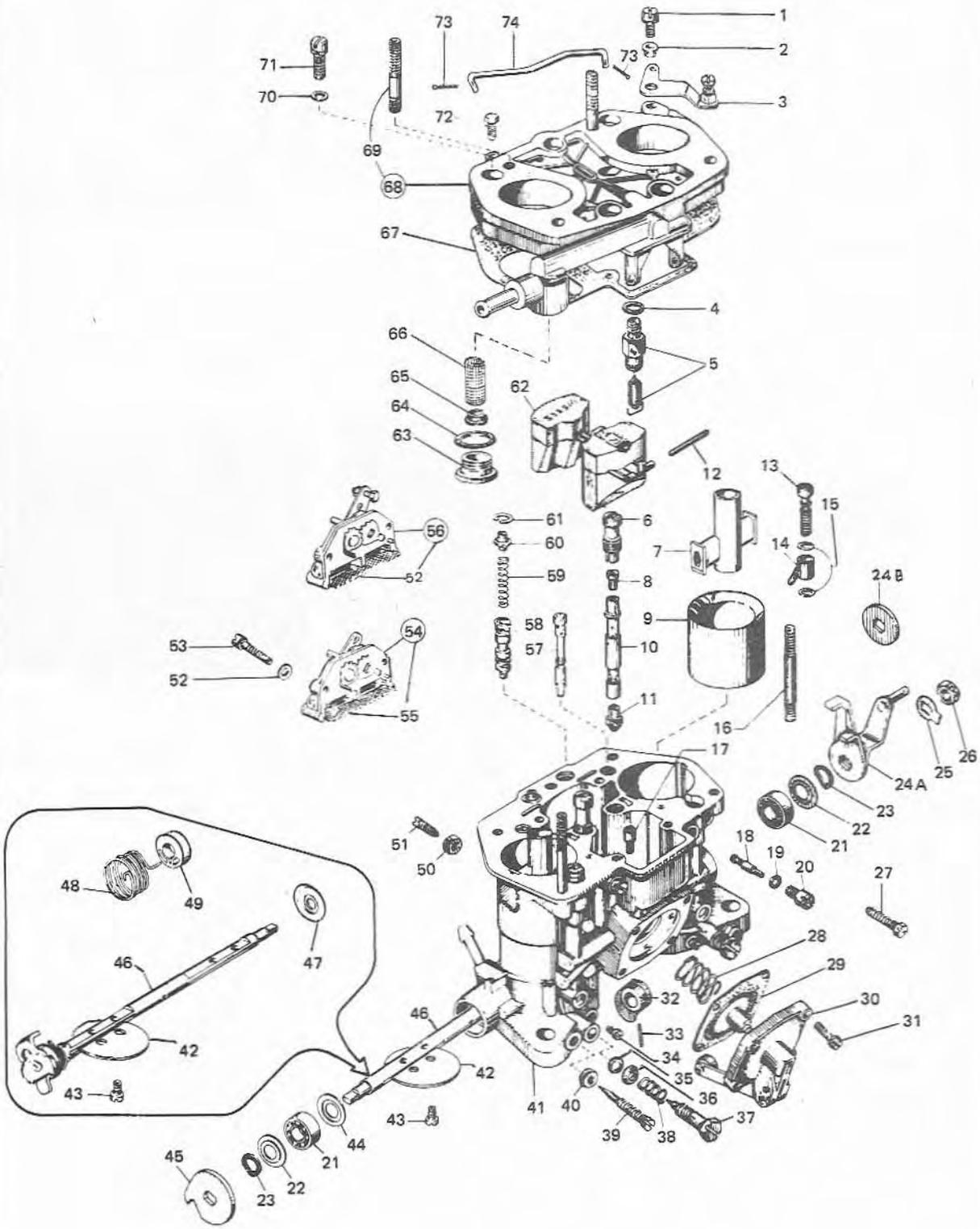
5.17a Removing a starter valve spring, retaining guide and spring washer

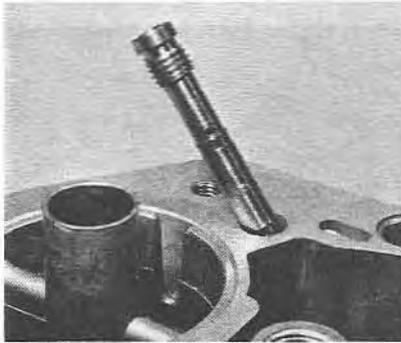


5.17b Removing a starter valve

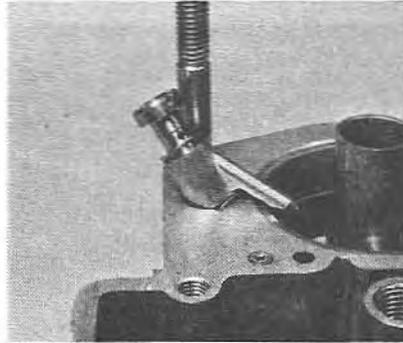
Fig. 12.5 Exploded view of the 40 IDF carburettor (typical) (Sec 5)

- |                                     |                           |                            |
|-------------------------------------|---------------------------|----------------------------|
| 1 Air horns                         | 30 End washer             | 58 Choke locking screw     |
| 2 Gasket                            | 31 Ball-bearing           | 59 Starter device assembly |
| 3 Filter gauze                      | 32 Idle jet               | 60 Lock screw              |
| 4 Base                              | 33 O-ring                 | 61 Nut                     |
| 5 Washer                            | 34 Idle jet holder        | 62 Spring washer           |
| 6 Plug                              | 35 Spring                 | 63 Lever assembly          |
| 7 Fulcrum pin                       | 36 Idle speed screw       | 64 Nut                     |
| 8 Emulsion tube holder              | 37 Spring                 | 65 Lever                   |
| 9 Air corrector jet                 | 38 Diaphragm              | 66 Screw                   |
| 10 Emulsion tube                    | 39 Accelerator pump cover | 67 Spring                  |
| 11 Main jet                         | 40 Screw                  | 68 Housing                 |
| 12 Choke                            | 41 Idle mixture screw     | 69 Sector shaft            |
| 13 Auxiliary venturi                | 42 O-ring                 | 70 Filter gauze            |
| 14 Delivery valve                   | 43 Spring                 | 71 Washer                  |
| 15 Copper washers                   | 44 Blanking screw         | 72 Starter jet             |
| 16 Pump jet                         | 45 Roll pin               | 73 Starter valve           |
| 17 Inlet valve with exhaust orifice | 46 Accelerator pump cam   | 74 Spring                  |
| 18 Stud                             | 47 Locknut                | 75 Retaining guide         |
| 19 Spacer                           | 48 Air bypass screw       | 76 Retaining washer        |
| 20 Throttle lever assembly          | 49 Carburettor body       | 77 Float assembly          |
| 21 Throttle lever                   | 50 Emission control valve | 78 Needle valve assembly   |
| 22 Split pin                        | 51 Throttle valve         | 79 Gasket                  |
| 23 Spring                           | 52 Retaining screw        | 80 Alternative fuel inlet  |
| 24 Pressure pin                     | 53 Throttle shaft         | 81 Gasket                  |
| 25 Spring                           | 54 Link arm               | 82 Carburettor cover       |
| 26 Adjusting screw                  | 55 Return spring          | 83 Stud                    |
| 27 Nut                              | 56 Carburettor body       | 84 Washer                  |
| 28 Tab washer                       | 57 Locknut                | 85 Retaining screw         |
| 29 Wave washer                      |                           |                            |

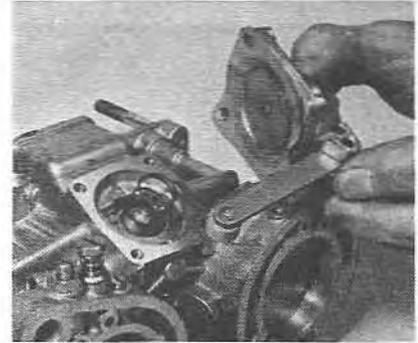




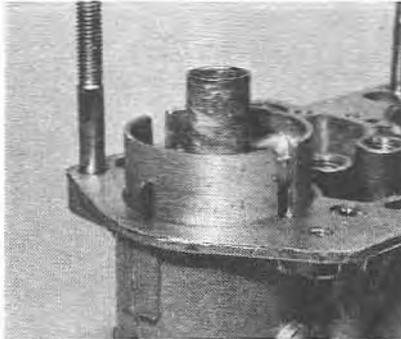
5.18 Removing a starter jet



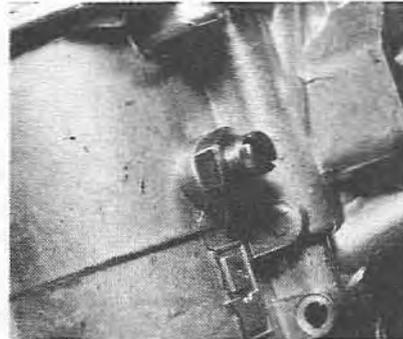
5.19 Removing the accelerator pump delivery valve and jet



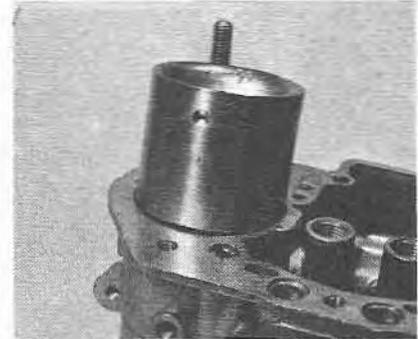
5.20 Withdrawing the accelerator pump cover from the carburettor



5.22 Removing an auxiliary venturi



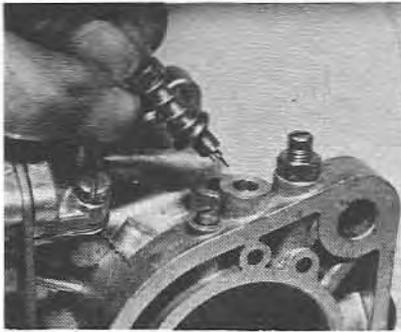
5.23 Choke locking screw location



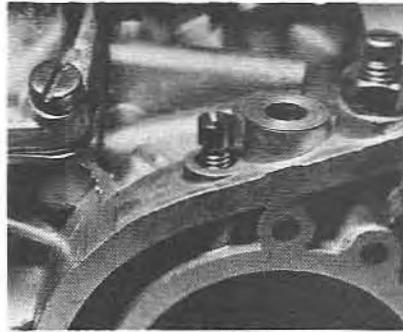
5.24 Removing a choke, showing location indentation

Fig. 12.6 Exploded view of the 40 and 44 IDF carburettor (series 28, 29 and 26, 27) (Sec 5)

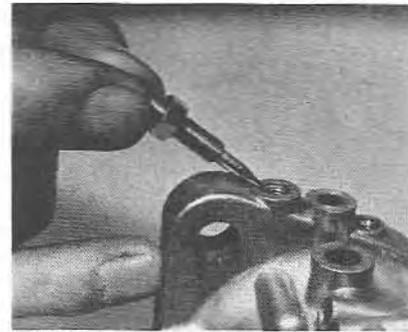
- |                                     |                           |                                             |
|-------------------------------------|---------------------------|---------------------------------------------|
| 1 Screw                             | 26 Nut                    | 52 Washer                                   |
| 2 Bush                              | 27 Idle speed screw       | 53 Screw                                    |
| 3 Starter control lever             | 28 Spring                 | 54 Starter device (40 IDF 28 and 44 IDF 26) |
| 4 Gasket                            | 29 Diaphragm              | 55 Filter gauze                             |
| 5 Needle valve assembly             | 30 Accelerator pump cover | 56 Starter device (40 IDF 29 and 44 IDF 27) |
| 6 Emulsion tube holder              | 31 Screw                  | 57 Starter jet                              |
| 7 Auxiliary venturi                 | 32 Cam                    | 58 Starter valve                            |
| 8 Air corrector jet                 | 33 Roll pin               | 59 Spring                                   |
| 9 Choke                             | 34 Blanking screw         | 60 Retaining guide                          |
| 10 Emulsion tube                    | 35 O-ring                 | 61 Retaining washer                         |
| 11 Main jet                         | 36 Washer                 | 62 Float assembly                           |
| 12 Fulcrum pin                      | 37 Idle mixture screw     | 63 Plug                                     |
| 13 Delivery valve                   | 38 Spring                 | 64 Washer                                   |
| 14 Pump jet                         | 39 Air bypass screw       | 65 Base                                     |
| 15 Copper washers                   | 40 Locknut                | 66 Filter gauze                             |
| 16 Stud                             | 41 Carburettor body       | 67 Gasket                                   |
| 17 Inlet valve with exhaust orifice | 42 Throttle plate         | 68 Carburettor cover                        |
| 18 Idle jet                         | 43 Retaining screw        | 69 Stud                                     |
| 19 O-ring                           | 44 Washer                 | 70 Spring washer                            |
| 20 Idle jet holder                  | 45 Anchor plate           | 71 Retaining screw                          |
| 21 Ball-bearing                     | 46 Throttle shaft         | 72 Cable locknut                            |
| 22 End washer                       | 47 Washer                 | 73 Split pin                                |
| 23 Wave washer                      | 48 Return spring          | 74 Starter control rod                      |
| 24A Throttle lever                  | 49 Emission control valve |                                             |
| 24B Spacer                          | 50 Locknut                |                                             |
| 25 Tab washer                       | 51 Choke locking screw    |                                             |



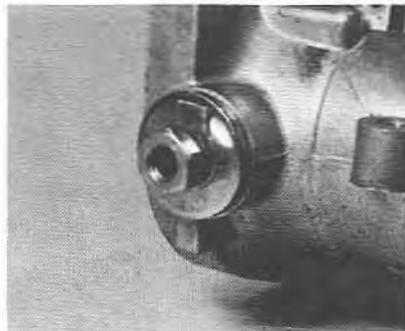
5.25 Removing an idling mixture adjusting screw



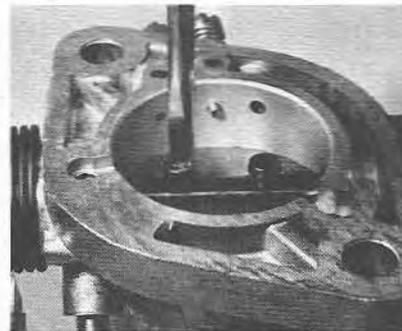
5.27 Removing a blanking screw



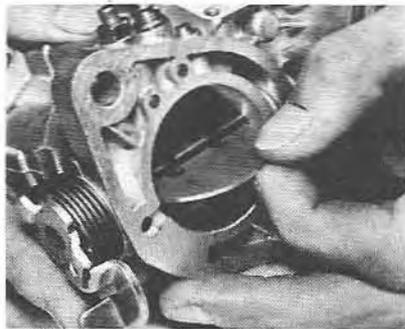
5.28 Removing an air bypass screw



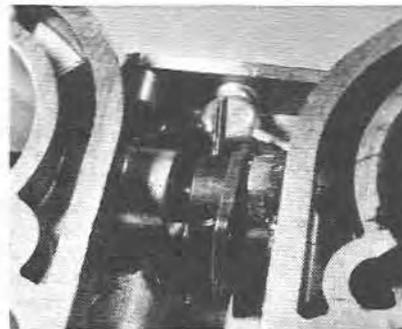
5.29 Throttle spindle end nut location and locktab



5.31 Removing the throttle valve retaining screws



5.33 Removing a throttle valve



5.34 Accelerator pump cam roll pin removal

29 Bend back the locktabs (28) on one or both ends of the throttle spindle (53) depending on the application, then unscrew and remove the nuts (27) (photo). If these are very tight, use Weber tool no 98023 700 to hold the spindle whilst the nut is loosened. If this precaution is not taken, the spindle (53) may become buckled. Do not loosen a tight nut with the throttle valves being forced against the barrel walls.

30 Remove the nut(s) (27), tab washer(s) (28), spacer (19) and throttle lever (21) as applicable to the carburettor.

31 Unscrew and remove the throttle valve retaining screws (52), being careful not to exert excessive pressure on the spindle (53) (photo).

32 Note the position of the throttle spindle and valves in relation to the barrels and if necessary, mark the valves with a pencil.

33 Turn the spindle to the fully open position and withdraw the two throttle valves (51) from their location slots (photo).

34 Using a suitable pin punch, drive the roll pin (45) through

the cam (46) and spindle (53). To ensure correct refitting, mark the cam and spindle in relation to each other (photo).

35 Using a plastic mallet, drive the spindle (53) from the carburettor. Before doing this, check that the spindle is free of any burrs and use a fine file if necessary, to remove them.

36 Recover the wave washer(s) (29) and bearing end washer(s) (30) the accelerator pump cam (46).

37 Drive the remaining bearing (31) from the carburettor body (49). Where the throttle lever (54) is swaged onto the spindle, use a suitable diameter length of metal dowel rod to remove the bearing. Where retaining nuts are located on each end of the throttle spindle, remove the bearing and washer and use the spindle to remove the bearing.

38 When fitted, remove the return spring (55) from the throttle spindle (54).

39 When fitted, remove the crankcase emission rotary disc (50) from the throttle spindle.

40 If necessary, unscrew the idle speed screw (26) and spring

(25) from the throttle lever (21), then remove the split pin (22), pressure pin (24) and spring (23).

## 6 Special overhaul procedures

After carrying out the general overhaul procedures given in Chapter 4, the following special procedures should be completed:

- 1 Using a hand chuck and the special tool available from Weber or a tool hire agent, reform the main jet seatings at the bottom of the emulsion tube housing wells by carefully rotating the tool in alternate directions. Finish the seatings with the additional special tool by tapping it gently whilst rotating it at the same time.
- 2 Using the same procedure as described in paragraph 1, reform the idling jet seats.
- 3 Using the same procedure as described in paragraph 1, reform the starter valve seats.
- 4 Using the same procedure as described in paragraph 1, reform the starter jet seats.
- 5 If the emulsion tube wells are discoloured and considerable sediment has accumulated, the bores must be removed using the applicable Weber tool and a hand chuck. Turn the tool carefully until it moves freely, then continue turning it whilst removing it.
- 6 Check the internal channels of the carburettor body and cover by injecting fuel from a syringe and observing whether it emerges freely. If any channels are blocked, it will be necessary to drill out the lead plugs and use Weber tool nos 98014 300, 98014 400 and 98014 500 to clear them. These tool numbers refer to the three channel diameters of 1.0 mm, 1.5 mm and 2.0 mm.
- 7 The carburettor body should be thoroughly cleaned after overhaul, preferably using clean fuel and air pressure. The lead plugs should be renewed and retained in position by using the Weber tool nos 98010 700 or 98010 800 as a punch until the plugs are expanded into their bores.
- 8 Check the float assembly for damage and leakage. Shake the floats to determine whether fuel has entered. If the floats are damaged or fuel is present, the assembly must be renewed.
- 9 Check the accelerator pump lever and diaphragm for wear and damage and renew them as necessary.

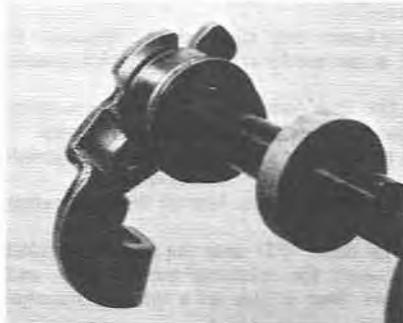
## 7 Assembly

**Note:** All components should be clean and dry before starting the assembly procedure.

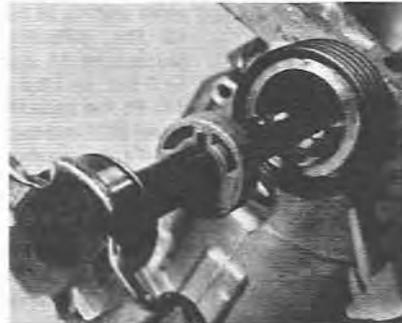
- 1 Fit the spring (23) and pressure pin (24) to the throttle lever (21) and secure with the split pin (22).
- 2 Fit the idle speed screw (26) and spring (25) to the throttle lever (21).
- 3 When fitted slide the crankcase emission rotary disc (50)

onto the throttle spindle, making sure that the locating pin is fully engaged with the slot (photos).

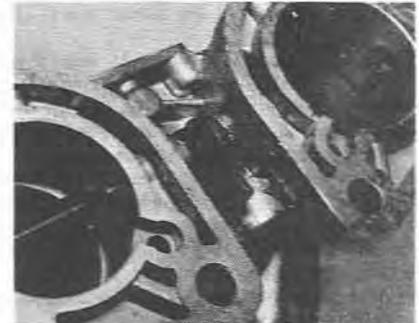
- 4 When fitted, locate the return spring (55) over the throttle spindle (54) and engage the hooked end on the throttle lever arm.
- 5 Using a suitable diameter length of tubing, drive the bearing (31) fully into the carburettor body (49). Make sure that the inner bearing washer is inserted into the body, where fitted.
- 6 If a new cam (46) or spindle (53) is being fitted, ream the cam as necessary so that it is a firm sliding fit on the spindle.
- 7 On throttle spindles fitted with two end nuts, place the remaining ball-bearing on an open vice and gently tap the spindle into it. Where necessary, the inner washer must be located on the spindle first.
- 8 Insert the throttle spindle (53) into the carburettor body (49), at the same time locate the accelerator pump cam (46) between the two barrels with its shoulder as shown in Fig. 12.5 (photo). Also insert the return spring (55) in the location hole where applicable.
- 9 Using a length of tubing, support the bearing (31) in the main body then tap the spindle (53) fully into position (photo).
- 10 Fit the bearing end washer(s) (30) and wave washer(s) (29) after lubricating the bearings with a little grease.
- 11 Turn the throttle spindle (53) to its approximate closed position then, with the accelerator pump cam (46) facing away from the diaphragm face, align the holes in the cam (46) and spindle (53) and drive in the roll pin (45) until it is in a central position.
- 12 Turn the spindle (53) (against the tension of spring 55 if already fitted) until the throttle valve slots can be seen from the flange end of the carburettor, then insert one throttle valve (51) in the location previously noted and close the valve. Make sure that the throttle valve is fitted the correct way round so that the angled perimeter seats in the barrel.
- 13 Snap the valve shut several times in order to centralise it, then insert and tighten the valve retaining screws (52) without exerting excessive pressure on the spindle. It is recommended that new screws are always fitted as it is quite easy to cross-thread previously peened screws. Lock the screws by peening with Weber tool no 98010 900 whilst supporting the spindle with a length of wood. Alternatively, coat the threads with a liquid locking agent (fuel resistant) prior to inserting them.
- 14 Repeat the procedure described in paragraphs 12 and 13 for the remaining throttle valve.
- 15 If a new spindle (53) or cam (46) is being fitted, both must be drilled with a 0.078 in (2.0 mm) drill to accommodate the roll pin (45). To do this, it is essential to obtain the special Weber fixture.
- 16 Fit the throttle lever (21), spacer (19), tab washer(s) (28) and nut(s) (27) and lock them to the carburettor.
- 17 Tighten the nut(s) (27) and lock them by bending the locktabs (28). Do not overtighten the nuts otherwise the spindle may be distorted.
- 18 Insert the air bypass screws (48) and screw them in until



7.3a Crankcase emission rotary disc locating peg ...



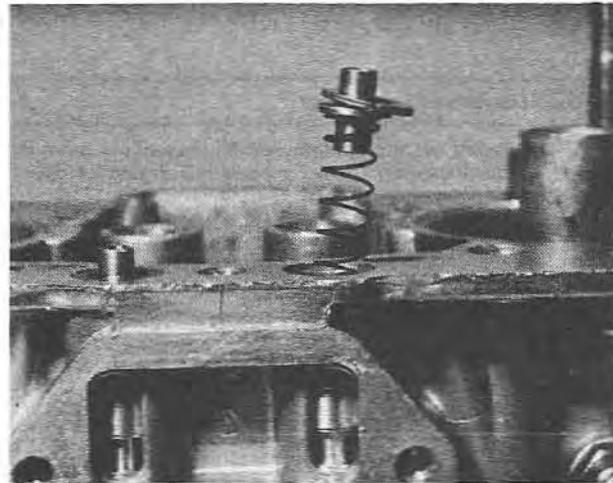
7.3b ... and slot



7.8 Fitting the throttle spindle through the accelerator pump cam



7.9 Fitting the throttle spindle bearing



7.31 Fitting a starter valve spring, retainer and spring washer

they are fully seated, then tighten the locknuts (47).  
 19 Insert and tighten the blanking screws (44).  
 20 Fit the idle speed screw (36) and spring (35), where fitted.  
 21 Fit the idling mixture adjusting screws (41) together with the rubber O-rings (42), washers and springs (43).  
 22 Insert the chokes (12) into the barrels with the smaller internal diameter ends uppermost.  
 23 Align the indentations in the chokes (12) with the holes in the carburettor body (49), then lightly tighten the locking screws (58) into position and tighten the locknuts (57).  
 24 Fit the auxiliary venturis (13) in their original locations, making sure that the location springs engage with the grooves in the barrels and that the supply of channels are in alignment with those in the carburettor body. The extended venturis must also be uppermost.  
 25 Support the carburettor body (49) with the pump diaphragm face uppermost, then locate the spring (37) on the face in a central position.  
 26 Place the diaphragm (38) against the pump cover (39) and retain with the fingers and thumb, then insert the retaining screws and washers (40) through the diaphragm.  
 27 Locate the diaphragm and cover on the carburettor and engage two or three threads of the retaining screws. Operate the pump lever several times then hold it so that the diaphragm is not tensioned. Tighten the retaining screws (40) evenly in diagonal sequence. Check the operation of the pump by operating the throttle lever.  
 28 Assemble the accelerator pump jets (16) to the delivery valves (14) with the copper washers (15), then tighten them into the carburettor body (49).  
 29 Insert and tighten the starter jets (72) into the carburettor body (49).  
 30 Fit the starter valves (73) into their respective bores, followed by the return springs (74) and retainers (75).  
 31 Depress the retainers (75) in turn and locate the spring washers (76) in the carburettor recesses (photo), fully pressing them in with the flat blade of a screwdriver.  
 32 Press the idling jets (32) into the holders (34), fit the rubber O-rings (33), then tighten the holders into the carburettor body.  
 33 Press the air corrector jets (9) and main jets (11) into the emulsion tubes (10), then press the holders (8) onto the top of the emulsion tubes (10).  
 34 Insert and tighten the emulsion tube assemblies into the carburettor body (49).  
 35 Insert and tighten the accelerator pump inlet and discharge valve (17).  
 36 Assemble the shaft (69) to the starter device so that the alignment lines on each sector are facing each other, then fit the

coil spring (67) with its end in the location hole. Fit the lever (65) over the shaft (69) and at the same time hook the end of the spring (67) over the lever, then locate the washer (62) and nut (61) and tighten the nut.  
 37 Check the operation of the starter device, then fit the cable securing nut (64) and screw (66) and filter gauze (70).  
 38 Offer the starter device up to the carburettor body and make sure that the sector lugs locate in the starter valve grooves, then insert the retaining screws (40A) and washers (71) and tighten the screws. Check that the starter device operates smoothly.  
 39 Tighten the needle valve seating (78), together with a new gasket (79), into the carburettor cover (82).  
 40 Hook the needle (78) onto the float arm (77) then lower the needle into the seating. Insert the fulcrum pin (7) through the posts and float assembly (77). If necessary, gently pinch the split post to secure the pin using a pair of pliers.  
 41 The float level adjustment must now be checked in the following manner: Hold the carburettor cover vertical so that the floats are hanging from the fulcrum pin with the float level arm in light contact with the needle ball (ie without the ball being depressed). Using a vernier caliper, check that the distance from the float to the cover face as shown in Fig. 12.7 is 0.394 in (10.0 mm) without the gasket in place (photo). If not, bend the tab retaining the needle hook as necessary.  
 42 Tilt the cover so that the floats move away from the cover and the tab makes contact with the needle valve seating. Now, using the same method as described in paragraph 41, check that the needle valve fully open dimension is 1.280 in (32.5 mm) (photo). If not, bend the tab which contacts the needle valve seating as necessary.  
 43 The difference between the dimensions checked in paragraphs 41 and 42 is the needle valve stroke which should be 0.886 in (22.5 mm).  
 44 Fit the base (4) to the filter gauze (3). With the carburettor cover (82) inverted, press the filter gauze into the inlet cavity.  
 45 Fit the washer (5) to the filter cover plug (6), then tighten the plug into the cover (82).  
 46 Place the gasket (81) onto the top face of the carburettor body (49).  
 47 Lower the carburettor cover (82) onto the main body (49) over the studs, then insert the retaining screws (85) and washers (84) and tighten them a little at a time in diagonal sequence.  
 48 Fit the starter device control rod and lever (where fitted) using new split pins.  
 49 Locate the gasket (2) and air horns (1) over the studs and onto the carburettor cover (82).

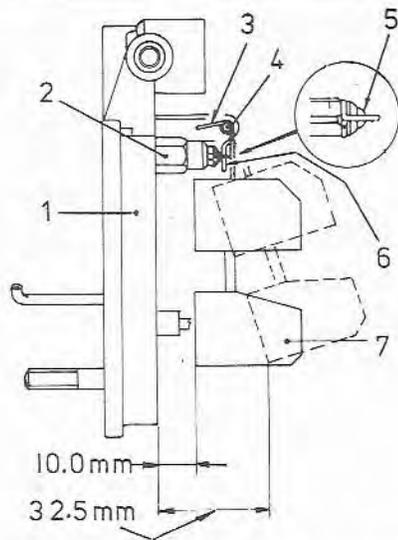


Fig. 12.7 Float level adjustment dimensions (Sec 7)

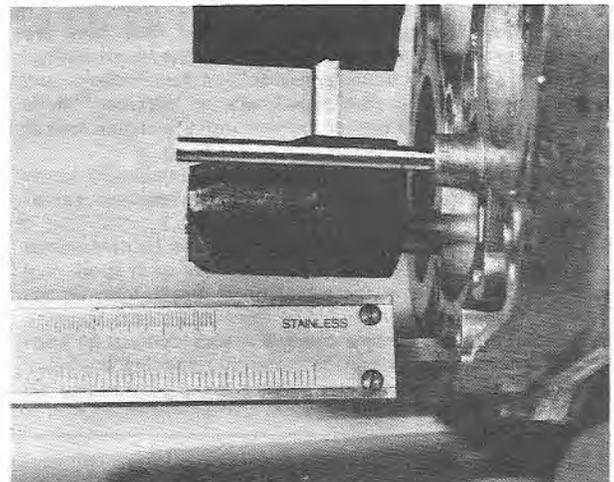
- |                         |                          |
|-------------------------|--------------------------|
| 1 Carburettor cover     | 5 Needle and return hook |
| 2 Needle valve assembly | 6 Height adjusting tab   |
| 3 Stroke adjusting tab  | 7 Float assembly         |
| 4 Fulcrum pin           |                          |

50 With the carburettor completely assembled, the idling adjustment screws should be turned to their preliminary settings. To do this, first screw in the throttle idling adjustment screw (where fitted) until it just touches the throttle lever, then continue turning for a further 2 turns. Working on the idling mixture volume screws in turn, fully screw them in until they are in contact with their seats, then back them off 2 complete turns. Final adjustments will be necessary with the carburettor fitted on the engine (refer to Section 8).

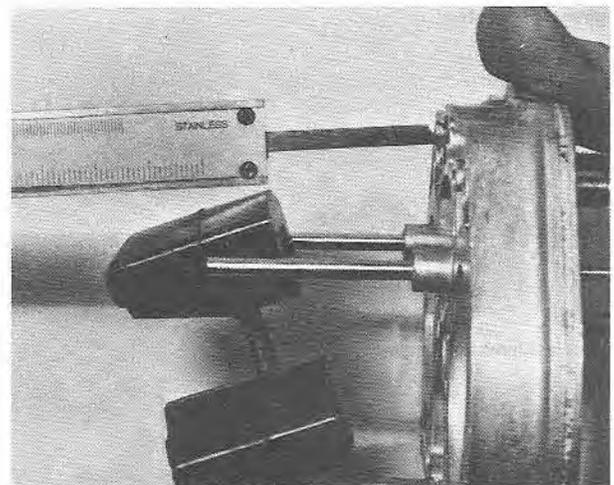
## 8 Tuning

**Note:** Refer to Chapter 3 for general notes on tuning.

- 1 Set the idling adjustment screws to their preliminary positions as described in Section 7.
- 2 Connect a tachometer to the engine in accordance with the manufacturer's instructions.
- 3 It is now important to understand that each barrel of each carburettor must be synchronized in order to deliver equal amounts of air/fuel mixture to each individual cylinder. To check this, it will be necessary to obtain a length of tubing (approximately 1 metre) of about 5 mm to 10 mm (0.25 in to 0.50 in) internal diameter. Alternatively a synchroniser as illustrated in Chapter 8 may be used.
- 4 Remove the air cleaner(s) if fitted, then run the engine until normal operating temperature is reached. To ensure that the engine is really hot enough, drive it hard over a 5 mile distance.
- 5 Switch off the engine and disconnect the accelerator rod connections from each carburettor.
- 6 Where two carburettor throttle spindles are linked, turn the adjustment screw on the link 2 turns from the fully shut position.
- 7 Start the engine and adjust each idling speed adjusting screw (except link adjustments) by equal amounts until the engine is idling at the approximate recommended speed. This will vary according to the application and state of tune of the engine but an average will be around 800 rpm.
- 8 The barrels of each individual carburettor must now be synchronised to pass identical quantities of air during idling. To do this, loosen the locknuts and check that the bypass screws are



7.41 Checking the float level closed position



7.42 Checking the float level open position

both in light contact with their seats. Place one end of the synchronising tube in the middle of one air intake and listen at the other end to the amount of hiss present. Alternatively, use the synchroniser to record the air flow through the air intake. Check both air intakes of the carburettor to determine which one is passing the greatest amount of air, then adjust the remaining barrel to give an identical volume. Finally, tighten the adjustment locknuts. Carry out this procedure independently on each carburettor fitted to the engine.

9 Each carburettor must now be synchronised with the remaining carburetors. To do this, allow the engine to idle and check the volume of air flowing through one air intake of each carburettor, using the length of tube or the synchroniser. Determine the carburettor which is passing the medium volume of air and adjust the idle speed adjustment screws of the remaining carburetors until they also pass identical volumes of air. Where the throttle linkage is arranged from a common shaft, the individual throttle levers will have to be adjusted by loosening the locknuts.

10 If necessary, from each idling speed adjustment screw by equal amounts to bring the engine speed within the recommended idling limits.

11 The mixture screw adjustments on each carburettor must now be set and synchronised. Since each screw was turned to

its preliminary setting, it can be assumed that they are reasonably synchronised to start with. With the engine idling, turn all the screws by equal amounts ( $\frac{1}{2}$  a turn initially) and observe whether the engine speed falls or increases. Make several adjustments in a similar manner until the engine runs at the highest speed commensurate with even firing.

12 If necessary, again turn each idling speed adjustment screw by equal amounts to bring the engine speed within the recommended idling limits.

13 The final mixture screw synchronisation can be determined by allowing the engine to idle, then to remove each spark plug lead in turn and observe the reduction in engine rpm on the tachometer. The reduction should be identical for each cylinder, thus proving that the mixture strength is also identical for each cylinder. A further check can be made by removing the spark plugs after the engine has been idling for approximately 15

minutes. Any with black sooty deposits indicate that the particular cylinder is running rich. Normally if the mixture screw has not been set correctly, weakening it by half a turn during idling will cut the relevant cylinder.

14 If necessary adjust the idling speed screws on each carburettor by equal amounts to obtain the correct engine idling speed.

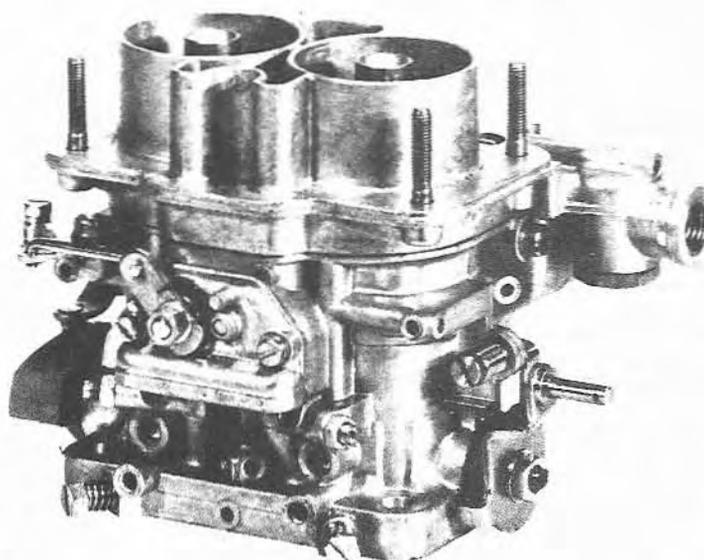
15 Note that on some applications it may be advisable to fit 'hotter' spark plugs whilst adjusting the carburetors to prevent misfiring. However the original plugs must always be refitted after completing the adjustment.

16 Switch off the engine and reconnect the throttle linkages, making adjustments as necessary to prevent the carburettor settings from being affected.

17 Remove the tachometer from the engine and refit the air cleaner(s), if fitted.

## 9 Fault diagnosis

Symptom	Reason
Engine will not start	Blocked fuel filter or jets Flooded engine as a result of depressing accelerator pedal
Uneven idling	Leaking manifold or carburettor flange gaskets Loose idling jets or auxiliary venturis Excessive sediment or water in carburettor Worn throttle spindle Incorrect tuning adjustments
Carburettor floods	Worn needle valve Leaking or damaged float(s) Incorrect float level adjustments Excessive sediment in fuel
Engine lacks performance	Incorrect tuning adjustments Incorrect float level adjustments Excessive sediment in fuel Throttle valves not fully opening Accelerator pump faulty or leaking
Excessive fuel consumption	Needle valve not seating Leaking or damaged float(s) Incorrect float level adjustments Choked air filter (if fitted)



2

## Part 2 Weber carburetors

### Chapter 13 Type 36 DCNF, 40 DCNF, 42 DCNF, 44 DCNF

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## 1 Introduction

The carburetors covered by this Chapter are of vertical downdraught type and each barrel of the carburettor is of identical diameter.

The throttle valves are of the synchronised, simultaneous operation type and are located on a single shaft.

The identification mark is located on the main body on the outer face of the float chamber wall.

## 2 Construction

The main body and cover of the Weber DCF carburettor are of die-cast aluminium or zinc alloy (Mazak) construction. The mounting flange is machined flat for fitting on the inlet manifold.

The throttle spindle is made of steel and the throttle valve plates of brass.

All fuel and air jets and emulsion tubes are of brass construction and are secured to the main body by screw fittings.

The internal channels of the main body are mainly drilled and where necessary, sealed with lead plugs.

The throttle spindle is supported by two ball-bearings mounted in the main body. Washers are located at each end of the spindle to prevent air being drawn through the bearings.

The fuel float assembly is constructed of thin brass sheet and comprises two halves soldered together.

The accelerator pump is of the diaphragm type and the operating lever is actuated by a cam plate attached to the end of the throttle shaft.

## 3 Operation

### Cold starting

The starting device fitted to type DCF carburetors operates independently of the main circuit and may be considered as a separate carburettor within the main carburettor.

Refer to Fig. 13.1 and note that when the choke cable is pulled, the starting device operating lever turns the control shafts which lift the starting valves off their seats. Fuel from the float chamber (8) is drawn through channels (34) into the starting jets (32) where it is emulsified with air entering through the top of the starting jets (32). The mixture is then drawn through channels (33) where it is further emulsified with air from the hole (31). After passing the starter valves (37) where additional air from holes (36) weakens the mixture, the final mixture is drawn through channels (35) into the engine below the throttle valves (14).

The starting device has a progressive action made possible by the tapered end of the valve heads and lowering the valves will reduce the amount of mixture admitted to the engine until, when completely shut, the supply will cease.

### Idling and progression

Refer to Fig. 13.2 and note that when the engine is idling with the throttle valves (14) closed, fuel is drawn through the main jets and emulsion tube wells (6), along channels (18) to the idling jets (19) where it becomes emulsified with air entering through the calibrated bushes (20). The mixture then travels through the channels (17), past the adjustable mixture screws (16), through the idling feed holes (15) and into the carburettor throats at the engine side of the throttle valves (14). The idling mixture screws (16) have tapered ends and can therefore be adjusted to admit more or less mixture as necessary.

When the throttle valves are opened slightly to increase the engine speed, the progression holes (13) are brought into action to provide additional fuel and to enable the engine to reach the speed when the main system starts to function.

In order to ensure that each carburettor barrel passes

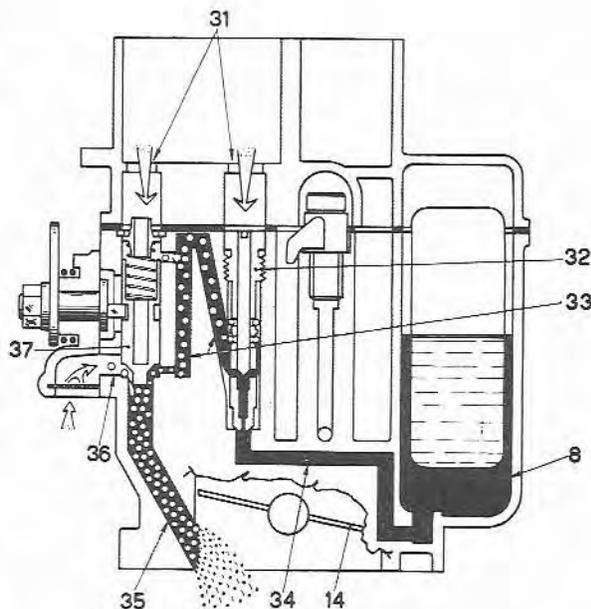


Fig. 13.1 Cold starting phase (Sec 3)

8	Float chamber	34	Channel
14	Throttle valves	35	Channel
31	Air holes	36	Channel
32	Starting jets	37	Starting valves
33	Channel		

identical amounts of air, in particular when the engine is idling, the majority of DCF carburetors incorporate air compensation screws in each barrel, whereby air can bypass the throttle valves (14) via the starting device ducts (35). This system ensures identical vacuum below each throttle valve and therefore ensures identical mixtures during idling and progression.

### Normal running

Refer to Fig. 13.3 and note that under full throttle and high speed cruise conditions, fuel is drawn from the float chamber (8), through the main jets (7) to the emulsion tubes (6). The fuel becomes emulsified with air drawn through the air corrector jets (1) and is then drawn through the nozzles (2), auxiliary venturis (3) and chokes (4) into the engine.

### Acceleration

Refer to Fig. 13.4 and note that when the throttle valves are closed, the spring (24) pushes the diaphragm (28) outwards and fuel is drawn from the float chamber (8), through the ball valve (30) into the pump chamber. When the throttle valves are opened, the cam (25) operates the lever (26) and the diaphragm (28) is depressed against the tension of the spring (24). Fuel is forced along the channel (23) to the delivery valve (22) and is injected through the pump jets (21) into the carburettor barrels in the vicinity of the auxiliary venturis. The spring (27) dampens any sudden opening of the throttle valves and prolongs the full delivery. The calibrated discharge hole (29) allows excess fuel and any accumulated air and vapour to escape into the float chamber.

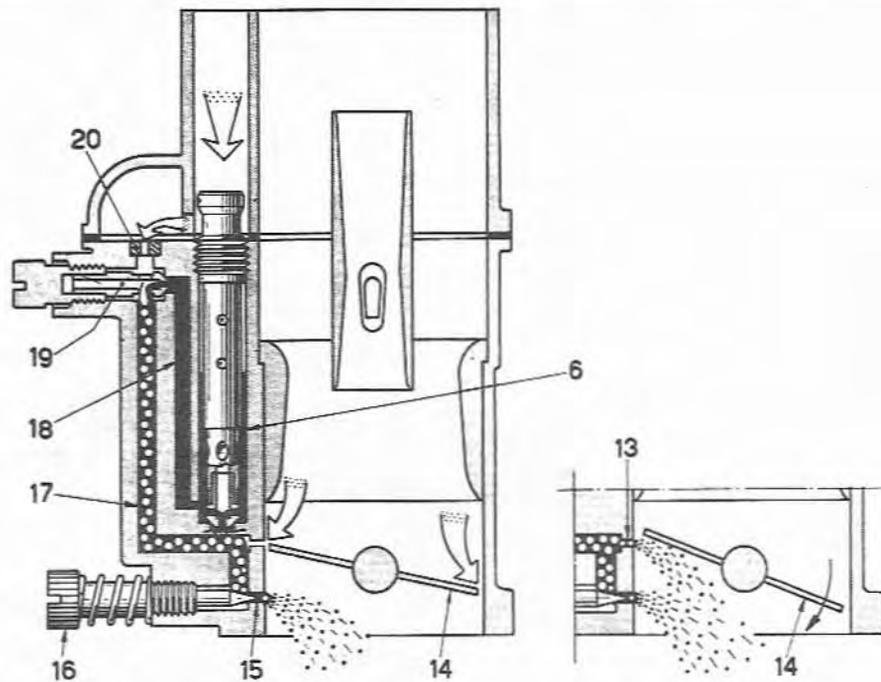


Fig. 13.2 Idling and progression phase (Sec 3)

- |                       |                       |                      |
|-----------------------|-----------------------|----------------------|
| 6 Emulsion tube wells | 15 Idle feed holes    | 18 Channel           |
| 13 Progression holes  | 16 Idle mixture screw | 19 Idle jets         |
| 14 Throttle valves    | 17 Channel            | 20 Calibrated bushes |

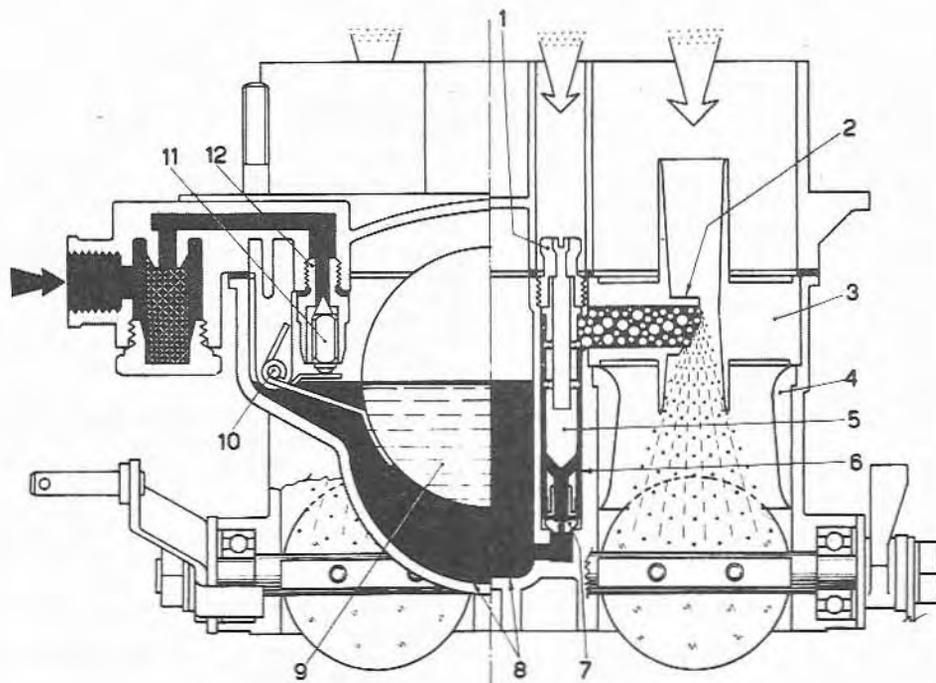


Fig. 13.3 Normal phase (Sec 3)

- |                      |                       |                         |
|----------------------|-----------------------|-------------------------|
| 1 Air corrector jets | 5 Emulsion tubes      | 9 Float                 |
| 2 Nozzles            | 6 Emulsion tube wells | 10 Fulcrum pin          |
| 3 Auxiliary venturis | 7 Main jets           | 11 Needle               |
| 4 Chokes             | 8 Float chamber       | 12 Needle valve seating |

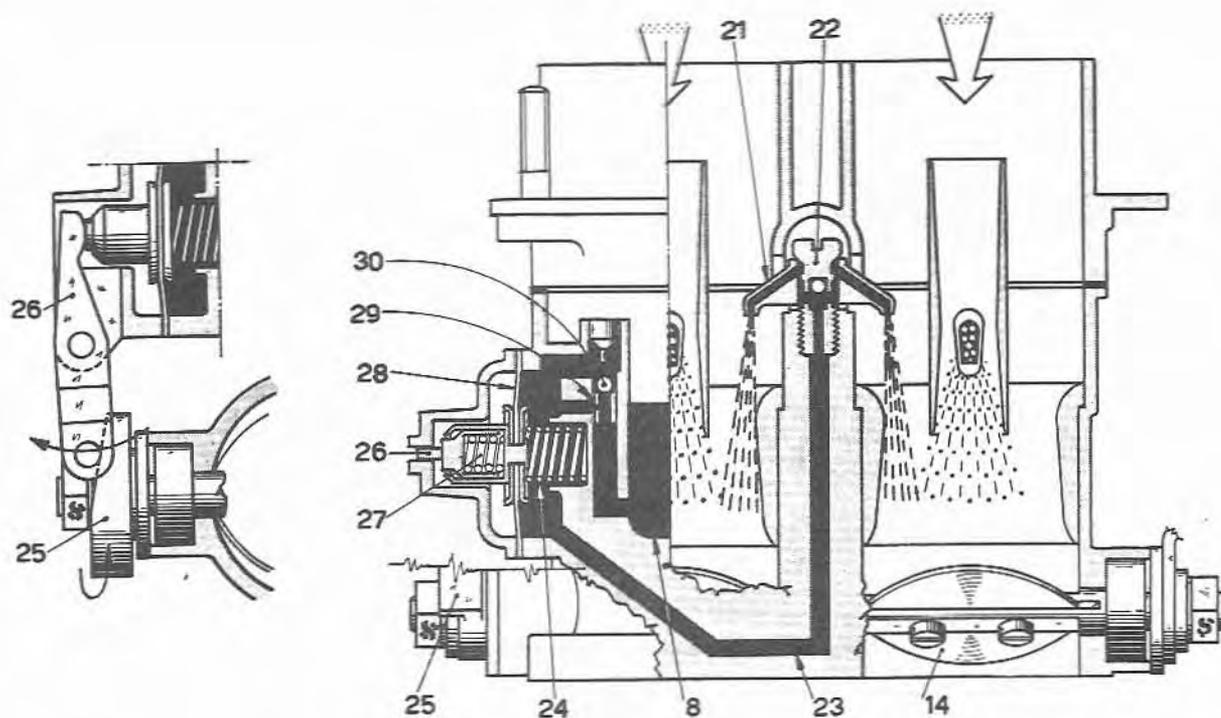


Fig. 13.4 Acceleration phase (Sec 3)

8 Float chamber  
14 Throttle valves  
21 Pump jets  
22 Delivery valve

23 Channel  
24 Return spring  
25 Cam  
26 Operating lever

27 Reaction spring  
28 Diaphragm  
29 Calibrated discharge hole  
30 Ball valve

#### 4 Removal and refitting

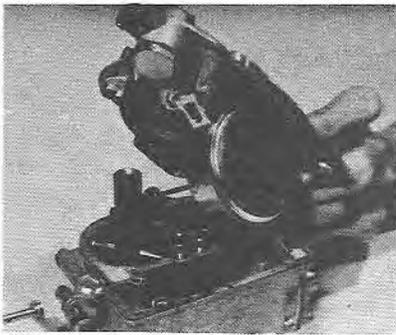
**Note:** The following procedure gives a general rather than a specific method of removing and refitting the carburettor, as much will depend on the location of the carburettor within the vehicle. On some applications for instance, the retaining nuts may not be accessible without removing surrounding components.

- 1 Where fitted, remove the air cleaner assembly from the carburettor.
- 2 Disconnect the throttle linkage and choke cable.
- 3 Unscrew the fuel inlet union and recover the two gaskets.
- 4 Unscrew and remove the carburettor retaining nuts and spring washers and withdraw the carburettor complete over the mounting studs.
- 5 Remove the gasket from the inlet manifold and clean all traces of gasket from the contact faces of the manifold and carburettor.
- 6 Protect the inlet manifold from ingress of foreign matter whilst the carburettor is removed by sealing it with masking tape.
- 7 Refitting is a reversal of removal but the following additional points should be noted:

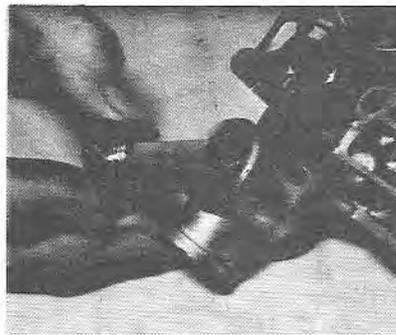
- (a) Always fit a new gasket and tighten the retaining nuts evenly in diagonal sequence
- (b) The idling adjustment screws should be set as described in Section 7 and finally tuned as described in Section 8
- (c) When refitting the choke (starting device) cable, first secure the outer cable to the support, then insert the inner cable into the operating lever nut and push the instrument panel control knob fully in. Tighten the inner cable retaining screw with the operating lever fully released.

#### 5 Disassembly

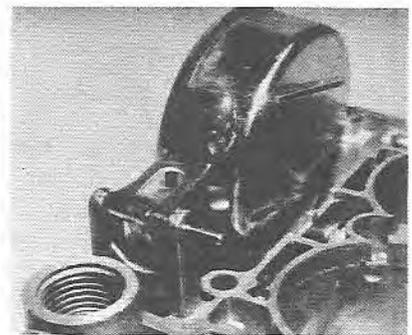
- 1 Thoroughly clean the carburettor exterior and wipe dry.
- 2 Where air horns are fitted, remove the retaining screws and washers and withdraw the air horn assembly.
- 3 Referring to Fig. 13.5, unscrew and remove the retaining screws (86) and washers (85) in diagonal sequence and lift the carburettor top cover (1) from the carburettor body (51), making sure that the gasket (3) is not broken (photo).
- 4 Lift the gasket (3) from the carburettor body (51).
- 5 Invert the carburettor cover (1) and unscrew the filter cover plug (78), using a 19 mm ring spanner or socket (photo). Remove the washer (79).
- 6 Remove the filter gauze (81) and extract the base (80).
- 7 Using a suitable diameter metal drift, tap the fulcrum pin (9) from the support posts (photo). Do not attempt to prise the split post apart.
- 8 Lift the float assembly (18) from the cover and extract the needle from the needle valve seating (11) (photo).
- 9 Unscrew and remove the needle valve seating (11) and washer (10).
- 10 Unscrew and remove the retaining screw (7) and remove the washer and bush (8) (photo).
- 11 Lift the operating arm (13) and disengage the rod (4 or 6) from the starter device.
- 12 Extract the split pin (5) and remove the rod from the operating arm (14) (photo). Remove the clamp screw (15) if necessary.
- 13 Unscrew and remove the retaining screws (69) and washers (70) and remove the starter device (61) from the carburettor (photo).
- 14 Dismantle the starter device by unscrewing the nut (68) from the shaft (62) together with the washer (67), then carefully



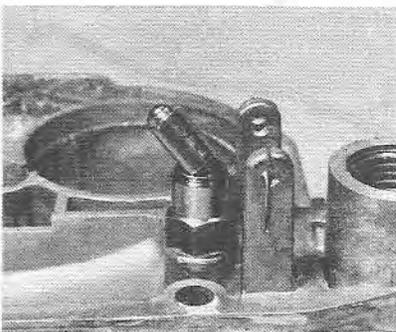
5.3 Removing the carburettor top cover



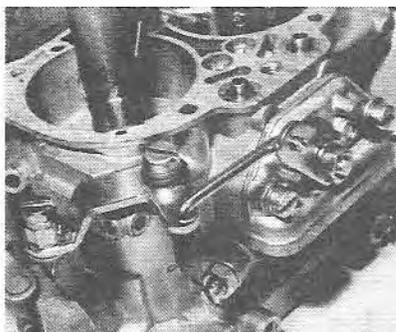
5.5 Removing the fuel filter and plug



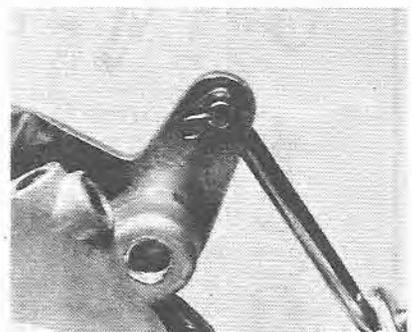
5.7 Removing the float fulcrum pin



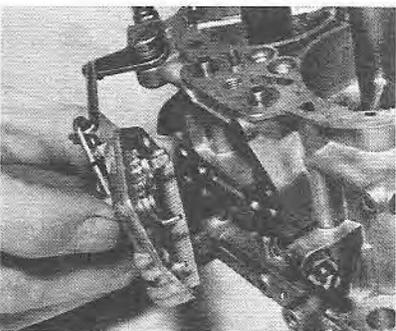
5.8 Removing the needle from the needle valve seating



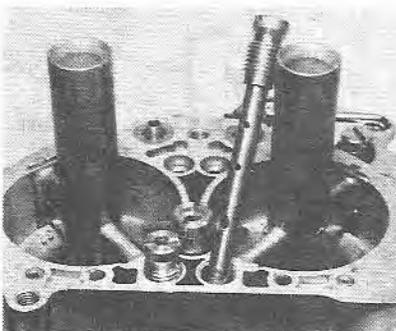
5.10 Starter device operating rod and lever location



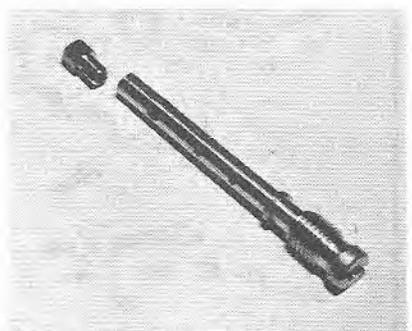
5.12 Starter device operating rod split pin location



5.13 Removing the starter device



5.15 Removing an emulsion tube



5.16 Separating the main jet and air corrector jet from the emulsion tube

remove the lever (66) and spring (65). Withdraw the shaft (62) and filter gauze (64).

15 Unscrew and remove the air corrector jets (12) from the carburettor body (51) and lift out the emulsion tube assemblies (photo).

16 Separate the emulsion tubes (17) from the air corrector jets (12) and main jets (25) (photo). Take care not to damage the jets when removing them and, if pliers are used, interpose a piece of paper or card to prevent the brass being scratched. Alternatively, insert a small drill through the emulsion tube holes to retain it whilst the jets are turned off each end.

17 Unscrew the idling jet holders (28) from the sides of the carburettor body (51), remove the rubber O-rings (27), then separate the idling jets (26) (photos).

18 Whilst depressing the starter valve spring retaining guides (75) in turn, prise the spring washers (74) from the carburettor body, then release the guides (75) and extract the return springs (76) and starter valves (77) (photos). Note from which bore

each valve is taken so that they can be refitted in their original locations. Do not force the valves if they will not come out freely; if a burr exists at the top of the bore, remove it with a fine file.

19 Unscrew and remove the starter jets (73) (photo).

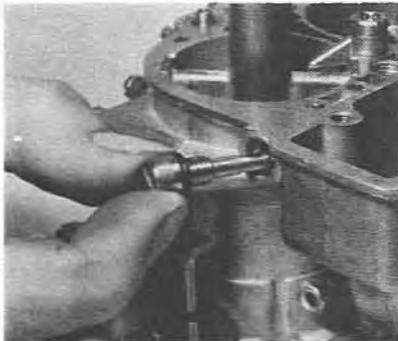
20 Unscrew and remove the accelerator pump delivery valve (16) together with the pump jet (23) and copper washers (24) (photo), then separate the washers and jet from the valve.

21 Unscrew the retaining screws and washers (31) and withdraw the pump cover (22) from the carburettor body (photo). Take care not to damage the diaphragm and if necessary, use a blunt knife to release it from the body.

22 Remove the diaphragm (30) and spring (29) (photo). Note that the gasket must not be separated from the diaphragm.

23 Mark the accelerator pump lever (21) in relation to the cover (22) to ensure correct refitting, then, using a suitable diameter metal drift, drive the pin (20) up out of the cover (22). On some models it will be necessary to remove a split pin,

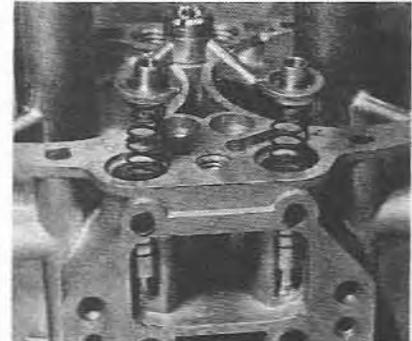




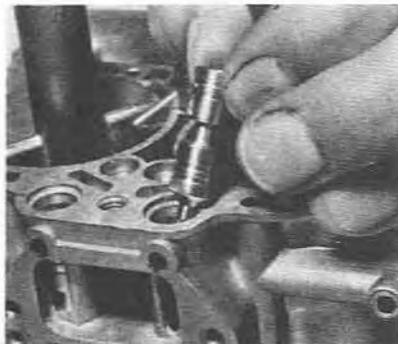
5.17a Removing the idling jets



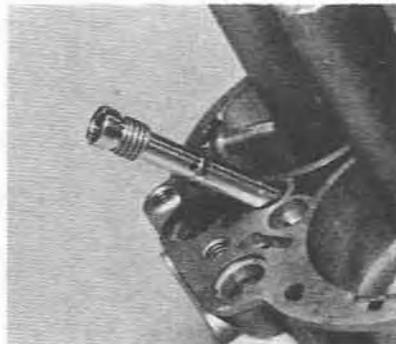
5.17b An idling jet and holder



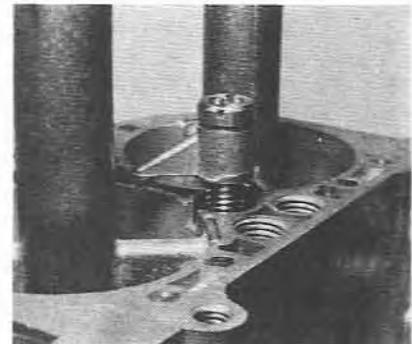
5.18a Removing the starter spring components ...



5.18b ... and starter valves



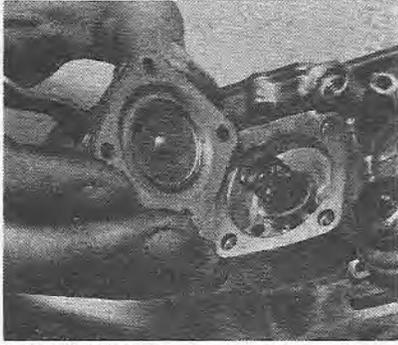
5.19 Removing a starter jet



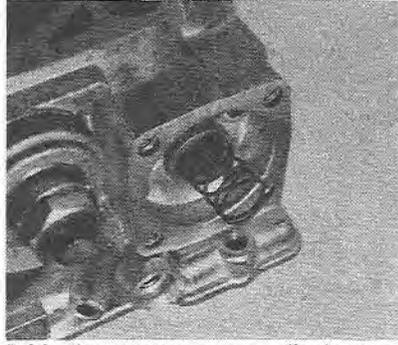
5.20 Removing the accelerator pump delivery valve and jet

Fig. 13.5 Exploded view of the 36 DCNF carburettor (typical) (Sec 5)

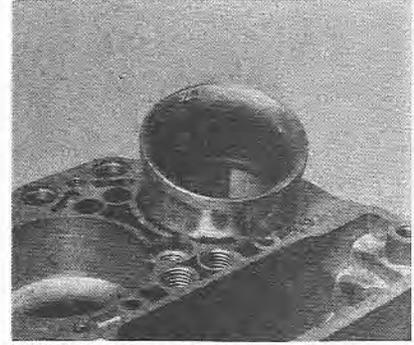
- |                                    |                            |                             |
|------------------------------------|----------------------------|-----------------------------|
| 1 Top cover                        | 30 Diaphragm               | 59 Air bypass screw         |
| 2 Stud                             | 31 Screw                   | 60 Locknut                  |
| 3 Gasket                           | 32 Nut                     | 61 Starting device assembly |
| 4 Operating rod                    | 33 Tab washer              | 62 Shaft and sector         |
| 5 Split pin                        | 34 Spacers                 | 63 Housing                  |
| 6 Operating rod link               | 35 Cam                     | 64 Filter gauze             |
| 7 Screw                            | 36 Spacers                 | 65 Return spring            |
| 8 Bush                             | 37 Wave washer             | 66 Lever                    |
| 9 Fulcrum pin                      | 38 Spacer                  | 67 Washer                   |
| 10 Gasket                          | 39 End washer              | 68 Nut                      |
| 11 Needle valve assembly           | 40 Ball-bearing            | 69 Screw                    |
| 12 Air corrector jet               | 41 Throttle lever assembly | 70 Washer                   |
| 13 Starting device lever assembly  | 42 Lever                   | 71 Choke                    |
| 14 Starting device lever           | 43 Adjustment screw        | 72 Auxiliary venturi        |
| 15 Clamp screw                     | 44 Spring                  | 73 Starter jet              |
| 16 Delivery valve                  | 45 Pressure pin            | 74 Retaining clip           |
| 17 Emulsion tube                   | 46 Spring                  | 75 Retaining guide          |
| 18 Float                           | 47 Split pin               | 76 Spring                   |
| 19 Accelerator pump cover assembly | 48 Throttle valve          | 77 Starter valve            |
| 20 Pivot pin                       | 49 Retaining screw         | 78 Plug                     |
| 21 Lever                           | 50 Throttle spindle        | 79 Gasket                   |
| 22 Cover                           | 51 Carburettor body        | 80 Base                     |
| 23 Pump jets                       | 52 Return spring           | 81 Filter                   |
| 24 Washers                         | 53 Throttle lever          | 82 Fuel inlet bolt          |
| 25 Main jet                        | 54 Spring                  | 83 Gasket                   |
| 26 Idle jet                        | 55 Idle speed screw        | 84 and 84A Inlet union      |
| 27 Rubber O-ring                   | 56 Spring                  | 85 Washer                   |
| 28 Idle jet holder                 | 57 Washer                  | 86 Screw                    |
| 29 Return spring                   | 58 Idle mixture screw      |                             |



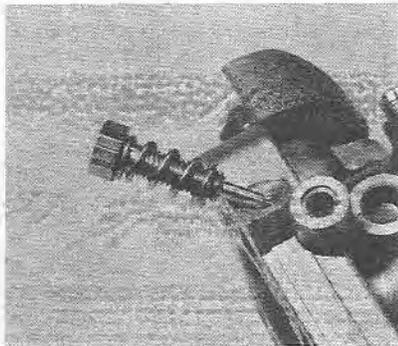
5.21 Withdrawing the accelerator pump cover



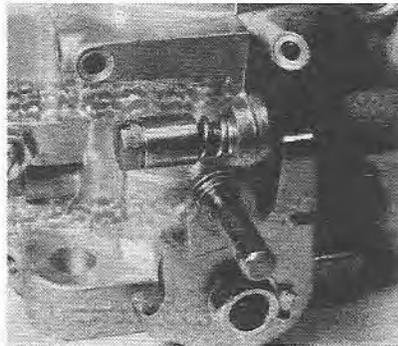
5.22 Accelerator pump diaphragm return spring location



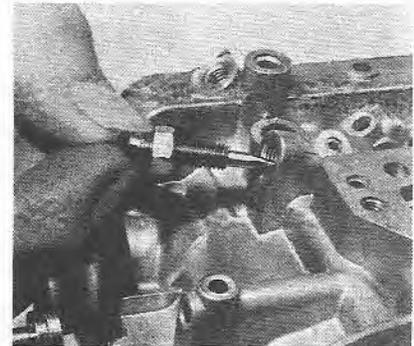
5.25 Removing a choke



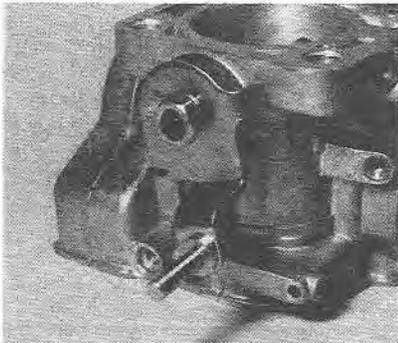
5.26 Removing an idling mixture adjusting screw



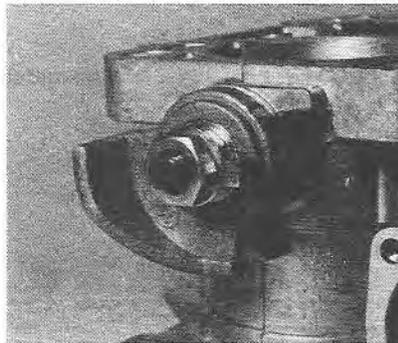
5.27 Idle speed screw location



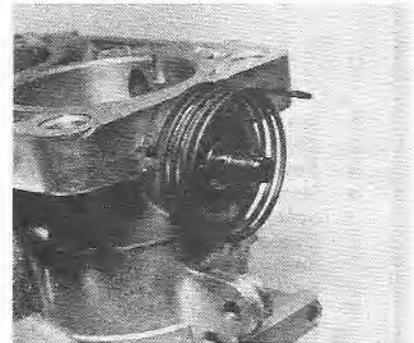
5.28 Removing an air bypass adjusting screw



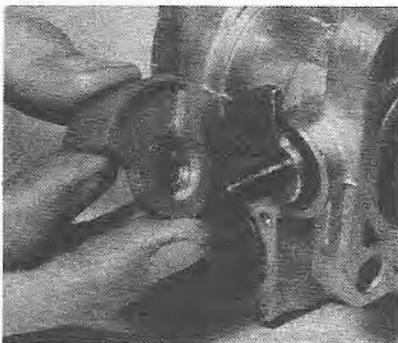
5.30a Throttle lever and end nut with locktab



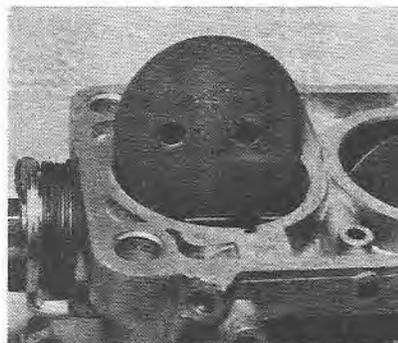
5.30b Accelerator pump cam and end nut with locktab



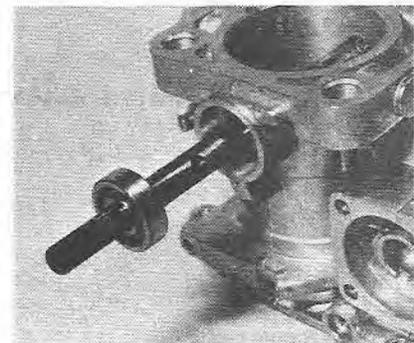
5.32 Throttle return spring location



5.33 Accelerator pump cam and sector



5.36 Removing a throttle valve



5.39 Removing the throttle spindle

washer and clevis pin.

24 Note the location of the auxiliary venturis (72) and mark them if necessary, with a pencil to ensure correct refitting. The auxiliary venturis (72) are lightly staked into the carburettor body and to remove them, it will be necessary to insert a wooden or plastic dowel rod through the throttle valve end of the barrels to tap them free. If they are excessively tight it will be necessary to obtain the special Weber tool no 98009 200.

25 Using a fine file, remove the staking from the two barrels, then note the locations of each choke (71) and slide them out of the barrels. Note that the choke ends with the smaller internal diameters are uppermost (photo).

26 Unscrew and remove the idling mixture adjusting screws (58) together with the springs (56) and washers (57) where fitted (photo).

27 Unscrew and remove the idle speed screw (55), spring (54) and sleeve, where fitted (photo).

28 Loosen the locknuts (60) with an 8 mm ring spanner, then unscrew and remove the air bypass screws (59) (photo).

29 Where fitted, unhook the throttle return spring from the accelerator pump end of the throttle spindle (50).

30 Bend back the locktabs (33) on each end of the throttle spindle (50), then unscrew and remove the nuts (32) (photos). If these are very tight, use Weber tool no 98023 700 to hold the spindle whilst they are loosened; this will prevent the spindle from being buckled. Do not loosen a tight nut with the throttle valves being forced against the barrel walls; instead, use a screwdriver to hold the throttle lever (53) in the open position.

31 Remove the nuts (32), tab washers (33) and spacer (34) from the throttle spindle (50), together with the throttle return spring lever where fitted.

32 Turn the throttle lever (53) against the tension of the coil spring (52) then ease it from the throttle spindle (50) and remove the coil spring (photo). Remove the wave washer (37) together with washers (34A and 36A) where fitted.

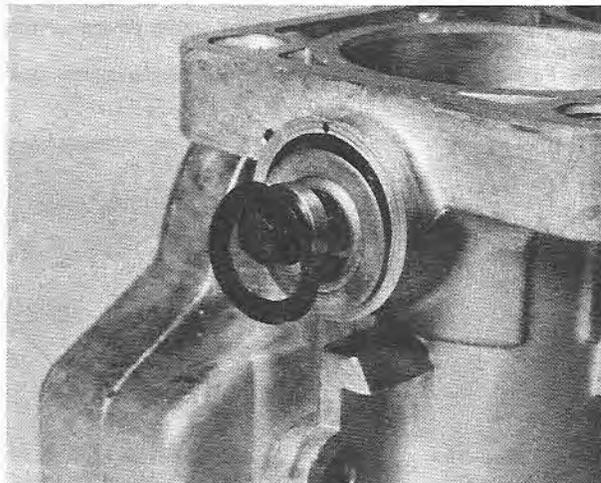
33 Using a screwdriver, prise the accelerator pump cam and sector (35) from the throttle spindle (50), together with the spacer (36) when fitted (photo). Remove the wave washer (37).

34 Unscrew and remove the throttle valve retaining screws (49), being careful not to exert excessive pressure on the spindle (50).

35 Note the position of the throttle spindle and valves in relation to the barrels and if necessary, mark the valves with a pencil.

36 Turn the spindle to the fully open position and withdraw the two throttle valves (48) from their location slots (photo).

37 Mark one end of the throttle spindle (50) in relation to the carburettor body (51) to ensure correct refitting.



5.40 Throttle spindle wave washer, spacer and bearing washer

38 Check that the spindle (50) is free of any burrs in the vicinity of the valve retaining screw holes and if necessary, remove them with a fine file.

39 Using a plastic mallet, drive the spindle (50) from the carburettor (photo).

40 Remove the spacers (38) and end washers (39) from the spindle and carburettor body (photo).

41 Tap the spindle (50) through the bearing (40) with the bearing placed on a vice.

42 Re-insert the spindle (50) and drive the remaining bearing (40) from the carburettor body (51). Remove the bearing from the spindle.

43 Where fitted, unscrew the idle speed screw (43) and spring (44) from the throttle lever (42), then remove the split pin (47), pressure pin (45) and spring (46).

## 6 Special overhaul procedures

After carrying out the general overhaul procedures given in Chapter 4, the following special procedures should be completed:

1 Using a hand chuck and the special tool available from Weber or a tool hire agent, reform the main jet seatings at the bottom of the emulsion tube housing wells by carefully rotating the tool in alternate directions. Finish the seatings with the special drift by tapping it gently whilst rotating it at the same time.

2 Using the same procedure as described in paragraph 1, reform the idling jet seats.

3 Using the same procedure as described in paragraph 1, reform the starter valve seats.

4 Using the same procedure as described in paragraph 1, reform the starter jet seats.

5 If the emulsion tube wells are discoloured and considerable sediment has accumulated, the bores must be reamed using the special Weber tool and a hand chuck. Turn the tool carefully until it moves freely, then continue turning it whilst removing it.

6 Check the internal channels of the carburettor body cover by injecting fuel from a syringe and observing whether it emerges freely. If any channels are blocked, it will be necessary to drill out the lead plugs and use Weber tool nos 98014 300, 98014 400 and 98014 500 to clear them. These tool numbers refer to the three channel diameters of 1.0 mm, 1.5 mm and 2.0 mm.

7 Check that the accelerator pump ball valve is free by shaking the carburettor body and listening to the ball movement.

8 After overhaul, the carburettor body should be thoroughly cleaned, preferably using clean fuel and air pressure. The lead plugs should be renewed and retained in position by using the Weber tool no 98010 700 or 98010 800 as a punch until the plugs are expanded into their bores.

9 Check the float assembly for damage and leakage; shake the float to determine whether fuel has entered. If the float is damaged or fuel is present, it must be renewed.

10 Check and renew if necessary, the accelerator pump lever and diaphragm.

## 7 Assembly

**Note:** All components should be clean and dry before starting the assembly procedure.

1 Where fitted, fit the spring (46) and pressure pin (45) to the throttle lever (42) and secure with the split pin (47).

2 Fit the idle speed screw (43) and spring (44) to the throttle lever (42), when fitted.

3 Using a suitable diameter length of tubing, drive one bearing (40) fully into the carburettor body (51) at the accelerator pump end.

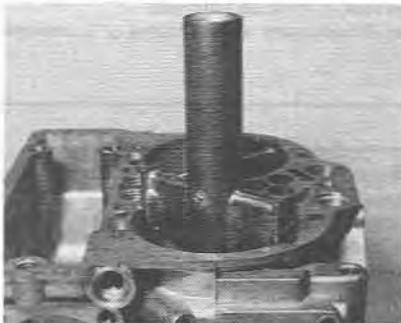
4 Place the remaining ball-bearing (40) on an open vice and gently tap the spindle (50) into it, entering the end with the

shorter recess first.

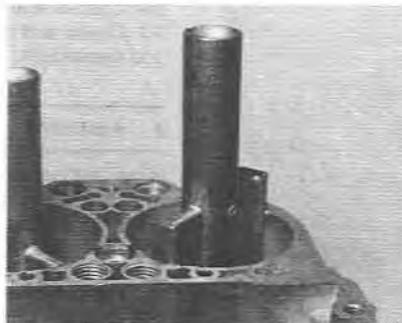
- 5 Insert the throttle spindle (50) into the carburettor body (51), then make sure that the bearings (40) are fully seated on the spindle by supporting one in a suitable diameter length of tubing and using a further length of tubing to tap the opposite bearing.
- 6 Fit the end washers (39) and spacers (38) over the ends of the spindle (50) after lubricating the bearings with a little grease.
- 7 Turn the throttle spindle (50) so that the throttle valve retaining screw head recesses are facing the carburettor mounting flange. Place the carburettor body (51) on the accelerator pump end then locate the wave washer (37) over the spindle, together with the washers (34A and 36A) where fitted.
- 8 Locate the return spring (52) in the hole on the body and hook the remaining end over the flat edge of the throttle lever (53). Tension the spring and press the throttle lever (53) fully onto the spindle (50).
- 9 Fit the tab washer (33) and nut (32), then tighten the nut and lock it by bending the tab onto a flat; do not overtighten the nut.
- 10 Turn the throttle lever (53) fully open so that the throttle valve slots can be seen from the flange end of the carburettor, then insert one throttle valve (48) in the location previously noted and close the valve. Make sure that the throttle valve is fitted the correct way round so that the angled perimeter seats in the barrel.
- 11 Snap the valve shut several times in order to centralise it, then insert and tighten the valve retaining screws (49) without exerting excessive pressure on the spindle. It is recommended that new screws are always fitted as it is quite easy to cross-thread previously peened screws. Lock the screws by peening with Weber tool no 98010 900 whilst supporting the spindle with a length of wood. Alternatively, coat the threads with a liquid locking agent (fuel resistant) prior to inserting them.
- 12 Repeat the procedure described in paragraphs 10 and 11 for the remaining throttle valve.
- 13 Locate the wave washer (37) over the spindle (50) and fit the spacer (36) when fitted.
- 14 Press the sector into the nylon accelerator pump cam (35), then fit the cam over the spindle with the lowest cam contour uppermost.
- 15 Fit the spacer (34) throttle return spring lever where fitted, tab washer (33) and nut (32). Tighten the nut (32) whilst holding the throttle lever (53) open with a screwdriver, then lock it by bending the locktab; do not overtighten the nut.
- 16 Where fitted, hook the throttle return spring onto the lever on the end of the spindle (50).
- 17 Insert the air bypass screws (59) and screw them in until they are fully seated, then tighten the locknuts (60).
- 18 Fit the idle speed screw (55), spring (54) and sleeve where fitted.
- 19 Fit the idling mixture adjusting screws (58) together with the springs (56) and washers (57), where fitted.

20 Insert the chokes (71) into the barrels with the smaller internal diameter ends uppermost.

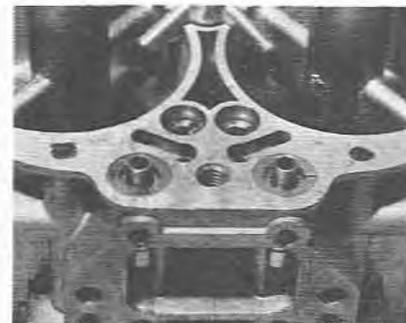
- 21 Fit the auxiliary venturis (72) in their original locations, making sure that the location springs engage with the grooves in the barrels and that the supply channels are in alignment with those in the carburettor body. The extended venturis must also be uppermost (photos).
- 22 With the auxiliary venturis (72) fully seated, lightly stake the carburettor upper face to retain them. Use a blade pinch and not a centre punch to do this.
- 23 Assemble the lever (21) to the accelerator pump cover (22) in its previously noted position, then drive the pin (20) through the cover and lever until fully entered. Where a clevis pin is fitted, insert it through the cover and lever and retain it with the washer and split pin.
- 24 Support the carburettor body (51) with the pump diaphragm face uppermost, then locate the spring (29) on the face in the central position.
- 25 Place the diaphragm (30) over the spring (29), then locate the pump cover (22) over the diaphragm (30).
- 26 Insert the retaining screws and washers (31) and tighten them evenly in diagonal sequence. Operate the throttle lever and make sure that the pump lever runs smoothly and is in contact with the cam.
- 27 Assemble the accelerator pump (23) to the delivery valve (16) with a copper washer (24) either side, then tighten the assembly into the carburettor body.
- 28 Insert and tighten the starter jets (73).
- 29 Fit the starter valves (77) into their respective bores followed by the return springs (76) and retainers (75).
- 30 Depress the retainers (75) in turn and locate the spring washers (74) in the carburettor recesses, pressing them fully in with the flat blade of a screwdriver (photo).
- 31 Press the idling jets (26) into the holders (28), fit the rubber O-rings (27), then tighten the holders into the carburettor body.
- 32 Press the emulsion tubes (17) onto the main jets (25) and into the air corrector jets (12). Insert and tighten the air corrector jets (12) into the carburettor body together with the emulsion tubes.
- 33 Assemble the shaft (62) to the starter device body so that the alignment lines on each sector are facing each other, then fit the coil spring (65) with its end in the location hole. Fit the lever (66) over the shaft (62) and at the same time hook the end of the spring (65) over the lever, then locate the washer (67) and nut (68), and tighten the nut.
- 34 Fit the filter gauze (64) and check that the starter device operates smoothly.
- 35 Offer the starter device (61) up to the carburettor body and make sure that the sector lugs locate in the starter valve grooves, then insert the retaining screws (69) and washers (70) and tighten the screws. Check that the starter device operates smoothly.
- 36 Fit the clamp screw (15) to the starter device operating arm (14).



7.21a Fitting an auxiliary venturi, showing the location spring



7.21b Showing the auxiliary venturi channel which must face the emulsion tube well



7.30 The starter valves fitted in the main body

- 37 Insert the operating rod (4 or 6) into the arm (14) and screw with the split pin (5).
- 38 Insert the rod into the starter device arm (66), then assemble the bush (8) and washer and tighten the retaining screw (7) into the carburettor body.
- 39 Tighten the needle valve seating (11) together with a new gasket (10) into the carburettor cover (1).
- 40 Lower the needle into the needle valve seating (11), tapered end first.
- 41 Lower the float assembly (18) onto the cover (1) and insert the fulcrum pin (9) through the support posts and float arm. If necessary, gently pinch the split post to secure the pin using a pair of pliers.
- 42 The float level adjustment must now be checked in the following manner: Hold the carburettor screw vertical so that the float is hanging from the fulcrum pin with the float level arm in light contact with the needle ball (ie without the ball being depressed). Using a vernier caliper, check that the distance from the cover face (without gasket) to the top of the float as shown in Fig. 13.6 is 1.890 in (48 mm) for 42 DCF models and 1.969 in (50 mm) for other DCF models (photo). If not, bend the needle operating tab as necessary.
- 43 Tilt the cover so that the float moves away from the cover and the tab makes contact with the needle valve seating. Now, using the same method as described in paragraph 42, check that the needle valve fully open dimension is 2.224 in (56.5 mm) for 42 DCF models and 2.303 (58.5 mm) for other DCF models (photo). If not, bend the tab which contacts the needle valve seating as necessary.
- 44 The difference between the dimensions checked in paragraphs 42 and 43 is the needle valve stroke which should be 0.335 in (8.5 mm).
- 45 Fit the base (80) to the filter gauze (81). With the carburettor cover (1) inverted, press the filter gauze into the inlet cavity.
- 46 Fit the washer (79) to the filter cover plug (78), then tighten the plug into the cover (1).
- 47 Place the gasket (3) onto the top face of the carburettor body (51).
- 48 Lower the carburettor cover (1) onto the main body (51), then insert the retaining screws (86) and washers (85) and

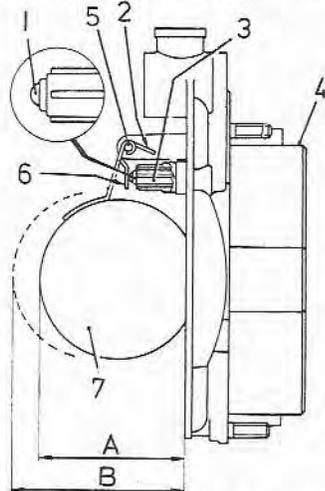


Fig. 13.6 Float level adjustment dimensions (Sec 7)

- 1 Spring loaded ball
- 2 Stroke adjusting tab
- 3 Needle valve assembly
- 4 Carburettor cover
- 5 Fulcrum pin
- 6 Height adjusting tab
- 7 Float
- A Needle valve fully closed dimension
- B Needle valve fully open dimension

tighten them a little at a time in diagonal sequence.

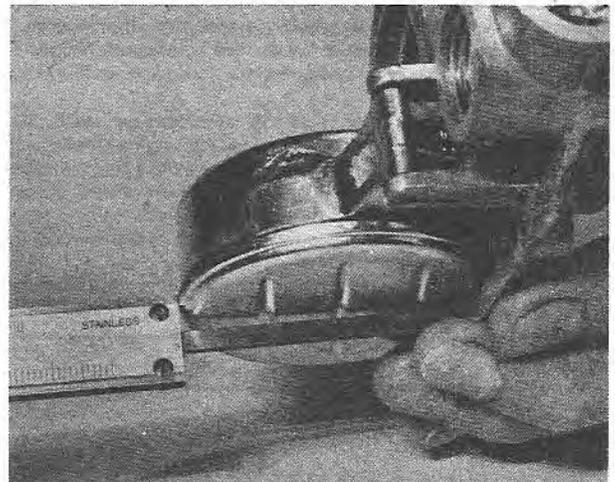
49 Fit the air horn assembly, where fitted. Insert the retaining screws and washers and tighten them evenly in diagonal sequence.

50 With the carburettor completely assembled, the idling adjustment screws should be turned to their preliminary settings. To do this, first screw in the idling speed adjustment screw until it just touches the throttle lever, then continue turning for a further  $\frac{1}{2}$  turn. Working on the idling mixture volume screws in turn, fully screw them in until they are in contact with their seats, then back them off 2 complete turns. Final adjustments will be necessary with the carburettor fitted on the engine (refer to Section 8).

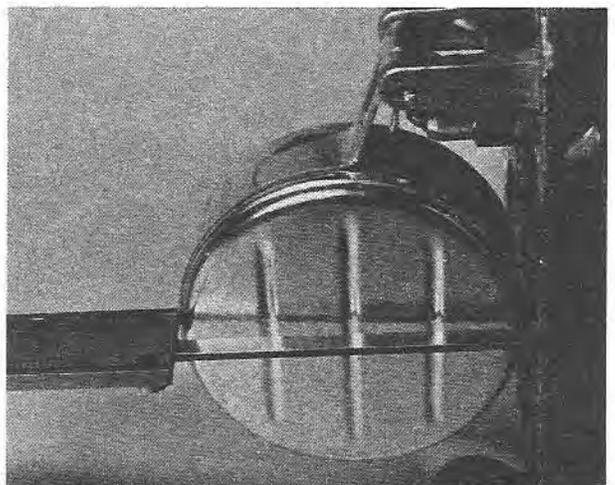
## 8 Tuning

**Note:** Refer to Chapter 3 for general notes on tuning.

- 1 Set the idling adjustment screws to their preliminary positions as described in Section 7.
- 2 Connect a tachometer to the engine in accordance with the manufacturer's instructions.
- 3 It is now important to understand that each barrel of each carburettor must be synchronised in order to deliver equal



7.42 Checking the float closed position with vernier calipers



7.43 Checking the float open position with vernier calipers

amounts of air/fuel mixture to each individual cylinder. To check this, it will be necessary to obtain a length of tubing (approximately 1 metre) of about 5 mm to 10 mm (0.25 in to 0.5 in) internal diameter. Alternatively, a synchroniser as illustrated in Chapter 8 may be used.

4 Remove the air cleaner(s) if fitted, then run the engine until normal operating temperature is reached. To ensure that the engine is really hot enough, drive it hard over a 5 mile distance.

5 Switch off the engine and disconnect the accelerator rod connections from each carburettor.

6 Where two carburettor throttle spindles are linked, turn the adjustment screw on the link  $\frac{1}{2}$  a turn in from the fully shut position.

7 Start the engine and adjust each idling speed adjusting screw (except link adjustments) by equal amounts until the engine is idling at the approximate recommended speed. This will vary according to the application and state of tune of the engine but on average will be around 800 rpm.

8 The barrels of each individual carburettor must now be synchronised to pass identical quantities of air during idling. To do this, loosen the locknuts and check that the bypass screws are both in light contact with their seats. Place one end of the synchronising tube in one air intake and listen at the other end to the amount of hiss present. Alternatively, use the synchroniser to record the air flow through the air intake. Check both air intakes of the carburettor to determine which one is passing the greatest amount of air, then adjust the remaining barrel to give an identical volume and finally tighten the adjustment locknuts. Carry out the procedure independently on each carburettor fitted to the engine.

9 Each carburettor must now be synchronised with the remaining carburetors. To do this, allow the engine to idle and check the volume of air flowing through one air intake of each carburettor, using the length of tube or the synchroniser. Determine the carburettor which is passing the medium volume of air and adjust the idle speed adjustment screws of the remaining

carburetors until they also pass identical volumes of air.

10 If the engine idling speed is not now within the recommended limits, turn each idling speed adjustment screw by equal amounts as necessary.

11 The mixture screw adjustments on each carburettor must now be set and synchronised. Since each screw was turned to its preliminary setting, it can be assumed that they are reasonably synchronised to start with. With the engine idling, turn all the screws by equal amounts ( $\frac{1}{2}$  a turn initially) first in one direction, then in the reverse direction. Observe whether the engine speed falls or increases and make several adjustments until the engine runs at the highest speed commensurate with even firing.

12 If necessary, again turn each idling speed adjustment screw by equal amounts to bring the engine speed within the recommended limits.

13 To check whether the final mixture screw synchronisation is correct, allow the engine to idle, then remove each spark plug lead in turn and observe the reduction in engine rpm on the tachometer. The reduction should be identical for each cylinder, thus proving that the mixture strength is also identical for each cylinder. A further check can be made by removing the spark plugs after the engine has been idling for approximately 15 minutes. Any with black sooty deposits indicate that the particular cylinder is running rich. Normally, if the mixture screw has been set correctly, weakening it by half a turn during idling will cut the relevant cylinder.

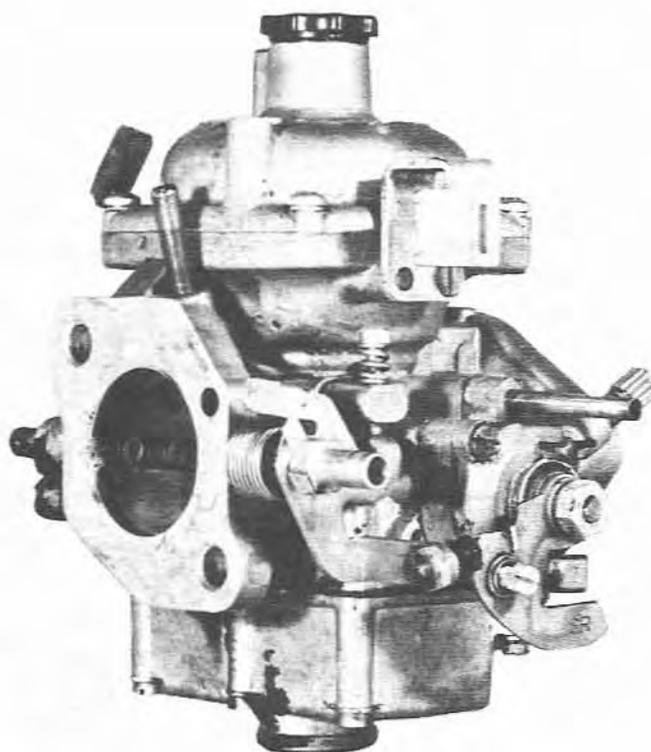
14 Note that on some applications it may be advisable to fit 'hotter' spark plugs whilst adjusting the carburetors to prevent misfiring. However, the original plugs must always be refitted after completing the adjustment.

15 Switch off the engine and reconnect the throttle linkages, making any adjustments as necessary to prevent the carburettor idling settings from being affected.

16 Remove the tachometer from the engine and refit the air cleaner(s), if fitted.

## 9 Fault diagnosis

Symptom	Reason
Engine will not start	Blocked fuel filter or jets Flooded engine as a result of faulty needle valve or depressing accelerator pedal
Uneven idling	Leaking manifold or carburettor flange gaskets Loose idling jets or auxiliary venturis Excessive sediment or water in carburettor Incorrect tuning adjustments
Carburettor floods	Worn needle valve Leaking or damaged float Incorrect float level adjustments Excessive sediment in fuel
Engine lacks performance	Incorrect tuning adjustments Incorrect float level adjustments Excessive sediment in fuel Throttle valves not fully opening Accelerator pump faulty or leaking
Excessive fuel consumption	Needle valve not seating Leaking or damaged float Incorrect float level adjustments Choked air filter (if fitted)



## Part 3 Zenith Stromberg carburetors

### Chapter 14 Series CD, CDS and CD-2S

#### Contents

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Construction .....	2	Disassembly .....	8
Air valve assembly and suction chamber.....	3	Special overhaul procedures.....	9
Damper assembly .....	4	Assembly.....	10
Starter bar (Series (CD) .....	5	Tuning .....	11
Cold-start valve (Series CDS and CD-2S).....	6		

#### 1 Introduction

The series CD carburettor is the earliest of the various series described in this manual. For the purpose of instruction it may be considered as the basic form of Stromberg constant depression carburettor, since all later series are largely refined versions and all use the same basic elements. Its construction and operation will be described fully in this chapter, and this will serve for a basic understanding of later series.

The series CDS and CD-2S differ from the CD in that they incorporate a separate cold-start device.

None of these carburetors have any emission control features. The example used to illustrate this text is from a 1971 SAAB 99, 1709 cc (carburettor reference 3302).

#### 2 Construction

The unit consists of a die-cast aluminium body in which is

formed the choke bore, a suction chamber and air valve assembly mounted vertically above it, a jet assembly mounted co-axially with the suction chamber below it, and closed at the base by a float chamber cover.

The body has a flange at each end, drilled for bolts to mount the unit to the inlet manifold at one end, and for the attachment of an air cleaner or intake system at the other. An inverted, bell-shaped extension at the top of the body houses the air valve and diaphragm assembly. A circular groove is machined at the rim of the bell to accommodate a bead moulded on the edge of the diaphragm. The internal contours of the bell are 'as cast', ie smooth with no machining. The interior is in communication with the outside via a cast-in passage-way which terminates at the inlet flange. Four tapped holes are provided at the top of the bell for the suction chamber top cover retaining screws. A large bore in the centre intercepts the choke bore at right angles and accepts the air valve assembly.

The underside of the body has a large internally threaded boss into which is screwed the jet assembly. Lugs supporting a float

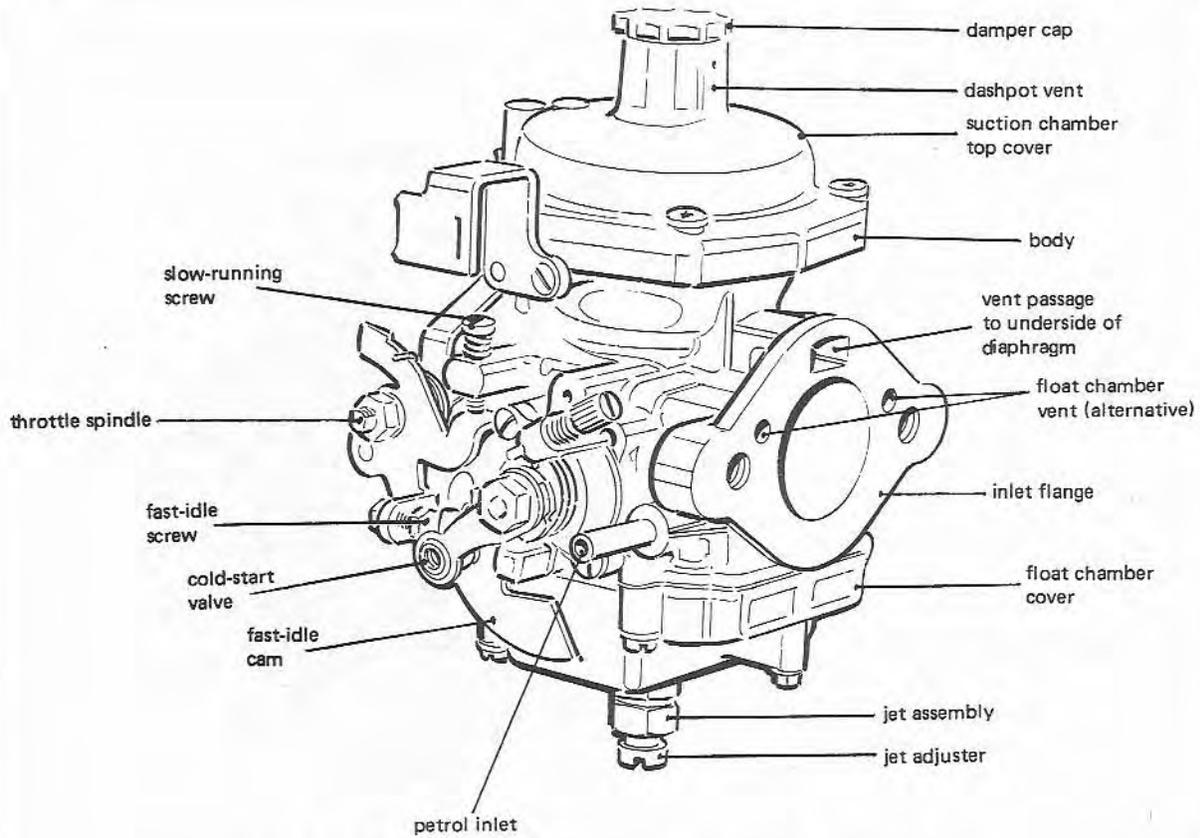


Fig. CD2 The major external components of the Series CDS carburettor

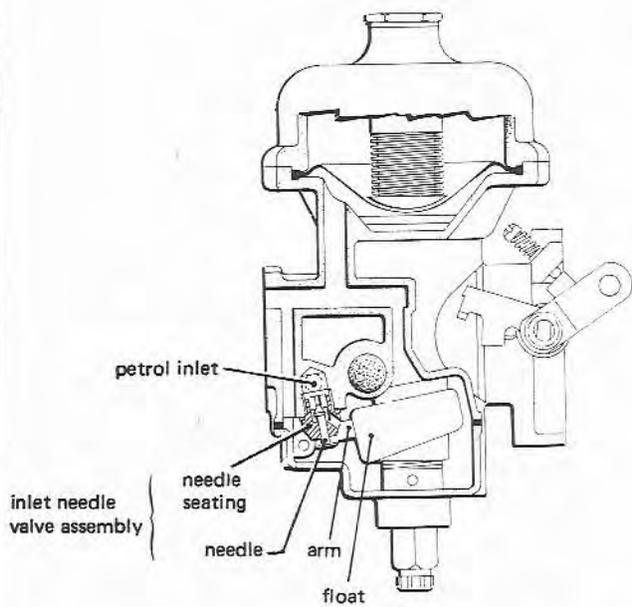


Fig. CD3 Cross-section of the inlet valve of the Series CD carburettor

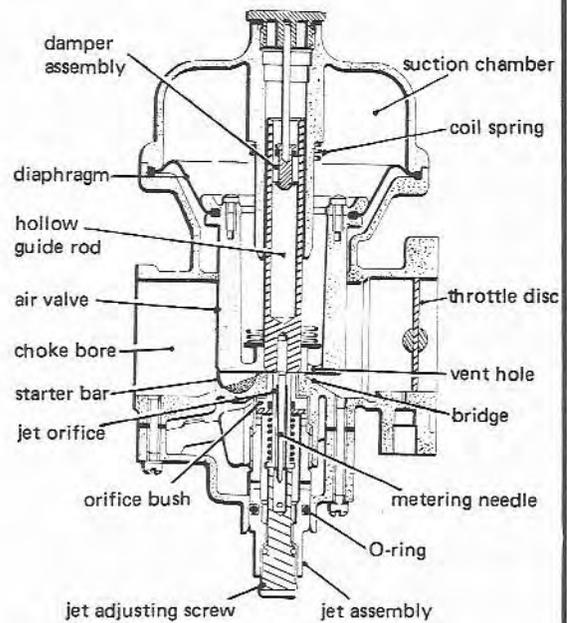


Fig. CD4 Cross-section through the Series CD jet assembly

hinge pin are cast toward the front of the body, and a tapped hole, communicating via internal passages to a stub pipe pressed into the body, is provided for fitting the inlet needle valve. These features are enclosed within a skirt the bottom of which forms a seating surface for the float chamber, secured to the body by screws and is sealed by a gasket. The chamber has a hole in the centre through which projects the jet assembly, sealed by a rubber O-ring.

Other cast features of the body include bosses bored to form throttle spindle bearings, a throttle stop, bearings for a starter bar (Series CD) or a raised face, machined for mounting a cold-start valve assembly (Series CDS and CD-2S).

### 3 Air valve assembly and suction chamber

The air valve assembly consists of a cylindrical air valve, and integral hollow guide rod, clamped to the inside of a conical, synthetic rubber diaphragm by a plastic diaphragm former, a plate and four screws. A fuel metering needle is fitted into a socket at the bottom of the guide rod and retained by a locking screw.

This assembly is fitted into the vertical bore in the unit body. The needle enters the jet assembly and the peripheral bead of the diaphragm locates in the machined groove at the top of the bell of the body.

The top cover is fitted to the top of the body and secured by four screws. The die-cast aluminium cover, together with the diaphragm, forms a sealed suction chamber. The chamber is vented via the transfer holes on the downstream (throttle plate or engine) side of the air valve base.

The top cover has a central guide tube fitted with a hardened steel sleeve bearing which supports the air valve guide rod. (Note that the air valve does not touch the inside of its base). The guide tube is extended at the top of the cover and internally threaded for attachment of a hydraulic damper.

### 4 Damper assembly

The damper consists of a cylindrical, non-return valve assembly retained on the end of a rod by a circlip. The rod is serrated at the top and pressed into a screwed plastic cap by which it is secured to the top cover. The caps may be drilled to vent the guide tube. The valve detail is immersed in the oil in the hollow air valve guide rod and is so arranged that oil can pass freely through it in a downwards direction (air valve falling) but presents a high resistance to upwards flow (air valve rising).

### 5 Starter bar (Series CD)

The series CD has a mechanical device for cold-starting. A boss at each side of the body is bored (similar to the throttle spindle bosses) to accept a shaft which passes across the choke bore underneath the front of the air valve (ie., upstream of the bridge). The bore is machined into the floor of the choke thus forming a semi-circular channel in which the shaft is a close fit. The starter bar is machined flat at the centre, and in its normal position this flat follows the slope of the entry to the bridge, and a small gap exists between it and the underside of the air valve. Rotation of the bar raises one edge of the machined flat until it is in contact with the air valve, thus closing the gas-way. Further rotation lifts the air valve and hence the attached fuel metering needle out of the jet, thus increasing the annular fuel flow area, while maintaining the gas-way closed.

A cam-shaped lever at one end of the starter has beams upon a tappet screw attached to the throttle level and thus provides a mechanical interconnection.

### 6 Cold-start valve (Series CDS and CD-2S)

The series CDS and CD-2S have a different provision for cold-starting from the series CD, in that a separate metering valve is fitted.

A disc with a number of different size holes drilled on a pitch circle is rotated through a limited arc within a housing to align with a kidney-shaped inlet port in a brass valve plate. The valve plate is clamped to a machined face on the body by the housing which is secured with screws.

The housing provides a bearing for the valve disc operating shaft and a manifold for the passage of fuel, which issues from the body, through the metering holes in the valve disc, and passes back through another kidney-shaped hole in the valve disc into the body, and then into the mixing chamber of the carburettor.

The inner end of the operating shaft is machined to a D section to provide positive location and drive for the valve disc which has a similarly shaped hole. A circlip fitted to the shaft provides a register for a coil spring which loads the valve disc towards the valve plate. It is retained by staking at the inner end of the shaft. The shaft runs in a steel sleeve bearing pressed into the housing.

### 7 Operation

Refer to Part 1, Chapter 1 - Operation, for general account of operation of the Stromberg Constant Depression Carburettor.

#### 1 Cold-starting

Series CD (Refer to Fig.)

The rich mixture necessary to start a cold engine is produced by raising the air valve by rotation of the starter bar, thus lifting the metering needle out of the jet orifice and increasing the annular fuel flow area. The edge of the starter bar, being in contact with the underside of the air valve, also closes the air supply duct so that, initially, the full depression in the mixing chamber is sensed at the jet. An interconnecting cam and lever arrangement outside the carburettor provides the correct degree of throttle opening for starting, without depressing the accelerator. When the engine fires and runs, the high manifold depression is transmitted to the suction chamber and the air valve lifts. With the engine running the choke control is used to set the fast-idle speed necessary to ensure rapid warm-up.

Series CDS and CD-2S

Operation of the vehicle's 'choke' control rotates the cold-start valve disc. With the control pulled fully out the largest hole in the valve disc is aligned with the kidney-shaped hole in the valve plate giving the maximum fuel flow area. Petrol flows up a vertical drilling in the float chamber, through the cold-start valve ports, and is discharged via a stub brass pipe direct into the mixing chamber. An interconnecting cam and lever arrangement outside the carburettor provides the correct degree of throttle opening for starting. The accelerator pedal should not be depressed. When the engine first starts and runs, the 'choke' control may be pushed in slightly to weaken the mixture but maintain a fast idle speed. (Rotation of the cold-start valve lever aligns a smaller hole in the valve disc with the port in the valve plate; and the fast-idle cam lift is not so great, giving a smaller throttle opening). The vehicle may be driven immediately with the choke control partly out.

#### 2 Normal running, full throttle and cruise conditions

As the engine warms through, the degree of mixture enrichment is gradually reduced by returning the choke control to its fully home position.

The operation of the carburettor is now under the control of the throttle only.

At cruise condition the throttle plate will be partly open with the engine running fast. The obstruction presented by the throttle reduces the depression in the mixing chamber, and

thence in the suction chamber and the air valve falls until the forces (weight, spring load and pneumatic) acting above and below it are in balance. The high manifold depression will be sensed at the edge of the throttle plate at the vacuum tapping (auto-timing connection) on units so fitted and transmitted to the ignition distributor to advance the ignition timing, with beneficial effects on fuel economy.

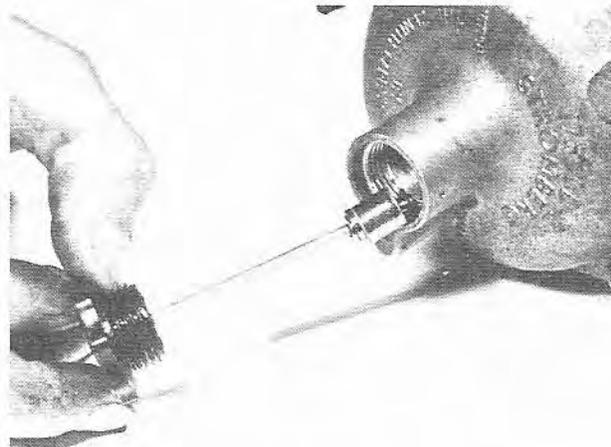
At full throttle condition the throttle plate presents only slight obstruction, manifold depression is sensed in the suction chamber and the air valve lifts to its limit. The depression at the jet is as before but more fuel is drawn out due to the withdrawal of the tapered needle, which creates a greater annular area. To prevent mechanical damage (burnt valves and piston crowns, mainly) which will occur if the mixture is too weak at full throttle, it is usually arranged that the mixture strength is slightly richer at the 'top end' than at part throttle conditions. This is achieved by the taper of the metering needle.

### 8 Disassembly

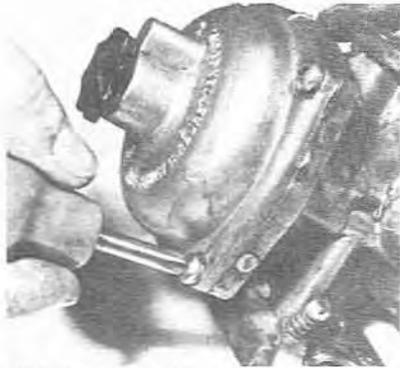
- 1 Unscrew and remove damper assembly. Do not disassemble at this stage. Invert carburettor and drain oil from air valve guide rod reservoir.
- 2 Remove four Phillips-head screws and spring washers securing diaphragm chamber cover. Collect brass identity tag and take care not to lose it. Discard spring washers.
- 3 Mark periphery of cover and body to ensure correct alignment on reassembly (there is no locating device and cover could be re-fitted in any of four different positions) and remove carefully. Remove spring and air valve complete with metering needle, diaphragm, diaphragm former and retaining plate. Note that the example illustrated here has a spring loaded metering needle which is not co-axial with the air valve guide rod but is biased to one side.
- 4 Remove needle locking screw and needle assembly. Do not disassemble. For units fitted with adjustable needles, refer to Series CDSE, Disassembly, paragraph 3.
- 5 Remove the four Phillips-head screws from the air valve, remove steel diaphragm retaining plate, plastic diaphragm former and diaphragm. Note that diaphragm has locating register on underside of periphery which engages in a slot in the recess in body. It is therefore unnecessary to mark it for reassembly. There is a similar arrangement on the inner rim and air valve.
- 6 Remove nut from non-drive end of throttle spindle ( $\frac{1}{4}$  in BSF spanner). Remove and discard star washer. Disengage throttle return spring (long tail) from top of extension carrying throttle stop screw (cast integrally with body). Remove special washer (with beam-shaped hole). Remove throttle lever. Do not remove fast-idle cam screw or locknut. Remove spring.
- 7 Remove nut from other end of spindle. Remove and discard star washer. Remove special washer with beam-shaped hole (thinner and larger diameter than previous one) and flexible drive coupling complete with steel plate. Carefully remove steel plate from groove in end of coupling. Note that OUT is stamped on side of plate facing away from carburettor. It has four equi-spaced projections which engage in recesses in the groove at the end of the drive coupling.
- 8 Remove shouldered brass washer. Note that flange is nearest to unit. Remove special steel washer (same as that described in paragraph 6), lever (with square tongue which engages in slot in steel drive plate facing outwards and at 10 o'clock when viewed on end of spindle, carburettor upright), and lever, (one square tongue facing unit body at 9 o'clock and one straight projection at 3 o'clock).

Note that all special washers and levers may be very tight on the spindle and may require force to remove them. Be very careful not to lever against any part of the unit except the body, not to bend the spindle, or damage the threads. If the last lever (paragraph above) is very tight do not lever between it and the machined face at the end of the flat on the spindle, but proceed to the next operation (paragraph 9) and remove the spindle by tapping it through the lever from the end, when the lever will be freed.

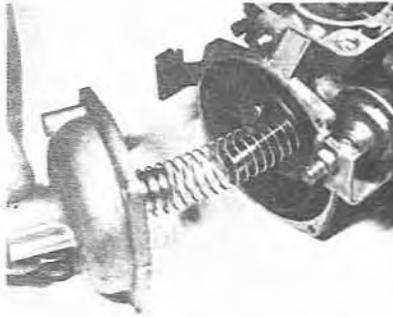
- 9 Remove and discard the copper screws securing the butterfly plate in the spindle. Open the throttle and withdraw the plate. Note that there are two small 'pips' on the face of throttle plate (facing outwards, below the spindle when the throttle is closed). Using a very fine file remove burrs around screw holes to prevent damage to bearings and seals as spindle is withdrawn. Withdraw spindle, noting that extension with shorter length of thread and longer portion with flats is on drive side.
- 10 Unscrew and remove jet adjusting screw. Remove and discard O-ring. Unscrew jet assembly ( $\frac{5}{8}$  in A/F spanner). Remove and discard O-ring.
- 11 Remove six screws and spring washers securing float chamber to unit body. Note that two screws are shorter. Discard spring washers. Remove float chamber base. If tight, tap gently on the bolt bosses with a wooden- or plastic-handled screwdriver. Remove and discard gasket.
- 12 Remove jet assembly. Withdraw jet and remove spring from it. Separate two brass bearings and remove soft aluminium washer. Remove and discard C-ring.
- 13 Remove float assembly by prising float hinge pin out of spring steel clip. Remove hinge pin from lever arm. Unscrew inlet needle valve assembly ( $\frac{5}{16}$  in BSF spanner) and discard soft aluminium washer.
- 14 Remove nut from cold-start valve spindle ( $\frac{1}{4}$  in BSF spanner). Remove and discard internal star washer. Remove special washer (with beam-shaped hole). With valve closed, disengage short tail of return spring from actuating lever/fast-idle cam and remove lever and spring.
- 15 Remove two countersunk-head screws (slacken off progressively; cold-start valve is spring loaded). Remove screws, remove and discard star washers. Remove the cold-start valve body and brass valve port plate. Note that a brass spigot pressed into carburettor body locates in a cut-out in valve plate, preventing incorrect fitting. Remove the valve detail from housing. Remove the clip from the spindle and collect the spring. This allows the two circular valve discs to be loose on the spindle. Their removal is prevented by staking of the spindle end.
- 16 Remove the throttle stop screw and spring. Remove the brass vacuum tapping union. Do not attempt any further disassembly.



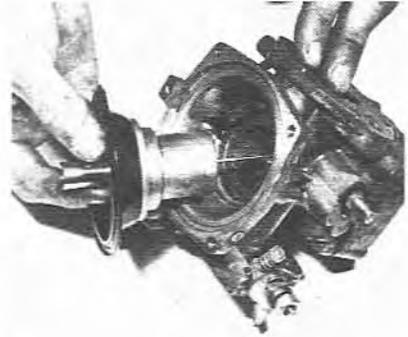
8.1 This is how the damper is removed



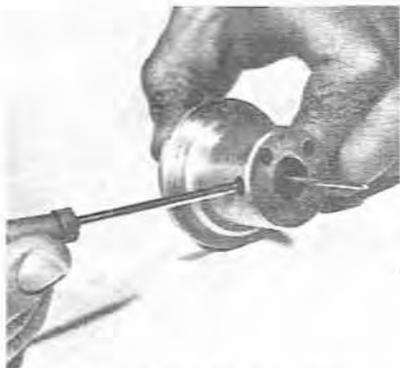
8.2 We have put the damper back: this indicates the screws.



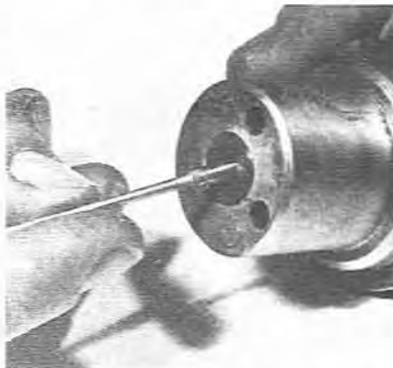
8.3 Watch the spring when you lift the cover away



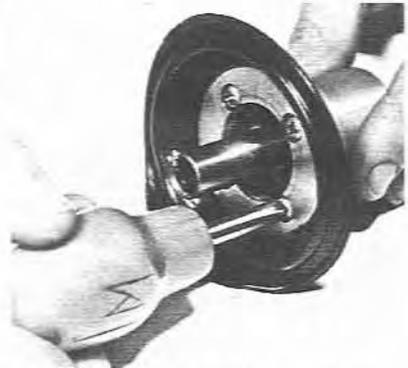
8.3a Do not dismantle the diaphragm still in the body



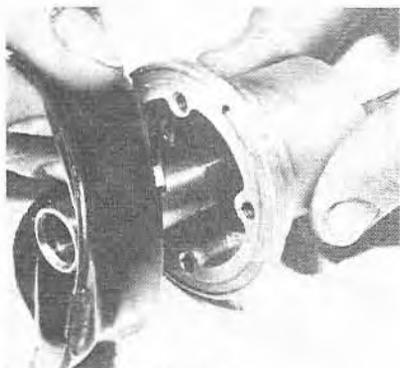
8.4 Great care is needed here so that nothing is damaged



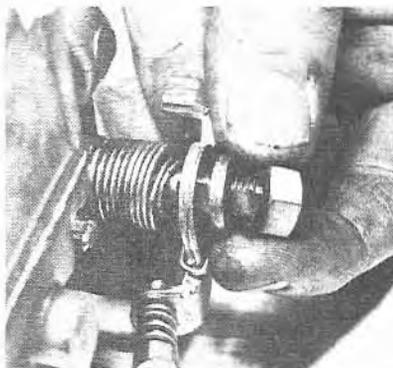
8.4a Never use more than 'finger' force



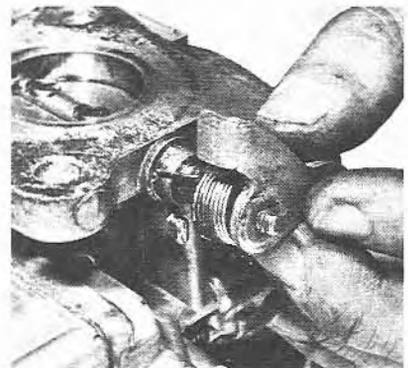
8.5 A dumpy screwdriver is all that should be necessary



8.5a Note the locating lip



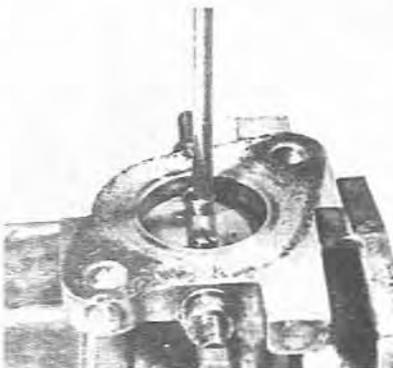
8.6 Try to record the order, for easy reassembly



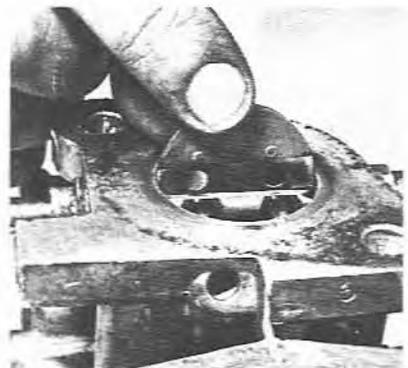
8.6a Again no undue force should be necessary here



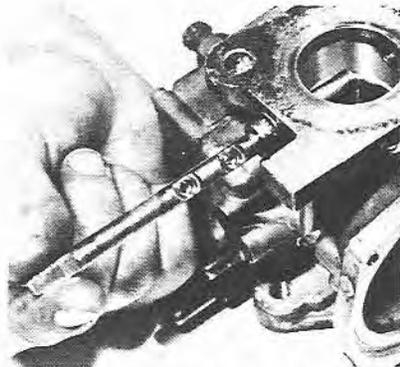
8.7 These connectors are brittle



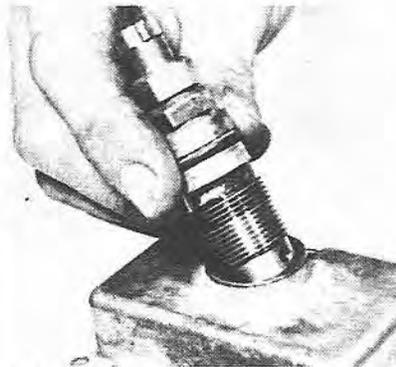
8.8 Take great care and precision over this task



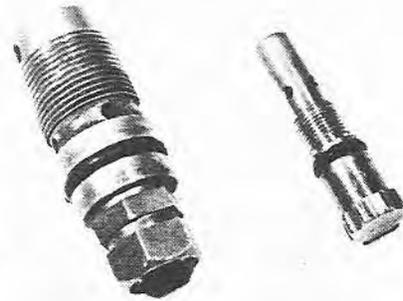
8.9a The butterfly is not round, do not force



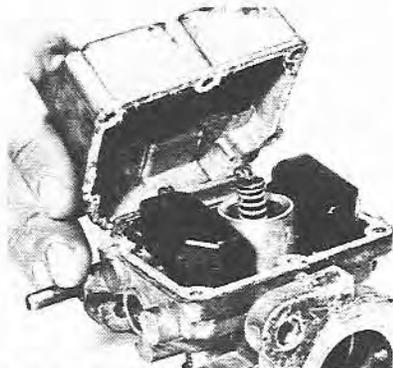
8.9b Withdraw the spindle at right angles



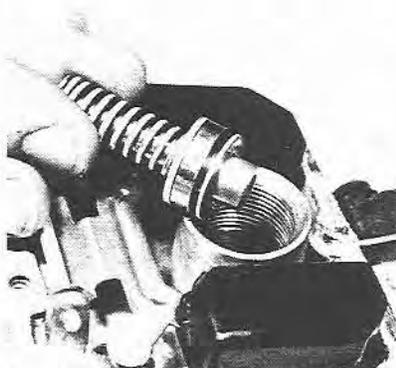
8.10 This shows the whole jet assembly being withdrawn



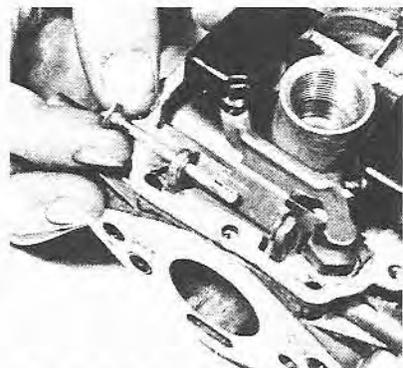
8.10a The two parts split once out of the body; note the O rings



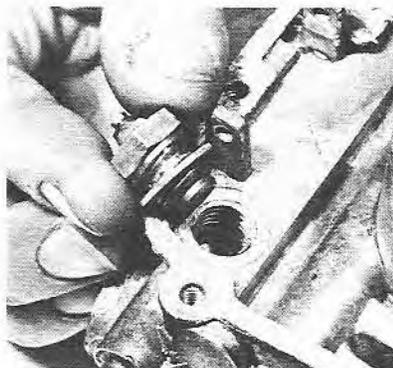
8.11 Make sure you clean off the gasket



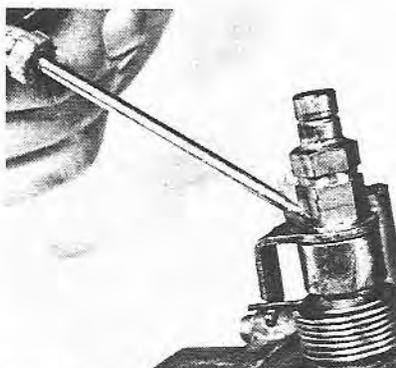
8.12 This clearly shows the soft aluminium washer



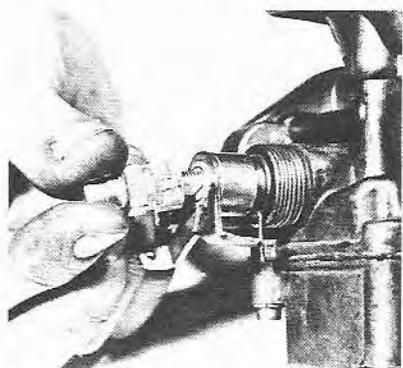
8.13 No force should be necessary to withdraw the float hinge pin



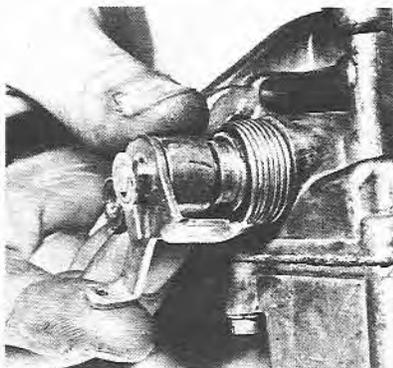
8.13a Again there should be the proper washer beneath the needle valve



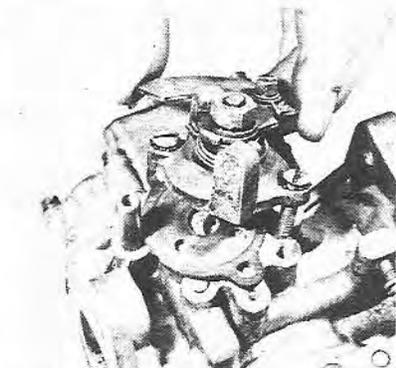
8.14 Bend back the locking lip carefully to enable its re-use



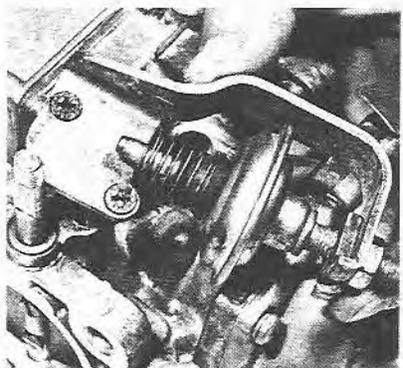
8.14a Careful disassembly is the essence



8.14b Still watch the return spring at this stage



8.15 Note the gasket, which looks in this case as though it could be re-used



8.15a The whole unit comes off in pieces like this

**9 Special overhaul procedures**

- 1 Refer to Chapter 4 - Overhaul.
- 2 Replacement parts - Stromberg part numbers
- A Needle valve assembly complete with alternative washers.

Code Ref	Part No.	Description
AR (replaces A)	B.19052	1.5 mm (Series CD)
AS (replaces B)	B.19053	1.75 mm (Series CD)
AT (replaces C)	B.19054	2.0 mm (Series CD)
AP	B.18651	2.25 mm (Series 175CD-2s)

**B Diaphragms**

Part No.	Description
B.16001	125, 150 Series CD and CDS
B.20924	150 Series CD-3
019583	175 Series CD and CD-1
B.17421	175 Series CD-2S

**3 Gasket packs - Stromberg reference numbers.**

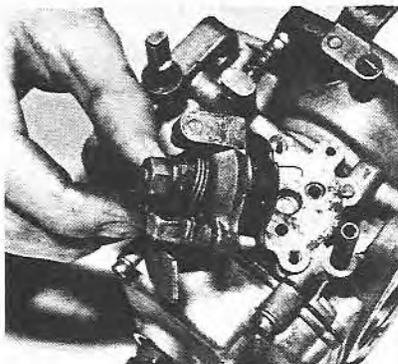
Ref No.	Description
59	125, 150 Series CD
58	175 Series CD
62	125 Series CD (conversion outfits)
63	175 Series CD (conversion outfits)
247	150 Series CD-3
235	125, 150 Series CDS and 175 Series CD-2S

- 4 Hydraulic damper oil  
Can of Zenith Lube Oil part No. B.18562Z.

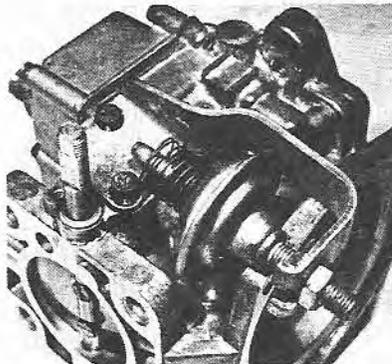
**10 Assembly**

*Note:* Ensure that all parts are clean and dry before assembly, unless otherwise noted.

- 1 Fit the vacuum tapping union.
- 2 Fit the spring to the cold-start valve spindle and secure the assembly with a special clip (with U-shaped slot). Ensure that all ports and the four pin holes in the valve disc are unobstructed. Fit the valve disc and spindle assembly in to the housing.  
Ascertain the correct position of the brass valve plate relative to the housing by reference to the carburettor body, noting how the cut-out in the plate registers with the locating peg in the body. Offer the valve plate up to the valve disc. Position valve disc so that the four pin holes are visible through the kidney-shaped port in the valve plate. The cut-out in the edge of the plate should be in line with one corner of the extension on the housing carrying the brass lever stop. Secure the valve plate, and valve disc and housing assembly to the carburettor body with two countersunk-head screws and new star washers.
- 3 Fit the cold-start lever return spring. Engage the straight tail with the bar-like projection at the bottom of valve housing on the right-hand (intake side) of projection. Fit the cam plate over the spindle and rotate 90° counter-clockwise until it contacts lower stop. Rotate the cranked spring tail clockwise and temporarily hook over lower stop on left-hand side. Fit the operating lever and hook the cranked tail of the spring over the plate. Ensure that the cam plate is in contact with the valve housing spindle boss and that the spring is not trapped between the two parts. Fit special washer, new internal star washer and nut. Rotate the cam plate 90° clockwise to cold-start ON position and tighten the nut.



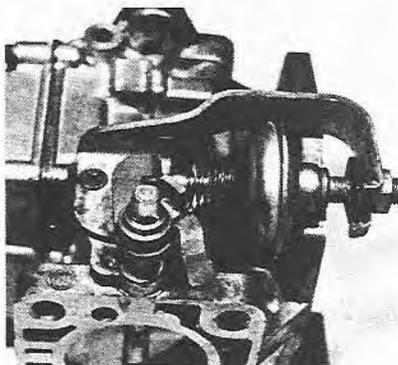
10.2 Reassembly is as simple as disassembly



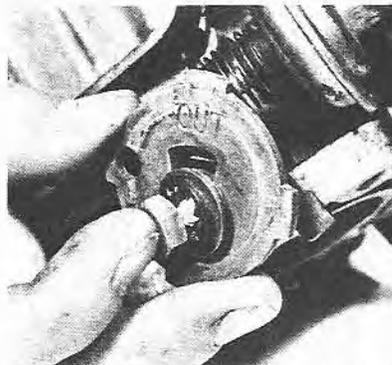
10.3 There is no gasket here



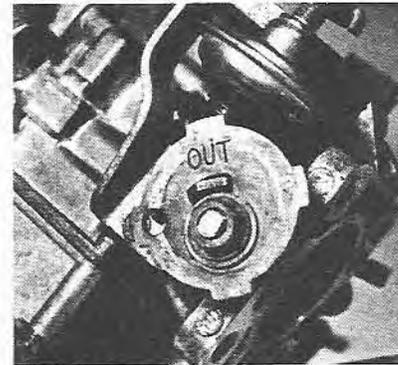
10.3a This is the correct order of fitment



10.3b Again note the position of the throttle spindle



10.3c Never leave off the star washer here



10.3d Note how the lip fits through the slit under 'OUT'

4 Invert the carburettor. Fit a new soft aluminium washer for the inlet needle valve assembly and screw it into its tapped hole in the underside of the body. Fit the hinge pin for the float assembly and spring into position in the spring steel clip, taking care not to damage either port. Note that the float lever arm rivetted to the plastic float should appear uppermost (lowermost when the carburettor is held upright) and that the tag on the arm should contact the needle at a right angle when it is closed. Check that the float hinges freely on its pin.

5 Fit a new O-ring and new soft aluminium washer for the upper brass jet bearing. Fit spring to jet and insert jet into bearings. Fit assembly into body.

6 Fit a new O-ring for the jet holder and screw into underside of the body.

7 Fit new gasket for the float chamber base and secure base with six screws and new spring washers. Tighten screws progressively and evenly, working in the sequence shown.

8 Fit a new O-ring for the jet adjusting screw. Insert into jet holder and screw in until the top of the jet is flush with the bridge in the carburettor bore.

9 Fit throttle spindle into bearings in the body. With the unit held upright, the extension with long flats and short threaded length is on the left, and the extension with short flats and long threaded length is on the right, when looking into the outlet. Position the spindle in the valve closed position (tapped holes away from outlet). Rotate the spindle 90° clockwise (viewed from cold-start valve side) and insert the throttle plate. Close the throttle and allow the plate to centralise in the bore; if there is a gap around the edge of the plate adjust so that it is even throughout its circumference. Fit two new copper retaining screws, tighten and expand the ends by striking with a long centre-punch inserted through the carburettor bore. Support the heads of the screws during this operation to prevent bending the spindle.

10 Hook the cranked end of the throttle return spring over the fast-idle lever and slide the spring and lever onto the spindle.

Wind the spring through 180° counter-clockwise and hook the straight tail over the slow-running screw extension to pre-load. Fit the special washer (thick, steel, with beam-shaped hole) new internal star washer and nut. Tighten the nut.

11 At the other end of the spindle, fit the lever (one straight tongue at 3 o'clock and one square tongue at 9 o'clock), the lever (one square tongue facing outwards at 10 o'clock), thick steel washer (with beam-shaped hole) and shouldered brass washer (large diameter, thin flange towards unit). Fit the steel drive plate (OUT facing outwards) with the tongue of the lever behind engaged in the slot, large diameter, thin special steel washer (with beam-shaped hole), new internal star washer and nut. Tighten the nut. Fit the flexible coupling over the steel drive plate, ensuring that the tongues on the plate engage in the slots in the groove in the end of the coupling. (Note that mould or 'flash' lines on the outside of the coupling are coincident with the slots on the inside. Manipulate the coupling to ensure that the tongues are properly engaged.

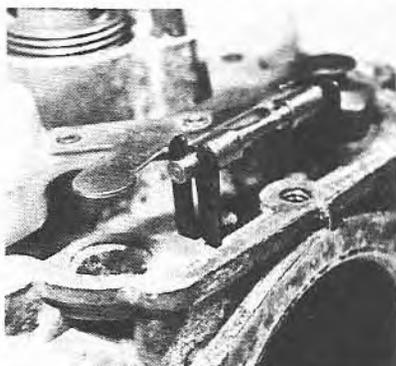
12 Fit the diaphragm to air valve ensuring that the locating tongue engages with the slot and that the bead sits correctly in the groove in the piston. Fit the plastic diaphragm former, and steel retaining plate ensuring that the cut-outs engage in semi-circular projections in the former. Fit and progressively tighten the four Phillips-head screws, checking that the diaphragm remains in its correct position.

13 Fit the metering needle for the air valve so that the shoulder of the needle is flush with the underside of the valve. Clamp with the needle locking screw.

14 Carefully fit the air valve, diaphragm and needle assembly into the body ensuring that the tongue on the underside of the diaphragm periphery engages with recess in the body, and that the needle enters the jet. It may be necessary to centre the jet by partially unscrewing the jet holder (refer to Assembly paragraph 6) and pushing the air valve assembly to the bottom of its travel when the jet will move sideways to align itself



10.4 Use a new aluminium washer for the needle valve



10.4a The hinge pin can look like this



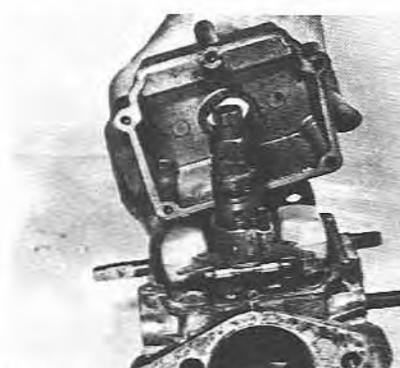
10.5 The upper jet assembly before insertion



10.5a Note the compressible washer



10.6/8 We assembled the jet complete before the float chamber cover. Follow the text



10.7 Now the float chamber cover

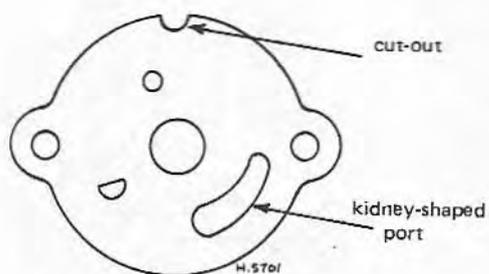


Fig. CD5 Valve plate view

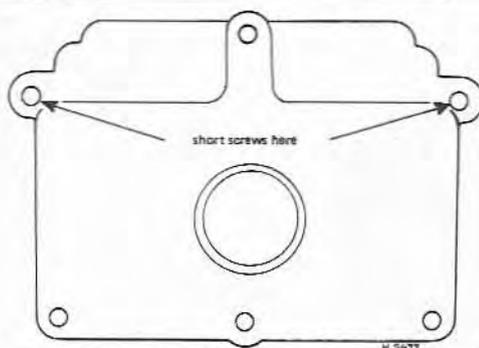
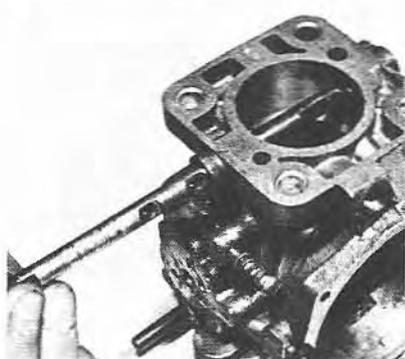
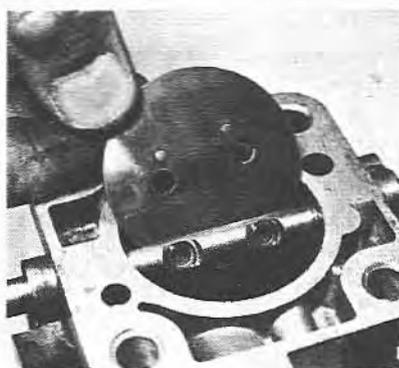


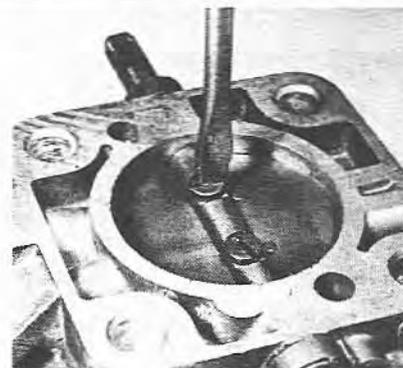
Fig. CD6 View of the underside of the float chamber, showing the order of tightening of the fixing screws



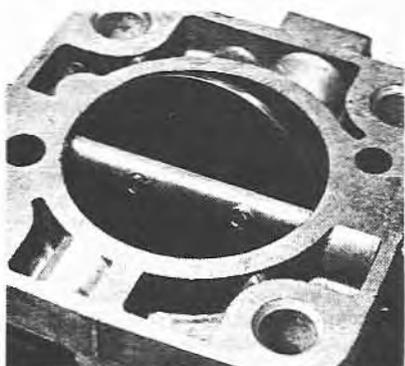
10.9 A little oil on the spindle helps



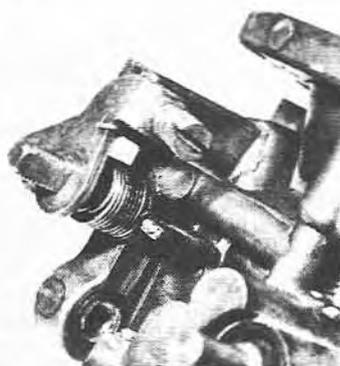
10.9a Again remember the butterfly is not round



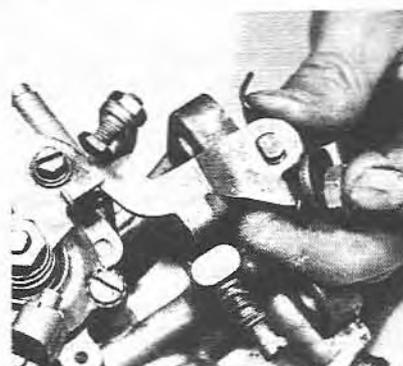
10.9b Use the correct size of screwdriver blade



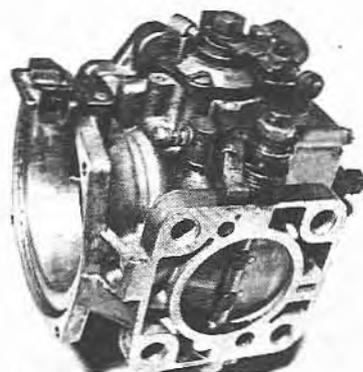
10.9c Make sure that the spindle now travels to its full extent



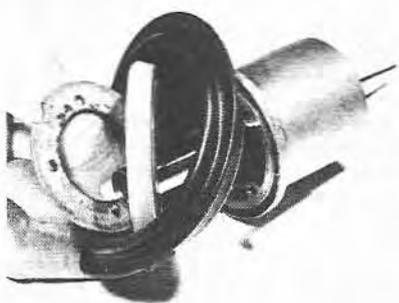
10.10 Note how the spring has been clipped over



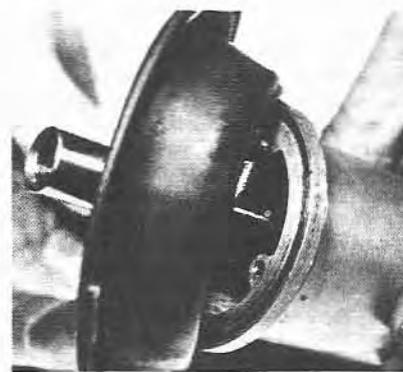
10.11 See the thumb on the return spring at this stage



10.11a The final assembly



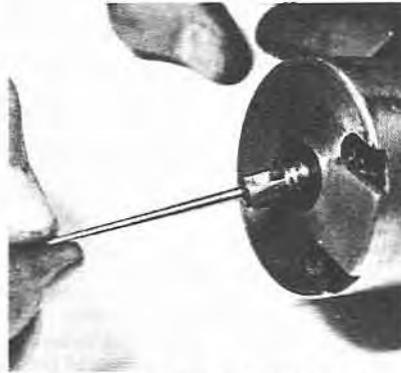
10.12 The component parts of the diaphragm



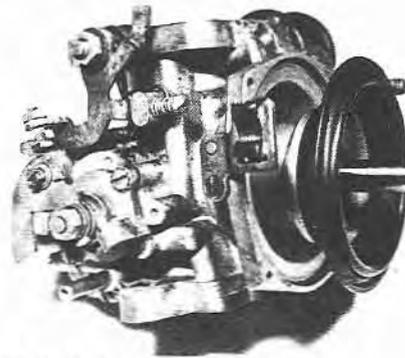
10.12a See how the lip fits over the piston



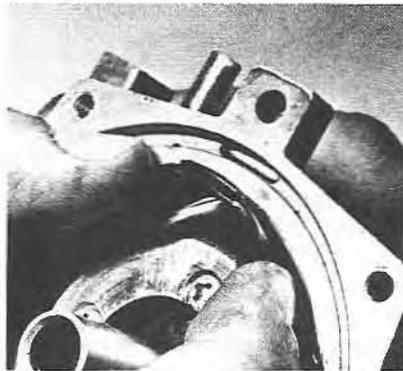
10.12b Tighten the four screws progressively



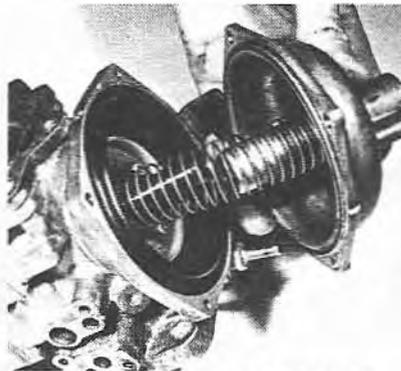
10.13 Careful assembly is essential here for proper working



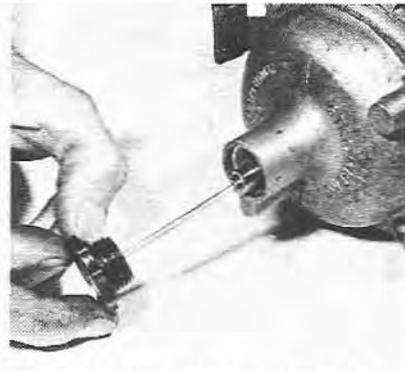
10.14 Slide the diaphragm in very carefully



10.14a Do not forget the location lip of the diaphragm



10.14b Now finally the spring before the cover



10.14c The damper rod should be a firm finger tight

relative to the needle. This procedure applies only to the conventional rigidly held needles; spring loaded needles are biased to one side and rub lightly on the inside of the jet, which is accurately located in the body.

Fit the air valve return spring, lightly oil (SAE, 20) the guide rod and fit the cover with the cast extension on the side of the guide rod bearing extension towards the inlet end of the body. Secure with four Phillips-head screws and new spring washers, not forgetting to fit the specification plate under one of them. Fit the damper cap; do not overtighten. Do not fill dashpot with oil at this stage.

## 11 Tuning

*Note:* Refer to Part 1, Chapter 3 for notes on tuning.

### Single carburettor installations

#### 1 Centre Jet

Check that the jet is accurately centred relative to the metering needle by lifting the air valve (by means of the lifting pin, when provided; otherwise by inserting a small screwdriver through the intake) and releasing, when it should fall freely and strike the bridge with a soft click. If the valve sticks, remove the damper and repeat the test. If the test is now satisfied the damper assembly is defective (probably a bent rod) and it must be replaced. If the fault persists, the jet is eccentric for the needle and must be centred as follows: Lift the air valve and fully screw in the jet adjustment screw to raise the jet orifice to its limit.

Slacken off the whole jet assembly to release the orifice bush. Release the air valve when the metering needle will enter the jet orifice and centre it.

Tighten the jet assembly and retest as in paragraph above.

*Note that this procedure applies only to units fitted with conventional rigidly held needles; spring loaded needles are biased to one side and rub lightly on the inside of the jet, which is accurately located in the body and has no provision for lateral adjustment.*

#### 2 Set jet height

Remove the damper and hold the air valve in contact with the bridge. Screw in the jet adjusting screw until the jet contacts the underside of the air valve. Screw out the jet adjusting screw three turns to set an approximate jet height.

#### 3 Set idle speed

Start engine and warm up to normal working temperature. Check that the fast-idle screw is clear of the fast-idle cam. Adjust the slow-running screw to give desired idling speed.

#### 4 Set mixture strength

Adjust the jet adjusting screw (screw in to weaken, out to enrich mixture) until the fastest idling speed consistent with even running is obtained.

#### 5 Check mixture strength and re-adjust idle speed

The effect of mixture strength variation on exhaust is as follows:

<i>Too weak</i>	-	<i>Colourless, irregular note, 'splashy' misfire</i>
<i>Correct</i>	-	<i>Colourless emission, even note</i>
<i>Too rich</i>	-	<i>Blackish emission, rhythmical 'heavy' running</i>

*Note that blue smoke is usually indicative of oil burning in a worn engine, and should not be misinterpreted as a carburation defect. Check for correct mixture strength by lifting the air valve (by means of the lifting pin, when provided; otherwise by inserting a long, thin screwdriver to avoid excessive disturbance of the air flow) approximately 0.032 in (0.8 mm), and noting the effect on engine speed.*

<i>Too weak</i>	-	<i>speed decreases, or engine stalls if air valve lifted too far</i>
<i>Correct mixture</i>	-	<i>speed stays constant, or decreases very slightly</i>
<i>Too rich</i>	-	<i>speed increases and engine runs more smoothly</i>

Readjust the slow-running screw if necessary to restore the desired idling speed.

**6 Set fast-idle screw**

Set the fast-idle screw in accordance with instructions given by the vehicle manufacturer for your particular application, or if no information is available, adjust to give 0.030 in (0.8 mm) clearance between the head of the screw and the cam profile, with the cold-start valve fully OFF.

**7 Lock screws and fill damper**

Without disturbing the adjusting screw positions, lock the screws with locknuts, where provided. If there is any doubt regarding the efficiency of coil springs used for locking, replace them or discard and use locknuts.

Fill the hollow air valve guide rod to within 0.25 in (6 mm) of the top with thin oil (SAE 20). Fit damper assembly and do not overtighten.

**Multiple carburettor installations**

**1 Centre jets**

Centre the jet of each carburettor as detailed in tuning procedures for single carburetors.

**2 Set jet height**

Set the height of the jet of each carburettor as detailed in tuning procedures for single carburetors.

**3 Disconnect throttle spindles**

Loosen the throttle interconnecting linkage clamping bolts. Check that the clamps are free on the spindles and that operation of one throttle spindle does not affect the other.

**4 Set slow-running screws**

Unscrew each slow-running screw to allow the throttle plate to fully close, screw in until end of screw just contacts the casting and screw in a further 1½ turns to open the throttles by equal amounts. Check that the fast-idle screws are clear of the fast-idle cams.

**5 Synchronise throttles and set idle speed.**

Start engine and warm up to normal working temperature. Synchronise the throttle openings by listening to the hiss at the air intake to each unit. A short length of 0.25 in (6 mm) bore rubber tubing, one end held to the ear and the other end held just inside the intake, is ideal for this. Adjust the slow-running screws until the hiss is the same for each unit.

Tighten the clamping bolts on the throttle spindle interconnecting linkage.

Adjust the slow-running screws by exactly equal amounts to give the desired idling speed.

**6 Set mixture strength**

Adjust the jet adjusting screws (screw in to weaken, out to enrich mixture) by exactly equal amounts until the fastest idling speed consistent with even running is obtained.

**7 Check mixture strength and re-adjust idle speed**

Check the mixture strength as detailed in tuning procedures for single carburetors.

**8 Set fast-idle screws**

Set the fast-idle screws as detailed in tuning procedures for single carburetors.

**9 Lock screws and fill dampers as detailed in tuning procedures for single carburetors.**

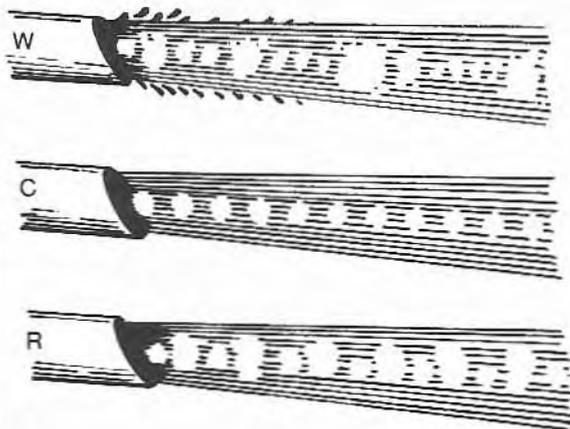


Fig. CD8 Mixture strength as a function of exhaust smoke

w - too weak                      c - just right                      r - too rich

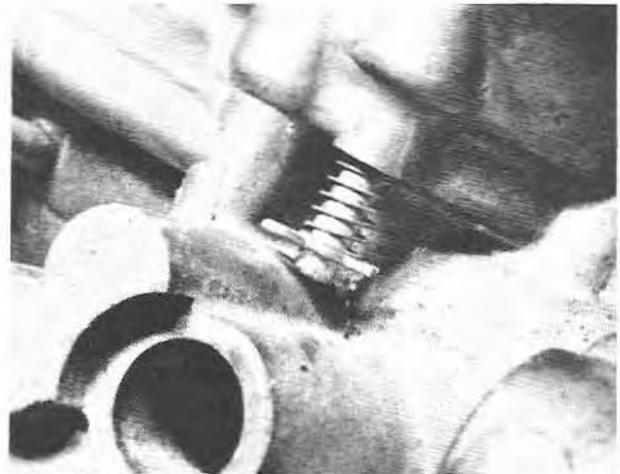


Fig. CD7 The air valve lifting pin

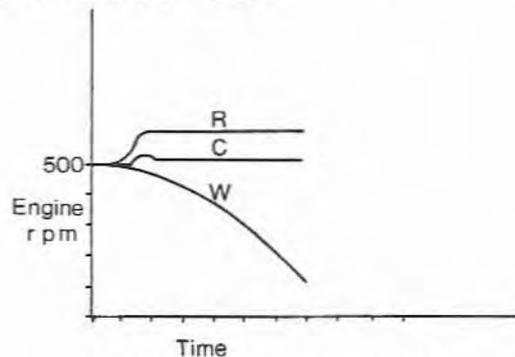


Fig. CD9 Mixture strength on a graph

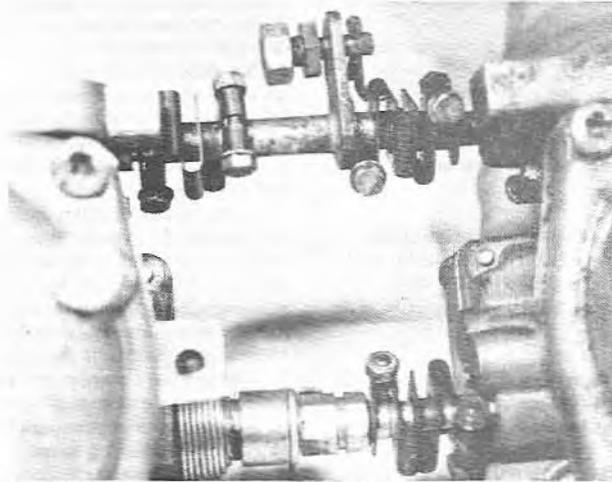


Fig. CD10 Twin carburettor multiple connections

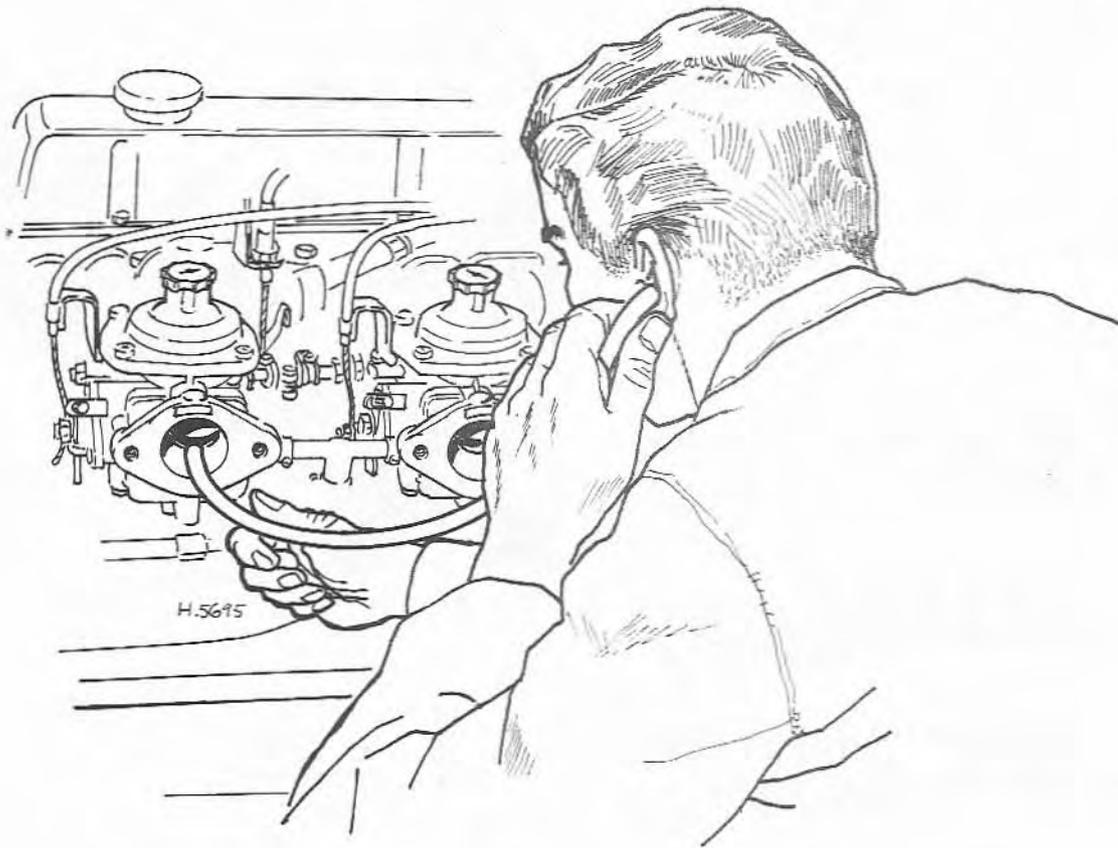
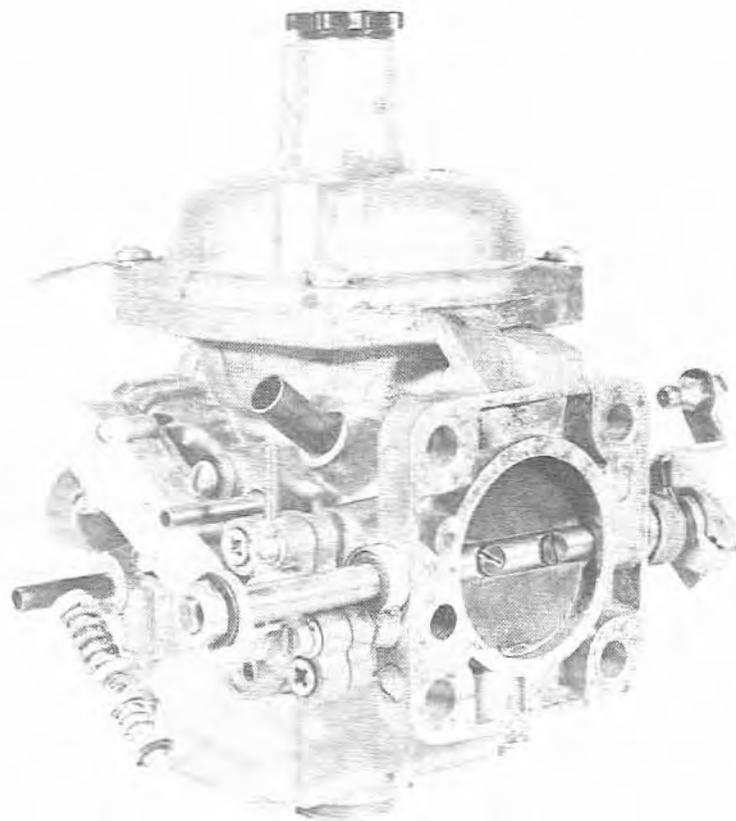


Fig. CD11 Tuning multiple carburettor set-ups. Adjust the throttle stop screws to equalise 'hiss' in each carburettor



## Part 3 Zenith Stromberg carburetors

### Chapter 15 Series CDSE and CD-2SE

#### Contents

	<i>Section</i>		<i>Section</i>
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Construction .....	2	Special tool for adjustable needles .....	7
Jet and needle arrangement .....	3	Special tool for adjustable jets .....	8
Adjustable needle assembly .....	4	Assembly .....	9
Special overhaul procedures .....	5	Tuning .....	10

#### 1 Introduction

This development of the CD carburettor has been specifically designed to meet exhaust emission control applications, and accordingly features several sophisticated devices to enable these stringent requirements to be met.

The principal features are a temperature compensator, throttle by-pass valve, idle trimming screw and leak balancing screw or manufacturing tolerance compensator.

The example used to illustrate this text is from a Jaguar V12 E-type 5.3 litre (carburettor reference is 3578A2). It is one of a multiple (four) carburettor installation and does not have a cold-start valve.

#### 2 Construction

The unit consists of a complex die-cast aluminium body closed at the top and bottom respectively by a suction chamber

cover and a float chamber cover and containing an air valve assembly and variable jet assembly. The emission control devices are separate sub-assemblies mounted externally on the body.

The design and disposition of the main elements (air valve and diaphragm assembly, damper, float and inlet needle valve mechanism) is similar to the Series CD (refer to appropriate section for a full description).

The metering needle and jet differ fundamentally, in that the jet is fixed, and the fixed needle is pre-set at the correct height. Some units have adjustable needles fitted in conjunction with special air valves. Note that not all of the emission control features are necessarily fitted to all units.

#### *Cold-start valve*

This is the same as that used in the Series CD. A detailed description is included in the appropriate section of this manual.

#### *Temperature compensator*

A horizontal passage at one side of the carburettor body

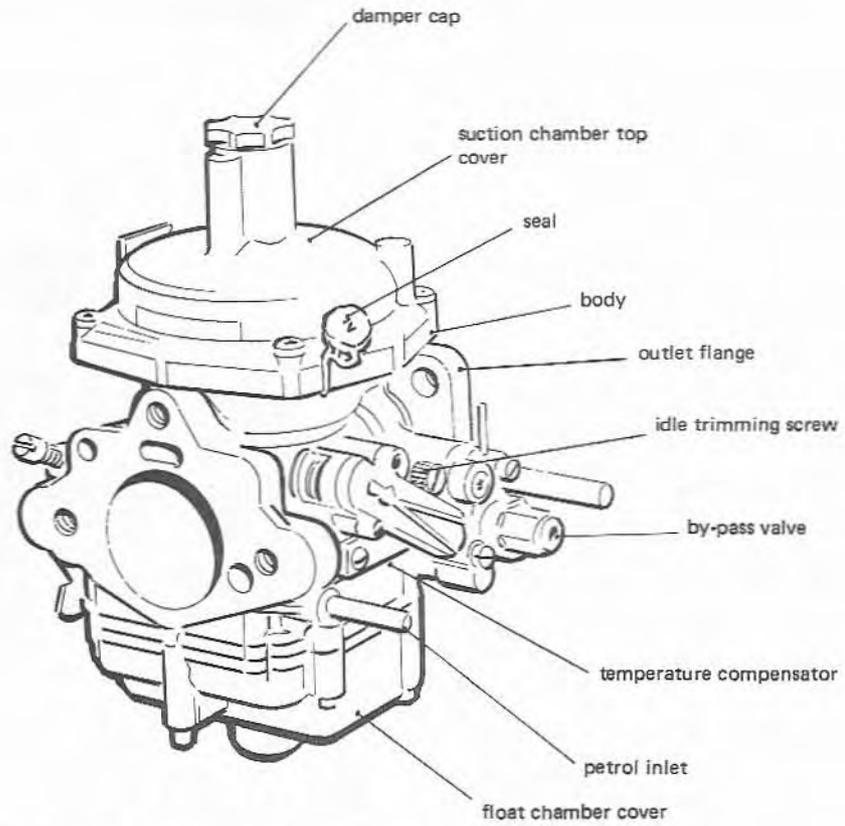


Fig. CDSE2 The major external components of the Series CDSE carburettor

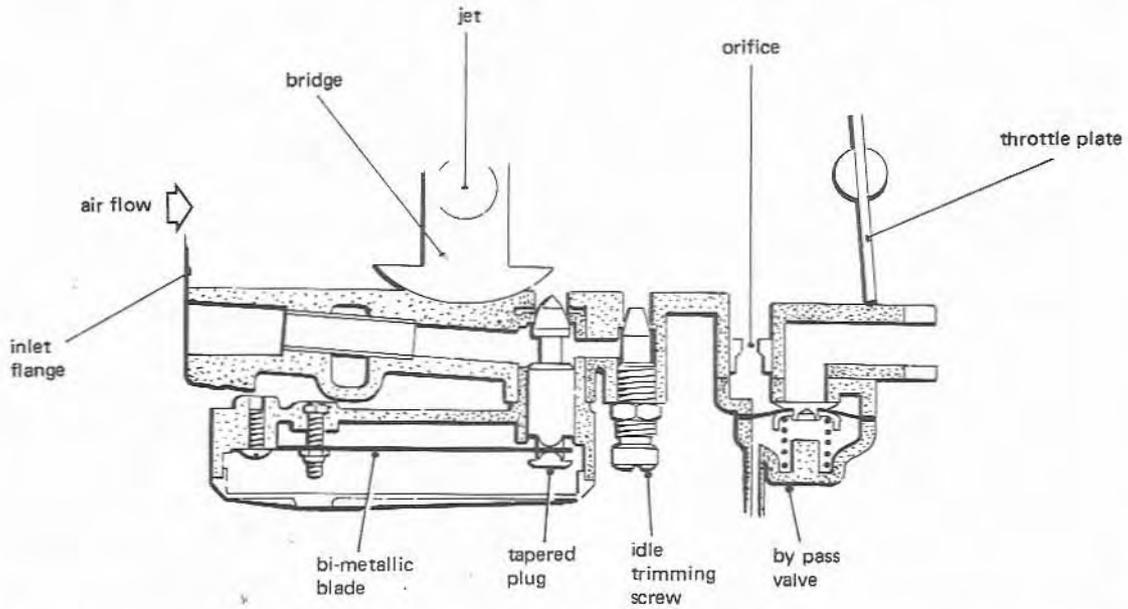


Fig. CDSE3 Horizontal cross-section through the choke bore, showing the arrangement of the temperature compensator, idle trimming screw and by-pass valve

forms a channel which by-passes the air valve, one end terminating in the mixing chamber and the other end open to atmosphere via a drilling in the intake flange. A circular recess in the wall of the unit body at the mixing chamber end of the passage accommodates the regulating valve of a temperature compensator device attached to the body by screws.

The temperature compensator consists of a rectangular housing closed by a plastic cover. It contains a bi-metallic blade, one end of which is rivetted to the inside of the housing, with an adjusting screw part-way along its length. The other end of the blade engages a cylindrical plug with a conical end, which slides in a cylindrical extension of the housing, forming a regulating valve.

Variation in temperature of the bi-metallic blade causes it to flex, moving the plug in its bore and regulating the annular area around the cone, thus controlling the by-pass air bleed. The adjusting screw enables a datum position to be set on initial build. It must not be adjusted in service.

#### Throttle by-pass valve

The by-pass valve provides a means of limiting the very high manifold depression which occurs when the engine is in the over-run condition. (Refer to Part 1, Chapter 1 for an explanation of this device).

It consists of a diaphragm clamped to a machined face on the wall of the unit by a cover. At the centre of the diaphragm is a combined metal valve plate and spring register, into which fits a compression spring located at the other end over a spigot in the cover. The spring loads the valve plate to the closed position. The cover also forms a diaphragm control chamber, being connected to the engine intake manifold by a small bore pipe.

Depression, sensed in the diaphragm chamber, will lift the valve at a pre-determined value (normally 22 to 23 in Hg), dictated by the compression spring pre-load, and admit air from the mixing chamber into the inlet manifold thus by-passing the

throttle plate and limiting the depression. The maximum bleed flow is controlled by an orifice fitted in the by-pass passage.

The by-pass valve is preset and no attempt may be made to adjust it in service. A replacement unit (for the particular application) should be fitted, if it is suspected of malfunction.

#### Idle trimming screw

The idle trimming screw provides for very fine adjustment to the idling mixture ratio to compensate for the difference between a new engine that is 'tight' and later when it is run-in. This is achieved by regulating an air bleed which by-passes the air valve, thus weakening the mixture ratio.

A new engine may be run with a comparatively weak mixture, when the idle trimming screw will be fully unscrewed, the maximum bleed being controlled by the size of the drilling (an extension of the passage to the temperature compensator). As the engine 'frees off' during the running-in period the screw may be progressively screwed in until it is seated and the air bleed is blanked off, giving a richer mixture.

Any adjustment of this screw should be carried out in conjunction with an exhaust gas analyzer to measure the carbon monoxide (CO) emission, and set it to the engine manufacturer's recommended value for idling.

#### Leak balancing screw

As explained in Part 1, Chapter 1, the air valve is a close fit in its bore in the body. The very small annular clearance around the air valve permits a leak between the ambient pressure region below the diaphragm and the low pressure region in the choke bore and mixing chamber, which lowers the depression. It is essential that all carburetors for a specific application are matched exactly in respect of flow. To compensate for the very small variations in component sizes (air valve diameter and body bore diameter) due to manufacturing tolerances, an adjustable screw is incorporated to provide an additional air bleed between these two regions. By adjustment of this screw the total leak may be held to a controlled value, irrespective of the 'unknown'

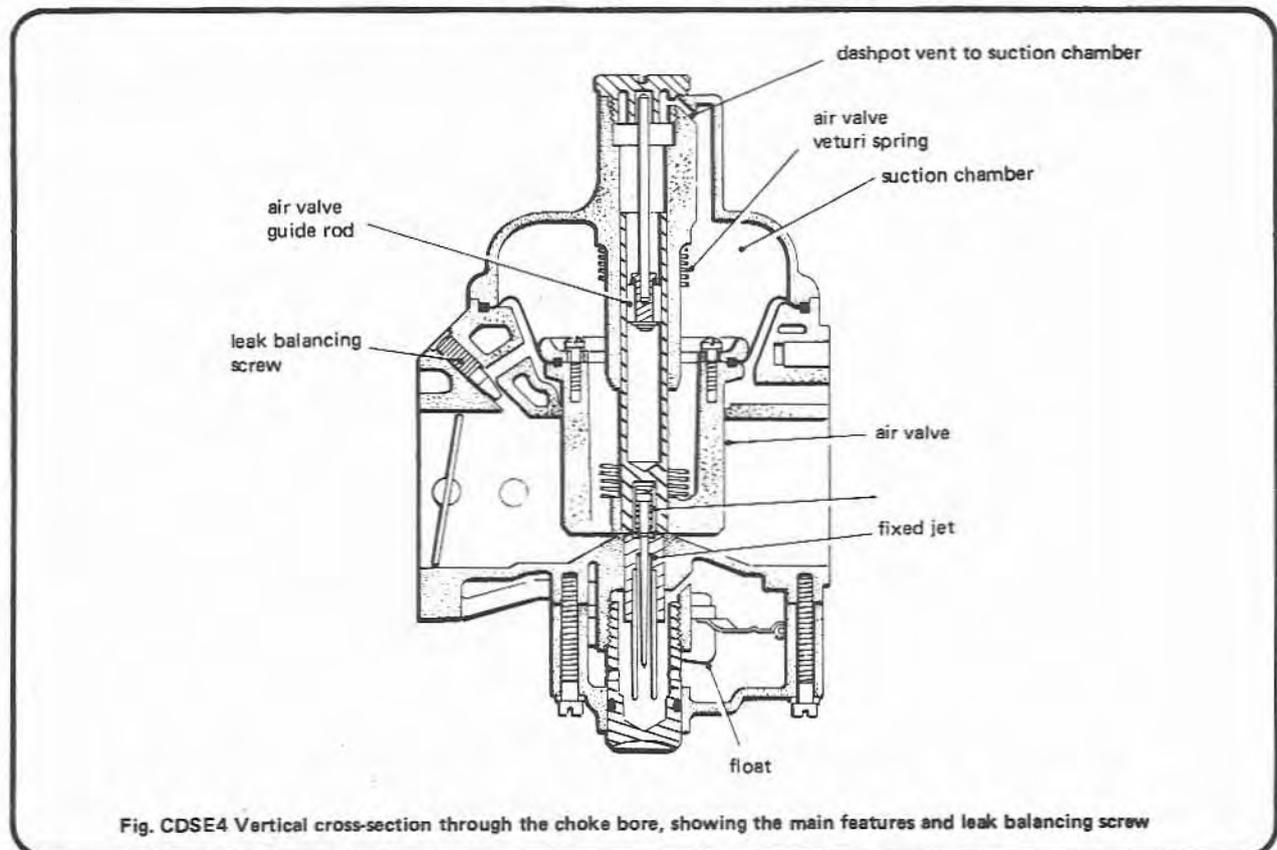


Fig. CDSE4 Vertical cross-section through the choke bore, showing the main features and leak balancing screw

spurious leak. Once the screw is set, on initial build, it must not be altered and to prevent tampering, the bore into which it fits is sealed with a plug. The body, air valve and cover become a matched set and neither part may be replaced independently of the other. The suction chamber cover is wired to the body, and may only be removed after a seal has been broken, thus revealing that the unit has been tampered with.

### 3 Jet and needle arrangement

One of three alternative arrangements of jet and needle assemblies may be fitted to this instrument. In each case the needle assembly is biased to one side of the jet orifice by an integral spring.

#### *Fixed jet and fixed (pre-set) needle*

The jet assembly is pressed into the body and is not adjustable or removable. The needle assembly is fitted to the socket in the air valve guide rod in a pre-set position and locked by a conventional locking screw. The position should not be altered.

#### *Fixed jet and adjustable needle*

The jet assembly is pressed into the body and is not adjustable or removable. The needle assembly height is adjustable through a limited range by an adjusting screw fitted in a special air valve guide rod. A keyway and peg arrangement replaces the conventional needle locking screw and permits vertical movement of the needle assembly while preventing its rotation in the socket, thus maintaining the correct angular relationship with the jet.

#### *Adjustable jet and fixed (pre-set) needle*

The needle assembly is fitted to the socket in the air valve guide rod in a pre-set position and locked by a conventional locking screw. Its position should not be altered.

The jet orifice slides in a bore in the carburettor bridge and is spring-loaded downwards, similar to the assembly in the Series CD instrument. It is retained by a bush screwed into the threaded sleeve surrounding the jet, a shoulder and skid washer on the

jet orifice bearing on a seating in the bush. The bottom of the bush projects through the float chamber cover where it is sealed by an O-ring, and is castellated to accept a special adjusting tool. A shielding cap is clipped over the bottom of the bush.

### 4 Adjustable needle assembly

All units are fitted with fixed jets. Some units have pre-set spring-loaded (biased) needles; others have adjustable biased needles, fitted in conjunction with a special air valve.

The adjustable needle assembly consists of a metering needle held in a cylindrical brass holder.

The tubular holder is internally threaded at the top to accept the needle adjusting screw fitted in the air valve guide rod. The lower end is internally flanged to form a seating for a light, helical compression spring.

The needle is provided with an enlarged head and has a flexible washer fitted to a groove near the top. The needle is loaded towards the top of the holder by the spring acting on the underside of the head. It is retained by a pin fitted across the bore of the holder. The pin is not at a right angle to the centreline of the holder, but is inclined to it at a slight angle. The spring, pressing the head of the needle in contact with the pin, tilts the needle by a pre-determined amount in a certain direction (normally towards the carburettor inlet).

The needle type number is stamped on the shank and is revealed by pulling it out of the holder against the spring load.

The lower portion of the holder has a keyway cut in a particular position relative to the pin, which engages with the spring loaded retaining screw fitted in the air valve, thus maintaining the metering needle tilt in the correct direction.

The adjusting screw in the air valve guide rod is located by a shoulder beneath it and a spring steel retaining clip fitted above it. The screw is fitted with an O-ring on its diameter to seal it and provide friction locking, and has a hexagonal recess in the top to accept an adjusting tool (refer to Special Overhaul Procedures).

The screw is not removable.

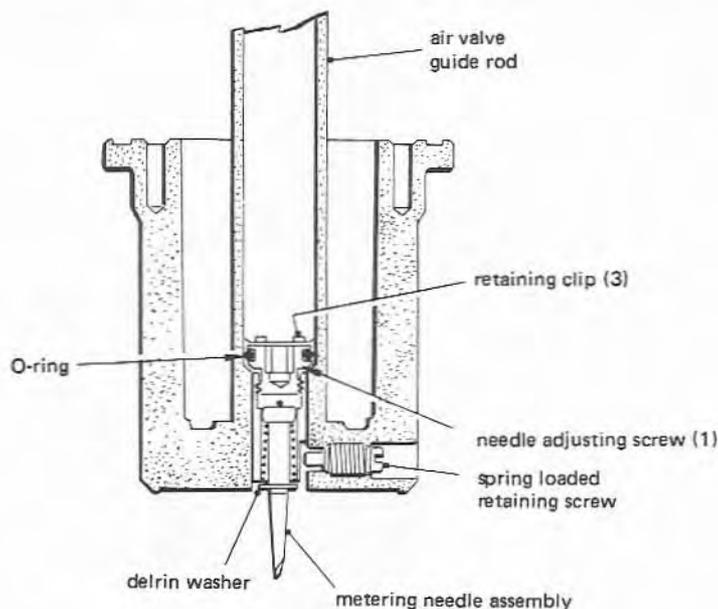


Fig. CDSE5 Adjustable metering needle assembly

5 Special overhaul procedures

1 Overhaul limitations

It is strongly recommended that overhaul of this unit is restricted to disassembly, cleaning and re-assembly. Damaged parts should be replaced (except for matched assemblies, as noted in Construction) and no attempt should be made to repair any item which has a regulating or metering function.

The unit, despite having the appearance of previous types is incomparably more sophisticated and may not be satisfactorily dealt with by the methods detailed in this manual. It has been specifically developed to meet the requirements of toxic emission regulations and is manufactured to far finer dimensional tolerances than previously employed.

A damaged unit may be restored to a serviceable condition by replacement of defective items but it is unlikely that the original performance, with regard to the extraordinary precision of emission control of which this unit is capable, will be restored.

Reconditioning of a generally worn unit is not feasible and it should be returned to the manufacturer for overhaul, or for replacement with a new unit.

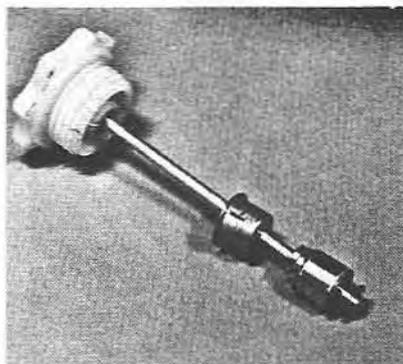
2 Refer to Part 1, Chapter 4 Overhaul

3 Replacement parts - Stromberg part numbers

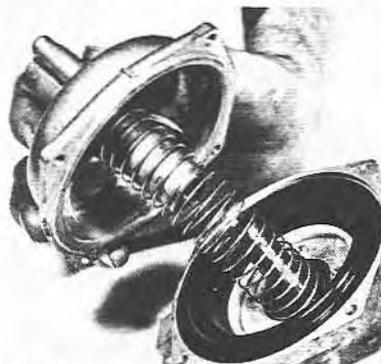
A Needle valve assembly complete with alternative washers.

Code Ref.	Part No.	Description
AY	B 20687	1.75 mm (filtered)
AZ	B 21344	2.00 mm (filtered)
ABA	B 22424	2.25 mm (filtered)

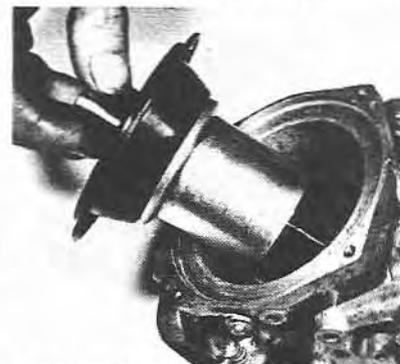
B Diaphragm



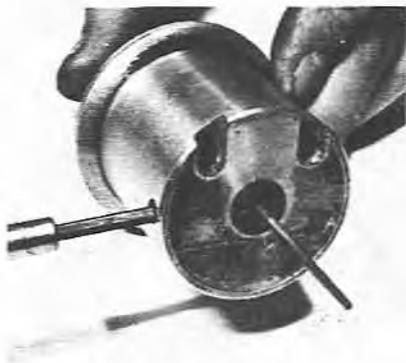
6.1 The damper rod complete, this time with a white plastic knob



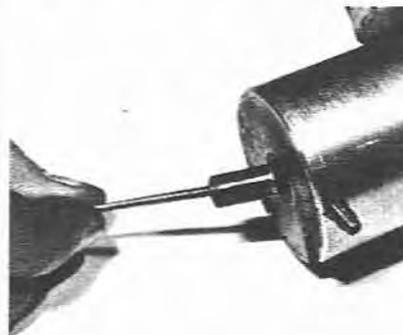
6.3 The cover and the spring should be lifted away carefully



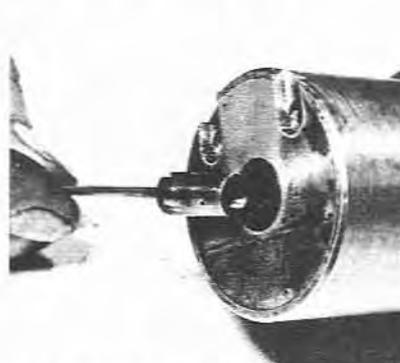
6.3a Do not forget to peel off the diaphragm from its locating lip



6.3b This time an allen key is necessary



6.3c A special screw is used on this example



6.3d Never use force to extract the needle

Part No.	Description
B 18175	150 Series CDSE (emission)
B 20924	150 Series CDSE
B 17421	175 Series CD-2SE
B 19420	175 Series CD-2SE

4 Gasket packs - Stromberg part numbers

Ref. No.	Description
245	150 Series CDSE
244	175 Series CD-2SE
242	175 Series CD-2SE (Volvo)

5 Hydraulic damper oil  
Can of Zenith Lube Oil part No. B 18562Z.

6 Disassembly

- 1 Unscrew and remove damper assembly. Do not disassemble at this stage. Insert the carburettor and drain the oil from the air valve guide rod reservoir.
- 2 Remove four Phillips-head screws and spring washers securing diaphragm chamber cover. Collect the brass identity tag and take care not to lose it. Discard spring washers.
- 3 Carefully remove the cover. If very tight, twist slightly to break the seal between it and the diaphragm. Remove the spring. Remove the air valve complete with metering needle, diaphragm, diaphragm former and retaining plate. Note that the needle is not co-axial with the air valve guide rod, but is biased to the carburettor inlet by the influence of a spring in the metering needle sub-assembly. Do not remove the spring loaded needle retaining screw. Insert a 0.125 in. A/F Allen key (or special tool

B 20379, refer to Special overhaul procedures) into the guide rod, engage in the adjuster, and turn counter-clockwise when the metering needle assembly will emerge from its socket. When further rotation of the Allen key does not produce movement of the needle, remove the needle locking screw and pull out the needle assembly.

4 Remove the four Phillips-head screws from the air valve, remove the steel diaphragm retaining plate, plastic diaphragm former and diaphragm. Note that diaphragm has a locating register on underside of periphery which engages in a slot in the recess in the body. It is therefore unnecessary to mark it for reassembly. There is a similar arrangement on the inner rim and air valve.

5 Remove nut from end of throttle spindle (temperature compensator side) using a  $\frac{1}{4}$  in. BSF spanner. Remove and discard internal star washer. Remove throttle interconnection lever (with adjusting screw and spring-loaded tappet). Do not disassemble at this stage.

6 Remove the nut from the other end (cold-start valve side of unit) of the spindle. Remove and discard the internal star washer. Remove large, plain washer (with bean-shaped hole) and throttle operating lever (with ball-joint and fork) complete with brass ferrule. Note that large diameter, thin walled flange of ferrule is fitted towards unit. Unhook the tail of the throttle return spring from the cast extension on the unit body (carrying the throttle stop screw). Remove the lever and spring. Note that the longer projecting end of throttle spindle is on the temperature compensator side of body.

7 Remove and discard the copper screws securing the throttle plate in the spindle. On a new unit these will be very tight and as the slots are not very deep they are easily damaged, making their removal difficult. Use a well-fitting screwdriver ( $\frac{1}{4}$  in. wide blade) with a properly ground blade, as shown.

Open the throttle and withdraw the plate from the slot in the spindle. Note that there are two small 'pips' on the face of the

throttle plate (facing outwards, below the spindle when the throttle is closed).

Using a very fine file (a magneto or contact breaker points file with  $\frac{5}{16}$  in. wide blade is suitable), remove burrs from around throttle plate screw holes to prevent damage to the bearings and seals as the spindle is withdrawn. Remove filings and withdraw spindle.

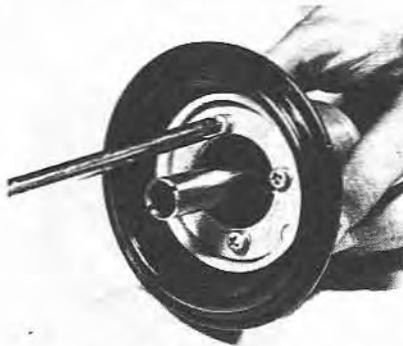
8 Remove the six screws and spring washers securing float chamber to unit body. Note that two screws are shorter than the remainder. Discard the spring washers. Remove the float chamber base. If tight, tap gently around the joint on the bolt bosses with a wooden or plastic handled screwdriver. Do not insert a screwdriver between the joint faces to lever it off. Take great care when removing the chamber base not to damage the float mechanism contained within. Remove and discard the gasket.

Units which have an adjustable metering needle assembly have a non-adjustable jet. No provision is made, therefore, for access to the jet from outside the unit, and the central hole in the base of the float chamber cover is accordingly sealed by a plastic plug, which has an O-ring fitted into an annular groove and a brass cap embellishment on the outside.

The top part of the plug is a thin-walled tube divided into eight segments by longitudinal slits. Four of the segments have external barbs. This feature enables the plug to be fitted to the float chamber cover from outside by simply pushing in, use being made of a standard cover. When the plug is home the barbs open, their lower faces abutting an internal flange in the cover and preventing its removal.

It is recommended that no attempt is made to remove this plug unless the O-ring is known to be leaking. To remove, the barbed tongues must be pressed inwards when the plug may be withdrawn from below.

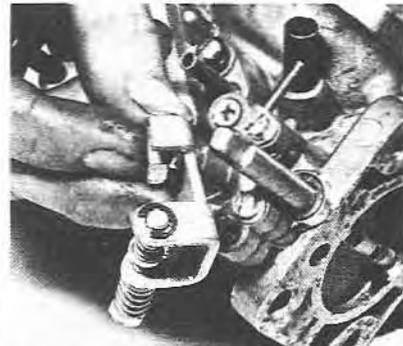
9 Remove the float assembly by prising float hinge pin out of the spring steel clip. Remove the hinge pin from the lever arm. Unscrew the inlet needle valve assembly using a well-fitting ring



6.4 Note the Phillips head screws on the diaphragm



6.4a The steel plate fixes onto the plastic plate



6.5 First remove the connections on one side ...

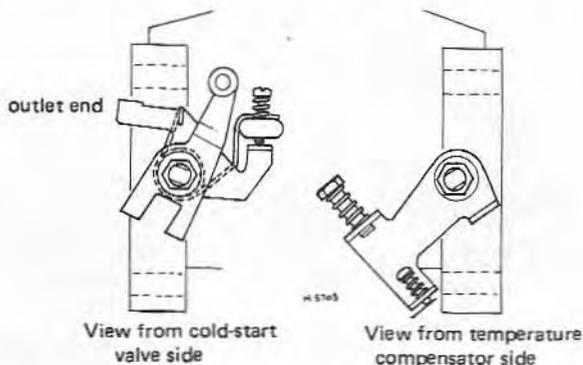
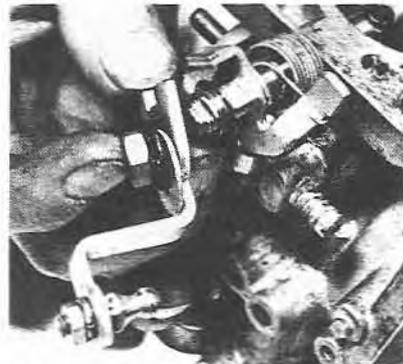


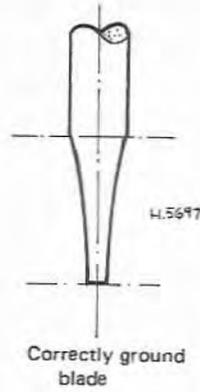
Fig. CDSE6 View of each end of the throttle spindle showing levers and springs



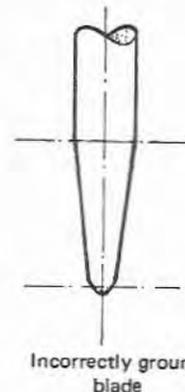
6.6 ... and then on the other side of the throttle spindle



6.6a Remove the lever arm with the spring together

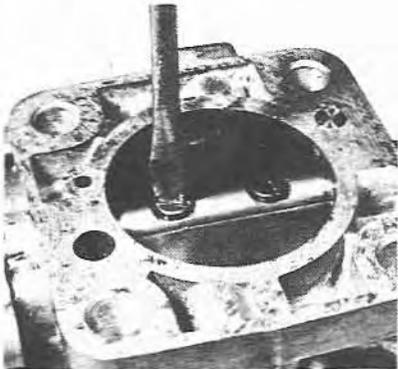


Correctly ground blade

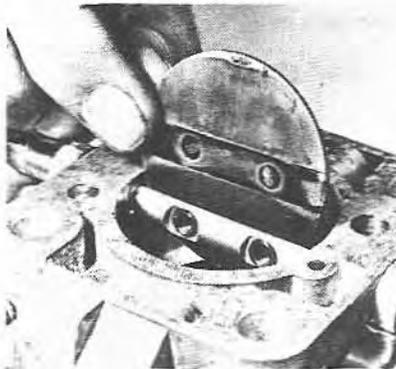


Incorrectly ground blade

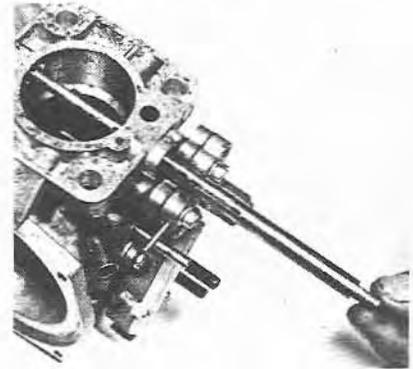
Fig. CDSE7 The right way to grind the screwdriver blade



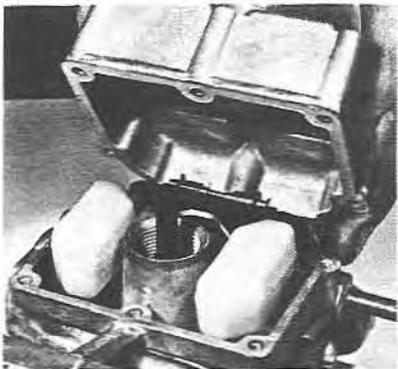
6.7 Take great care with the screws here



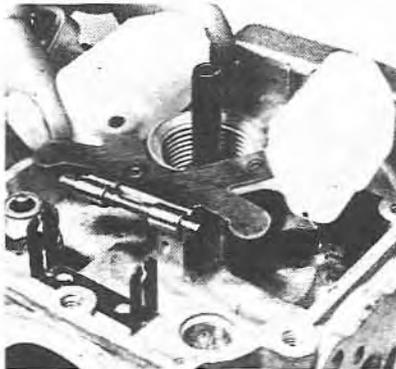
6.7a Note the difference in colour, showing some wear



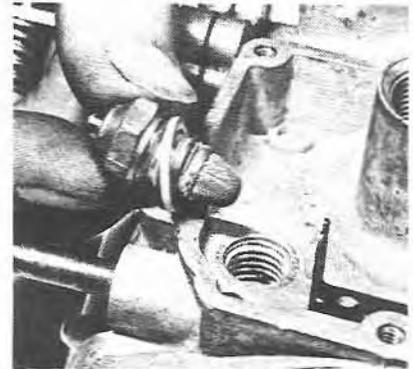
6.7b The spindle may not come out so simply



6.8 The jet has been removed to aid photography only



6.8a Note that the float spindle slots in



6.9 Make sure the gauze filter on the needle valve is clear

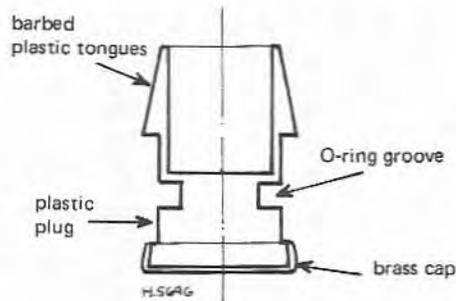


Fig. CDSE8 The plastic plug fitted to the float chamber cover of units with adjustable needles

spanner and take great care not to damage the adjacent float hinge pin bracket. Remove and discard the soft aluminium washer ensuring that a new one of the same thickness is available for re-assembly.

**Note:** Unless the temperature compensator assembly or the by-pass valve assembly is suspected of malfunction it is inadvisable to proceed with further disassembly. In the event of an unserviceable assembly, a complete new assembly must be obtained, appropriate for the particular application.

10 Remove round-head screws and internal star washers securing the temperature compensator assembly to the unit body, and remove assembly. Remove and discard the soft rubber sealing washers (one between the unit body and compensator, and one at the bottom of the counterbore in the unit body into which the spigot of the compensator fits). Do not disassemble the temperature compensator at this stage.

11 Remove the three cheese-head screws and spring washers securing the by-pass valve to the unit body. Discard the spring washers. Remove and discard the gasket. Hold the two parts of

the valve detail (body and plate) together and remove two countersunk-head Phillips screws. Remove and discard external star washers.

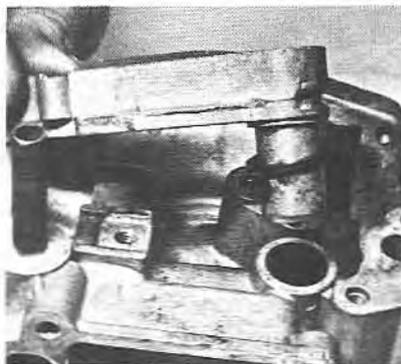
Remove the spring from the by-pass valve body. Remove the adjustable stop assembly. This consists of two parts; a threaded outer brass tube with a hexagonal flange at its outer end, and a screw fitted to it. Take care not to rotate the screw. Measure and record the protrusion of the screw tip from the end of the holder.

Remove and discard the gaskets (2 off) and remove flexible diaphragm trapped between them. Do not attempt to disassemble the diaphragm and valve seat.

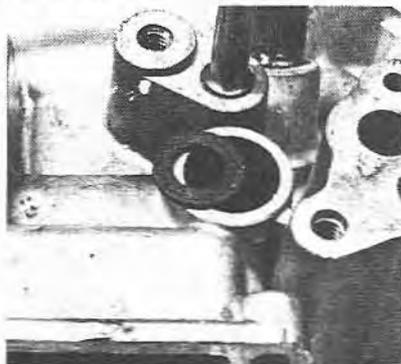
#### 12 Temperature compensator

Remove the two round-head screws and lift off the cover. Do not remove the Phillips-head screw securing the end of the bi-metal arm to the casting, and do not move the Nyloc (nylon insert) nut. Do not attempt any further disassembly of the temperature compensator.

13 Do not attempt any further disassembly of the unit.



6.10 We have taken off the plastic top for clarity



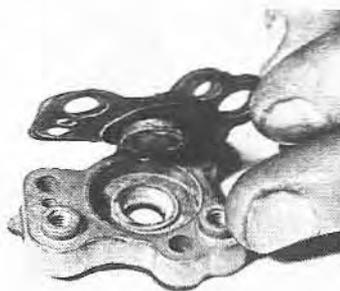
6.10a Note the felt washer



6.11 Note the positioning and the gasket



6.11a Note the strength of the spring once the cover is being removed



6.11b The correct positioning is obvious here



6.12 All the fixing screws are obvious here too. Never touch the nylon nut

#### 7 Special tool for adjustable needles

For tuning carburetors with non-adjustable jets and adjustable metering needles, special tool B 20379Z is required. The tool consists of tubular sleeve containing an Allen key which projects from both top and bottom. The top of the sleeve has a pair of wings and the bottom has a locating peg.

In use, the reduced diameter nose of the tool is inserted in the hollow air valve guide rod (damper assembly removed from carburettor) and the locating peg engaged in the machined slot at the top of the rod. The Allen key is pushed down and engages with the hexagonal socket in the needle adjusting screw (refer to Construction, of this section of the manual, for a detailed description of the needle assembly).

Rotation of the Allen key will raise or lower the needle, the outer sleeve being firmly held to prevent rotation of the air valve and damage to the diaphragm.

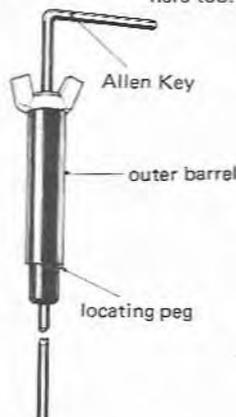


Fig. CDSE9 The special tool for adjustable needles

**8 Special tool for adjustable jets**

For tuning carburetors with non-adjustable metering needles and adjustable jets, special tool B 24667 is required.

**9 Assembly**

*Note:* Ensure that all parts are clean and dry before assembly, unless otherwise noted.

*Temperature compensator sub-assembly*

- 1 Fit the plastic cover with two round-head screws.
- 2 Fit a new rubber sealing washer into the counterbore in the unit body and another to the temperature compensator valve housing.
- 3 Fit the temperature compensator unit to body with two round-head screws and two new internal star washers.

*By-pass valve sub-assembly*

- 1 Fit the screw into the holder and adjust to the position found on disassembly. Insert into the cover.
- 2 Fit two gaskets (one either side of the diaphragm), and the diaphragm complete with valve seat to the valve port block (fits over three spigots drilled and tapped for countersunk-head Phillips screws).
- 3 Fit spring into cover, engage outer end in brass cup and hold assembly together. Secure with three countersunk-head Phillips screws and new external star washers.
- 4 Fit a new gasket and secure the by-pass valve to the unit body with cheese-head screws and new spring washers.

*Main assembly*

- 1 Invert the carburettor. Fit a new soft aluminium washer to

the inlet needle valve assembly and screw into its tapped hole in the underside of the body. Fit the hinge pin to the float assembly and spring into position in the spring steel clip, taking care not to damage either part. Note that the float lever arm should appear uppermost with the carburettor inverted. Check that the highest point of the float above the face of the body with the inlet needle valve closed is 0.725 to 0.787 in. (16 to 17 mm), and that the tag on the arm contacts the needle at a right angle. Check that the float hinges freely on its pin.

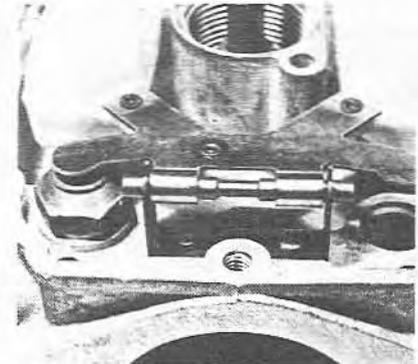
- 2 If the plastic float chamber plug has been removed, fit a new O-ring to the groove and push the plug into the hole until all the barbed tongues are open on the inside of the cover.
- 3 Fit a new gasket (do not use gasket cement) to the float chamber base and secure the base with six screws and new spring washers. Tighten the screws progressively and evenly, working in the sequence shown.
- 4 Fit the throttle spindle into the bearings in the body with the longer extension of spindle projecting from the temperature compensator side of the body. Position the spindle in the valve closed position (tapped holes away from outlet). Rotate the spindle 90° counter-clockwise (viewed from by-pass valve side) and insert the throttle plate. Close the throttle and allow the plate to centralize in the bore; if there is a gap around the edge of the plate adjust so that it is even throughout its circumference. Fit two new copper retaining screws, tighten and expand the ends by striking with a long centre-punch inserted through the carburettor bore. Support the heads of the screws during this operation to prevent bending the spindle.
- 5 Hook the cranked end of the throttle return spring over the top of the lever and slide the spring and lever over the spindle and bearing housing. Wind the bent tail of the spring 180° counter-clockwise and hook over the cast extension on the unit body (carrying the throttle stop screw). Fit the brass ferrule to the throttle spindle (large, thin flange abutting lever) and fit the throttle operating lever (with fork and ball joint). Engage the



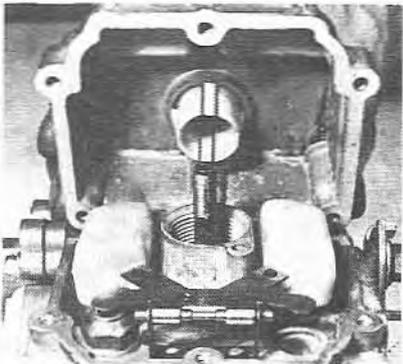
9.4 By-pass valve: watch the cleanliness here



9.1 Main assembly: Do not ignore the instruction



9.1a Main assembly: Note the proper position



9.3 Main assembly: Always make sure it is as clean as this

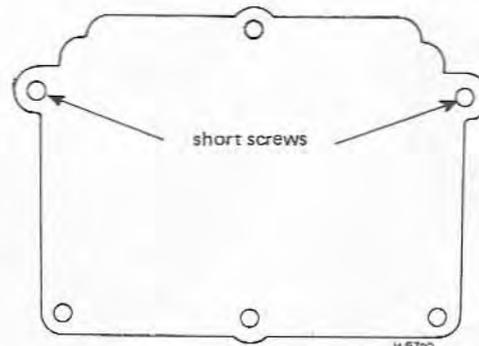
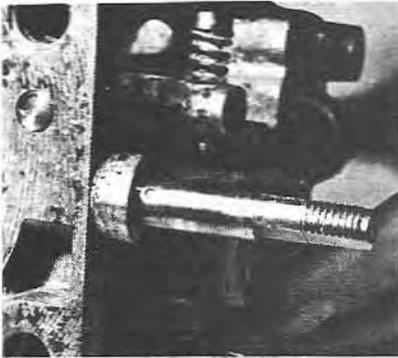
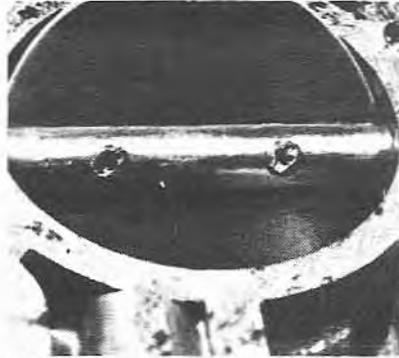


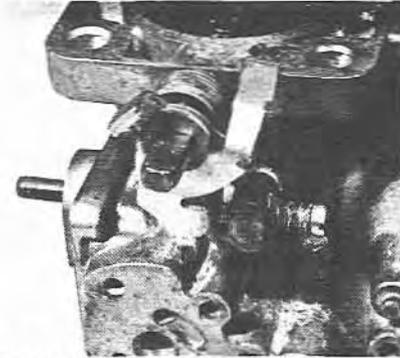
Fig. CDSE10 View of the underside of the float chamber, showing the order of tightening of the fixing screws



9.4 Main assembly: this is the spindle sticking through the correct amount



9.4a Main assembly: the butterfly screws have been bent over



9.5 Main assembly: Carefully note the exact positions

tongue of the first lever in the fork. Fit the large plain washer, new internal star washer and nut. Tighten the nut.

6 Fit the throttle interconnection lever (when applicable), new internal star washer and nut. Tighten the nut.

7 Fit the diaphragm to air valve ensuring that the locating tongue engages with the slot and that the bead sits correctly in the groove in the piston.

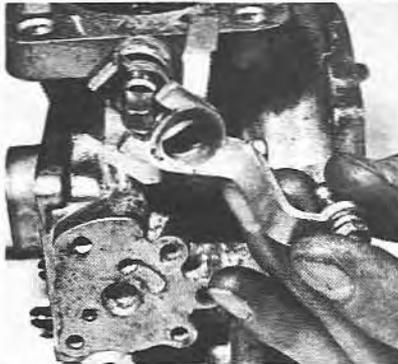
Fit the plastic diaphragm former, and steel retaining plate, ensuring that the cut-outs engage in the semi-circular projections in former. Fit and progressively tighten the four Phillips-head screws, checking that the diaphragm remains in its correct position.

8 Press the metering needle assembly into the socket in the air valve. Align the keyway with the centre-line of the needle locking screw, and insert the screw. Check that the spring-loaded pin in the end of the screw enters the keyway. If necessary, insert a 1/8 in. A/F Allen key (or special tool B 20379, refer to Special overhaul procedures) into the hollow air valve guide rod, locate

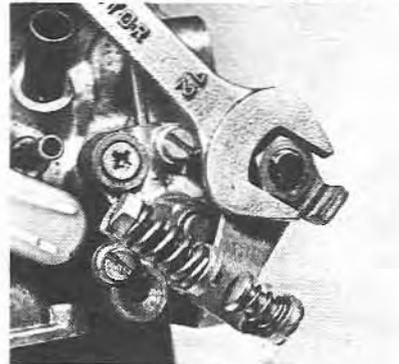
in the adjusting screw, and turn clockwise to draw the needle assembly into its socket until the pin will engage the keyway. Prevent the needle holder from rotating. When the pin is engaged in the keyway and the needle locking screw is fully tightened, draw the needle into the air valve by clockwise rotation of the adjusting screw until the washer is flush with underside of the air valve.

9 Carefully fit the air valve, diaphragm and needle assembly into the body, ensuring that the tongue on the underside of the diaphragm periphery engages with the recess in the body, and that the needle enters the jet.

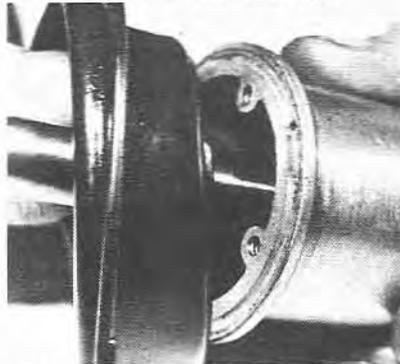
10 Fit the air valve return spring, lightly oil (SAE 20) the guide rod and fit the cover with the cast boss on the side of the guide rod bearing extension towards the inlet end of the body. Secure with four Phillips-head screws and spring washers, not forgetting to fit the specification plate under one of them. Fit the damper cap with a new fibre washer (not always fitted) and do not overtighten. Do not fill the dashpot with oil at this stage.



9.5a Main assembly: For clarity other parts of the carburetor body are missing



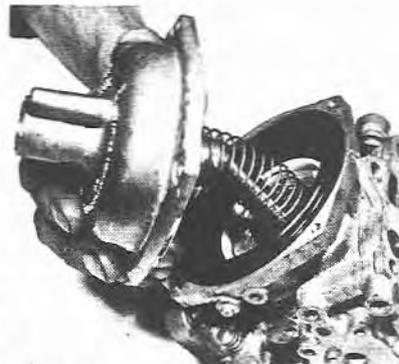
9.6 Main assembly: Note the positions of the springs



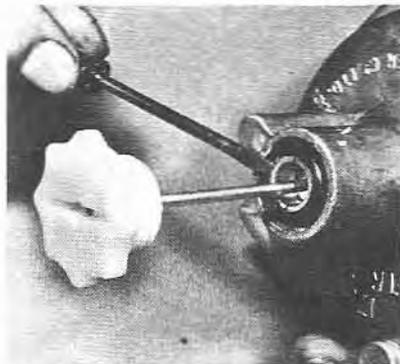
9.7 Main assembly: Cleanliness and careful positioning are essential



9.9 Main assembly: This too has a locating lip



9.10 Main assembly: Now the spring and cap



9.10a Main assembly: Finally the locating and fixing of the damper rod

## 10 Tuning

*Note:* Refer to Part 1, Chapter 3 for notes on tuning.

The tuning of emission control carburetors is limited to adjustment of the following:

- 1 Idle speed
- 2 Fast-idle speed
- 3 Idle speed exhaust emission

The idle speed and fast-idle speed are adjusted by means of the screws on the external linkages.

### Set idle speed

- 1 Start the engine and warm up to normal working temperature.
- 2 Check that the fast-idle screw is clear of the fast-idle cam with cold-start valve OFF.
- 3 Adjust the throttle stop screw to give the desired idle speed.

### Set fast-idle screw

Set the fast-idle screw in accordance with instructions given by the vehicle manufacturer for particular application, or if no information available, adjust to give 0.030 in. (0.8 mm) clearance between the head of the screw and the cam profile, with the cold-start valve fully OFF.

### Lock screws and fill damper

Without disturbing the adjusting screw positions, lock the screws with locknuts, where provided. If there is any doubt regarding the efficiency of the coil springs used for locking, replace them or discard and use locknuts.

Fill the hollow air valve guide rod to within 0.25 in. (6 mm) of the top with Zenith Lube Oil. Fit the damper assembly and do not overtighten.

The idle speed exhaust emission is adjusted by the idle trimming screw (refer to Construction - Idle trimming screw) in

conjunction with an exhaust gas analyzer to measure the carbon monoxide (CO) emission. If this equipment is not available and the operator is not concerned about exhaust emission, the screw may be adjusted to give best 'driveability', turning clockwise to enrich and counter-clockwise to weaken. Note that there may be no detectable difference to the car.

Should idling quality deteriorate during the running-in period, the screw should be turned clockwise slowly until smooth idling is just restored.

The screw should be fully screwed in on a carburettor that is to be fitted to a well-worn engine. Do not overtighten the screw, and lock securely with the locknut after any adjustment.

*Idling mixture adjustment* (units fitted with adjustable metering needles)

- 1 Refer to Construction - Adjustable needle assembly.
- 2 Refer to Special overhaul procedures - 5 Special tool

### Procedure

- 1 Remove the air valve and metering needle assembly (refer to Disassembly, paragraphs 1 to 3.)
- 2 Using an 1/8 in. A/F Allen key or special tool B 20379Z adjust the needle height so that the shoulder on the underside of the Delrin washer (where fitted) is flush with the bottom of the guide rod.
- 3 Refit the air valve and metering needle assembly, spring and cover (refer to Assembly, paragraphs 9 and 10). Do not fit the damper.
- 4 Start the engine and warm-up to normal working temperature. Reduce engine speed to idling.
- 5 Insert the outer barrel of the special tool into the air valve guide rod and locate the peg in the machined slot. Push down the Allen key at its centre to engage with the hexagonal recess in the needle adjusting screw.
- 6 With the outer barrel held to prevent rotation of the air valve

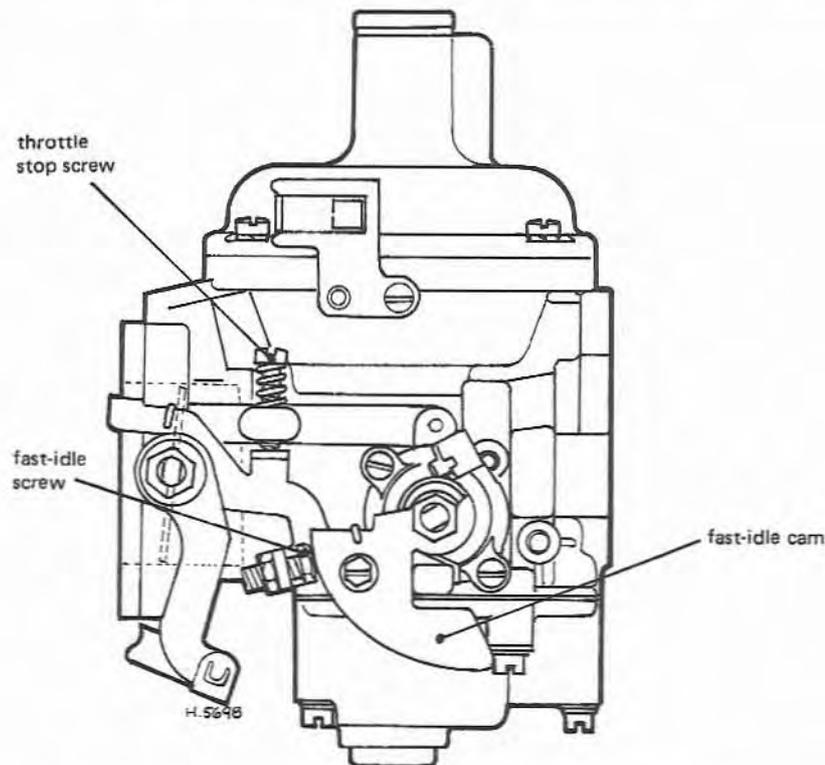


Fig. CDSE11 A side elevation of the unit showing the adjustment facilities

assembly and consequent damage to the diaphragm, the Allen key may be turned a maximum of one turn in either direction to set optimum idle quality (smooth, even running with colourless exhaust and no 'hunting').

Turning clockwise raises the needle and enriches the mixture, turning counter-clockwise lowers the needle and weakens the mixture.

If the engine tends to stall while making adjustment, open up to approximately 2000 rpm for 10 seconds. This will clear the manifold walls of any excess fuel.

**CAUTION:** On some versions of CDS and CDSE carburetors fitted with adjustable needles it is possible to turn the adjusting screw so far counter-clockwise that the needle assembly disengages from the screw. Do not exceed one turn of the screw in this direction.

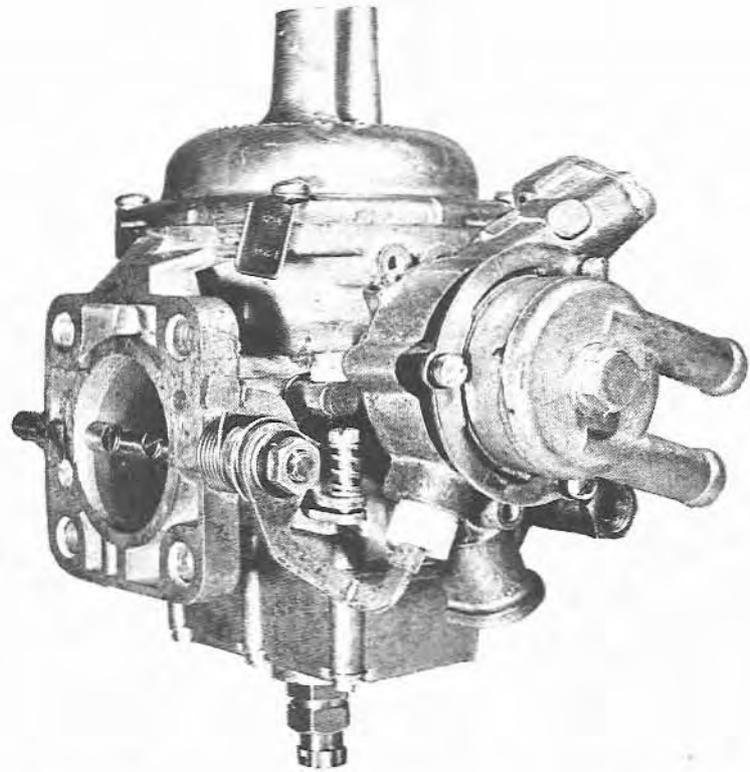
If this range of adjustment is insufficient to obtain the correct idle quality, the fault is probably outside the carburettor and the complete carburation system should be examined as detailed in Part 1.

*Idling mixture adjustment* (units fitted with adjustable jets)

- 1 Refer to Construction.
- 2 Refer to Special overhaul procedures - 6 Special tool

#### Procedure

- 1 Remove the air valve and metering needle assembly (refer to Disassembly, paragraphs 1 to 3).
  - 2 Check that the shoulder of the needle is level with the periphery of the air valve or set as necessary.
  - 3 Refit the air valve and metering needle assembly, spring and cover (refer to Assembly, paragraphs 9 and 10). Fit the damper.
  - 4 Start the engine and warm-up to normal working temperature. Reduce engine speed to idling.
  - 5 Spring off the shielding cap fitted over the base of the bush and apply the special tool to the castellated end of the bush.
  - 6 Rotate the tool to set optimum idle quality (smooth, even running with colourless exhaust and no 'hunting'). Turning clockwise (viewed from above) lowers the jet and enriches the mixture, turning counter-clockwise raises the jet and weakens the mixture.
- CAUTION:** In the full weak position the bush will lock-up against the carburettor body, and in the full rich position a shoulder bears on the upper face of the boss in the float chamber cover. At the extremes of travel, therefore, do not apply excessive torque to the adjusting bush as the threads may be damaged or the float chamber cover casting may be overstressed and cracked.
- 7 The effect of this adjustment is limited and if correct idle quality cannot be obtained the fault is probably in other areas of the carburettor, or outside it. The complete carburation system should be examined as detailed in Part 1.



## Part 3 Zenith Stromberg carburetors

### Chapter 16 Series CDST and CDSET

#### Contents

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Construction .....	2	Assembly .....	6
Operation .....	3	Fault finding .....	7
Disassembly .....	4		

#### 1 Introduction

The Series CDST and CDSET carburetors are further developments of the basic CD instruments, with the addition of a thermostatically controlled automatic starter ('choke'). This device relieves the driver from having to exercise any judgement regarding the use of a manual choke, and apart from its action being initiated by the driver it is entirely automatic in operation.

The unit is available with or without certain emission control features as indicated by the code letter E.

The example used to illustrate this test is from a Vauxhall Firenza 2300 (carburettor reference 3588LH).

#### 2 Construction

The main elements of the carburettor are the same as the Series CDS, or CDSE, full descriptions of which are given in the appropriate sections of this book.

The Autostarter consists of a cylindrical body containing a

metering needle valve assembly, a pneumatic piston assembly, and a cam and lever system. The body is closed by a finned aluminium block which is separated from the body by a heat insulator and fitted with a cover, which forms a chamber.

The assembly is secured to the carburettor body by three screws and a gasket is fitted to prevent leakage around the interface parts.

The die-cast aluminium body is drum-shaped, closed at the back, open at the front and has three radial projections being housings for sub-assemblies. A pin fitted to the centre of the body provides a pivot for a lever assembly consisting of a steel lever and a brass bush. A spade-shaped projection on the lever engages a machined recess in the end of a piston rod, a drive peg on another projection at approximately 120° from the first engages a similar recess at the end of a metering needle, and a tongue diametrically opposite the second extension is bent upwards at 90° (parallel with the axis of the pin) to form an arm. The projecting brass bush at the centre of the lever forms a bearing, a spacer, and a register for a light torsion spring fitted over it.

A stepped cam is fitted on the pivot pin abutting the top of the lever bush. A radial arm on the cam is held in contact with

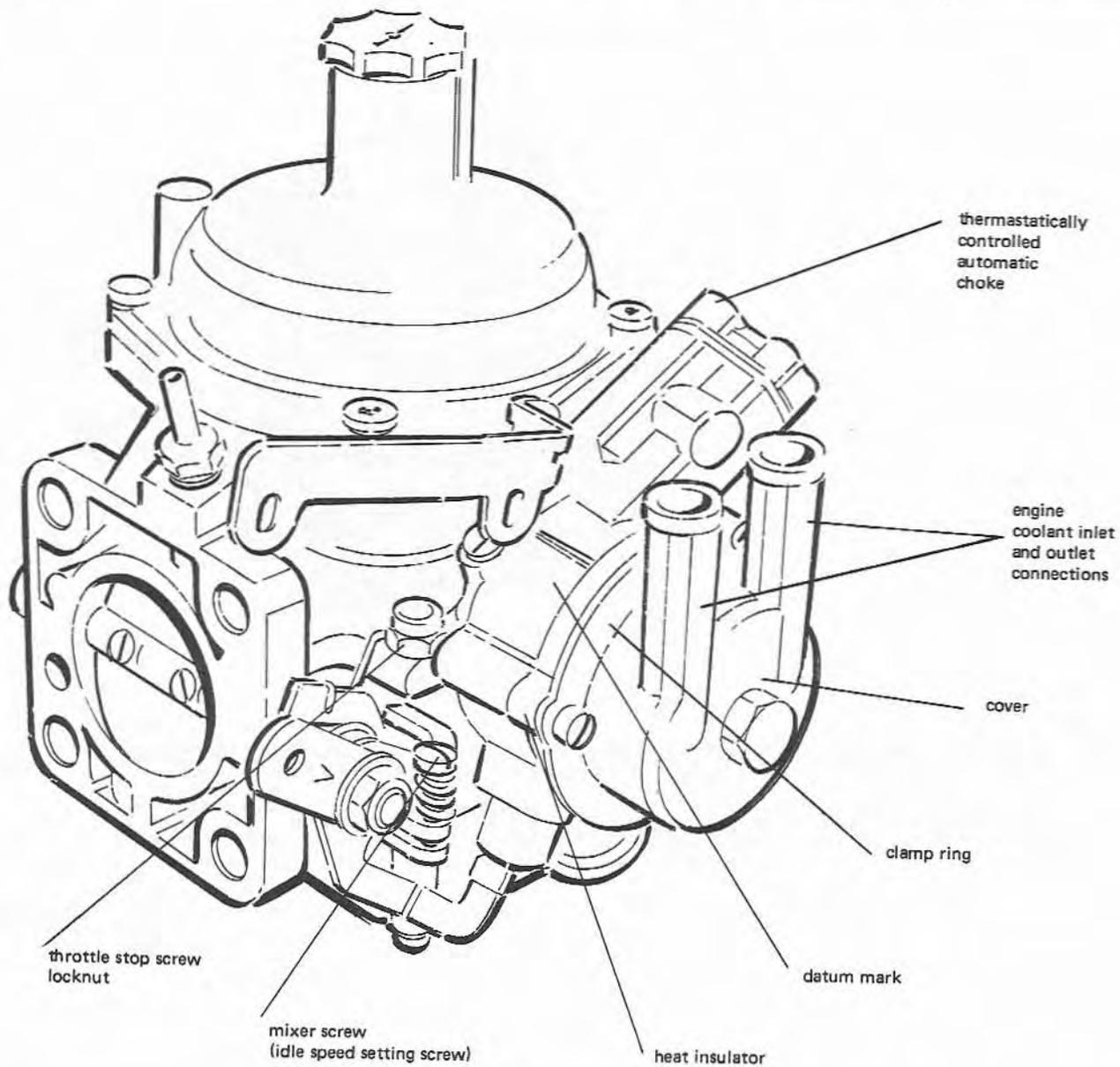


Fig. CDST2 The major external components of the Series CDST carburettor

the lever arm by the torsion spring which loads the two components (lever and cam) in contra-rotation.

The assembly is retained on the pivot pin by a circlip fitted to a groove at the end.

The upper extension of the body is machined to form a cylinder for a vacuum kick piston assembly. The bore is closed by a cover secured by screws and the inner end of the bore is fitted with a pressed-in brass guide. The cylinder is in communication with the induction manifold via a passage. The piston assembly consists of an aluminium piston to which is loosely attached a brass piston rod. This articulated connection enables the piston to align itself in the bore, and the piston rod to align itself in the pressed-in brass guide. A compression spring loads the piston assembly outwards, to the top of the bore.

A lower extension accommodates a pressed-in brass valve sleeve in which slides a metering needle. The valve sleeve is axially

drilled and cross-drilled to provide fuel-flow parts, a small diameter drilling in the centre forms a flow metering and regulating orifice into which the tip of the needle enters. A shoulder at the top of the tapered portion of the needle is grooved and fitted with a flexible O-ring.

An adjacent extension accommodates a spring-loaded fast-idle pin, the inner end of which bears upon the profile of the stepped cam. The spring loads the pin outwards, out of engagement with the cam. A throttle spindle lever extension (on main carburettor) bears on an external button at the end of the pin to overcome the spring pre-load and press the pin into engagement with the cam.

A non-metallic heat insulator locates in a peripheral recess in the body, the extended arm on the lever projecting through a circumferential slot and engaging in a rectangular loop formed at the end of a temperature sensitive coil attached to the back of a

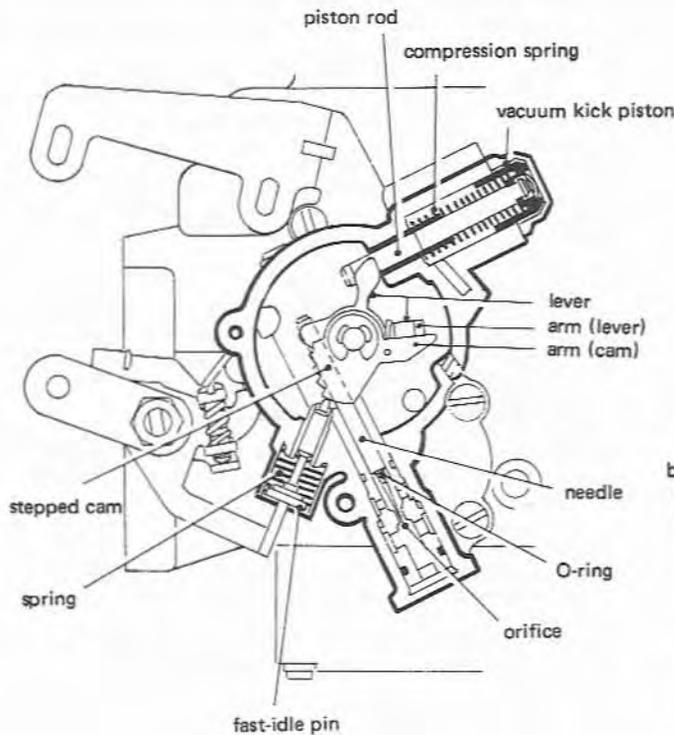


Fig. CDST3 Side cross-section of the thermostatically controlled automatic starter

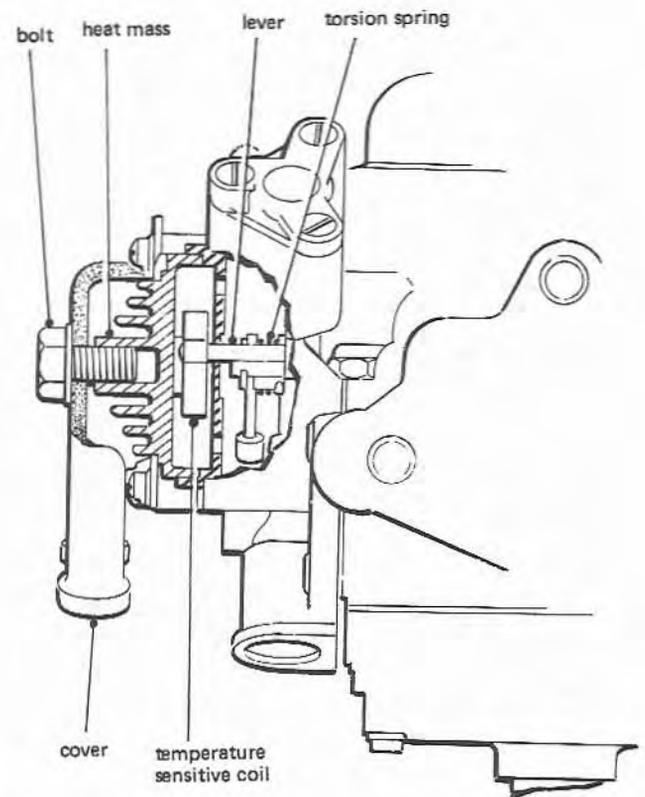


Fig. CDST4 Another cross-sectional view of the automatic starter

finned aluminium heat mass. The heat mass locates in a recess in the heat insulator, the assembly being secured to the body by a clamp ring and three screws. The heat mass closes the housing in the body containing the mechanisms.

An aluminium cover with inlet and outlet connections for engine coolant is fitted to the heat mass by a central bolt screwed into a tapped hole in the heat mass. A sealing ring fitted to the locating spigot in the heat mass and a soft aluminium washer under the bolt head render the assembly water-tight.

### 3 Operation

With the engine cold the temperature sensitive coil applies a clockwise torque to the lever arm according to its thermal/torsion spring operating characteristics. The lever is restrained in its

position as the arm bears on the cam arm and the cam is held by the fast-idle pin. Depression of the vehicle's accelerator pedal will open the carburettor throttle releasing the load on the button at the end of the fast-idle pin and allowing it to move out of engagement with the cam by the action of the spring. The cam is therefore freed and the temperature sensitive coil rotates the lever and cam (arms still in contact due to the torsion spring) fully clockwise withdrawing the metering needle from the orifice and allowing the vacuum kick piston to rise to the top of its stroke under the influence of the piston compression spring. When the accelerator pedal is released, the carburettor throttle will be held open by the fast-idle pin in a position determined by the height of the highest step above the cam base circle.

The Autostarter has therefore automatically set itself in a position to supply maximum additional fuel (by the withdrawal of the metering needle from the orifice) and to provide the correct

amount of additional throttle opening (due to the throttle being held open by the fast-idle pin resting on an appropriate step on the cam) according to the engine coolant temperature.

The only action by the driver has been a momentary depression of the accelerator to release the mechanism. Note that if the accelerator were depressed when the engine was already at or near normal temperature, the temperature sensitive coil would not rotate the mechanism and no 'choke' effects would be produced. The device is therefore foolproof, and the common mistake of using the choke to start a hot engine is eliminated.

The engine may now be turned over by the starter motor, when it should fire and run at a fast-idle speed, without further operation of any control by the driver.

With the engine running the depression generated in the induction manifold is sensed in the vacuum kick piston cylinder, drawing the piston down the bore against the compression spring load, to a position determined by the magnitude of the depression and the spring rate. When the inner face (nearest the piston) of the machined flat on the piston rod contacts the spade-shaped projection on the lever, the lever will be rotated counter-clockwise and the metering needle will enter the orifice, reducing the fuel supply and weakening the mixture.

The vacuum kick piston assembly thus provides for immediate reduction of the mixture strength when the engine fires, preventing over-dosing. When the engine is stationary the spring load, acting on the underside of the piston which is connected to the lever through the rod, augments the clockwise torque applied by the temperature sensitive coil and withdraws the needle further from the orifice, and aligns a higher step on the cam with the fast-idle pin, than if they were under the influence of the coil only.

As the engine warms up, the temperature sensitive coil rotates the lever counter-clockwise progressively closing the orifice and reducing the degree of mixture enrichment until, at normal working temperature, the O-ring on the needle seals the orifice and shuts off the fuel supply. Note that while the lever rotates under the influence of the coil *the stepped cam will remain in its initial position unless the accelerator is depressed* to release the fast-idle pin, and hence the cam. An unnecessarily high idle speed may result, therefore, unless the accelerator is periodically depressed during the warm-up period. As this procedure seems natural to the majority of motorists, this slight shortening in the performance may never be realised. If the vehicle is driven off straight away after starting without waiting to warm-up (and this seems customary as current practice) the fast-idle pin will of course, be more or less permanently out of engagement with the cam and the cam will remain in contact with the lever arm under the influence of the torsion spring and assume its correct position according to the prevailing temperature.

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#### 4 Disassembly

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As the carburettor is basically a Series CDS unit with the addition of the thermostatic starter no details for disassembly of the main unit will be given, this being a duplication of the instructions given previously. The Autostarter is a separate sub-assembly, attached to the unit body by screws. It may therefore be detached for replacement or for cleaning and servicing in isolation, without disturbing the remainder of the unit except as noted below.

#### Replacement of the Autostarter

**Note:** Before removing the Autostarter ensure that the following parts are available.

- 1 A replacement Autostarter. This must be the same or approved alternative part number. The part number is stamped on the mounting face between two of the attachment screws.
- 2 A new throttle stop screw and locknut.
- 3 A new gasket.

#### Removal of unserviceable Autostarter

- 1 With the carburettor removed from the engine, drain off the petrol from the float chamber.
- 2 Open the throttle sufficiently to keep the fast-idle lever out of contact with the Autostarter. Keep it open by jamming a small piece of soft wood between the throttle disc and the bore (a matchstick is ideal).
- 3 Remove the three copper-plated screws securing the Autostarter assembly to the body, remove the Autostarter, remove and discard the gasket and the throttle stop screw and locking nut.

#### Fitting replacement Autostarter

- 1 Clean the mounting face of the unit body with a sharp razor blade. Ensure that there is no gasket material adhering to it.
- 2 Remove the central bolt, washer, cover and sealing ring from the new Autostarter ( $\frac{1}{2}$  in A/F spanner).
- 3 Remove the three screws and spring washers securing the clamp ring and remove the ring.
- 4 Carefully remove the finned aluminium heat mass taking care not to strain the temperature sensitive coil attached to it. Remove the heat insulator.
- 5 Fit a new gasket to the carburettor body and fit the new Autostarter with the three countersunk-head copper-plated screws. Do not use any jointing compound on the gasket. Tighten the three screw progressively to 40 to 45 lb f in (46 to 52 kg f cm).
- 6 Follow the instructions given in Assembly, paragraph 9 onwards for completion of assembly and unit setting.

#### Dismantling the Autostarter

- 1 Remove the central bolt, washer, cover and sealing ring. Discard the washer and sealing ring.
- 2 Remove the three screws and spring washers securing the clamp ring and remove the ring. Discard the spring washers.
- 3 Carefully remove the finned aluminium heat mass taking care not to strain the temperature sensitive coil attached to it. Remove the heat insulator.
- 4 Remove the circlip from the pivot pin. Take care not to damage the tail of the light torsion spring which is located in a hole in the stepped cam.
- 5 Lift off the stepped cam taking care not to damage the spring.
- 6 Remove the spring noting that the other tail is fitted above the arm of the lever.
- 7 Rotate the lever counter-clockwise to its limit. Hold the vacuum kick piston rod in its extended position with a small screwdriver to release the load on the lever, and withdraw the lever from the pivot pin. Allow the piston rod to return.
- 8 Unscrew the brass plug at the top of the housing, invert the unit and withdraw the metering needle.
- 9 Restrain the vacuum kick piston cylinder cover plate, remove the three Phillips-head countersunk screws and remove the plate. Take care that the spring loaded assembly inside is not ejected and damaged. Remove and discard gasket.
- 10 Remove the piston and rod assembly and the spring.
- 11 Remove the brass nut retaining the pivot pin ( $\frac{5}{16}$  in A/F spanner). Remove and discard the star washer. Press out the pivot pin.
- 12 No further disassembly is practicable. The brass bush housing the fast-idle pin, the valve sleeve and the piston rod guide are tight press fits in the body.

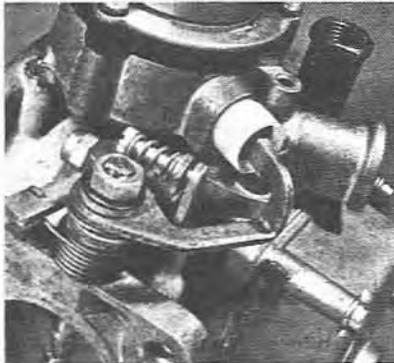
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#### 5 Overhaul

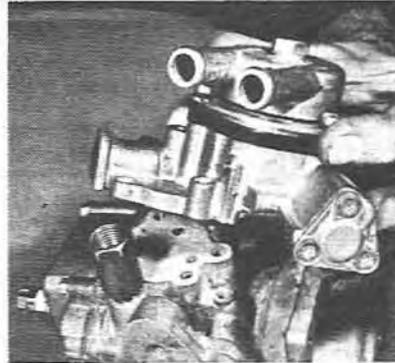
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- 1 For overhaul of the main carburettor refer to Part 1, Chapter 4, - Overhaul, and to Series CDS or CDSE as appropriate in Part 3 of this manual.

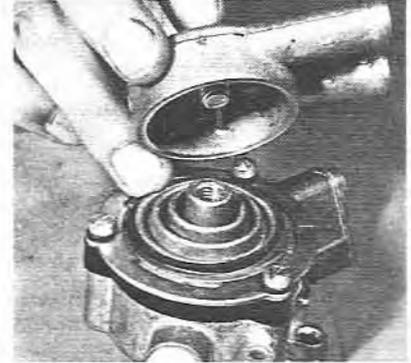
Overhaul of the Autostarter is not recommended. The components are very small and delicate and manufactured to close tolerances. The performance of the unit is easily upset by dirt and excessive clearances (vacuum kick piston/cylinder, for example). The following inspection and suggested repair



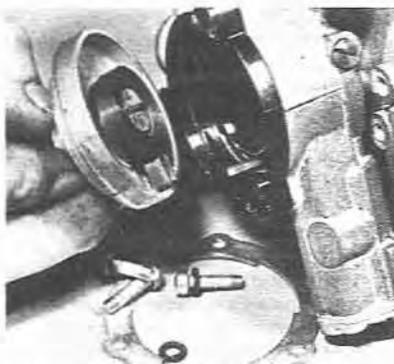
4.2 Removal: Keep out the fast idle lever from the Autostarter



4.3 Removal: Do not dismantle the unit on the carburettor



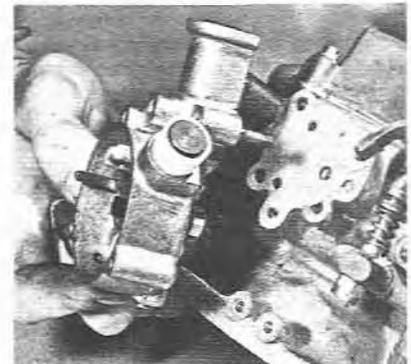
4.1 Fitting: remove the top first before anything else



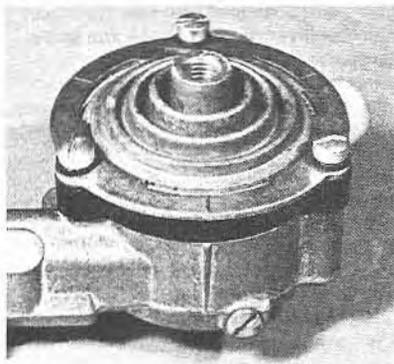
4.3 Fitting: Take special care with the components



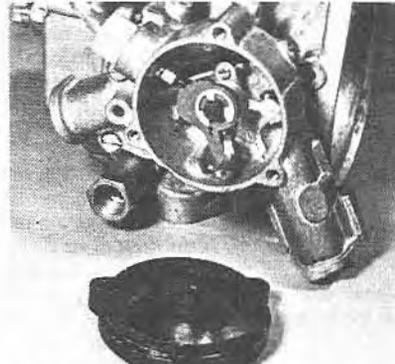
4.4 Fitting: Note the spring position



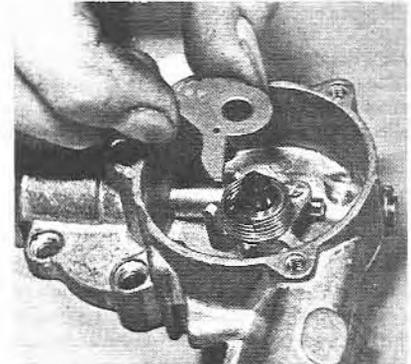
4.5 Fitting: Always use a new gasket



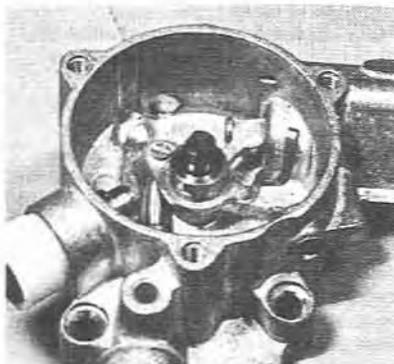
4.1 Dismantling: Clean off each component as it is dismantled



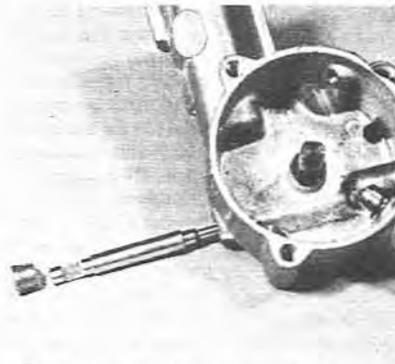
4.4 Dismantling: Record the position of the components



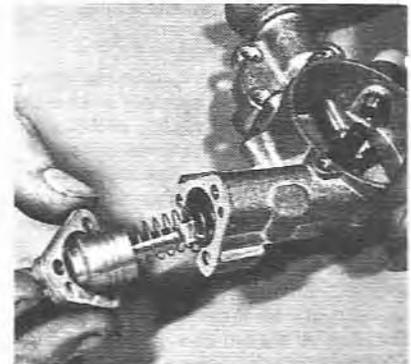
4.5 Dismantling: Note the catch hole for the spring end



4.7 Dismantling: Again clean and check all the components



4.8 Dismantling: This has been laid out as it would fit in the body



4.9 Dismantling: Take great care with that spring

procedures should only be employed if a new unit is not available.

## 2 Replacement Parts

Needle valve assemblies and diaphragms - as for appropriate size CDS or CDSE carburettor.

## 3 Gasket Packs

As for appropriate size CDS or CDSE carburettor. A gasket pack Stromberg ref. No. 246 will be required for the Autostarter.

## Cover

Inspect for corrosion, particularly inside the cover and the stub pipes. Clean out by scraping, wash out with petrol and blow through pipes to ensure that they are not obstructed.

Check that the sealing ring groove and raised boss on outside of cover are undamaged, or leaks may occur here.

## Heat Mass

Do not attempt to separate the temperature sensitive coil from the aluminium die-casting. Clean very carefully to prevent damage to the coil. A hard toothbrush is suitable for removing deposits and corrosion from between the fins of the heat mass.

## Body

Wash in petrol, allow to dry and blow through all openings, ports and passages with compressed air (from a tyre pump) to ensure that they are unobstructed.

Remove all traces of gasket material from the unit mounting face and the end of the vacuum kick piston cylinder with a sharp razor blade.

Check the integrity of the threads in all tapped holes. Stripped threads in this component will probably entail scrapping it, as it is not feasible to reclaim threads by fitting inserts, due to the small screw boss wall thickness (cover screws).

Corrosion of this part should be minimal as it is not in contact with the coolant as the cover and heat mass are.

When removing external corrosion, however, care should be taken not to erase the datum line on the top of the housing.

## Heat insulation

Check for cracks, particularly around bolt bosses and on rim. Damage may be repaired with Araldite if a new part is not available. Do not erase the datum line on the rim.

## Springs

### Vacuum piston return spring

Check for corrosion, bowing of spring and flattening of coils. Do not attempt to repair a damaged spring as it has a critical influence on the operation of the Autostarter.

### Torsion spring

Check for corrosion. Check for distortion, particularly the alignment of the tails which should be parallel and in line with each other. Replace a damaged spring.

### Vacuum piston assembly

Clean all dirt from the grooves on the piston. Do not use abrasives. Fit the piston assembly to its cylinder in the starter body. Check that it slides freely under its own weight, and that when held at the top of its travel (piston rod vertical, piston uppermost) and released with a thumb covering the end of the cylinder, it falls slowly and smoothly. Any suspicion of jerkiness must be examined and rectified. This will usually be due to dirt. Note that it must not be lubricated.

## Cam

Clean corrosion from the cam. If the steps show signs of wear or indentation by the pin they may be 'squared-up' with a very fine file, taking care not to greatly alter the cam profile. Check the fit of the cam on the pivot pin.

## Metering needle

Replace the flexible sealing ring with a new part. Fit the needle into its sleeve in the body checking that it slides freely.

## 6 Assembly

Ensure that all parts are clean and dry before assembly. Scrupulous cleanliness is essential because of the smallness and delicacy of the mechanism. Take care not to overtighten any screws or nuts to prevent distortion and stripped threads.

- 1 Fit the pivot pin to the body. Fit a new star washer and secure with the brass nut.
- 2 Fit the coil spring over the piston rod and locate in the piston. Slide the assembly into the cylinder with the flat on the piston rod facing outwards, ensuring that the spring locates properly over the brass piston rod bearing.
- 3 Fit a new gasket and the triangular cylinder cover plate with three Phillips head countersunk screws. Note that the vent hole in the gasket and in the plate must both align with the passage in the body. Tighten the screws progressively and evenly.
- 4 Check that a new flexible sealing ring is fitted to the groove at the top of the tapered portion of the needle, and insert it into the valve sleeve via the access hole in the top of the body, with the machined flat facing outwards. Check that it slides freely in the sleeve and fit the brass plug into the access hole.
- 5 Lightly smear the pivot pin with petroleum jelly (Vaseline). Pull the piston rod to its extended position against the spring load by engaging a small screwdriver in the machined flat, and allow the needle to fully enter its sleeve. Fit the lever over the pivot pin ensuring that the spade-shaped extension engages in the piston rod, and that the drive peg engages in the recess in the needle. Remove the screwdriver to allow the piston spring to return the rod, rotating the lever clockwise. Rotate the lever, counter-clockwise to its full travel and allow to return, checking for freedom of movement at all positions.
- 6 Hook one tail of the torsion spring over the top of the arm on the lever. Locate the pin hole in the stepped cam over the other tail and position the cam on the pivot pin so that the arm bears on the underside of the lever arm under the influence of the spring which tends to rotate the cam counter-clockwise. Take care that the top coil of the torsion spring is not trapped between the top of the brass bush in the lever and the underside of the cam.
- 7 Fit the circlip to the groove in the pivot pin. Depress the button of the fast-idle pin with the finger until the pin bears on the cam to retain it. Rotate the lever arm counter-clockwise to the limit of its travel and release the fast-idle pin. Check that the cam springs round so that its arm contacts the lever arm and that the fast-idle pin can now be fully depressed to touch the base circle of the cam. Check that the cam can be similarly held against the influence of the spring when the fast idle pin contacts any of the steps.
- 8 Fit the Autostarter assembled thus far to the carburettor body with a new gasket and three copper screws. Note that the short screw fits into the lowest hole. Progressively and evenly tighten the screws to 40 to 45 lb f in (46 to 52 kg f cm).
- 9 Open the throttle, remove the temporary stop and allow the throttle to close. Screw in the spring-loaded engine idle speed setting screw on the fast-idle lever until there is a 0.10 in (2.5 mm) gap minimum between the lug carrying this screw and the lug on the throttle lever upon which the screw bears.
- 10 Rotate the Autostarter lever arm counter-clockwise to the fully OFF position, open the throttle to allow the cam to assume its correct position (arm bearing on lever arm) and fully close the throttle. Check (with feeler gauges) the gap between the end of the fast-idle pin and the base circle of the cam. Refer to the vehicle manufacturer's manual to ascertain what the clearance should be and adjust, if necessary, as follows:  
Fit a new throttle stop screw to the lug on the carburettor body. Adjust the screw until the correct gap between the fast-idle pin and the base circle of the cam is obtained for the particular carburettor.

Lock the throttle stop screw with a new nut without disturbing the position of the screw and recheck the gap.

11 Continue with assembly of the Autostarter.

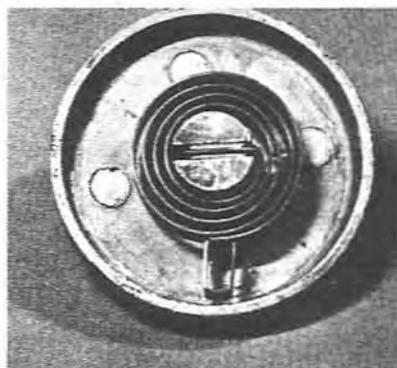
Open the throttle to release the cam and allow the lever to rotate clockwise to the fully ON position. Fit the heat insulator to the Autostarter body (it can only be fitted in one position with the Autostarter fully ON, with the arm projecting through the slot) and fit the aluminium heat mass complete with temperature sensitive coil into the recess in the heat insulator. Ensure that the lever arm engages in the rectangular loop at the end of the coil. To verify correct location rotate the heat mass through 30° in each direction and check that when released it springs back to its original position. Do not rotate the heat mass more than 30° or it may be permanently damaged.

12 Fit the clamp ring and the three screws and new spring washers. Do not tighten the screws. Rotate the heat mass counter-clockwise against the spring load of the temperature sensitive coil until the index mark on the edge aligns with the datum mark on the Autostarter body. Progressively and evenly tighten the screws to 8 to 10 lb f in (9 to 11.5 kg f cm). Do not overtighten as the heat insulator may be damaged or the threads in the body may be stripped.

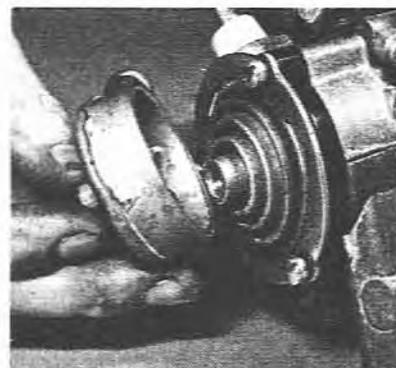
13 Fit a new rubber sealing ring for the heat mass, fit the cover and central bolt with a new aluminium washer. Do not tighten the bolt at this stage but refit the carburettor to the engine and refit the water hoses to the carburettor to the connections on the cover. Tighten the bolt, fill the system and check for leaks.



6.5 Make sure of the proper location before inserting



6.11 Again, note how clean the interior is



6.13 The final assembly

## 7 Fault finding

Fault	Probable cause	Cure	Notes
Poor idle	Air leakage at manifold joints or anti-vibration flanges, if fitted	Remake joints	Check idle carbon monoxide level with CO meter. Consult manufacturer's limits. Refer to Tuning, Series CD and CDS. Check air valve free movement by hand. Unit should move freely and return to carburettor bridge with click.  Float height must be checked with the carburettor inverted. Measure to the highest point of the float(s), above the face of the main body. Refer to Assembly. Refer to Appendix II for correct needle identification number.
	Throttles not synchronised (Multi-carburettor)	Balance carburettors and reset linkage	
	Air Valve or valves sticking in guides	Clean air valve rods and guides, re-assemble	
	Obstructed float chamber or diaphragm ventilation holes	Check air box is properly fitted and that gasket(s) are not obstructing Reset float heights and clean/replace needle valves	
	Wrong fuel level caused by maladjusted float assemblies or worn or dirty needle valves		
	Metering needle improperly fitted or wrong type fitted	Shoulder of needle should be flush with face of air valve and needle bias correct (upstream or downstream). Fit proper metering needle	
	Diaphragm not located or damaged	Check with air valve cover removed, piston depression holes should be in line with and face towards throttle spindle. Renew diaphragm if damage is in evidence	
	Leak from ignition advance or retard pipe	Check connections and ignition settings	

	Faulty temperature compensator	With engine cold check that compensator cone is seated, and free to move. If any doubt exists replace unit with new assembly	
	After long use leakage may occur at throttle spindle or secondary throttle spindles	Replace spindle seals or spindles	
Hesitation or flat spot See previous section. Other causes may be indicated with an asterisk	Inoperative damper	Check damper oil level and top up, recheck damper operation by raising by hand, resistance should be felt	Use correct grade of oil or Zenith Lube Oil. Part No. B.18562.Z.
	Air Valve Spring vanished or wrong part fitted	Check grade of spring and refit	Refer to Appendix II for correct spring, do not attempt to alter the spring rate.
	Incorrect ignition timing Incorrect throttle linkage operation	Check and reset Check operation	
High fuel consumption All points covered in both the above sections can induce heavy fuel consumption. Other causes are:-	Leakage from the fuel connections, float chamber joints or sealing plug 'O' rings	Replace gaskets and 'O' rings	
	Low engine braking	Probably caused by three main factors: Faulty by-pass valve	
	Sticking throttles	Replace by-pass valve <i>Note:</i> No attempt should be made to adjust these units Check throttle operation, reset	
	Inoperative ignition retard	Check ignition setting at idle and ensure functioning of retard system and that retard manifold pressure tappings are free from obstruction in the throttle flange of the carburettor	Consult manufacturer's data.
Low Engine Power	Damaged diaphragm Low fuel flow	Inspect and replace Check discharge from fuel pump. Inspect needle valve seating	

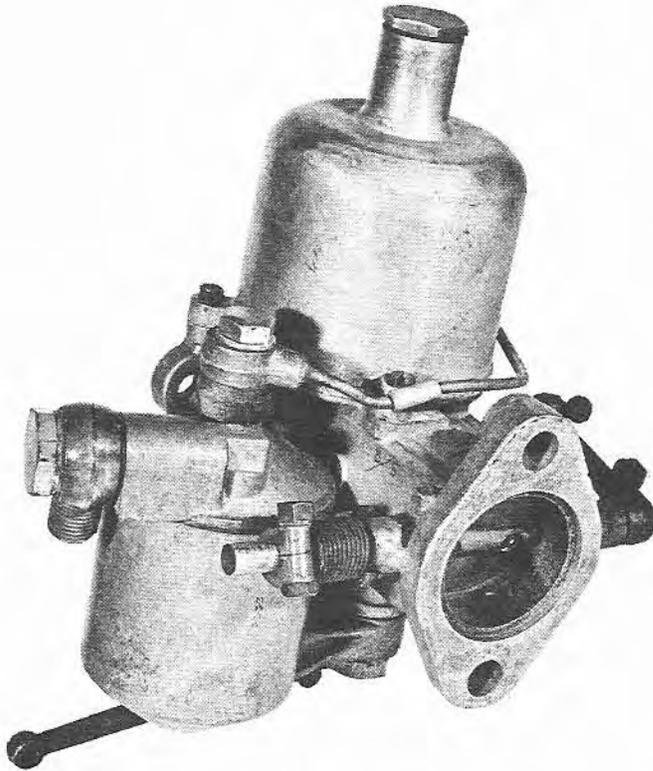
*Note:* To ensure that all legal exhaust emission requirements are met, the following items must not be changed or modified in any way:  
1 the fuel jet assembly, 2 the air valve, 3 the depression chamber cover, 4 the position of the fuel metering needle.

The following items must not be adjusted but should be replaced completely by factory set units:

1 the temperature compensator, 2 the air valve return spring, 3 the by pass unit, 4 the starter assembly.

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**Notes**



## Part 4 SU carburetors

### Chapter 17 Type H

#### Contents

	<i>Section</i>		<i>Section</i>
Assembly .....	8	Jet assembly .....	3
Construction .....	2	Operation .....	5
Disassembly .....	7	Special overhaul procedures .....	6
Float chamber and its operation .....	4	Tuning .....	9
Introduction .....	1		

#### 1 Introduction

The Type H (Horizontal) carburettor is the earliest of the four types described in this Manual. For the purpose of instruction it may be considered as the basic form of SU instrument, since all later types are largely refined versions and all use the same basic elements.

It was most popular in the early 1950s, and was fitted as standard to many production saloon and sports cars, and as a 'performance modification' to others. It is often to be found fitted with a thermostatic carburettor on larger cars with a multiple installation.

#### 2 Construction

The unit consists of a die-cast aluminium body in which is formed the choke bore, a suction chamber and piston assembly mounted vertically above it, a jet assembly mounted co-axially with the suction chamber below it, and a float chamber assembly attached by an arm to the body.

The body has a flange at each end, drilled for bolts to mount the unit to the engine and for the attachment of an air cleaner or intake system. A circular, machined platform on the upper side mounts the

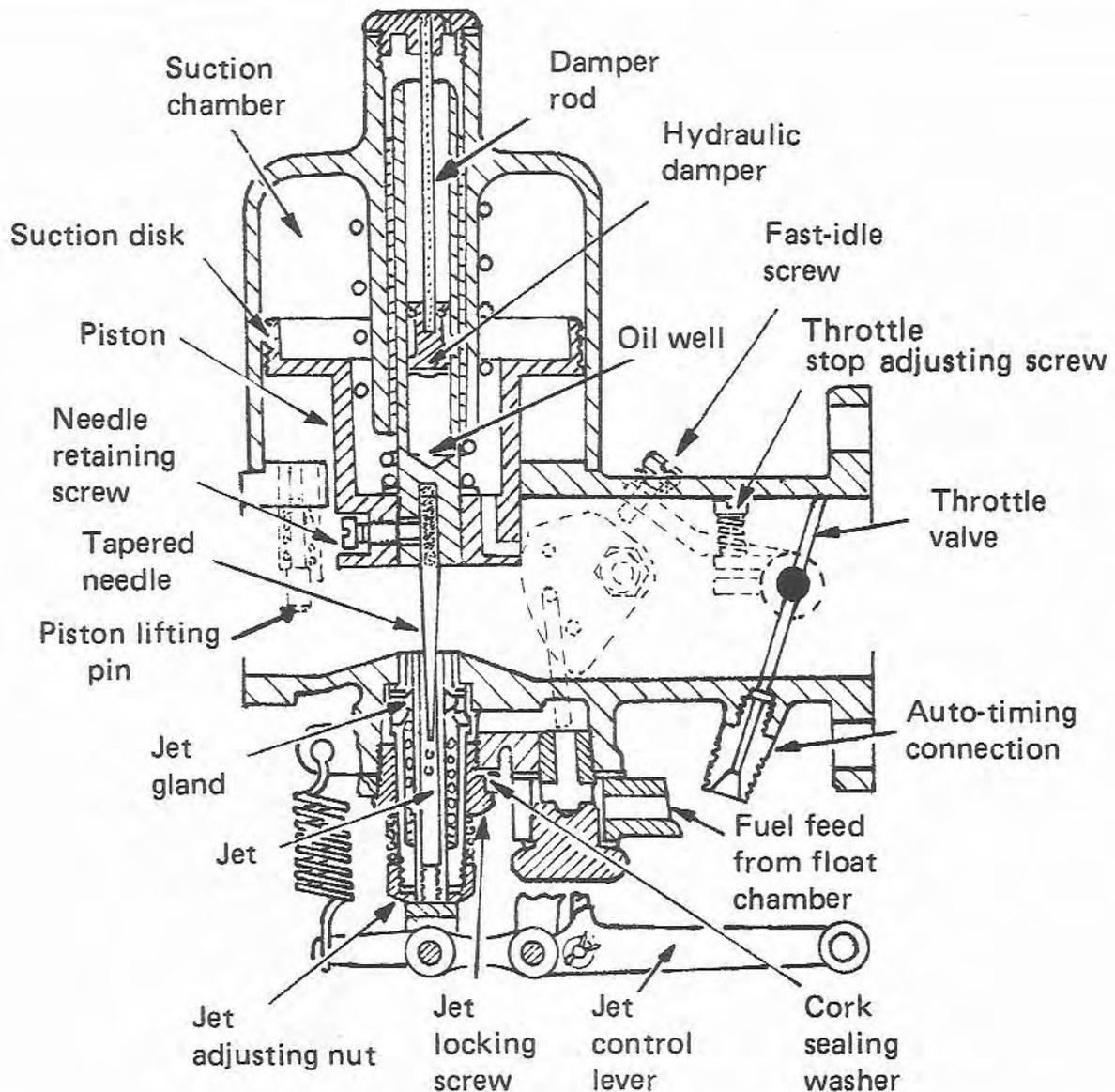


Fig. 5.1 Cross-section through the type H carburettor (Sec 2)

suction chamber, with a large bore intercepting the choke bore at right angles in which the piston moves.

The underside of the body has an internally threaded boss for attachment of the jet assembly, and a similar boss for attachment of the float chamber arm. They are linked to each other by a drilling through the cast web between them.

Other cast features on the body include bosses bored to form throttle spindle bearings, a lug with a hole to accept the tail of a jet return (tension) spring, a housing for a piston lifting pin, tapped holes for vacuum connections, and bosses for throttle/choke interconnecting linkage bearings.

The suction chamber is a die-cast aluminium cylinder with a central guide tube fitted with a hardened steel sleeve bearing. The guide tube is extended at the top of the chamber and internally threaded for attachment of a hydraulic damper. Lugs are provided at the chamber base for attachment to the unit body with screws.

A piston slides in the bearing in the suction chamber, the smaller, lower diameter protruding into the bore of the carburettor body. The piston consists of two parts; the piston rod and the piston disc with integral suction disk. The piston rod is hollow, to act as an oil well for the hydraulic damper (which is secured to the suction chamber). The piston has two ports drilled from the top and emerging on the downstream (throttle plate or engine) side of the piston. A tapered

needle is fitted to the base of the piston assembly and secured by a locking screw.

### 3 Jet assembly

Refer to Fig. 5.3. The jet assembly consists of the jet (1) which slides in upper bearings (13) and lower bearing (7). Jet glands (12), conical washers and washers (11) are fitted to the bearing and loaded to their respective ends by compression spring (10). The assembly is fitted to the unit body with nut (4) sealed with washer (5) and cork washer (6). The bearing is a loose fit in the nut, thus permitting slight radial movement of the jet assembly to centre it, relative to the needle.

The assembly is held to the body by the clamping action of the nut against the flange at the top of the lower bearing. The soft (copper) washer (5) forms a seal between the lower jet bearing (7) and the body.

The maximum height of the jet is determined by the position of the jet adjusting nut (2), the jet being held in contact with it by the spring loading on the external jet control lever linkage.

The jet size is identified by a code number stamped on one face of the steel fork.

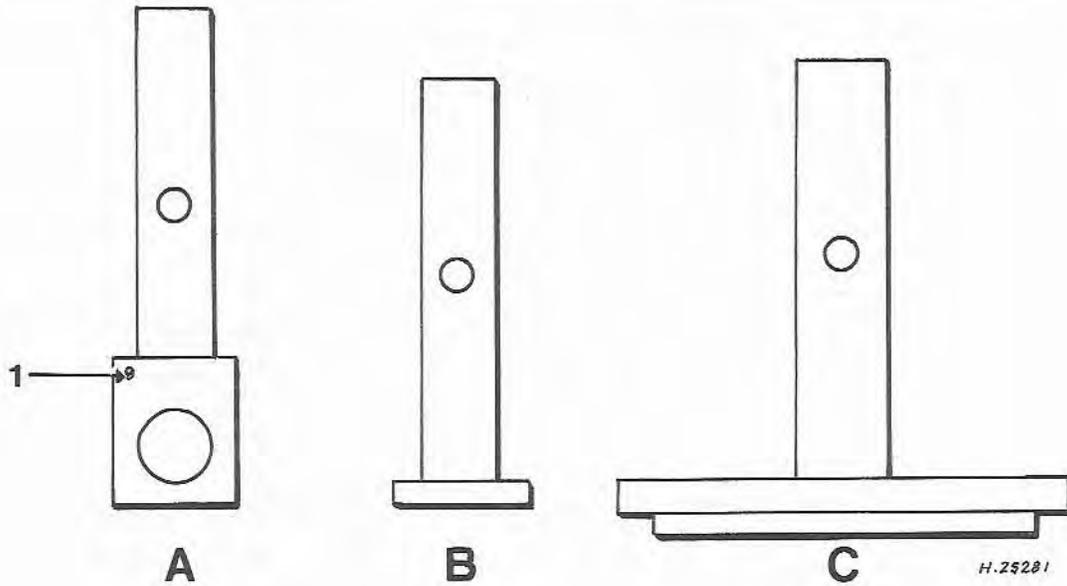


Fig. 5.2 The three types of jet - Standard (A), Thermostatic (B), and Invicta (C) (Sec 3)

1 Jet size stamped on jet  
 Jet sizes: 9 = 0.09 in, 1 = 0.1 in, 125 = 0.125 in

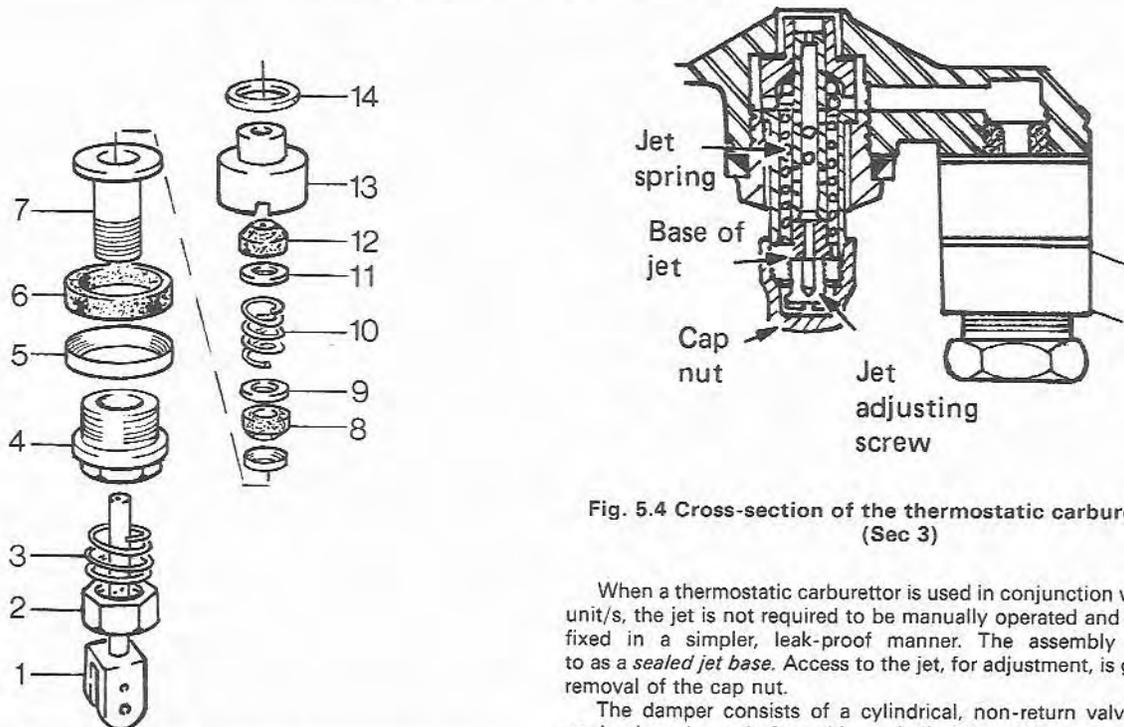


Fig. 5.3 Exploded view of the Standard jet components (Sec 3)

- |                     |                  |
|---------------------|------------------|
| 1 Jet               | 8 Jet gland      |
| 2 Jet adjusting nut | 9 Washer         |
| 3 Spring            | 10 Spring        |
| 4 Fitting nut       | 11 Washer        |
| 5 Copper washer     | 12 Jet gland     |
| 6 Cork washer       | 13 Upper bearing |
| 7 Lower jet bearing | 14 Washer        |

Fig. 5.4 Cross-section of the thermostatic carburettor jet (Sec 3)

When a thermostatic carburettor is used in conjunction with Type H unit/s, the jet is not required to be manually operated and is therefore fixed in a simpler, leak-proof manner. The assembly is referred to as a *sealed jet base*. Access to the jet, for adjustment, is gained after removal of the cap nut.

The damper consists of a cylindrical, non-return valve assembly retained on the end of a rod by a circlip. The rod is serrated at the top and pressed into a screwed brass cap, by which it is secured to the suction chamber. The valve is immersed in the oil in the hollow piston rod, and is so arranged that oil can pass freely through it in a downwards direction (piston falling), but presents a high resistance to upwards flow (piston rising).

#### 4 Float chamber and its operation

The float chamber assembly consists of the chamber, a detachable lid incorporating the inlet valve, and a float.

The chamber is a die-cast aluminium cylinder fitted with a central float guide rod. An extension arm at the bottom of the chamber is enlarged at its outer end, and drilled for a banjo bolt which secures it to the carburettor body. Fuel is supplied to the carburettor through a drilling in the arm.

The detachable lid incorporates lugs which carry the float lever hinge pin. The inlet valve consists of a brass seating screwed into the lid, in which slides a steel needle. The position of the needle is controlled by the float lever movement. Fuel inlet to the valve is from an external banjo union, secured with a banjo bolt to a tapped hole in the lid. A thimble-shaped filter is retained in the inlet by the banjo bolt, the open inlet end being loaded towards it (to seal the periphery) by a conical spring surrounding the filter. The inlet assembly is sealed with soft fibre washers.

The top, threaded portion of the float guide rod projects through a central hole in the lid and retains it with a cap nut. A cover cap is fitted under the cap nut to protect the annular vent from the ingress of dirt. The lid is located in the chamber by a machined spigot at the rim.

The float consists of two brass spinnings soldered together, with a brass tube running through the centre. The float slides vertically on the guide rod fixed to the float chamber base and operates the inlet valve via the hinged lever.

Fuel, supplied by an external mechanical or electric pump, enters the float chamber inlet and passes through the fine mesh filter. As the fuel level in the chamber rises, the float rises and operates the inlet valve, reducing the flow and stopping it when a previously determined level is attained. Petrol flows from the base of the chamber through the drilling in the arm to the jet assembly, and rises to the same level (just below the top of the jet when in its fully raised position).

## 5 Operation

### Cold starting

To start the engine from cold, the external, fascia-mounted mixture control (choke) is pulled out, which lowers the jet assembly in its bearings and glands. With the piston seated on the bridge of the carburettor, this lowering of the jet increases the annular area between the needle and the orifice at the top of the jet. The throttle plate is partly opened by the mechanical interconnection between the mixture control linkage and the throttle lever. See Chapter 1 for explanation of the constant-depression concept.

With the engine turning over by hand cranking or by the starter motor, the depression generated in the inlet manifold is sensed in the suction chamber via the passages in the base of the piston. The resultant upward load on the piston assembly, due to the differential pressures sensed above and below the suction disc, lifts the piston against the spring load.

The depression created by the flow of air between the underside of the piston and bridge lifts fuel from the jet. The fuel is atomised in the mixing chamber (that part of the choke bore between the piston and the throttle plate) and passes to the engine, when it should start and run.

### Normal running, cruising and full throttle

With a cold engine, the mixture must be enriched to compensate for the effects of fuel condensation on the cold surfaces of the induction system, which has the effect of weakening the effective mixture delivered to the engine combustion chambers. This is achieved by lowering the jet assembly, thus increasing the annular area around the needle at any position of the needle, and permitting more fuel to flow.

As the engine warms through, the mixture strength is weakened by progressively raising the jet assembly until, when normal working temperature is attained, the jet is at its highest position, dictated by the position of the jet adjusting nut which will have been preset (see Section 9).

Under cruise conditions, the throttle plate will be partly open with the engine running fast. The obstruction presented by the throttle reduces the depression in the mixing chamber, and thence in the suction chamber, and the piston falls until the forces acting above and below the suction disc are in balance. The depression at the jet will be the same as before, but as the jet has been raised the mixture will be weaker.

The high manifold depression will be sensed just downstream of the throttle plate at the auto-timing connection (on units so fitted) and

transmitted to the distributor to advance the ignition timing, with beneficial effects on fuel economy.

At full throttle, the throttle plate presents only a slight obstruction; manifold depression is sensed in the suction chamber and the piston lifts to its maximum limit. The depression at the jet is as before, but more fuel is drawn out due to the withdrawal of the tapered needle, which creates a greater annular area. The mixture strength remains constant.

### Acceleration

A richer mixture is required for smooth acceleration. This is achieved by increasing the depression at the jet for any given piston position by retarding the rate at which the piston lifts, thus temporarily increasing the air velocity. The hydraulic damper, in conjunction with the oil-filled piston rod, controls the rate at which the piston rises.

Note that the damper does not limit or reduce the height to which the piston rises, it merely controls the speed at which it rises, causing an immediately richer mixture to be delivered when the throttle is snapped open, which gradually weakens as the piston lifts to its correct position.

As the damper is only effective for upward movement of the piston, the piston falls immediately the throttle is closed, preventing an over-weak mixture being produced.

## 6 Special overhaul procedures

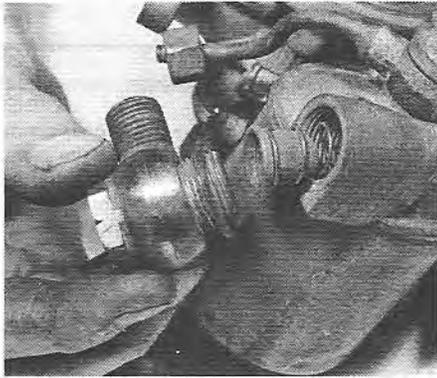
- 1 Refer to Chapter 4.
- 2 The SU part numbers for gasket and overhaul packs are as follows:

Carburettor model	Throttle diameter	Gasket pack	Overhaul pack
H1	1 1/8"	AUE 800S	AUE 850
H2	1 1/4"	AUE 800S	AUE 850
H4	1 1/2"	AUE 801S	AUE 850
H6	1 3/4"	AUE 801S	AUE 850

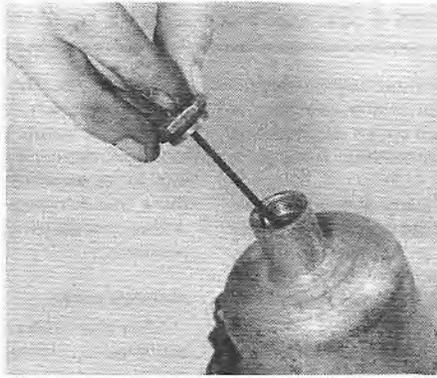
**Note:** Overhaul packs may be difficult to obtain. The 'S' suffix on the gasket pack part numbers indicates that throttle plate screws are included

### Disassembly

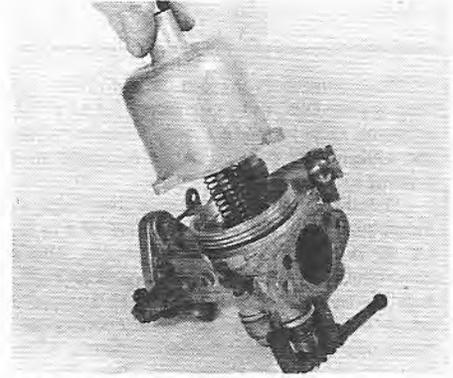
- 1 Clean the outside of the carburettor thoroughly. Remove the banjo bolt, banjo union and fibre washers. Extract the filter and spring assembly from inside the float chamber lid (photo).
- 2 Mark the relative position of the suction chamber to the body.
- 3 Remove the damper and its washer. Unscrew the chamber retaining screws. Lift the chamber straight off (photos).
- 4 Remove the piston spring and washer (if fitted), lift out the piston assembly carefully and empty out the damper oil from the piston rod.
- 5 Undo the needle locking screw and remove the needle. If the needle sticks in place, first tap it inwards and then pull it out; do not bend it (photo).
- 6 Unhook the lever return spring. Remove the split pins and clevis pins (photos). Remove the fast idle cam pivot bolt. Note the positions of the aluminium spacing washer and the spring washer. If a thermostatic starting carburettor is fitted, refer to Chapter 9.
- 7 Undo the linkage assembly. Press in the piston lifting pin, extract the circlip from its groove and withdraw the pin and its spring downwards.
- 8 Withdraw the jet and take off the jet adjusting nut and spring.
- 9 Unscrew the jet locking nut and carefully withdraw the assembly. Lift off the upper jet bearing and copper washer. Extract the gland and brass gland washer (photos).
- 10 Remove the gland spring and extract the lower jet bearing from the jet locking nut. Extract the gland and brass gland washer from the bearing. Do not touch the jet locking nut cork washer.
- 11 Mark the position of the lid to float chamber. Unscrew the central nut and remove the overflow pipe and washers; the stay, washer and cover cap, or the cover cap alone. Record the positions of the washers and other components. Lift off the lid, note the gasket. Remove the float (photos).
- 12 Pull out the hinge pin for the hinged lever and detach the lever (photo).



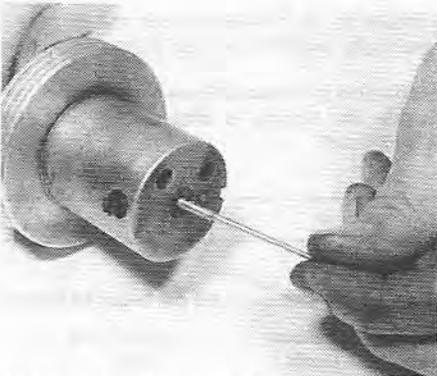
7.1 Removing the filter and spring assembly



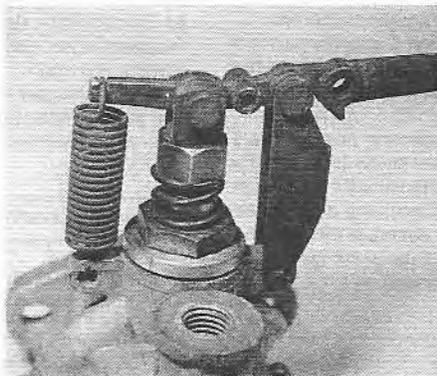
7.3A Removing the damper



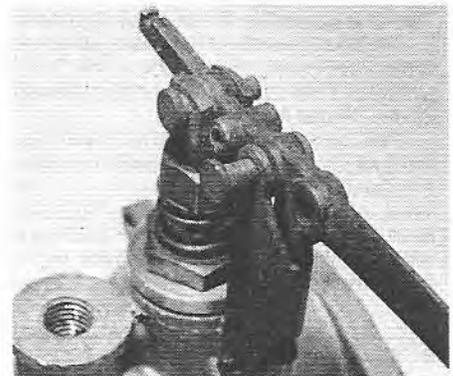
7.3B Lifting the suction chamber away from the base



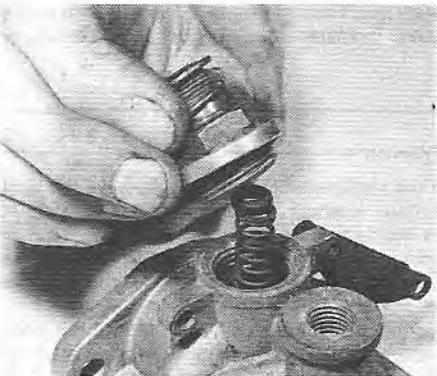
7.5 Removing the needle from the piston



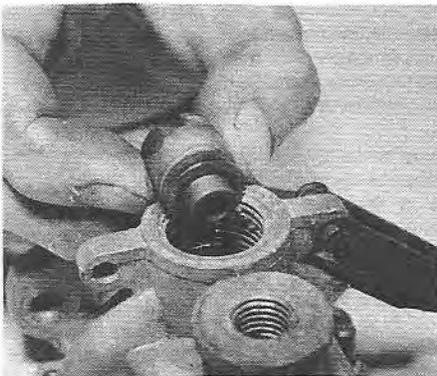
7.6A Jet control lever and return spring



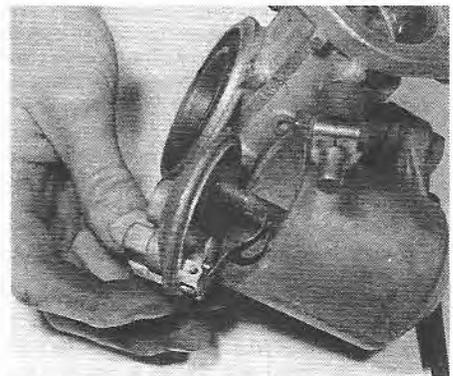
7.6B Removing the lever clevis pin



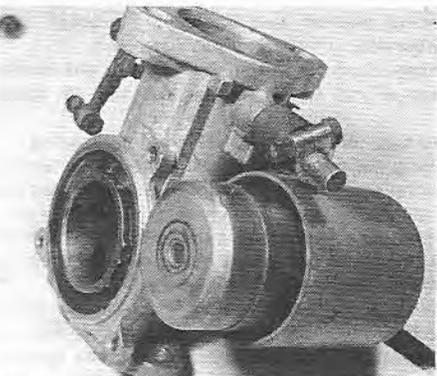
7.9A Removing the jet locking nut ...



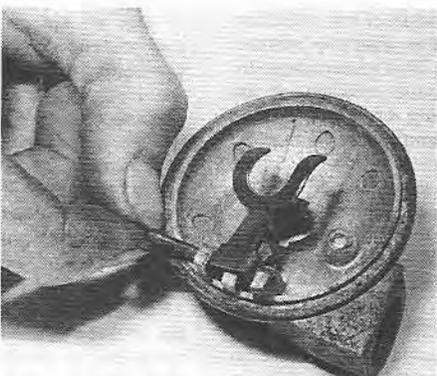
7.9B ... and upper jet bearing



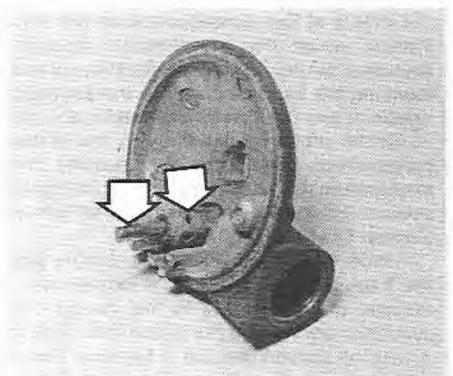
7.11A Removing the float chamber lid ...



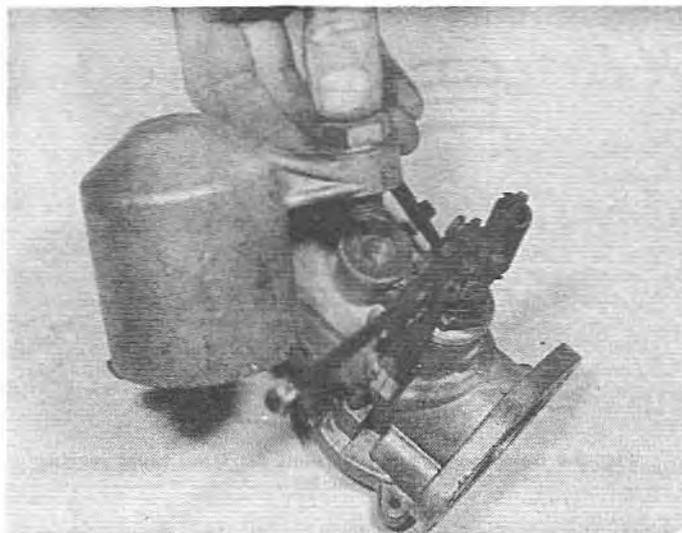
7.11B ... and float



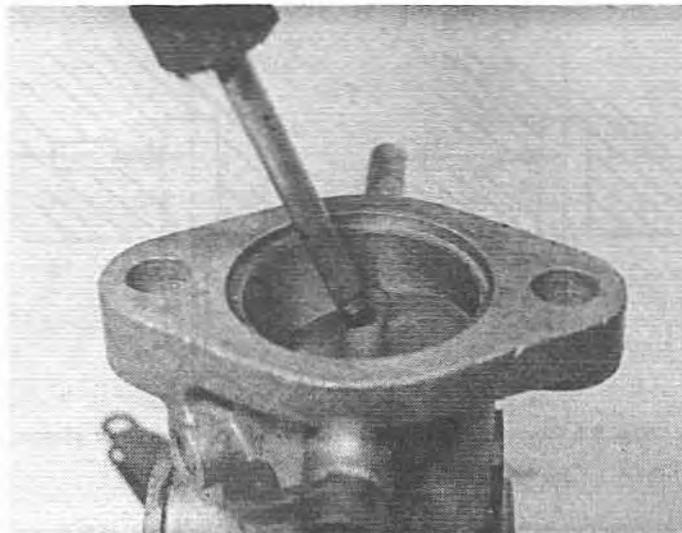
7.12 Removing the needle valve hinge pin and lever



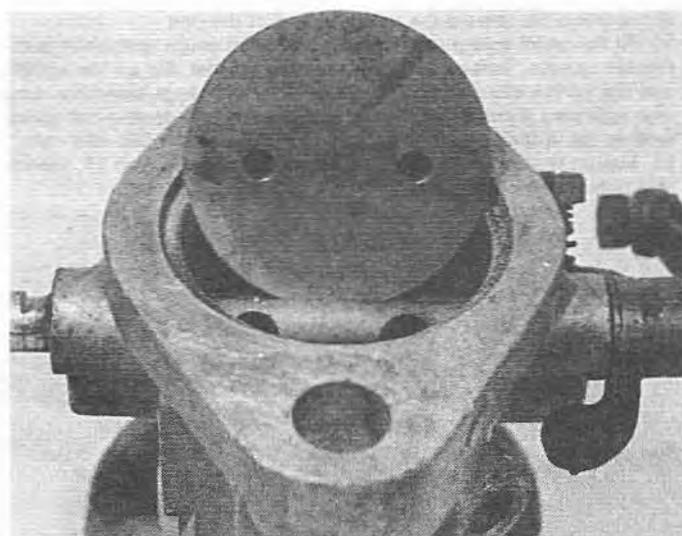
7.13 Needle and needle valve seating (arrowed)



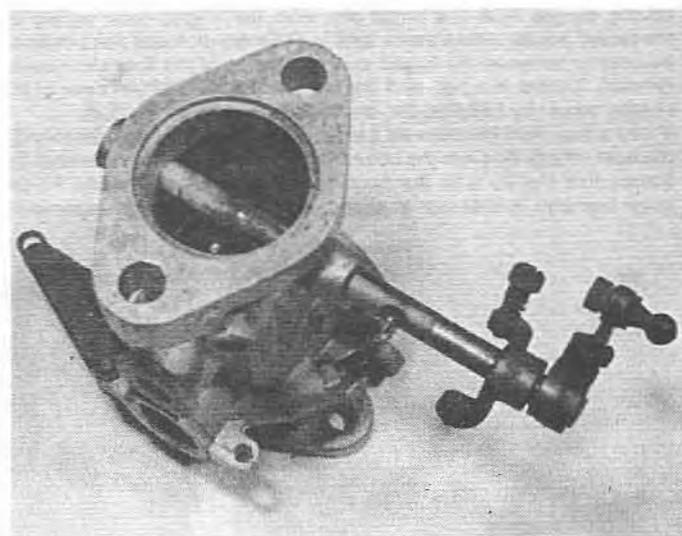
7.14 Removing the float chamber



7.15A Remove the screws ...



7.15B ... and withdraw the throttle disc ...



7.15C ... and spindle

13 Lift out the needle from its seating (photo) and unscrew the seating from the lid using a spanner 0.338 in (8.58 mm) across flats. Do not distort the seating.

14 Remove the screw retaining the stay to the carburettor body (if fitted). Remove the fixing retaining the float chamber to the body (photo). Record the positions of the fibre washers and the brass washer.

15 Remove the two disc retaining screws and mark the disc for location. Twist the throttle and ease out the disc from its slot in the spindle. Pull out the spindle from the body (photos).

16 Loosen the return spring clip bolt and remove the clip, spring, and return spring plate (if fitted). If a clamped operating lever is fitted, loosen the clamping bolt and remove the lever.

17 For instructions on cleaning, inspection and repair, refer to Chapter 4.

## 8 Assembly

**Note:** Ensure that all parts are clean and dry before assembly.

1 Fit the spindle to the body, ensuring that the fixed lever is in the correct position. Slide the throttle disc into the slot in the spindle and

fit two new retaining screws. Do not tighten at this stage. Close the throttle, when the disc will centre itself in the bore. Check visually that contact is made between the disc and the bore throughout its circumference. Tighten the screws and spread the split ends sufficiently to prevent the screws unscrewing.

2 Fit the jet assembly in the reverse order to disassembly, using new gland packings. Ensure that the washer is under the shoulder of the lower jet bearing, that the coned faces of the gland washers face toward the gland packings, and that the copper washer is fitted with the sharp edge towards the upper jet bearing. Fit the assembly to the body, but do not tighten the jet locking nut at this stage (photos).

3 Fit the needle to the piston. The relative position of the two parts is critical, and may be either of two arrangements according to the contour of the needle at junction of the taper and the shank (ie square or radiused shoulder). Fit and tighten a new locking screw.

4 Fit the piston assembly to the body, taking care not to damage the needle. Fit the washer (if provided) and piston spring to the piston rod. Lightly oil the outside of the piston rod and fit the suction chamber. Fit and tighten the securing screws.

5 Remove the jet, jet locking nut, and spring. Refit the adjusting nut and screw it up as far as it will go. Refit the jet and ensure that it is in the correct relative position (check position of fork). With the jet

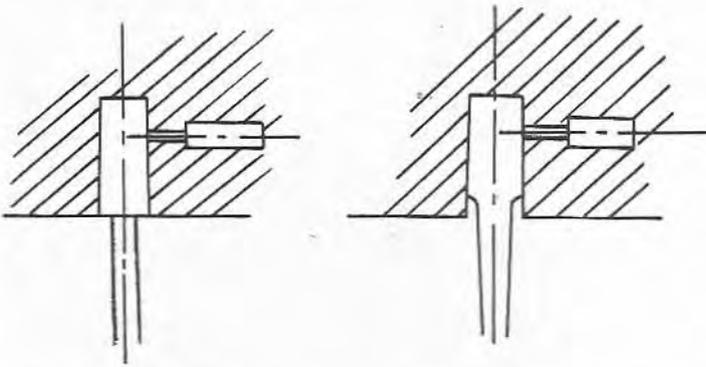


Fig. 5.5 Correct fitted position of the two types of piston needle (Sec 8)

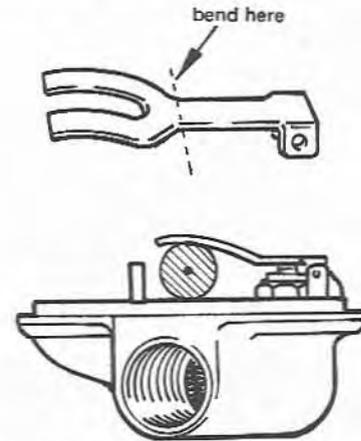


Fig. 5.6 Needle valve adjustment for float level setting (Sec 8)

locking nut loose, check that the underside of the piston is in contact with the top of the jet, which will protrude into the bore. The jet is now accurately centred. Tighten the jet locking nut, remove the jet and adjusting nut, fit the spring and refit the adjusting nut and jet.

6 Fit the float chamber valve seating to the float chamber lid. Fit the needle, hinged lever and hinge pin. With the hinged lever resting on the seated needle, check that a 0.44 in (11 mm) diameter twist drill can be inserted between the forked lever and the lip of the float chamber lid (photo). If there is a gap, or if the bar lifts the forked lever clear of the needle, adjust by bending the lever where shown in Fig. 5.6.

7 Fit a new float chamber lid gasket (do not use jointing compound), the float (check that it is the correct way up) and the float chamber lid. Ensure that the lid is in the position marked on disassembly. Fit the cover cap and central nut, or drainpipe, washers and nut (alternative

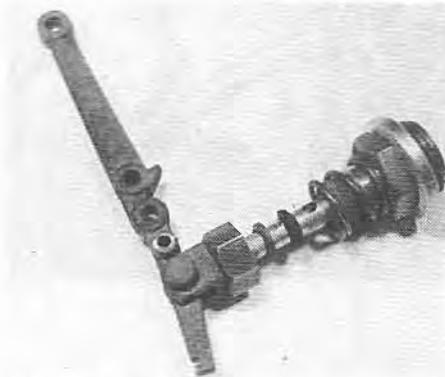
detail). Use new fibre washers. Do not overtighten the nut (photo).

8 Fit the float chamber assembly to the carburettor body using new fibre washers or rubber grommets (alternative detail).

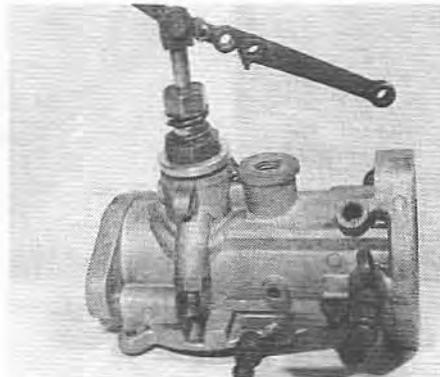
9 Insert the fuel inlet filter assembly (spring end innermost) and fit the banjo and bolt with new fibre washers. Note that the recessed face of the banjo fits toward the hexagon end of the bolt.

10 Fit the return spring plate, return spring and return spring clip to the throttle spindle. Tension the spring by turning the clip on the spindle and tighten the clip pinch-bolt (photo). Fit the linkage assembly using new split pins. Ensure that the distance washer and double-coil spring washer are in their correct positions in relation to the fast-idle cam.

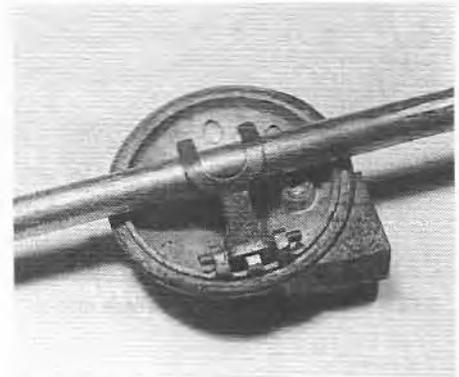
11 Top up the piston rod with oil as described in Section 11, then fit and tighten the damper rod.



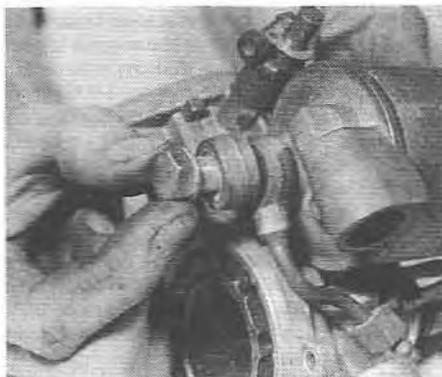
8.2A Jet assembly



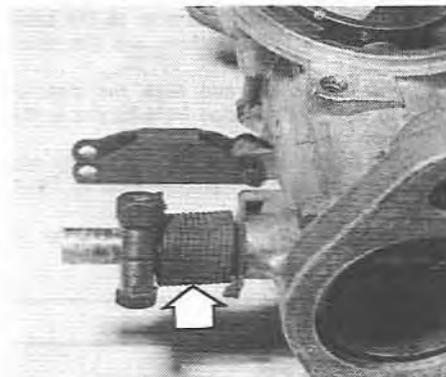
8.2B Refitting the jet assembly



8.6 Checking the float level setting with a 0.44 in (11.0 mm) diameter twist drill



8.7 Refitting the float chamber lid



8.10 Throttle return spring (arrowed)

## 9 Tuning

**Note:** Refer to Chapter 3 for notes on tuning, with particular reference to preliminary procedures. If a thermostatic starting carburettor is fitted, refer also to Chapter 21.

### Single carburettor installations

- 1 Set the throttle adjusting screw. Warm up the engine to operating temperature, then switch off. Unscrew the throttle adjusting screw until it is just touching its stop, and the throttle is closed. Set the throttle adjusting screw  $1\frac{1}{2}$  turns open. Ensure that the fast idle screw is clear of the fast idle cam.
- 2 Set the jet height. Mark the components for correct reassembly, and remove the piston and suction chamber unit. Disconnect the mixture control wire (if fitted), or remove the jet cap nut (thermo-type). Screw the jet adjusting nut/screw until the jet is just flush with the bridge of the carburettor, or fully up if this position cannot be obtained.
- 3 Set the jet adjusting nut. Replace the piston and suction chamber unit into its original position. Check that the piston falls freely onto the bridge when the lifting pin is released. Turn down the jet adjusting nut/screw two complete turns.
- 4 Set the idle speed. Start the engine and adjust the throttle adjusting screw to give the desired idle speed. Turn the jet adjusting nut/screw up to weaken, or down to richen, until the fastest idle speed, consistent with even running, is obtained. Re-adjust the throttle adjusting screw to give the correct idle speed, if necessary. Refit the jet cap nut on the thermo-type carburettor.
- 5 Check the mixture strength (CO content). The mixture strength affects the colour of the exhaust gases, and the idle quality – see Figs. 5.9 and 5.10, and the following tables.

(w)	Too weak	Colourless, irregular note, splashy misfire
(c)	Correct	Regular and even note
(r)	Too rich	Blackish, regular or rhythmical misfire

Check for correct mixture by slowly pushing the lifting pin up about 0.031 in (0.8 mm) after free movement has been taken up. The graph illustrates the effect on engine rpm as the lifting pin raises the piston, indicating the mixture strength.

(r)	Rich mixture	rpm increases considerably
(c)	Correct mixture	rpm increases very slightly
(w)	Weak mixture	rpm immediately decreases

- 6 Connect and set the mixture control wire (except on thermo-type carburettor). Connect the mixture control wire and adjust with about 0.0625 in (1.6 mm) free movement before it starts to pull on the jet lever. Pull the choke knob at the facia until the linkage is about to move the carburettor jet, and adjust the fast idle screw to give an engine speed of about 1000 rpm when the engine is hot.
- 7 Fill the damper. Finally top up the piston damper with engine oil, until the level is 0.5 in (13 mm) above the top of the hollow piston rod. On dust-proofed carburetors (identified by no vent hole in the damper cap, and a transverse hole drilled in the neck of the suction chamber), the oil level should be 0.5 in (13 mm) below the top of the hollow piston rod.

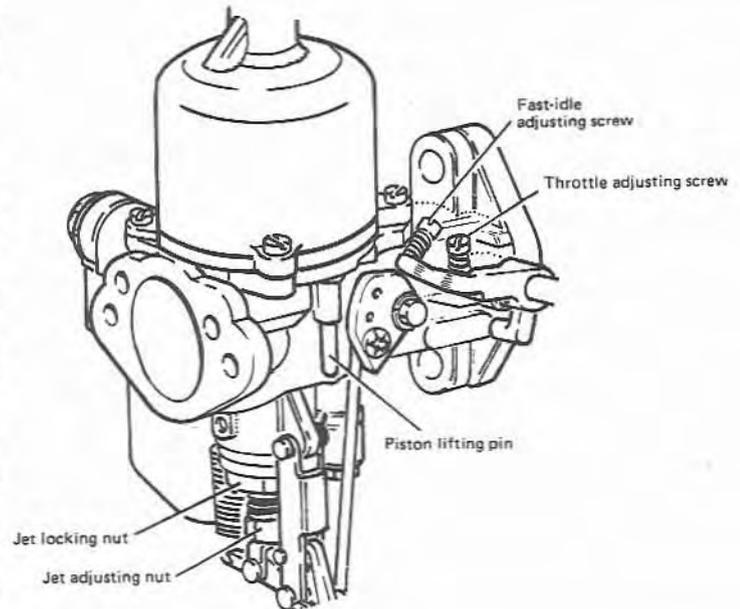
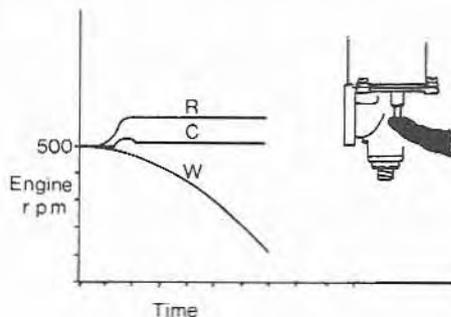


Fig. 5.7 Type H carburettor tuning points (Sec 9)

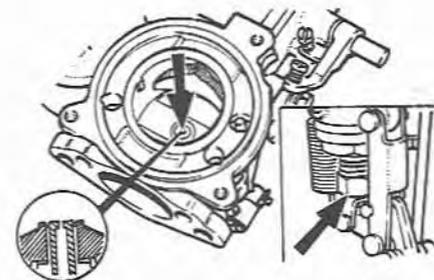


Fig. 5.8 Initial jet height setting (Sec 9)

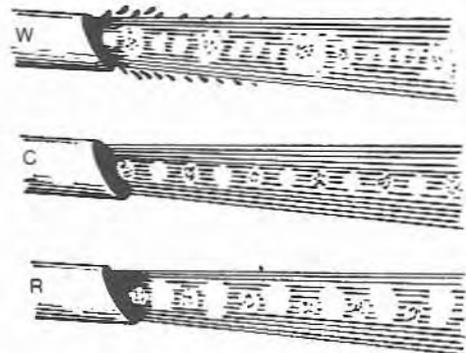


Fig. 5.9 Diagram of effect on exhaust of mixture strengths at idle speed (Sec 9)

Fig. 5.10 Graph showing effect of piston lifting pin on idle speed at different mixture strengths (Sec 9)

**Multiple carburettor installations**

8 Before the attempted tuning of any carburettor installation, it is essential to make sure the valve clearances, points gap and spark plug gaps are correct. Successful tuning cannot take place if any one of these is 'out'. Multiple carburettor set-ups have their problems compounded if this is not strictly observed.

9 Remove the air cleaner(s) and check for throttle linkage adjustment, smoothness of action and that the dashpots are topped up properly. Run the engine to normal operating temperature, then switch off.

10 Slacken a clamping bolt on one of the throttle spindle interconnection couplings between the carburetors.

11 Unscrew both throttle stop adjusting screws until they are both just touching their stops with the throttle closed. Turn both screws clockwise  $1\frac{1}{2}$  turns exactly.

12 Remove the pistons and suction chambers.

13 Disconnect the jet control interconnecting rods and cables on the non-thermo carburetors, or remove the jet cap nuts on thermo-type carburetors. Turn the jet adjusting nuts or screws until each jet is flush with the bridge of its carburettor.

14 Refit the pistons and suction chambers. Top up the piston rods with oil, refit and tighten the damper rods, then check that each piston falls freely by pressing the small lifting pin upwards and letting the pistons fall onto their bridges. A distinct 'click' should be heard. Turn down the jet adjusting nuts or screws 2 turns exactly.

15 Restart the engine, and turn the throttle stop adjusting screws by

equal amounts to give the desired idle speed. To make sure that both carburetors are synchronised, use a length of tubing placed between the carburettor intake and the ear, and adjust the throttle screws fractionally until the hiss from both units is the same. Alternatively, use a balancing device (flowmeter) in accordance with its manufacturer's instructions.

16 With the carburetors correctly synchronised, turn the jet adjusting nuts or screws up or down by equal amounts until the fastest idle speed is obtained, consistent with even running. If necessary, re-adjust the throttle stop adjusting screws by equal amounts until the correct idle speed is re-obtained.

17 Now check the mixture strength on each carburettor separately, using the procedure described in paragraph 5. Stop the engine.

18 Refit the jet cap nuts on thermo-type carburetors.

19 With both throttles closed, tighten the clamping bolt on the interconnection coupling with the pin of the link pin lever resting against the edge of the pick-up lever hole. When forked levers are fitted, set the cranked levers so that the pin is 0.006 in (0.15 mm) from the lower edge of the fork. This makes sure that both (all) carburettor throttles operate simultaneously.

20 Where cold start control (choke) cables are fitted, reconnect them, together with the interconnecting rods, and adjust them with reference to paragraph 6, making sure that both operating arms move simultaneously.

21 Refit the air cleaners and re-check for correct mixture strength.

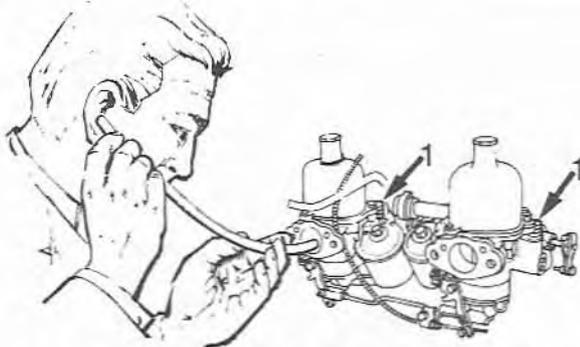


Fig. 5.11 Balancing twin carburetors (Sec 9)

1 Throttle stop adjustment screws

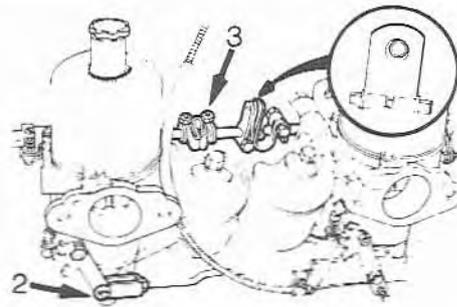


Fig. 5.12 Control couplings on multiple carburettor installations (Sec 9)

2 Throttle spindle coupling

3 Choke control coupling



# Part 4 SU carburetors

## Chapter 18 Type HD

### Contents

	<i>Section</i>		<i>Section</i>
Assembly .....	7	Jet assembly .....	3
Construction .....	2	Operation .....	4
Disassembly .....	6	Special overhaul procedures .....	5
Introduction .....	1	Tuning .....	8

### 1 Introduction

The Type HD (Diaphragm-jet) carburettor was introduced after the Type H. It was manufactured in larger sizes only – 1½ in, 1¾ in and 2 in, being models HD4, HD6 and HD8 respectively, and was therefore generally fitted to larger and heavier cars.

The characteristic features of the Type HD are the methods of metering fuel for idling, and of sealing the jet base.

### 2 Construction

The piston and suction chamber assembly is of the same general design as that of the Type H. The dashpot bore may be either dustproofed or non-dustproofed, and may therefore have un-drilled or drilled piston damper caps respectively.

The jet slides within a bearing, secured to the underside of the body, by the same method as in the Type H, and is surrounded by an open-ended cylindrical housing, cast integrally with the body. The housing is closed by a jet housing, incorporating the jet actuating lever assembly hinged in integrally-cast lugs, and an extension of the float-chamber, the parts being secured to the body by four screws. A flexible diaphragm (fixed to the base of the jet assembly) is clamped between the float chamber extension and the underside of the jet housing, and divides the housing cavity into two chambers. The upper chamber contains the jet actuating (lowering) mechanism and the lower chamber is linked to the float chamber via a drilling in the

extension, and is therefore flooded with fuel. The fuel flows up through the hollow jet to the orifice at the top.

A helical compression spring, fitted between a cup at the base of the jet assembly and a locating spigot in the float chamber extension, loads the jet upwards.

All HD4 and HD6 units are fitted with throttle spindle sealing glands, which minimise inwards air leakage when the spindle bearings become worn. Some HD8 units are also so equipped, while others have no sealing glands and are fitted with replaceable PTFE bushes.

The glands have tapered faces, and are fitted into conical-ended counterbores in the unit body. A helical compression spring, retained by a steel sleeve pressed into the end of the counterbore, compresses the gland so that the bore closes onto the throttle spindle and forms a seal. The glands do not require servicing, and no provision is made for their easy removal.

PTFE bushes are inserted into counterbores in the unit body from inside the bore of the unit. They are retained in position by circular spring clips fitted to the throttle spindle.

The underside of the body has cast ribs, and there is a cast projection at each side of the main bore. The ribs are internally-drilled to form a passage which bypasses the throttle plate when it is closed. One of the side projections houses a screwed needle valve, the end of which intercepts the drilled passage, and functions as a slow running volume screw. The other side projection has a vertical bore in which slides a cam rod, forming part of the cold start enrichment/throttle opening interconnection mechanism. The top end of the cam rod is fitted with a plate, carrying an adjusting screw which bears on the throttle spindle

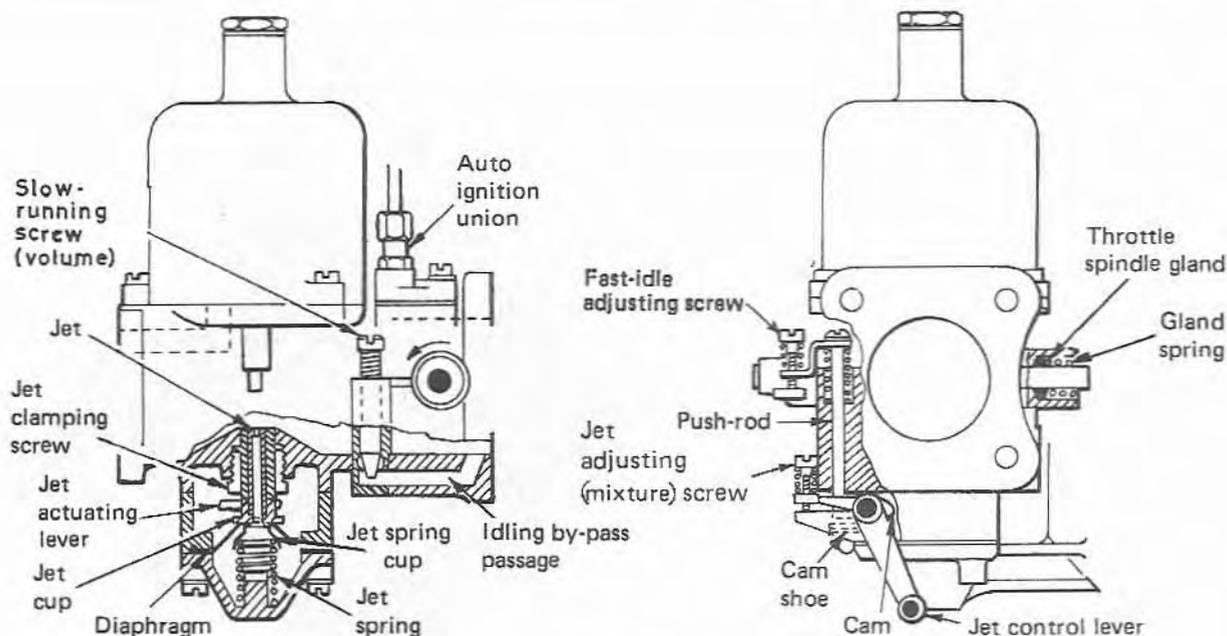


Fig. 6.1 Cutaway view of the Type HD carburettor (Sec 2)

arm. The bottom end is rivetted to an arm, at the end of which is a roller. The roller bears on a cam at the end of the jet actuating lever spindle.

The float chamber assembly is of similar design to Type H, in that it houses a brass float sliding on a central spindle, and the inlet valve is closed by a hinged lever mounted in the detachable float chamber top.

An ignition timing vacuum tapping is provided in the roof of the bore, the fine hole emerging at the edge of the throttle plate when in the closed position. The hole is bored through from a flat projection behind the suction chamber. Connection is made by an adapter plate with a stub pipe, secured to the body with two screws. A gasket is fitted between the body and the plate.

### 3 Jet assembly

The jet assembly consists of a brass jet tube, a flanged collar on which the jet actuating lever bears, a spring cup and a synthetic rubber diaphragm. The component parts are assembled by clamping and pressing and cannot be separated.

The diaphragm has a moulded circumferential rib on its upper surface, which locates in a similar annular groove in the underside of the jet housing and forms the sealing face. Four holes or cut-outs on the periphery accommodate the jet housing securing screws.

The jet size is identified by a code number stamped on the upper surface of the flanged collar.

### 4 Operation

The operation of the unit for acceleration, full throttle and cruise conditions is similar to that of the Type H. The idling condition is different, as the throttle disc is not used for idling mixture volume regulation.

When idling (engine hot), the throttle plate is fully closed in the carburettor bore. Mixture flows from the jet (upstream of the throttle) through the bypass passage, past the slow running volume screw and returns to the bore through a drilling downstream of the throttle plate. This gives more precise control of metering small quantities of mixture, and eliminates the effects of irregular flow around worn throttle plates, bores and spindles.

Note that the idling mixture *strength* is still determined by the position of the jet, and that the slow running volume screw only regulates the *volume* of mixture.

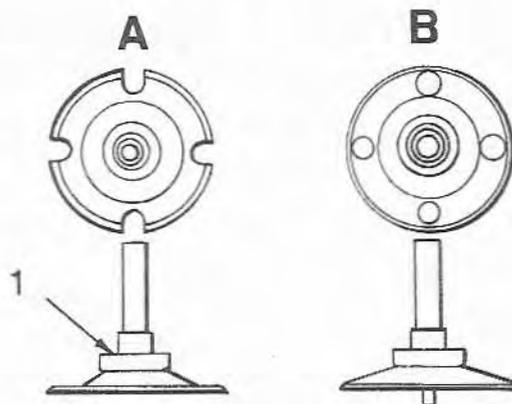


Fig. 6.2 Standard (A) and Rolls Royce (B) jets for the HD carburettor (Sec 3)

1 Jet size code location

Jet sizes: 9 = 0.09 in, 1 = 0.1 in, 125 = 0.125 in

At cold-start condition, the jet is lowered (by operation of the jet control lever) and the throttle interconnection mechanism opens the throttle slightly to a preset amount (determined by adjustment of the fast idle screw). A rich mixture of increased volume is therefore supplied to the engine through both the main throttle valve and the bypass passage.

As the engine warms through, the jet is raised and the throttle is automatically closed by the interaction of the throttle interconnection mechanism, when the 'choke' control is pushed home.

Due to the construction of the linkage in the jet housing, it is possible to obtain a fast-idle condition by pulling out the 'choke' control slightly from its fully closed position. This has the effect of opening the throttle before the jet actuating lever starts to lower the jet.

### 5 Special overhaul procedures

1 Refer to Chapter 4.

2 The SU part numbers for gasket and overhaul packs are as follows:

Carburettor model	Throttle diameter	Gasket pack	Overhaul pack
HD4	1 1/2"	AUE 805S	AUE 855
HD6	1 3/4"	AUE 805S	AUE 855
HDB	2"	AUE 806S	AUE 857

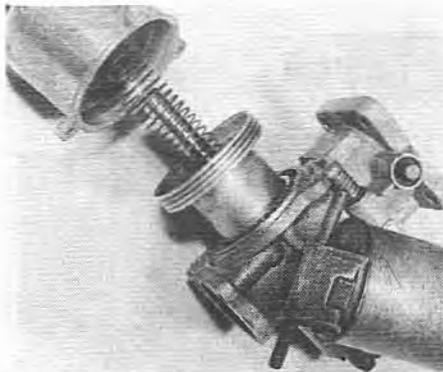
**Note:** Overhaul packs may be difficult to obtain. The 'S' suffix on the gasket pack part numbers indicates that throttle plate screws are included

## 6 Disassembly

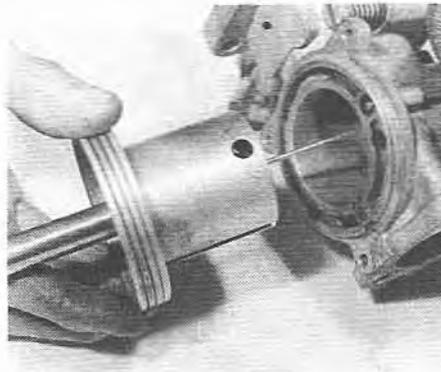
- Clean the outside of the carburettor thoroughly.
- Undo and remove the damper and washer.
- Remove the suction chamber retaining screws and remove the chamber straight up (photo).
- Lift off the piston spring. Carefully lift out the piston and needle assembly (photo). Empty out the damper oil from the piston rod.
- Remove the needle locking screw and withdraw the needle (photos). If it sticks in place, tap the needle inwards first and then pull outwards. Do not bend it.
- Record the positions of the float chamber, jet housing, and carburettor body. Unscrew the float chamber screws, holding the float chamber against the pressure of the jet spring. Carefully detach the float chamber (photos). If a thermostat starting carburettor is fitted, refer to Chapter 10.
- Lift out the jet spring, mark the jet diaphragm opposite one of the screw holes in the jet housing and withdraw the jet assembly (photo).
- Remove the screw from the top of the fast idle pushrod, and lift off the plate (with fast idle adjustment screw) and the return spring (photo).
- Withdraw the fast idle pushrod, then remove the jet housing,

complete with the jet actuating levers (photos).

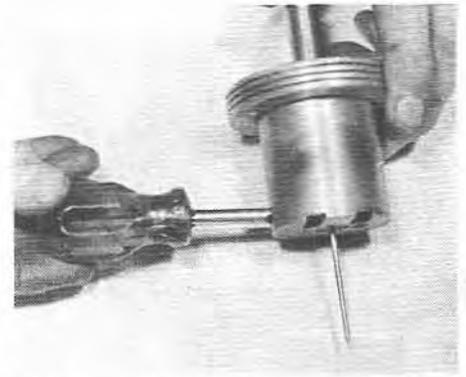
- Slacken and remove the jet locking nut together with the jet bearing (photo).
  - Record the positions of the float chamber and lid. Remove the central nut retaining the float chamber lid together with the vent tube banjo and fibre washer, or cover cap, as applicable.
  - Where a banjo inlet is fitted, unscrew the banjo bolt from the float chamber and remove the bolt, banjo and fibre washers. Pull out the filter and spring assembly from the float chamber lid inlet (photo).
  - Remove the lid and gasket (photo). Pull out the float lever hinge pin from the serrated end. Detach the lever.
  - Extract the float needle from its seating, and unscrew the seating from the lid using a spanner 0.338 in (8.58 mm) across flats (photo). Do not distort the seating.
  - Remove the float from the chamber (photo).
  - Shut the throttle and record the positions of the throttle disc and the carburettor flange.
  - Loosen and remove the disc retaining screws. The ends of the screws will be split to retain them securely – close the split before attempting to remove the screws. Withdraw the disc from its slot in the throttle spindle (photos). The disc is oval, and can jam. Take care to make sure it does not.
  - Slide out the spindle from its bearings (photo).
  - Do not remove the throttle spindle sealing glands.
- Note:** Some Type HDB carburetors are fitted with plastic spindle bushes and have no spindle sealing glands.
- Loosen and remove the slow running volume screw, complete with spring, seal, and brass washer (photo).
  - Remove the two screws and washers holding the vacuum ignition take-off plate and union. Lift off the plate and gasket.
  - Remove the piston lifting pin by extracting the circlip from its groove with the pin pressed upwards. Withdraw the pin and spring downwards.
  - For instructions on cleaning, inspection and repair, refer to Chapter 4.



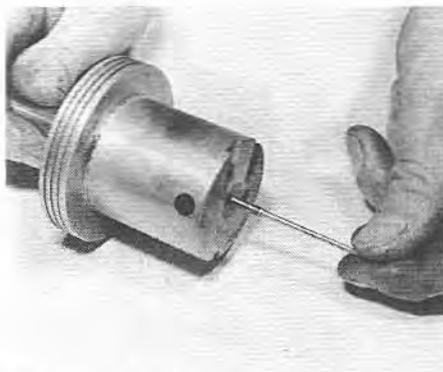
6.3 Removing the suction chamber



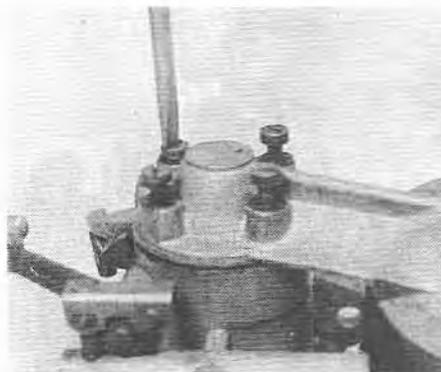
6.4 Removing the piston



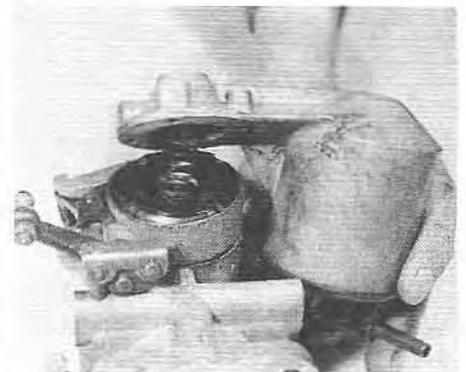
6.5A Extract the locking screw ...



6.5B ... and withdraw the needle



6.6A Remove the screws ...



6.6B ... and lift off the float chamber

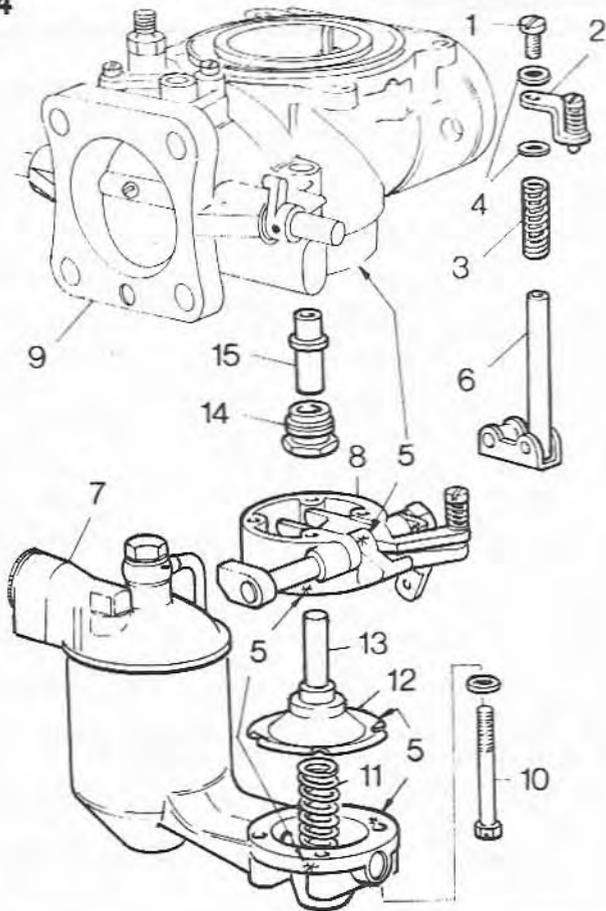


Fig. 6.3 Type HD jet housing components (Sec 6)

- |                         |                        |
|-------------------------|------------------------|
| 1 Plate retaining screw | 9 Carburettor body     |
| 2 Plate                 | 10 Float chamber screw |
| 3 Spring                | 11 Jet spring          |
| 4 Shakeproof washer     | 12 Jet diaphragm       |
| 5 Marks for replacement | 13 Jet assembly        |
| 6 Fast idle pushrod     | 14 Jet locking nut     |
| 7 Float chamber lid     | 15 Jet bearing         |
| 8 Jet housing           |                        |

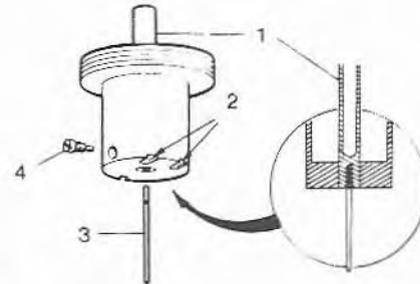
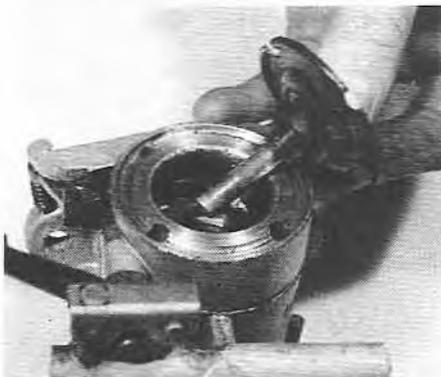
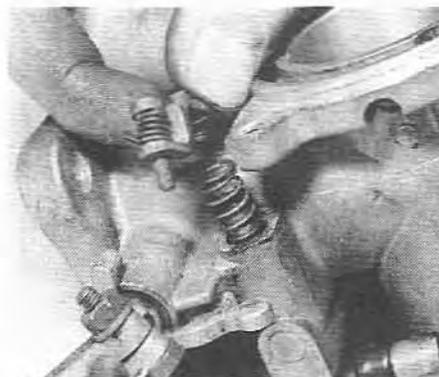


Fig. 6.4 Piston and needle components (Sec 6)

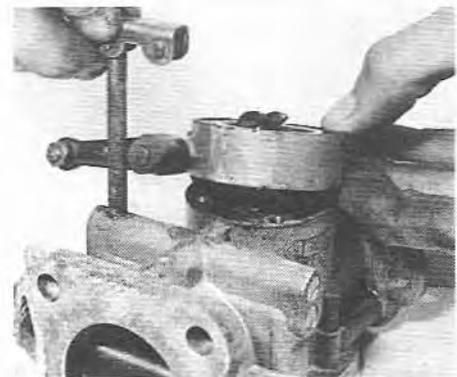
- |                         |                 |
|-------------------------|-----------------|
| 1 Piston rod            | 3 Needle        |
| 2 Vacuum transfer holes | 4 Locking screw |



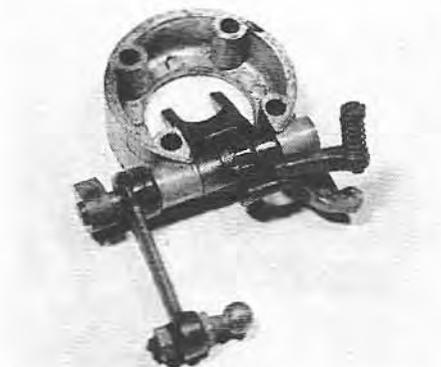
6.7 Withdrawing the jet assembly



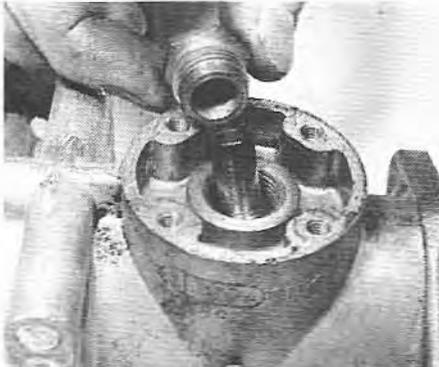
6.8 Removing the fast idle adjustment screw plate



6.9A Fast idle pushrod and jet housing removal



6.9B Jet housing and levers



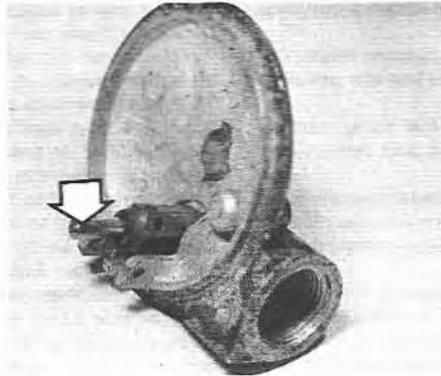
6.10 Jet locking nut and bearing removal



6.12 Removing the banjo inlet and filter from the float chamber lid



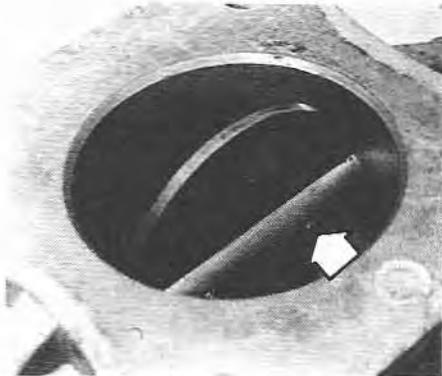
6.13 Removing the hose connection type float chamber lid



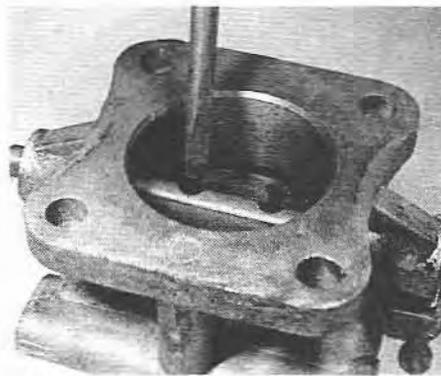
6.14 Float needle (arrowed)



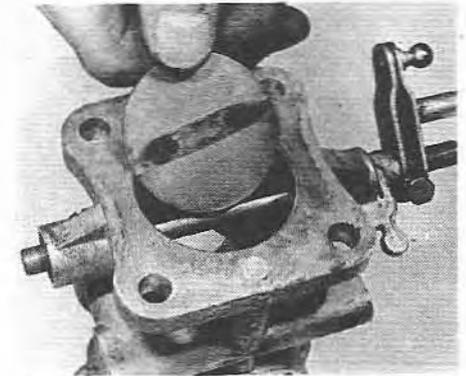
6.15 Lifting the float from the float chamber



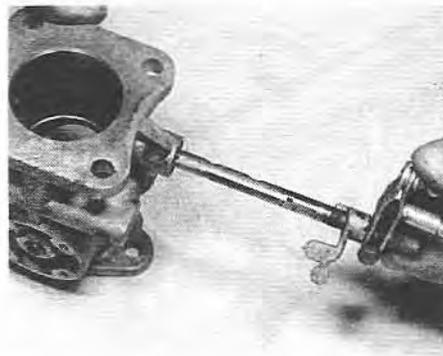
6.17A Showing the split ends of the throttle disc retaining screws (arrowed)



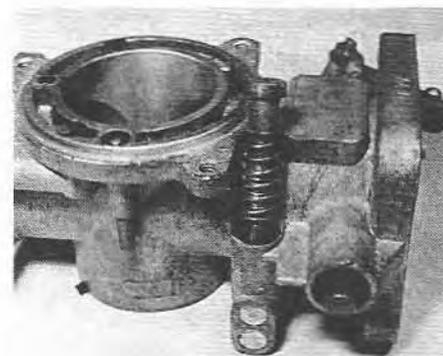
6.17B Extract the screws ...



6.17C ... and withdraw the throttle disc



6.18 Throttle spindle removal



6.20 Removing the slow running volume screw

## 7 Assembly

- 1 Fit the spindle in its bearings.
- 2 Fit the throttle disc to the slot in the throttle spindle in the position marked previously (on disassembly). Note that the countersunk ends of the screw holes in the spindle must face outwards, ie towards the intake flange of the carburettor body. Insert two new retaining screws, but do not tighten. Adjust the disc in the slot until it closes fully in the bore of the carburettor, and tighten the screws. Spread the split ends of the screws just enough to prevent them turning.
- 3 Fit the slow running volume screw, taking care that the brass washer is fitted with its concave face toward the seal.
- 4 Fit the gasket and vacuum ignition take-off plate, with screws and new shakeproof washers. Do not use jointing compound on the gasket.
- 5 Fit the piston lifting pin, spring, new rubber washer, plain washer and circlip.
- 6 Fit the needle to the piston assembly. The lower edge of the groove must be level with the lower face of the piston rod. Fit a new needle locking screw and tighten. Invert the suction chamber and turn the piston assembly inside it to check for concentricity of the needle.
- 7 Check the piston key for security in the carburettor body (photo).
- 8 Fit the jet bearing and jet locking nut. Leave the nut with just enough slack to allow the bearing to be moved from side to side.
- 9 Temporarily fit the jet assembly in the jet bearing in the previously-noted position, and push it fully upwards. Carefully locate the piston and needle in the upper end of the body, and push

downwards. This will centralise the jet, and the jet locking nut may then be tightened. Remove both the piston and jet.

10 Locate the jet housing, complete with the jet actuating levers, on the body in its previously-noted position, then fit the fast idle pushrod and lower it onto the cam (photo).

11 Fit the jet, jet spring and float chamber in the same relative positions as recorded on dismantling (photos). Fit and tighten the securing screws evenly.

12 Fit the fast idle pushrod spring, plate and plate retaining screw with a shakeproof washer on either side of the plate. Make sure the plate is positioned so that the fast idle adjustment screw strikes squarely on the lug of the throttle spindle operating arm.

13 Smear a little oil on the piston rod, then fit the piston to the suction chamber without the spring. With the piston fully inserted, seal the transfer holes (with plasticine or similar product), then invert the assembly and allow the suction chamber to fall from the piston. Check the time this takes. It should be between 5 and 7 seconds. If the time taken exceeds that, the cause will be thick oil on the piston rod, or an oil film on the piston or inside the suction chamber. Remove the oil

from the points suggested and re-test.

14 Fit the piston assembly to the body, and locate the piston spring on the piston rod. Fit the suction chamber and retaining screws. Tighten the screws evenly.

15 Fit the needle seating and needle to the float chamber lid.

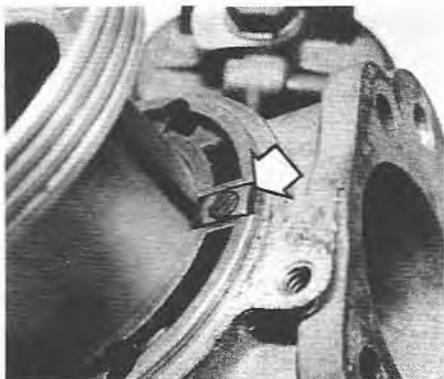
16 Fit the float lever and press in the lever hinge pin to secure. Check the float level as described for the Type H carburettor in Chapter 5, Section 8, paragraph 6 (photo).

17 Refit the float to the float chamber.

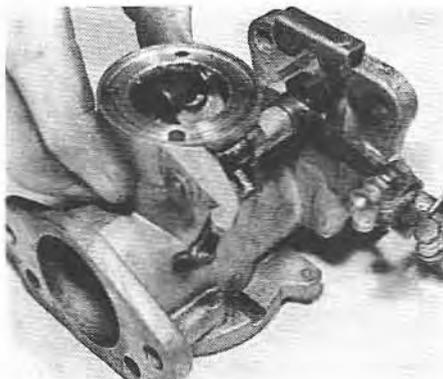
18 Fit the gasket to the lid, and refit the lid on the float chamber in the same position as recorded on dismantling. Fit the fibre washer, vent tube banjo, plain washer, and nut or cover cap and nut, as applicable. Do not overtighten the nut.

19 Where a banjo inlet is fitted, insert the filter, spring end first, followed by the banjo, fibre washers, and bolt. The recessed side of the banjo must face outwards (ie abutting the bolt head).

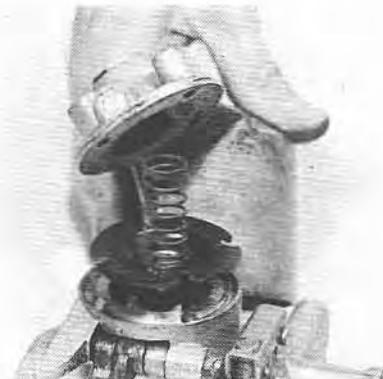
20 Top up the piston rod with oil as described in Section 8, then fit and tighten the damper rod.



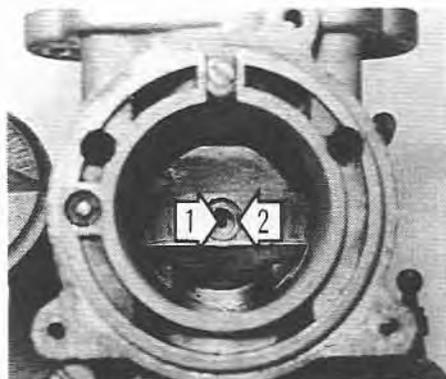
7.7 Piston key location (arrowed)



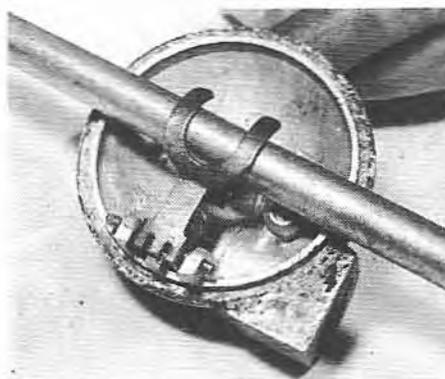
7.10 Refitting the jet housing



7.11A Refitting the float chamber



7.11B Top view of the jet (1) and jet bearing (2)



7.16 Checking the float level

## 8 Tuning

**Note:** Refer to Chapter 3 for notes on tuning, with particular reference to preliminary procedures. If a thermostatic starting carburettor is fitted, refer also to Chapter 21.

### Single carburettor installations

1 Set the initial fast idle and slow running volume screws. Run the engine up to a normal running temperature. Switch off the engine. Unscrew the fast idle adjusting screw where fitted to clear the throttle spindle arm with the throttle closed. Screw down the slow running volume screw onto its seating, then unscrew it  $3\frac{1}{2}$  turns.

2 Set the jet height. Remove the piston and suction chamber unit. Turn the jet adjusting (mixture) screw until the jet is flush with the bridge of the carburettor.

3 Set the jet adjusting (mixture) screw. Refit the piston and suction chamber unit. Check that the piston falls freely onto the bridge when the lifting pin is released. Lower the jet by turning the jet adjusting screw clockwise  $2\frac{1}{2}$  turns.

4 Set the idle speed. Start the engine and adjust the slow running volume screw to give the desired idle speed. Turn the jet adjusting screw anti-clockwise to weaken, or clockwise to richen, until the fastest idle speed, consistent with even running, is obtained. Re-adjust the slow running volume screw to give the correct idle speed, if necessary.

5 Check the mixture strength (CO content) as described in Chapter 5, Section 9.

6 Connect and set the mixture control wire (except on thermo-type carburettor). Connect the mixture control wire with about 0.0625 in (1.6 mm) free movement before it starts to pull on the jet lever. Pull the choke knob at the fascia until the linkage is about to move the

carburettor jet operating arm, and adjust the fast idle screw to give an engine speed of about 1000 rpm when the engine is hot. Return the choke knob, and check that there is some clearance between the fast idle screw and the throttle stop.

7 Fill the damper. Finally top up the piston damper with engine oil, until the level is 0.5 in (13 mm) below the top of the hollow piston rod. On non-dustproofed carburetors, (identified by a vent hole in the piston damper top) the oil level should be 0.5 in (13 mm) above the top of the hollow piston rod.

#### Multiple carburettor installations

8 Run the engine to normal operating temperature then switch off.

9 Slacken one of the pinch-bolts on the throttle spindle coupling, then hold both throttle butterfly plates fully closed and re-tighten the pinch-bolt. Where throttle adjusting screws are fitted, these must be adjusted so that both throttle plates are fully closed before tightening the pinch-bolt.

10 Screw in each of the slow running volume screws until they are fully seated, then unscrew each screw exactly two turns.

11 Remove the pistons and suction chambers, and unscrew each of the jet adjusting (mixture) screws until each jet is flush with the bridge of its carburettor.

12 Refit the pistons and suction chambers, and then check that each piston falls freely by pressing the small lifting pin upwards and letting the pistons fall onto their bridges. A distinct 'click' should be heard.

13 Turn each of the jet adjusting (mixture) screws clockwise  $2\frac{1}{2}$  turns, then top up the piston dampers with engine oil.

14 Restart the engine and adjust each of the slow running volume screws by equal amounts to give the desired idle speed. To make sure that both carburetors are synchronized, use a length of tubing placed between the carburettor intake and the ear, and adjust the slow running volume screws fractionally until the hiss from both units is the same. Alternatively, use a balancing device (flowmeter) in accordance with its manufacturer's instructions.

15 With the carburetors correctly synchronized, screw the jet adjusting (mixture) screws up or down by equal amounts until the fastest idle speed is obtained, consistent with even running. If necessary, re-adjust the slow running volume screws by equal amounts until the correct idle speed is re-obtained.

16 Now check the mixture strength on each carburettor separately using the procedure described in Chapter 17, Section 9. Stop the engine.

17 Where cold start control (choke) cables are fitted, adjust them with reference to paragraph 6.

Piston lifting pin

Slow-running volume screw

Throttle adjusting screw (not on all units)

Fast-idle adjusting screw

Jet adjusting (mixture) screw

Fig. 6.5 Type HD carburettor adjustment points (Sec 8)

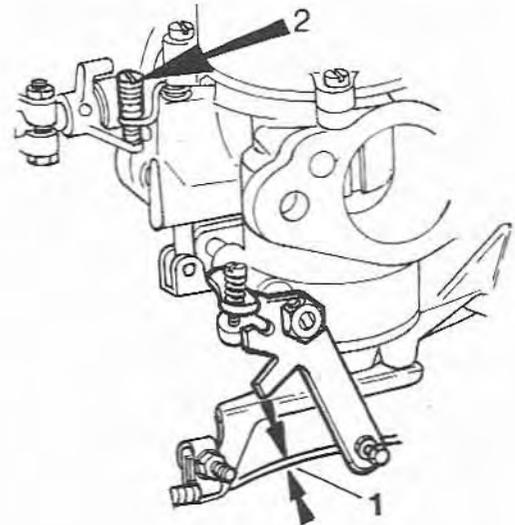
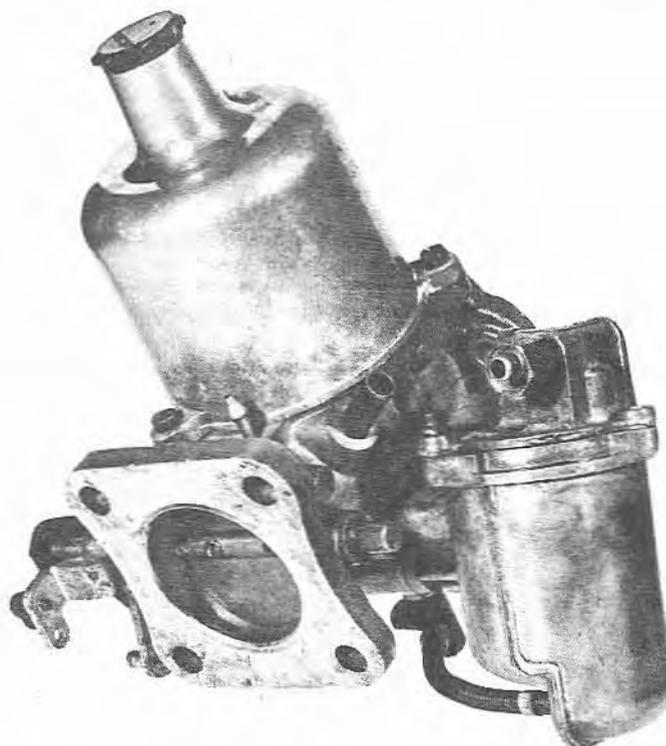


Fig. 6.6 The cold start control (choke) cable free movement (1) and fast idle adjusting screw (2) (Sec 8)



## Part 4 SU carburetors

### Chapter 19 Type HS

#### Contents

	<i>Section</i>		<i>Section</i>
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Disassembly .....	7	Piston and needle .....	4
Float chamber assembly .....	3	Special overhaul procedures .....	6
Introduction .....	1	Tuning .....	9
Jet assembly .....	2		

#### 1 Introduction

The Type HS carburettor was introduced in the late 1950s and came into widespread use in the early 1960s. It does not supersede Types H or HD, but was produced together with these units. It was probably the most popular type of SU carburettor in service at the time.

The Type HS is basically a development of the Type H unit. The main improvement is in the jet assembly, which was designed to eliminate the troublesome gland seals of the previous carburettor, and it is this feature by which it is easily identified. The float chamber is also of a different design, and incorporates a float moulded from a plastic material instead of the previous brass type. On some models, the throttle valve incorporates an overrun valve to improve combustion during overrun conditions (Fig.7.1).

#### 2 Jet assembly

Petrol from the float chamber flows direct to the base of the jet through a plastic tube. The tube is flexible, which allows the jet to

move down in its holder to give the necessary degree of enrichment for starting. This dispenses with the necessity of a petrol-filled annulus surrounding a drilled jet tube (as in Type H), and the attendant seals or glands at the base of the annulus to allow an extension of the tube to project through for external operation.

The jet assembly consists of an accurately-machined brass tube (the jet), a flexible feed pipe, and a plastic moulding into which both items are inserted. They are secured by contraction of the moulding by means of conical metal collars pressed on. Short brass reinforcing sleeves are fitted inside each end of the flexible pipe to prevent it being crushed. The flexible feed pipe is secured to the base of the float chamber by a union nut and rubber sealing washer. Where the carburettor is fitted to automatic transmission models, the jet assembly may incorporate a fuel temperature compensation device, which raises the fuel jet slightly with increasing fuel temperatures, and lowers it slightly with decreasing fuel temperatures. The device is called a *capstat*, and consists of a wax pellet contained inside a capsule, with the jet assembly mounted above. It essentially responds to the varying ambient air temperature within the engine compartment.

The jet holder is a brass tube, in which the jet is a sliding fit, externally flanged at the top and threaded at the bottom. It is held to the underside of the carburettor body by a large, steel nut which

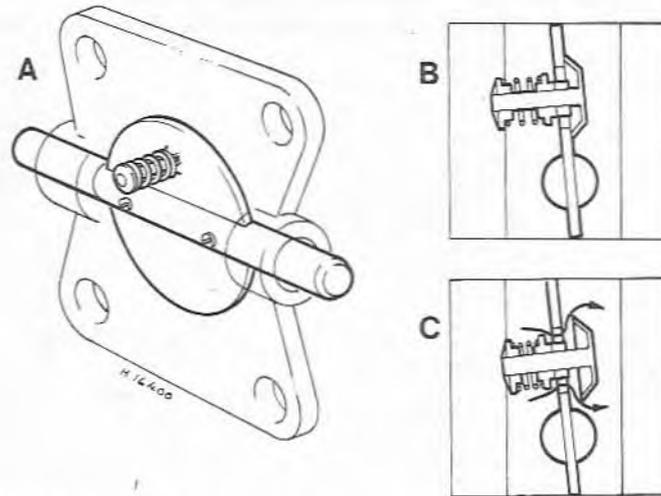


Fig. 7.1 Diagram of overrun valve fitted to throttle valve (Sec 1)

A Overrun valve location

B Overrun valve closed (engine idling)

C Overrun valve open (engine on overrun)

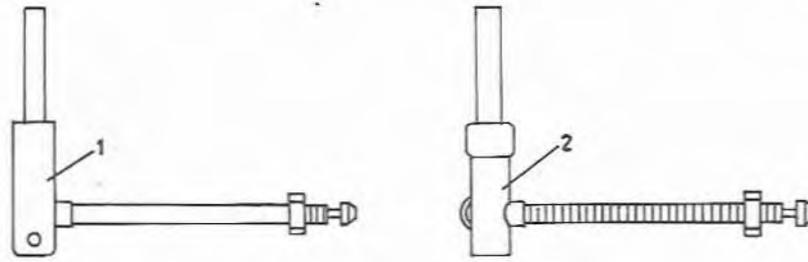


Fig. 7.2 Early HS jet assemblies (Sec 2)

1 Brass

2 Plastic

HS 2, 4 & 6 JET

HS4C & HS8 JET

HS CAPSTAT JET

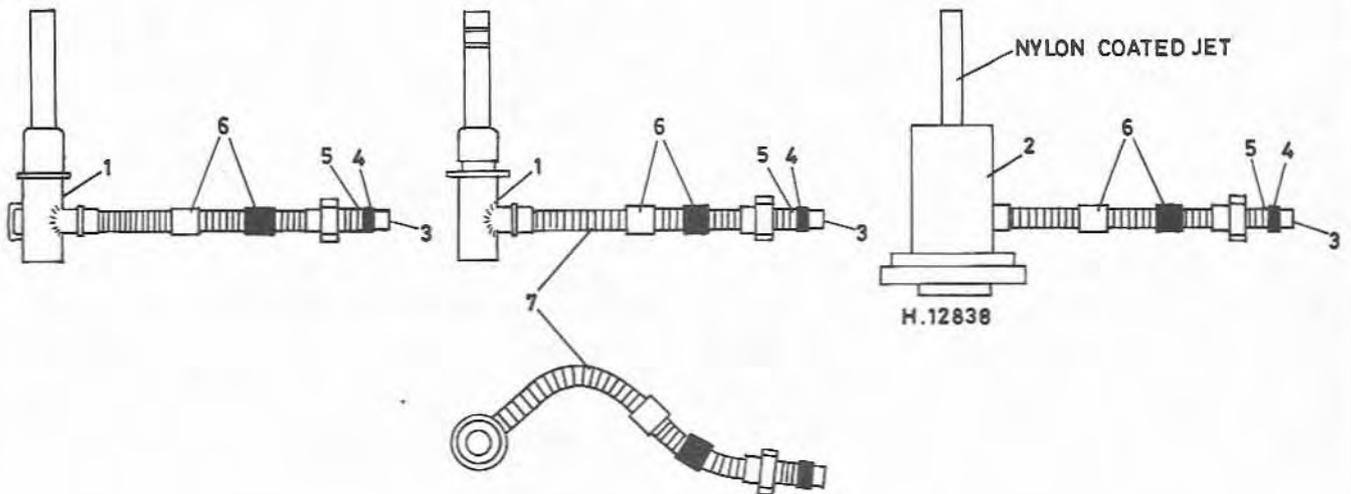


Fig. 7.3 Later HS jet assemblies (Sec 2)

1 Plastic  
2 Die cast

3 Brass sleeve  
4 Rubber washer

5 Brass washer  
6 Plastic identification sleeves

7 Moulded swan neck for type HS8

clamps the flange against the end of a counterbored hole in the body. the hole in the nut is considerably larger than the external diameter of the jet holder, thus permitting sideways adjustment of the jet assembly to centre it relative to the needle.

A helical compression spring and long nut are fitted to the threaded portion at the bottom of the jet holder. The underside of the nut is in contact with the metal collar on the jet assembly moulding, thus the vertical position of the jet is controlled by screwing the nut up or down. The jet is held in contact with the nut by spring loading on the external (choke) linkage. On type HS4C and HS8 carburetors, the jet holder is retained with a bracket and two screws, and the jet position is adjusted by a linkage and adjustment screw.

The jet may be any of three sizes, according to the size and application of the carburettor. The size denotes the diameter of the bore and is 0.09 in, 0.10 in or 0.125 in. This is identified by the number of machined grooves at the top of the jet, being none, one, and two, respectively.

If replacing a jet, ensure that the replacement has the same number of grooves, the same colour of jet head (the plastic moulding), and the same number (one, two or three) and colour of plastic sleeves on the flexible feed pipe as the original one. Each jet has a separate part number, and its application is dictated by the following features:

- (a) Angle of float chamber
- (b) Carburettor size
- (c) Interconnection (right- or left-hand)
- (d) Jet size

On more recent models the jet adjusting nut may be tamperproofed, to discourage unauthorized adjustment, by fitting a plastic clamp over both the adjusting nut and the jet locking nut. The clamp is designed to break when it is removed, so that a new one must be fitted after making an adjustment. The throttle adjusting screw may be tamperproofed by fitting a metal cap over it. The cap may be levered out using a pointed instrument, and should also be renewed after making an adjustment.

### 3 Float chamber assembly

The float chamber is of different design from the previous Types H and HD, due to the different design of jet assembly, and a simplification and improvement in construction and operation.

The chamber is attached to the carburettor body by a single bolt screwed into a tapped boss cast on the side of the chamber. This enables the chamber to be rotated, within limits, to suit either horizontal or semi-down draught installation, thereby eliminating the need for different castings. An adapter bush with locating tongues, interposed between the chamber and the body, ensures correct orientation for any particular installation. The fuel outlet from the chamber is arranged so that there is a sediment-well surrounding it. Where the outlet emerges from the chamber, the boss is tapped to accept the union nut of the jet connection pipe.

The detachable float chamber lid incorporates lugs which carry the float lever hinge pin. The fuel inlet is a stub (brass pipe) for connection to a push-on flexible pipe, and the vent is a horizontal drilling immediately below it, the outlet being shielded by a baffle plate to prevent the entry of dirt, and to prevent fuel being ejected forcibly from it, should the inlet valve stick open.

The inlet valve may be either the brass type with a steel needle, as on Types H and HD, or may be a plastic-bodied, spring-loaded type. This latter type was introduced on the Type HS to overcome the effects of engine vibration, which tends to affect the seating of the inlet valve.

To further assist in reducing the effects of vibration, the float chamber may be flexibly mounted by the inclusion of rubber bushes between it and the carburettor body. The float is formed by two plastic mouldings – on some types a steel arm is fitted to the float for adjustment purposes.

### 4 Piston and needle

On some applications, the needle is spring-loaded in the piston, and biased toward the engine side of the jet. This provides more accurate metering of the fuel. A spring seat is fitted inside the piston rod, and a flanged collar is fitted to the top of the needle. The spring

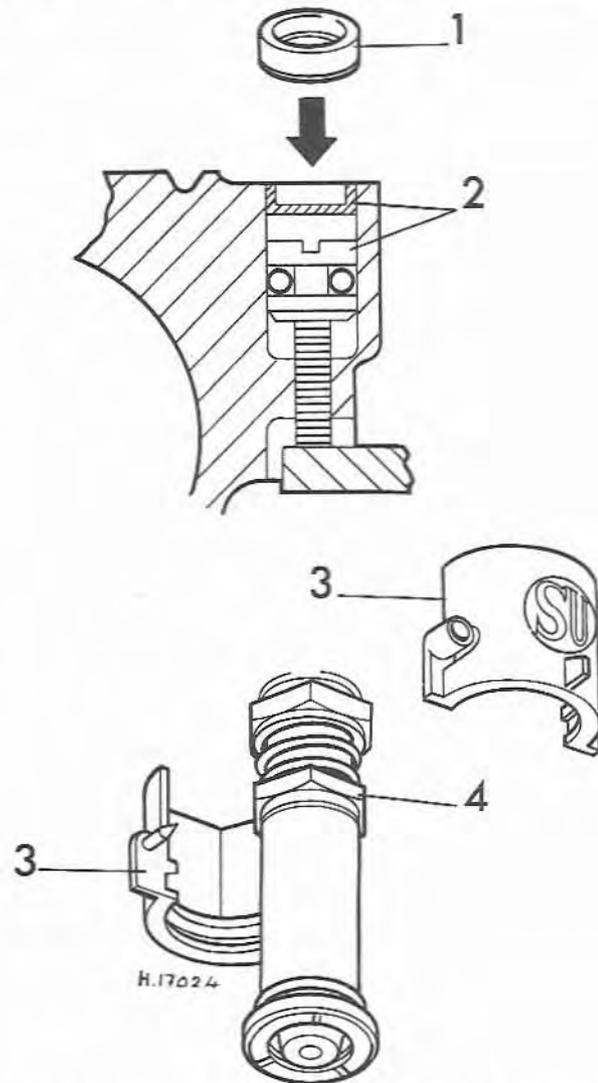


Fig. 7.4 Tamperproof cap and clamp fitted to later models (Sec 2)

- 1 Throttle adjusting screw cap
- 2 Throttle adjusting screw showing cap in position
- 3 Plastic clamp
- 4 Jet adjusting nut

presses the needle collar onto a guide, which is clamped in the piston by a locking screw. the upper surface of the guide is machined at an angle to provide the bias to the needle.

### 5 Operation

The operation of the carburettor for cold start, idling, acceleration and cruise conditions is the same as for the Type H.

### 6 Special overhaul procedures

- 1 Refer to Chapter 4.
- 2 Service and repair kits are available under SU part numbers according to vehicle model. Gasket packs are available under the following part numbers:

Carburettor model	Throttle diameter	Gasket pack
HS2	1 1/4"	AUE 810S
HS4	1 1/2"	AUE 811S

HS6  
HS8

1 3/4"  
2"

AUE 812S  
AUE 813S

**Note:** The 'S' suffix on gasket pack part numbers indicates that throttle plate screws are included

### 7 Disassembly

- 1 Take off the baffle plate from the vent pipe and thoroughly clean the outside of the carburettor.
- 2 Record the relative positions of the suction chamber and the carburettor body.
- 3 Unscrew and remove the damper and its washer. Where a retaining clip is fitted, give the damper a sharp tug to release the clip from the piston rod (photos).

- 4 Unscrew the suction chamber retaining screws and lift off the chamber without tilting it (photo). Take off the piston spring and washer (if fitted).
- 5 Lift out the piston assembly carefully, and empty the oil from the piston rod.
- 6 Undo the needle locking screw and withdraw the needle (photos). If it sticks, tap the needle inwards first, and then pull outwards. Do not bend the needle. Where fitted, recover the guide and spring.
- 7 If a piston lifting pin with an external spring is fitted, remove the spring retaining circlip and spring, then push the lifting pin upwards to remove it. For the concealed-spring type, press the pin upwards, detach the circlip, and withdraw the pin and spring downwards.
- 8 Support the moulded base of the jet, and loosen the screw retaining the jet pick-up link.
- 9 Relieve the tension of the pick-up lever return spring, and remove the screw and brass bush (if fitted).
- 10 Undo the brass union nut retaining the flexible jet feed pipe to the

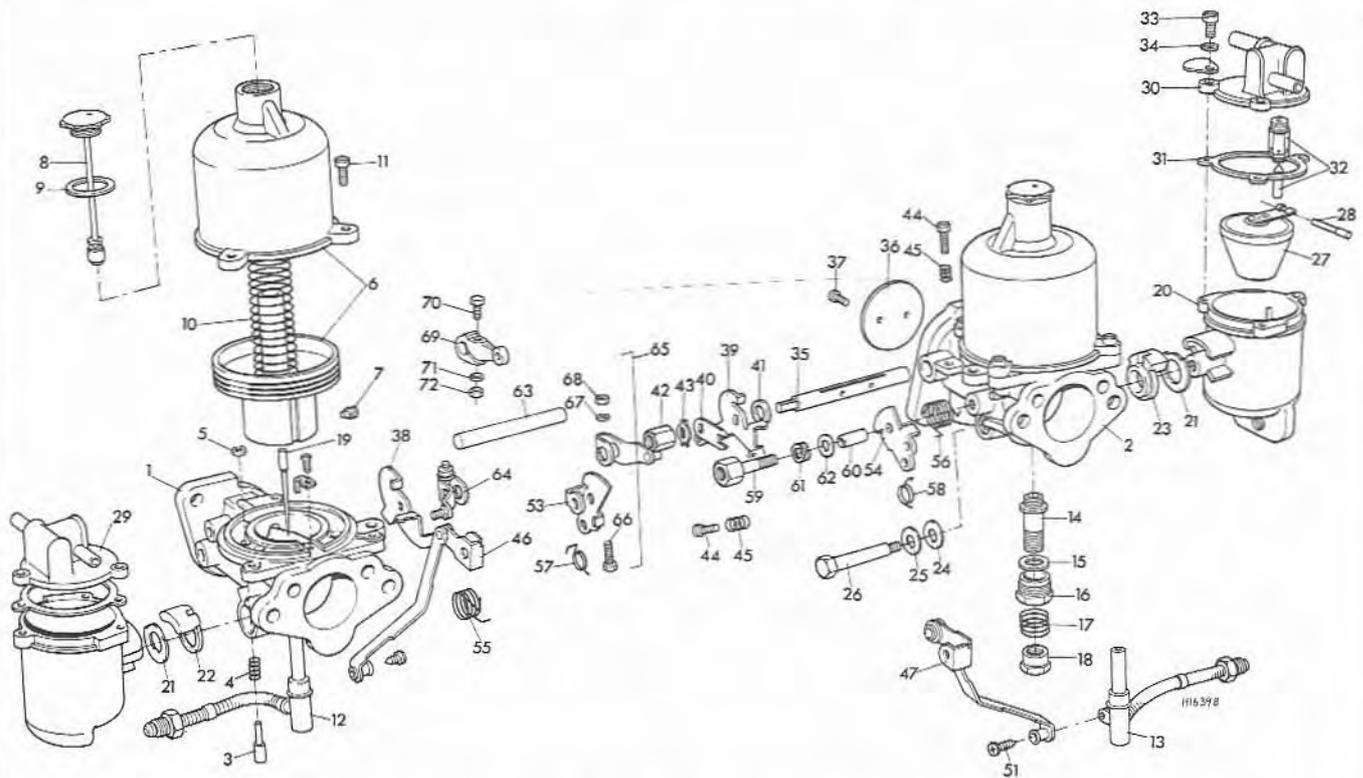


Fig. 7.5 Exploded view of twin HS4 carburettor installation (Sec 7)

- |                                     |                                |                                                |                                               |
|-------------------------------------|--------------------------------|------------------------------------------------|-----------------------------------------------|
| 1 Body - front carburettor          | 17 Spring                      | 36 Throttle disc                               | 57 Spring - front carburettor                 |
| 2 Body - rear carburettor           | 18 Screw                       | 37 Screw                                       | 58 Spring - rear carburettor                  |
| 3 Pin                               | 19 Needle                      | 38 Lever - front carburettor                   | 59 Bolt                                       |
| 4 Spring                            | 20 Float chamber               | 39 Lever - rear carburettor                    | 60 Tube                                       |
| 5 Circlip                           | 21 Washer                      | 40 Lever                                       | 61 Washer                                     |
| 6 Chamber and piston assembly       | 22 Grommet - front carburettor | 41 Washer                                      | 62 Washer                                     |
| 7 Screw                             | 23 Grommet - rear carburettor  | 42 Nut                                         | 63 Rod                                        |
| 8 Cap and dampers assembly          | 24 Washer                      | 43 Washer                                      | 64 Lever and pin assembly - front carburettor |
| 9 Washer                            | 25 Plain washer                | 44 Screw                                       | 65 Lever and pin assembly - rear carburettor  |
| 10 Spring                           | 26 Bolt                        | 45 Spring                                      | 66 Bolt                                       |
| 11 Screw                            | 27 Float assembly              | 46 Lever and link assembly - front carburettor | 67 Washer                                     |
| 12 Jet assembly - front carburettor | 28 Pin                         | 47 Lever and link assembly - rear carburettor  | 68 Nut                                        |
| 13 Jet assembly - rear carburettor  | 29 Lid - front carburettor     | 51 Screw                                       | 69 Lever                                      |
| 14 Jet bearing                      | 30 Lid - rear carburettor      | 53 Lever - front carburettor                   | 70 Bolt                                       |
| 15 Washer                           | 31 Washer                      | 54 Lever - rear carburettor                    | 71 Spring washer                              |
| 16 Screw                            | 32 Needle and seat assembly    | 55 Spring - front carburettor                  | 72 Nut                                        |
|                                     | 33 Screw                       | 56 Spring - rear carburettor                   |                                               |
|                                     | 34 Washer                      |                                                |                                               |
|                                     | 35 Throttle spindle            |                                                |                                               |

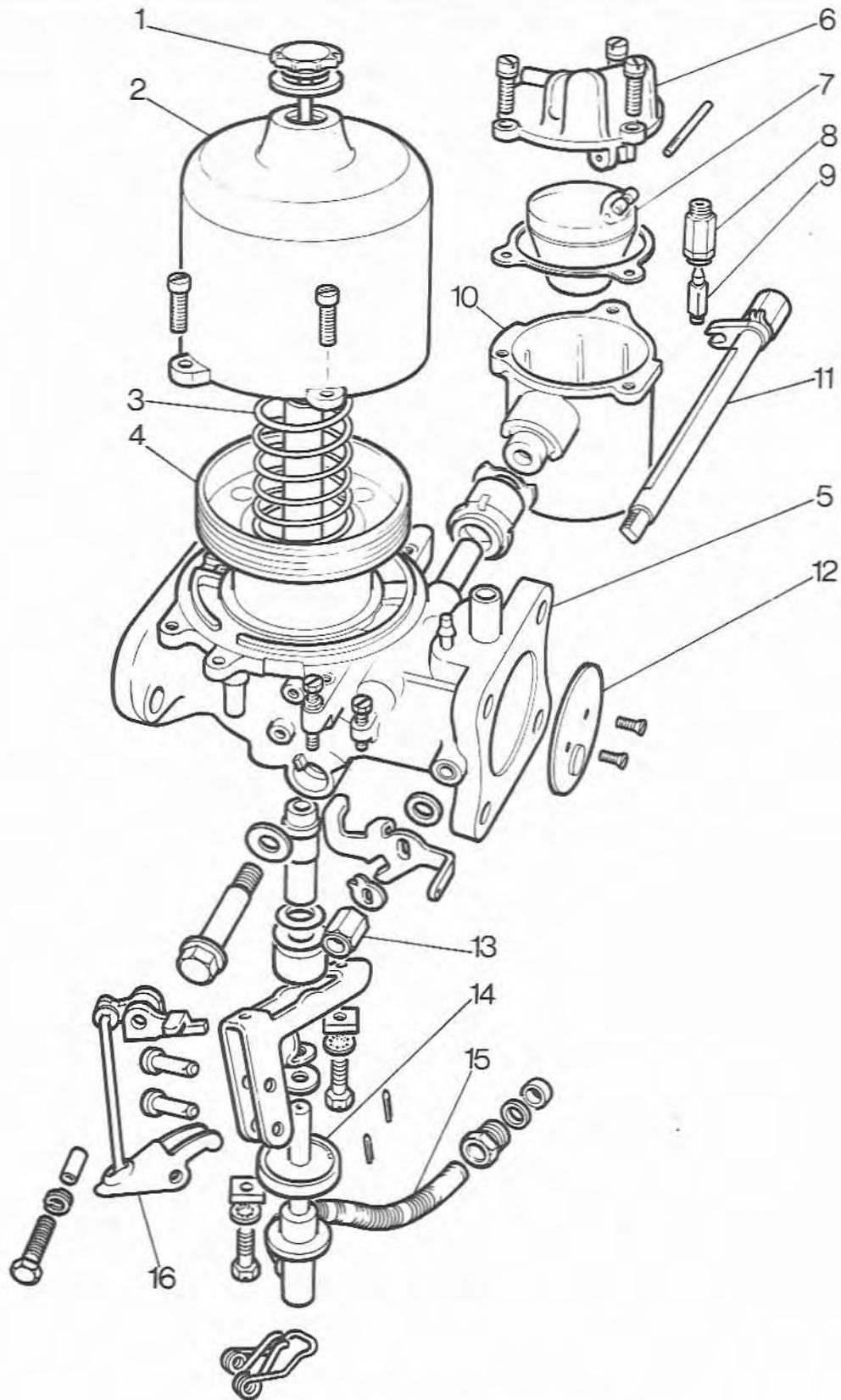


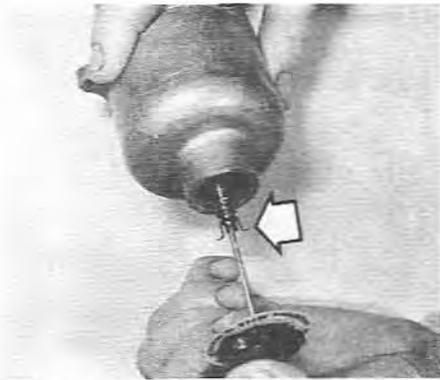
Fig. 7.6 Exploded view of HS8 carburettor (Sec 7)

1 Damper  
2 Suction chamber  
3 Spring  
4 Piston

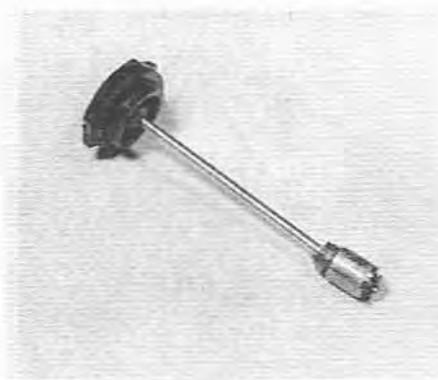
5 Body  
6 Float chamber lid  
7 Float  
8 Needle valve seating

9 Needle  
10 Float chamber  
11 Throttle valve spindle  
12 Throttle valve

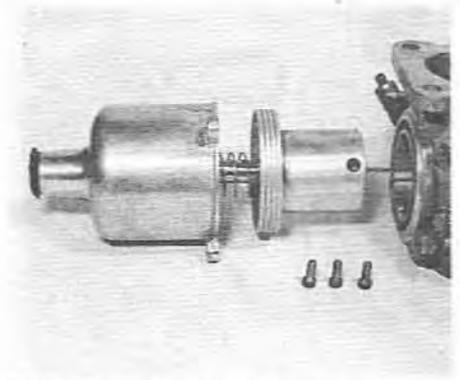
13 Spindle nut  
14 Jet assembly  
15 Flexible feed pipe  
16 Jet fork



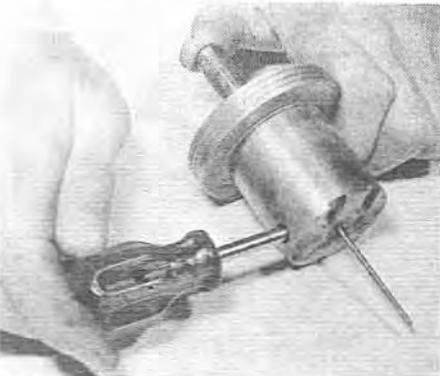
7.3A Removing a damper fitted with a retaining clip (arrowed)



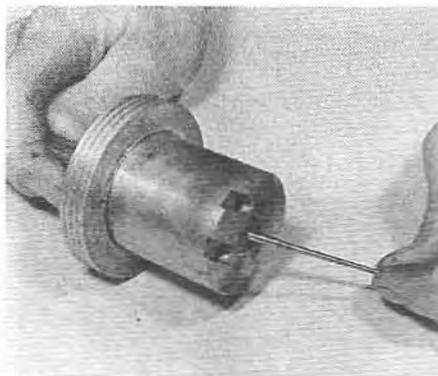
7.3B Standard damper



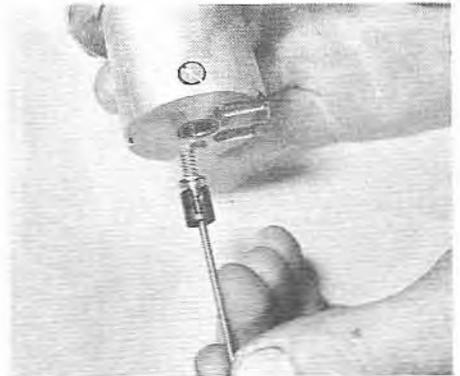
7.4 Removing the suction chamber



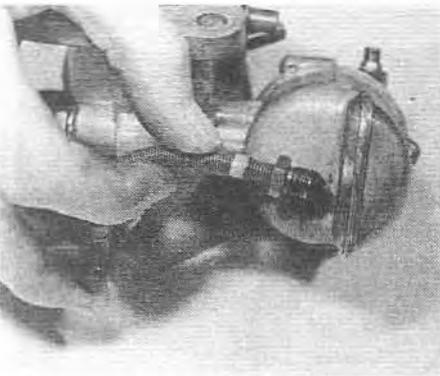
7.6A Undo the locking screw ...



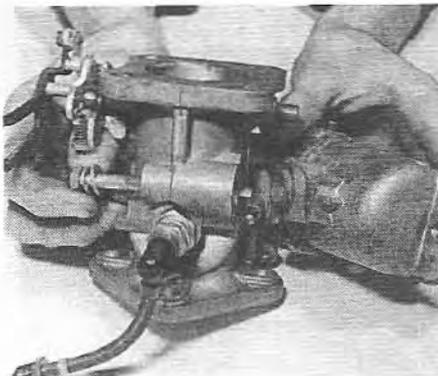
7.6B ... and withdraw the needle



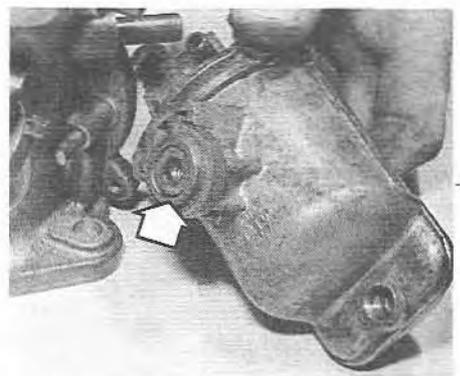
7.6C Removing the spring-loaded type needle



7.10 Jet feed pipe removal from the float chamber



7.11A Float chamber removal



7.11B Float chamber adapter bush location (arrowed)

float chamber (photo).

11 Unscrew the bolt retaining the float chamber to the carburettor body, and withdraw the float chamber. Note the location of the adapter bush and (where fitted) the flexible rubber mountings (photos).

12 Slide the jet from its bearing (photo).

13 Unscrew and remove the jet locking nut, together with the adjusting nut (photo). Unscrew the adjusting nut and separate the spring and jet bearing. On HS4C and HS8 carburetors, unscrew the clamp screws.

14 Record the seating points of the two ends of the pick-up lever return spring. Unscrew the lever pivot bolt, together with its double-coil spring washer, or spacer. Take off the lever assembly and return spring (photo).

15 Record the seating of the two ends of the cam lever spring, and push out the pivot bolt tube or tubes. Take care not to lose the spring. Lift off the cam lever, noting the washer between the two levers.

16 Record the location of the float chamber lid. Undo the lid retaining

screws and take off the lid and its gasket, complete with float assembly (photo).

17 Pull out the float hinge pin from the serrated end, and detach the float (photo).

18 Extract the float needle from its seating and unscrew the seating from the lid, using a spanner 0.338 in (8.58 mm) across flats.

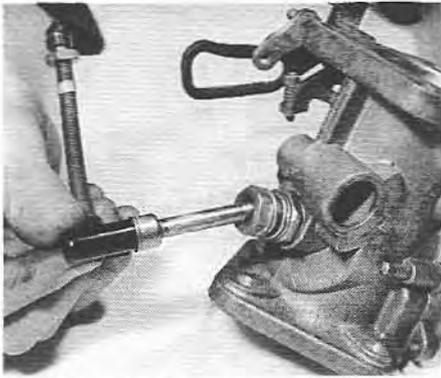
19 Shut the throttle and record the relative positions of the throttle disc and the carburettor flange.

20 Unscrew the two disc retaining screws. Open and ease out the disc from its slot in the throttle spindle (photos). The disc is not round but oval, and will jam if care is not taken.

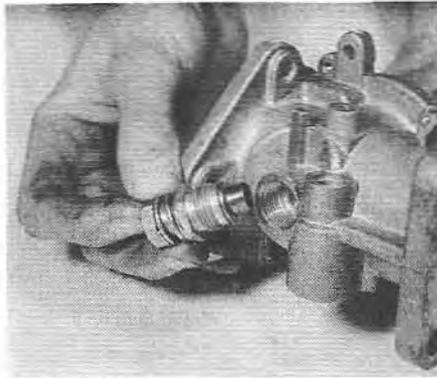
21 Bend back the tabs of the washer securing the spindle nut. Note the location of the lever arm in relation to the spindle and carburettor body; remove the nut and arm (photo).

22 Withdraw the spindle (photo).

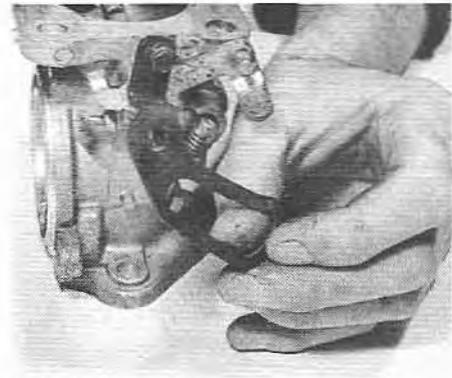
23 For instructions on cleaning, inspection and repair, refer to Chapter 4.



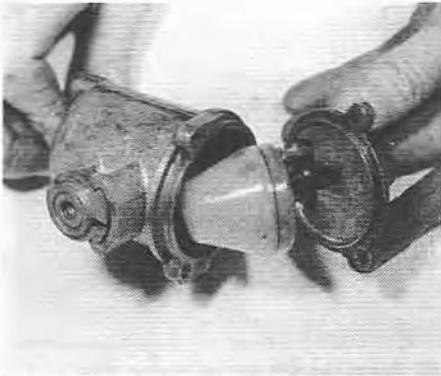
7.12 Removing the jet assembly



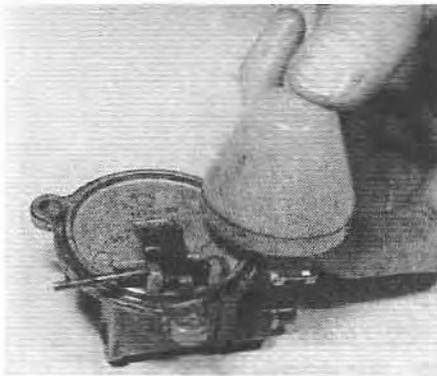
7.13 Removing the jet locking and adjusting nuts



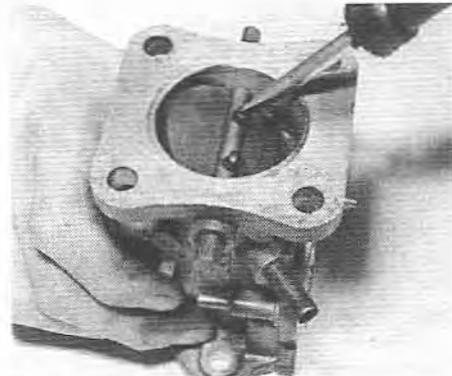
7.14 Pick-up lever removal (except HS8)



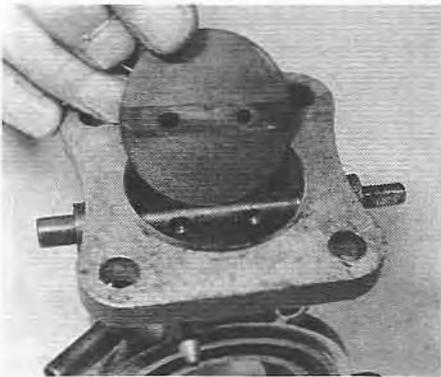
7.16 Removing the float chamber lid



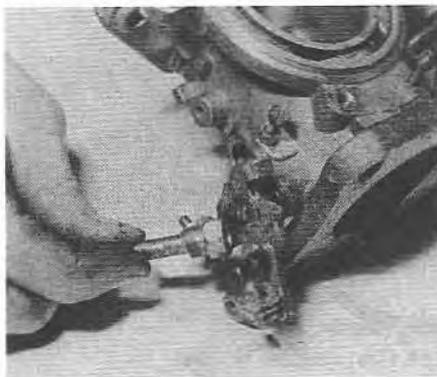
7.17 Float removal



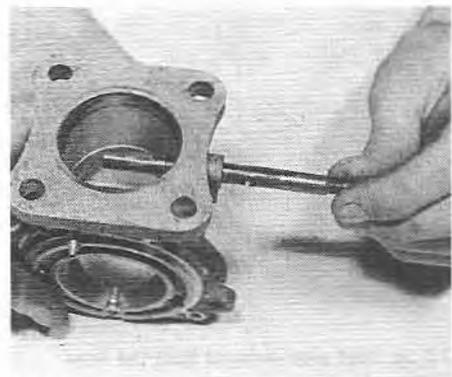
7.20A Remove the screws ...



7.20B ... and lift out the throttle disc



7.21 Spindle nut removal



7.22 Removing the throttle spindle

## 8 Assembly

1 Oil the spindle, then fit it to the body. Fit the lever arm, new tab washer and spindle nut. Check that when the stop on the lever arm is against the abutment on the body, the countersunk ends of the holes in the spindle face towards the intake end of the carburettor. Tighten the spindle nut, and lock with one of the two pointed tabs. This enables the tab washer to be re-used. Bend the square tab over the lever arm.

2 Slide the throttle disc into the slot in the spindle in the same relative position marked on disassembly, and fit two new throttle screws. Do not tighten at this stage. Close the throttle, when the disc will centre itself in the bore. Check visually that contact is made between the disc and the bore throughout its circumference. Check with the throttle closed that there is clearance between the throttle and the carburettor

body. Without moving the disc in the slot, tighten the screws and spread the split ends sufficiently to prevent the screws coming undone (photo).

3 Screw the needle valve seating into the float chamber lid. Do not overtighten. Insert the needle into the seating, and check that the spring-loaded plunger in the needle operates freely. Fit the float assembly and retain with the hinge pin. Check that the float hinges freely. With the float assembly resting on the needle valve, check that the gap between the float lever, or float itself, and the rim of the float chamber lid is between 0.126 and 0.189 in (3.2 and 4.8 mm). Use a twist drill or length of metal bar to make the check (photo). Where a steel arm is fitted, adjustment is possible by carefully bending the arm. However, where an all-plastic float is fitted, it will be necessary to increase or decrease the washer thickness under the needle seat (photos).

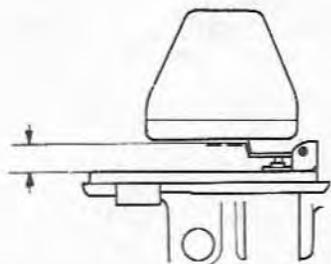


Fig. 7.7 Float level setting – steel arm type (Sec 8)

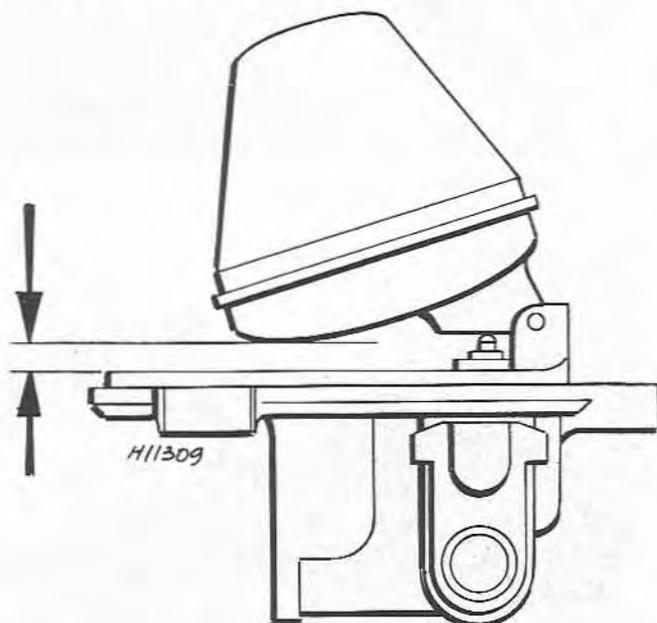


Fig. 7.8 Float level setting – all-plastic type (Sec 8)

4 Fit a new float chamber lid gasket (do not use jointing compound) and fit the lid to the float chamber in the same relative position marked on disassembly. Fit and evenly tighten the securing screws. Fit the identity tag under one of these screws.

5 Fit the float chamber assembly to the carburettor body, with spacers between the two as necessary. Ensure that the registers on the body and the chamber engage correctly. If the chamber is flexibly mounted, ie with rubber spacer(s), use new items. Fit and tighten the retaining bolt, but take care not to overtighten.

6 Fit the piston lifting pin, spring, new rubber sealing washer (if applicable) and circlip to the body.

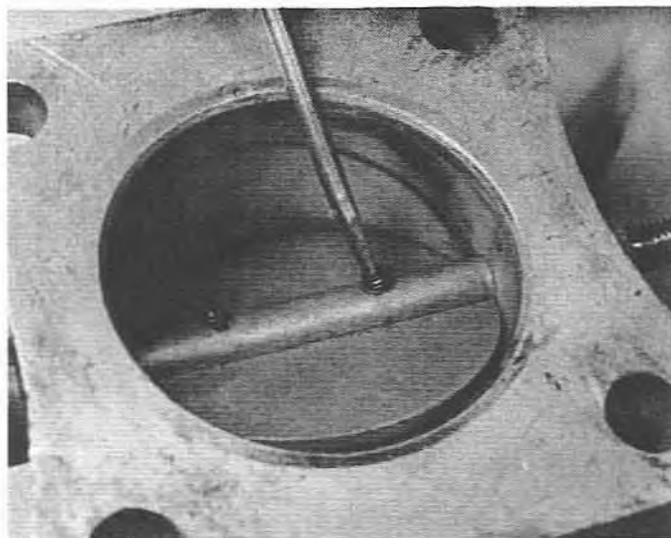
7 Fit the needle to the piston. Refer to Chapter 5, Fig 5.5, (where a rigid needle is fitted) and tighten the screw to secure. Where a spring-loaded needle is fitted, locate the spring on the needle collar and insert them in the piston. Insert the guide so that it is flush with the lower surface of the piston, and with the slot aligned with the locking screw hole. The small etch-mark must also be located between the two vacuum transfer holes. Insert and tighten the locking screw.

8 Check the piston key for security in the carburettor body (photo).

9 Fit the jet bearing, washer and locking nut. Do not tighten the nut.

10 Temporarily fit the jet assembly in the jet bearing, with the flexible feed pipe located in the float chamber outlet. Push the jet fully upwards (photo), then carefully locate the piston and needle in the upper end of the body, and push downwards. This will centralise the jet, and the jet locking nut may then be tightened. Remove both the piston and jet.

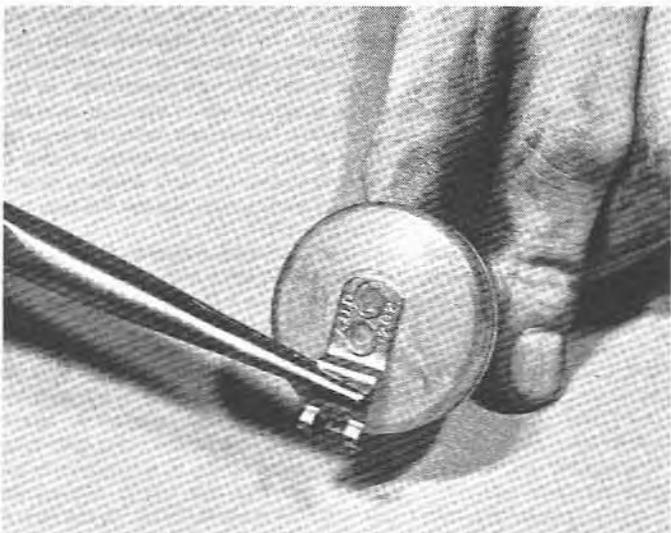
11 Fit the spring and jet adjusting nut to the jet bearing. Fit the gland, washer and ferrule to the flexible pipe (if removed). Check that the end of the tube projects at least 0.188 in (4.8 mm) beyond the gland.



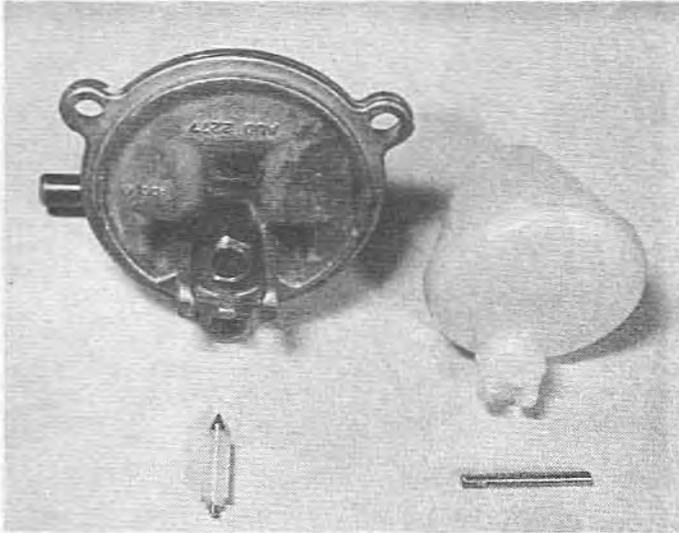
8.2 Spreading the throttle disc screw split ends



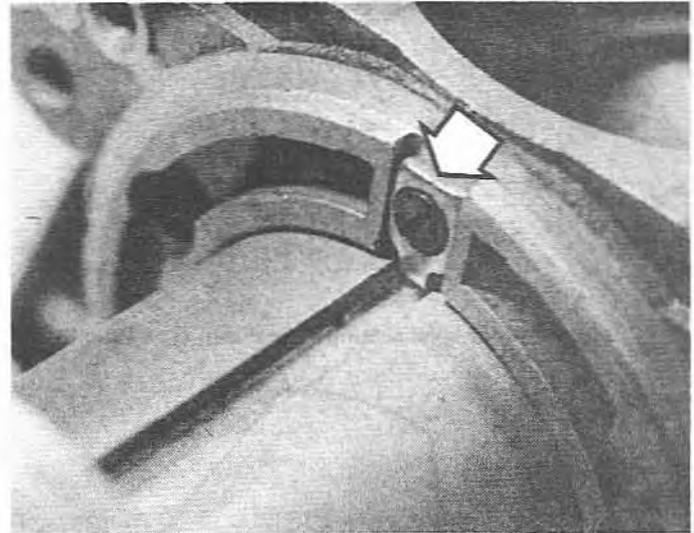
8.3A Checking the float level



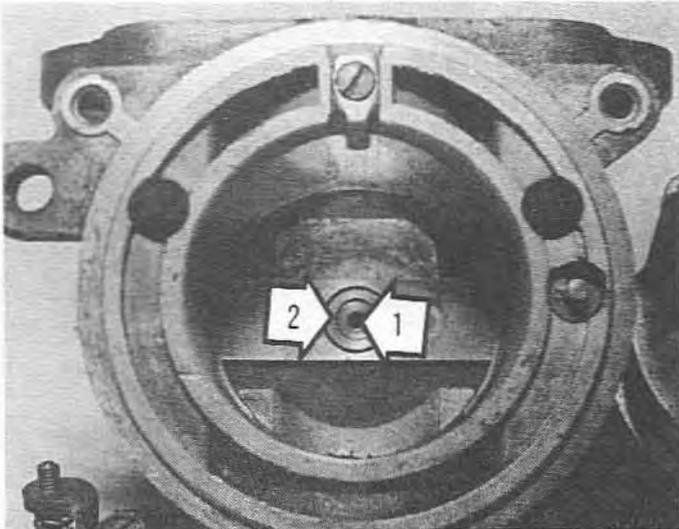
8.3B Bending the steel float arm



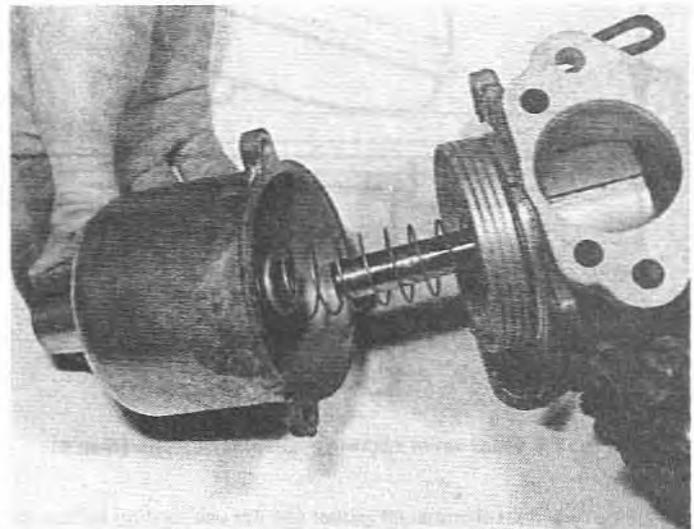
8.3C All-plastic float, needle and float chamber lid



8.8 Piston key (arrowed)



8.10 Top view of the jet (1) and jet bearing (2)



8.12 Fitting the suction chamber

Lightly smear petroleum jelly on the outside of the jet and insert into the bearing. Insert the feed pipe into the float chamber outlet, and tighten the union nut until the neoprene gland is compressed (when the pipe will be held firmly in the outlet). Do not overtighten, as this can cause leakage and possibly stripped threads in the float chamber.

12 Fit the piston assembly to the body, taking care not to damage the needle. Fit the piston spring to the piston rod. Lightly oil the outside of the piston rod, and fit the suction chamber in the same relative position as marked on disassembly (photo). Fit and evenly tighten the retaining screws.

13 Top up the piston rod with oil as described in Section 9, paragraph 7, then fit and tighten the damper rod. Where a retaining clip is fitted, hold the piston in its raised position while inserting the damper rod, and press the clip firmly into the top of the piston rod.

14 Assemble the pick-up lever, cam lever, cam lever spring, washer and pivot bolt tube(s). Place the lever return spring in position over the boss, and fit the linkage assembly to the carburettor body with the pivot bolt. Ensure that the double-coil spring washer or spacer (alternative part) fits over the projecting end of the pivot bolt tube. Register the angled end of the lever return spring in the groove in the pick-up lever, and hook the other end of the spring around the moulded peg on the carburettor body. Fit the brass ferrule to the hole in the end of the pick-up lever. Relieve the torsion of the return spring, and fit the link to the jet with its retaining screw. Fit the baffle plate to the float chamber vent pipe.

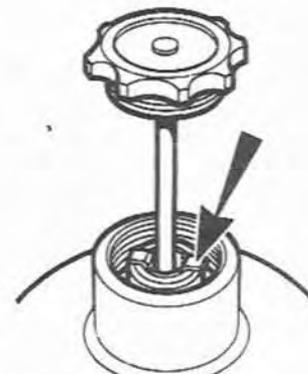


Fig. 7.9 Damper retaining clip fitted in the piston rod (Sec 8)

## 9 Tuning

**Note:** Refer to Chapter 3 for notes on tuning, with particular reference to preliminary procedures

**Single carburettor installations**

- 1 Set the throttle adjusting screw. Warm the engine up to normal operating temperature, then switch off. Unscrew the throttle adjusting screw until it is just touching its stop, and the throttle is shut. Set the throttle adjusting screw  $1\frac{1}{2}$  turns open. Ensure that the fast idle screw is clear of the fast idle cam.
- 2 Set the jet height. Mark the components for correct reassembly, and remove the suction chamber and piston. Disconnect the mixture control wire. Screw up the jet adjusting nut (or screw on HS4C carburetors) until the jet is flush with the bridge of the carburettor (or fully up if this position cannot be attained). Refit the piston and suction chamber. Check that the piston falls freely onto the bridge when the lifting pin is released.
- 3 Set the jet adjusting nut/screw. Screw down the jet adjusting nut/screw two turns on non-tamperproof type carburetors, or three turns on tamperproofed carburetors.
- 4 Set the idle speed. Start the engine, and adjust the throttle

adjusting screw to give the desired idle speed. Turn the jet adjusting nut/screw up to weaken, or down to richen, until the fastest idle speed, consistent with even running, is obtained. Re-adjust the throttle adjusting screw to give the correct idle speed if necessary.

5 Check the mixture strength (CO content), as described in Chapter 17, Section 9.

6 Connect and set the mixture control wire. Connect the mixture control wire with about 0.0625 in (1.6 mm) free movement before it starts to pull on the jet lever. Pull the choke knob at the facia until the linkage is about to move the carburettor jet operating arm, and adjust the fast idle screw to give an idle speed of about 1000 rpm when the engine is hot. Return the choke knob, and check that there is some clearance between the fast idle screw and the throttle stop.

7 Fill the damper. Finally top up the piston damper with the engine oil, until the level is 0.5 in (13mm) below the top of the hollow piston rod. On non-dustproofed carburetors (identified by a vent hole in the piston damper top), the oil level should be 0.5 in (13mm) above the top of the hollow piston rod.

**Multiple carburettor installations**

8 Refer to Chapter 17, Section 9, but ignore references to thermostatic carburetors. On HS8 carburetors, a jet adjusting screw is provided instead of an adjustment nut.

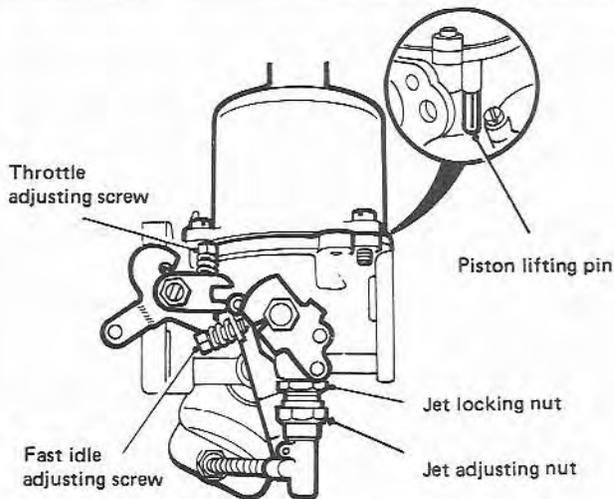


Fig. 7.10 HS carburettor adjustment points (Sec 9)

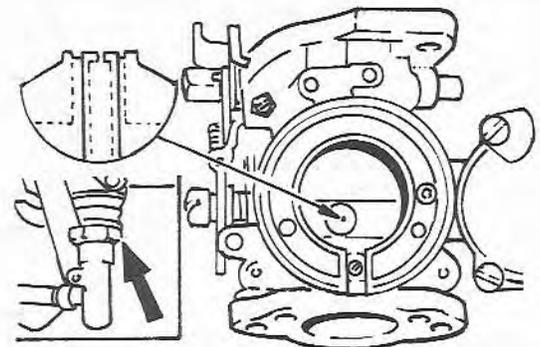


Fig. 7.11 Jet height adjustment (Sec 9)  
 Insets show cross-section of upper part of jet, and jet adjusting nut

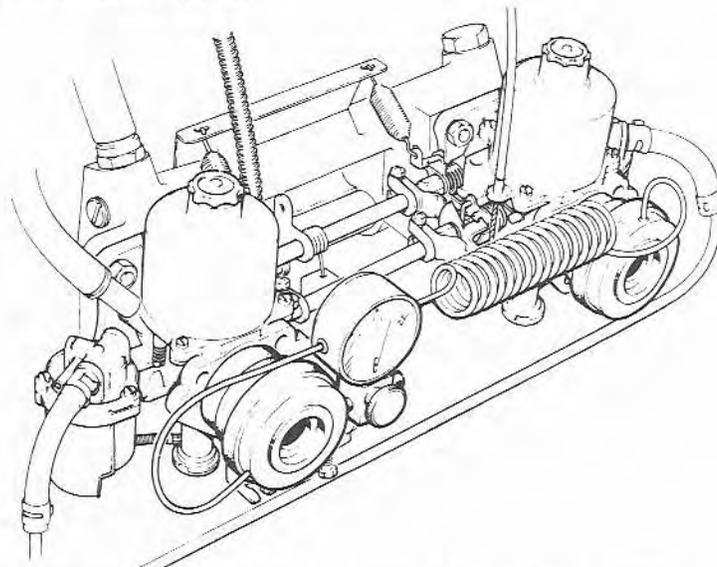
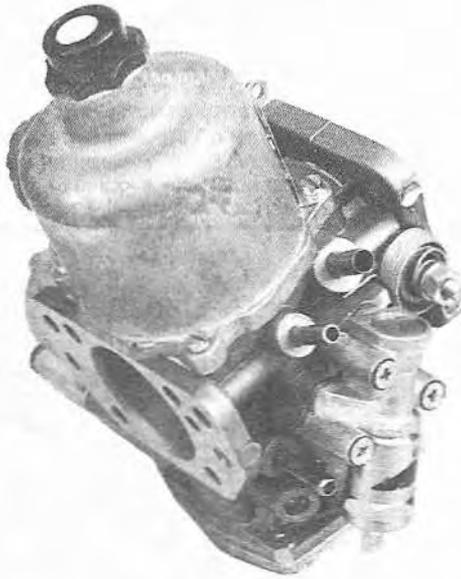


Fig. 7.12 Using an airflow balancing meter on a twin HS carburettor installation (Sec 9)



## Part 4 SU carburetors

### Chapter 20 Type HIF

#### Contents

	<i>Section</i>		<i>Section</i>
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Automatic starting unit (ASU – twin carburetors) – testing, removal, overhaul and refitting .....	11	Introduction .....	1
Cold start enrichment devices .....	5	Jet assembly .....	4
Disassembly .....	9	Mixture control .....	3
Float chamber assembly .....	2	Operation .....	7
Fully automatic starting device (FASD – twin carburetors) – checking and adjustment .....	12	Piston and needle .....	6
		Special overhaul procedures .....	8
		Tuning .....	14

#### 1 Introduction

The Type HIF (Horizontal Integral Float Chamber) carburettor is the most recent development of the SU instrument working on the constant-vacuum principle. It has been designed primarily to meet the requirements of exhaust emission control carburation systems. Functionally similar to previous types, the instrument uses the variable choke/constant depression principle to achieve the precise mixture ratio required to control the toxic elements of exhaust emission to within statutory requirements. It differs from previous types in that additional mixture required for cold starting is supplied separately to that from the main jet. It is manufactured in the larger sizes only; HIF4, HIF6 and HIF7 being 1.5 in, 1.75 in and 1.875 in throttle bore diameters, respectively. Metric equivalents of the 1.5 in and 1.75 in

diameters are 38 mm and 44 mm respectively, hence the HIF38 and HIF44 types.

The other characteristic feature of the unit is the absence of a separate float chamber. The float and inlet valve mechanism are contained in a housing underneath the carburettor body, giving the unit a distinctive appearance. This housing also contains a temperature-sensitive device which alters the main jet position in relation to the metering needle, thereby automatically adjusting the mixture ratio to compensate for changes in fuel viscosity due to changes in fuel temperature (see Chapter 1). This enables the carburettor to maintain a very accurate mixture ratio control over a range of operating conditions.

An overrun valve is incorporated in the throttle disc on some versions, to limit the depression when the throttle is closed during deceleration.

## 2 Float chamber assembly

The float chamber, incorporated in the body casting below the choke bore, is sealed by a removable cover plate and rubber gasket. It houses a moulded plastic float, hinged upon a pivot screwed into the wall of the housing, a spring-loaded needle valve assembly, and the jet operating mechanism.

On ASU versions, the cover plate forms the link base for the ASU. On FASD versions, a plastic pick-up tube channels fuel from the float chamber to the FASD.

## 3 Mixture control

The mechanism consists of a right-angled adjusting lever riveted to a bi-metal blade, the end of which engages with the base of the jet assembly. The lever is flexibly secured to the body by a spring-loaded screw, and is adjusted by the jet adjusting screw in contact with one of its limbs. Screwing in and out (from outside) of the jet adjusting screw lowers and raises the jet respectively, giving a fine degree of mixture control. At any position of this lever, the bi-metal assembly has an overriding control function, and will compensate for variation in fuel viscosity due to temperature changes.

Note that the height of the jet is not adjusted for cold start conditions, this function being performed by a separate device. Once the jet height has been set, no further adjustment is necessary and to frustrate attempted tampering, provision is made for fitting a sealing plug in the adjusting screw tapped hole.

## 4 Jet assembly

The jet assembly differs from previous types chiefly in respect of its redundancy in cold start conditions. It also differs considerably in construction, being of aluminium alloy and not brass, and has a separate pressed-in brass orifice forming the jet proper.

The integral plastic moulding at its lower end forms an inlet for fuel, an articulated connection for the end of the bi-metal jet lever (which controls its height), a stop to limit its upward movement, and a means of identification (of right or left-hand interconnection, see Fig. 8.2). The size of the jet (0.090 in or 0.10 in) is given by the absence or presence of a machined groove at the top of the jet tube. The length of the jet also varies according to the carburettor type. The jet assembly is not repairable, and must be replaced by a new part complete if damaged.

## 5 Cold start enrichment devices

Additional mixture required for cold starting is supplied by a separate cold start valve and is independent of the main jet.

The cold start valve consists of a starter valve body, a valve spindle which rotates through a limited arc within it, and an O-ring and V-seal to seal the valve body in its housing, and to seal the valve spindle in the valve body, respectively. A metal seal cover is fitted to prevent damage to the V-seal. The assembly is fitted into a bored-out housing in the side of the carburettor, and is operated by a lever and a return spring.

The valve body has a hole drilled through its wall which is linked, via the annular space in the housing bore, with a fuel supply passage. An air bleed hole breaks into this passage above the fuel level (controlled by float).

The spindle is hollow, and is linked to the passage which terminates in the carburettor mixing chamber at the back of the bridge. A hole in the wall of the spindle corresponds with that in the valve body when the spindle is in a certain position. At each side of the hole is a tapering, machined groove. The varying depth of this groove gives a progressive throttling effect as the spindle is turned to different positions.

On manual choke versions, the cold start device is operated by cable, and increased engine speed is obtained by a fast idle cam, which partially opens the throttle valve. On the later electronic type carburettors, the cold start device is operated electrically by a stepper motor, in conjunction with a computerised control unit.

On some twin carburettor engines, the previously-described cold

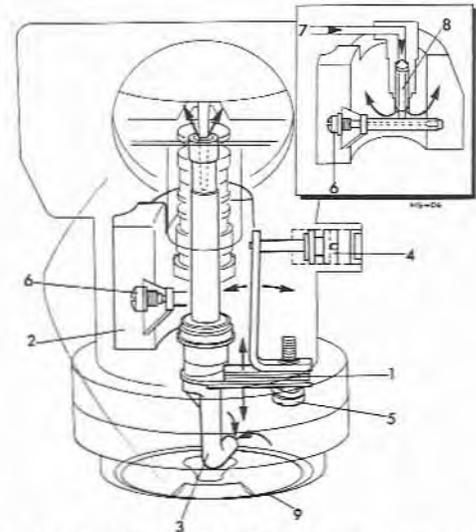


Fig. 8.1 HIF carburettor float chamber layout (Sec 2)

- |                                 |                                        |
|---------------------------------|----------------------------------------|
| 1 Bi-metallic assembly          | 5 Bi-metallic assembly retaining screw |
| 2 Float                         | 6 Float pivot screw                    |
| 3 Jet head                      | 7 Fuel inlet                           |
| 4 Jet adjusting (mixture) screw | 8 Needle valve                         |
|                                 | 9 Cover                                |

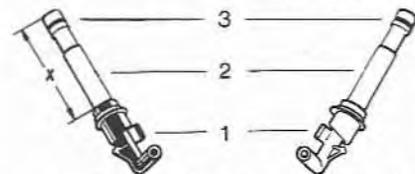


Fig. 8.2 Jet identification (Sec 4)

- 1 Jet head – black/right-hand connection, white/left-hand connection
- 2 Jet assembly
- 3 Jet size identification – no groove/0.09 in, one groove/0.10 in  
Dimension X = 1.5 in for HIF 4/6 carburettors, 1.3 in for HIF 7 carburettors

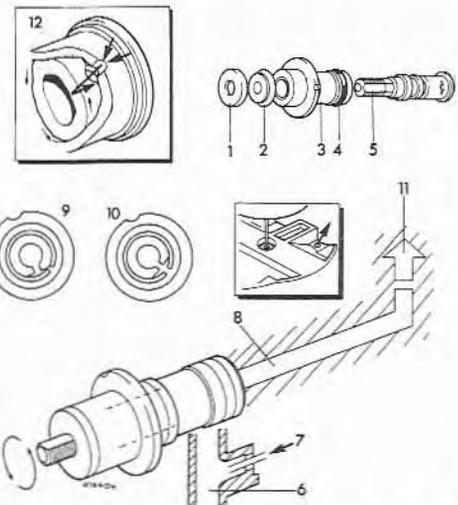


Fig. 8.3 Cold start enrichment device (Sec 5)

- |                      |                               |
|----------------------|-------------------------------|
| 1 End seal cover     | 8 Fuel delivery to jet bridge |
| 2 End seal           | 9 Commencement of enrichment  |
| 3 Starter valve body | 10 Maximum enrichment         |
| 4 O-ring             | 11 Enrichment outlet          |
| 5 Valve spindle      | 12 Fuel flow through valve    |
| 6 Fuel supply        |                               |
| 7 Air bleed          |                               |

start device is not fitted to either carburettor, but a separate device supplies a rich mixture automatically during the engine starting and warm-up period.

## 6 Piston and needle

The spring-loaded needle assembly is secured in the piston by the needle locking screw. A flanged collar at the top of the needle bears against a protrusion on the needle guide, which tilts it under the action of the spring. The needle is thus biased towards a particular position in the jet, either forwards or backwards depending upon design of needle guide (location of protrusion). An etched alignment mark on the underside of the needle guide ensures correct assembly. The mark must be between the transfer holes.

## 7 Operation

### Cold starting

With the choke control (on the car's instrument panel) pulled fully out, the cold start valve is rotated to its fully open position, when the hole in the inner spindle aligns with the hole in the valve body, providing a maximum free area for fuel flow. The fuel level in the feed passage is below the air bleed, and there is no flow of fuel until a depression is generated in the mixing chamber of the carburettor.

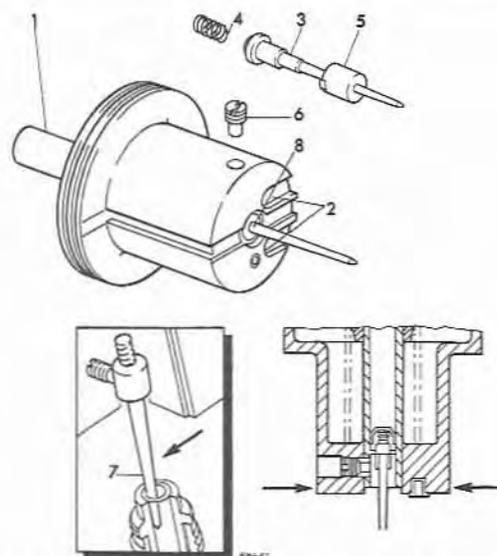


Fig. 8.4 Piston and needle components (Sec 6)

- |                  |                        |
|------------------|------------------------|
| 1 Piston rod     | 5 Needle guide         |
| 2 Transfer holes | 6 Locking screw        |
| 3 Jet needle     | 7 Needle biased in jet |
| 4 Needle spring  | 8 Etch-mark            |

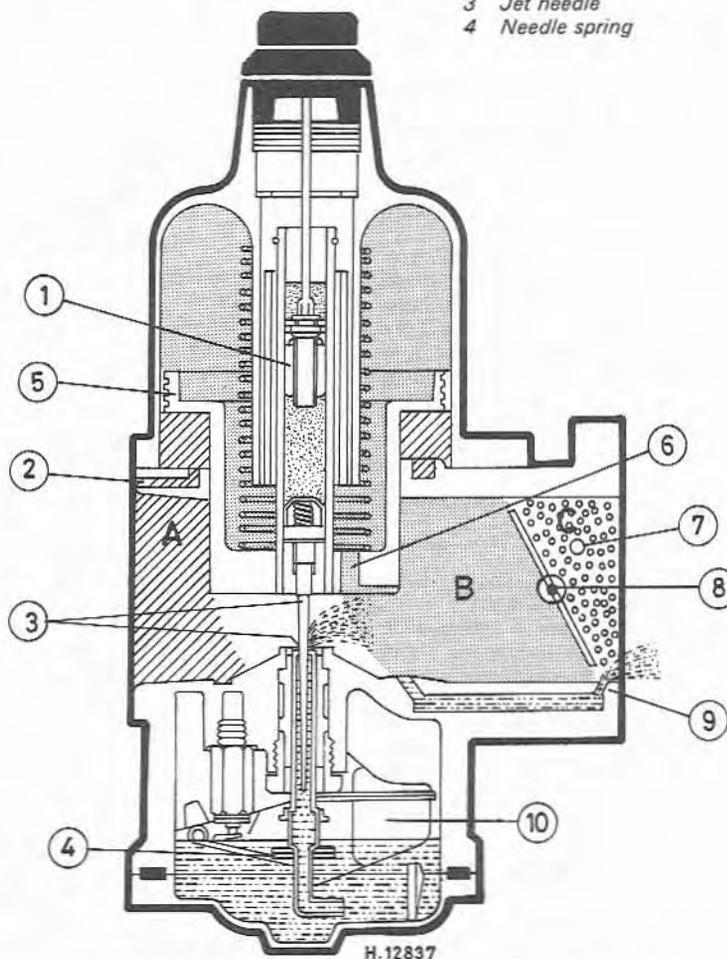


Fig. 8.5 Diagram of HIF carburettor operation (Sec 7)

- |                            |                           |                    |                         |
|----------------------------|---------------------------|--------------------|-------------------------|
| 1 Damper and oil reservoir | 5 Piston                  | 8 Throttle valve   | A Atmospheric pressure  |
| 2 Atmosphere pressure port | 6 Vacuum transfer holes   | 9 Bypass idle port | B Continuous depression |
| 3 Needle and jet           | 7 Mixture enrichment port | 10 Float           | C Manifold depression   |
| 4 Bi-metal jet lever       |                           |                    |                         |

When the depression is generated by turning over the engine (on the starter motor), fuel is drawn up out of the feed passage, and mixes with air drawn through the air bleed to form an emulsion in the annulus surrounding the valve body. The mixture flows through the port in the valve body, through the corresponding hole in the inner spindle, through the hollow spindle, and is discharged into the mixing chamber of the carburettor.

Gradual return of the choke control to its fully home position results in a corresponding progressive reduction in rich-mixture quantity delivered. As the main air valve (piston) will also have opened when the engine fired, the net mixture strength will also weaken.

On electronic type carburetors (denoted by an 'E' suffix), the cold start device is operated electrically by a stepper motor. A computerised control unit (ECU - electronic control unit) receives signals from the engine coolant thermistor, air temperature sensor, accelerator pedal and ignition coil, and from this information computes the correct choke position. Using electrical impulses, the stepper motor is moved to its correct position within a 120° arc, the first 40° operating the fast idle cam only. The system also incorporates a vacuum valve to further enrich the mixture on acceleration during engine warm-up.

On some twin carburettor installations, as FASD (fully automatic starting device) is attached to the side of one of the carburetors, and draws its fuel from the carburettor float chamber. Air is supplied to the top of the unit from the air cleaner mounted on the carburetors. A starter jet with tapered metering needle supplies the fuel. A spring-loaded air valve is located in the air inlet, and may be opened by manifold vacuum through a delay valve. The bi-metallic vacuum delay valve is fitted between the FASD and carburettor. It prevents the air valve opening during engine cranking, and so provides a rich mixture for starting. When the engine starts, a computerised control module supplies current to the vacuum delay valve, which then opens the air valve to supply sufficient air for the engine to run.

The air/fuel mixture through the FASD is controlled by the shut-off valve and starter jet, and since the valve is connected directly to the tapered metering needle, the mixture volume may be progressively reduced by moving the two components downwards. The valve movement is controlled by a wax capsule in contact with the engine

coolant, and in addition, the vacuum on the engine side of the FASD helps to close the valve. When normal engine temperature is reached, the shut-off valve will have completely shut, and normal air/fuel mixture will be supplied by the twin carburetors alone.

An alternative to the FASD is the ASU (automatic starting unit), which is also fitted to one carburettor of a twin carburettor installation. This unit functions in a similar manner to the AED (automatic enrichment device) described in Chapter 9, except that it is attached to the bottom of the carburettor instead of being separate with its own fuel supply.

#### Full throttle

With the engine at normal running temperature and the cold start valve (where fitted) out of action, the carburettor will function as a normal H-Type unit, mixture quantity and strength delivered being dependent upon the interaction of the throttle opening, the manifold depression and the fuel needle jet relationship.

#### Acceleration

Temporary enrichment for acceleration is provided by the resistance to upward movement of the piston, caused by the hydraulic damper. It is single-acting, and has no effect on downward movement, allowing the piston to respond immediately during deceleration.

#### Overrun

An overrun condition occurs when the vehicle is 'driving the engine', for example, when descending a hill with the throttle closed. In this condition, very high manifold depression is produced, which is not conducive to efficient 'clean' combustion. The maximum depression is governed on some versions by the operation of a spring-loaded plate valve in the throttle disc, which opens at a predetermined value to admit air into the mixing chamber, and thus limit the depression.

#### Idling

When idling, the mixture is conducted through a small bore passageway below the 'floor' of the main choke bore, to emerge at a point adjacent to the bottom edge of the throttle plate, where a cut-out

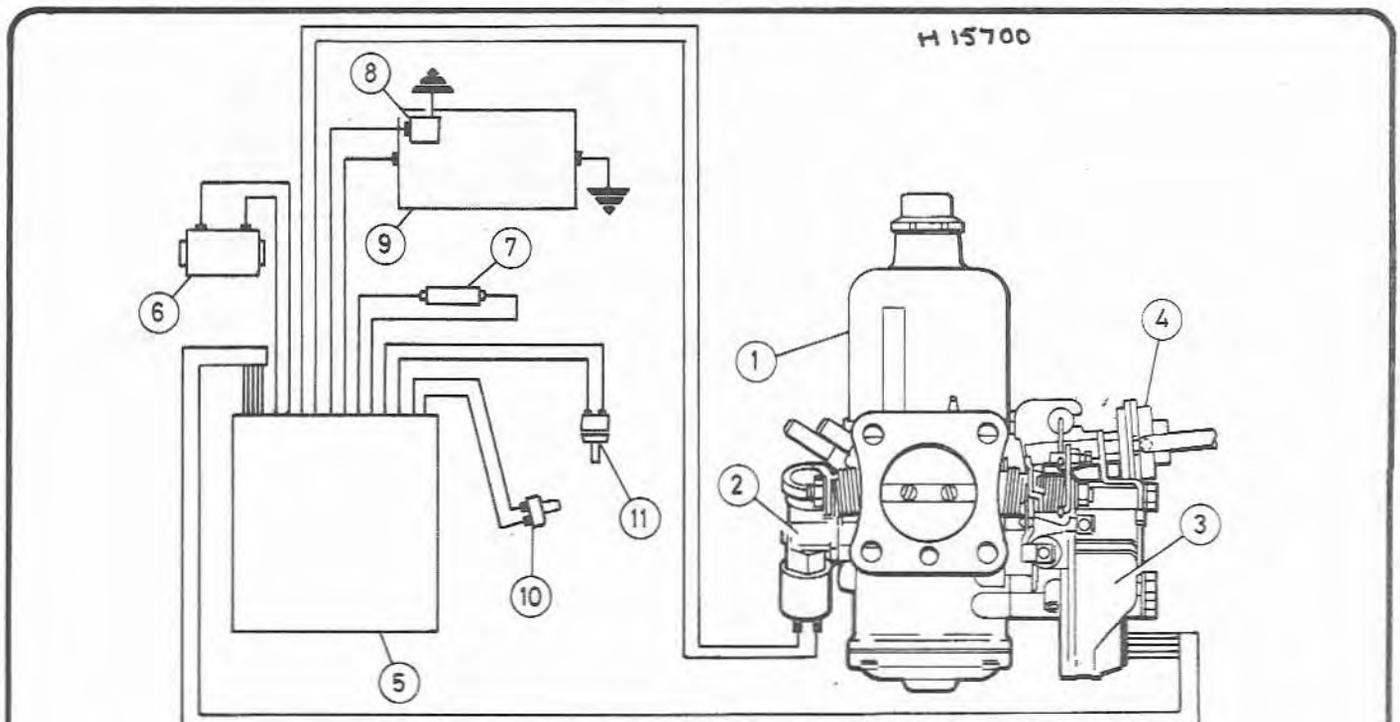


Fig. 8.6 Diagram of typical electronic type HIF carburettor (Sec 7)

- |                                 |                                  |                                        |                                   |
|---------------------------------|----------------------------------|----------------------------------------|-----------------------------------|
| 1 Carburettor                   | 5 Electronic control unit        | 8 High engine temperature warning lamp | 10 Accelerator pedal switch       |
| 2 Fuel shut-off valve           | 6 Ignition coil                  | 9 Engine temperature gauge             | 11 Coolant temperature thermistor |
| 3 Mixture control stepper motor | 7 Ambient air temperature sensor |                                        |                                   |
| 4 Vacuum switch                 |                                  |                                        |                                   |

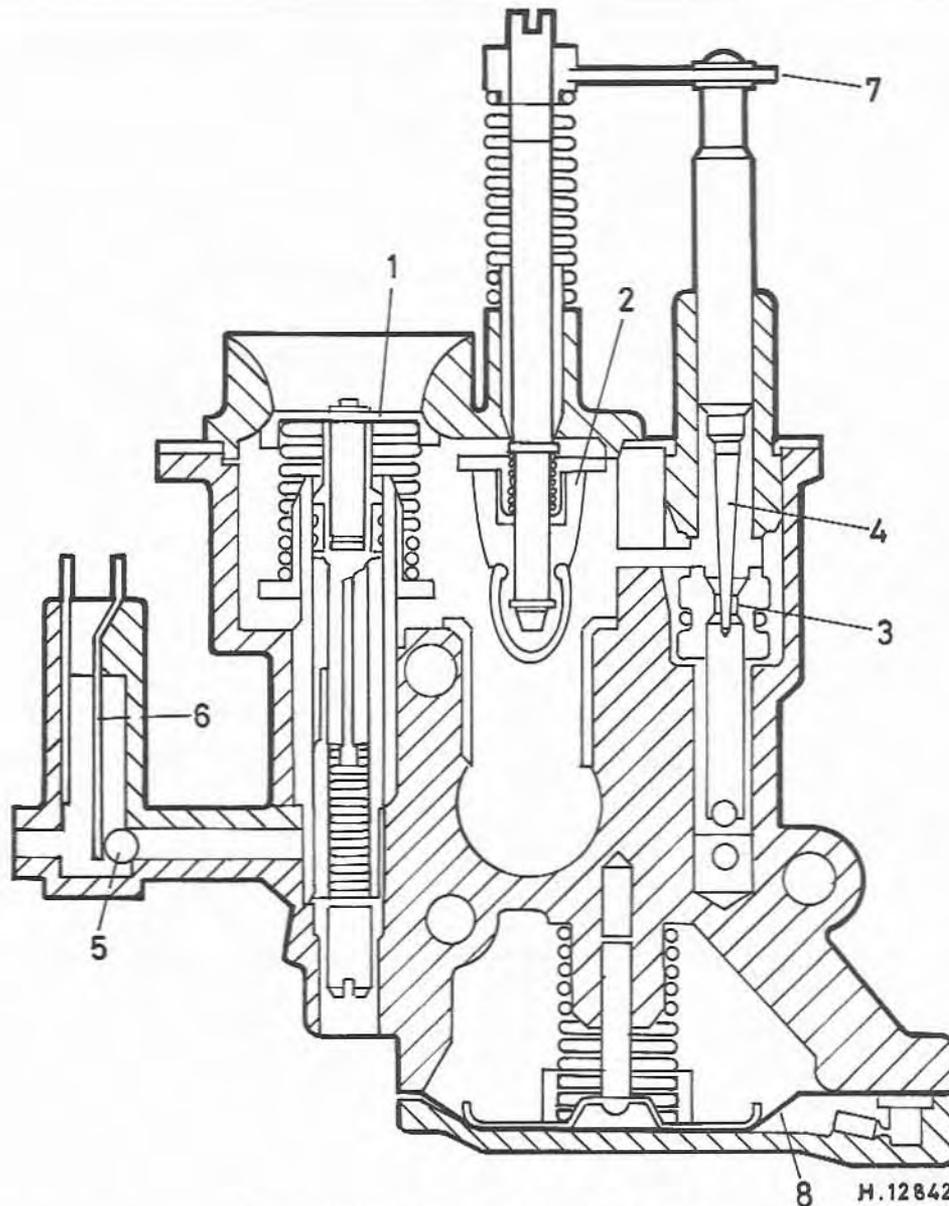


Fig. 8.7 Cross-section of the FASD (Sec 7)

- |                               |                           |                      |                                    |
|-------------------------------|---------------------------|----------------------|------------------------------------|
| 1 Vacuum controlled air valve | 3 Starter jet             | 5 Vacuum delay valve | 7 Needle carrier                   |
| 2 Shut-off valve              | 4 Tapered metering needle | 6 Bi-metallic strip  | 8 Vacuum-operated accelerator pump |

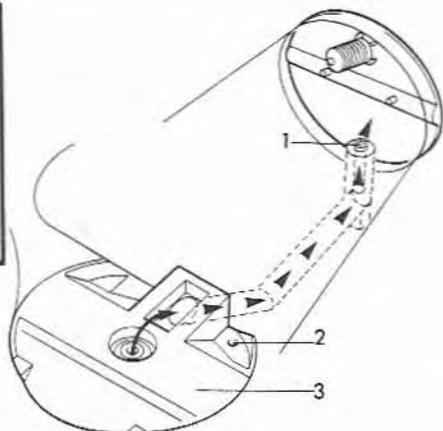
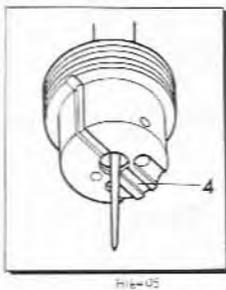


Fig. 8.8 Bypass idle system (Sec 7)

- |                                |                  |
|--------------------------------|------------------|
| 1 Outlet at throttle valve     | 3 Jet bridge     |
| 2 Cold start enrichment outlet | 4 Slot in piston |

is formed. This results in the mixture velocity being considerably higher than if it were induced normally, due to the much smaller cross-sectional area, with more complete atomization of the mixture, particularly at the local high depression at the throttle plate cut-out.

**Fuel temperature variation**

At all phases of operation described above, the precise mixture ratio is also subject to the height of the main jet, which is controlled by the fuel temperature compensator. With increasing fuel temperature the jet is raised, and with decreasing temperature it is lowered. Thus the variation in fuel flow which would normally ensue as a result of the change of viscosity is compensated for by an inverse and proportional change of annular fuel flow area, and the actual flow is maintained at a constant value.

**8 Special overhaul procedures**

- 1 Refer to Chapter 4.
- 2 Service and repair kits are generally available under SU part numbers, according to *vehicle* model. One gasket pack is available for all HIF carburetors, under the part number AUE 821S. The 'S' suffix indicates that throttle plate screws are included.
- 3 The throttle diameters applicable to the carburettor models are as follows:

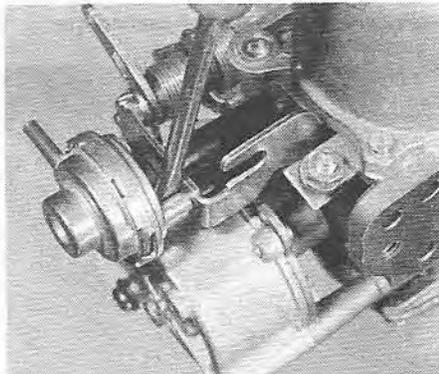
Carburettor model	Throttle diameter
HIF4	1 1/2"
HIF6	1 3/4"
HIF7	1 7/8"
HIF38	38.0 mm (1.50 in)
HIF44	44.0 mm (1.73 in)

- 4 On some HIF carburetors, and in particular on the HIF38 fitted to some Austin Metro 1.0 HLE models, a carburettor vent filter assembly

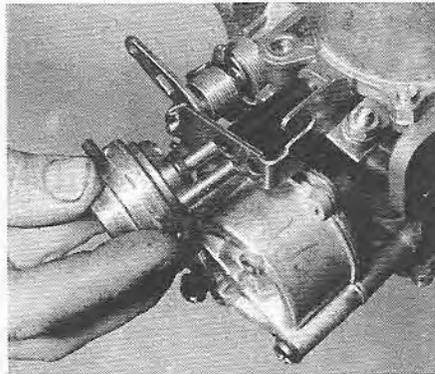
may be fitted. This screws into the float chamber, and should be removed periodically for cleaning.

**9 Disassembly**

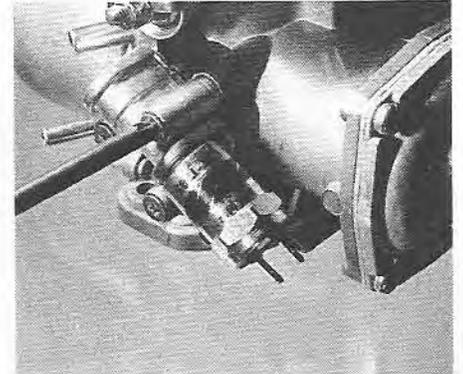
- 1 Thoroughly clean the exterior of the carburettor.
- 2 On electronic type carburetors, remove the vacuum switch by levering it from the mounting bracket. Remove the sealing washer from the short stub pipe (photos).
- 3 On electronic type carburetors, unscrew the three retaining screws and remove the fuel shut-off valve and solenoid assembly (photos). Recover the gasket.
- 4 Unscrew the damper rod from the suction chamber (photo). On Turbo versions, first unscrew the securing clamp. On some versions it will be necessary to pull the guide clip from the top of the piston rod (Fig. 8.11). Drain the oil from the piston rod. If necessary, the valve may be removed from the damper rod after extracting the spring clip (photo).
- 5 Unscrew the three retaining screws and raise the suction chamber. At the same time, lift the piston and withdraw the assembly from the carburettor body, taking care not to damage the metering needle (photos).
- 6 On the ball-bearing type suction chamber, push up the piston, then extract the circlip from the top of the piston rod (photo).
- 7 Withdraw the piston and spring from the suction chamber (photo).
- 8 Unscrew the needle guide locking screw and withdraw the needle, guide and spring from the piston (photos).
- 9 If necessary, remove the screw and piston guide from the carburettor body (photo).
- 10 Where applicable, remove the FASD from the side of the carburettor, with reference to Section 13.
- 11 Where applicable, remove the ASU from the bottom of the carburettor, with reference to Section 11.
- 12 Except on ASU versions, mark the relationship of the float chamber



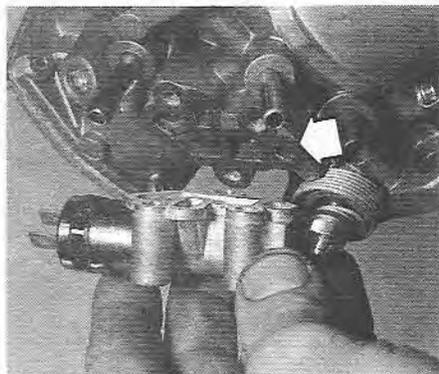
9.2A Using a screwdriver to prise the vacuum switch ...



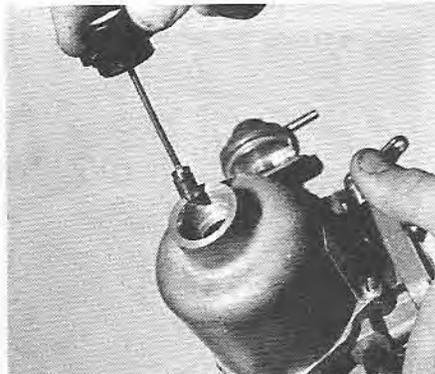
9.2B ... from the mounting bracket



9.3A Extract the screws ...



9.3B ... and remove the fuel shut-off valve and solenoid assembly (gasket arrowed)



9.4A Removing the damper rod



9.4B Dismantled damper rod valve

cover to the carburettor body. Unscrew the four retaining screws and lift off the cover, then remove the O-ring seal (photos).

13 Unscrew the jet adjusting lever retaining screw and withdraw the jet and adjusting lever assembly. Disengage the jet from the lever (photos).

14 Where an FASD is fitted, turn the pick-up elbow away from the float (photo).

15 Unscrew the float pivot screw and lift out the float (photos). Discard the screw seal.

16 Remove the float needle, then unscrew the needle valve seat from the base of the carburettor. Where applicable, separate the filter from the seat (photos).

17 Unscrew the jet bearing locking nut and withdraw the jet bearing. Recover the washer (photos).

18 Remove the circlip from the lower end of the piston lifting pin, recover the spring and withdraw the pin.

19 Note the location of the throttle return spring and levers. Unscrew the nut after bending up the tabs, and remove the washers, levers and return spring (photos).

20 Note which way round the throttle disc is fitted, then carefully unscrew the retaining screws. Slide the disc from the slot in the spindle (photo).

21 Remove the throttle spindle and the spindle seals (photos).

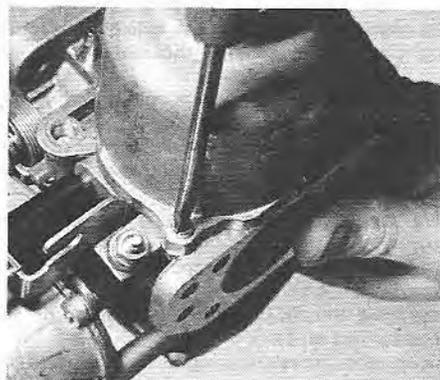
22 This completes the dismantling procedure on all but manual choke versions. On the electronic type carburettor, do not attempt to remove the mixture control stepper motor as it is set during manufacture, and may not operate correctly if disturbed. Note also that the stepper motor is a low-voltage unit, and must not be connected to a 12-volt supply. It is not possible to obtain a new stepper motor, so if it is proved faulty, the complete carburettor must be renewed.

23 On manual choke carburetors, note how the spring is attached to the fast idle cam lever (photo). Bend back the locktabs, then unscrew the nut and remove the washer.

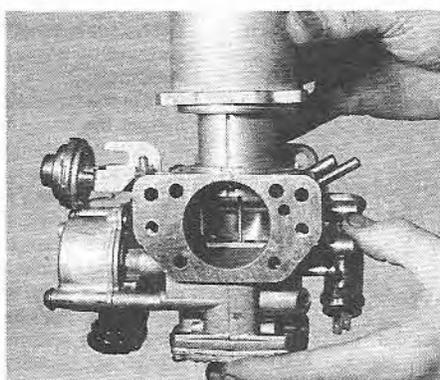
24 Hold the return spring against the main body, and use a screwdriver to prise the cam lever from the end of the cold start spindle. Remove the spring.

25 Remove the end cover and spindle seat.

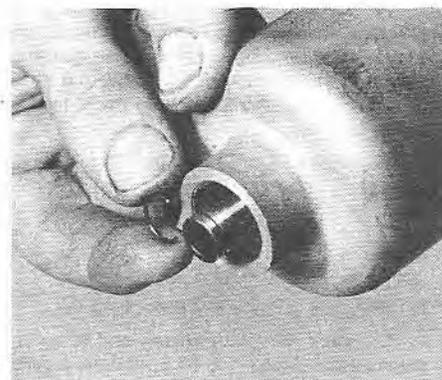
26 Remove the two screws and withdraw the retaining plate, cold



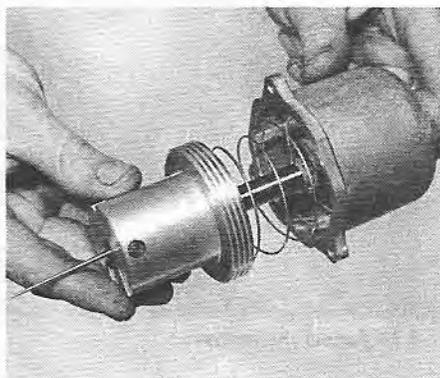
9.5A Extract the screws ...



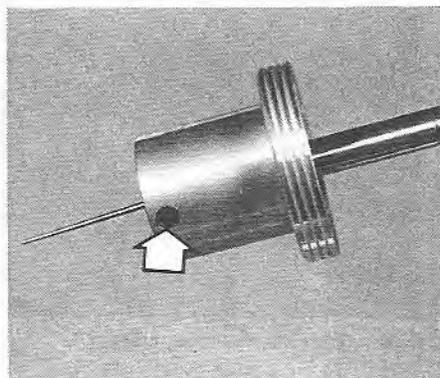
9.5B ... and withdraw the suction chamber and piston assembly



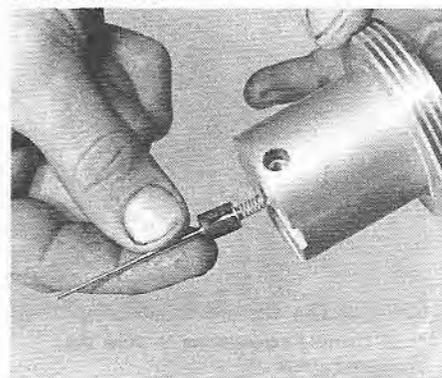
9.6 Removing the circlip from the top of the piston rod on the ball-bearing type suction chamber



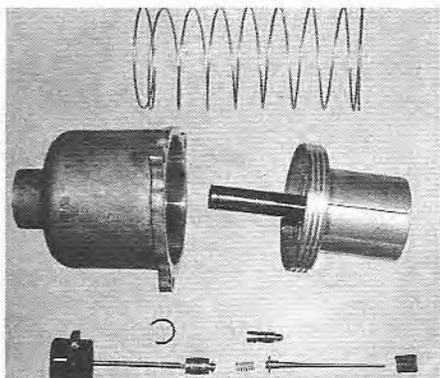
9.7 Separating the piston and spring from the suction chamber



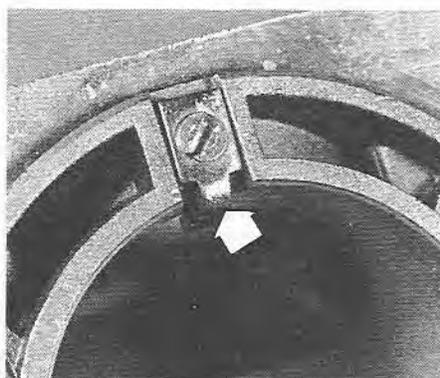
9.8A Unscrew the needle guide locking screw (arrowed) ...



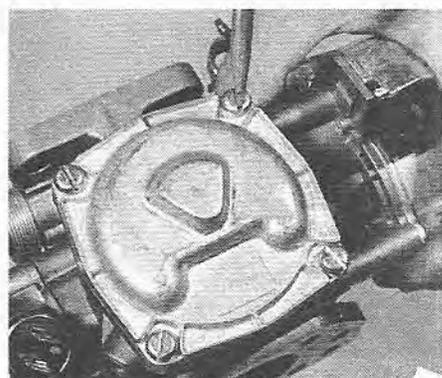
9.8B ... and withdraw the needle, guide and spring



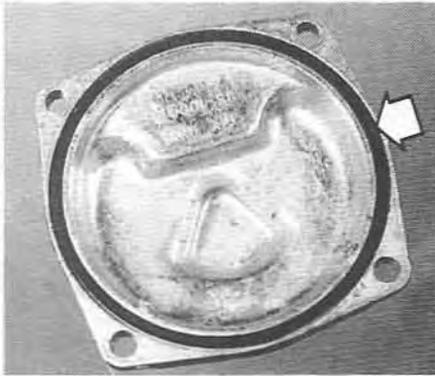
9.8C Piston and suction chamber components



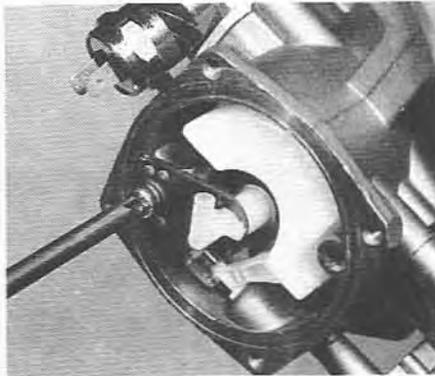
9.9 Piston guide (arrowed)



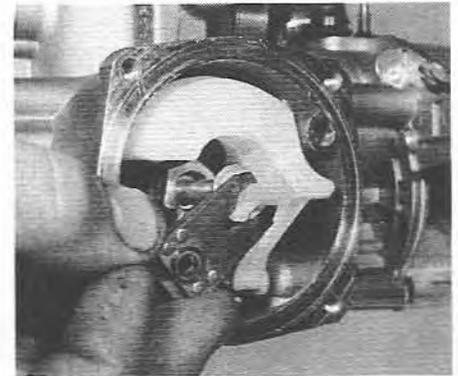
9.12A Removing the float chamber cover screws



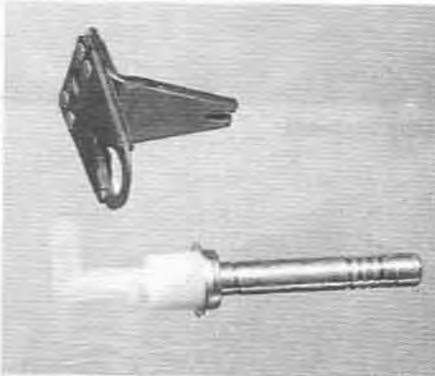
9.12B O-ring seal (arrowed) on the float chamber cover



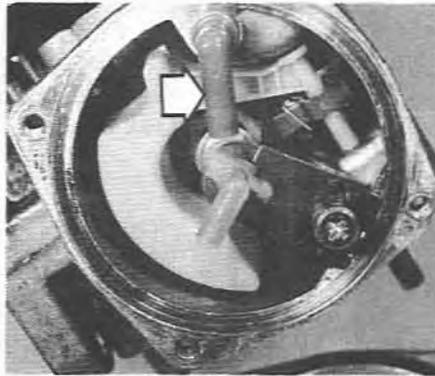
9.13A Remove the screw and spring ...



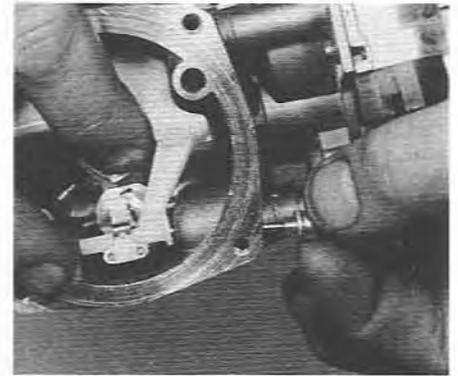
9.13B ... and withdraw the jet and adjusting lever assembly



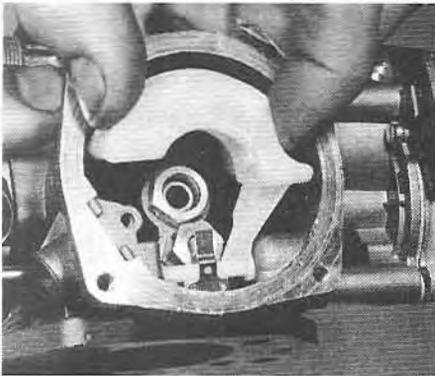
9.13C Jet separated from the adjusting lever



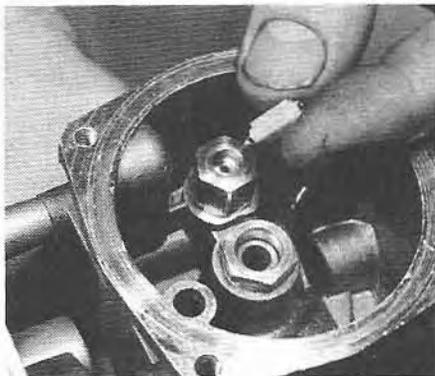
9.14 Pick-up elbow (arrowed) fitted to an FASD-equipped carburettor



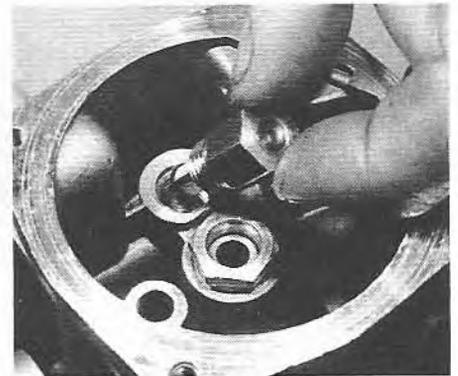
9.15A Unscrew the float pivot screw ...



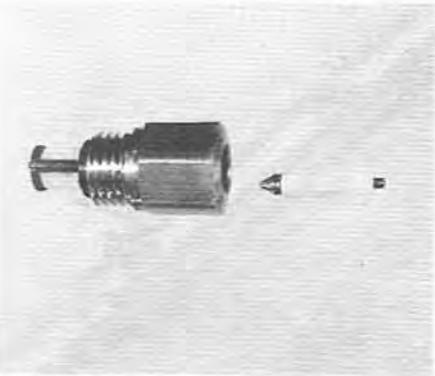
9.15B ... and lift out the float



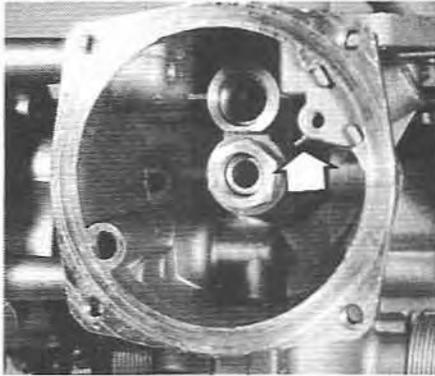
9.16A Removing the float needle



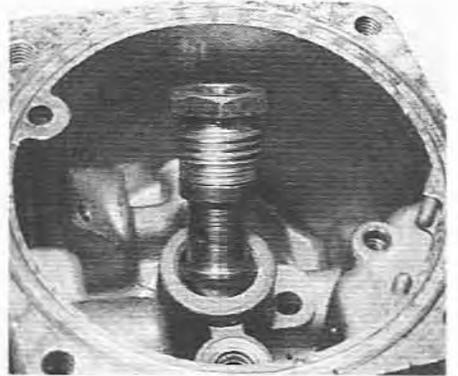
9.16B Removing the needle valve seat



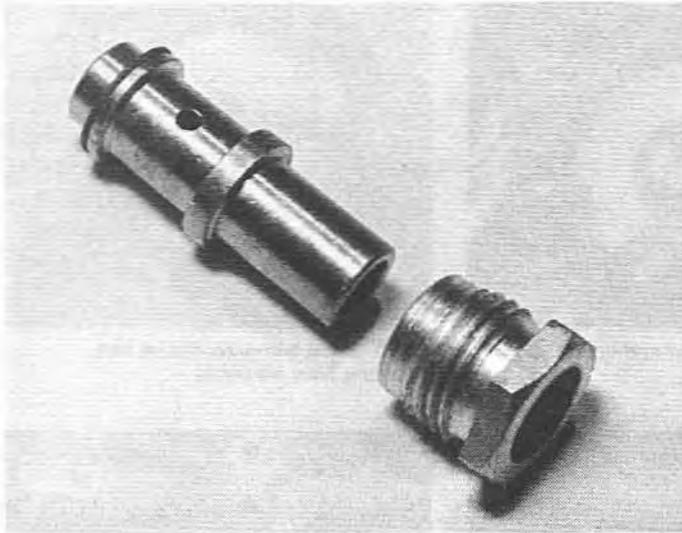
9.16C Needle valve seat and float needle



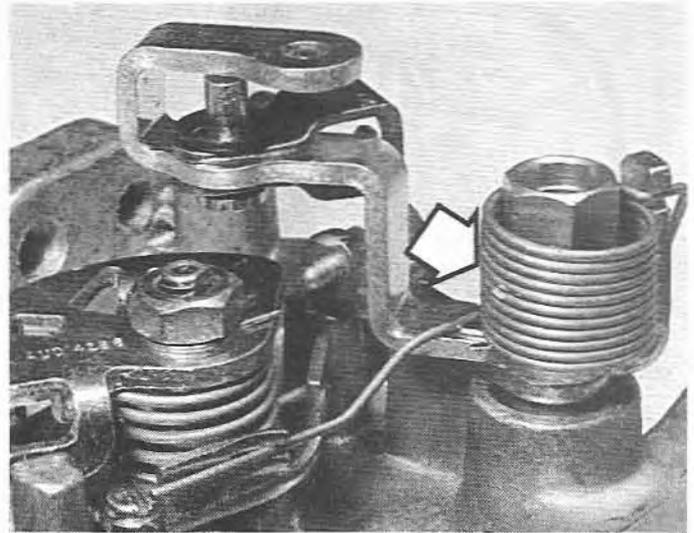
9.17A Jet bearing and locking nut location. Note inner tip of mixture adjustment screw (arrowed)



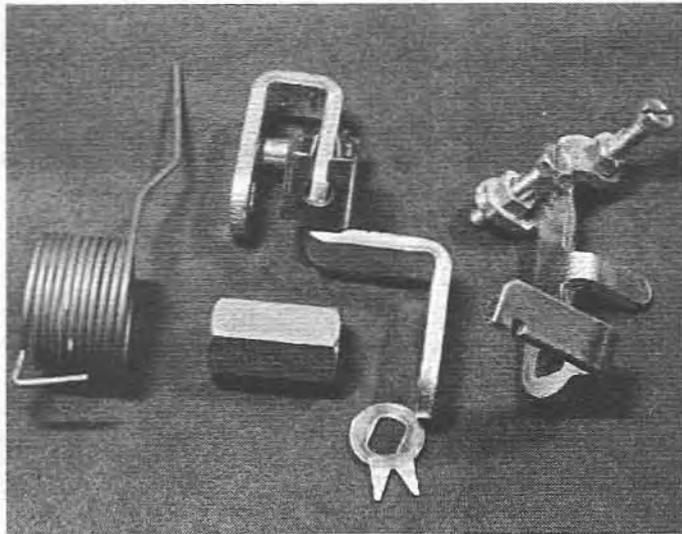
9.17B Removing the jet bearing and locking nut



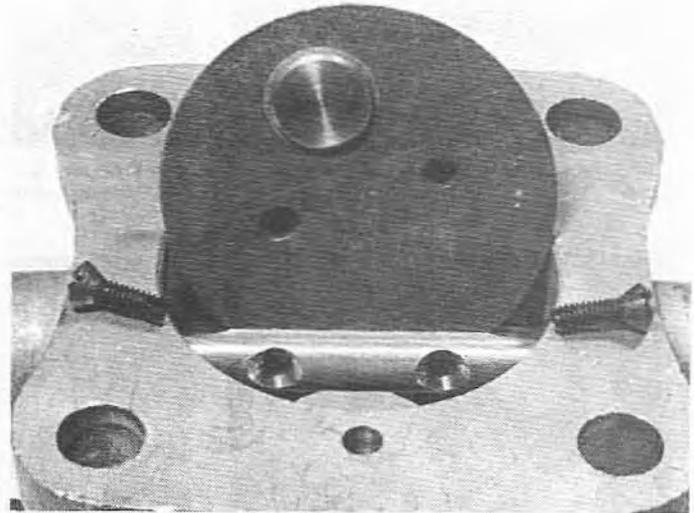
9.17C Locking nut separated from jet bearing



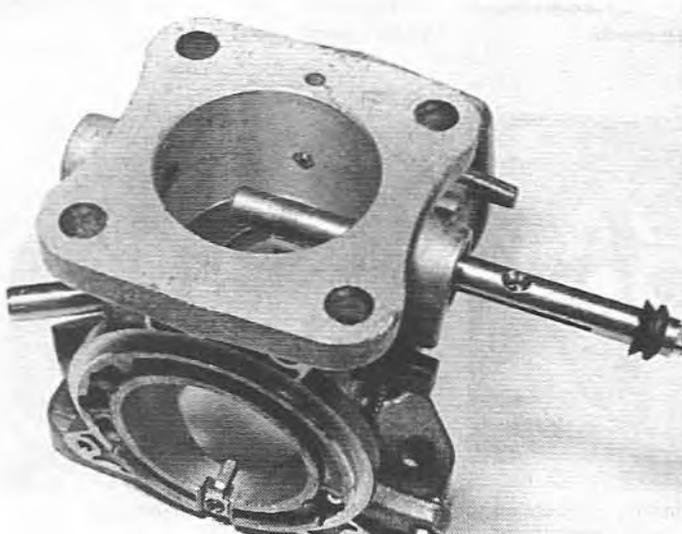
9.19A Throttle return spring (arrowed)



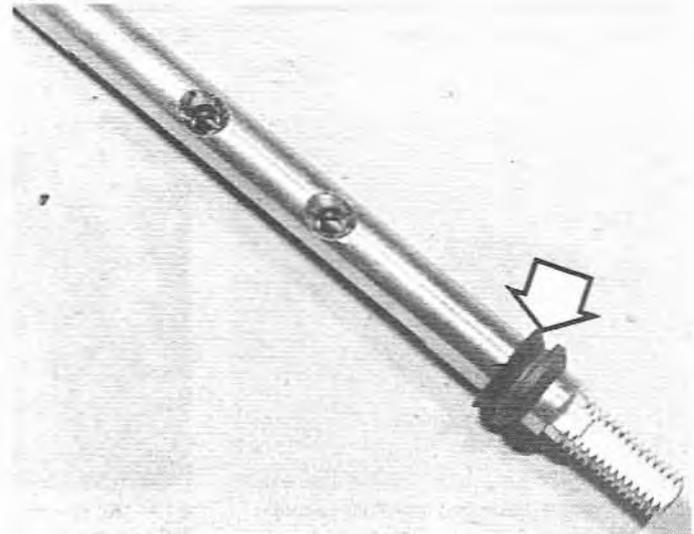
9.19B Throttle lever components



9.20 Throttle disc removal



9.21A Removing the throttle spindle



9.21B Throttle spindle and seal (arrowed)

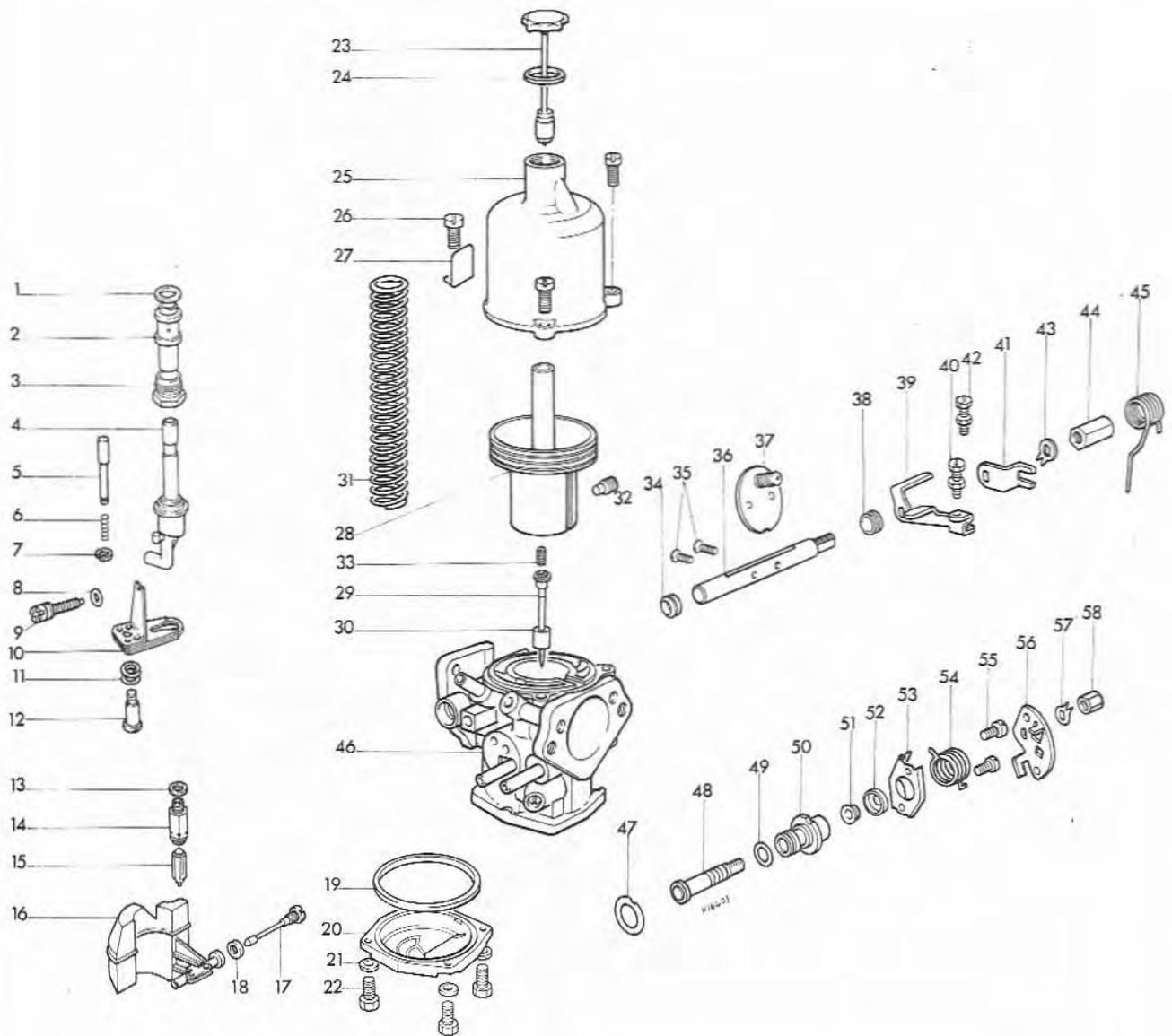


Fig. 8.9 Exploded view of manual choke HIF carburettor for twin carburettor installation (Sec 9)

- |                                     |                             |                                     |                       |
|-------------------------------------|-----------------------------|-------------------------------------|-----------------------|
| 1 Jet bearing washer                | 15 Float needle             | 30 Needle guide                     | 44 Retaining nut      |
| 2 Jet bearing                       | 16 Float                    | 31 Piston spring                    | 45 Throttle spring    |
| 3 Jet bearing nut                   | 17 Float pivot              | 32 Needle retaining screw           | 46 Body               |
| 4 Jet assembly                      | 18 Pivot seal               | 33 Needle spring                    | 47 Cold start seal    |
| 5 Lifting pin                       | 19 Float chamber cover seal | 34 Throttle spindle seal            | 48 Cold start spindle |
| 6 Lifting pin spring                | 20 Float chamber cover      | 35 Throttle disc screws             | 49 O-ring             |
| 7 Circlip                           | 21 Spring washer            | 36 Throttle spindle                 | 50 Cold start body    |
| 8 Adjusting screw seal              | 22 Cover screw              | 37 Throttle disc                    | 51 Spindle seal       |
| 9 Jet adjusting screw               | 23 Piston damper            | 38 Throttle spindle seal            | 52 End cover          |
| 10 Bi-metallic jet lever            | 24 Damper washer            | 39 Throttle actuating lever         | 53 Retaining plate    |
| 11 Jet spring                       | 25 Suction chamber          | 40 Fast idle screw and nut          | 54 Cold start spring  |
| 12 Jet retaining screw              | 26 Chamber screw            | 41 Throttle lever                   | 55 Retaining screw    |
| 13 Needle seat washer (if required) | 27 Identity tag             | 42 Throttle adjusting screw and nut | 56 Fast idle cam      |
| 14 Float needle                     | 28 Piston                   | 43 Tab washer                       | 57 Tab washer         |
|                                     | 29 Jet needle               |                                     | 58 Retaining nut      |

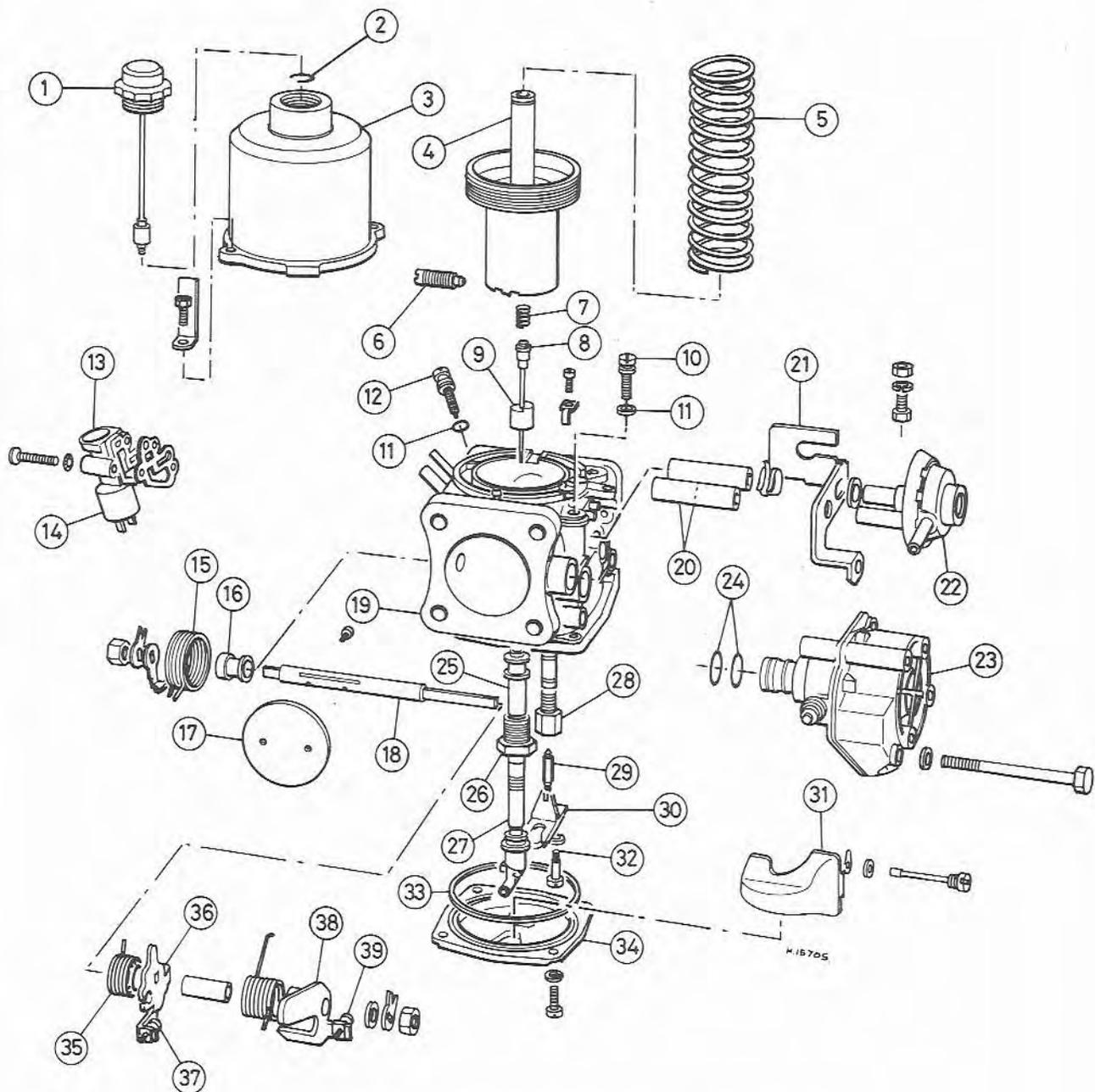


Fig. 8.10 Exploded view of electronic type HIF carburettor (Sec 9)

- |                             |                                 |                            |                                    |
|-----------------------------|---------------------------------|----------------------------|------------------------------------|
| 1 Piston damper             | 11 O-ring                       | 21 Bracket                 | 31 Float                           |
| 2 Circlip                   | 12 Mixture adjusting screw      | 22 Vacuum switch           | 32 Jet retaining screw             |
| 3 Suction chamber           | 13 Fuel shut-off valve housing  | 23 Mixture control stepper | 33 O-ring                          |
| 4 Piston                    | 14 Fuel shut-off valve solenoid | 24 Stepper motor O-rings   | 34 Float chamber cover             |
| 5 Piston spring             | 15 Throttle return spring       | 25 Jet bearing             | 35 Throttle return spring          |
| 6 Locking screw             | 16 Throttle spindle seal        | 26 Jet bearing nut         | 36 Lost motion link                |
| 7 Needle bias spring        | 17 Throttle disc                | 27 Jet assembly            | 37 Throttle lever adjustment screw |
| 8 Metering needle           | 18 Throttle spindle             | 28 Needle valve seat       | 38 Throttle lever                  |
| 9 Needle guide              | 19 Carburettor body             | 29 Needle                  | 39 Fast idle adjustment screw      |
| 10 Throttle adjusting screw | 20 Vacuum tubes                 | 30 Bi-metal jet lever      |                                    |

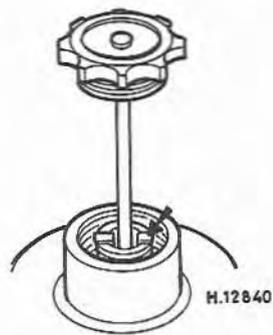
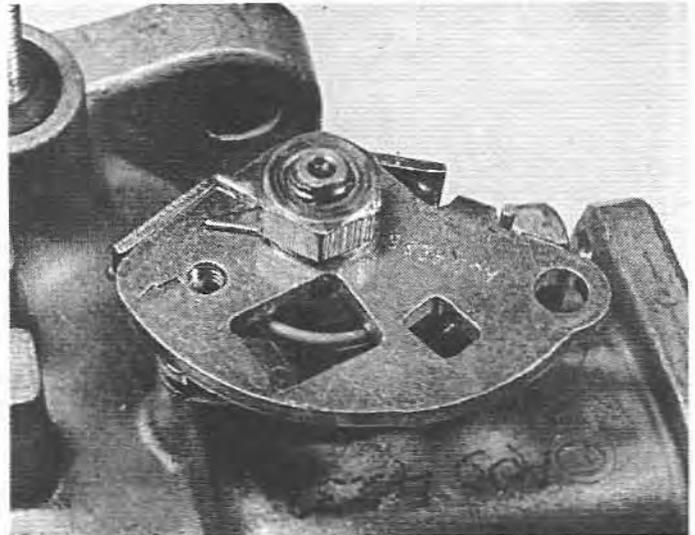


Fig. 8.11 Piston damper guide clip position (Sec 9)

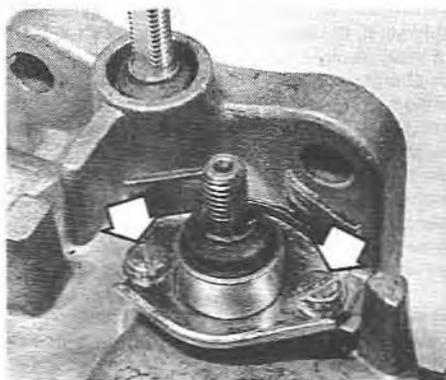
start body, and gasket (photos).

27 Remove the O-ring from the end of the cold start spindle, and withdraw the spindle from the main body. Remove the cold start seal (photo).

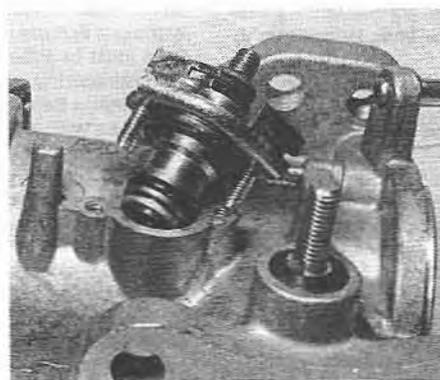
28 For instructions on cleaning, inspection and repair, refer to Chapter 4.



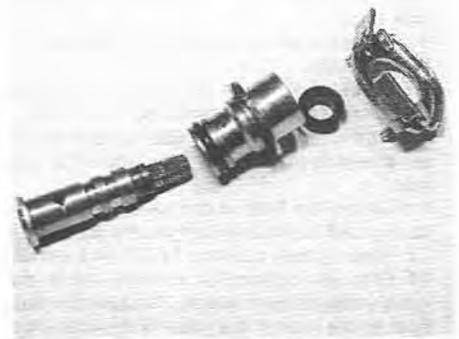
9.23 Fast idle cam



9.26A Remove the screws (arrowed) ...



9.26B ... and withdraw the cold start body assembly



9.27 Dismantled cold start assembly

## 10 Assembly

### Manual choke carburetors

1 On manual choke carburetors, locate the cold start seal in the main body with the cut-out uppermost.

2 Insert the cold start spindle with its hole uppermost, then fit the new O-ring.

3 Fit the cold start body with the cut-out uppermost, followed by the retaining plate with the slotted flange facing the throttle spindle location. Use a new gasket, then insert and tighten the retaining screws.

4 Fit the spindle seat and end cover, following by the spring, cam lever, lockwasher and nut. Make sure that the spring is correctly engaged, then tighten the nut and bend over the locktabs to lock.

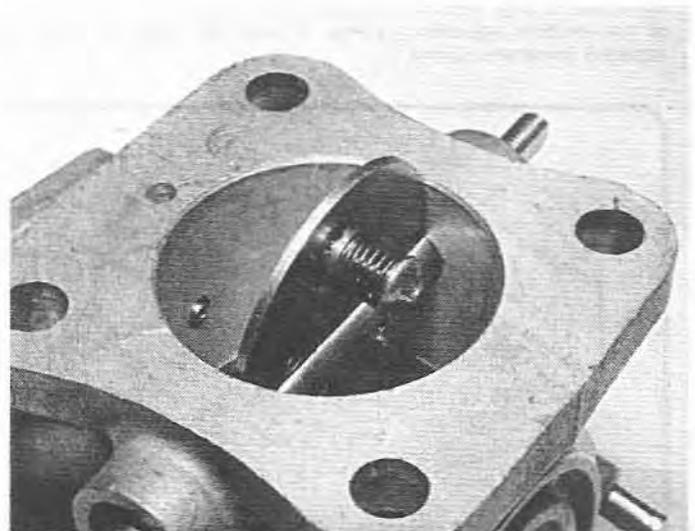
### All carburetors

5 On all carburetor types, fit the seal to the throttle spindle, then lightly oil the spindle and insert it into the main body. Press the outer seal into the recess in the main body.

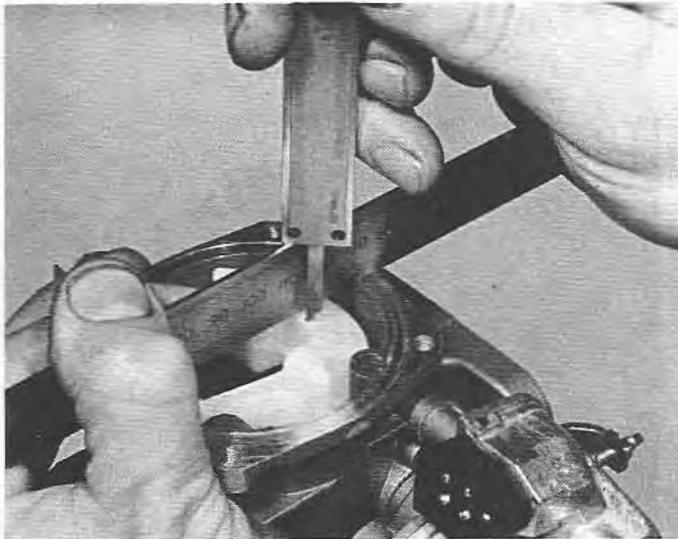
6 Slide the throttle disc into the spindle slot in its previously-noted position (photo). Close the throttle and insert the screws, however do not tighten the screws at this stage.

7 Fit the throttle return spring, levers and washers in their previously-noted positions, and tighten the nut. Bend the tabs over the nut to lock it. Make sure that the return spring is correctly located.

8 Slightly open the throttle, and allow it to snap shut several times in order to centralise the disc. Also move the spindle laterally, to



10.6 Inserting the throttle disc



10.14 Checking the float level dimension

determine its central position. Fit new throttle disc screws and tighten them, then open the throttle and spread the screw ends sufficiently to lock them.

9 Insert the piston lifting pin in the main body, locate the spring, and fit the circlip.

10 Locate the washer on the jet bearing, insert the bearing in the main body, and secure by tightening the locking nut.

11 Fit the filter to the needle valve seat. Insert and tighten the needle valve seat in the base of the carburettor. Locate the float needle in the seat.

12 Locate the float in the carburettor, then fit a new seal to the pivot screw, and insert and tighten the screw.

13 Where fitted, turn the FASD pick-up elbow towards the float.

14 With the carburettor inverted, allow the float to close the needle valve under its own weight. Measure the distance from the centre of the float to the face of the main body, as shown in Fig. 8.12. The distance should be 0.040 to 0.060 in (1.02 to 1.52 mm). A steel rule and vernier calipers may be used to check the distance (photo). Note that it will be necessary to record the width of the rule and deduct this from the overall distance. If adjustment is necessary, carefully bend the brass contact arm on the float as required.

15 Engage the jet with the cut-out in the adjusting lever, ensuring that the jet head moves freely. Position the jet in the jet bearing and, at the same time, engage the slot in the adjusting lever with the protruding tip of the mixture adjustment screw. Secure the assembly with the retaining screw and spring.

16 Except on ASU versions, fit a new O-ring seal to the float chamber cover. Fit the cover with the previously-made marks aligned, and secure with the four retaining screws.

17 Where applicable, refit the ASU to the bottom of the carburettor, with reference to Section 11.

18 Where applicable, refit the FASD to the side of the carburettor, with reference to Section 13.

19 Refit the piston guide, and secure with the screw.

20 Refit the piston needle, spring and guide to the piston, ensuring that the guide is flush with the underside of the piston, and the guide slot aligned with the locking screw location. Where applicable, the triangular etch-mark on the guide should be between the two vacuum transfer holes in the piston. Refit and tighten the locking screw.

21 Temporarily refit the piston and suction chamber to the carburettor body without the spring. Engage the piston in its guide, and, with the suction chamber in its correct position relative to the retaining screws, mark the piston-to-suction chamber relationship with a pencil. Remove the piston and suction chamber.

22 Fit the spring to the piston, align the previously-made marks, and slide the suction chamber over the piston and spring. Avoid turning the piston in the suction chamber, otherwise the spring will be wound up.

23 On the ball-bearing type suction chamber, push the piston up and refit the circlip to the piston rod.

24 Refit the piston and suction chamber assembly, taking care not to damage the metering needle. Insert and tighten the three retaining screws.

25 Assemble the valve to the damper rod, and fit the spring clip.

26 Fill the piston rod with oil. On standard suction chambers (ie without a damper rod guide clip, or upper circlip on the piston rod), the level must be 0.5 in (13 mm) above the top of the hollow piston rod. On ball-bearing suction chambers with a damper rod guide clip, the level should be at the bottom of the guide clip. On ball-bearing suction chambers with a circlip on the top of the piston rod, the level should be 0.25 in (6.5 mm) below the top of the hollow piston rod.

27 Insert and tighten the damper rod and, where applicable, press the guide clip into the top of the piston rod at the same time. On Turbo versions, refit and tighten the damper securing clamp.

28 On the electronic type carburettor, fit the fuel shut-off valve and solenoid assembly, together with a new gasket. Insert and tighten the three retaining screws.

29 On the electronic type carburettor, fit the sealing washer to the short stub pipe on the vacuum switch. Press the switch into position on the mounting bracket.

### 11 Automatic starting unit (ASU – twin carburetors) – testing, removal, overhaul and refitting

#### Testing

1 Should it be suspected that the ASU is not operating correctly, carry out the following test.

2 Remove the air cleaner, and check that the ASU outlet hose is

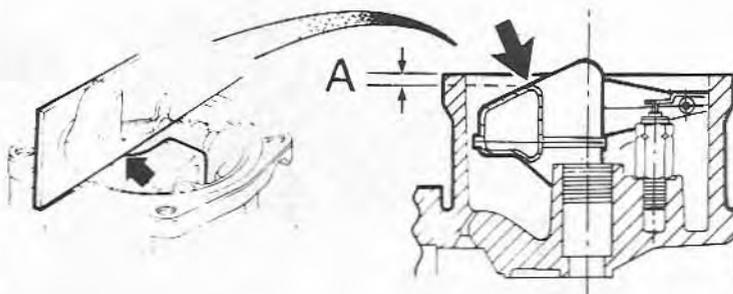


Fig. 8.12 Checking the float level dimension (Sec 10)

A = 0.040 to 0.060 in (1.02 to 1.52 mm)

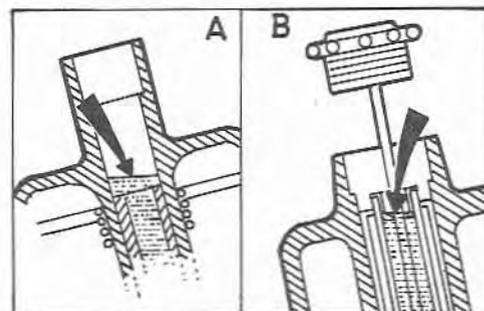


Fig. 8.13 Piston damper oil level (Sec 10)

A Standard suction chamber B Ball-bearing suction chamber

H.12841

secure and that the fuel level in the carburettor with the ASU attached is correct.

3 Remove the ASU air filter and intake hose after loosening the two clips.

4 With the engine cold, start the engine for five seconds, then switch off.

5 Disconnect the outlet hose and check that the ASU outlet port is moist with fuel. If not, refit the outlet hose, partially block the inlet port, and start the engine for a further five seconds only.

6 Disconnect the outlet hose and check again that the ASU outlet port is moist with fuel. If it is now, the internal thermostatic unit is proved faulty, and the ASU should be replaced.

7 Run the engine to normal operating temperature, then check that the ASU inlet port is closed, using a strip of paper to detect any suction through the port. If it is open, the unit is faulty.

8 Refit the intake hose and special air filter, and tighten the two clips.

9 A further test may be made if difficult hot starting is experienced. With the engine hot, remove the outlet hose and blank off the port in the inlet manifold. If the engine now starts better, the ASU is proved defective. Check that the outlet hose is firmly secured, and is not deteriorated.

### Removal

10 First remove the carburettor with the ASU attached. On some models, it may be possible to remove the ASU without removing the carburettor, although this is not recommended.

11 Loosen the clips and disconnect the inlet and outlet hoses, if not already removed.

12 Remove the screw securing the ASU to the upper support bracket (photo).

13 Extract the screws which hold the spacer plate and ASU adaptor plate to the carburettor (photo). Remove the ASU from the carburettor.

14 Remove the upper O-ring, spacer plate, and lower O-ring (photos).

### Overhaul

15 Pull the plastic cover from the top of the ASU (photo).

16 Remove the screws, and lift the ASU from the adaptor plate (photo).

17 Remove the diaphragm, location dowel, spring, and plunger from the top of the adaptor plate (photos).

18 Turn the adaptor plate over, and remove the bottom cover, diaphragm, and location dowel (photos).

19 Remove the clamp screw and clamp, then pull out the air inlet stub and remove the O-ring (photos).

20 Remove the screws, and separate the cover from the valve body (photo). The bi-metal unit loading spring will probably remain in the top cover.

21 Remove the gasket. Note how the bi-metal unit is located, then lift it from the cut-outs in the valve body (photo).

22 Prise out the O-ring from the top of the fuel metering needle assembly (photo).

23 Remove the screws, and lift the valve body from the ASU body (photo).

24 Remove the gasket. Note the location of the air valve, then remove it from the ASU body (photo).

25 Thoroughly clean all the components, and examine them for wear and damage. Check the diaphragms for splits and pin holes. Blow clear all internal drillings using low air pressure.

26 Commence reassembly by locating the air valve in the ASU body. With the spring correctly positioned, check that the valve closes properly.

27 Refit the valve body together with a new gasket, then insert and tighten the screws.

28 Locate a new O-ring over the fuel metering needle assembly.

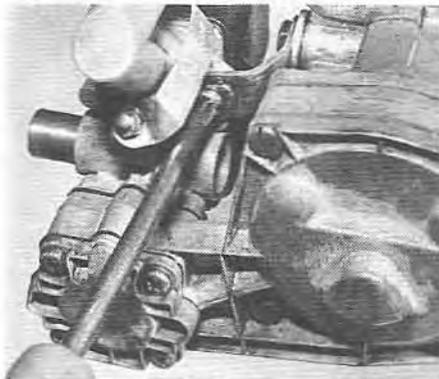
29 Locate a new gasket on the valve body, and refit the bi-metal unit in its previously-noted position.

30 Check that the bi-metal unit loading spring is in the top cover. Refit the top cover and tighten the screws.

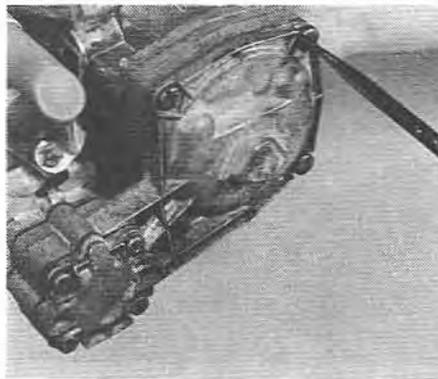
31 Locate a new O-ring on the air inlet stub. Refit the air inlet stub, and secure with the clamp and screw.

32 Press the location dowel in the bottom of the adaptor plate, and refit the diaphragm and bottom cover.

33 With the adaptor plate upright, insert the plunger, and refit the



11.12 Removing ASU upper support bracket screw



11.13 Removing the ASU-to-carburetor adaptor plate screws



11.14A Removing the upper O-ring ...



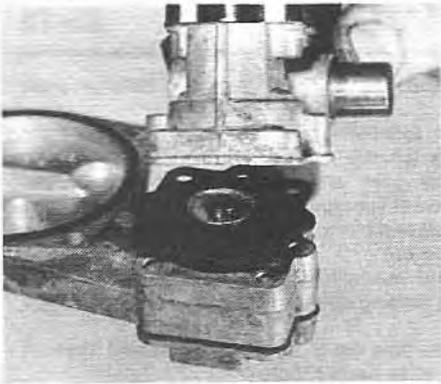
11.14B ... spacer plate ...



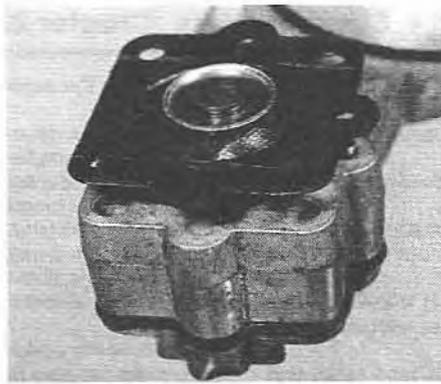
11.14C ... and lower O-ring



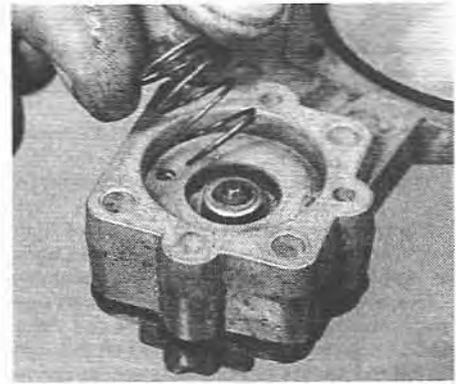
11.15 ASU top cover removal



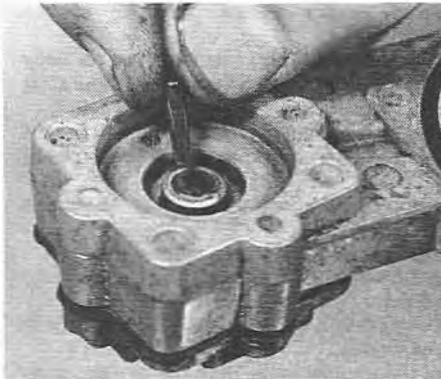
11.16 Removing the ASU from the adaptor plate



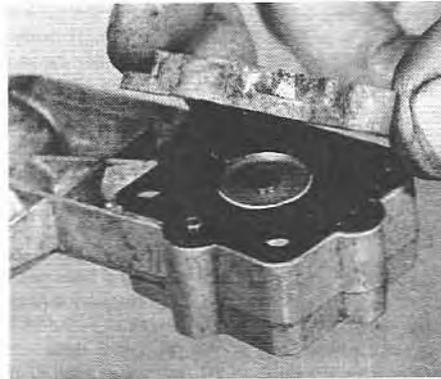
11.17A Remove the diaphragm ...



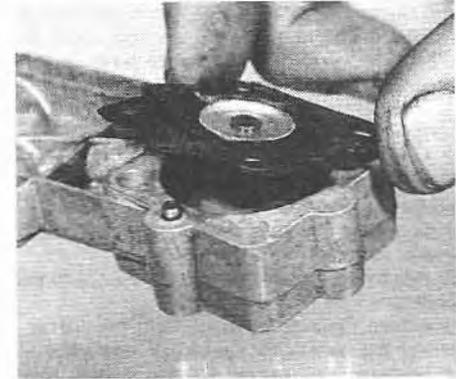
11.17B ... spring ...



11.17C ... and plunger



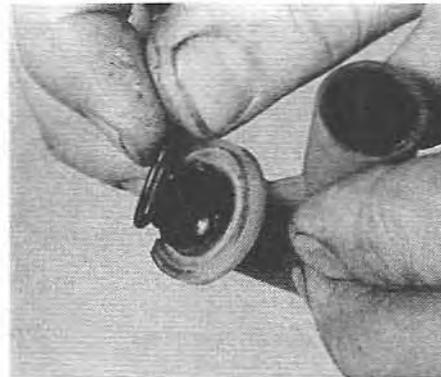
11.18A Remove the bottom cover ...



11.18B ... diaphragm, and location dowel



11.19A Air inlet stub and clamp removal



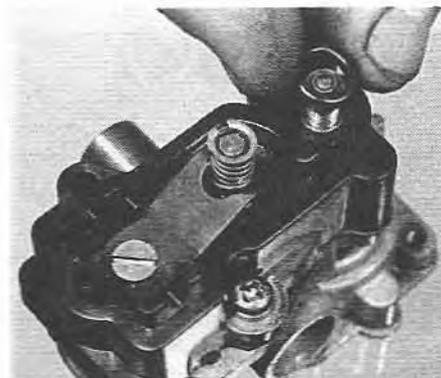
11.19B Air inlet stub O-ring removal



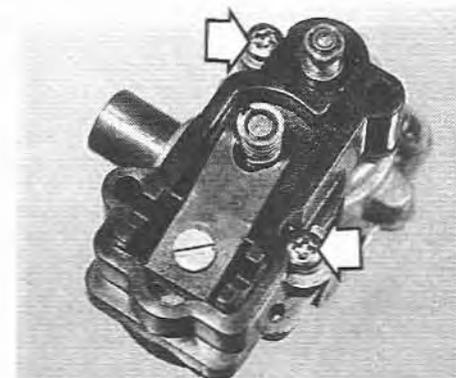
11.20 Valve body cover removal



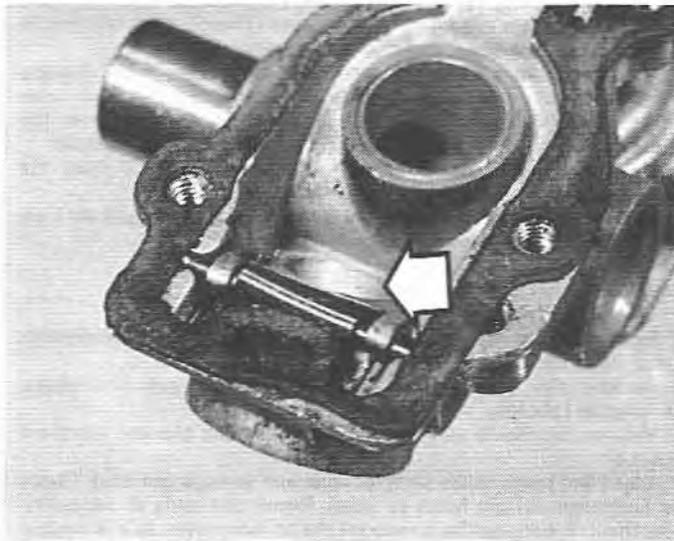
11.21 Bi-metal unit (arrowed)



11.22 Fuel metering needle O-ring removal



11.23 Valve body securing screws



11.24 Air valve location (arrowed)

spring, location dowel and diaphragm.

34 Press the cover and adaptor plate onto the ASU, then insert and tighten the screws.

35 Press the plastic cover on the top of the ASU.

#### Refitting

36 Refitting is a reversal of removal, but fit new O-rings either side of the spacer plate. Make sure that the associated air hoses are in good condition.

### 12 Fully automatic starting device (FASD – twin carburettors) – checking and adjustment

#### Checking

1 Check that fuel is being delivered to the carburettor with the FASD attached, by temporarily disconnecting the feed pipe, and switching on the ignition for a few seconds.

2 If the cooling system has recently been drained and refilled, make sure that all air has been purged from the coolant. The presence of air around the wax capsule inside the FASD will reduce the movement of the shut-off valve during the warm-up period, resulting in an over-rich mixture.

3 To check that the FASD cuts out correctly, run the engine to normal operating temperature, then connect an exhaust gas analyser to the exhaust tailpipe. Record the CO percentage at idle speed. Disconnect the FASD outlet hose at the inlet manifold, blank off the manifold aperture, and check that the CO reading remains as previously recorded, or drops very slightly. The FASD is proved faulty if the CO reading drops significantly, or fluctuates. Stop the engine, re-connect the outlet hose, and disconnect the exhaust gas analyser.

4 It is possible for a fault to occur in the FASD control module (usually located behind the instrument panel) or its associated wiring, which prevents the vacuum delay valve opening. In such a case, the engine will start well from cold, and will run well when hot, but in the intervening period will show symptoms of excessive richness (eg lumpiness and black smoke). This condition is confirmed if battery voltage is not present across the delay valve terminals when the engine is running.

5 If starting is satisfactory, but the FASD seems to stay on too long, check that the coolant is circulating freely past the wax capsule. On some models, there is a restrictor in the hose between the FASD and the radiator, which may become blocked. Furthermore, on some models (notably Rover 2300/2600) it is possible for the coolant feed to be blocked by the fitting of an incorrect (early pattern) inlet manifold gasket.

6 Reluctance to start and run when cold may be due to fuel starvation. Remove the FASD adaptor (accessible after removing the float chamber cover on the carburettor), and check that the non-return valve ball is not dislodged.

#### Adjustment

7 To carry out adjustment, it will be necessary to obtain a means of determining when airflow through the FASD has ceased. A circle of 100 gram weight paper 2.64 in (67.1 mm) in diameter, with a central 0.5 in (13.0 mm) diameter hole may be used for this purpose. A means of accurately measuring the temperature of the FASD water jacket is also required, and for this purpose, temperature-sensitive adhesive labels should be obtained.

8 Remove the air cleaner or inlet duct from the carburettors.

9 Prise out the rubber plug from the end of the adjustment tube, and insert a 1.5 mm Allen key so that it engages the adjuster (photo).

10 Wipe clean the water jacket, and attach a 65°C (150°F) temperature-sensitive label as shown in Fig. 8.14.

11 Start the engine (cold) and allow it to idle. If the engine will not start, turn the Allen key two turns clockwise and try again.

12 With the engine idling, locate the paper airflow detector over the FASD air intake, so that the passage of air holds it in place (photo).

13 As soon as the water jacket temperature reaches 65°C (150°F), turn the Allen key clockwise slowly until the paper airflow detector falls from the air intake, indicating that the flow of air has ceased. Should the detector fall *before* 65°C (150°F) is reached, turn the Allen key anti-clockwise one turn, then reposition the detector. The adjustment must be completed within 30 seconds of the 65°C (150°F) temperature being reached, otherwise the engine must be allowed to cool for at least one hour before starting again.

14 Remove the Allen key, and refit the rubber plug. Refit the air cleaner or inlet duct.



12.9 1.5 mm Allen key inserted in the FASD

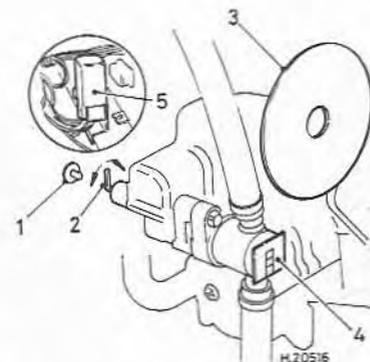
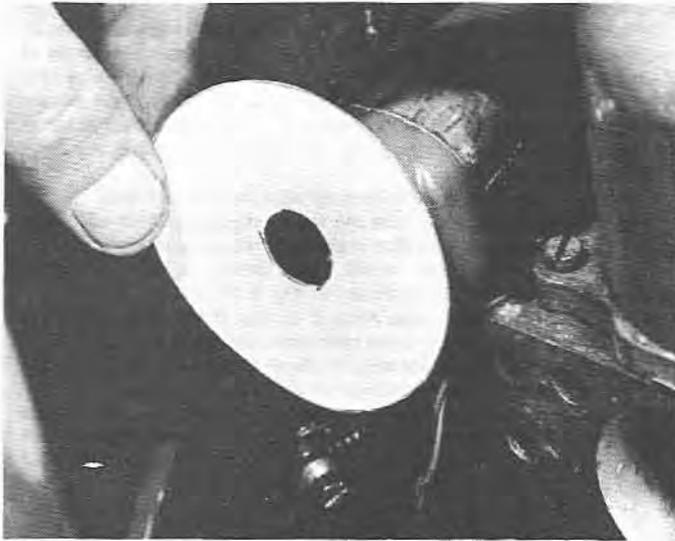


Fig. 8.14 Adjusting the FASD (Sec 12)

- |                            |                         |
|----------------------------|-------------------------|
| 1 Rubber plug              | 4 Temperature indicator |
| 2 Allen key                | 5 Control module        |
| 3 Paper shut-off indicator |                         |

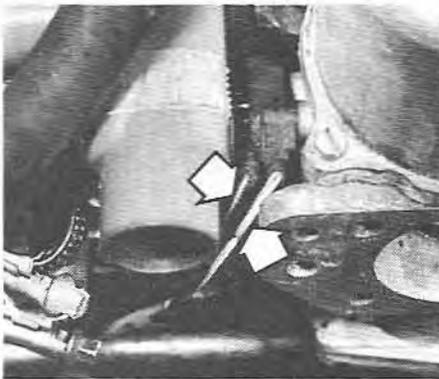


12.12 Locating the paper airflow detector over the FASD air intake

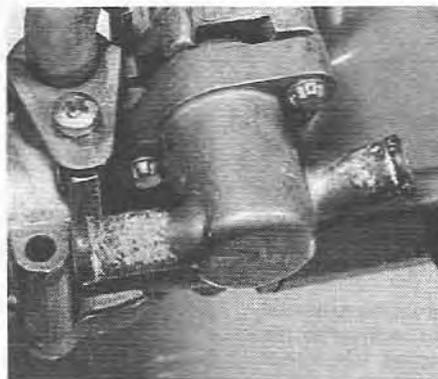
### 13 Fully automatic starting device (FASD – twin carburetors) – removal, overhaul and refitting

#### Removal

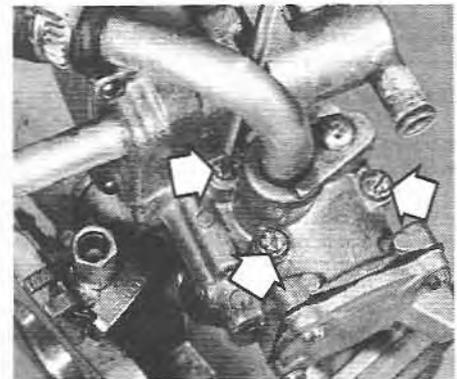
- 1 Unbolt and remove the air cleaner assembly from the carburetors.
- 2 Disconnect the FASD air inlet and outlet hoses, and also the delay valve wiring (photo).



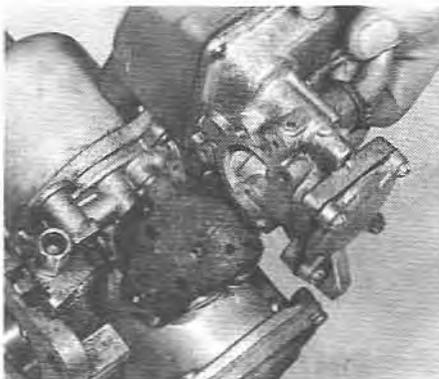
13.2 FASD delay valve wiring (arrowed)



13.3 FASD water jacket



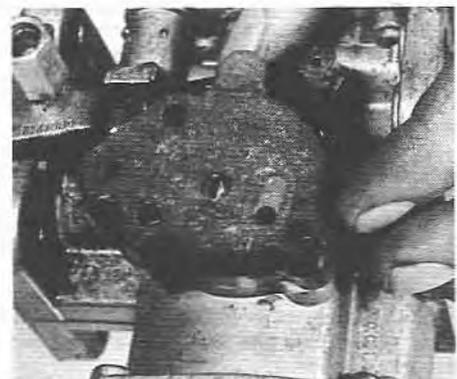
13.5A Remove the through-bolts (arrowed)



13.5B ... and withdraw the FASD



13.5C The FASD removed



13.6A Delay valve removal

- 3 Drain the cooling system, then loosen the clips and disconnect the coolant hoses from the FASD water jacket (photo). Alternatively, fit hose clamps to the hoses before disconnecting them.

- 4 On some models it may be possible to remove the FASD leaving the carburettor in position. Otherwise, disconnect the fuel hose, vacuum hose(s), accelerator cable and linkage, then unscrew the mounting nuts and remove the carburettor from the inlet manifold.

- 5 Unscrew the through-bolts and withdraw the FASD from the carburettor (photos). Be prepared for fuel spillage.

- 6 Remove the delay valve from the carburettor. Peel the gaskets from the carburettor and delay valve (photos).

#### Overhaul

- 7 Clean the external surfaces of the FASD.

- 8 Extract the screws, and remove the cover from the accelerator pump diaphragm (photo).

- 9 Remove the diaphragm, and lift the spring from the plastic guide/valve (photos).

- 10 Release the plastic guide/valve from the spring clip and remove it (photos).

- 11 Clean and examine the parts for wear and damage (photos). Check the diaphragm for pin holes or splits. Renew the parts as necessary. Note that it is not possible to remove the air inlet cover, as it is rivetted in position.

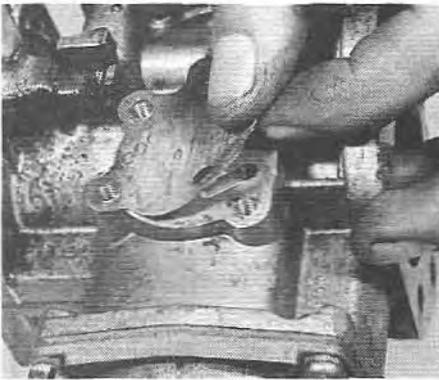
- 12 Commence reassembly by engaging the plastic guide/valve with the spring clip.

- 13 Insert the spring through the plastic guide/valve, then fit the diaphragm with the square tab aligned with the vacuum hole in the main body.

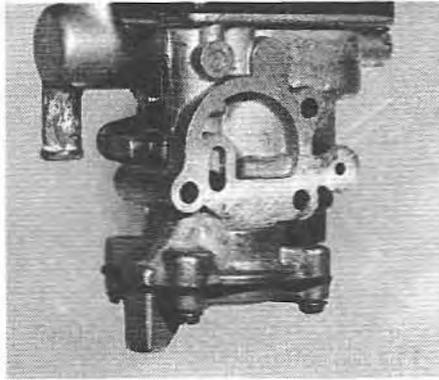
- 14 Fit the cover, and hold it down against the spring tension, making sure the screw holes are aligned. Insert and tighten the screws evenly.

#### Refitting

- 15 Refitting is a reversal of removal, but clean the mating surfaces and fit new gaskets. Refill the cooling system.



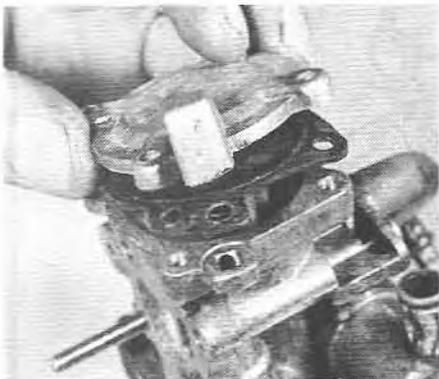
13.6B Peel the gasket from the carburettor



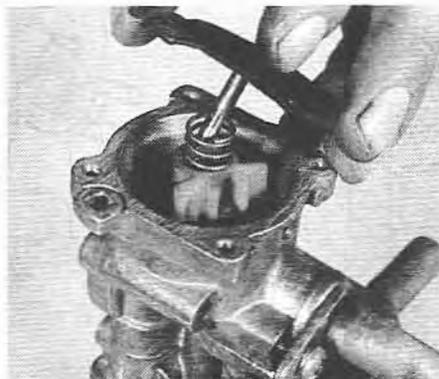
13.6C Delay valve location face on the carburettor



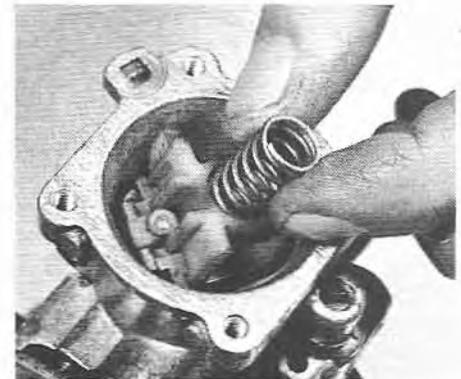
13.6D Removing the gasket from the delay valve



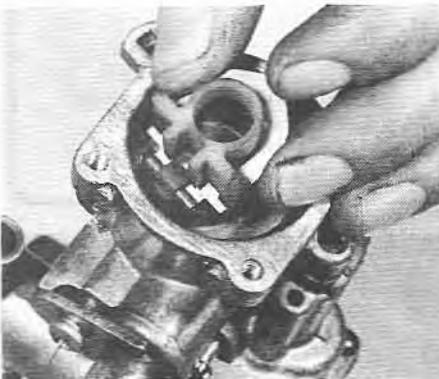
13.8 Accelerator pump diaphragm cover removal



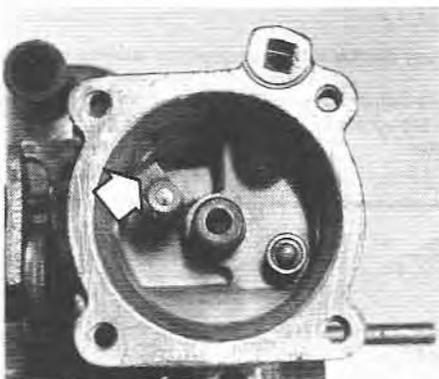
13.9A Remove the accelerator pump diaphragm ...



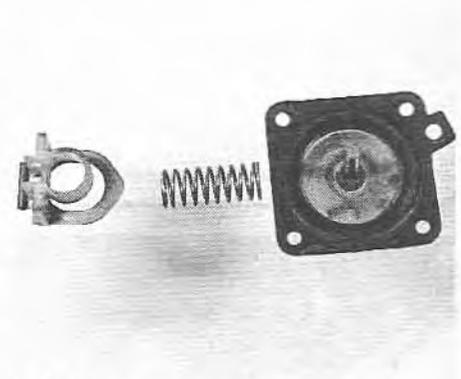
13.9B ... and spring



13.10A Removing the plastic guide/valve



13.10B Plastic guide/valve retaining spring



13.11 Accelerator pump diaphragm components

## 14 Tuning

**Note:** Refer to Chapter 3 for notes on tuning, with particular reference to preliminary procedures.

### Single carburettor installations

- 1 Set the throttle adjusting screw. Run the engine to working temperature, then switch off.
- 2 Where necessary, remove the air cleaner or plenum chamber.
- 3 Unscrew the throttle adjusting screw until it is just touching its stop with the throttle valve shut (photo).
- 4 Where applicable, check that the cold start lever is fully closed (cold-start device out of action), and that the fast idle adjusting screw

is well clear of the cam. Failure to observe this may result in the throttle being held open when, by external examination, it appears closed.

5 Turn the throttle adjusting screw  $1\frac{1}{2}$  turns clockwise to set the throttle to its initial position.

6 Set the jet height. Remove the suction chamber and piston with reference to Section 9.

7 Check that the needle guide is flush with the bottom face of the piston.

8 Turn the mixture adjustment screw until the top of the jet is flush with the top of the jet guide. Now turn the screw 2 turns clockwise (photos). If the mixture adjusting screw is covered by a small blue or red tamperproof plug, hook this out with a small screwdriver and discard it.

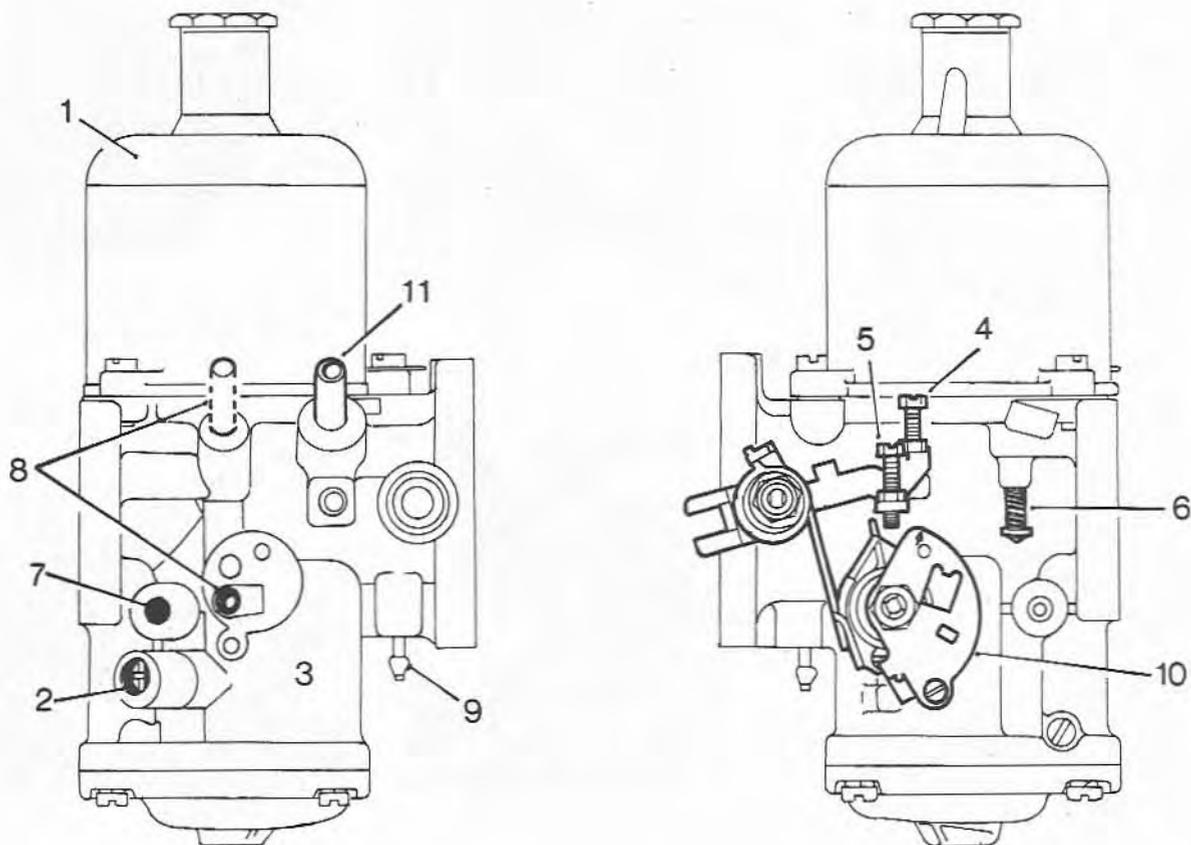
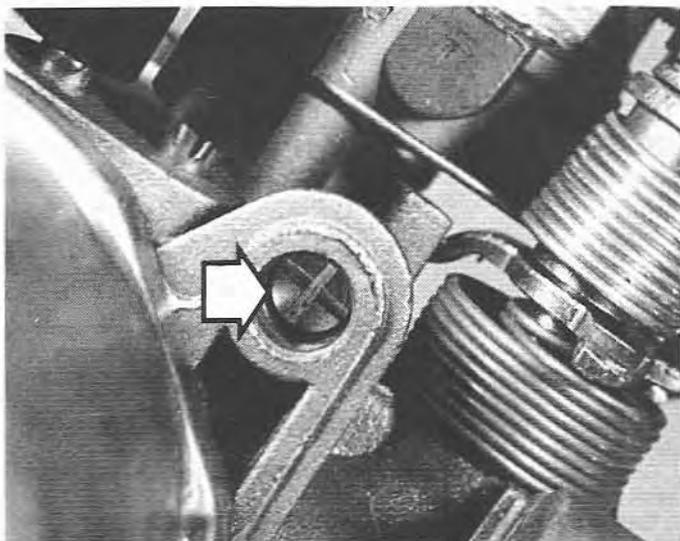
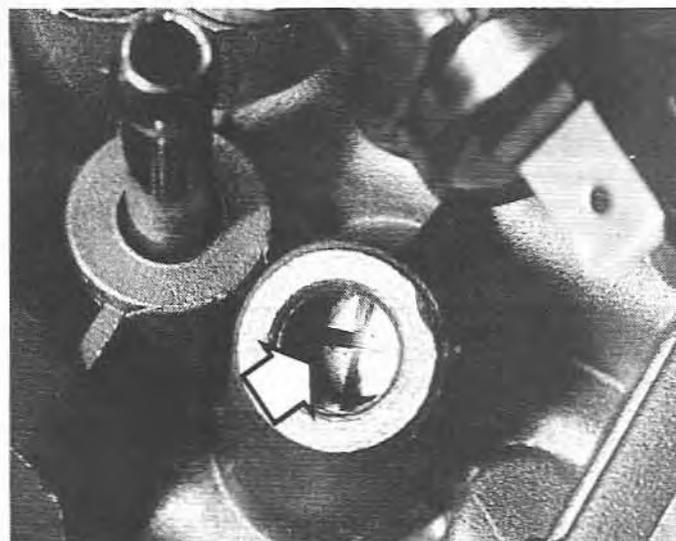


Fig. 8.15 Manual choke HIF carburettor tuning points (Sec 14)

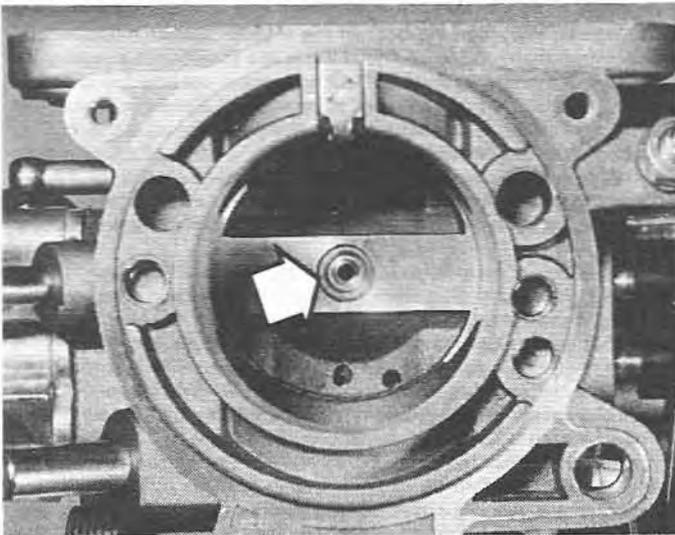
- |                            |                             |                                      |                                     |
|----------------------------|-----------------------------|--------------------------------------|-------------------------------------|
| 1 Suction chamber          | 5 Fast idle adjusting screw | 8 Vent tube (alternative positions)  | 10 Cold start fast idle cam         |
| 2 Mixture adjusting screw  | 6 Piston lifting pin        | 9 Ignition vacuum advance connection | 11 Crankcase ventilation connection |
| 3 Float chamber            | 7 Fuel inlet                |                                      |                                     |
| 4 Throttle adjusting screw |                             |                                      |                                     |



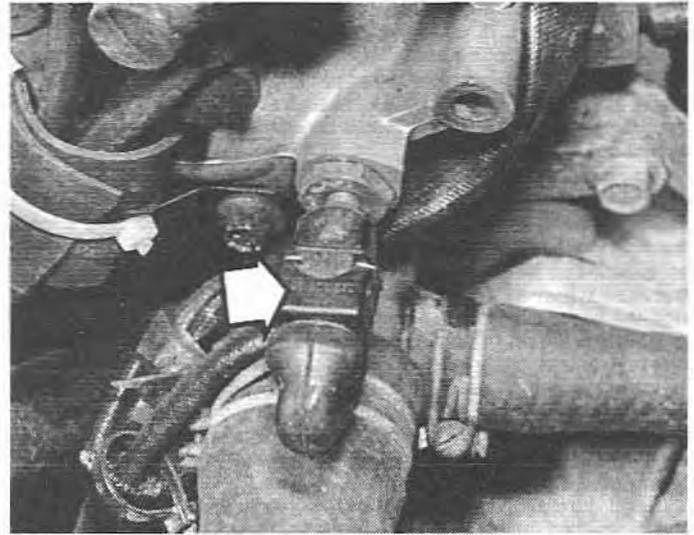
14.3 Throttle adjusting screw location (arrowed)



14.8A Mixture adjusting screw location (arrowed)



14.8B Upper view of the jet (arrowed)



14.14 Coolant thermistor wiring plug (arrowed)

- 9 Refit the piston and suction chamber, together with the damper, with reference to Section 10.
- 10 Set the idle speed and mixture. Refit the air cleaner or plenum chamber. Note that where these items conceal the carburettor adjustment screws, do not refit them, but position them near the carburettor and re-connect the vacuum hoses.
- 11 Connect a tachometer to the engine, and a CO exhaust gas analyser to the exhaust tailpipe. If an exhaust gas analyser is not available, it will not be possible to adjust the mixture setting accurately, although a reasonable adjustment may be possible.
- 12 Run the engine at a fast idle speed until it reaches its normal operating temperature. Where an electric cooling fan is fitted, this must

- have started and stopped at least once. Continue to run the engine for a further five minutes before commencing adjustment.
- 13 Increase the engine speed to 2500 rpm for 30 seconds, and repeat this at three-minute intervals during the adjustment procedure. This is necessary to clear both the inlet manifold and exhaust system.
- 14 On electronic type carburetors fitted with a stepper motor (eg HIF44E), disconnect the wiring plug from the coolant thermistor (photo), and join the two plug terminals together with a suitable length of wire. This will ensure that the stepper motor mixture control remains fully off. Turn the throttle adjusting screw to reduce the idle speed to 900 rpm.
- 15 If the cooling fan is running, wait until it stops, then turn the

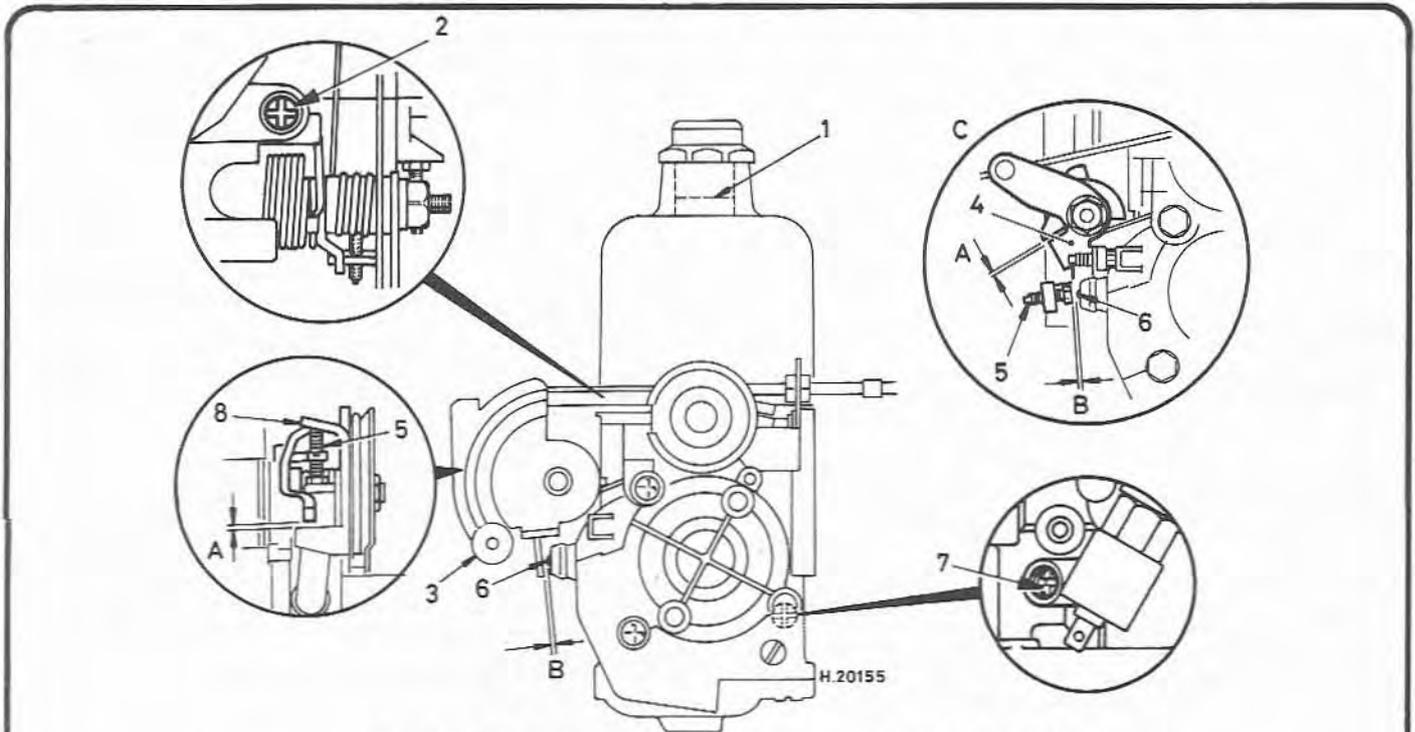


Fig. 8.16 Electronic type HIF carburettor tuning points (Sec 14)

- |                                 |                                  |                             |                              |
|---------------------------------|----------------------------------|-----------------------------|------------------------------|
| 1 Piston damper oil level       | 4 Throttle lever adjusting screw | 6 Fast idle push rod        | A Lost motion gap            |
| 2 Idle speed adjusting screw    | 5 Fast idle adjusting screw      | 7 Mixture adjusting screw   | B Fast idle gap              |
| 3 Progressive type throttle cam |                                  | 8 Lost motion adjusting tag | C Throttle lever and linkage |

throttle adjusting screw to give the desired idle speed. On electronic type carburetors, it is recommended that the desired idle speed be approached from a higher speed, because if the speed drops more than 100 rpm below the recommended speed, the throttle jacking system will be activated. If this occurs, increase the idle speed on the throttle adjusting screw, and wait 2 minutes for conditions to stabilise before repeating the adjustment.

16 On electronic type carburetors, switch off the engine and check the clearance between the fast idle pushrod and the adjustment screw (Fig. 8.16) using feeler gauges. If necessary, turn the adjustment screw to obtain a minimum clearance of 0.005 in (0.13 mm). Also check that the throttle lever lost motion gap is  $0.07 \pm 0.01$  in ( $1.8 \pm 0.25$  mm). If necessary, turn the adjustment screw or, on models with a throttle cam, bend the tag to obtain the correct clearance.

17 With the engine idling, slowly turn the jet adjusting (mixture) screw clockwise (to enrich) or anti-clockwise (to weaken), until the fastest idle speed which is consistent with even running is obtained. Now slowly turn the screw anti-clockwise until the engine speed just begins to drop. If an exhaust gas analyser is being used, adjust the screw to obtain the desired CO percentage reading (typically  $2.5 \pm 1.0\%$ ).

18 Reset the idle speed if necessary, then switch off the engine.

19 Set the fast idle speed (manual choke carburetors). Pull out the choke control knob until the arrow on the fast idle cam is aligned with the fast idle adjusting screw.

20 Start the engine, and check that the fast idle speed is as desired (typically 1100 to 1300 rpm). If necessary, turn the fast idle adjusting screw to obtain the correct speed.

21 Switch off the engine, and push in the choke control knob. Make sure that the mixture control lever is fully returned, and the choke cable correctly adjusted.

22 Set the fast idle speed (electronic type carburetors). Remove the bridging wire fitted to the coolant thermistor wiring plug in paragraph 14, however leave the plug disconnected.

23 Disconnect the two wires from the ambient air temperature sensor, located in the front of the engine compartment. Remove the sensor, and join the two wires together using a strip of metal.

24 Start the engine. The stepper motor should move the fast idle pushrod to the fast idle position, and the engine should run at the desired fast idle speed (typically 950 to 1150 rpm). If necessary, turn the fast idle adjusting screw to obtain the correct speed.

25 Switch off the engine, and check that the minimum clearance still exists between the fast idle pushrod and adjustment screw, as described in paragraph 16.

26 Re-connect the ambient air temperature sensor and the coolant thermistor wiring plug.

27 On all models, refit the air cleaner or plenum chamber where applicable, then make a final check that the idle speed and mixture are correct.

28 Remove the tachometer and exhaust gas analyser.

### Multiple carburettor installations

29 Set the jet height. Run the engine to working temperature, then switch off. Make sure that the manual choke, where fitted, is fully off.

30 Remove the air cleaner or plenum chamber as applicable.

31 Working on each carburettor in turn, remove the suction chamber and piston with reference to Section 9, then turn the mixture adjustment screw until the jet is flush with the top of the jet guide. Now turn the screw 2 turns clockwise to set the jet at its initial position. If the screw is covered by a tamperproof plug, hook this out and discard it. Refit the suction chamber and piston, with reference to Section 10.

32 Set the throttle adjusting screws. Slacken the clamping bolt on the throttle spindle interconnection coupling between the carburetors.

33 Unscrew both throttle stop adjusting screws until they are both just touching their stops with the throttles closed. Turn both screws clockwise  $1\frac{1}{2}$  turns exactly, and tighten the locknuts where applicable. Check that the fast idle adjustment screw is clear of the throttle opening mechanism.

34 Set the idle speed and mixture. Connect a tachometer to the engine, and a CO exhaust gas analyser to the exhaust tailpipe. If an exhaust gas analyser is not available, it will not be possible to adjust the mixture setting accurately, although a reasonable adjustment may

be possible.

35 Re-tighten the clamping bolt on the throttle spindle interconnection coupling, then run the engine at a fast idle speed until it regains its normal operating temperature. Where an electric cooling fan is fitted, this must have started and stopped at least once. Continue to run the engine for a further five minutes before commencing adjustment.

36 Increase the engine speed to 2500 rpm for 30 seconds, and repeat this at three-minute intervals during the adjustment procedure. This is necessary to clear both the inlet manifold and exhaust system.

37 Loosen the clamping bolt on the throttle spindle interconnection coupling.

38 On electronic type carburetors fitted with a stepper motor, disconnect the wiring plug from the coolant thermistor, and join the two plug terminals together with a suitable length of wire. This will ensure that the stepper motor mixture controls remain fully off.

39 If the cooling fan (where fitted) is running, wait until it stops, then turn the throttle stop adjusting screws by equal amounts to give the desired idle speed. On electronic type carburetors, it is recommended that the desired idle speed be approached from a higher speed, because if the speed drops more than 100 rpm below the recommended speed, the throttle jacking system will be activated. If this occurs, increase the idle speed on the throttle adjusting screws, and wait 2 minutes for conditions to stabilise before repeating the adjustment.

40 To make sure that both carburetors are synchronised, use a length of tubing placed between the carburettor intake and the ear, and adjust the throttle screws fractionally until the hiss from both units is the same. For a more accurate setting, use a balancing device (flow meter) in accordance with its manufacturer's instructions.

41 On electronic type carburetors, check the fast idle and throttle lever clearances as previously described in paragraph 16.

42 With the engine idling, turn the jet adjusting (mixture) screws by equal amounts clockwise (to enrich), or anti-clockwise (to weaken), until the fastest idle speed which is consistent with even running is obtained. If an exhaust gas analyser is being used, adjust the screws by equal amounts to obtain the desired CO percentage reading (typically  $2.5 \pm 1.0\%$ ).

43 If necessary, re-adjust the throttle stop adjusting screws by equal amounts until the correct idle speed is obtained again.

44 Re-tighten the clamping bolt on the throttle spindle interconnection coupling, while holding the lever against its fork. The interconnection rod endfloat should be approximately 0.032 in (0.8 mm).

45 Set the fast idle speed (manual choke carburetors). Pull out the choke control knob until the arrows on both fast idle cams are aligned with the fast idle adjusting screws.

46 Check that the fast idle speed is as desired (typically 1100 to 1300 rpm). If necessary, turn the fast idle adjusting screw to obtain the correct speed, making sure that both screws are in contact with the fast idle cams.

47 Push in the choke control knob and switch off the engine. Make sure that the mixture control lever is fully returned, and the choke cable correctly adjusted.

48 Set the fast idle speed (electronic type carburetors). Remove the bridging wire fitted to the coolant thermistor wiring plug in paragraph 38, however leave the plug disconnected.

49 Disconnect the two wires from the ambient air temperature sensor, located in the front of the engine compartment. Remove the sensor, and join the two wires together using a strip of metal.

50 Start the engine. The stepper motors should move the fast idle pushrods to the fast idle position, and the engine should run at the desired fast idle speed (typically 1100 to 1300 rpm). If necessary, turn the fast idle adjusting screws to obtain the correct speed, making sure that both screws are in contact with the fast idle pushrods.

51 Switch off the engine, and check that the minimum clearance still exists between the fast idle pushrods and adjustment screws as described in paragraph 16.

52 Re-connect the ambient air temperature sensor and the coolant thermistor wiring plug.

53 On all models, remove the flowmeter (if used), then refit the air cleaner or plenum chamber as applicable.

54 Make a final check that the idle speed and mixture are correct.

55 Remove the tachometer and exhaust gas analyser.



## Part 4 SU carburetors

### Chapter 21 Auxiliary starting devices

#### Contents

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Auxiliary enrichment device – removal, overhaul, refitting and adjustment .....	5	Introduction .....	1
		Operation .....	3
		Special overhaul procedures .....	4

#### 1 Introduction

This Chapter contains information on auxiliary starting devices which are fitted on more than one type of carburettor. Information on the FASD and ASU is given in Chapter 8, as these units are only fitted to type HIF carburetors.

The auxiliary starting devices provide automatically differing degrees of mixture enrichment at starting, idling, cruising and full throttle conditions, when the engine has not attained normal running temperature.

When working on the AED, no attempt should be made to dismantle the unit further than described in Section 6, otherwise the factory adjustments will be disturbed.

#### 2 Construction

##### *Auxiliary enrichment device (thermostatic starting carburettor)*

The unit consist of a die-cast aluminium body, a solenoid assembly, a disc valve and a needle valve.

The body has a machined recess to accommodate the solenoid,

which is secured to it by a spring clip hinged upon lugs and a retaining screw.

Passages are drilled for air and mixture transfer through the two valves, and screwed union connections are provided for fuel inlet and mixture outlet.

The solenoid assembly consists of a solenoid, to which is attached a cover with terminals for connection of 12V dc electrical supply. There is a brass tube in the centre, in which slides an armature. The lower end of the armature is provided with a socket, which accommodates the ball extension of a brass disc. A light, conical, compression spring, fitted between the disc and a brass spring retainer underneath the solenoid, loads the armature and disc assembly out of the solenoid and seats the valve disc on a circular 'knife-edge' brass seating into the valve body. The articulated ball-and-socket joint compensates for slight manufacturing inaccuracies by allowing the valve disc to tilt in any plane, to ensure full contact on the seating.

The needle valve assembly consists of a brass rod, tapered at its lower end, and fitted with a plunger near the top. It is supported in a screwed bearing (adjustable stop) fitted to a bar, which is attached to the top of the body. The plunger acts as a spring register and suction disc. The assembly is fitted into a bore in the body, the tapered end of the needle entering a jet screwed into the bottom of the bore from underneath. A light, helical, compression spring loads the needle out of the jet.

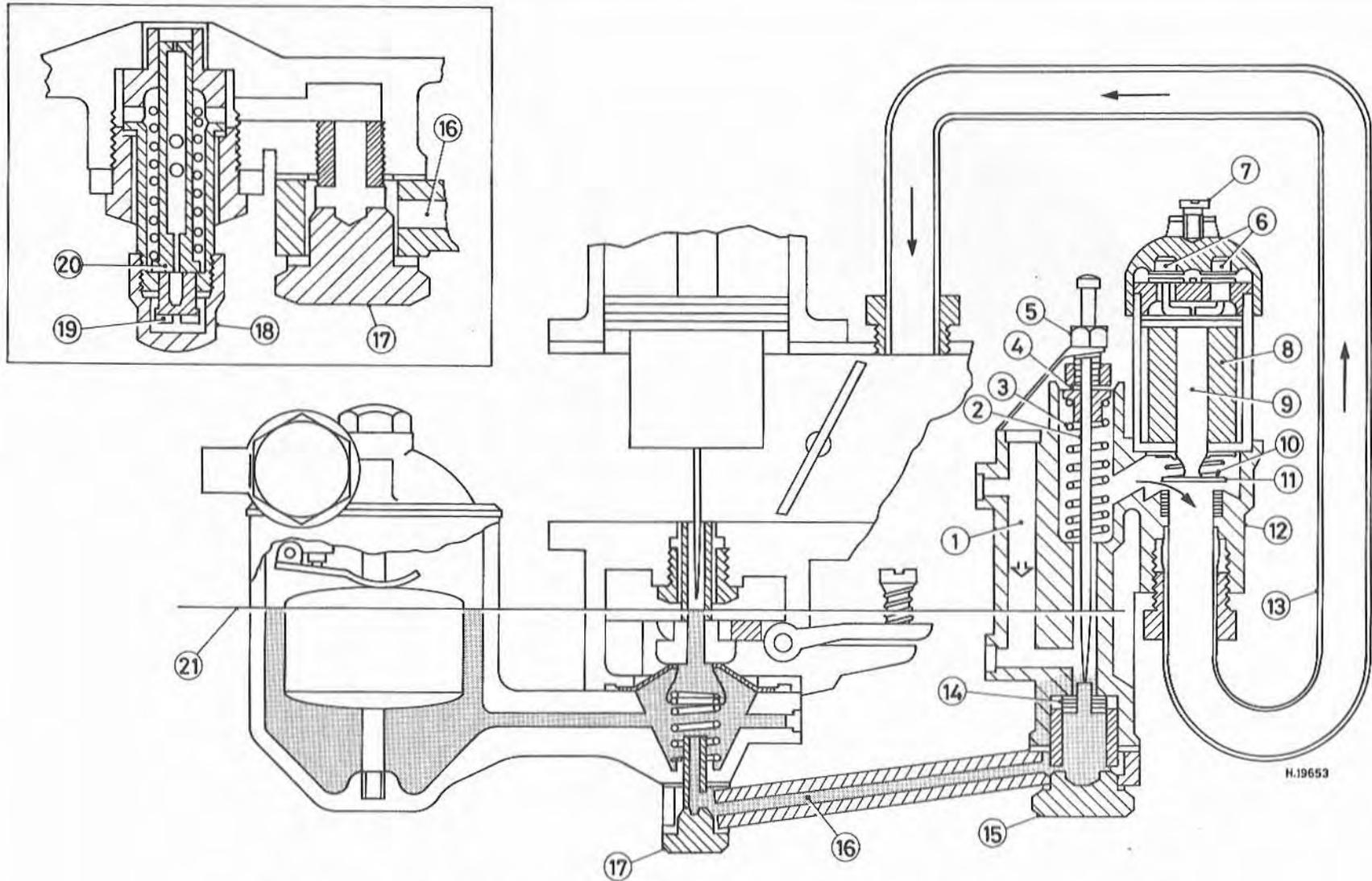


Fig. 9.1 Cross-section of the auxiliary enrichment device (thermostatic starting carburettor) (Sec 2)

*Inset shows type H carburettor application, main diagram is type HD carburettor application*

- |                           |                     |                                 |                               |
|---------------------------|---------------------|---------------------------------|-------------------------------|
| 1 Air inlet               | 7 Clamping screw    | 12 Body                         | 17 Banjo bolt                 |
| 2 Tapered metering needle | 8 Solenoid          | 13 External feed pipe           | 18 Cap nut (type H)           |
| 3 Spring                  | 9 Iron core plunger | 14 Jet                          | 19 Jet adjusting nut (type H) |
| 4 Suction disc            | 10 Conical spring   | 15 Banjo bolt                   | 20 Jet flange (type H)        |
| 5 Adjustable stop nut     | 11 Valve            | 16 Fuel channel in mounting arm | 21 Fuel level                 |
| 6 Terminals               |                     |                                 |                               |

The unit is mounted to the base of the main carburettor by an arm which is centrally drilled for the passage of fuel. The arm has a boss at each end, and is secured by banjo bolts. The arm is angled slightly from the horizontal, and is reversible (by inverting it) to give varying petrol levels. The outlet of the unit is connected by an external pipe to the inlet manifold.

lid, plastic float, main valve and bi-metal unit body, and cover. The main valve is connected to the main bi-metal unit by a spindle, which slides in a low-friction bush. The main bi-metal unit is attached to the heat shroud, supported by a spring and the bi-metal adjusting screw. The fuel metering needle is of steel, and is located at its upper end in the secondary bi-metal spring. Maximum downward movement of the needle is determined by a circlip which rests on an adjusting nut. The float needle incorporates a spring-loaded ball and a viton tip.

#### Automatic enrichment device (AED)

The unit consists of a die-cast aluminium body and float chamber

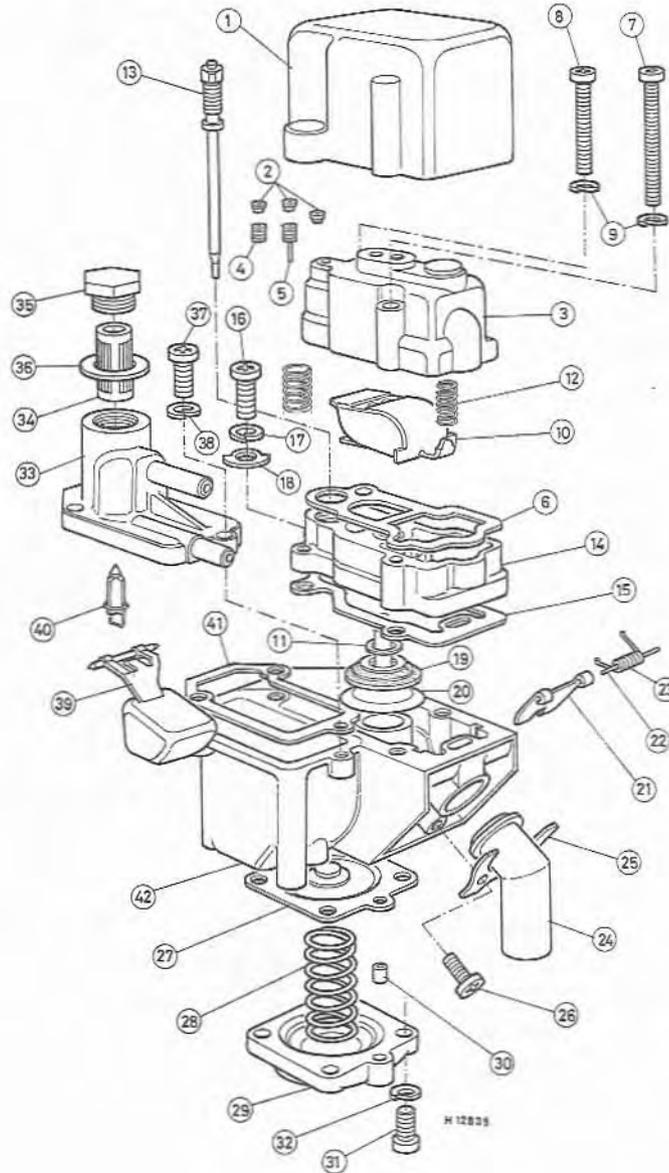


Fig. 9.2 Exploded view of the automatic enrichment device (AED) (Sec 2)

- |                                      |                             |                       |                        |
|--------------------------------------|-----------------------------|-----------------------|------------------------|
| 1 Heat insulation cover              | 10 Main bi-metal unit       | 21 Air entry pipe     | 32 Spring washer       |
| 2 Blanking plugs                     | 11 Spring seat              | 22 Spindle            | 33 Float chamber cover |
| 3 Top cover                          | 12 Loading spring           | 23 Return spring      | 34 Nylon filter        |
| 4 Secondary bi-metal adjusting screw | 13 Needle assembly          | 24 Hot air inlet stub | 35 Plug                |
| 5 Main bi-metal adjusting screw      | 14 Valve body               | 25 Clamp              | 36 Washer              |
| 6 Gasket                             | 15 Gasket                   | 26 Screw              | 37 Screw               |
| 7 Long screw                         | 16 Screw                    | 27 Needle diaphragm   | 38 Spring washer       |
| 8 Short screw                        | 17 Spring washer            | 28 Spring             | 39 Float               |
| 9 Spring washer                      | 18 Plain washer             | 29 Cap                | 40 Float needle        |
|                                      | 19 Main valve and diaphragm | 30 Locating dowel     | 41 Gasket              |
|                                      | 20 Diaphragm clamp ring     | 31 Screw              | 42 Main body           |

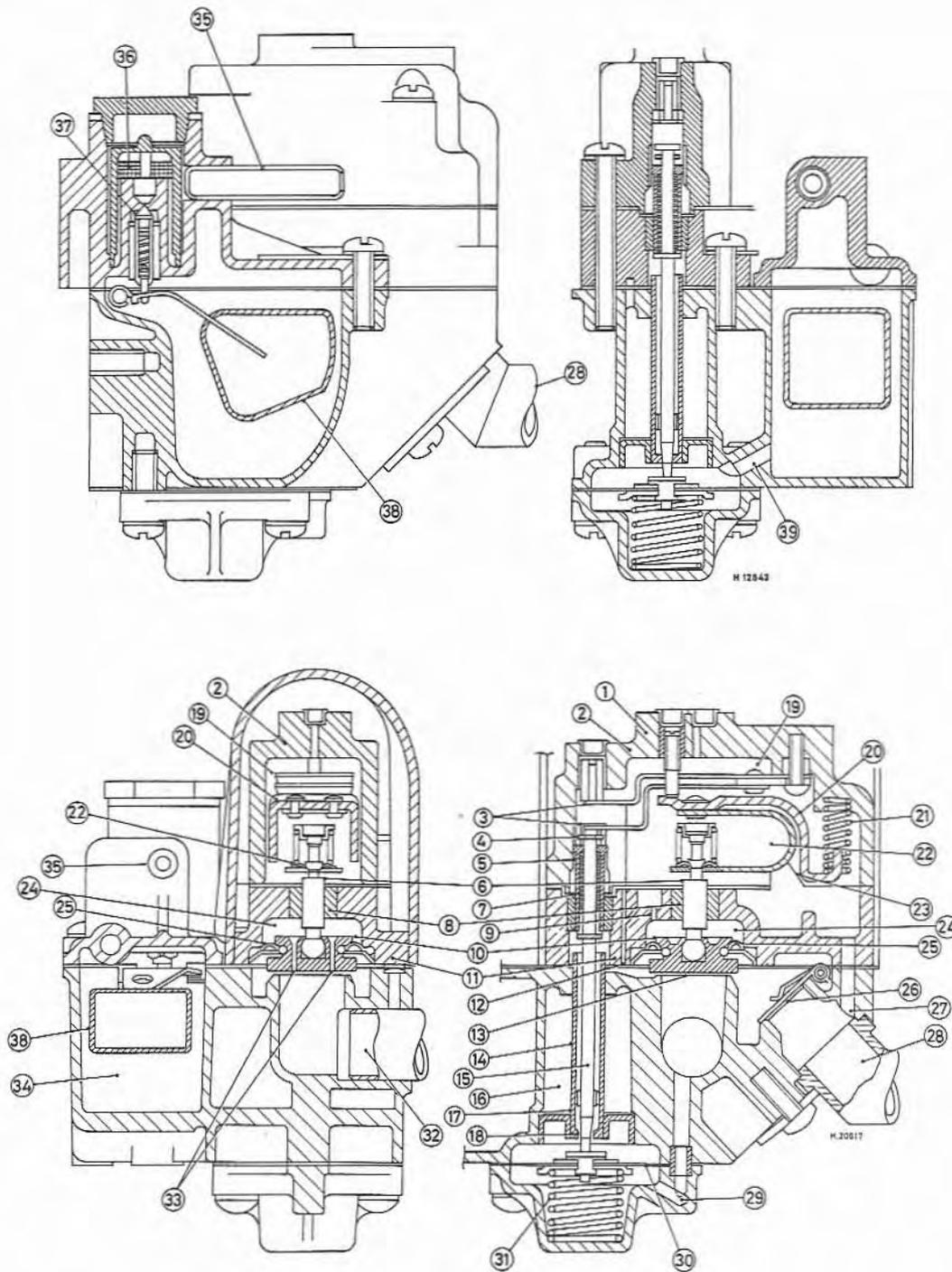


Fig. 9.3 Cross-section of the automatic enrichment device (AED) (Sec 2)

- |                                      |                         |                       |                      |
|--------------------------------------|-------------------------|-----------------------|----------------------|
| 1 Main bi-metal unit adjusting screw | 11 Valve body           | 21 Loading spring     | 31 Return spring     |
| 2 Bi-metal unit top cover            | 12 Air passage          | 22 Main bi-metal unit | 32 Outlet pipe       |
| 3 Secondary bi-metal spring          | 13 Main valve seating   | 23 Location grooves   | 33 Air bleed passage |
| 4 Circlip                            | 14 Jet tube             | 24 Balance chamber    | 34 Float chamber     |
| 5 Adjusting nut                      | 15 Fuel metering needle | 25 Diaphragm          | 35 Fuel inlet pipe   |
| 6 Spindle                            | 16 Fuel well            | 26 Air valve          | 36 Nylon filter      |
| 7 Spring                             | 17 Orifice              | 27 Air passage        | 37 Float needle      |
| 8 Low-friction bush                  | 18 Fuel jet             | 28 Hot air inlet stub | 38 Float             |
| 9 Air bleed passage                  | 19 Bi-metal chamber     | 29 Vacuum passage     | 39 Fuel passage      |
| 10 Main valve                        | 20 Heat shroud          | 30 Needle diaphragm   |                      |

3 Operation

*Auxiliary enrichment device (thermostatic starting carburettor)*

With the engine stationary and the solenoid coil energized, the armature is retracted into the bore of the coil against the loading of the conical spring, thus lifting the disc valve from its seat. The coil is switched on either by a manual switch, or by a thermostatic switch located in the engine cooling system.

When the engine is rotated by the starter, air is drawn through the air intake and past the jet, where it is mixed with fuel. The mixture flows upwards, past the shank of the needle, and out through the disc valve into the inlet manifold via the external feed pipe. The level of fuel at the jet is controlled by the main carburettor float chamber inlet valve, and is above the jet when the engine is stationary, giving a reservoir of fuel in the well of the auxiliary carburettor. When starting with the device in operation, this fuel is drawn into the induction manifold, creating the rich mixture necessary for instant starting.

With the engine running, the needle responds to variation in inlet manifold depression against the load of the compression spring. With increasing depression, the needle moves downward into the jet until the head abuts the adjustable stop. This weakens the mixture. The mixture will be weakest at high depression (idling with throttle nearly closed) and richest at low depression (large throttle openings). The engine is thus supplied with an additional quantity of mixture at a strength proportional to its demands.

Note that if the solenoid is energized while the engine is idling, the disc valve will not normally lift, as the force due to the high manifold depression, combined with the spring load, is greater than the attraction force generated by the solenoid. Momentary opening of the throttle will reduce the depression and permit the valve to lift. It will remain lifted when the throttle is closed.

*Automatic enrichment device (AED)*

With the engine cold, the main valve is opened by the main bi-metal unit, and the metering needle is raised by the diaphragm spring until it is restrained by the secondary bi-metal spring. When the engine is rotated on the starter, air is drawn through the air valve and main valve, and into the inlet manifold. The resulting depression draws fuel from the fuel well, through the orifice and jet, up the jet tube, and into the inlet manifold, to produce a very rich mixture.

When the engine starts, the inlet manifold depression draws the diaphragm down, and allows the tapered metering needle to move downwards under its spring tension. During initial starting, the mixture is further enriched by fuel from the fuel well, however when this is exhausted, air passes through the fuel well and small orifice. As the engine temperature increases, the main bi-metal unit gradually closes the main valve until it is completely closed at normal operating temperature. An air bleed through the bi-metal chamber ensures that the main valve remains closed during normal running.

Enrichment for acceleration during the warm-up stage is catered for by inlet manifold depression acting on the diaphragm and main valve. When the throttle is opened, the metering needle will rise, and the main valve will open due to the reduced depression tending to keep it shut.

When the hot engine is stopped, heat dissipation from the AED is matched to that of the engine, so that the device will only operate at the required temperature.

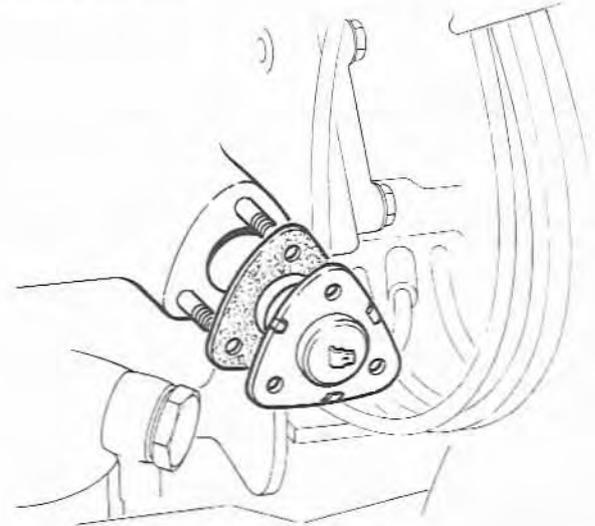


Fig. 9.4 Typical thermostatic switch for the auxiliary enrichment device (Sec 3)

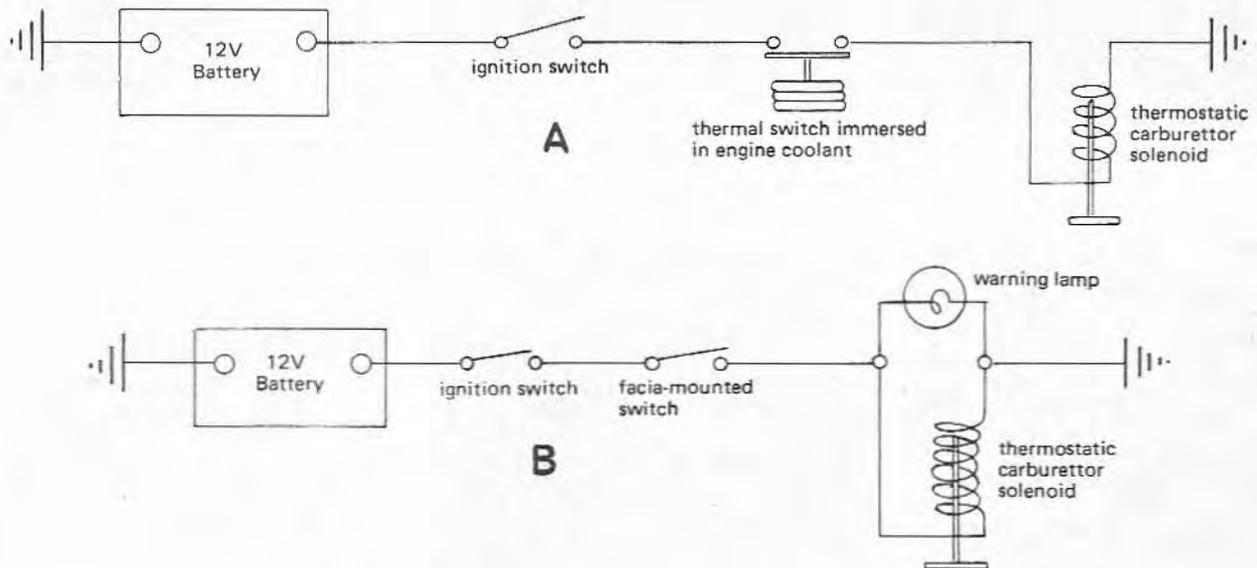


Fig. 9.5 Auxiliary enrichment device wiring diagrams (Sec 3)

A Automatic control

B Manually operated

#### 4 Special overhaul procedures

- The general information given in Chapter 4 applies also to auxiliary starting devices, but spare parts may be difficult to obtain. The same applies to gasket packs, although a gasket pack for the auxiliary enrichment device is available under part number AUE 807.
- Check the springs for bowing and flattening of coils. Replace a damaged spring. Five different springs are available, identified by a coloured end coil, as follows:

Paint colour on end coil	Load (oz)	Length (in)	Part No
White	1 <sup>3</sup> / <sub>4</sub>	1	AUC 1195
Blue	2 <sup>1</sup> / <sub>4</sub>	1	AUC 1041
Yellow	2 <sup>3</sup> / <sub>4</sub>	1	AUC 5021
Red	3 <sup>1</sup> / <sub>4</sub>	1	AUC 3427
Green	3 <sup>3</sup> / <sub>4</sub>	1	AUC 3127

#### 5 Auxiliary enrichment device – removal, overhaul, refitting and adjustment

##### Removal

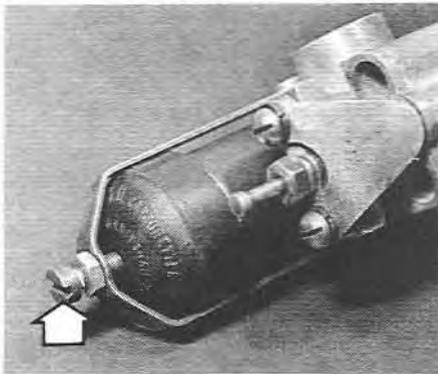
- Disconnect the battery negative lead and remove the air cleaner.
- Identify the two electrical wires for location, then disconnect them from the device.
- Loosen the union nuts and remove the outlet pipe from the inlet manifold.
- Place a suitable container beneath the device, then unscrew the banjo bolt and remove the device from the mounting arm leading from the carburettor. Be prepared for fuel draining from the carburettor float chamber. Collect the washers.

##### Overhaul

- Remove the clamping screw from the top of the clip (photo).
- Hinge the clip to one side, remove the cover and solenoid, taking care that the armature and disc valve assembly does not fall out. Remove the clip (photos).
- Remove the armature assembly from the coil, then remove the conical spring and spring register.
- Remove the screws and shakeproof washers. Withdraw the needle valve assembly and spring from the body. Remove the baffle plate (photos).
- Remove the jet (photo).
- Thoroughly clean all the components and examine them for wear and damage. Using low air pressure, blow clear all internal drillings (photo). Check the brass valve seating for wear and security. Check the needle and armature springs, if possible comparing their length and load with new springs. Check that the metering needle is straight, and that the plunger is secure. Check that the disc valve moves freely on its balljoint, but do not attempt to separate the disc valve from the armature. Check that the armature slides freely in the bore of the coil. Check the solenoid terminals for damage (photo).
- Commence reassembly by tightening the jet in the main body.
- Locate the spring on the needle disc, and insert the assembly in the body.
- Fit the baffle plate, and secure with screws and new shakeproof washers.
- Fit the spring register, conical spring and armature to the solenoid.
- Fit the solenoid to the body.
- Fit the terminal cover, spring clip and clamping screw. Do not overtighten the screw. Tighten the locking nut.

##### Refitting

- Refitting is a reversal of removal. The engine may need cranking for longer than normal, due to the loss of fuel from the carburettor float chamber.



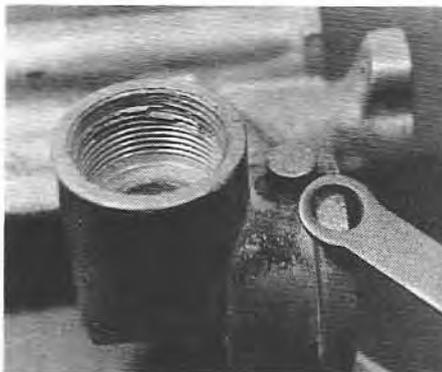
5.5 Cover retaining screw (arrowed) and locknut



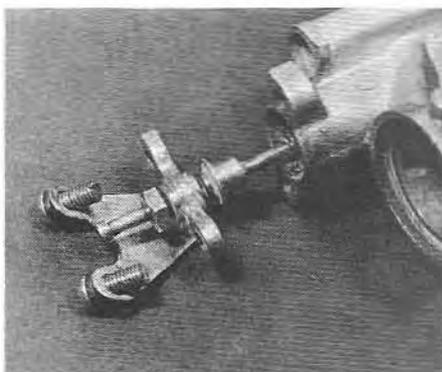
5.6A Removing the solenoid



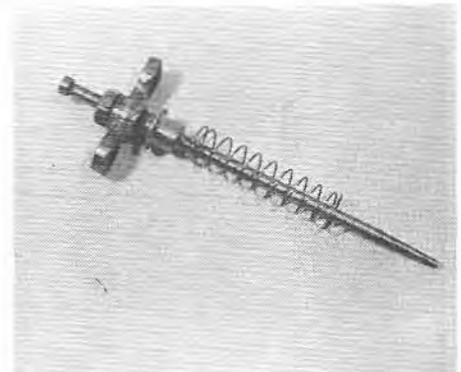
5.6B Solenoid and spring-tensioned disc valve



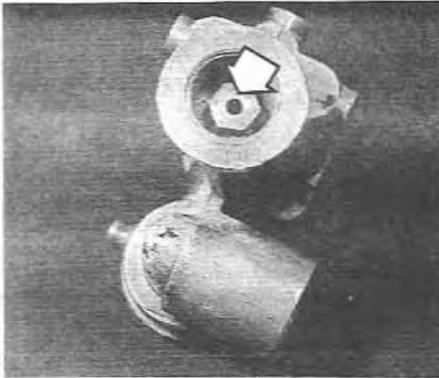
5.6C Removing the clip from the pivot



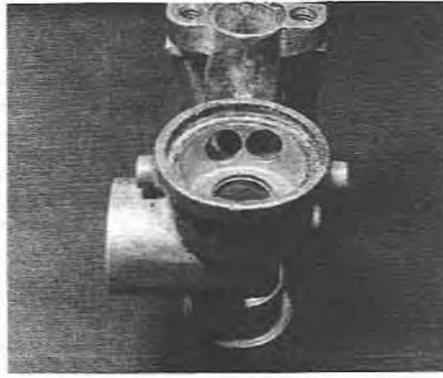
5.8A Removing the needle valve assembly



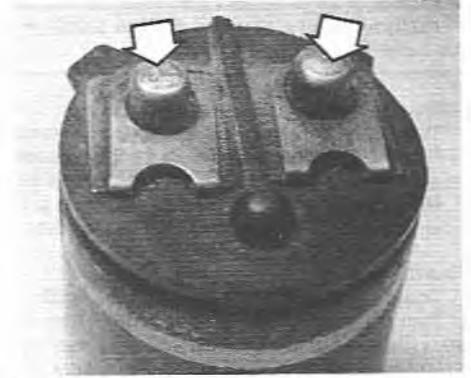
5.8B Needle valve assembly



5.9 Jet location (arrowed) in the main body



5.10A Main body showing internal drillings



5.10B Solenoid terminals (arrowed)

**Adjustment**

18 Note that the main carburetors must be correctly adjusted before attempting to adjust the auxiliary enrichment device. Where the device is fitted to a type H carburettor, jet adjustment is by means of a screw covered by a cap nut, instead of an adjustment nut. When adjusting the carburettor with the cap nut removed, any slight leakage of fuel through the jet can be ignored.

19 To adjust the device, first run the engine to normal operating temperature, then let it idle.

20 Where a thermostatic switch is fitted (ie instead of a manually operated switch), energize the solenoid by earthing the thermostatic switch supply wire. If this is inaccessible, earth the appropriate terminal of the solenoid to ensure the device is switched on.

21 Where a manual switch is fitted, switch it to the 'on' position.

22 Momentarily open the throttle to allow the internal valve to open.

This is necessary in the event of the valve being held shut by the vacuum within the inlet manifold, due to the device being activated with the engine already idling. The device will make a pronounced hissing noise with the valve open.

23 Refer to Fig. 9.6. Turn the adjustable stop nut slowly clockwise, until the engine begins to run unevenly due to excessive weakness. Now turn the nut slowly anti-clockwise until the engine speed has first risen, then dropped to between 800 and 1000 rpm. At this point, the exhaust gases should be noticeably black in colour.

24 Switch off the engine and re-connect the wiring where applicable.

25 A faulty thermostatic switch will either prevent the device from being energised when the engine is cold, or will keep it energised with the engine hot. The operating temperature of the switch is 35°C (95°F).

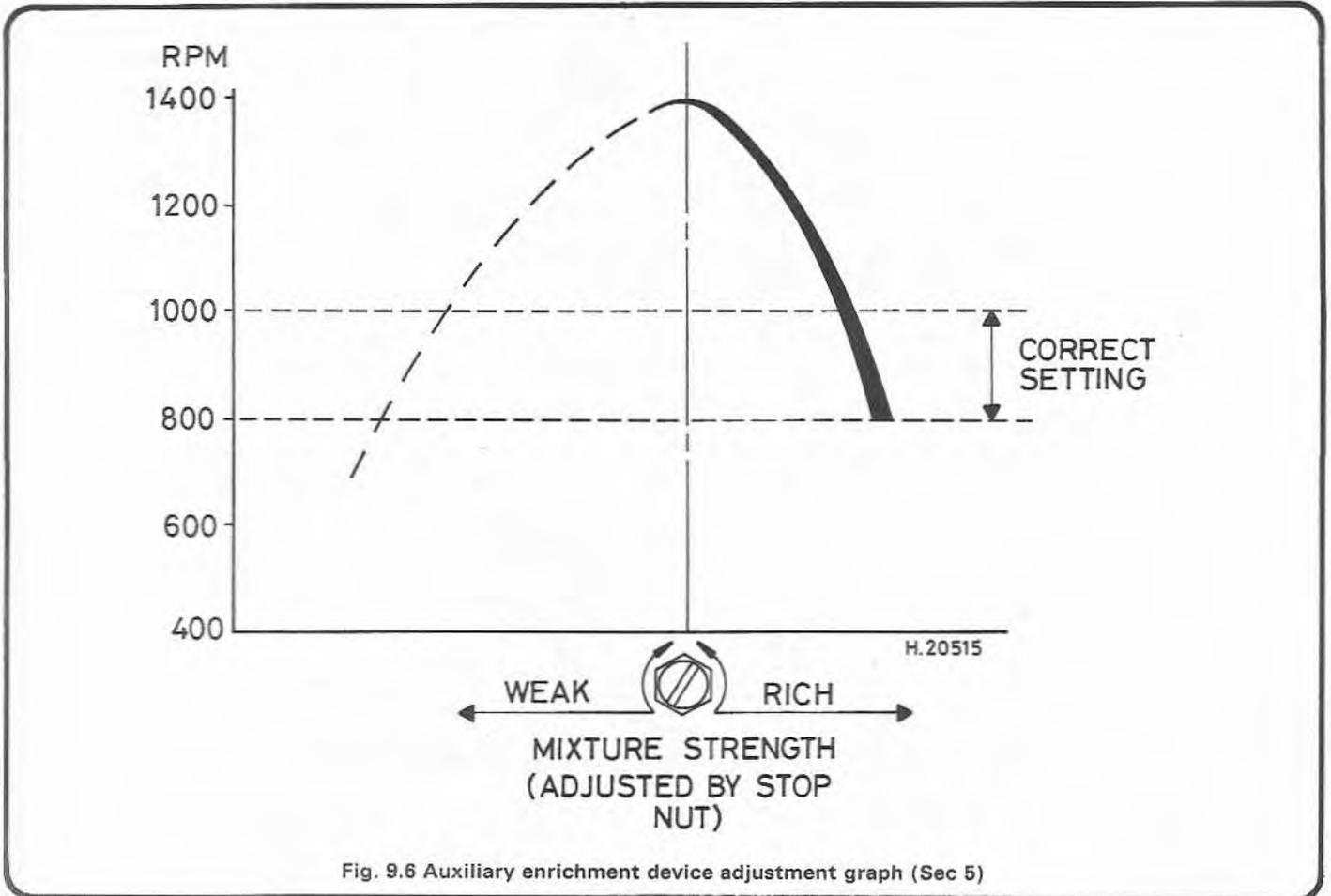


Fig. 9.6 Auxiliary enrichment device adjustment graph (Sec 5)

### 6 Automatic enrichment device (AED) – removal, overhaul and refitting

#### Removal

- 1 Unbolt the air cleaner assembly from the carburetors.
- 2 Loosen the clip and disconnect the fuel inlet hose from the AED. On some units, a union is fitted instead of a clip.
- 3 Disconnect the float chamber vent pipe and the hot air inlet hose.
- 4 Unbolt the AED from its mounting bracket.

#### Overhaul

- 5 Thoroughly clean the exterior of the AED.
- 6 Turn the hot air inlet stub to expose the clamp screw, extract the screw, and remove the clamp and inlet stub (photo).
- 7 Unscrew the plug from the float chamber cover and extract the filter (photos). Recover the washer.
- 8 Remove the screws and withdraw the float chamber cover upwards, taking care not to damage the float needle (photos). If the cover is stuck, tap it lightly with the handle of a screwdriver or similar tool to free it. Recover the gasket.
- 9 Unhook the float needle from the float arm adjusting tab (photo).
- 10 Lift out the float and hinge pin (photo), then slide the hinge pin from the float arm.
- 11 Invert the AED and drain the fuel from the float chamber.
- 12 Remove the screws from the needle diaphragm cap and withdraw the cap, spring, diaphragm and locating dowel (photos). If stuck, tap the cap lightly with the handle of a screwdriver.
- 13 Pull the plastic cover from the top of the AED (photo).

14 Remove the screws, and separate the top cover from the valve body (photos). The bi-metal unit loading spring will probably remain in the top cover.

15 Note how the bi-metal unit is located beneath the spring on the top of the main valve spindle, then lift it from the cut-outs in the valve body and slide it from the spindle (photo).

16 Remove the gasket from the valve body (photo).

17 Remove the screws, and lift the valve body, complete with fuel metering needle, from the AED body (photos). Remove the gasket.

18 Note the location of the air valve, then remove it from the AED body.

19 Thoroughly clean all the components, and examine them for wear and damage (photo). Using low air pressure, blow clear all internal drillings. Check the diaphragm for splits or pin holes. Check the float needle tip and seat for wear, and the float for damage which may allow fuel to enter it.

20 Commence reassembly by locating the air valve in the AED body. With the spring correctly positioned, check that the valve closes properly (photo).

21 Refit the valve body and fuel metering needle together with a new gasket, then insert and tighten the screw.

22 Locate a new gasket on the valve body, and refit the bi-metal unit in its previously-noted position.

23 Check that the bi-metal unit loading spring is in the top cover. Refit the top cover and tighten the screws.

24 Press the plastic cover into position (photo).

25 Refit the heating dowel, diaphragm, spring and cap. Press the cap against the body and make sure that the diaphragm is flat, then insert and tighten the screws.

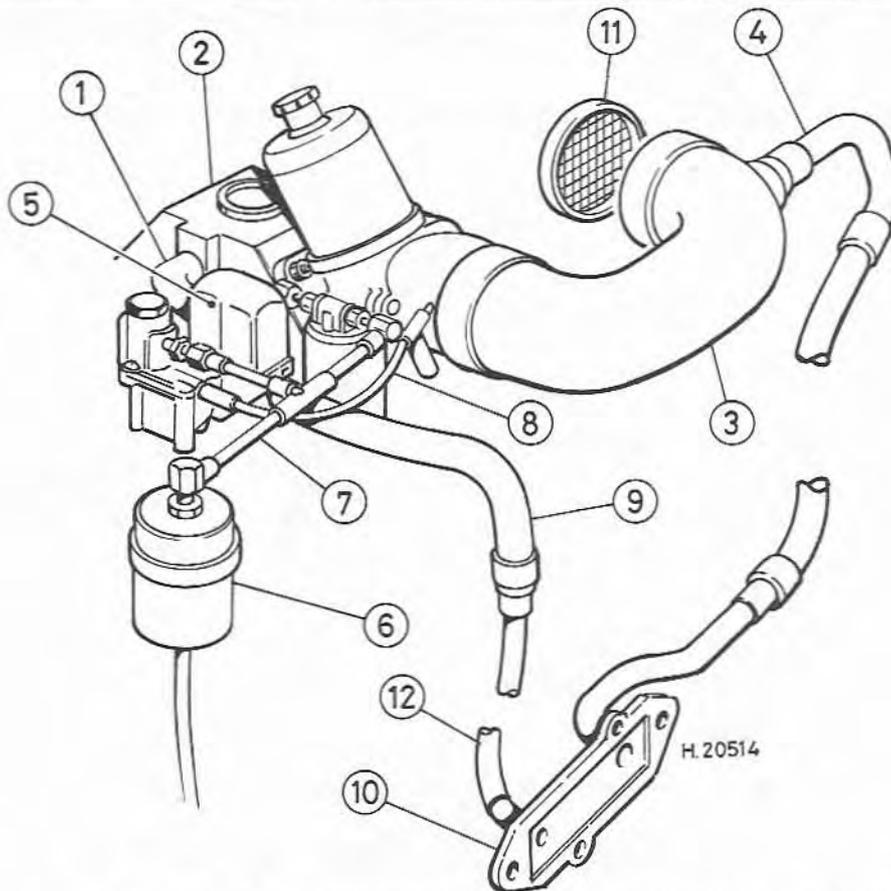
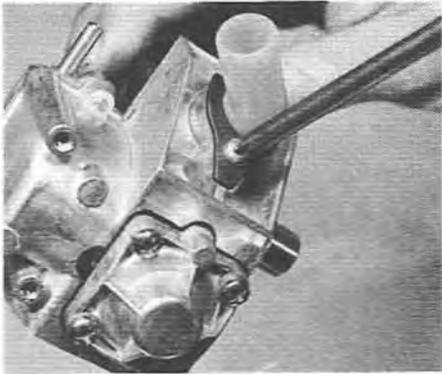


Fig. 9.7 Typical automatic enrichment device (AED) installation (Sec 6)

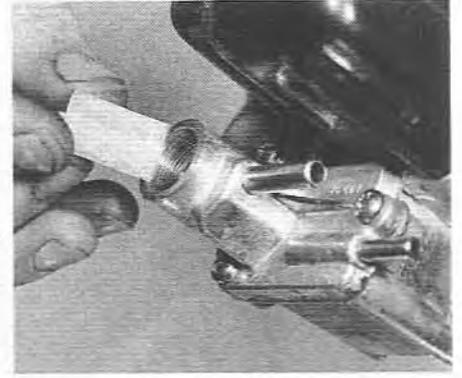
- |                                   |                               |                                                  |                                    |
|-----------------------------------|-------------------------------|--------------------------------------------------|------------------------------------|
| 1 Outlet hose (to inlet manifold) | 4 AED hose to hot air pick-up | 8 Vent pipe                                      | 11 Filtered air from air chamber   |
| 2 Inlet manifold                  | 5 AED                         | 9 AED air supply hose                            | 12 Heated air from hot air pick-up |
| 3 Air inlet duct                  | 6 Fuel filter                 | 10 Hot air pick-up, attached to exhaust manifold |                                    |
|                                   | 7 Fuel supply pipe            |                                                  |                                    |



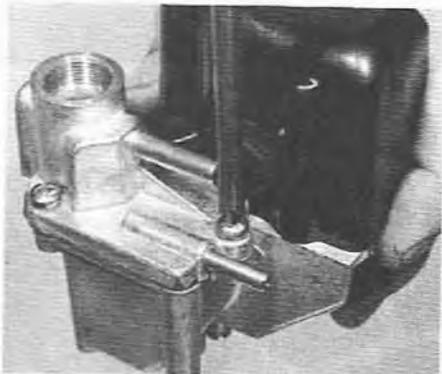
6.6 Removing the hot air inlet stub



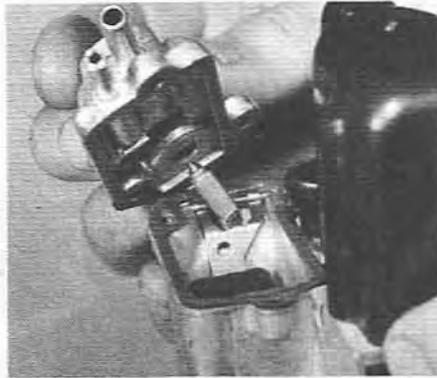
6.7A Unscrew the plug ...



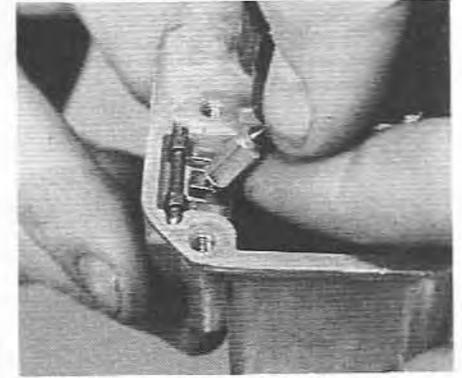
6.7B ... and extract the filter



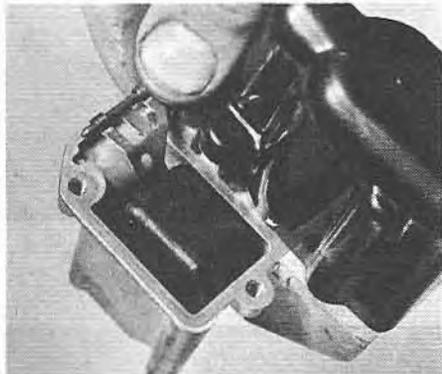
6.8A Remove the screws ...



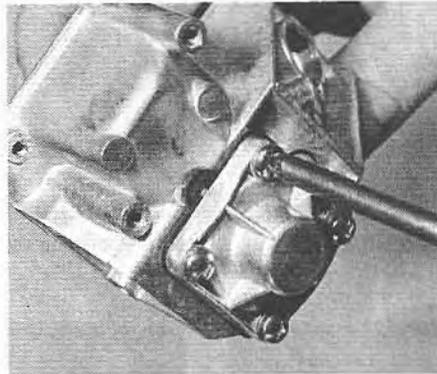
6.8B ... and withdraw the float chamber cover



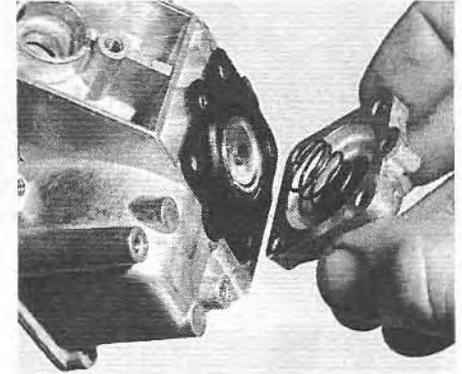
6.9 Releasing the float needle from the float arm



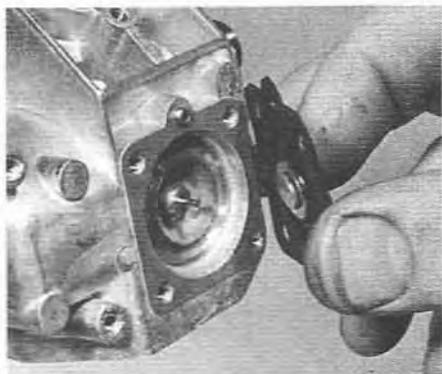
6.10 Lifting the float from the float chamber



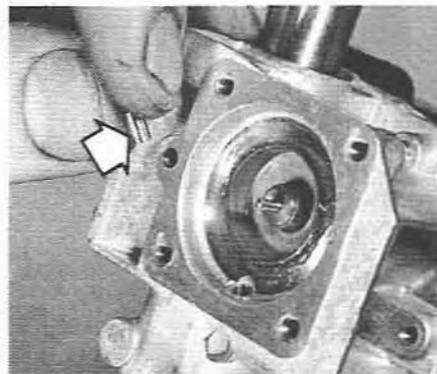
6.12A Remove the screws ...



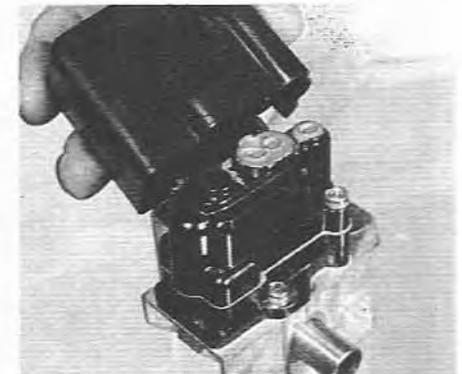
6.12B ... and lift off the needle diaphragm cap and spring ...



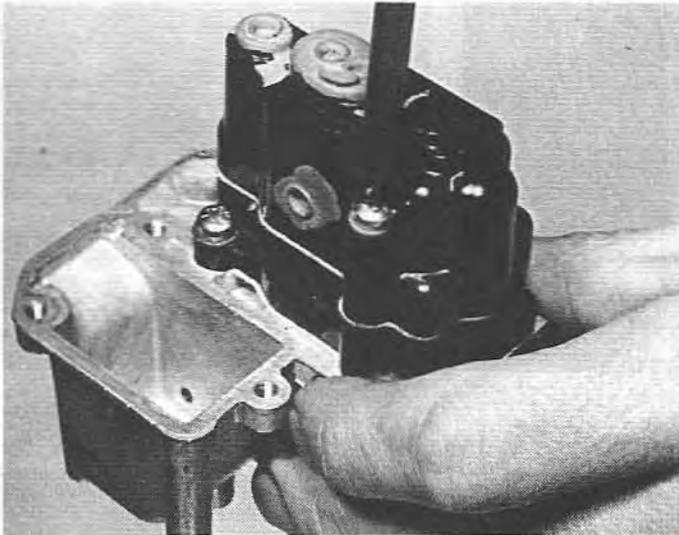
6.12C ... diaphragm ...



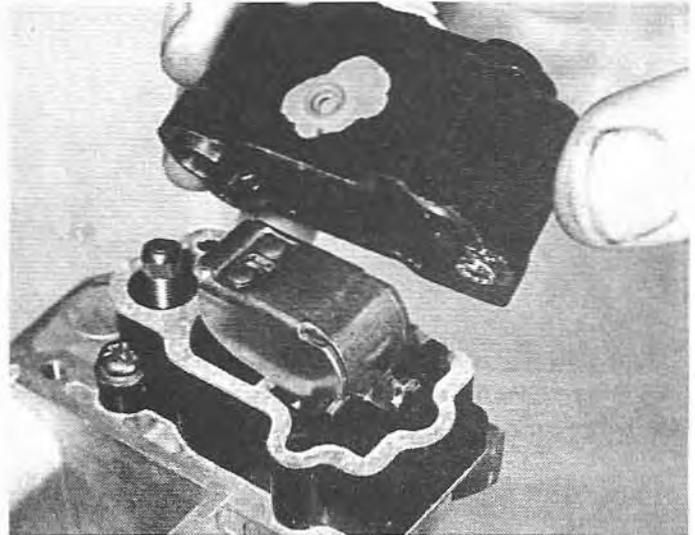
6.12D ... and locating dowel (arrowed)



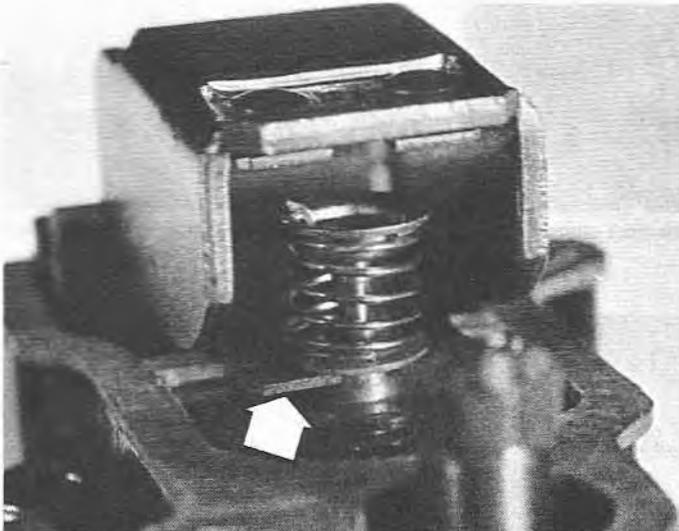
6.13 Removing the plastic cover



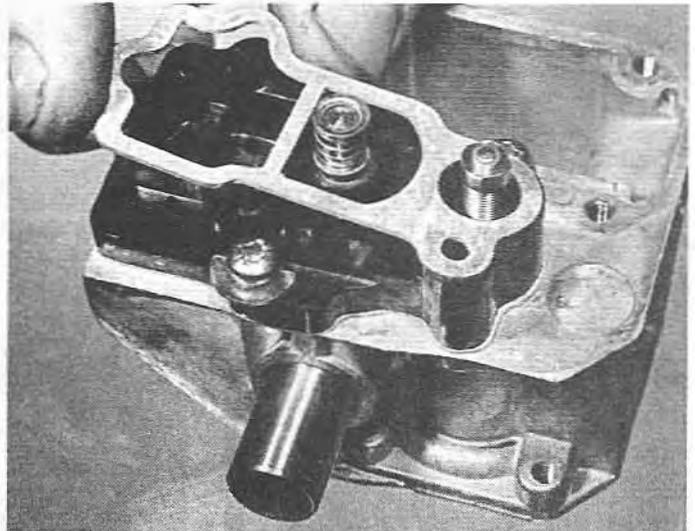
6.14A Remove the screws ...



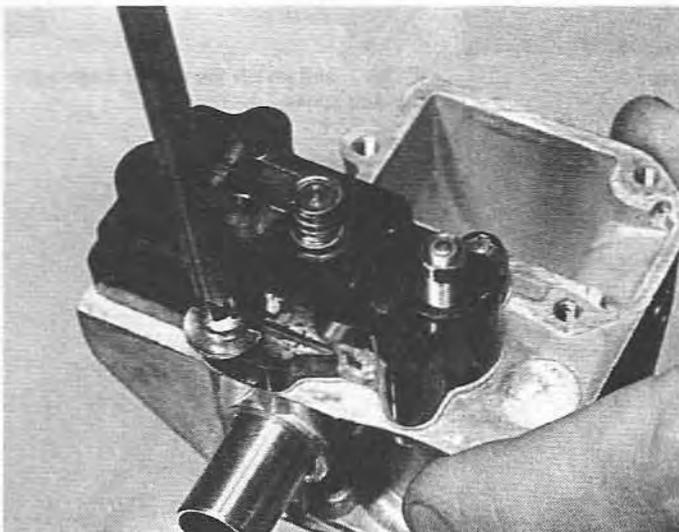
6.14B ... and separate the top cover from the valve body



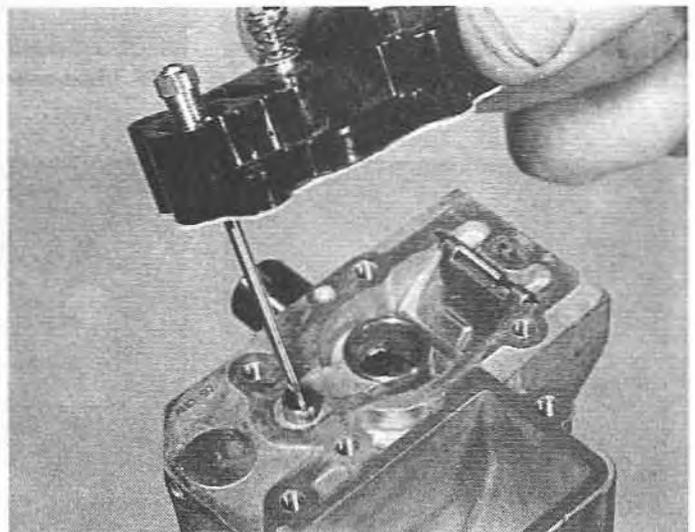
6.15 The bi-metal unit (arrowed) is located beneath the spring



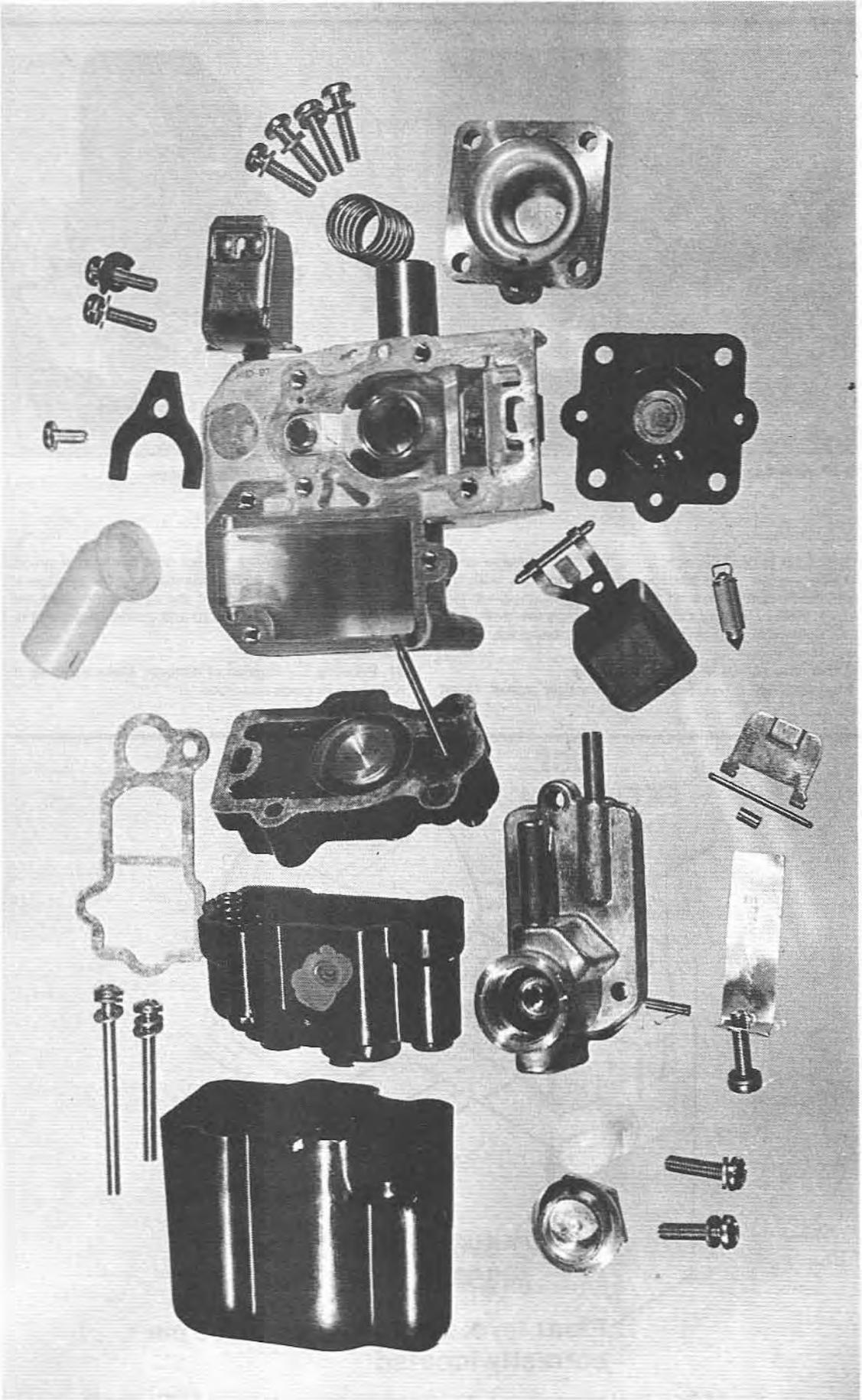
6.16 Removing the top cover gasket



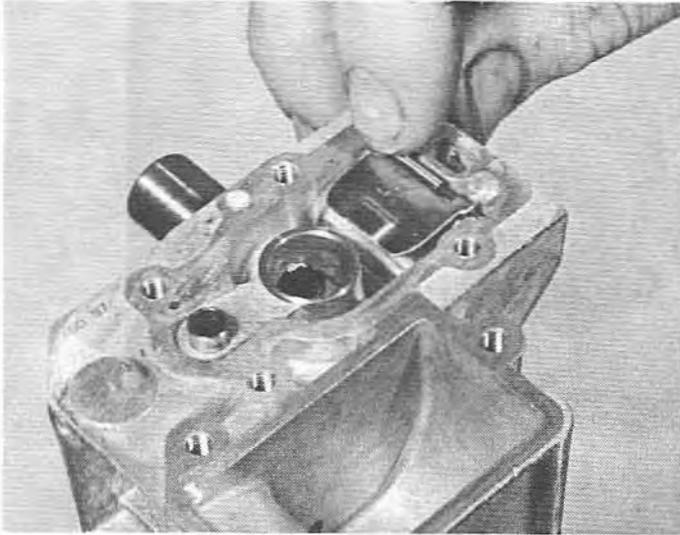
6.17A Remove the screws ...



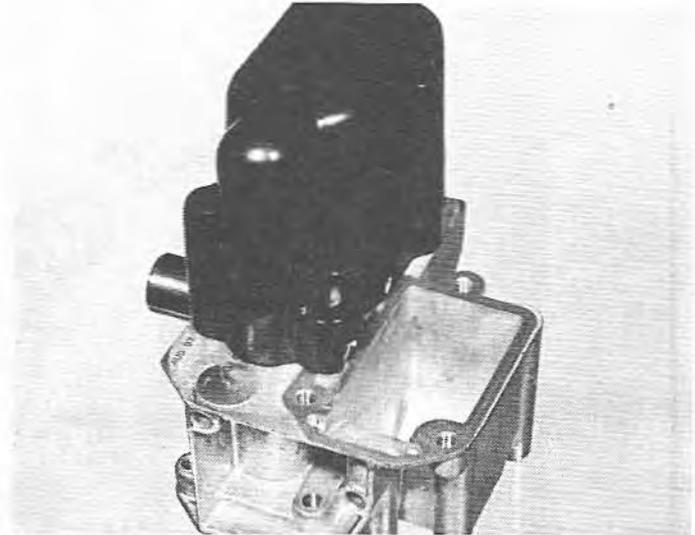
6.17B ... and withdraw the valve body and fuel metering needle



6.19 Automatic enrichment device component parts



6.20 Checking air valve movement



6.24 Plastic cover fitted in position

26 Insert the hinge pin in the float arm. Invert the float chamber cover and insert the float needle. Now engage the float arm tab with the needle, and hold the float in place with a feeler gauge as shown in Fig. 9.8. Using a twist drill or vernier calipers, check that the float level dimension is as shown. If adjustment is necessary, bend the tab as required.

27 Locate the float and needle in the float chamber.

28 Refit the float chamber cover, together with a new gasket. Insert

and tighten the screws. Check that the float is pivoting correctly by slowly rotating the AED while listening for the float movement.

29 Insert the filter, then refit and tighten the plug and washer.

30 Refit the hot air inlet stub and clamp. Insert and tighten the screw.

#### Refitting

31 Refitting is a reversal of removal. Make sure that the associated air hoses are in good condition.

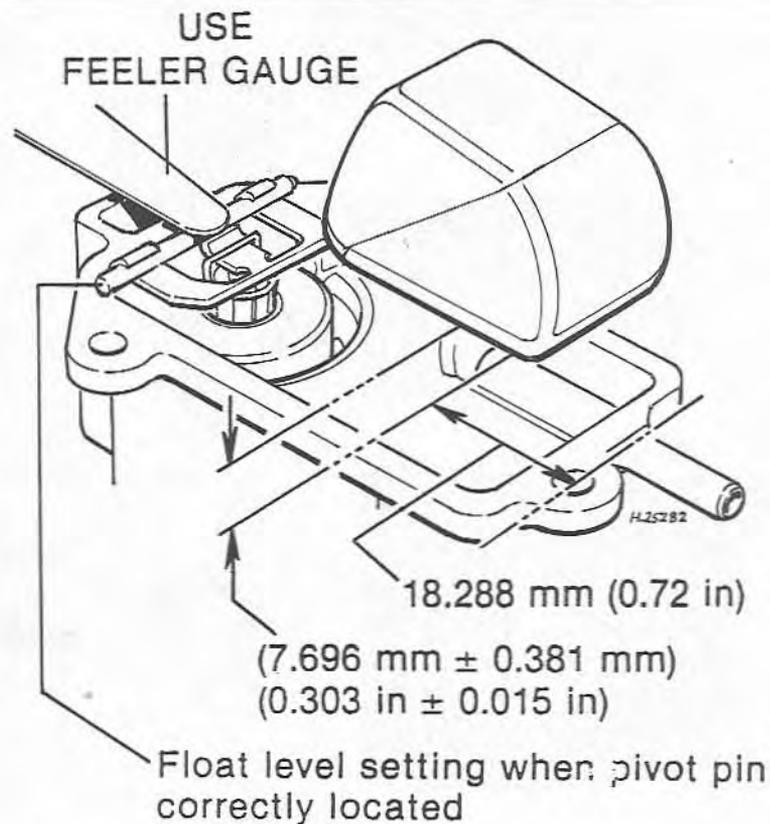


Fig. 9.8 Float level adjustment on the automatic enrichment device (AED) (Sec 6)

## Part 5 Appendix 1

# Original equipment jet setting list for Weber carburetors

This list gives details of calibration and jet sizes on carburetors fitted as original equipment:

<b>A</b>	<i>Model details</i>	<b>K</b>	<i>Emulsion tube</i>
<b>B</b>	<i>Number of cylinders</i>	<b>L</b>	<i>Air corrector jet</i>
<b>C</b>	<i>Capacity in cc</i>	<b>M</b>	<i>Starter jet</i>
<b>D</b>	<i>Carburettor type</i>	<b>N</b>	<i>Accelerator pump jet</i>
<b>E</b>	<i>Number of carburetors</i>	<b>O</b>	<i>Accelerator pump back bleed</i>
<b>F</b>	<i>Choke sizes</i>	<b>P</b>	<i>Needle valve</i>
<b>G</b>	<i>Auxiliary venturi</i>		
<b>H</b>	<i>Main jet</i>		
<b>I</b>	<i>Idle jet</i>		
<b>J</b>	<i>Air idle jet or hole</i>		

**Note:**

Where two sets of data are tabulated against the car model, the first line refers to the primary barrel and the second line refers to the secondary barrel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
<b>ALFA ROMEO</b>																
Giulietta Sprint Veloce	4	1290		40 DCOE 2	2	29	4-50	1-10	0-50 F11	—	F16	2-00	0-60 F5	0-35	0-70	1-50
1300 GT Junior Super	4	1290		40 DCOE 28	2	28	4-50	1-12	0-50 F11	—	F16	2-10	0-65 F5	0-35	0-60	1-50
Giulia 1600 SS	4	1570		40 DCOE 2	2	30	4-50	1-20	0-55 F11	—	F16	1-80	0-65 F5	0-35	0-70	1-50
Giulia 1600 TI Super	4	1570		45 DCOE 14	2	30	4-50	1-20	0-55 F8	—	F16	1-80	0-65 F5	0-35	0-50	1-50
Giulia 1600 Sprint GT	4	1570		40 DCOE 4	2	30	4-50	1-27	0-50 F11	—	F16	2-20	0-65 F5	0-35	0-50	1-50
Giulia 1600 Super	4	1570		40 DCOE 24	2	27	4-50	1-10	0-50 F11	—	F16	1-80	0-65 F5	0-35	0-50	1-50
Giulia 1600 Super	4	1570		40 DCOE 33	2	30	4-50	1-20	0-50 F14	—	F9	2-00	0-65 F5	0-35	0-60	1-50
1600 Junior Z, Giulia 1600 Super	4	1570		40 DCOE 44/55	2	30	4-50	1-17	0-50 F15	—	F16	1-80	0-65 F5	0-35	0-60	1-50
Giulia 1600 GTV/Spider	4	1570		40 DCOE 27	2	30	4-50	1-17	0-50 F14	—	F16	1-80	0-65 F5	0-35	0-60	1-50
Giulia 1600 GTA	4	1570		45 DCOE 14	2	30	4-50	1-35	0-50 F8	—	F16	2-20	0-65 F5	0-35	0-50	1-50
Giulia 1600 Sprint GTA	4	1570		45 DCOE 18	2	30	4-50	1-20	0-50 F8	—	F9	2-20	0-65 F5	0-35	0-50	1-50
1750 Berlina/Coupé GT																

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Veloce/Spider Veloce	4	1779		40 DCOE 32	2	32	4-50	1-30	0-50 F8	-	F9	2-00	0-65 F5	0-35	0-60	1-50
Giulia 1600, Alfetta 1600	4	1570		40 DCOE 106/107	2	30	6-00	1-32	0-55 F21	-	F41	1-80	0-85 F9	0-30	none	1-50
Alfetta 1-6	4	1570		40 DCOE 82/83	2	30	6-00	1-32	0-55 F21	-	F41	1-80	0-85 F9	0-35	0-35	1-50
Alfetta 1-8	4	1779		40 DCOE 72/73	2	32	4-50	1-35	0-55 F17	-	F34	2-10	0-85 F9	0-35	0-60	1-50
2000 GT Spider Europa	4	1962		40 DCOE 76/77	2	32	4-50	1-35	0-55 F17	-	F34	2-10	0-85 F9	0-35	0-60	1-50
2600 Sprint-Coupé	6	2584		45 DCOE 9	3	36	4-50	1-45	0-55 F8	-	F16	1-55	0-60 F5	0-45	0-40	2-00
<b>ASTON MARTIN</b>																
DB4 GT	6	3670		45 DCOE 9	3	40	3-50	1-55	0-55 F8	-	F2	1-50	0-60 F5	0-55	none	2-00
DB5 GT, DB6 Vantage	6	3995		45 DCOE 9	3	40	4-50	1-50	0-50 F6	-	F2	1-25	0-60 F5	0-45	none	2-00
DB 6MK Coupé	6	3995		45 DCOE 9	3	40	4-50	1-45	0-50 F8	-	F7	1-25	0-60 F6	0-45	none	2-00
DBS V8 Europa	8	5340		42 DCNF 27/100	4	36	4-50	1-35	0-55	1-10	F33	1-80	0-80 F5	0-45	0-40	2-00
DBS V8 Europa	8	5340		42 DCNF 27/150	4	36	4-50	1-35	0-55	1-10	F39	1-80	0-80 F5	0-45	0-40	2-00
DBS V8 USA	8	5340		42 DCNF 27/200	4	36	4-50	1-35	0-55	1-10	F39	2-20	0-80 F5	0-45	0-40	2-00
<b>BMW</b>																
1800 T1/SA	4	1773		45 DCOE 15/16	2	38	5-00	1-25	0-45 F8	-	F9	1-70	1-40 F5	0-40	0-70	2-25
1600 Alpina	4	1573		40 DCOE 84/85	2	27	4-50	1-10	0-50 F8	-	F9	2-00	0-60 F5	0-35	0-70	1-50
1800 Alpina	4	1766		40 DCOE 86/87	2	32	4-50	1-20	0-55 F8	-	F9	2-10	0-60 F5	0-35	0-60	1-75
2000 Alpina	4	1990		40 DCOE 88/89	2	34	4-50	1-25	0-55 F8	-	F16	1-70	0-60 F5	0-40	0-60	2-00
<b>CHRYSLER UK</b>																
Avenger Tiger	4	1725		40 DCOE 70/71	2	30	4-50	1-10	0-45 F11	-	F15	2-40	1-00 F5	0-35	1-00	1-50
<b>CHRYSLER FRANCE</b>																
1100 Special H	4	1294		36 DCNF 15	1	28	3-50	1-55	0-50	1-60	F27	1-65	0-80 F1	0-40	none	1-75
1100 TI	4	1294		36 DCNF 17/18	2	29	3-50	1-20	0-45	1-30	F36	1-85	0-70 F100-40	0-40	0-40	1-75
1100 Special Austria	4	1294		36 DCNF 21	1	28	3-50	1-55	0-50	1-60	F27	1-65	0-80 F1	0-40	none	1-75
1100 Special	4	1294		36 DCNF 24	1	28	3-50	1-55	0-45	1-40	F27	1-65	0-80 F1	0-40	none	1-75
1100 Special	4	1294		36 DCNF 33/34	2	28	4-50	1-50	0-45	1-35	F27	1-75	0-80 F4	0-40	none	1-75
1100 T1/1307 S	4	1294		36 DCNF 49-50/100	2	29	3-50	1-25	0-45	1-35	F36	2-00	0-70 F100-40	0-40	0-40	1-75
<b>FERRARI</b>																
Dino 246 GT	6	2418		40 DCNF 13-20, 13(2)-20(1)	3	32	4-50	1-25	0-50	1-20	F24	2-20	0-60 F6	0-50	0-40	1-75
Dino 246 GT USA	6	2418		40 DCNF 19	3	32	4-50	1-25	0-55	1-20	F24	2-20	0-60 F6	0-50	0-40	1-75
Dino 208 GT4 '75	8	1991		34 DCNF 53/54/55/56/100	4	29	3-50	1-20	0-45	1-80	F36	2-00	0-80 F5	0-45	0-40	1-75
Dino 308 GT4	8	2926		40 DCNF 35/36/37/38	4	32	4-50	1-30	0-45	1-60	F24	2-20	0-80 F6	0-45	0-40	1-75
Dino 308 GT4 '75	8	2926		40 DCNF 57/58/59/60	4	32	4-50	1-30	0-50	1-50	F36	2-00	1-00 F6	0-45	0-40	1-75
308 GTB/GT4 '77	8	2926		40 DCNF 57/58/59/60/150	4	32	4-50	1-30	0-50	1-50	F36	2-00	1-00 F6	0-45	0-40	1-75
308 GT4 USA	8	2926		40 DCNF 45/46/47/48	4	32	4-50	1-35	0-55	1-70	F36	2-20	0-60 F6	0-45	0-70	1-75
308 GT4 Australia	8	2926		40 DCNF 64/65/66/67	4	32	4-50	1-25	0-55	1-60	F36	1-90	1-00 F6	0-45	0-40	1-75
365 GTC/4	12	4390		38 DCOE 59-60	6	30	4-50	1-25	0-60 F8	-	F29	2-10	0-85 F5	0-35	none	1-50
365 GTC/4 USA	12	4390		38 DCOE 59A/60A	6	30	4-50	1-25	0-55 F9	-	F29	2-10	0-85 F5	0-35	none	1-50
400 GT	12	4823		38 DCOE 110M/11M	6	30	6-00	1-40	0-45 F24	1-55	F41	1-90	0-65 F5	0-35	none	1-50
400 GT (auto)	12	4823		38 DCOE 110/111	6	30	6-00	1-40	0-45 F23	1-25	F41	1-90	0-65 F5	0-35	none	1-50
<b>FIAT</b>																
124 Sport 1600	4	1608		40 IDF 13-15	2	32	4-50	1-25	0-55	1-15	F11	2-10	0-80 F5	0-40	0-50	1-75
124 Sport/Rally	4	1997		44 IDF 20/200/21/200	2	36	4-50	1-45	0-60	1-15	F9	1-90	0-90 F5	0-40	0-80	1-75
Dino Coupé Spider	6	2418		40 DCNF 12	3	32	4-50	1-25	0-50	1-20	F24	2-20	0-75 F5	0-45	0-40	1-75
Dino Coupé Spider	6	2418		40 DCNF 22/23	3	32	4-50	1-25	0-50	1-25	F24	2-20	0-75 F5	0-50	0-40	1-75
<b>FIAT - ABARTH</b>																
124 Sport/Rally	4	1756		44 IDF 20-21/200	2	36	4-50	1-45	0-60	1-15	F9	1-90	0-90 F5	0-40	0-80	1-75
<b>FORD</b>																
Anglia	4	997		28/36 DCD 41	1	23	4-50	1-20	0-40	2-00	F30	2-30	1-00 F1	0-55	0-35	1-75
							24 4-50	1-30	0-50	0-70	F30	1-80				
Escort L/GL	4	940		28/30 DGV 14A	1	21	4-50	1-15	0-55	1-50	F50	2-00	-	0-50	0-40	2-00
							22 4-00	1-05	0-50	0-70	F50	2-00				
Escort GT	4	1098		32 DGV 16B	1	21	3-50	1-05	0-45	1-50	F66	1-70	-	0-50	0-30	2-00
							24 4-50	1-15	0-40	1-40	F50	1-70				
Escort GT	4	1098		32 DGV 16C/16D	1	21	3-50	1-05	0-45	1-50	F66	1-70	-	0-50	0-30	2-00
							24 4-50	1-15	0-40	1-40	F50	1-70				
Escort GT Sport	4	1298		32 DGV 15C	1	23	3-50	1-20	0-45	1-65	F66	1-90	-	0-45	0-30	2-00
							24 4-50	1-05	0-45	1-50	F50	1-60				
Escort GT	4	1599		32 DGAV 5C	1	23	3-50	1-20	0-45	1-85	F50	1-60	-	0-45	0-30	2-00
							24 4-50	1-15	0-45	1-50	F50	1-20	-	0-45		
Escort GT	4	1599		32 DGAV 6C	1	23	3-50	1-15	0-45	1-85	F50	1-60	-	0-50	0-30	2-00
							24 4-50	1-20	0-45	1-50	F50	1-20				
Escort GT	4	1599		32 DGAV 5D	1	23	3-50	1-20	0-45	1-85	F50	1-60	-	0-45	0-30	2-00
							24 4-50	1-15	0-45	1-50	F50	1-20	-	0-45		
Escort GT	4	1599		32 DGAV 6D	1	23	3-50	1-15	0-45	1-85	F50	1-60	-	0-50	0-30	2-00
							24 4-50	1-20	0-45	1-50	F50	1-20				
Escort GT	4	1599		32 DGAV 5E	1	23	3-50	1-20	0-45	1-65	F50	1-60	-	0-45	0-30	2-00
							24 4-50	1-15	0-45	1-50	F50	1-20	-	0-45		
Escort GT	4	1599		32 DGAV 6E	1	23	3-50	1-15	0-45	1-65	F50	1-60	-	0-50	0-30	2-00
							24 4-50	1-20	0-45	1-50	F50	1-20				
Escort GT/Capri/1300GT	4	1298		32 DFE 2	1	23	4-50	1-20	0-50	2-00	F6	1-40	-	0-65	0-40	2-00
							24 4-50	1-20	0-45	1-10	F6	1-65				
Escort/Capri 1300/GT	4	1298		32 DGV 7A	1	23	3-50	1-25	0-55	1-50	F50	1-80	-	0-55	0-40	2-00
							24 3-50	1-30	0-50	0-70	F6	1-80				
Cortina Special/ Corsair GT	4	1500		28/36 DCD 23	1	26	4-50	1-40	0-50	2-00	F30	2-30	2-05 F1	0-70	0-50	1-75
							27 4-50	1-55	0-70	0-70	F30	1-80				
Cortina Special GT	4	1500		28/36 DCD 36	1	26	4-50	1-40	0-55	2-00	F30	2-30	2-05 F1	0-70	0-50	1-75
							27 4-50	1-65	0-70	0-70	F30	1-80				

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Cortina Special GT	4	1500	28/36 DCD 38	1	26	4-50	1-40	0-55	2-00	F30	2-30	2-05 F1	0-70	0-50	1-75
					27	4-50	1-55	0-70	0-70	F30	1-80				
Cortina 1600 GTE	4	1596	32 DFM 4	1	26	4-50	1-42	0-50	1-80	F6	1-65	-	0-65	0-40	2-00
					27	4-50	1-65	0-45	0-70	F6	1-65				
Cortina GT - Export	4	1596	32 DFD	1	26	4-50	1-40	0-55	1-75	F6	1-60	-	0-65	0-40	2-00
					27	4-50	1-62	0-50	0-70	F6	1-40				
Capri 1600 GT	4	1599	28/36 DCD 22	1	26	4-50	1-40	0-50	2-00	F30	2-30	2-05 F1	0-70	0-50	1-75
					27	4-50	1-55	0-70	0-70	F30	1-80				
Capri 1600 GT	4	1599	32 DFM 5	1	26	4-50	1-42	0-50	1-80	F6	1-65	-	0-65	0-40	2-00
					27	4-50	1-65	0-45	0-70	F6	1-65				
Capri 1600 GT	4	1599	32 DFM 3	1	26	4-50	1-45	0-45	1-80	F6	1-50	-	0-55	0-40	2-00
					27	4-50	1-55	0-45	0-70	F6	1-40				
Capri 1600 GT	4	1599	32/36 DGV 5A/05A	1	26	3-50	1-40	0-55	1-60	F50	1-65	-	0-50	0-30	2-00
					27	3-50	1-35	0-50	0-70	F6	1-60				
Capri 1600 GT	4	1599	32/36 DGAV 8A/08A	1	26	3-50	1-40	0-55	1-70	F50	1-70	-	0-50	0-30	2-00
					27	3-50	1-40	0-45	0-70	F50	1-40				
Capri 1600 GT	4	1599	32 DGAV 9A/09A	1	26	3-50	1-35	0-55	1-70	F50	1-70	-	0-50	0-30	2-00
					27	3-50	1-50	0-45	0-70	F50	1-40				
Capri 1600 GT	4	1599	32/36 DGAV 8B/8B1	1	26	3-50	1-30	0-50	1-60	F66	1-60	-	0-50	0-30	2-00
					27	4-50	1-25	0-45	1-50	F66	1-25				
Capri 1600 GT	4	1599	32/36 DGAV 9B/9B1	1	26	3-50	1-30	0-45	1-60	F66	1-60	-	0-50	0-30	2-00
					27	4-50	1-25	0-45	1-50	F66	1-25				
Capri 1600 GT	4	1599	32/36 DGAV 8C	1	26	3-50	1-30	0-50	1-50	F66	1-60	-	0-50	0-30	2-00
					27	4-50	1-25	0-45	1-50	F66	1-25				
Capri 1600 GT	4	1599	32/36 DGAV 9C	1	26	3-50	1-30	0-45	1-50	F66	1-60	-	0-50	0-30	2-00
					27	4-50	1-25	0-45	1-50	F66	1-25				
Capri 1600 GT	4	1599	32/36 DGAV 8C1	1	26	4-50	1-37	0-45	1-50	F50	1-70	-	0-45	0-30	2-00
					27	3-50	1-25	0-45	1-50	F50	1-20		0-45		
Taurus/Cortina 1600	4	1599	32/36 DGAV 1A/01A, 1B/01B	1	26	3-50	1-40	0-55	1-70	F50	1-70	-	0-50	0-30	2-00
					27	3-50	1-40	0-45	0-70	F6	1-40				
Taurus/Cortina 1600	4	1599	32/36 DGAV 2A/02A, 2B/02B	1	26	3-50	1-35	0-55	1-70	F50	1-70	-	0-50	0-30	2-00
					27	3-50	1-45	0-45	0-70	F6	1-40				
Taurus/Cortina 1600	4	1599	32/36 DGAV 1C/1C1	1	26	3-50	1-30	0-50	1-50	F66	1-80	-	0-50	0-30	2-00
					27	4-50	1-25	0-45	1-50	F66	1-25				
Taurus/Cortina 1600	4	1599	32/36 DGAV 2C/2C1	1	26	3-50	1-30	0-45	1-50	F66	1-60	-	0-50	0-30	2-00
					27	4-50	1-25	0-45	1-50	F66	1-25				
Taurus/Cortina 1600	4	1599	32/36 DGAV 1D	1	26	3-50	1-30	0-50	1-50	F66	1-80	-	0-50	0-30	2-00
					27	4-50	1-25	0-45	1-50	F66	1-25				
Taurus/Cortina 1600	4	1599	32/36 DGAV 2D	1	26	3-50	1-30	0-45	1-50	F66	1-80	-	0-50	0-30	2-00
					27	4-50	1-25	0-45	1-50	F66	1-25				
Taurus/Cortina 1600	4	1599	32/36 DGAV 1D1	1	26	4-50	1-37	0-45	1-50	F50	1-70	-	0-45	0-30	2-00
					27	3-50	1-25	0-45	1-50	F50	1-20		0-45		
Taurus/Cortina Svezia	4	1599	32 DGAV 24A	1	23	3-50	1-15	0-50	1-50	F50	1-85	-	0-50	0-30	2-00
					24	3-50	1-05	0-45	0-70	F50	1-40				
Taurus/Cortina Svezia	4	1599	32 DGAV 25A	1	23	3-50	1-12	0-55	1-50	F50	1-85	-	0-55	0-30	2-00
					24	3-50	1-10	0-45	0-70	F50	1-40				
Corsair 2000 E GT	4	1997	32 DAF 1	1	26	4-50	1-55	0-45	1-50	F6	1-80	-	0-65	0-40	2-00
					27	4-50	1-40	0-45	0-70	F6	1-80				
Corsair 2000 E GT	4	1997	32 DIF 4	1	26	4-50	1-55	0-50	1-50	F6	1-80	-	0-65	0-40	2-00
					27	4-50	1-40	0-45	0-70	F6	1-80				
Cortina 2000 V4	4	1997	32 DIF 5	1	26	4-50	1-55	0-50	1-50	F6	1-80	-	0-65	0-40	2-00
					27	4-50	1-40	0-45	0-70	F6	1-80				
Taurus/Cortina 2000	4	1997	32/36 DGAV 3A/03A, 3B/03B	1	26	3-50	1-40	0-60	1-70	F50	1-70	-	0-50	0-30	2-00
					27	3-50	1-40	0-50	0-70	F50	1-60				
Taurus/Cortina 2000	4	1997	32/36 DGAV 4A/04A, 4B/04B	1	26	3-50	1-40	0-55	1-70	F50	1-70	-	0-50	0-30	2-00
					27	3-50	1-40	0-50	0-70	F50	1-60				
Taurus/Cortina 2000	4	1997	32/36 DGAV 3C/3C1	1	26	3-50	1-37	0-45	1-75	F66	1-70	-	0-50	0-30	2-00
					27	4-50	1-27	0-60	1-40	F66	1-25				
Taurus/Cortina 2000	4	1997	32/36 DGAV 4C/4C1	1	26	3-50	1-35	0-45	1-75	F66	1-70	-	0-50	0-30	2-00
					27	4-50	1-27	0-60	1-40	F66	1-25				
Taurus/Cortina Granada	4	1997	32/36 DGAV 3D	1	26	3-50	1-37	0-45	1-75	F66	1-70	-	0-50	0-30	2-00
					27	4-50	1-27	0-60	1-40	F66	1-25				
Taurus/Cortina Granada	4	1997	32/36 DGAV 4D	1	26	3-50	1-35	0-45	1-75	F66	1-70	-	0-50	0-30	2-00
					27	4-50	1-27	0-60	1-40	F66	1-25				
Taurus/Cortina Granada	4	1997	32/36 DGAV 3D1	1	26	3-50	1-35	0-45	1-60	F66	1-70	-	0-45	0-30	2-00
					27	4-50	1-30	0-45	1-60	F66	1-25		0-45		
Taurus/Cortina Granada	4	1997	32/36 DGAV 4D1	1	26	3-50	1-32	0-45	1-60	F66	1-75	-	0-45	0-30	2-00
					27	4-50	1-40	0-45	1-60	F66	1-25		0-45		
Taurus/Cortina Svezia	4	1997	32/36 DGAV 18A	1	26	3-50	1-32	0-55	1-50	F66	1-75	-	0-45	0-30	2-00
					27	4-50	1-27	0-50	0-70	F66	1-45		0-45		
Taurus/Cortina Svezia	4	1997	32/36 DGAV 19A	1	26	3-50	1-32	0-55	1-50	F66	1-75	-	0-50	0-30	2-00
					27	4-50	1-27	0-50	0-70	F66	1-45				
Capri 2000 GT	4	1997	32/36 DFM	1	26	4-50	1-45	0-45	1-50	F6	1-70	-	0-65	0-40	2-00
					27	4-50	1-45	0-50	0-70	F6	1-80				
Capri 2000 GT	4	1997	32/36 DFM	1	26	4-50	1-35	0-45	1-50	F6	1-70	-	0-65	0-40	2-00
					27	4-50	1-40	0-50	0-70	F6	1-80				
Capri 2000	4	1997	32/36 DGAV 12A	1	26	3-50	1-40	0-60	1-70	F50	1-70	-	0-50	0-30	2-00
					27	3-50	1-35	0-50	0-70	F50	1-50				
Capri 2000	4	1997	32/36 DGAV 13A	1	26	3-50	1-40	0-55	1-70	F50	1-70	-	0-50	0-30	2-00
					27	3-50	1-35	0-50	0-70	F50	1-50				
Capri 2000	4	1997	32/36 DGAV 12A1	1	26	3-50	1-40	0-60	1-70	F50	1-70	-	0-50	0-30	2-00
					27	3-50	1-35	0-50	0-70	F50	1-50				
Capri 2000	4	1997	32/36 DGAV 13A1	1	26	3-50	1-40	0-55	1-70	F50	1-70	-	0-50	0-30	2-00
					27	3-50	1-35	0-50	0-70	F50	1-50				
Capri 2000	4	1997	32/36 DGAV 12C	1	26	3-50	1-37	0-45	1-75	F66	1-70	-	0-50	0-30	2-00
					27	4-50	1-27	0-60	1-40	F66	1-25				
Capri 2000	4														

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Capri 2000	4	1997	32/36 DGAV 13C1	1 26	3-50	1-32	0-45	1-60	F66	1-75	-	0-45	0-30	2-00	
				27	4-50	1-40	0-45	1-60	F66	1-25	-	0-45			
Capri 2000 Svezia	4	1997	32/36 DGAV 22A1	1 26	3-50	1-32	0-55	1-50	F66	1-75	-	0-45	0-30	2-00	
				27	4-50	1-30	0-50	0-70	F66	1-35	-	0-45			
Capri 2000 Svezia	4	1997	32/36 DGAV 23A	1 26	3-50	1-32	0-55	1-50	F66	1-75	-	0-50	0-30	2-00	
				27	4-50	1-27	0-50	0-70	F66	1-45	-				
Capri 2000 Giappone	4	1997	32/36 DGAV 27A	1 26	3-50	1-32	0-55	1-10	F66	1-75	-	0-50	0-30	2-00	
				27	4-50	1-10	0-50	0-70	F66	1-25	-				
Granada 2000 Svezia	4	1997	32/36 DGAV 20A1	1 26	3-50	1-32	0-55	1-50	F66	1-75	-	0-45	0-30	2-00	
				27	4-50	1-30	0-50	0-70	F66	1-35	-	0-45			
Consul/Granada 2000	4	1997	32/36 DGAV 10A/010A	1 26	3-50	1-40	0-60	1-70	F50	1-70	-	0-50	0-30	2-00	
				27	3-50	1-35	0-50	0-70	F50	1-25	-				
Consul/Granada 2000	4	1997	32/36 DGAV 11A/011A	1 26	3-50	1-40	0-55	1-70	F50	1-70	-	0-50	0-30	2-00	
				27	3-50	1-35	0-50	0-70	F50	1-25	-				
Consul/Granada 2500	6	2551	34 DGAS 8A	1 24	4-50	1-22	0-45	1-95	F50	1-80	-	0-55	0-40	2-60	
Consul/Granada 2500	6	2551	38 DGAS 1A	1 27	4-00	1-45	0-50	2-00	F50	1-75	-	0-60	0-30	2-60	
Consul/Granada 3000	6	2994	38 DGAS 3A/03A	1 27	4-00	1-45	0-45	1-85	F50	1-85	-	0-60	0-30	2-60	
Consul/Granada 3000	6	2994	38 DGAS 4A/04A	1 27	4-00	1-45	0-45	1-95	F50	1-85	-	0-70	0-30	2-60	
Granada 3000	6	2994	38 DGAS 4A2	1 27	4-00	1-42	0-45	1-95	F50	1-85	-	0-70	0-30	2-60	
Granada 3000	6	2994	38 DGAS 3B	1 27	4-00	1-42	0-45	1-95	F50	1-85	-	0-55	0-45	2-60	
Granada 3000	6	2994	38 DGAS 3C	1 27	4-00	1-42	0-45	1-95	F50	1-85	-	0-55	0-45	2-60	
Capri 3000 GT	6	2994	38 DGAS 7A/07A	1 27	4-00	1-45	0-45	1-95	F50	1-85	-	0-70	0-30	2-60	
Capri 3000	6	2994	38 DGAS 6A1	1 27	4-00	1-42	0-45	1-95	F50	1-85	-	0-70	0-30	2-60	
Capri 3000	6	2994	38 DGAS 7A1	1 27	4-00	1-42	0-45	1-95	F50	1-85	-	0-70	0-30	2-60	
Capri 3000	6	2994	38 DGAS 6B	1 27	4-00	1-42	0-45	1-95	F50	1-85	-	0-55	0-45	2-60	
Capri 3000	6	2994	38 DGAS 6C	1 27	4-00	1-42	0-45	1-95	F50	1-85	-	0-55	0-45	2-60	
Fiesta 1600 (49 States)	4	1598	32 DFTA	1 22	4-00	1-00	0-60	1-20	F22	2-50	-	0-45	0-40	1-50	
				22	4-00	1-05	0-60	0-70	F22	2-50	-				
Fiesta 1600 (California)	4	1598	32 DFTA 1	1 22	4-00	1-05	0-60	1-10	F22	2-50	-	0-45	0-40	1-60	
				22	4-00	1-00	0-60	0-70	F22	2-50	-				
Escort GT, twin cam	4	1558	40 DCOE 31	1 30	4-50	1-10	0-45 F8	-	F11	1-55	1-00 F5	0-35	0-40	1-75	
Escort 2000 RS	4	1993	44 IDF 40/41	2 34	4-50	1-45	0-55	1-30	F19	1-80	0-90 F550-40		0-80	1-75	
<b>IKA</b>															
Torina GS Coupé	6	3770	45 DCOE 17	3 33	4-50	1-30	0-55 F8	-	F11	2-00	0-60 F5	0-45	0-60	2-00	
<b>LAMBORGHINI</b>															
Urraco USA	8	2462	40 IDF 30-31/32/33	4 30	3-00	1-20	0-65	1-00	F7	1-80	-	0-35	1-00	1-75	
Urraco SS	8	2462	40 DCNF 42/43	4 34	4-50	1-35	0-60	1-30	F24	2-20	0-60 F5	0-35	0-40	1-75	
Urraco P200	8	1973	36 IDF 34/35/36/37	4 27	3-00	1-15	0-55	1-25	F7	1-70	-	0-35	1-00	1-75	
Urraco P250	8	2462	40 IDF 22/23/24/25	4 30	3-00	1-20	0-60	1-00	F7	1-60	0-80 F5	0-35	1-00	1-75	
Urraco P300 USA	8	2996	40 DCNF 70/71	4 32	4-50	1-30	0-55	1-65	F27	1-80	0-55 F5	0-35	0-45	1-75	
Urraco P300 Silhouette	8	2996	40 DCNF 62/63	4 32	4-50	1-35	0-55	1-30	F27	1-90	0-60 F5	0-35	0-45	1-75	
Islero GT/Espada															
GT Jarama	12	3929	40 DCOE 22/23	6 30	4-50	1-15	0-45 F9	-	F3	2-10	0-80 F5	0-35	0-70	1-75	
Espada-Jarama USA	12	3929	40 DCOE 22A/23A	6 30	4-50	1-20	0-50 F9	-	F9	2-10	-	0-35	1-00	1-75	
Espada-Jarama GTS '77	12	3929	40 DCOE 92-93/150	6 30	4-50	1-15	0-45 F19	-	F3	2-10	-	0-35	1-00	1-75	
Countach	12	3929	45 DCOE 96-97/150	6 38	4-50	1-50	0-50 F19	-	F3	2-10	-	0-45	0-70	1-75	
<b>LANCIA</b>															
Stratos	6	2418	40 IDF 28-29, 28(2)-29(1)	3 32	4-50	1-25	0-50	1-20	F3	2-20	0-60 F6	0-40	0-40	1-75	
<b>LOTUS</b>															
Elan S4-SE	4	1558	48 DCOE 18	2 30	4-50	1-15	0-45 F9	-	F11	2-00	1-00 F5	0-40	0-50	1-75	
Cortina GT	4	1558	40 DCOE 31	2 30	4-50	1-10	0-45 F8	-	F11	1-55	1-00 F5	0-35	0-40	1-75	
<b>MASERATI</b>															
Merak 2000	6	1999	42 DCNF 78-78/1, 78(2) 78/1	3 32	3-50	1-25	0-50	1-45	F36	1-80	0-80 F7	0-40	0-40	2-00	
Merak	6	2995	42 DCNF 31(2), 32(1)	3 36	3-50	1-40	0-60	1-30	F25	1-80	0-80 F7	0-40	0-40	2-00	
Merak SS	6	2965	44 DCNF 44	3 36	3-50	1-40	0-65	1-45	F25	1-70	1-10 F7	0-40	0-40	2-00	
Merak SS '77	6	2965	44 DCNF 69-69/1, 69(2)-69/1(1)	3 36	3-50	1-40	0-65	1-45	F25	1-70	1-10 F7	0-40	0-40	2-00	
3500 GT	6	3485	42 DCOE 8	3 32	3-50	1-35	0-55 F2	-	F15	1-55	0-60 F5	0-45	none	2-00	
Khamsin	8	4930	42 DCNF 41	4 34	3-50	1-30	0-60	1-30	F25	1-55	0-80 F7	0-40	0-40	2-00	
Khamsin '77	8	4930	42 DCNF 68	4 34	3-50	1-35	0-60	1-35	F25	1-55	0-80 F7	0-40	0-40	2-00	
Kyalami 4200	8	4136	42 DCNF 75	4 34	3-50	1-30	0-60	1-35	F25	1-55	0-80 F7	0-40	0-40	2-00	
Quattro Porte 11	6	2965	44 DCNF 61	3 34	3-50	1-40	0-65	1-65	F25	1-70	1-10 F7	0-40	0-40	2-00	
Bora-Indy 4700	8	4719	42 DCNF 35(3)-36	4 36	3-50	1-40	0-60	1-60	F25	1-55	0-80 F7	0-40	0-40	2-00	
Bora 4900	8	4930	42 DCNF 68	4 34	3-50	1-35	0-60	1-35	F25	1-55	0-80 F7	0-40	0-40	2-00	
<b>MATRA-SIMCA</b>															
Baghera	4	1294	36 DCNF 49-50/100	1 29	3-50	1-25	0-45	1-35	F36	2-00	0-70 F10	0-40	0-40	1-75	
Baghera S	4	1294	36 DCNF 51-52/100	1 30	3-50	1-30	0-47	1-35	F36	2-10	0-70 F10	0-40	0-40	1-75	
<b>PORSCHE</b>															
904 GTS Carrera	4	1956	46 IDA 2/3	2 40	4-50	1-70	0-60 F10	-	F14	1-30	-	0-50	none	3-00	
911 L	6	1991	40 IDA 3C/1	2 30	4-50	1-25	0-55	1-10	F26	1-80	-	0-50	none	1-75	
911 USA	6	1991	40 IDAP 3C/1	2 30	4-50	1-25	0-52	1-10	F26	1-80	-	0-50	none	1-75	
911 S	6	1991	40 IDS 3C/1	2 32	4-50	1-30	0-55	1-10	F3	1-80	-	0-50	none	1-75	
911 T	6	1991	40 IDT 3C/1	2 27	4-50	1-10	0-50	1-10	F2	1-85	-	0-50	none	1-75	
911 T	6	1991	40 IDTP 3C/1	2 27	4-50	1-10	0-45	1-45	F1	1-85	-	0-50	none	1-75	
Carrera 6	6	1991	46 IDA 3C/1	2 42	4-50	1-70	0-70	0-80	F24	1-45	-	0-50	0-40	1-75	
914/6	6	1991	40 IDTP 13C/1	2 27	4-50	1-05	0-50	1-45	F1	1-70	-	0-50	none	1-75	
<b>SUNBEAM (Rootes)</b>															
Rapier H 120	4	1725	40 DCOE 90/91	2 30	3-50	1-15	0-50 F18	-	F34	2-00	1-40 F5	0-35	1-00	1-60	

## Part 5 Appendix 2

# Conversion equipment jet setting list for Weber carburetors

This list gives details of calibration and jet sizes on carburetors fitted as conversion equipment:

<b>A</b>	<i>Model details</i>	<b>K</b>	<i>Accelerator pump inlet valve with exhaust orifice</i>
<b>B</b>	<i>Carburettor type</i>	<b>L</b>	<i>Needle valve</i>
<b>C</b>	<i>Number of carburetors</i>		
<b>D</b>	<i>Choke size</i>		
<b>E</b>	<i>Auxiliary venturi</i>		
<b>F</b>	<i>Main jet</i>		
<b>G</b>	<i>Emulsion tube</i>		
<b>H</b>	<i>Air corrector jet</i>		
<b>I</b>	<i>Idle jet</i>		
<b>J</b>	<i>Accelerator pump jet</i>		

A	B	C	D	E	F	G	H	I	J	K	L
Alfasud	40 IDF 42/43	2	28	4-50	1-10	F11	2-25	0-50	0-40	0-50	1-75
Austin Mini Cooper 'S' 1070 cc and 1275 cc	45 DCOE 13	1	34	3-5	1-30	F2	1-75	0-50 F9	0-50	0-50	2-00
Austin Mini Cooper 'S' 1275 cc	45 DCOE 13	1	38	5-00	1-60	F16	1-70	0-45 F9	0-50	1-00	2-25

A	B	C	D	E	F	G	H	I	J	K	L
Austin America	45 DCOE 9	1	34	3.5	1.30	F2	1.75	0.50 F9	0.50	0.50	2.00
Austin Marina	45 DCOE 9	1	36	4.5	1.65	F16	1.60	0.50 F8	0.60	closed	2.00
Austin Healey Sprite Mk 1	45 DCOE 9	1	32	5.0	1.40	F16	1.80	0.45 F6	0.40	0.50	2.00
Austin Healey Sprite Mk 2 and 3	45 DCOE 9	1	32	5.0	1.40	F16	1.80	0.45 F6	0.40	0.50	2.00
Austin Healey Sprite Mk 4	45 DCOE 9	1	34	3.5	1.30	F2	1.75	0.50 F9	0.50	0.50	2.25
Austin Healey 3000 Mk 2 and 3	45 DCOE 9	3	36	4.5	1.65	F16	1.50	0.55 F8	0.45	closed	2.00
BMW 1600	40 DCOE 18	2	32	4.5	1.30	F9	1.85	0.45 F12	0.35	0.45	1.75
BMW 2002	45 DCOE 15/16	2	34	5.0	1.30	F9	1.80	0.50 F8	0.40	0.45	2.25
Capri 1600	40 DCOE 2	2	32	4.5	1.20	F16	1.80	0.50 F9	0.40	0.50	2.00
Capri 2000	45 DCOE 13	1	34	3.5	1.45	F2	1.85	0.55 F4	0.50	0.50	2.25
Capri 2000	42 DCOE 8	2	32	4.5	1.25	F16	1.80	0.50 F9	0.40	0.50	2.00
Colt 1600	45 DCOE 9	1	32	5.0	1.25	F20	1.60	0.50 F8	0.45	0.50	2.00
Datsun B 110	40 DCOE 2	1	27	4.5	1.10	F7	1.65	0.50 F9	0.50	0.50	2.00
Datsun B210 F10	40 DCOE 2	1	33	4.5	1.30	F11	1.80	0.50 F8	0.60	closed	2.00
Datsun 510	45 DCOE 13	1	33	4.5	1.30	F16	1.90	0.50 F8	0.50	0.55	2.25
Datsun 510	40 DCOE 12	2	32	4.5	1.35	F15	1.70	0.55 F2	0.40	0.55	2.00
Datsun 610	45 DCOE 13	1	34	3.5	1.30	F16	1.80	0.50 F8	0.50	closed	2.25
Datsun 610	40 DCOE 2	2	33	4.5	1.50	F16	2.00	0.50 F6	0.45	0.55	2.00
Datsun 710	45 DCOE 13	1	34	3.5	1.30	F16	1.80	0.50 F8	0.50	closed	2.25
Datsun 710	40 DCOE 2	2	33	4.5	1.50	F16	2.00	0.50 F6	0.45	0.55	2.00
Datsun 240Z and 260Z	40 DCOE 18	3	30	4.5	1.30	F2	1.75	0.50 F9	0.45	0.55	1.75
Datsun 521 PU (1595 cc)	45 DCOE 13	1	33	4.5	1.30	F16	1.90	0.50 F8	0.50	0.55	2.25
Datsun 521 PU (1595 cc)	40 DCOE 2	2	32	4.5	1.35	F15	1.70	0.55 F2	0.40	0.55	2.00
Datsun 620 PU (1595 cc)	45 DCOE 13	1	33	4.5	1.30	F16	1.90	0.50 F8	0.50	0.55	2.25
Datsun 620 PU (1595 cc)	40 DCOE 2	2	32	4.5	1.35	F15	1.70	0.55 F2	0.40	0.55	2.00
Datsun 620 PU (1770 cc and 1952 cc)	45 DCOE 13	1	34	3.5	1.30	F16	1.80	0.50 F8	0.50	closed	2.25
Datsun 620 PU (1770 cc and 1952 cc)	40 DCOE 2	2	33	4.5	1.50	F16	2.00	0.50 F6	0.45	0.55	2.00
Fiat 126 Gruppo 2	40 DCOE 102	1	28	4.5	1.10	F11	2.50	0.45 F8	0.45	1.00	1.75
Fiat 124 Sport/Rally GR4	48 IDF 1-2/100	2	40	4.5	1.65	F11	1.90	0.65	0.40	1.00	2.00
Ford Cortina 1500	40 DCOE 2	2	33	4.5	1.25	F16	1.70	0.45 F9	0.35	closed	2.00
Ford Cortina 1600 (cross flow) and Pinto 1600	40 DCOE 2	2	32	4.5	1.20	F16	1.80	0.50 F9	0.40	0.50	2.00
Ford Pinto 2000	45 DCOE 13	1	34	3.5	1.45	F2	1.85	0.55 F4	0.50	0.50	2.25
Ford Pinto 2000	42 DCOE 8	2	32	4.5	1.25	F16	1.80	0.50 F9	0.40	0.50	2.00
Honda Civic (except CVCC)	40 DCOE 2	1	33	4.5	1.40	F2	1.85	0.45 F9	0.45	0.55	2.00
Jaguar XKE (3.8 and 4.2)	45 DCOE 9	3	38	3.5	1.65	F2	1.90	0.65 F8	0.40	0.50	2.00
Lancia Stratos	44 IDF 26(2)-27	3	36	4.5	1.50	F11	1.80	0.55	0.40	0.80	1.75
Lotus Europa (Renault engine)	45 DCOE 13	1	34	3.5	1.50	F2	1.80	0.45 F8	0.40	0.50	2.25
Mercedes Benz 190 SL	40 DCOE 18	2	30	4.5	1.35	F2	2.00	0.50 F9	0.45	closed	1.75
MG Midget Mk 1 and 2	45 DCOE 9	1	32	5.0	1.40	F16	1.80	0.45 F6	0.40	0.50	2.00
MG Midget Mk 3	45 DCOE 13	1	34	3.5	1.30	F2	1.75	0.50 F9	0.50	0.50	2.25

A	B	C	D	E	F	G	H	I	J	K	L
MG 1100 Saloon	45 DCOE 9	1	32	5.0	1.40	F16	1.80	0.45 F6	0.40	0.50	2.00
MGA (except twin cam)	45 DCOE 13	1	34	3.5	1.60	F16	1.70	0.50 F8	0.60	closed	2.25
MGB and MGB GT	45 DCOE 9	1	36	4.5	1.65	F16	1.60	0.50 F8	0.60	closed	2.00
Opel Kadette and Rallye (to 1970)	40 DCOE 2	2	33	4.5	1.15	F16	1.50	0.50 F9	0.35	0.55	2.00
Opel Kadette, Rallye and Manta (1971 on)	40 DCOE 2	2	33	4.5	1.15	F16	1.50	0.50 F9	0.35	0.55	2.00
Opel GT 1900	40 DCOE 2	2	33	4.5	1.15	F16	1.50	0.50 F9	0.35	0.55	2.00
Porsche 356A, B, C and 912	48 IDA 4	2	37	4.5	1.35	F7	1.20	0.70 F10	0.50	0.50	2.00
Renault R12 Gordini	45 DCOE 68/69	2	34	4.5	1.35	F9	2.00	0.55 F8	0.45	0.60	1.50
Toyota Corolla 1100 and 1200	40 DCOE 2	1	27	4.5	1.05	F7	1.55	0.50 F11	0.50	0.50	2.00
Toyota Corolla 1600 (2TC)	40 DCOE 18	1	30	4.5	1.10	F11	2.00	0.45 F9	0.50	0.50	1.75
Toyota Corolla 1600 (2TC)	40 DCOE 18	2	30	4.5	1.15	F11	2.00	0.50 F9	0.40	0.50	1.75
Toyota Carina 1600 (2TC)	40 DCOE 18	1	30	4.5	1.10	F11	2.00	0.45 F9	0.50	0.50	1.75
Toyota Carina 1600 (2TC)	40 DCOE 18	2	30	4.5	1.15	F11	2.00	0.50 F9	0.40	0.50	1.75
Toyota Celica (8RC and 18RC)	40 DCOE 2	1	33	4.5	1.60	F2	1.65	0.40 F9	0.60	closed	2.00
Toyota Celica (8RC and 18RC)	40 DCOE 2	2	33	4.5	1.40	F2	1.70	0.45 F6	0.35	closed	2.00
Toyota Corona (8RC and 18RC)	40 DCOE 2	1	33	4.5	1.60	F2	1.65	0.40 F9	0.60	closed	2.00
Toyota Corona (8RC and 18RC)	40 DCOE 2	2	33	4.5	1.40	F2	1.70	0.45 F6	0.35	closed	2.00
Toyota Corona Mk2 (8RC and 18RC)	40 DCOE 2	1	33	4.5	1.60	F2	1.65	0.40 F9	0.60	closed	2.00
Toyota Corona Mk2 (8RC and 18RC)	40 DCOE 2	2	33	4.5	1.40	F2	1.70	0.45 F6	0.35	closed	2.00
Toyota Hi-Lux PU (8RC and 18RC)	40 DCOE 2	1	33	4.5	1.60	F2	1.65	0.40 F9	0.60	closed	2.00
Toyota Hi-Lux PU (8RC and 18RC)	40 DCOE 2	2	33	4.5	1.40	F2	1.70	0.45 F6	0.35	closed	2.00
Toyota PU (18RC)	40 DCOE 2	1	33	4.5	1.60	F2	1.65	0.40 F9	0.60	closed	2.00
Toyota PU (18RC)	40 DCOE 2	2	33	4.5	1.40	F2	1.70	0.45 F6	0.35	closed	2.00
Triumph Dolomite Sprint	48 DCOE	2	42	4.5	1.65	F16	1.75	0.60	0.45	0.40	3.00
Triumph GT6	40 DCOE 2	3	29	4.5	1.20	F16	1.90	0.45 F9	0.40	closed	2.00
Triumph GT6 + Mk 2 and GT6 Mk 3	40 DCOE 2	3	27	4.5	1.30	F2	1.60	0.50 F11	0.45	closed	2.00
Triumph TR2, 3, 3A, 3B, 4 and 4A	42 DCOE 8	2	32	4.5	1.40	F15	1.50	0.50 F2	0.50	0.50	2.00
Triumph TR 250 and TR6	40 DCOE 2	3	27	4.5	1.30	F2	1.60	0.50 F11	0.45	closed	2.00
Volvo 122S, 144 and P1800	42 DCOE 8	2	32	4.5	1.25	F15	1.60	0.50 F8	0.50	0.50	2.00
Volkswagen 1200	36 IDF 16/17	2	27	4.5	1.10	F11	2.15	0.50	0.40	0.50	1.75
Volkswagen 1600	40 IDF 18/19	2	28	4.5	1.15	F11	2.00	0.50	0.50	0.50	1.75
Volkswagen 2000	44 IDF 38/39	2	36	4.5	1.70	F11	2.00	0.50	0.55	0.80	1.75
Volkswagen Saloon 1600 (dual port) stock	40 DCNF 12	1	32	4.5	1.60	F24	2.20	0.55	0.50	none	1.75
Volkswagen Saloon 1600 (dual port) - 1800 cc modification	40 DCNF 12	2	32	4.5	1.55	F24	2.20	0.55	0.45	none	1.75
Volkswagen Saloon 1600 (dual port) - 1800 cc modification	42 DCNF 9	2	34	4.5	1.40	F25	1.80	0.60	0.40	none	2.00
Volkswagen Saloon 1600 (dual port) - 1800 cc modification	40 IDF 19	2	28	4.5	1.15	F11	2.00	0.50	0.50	0.55	1.75
Volkswagen Transporter 1600 (dual port) - stock	40 DCNF 12	1	32	4.5	1.60	F24	2.20	0.55	0.50	none	1.75
Volkswagen Transporter 1600 (dual port) - 1800 cc modification	40 DCNF 12	2	32	4.5	1.55	F24	2.20	0.55	0.45	none	1.75
Volkswagen Transporter 1600 (dual port) - 1800 cc modification	40 DCNF 9	2	34	4.5	1.40	F25	1.80	0.60	0.40	none	2.00
Volkswagen Transporter 1600 (dual port) - 1800 cc modification	40 IDF 19	2	28	4.5	1.15	F11	2.00	0.50	0.50	0.55	1.75
Volkswagen Transporter 1700 (type 4)	40 IDF 19	2	28	4.5	1.15	F11	2.00	0.50	0.50	0.55	1.75
Volkswagen Saloon and Transporter 1600 - highly modified	48 IDA 4	2	37	4.5	1.35	F7	1.20	0.70 F10	0.50	0.50	2.00
Volkswagen Fastback and Squareback 1600 (dual port)	40 DCNF 12	2	32	4.5	1.55	F24	2.20	0.55	0.45	none	1.75
Volkswagen Fastback and Squareback 1600 (dual port)	42 DCNF 9	2	34	4.5	1.40	F25	1.80	0.60	0.40	none	2.00
Volkswagen 411 and 412 1700 and 1800	40 IDF 19	2	28	4.5	1.15	F11	2.00	0.50	0.50	0.55	1.75

# Part 5 Appendix 3

## Applications list for Zenith Stromberg carburetors

This list gives outline details of Stromberg CD carburetors fitted as standard equipment to passenger and light commercial vehicles. It is presented in tabular form, and the entries are arranged in alphabetical order according to the name of the vehicle manufacturer. The list is concluded with the more popular applications of the conversion kits which have been offered by various specialist firms for fitting to vehicles originally equipped with other types of carburetors. These are similarly arranged in alphabetical order.

A fully detailed spare parts schedule is available from the manufacturer for any specific application. In addition to a complete illustrated parts list, this also gives standard setting data, ie float height, fast-idle interconnection setting dimension,

and alternative metering needle for operation at elevated altitudes (when applicable).

The columns are self-explanatory but it should be noted that the carburettor reference (cr), metering needle marking (mnm), and air valve return spring colour (avrsc), are included for identification only of these parts, as this is the evidence actually found on the unit. The details do not constitute part numbers and should not be quoted when ordering replacement parts.

Part numbers corresponding with metering needle code marking will be found by cross-reference to Appendix 2.

Part numbers for air valve return springs will be found by cross-reference to Part 2.

Model details	Years	cr	Type	mnm	avrsc **
<b>ALFA-ROMEO</b> 1750 Berlina, GTV, Spider Veloce	1970	3291	2x175CD-2SE	B1AW	Not fitted
<b>ASTON MARTIN</b> DBS	1969/70	3212F 3212M 3212R	3x175CD-2SE	BIU BIU BIU	Natural Natural Natural
<b>BEDFORD</b> HA Van, GPO	1974 on	3683B	150CDSEV		
<b>BRITISH ANZANI</b> 40 bhp, 2-stroke	1966/67	3090	150CD	8A	Natural
<b>HILLMAN</b> Imp Sports	1974	3653RH 3653LH	125CD-3 125CD-3	B5DN B5DN	
Imp Sports	1966/74	3061F 3061R	125CDS 125CDS	6K 6K	Natural Natural
Rally Imp, Comp Dept.	1965 on	3068	2x150CD	6F	Red *
Avenger SC, 1300 & 1600 cc	1973/74	3607	150CD-3	B5DK	Blue *
Avenger TC, 1300 & 1600 cc	1974	3625LH 3625RH	150CD-3 150CD-3	B5DM B5DM	Natural Natural
Avenger, 1250 cc	1973/74	3636	150CD-3	B5CJ	Red *
Avenger, 1250 cc	1972/73	3520	150CD-3	B5CJ	Red *
Avenger, 1250 cc	1970/72	3248	150CDS	58B	Red *
Avenger, 1250 cc Twin carb	1972/73	3488LH 3488RH	150CD-3 150CD-3	B5CU B5CU	Not fitted Not fitted
Avenger, 1500 cc	1973/74	3635	150CD-3	B6BJ	Red *
Avenger, 1500 cc	1972/73	3609	150CD-3	B6BJ	Red *
Avenger, 1500 cc	1972/73	3377	150CD-3	B6BJ	Red *
Avenger, 1500 cc	1971/74	3449	150CDS	5S	Red *
Avenger, 1500 cc	1970/72	3249	150CDS	6AG	Red *
Avenger, 1500 cc	1972/74	3389LH	150CD-3	B5CD	Blue *
Avenger, 1500 cc Twin carb	1972/74	3389RH	150CD-3	B5CD	Blue *
Avenger GT, 1500 cc	1970/71	3278L 3278R	150CDS 150CDS	6BE 6BE	Blue * Blue *

\* After spring colour indicates that colour is at both ends.

\*\* Gaps in this column assume that the same model, but under another name is also listed

Model details	Years	cr	Type	mnm	avrsc **
Avenger, 1500 cc	1972/73	3473RH	150CDS	6Z	
Twin carb (Argentine)		3473LH	150CDS	6Z	
Hillman GT, 1725 cc	1969/70	3163F	150CDS	6R	
		3163R	150CDS	6R	
Minx, 1500 cc and 1725 cc					
CI head	1967/72	3161	150CDS	6Q	Red *
Minx, CI head, emission carb	1969/70	3198	150CDSE	B5AP	Red *
Hunter GT, 1725 cc	1973/74	3623LH	150CD-3	B5CK	Blue *
Twin carbs		3623RH	150CD-3	B5CK	Blue *
Hunter GT, 1725 cc	1971/73	3452R	150CD-3	B5CK	Blue *
		3452L	150CD-3	B5CK	Blue *
Hunter, 1725 cc CI head	1972/74	3489	150CD-3	B5CM	Red *
Hunter, 1725 cc	1971/74	3453	150CD-3	B5CL	Red *
Hunter, 1725 cc Export	1968/70	3182	150CDS	6Z	Natural
Hunter, 1725 cc	1966/72	3162	150CDS	6P	Red *
Chrysler Cricket 1500 cc	1972/73	3554	150CD-SET	B5DC	
Chrysler Avenger (Plymouth Cricket), 1500 cc emission carb, USA	1970/71	3275	150CDSE	B5BD	Red *
Chrysler Avenger (Plymouth Cricket-Auto), 1500 cc emission carb, USA	1971	3417	150CDSET	B6BD	
Chrysler Cricket, 1500 cc twin-emission carb	1972/73	3555LH	150CDSEV	B5DD	
	1972/73	3555RH	150CDSEV	B5DD	
Chrysler (Plymouth Cricket-Sports), 1500 cc emission carbs, USA	1971/72	3442L	150CDSEV	B5CC	
	1971/72	3442R	150CDSEV	B5CC	
Chrysler Arrow, Iran CI head, 1500 cc & 1725 cc, plastic air cleaner	1971	3408	150CDS	5CG	
Chrysler Arrow, Iran, 1725 cc, Twin carbs	1972	3470	150CDS	6AM	
	1972	3470	150CDS	6AM	
<b>HOLDEN</b>					
Holden, 6 cyl, 202 CI	1971/72	3547	175CD-2S	6D	
Holden 6 cyl, 3 carbs	1971/72	3521	3x175CD-2S	6D	
Holden	1970/71	3380	150CDS	6E	
Holden	1970/71	3381	150CDS	6E	
<b>HUMBER</b>					
Sceptre, 1725 cc	1971/73	3452R	150CD-3	B5CK	
		3452L	150CD-3	B5CK	
Sceptre, 1725 cc	1967/71	3163F	2x150CDS	6R	Blue *
		3163R		6R	Blue *
Super Snipe V, 3 litre & Imperial	1966/67	3075F	2x175CD-1	2K	Blue
		3075R		2K	Blue
Super Snipe IV & Imperial	1965	C1866F	2x175CD-1	4A	Blue
		C1866R		4A	Blue
<b>JAGUAR</b>					
E Type, 4.2 litre, emission carb	1969/70	3305F	175CD-2SE	B1AR	
		3305R	175CD-2SE	B1AR	
E Type, 4.2 litre, emission carbs	1967/68	3165F	175CD-2SE	B1E	Natural
		3165R	175CD-2SE	B1E	Natural
XJ6, 4.2 litre (Federal)	1974	3627RH	175CD-2SE	B1CG	
	1974	3627LH	175CD-2SE	B1CG	
XJ6, 4.2 litre water heated jacket, emission carb	1972/74	3598RH	175CD-2SE	B1CG	
	1972/74	3598LH	175CD-2SE	B1CG	
XJ6, 4.2 litre, emission carbs	1971/72	3496RH	175CD-2SE	B1BT	
	1971/72	3496LH	175CD-2SE	B1BT	
XJ6, 4.2 litre, emission carbs	1969/70	3304F	175CD-2SE	B1AR	Natural
		3304R	175CD-2SE	B1AR	Natural

Model details	Years	cr	Type	mnm	avrsc **
XJ6, 4.2 litre, emission carbs	1969/70	3234F	175CD-2SE	B1AE	Natural
		3234R	175CD-2SE	B1AE	Natural
V12, 5.3 litre, automatic trans	1973/74	3527A1	175CD-2SE	B1CE	
		3527A2	175CD-2SE	B1CE	
		3528B1	175CD-2SE	B1CE	
		3528B2	175CD-2SE	B1CE	
		3567A1	175CD-2SE	B1CK	
V12, 5.2 litre, manual trans	1973/74	3567A2	175CD-2SE	B1CK	
		3568B1	175CD-2SE	B1CK	
		3568B2	175CD-2SE	B1CK	
		3629A1	175CD-2SE	B1CQ	
V12, 5.3 litre, auto and manual trans, USA	1973/74	3629A2	175CD-2SE	B1CQ	
		3630B1	175CD-2SE	B1CQ	
		3630B2	175CD-2SE	B1CQ	
V12, 5.3 litre, auto-trans, European	1973/74	3578A1	175CD-2SE	B1CN	
		3578A2	175CD-2SE	B1CN	
		3579B1	175CD-2SE	B1CN	
		3579B2	175CD-2SE	B1CN	
V12, 5.3 litre, XJ25, man-trans	1971/72	3510A1	175CD-2SE	B1BH	
		3510A2	175CD-2SE	B1BH	
		3511B1	175CD-2SE	B1BH	
		3511B2	175CD-2SE	B1BH	
V12, 5.3 litre, XJ25, auto-trans	1971/72	3499A1	175CD-2SE	B1BH	
		3499A2	175CD-2SE	B1BH	
		3500B1	175CD-2SE	B1BH	
		3500B2	175CD-2SE	B1BH	
V12, 5.3 litre	1971	3391A1	175CD-2SE	B1BH	
		3391A2	175CD-2SE	B1BH	
		3392B1	175CD-2SE	B1BH	
		3392B2	175CD-2SE	B1BH	
V12, 5.3 litre, auto-trans	1971	3402A2	175CD-2SE	B1BH	
		3402A1	175CD-2SE	B1BH	
		3403B1	175CD-2SE	B1BH	
		3403B2	175CD-2SE	B1BH	
<b>LAND ROVER</b>					
Range-Rover	1973/74	3318RH	175CD-2SE	B2AS	
		3318LH	175CD-2SE	B2AS	
Range-Rover	1971	3394R	175CD-2S	2AQ	Red
		3394L	175CD-2S	2AQ	Red
Range-Rover	1970	3293RH	175CD-2S	2AQ	Red
		3293LH	175CD-2S	2AQ	Red
Land Rover, 2.6 litre	1973/74	3618	175CD-2S	4J	
Land Rover, 2.6 litre (European)	1973/74	3539	175CD-2SE	B2AU	
Land Rover, 2.6 litre	1971/72	3413	175CD-2S	4J	Blue
Land Rover, 2.6 litre	1967/70	3136	175CD-2S	4J	Blue
<b>LOTUS</b>					
1.6 litre	1973/74	3517RH	175CD-2SE	B1G	Blue
		3517LH	175CD-2SE	B1G	Blue
Elan, 1558 cc, adjustable needle (Home)	1970/72	3322L	175CD-2SE	B2AR	
		3322R	175CD-2SE	B2AR	
Elan, 1558 cc, Export, emission carb	1971/72	3367L	175CD-2SE	B1G	
		3367R	175CD-2SE	B1G	
Elan, 1588 cc, Export, emission carb	1971/72	3368L	175CD-2SE	B1G	
		3368R	175CD-2SE	B1G	
2 litre	1974	3713RH	175CD-2SE	B1DK	
		3713LH	175CD-2SE	B1DK	
2 litre	1973/74	3548RH	175CD-2SE	B1CM	
		3548LH	175CD-2SE	B1CM	
Elan and Elan+2, adjustable needle (Home)	1969/70	3296F	175CD-2SE	B1Y	
		3296R	175CD-2SE	B1Y	

Model details	Years	cr	Type	mm	avrsc**
Elan and Elan+2 (Home)	1969/70	3236F	175CD-2SE	B1Y	Natural
		3236R	175CD-2SE	B1Y	Natural
Elan and Elan+2, Export emission	1968/69	3175F	175CD-2SE	B1G	
		3175R	175CD-2SE	B1G	
<b>SAAB</b>					
99, 2 litre, B20		3557	175CD-2S	B1BR	Red
99, emission carb. 1854 cc	1971/72	3464	175CD-2SE	B1AG	
99 1854 cc	1971/74	3465	175CD-2S	B1W	Red
99 1709 cc	1969/71	3302	175CD-2S	B1W	Red
99, emission carb	1969/71	3301	175CD-2SE	B1AG	Red
99 1709 cc	1969	3282	175CD-2S	B1W	
99 1709 cc	1969	3210	175CD-2S	B1W	Red
99 1709 cc	1968/69	3169	175CD-2S	B1F	Red
<b>SINGER</b>					
Chamois Sports	1966 on	3061F	125CDS	6K	
		3061R	125CDS	6K	
Gazelle, 1500 cc and 1725 cc., CI Head	1967/71	3161	150CDS	6Q	Red *
		3182	150CDS	6Z	
Vogue, 1725 cc Export	1968/70	3182	150CDS	6Z	
Vogue, 1725 cc	1966/71	3162	150CDS	6P	
<b>SUNBEAM</b>					
Stiletto	1966 on	306 (F)	2x125CDS	6K	Natural
		306 (R)		6K	Natural
Rapier, 1725 cc	1971/73	3452R	150 CD-3	B5CK	
		3452L	150CD-3	B5CK	
Rapier, Mk1, 1725 cc	1967/71	3163(F)	2x150CDS	6R	Blue *
		3163(R)		6R	Blue *
Alpine, 1725 cc	1971/74	3453	150CD-3	B5CL	
Alpine, 1725 cc	1969/71	3162	150CDS	6P	
Alpine GT., 1725 cc, emission carb	1969/70	3306(F)	150CDSE	B5BC	
		3306(R)	150CDSE	B5BC	
Alpine GT., 1725 cc, emission carb	1969	3211(F)	150CDSE	B5AU	Blue *
		3211(R)	150CDSE	B5AU	Blue *
Alpine V, 1725 cc	1966/68	3059(F)	150CD	5M	Natural
		3059(R)	150CD	5M	Natural
Sunbeam Arrow, Iran, 1725 cc	1971/72	3470L	150CDS	6AM	
		3470R	150CDS	6AM	
<b>TRIUMPH</b>					
1300	1966/71	3054	150CD	6E	Not fitted
1300 (Sweden, cold climate)	1970	3320	150CDS	5BE	
Herald 13/60	1967/71	3166	150CD	6E	Not fitted
Dolomite 1854 cc 4 cyl	1973/74	3634RH	150CD-3	B5DH	
		3634LH	150CD-3	B5DH	
Dolomite 1854 cc 4 cyl	1972/73	3582RH	150CD-3	B5DH	
		3582LH	150CD-3	B5DH	
Dolomite 1854 cc	1971/73	3334L	150 CDSEV	B5BW	Blue *
		3334R	150CDSEV	B5BW	Blue *
Vitesse Mk II, emission carb	1971/72	3335R	150CDSE	B5BT	
		3335L	150CDSE	B5BT	
Vitesse, 2000 cc Mk II	1969/70	3224(F)	2x150CDS	6AC	Blue *
		3224(R)		6AC	Blue *
Vitesse, 2000 cc	1966/68	3137(F)	2x150CD	6J	Natural
		3137(R)		6J	Natural
Vitesse, 1600 cc	1965/66	3027(F)	2x150CD	7B	Not fitted
		3027(R)		7B	Not fitted
TR6, emission carb	1974	3613RH	175CD-SEVX	B1AF	
		3613LH	175CD-SEVX	B1AF	
TR6, emission carb	1972/73	3508RH	175CD-SEV	B1AF	
		3508LH	175CD-SEV	B1AF	

Model details	Years	cr	Type	mnm	avrsc**
TR6, emission carb	1971/72	3337R	175CD-2SE	B1AF	Blue
		3337L	175CD-2SE	B1AF	Blue
TR6, emission carb	1971/72	3385L	175CD-2SE	B1AF	
		3385R	175CD-2SE	B1AF	
TR6, emission carb	1970	3365(F)	2x175CD-2SE	B1AF	Blue
		3365(R)		B1AF	Blue
TR250, emission carb	1968/69	3173(F)	2x175CD-2SE	B2Y	Blue
		3173(R)		B2Y	Blue
TR250, emission carb	1967/68	3150(F)	2x175CD-2SE	B2Y	Blue
		3150(R)		B2Y	Blue
TR4A	1965	3069(F)	2x175CD	2H	Blue
TR4	1963/65	3069(R)		2H	Blue
		C1825(F)	2x175CD	2A	Natural
2496 cc, 6 cyl, European	1973/74	C1825(R)		2A	Natural
		3650RH	150CD-3	B5DG	
2496 cc, 6 cyl, Australia	1973	3650LH	150CD-3	B5DG	
		3604RH	150CD-3	B5DG	
2000, 6 cyl, European	1973/74	3604LH	150CD-3	B5DG	
		3633RH	150CD-3	B5DG	Blue *
2000, 6 cyl, European	1972/73	3633LH	150CD-3	B5DG	Blue *
		3581RH	150CD-3	B5DG	Blue *
2000 Mk II, Home and Europe	1971/74	3581LH	150CD-3	B5DG	Blue *
		3471L	150CDSE	B5CB	Blue *
2000 Mk II	1970/71	3471R	150CDSE	B5CB	Blue *
		3372R	150CD-3	B5BU	
2000 Mk II	1969/70	3372L	150CD-3	B5BU	
		3281(F)	2x150CDS	5AW	Blue *
2000	1966/69	3281(R)		5AW	Blue *
		3116(F)	2x150CD	6J	Natural
2000	1964/65	3116(R)		6J	Natural
		C1854(F)	2x150CD	7A	Natural
Spitfire, 1496 cc 4 cyl	1974	C1854(R)		7A	Natural
		3612	150CD-SEVX	B5CH	Blue *
Spitfire, 1496 cc, 4 cyl	1972/74	3506	150CD-SEV	B5CH	
Spitfire 4, emission carb	1972	3427	150CDSE	B5CH	Blue *
Spitfire 4, emission carb	1971/72	3336	150CDSE	B5AV	Blue *
Spitfire, emission carb	1969/70	3277	150CDSE	B5AV	Blue *
GT6	1972/74	3507RH	150CD-SEV	B5CF	
		3507LH	150CD-SEV	B5CF	
GT6	1972/74	3432RH	150CD-SE	B5CF	
		3432LH	150CD-SE	B5CF	
GT6, USA, emission carb	1971/72	3426R	150CDSE	B5CF	
		3426L	150CDSE	B5CF	
GT6 Mk III, emission carb	1971/72	3335R	150CDSE	B5BT	
		3335L	150CDSE	B5BT	
GT6, USA & Sweden, emission carb	1971	3384R	150CDSE	B5AJ	
		3384L	150CDSE	B5AJ	
GT6, Mk III, emission carb	1970	3369R	150CDSE	B5AJ	Blue *
		3369L	150CDSE	B5AJ	Blue *
GT6, Stage II, emission carb	1969/70	3225(F)	2x150CD-SE	B5AJ	Blue *
		3225(R)		B5AJ	Blue *
GT6, Stage II	1969/70	3223(F)	2x150CDS	6AC	Blue *
		3223(R)		6AC	Blue *
GT6, 2000	1966/68	3092(F)	2x150CD	6J	Natural
		3092(R)		6J	Natural
GT6, 2000 emission carb	1968/69	3172(F)	2x150CD-SE	6W	Blue *
		3172(R)		6W	Blue *
Stag V8, European, emission carb	1974	3662RH	175CD-2SEV	B1AQ	
		3662LH	175CD-2SEV	B1AQ	
Stag V8, ohc	1973/74	3509RH	175CD-2SEV	B1AQ	
		3509LH	175CD-2SEV	B1AQ	

Model details	Years	cr	Type	mm	svrsc **
Viva, HB23, 1160 cc Borg-Warner trans. and Fram plastic air cleaner	1969	3213A	150CD	6AB	Blue *
Viva, HB23, 1160 cc 90 & SL90	Late 1966/69	3118A	150CD	6N	Blue *
Viva, HB23, 1160 cc 90 * SL90, Borg-Warner	Late 1966/69	3342	150CD	6N	Blue *
Viva, HA90 & SL90, 1057 cc	Late 1965/66	3062A	150CD	6G	Blue *
Viva, HC 1159 cc, Canada	1971/72	3393	150CDSETV	B5AY	
Victor, 2.3 Litre, FE	1973/74	3592	175CD-2SE	B1CY	Red
Victor, 2.3 litre, FE, auto trans	1973/74	3593	175CD-2SET	B1QU	
Victor, 2.3 Litre, FE	1972/73	3404	175CD-2S	B1BW	Red
Victor, 2.3 Litre, FE, Europe	1972/73	3404B	175CD-2S	B1BW	
Victor, 2.3 Litre, FE, auto trans.	1972/73	3405	175CD-2ST	B1BW	
Victor, 2000 cc FD	1971/72	3434	175CD-2S	2AM	
Victor, 2000 cc FD auto	1971/72	3472	175CD-2ST	2AM	Blue
Victor, 2000 FD	1970/71	3328	175CD-2S	2AM	Blue
Victor, 2000, 2000SL and Super	1969/70	3269	175CD-2S	2AM	Blue
Victor 2000, emission carb	1969/70	3270	175CD-2SE	B2AP	
Victor, 2000 FD, auto trans. thermo-start	1969/70	3271	175CD-2ST	2AM	Blue
Victor 2000, FD auto trans. thermo-start, emission carb	1969/70	3272	175CD-2SET	B2AP	
Victor FD, 1600 cc auto emission carb	1970/71	3383	175CD-2SE	B3F	
VX4 90 and Firenza, 2.3 litre HC and FE, man-trans., Domestic and European	1973/74	3599BR	175CD-2S	B1DC	Blue
		3599BL	175CD-2S	B1DC	Blue
VX4 90 and Firenza, 2.3 litre, HC and FE, man-trans	1973	3587RH	175CD-2S	B1CL	
		3587LH	175CD-2S	B1CL	
VX4 90 and Firenza, 2.3 litre, HC and PE	1972	3411L	175CD-2S	B1BZ	
		3411R	175CD-2S	B1BZ	
VX4 90 and Firenza 2.3 litre, HC and PE, Europe	1972	3411BL	175CD-2S	B1BZ	
		3411BR	175CD-2S	B1BZ	
VX4 90 and Firenza, 2.3 litre, HC and FE, auto trans. Domestic and European	1973/74	3600BR	175CE-2SET	B1DC	
		3600BL	175CD-2SET	B1DC	
VX4 90 and Firenza, 2.3 litre, HC and FE, auto trans	1973	3588RH	175CD-2ST	B1CL	
		3588LH	175CD-2ST	B1CL	
VX4 90 and Firenza, 2.4 litre, FE auto trans.	1972	3412R	175CD-2ST	B1BZ	
		3412L	175CD-2ST	B1BZ	
VX4 90, FD 2000 cc	1971/72	3438R	175CD-2S	1BJ	
		3438L	175CD-2S	1BJ	
VX4 90, FD 2000 cc auto trans	1971/72	3439L	175CD-2ST	1BJ	
		3439R	175CD-2ST	1BJ	
VX4 90, FD, 2000 cc	1970/71	3378R	175CD-2S	1BJ	
		3378L	175CD-2S	1BJ	
VX4 90, FD 2000 cc auto trans	1970/71	3379R	175CD-2ST	1BJ	
		3379L	175CD-2ST	1BJ	
VX4 90, 1975 cc rhd	1969/70	3295(F)	2X175CD-2S	1AS	Red *
		3295(R)		1AS	Red *
VX4 90, 1975 cc lhd	1969/70	3297(F)	2X175CD-2S	1AS	Red *
		3297(R)		1AS	Red *
VX4 90, 1975 cc rhd auto trans	1969/70	3312(F)	2X175CD-2S	1AS	
		3312(R)		1AS	
VX4 90, 1975 cc lhd, auto trans	1969/70	3313(F)	2X175CD-2S	1AS	
		3313(R)		1AS	

Model details	Years	cr	Type	mnm	avrsc **
<b>VOLVO</b>					
164, 6 cyl	1972/73	3580RH	175CD-2SE	B1BE	Blue
		3580LH	175CD-2SE	B1BE	Blue
164	1971/72	3375L	175CD-2SE	B1BE	Blue
		3375R	175CD-2SE	B1BE	Blue
2 litre, 4 cyl, B20B	1973/74	3668RH	175CD-2SE	B1DA	
		3668LH	175CD-2SE	B1DA	
2 litre, 4 cyl, B20B, Japan	1973/74	3629RH	175CD-2SE	B1DA	
		3629LH	175CD-2SE	B1DA	
144, 4 cyl	1972/74	3573	175CD-2SE	B1CC	Blue
144S, 145S	1971/73	3574R	175CD-2SE	B1BL	
		3574L	175CD-2SE	B1BL	
144, 145, 4 cyl, emission carb, Home and Export	1968/71	3285	175CD-2SE	B1AN	Blue
142S, 144S and 145S, 4 cyl emission carb, Home & Export	1968/71	3286(F)	2X175CD-2SE	B1AP	Blue
		3286(R)		B1AP	Blue
164 and 164S, 6 cyl, emission carb, Home and Export	1968/70	3287(F)	2X175CD-2SE	B1AM	Blue
		3287(R)		B1AM	Blue
121, 131 and 144	1966/68	3079	175CD-2S	4F	Blue
<b>CONVERSIONS</b>					
<b>BRITISH LEYLAND CONVERSIONS</b>					
Austin Seven & Mini, 850 cc	1959 on				
Morris Mini Minor, 850 cc	1959 on				
Riley Elf, 850 cc	1961/63	F6003	125CD	5A	Blue *
Wolseley Hornet, 850 cc	1961/63				
Austin/Morris, 1100 cc	1963 on				
Austin A40, 1098 cc	1963 on	F6011	125CD	5B	Natural
Morris Minor, 1098 cc	1962 on				
Austin Healey Sprite, Mk II	1961/64	F6012	2X125CD	6C	Natural
MG Midget, 948 cc	1961/64				
Austin A55					
Morris Oxford, Series V	1959/61	F6014	125CD	5E	Natural
Wolseley 15/60					
Austin A60					
Morris Oxford, Series VI	1961/66	F6015	125CD	5D	Natural
Wolseley 16/60					
Austin A40, Mk II, 948 cc	1963/66	F6016	125CD	5E	Natural
Morris Minor, 948 cc	1959/62				
Austin Seven and Mini 850 cc	For				
Morris Mini Minor, 850 cc	tuned engines				
Riley Elf, 850 cc	only	F6029	150CD	15X	Natural
Wolseley Hornet, 850 cc	1961/62				
<b>Alexander Engineering Co Ltd</b>					
BMC A Series 1098 cc		F6032	2X125CD	5H	Natural
BMC B Series 1622 cc		F6033	2X150CD	7A	Natural
Morris/Austin Mini Cooper					
MG 1100					
Vandem Plas 1100		F6037	2X150CD	7A	Natural
MG Midget					
Austin Healey Sprite					
<b>Carbureibar S.A. Outfits</b>					
Austin Seven and Mini		F6051	2X125CD	5A	Natural
Morris Mini Minor					
Austin/Morris 1100		F6052	2X150CD	7A	Natural
Austin Seven and Mini		F6053	150CD	15X	Natural
Morris Mini Minor					

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Model details	Years	cr	Type	mm	avrsc **
<b>FORD CONVERSIONS</b>					
Ford Anglia, 105E, 997 cc	—				
Ford Anglia, 123E, 1200 cc	—				
Ford Cortina, 113E, 1200 cc	—	F6007	125CD	6T	Natural
Ford 5/7 cwt Van, 307E, 997 cc	—				
<b>ALEXANDER ENGINEERING CO LTD</b>					
997 cc and 1200 cc and 1500 cc		F6036	2X150CD	7A	Blue *
Marcos Cars Ltd Marcos 1500 Ford		F6046	2X150CD	7C	Natural
<b>HILLMAN CONVERSIONS</b>					
<b>ALEXANDER ENGINEERING CO LTD</b>					
Minx, 1500 cc and 1800 cc		F6035	2X150CD	7A	Natural
<b>JAGUAR CONVERSIONS</b>					
Jaguar, Mk VII	1951/57	F6002	2X175CD	5X	Natural
<b>OPEL CONVERSIONS</b>					
<b>ALEXANDER ENGINEERING CO LTD</b>					
Opel Kadett		F6030	2X125CD	5H	Natural
<b>SUNBEAM CONVERSIONS</b>					
<b>Alexander Engineering Co. Ltd</b>					
Alpine Alloy head Rapier		F6039	2X150CD	14X	Natural
<b>TRIUMPH CONVERSIONS</b>					
Vitesse 6	1962/65	F6025	2X125CD	5C	Natural
TR3, 3A and 4	1960/63	F6001	2X175CD	1A	Natural
<b>Alexander Engineering Co Ltd</b>					
Herald 12/50		F6034	2X125CD	5D	Natural
Vitesse		F6038	2X150CD	12X	Natural
<b>SAH Accessories Ltd</b>					
1300		F6047	150CD (plus existing unit)	7B	Not fitted
<b>VAUXHALL CONVERSIONS</b>					
<b>Alexander Engineering Co Ltd</b>					
Viva		F6030	2X125CD	5H	Natural
<b>Jack Brabham Conversions Ltd</b>					
Viva HA, 1057 cc		F6041	2X125CD	6D	Natural
Viva HA90, 1057 cc		F6044 (plus existing unit)	150CD	7A	Blue *
Viva HB90, 1159 cc		F6049 (plus existing unit)	150CD	11X	Blue *
<b>VOLKSWAGEN CONVERSIONS</b>					
<b>Allard Motor Co Ltd</b>					
Volkswagen 1200		F6027	150CD	4B	Natural
<b>Speedwell Performance Conversions Ltd</b>					
Volkswagen 1200, 1300 and 1500		F6045	2X150CD	5E	Natural

## Part 5 Appendix 4

# Metering needles for Zenith Stromberg carburetors

The metering needle detailed for a specific application in Appendix 1 is that fitted as original equipment and can be relied upon as being the most satisfactory for all normal running. However, when it is desired to make a change from standard to take care of some special requirement, a suitable replacement can usually be determined by reference to the needle dimension charts.

Needles should be ordered by the part number rather than by the reference stamped on the shank of the needle. A quick

cross-reference chart is included for this.

Needles marked with a reference commencing with the letter B are biased or adjustable assemblies and can only be fitted to appropriate carburetors. On no account should any change be made to the needles fitted as original equipment in emission control carburetors.

Needle dimensions are taken at 1/8 in. intervals from the shoulder (underside of shank).

### Main metering needles to .090 jets

Needle Part No.	020821 5A	020888 5B	020903 5C	020908 5D	B16242Z 5E	B16404Z 5F	B16405Z 5G	B16561Z 5H	B16824Z 5J	B16887Z 5K	B16961Z 5L
1	.0880	.0880	.0880	.0880	.0880	.0880	.0880	.0880	.0885	.0879	.0880
2	.0831	.0809	.0841	.0823	.0827	.0840	.0835	.0844	.0840	.0840	.0847
3	.0802	.0786	.0806	.0795	.0792	.0813	.0815	.0798	.0817	.0823	.0821
4	.0788	.0765	.0781	.0784	.0779	.0792	.0785	.0787	.0797	.0800	.0791
5	.0775	.0745	.0761	.0777	.0762	.0775	.0777	.0769	.0783	.0775	.0762
6	.0759	.0730	.0742	.0760	.0742	.0757	.0765	.0747	.0773	.0758	.0739
7	.0744	.0722	.0718	.0740	.0729	.0740	.0750	.0727	.0758	.0747	.0714
8	.0726	.0714	.0693	.0715	.0723	.0720	.0730	.0707	.0735	.0735	.0687
9	.0708	.0705	.0668	.0692	.0705	.0710	.0710	.0693	.0722	.0723	.0660
10	.0686	.0697	.0642	.0668	.0683	.0690	.0690	.0670	.0702	.0711	.0633
11	.0664	.0687	.0617	.0645	.0663	.0670	.0670	.0656	.0681	.0700	.0606
12	.0646	.0677	.0593	.0623	.0642	.0670	.0670	.0635	.0659	.0630	.0578
13	.0641	.0677	.0593	.0623	.0642	.0670	.0670	.0635	.0659	.0630	.0578

Needle Part No.	B16852Z 5M	B17101Z 5N	B17297Z 5P	B17298Z 5Q	B17749Z 5R	B17753Z 5S	B17750Z 5T	B17751Z 5U	B17752Z 5V	B18152Z B5W**	B18218Z 5Y
1	.0880	.0880	.0880	.0880	.0881	.0883	.0883	.0884	.0882	.0880	.0867
2	.0835	.0844	.0834	.0834	.0844	.0845	.0844	.0842	.0844	.0839	.0846
3	.0805	.0821	.0812	.0819	.0824	.0824	.0835	.0832	.0842	.0821	.0827
4	.0784	.0791	.0793	.0804	.0800	.0797	.0817	.0806	.0816	.0798	.0797
5	.0760	.0760	.0768	.0782	.0772	.0765	.0792	.0768	.0788	.0762	.0756
6	.0735	.0732	.0746	.0760	.0739	.0730	.0761	.0738	.0761	.0717	.0715
7	.0705	.0700	.0716	.0732	.0700	.0687	.0728	.0701	.0729	.0671	.0665
8	.0693	.0656	.0703	.0718	.0644	.0647	.0697	.0663	.0698	.0625	.0617
9	.0671	.0630	.0681	.0698	.0636	.0615	.0674	.0639	.0674	.0625	.0584
10	.0644	.0616	.0656	.0672	.0613	.0587	.0653	.0639	.0674	.0625	.0553
11	.0621	.0592	.0630	.0645	.0611	.0585	.0650	.0639	.0674	.0625	.0535
12	.0598	.0575	.0600	.0615	.0609	.0584	.0650	.0637	.0672	.0625	.0535
13	.0593	.0571	.0570	.0590	.0609	.0584	.0650	.0636	.0671	.0625	.0535

## Main metering needles for .090 jets

Needle Part No.	B18260Z B18302Z B18421Z B18423Z B18424Z B18725Z B18726Z B18727Z B19070Z B19101Z B19134Z										
	5Z	B5AA**	B5AB**	5AC	5AD	5AE	5AF	5AG	B5AH**	B5AJ**	B5AK**
1	.0880	.0880	.0876	.0879	.0880	.0880	.0880	.0880	.0880	.0855	.0864
2	.0842	.0836	.0845	.0842	.0843	.0840	.0848	.0854	.0847	.0843	.0847
3	.0826	.0820	.0825	.0825	.0836	.0815	.0826	.0835	.0816	.0829	.0825
4	.0796	.0796	.0792	.0801	.0816	.0800	.0813	.0825	.0801	.0800	.0786
5	.0758	.0759	.0762	.0778	.0792	.0778	.0795	.0808	.0768	.0766	.0755
6	.0720	.0713	.0722	.0758	.0776	.0753	.0772	.0788	.0743	.0737	.0732
7	.0678	.0660	.0680	.0742	.0762	.0736	.0757	.0775	.0710	.0709	.0718
8	.0636	.0615	.0666	.0725	.0748	.0720	.0743	.0763	.0693	.0683	.0711
9	.0610	.0613	.0650	.0711	.0736	.0695	.0722	.0745	.0681	.0671	.0652
10	.0586	.0613	.0633	.0699	.0724	.0682	.0710	.0735	.0667	.0657	.0633
11	.0583	.0613	.0614	.0699	.0724	.0682	.0710	.0735	.0650	.0644	.0631
12	.0580	.0613	.0592	.0699	.0724	.0682	.0710	.0735	.0639	.0635	.0630
13	.0580	.0613	.0581	.0699	.0724	.0682	.0710	.0735	.0639	.0635	.0630

Needle Part No.	B19135Z B19173Z B19193Z B19228Z B19370Z B19398Z B19432Z B19519Z B19616Z B19622Z B19947Z										
	5AL	B5AM**	5AN**	B5AP**	B5AQ**	B5AR**	B5AS**	B5AT**	B5AU**	B5AV**	5AW
1	.0883	.0846	.0883	.0857	.0845	.0882	.0862	.0862	.0846	.0883	.0883
2	.0845	.0843	.0844	.0847	.0832	.0867	.0842	.0838	.0844	.0840	.0845
3	.0823	.0825	.0824	.0834	.0824	.0834	.0826	.0826	.0833	.0824	.0820
4	.0790	.0801	.0791	.0808	.0800	.0819	.0786	.0786	.0807	.0805	.0792
5	.0764	.0768	.0760	.0778	.0773	.0785	.0753	.0753	.0776	.0772	.0765
6	.0730	.0732	.0729	.0736	.0704	.0756	.0729	.0729	.0741	.0736	.0734
7	.0684	.0695	.0679	.0695	.0673	.0726	.0720	.0720	.0704	.0685	.0705
8	.0646	.0663	.0643	.0652	.0670	.0697	.0711	.0711	.0671	.0638	.0683
9	.0614	.0630	.0596	.0613	.0619	.0679	.0655	.0655	.0638	.0601	.0664
10	.0587	.0600	.0554	.0573	.0619	.0666	.0636	.0636	.0608	.0553	.0649
11	.0583	.0590	.0549	.0568	.0619	.0653	.0632	.0632	.0593	.0545	.0623
12	.0582	.0580	.0549	.0568	.0619	.0641	.0631	.0631	.0583	.0552	.0596
13	.0581	.0580	.0549	.0568	.0619	.0641	.0631	.0631	.0583	.0509	.0573

Needle Part No.	B19965Z B19988Z B20378Z B20386Z B20388Z B20471Z B20493Z B20577Z B20578Z B20579Z B20580Z										
	B5AY**	5AZ	B5BA**	5BB	B5BC**	B5BD**	5BE	5BF	5BG	5BI'	5BJ
1	.0863	.0862	.0846	.0879	.0859	.0866	.0860	.0881	.0881	.0880	.0880
2	.0837	.0835	.0845	.0844	.0850	.0856	.0844	.0856	.0861	.0856	.0860
3	.0827	.0809	.0837	.0820	.0837	.0836	.0831	.0833	.0842	.0830	.0840
4	.0798	.0792	.0812	.0789	.0812	.0809	.0799	.0806	.0820	.0802	.0815
5	.0768	.0760	.0783	.0756	.0781	.0782	.0765	.0783	.0800	.0775	.0792
6	.0709	.0699	.0748	.0724	.0741	.0741	.0726	.0750	.0770	.0745	.0766
7	.0683	.0675	.0712	.0693	.0704	.0694	.0704	.0714	.0740	.0719	.0743
8	.0667	.0673	.0678	.0657	.0671	.0647	.0671	.0683	.0712	.0686	.0716
9	.0661	.0671	.0645	.0632	.0638	.0607	.0642	.0655	.0688	.0666	.0698
10	.0661	.0666	.0614	.0607	.0608	.0569	.0600	.0632	.0670	.0643	.0680
11	.0661	.0661	.0596	.0600	.0593	.0530	.0580	.0630	.0667	.0621	.0659
12	.0661	.0658	.0585	.0600	.0583	.0492	.0560	.0630	.0667	.0603	.0643
13	.0661	.0658	.0583	.0600	.0583	.0483	.0560	.0630	.0667	.0603	.0643

\* Denotes biased needle assemblies

\*\* Denotes adjustable biased needle assemblies

Main metering needles for .090 jets

Needle Part No.	B20628Z	B20629Z	B20630Z	020849	021101	B16198Z	B16623Z	B16894Z	B16971Z	B17064Z	B17274Z
	5BK	5BL	5BM	6A	6B	6C	6D	6E	6F	6G	6H
1	.0866	.0871	.0874	.0880	.0880	.0880	.0875	.0880	.0876	.0880	.0880
2	.0843	.0851	.0857	.0835	.0831	.0833	.0830	.0838	.0850	.0830	.0829
3	.0821	.0831	.0839	.0802	.0793	.0805	.0780	.0810	.0816	.0805	.0800
4	.0805	.0817	.0828	.0775	.0765	.0780	.0750	.0786	.0776	.0783	.0774
5	.0776	.0793	.0807	.0750	.0735	.0755	.0740	.0763	.0727	.0755	.0740
6	.0723	.0747	.0766	.0735	.0708	.0732	.0732	.0739	.0691	.0720	.0700
7	.0702	.0728	.0750	.0688	.0690	.0708	.0718	.0710	.0673	.0680	.0682
8	.0700	.0726	.0748	.0639	.0672	.0685	.0693	.0689	.0655	.0640	.0660
9	.0698	.0724	.0746	.0580	.0635	.0657	.0668	.0668	.0632	.0600	.0639
10	.0695	.0722	.0745	.0528	.0599	.0632	.0642	.0649	.0605	.0600	.0618
11	.0690	.0718	.0741	.0500	.0564	.0607	.0617	.0631	.0574	.0600	.0595
12	.0687	.0715	.0739	.0500	.0560	.0580	.0593	.0612	.0544	.0600	.0572
13	.0687	.0715	.0739	.0500	.0560	.0580	.0593	.0566	.0537	.0600	.0570

Needle Part No.	B17316Z	B17351Z	B17350Z	B17519Z	B17584Z	B17595Z	B17649Z	B17866Z	B18173Z	B18220Z	B18388Z
	6J	6K	6L	6M	6N	6P	6Q	6R	6S	6T	B6U**
1	.0880	.0880	.0883	.0880	.0877	.0883	.0885	.0883	.0884	.0881	.0880
2	.0841	.0842	.0844	.0835	.0832	.0844	.0846	.0844	.0844	.0828	.0826
3	.0799	.0821	.0813	.0811	.0789	.0814	.0815	.0817	.0826	.0809	.0812
4	.0777	.0790	.0787	.0784	.0773	.0787	.0789	.0790	.0793	.0768	.0787
5	.0748	.0751	.0758	.0745	.0748	.0757	.0764	.0763	.0765	.0745	.0764
6	.0721	.0715	.0719	.0709	.0732	.0718	.0726	.0742	.0721	.0720	.0732
7	.0693	.0673	.0676	.0666	.0711	.0675	.0685	.0725	.0677	.0683	.0700
8	.0662	.0632	.0641	.0621	.0689	.0636	.0649	.0705	.0636	.0655	.0690
9	.0628	.0605	.0609	.0592	.0669	.0605	.0615	.0690	.0596	.0641	.0676
10	.0590	.0579	.0577	.0588	.0655	.0577	.0582	.0674	.0572	.0623	.0662
11	.0555	.0558	.0574	.0585	.0644	.0573	.0582	.0674	.0553	.0602	.0644
12	.0514	.0540	.0572	.0573	.0632	.0572	.0575	.0655	.0534	.0562	.0636
13	.0500	.0540	.0572	.0573	.0593	.0574	.0575	.0655	.0519	.0540	.0636

Needle Part No.	B18599Z	B18605Z	B18683Z	B18745Z	B19051Z	B19065Z	B19204Z	B19482Z	B19639Z	B19939Z	B19991Z
	6V	6W	6Y	6Z	6AA	6AB	6AC	B6AD**	6AE	6AF	6AG
1	.0876	.0880	.0880	.0879	.0880	.0880	.0880	.0862	.0881	.0883	.0881
2	.0836	.0841	.0845	.0841	.0840	.0833	.0841	.0839	.0829	.0844	.0849
3	.0814	.0818	.0817	.0811	.0818	.0806	.0814	.0821	.0793	.0824	.0825
4	.0788	.0793	.0785	.0784	.0788	.0786	.0788	.0795	.0779	.0790	.0796
5	.0764	.0768	.0762	.0756	.0761	.0761	.0762	.0768	.0757	.0759	.0768
6	.0737	.0741	.0725	.0729	.0725	.0737	.0740	.0709	.0733	.0728	.0731
7	.0714	.0719	.0676	.0703	.0680	.0715	.0712	.0686	.0697	.0678	.0691
8	.0687	.0691	.0640	.0676	.0646	.0701	.0694	.0668	.0673	.0642	.0655
9	.0667	.0672	.0612	.0649	.0612	.0691	.0670	.0664	.0658	.0596	.0623
10	.0646	.0650	.0582	.0622	.0585	.0681	.0645	.0650	.0642	.0555	.0598
11	.0617	.0621	.0582	.0595	.0585	.0671	.0621	.0633	.0620	.0550	.0595
12	.0602	.0608	.0582	.0568	.0585	.0661	.0590	.0614	.0579	.0550	.0595
13	.0593	.0603	.0582	.0568	.0585	.0661	.0561	.0614	.0575	.0550	.0595

Main metering needles for .090 jets

Needle Part No.	B20572Z	B20658Z	020691	B16837Z	B17052Z	B17214Z	B19275Z	B20084Z	B20151Z	B20625Z	B20626Z
	6BA	6BB	7A	7B	7C	7D	7E	7F	B7G**	7H	7J
1	.0880	.0880	.0881	.0880	.0880	.0860	.0880	.0881	.0867	.0883	.0885
2	.0848	.0840	.0821	.0835	.0836	.0817	.0832	.0835	.0851	.0857	.0850
3	.0818	.0816	.0793	.0796	.0802	.0795	.0798	.0802	.0832	.0816	.0826
4	.0788	.0794	.0773	.0769	.0769	.0774	.0771	.0793	.0804	.0806	.0818
5	.0758	.0768	.0737	.0736	.0735	.0744	.0728	.0762	.0776	.0778	.0794
6	.0718	.0738	.0695	.0700	.0691	.0707	.0684	.0754	.0733	.0772	.0789
7	.0680	.0707	.0670	.0672	.0655	.0664	.0648	.0739	.0684	.0759	.0778
8	.0640	.0679	.0648	.0639	.0618	.0624	.0603	.0719	.0638	.0741	.0762
9	.0606	.0650	.0633	.0608	.0580	.0586	.0570	.0708	.0600	.0732	.0754
10	.0578	.0624	.0616	.0573	.0544	.0578	.0530	.0693	.0561	.0718	.0742
11	.0548	.0595	.0579	.0539	.0544	.0580	.0500	.0679	.0522	.0714	.0738
12	.0548	.0595	.0549	.0506	.0544	.0580	.0500	.0679	.0484	.0707	.0734
13	.0548	.0595	.0549	.0506	.0544	.0580	.0500	.0679	.0484	.0707	.0734

Needle Part No.	B20627Z	B17247Z	B19409Z	B19592Z	B19593Z	B19594Z	B19595Z	B19596Z	B19597Z	B19598Z	B19599Z	B16918Z
	7K	8A	8B	9X	10X	11X	12X	13X	14X	15X	16X	17X
1	.0887	.0880	.0880	.0900	.0881	.0879	.0880	.0880	.0879	.0875	.0878	.0880
2	.0857	.0810	.0832	.0850	.0842	.0841	.0840	.0835	.0834	.0830	.0829	.0840
3	.0836	.0755	.0785	.0829	.0817	.0811	.0809	.0804	.0798	.0790	.0786	.0825
4	.0828	.0730	.0755	.0808	.0790	.0784	.0778	.0770	.0761	.0750	.0744	.0812
5	.0808	.0700	.0720	.0788	.0766	.0756	.0749	.0737	.0724	.0711	.0701	.0795
6	.0803	.0670	.0684	.0768	.0743	.0729	.0719	.0704	.0689	.0672	.0659	.0780
7	.0794	.0640	.0648	.0749	.0719	.0703	.0688	.0672	.0653	.0634	.0617	.0760
8	.0780	.0610	.0603	.0728	.0693	.0676	.0659	.0642	.0617	.0595	.0575	.0750
9	.0773	.0580	.0570	.0706	.0668	.0649	.0629	.0610	.0582	.0555	.0534	.0730
10	.0763	.0545	.0530	.0685	.0644	.0622	.0599	.0576	.0546	.0517	.0492	.0710
11	.0760	.0509	.0500	.0664	.0619	.0595	.0568	.0540	.0509	.0476	.0448	.0700
12	.0755	.0473	.0500	.0650	.0596	.0568	.0538	.0508	.0473	.0438	.0408	.0690
13	.0755	.0473	.0500	.0650	.0593	.0568	.0538	.0508	.0473	.0438	.0405	.0690

\* Denotes biased needle assemblies

\*\* Denotes adjustable biased needle assemblies

Main metering needles for .100 jets

Needle Part No.	019672 1A	B17296Z 1B	B18128Z 1C	B18330Z 1D	B18394Z B1E**	B18645Z B1F**	B18654Z B1G**	B18672Z B1H**	B18742Z B1J**	B18743Z B1K	B18722Z 1L
1	.0980	.0980	.0980	.0983	.0942	.0990	.0962	.0979	.0950	.0955	.0980
2	.0919	.0931	.0926	.0942	.0933	.0949	.0930	.0930	.0932	.0944	.0935
3	.0889	.0913	.0919	.0913	.0915	.0918	.0912	.0910	.0914	.0913	.0926
4	.0862	.0893	.0899	.0883	.0881	.0892	.0877	.0880	.0880	.0878	.0908
5	.0834	.0877	.0876	.0857	.0845	.0854	.0850	.0837	.0844	.0843	.0887
6	.0811	.0868	.0855	.0813	.0809	.0807	.0828	.0797	.0805	.0807	.0870
7	.0784	.0867	.0849	.0764	.0764	.0762	.0804	.0752	.0774	.0778	.0863
8	.0758	.0865	.0847	.0718	.0725	.0719	.0781	.0708	.0740	.0738	.0861
9	.0725	.0862	.0833	.0674	.0687	.0675	.0750	.0647	.0700	.0702	.0850
10	.0692	.0860	.0827	.0654	.0653	.0640	.0712	.0585	.0666	.0675	.0845
11	.0661	.0857	.0823	.0637	.0620	.0600	.0706	.0567	.0625	.0638	.0841
12	.0630	.0855	.0823	.0634	.0601	.0565	.0706	.0548	.0598	.0607	.0840
13	.0630	.0853	.0823	.0617	.0587	.0565	.0706	.0530	.0594	.0597	.0840

Needle Part No.	B18723Z 1M	B18724Z 1N	B19827Z F1Q**	B19000Z B1R**	B18999Z B1S**	B19074Z B1T**	B19147Z B1U**	B19411Z B1V**	B19417Z B1W**	B19419Z B1Y**	B19466Z B1Z**
1	.0980	.0980	.0940	.0979	.0955	.0980	.0969	.0975	.0980	.0967	.0979
2	.0943	.0964	.0931	.0930	.0944	.0949	.0968	.0938	.0949	.0941	.0951
3	.0936	.0945	.0914	.0910	.0913	.0918	.0919	.0914	.0918	.0905	.0925
4	.0920	.0932	.0878	.0880	.0878	.0892	.0897	.0888	.0892	.0889	.0891
5	.0902	.0915	.0843	.0837	.0843	.0854	.0864	.0858	.0854	.0866	.0867
6	.0887	.0903	.0807	.0797	.0807	.0807	.0834	.0812	.0807	.0829	.0846
7	.0882	.0898	.0778	.0752	.0778	.0762	.0794	.0773	.0762	.0793	.0822
8	.0878	.0896	.0738	.0708	.0738	.0719	.0761	.0726	.0719	.0759	.0797
9	.0870	.0888	.0702	.0647	.0702	.0675	.0734	.0681	.0675	.0723	.0758
10	.0865	.0885	.0675	.0585	.0675	.0640	.0703	.0647	.0640	.0704	.0723
11	.0861	.0881	.0638	.0567	.0638	.0600	.0674	.0645	.0600	.0697	.0684
12	.0860	.0880	.0607	.0548	.0607	.0565	.0653	.0645	.0565	.0697	.0684
13	.0860	.0880	.0597	.0530	.0597	.0565	.0645	.0645	.0565	.0697	.0684

Needle Part No.	B19504Z 1AA	B19506Z B1AB**	B19527Z B1AC**	B19547Z B1AD**	B19619Z B1AE**	B19699Z B1AF**	B19773Z B1AG**	B19852Z B1AH**	B19883Z B1AJ**	B19997Z B1AK**	B20001Z B1AL**
1	.0982	.0951	.0980	.0969	.0961	.0951	.0970	.0972	.0982	.0960	.0982
2	.0932	.0928	.0944	.0932	.0935	.0942	.0947	.0954	.0946	.0940	.0946
3	.0919	.0917	.0916	.0914	.0911	.0923	.0920	.0927	.0922	.0912	.0922
4	.0898	.0896	.0886	.0883	.0885	.0897	.0795	.0898	.0896	.0884	.0899
5	.0861	.0859	.0856	.0849	.0854	.0864	.0895	.0870	.0857	.0852	.0868
6	.0850	.0822	.0812	.0802	.0807	.0835	.0823	.0841	.0809	.0821	.0825
7	.0843	.0779	.0772	.0780	.0764	.0798	.0782	.0807	.0784	.0782	.0796
8	.0833	.0742	.0727	.0742	.0734	.0771	.0738	.0775	.0755	.0717	.0770
9	.0820	.0706	.0683	.0708	.0704	.0749	.0694	.0750	.0722	.0675	.0744
10	.0810	.0665	.0647	.0674	.0677	.0731	.0655	.0730	.0686	.0655	.0717
11	.0794	.0630	.0644	.0640	.0655	.0712	.0655	.0711	.0650	.0648	.0690
12	.0791	.0591	.0644	.0640	.0626	.0695	.0655	.0692	.0650	.0641	.0690
13	.0790	.0586	.0644	.0640	.0604	.0695	.0655	.0684	.0650	.0634	.0690

Main metering needles for .100 jets

Needle Part No.	B20004Z	B20091Z	B20194Z	B20217Z	B20287Z	B20353Z	B20460Z	B20461Z	B20462Z	B20524Z	B20560Z
	B1AM**	B1AN**	B1AP**	B1AQ**	B1AR**	1AS	1AT	1AU	1AV	B1AW**	1AY
1	.0979	.0970	.0982	.0957	.0953	.0980	.0980	.0980	.0980	.0957	.0982
2	.0945	.0943	.0946	.0940	.0931	.0929	.0921	.0932	.0942	.0940	.0939
3	.0918	.0914	.0922	.0917	.0912	.0916	.0908	.0920	.0931	.0917	.0929
4	.0896	.0886	.0896	.0892	.0891	.0894	.0890	.0905	.0917	.0892	.0909
5	.0861	.0855	.0857	.0858	.0853	.0858	.0857	.0875	.0893	.0858	.0874
6	.0824	.0826	.0809	.0827	.0814	.0844	.0822	.0845	.0867	.0827	.0865
7	.0782	.0798	.0784	.0792	.0778	.0834	.0781	.0810	.0836	.0792	.0860
8	.0744	.0738	.0755	.0751	.0739	.0823	.0762	.0793	.0823	.0757	.0850
9	.0706	.0688	.0737	.0703	.0715	.0812	.0710	.0747	.0783	.0723	.0840
10	.0667	.0658	.0717	.0655	.0685	.0798	.0670	.0712	.0753	.0696	.0831
11	.0629	.0650	.0700	.0616	.0660	.0783	.0643	.0688	.0733	.0681	.0817
12	.0590	.0643	.0700	.0564	.0656	.0776	.0620	.0665	.0715	.0660	.0813
13	.0590	.0643	.0700	.0544	.0650	.0776	.0620	.0665	.0715	.0660	.0813

Needle Part No.	B20561Z	B20562Z	B20596Z	B20597Z	B20598Z	020101	020774	020965	B16304Z	B16625Z	B16792Z
	1AZ	1BA	1BB	1BC	1BD	2A	2B	2C	2D	2E	2F
1	.0982	.0982	.0980	.0980	.0980	.0981	.0980	.0980	.0980	.0980	.0980
2	.0947	.0955	.0937	.0945	.0954	.0939	.0936	.0950	.0907	.0925	.0943
3	.0938	.0947	.0925	.0934	.0944	.0915	.0908	.0910	.0888	.0898	.0905
4	.0921	.0932	.0907	.0919	.0929	.0885	.0881	.0875	.0870	.0876	.0878
5	.0892	.0907	.0873	.0889	.0906	.0852	.0857	.0855	.0840	.0847	.0850
6	.0884	.0900	.0862	.0880	.0896	.0827	.0829	.0825	.0812	.0818	.0828
7	.0878	.0894	.0850	.0870	.0888	.0800	.0788	.0780	.0782	.0781	.0804
8	.0870	.0888	.0842	.0862	.0882	.0775	.0757	.0750	.0751	.0740	.0790
9	.0860	.0880	.0833	.0854	.0875	.0753	.0725	.0690	.0720	.0705	.0782
10	.0853	.0873	.0821	.0845	.0867	.0730	.0693	.0630	.0688	.0670	.0774
11	.0841	.0864	.0807	.0732	.0854	.0708	.0662	.0575	.0656	.0635	.0765
12	.0837	.0859	.0800	.0825	.0850	.0690	.0648	.0525	.0625	.0597	.0765
13	.0837	.0859	.0800	.0825	.0850	.0690	.0648	.0525	.0625	.0597	.0765

Needle Part No.	B16899Z	B16948Z	B17005Z	B17060Z	B17202Z	B17203Z	B17295Z	B17659Z	B17677Z	B18226Z	B18380Z
	2G	2H	2J	2K	2L	2M	2N	2P	2Q	2S	B2T**
1	.0980	.0980	.0980	.0980	.0980	.0980	.0980	.0964	.0964	.0983	.0974
2	.0910	.0923	.0930	.0930	.0930	.0930	.0931	.0935	.0938	.0926	.0932
3	.0894	.0899	.0897	.0890	.0902	.0913	.0902	.0910	.0914	.0896	.0902
4	.0876	.0877	.0876	.0867	.0867	.0877	.0881	.0871	.0875	.0873	.0864
5	.0847	.0755	.0857	.0851	.0833	.0850	.0864	.0835	.0839	.0846	.0833
6	.0818	.0825	.0847	.0843	.0805	.0825	.0856	.0796	.0798	.0823	.0800
7	.0781	.0792	.0837	.0837	.0782	.0807	.0848	.0758	.0763	.0793	.0766
8	.0740	.0750	.0828	.0828	.0777	.0800	.0846	.0720	.0722	.0765	.0745
9	.0705	.0708	.0825	.0825	.0775	.0795	.0843	.0681	.0684	.0738	.0725
10	.0670	.0674	.0823	.0823	.0770	.0790	.0841	.0644	.0647	.0710	.0705
11	.0635	.0635	.0821	.0821	.0765	.0785	.0838	.0606	.0605	.0710	.0686
12	.0597	.0604	.0821	.0821	.0755	.0780	.0836	.0569	.0574	.0710	.0668
13	.0597	.0600	.0821	.0821	.0755	.0780	.0834	.0532	.0551	.0710	.0668

\* Denotes biased needle assemblies

\*\* Denotes adjustable biased needle assemblies

## Main metering needles for .100 jets

Needle Part No.	B18426Z	B18436Z	B18510Z	B18580Z	B18739Z	B18744Z	B18926Z	B19061Z B19058Z B19164Z			
	B2U**	B2V**	B2W**	B2Y**	B2Z**	2AA	F2AB**	B2AC**	B2AD**	B2AE**	B2AF**
1	.0959	.0959	.0953	.0967	.0942	.0978	.0938		.0953	.0953	.0953
2	.0923	.0926	.0943	.0932	.0929	.0927	.0925		.0923	.0932	.0932
3	.0896	.0899	.0914	.0905	.0908	.0898	.0906		.0895	.0898	.0898
4	.0867	.0871	.0879	.0880	.0872	.0870	.0872		.0865	.0868	.0868
5	.0835	.0840	.0840	.0848	.0844	.0840	.0840		.0837	.0840	.0840
6	.0803	.0807	.0804	.0816	.0805	.0812	.0803		.0803	.0804	.0804
7	.0769	.0773	.0768	.0779	.0774	.0791	.0771		.0779	.0770	.0770
8	.0748	.0750	.0731	.0755	.0740	.0770	.0710		.0697	.0700	.0700
9	.0728	.0730	.0693	.0735	.0700	.0751	.0667		.0665	.0668	.0668
10	.0708	.0710	.0615	.0715	.0666	.0742	.0634		.0634	.0636	.0636
11	.0689	.0691	.0580	.0695	.0623	.0726	.0615		.0606	.0608	.0608
12	.0671	.0673	.0562	.0677	.0580	.0710	.0578		.0578	.0580	.0580
13	.0671	.0673	.0562	.0677	.0580	.0694	.0578		.0551	.0553	.0553

Needle Part No.	B19222Z	B19248Z	B19312Z	B19362Z	B19665Z	B19743Z	B19953Z	B20154Z	B20521Z	B20527Z	B16039Z
	B2AG**	B2AH**	B2AJ**	B2AK**	2AL	2AM	B2AN**	B2AP**	2AQ	B2AR**	3A
1	.0979	.0987	.0976	.0987	.0980	.0980	.0970	.0980	.0978	.0959	.0980
2	.0930	.0940	.0951	.0940	.0915	.0912	.0923	.0929	.0928	.0931	.0936
3	.0910	.0906	.0926	.0901	.0906	.0896	.0905	.0911	.0904	.0902	.0897
4	.0880	.0887	.0893	.0880	.0876	.0876	.0878	.0885	.0880	.0875	.0858
5	.0837	.0855	.0860	.0848	.0838	.0838	.0842	.0855	.0853	.0849	.0821
6	.0797	.0815	.0826	.0808	.0800	.0800	.0801	.0814	.0827	.0825	.0789
7	.0759	.0775	.0793	.0768	.0755	.0755	.0762	.0776	.0797	.0797	.0771
8	.0721	.0736	.0755	.0729	.0733	.0733	.0713	.0726	.0762	.0765	.0751
9	.0683	.0695	.0703	.0687	.0674	.0674	.0678	.0687	.0724	.0741	.0716
10	.0645	.0663	.0661	.0653	.0631	.0631	.0648	.0654	.0705	.0720	.0685
11	.0607	.0634	.0632	.0622	.0599	.0599	.0618	.0621	.0677	.0691	.0663
12	.0569	.0614	.0625	.0600	.0572	.0572	.0585	.0615	.0666	.0668	.0640
13	.0530	.0610	.0625	.0595	.0572	.0572	.0585	.0615	.0655	.0668	.0604

Needle Part No.	B17645Z	B18263Z	B18946Z	B20006Z	B20010Z	B20157Z	021061	B16169Z	B16651Z	B17176Z	B17303Z
	3B	3C	3D	B3E**	B3F**	B3G**	4A	4B	4C	4D	4F
1	.0980	.0983	.0980	.0957	.0939	.0949	.0980	.0980	.0980	.0980	.0980
2	.0918	.0929	.0918	.0944	.0932	.0930	.0931	.0927	.0922	.0890	.0922
3	.0888	.0893	.0888	.0915	.0910	.0918	.0887	.0890	.0876	.0866	.0896
4	.0857	.0867	.0857	.0884	.0882	.0894	.0851	.0863	.0835	.0841	.0858
5	.0820	.0825	.0820	.0849	.0847	.0862	.0815	.0825	.0806	.0815	.0817
6	.0787	.0777	.0780	.0815	.0810	.0812	.0784	.0785	.0757	.0787	.0775
7	.0775	.0732	.0765	.0767	.0765	.0773	.0760	.0740	.0708	.0752	.0744
8	.0765	.0684	.0750	.0723	.0725	.0735	.0755	.0695	.0656	.0717	.0694
9	.0752	.0642	.0720	.0688	.0687	.0692	.0750	.0650	.0599	.0661	.0650
10	.0728	.0626	.0710	.0655	.0655	.0652	.0744	.0600	.0550	.0608	.0617
11	.0700	.0610	.0685	.0622	.0621	.0618	.0737	.0555	.0505	.0565	.0587
12	.0675	.0593	.0665	.0618	.0586	.0600	.0730	.0500	.0464	.0525	.0560
13	.0675	.0570	.0665	.0618	.0586	.0570	.0730	.0500	.0464	.0525	.0560

## A4-8

## Part 5 Appendix 4

Needle Part No.	B18137Z	B17867Z	B18362Z	B18857Z	B19584Z	B19585Z	B19586Z	B19587Z	B19588Z	B19589Z	B19590Z	B19591Z
	4G	4H	4J	4K	1X	2X	3X	4X	5X	6X	7X	8X
1	.0958	.0964	.0964	.0980	.0981	.0979	.0983	.0981	.0980	.0980	.0973	.0979
2	.0913	.0897	.0897	.0918	.0941	.0939	.0942	.0942	.0935	.0934	.0931	.0931
3	.0871	.0885	.0885	.0888	.0919	.0914	.0913	.0910	.0905	.0898	.0891	.0887
4	.0836	.0851	.0850	.0857	.0897	.0888	.0885	.0878	.0870	.0861	.0852	.0846
5	.0783	.0817	.0808	.0820	.0876	.0864	.0858	.0848	.0837	.0824	.0813	.0803
6	.0737	.0773	.0756	.0787	.0855	.0839	.0830	.0817	.0805	.0788	.0774	.0760
7	.0693	.0721	.0710	.0722	.0835	.0817	.0803	.0787	.0773	.0753	.0734	.0718
8	.0638	.0677	.0669	.0760	.0814	.0790	.0776	.0756	.0742	.0716	.0695	.0676
9	.0580	.0645	.0645	.0745	.0791	.0765	.0749	.0726	.0710	.0679	.0655	.0635
10	.0518	.0619	.0619	.0720	.0769	.0740	.0721	.0695	.0676	.0644	.0616	.0593
11	.0455	.0593	.0593	.0695	.0748	.0714	.0694	.0664	.0640	.0606	.0578	.0550
12	.0415	.0562	.0562	.0675	.0730	.0695	.0668	.0642	.0610	.0573	.0543	.0510
13	.0415	.0524	.0524	.0675	.0730	.0690	.0666	.0633	.0610	.0573	.0543	.0505

\* Denotes biased needle assemblies

\*\* Denotes adjustable biased needle assemblies

# Part 5 Appendix 5

## Metering needles cross-reference chart for Zenith Stromberg carburetors

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## No.1 Series

1A 019672  
1B B.17296  
1C B.18128  
1D B.18330  
1L B.18722  
1AA B.19504  
1AS B.20353  
1AT B.20460  
1AU B.20461  
1AV B.20462  
1AY B.20560

B.1E B.18394  
B.1G\* B.20672  
B.1G B.18564  
B.1R B.19000  
B.1S B.18999  
B.1U B.19147  
B.1W B.19417  
B.1Y\* B.19982  
B.1Y B.19419

B.1AE B.19619  
B.1AF\* B.20376  
B.1AF B.19699  
B.1AG B.19773  
B.1AM B.20004  
B.1AN B.20091  
B.1AP B.20194  
B.1AQ\* B.21217  
B.1AR B.20287  
B.1AR\* B.21848  
B.1AW B.20524  
B.1BE B.20799  
B.1BF\* B.20816  
B.1BH\* B.20958  
B.1BK B.21442  
B.1BL B.21666  
B.1BM B.21750  
B.1BP B.21790  
B.1BQ B.21792  
B.1BR B.21890  
B.1BS\* B.21919  
B.1BT\* B.21989  
B.1BW B.22242  
B.1BZ B.22261

B.1CC B.22330  
B.1CE\* B.22355  
B.1CG\* B.22415  
B.1CK\* B.22693  
B.1CL B.22536  
B.1CM\* B.22290  
B.1CN\* B.22609  
B.1CP\* B.22645  
B.1CQ\* B.22658  
B.1CU B.23083  
B.1CW B.23139  
B.1CY B.23141  
B.1CZ B.23200

B.1DA B.23230  
B.1DC B.23428  
B.1DE B.23461  
B.1DF B.23969  
B.1DG B.23523  
B.1DH\* B.23561  
B.1DJ B.23600  
B.1DK\* B.23619  
B.1DL\* B.23655  
B.1DQ B.23991  
B.1DS\* B.25265  
B.1DS B.24038  
B.1DT B.24158  
B.1DV B.24220

B.1EB\* B.24566  
B.1EC\* B.24568  
B.1ED B.24570  
B.1EE B.24805

## No.2 Series

2A 020101  
2B 020774  
2C 020965  
2D B.16304  
2E B.16625  
2F B.16792  
2G B.16899  
2H B.16948  
2J B.17005  
2K B.17060  
2L B.17202  
2M B.17203  
2N B.17295  
2P B.17659  
2S B.18226  
2AA B.18744  
2AL B.19665  
2AM B.19743  
2AQ B.20521

B.2V B.18436  
B.2W B.18510  
B.2Y B.18580

B.2AF B.19164  
B.2AP B.20154  
B.2AR\* B.20527  
B.2AS\* B.21913  
B.2AU\* B.22547  
B.2AZ\* B.23759  
B.2BB B.24043  
B.2BC\* B.24399  
B.2BD\* B.25066

## No.3 Series

3A B.16039  
 3B B.17645  
 3D B.18946  
 B.3F B.20010

## No.4 Series

4A 021061  
 4B B.16169  
 4C B.16651  
 4D B.17176  
 4F B.17303  
 4H B.17867  
 4J B.18362  
 4K B.18857

## No.5 Series

5A 020821  
 5B 020888  
 5C 020903  
 5D 020908  
 5E B.16242  
 5F B.16404  
 5G B.16405  
 5H B.16561  
 5K B.16887  
 5L B.16961  
 5M B.16852  
 5N B.17101  
 5P B.17297  
 5Q B.17298  
 5R B.17749  
 5S B.17750  
 5T B.17750  
 5U B.17753  
 5Y B.18218  
 5Z B.18260  
 5AC B.18423  
 5AE B.18725  
 5AF B.18726  
 5AG B.18727  
 5AL B.19135  
 5AN B.19193  
 5AW B.19947  
 5AZ B.19988  
 5BB B.20386  
 5BE B.20493  
 5BF B.20577  
 5BG B.20578  
 5BH B.20579  
 5BJ B.20580  
 5BK B.20628  
 5BL B.20629  
 5BM B.20630  
 B.5AJ\* B.20660  
 B.5AJ B.19101  
 B.5AP B.19228  
 B.5AR B.19398  
 B.5AT B.19519  
 B.5AU B.19616  
 B.5AV\* B.20122  
 B.5AY B.19965

B.5BC B.20388  
 B.5BD B.20471  
 B.5BT\* B.21052  
 B.5BU\* B.21123  
 B.5BW\* B.21546  
 B.5CB\* B.21639  
 B.5CC B.21679  
 B.5CD\* B.21692  
 B.5CE\* B.21766  
 B.5CF\* B.21769  
 B.5CH\* B.21977  
 B.5CJ\* B.22041  
 B.5CK\* B.22053  
 B.5CL\* B.22055  
 B.5CM\* B.22057  
 B.5CS\* B.22205  
 B.5CT\* B.22207  
 B.5CU\* B.22247  
 B.5CY\* B.22339  
 B.5CZ\* B.22341

B.5DA\* B.22343  
 B.5DB\* B.22345  
 B.5DC\* B.22353  
 B.5DD\* B.22387  
 B.5DE\* B.22456  
 B.5DF\* B.22458  
 B.5DG\* B.22564  
 B.5DH\* B.22566  
 B.5DK\* B.23063  
 B.5DM\* B.23128  
 B.5DN B.23209  
 B.5DQ\* B.23934  
 B.5DS\* B.24226

## X Series

1X B.19584  
 3X B.19586  
 5X B.19588  
 8X B.19591  
 9X B.19592  
 10X B.19593  
 11X B.19594  
 12X B.19595  
 13X B.19596  
 14X B.19597  
 15X B.19598  
 16X B.19599

## New Series

44A\* B.24189  
 45C\* B.24081  
 45D\* B.24284  
 45F\* B.24759  
 45G\* B.24761

## No.6 Series

6A 020849  
 6B 021101  
 6C B.16198  
 6D B.16623  
 6F B.16971  
 6G B.17064  
 6H B.17274  
 6J B.17316  
 6K B.17351  
 6L B.17350  
 6M B.17519  
 6N B.17584  
 6P B.17595  
 6Q B.17649  
 6R B.17866  
 6T B.18220  
 6V B.18599  
 6W B.18605  
 6Z B.18745  
 6AA B.19051  
 6AB B.19065  
 6AC B.19204  
 6AE B.19639  
 6AG B.19991  
 6BA B.20572  
 B.6BD\* B.20572  
 B.6BD B.22050  
 B.6BG\* B.22460  
 B.6BH\* B.22462  
 B.6BJ\* B.22588

## No.7 Series

7A 020691  
 7B B.16837  
 7C B.17052  
 7D B.17214  
 7E B.19275  
 7F B.20084  
 7H B.20625  
 B.7G B.20151

## No.8 Series

8A B.17247  
 8B B.19409

\* Denotes adjustable needle

## Part 5 Appendix 6

# Applications list for SU carburetors

This list gives details of SU carburetors fitted to passenger vehicles of British manufacture from circa 1950 to date. The list is arranged alphabetically in sections according to name of manufacturer. Each section is sub-divided into groups according to models and/or date of manufacture. List A is for vehicles manufactured before 1975, and List B for vehicles manufactured from 1975 onwards.

### LIST A (pre-1975)

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
<b>ALVIS</b>										
TD 21	2993cc	6	1963/64	AUD 128F	F	HD6	-	KA	-	Red
				AUD 128R	R	HD6Th <sup>2</sup>	-	KA	-	Red
TF 21 Series IV	2993 cc	6	1966/66	AUD 226F	F	HD6	-	SC	-	Red
				AUD 226C	C	HD6	-	SC	-	Red
				AUD 226R	R	HD6Th <sup>2</sup>	-	SC	-	Red
<b>ASTON MARTIN</b>										
DB5	3670cc	6	1962/64	AUD 88F	F	HD8	-	UX	-	Red/Green
				AUD 88C	C	HD8	-	UX	-	Red/Green
				AUD 88R	R	HD8	-	UX	-	Red/Green
DB6	3995cc	6	1965/67	AUD 88F	F	HD8	-	UX	-	Red/Green
				AUD 88C	C	HD8	-	UX	-	Red/Green
				AUD 88R	R	HD8	-	UX	-	Red/Green
<b>AUSTIN-HEALEY</b>										
Austin-Healey 100 (BN2)	2639cc	4	1953/56		F	H4	QA	QW	AT	Yellow
					R	H4	QA	QW	AT	Yellow
Austin-Healey Le Mans	2639cc	4	1954/56		F	H6	QA6	QA7	QA8	Red
					R	H6	QA6	QA7	QA8	Red
Austin-Healey 100S	2639cc	4	1955		F	H6	KW	KW1	SA	Red
					R	H6	KW	KW1	SA	Red
Austin-Healey 100/6 (BN4)	2639cc	6	1957		F	H4	4	AJ	MI	Red
					R	H4	4	AJ	MI	Red
Austin-Healey 3000 Mk 1 (BN6)	2912cc	6	1959		F	HD6	RD	CV	SQ	Yellow
					R	HD6	RD	CV	SQ	Yellow
Austin-Healey 3000 Mk II (BN7)	2912cc	6	1959		F	HD6	RD	CV	SQ	Green
					R	HD6	RD	CV	SQ	Green

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
Austin Healey 3000 Mk II (BN7)	2912cc	6	1959		F	HD6Th	RD	CV	SQ	Green
					R	HD6	RD	CV	SQ	Green
Austin-Healey 3000 Mk II (BN7) (RC)	2912cc	6	1960		F	HD6	RD	CV	SQ	Green
					R	HD6	RD	CV	SQ	Green
Austin-Healey 3000 Mk II (BN7)	2912cc	6	1961/62		F	HS4	DK	DJ	DH	Red
					C	HS4	DK	DJ	DH	Red
					R	HS4	DK	DJ	DH	Red
Austin-Healey 3000 Mk II	2912cc	6	1962/63		F	HS6	RD	BC	TZ	Green
					R	HS6	RD	BC	TZ	Green
Austin-Healey 3000 Mk III (BJ8)	2912cc	6	1964	AUD 124	F	HD8	UN	UH	UL	Red/Green
				AUD 124	R	HD8	UN	UH	UL	Red/Green
<b>AUSTIN</b>										
A99	2912cc	6	1959/61		F	H4		M5	HA	Yellow
					R	H4		M5	HA	Yellow
Seven (Mini)	848cc	4	1959		—	HS2	M	EB	GG	Red
Seven and Super	848cc	4	1961/62		—	HS2	M	EB	GG	Red
Mini-Cooper	997cc	4	1961/62		F	HS2	AH2	GZ	EB	Red
					R	HS2	AH2	GZ	EB	Red
A40	948cc	4	1961/62		—	HS2	AH2	M	EB	Red
A35 Van	948cc	4	1962/63		—	HS2	H6	AN	EB	Red
A35 Van	848cc	4	1965/70	AUD 120	—	HS2	M	EB	GG	Red
A40 Mk II	1098cc	4	1962/7	AUD 13	—	HS2	H6	AN	EB	Red
Westminster 110	2912cc	6	1967	AUD 240F	F	H4	3	AR	HA	Yellow
				AUD 240R	R	H4	3	AR	HA	Yellow
Westminster A110 Police	2912cc	6	1967	AUD 259F	F	H4	3	AR	HA	Yellow
				AUD 259R	R	H4	3	AR	HA	Yellow
3 litre	2912cc	6	1967/68	AUD 217F	F	HS6	TU	CI	CIW	Yellow
				AUD 217R	R	HS6	TU	CI	CIW	Yellow
A60	1622cc	4	1961/70	AUD 40	—	HS2	M	GX	GG	Yellow
10 cwt Van	1622cc	4	1971/72	AUD 523	—	HS2	M	GX	GG	Yellow
Mini	848cc	4	1962/68	AUC 976	—	HS2	M	EB	GG	Red
Mini Automatic	848cc	4	1965/67	AUD 170	—	HS4	H6	AN	EB	Red
Mini Automatic	848cc	4	1967/68	AUD 250	—	HS4	H6	AN	EB	Red
Mini Mk II	848cc	4	1968/70	AUD 299	—	HS2	M	EB	GG	Red
Mini Mk II Automatic	848cc	4	1969/71	AUD 360	—	HS4	H6	AN	EB	Red
Mini Mk II	848cc	4	1969/74	AUD 369	—	HS2	—	EB	—	Red
Mini Mk II Automatic	848cc	4	1971/74	AUD 394	—	HS4	—	AN	—	Red
Mini (ECE)	848cc	4	1971/74	AUD 449	—	HS2	—	AAV	—	Red
Mini Van (GPO)	848cc	4	1972/74	AUD 587	—	HS2	—	AAV	—	Red
Austin Mini Van (GUS)	848cc	4	1974/	AUD 713	—	HS4	—	ABS	—	Red
Mini (E.C.E.)	848cc	4	1974/	AUD 611	—	HS4	—	ABS	—	Red
Mini Mk II	998cc	4	1967/68	AUD 86	—	HS2	M	GX	GG	Red
Mini Mk II Automatic	998cc	4	1967/68	AUD 184	—	HS4	MI	AC	HA	Red
Mini Mk II	998cc	4	1968/70	AUD 298	—	HS2	M	GX	GG	Red
Mini Mk II Automatic	998 cc	4	1969	AUD 366	—	HS4	MI	AC	HA	Red
Mini Mk II Automatic	998 cc	4	1970	AUD 367	—	HS4	MI	AC	HA	Red
Mini Mk II	998cc	4	1970/71	AUD 363	—	HS2	M	GX	GG	Red
Mini Mk II Automatic	998cc	4	1970/74	AUD 393	—	HS4	MI	AC	HA	Red
Mini Mk II Automatic	998cc	4	1970/74	AUD 393	—	HS4	MI	AC	HA	Red
Mini Mk II (E.C.E.)	998cc	4	1971/74	AUD 509	—	HS2	—	AAV	—	Red
Mini Mk II Man/Auto (ECE)	998cc	4	1974/	AUD 679	—	HS4	—	ABX	—	Red
Mini Van (GPO)	998cc	4	1974/	AUD 706	—	HS4	—	ABX	—	Red
Mini (Canada)	998cc	4	1972/73	AUD 648	—	HS4	—	AAG	—	Red
Mini (Canada)	998cc	4	1973/	AUD 618	—	HS4	—	ABJ	—	Red
Mini (Canada)	998cc	4	1974/	AUD 654	—	HS4	—	ABJ	—	Red
Mini Mk II Man/Auto (ECE)										
Export only	1098cc	4	1973	AUD 608	—	HS4	—	ABJ	—	Red
Mini Clubman	998cc	4	1969/71	AUD 363	—	HS2	M	GX	GG	Red
Mini Clubman Automatic	998cc	4	1970/74	AUD 393	—	HS4	MI	AC	HA	Red
Mini Clubman (ECE)	998cc	4	1971/74	AUD 509	—	HS2	—	AAV	—	Red
Mini Clubman Man/Auto (ECE)	998cc	4	1974/	AUD 679	—	HS4	—	ABX	—	Red
Mini Clubman Automatic	998cc	4	1972/	AUD 450	—	HS4	—	AAG	—	Red
Mini Clubman 1275 GT	1275cc	4	1969/71	AUD 317	—	HS4	BQ	DZ	CF	Red
Mini Clubman 1275 GT	1275cc	4	1971/72	AUD 451	—	HS4	—	AAR	—	Red
Mini Clubman 1275GT (ECE)	1275cc	4	1972/	AUD 567	—	HS4	—	ABB	—	Red
Mini Cooper Mk I & Mk II	998cc	4	1964/69	AUD 104L	LH	HS2	M	GY	GG	Blue
				AUD 104R	RH	HS2	M	GY	GG	Blue
Mini Cooper S	970cc	4	1964	AUD 151L	LH	HS2	H6	AN	EB	Red
				AUD 151R	RH	HS2	H6	AN	EB	Red
Mini Cooper S	1071cc	4	1963/64	AUD 99L	LH	HS2	3	H6	EB	Red
				AUD 99R	RH	HS2	3	H6	EB	Red
Mini Cooper S	1275cc	4	1964/70	AUD 146L	LH	HS2	AH2	M	EB	Red
				AUD 146R	RH	HS2	AH2	M	EB	Red
Mini Cooper S	1275cc	4	1970/71	AUD 440L	LH	HS2	AH2	M	EB	Red
				AUD 440R	RH	HS2	AH2	M	EB	Red
1100	1098cc	4	1962/67	AUD 13	—	HS2	H6	AN	EB	Red
1100 Automatic	1098cc	4	1965/67	AUD 185	—	HS4	BQ	DL	ED	Red
1100 Mk II	1098cc	4	1967/71	AUD 13	—	HS2	H6	AN	EB	Red
1100 Mk II Automatic	1098cc	4	1967/68	AUD 251	—	HS4	BQ	DL	ED	Red
1100 Mk II Automatic	1098cc	4	1969/71	AUD 370	—	HS4	BQ	DL	ED	Red
1100 Mk II	1098cc	4	1971/72	AUD 368	—	HS2	H6	AN	EB	Red
1100 Mk III	1098cc	4	1971/74	AUD 368	—	HS2	H6	AN	EB	Red
1100 Mk III Automatic	1098cc	4	1971/74	AUD 371	—	HS4	BQ	DL	ED	Red
1100 Mk III (ECE)	1098cc	4	1971/74	AUD 508	—	HS4	—	AAV	—	Red
1300	1275cc	4	1967/68	AUD 186	—	HS4	BQ	DZ	CF	Red
1300 Automatic	1275cc	4	1967/68	AUD 271	—	HS4	BQ	DZ	CF	Red

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
1300	1275cc	4	1969/70	AUD 374	—	HS4	BQ	DZ	CF	Red
1300 Automatic	1275cc	4	1969/70	AUD 376	—	HS4	BQ	DZ	CF	Red
1300 GT	1275cc	4	1969/71	AUD 344L	LH	HS2	M	GY	GG	Blue
				AUD 344R	RH	HS2	M	GY	GG	Blue
1300	1275cc	4	1971	AUD 472	—	HS4	BQ	DZ	CF	Red
1300GT	1275cc	4	1971	AUD 431L	LH	HS2	M	GY	GG	Blue
				AUD 431R	RH	HS2	M	GY	GG	Blue
1300	1275cc	4	1971/72	AUD 480	—	HS4	BQ	DZ	CF	Red
1300GT	1275cc	4	1971/72	AUD 454LH	LH	HS2	—	AAP	—	Blue
				AUD 454RH	RH	HS2	—	AAP	—	Blue
1300 Mk I & III (ECE)	1275cc	4	1971/72	AUD 453	—	HS4	—	AAR	—	Red
1300GT (ECE)	1275cc	4	1971/72	AUD 496LH	LH	HS2	—	AAP	—	Blue
				AUD 496RH	RH	HS2	—	AAP	—	Blue
1300 Mk I & III (ECE)	1275cc	4	1972/73	AUD 559	—	HS4	—	ABB	—	Red
1300 Mk III (ECE)	1275cc	4	1972/73	AUD 585	—	HS4	—	AAR	—	Red
1300 Mk III (ECE)	1275cc	4	1973/4	AUD 594	—	HS4	—	ABB	—	Red
1300 Mk III (ECE)	1275cc	4	1973/	AUD 596	—	HS4	—	AAR	—	Red
1300 Mk III Automatic (ECE)	1275cc	4	1971/74	AUD 486	—	HS4	—	AAR	—	Red
1300 Mk III Automatic (ECE)	1275cc	4	1972/74	AUD 567	—	HS4	—	ABB	—	Red
Austin Healey Sprite Mk I	948cc	4	1959		F	H1	EB	GG	MOW	
					R	H1	EB	GG	MOW	
Austin Healey Sprite Mk II	948cc	4	1961/62		F	HS2	V2	V3	GX	Blue
					R	HS2	V2	V3	GX	Blue
Austin Healey Sprite Mk II	1098cc	4	1962/63		F	HS2	M	GY	GG	Blue
					R	HS2	M	GY	GG	Blue
Austin Healey Sprite Mk III	1098cc	4	1964/66	AUD 136F	F	HS2	H6	AN	GG	Blue
				AUD 136R	R	HS2	H6	AN	GG	Blue
Austin Healey Sprite Mk IV	1275cc	4	1967/68	AUD 136F	F	HS2	H6	AN	GG	Blue
				AUD 136R	R	HS2	H6	AN	GG	Blue
Austin Healey Sprite Mk IV	1275cc	4	1968/71	AUD 327F	F	HS2	H6	AN	GG	Blue
				AUD 327R	R	HS2	H6	AN	GG	Blue
Austin Sprite Mk IV	1275cc	4	1971	AUD 327F	F	HS2	H6	AN	GG	Blue
				AUD 327R	R	HS2	H6	AN	GG	Blue
Austin Healey Sprite Mk IV (USA)	1275cc	4	1968	AUD 268F	F	HS2	—	AN	—	Blue
				AUD 268R	R	HS2	—	AN	—	Blue
Austin Healey Sprite Mk IV (USA)	1275cc	4	1968/69	AUD 328F	F	HS2	—	AAC	—	Blue
				AUD 328R	R	HS2	—	AAC	—	Blue
Austin Healey Sprite Mk IV (USA)	1275cc	4	1969/71	AUD 404F	F	HS2	—	AAC	—	Blue
				AUD 404R	R	HS2	—	AAC	—	Blue
Austin Sprite (USA)	1275cc	4	1972/74	AUD 549F	F	HS2	—	ABC	—	Blue
				AUD 549R	R	HS2	—	ABC	—	Blue
Austin America Automatic	1275cc	4	1968	AUD 296	—	HS4	—	DZ	—	Red
Austin America	1275cc	4	1968	AUD 281	—	HS4	—	DZ	—	Red
Austin America Automatic	1275cc	4	1969	AUD 380	—	HS4	—	AAG	—	Red
Austin America	1275cc	4	1969	AUD 379	—	HS4	—	AAG	—	Red
Austin America Automatic	1275cc	4	1969/71	AUD 346	—	HS4	—	AAG	—	Red
Austin America	1275cc	4	1969/71	AUD 345	—	HS4	—	AAG	—	Red
Austin Marina (USA)	1798cc	4	1972	AUD 494	—	HIF6	—	BBE	—	Yellow
Austin Marina Automatic (USA)	1798cc	4	1972	AUD 495	—	HIF6	—	BBE	—	Yellow
Austin Marina (USA)	1798cc	4	1972/74	AUD 583	—	HIF6	—	BBQ	—	Yellow
Austin Marina Automatic (USA)	1798cc	4	1972/74	AUD 584	—	HIF6	—	BBQ	—	Yellow
Austin Marina (Canada)	1798cc	4	1973/	AUD 575	—	HIF6	—	BAG	—	Yellow
Austin Marina Automatic (Canada)	1798cc	4	1973/	AUD 576	—	HIF6	—	BAG	—	Yellow
Austin 7 cwt Van	1098cc	4	1972/73	AUD 368	—	HS2	H6	AN	EB	Red
Austin 7 cwt Van (ECE)	1098cc	4	1973/	AUD 627	—	HS4	—	ABN	—	Red
Austin 10 cwt Van (ECE)	1275cc	4	1972/	AUD 541	—	HS4	—	AAZ	—	Red
Austin 10 cwt GPO Van	1275cc	4	1972/73	AUD 589	—	HS4	—	AAZ	—	Red
Allegro 1100 (ECE)	1098cc	4	1973/	AUD 608	—	HS4	—	ABP	—	Red
Allegro 1300 (ECE)	1275cc	4	1973/	AUD 594	—	HS4	—	ABB	—	Red
Allegro 1300 Automatic (ECE)	1275cc	4	1973/	AUD 567	—	HS4	—	ABB	—	Red
Allegro 1500 (ECE)	1485cc	4	1973/	AUD 556	—	HS6	—	BAS	—	Red
Allegro 1500 Automatic (ECE)	1485cc	4	1973/	AUD 628	—	HS6	—	BAS	—	Red
Allegro 1750 (ECE)	1748cc	4	1973/4	AUD 557	—	HS6	—	BBH	—	Red
Allegro 1750 Automatic (ECE)	1748cc	4	1973/4	AUD 619	—	HS6	—	BBH	—	Red
Allegro HL/Sport (ECE)	1748cc	4	1974/	AUD 539L	LH	HS6	—	BBR	—	Red
				AUD 539R	RH	HS6	—	BBR	—	Red
Maxi 1500	1485cc	4	1969/71	AUD 258	—	HS6	—	KP	—	Red
Maxi 1500	1485cc	4	1971	AUD 468	—	HS6	—	BAS	—	Red
Maxi 1500 (ECE)	1485cc	4	1971/72	AUD 498	—	HS6	—	BAS	—	Red
Maxi 1500	1485cc	4	1972/73	AUD 555	—	HS6	—	BAS	—	Red
Maxi 1500 (ECE)	1485cc	4	1972/	AUD 556	—	HS6	—	BAS	—	Red
Maxi 1750	1748cc	4	1970/71	AUD 462	—	HS6	—	BAR	—	Red
Maxi 1750 Automatic	1748cc	4	1972	AUD 463	—	HS6	—	BAR	—	Red
Maxi 1750 (ECE)	1748cc	4	1971/72	AUD 528	—	HS6	—	BBH	—	Red
Maxi 1750 HL (ECE)	1748cc	4	1972/	AUD 539LH	LH	HS6	—	BBR	—	Red
				AUD 539RH	RH	HS6	—	BBR	—	Red
Maxi 1750	1748cc	4	1972/73	AUD 558	—	HS6	—	BAR	—	Red
Maxi 1750 (ECE)	1748cc	4	1972/	AUD 557	—	HS6	—	BBH	—	Red
Maxi 1750 Automatic (ECE)	1748cc	4	1973/	AUD 619	—	HS6	—	BBH	—	Red
1800	1798cc	4	1964/66	AUD 147	—	HS6	SW	TW	CIW	Yellow
1800	1798cc	4	1966/67	AUD 223	—	HS6	SW	TW	CIW	Yellow

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
1800 Mk II	1798cc	4	1968/70	AUD 280	—	HS6	SA	ZH	CIW	Yellow
1800 Mk II Automatic	1798cc	4	1968/70	AUD 291	—	HS6	SA	ZH	CIW	Yellow
1800 Automatic (Canada)	1798cc	4	1968/72	AUD 315	—	HS6	—	BAJ	—	Yellow
1800 (Canada)	1798cc	4	1969/72	AUD 314	—	HS6	—	BAJ	—	Yellow
1800 S	1798cc	4	1969/71	AUD 171 LH	LH	HS6	CI	TZ	CIW	Red
				AUD 171 RH	RH	HS6	CI	TZ	CIW	Red
1800 Mk II	1798cc	4	1971/72	AUD 524	—	HS6	SA	ZH	CIW	Yellow
1800 Mk II Automatic	1798cc	4	1971/74	AUD 525	—	HS6	SA	ZH	CIW	Yellow
1800 Mk II (ECE)	1798cc	4	1971/72	AUD 355	—	HS6	—	BBF	—	Yellow
1800 Mk II Automatic (ECE)	1798cc	4	1973/	AUD 356	—	HS6	—	BBF	—	Yellow
1800 Mk II (ECE)	1798cc	4	1973/	AUD 564	—	HS6	—	BBF	—	Yellow
1800 Mk II	1798cc	4	1972/73	AUD 565	—	HS6	—	ZH	—	Yellow
1800 Mk II Automatic	1798cc	4	1972/73	AUD 568	—	HS6	—	ZH	—	Yellow
2200	2227cc	6	1972/74	AUD 409F	LH	HS6	—	BBD	—	Red
				AUD 409R	RH	HS6	—	BBD	—	Red
2200 (ECE)	2227cc	6	1972/74	AUD 546F	LH	HIF6	—	BBN	—	Red
				AUD 546R	RH	HIF6	—	BBN	—	Red
2200 Automatic (ECE)	2227cc	6	1972/74	AUD 581F	LH	HIF6	—	BBN	—	Red
				AUD 581R	RH	HIF6	—	BBN	—	Red
<b>BENTLEY</b>										
S3 V8	6230cc	8	1963/64	AUD 54A	RH	HD8	—	US	—	Red/Blue
				AUD 54'B'	LH	HD8	—	US	—	Red/Blue
T Series (SY)	6230cc	8	1965/68	AUD 177 'A'	RH	HD8	—	UZ	—	Red/Blue
				AUD 177 'B'	LH	HD8	—	UZ	—	Red/Blue
T Series (SY) (USA)	6230cc	8	1968	AUD 269 'A'	RH	HD8	—	UVU	—	Red/Blue
				AUD 269 'B'	LH	HD8	—	UVU	—	Red/Blue
T Series (SY) (USA)	6750cc	8	1969	AUD 389 'A'	RH	HD8	—	BAE	—	Red/Blue
				AUD 389 'B'	LH	HD8	—	BAE	—	Red/Blue
T Series (SY) (USA)	6750cc	8	1969/71	AUD 387 'A'	RH	HD8	—	BAE	—	Red/Blue
				AUD 387 'B'	LH	HD8	—	BAE	—	Red/Blue
<b>CHRYSLER</b>										
Hillman Hunter	1496cc	4	1972/73	AUD 554	—	HS4	—	AAK	—	Green
Hillman Hunter	1725cc	4	1972/73	AUD 554	—	HS4	—	AAK	—	Green
Hillman Avenger 1300	1295cc	4	1973/74	AUD 572	—	HS4C	—	ABR	—	Yellow
Avenger 1300	1295cc	4	1974/	AUD 690	—	HS4C	—	ACA	—	Red
Hillman Avenger 1600	1600cc	4	1973/74	AUD 572	—	HS4C	—	ABR	—	Yellow
Dodge 1800	1800cc	4	1973/	AUD 672	—	HS4C	—	AAU	—	Green
<b>COVENTRY CLIMAX</b>										
FWA Stage I	1098cc	4			F	H4		BE		Blue
					R	H4		BE		Blue
FWA Stage II	1098cc	4			F	H4		BF		Blue
					R	H4		BF		Blue
Lotus Elite	1216cc	4			F	H4		BQ		Blue
					R	H4		BQ		Blue
Lotus Elite	1216cc	4			—	H4		BF		Yellow
FPF	1498cc	4			F	DU6		ZB		
					R	DU6		ZB		
<b>DAIMLER</b>										
SP 250 Sports	2548cc	8	1959/64							
V8 Saloon Automatic	2548cc	8	1964/68	AUD 180L	LH	HD6	TL	TZ	—	Red
				AUD 180R	RH	HD6	TL	TZ	—	Red
V8 Saloon Manual	2548cc	8	1967/68	AUD 180L	LH	HD6	TL	TZ	—	Red
				AUD 180R	RH	HD6	TL	TZ	—	Red
V8 Majestic Major	4561cc	8	1964	AUD 139L	LH	HD8	—	UL	—	Red/Green
				AUD 139R	RH	HD8	—	UL	—	Red/Green
V8 Majestic	4561cc	8	1964	AUD 139L	LH	HD8	—	UL	—	Red/Green
				AUD 139R	RH	HD8	—	UL	—	Red/Green
V8 Majestic Major	4561cc	8	1964/68	AUD 181L	LH	HD8	—	UL	—	Red/Green
				AUD 181R	RH	HD8	—	UL	—	Red/Green
Limousine	4235cc	6	1970/72	AUD 357F	F	HD8Th <sup>2</sup>	—	UM	—	Red/Green
				AUD 357R	R	HD8	—	UM	—	Red/Green
Limousine	4235cc	6	1973/74	AUD 647F	F	HS8 AED <sup>3</sup>	—	BAW	—	Red/Green
				AUD 647R	R	HS8 AED	—	BAW	—	Red/Green
Limousine	4235cc	6	1974/75	AUD 667F	F	HS8 AED <sup>3</sup>	—	BCC	—	Red/Green
				AUD 667R	R	HS8 AED	—	BCC	—	Red/Green
Sovereign	2792cc	6	1968/71	AUD 321F	F	HD8Th <sup>2</sup>	—	UVX	—	Red/Green
				AUD 321R	R	HD8	—	UVX	—	Red/Green
Sovereign (LHD)	2792cc	6	1971/72	AUD 537F	F	HS8 AED <sup>4</sup>	—	BBL	—	Red/Green
				AUD 537R	R	HS8 AED	—	BBL	—	Red/Green
Sovereign	2792cc	6	1971/73	AUD 415F	F	HS8 AED <sup>4</sup>	—	BAU	—	Blue/Black
				AUD 415R	R	HS8 AED	—	BAU	—	Blue/Black
Sovereign	4235cc	6	1967/68	AUD 245F	F	HD8 Th <sup>2</sup>	—	UM	—	Red/Green
				AUD 245R	R	HD8	—	UM	—	Red/Green
Sovereign	4235cc	6	1968/71	AUD 357F	F	HD8 Th <sup>2</sup>	—	UM	—	Red/Green
				AUD 357R	R	HD8	—	UM	—	Red/Green
Sovereign (LHD)	4235cc	6	1971/72	AUD 538F	F	HS8 AED <sup>3</sup>	—	BBK	—	Red/Green
				AUD 538R	R	HS8 AED	—	BBK	—	Red/Green
Sovereign	4235cc	6	1971/73	AUD 397F	F	HS8 AED <sup>3</sup>	—	BAW	—	Red/Green
				AUD 397R	R	HS8 AED	—	BAW	—	Red/Green
Sovereign	4235cc	6	1973	AUD 647F	F	HS8 AED <sup>3</sup>	—	BAW	—	Red/Green
				AUD 647R	R	HS8 AED	—	BAW	—	Red/Green
Sovereign	4235cc	6	1973/	AUD 653F	F	HS8 AED <sup>3</sup>	—	BCC	—	Red/Green
				AUD 653R	R	HS8 AED	—	BCC	—	Red/Green

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
<b>INNOCENTI</b>										
Mini	848cc	4	1965/66	AUD 210	—	HS2	M	EB	GG	Red
Mini Automatic	848cc	4	1967/68	AUD 262	—	HS4	H6	AN	EB	Red
Mini	998cc	4	1968/69	AUD 324L	LH	HS2	M	GY	GG	Blue
				AUD 324R	RH	HS2	M	GY	GG	Blue
Mini 90	998cc	4	1974/	AUD 693	—	HS4	—	ABB	—	Yellow
Mini Clubman	998cc	4	1970/71	AUD 366L	LH	HS2	M	GY	GG	Blue
				AUD 366R	RH	HS2	M	GY	GG	Blue
Minimatic	998cc	4	1970/71	AUD 460	—	HS4	DL	CZ	GY	Red
Mini 1001 Automatic	998cc	4	1971/74	AUD 513	—	HS4	—	AAR	—	Red
Mini 1300 (ECE)	1275cc	4	1972/	AUD 534L	LH	HS2	—	AAP	—	Blue
				AUD 534R	RH	HS2	—	AAP	—	Blue
Mini 120	1275cc	4	1974/	AUD 692	—	HS6	—	BAU	—	Yellow
1100 IM3	1098cc	4	1963/64	AUD 132L	LH	HS2	D6	D3	GV	Blue
				AUD 132R	RH	HS2	D6	D3	GV	Blue
1100 IM3	1098cc	4	1964/	AUD 160L	LH	HS2	D6	D3	GV	Blue
				AUD 160R	RH	HS2	D6	D3	GV	Blue
1100 IM3	1098cc	4	1964	AUD 168	—	HS2	H6	AN	EB	Red
1100 IM3 Automatic	1098cc	4	1967/68	AUD 263	—	HS4	BQ	DL	ED	Red
1100 IM3	1098cc	4	1970/71	AUD 490L	LH	HS2	M	EB	GG	Blue
				AUD 490R	RH	HS2	M	EB	GG	Blue
1100 IM3	1098cc	4	1971/72	AUD 532L	LH	HS2	M	EB	GG	Blue
				AUD 532R	RH	HS2	M	EB	GG	Blue
Regent 1300	1275cc	4	1974/	AUD 534L	LH	HS2	—	AAP	—	Blue
				AUD 534R	RH	HS2	—	AAP	—	Blue
Regent 1500	1498cc	4	1974/	AUD 633L	LH	HS4	—	ABB	—	Red
				AUD 633R	RH	HS4	—	ABB	—	Red
<b>JAGUAR</b>										
XK 120	3442cc	6	1949/50		F	H6Th	—	RB	—	Red
					R	H6	—	RB	—	Red
XK 120	3442cc	6	1951/54		F	H6Th	53	RF	RG	Red
					R	H6	53	RF	RG	Red
XK 120 (remote air cleaner)	3442cc	6	1951/54		F	H6Th	WO4	WO2	WO3	Red
					R	H6	WO4	WO2	WO3	Red
XK 120 7 : 1 and 8 : 1 C.R. C Type	3442cc	6	1952		F	H8	75	VR	VE	Black/Red
					R	H8	75	VR	VE	Black/Red
XK 120 8 : 1 C.R. C Type	3442cc	6	1952		F	H6Th	—	RG	—	Red
					R	H6	—	RG	—	Red
XK 120 8 : 1 cr (remote air cleaner)	3442cc	6	1952		F	H6Th	—	DG	—	Red
					R	H6	—	DG	—	Red
XK 120 9 : 1 cr C Type	3442cc	6	1952		F	H6Th	—	RC	—	Red
					R	H6	—	RC	—	Red
XK 140 7 : 1 and 8 : 1 cr	3442cc	6	1954		F	H6Th	SA	SJ	LBA	Red
					R	H6	SA	SJ	LBA	Red
XK 140C 7 : 1 and 8 : 1 cr (C Type head)	3442cc	6	1954		F	H6Th	—	SR	—	Red
					R	H6	—	SR	—	Red
XK 140C 7 : 1 and 8 : 1 cr (C Type head) (disc air cleaners)	3442cc	6	1954		F	H6Th	—	WO2	—	Red
					R	H6	—	WO2	—	Red
XK 140C 8 : 1 and 9 : 1 cr (C Type head)	3442cc	6	1954		F	H8	75	VR	VE	Black/Red
					R	H8	75	VR	VE	Black/Red
XK 140C 7 : 1 and 8 : 1 cr D/H coupe and standard	3442cc	6	1955		F	H6Th	—	WO2	—	Red
					R	H6	—	WO2	—	Red
XK 140C 7 : 1 and 8 : 1 cr RHD F/H Coupe	3442cc	6	1955		F	H6Th	—	WO2	—	Red
					R	H6	—	WO2	—	Red
XK 140C 7 : 1 and 8 : 1 cr LHD F/H Coupe	3442cc	6	1955		F	H6Th	—	WO2	—	Red
					R	H6	—	WO2	—	Red
XK 140 7 : 1 and 8 : 1 cr RHD F/H Coupe	3442cc	6	1955		F	H6Th	SA	SJ	LBA	Red
					R	H6	SA	SJ	LBA	Red
XK 140 7 : 1 and 8 : 1 cr LHD F/H Coupe	3442cc	6	1955		F	H6Th	SA	SJ	LBA	Red
					R	H6	SA	SJ	LBA	Red
XK 140 7 : 1 and 8 : 1 cr RHD F/H Coupe	3442cc	6	1955		F	H6Th	SA	SJ	LBA	Red
					R	H6	SA	SJ	LBA	Red
XK 140 7 : 1 and 8 : 1 cr B-W trans. RHD F/H Coupe	3442cc	6	1956		F	H6Th	SA	SJ	LBA	Red
					R	H6	SA	SJ	LBA	Red
XK 140 7 : 1 and 8 : 1 cr B-W trans. LHD D/H Coupe	3442cc	6	1956		F	H6Th	SA	SJ	LBA	Red
					R	H6	SA	SJ	LBA	Red
XK 140 7 : 1 and 8 : 1 cr B-W trans. RHD D/H Coupe	3442cc	6	1956		F	H6Th	SA	SJ	LBA	Red
					R	H6	SA	SJ	LBA	Red
XK 150S	3781cc	6	1959/62		F	HD8Th	—	UE	—	Blue/Black
					C	HD8	—	UE	—	Blue/Black
					R	HD8	—	UE	—	Blue/Black
XK 150 3.4 litre	3442cc	6	1959/62		F	HD6Th	WO3	TL	SJ	Red
					R	HD6	WO3	TL	SJ	Red
XK 150 3.8 litre	3781cc	6	1960/62		F	HD6Th	—	TU	—	Red
					R	HD6	—	TU	—	Red
E Type 3.8 litre	3781cc	6	1961/64		F	HD8	—	UM	—	Blue/Black
					C	HD8	—	UM	—	Blue/Black
E Type 4.2 litre	4235cc	6	1965		R	HD8	—	UM	—	Blue/Black
Mk X	3781cc	6	1963/64	AUD 111F	F	HD8Th <sup>2</sup>	—	UM	—	Blue/Black
				AUD 111C	C	HD8	—	UM	—	Blue/Black
				AUD 111R	R	HD8	—	UM	—	Blue/Black
Mk X 8 : 1 + 9 : 1 cr	3781cc	6	1964	AUD 144F	F	HD8Th <sup>2</sup>	—	UM	—	Blue/Black
				AUD 144C	C	HD8	—	UM	—	Blue/Black
				AUD 144R	R	HD8	—	UM	—	Blue/Black
Mk X Automatic and Overdrive	3781cc	6	1964	AUD 156F	F	HD8Th <sup>2</sup>	—	UM	—	Blue/Black
				AUD 156C	C	HD8	—	UM	—	Blue/Black
				AUD 156R	R	HD8	—	UM	—	Blue/Black
Mk X	3781cc	6	1964	AUD 157F	F	HD8Th <sup>2</sup>	—	UM	—	Blue/Black
				AUD 157C	C	HD8	—	UM	—	Blue/Black

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
Mk X 8 : 1 & 9 : 1 cr	4235cc	6	1964	AUD 157R	R	HD8	—	UM	—	Blue/Black
				AUD 144F	F	HD8Th <sup>2</sup>	—	UM	—	Blue/Black
				AUD 144C	C	HD8	—	UM	—	Blue/Black
				AUD 144R	R	HD8	—	UM	—	Blue/Black
Mk X Automatic & Overdrive	4135cc	6	1964	AUD 156F	F	HD8Th <sup>2</sup>	—	UM	—	Blue/Black
				AUD 156C	C	HD8	—	UM	—	Blue/Black
				AUD 156R	R	HD8	—	UM	—	Blue/Black
				AUD 157F	F	HD8Th <sup>2</sup>	—	UM	—	Blue/Black
Mk X	4235cc	6	1964	AUD 157C	C	HD8	—	UM	—	Blue/Black
				AUD 157R	R	HD8	—	UM	—	Blue/Black
240	2483cc	6	1967/68	AUD 256F	F	HS6	—	TL	—	Red
240 Automatic	2483cc	6	1967/68	AUD 256R	R	HS6	—	TL	—	Red
				AUD 297F	F	HS6	—	TL	—	Red
240	2483cc	6	1968/69	AUD 297R	R	HS6	—	TL	—	Red
				AUD 309F	F	HS6	—	TL	—	Red
240 Automatic	2483cc	6	1968/69	AUD 309R	R	HS6	—	TL	—	Red
				AUD 310F	F	HS6	—	TL	—	Red
3.4 Mk III	3442cc	6	1963/64	AUD 310R	R	HS6	—	TL	—	Red
				AUD 109F	F	HD6Th <sup>2</sup>	—	TL	—	Red
3.4 S Type 8 : 1 + 9 : 1 cr Auto. Man. AC Paper cleaner	3442cc	6	1967/68	AUD 109R	R	HD6	—	TL	—	Red
				AUD 243F	F	HD6Th <sup>2</sup>	—	TL	—	Red
3.8 Mk II	3781cc	6	1963/64	AUD 243R	R	HD6	—	TL	—	Red
				AUD 109F	F	HD6Th <sup>2</sup>	—	TL	—	Red
3.8 7 : 1 cr (Cooper cleaner)	3781cc	6	1964	AUD 109R	R	HD6	—	TL	—	Red
				AUD 155F	F	HD6Th <sup>2</sup>	—	TM	—	Red
3.8 7 : 1 cr (Cooper cleaner)	3781cc	6	1964	AUD 155R	R	HD6	—	TM	—	Red
				AUD 153F	F	HD6Th <sup>2</sup>	—	TL	—	Red
3.8 S Type Mk III 8 : 1 + 9 : 1 cr (Paper cleaner)	3781cc	6	1964	AUD 153R	R	HD6	—	TL	—	Red
				AUD 154F	F	HD6Th <sup>2</sup>	—	CI	—	Red
3.8 S Type Mk III 8 : 1 + 9 : 1 cr (Oil bath cleaner)	3781cc	6	1964	AUD 154R	R	HD6	—	CI	—	Red
				AUD 243F	F	HD6Th <sup>2</sup>	—	TL	—	Red
3.8 S Type 8 : 1 and 9 : 1 cr Auto. Man (AC Paper cleaner)	3781cc	6	1967/68	AUD 243R	R	HD6	—	TL	—	Red
				AUD 241F	F	HD6Th <sup>2</sup>	—	TM	—	Red
340 7 : 1 cr Man. Aut. (AC Paper cleaner)	3442cc	6	1967/68	AUD 241R	R	HD6	—	TM	—	Red
				AUD 242F	F	HD6Th <sup>2</sup>	—	CI	—	Red
340 8 : 1 + 9 : 1 cr Man. Aut. (AC Paper cleaner)	3442cc	6	1967/68	AUD 242R	R	HD6	—	CI	—	Red
				AUD 239F	F	HD8Th <sup>2</sup>	—	UM	—	Blue/Black
420 Manual 8 : 1 + 9 : 1 cr (AC Paper cleaner)	4235cc	6	1967/68	AUD 239R	R	HD8	—	UM	—	Blue/Black
				AUD 245F	F	HD8Th <sup>2</sup>	—	UM	—	Red/Green
420 Automatic 8 : 1 + 9 : 1 cr (AC Paper cleaner)	4235cc	6	1967/68	AUD 245R	R	HD8	—	UM	—	Red/Green
				AUD 157F	F	HD8Th <sup>2</sup>	—	NA	—	Blue/Black
420G Manual 8 : 1 + 9 : 1 cr (AC Paper cleaner)	4235cc	6	1967/68	AUD 157C	C	HD8	—	NA	—	Blue/Black
				AUD 157R	R	HD8	—	NA	—	Blue/Black
				AUD 156F	F	HD8Th <sup>2</sup>	—	UM	—	Blue/Black
420G Auto. 8 : 1 and 9 : 1 cr (AC Paper cleaner)	4235cc	6	1967/68	AUD 156C	C	HD8	—	UM	—	Blue/Black
				AUD 156R	R	HD8	—	UM	—	Blue/Black
				AUD 112F	F	HD8	—	UM	—	Blue/Black
E Type	3781cc	6	1963/64	AUD 112C	C	HD8	—	UM	—	Blue/Black
				AUD 112R	R	HD8	—	UM	—	Blue/Black
				AUD 227F	F	HD8	—	UM	—	Blue/Black
E Type 8 : 1 and 9 : 1 cr	4235cc	6	1967/68	AUD 227C	C	HD8	—	UM	—	Blue/Black
				AUD 227R	R	HD8	—	UM	—	Blue/Black
				AUD 321F	F	HD8Th <sup>2</sup>	—	UVV	—	Blue/Black
E Type 5.3 litre XJ12 5.3 litre	5343cc	12	1971/73	AUD 321R	R	HD8	—	UVV	—	Blue/Black
				AUD 415F	F	HS8AED <sup>4</sup>	—	BAU	—	Blue/Black
2.8 XJ6	2792cc	6	1971/72	AUD 415R	R	HS8AED	—	BAU	—	Blue/Black
				AUD 537F	F	HS8AED <sup>4</sup>	—	BBL	—	Red/Green
2.8 XJ6 (LHD)	2792cc	6	1972/73	AUD 537R	R	HS8AED	—	BBL	—	Red/Green
				AUD 357F	F	HD8Th <sup>2</sup>	—	UM	—	Red/Green
4.2 XJ6	4235cc	6	1968/71	AUD 357R	R	HD8	—	UM	—	Red/Green
				AUD 538F	F	HS8AED <sup>3</sup>	—	BBK	—	Red/Green
4.2 XJ6 (LHD)	4235cc	6	1972/73	AUD 538R	R	HS8AED	—	BBK	—	Red/Green
				AUD 397F	F	HS8AED <sup>3</sup>	—	BAW	—	Red/Green
4.2 XJ6	4235cc	6	1971/73	AUD 397R	R	HS8AED	—	BAW	—	Red/Green
				AUD 647F	F	HS8AED <sup>3</sup>	—	BAW	—	Red/Green
4.2 XJ6	4235cc	6	1973/	AUD 647R	R	HS8AED	—	BAW	—	Red/Green
				AUD 653F	F	HS8AED <sup>3</sup>	—	BCC	—	Red/Green
4.2 XJ6	4235cc	6	1973/	AUD 653R	R	HS8AED	—	BCC	—	Red/Green
				AUD 620	—	HS6	—	BCT	—	Yellow
LEYLAND INTERNATIONAL										
185, 215, 220, Van	1622cc	4	1974/	AUD 621	—	HS6	—	BCU	—	Yellow
215, 220, 240, 250 LC Van	1798cc	4	1974/	AUD 658	—	HS6	—	BCU	—	Yellow
215, 220, 240, 250 LC Auto. Van	1798cc	4	1974/	AUD 481	—	HS4	DL	CZ	GY	Red
Mini (SA)	1097cc	4	1971	AUD 468	—	HS4	BQ	DZ	CF	Red
Apache 1300 (SA)	1275cc	4	1970/71	AUD 431L	LH	HS2	—	GY	—	Blue
Mini GTS (SA)	1275cc	4	1971/	AUD 431R	RH	HS2	—	GY	—	Blue

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
Apache 1300 (SA)	1275cc	4	1973/74	AUD 595	—	HS4	—	AAR	—	Red
Apache 1300 Automatic (SA)	1275cc	4	1970/74	AUD 317	—	HS4	BQ	DZ	CF	Red
Apache 1300 TC (SA)	1275cc	4	1971/	AUD 431L	LH	HS2	—	GY	—	Blue
				AUD 431R	RH	HS2	—	GY	—	Blue
Marina 1.7 Man/Auto (SA)	1748cc	4	1972	AUD 503	—	HS6	—	BAN	—	Yellow
Marina 2.6 Man/Auto (SA)	2620cc	6	1973/74	AUD 588	—	HS6	—	BCA	—	Green
1500 TC (Aus)	1485cc	4	1968	AUD 385L	LH	HS6	—	KS	—	Blue
				AUD 385R	RH	HS6	—	KS	—	Blue
1500 (Aus)	1485cc	4	1969	AUD 288	—	HS6	—	TD	—	Red
Mini Saloon/Van/Moke (Aus)	1098cc	4	1974	AUD 668	—	HS2	—	ABV	—	Red
Marina 1500 (Aus)	1485cc	4	1972	AUD 487	—	HS4	—	AAF	—	Yellow
Marina 1750 (Aus)	1748cc	4	1972/73	AUD 503	—	HS6	—	BAN	—	Yellow
Marina 1750TC (Aus)	1748cc	4	1972	AUD 504F	F	HS6	—	BAD	—	Red
				AUD 504R	R	HS6	—	BAD	—	Red
Marina 2620 (Aus)	2620cc	6	1973/74	AUD 588	—	HS6	—	BCA	—	Green
1800 Mk II (Aus)	1798cc	4	1968	AUD 381	—	HS6	—	SL	—	Yellow
1800 Mk II Auto (Aus)	1798cc	4	1968	AUD 382	—	HS6	—	SL	—	Yellow
1800 Mk II TC (Aus)	1798cc	4	1968	AUD 385F	LH	HS6	—	KS	—	Blue
				AUD 385R	RH	HS6	—	KS	—	Blue
2200 (Aus)	2227cc	6	1971/72	AUD 419	—	HS6	—	KV	—	Red
P76 (Aus)	2620cc	6	1973/74	AUD 588	—	HS6	—	BCA	—	Green
Mini 850 (Spain)	848cc	4	1971/74	AUD 449	—	HS2	—	AAV	—	Red
Mini 1000 (Spain)	998cc	4	1971/74	AUD 509	—	HS2	—	AAV	—	Red
Mini GT (Spain)	1275cc	4	1972/74	AUD 559	—	HS4	—	ABB	—	Red
1100 (Spain)	1098cc	4	1971/	AUD 368	—	HS2	—	AN	—	Red
Victoria 1300 (Spain)	1275cc	4	1972/74	AUD 559	—	HS4	—	ABB	—	Red
Victoria 1300TC (Spain)	1275cc	4	—	AUD 496L	LH	HS2	—	AAP	—	Blue
				AUD 496R	RH	HS2	—	AAP	—	Blue
Victoria 1300 (Spain)	1275cc	4	1973/	AUD 593	—	HS6	—	BCH	—	Red
MG										
TF (and 1.5 litre)	1250cc	4	1954/66	—	F	H4	HI	GJ	GL	Blue
					R	H4	HI	GJ	GL	Blue
ZA Magnette	1489cc	4	1954/66	—	F	H2	M	GM	GO	Red
					R	H2	M	GM	GO	Red
MGA	1489cc	4	1955/59	—	F	H4	CC	GS	4	Red
					R	H4	CC	GS	4	Red
ZA/ZB Magnette	1488cc	4	1956/58	—	F	H4	—	EQ	M5	Red
					R	H4	—	EQ	M5	Red
Twin Cam	1588cc	4	1958	—	F	H6	RH	OA6	OA7	Red
					R	H6	RH	OA6	OA7	Red
Magnette III	1489cc	4	1959/61	—	F	HD4	FT	FU	M9	Red
					R	HD4	FT	FU	M9	Red
MGA (Mk I and II)	1588cc	4	1959/62	—	F	H4	RO	6	AO	Red
					R	H4	RO	6	AO	Red
MG Magnette Mk IV	1622cc	4	1961/68	AUD 41F	F	HD4	FU	HB	FK	Red
				AUD 41R	R	HD4	FU	HB	FK	Red
MG 1100	1098cc	4	1962/68	AUD 69L	L	HS2	D6	D3	GY	Blue
				AUD 69R	R	HS2	D6	D3	GY	Blue
Sedan USA	1275cc	4	1967/68	AUD 281	—	HS4	—	DZ	—	Red
Sedan Auto. (USA)	1275cc	4	1963	AUD 296	—	HS4	—	DZ	—	Red
MGC	2912cc	6	1967/68	AUD 150F	F	HS6	SQ	ST	CIW	Yellow
				AUD 150R	R	HS6	SQ	ST	CIW	Yellow
MGC	2912cc	6	1969	AUD 341F	F	HS6	—	ST	—	Yellow
				AUD 341R	R	HS6	—	ST	—	Yellow
MGC (USA)	2912cc	6	1968	AUD 287F	F	HS6	—	KM	—	Yellow
				AUD 287R	R	HS6	—	KM	—	Yellow
MGC (USA)	2912cc	6	1969	AUD 342F	F	HS6	—	BAD	—	Yellow
				AUD 342R	R	HS6	—	BAD	—	Yellow
Midget Mk I	948cc	4	1961/62	—	F	HS2	V2	V3	GX	Blue
					R	HS2	V2	V3	GX	Blue
Midget Mk II	1098cc	4	1962/63	—	F	HS2	M	GY	GG	Blue
					R	HS2	M	GY	GG	Blue
Midget Mk II	1098cc	4	1964	AUD 136F	F	HS2	H6	AN	GG	Blue
				AUD 136R	R	HS2	H6	AN	GG	Blue
Midget Mk III	1275cc	4	1967/68	AUD 136F	F	HS2	H6	AN	GG	Blue
				AUD 136R	R	HS2	H6	AN	GG	Blue
Midget Mk III	1275cc	4	1968/71	AUD 327F	F	HS2	H6	AN	GG	Blue
				AUD 327R	R	HS2	H6	AN	GG	Blue
Midget Mk III	1275cc	4	1971/72	AUD 502F	F	HS2	—	AAT	—	Red
				AUD 502R	R	HS2	—	AAT	—	Red
Midget Mk III (ECE)	1275cc	4	1973/74	AUD 662F	F	HS2	—	AAC	—	Blue
				AUD 662R	R	HS2	—	AAC	—	Blue
Midget Mk III (USA)	1275cc	4	1968	AUD 266F	F	HS2	—	AN	—	Blue
				AUD 266R	R	HS2	—	AN	—	Blue
Midget Mk III (USA)	1275cc	4	1968/69	AUD 328F	F	HS2	—	AAC	—	Blue
				AUD 328R	R	HS2	—	AAC	—	Blue
Midget Mk III (USA)	1275cc	4	1969/70	AUD 404F	F	HS2	—	AAC	—	Blue
				AUD 404R	R	HS2	—	AAC	—	Blue
Midget Mk III (USA)	1275cc	4	1972/74	AUD 549F	F	HS2	—	ABC	—	Blue
				AUD 549R	R	HS2	—	ABC	—	Blue
Midget 1500 (ECE)	1493cc	4	1974/	AUD 665F	F	HS4	—	ABT	—	Red
				AUD 665R	R	HS4	—	ABT	—	Red
MG 1300	1275cc	4	1967	AUD 186	—	HS4	BQ	DZ	CF	Red
MG 1300 Auto.	1275cc	4	1967/68	AUD 271	—	HS4	BQ	DZ	CF	Red
MG 1300	1275cc	4	1969	AUD 318L	LH	HS2	M	EB	GG	Blue
				AUD 318R	RH	HS2	M	EB	GG	Blue
MG 1300	1275cc	4	1969	AUD 374	—	HS4	BQ	DZ	CF	Red
MG 1300 Mk II	1275cc	4	1969/71	AUD 344L	LH	HS2	M	GY	GG	Blue
				AUD 344R	RH	HS2	M	GY	GG	Blue

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
MG 1300 Mk II	1275cc	4	1971	AUD 431L	LH	HS2	M	GY	GG	Blue
				AUD 431R	RH	HS2	M	GY	GG	Blue
MG 1300 Mk II	1275cc	4	1971/72	AUD 454LH	LH	HS2	—	AAP	—	Blue
				AUD 454RH	RH	HS2	—	AAP	—	Blue
MG 1300 Mk II (ECE)	1275cc	4	1971/72	AUD 496L	LH	HS2	—	AAP	—	Blue
				AUD 496R	RH	HS2	—	AAP	—	Blue
MGB	1798cc	4	1962/63		F	HS4	6	MB	21	Red
					R	HS4	6	MB	21	Red
MGB (USA)	1798cc	4	1968	AUD 265F	F	HS4	—	FX	—	Red
				AUD 265R	R	HS4	—	FX	—	Red
MGB Mk II (USA)	1798cc	4	1968/69	AUD 326F	F	HS4	—	AAE	—	Red
				AUD 326R	R	HS4	—	AAE	—	Red
MGB Mk II (USA)	1798cc	4	1970/71	AUD 405F	F	HS4	—	AAE	—	Red
				AUD 405R	R	HS4	—	AAE	—	Red
MGB Mk II (USA)	1798cc	4	1971	AUD 465F	F	HS4	—	AAL	—	Red
				AUD 465R	R	HS4	—	AAL	—	Red
MGB Mk II (USA)	1798cc	4	1972	AUD 493F	F	HIF4	—	AAU	—	Red
				AUD 493R	R	HIF4	—	AAU	—	Red
MGB	1798cc	4	1972/74	AUD 550F	F	HIF4	—	ABD	—	Red
				AUD 550R	R	HIF4	—	ABD	—	Red
MGB (USA)	1798cc	4	1974/	AUD 630F	F	HIF4	—	ABD	—	Red
				AUD 630R	R	HIF4	—	ABD	—	Red
MGB Competition	1798cc	4	1963/64	AUD 129F	F	HD8	—	UVD	—	Blue/Black
				AUD 129R	R	HD8	—	UVD	—	Blue/Black
MGB & GT	1798cc	4	1965/66	AUD 135F	F	HS4	6	5	21	Red
				AUD 135R	R	HS4	6	5	21	Red
MGB & GT	1798cc	4	1967/68	AUD 278F	F	HS4	5	FX	GZ	Red
				AUD 278R	R	HS4	5	FX	GZ	Red
MGB	1798cc	4	1969/71	AUD 325F	F	HS4	5	FX	GZ	Red
				AUD 325R	R	HS4	5	FX	GZ	Red
MGB	1798cc	4	1972	AUD 434F	F	HIF4	—	AAU	—	Red
				AUD 434R	R	HIF4	—	AAU	—	Red
MGB (ECE)	1798cc	4	1973/74	AUD 616F	F	HIF4	—	AAU	—	Red
				AUD 616R	R	HIF4	—	AAU	—	Red
MGB (ECE)	1798cc	4	1974/	FZX 1001F	F	HIF4	—	ACD	—	Red
				FZX 1001R	R	HIF4	—	ACD	—	Red
MGB GT V8 (ECE)	3528cc	8	1973/	AUD 613L	LH	HIF6	—	BBU	—	Yellow
				AUD 613R	RH	HIF6	—	BBU	—	Yellow
<b>MORRIS</b>										
Minor (Series II) ohv	800cc	4	1953/56	—	—	H1	EB	GG	MOW	
Minor 1000	948cc	4	1957	—	—	H2	S	BX1	MO	Red
Minor 1000 (paper air cleaner)	948cc	4	1957	—	—	H2	AH2	M	EB	Red
Minor 1000 (Rubber fuel line)	948cc	4	1957	—	—	H2	S	BX1	MO	Red
Minor 1000 (Rubber fuel line and paper air cleaner)	948cc	4	1957	—	—	H2	—	M	—	Red
Minor 1000 (Steel levers)	948cc	4	1958	—	—	H2	S	BX1	MO	Red
Minor 1000 (Steel levers and Paper air cleaner)	948cc	4	1958/59	—	—	H2	AH2	M	EB	Red
Mini Minor	848cc	4	1959/62	—	—	HS2	M	EB	GG	Red
Minor 1000	948cc	4	1960/62	—	—	HS2	AH2	M	EB	Red
Minor and 1100	1098cc	4	1962/63	—	—	HS2	H6	AN	EB	Red
Minor	1098cc	4	1962/70	AUD 13	—	HS2	H6	AN	EB	Red
Oxford	1622cc	4	1961/71	AUD 40	—	HS2	M	GX	GG	Yellow
Mini	848cc	4	1962/68	AUC 976	—	HS2	M	EB	GG	Red
Mini Automatic	848cc	4	1965/66	AUD 170	—	HS4	H6	AN	EB	Red
Mini Automatic	848cc	4	1967	AUD 250	—	HS4	H6	AN	EB	Red
Mini	848cc	4	1968/71	AUD 299	—	HS2	M	EB	GG	Red
Mini Automatic	848cc	4	1969	AUD 360	—	HS4	H6	AN	EB	Red
Mini Mk II	848cc	4	1969/72	AUD 359	—	HS2	—	EB	—	Red
Mini (ECE)	848cc	4	1971/74	AUD 449	—	HS2	—	AAV	—	Red
Mini Van (GPO)	848cc	4	1972/73	AUD 587	—	HS2	—	AAV	—	Red
Mini Mk II	998cc	4	1967/68	AUD 86	—	HS2	M	GX	GG	Red
Mini Mk II Auto	998cc	4	1967/68	AUD 184	—	HS4	MI	AC	HA	Red
Mini Mk II	998cc	4	1968/71	AUD 298	—	HS2	M	GX	GG	Red
Mini Mk II Auto	998cc	4	1969	AUD 366	—	HS4	MI	AC	HA	Red
Mini Mk II	998cc	4	1969	AUD 363	—	HS2	M	GX	GG	Red
Mini Mk II Auto	998cc	4	1970	AUD 367	—	HS4	MI	AC	HA	Red
Mini Mk II Auto	998cc	4	1970/74	AUD 393	—	HS4	MI	AC	HA	Red
Mini ECE	998cc	4	1971/74	AUD 509	—	HS2	—	AAV	—	Red
Mini Mk II Auto (ECE)	998cc	4	1974/	AUD 679	—	HS4	—	ABX	—	Red
Mini Clubman	998cc	4	1969	AUD 363	—	HS2	M	GX	GG	Red
Mini Clubman Auto	998cc	4	1970/74	AUD 393	—	HS4	MI	AC	HA	Red
Mini Clubman (ECE)	998cc	4	1971/74	AUD 509	—	HS2	—	AAV	—	Red
Mini Clubman Auto	998cc	4	1972/	AUD 450	—	HS4	—	AAG	—	Red
Mini Clubman Auto/Man (ECE)	998cc	4	1974/	AUD 679	—	HS4	—	ABX	—	Red
Mini Van (GPO)	998cc	4	1974/	AUD 706	—	HS4	—	ABX	—	Red
Mini Mk II Auto/Man (ECE) Expt. only	1098cc	4	1973/	AUD 608	—	HS4	—	ABP	—	Red
Mini Clubman 1275 GT	1275cc	4	1969	AUD 317	—	HS4	BQ	DZ	CF	Red
Mini Clubman 1275 GT (ECE)	1275cc	4	1971/72	AUD 451	—	HS4	—	AAR	—	Red
Mini Clubman 1275 GT (ECE)	1275cc	4	1972/	AUD 567	—	HS4	—	ABB	—	Red
Mini Cooper	998cc	4	1964/69	AUD 104L	L	HS2	M	GY	GG	Blue
				AUD 104R	R	HS2	M	GY	GG	Blue
Mini Cooper S	970cc	4	1964	AUD 151L	L	HS2	H6	AN	EB	Red
				AUD 151R	R	HS2	H6	AN	EB	Red

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
Mini Cooper S	1071cc	4	1963/64	AUD 99L	L	HS2	3	H6	EB	Red
				AUD 99R	R	HS2	3	H6	EB	Red
Mini Cooper S	1275cc	4	1964/70	AUD 146L	L	HS2	AH2	M	EB	Red
				AUD 146R	R	HS2	AH2	M	EB	Red
Mini Cooper S	1275cc	4	1970/71	AUD 440L	L	HS2	AH2	M	EB	Red
				AUD 440R	R	HS2	AH2	M	EB	Red
1100 Auto	1098cc	4	1965/66	AUD 185	—	HS4	BQ	DL	ED	Red
1100 Auto	1098cc	4	1967	AUD 251	—	HS4	BQ	DL	ED	Red
1100 Mk II	1098cc	4	1967/68	AUD 13	—	HS2	H6	AN	EB	Red
1100 Mk II Auto	1098cc	4	1969/71	AUD 370	—	HS4	BQ	DL	ED	Red
1300	1275cc	4	1967/68	AUD 186	—	HS4	BQ	DZ	CF	Red
1300 Auto	1275cc	4	1967/68	AUD 271	—	HS4	BQ	DZ	CF	Red
1300	1275cc	4	1969/70	AUD 374	—	HS4	BQ	DZ	CF	Red
1300 Auto	1275cc	4	1969/70	AUD 376	—	HS4	BQ	DZ	CF	Red
1300 GT	1275cc	4	1969/71	AUD 344L	L	HS2	M	GY	GG	Blue
				AUD 344R	R	HS2	M	GY	GG	Blue
1300	1275cc	4	1971	AUD 472	—	HS4	BQ	DZ	CF	Red
1300 GT	1275cc	4	1971	AUD 431L	L	HS2	M	GY	GG	Blue
				AUD 431R	R	HS2	M	GY	GG	Blue
1300	1275cc	4	1971	AUD 480	—	HS4	BQ	DZ	CF	Red
1300 Traveller (ECE)	1275cc	4	1971/72	AUD 453	—	HS4	—	AAR	—	Red
1300 Traveller	1275cc	4	1972/73	AUD 559	—	HS4	—	ABB	—	Red
1300 Mk III Traveller	1275cc	4	1972/73	AUD 585	—	HS4	—	AAR	—	Red
1300 Mk III Traveller (ECE)	1275cc	4	1973/74	AUD 594	—	HS4	—	ABB	—	Red
1300 Mk III Traveller	1275cc	4	1973	AUD 595	—	HS4	—	AAR	—	Red
1300 Traveller Auto (ECE)	1275cc	4	1971/72	AUD 486	—	HS4	—	AAR	—	Red
1300 Mk III Traveller Auto (ECE)	1275cc	4	1972/74	AUD 567	—	HS4	—	ABB	—	Red
Marina 1.3	1275cc	4	1971/72	AUD 354	—	HS4	—	AAQ	—	Red
Marina 1.3 Auto	1275cc	4	1971/72	AUD 436	—	HS4	—	AAQ	—	Red
Marina 1.3 (ECE)	1275cc	4	1972/	AUD 541	—	HS4	—	AAZ	—	Red
Marina 1.3 Auto (ECE)	1275cc	4	1972/	AUD 542	—	HS4	—	AAZ	—	Red
Marina 1.8	1798cc	4	1971/72	AUD 428	—	HS6	—	BAQ	—	Yellow
Marina 1.8 Auto	1798cc	4	1971/72	AUD 479	—	HS6	—	BAQ	—	Yellow
Marina 1.8 TC	1798cc	4	1971/72	AUD 445F	F	HS4	—	AAS	—	Red
				AUD 445R	R	HS4	—	AAS	—	Red
Marina 1.8 TC Auto	1798cc	4	1971/72	AUD 464F	F	HS4	—	AAS	—	Red
				AUD 464R	R	HS4	—	AAS	—	Red
Marina 1.8 (ECE)	1798cc	4	1972/74	AUD 535	—	HS6	—	BAS	—	Yellow
Marina 1.8 Auto (ECE)	1798cc	4	1972/74	AUD 536	—	HS6	—	BAS	—	Yellow
Marina 1.8 TC (ECE)	1798cc	4	1972/74	AUD 543F	F	HS4	—	ABA	—	Red
				AUD 543R	R	HS4	—	ABA	—	Red
Marina 1.8 (ECE)	1798cc	4	1972/74	AUD 566	—	HS6	—	BAS	—	Yellow
Marina 1.8 TC (ECE) Auto	1798cc	4	1973/74	AUD 573F	F	HS4	—	AAS	—	Red
				AUD 573R	R	HS4	—	AAS	—	Red
Marina 1.8 (ECE)	1798cc	4	1974/	FZX 1011	—	HS6	—	BCW	—	Yellow
Marina 1.8 Auto (ECE)	1798cc	4	1974/	FZX 1012	—	HS6	—	BCW	—	Yellow
Marina 1.8 TC (ECE)	1798cc	4	1974/	FZX 1013F	F	HS4	—	ACE	—	Red
				FZX 1013R	R	HS4	—	ACE	—	Red
Marina 1.8 TC Auto (ECE)	1798cc	4	1974/	FZX 1014F	F	HS4	—	ACE	—	Red
				FZX 1014R	R	HS4	—	ACE	—	Red
7 cwt Van	1098cc	4	1972/73	AUD 268	—	HS2	—	AN	—	Red
7 cwt Van (ECE)	1098cc	4	1973/	AUD 627	—	HS4	—	ABN	—	Red
10 cwt Van (ECE)	1275cc	4	1972/	AUD 541	—	HS4	—	AAZ	—	Red
10 cwt GPO Van	1275cc	4	1972/73	AUD 589	—	HS4	—	AAZ	—	Red
1800	1798cc	4	1964	AUD 147	—	HS6	SW	TW	CIW	Yellow
1800	1798cc	4	1966	AUD 223	—	HS6	SW	TW	CIW	Yellow
1800 Mk II	1798cc	4	1968	AUD 280	—	HS6	SA	ZH	CIW	Yellow
1800 Mk II Auto	1798cc	4	1968	AUD 291	—	HS6	SA	ZH	CIW	Yellow
1800 S	1798cc	4	1969/71	AUD 171L	LH	HS6	CI	TZ	CIW	Red
				AUD 171R	RH	HS6	CI	TZ	CIW	Red
1800 Mk II	1798cc	4	1971/72	AUD 524	—	HS6	SA	ZH	CIW	Yellow
1800 Mk II Auto	1798cc	4	1971/72	AUD 525	—	HS6	SA	ZH	CIW	Yellow
1800 Mk II (ECE)	1798cc	4	1971/72	AUD 355	—	HS6	—	BBF	—	Yellow
1800 Mk II (ECE)	1798cc	4	1973/74	AUD 564	—	HS6	—	BBF	—	Yellow
1800 Mk II	1798cc	4	1972/73	AUD 565	—	HS6	—	ZH	—	Yellow
1800 Mk II Auto	1798cc	4	1972/73	AUD 568	—	HS6	—	ZH	—	Yellow
1800 Mk II Auto (ECE)	1798cc	4	1971/74	AUD 356	—	HS6	—	BBF	—	Yellow
2200	2227cc	6	1972/74	AUD 409F	LH	HS6	—	BBB	—	Red
				AUD 409R	RH	HS6	—	BBB	—	Red
2200 (ECE)	2227cc	6	1972/74	AUD 546F	LH	HIF6	—	BBN	—	Red
				AUD 546R	RH	HIF6	—	BBN	—	Red
2200 Auto (ECE)	2227cc	6	1972/74	AUD 581F	LH	HIF6	—	BBN	—	Red
				AUD 581R	RH	HIF6	—	BBN	—	Red
<b>LAND ROVER</b>										
2.6 109 FWD. Forward Control	2625cc	6	1963/67	AUD 816	—	HD6	—	SS	—	Yellow
2.6 Station Wagon	2625cc	6	1967	AUD 2476	—	HD6	—	SS	—	Yellow
2.6 109 WB (LHD)	2625cc	6	1967/68	AUD 2012	—	HD8	—	UG	—	Red/Green
<b>RELIANT</b>										
Sabre-Ford	1703cc	4	1962/63	—	F	HS4	—	CZ	—	Red
					R	HS4	—	CZ	—	Red
Sabre-Ford	1703cc	4	1963/64	AUD 118F	F	HS4	—	DH	—	Red
				AUD 118R	R	HS4	—	DH	—	Red
Scimitar (in line)	2553cc	6	1965/66	AUD 161F	F	HS4	—	GE/R	—	Red
				AUD 161C	C	HS4	—	GE/R	—	Red
				AUD 161R	R	HS4	—	GE/R	—	Red

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
<b>RILEY</b>										
4/68	1489cc	4	1959/61		F	HD4	FT	FU	M9	Red
Elf	848cc	4	1961/62		R	HD4	FT	FU	M9	Red
One-Point-Five	1498cc	4	1957/64	AUC 864F	—	HS2	M	EB	GG	Red
				AUC 864R	F	H4	AR	AD	HA	Red
4/72 Saloon	1622cc	4	1961/69	AUD 41F	R	H4	AR	AD	HA	Red
				AUD 41R	F	HD4	FU	HB	FK	Red
Elf Mk II	998cc	4	1963/64	AUD 86	—	HS2	M	GX	GG	Red
Elf Mk III	998cc	4	1968/69	AUD 298	—	HS2	M	GX	GG	Red
Kestrel	1098cc	4	1965/66	AUD 69L	LH	HS2	D6	D3	GV	Blue
				AUD 69R	RH	HS2	D6	D3	GV	Blue
Kestrel	1275cc	4	1967/68	AUD 186	—	HS4	BQ	DZ	CF	Red
Kestrel Auto	1275cc	4	1967/68	AUD 271	—	HS4	BQ	DZ	CF	Red
Kestrel Mk II	1275cc	4	1968	AUD 318L	LH	HS2	M	EB	GG	Blue
				AUD 318R	RH	HS2	M	EB	GG	Blue
Kestrel Mk II	1275cc	4	1968/69	AUD 344L	LH	HS2	M	GY	GG	Blue
				AUD 344R	RH	HS2	M	GY	GG	Blue
<b>ROLLS-ROYCE</b>										
B61 Power Unit	4887cc	6	1964/69	AUD 55F	F	HS6	CIW	TV	—	Green
				AUD 55R	R	HS6	CIW	TV	—	Green
B61 Power Unit	4887cc	6	1971	AUD 477F	F	HS6	—	CIW	—	Green
				AUD 477R	R	HS6	—	CIW	—	Green
B61 Power Unit	4887cc	6	1974/	AUD 646F	F	HS8	—	BAH	—	Red/Green
				AUD 646R	R	HS8	—	BAH	—	Red/Green
Phantom V	6230cc	8	1969	AUD 384A	RH	HD8	—	US	—	Red/Blue
				AUD 384B	LH	HD8	—	US	—	Red/Blue
Phantom VI	6230cc	8	1971/72	AUD 474A	RH	HD8	—	BAM	—	Red/Blue
				AUD 474B	LH	HD8	—	BAM	—	Red/Blue
Phantom VI	6230cc	8	1971/72	AUD 446A	RH	HD8	—	US	—	Red/Blue
				AUD 446B	LH	HD8	—	US	—	Red/Blue
Phantom VI	6230cc	8	1973/	AUD 656A	RH	HD8	—	BCE	—	Red/Blue
				AUD 656B	LH	HD8	—	BCE	—	Red/Blue
S3 V8	6230cc	8	1963/64	AUD 54A	RH	HD8	—	US	—	Red/Blue
				AUD 54B	LH	HD8	—	US	—	Red/Blue
Silver Shadow	6230cc	8	1965/68	AUD 177A	RH	HD8	—	UZ	—	Red/Blue
				AUD 177B	LH	HD8	—	UZ	—	Red/Blue
Silver Shadow (USA)	6230cc	8	1968	AUD 269A	RH	HD8	—	UVU	—	Red/Blue
				AUD 269B	LH	HD8	—	UVU	—	Red/Blue
Silver Shadow (USA)	6750cc	8	1969	AUD 389A	RH	HD8	—	BAE	—	Red/Blue
				AUD 389B	LH	HD8	—	BAE	—	Red/Blue
Silver Shadow (USA & General)	6750cc	8	1969/71	AUD 387A	RH	HD8	—	BAE	—	Red/Blue
				AUD 387B	LH	HD8	—	BAE	—	Red/Blue
Silver Shadow (USA & General)	6750cc	8	1972	AUD 526A	RH	HD8	—	BAE	—	Red/Blue
				AUD 526B	LH	HD8	—	BAE	—	Red/Blue
Silver Shadow (Home Market & Europe)	6750cc	8	1973	AUD 526A	RH	HD8	—	BAE	—	Red/Blue
				AUD 526B	LH	HD8	—	BAE	—	Red/Blue
Silver Shadow/Corniche (USA)	6750cc	8	1973	AUD 574A	RH	HD8	—	BBS	—	Red/Blue
				AUD 574B	LH	HD8	—	BBS	—	Red/Blue
Silver Shadow (Japan)	6750cc	8	1973/	AUD 671A	RH	HD8	—	BBY	—	Red/Blue
				AUD 671B	LH	HD8	—	BBY	—	Red/Blue
Silver Shadow/Corniche (USA)	6750cc	8	1974	AUD 648A	RH	HD8	—	BCB	—	Red/Blue
				AUD 648B	LH	HD8	—	BCB	—	Red/Blue
Corniche	6750cc	8	1971	AUD 474A	RH	HD8	—	BAM	—	Red/Blue
				AUD 474B	LH	HD8	—	BAM	—	Red/Blue
Corniche (Home Market & Europe)	6750cc	8	1972/	AUD 530A	RH	HD8	—	BAM	—	Red/Blue
				AUD 530B	LH	HD8	—	BAM	—	Red/Blue
Silver Shadow/Corniche (USA)	6750cc	8	1974/	AUD 702A	RH	HD8	—	BCQ	—	Red/Blue
				AUD 702B	LH	HD8	—	BCQ	—	Red/Blue
<b>ROVER</b>										
3 litre Coupe P5	2995cc	6	1963/64	AUC 982	—	HD8 <sup>6</sup>	—	UR	—	Red/Green
3 litre P5	2995cc	6	1963/64	AUD 114	—	HD8 <sup>6</sup>	—	UR	—	Red/Green
3 litre	2995cc	6	1963/64	AUD 115	—	HD8 <sup>6</sup>	—	UR	—	Red/Green
2000	1975cc	4	1963/64	AUC 968	—	HS6	—	RN	—	Green
2000	1975cc	4	1963/64	AUD 141	—	HS6	—	RR	—	Green
2000	1975cc	4	1965/68	AUD 211	—	HS6	—	RN	—	Green
2000	1975cc	4	1969/71	AUD 401	—	HS6	—	KU	—	Green
2000 (ECE)	1975cc	4	1971	AUD 475	—	HS6	—	BAF	—	Green
2000 TC	1975cc	4	1966	AUD 92F	F	HD8	—	UI	—	Blue/Black
				AUD 92R	R	HD8	—	UI	—	Blue/Black
2000 TC	1975cc	4	1967/68	AUD 264F	F	HS8	—	AAA	—	Blue/Black
				AUD 264R	R	HS8	—	AAA	—	Blue/Black
2000 TC	1975cc	4	1969/71	AUD 330F	F	HS8	—	AAA	—	Blue/Black
				AUD 330R	R	HS8	—	AAA	—	Blue/Black
2000 TC	1975cc	4	1971/73	AUD 533F	F	HS8	—	AAM	—	Blue/Black
				AUD 533R	R	HS8	—	AAM	—	Blue/Black
2000 (USA)	1975cc	4	1967/68	AUD 267	—	HS6	—	RR	—	Green
2000 TC (USA)	1975cc	4	1967/68	AUD 254F	F	HS8	—	AAA	—	Blue/Black
				AUD 254R	R	HS8	—	AAA	—	Blue/Black
2000 TC (USA)	1975cc	4	1968	AUD 329F	F	HS8	—	AAB	—	Blue/Black
				AUD 329R	R	HS8	—	AAB	—	Blue/Black
2000 TC (USA ECE)	1975cc	4	1969/74	AUD 411F	F	HS8	—	AAB	—	Blue/Black
				AUD 411R	R	HS8	—	AAB	—	Blue/Black

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
2200 SC	2204cc	4	1973/	AUD 631	—	HIF6	—	BBW	—	Green
2200 TC	2204cc	4	1973/	AUD 632F	F	HIF6	—	BBX	—	Yellow
				AUD 632R	R	HIF6	—	BBX	—	Yellow
3.5 litre V8 P5	3528cc	8	1967/68	AUD 233L	LH	HS6	—	KL	—	Yellow
				AUD 233R	RH	HS6	—	KL	—	Yellow
3.5 litre V8 P5	3528cc	8	1968/69	AUD 270L	LH	HSGAED <sup>5</sup>	—	KL	—	Yellow
				AUD 270R	RH	HSGAED	—	KL	—	Yellow
3.5 litre V8 P6	3528cc	8	1968	AUD 313L	LH	HS6	—	KO	—	Yellow
				AUD 313R	RH	HS6	—	KO	—	Yellow
3500 V8 P6	3528cc	8	1968	AUD 350L	LH	HSGAED <sup>5</sup>	—	KO	—	Yellow
				AUD 350R	RH	HSGAED	—	KO	—	Yellow
3500S V8 P6 (USA)	3528cc	8	1969/70	AUD 312L	LH	HS6	—	BAC	—	Yellow
				AUD 312R	RH	HS6	—	BAC	—	Yellow
3500S P6 (USA)	3528cc	8	1969/70	AUD 412L	LH	HSGAED <sup>8</sup>	—	BAC	—	Yellow
				AUD 412R	RH	HSGAED	—	BAC	—	Yellow
3500 V8 P6	3528cc	8	1971/72	AUD 467L	LH	HS6	—	BAK	—	Yellow
				AUD 467R	RH	HS6	—	BAK	—	Yellow
3500 V8 P6 (ECE)	3528cc	8	1972/73	AUD 408L	LH	HIF6	—	BBG	—	Yellow
				AUD 408R	RH	HIF6	—	BBG	—	Yellow
3500 V8 P6	3528cc	8	1972/73	AUD 521L	LH	HIF6	—	BBG	—	Yellow
				AUD 521R	RH	HIF6	—	BBG	—	Yellow
3500 V8 P6 (ECE) & 3500S V8 P6 (ECE)	3528cc	8	1973/76	AUD 623L	LH	HIF6	—	BBV	—	Yellow
				AUD 623R	RH	HIF6	—	BBV	—	Yellow
3500 (Japan)	3528cc	8	1973/76	AUD 669L	LH	HIF6	—	BBV	—	Yellow
				AUD 669R	RH	HIF6	—	BBV	—	Yellow
<b>STANDARD</b>										
8 h.p. and 10 h.p.	803cc	4	1955/56	—	F	H1	—	D3	—	
	948cc	4	1955/56	—	R	H1	—	D3	—	
<b>TRIUMPH</b>										
TR2	1991cc	4	1953/55		F	H4	GER	FV	CR	Red
					R	H4	GER	FV	CR	Red
Herald	948cc	4	1959/61		F	H1	EB	GV	CA	
					R	H1	EB	CV	CA	
TR3, TR3A and TR4	1991cc	4	1956/62		F	H6	RH	SM	SL	Red
					R	H6	RH	SM	SL	Red
TR4A	2138cc	4	1965/66	AUD 209F	F	HS6	SW	TW	CIW	Red
				AUD 209R	R	HS6	SW	TW	CIW	Red
TR4A (USA)	2138cc	4	1968	AUD 284F	F	HS6	—	QW	—	Red
				AUD 284R	R	HS6	—	QW	—	Red
Spitfire Mk I & II	950cc	4	1962/66	AUC 983F	F	HS2	H6	AN	EB	Red
				AUC 983R	R	HS2	H6	AN	EB	Red
Spitfire Mk III	1298cc	4	1967/70	AUD 257F	F	HS2	—	BO	—	Red
				AUD 257R	R	HS2	—	BO	—	Red
Spitfire Mk III (USA)	1296cc	4	1969	AUD 285F	F	HS2	—	DD	—	Red
				AUD 285R	R	HS2	—	DD	—	Red
Spitfire Mk III	1296cc	4	1967/68	AUD 275F	F	HS2	—	DD	—	Red
				AUD 275R	R	HS2	—	DD	—	Red
Spitfire Mk III (USA)	1296cc	4	1967/68	AUD 290F	F	HS2	—	DD	—	Red
				AUD 290R	R	HS2	—	DD	—	Red
Spitfire Mk IV	1296cc	4	1970/71	AUD 441F	F	HS2	—	AAN	—	Red
				AUD 441R	R	HS2	—	AAN	—	Red
Spitfire Mk IV (ECE)	1296cc	4	1972	AUD 517F	F	HS2	—	AAN	—	Red
				AUD 517R	R	HS2	—	AAN	—	Red
Spitfire Mk IV	1296cc	4	1973	AUD 580F	F	HS2	—	AAN	—	Red
				AUD 580R	R	HS2	—	AAN	—	Red
Spitfire Mk V (ECE)	1296cc	4	1973/	AUD 624F	F	HS2	—	AAN	—	Red
				AUD 624R	R	HS2	—	AAN	—	Red
Spitfire 1500 (ECE)	1493cc	4	1974/	AUD 665F	F	HS4	—	ABT	—	Red
				AUD 665R	R	HS4	—	ABT	—	Red
1300 TC	1295cc	4	1967/68	AUD 257F	F	HS2	—	BO	—	Red
				AUD 257R	R	HS2	—	BO	—	Red
Toledo	1296cc	4	1970/71	AUD 392	—	HS4	—	AAK	—	Red
Toledo (ECE)	1296cc	4	1972	AUD 516	—	HS4	—	AAW	—	Red
Toledo	1296cc	4	1972/74	AUD 577	—	HS4	—	ABF	—	Red
Toledo TS	1493cc	4	1974/	AUD 665F	F	HS4	—	ABT	—	Red
				AUD 665R	R	HS4	—	ABT	—	Red
1500	1493cc	4	1970/71	AUD 392	—	HS4	—	AAK	—	Red
1500 (ECE)	1493cc	4	1972/73	AUD 516	—	HS4	—	AAK	—	Red
1500	1493cc	4	1972/74	AUD 578	—	HS4	—	ABG	—	Red
1500 TC (ECE)	1493cc	4	1972/73	AUD 519F	F	HS2	—	AAX	—	Red
				AUD 519R	R	HS2	—	AAX	—	Red
1500 (ECE)	1493cc	4	1973	AUD 579	—	HS4	—	ABG	—	Red
1500 TC	1493cc	4	1973	AUD 582F	F	HS2	—	AAX	—	Red
				AUD 582R	R	HS2	—	AAX	—	Red
1500 TC (ECE)	1493cc	4	1973/74	AUD 625F	F	HS2	—	AAX	—	Red
				AUD 625R	R	HS2	—	AAX	—	Red
1500	1493cc	4	1974/	AUD 665F	F	HS4	—	ABT	—	Red
				AUD 665R	R	HS4	—	ABT	—	Red
Dolomite (ECE)	1854cc	4	1974/	AUD 603F	F	HS4	—	ABK	—	Red
				AUD 603R	R	HS4	—	ABK	—	Red
Dolomite Sprint	1998cc	4	1973/74	AUD 545F	F	HS6	—	BBT	—	Yellow
				AUD 545R	R	HS6	—	BBT	—	Yellow
Dolomite Sprint (ECE)	1998cc	4	1974	AUD 661F	F	HS6	—	BCM	—	Yellow
				AUD 661R	R	HS6	—	BCM	—	Yellow
2000	1998cc	6	1974/	AUD 604F	F	HS4	—	ABL	—	Yellow
				AUD 604R	R	HS4	—	ABL	—	Yellow
2500 TC	2498cc	6	1974/	AUD 607F	F	HS4	—	ABU	—	Yellow
				AUD 607R	R	HS4	—	ABU	—	Yellow
Stag V8	2997cc	8	1970/74	—	—	—	—	—	—	—

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
<b>UNIVERSAL POWER DRIVES</b>										
Unipower	998cc	4	—	AUD 104L	LH	HS2	M	GY	GG	Blue
				AUD 104R	RH	HS2	M	GY	GG	Blue
<b>VANDEN PLAS</b>										
Princess 4 litre DM4	—	6	1956/64	—	—	—	—	—	—	—
Princess 3 litre HC & LC	2912cc	6	1961/64	AUD 44F	F	H4	3	AR	HA	Yellow
				AUD 44R	R	H4	3	AR	HA	Yellow
Princess 4 litre R	3909cc	6	1964	AUD 97F	F	HS8	—	UV	—	Red/Blue
				AUD 97R	R	HS8	—	UV	—	Red/Blue
Princess 4 litre R	3909cc	6	1965/66	AUD 215F	F	HS8	—	UV	—	Red/Blue
				AUD 215R	R	HS8	—	UV	—	Red/Blue
Princess 4 litre R (Service replacement)	3909cc	6	1964/66	AUD 418F	F	HS8	—	UV	—	Red/Blue
				AUD 418R	R	HS8	—	UV	—	Red/Blue
Princess 1100	1098cc	4	1964	AUD 69L	LH	HS2	D6	D3	GV	Blue
				AUD 69R	RH	HS2	D6	D3	GV	Blue
Princess 1300	1275cc	4	1967/68	AUD 186	—	HS4	BQ	DZ	CF	Red
Princess Auto	1275cc	4	1967/68	AUD 271	—	HS4	BQ	DZ	CF	Red
Princess 1300	1275cc	4	1968/69	AUD 318L	LH	HS2	M	EB	GG	Blue
				AUD 318R	RH	HS2	M	EB	GG	Blue
Princess 1300	1275cc	4	1969/71	AUD 344L	LH	HS2	M	GY	GG	Blue
				AUD 344R	RH	HS2	M	GY	GG	Blue
Princess 1300	1275cc	4	1971	AUD 431L	LH	HS2	M	GY	GG	Blue
				AUD 431R	RH	HS2	M	GY	GG	Blue
Princess 1300 (ECE)	1275cc	4	1971/72	AUD 454L	LH	HS2	—	AAP	—	Blue
				AUD 454R	RH	HS2	—	AAP	—	Blue
Princess 1300 (ECE)	1275cc	4	1971/72	AUD 496L	LH	HS2	—	AAP	—	Blue
				AUD 496R	RH	HS2	—	AAP	—	Blue
Princess 1500	1485cc	4	1974/	AUD 628	—	HS6	—	BAS	—	Red
<b>VOLVO</b>										
B18B Snow Weasel (Pancake filter)	1788cc	4	1965/66	AUD 95F	F	HS6	—	ZH	—	Red
				AUD 95R	R	HS6	—	ZH	—	Red
B18B Snow Weasel	1788cc	4	1967	AUD 277F	F	HS6	—	ZH	—	Red
				AUD 277R	R	HS6	—	ZH	—	Red
B18B P1800	1788cc	4	1963/65	AUD 94F	F	HS6	—	ZH	—	Red
				AUD 94R	R	HS6	—	ZH	—	Red
B18B 1800S (Pancake filter)	1788cc	4	1965/66	AUD 93F	F	HS6	—	KD	—	Red
				AUD 93R	R	HS6	—	KD	—	Red
B18B 1800S (Silencer, Paper element)	1788cc	4	1965/66	AUD 204F	F	HS6	—	KF	—	Red
				AUD 204R	R	HS6	—	KF	—	Red
B18B 144 (Pancake filter)	1788cc	4	1967/68	AUD 230F	F	HS6	—	KD	—	Red
				AUD 230R	R	HS6	—	KD	—	Red
B18B 144 (Silencer filter)	1788cc	4	1967/68	AUD 231F	F	HS6	—	KF	—	Red
				AUD 231R	R	HS6	—	KF	—	Red
B18B 144	1788cc	4	1968	AUD 305F	F	HS6	—	KN	—	Red
				AUD 305R	R	HS6	—	KN	—	Red
B18B 144 (USA)	1788cc	4	1967/68	AUD 252F	F	HS6	—	DX	—	Red
				AUD 252R	R	HS6	—	DX	—	Red
B18B 144 (USA)	1788cc	4	1968	AUD 331F	F	HS6	—	KN	—	Red
				AUD 331R	R	HS6	—	KN	—	Red
B18D P544 and P122S (Pancake filter)	1788cc	4	1965/66	AUD 94F	F	HS6	—	ZH	—	Red
				AUD 94R	R	HS6	—	ZH	—	Red
B18D P544 and P122S (Oil bath filter)	1788cc	4	1965/66	AUD 200F	F	HS6	—	KE	—	Red
				AUD 200R	R	HS6	—	KE	—	Red
B18D (Silencer filter)	1788cc	4	1966/67	AUD 202F	F	HS6	—	KG	—	Red
				AUD 202R	R	HS6	—	KG	—	Red
B18D 144 (Pancake filter)	1788cc	4	1967/68	AUD 232F	F	HS6	—	SM	—	Red
				AUD 232R	R	HS6	—	SM	—	Red
B20A 142/144	1990cc	4	1969/70	AUD 403	—	HS6	—	BAH	—	Green
B20B 144S	1990cc	4	1969/70	AUD 331F	F	HS6	—	KN	—	Red
				AUD 331R	R	HS6	—	KN	—	Red
B20B 144 (USA)	1990cc	4	1971	AUD 388F	F	HIF6	—	BAL	—	Red
				AUD 388R	R	HIF6	—	BAL	—	Red
B20B 144 (LHD)	1990cc	4	1971/72	AUD 499F	F	HIF6	—	BBB	—	Red
				AUD 499R	R	HIF6	—	BBB	—	Red
B20B 144 Auto (LHD)	1990cc	4	1971/72	AUD 511F	F	HIF6	—	BBB	—	Red
				AUD 511R	R	HIF6	—	BBB	—	Red
B20D 144 (LHD)	1990cc	4	1971	AUD 433F	F	HIF6	—	BAL	—	Red
				AUD 433R	R	HIF6	—	BAL	—	Red
B20D 144 (LHD)	1990cc	4	1972	AUD 522F	F	HIF6	—	BBZ	—	Red
				AUD 522R	R	HIF6	—	BBZ	—	Red
B20B (LHD)	1990cc	4	1972/73	AUD 599F	F	HIF6	—	BBB	—	Red
				AUD 599R	R	HIF6	—	BBB	—	Red
B20B 144 Auto (LHD)	1990cc	4	1972/73	AUD 600F	F	HIF6	—	BBB	—	Red
				AUD 600R	R	HIF6	—	BBB	—	Red
B20B 144 (Canada)	1990cc	4	1973/74	AUD 666F	F	HIF6	—	BBB	—	Red
				AUD 655R	R	HIF6	—	BBB	—	Red
B20B 144 Auto (Canada)	1990cc	4	1973/74	AUD 677F	F	HIF6	—	BBB	—	Red
				AUD 655R	R	HIF6	—	BBB	—	Red
B20A 144 (LHD)	1990cc	4	1974	AUD 466	—	HIF6	—	BCJ	—	Green
B20A 144 (LHD)	1990cc	4	1974/	AUD 699	—	HIF6	—	BCJ	—	Green

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
<b>WOLSELEY</b>										
Wolseley 1500	1489cc	4	1962/64	AUC 979	—	HS2	M	GY	GG	Red
Hornet Mk I & Mk II	998cc	4	1963/68	AUD 86	—	HS2	M	GX	GG	Red
Hornet Mk III	998cc	4	1968/69	AUD 298	—	HS2	M	GX	GG	Red
1100	1098cc	4	1965/66	AUD 69L	LH	HS2	D6	D3	GV	Blue
				AUD 69R	RH	HS2	D6	D3	GV	Blue
6/110 (hc & lc)	2912cc	6	1961/64	AUD 43F	F	H4	3	AR	HA	Yellow
				AUD 43R	R	H4	3	AR	HA	Yellow
6/110	2912cc	6	1967	AUD 240F	F	H4	3	AR	HA	Yellow
				AUD 240R	R	H4	3	AR	HA	Yellow
1300	1275cc	4	1967/68	AUD 186	—	HS4	BQ	DZ	CF	Red
1300 Auto	1275cc	4	1967/68	AUD 271	—	HS4	BQ	DZ	CF	Red
1300	1275cc	4	1968/69	AUD 318L	LH	HS2	M	EB	GG	Blue
				AUD 318R	RH	HS2	M	EB	GG	Blue
1300 Mk II	1275cc	4	1969/71	AUD 344L	LH	HS2	M	GY	GG	Blue
				AUD 344R	RH	HS2	M	GY	GG	Blue
1300 Mk II	1275cc	4	1971/74	AUD 431L	LH	HS2	M	GY	GG	Blue
				AUD 431R	RH	HS2	M	GY	GG	Blue
1300 Mk II	1275cc	4	1971/74	AUD 454L	LH	HS2	—	AAP	—	Blue
				AUD 454R	RH	HS2	—	AAP	—	Blue
1300 Mk II	1275cc	4	1971/74	AUD 496L	LH	HS2	—	AAP	—	Blue
				AUD 496R	RH	HS2	—	AAP	—	Blue
18/85 Auto	1798cc	4	1967	AUD 273	—	HS6	SW	TW	CIW	Yellow
18/85 Mk II Auto	1798cc	4	1969/71	AUD 291	—	HS6	SA	ZH	CIW	Yellow
18/85 Mk II S	1798cc	4	1969/71	AUD 171L	LH	HS6	CI	YZ	CIW	Red
				AUD 171R	RH	HS6	CI	TZ	CIW	Red
Wolseley Six	2227cc	6	1972/74	AUD 409F	LH	HS6	—	BBD	—	Red
				AUD 409R	RH	HS6	—	BBD	—	Red
Wolseley Six (ECE)	2227cc	6	1972/	AUD 546F	LH	H1F6	—	BBN	—	Red
				AUD 546R	RH	H1F6	—	BBN	—	Red
Wolseley Six Auto (ECE)	2227cc	6	1972/	AUD 581F	LH	H1F6	—	BBN	—	Red
				AUD 581R	RH	H1F6	—	BBN	—	Red

**Special conversions:**

This cannot be a complete listing. It covers the majority of the more popular 'production' conversions with specifications where available.

Citroen 2.6	—	6	1950/54	AUC 712F	F	H4Th <sup>2</sup>	MME	CP4	CF	Red
				AUC 712R	R	H4	MME	CP4	CF	Red
<b>BMC and BRITISH LEYLAND</b>										
Minor MM and Series II	800cc	4	1948/56	—	F	UBA	M9	EK	MOW	Red
- Derrington					F	UBA	M9	EK	MOW	Red
Oxford MO Series II/III	1489cc	4	1950/57	—	R	H2	CJ	HB	MO	Red
- Derrington					R	H2	CJ	HB	MO	Red
Minor - Power drive and Alexander	948cc	4	1957	—	F	H1	EB	GG	MOW	Red
MG Elva	1588cc	4	1959/61	AUC 892F	F	H4	—	GS	—	Red
				AUC 892R	R	H4	—	GS	—	Red
Minor 1000 Speedwell	948cc	4	1959/61	AUC 919F	F	H2	—	M8	—	Blue
				AUC 919R	R	H2	—	M8	—	Blue
BMC A Series Turner	948cc	4	1959/61	AUC 911F	F	H1	—	BX1	—	—
				AUC 911R	R	H1	—	BX1	—	—
BMC A Series Turner	948cc	4	1959/61	AUC 927F	F	H2	—	M6	—	Red
				AUC 927R	R	H2	—	M6	—	Red
Mini—WHMB	948cc	4	1959/71	AUD 489	—	H4	—	AO	—	Blue
Sprite	948cc	4	1960	—	F	H4	—	A5	—	Blue
					R	H4	—	A5	—	Blue
Sprite Sebring	948cc	4	1960	AUC 930F	F	H2	—	GX	—	Blue
				AUC 930R	R	H2	—	GX	—	Blue
Sprite	1098cc	4	1960	AUC 989F	F	H4	—	AM	—	Blue
				AUC 989R	R	H4	—	AM	—	Blue
Formula Junior BMC	997cc	4	1960	AUC 951	—	H4	—	AM	—	Blue
				AUC 951	—	H4	—	AM	—	Blue
Mangoletsi Remix	—	—	1961/63	AUD 25F	F	H1	—	M8	—	—
				AUD 25R	R	H1	—	M8	—	—
Mini Cooper Thermo Jets	997cc	4	1961/63	AUD 59LH	LH	H4	—	MME	—	Blue
				AUD 59RH	RH	H4	—	MME	—	Blue
Healey 3000 BN7										
Competition 9 : 1 cr	2912cc	6	1961	AUD 19F	F	HD8	—	UH	—	Blue/Black
				AUD 19C	C	HD8	—	UH	—	Blue/Black
				AUD 19R	R	HD8	—	UH	—	Blue/Black
Mini Competition	848cc	4	1962/63	AUD 106LH	LH	H4	—	MME	—	Blue
				AUD 106RH	RH	H4	—	MME	—	Blue
Sprite Speedwell	1098cc	4	1962/63	AUD 103F	F	H4	—	AO	—	Red
				AUD 103R	R	H4	—	AO	—	Red
Mini Cooper S Group II	970cc	4	1964/68	AUD 164LH	LH	H4	—	CP4	—	Blue
				AUD 164RH	RH	H4	—	CP4	—	Blue
Mini Cooper S Group II	1071cc	4	1964/68	AUD 108LH	LH	H4	—	MME	—	Blue
				AUD 108RH	RH	H4	—	MME	—	Blue
Mini Cooper S Group II	1275cc	4	1964/68	AUD 165LH	LH	H4	—	BG	—	Blue
				AUD 165RH	RH	H4	—	BG	—	Blue
Formula III Cooper BMC	997cc	4	1964/68	AUD 143	—	HS6	—	UVP	—	Red
Morris (Downton) 1100	1098cc	4	1964/68	AUD 137L	LH	H4	—	AM	—	Blue
				AUD 137R	RH	H4	—	AM	—	Blue
BLMC Maxi (Special Tuning)	1485cc	4	1969/71	AUD 438L	LH	HS4	—	AAB	—	Red
				AUD 438R	RH	HS4	—	AAB	—	Red
<b>FORD</b>										
E93A	1172cc	4	1949/53	—	F	HV1	M9	EK	MOW	—
					R	HV1	M9	EK	MOW	—

Model Details	Capacity	No. of Cyl.	Year	Spec.	Position	Type	Rich	Needle Std.	Weak	Piston Spring
E93A - Dellow	1172cc	4	1950	—	—	HV3	—	RLS	—	Red
30 hp V8	3622cc	8	1950	—	F	H4	RO	6	—	Red
(special adapter)					R	H4	RO	6	—	Red
Consul (Series 1)	1508cc	4	1952	—	F	H4	—	61	—	Yellow
					R	H4	—	61	—	Yellow
Consul (Series 1)	1508cc	4	1953	—	F	H2	—	62	—	Yellow
					R	H2	—	62	—	Yellow
Zephyr (Series 1)	2262cc	6	1953	—	F	H2	—	WX	—	Yellow
					C	H2	—	WX	—	Yellow
					R	H2	—	WX	—	Yellow
Consul (Series 1) - Dellow	1508cc	4	1953	—	F	H2	—	M5	—	Red
					R	H2	—	M5	—	Red
100E Aquasport	1172cc	4	1953/57	—	F	MC2	M1	A5	HA	Red
					R	MC2	M1	A5	HA	Red
100E Prefect & Anglia	1172cc	4	1953	—	F	H1	—	M6	—	—
					R	H1	—	M6	—	—
100E Lotus	1172cc	4	1954/60	—	F	H2	M5	M6	M7	Red
					R	H2	M5	M6	M7	Red
Consul - Aquaplane (Series 1)	1508cc	4	1954/57	—	F	H4	4	3	L	Red
					R	H4	4	3	L	Red
Zephyr - Aquaplane (Series 1)	2262cc	6	1954/57	—	F	H4	4	3	L	Yellow
					C	H4	4	3	L	Red
					R	H4	4	3	L	Yellow
Zephyr - Raymond Mays (Series 1)	2262cc	6	1954/56	—	F	H4	CN	5	GE	Yellow
					R	H4	CN	5	GE	Yellow
Zephyr (Series 1) - Dellow	2262cc	6	1954	—	F	H2	—	M5	—	Red
					C	H2	—	M5	—	Red
					R	H2	—	M5	—	Red
100E Prefect & Anglia - Dellow	1172cc	4	1955	—	F	H1	M9	EK	MOW	—
					R	H1	M9	EK	MOW	—
Consul WHMB	1508cc	4	1955/57	—	F	H2	H2	QA	QW	Red
					R	H2	H2	QA	QW	Red
Zephyr WHMB	2262cc	6	1955/57	—	F	H2	EM	ES	AP	Red
					C	H2	EM	ES	AP	Red
					R	H2	EM	ES	AP	Red
Consul R. Owen (Series 2) 4 port head	1703cc	4	1958/60	—	—	H6	—	RB	—	Red
Consul R. Owen (Series 2) 6 port head	1703cc	4	1958/60	—	F	H6	—	RB	—	Red
105E FJ	997cc	4	1960/62	—	F	H4	—	AM	—	Blue
					R	H4	—	AM	—	Blue
100E Aquaplane	1172cc	4	1960/62	—	F	H2	—	GX	—	Blue
					R	H2	—	GX	—	Blue
105E/107E Aquaplane	997cc	4	1960/62	—	F	H2	—	A5	—	Blue
	1198cc				R	H2	—	A5	—	Blue
Consul R. Owen (Series 2) 4 port head	1703cc	4	1962	—	—	H6	—	RB	—	Red
Zephyr Raymond Mays	2553cc	6	1962	—	F	H4	—	AY	—	Yellow
					R	H4	—	AY	—	Yellow
Lotus Ford 105E	997cc	4	1961/62	AUD 38F	F	H2	—	A5	—	Blue
				AUD 38R	R	H2	—	A5	—	Blue
Turner/Classic	1297cc	4	1961/62	AUD 57	—	HS4	—	DJ	—	Red
Formula 3 Holbay - Ford	997cc	4	1964	—	—	HS6	—	UVP	—	Red
Escort 1100 & 1300	1098cc	4	1968/	AUD 674	—	HS2	—	AAC	—	Red
	1298cc									
<b>HILLMAN</b>										
Minx	1390cc	4	1956/58	AUC 825F	F	H2	CU	CZ	CF	Blue
				AUC 825R	R	H2	CU	CZ	CF	Blue
Alexander Minx	1600cc	4	1959/61	AUC 923F	F	H2	—	GR	—	Blue
				AUC 923R	R	H2	—	GR	—	Blue
Minx	1600cc	4	1964	AUD 145F	F	H4	—	QA	—	Red
				AUD 145R	R	H4	—	QA	—	Red
Imp	875cc	4	1964	AUD 140F	F	HS2	—	H4	—	Blue
				AUD 140R	R	HS2	—	H4	—	Blue
<b>JAGUAR</b>										
E Type V12	5343cc	12	1972/	AUD 547	NS	H1F6	—	BBG	—	Yellow
				NSF	F	H1F6	—	BBG	—	Yellow
				AUD 547	NS	H1F6	—	BBG	—	Yellow
				NSR	R	H1F6	—	BBG	—	Yellow
				AUD 547	OS	H1F6	—	BBG	—	Yellow
				OSF	F	H1F6	—	BBG	—	Yellow
				AUD 547	OS	H1F6	—	BBG	—	Yellow
				OSR	R	H1F6	—	BBG	—	Yellow
<b>TRIUMPH</b>										
Alexander Herald	948cc	4	1960/61	—	F	H2	—	M6	—	Blue
					R	H2	—	M6	—	Blue
Spitfire Group II	1147cc	4	1966	AUD 235F	F	H4	—	DB	—	Blue
				AUD 235R	R	H4	—	DB	—	Blue
Vitesse	1596cc	6	1963/64	AUD 98F	F	HS2	—	MO	—	Red
				AUD 98R	R	HS2	—	MO	—	Red
2000	1998cc	6	1966/73	AUD 704F	F	HS4C	—	ABL	—	Yellow
				AUD 704R	R	HS4C	—	ABL	—	Yellow
Vitesse	1998cc	6	1966/71	AUD 704F	F	HS4C	—	ABL	—	Yellow
				AUD 704R	R	HS4C	—	ABL	—	Yellow

Model Details	Year	Spec.	Position	Type	Needle	Piston Spring	Jet
<b>AUSTIN</b>							
Allegro 1000	1981-82	FZX 1311	-	HIF38	NZX 4014	AUD 4355	LZX 1027
Allegro 1100	1975	FZX 1022	-	HS4	CUD 1037	AUC 4387	AUD 9451
Allegro 1100	1975	FZX 1067	-	HS4	CUD 1037	AUC 4387	LZX 1111
Allegro 1100	1976	FZX 1170	-	HS4	CUD 1037	AUC 4387	LZX 1111
Allegro 1300	1975	FZX 1023	-	HS4	CUD 1025	AUC 4387	AUD 9451
Allegro 1300	1975	AUD 594	-	HS4	CUD 1025	AUC 4387	AUD 9451
Allegro 1300 Auto	1976	AUD 567	-	HS4	CUD 1025	AUC 4387	AUD 9451
Allegro 1300	1976	AUD 595	-	HS4	CUD 1015	AUC 4387	AUD 9451
Allegro 1300	1976	AUD 451	-	HS4	CUD 1015	AUC 4387	AUD 9451
Allegro 1300	1975	FZX 1176	-	HS4	CUD 1025	AUC 4387	LZX 1111
Allegro 1300	1975	FZX 1068	-	HS4	CUD 1017	AUC 4387	LZX 1111
Allegro 1300 Auto	1975	FZX 1086	-	HS4	CUD 1025	AUC 4387	LZX 1111
Allegro 1300	1976	FZX 1172	-	HS4	CUD 1017	AUC 4387	LZX 1111
Allegro 1300 Auto	1976	FZX 1174	-	HS4	CUD 1017	AUC 4387	LZX 1111
Allegro 1300 (Sweden)	1976-77	FZX 1106	-	HS4	CUD 1025	AUC 4387	AUD 9451
Allegro 1300	1980	FZX 1312	-	HIF44	NZX 8033	AUD 4355	LZX 1029
Allegro 1300	1981	FZX 1366	-	HIF44	NZX 8033	AUD 4355	LZX 1029
Allegro 1300	1981	FZX 1313	-	HIF44	NZX 8033	AUD 4355	LZX 1029
Allegro 1500	1976	AUD 556	-	HS6	CUD 1116	AUC 4387	AUD 9105
Allegro 1500 Auto	1975	AUD 628	-	HS6	CUD 1116	AUC 4387	AUD 9105
Allegro 1500 Auto	1975-76	FZX 1074	-	HS6	CUD 1116	AUC 4387	AUD 9105
Allegro 1500	1975	FZX 1076	-	HS6	CUD 1116	AUC 4387	LZX 1118
Allegro 1500	1976	FZX 1078	-	HS6	CUD 1116	AUC 4387	LZX 1118
Allegro 1500 Auto	1976	FZX 1180	-	HS6	CUD 1116	AUC 4387	LZX 1118
Allegro 1500	1979	FZX 1302F	LH	HIF4	NZX 4018	AUD 4355	LZX 1026
Allegro 1500	1979	FZX 1302R	RH	HIF4	NZX 4018	AUD 4355	LZX 1027
Allegro 1750	1976	AUD 557	-	HS6	CUD 1131	AUC 4387	AUD 9105
Allegro 1750 Auto	1976	AUD 619	-	HS6	CUD 1131	AUC 4387	AUD 9105
Allegro 1750 HL/Sport	1976	AUD 539L	LH	HS6	CUD 1139	AUC 4387	AUD 9148
Allegro 1750 HL/Sport	1976	AUD 539R	RH	HS6	CUD 1139	AUC 4387	AUD 9149
Allegro 1750	1976	FZX 1077	-	HS6	NZX 8005	AUC 4387	LZX 1118
Allegro 1750	1976	FZX 1087	-	HS6	CUD 1131	AUC 4387	LZX 1118
Allegro 1750	1976	FZX 1209	-	HS6	NZX 8005	AUC 4387	LZX 1118
Allegro 1750 Hilline	1975	FZX 1093L	LH	HS6	CUD 1139	AUC 4387	LZX 1126
		FZX 1093L	RH	HS6	CUD 1139	AUC 4387	LZX 1127
Allegro 1750 HL/Sport	1976	FZX 1183L	LH	HS6	CUD 1139	AUC 4387	LZX 1126
		FZX 1183R	RH	HS6	CUD 1139	AUC 4387	LZX 1127
Maxi 1500	1976	AUD 556	-	HS6	CUD 1116	AUC 4387	AUD 9105
Maxi 1500	1975	FZX 1076	-	HS6	CUD 1116	AUC 4387	LZX 1118
Maxi 1500 Auto	1976	FZX 1180	-	HS6	CUD 1116	AUC 4387	LZX 1118
Maxi 1500	1976	FZX 1178	-	HS6	CUD 1116	AUC 4387	LZX 1118
Maxi 1750	1976	AUD 557	-	HS6	CUD 1131	AUC 4387	AUD 9105
Maxi 1750 Auto	1976	AUD 619	-	HS6	CUD 1131	AUC 4387	AUD 9105
Maxi 1750	1975	FZX 1077	-	HS6	NZX 8005	AUC 4387	LZX 1118
Maxi 1750 Hilline	1975	FZX 1093L	LH	HS6	CUD 1139	AUC 4387	LZX 1126
		FZX 1093R	RH	HS6	CUD 1139	AUC 4387	LZX 1127
Maxi 1750 HL	1976	AUD 539L	LH	HS6	CUD 1139	AUC 4387	AUD 9148
		AUD 539R	RH	HS6	CUD 1139	AUC 4387	AUD 9149
Maxi 1750 Auto	1976	FZX 1087	-	HS6	NZX 8005	AUC 4387	LZX 1118
Maxi 1750	1976	FZX 1207	-	HS6	NZX 8005	AUC 4387	LZX 1118
Maxi 1750 Auto	1976	FZX 1209	-	HS6	NZX 8005	AUC 4387	LZX 1118
Maxi 1750 T.C.	1976	FZX 1211L	LH	HS6	CUD 1139	AUC 4387	LZX 1116
		FZX 1211R	RH	HS6	CUD 1139	AUC 4387	LZX 1117
Maxi 1750 HL Auto	1977	FZX 1213L	LH	HS6	CUD 1139	AUC 4387	AUD 9148
		FZX 1213R	RH	HS6	CUD 1139	AUC 4387	AUD 9149
Metro 850	1982	FZX 1410	-	HS4	NZX 4008	AUC 4387	LZX 1111
Metro 1000	1980-82	FZX 1270	-	HIF38	NZX 4014	AUC 4355	LZX 1027
Metro 1000 Auto	1982	FZX 1279	-	HIF38	NZX 4014	AUC 4355	LZX 1027
Metro 1000	1980-82	FZX 1298	-	HIF38	NZX 4019	AUC 4355	LZX 1027
Metro 1000 HLE	1980-82	FZX 1380	-	HIF38	NZX 4024	AUC 4355	LZX 1027
Metro 1000 HLE		FZX 1405	-	HIF38	NZX 4024	AUC 4355	LZX 1027
Metro 1000 Van	1982	FZX 1413	-	HIF38	NZX 4019	AUC 4355	LZX 1027
Metro 1000 HLE	1982	FZX 1414	-	HIF38	NZX 4017	AUC 4355	LZX 1027
Metro 1275	1980-82	FZX 1280	-	HIF44	NZX 8033	AUC 4355	LZX 1029
Metro 1275 Auto	1981	FZX 1281	-	HIF44	NZX 8033	AUC 4355	LZX 1029
Metro 1275 Sport	1982	FZX 1409	-	HIF44	NZX 8011	AUD 4355	LZX 1029
Metro 1275	1982	FZX 1412	-	HIF 44	NZX 8033	AUC 4355	LZX 1029
Metro 1275 HLE	1983	FZX 1429	-	HIF44	NZX 8040	AUD 4355	LZX 1029
Metro 1275 HLE Auto	1985	FZX 1462	-	HIF44	NZX 8072	AUD 4355	LZX 1029
Metro Turbo	1982	FZX 1411	-	HIF44	NZX 8049	AUD 4398	LZX 1029
Metro Turbo	1982	FZX 1435	-	HIF 44	NZX 8004	AUD 4398	LZX 1029
Mini 850	1975	FZX 1043	-	HS4	NZX 4008	AUC 4387	LZX 1111
Mini 850	1975	FZX 1064	-	HS4	NZX 4008	AUC 4387	AUD 9451
Mini 850	1976	FZX 1142	-	HS4	NZX 4008	AUC 4387	LZX 1111
Mini 1000	1975	FZX 1044	-	HS4	NZX 4005	AUC 4387	LZX 1111
Mini 1000	1975	FZX 1065	-	HS4	NZX 4005	AUC 4387	AUD 9451
Mini 1000	1976	FZX 1146	-	HS4	NZX 4005	AUC 4387	LZX 1111
Mini 1000	1982	FZX 1415	-	HS4	CUD 1002	AUC 4387	LZX 1111
Mini 1000	1975	AUD 679	-	HS4	CUD 1045	AUC 4387	AUD 9451
Mini 1000 (Sweden)	1977	FZX 1094	-	HS4	CUD 1045	AUC 4387	AUD 9451
Mini 1000 (Sweden)	1975	FZX 1115	-	HS4	NZX 4006	AUC 4387	AUD 9451
Mini 1100	1975	FZX 1045	-	HS4	CUD 1037	AUC 4387	LZX 1111
Mini 1100	1975	FZX 1066	-	HS4	CUD 1037	AUC 4387	AUD 9451
Mini 1100	1976	FZX 1160	-	HS4	CUD 1037	AUC 4387	LZX 1111
Mini 1100 (Auto)	1976	FZX 1162	-	HS4	CUD 1037	AUC 4387	LZX 1111

Model Details	Year	Spec.	Position	Type	Needle	Piston Spring	Jet
Mini 1275	1975	FZX 1046	-	HS4	CUD 1025	AUC 4387	LZX 1111
Mini 1275	1976	FZX 1164	-	HS4	CUD 1025	AUC 4387	LZX 1111
Mini 1275 (Spain)	1975	FZX 1047	-	HS4	CUD 1025	AUC 4387	AUD 9451
998cc (Australia)	1976	FZX 1239	-	HS4	NZX 4006	AUC 4387	AUD 9451
998cc (Australia)	1976	FZX 1240	-	HS4	NZX 4006	AUC 4387	AUD 9451
998cc (Canada)	1975-76	FZX 1016	-	HS4	CUD 1032	AUC 4387	AUD 9451
998cc (Canada)	1976	FZX 1114	-	HS4	NZX 4004	AUC 4387	AUD 9451
998cc (Canada)	1976	FZX 1150	-	HS4	NZX 4004	AUC 4387	LZX 1111
1097cc (South Africa)	1977	AUD 481	-	HS4	AUD 1116	AUC 4387	AUD 9451
1098cc (South Africa)	1977	FZX 1282	-	HS4	AUD 1116	AUC 4387	AUD 9451
1098cc (South Africa)	1981	FZX 1377	-	HS4	NZX 4023	AUC 4387	LZX 1111
Van (1/4 ton)	1975	FZX 1043	-	HS4	NZX 4008	AUC 4387	LZX 1111
Van (1/4 ton)	1976	FZX 1064	-	HS4	NZX 4008	AUC 4387	AUD 9451
Van (1/4 ton)	1977	FZX 1142	-	HS4	NZX 4008	AUC 4387	LZX 1111
(998cc) (GPO)	1976	FZX 1148	-	HS4	NZX 4005	AUC 4387	LZX 1111
(3 Litre)	1978	AUD 217F	F	HS6	AUD 1099	AUC 1167	AUD 9105
		AUD 217R	R	HS6	AUD 1099	AUC 1167	AUD 9106
1300 (Auto)	1976	AUD 567	-	HS4	CUD 1025	AUC 4251	AUD 9451
1300 (GT) Estate	1975	AUD 594	-	HS4	CUD 1025	AUC 4387	AUD 9451
1300 (GT) (Auto)	1976	AUD 567	-	HS4	CUD 1025	AUC 4387	AUD 9451
1800 MK II	1975	AUD 564	-	HS6	CUD 1129	AUC 1167	AUD 9148
1800 MK II Auto	1975	AUD 568	-	HS6	AUD 1490	AUC 1167	AUD 9148
1800 (Special Tuning)	1975	FZX 1098F	LH	HS6	NZX 8016	AUC 4387	AUD 9148
		FZX 1098R	RH	HS6	NZX 8016	AUC 4387	AUD 9149
2200	1975	AUD 546F	LH	HIF6	CUD 1136	AUC 4387	LZX 1028
		AUD 546R	RH	HIF6	CUD 1136	AUC 4387	LZX 1029
2200	1975	AUD 581F	LH	HIF6	CUD 1136	AUC 4387	LZX 1028
		AUD 581R	RH	HIF6	CUD 1136	AUC 4387	LZX 1029
Maestro							
1.3	1983	FZX 1422	-	HIF44E	CUD 1171	AUD 4355	LZX 1029
1.3 HLE	1983	FZX 1428	-	HIF44E	CUD 1171	AUD 4355	LZX 1029
1.3 (Switzerland)	1984	FZX 1443	-	HIF44E	CUD 1171	AUD 4355	LZX 1029
1.3 HC	1984	FZX 1468	-	HIF44	CUD 1171	AUD 4355	LZX 1029
1.6	1983	FZX 1419	-	HIF44	NZX 8041	AUD 4355	LZX 1029
1.6 (Auto)	1983	FZX 1420	-	HIF44	NZX 8041	AUD 4355	LZX 1029
1.6 (Man)	1984	FZX 1463	-	HIF44E	NZX 8060	AUD 4355	LZX 1029
1.6 (Man) (Switzerland)	1984	FZX 1464	-	HIF44E	NZX 8060	AUD 4355	LZX 1029
1.6 Van	1985	FZX 1475	-	HIF44	NZX 8060	AUD 4355	LZX 1029
Montego							
1.3	1984	FZX 1422	-	HIF44E	CUD 1171	AUD 4355	LZX 1029
1.6 Manual	1983	FZX 1424	-	HIF44E	NZX 8060	AUD 4355	LZX 1029
1.6 Auto	1984	FZX 1425	-	HIF44E	NZX 8060	AUD 4355	LZX 1029
1.6 (Man)	1984	FZX 1463	-	HIF44E	NZX 8060	AUD 4355	LZX 1029
2.0 Manual	1984	FZX 1438	-	HIF44E	NZX 8067	AUD 4398	LZX 1029
2.0 Auto	1984	FZX 1439	-	HIF44E	NZX 8067	AUD 4398	LZX 1029
2.0 'O' Series	1984	FZX 1465	-	HIF44E	NZX 8067	AUD 4398	LZX 1029
2.0 (Man) (Saudi)	1985	FZX 1480	-	HIF44E	NZX 8067	AUD 4398	LZX 1029
2.0 (Auto) (Saudi)	1985	FZX 1481	-	HIF44E	NZX 8067	AUD 4398	LZX 1029
<b>AUSTIN MORRIS LIGHT COMMERCIAL</b>							
7 cwt Van (1098cc)	1976	AUD 627	-	HS4	CUD 1036	AUC 4387	AUD 9450
7 cwt Van (1098cc)	1976-78	FZX 1187	-	HS4	CUD 1036	AUC 4387	LZX 1110
7 cwt Van (1275cc)	1976	AUD 589	-	HS4	CUD 1023	AUC 4387	AUD 9450
7 cwt Van (1275cc)	1976-78	FZX 1193	-	HS4	NZX 4207	AUC 4387	LZX 1110
10 cwt Van	1976	AUD 589	-	HS4	CUD 1023	AUC 4387	AUD 9450
10 cwt Van	1976-78	FZX 1189	-	HS4	NZX 4007	AUC 4387	LZX 1110
10 cwt Van (GPO)	1976	AUD 589	-	HS4	CUD 1023	AUC 4387	AUD 9450
10 cwt Van (GPO)	1976-78	FZX 1193	-	HS4	NZX 4007	AUC 4387	LZX 1110
440 Van (1098cc)	1978-79	FZX 1187	-	HS4	CUD 1036	AUC 4387	LZX 1110
440 Van (1275cc)	1978-80	FZX 1193	-	HS4	NZX 4007	AUC 4387	LZX 1110
440 Van (1275cc)	1982	FZX 1306	-	HIF44	NZX 8044	AUD 4355	LZX 1029
440 Van (British Tel)	1982	FZX 1434	-	HS4	NZX 4007	AUC 4387	LZX 1110
575 Van	1978-82	FZX 1189	-	HS4	NZX 4007	AUC 4387	LZX 1110
575 Van	1982	FZX 1306	-	HIF44	NZX 8044	AUC 4355	LZX 1029
575 Van (GPO)	1978-80	FZX 1193	-	HS4	NZX 4007	AUC 4387	LZX 1110
575 Van (GPO)	1981	FZX 1369	-	HIF44	NZX 8044	AUD 4355	LZX 1029
<b>CHRYSLER</b>							
Avenger 1800 (Brazil)	1975	AUD 689	-	HS6	CUD 1107	AUC 4387	AUD 9105
Avenger 1800 (Brazil)	1976	FZX 1250	-	HS6	CUD 1107	AUC 4387	AUD 9105
<b>DAIMLER</b>							
Limousine	1976	AUD 667F	F	HS8AED†	CUD 1150	AUC 4826	CUD 2753
		AUD 667R	R	HS8	CUD 1150	AUC 4826	CUD 2752
Limousine	1977	FZX 1251F	F	HIF7	NZX 8022	AUD 4398	LZX 1068
		FZX 1251R	R	HIF7	NZX 8022	AUD 4398	LZX 1068
Limousine	1979	FZX 1331F	F	HIF7	NZX 8022	AUD 4398	LZX 1068
		FZX 1331R	R	HIF7	NZX 8022	AUD 4398	LZX 1068
Sovereign 4.2 Series II	1975	AUD 653F	F	HS8AED†	CUD 1150	AUC 4826	CUD 2753
		AUD 653R	R	HS8	CUD 1150	AUC 4826	CUD 2752
Sovereign 4.2 Series II	1975	AUD 667F	F	HS8AED†	CUD 1150	AUC 4826	CUD 2753
		AUD 667R	R	HS6	CUD 1150	AUC 4826	CUD 2752
Sovereign 4.2 Series II	1975-76	FZX 1049F	F	HIF7AED†	NZX 8013	AUD 4355	LZX 1068
		FZX 1049R	R	HIF7	NZX 8013	AUD 4355	LZX 1068
Sovereign 4.2 Series II	1976	FZX 1252F	F	HIF7AED†	NZX 8023	AUD 4355	LZX 1068
		FZX 1252R	R	HIF7	NZX 8023	AUD 4355	LZX 1068

Model Details	Year	Spec.	Position	Type	Needle	Piston Spring	Jet
<b>FREIGHT-ROVER</b>							
Sherpa							
1622cc	1975	AUD 620	-	HS6	CUD 1165	AUC 1167	AUD 9148
1622cc	1975	FZX 1035	-	HS6	NZX 8017	AUC 1167	AUD 9148
1622cc	1975	FZX 1041	-	HS6	CUD 1165	AUC 1167	AUD 9148
1622cc	1975-76	FZX 1042	-	HS6	CUD 1166	AUC 1167	AUD 9148
1622cc	1976-78	FZX 1223	-	HS6	CUD 1165	AUC 1167	LZX 1114
1798cc (LC)	1975	AUD 621	-	HS6	CUD 1166	AUC 1167	AUD 9148
1798cc (LC) Auto	1976	AUD 658	-	HS6	CUD 1166	AUC 1167	AUD 9148
1798cc (LC) Auto	1975	FZX 1033	-	HS6	NZX 8018	AUC 4387	AUD 9148
1798cc (LC) Auto	1976-78	FZX 1225	-	HS6	CUD 1166	AUC 1167	LZX 1114
1798cc Auto	1976-78	FZX 1227	-	HS6	CUD 1166	AUC 1167	LZX 1114
1700cc Manual	1979	FZX 1236	-	HIF6	NZX 8036	AUD 4285	LZX 1029
1700cc Auto	1979	FZX 1237	-	HIF6	NZX 8036	AUD 4355	LZX 1029
1700cc Auto	1979	FZX 1320	-	HIF6	NZX 8036	AUD 4355	LZX 1029
1700cc Auto	1979	FZX 1321	-	HIF6	NZX 8036	AUD 4355	LZX 1029
1700cc (GPO)	1981	FZX 1375	-	HIF6	NZX 8036	AUD 4355	LZX 1029
1700cc (GPO)	1983	FZX 1432	-	HIF6	NZX 8036	AUD 4355	LZX 1029
1933cc Manual	1980	FZX 1299	-	HIF44	NZX 8043	AUD 4398	LZX 1029
1933cc Auto	1980	FZX 1300	-	HIF44	NZX 8043	AUD 4398	LZX 1029
1933cc Manual	1983	FZX 1441	-	HIF44	NZX 8043	AUD 4398	LZX 1029
2.0 H.C.	1987	FZX 1485	-	HIF44	NZX 8083	AUD 4398	LZX 1029
1.0 H.C.	1987	FZX 1487	-	HIF44	NZX 8084	AUD 4398	LZX 1029
<b>HILLMAN</b>							
Avenger 1300	1976	AUD 690	-	HS4C	CUD 1048	AUC 4387	AUD 9815
Hunter 1500	1975	AUD 660	-	HS4C	CUD 1044	AUC 1167	AUD 9814
Hunter 1700	1975	AUD 660	-	HS4C	CUD 1044	AUC 1167	AUD 9814
<b>INNOCENTI</b>							
Mini	1975	FZX 1060	-	HS4	CUD 1023	AUC 1167	AUD 9451
Mini	1976	FZX 1156	-	HS4	CUD 1025	AUC 1167	LZX 1111
Mini 90	1975	AUD 693	-	HS4	CUD 1025	AUC 1167	AUD 9451
Mini 120	1975	AUD 692	-	HS6	CUD 1118	AUC 1167	AUD 9106
Mini 1275	1976-77	FZX 1168	-	HS6	CUD 1118	AUC 1167	LZX 1119
<b>JAGUAR</b>							
3.4 XJ6	1975-76	AUD 710F	F	HS8AED†	CUD 1169	AUC 4826	CUD 2753
		AUD 710R	R	HS8	CUD 1169	AUC 4826	CUD 2752
3.4 XJ6	1975-76	FZX 1001R	R	HIF7AED†	NZX 8013	AUD 4355	LZX 1068
		FZX 1049R	R	HIF7	NZX 8013	AUD 4355	LZX 1068
3.4 XJ6	1976-79	FZX 1053F	F	HIF7AED†	NZX 8021	AUD 4355	LZX 1068
		FZX 1053R	R	HIF7	NZX 8021	AUD 4355	LZX 1068
3.4 XJ6	1979	FZX 1330F	-	HIF7	NZX 8021	AUD 4355	LZX 1068
		FZX 1330R	R	HIF7	NZX 8021	AUD 4355	LZX 1068
4.2 XJ6	1975	AUD 667F	F	HS8AED†	CUD 1150	AUC 4826	CUD 2753
		AUD 667R	R	HS8	CUD 1150	AUC 4826	CUD 2752
4.2 XJ6	1975-76	FZX 1049F	F	HIF7AED†	NZX 8013	AUD 4355	LZX 1068
		FZX 1049R	R	HIF7	NZX 8013	AUD 4355	LZX 1068
4.2 XJ6	1976	FZX 1252F	F	HIF7AED†	NZX 8023	AUD 4355	LZX 1068
		FZX 1252R	R	HIF7	NZX 8023	AUD 4355	LZX 1068
Daimler Limousine		FZX 1459F	F	HIF44	NZX 8068	AUD 4398	LZX 1029
		FZX 1459R	R	HIF44	NZX 8068	AUD 4398	LZX 1028
<b>LAND ROVER</b>							
V8 (South Africa)		FZX 1381L	-	HIF6	CUD 1161	AUC 4355	LZX 1029
		FZX 1381R	-	HIF6	CUD 1161	AUC 4355	LZX 1028
V8 Auto (South Africa)		FZX 1382L	-	HIF6	CUD 1161	AUC 4355	LZX 1029
		FZX 1382R	-	HIF6	CUD 1161	AUC 4355	LZX 1028
<b>MG</b>							
MGB MK II	1976	FZX 1001F	F	HIF4	CUD 1051	AUC 4387	LZX 1026
	1976	FZX 1001RF	RF	HIF4	CUD 1051	AUC 4387	LZX 1027
	1976	FZX 1229F	F	HIF4	CUD 1051	AUC 4387	LZX 1026
		FZX 1229R	R	HIF4	CUD 1051	AUC 4387	LZX 1027
V8	1976	AUD 613L	LH	HIF6	CUD 1142	AUC 4398	LZX 1028
		AUD 613R	RH	HIF6	CUD 1142	AUC 4398	LZX 1029
Metro	1982	FZX 1409	-	HIF44	NZX 8011	AUC 4355	LZX 1029
Metro (Turbo)	1982	FZX 1411	-	HIF44	NZX 8049	AUD 4398	LZX 1029
Metro (Turbo)	1982	FZX 1435	-	HIF44	NZX 8004	AUD 4398	LZX 1029
Metro	1985	FZX 1469	-	HIF44	NZX 8071	AUD 4355	LZX 1029
1500	1976	AUD 665F	F	HS4	CUD 1041	AUC 4387	AUD 9451
		AUD 665R	R	HS4	CUD 1041	AUC 4387	AUD 9450
1500	1978	FZX 1122F	F	HS4	NZX 4013	AUD 4355	LZX 1330
		FZX 1122R	R	HS4	NZX 4013	AUD 4355	LZX 1331
<b>MORRIS</b>							
Ital 1300 Manual	1980	FZX 1306	-	HIF44	NZX 8040	AUD 4355	LZX 1029
Ital 1300 Auto	1980	FZX 1307	-	HIF44	NZX 8040	AUD 4355	LZX 1029
1700 Manual	1980	FZX 1315	-	HIF6	NZX 8034	AUD 4355	LZX 1029
1700 Auto	1980	FZX 1318	-	HIF6	NZX 8034	AUD 4355	LZX 1029
2000 Auto	1980	FZX 1357	-	HIF6	NZX 8050	AUD 4398	LZX 1029
Marina 1.3 Auto	1975	AUD 541	-	HS4	CUD 1023	AUC 4387	AUD 9450
Marina 1.3 Auto	1975-76	AUD 670	-	HS4	NZX 4007	AUC 4387	LZX 1110
Marina 1.3 Auto	1976-80	FZX 1189	-	HS4	NZX 4007	AUC 4387	LZX 1110
Marina 1.3 Manual	1975	AUD 542	-	HS4	CUD 1023	AUC 4387	AUD 9450
Marina 1.3 Manual	1975-76	FZX 1071	-	HS4	NZX 4007	AUC 4387	LZX 1110

† AED: TZX 1002

Model Details	Year	Spec.	Position	Type	Needle	Piston Spring	Jet
Marina 1.3 Manual	1976-80	FZX 1191	-	HS4	NZX 4007	AUD 4387	LZX 1110
Marina 1.7 Manual	1979	FZX 1108	-	HF6	NZX 8034	AUD 4355	LZX 1029
Marina 1.7 Manual	1980	FZX 1315	-	HIF6	NZX 8034	AUD 4355	LZX 1029
Marina 1.7 Auto	1979	FZX 1271	-	HIF6	NZX 8034	AUD 4355	LZX 1029
Marina 1.7 Auto	1980	FZX 1318	-	HIF6	NZX 8034	AUD 4355	LZX 1029
1750 Man (S. Africa)	1975	AUD 503	-	HS6	CUD 1112	AUC 4387	AUD 9148
1750 Man (S. Africa)	1975-76	FZX 1099	-	HS6	CUD 1131	AUC 4387	AUD 9148
1750 Man (S. Africa)	1977	FZX 1241	-	HS6	CUD 1131	AUC 4387	LZX 1363
1750 Auto	1975-76	FZX 1100	-	HS6	CUD 1131	AUC 4387	AUD 9148
1750 Auto	1977	FZX 1243	-	HS6	CUD 1131	AUC 4387	LZX 1363
1.8 SC Manual	1975	AUD 535	-	HS6	CUD 1116	AUC 1167	AUD 9148
1.8 SC Manual	1975-76	AUD 566	-	HS6	CUD 1116	AUC 1167	AUD 9148
1.8 SC Manual	1976	FZX 1011	-	HS6	CUD 1168	AUC 1167	AUD 9148
1.8 SC Manual	1976-79	FZX 1199	-	HS6	CUD 1168	AUC 1167	AUD 9148
1.8 SC Auto	1975	AUD 536	-	HS6	CUD 1116	AUC 1167	AUD 9148
1.8 SC Auto	1976	FZX 1012	-	HS6	CUD 1168	AUC 1167	AUD 9148
1.8 SC Auto	1976-79	FZX 1201	-	HS6	CUD 1168	AUC 1167	AUD 9148
Marina (USA)	1976	AUD 583	-	HIF6	CUD 1138	AUC 1167	LZX 1028
Marina (USA) (Auto)	1976	AUD 584	-	HIF6	CUD 1138	AUC 1167	LZX 1028
1.8 TC Manual	1976	FZX 1013F	F	HS4	CUD 1052	AUC 4387	AUD 9141
		FZX 1013R	R	HS4	CUD 1052	AUC 4387	AUD 9142
1.8 TC Manual	1976-79	FZX 1203F	F	HS4	CUD 1052	AUC 4387	AUD 9141
		FZX 1203R	R	HS4	CUD 1052	AUC 4387	AUD 9142
1.8 TC Auto	1976	FZX 1014F	F	HS4	CUD 1052	AUC 4387	AUD 9141
		FZX 1014R	R	HS4	CUD 1052	AUC 4387	AUD 9142
1.8 TC Auto	1976-79	FZX 1283F	F	HS4	CUD 1052	AUC 4387	AUD 9141
		FZX 1283R	R	HS4	CUD 1052	AUC 4387	AUD 9142
P76 (Australia)	1975	AUD 588	-	HS6	CUD 1148	AUC 1170	AUD 9148
(South Africa)	1975-76	FZX 1100	-	HS6	CUD 1131	AUC 4387	AUD 9148
2.6 South Africa	1977	FZX 1245	-	HS6	CUD 1148	AUC 1170	LZX 1363
2.6 Auto (S. Africa)	1975-76	FZX 1102	-	HS6	CUD 1148	AUC 1170	AUD 9148
2.6 South Africa	1977	FZX 1246	-	HS6	CUD 1148	AUC 1170	LZX 1363
Princess							
1700 Manual	1979	FZX 1285	-	HIF6	NZX 8035	AUD 4355	LZX 1029
1700 Manual	1979	FZX 1322	-	HIF6	NZX 8035	AUD 4355	LZX 1029
1700 Auto	1979	FZX 1286	-	HIF6	NZX 8035	AUD 4355	LZX 1029
1700 Auto	1979	FZX 1323	-	HIF6	NZX 8035	AUD 4355	LZX 1029
1800 Manual	1975-76	AUD 684	-	HS6	CUD 1129	AUC 1167	AUD 9148
1800 Manual	1976-79	FZX 1215	-	HS6	CUD 1129	AUC 1167	LZX 1114
1800 Auto	1975-76	AUD 635	-	HS6	CUD 1129	AUC 1167	AUD 9148
1800 Auto	1976-79	FZX 1319	-	HS6	CUD 1129	AUC 1167	LZX 1114
2000 Manual	1979	FZX 1109	-	HIF6	NZX 8030	AUD 4398	LZX 1029
2000 Manual	1979	FZX 1317	-	HIF6	NZX 8030	AUD 4398	LZX 1029
2000 Auto	1979	FZX 1272	-	HIF6	NZX 8030	AUD 4398	LZX 1029
2000 Auto	1979	FZX 1319	-	HIF6	NZX 8030	AUD 4398	LZX 1029
2200 Manual	1975	AUD 697F	LH	HIF6	CUD 1161	AUD 4355	LZX 1028
		AUD 697R	RH	HIF6	CUD 1161	AUD 4355	LZX 1029
2200 Manual	1975	FZX 1095F	LH	HIF6	CUD 1161	AUD 4355	LZX 1028
		FZX 1095R	RH	HIF6	CUD 1161	AUD 4355	LZX 1029
2200 Manual	1976-77	FZX 1219F	LH	HIF6	CUD 1161	AUD 4355	LZX 1028
		FZX 1219R	RH	HIF6	CUD 1161	AUD 4355	LZX 1029
2200 Manual	1977-78	FZX 1304F	LH	HIF6	CUD 1161	AUD 4355	LZX 1028
		FZX 1304R	RH	HIF6	CUD 1161	AUD 4355	LZX 1029
2200 Manual	1979	FZX 1325F	LH	HIF6	CUD 1161	AUD 4355	LZX 1028
		FZX 1325R	RH	HIF6	CUD 1161	AUD 4355	LZX 1029
<b>RELIANT</b>							
Kitten, Robin	1975	FZX 1027	-	HS2	CUD 1002	AUC 4387	AUD 9141
Kitten, Robin	1976-77	FZX 1253	-	HS2	CUD 1002	AUC 4387	AUD 9098
Kitten, Robin	1975-76	FZX 1275	-	HS2	CUD 1017	AUC 4387	AUD 9141
Kitten, Robin	1977-79	FZX 1292	-	HS2	CUD 1040	AUC 4387	AUD 9098
Kitten, Robin	1979-83	FZX 1351	-	HS2	CUD 1011	AUC 4387	AUD 9141
Kitten, Robin	1983	FZX 1442	-	HS2	NZX 4026	AUC 4387	AUD 9141
<b>ROLLS ROYCE</b>							
B61 Power Unit	1975	AUD 646F	F	HS8	CUD 1107	AUC 4826	CUD 3176
		AUD 646R	R	HS8	CUD 1107	AUC 4826	CUD 3177
B61 Power Unit	1975	AUD 708F	F	HS8	CUD 1129	AUC 4826	CUD 3176
		AUD 708R	R	HS8	CUD 1129	AUC 4826	CUD 3177
B61 Power Unit	1976	FZX 1206F	F	HIF6	CUD 1129	AUC 1170	LZX 1029
		FZX 1206R	R	HIF6	CUD 1129	AUC 1170	LZX 1028
Corniche (USA)	1975	FZX 1040A	RH	HD8	NZX 8004	AUC 4818	CUD 2637
		FZX 1040B	LH	HD8	NZX 8004	AUC 4818	CUD 2637
Phantom VI	1977	FZX 1289(2)	-	HIF7	NZX 8029	AUD 4355	LZX 1068
Silver Shadow	1975	FZX 1040A	RH	HD8	NZX 8004	AUC 4818	CUD 2637
		FZX 1040B	LH	HD8	NZX 8004	AUC 4818	CUD 2637
Silver Shadow	1976	FZX 1104A	F	HIF7	NZX 8024	AUD 4355	LZX 1068
		FZX 1104B	R	HIF7	NZX 8024	AUD 4355	LZX 1068
Silver Shadow	1976	FZX 1141A	RH	HD8	NZX 8004	AUC 4818	CUD 2637
		FZX 1141B	LH	HD8	NZX 8004	AUC 4818	CUD 2637
Silver Shadow	1976	FZX 1232A	RH	HIF7	NZX 8025	AUD 4355	LZX 1068
		FZX 1232B	LH	HIF7	NZX 8025	AUD 4355	LZX 1068
Silver Shadow	1975	FZX 1026A	RH	HD8	NZX 8001	AUC 4818	CUD 2637
		FZX 1026B	LH	HD8	NZX 8001	AUC 4818	CUD 2637
Silver Shadow	1976	FZX 1116A	RH	HD8	NZX 8004	AUC 4818	CUD 2637
		FZX 1116B	LH	HD8	NZX 8004	AUC 4818	CUD 2637
Silver Shadow	1976	FZX 1232	LHIC	HIF7	NZX 8025	AUD 4355	LZX 1068
		FZX 1232	RHIC	HIF7	NZX 8025	AUD 4355	LZX 1068

Model Details	Year	Spec.	Position	Type	Needle	Piston Spring	Jet
<b>ROVER</b>							
2000 (USA)	1975	AUD 411F	F	HS8	CUD 1001	AUC 2107	CUD 2709
		AUD 411R	R	HS8	CUD 1001	AUC 2107	CUD 2709
2000 (SDI) (Man) (Auto)	1982	FZX 1383F	F	HIF44	NZX 8055	AUD 4355	LZX 1028
		FZX 1383F	R	HIF44	NZX 8055	AUD 4355	LZX 1029
2000	1984	FZX 1450F	F	HIF44E	NZX 8070	AUD 4355	LZX 1029
		FZX 1450R	R	HIF44E	NZX 8070	AUD 4355	LZX 1029
2200 (SC)	1976	AUD 631	-	HIF6	CUD 1144	AUC 1170	LZX 1028
2200 (TC)	1976	AUD 632F	F	HIF6	CUD 1145	AUC 1167	LZX 1028
		AUD 632R	R	HIF6	CUD 1145	AUC 1167	LZX 1029
2300 (SDI)	1976-78	FZX 1130F	F	HS6	NZX 8026	AUD 4398	LZX 1059
		FZX 1130R	R	HS6	NZX 8026	AUD 4398	LZX 1058
2300 (SDI)	1978-79	FZX 1308F	-	HS6	NZX 8039	AUD 4398	LZX 1059
		FZX 1308R	-	HS6	NZX 8039	AUD 4398	LZX 1058
2300 (SDI)	1979-81	FZX 1328F	-	HS6	NZX 8039	AUD 4398	LZX 1059
		FZX 1328R	-	HS6	NZX 8039	AUD 4398	LZX 1058
2300 (SDI) (Manual) (Auto)	1982	FZX 1384F	F	HIF44	NZX 8056	AUD 4398	LZX 1029
		FZX 1384R	R	HIF44	NZX 8056	AUD 4398	LZX 1029
2300	1984	FZX 1452F	F	HIF44E	NZX 8056	AUD 4398	LZX 1029
		FZX 1452R	R	HIF44E	NZX 8056	AUD 4398	LZX 1029
2600 (SDI)	1976-78	FZX 1130F	F	HS6	NZX 8026	AUD 4398	LZX 1059
		FZX 1130R	R	HS6	NZX 8026	AUD 4398	LZX 1058
2600 (SDI)	1978-79	FZX 1308F	-	HS6	NZX 8039	AUD 4398	LZX 1059
		FZX 1308R	-	HS6	NZX 8039	AUD 4398	LZX 1058
2600 (SDI)	1979-81	FZX 1328F	-	HS6	NZX 8039	AUD 4398	LZX 1059
		FZX 1328R	-	HS6	NZX 8039	AUD 4398	LZX 1058
2600 (SDI) (Manual) (Auto)	1982	FZX 1384F	F	HIF44	NZX 8056	AUD 4398	LZX 1029
		FZX 1384R	R	HIF44	NZX 8056	AUD 4398	LZX 1029
2600 (SDI)	1976-77	FZX 1131F	F	HS6	NZX 8027	AUD 4398	LZX 1059
		FZX 1131R	R	HS6	NZX 8027	AUD 4398	LZX 1058
2600 (SDI)	1078-79	FZX 1309F	-	HS6	NZX 8038	AUD 4398	LZX 1059
		FZX 1309R	-	HS6	NZX 8038	AUD 4398	LZX 1058
2600 (SDI)	1979-81	FZX 1329F	-	HS6	NZX 8038	AUD 4398	LZX 1059
		FZX 1329R	-	HS6	NZX 8038	AUD 4398	LZX 1058
2600 (SDI)	1982	FZX 1390F	F	HIF44	NZX 8057	AUD 4398	LZX 1029
		FZX 1390R	R	HIF44	NZX 8057	AUD 4398	LZX 1029
2600 (SDI) (Switzerland)	1983	FZX 1406F	F	HIF44	NZX 8059	AUD 4398	LZX 1029
		FZX 1406R	R	HIF44	NZX 8059	AUD 4398	LZX 1029
2600	1984	FZX 1454F	F	HIF44E	NZX 8057	AUD 4398	LZX 1029
		FZX 1454R	R	HIF44E	NZX 8057	AUD 4398	LZX 1029
3500 V8 (P6)	1976	AUD 623L	LH	HIF6	CUD 1143	AUC 1167	LZX 1028
		AUD 623R	RH	HIF6	CUD 1143	AUC 1167	LZX 1029
3500 V8 (P6) (Japan)	1976	AUD 669L	LH	HIF6	CUD 1143	AUD 4398	LZX 1028
		AUD 669R	RH	HIF6	CUD 1143	AUD 4398	LZX 1029
3500 (SDI)	1976	FZX 1341	-	-	Fitted to 50 cars only-no service replacement-fit FZX 1316	-	-
		FZX 1341	-	-	-	-	-
3500 (SDI)	1976	AUD 664L	LH	HIF6	CUD 1109	AUD 4398	LZX 1028
		AUD 664R	RH	HIF6	CUD 1109	AUD 4398	LZX 1029
3500 (SDI)	1976-79	FZX 1270L	LH	HIF6	CUD 1109	AUD 4398	LZX 1028
		FZX 1270R	RH	HIF6	CUD 1109	AUD 4398	LZX 1029
3500 (SDI)	1979	FZX 1316L	-	HIF6	CUD 1109	AUD 4398	LZX 1028
		FZX 1316R	-	HIF6	CUD 1109	AUD 4398	LZX 1029
3500	1984	FZX 1456L	LH	HIF44E	NZX 8069	AUD 4398	LZX 1029
		FZX 1456R	RH	HIF44E	NZX 8069	AUD 4398	LZX 1029
3500 L (Saudi)	1984	FZX 1470L	LH	HIF44E	NZX 8069	AUD 4398	LZX 1029
		FZX 1470R	RH	HIF44E	NZX 8069	AUD 4398	LZX 1029
2600 L (Swiss)	1984	FZX 1471F	-	HIF44E	NZX 8059	AUD 4398	LZX 1029
		FZX 1471R	-	HIF44E	NZX 8059	AUD 4398	LZX 1029
2000 (India)	1984	FZX 1473F	-	HIF44	CUD 1171	AUD 4355	LZX 1028
		FZX 1473R	-	HIF44	CUD 1171	AUD 4355	LZX 1029
216 'S' (SD 3)	1985	FZX 1478	-	HIF44E	NZX 8060	AUD 4355	LZX 1029
<b>TRIUMPH</b>							
Acclaim 1600	1984	FZX 1460	-	HIF44E	NZX 8060	AUD 4355	LZX 1029
Dolomite 1300	1976-77	FZX 1269	-	HS4	CUD 1029	AUC 4387	LZX 1322
Dolomite 1300	1977	FZX 1121	-	HS4	NZX 4012	AUD 4355	LZX 1330
Dolomite 1300	1978-79	FZX 1303	-	HS4	NZX 4015	AUD 4355	LZX 1330
Dolomite 1300	1979-80	FZX 1339	-	HS4	NZX 4015	AUD 4355	LZX 1507
1500	1976-77	FZX 1258F	F	HS4	CUD 1041	AUC 4387	LZX 1323
		FZX 1258R	R	HS4	CUD 1041	AUC 4387	LZX 1322
1500	1977-79	FZX 1122F	-	HS4	NZX 4013	AUD 4355	LZX 1331
		FZX 1122R	-	HS4	NZX 4013	AUD 4355	LZX 1330
1500	1979-80	FZX 1327F	-	HS4	NZX 4013	AUD 4355	LZX 1331
		FZX 1327R	-	HS4	NZX 4013	AUD 4355	LZX 1330
1854cc	1975	AUD 603F	F	HS4	CUD 1033	AUC 4387	AUD 9451
		AUD 603R	R	HS4	CUD 1033	AUC 4387	AUD 9450
1854cc	1975	FZX 1005F	F	HS4	CUD 1033	AUC 4387	AUD 9451
		FZX 1005R	R	HS4	CUD 1033	AUC 4387	AUD 9450
1854cc	1975-76	FZX 1051F	F	HS4	CUD 1033	AUC 4387	AUD 9451
		FZX 1051R	R	HS4	CUD 1033	AUC 4387	AUD 9450
1854cc	1977-80	FZX 1265F	F	HS4	CUD 1033	AUC 4387	LZX 1323
		FZX 1265R	R	HS4	CUD 1033	AUC 4387	LZX 1322
Dolomite Sprint							
1999cc	1975-76	AUD 680F	F	HS6	CUD 1159	AUC 1167	AUD 9106
		AUD 680R	R	HS6	CUD 1159	AUC 1167	AUD 9106
1998cc	1976	AUD 663F	F	HS6	NZX 8015	AUC 1167	AUD 9106
		AUD 663R	R	HS6	NZX 8015	AUC 1167	AUD 9106
1998cc	1977-80	FZX 1257F	F	HS6	NZX 8015	AUC 1167	AUD 9106
		FZX 1257R	R	HS6	NZX 8015	AUC 1167	AUD 9106

Model Details	Year	Spec.	Position	Type	Needle	Piston Spring	Jet
Spiritfire							
1500	1974-76	AUD 665F	F	HS4	CUD 1041	AUC 4387	AUD 9451
		AUD 665R	R	HS4	CUD 1041	AUC 4387	AUD 9450
1500	1976-77	FZX 1258F	-	HS4	CUD 1041	AUC 4387	LZX 1323
		FZX 1258R	-	HS4	CUD 1041	AUC 4387	LZX 1322
1500	1977-79	FZX 1122F	-	HS4	NZX 4013	AUD 4355	LZX 1331
		FZX 1122R	-	HS4	NZX 4013	AUD 4355	LZX 1330
1500	1979-80	FZX 1327F	-	HS4	NZX 4013	AUD 4355	LZX 1331
		FZX 1327R	-	HS4	NZX 4013	AUD 4355	LZX 1330
Toledo	1975-76	AUD 707	-	HS4	CUD 1029	AUC 4387	AUD 9103
Toledo	1976	AUD 665F	F	HS4	CUD 1041	AUC 4387	AUD 9451
TR7	1976	AUD 665R	R	HS4	CUD 1041	AUC 4387	AUD 9450
		AUD 634F	F	HS6	NZX 8012	AUC 4387	AUD 9106
		AUD 634R	R	HS6	NZX 8012	AUC 4387	AUD 9105
TR7	1976	FZX 1242F	F	HS6	NZX 8012	AUC 4387	LZX 1121
		FZX 1242R	R	HS6	NZX 8012	AUC 4387	LZX 1120
TR7	1976	FZX 1257F	F	HS6	NZX 8015	AUC 1167	LZX 1121
		FZX 1257R	R	HS6	NZX 8015	AUC 1167	LZX 1120
1500 TC	1976	AUD 665F	F	HS4	CUD 1041	AUC 4387	AUD 9451
		AUD 665R	R	HS4	CUD 1041	AUC 4387	AUD 9450
1500 TC	1976	AUD 1122F	F	HS4	NZX 4013	AUD 4355	LZX 1330
		AUD 1122R	R	HS4	NZX 4013	AUD 4355	LZX 1331
2000	1975	AUD 604F	F	HS4	CUD 1034	AUC 1167	AUD 9451
		AUD 604R	R	HS4	CUD 1034	AUC 1167	AUD 9450
2000	1975-76	AUD 676F	F	HS4	CUD 1170	AUC 1167	AUD 9106
		AUD 676R	R	HS4	CUD 1170	AUC 1167	AUD 9105
2000	1976	AUD 1264F	F	HS4	CUD 1170	AUC 1167	LZX 1121
		AUD 1264R	R	HS4	CUD 1170	AUC 1167	LZX 1120
2500 (TC)	1975	AUD 607F	F	HS4	CUD 1042	AUC 1167	AUD 9451
		AUD 607R	R	HS4	CUD 1042	AUC 1167	AUD 9450
2500 (TC)	1975	AUD 678F	F	HS6	NZX 8002	AUC 1167	AUD 9106
		AUD 678R	R	HS6	NZX 8002	AUC 1167	AUD 9105
2500 (TC)	1976	FZX 1263F	F	HS6	NZX 8002	AUC 1167	LZX 1121
		FZX 1263R	R	HS6	NZX 8002	AUC 1167	LZX 1120
(Australia)	1975	FZX 1070F	F	HS6	NZX 8002	AUC 1167	AUD 9106
		FZX 1070R	R	HS6	NZX 8002	AUC 1167	AUD 9105
(Australia)	1976	FZX 1105F	F	HS6	NZX 8019	AUD 4398	LZX 1059
		FZX 1105R	R	HS6	NZX 8019	AUD 4398	LZX 1058
(Australia)	1976	FZX 1117F	F	HS6	NZX 8019	AUD 4398	LZX 1059
		FZX 1117R	R	HS6	NZX 8019	AUD 4398	LZX 1058
<b>UNIVERSAL POWER DRIVES</b>							
Unipower	-	AUD 104L	LH	HS2	AUD 1468	AUC 4587	AUD 9141
		AUD 104R	RH	HS2	AUD 1468	AUC 4587	AUD 9142
<b>VANDEN PLAS</b>							
Ambassador	1982	FZX 1355R	RH	HIF44	NZX 8050	AUD 4398	LZX 1028
		FZX 1355L	LH	HIF44	NZX 8050	AUD 4398	LZX 1029
		FZX 1356R	RH	HIF44	NZX 8050	AUD 4355	LZX 1028
		FZX 1356L	LH	HIF44	NZX 8050	AUD 4355	LZX 1029
Maestro (Manual)	1983	FZX 1419	-	HIF44	NZX 8041	AUD 4355	LZX 1029
Maestro (Auto)	1983	FZX 1420	-	HIF44	NZX 8041	AUD 4355	LZX 1029
Metro	1982	FZX 1409	-	HIF44	NZX 8011	AUD 4355	LZX 1029
Metro (RHD)	1982	FZX 1412	-	HIF44	NZX 8033	AUD 4355	LZX 1029
Metro (Auto)	1982	FZX 1281	-	HIF44	NZX 8033	AUD 4355	LZX 1029
1500	1975	AUD 628	-	HS6	CUD 1116	AUD 4387	AUD 9105
<b>VOLVO</b>							
B20A Power Unit (LHD)	1976	AUD 669	-	HIF6	CUD 1156	AUC 1170	LZX 1029
	1975	FZX 1055	-	HIF6	NZX 8007	AUC 1170	LZX 1029
	1977	FZX 1256	-	HIF6	CUD 1156	AUC 1170	LZX 1029
B21A Power Unit (Australia)	1975	FZX 1057	-	HIF6	NZX 8009	AUC 1170	LZX 1028
B21A Power Unit (Sweden)	1975-76	FZX 1056	-	HIF6	NZX 8009	AUC 1170	LZX 1028
	1976-77	FZX 1259	-	HIF6	NZX 8009	AUC 1170	LZX 1028
B21A Power Unit (Canada)	1976-77	FZX 1267	-	HIF6	NZX 8009	JZX 1088	LZX 1028
(Canada) (Sweden)	1977	FZX 1290	-	HIF6	NZX 8009	AUC 1170	LZX 1028
(Canada)	1977	FZX 1291	-	HIF6	NZX 8009	JZX 1088	LZX 1028
(Canada)	1977	FZX 1293	-	HIF6	NZX 8009	AUC 1170	LZX 1028
B27A Power Unit	1975	FZX 1059	-	HIF6	NZX 8010	JZX 1088	LZX 1028
B27A Power Unit	1976	FZX 1205	-	HIF6	NZX 8010	JZX 1088	LZX 1028
B28A Power Unit	1981	FZX 1349	-	HIF6	NZX 8010	JZX 1088	LZX 1028
Snow Weasel	1976	FZX 1238F	F	HS6	AUD 1490	AUC 4387	AUD 9148
		FZX 1238R	R	HS6	AUD 1490	AUC 4387	AUD 9149
Snow Weasel	1976	FZX 1284F	F	HS6	AUD 1499	AUC 4387	AUD 9148
		FZX 1284R	R	HS6	AUD 1499	AUC 4387	AUD 9149
<b>WOLSELEY</b>							
Six (Man)	1975	AUD 546F	LH	HIF6	CUD 1136	AUC 4387	LZX 1028
		AUD 546R	RH	HIF6	CUD 1136	AUC 4387	LZX 1029
Six (Auto)	1975	AUD 581F	LH	HIF6	CUD 1136	AUC 4387	LZX 1028
		AUD 581R	RH	HIF6	CUD 1136	AUC 4387	LZX 1029
1300 MK II	1975	AUD 431L	LH	HS2	AUD 1468	AUC 4587	AUD 9141
		AUD 431R	RH	HS2	AUD 1468	AUC 4587	AUD 9142

# Part 5 Appendix 7

## Needle charts for SU carburetors

### Notes on needles

#### Needle selection

The applications list (Appendix 1, List A) details three alternative needles – Rich, Standard, Weak – for each application of carburettor to a particular car. These recommendations apply only to the installation as designed by the relevant vehicle manufacturer.

The standard needle should normally be used except in special circumstances.

The rich needle gives a richer mixture ratio, and therefore greater power, throughout its range.

The weak needles for carburettor specifications fitted with fixed needles are not economy needles – they are to compensate for operation at high altitudes. There is no guarantee that greater economy will result from their use at normal altitudes.

\* Needles marked thus are supplied with collar attached to shank for use as spring-loaded needles.

† The AAA needle is available without collar as a standard .090 needle and with collar for spring-loaded application.

### 0.090 Jet needles

	A5	AA	AB	AC	AC2	AD	AE		AK	AL	AM	AN	AO	AP	AQ
1	.089	.089	.089	.089	.089	.089	.089	1	.089	.089	.089	.089	.089	.089	.089
2	.085	.085	.085	.085	.085	.085	.085	2	.086	.085	.085	.0855	.085	.085	.085
3	.0826	.080	.080	.082	.082	.082	.081	3	.0825	.0816	.081	.0827	.082	.0817	.080
4	.080	.0767	.0785	.080	.080	.080	.078	4	.0795	.0796	.078	.0807	.0793	.0796	.076
5	.0782	.0735	.0768	.0783	.0783	.0780	.0763	5	.0786	.0781	.0753	.0787	.0766	.0777	.0724
6	.0765	.071	.075	.0765	.0765	.0760	.0754	6	.078	.077	.073	.077	.0737	.0765	.0694
7	.0746	.0689	.0732	.0746	.0746	.0740	.0745	7	.077	.076	.0704	.0753	.0705	.0752	.0668
8	.073	.0661	.0718	.073	.073	.0720	.0737	8	.0764	.0748	.068	.074	.0673	.0745	.0642
9	.0711	.0638	.0702	.071	.071	.070	.0728	9	.0755	.0738	.0655	.073	.064	.0736	.062
10	.0694	.0614	.0688	.0694	.0694	.0680	.0718	10	.0747	.0726	.063	.072	.0608	.0727	.060
11	.0676	.0591	.0671	.0676	.0676	.066	.071	11	.0738	.0715	.0606	.071	.0576	.072	.058
12	.066	.0566	.0657	.066	.066	.064	.070	12	.073	.0705	.0583	.070	.0544	.071	.0558
13		.054	.064	.064	.064	.062		13			.056	.069	.051		.0536

	AF	AG	AH	AH1	AH2	AI	AJ
1	.089	.089	.089	.089	.089	.089	.089
2	.085	.085	.0862	.086	.085	.085	.085
3	.0814	.0795	.083	.082	.082	.0817	.0815
4	.078	.0745	.0803	.079	.0794	.0798	.079
5	.0758	.0702	.0775	.0765	.077	.078	.0767
6	.0727	.0665	.0756	.075	.0748	.0765	.0745
7	.071	.063	.0733	.073	.0726	.075	.0723
8	.0695	.0598	.0711	.071	.0704	.0732	.0703
9	.068	.0567	.069	.069	.0683	.0712	.0683
10	.0665	.054	.067	.067	.0662	.0693	.0663
11	.065	.051	.065	.065	.064	.0685	.064
12	.0632	.0485	.063	.063	.062	.0675	.062
13		.046	.061	.061	.060		

	AR	AS	AT	AU	AV	AW	AX
1	.089	.089	.088	.089	.089	.090	.089
2	.085	.0845	.0856	.084	.085	.085	.0843
3	.082	.079	.0833	.0815	.0805	.0807	.0807
4	.0795	.075	.0809	.079	.0773	.078	.0775
5	.0771	.072	.0785	.0773	.0742	.0757	.075
6	.0748	.0692	.0761	.0755	.0717	.0735	.073
7	.073	.0665	.0738	.0737	.070	.0713	.071
8	.0712	.0635	.0714	.0717	.0675	.0693	.0692
9	.0696	.061	.069	.0698	.065	.0674	.0675
10	.068	.0586	.0666	.068	.0625	.0655	.066
11	.066	.056	.0643	.066	.060	.0637	.0645
12	.064	.0533	.0619	.064	.059	.0618	.063
13		.051			.058	.060	.0615

	AY	AZ	† AAA	* AAB	* AAC	* AAD	* AAE
1	.089	.089	.089	.089	.089	.089	.089
2	.085	.085	.085	.085	.0855	.0855	.085
3	.0805	.0815	.0814	.0824	.0835	.0827	.0833
4	.0768	.079	.0785	.0785	.0811	.0807	.0803
5	.0741	.0755	.0755	.0752	.0788	.0787	.0773
6	.072	.071	.072	.0715	.0765	.077	.0745
7	.0694	.0662	.0674	.067	.0742	.0753	.0715
8	.0669	.0615	.063	.061	.072	.074	.068
9	.0643	.0575	.060	.056	.0698	.073	.0653
10	.0617	.0532	.058	.0537	.0676	.072	.0627
11	.059	.0490	.056	.0516	.0655	.071	.060
12	.0565	.0445	.0540	.0493	.0631	.070	.059
13	.0538	.0405	.052	.047	.061	.069	.058
14			.050	.0448	.059	.068	.057
15			.048	.0448	.057	.067	.056
16			.046	.0448	.055	.066	.055

	* AAF	* AAG	* AAH	* AAJ	* AAK	* AAL	* AAM
1	.089	.089	.089	.089	.089	.089	.089
2	.0855	.085	.0855	.0855	.0855	.085	.085
3	.0827	.083	.0832	.0832	.0830	.83	.0824
4	.080	.080	.0812	.0812	.0807	.080	.0785
5	.0775	.0773	.0790	.0789	.0784	.0771	.0752
6	.075	.0745	.0764	.0770	.0760	.0745	.0715
7	.0715	.0715	.0736	.0747	.0735	.0715	.0673
8	.068	.0686	.0705	.0716	.0708	.068	.063
9	.0653	.0658	.0674	.0672	.0677	.0653	.059
10	.0627	.0647	.0644	.0640	.0645	.0627	.0567
11	.060	.0636	.0619	.0620	.0613	.060	.0543
12	.059	.0625	.0593	.0600	.0580	.059	.0519
13	.058	.0614	.0566	.0580	.0550	.058	.0496
14	.057	.0605	.0540	.0560	.0520	.057	.0472
15	.056	.0595	.0515	.0540	.0490	.056	.0448
16	.055	.0584	.0490	.0520	.0460	.055	.0448

	* AAN	* AAP	* AAQ	* AAR	* AAS	* AAT	* AAU
1	.089	.089	.089	.089	.089	.089	.089
2	.0855	.0855	.0855	.085	.085	.0855	.085
3	.0835	.0835	.0827	.0827	.083	.0832	.0828
4	.0815	.0811	.0801	.0795	.0802	.081	.0806
5	.0797	.0788	.0775	.077	.0775	.0784	.078
6	.0781	.077	.0754	.0745	.075	.076	.0745
7	.0767	.076	.0732	.0715	.0718	.0745	.071
8	.0757	.075	.0718	.0686	.0688	.0725	.0675
9	.0750	.074	.0701	.0658	.0665	.0706	.0647
10	.0745	.073	.0688	.0647	.0648	.0691	.062
11	.074	.072	.0672	.0636	.063	.0674	.059
12	.0735	.071	.0655	.0625	.0612	.0657	.056
13	.073	.070	.0642	.0614	.0596	.064	.053
14	.0725	.069	.0625	.0605	.0577	.0623	.050
15	.072	.068	.0612	.0595	.056	.0606	.047
16	.0715	.067	.0595	.0584	.0542	.0589	.044

	* AAV	* AAW	* AAX	* AAY	* AAZ	* ABA	* ABB
1	.089	.089	.089	.089	.089	.089	.089
2	.0855	.0855	.0855	.0855	.0855	.0855	.0855
3	.0835	.0832	.0833	.083	.0832	.0825	.083
4	.0815	.081	.081	.0807	.0805	.0802	.0807
5	.0792	.0788	.079	.0782	.0777	.0775	.0782
6	.0768	.0765	.0772	.0758	.0754	.075	.0758
7	.0746	.0742	.0758	.0744	.0732	.0718	.0745
8	.072	.0715	.075	.0732	.0718	.0688	.0725
9	.0698	.0683	.0745	.0723	.0701	.0665	.0708
10	.0674	.0652	.074	.0717	.0688	.0648	.0691
11	.065	.062	.0735	.0712	.0672	.063	.0674
12	.0627	.059	.073	.0707	.0655	.0612	.0657
13	.0602	.056	.0725	.0700	.0642	.0596	.064
14	.0578	.053	.072	.069	.0625	.0577	.0623
15	.0554	.050	.0715	.068	.0612	.056	.0606
16	.053	.047	.071	.067	.0595	.0542	.0589

	* ABC	* ABD	* ABE	* ABF	* ABG	* ABH	* ABJ
1	.089	.089	.089	.089	.089	.089	.089
2	.0855	.085	.085	.0855	.0855	.085	.085
3	.0827	.0828	.083	.0832	.0832	.0825	.083
4	.0810	.0803	.080	.0809	.0807	.079	.080
5	.077	.0765	.0775	.0785	.0784	.076	.0765
6	.076	.074	.0758	.0761	.0760	.073	.0725
7	.0745	.071	.0717	.0737	.0737	.0705	.0715
8	.0725	.0675	.0699	.0712	.0717	.0693	.0686
9	.0708	.0647	.0676	.0687	.0697	.0682	.0658
10	.0691	.062	.0653	.0664	.0677	.067	.0647
11	.0674	.059	.063	.0642	.0656	.0656	.0636
12	.0657	.056	.0612	.0618	.0635	.064	.0625
13	.064	.053	.0596	.0595	.0614	.063	.0614
14	.0623	.050	.0577	.0572	.0593	.062	.0605
15	.0606	.047	.056	.0550	.0572	.061	.0595
16	.0589	.044	.0542	.0525	.0500	.060	.0584

	* ABK	* ABL	* ABM	* ABN	* ABP	* ABQ	* ABR
1	.089	.089	.089	.089	.089	.089	.089
2	.0855	.0855	.0855	.0855	.0855	.0855	.0855
3	.0833	.0832	.0835	.0832	.0831	.0828	.0830
4	.0812	.0810	.0815	.0805	.0808	.0803	.0803
5	.0793	.0790	.0795	.0777	.0787	.0778	.0775
6	.0775	.0770	.0777	.0754	.0766	.0753	.0745
7	.0757	.0757	.0762	.0732	.0743	.0730	.0715
8	.0742	.0745	.075	.0712	.0722	.0707	.0681
9	.0728	.0737	.074	.0692	.0700	.0685	.0653
10	.0717	.0730	.073	.0672	.0685	.0660	.0620
11	.0704	.0723	.072	.0652	.0672	.0638	.0600
12	.0692	.0715	.071	.0632	.0659	.0615	.0590
13	.0680	.0709	.070	.0612	.0646	.0590	.0580
14	.0668	.0700	.069	.0592	.0633	.0570	.0570
15	.0656	.0694	.068	.0572	.062	.0550	.0560
16	.0644	.0686	.067	.0552	.0607	.0530	.0550

	* ABS	* ABT
1	.089	.089
2	.0855	.0855
3	.0835	.0833
4	.0814	.0810
5	.0789	.0785
6	.0765	.0763
7	.0746	.0747
8	.0728	.0734
9	.0713	.0722
10	.0692	.0711
11	.0674	.0700
12	.0656	.0689
13	.064	.0678
14	.062	.0666
15	.060	.0655
16	.058	.0645

	ABU	ABV	ABW	ABX	ABY	ABZ	ACA
1	.089	.089	.089	.089	.089	.089	.089
2	.0855	.0865	.0865	.085	.085	.0865	.0865
3	.0834	.0835	.0840	.0832	.0827	.0840	.0840
4	.0814	.0815	.0815	.0803	.0798	.0815	.0815
5	.0795	.0797	.0786	.0775	.0771	.0790	.0790
6	.0777	.0775	.0761	.0746	.0720	.0761	.0764
7	.0759	.0732	.0728	.0715	.0653	.0730	.0735
8	.0745	.0720	.0704	.0697	.0621	.0704	.0720
9	.0730	.0708	.0680	.0678	.0589	.0676	.0706
10	.0718	.0691	.0663	.0665	.0557	.0650	.0680
11	.0710	.0674	.0637	.0645	.0525	.0624	.0640
12	.0703	.0657	.0614	.0625	.0493	.0596	.0604
13	.0695	.0640	.0590	.0605	.0461	.0570	.0565
14	.0688	.0623	.0567	.0585	.0429	.0544	.0526
15	.0680	.0606	.0543	.0565	.0429	.0517	.0489
16	.0670	.0589	.0519	.0545	.0429	.0490	.0450

	ADT	ADU	ADV	ADW	ADX	ADY	ADZ
1	.089	.089			.089	.089	.089
2	.0855	.0855			.0855	.0856	.085
3	.0835	.0835			.0835	.0832	.0834
4	.0811	.0813			.081	.081	.0801
5	.0788	.0787			.0788	.0785	.0762
6	.077	.0752			.0738	.0765	.0732
7	.0756	.0732			.067	.075	.0702
8	.074	.0707			.061	.0734	.0687
9	.0734	.070			.0578	.072	.0672
10	.0727	.0677			.0548	.0707	.066
11	.0719	.0656			.053	.0691	.065
12	.071	.0635			.0516	.0679	.064
13	.0700	.0616			.050	.0665	.0627
14	.069	.0596			.0483	.065	.0616
15	.068	.0576			.0468	.0636	.0606
16	.067	.0553			.045	.062	.0595

	ACB	ACC	ACD	ACE	ADA	ADB	ADC
1	.089	.089	.089	.089	.089	.089	.089
2	.0865	.085	.085	.085	.0865	.0865	.085
3	.0840	.0834	.0828	.083	.0838	.0840	.0822
4	.0815	.0812	.0806	.0806	.0812	.0810	.0806
5	.0790	.0794	.0779	.0785	.0781	.0780	.0785
6	.0757	.0775	.0752	.0744	.0751	.0750	.0763
7	.0724	.0758	.0713	.0722	.0715	.0715	.0742
8	.0704	.0744	.068	.0709	.0691	.0678	.0720
9	.0675	.0728	.0665	.0698	.0649	.0642	.0700
10	.0640	.0715	.065	.0683	.0621	.0615	.0685
11	.0615	.0700	.0635	.067	.0591	.0586	.0672
12	.0590	.0685	.062	.0659	.0565	.0560	.0659
13	.0565	.0670	.0605	.0646	.0538	.0532	.0646
14	.0540	.0655	.059	.0633	.0509	.0505	.0633
15	.0515	.0640	.0575	.062	.0481	.0477	.0620
16	.0490	.0625	.056	.0607	.0455	.0450	.0607

	AEA	AEB	AEC	BA	BB
1	.089	.089	.090	.089	.089
2	.085	.0855	.087	.0856	.085
3	.0835	.0835	.0842	.0822	.0825
4	.0815	.0812	.0817	.0805	.080
5	.0797	.0787	.0790	.0794	.0775
6	.0781	.0762	.0757	.0777	.075
7	.0767	.0743	.0718	.0760	.0725
8	.0757	.0724	.0681	.0743	.070
9	.0750	.0708	.0645	.0727	.0675
10	.0745	.0691	.0610	.0710	.065
11	.0740	.0674	.0580	.0694	.0625
12	.0735	.0656	.0560	.0677	.060
13	.0730	.0640	.0523		.0575
14	.0725	.0620	.0497		
15	.0720	.0600	.0470		
16	.0715	.0580	.0445		

	ADD	ADE	ADF	ADG	ADH	ADJ	ADK
1	.089	.089	.089	.089	.089	.089	.089
2	.085	.0855	.085	.0855	.0855	.08725	.0865
3	.0828	.0832	.0822	.0833	.0835	.0844	.0838
4	.0803	.0807	.0803	.0808	.0811	.0824	.0812
5	.0778	.0787	.0775	.0780	.0783	.0803	.078
6	.0753	.0765	.0746	.0754	.0757	.0782	.0749
7	.0730	.0725	.0730	.0732	.0727	.0764	.0708
8	.0707	.0715	.0707	.0718	.0721	.0750	.0661
9	.0685	.0708	.0685	.0701	.0710	.0740	.0619
10	.0660	.0691	.0660	.0688	.0700	.0730	.0594
11	.0638	.0674	.0638	.0672	.069	.0722	.057
12	.0615	.0657	.0615	.0656	.068	.0715	.0546
13	.0590	.064	.059	.064	.067	.071	.0522
14	.0570	.0623	.057	.062	.066	.0705	.050
15	.0550	.0606	.055	.060	.065	.070	.0474
16	.0530	.0589	.053	.058	.064	.0695	.045

	BD	BE	BF	BG	BH	BI	BJ
1	.090	.089	.089	.089	.089	.089	.089
2	.0856	.084	.085	.085	.085	.0855	.0855
3	.0822	.0805	.082	.0815	.0812	.0808	.0824
4	.0805	.0773	.0796	.0782	.0775	.0777	.0794
5	.0794	.074	.0764	.0745	.0753	.0751	.0769
6	.0777	.0705	.072	.0695	.074	.073	.0749
7	.0760	.067	.068	.0647	.0731	.0714	.0734
8	.0750	.0634	.0635	.060	.0722	.0705	.0725
9	.0740	.060	.0691	.0657	.0714	.0701	.0721
10	.0730	.0565	.0549	.0515	.0705	.0697	.0717
11	.0720	.053	.0505	.0474	.0696	.0694	.0714
12	.0710	.0495	.0463	.043	.0688	.069	.071
13		.046	.042	.039	.068		

	ADL	ADM	ADN	ADP	ADQ	ADR	ADS
1	.089	.090	.090	.089	.090	.086	.089
2	.0855	.08675	.08725	.085	.08675	.0852	.085
3	.0838	.0837	.0845	.0833	.0838	.0843	.0838
4	.0812	.0812	.0825	.0813	.0813	.0826	.0811
5	.0781	.0787	.0802	.0783	.0788	.0806	.0768
6	.075	.076	.0779	.0748	.076	.0786	.0739
7	.071	.0735	.076	.0725	.0735	.0766	.0709
8	.0678	.0709	.0742	.0712	.0713	.074	.0691
9	.064	.0683	.0732	.0696	.0692	.0711	.0682
10	.0608	.0658	.0724	.0685	.067	.0681	.0655
11	.0584	.0632	.0716	.0675	.065	.0652	.065
12	.0557	.0605	.0708	.0656	.063	.0625	.064
13	.0531	.058	.0700	.064	.061	.0598	.0627
14	.0505	.0555	.0693	.062	.0593	.0572	.0616
15	.048	.053	.0685	.060	.0575	.0546	.0603
16	.0455	.050	.0678	.058	.056	.0521	.059

	BK	BL	BM	BN	BO	BP	BQ
1	.089	.089	.089	.089	.089	.089	.089
2	.0855	.0855	.0855	.0855	.0855	.085	.085
3	.0815	.081	.0805	.0816	.0835	.0814	.082
4	.0785	.0777	.0768	.0784	.0815	.078	.079
5	.0762	.075	.074	.0758	.080	.074	.075
6	.0738	.073	.072	.0738	.0787	.0715	.0725
7	.0722	.0715	.0705	.0724	.077	.0695	.0705
8	.0715	.0707	.0695	.0714	.0757	.0673	.0685
9	.071	.070	.0692	.0707	.075	.065	.0662
10	.0706	.0698	.0688	.0703	.074	.0625	.064
11	.0703	.0693	.0684	.0701	.073	.060	.0616
12	.070	.069	.068	.070	.072	.058	.0594
13	.0695	.0688		.071	.066	.067	

	BR	BS	BT	BU	BV	BW	BX
1	.089	.088	.088	.090	.089	.089	.089
2	.085	.0856	.0856	.085	.0845	.0855	.085
3	.0817	.0836	.0835	.080	.081	.0818	.0805
4	.0785	.0817	.0813	.077	.0785	.079	.077
5	.0757	.0798	.0792	.0745	.076	.0765	.075
6	.075	.0778	.0771	.072	.074	.0742	.0735
7	.0741	.076	.0749	.0695	.072	.0718	.072
8	.0735	.074	.0726	.0675	.070	.0693	.0705
9	.0728	.072	.0705	.0655	.068	.067	.0687
10	.072	.0701	.0684	.0625	.066	.0645	.067
11	.071	.0683	.0663	.0602	.064	.062	.0655
12	.070	.0664	.064	.058	.062	.0596	.064
13	.069			.056	.060	.057	

	BX1	BY	BZ	BB2	BB3	BB4	C
1	.089	.088	.088	.0890	.0890	.0890	.089
2	.085	.084	.0843	.085	.085	.085	.0845
3	.0827	.0805	.081	.081	.081	.081	.081
4	.081	.0775	.0752	.0787	.078	.078	.077
5	.0792	.0745	.0719	.0762	.075	.0742	.0742
6	.0777	.0725	.0686	.0735	.0718	.0706	.071
7	.076	.0709	.0653	.0712	.0687	.067	.0683
8	.075	.069	.0622	.0685	.0654	.0638	.066
9	.074	.067	.069	.0659	.0622	.0602	.0635
10	.073	.0653	.066	.0632	.0589	.0564	.0613
11	.072	.0635	.063	.0604	.0554	.0528	.0594
12	.071	.062	.060	.0577	.0526	.0495	.0575
13		.060	.047	.055	.0494	.046	.056

	CA	CB	CC	CD	CE	CF	CG
1	.089	.089	.089	.089	.089	.089	.090
2	.0855	.085	.085	.085	.085	.085	.084
3	.084	.0805	.081	.0815	.082	.083	.081
4	.0825	.077	.078	.0775	.0795	.0805	.079
5	.081	.0745	.075	.0735	.0777	.0787	.0765
6	.0807	.0725	.0725	.070	.076	.0767	.075
7	.0803	.071	.0698	.069	.0745	.0747	.0735
8	.0803	.0695	.067	.0678	.0735	.0727	.0722
9	.0803	.068	.064	.0666	.072	.0707	.0707
10	.0803	.0665	.061	.0654	.071	.0687	.0693
11	.0803	.065	.058	.0643	.0695	.0667	.0678
12	.0803	.0635	.055	.063	.0682	.0647	.0664
13	.0803	.062	.052	.062	.067		.065

	CH	CJ	CK	CL	CM	CN	CO
1	.090	.090	.090	.090	.088	.089	.089
2	.084	.084	.084	.084	.084	.085	.085
3	.0805	.0815	.081	.080	.0805	.0812	.081
4	.0782	.0795	.079	.0775	.0775	.078	.0787
5	.0767	.0775	.0775	.076	.074	.075	.0765
6	.076	.0761	.077	.075	.0718	.072	.0747
7	.0756	.0747	.0766	.0746	.070	.069	.073
8	.0752	.0734	.0762	.0742	.0685	.0665	.0725
9	.0747	.072	.0757	.0737	.0668	.064	.072
10	.0743	.0705	.0753	.0733	.0652	.062	.0717
11	.0738	.0692	.0749	.0728	.0635	.060	.0714
12	.0733	.0677	.0745	.0724	.062	.058	.071
13	.073	.0664	.074	.072	.060	.056	

	CP	CP4	CQ	CR	CS	CS1	CS2
1	.089	.088	.088	.088	.089	.089	.089
2	.085	.0852	.0852	.0852	.085	.085	.085
3	.0813	.0825	.0825	.083	.0822	.081	.081
4	.0793	.079	.0798	.0805	.0792	.077	.077
5	.0775	.0757	.0768	.078	.0765	.073	.073
6	.0757	.0725	.0737	.0754	.0725	.0692	.069
7	.074	.069	.0706	.0725	.0706	.066	.065
8	.0735	.0655	.0676	.0697	.069	.063	.0615
9	.073	.062	.0646	.067	.0672	.060	.058
10	.0725	.0585	.0615	.064	.0655	.057	.0546
11	.072	.0545	.0585	.0613	.0638	.054	.051
12	.0715	.051	.0555	.0585	.062	.051	.0475
13		.047	.0525	.0556	.0605	.048	.044

	CT	CU	CW	CX	CY	CZ	D1
1	.089	.089	.089	.089	.089	.089	.089
2	.085	.085	.085	.085	.085	.085	.085
3	.081	.0825	.081	.081	.080	.0827	.082
4	.077	.080	.079	.0796	.076	.0806	.0802
5	.0738	.0775	.078	.0788	.0738	.0785	.0793
6	.0706	.0735	.077	.078	.0715	.0745	.0785
7	.0675	.0715	.0763	.0771	.0695	.0727	.0776
8	.0643	.070	.0754	.0763	.068	.071	.077
9	.061	.0683	.0745	.0755	.067	.0693	.0764
10	.058	.0665	.0736	.0748	.066	.0675	.0759
11	.0547	.0647	.0727	.074	.0655	.0657	.0762
12	.0515	.0630	.0718	.073	.065	.064	.0748
13	.0485	.0610			.0645	.0625	

	D2	D3	D4	D6	D7	D8	D9
1	.089	.089	.089	.089	.089	.089	.089
2	.085	.085	.0855	.0855	.0855	.085	.0852
3	.0815	.083	.0825	.0825	.0817	.0817	.0825
4	.0800	.081	.0805	.0805	.0795	.0785	.0806
5	.0795	.080	.079	.0793	.0785	.0767	.0791
6	.0790	.0794	.078	.0785	.0778	.076	.0778
7	.0785	.0785	.0767	.0776	.077	.075	.0764
8	.0780	.0778	.0756	.077	.0765	.074	.075
9	.0775	.0772	.0745	.0764	.0759	.073	.0736
10	.0770	.0764	.0733	.0759	.0752	.072	.0723
11	.0765	.0757	.0721	.0752	.0747	.071	.071
12	.0760	.075	.071	.0748	.074	.070	.0696

	DA	DB	DC	DD	DE	DH	DJ
1	.089	.089	.089	.089	.089	.089	.089
2	.084	.085	.084	.0855	.0855	.085	.085
3	.082	.082	.082	.0835	.0825	.0822	.0822
4	.080	.080	.0805	.0817	.0802	.080	.0795
5	.0788	.078	.0796	.0798	.0772	.0775	.0765
6	.0784	.0753	.0794	.0782	.0745	.074	.073
7	.0780	.0717	.0792	.0767	.0734	.072	.071
8	.0776	.0674	.0790	.0762	.0729	.071	.070
9	.0773	.062	.0787	.0740	.0723	.070	.069
10	.0769	.0557	.0785	.0730	.0717	.069	.068
11	.0765	.0493	.0783	.0720	.0712	.068	.067
12	.0761	.043	.0780	.0710	.0707	.067	.066
13		.0368				.066	.065

	DK	DL	DM	DN	DP	DQ	DR
1	.089	.089	.089	.0885	.089	.089	.088
2	.085	.085	.084	.085	.085	.085	.085
3	.0817	.082	.081	.082	.081	.0815	.080
4	.0787	.0795	.0791	.080	.0777	.0785	.0768
5	.0755	.077	.0780	.0782	.075	.076	.0735
6	.072	.0745	.0775	.077	.0735	.073	.0705
7	.070	.0715	.0770	.076	.0723	.071	.0675
8	.069	.070	.0765	.075	.0715	.070	.065
9	.068	.0685	.0760	.074	.071	.069	.0635
10	.067	.067	.0755	.0728	.0703	.068	.0627
11	.066	.0655	.0750	.0717	.0698	.067	.0618
12	.066	.064	.0745	.0705	.069	.066	.0608
13	.064	.0625			.0688	.065	.060

	DS	DT	DU	DV	DW	DY	DZ
1	.089	.088	.089	.089	.089	.089	.089
2	.085	.084	.085	.084	.085	.085	.085
3	.0805	.081	.081	.0822	.0815	.079	.0827
4	.0776	.078	.0775	.081	.0795	.0765	.0795
5	.0769	.076	.0755	.0792	.0780	.074	.077
6	.074	.074	.074	.0781	.0765	.0715	.0745
7	.0725	.0723	.073	.078	.0752	.069	.0715
8	.071	.0712	.072	.078	.074	.0665	.070
9	.0695	.0709	.071	.078	.0728	.0643	.0685
10	.068	.0705	.070	.078	.0714	.062	.067
11	.067	.0703	.069	.078	.070	.061	.0655
12	.066	.0701	.068	.078	.0686	.060	.064
13		.070				.059	.0625

	E2	E21	E3	E31	E4	EA	EB
1	.088	.089	.088	.088	.088	.089	.089
2	.0845	.085	.0862	.0845	.084	.085	.0855
3	.081	.0826	.083	.0817	.080	.081	.0835
4	.0775	.0788	.0803	.079	.078	.078	.0815
5	.075	.0763	.0775	.076	.076	.075	.0795
6	.0725	.0736	.0747	.073	.0739	.072	.0777
7	.070	.0711	.072	.070	.0718	.0695	.0762
8	.0675	.0685	.0693	.0675	.0695	.067	.075
9	.0646	.066	.0665	.0646	.0673	.0645	.074
10	.0626	.064	.0638	.0626	.0631	.062	.073
11	.0605	.062	.062	.0605	.063	.0595	.072
12	.059	.060	.060	.059	.061	.057	.071
13	.057	.058	.0582	.057	.059	.0545	

	FD	FE	FF	FG	FH	FI	FJ
1	.088	.089	.089	.089	.089	.089	.090
2	.0865	.085	.0856	.085	.085	.085	.085
3	.084	.081	.0822	.0795	.082	.0825	.081
4	.0805	.0775	.079	.075	.080	.079	.0775
5	.078	.074	.0757	.071	.079	.076	.076
6	.076	.071	.072	.0678	.078	.073	.0745
7	.075	.0695	.0700	.065	.077	.0705	.0725
8	.074	.0686	.0672	.0625	.076	.0693	.071
9	.073	.0678	.0651	.060	.075	.0682	.070
10	.072	.0671	.0639	.058	.074	.067	.068
11	.071	.0664	.0622	.056	.073	.0656	.0665
12		.0657		.054	.072	.064	.065
13		.065		.052		.063	

	EC	ED	EE	EF	EG	EH	EI
1	.089	.089	.089	.089	.088	.089	.089
2	.085	.085	.085	.085	.085	.085	.085
3	.081	.0825	.080	.082	.080	.082	.081
4	.0775	.0805	.0777	.0795	.0768	.0805	.0775
5	.0740	.0785	.075	.077	.074	.0788	.073
6	.0705	.076	.0735	.074	.071	.0775	.069
7	.0675	.074	.072	.072	.0685	.077	.066
8	.0645	.072	.0715	.071	.0665	.077	.0635
9	.0625	.070	.0709	.070	.065	.077	.0618
10	.0605	.068	.0703	.069	.0637	.077	.060
11	.0585	.066	.0696	.068	.062	.077	.059
12	.0570	.064	.069	.067	.061	.077	.058
13	.0555	.062		.066	.060	.077	.057

	FK	FL	FM	FN	FO	FP	FQ
1	.089	.089	.090	.089	.089	.0898	.0890
2	.085	.085	.083	.085	.085	.0855	.0850
3	.083	.079	.0796	.081	.0818	.0826	.0820
4	.0812	.0765	.0772	.0775	.0785	.0799	.0795
5	.0796	.074	.075	.0735	.076	.0778	.0774
6	.0784	.0715	.0727	.069	.0745	.0762	.0758
7	.0772	.069	.0703	.066	.0731	.0754	.0745
8	.076	.0665	.068	.063	.0729	.0750	.0735
9	.0748	.065	.0657	.061	.0727	.0743	.0725
10	.0736	.065	.0635	.058	.0725	.0735	.0715
11	.0724	.065	.0612	.055	.0723	.0728	.0705
12	.0712		.060		.0721	.0720	.0695

	EJ	EK	EL	EM	EN	EO	EP
1	.089	.089	.089	.089	.089	.088	.089
2	.085	.085	.085	.085	.085	.085	.085
3	.0805	.0827	.080	.081	.0813	.0806	.0835
4	.076	.081	.0775	.078	.0778	.0773	.0815
5	.0715	.0792	.0747	.0763	.074	.0746	.0795
6	.068	.0777	.072	.0747	.0706	.072	.0775
7	.065	.0762	.070	.073	.068	.0697	.0755
8	.0625	.075	.068	.0725	.0657	.0677	.075
9	.0605	.075	.066	.072	.0643	.0668	.075
10	.059	.075	.064	.0715	.0632	.0659	.075
11	.058	.075	.062	.071	.062	.065	.075
12	.057	.075	.060	.0705	.061	.064	.075
13	.056		.058		.060	.063	

	FR	FS	FT	FU	FV	FW	FX
1	.089	.089	.089	.089	.089	.089	.089
2	.085	.085	.085	.085	.085	.085	.0855
3	.081	.0827	.082	.082	.083	.081	.0827
4	.078	.081	.0795	.080	.080	.0775	.080
5	.075	.0785	.0772	.078	.0773	.075	.0775
6	.0728	.076	.0753	.0763	.0745	.0725	.075
7	.0705	.075	.0738	.075	.0715	.070	.0715
8	.0685	.074	.0728	.074	.0686	.0675	.068
9	.0663	.073	.0724	.0733	.0658	.0665	.0653
10	.0642	.072	.072	.0728	.0647	.0665	.0627
11	.0622	.071	.072	.0724	.0636	.0665	.060
12	.060	.070	.072	.0714	.0625	.0665	.059
13					.0614	.0665	.058

	EQ	ER	ES	ET	EU	EV	EW
1	.089	.089	.089	.088	.089	.090	.089
2	.085	.085	.085	.086	.085	.0855	.085
3	.0817	.0833	.0818	.0845	.0825	.0815	.0825
4	.0785	.081	.079	.0825	.0805	.078	.081
5	.076	.0777	.077	.0803	.0785	.075	.079
6	.0746	.074	.0755	.0781	.077	.0725	.0775
7	.0732	.0725	.0748	.0773	.0755	.0705	.0755
8	.072	.0712	.074	.077	.0745	.069	.0745
9	.071	.0706	.073	.077	.074	.068	.074
10	.070	.0706	.073	.077	.074	.067	.074
11	.069	.0706	.073	.077	.074	.066	.074
12	.068		.073			.065	

	FY	FZ	G2	GA	GB	GC	GD
1	.090	.089	.0875	.089	.089	.089	.089
2	.085	.085	.0835	.085	.085	.085	.085
3	.081	.0813	.081	.0795	.082	.083	.0833
4	.0775	.0789	.0785	.077	.0795	.080	.081
5	.075	.077	.0765	.074	.0771	.0773	.079
6	.0735	.0756	.0745	.0715	.0748	.0740	.0766
7	.072	.0748	.0725	.069	.073	.0705	.0753
8	.071	.074	.0705	.067	.0712	.0665	.0743
9	.070	.0735	.069	.065	.0696	.0630	.0738
10	.068	.073	.0674	.0632	.0685	.0605	.0738
11	.066	.0725	.066	.0615	.068	.0590	.0738
12	.064	.072	.0642	.0597	.067	.0575	.0738
13	.062			.058		.0560	

	EX	EX/1	EY	EZ	FA	FB	FC
1	.088	.088	.088	.088	.089	.089	.090
2	.0862	.0865	.0855	.0865	.085	.085	.0865
3	.0835	.084	.0835	.0838	.081	.0806	.083
4	.081	.0816	.0812	.0798	.077	.0767	.0795
5	.0785	.0794	.0789	.0775	.072	.0729	.076
6	.076	.077	.0741	.0751	.067	.070	.073
7	.0735	.0745	.0716	.0737	.063	.0687	.071
8	.071	.072	.0708	.0726	.060	.0676	.070
9	.0685	.0698	.0704	.0716	.0585	.0667	.069
10	.066	.0675	.0701	.0706	.0576	.0658	.068
11	.0635	.065	.0698	.0696	.0567	.065	.067
12	.061	.0627			.056	.0643	.066
13	.058	.0602			.055	.0635	.065

	GE	GE/R	GF	GG	GH	GI	GJ
1	.089	.089	.089	.089	.089	.089	.089
2	.0845	.085	.085	.087	.0845	.085	.084
3	.082	.0825	.0795	.0845	.082	.0825	.0817
4	.0793	.0795	.077	.0825	.0786	.079	.0792
5	.0766	.076	.0745	.0808	.0753	.075	.0770
6	.0739	.0725	.073	.079	.0695	.0715	.0745
7	.0712	.069	.072	.078	.0635	.069	.0717
8	.0686	.066	.0715	.077	.0586	.067	.0696
9	.0656	.064	.071	.0758	.0570	.0665	.0675
10	.0643	.062	.0703	.0745	.0565	.0665	.0654
11	.0627	.0615	.0696	.0732	.0565	.0665	.0632
12	.0627	.061	.069	.072	.0565	.0665	.0611
13	.0627	.0605					.059

	GL	GM	GN	GO	GP	GR	GS
1	.089	.089	.089	.089	.089	.089	.089
2	.084	.086	.0855	.086	.085	.085	.085
3	.082	.0842	.0835	.0845	.080	.082	.0815
4	.0795	.0817	.081	.0825	.076	.079	.0785
5	.0772	.0782	.078	.0792	.075	.077	.0755
6	.075	.0770	.0755	.0777	.0725	.075	.0725
7	.0727	.0758	.0725	.0765	.0696	.073	.070
8	.0706	.0750	.070	.0755	.0666	.071	.0675
9	.0685	.0745	.0675	.0750	.0636	.069	.0650
10	.0664	.0740	.0650	.0745	.0606	.067	.0625
11	.0642	.0735	.0625	.0740	.0577	.065	.060
12	.0621	.0730	.060	.0735	.055	.063	.0575
13	.060		.0575	.0730	.052	.061	.055

	GT	GU	GV	GW	GX	GY	GZ
1	.089	.089	.089	.089	.089	.089	.089
2	.085	.0855	.0855	.085	.0855	.0855	.0855
3	.082	.083	.0836	.083	.0835	.0832	.0835
4	.0795	.0805	.082	.080	.0815	.0812	.0811
5	.077	.0775	.0804	.0775	.0795	.079	.0788
6	.0745	.0745	.080	.076	.0775	.077	.0765
7	.071	.0705	.0796	.0745	.0755	.0753	.0742
8	.0675	.067	.0793	.073	.0735	.074	.072
9	.0640	.0635	.0793	.0715	.072	.073	.0698
10	.0605	.060	.0793	.070	.070	.072	.0676
11	.0570	.0565	.0793	.0685	.068	.071	.0655
12	.0535	.053	.0793	.067	.066	.070	.0631
13	.050		.0793	.066	.064	.069	.061

	H1	H2	H4	H6	HA	HB	HC
1	.088	.088	.089	.089	.089	.089	.089
2	.085	.085	.085	.0855	.085	.085	.0855
3	.082	.082	.081	.082	.0825	.0825	.0822
4	.0792	.0792	.0778	.080	.0805	.0805	.0805
5	.0762	.0762	.076	.078	.0785	.0785	.0785
6	.0735	.0735	.0741	.076	.077	.0776	.077
7	.0707	.0707	.072	.074	.0756	.0764	.0755
8	.0686	.0684	.0702	.072	.074	.0752	.0751
9	.0665	.0661	.0683	.070	.0727	.0743	.0747
10	.0644	.0638	.0663	.068	.0711	.0732	.0743
11	.0622	.0615	.064	.066	.0698	.072	.0739
12	.0601	.0592	.062	.064	.068	.071	.0735
13	.058	.057			.067	.070	

	HD	HE	HF	HG	HV2	HV3	HV4
1	.089	.090	.090	.089	.089	.089	.089
2	.0855	.0845	.0845	.0845	.084	.084	.084
3	.0825	.0817	.082	.0823	.080	.080	.080
4	.081	.080	.0805	.0802	.0778	.078	.0782
5	.0795	.0787	.0797	.0782	.0756	.076	.0764
6	.078	.078	.079	.0753	.0734	.074	.0746
7	.0766	.0776	.0787	.0737	.0712	.072	.0728
8	.0762	.0772	.0784	.072	.069	.070	.071
9	.0758	.0769	.078	.070	.0668	.068	.0692
10	.0754	.0766	.0776	.068	.0646	.066	.0674
11	.0751	.0763	.0774	.066	.0626	.064	.0656
12	.0748	.0759	.077	.064	.0602	.062	.0638
13		.0755	.0766	.062	.058	.060	.062

	JM	L	L11	L12	LS
1	.089		.089	.089	.088
2	.085		.085	.084	.085
3	.081		.081	.0801	.081
4	.078		.079	.0772	.078
5	.0752		.077	.0745	.0755
6	.0729		.075	.0722	.073
7	.0702		.0735	.0702	.068
8	.068		.072	.0675	.0658
9	.0653		.071	.065	.065
10	.0627		.070	.0625	.0625
11	.060		.069	.060	.059
12	.059		.068	.0575	.057
13	.058			.055	.055

	LS1	M	M1	M2	M5	M6
1	.088	.089	.089	.089	.089	.089
2	.085	.0855	.085	.085	.085	.085
3	.080	.0832	.0817	.0817	.0817	.0817
4	.0765	.0808	.0796	.080	.0792	.0801
5	.073	.0785	.0777	.0785	.0776	.0786
6	.071	.0763	.0757	.0765	.076	.077
7	.0698	.0745	.0737	.0745	.0745	.0754
8	.0678	.0726	.0717	.0725	.0729	.0738
9	.066	.0707	.0698	.0705	.0712	.0723
10	.064	.0688	.0678	.0688	.0696	.0707
11	.062	.0669	.0659	.0669	.068	.0691
12	.060	.065	.064	.0665	.0666	.0676
13	.058					

	M7	M8	M9	MA	MB	MME	MO
1	.089	.089	.089	.089	.089	.089	.089
2	.085	.086	.085	.085	.085	.085	.0855
3	.0822	.0827	.0827	.0817	.0815	.0813	.0835
4	.0807	.0812	.081	.0795	.079	.078	.0815
5	.0792	.0797	.0792	.078	.0767	.074	.080
6	.0777	.0782	.0777	.0765	.074	.0707	.07875
7	.0762	.0767	.0762	.075	.0715	.0673	.0775
8	.0747	.0752	.0747	.0735	.068	.0636	.07625
9	.0732	.0737	.0732	.072	.0653	.060	.075
10	.0717	.0722	.0717	.0705	.0627	.0563	.07375
11	.0702	.0707	.0702	.069	.060	.053	.0725
12	.0687	.0692	.0687	.0675	.059	.0495	.07125
13					.058	.046	

	MOW	MW	1	2	3	4
1	.089	.089	.089	.089	.089	.089
2	.0855	.0855	.085	.085	.085	.085
3	.0837	.084	.0814	.0814	.0814	.0814
4	.082	.0825	.0785	.0785	.0785	.0785
5	.0808	.0813	.077	.0767	.0765	.0761
6	.0795	.0803	.0755	.0749	.0744	.0737
7	.0783	.0792	.074	.0732	.0723	.0714
8	.077	.078	.0725	.0714	.0703	.0692
9	.0758	.0768	.071	.0696	.0683	.0668
10	.0745	.0757	.0695	.0678	.0661	.0645
11	.0732	.0746	.068	.066	.064	.062
12	.072	.0735	.067	.065	.063	.061
13			.066	.064	.062	.060

	5	6	7	20	21	24	24A
1	.089	.089	.089	.089	.089	.088	.088
2	.085	.085	.085	.0855	.0855	.0845	.0845
3	.0814	.0814	.0814	.0822	.0827	.0815	.0815
4	.0785	.0785	.0785	.0792	.080	.0785	.0785
5	.0758	.0755	.0755	.076	.0775	.0755	.076
6	.0733	.0725	.072	.073	.075	.0725	.0738
7	.0705	.0696	.0686	.0703	.0723	.0702	.0716
8	.068	.0666	.065	.0677	.0697	.0682	.0698
9	.0653	.0636	.062	.0647	.0671	.0667	.068
10	.0627	.0606	.0587	.0624	.0646	.065	.066
11	.060	.0577	.0553	.060	.0628	.0636	.064
12	.059	.055	.052	.058	.0608	.0625	.062
13	.058	.052	.049	.056	.059	.061	.060

	24B	61	62	69	80	81
1	.088	.089	.089	.089	.089	.089
2	.0845	.085	.085	.085	.085	.085
3	.0815	.0805	.081	.0805	.080	.080
4	.0795	.0775	.078	.0785	.078	.077
5	.0775	.0745	.075	.0765	.0758	.0742
6	.0755	.0725	.0734	.075	.0733	.0719
7	.0735	.0709	.0719	.074	.0705	.0699
8	.0715	.069	.070	.073	.068	.068
9	.0695	.067	.0685	.072	.0653	.0653
10	.0675	.0653	.067	.071	.0627	.0627
11	.0655	.0635	.065	.070	.060	.060
12	.0635	.062	.0635	.069	.059	.059
13	.0615	.060	.062		.058	.058

	O7	P4	P6	P61	PJ
1	.089	.088	.088	.088	.089
2	.085	.0845	.0845	.0845	.085
3	.0815	.081	.081	.081	.0822
4	.0795	.0785	.0775	.077	.0807
5	.078	.0755	.0738	.0746	.0795
6	.077	.073	.0703	.0715	.079
7	.076	.070	.067	.0684	.0785
8	.075	.0675	.0638	.0653	.078
9	.074	.0645	.0603	.062	.0775
10	.073	.06175	.057	.059	.077
11	.072	.059	.054	.056	.0765
12	.071	.0562	.0505	.053	.076
13		.0535	.0473	.050	

	S6	TB	V2	V3	VS
1	.089	.089	.089	.089	.089
2	.085	.085	.085	.085	.085
3	.0805	.081	.082	.0826	.081
4	.077	.078	.0795	.0804	.077
5	.0743	.075	.0775	.0783	.0748
6	.0715	.073	.0756	.0764	.0725
7	.069	.071	.0738	.0746	.071
8	.0666	.0698	.0718	.0726	.0695
9	.064	.0678	.0698	.0706	.068
10	.062	.066	.0678	.0686	.0665
11	.059	.064	.0658	.0666	.065
12	.0568	.062	.064	.0646	.0635
13	.0545	.060			

	QA	QW	R3	R6	R32	RLB
1	.089	.089	.089	.089	.088	.089
2	.085	.085	.085	.085	.084	.085
3	.082	.0825	.0805	.081	.0805	.081
4	.0796	.0802	.0776	.077	.0776	.077
5	.077	.0780	.0759	.0732	.0759	.0732
6	.0745	.0755	.074	.070	.074	.0693
7	.072	.0731	.0722	.0665	.0722	.066
8	.0695	.0708	.0703	.063	.0703	.0626
9	.0668	.0685	.0687	.060	.0687	.0592
10	.0642	.066	.067	.057	.067	.056
11	.0615	.0636	.065	.054	.065	.0526
12	.059	.0613	.0632	.051	.0632	.0495
13	.0565	.059		.048		.046

	W3	WX	WX1
1	.088	.089	.089
2	.083	.085	.085
3	.0805	.0814	.082
4	.078	.0785	.0795
5	.0763	.0775	.0777
6	.0745	.0765	.0765
7	.073	.0755	.0755
8	.071	.0746	.0746
9	.0694	.0736	.0736
10	.0677	.0728	.0728
11	.066	.0718	.0718
12	.065	.0709	.0709

	RLS	RO	RS	S	S4	S5
1	.089	.089	.089	.089	.0895	.0895
2	.085	.085	.085	.085	.0852	.0852
3	.0804	.081	.0823	.0822	.082	.0815
4	.076	.077	.081	.0806	.079	.078
5	.0725	.074	.0803	.079	.0765	.0753
6	.0692	.071	.0795	.0774	.0744	.073
7	.066	.0685	.0786	.0758	.0722	.0707
8	.0626	.066	.078	.074	.070	.0684
9	.0592	.0633	.0775	.0724	.0677	.0663
10	.056	.0605	.077	.0708	.0656	.0639
11	.0526	.058	.0765	.069	.0634	.0616
12	.0495	.0568	.076	.0675	.0612	.0593
13	.046	.053			.059	.057

0.100 Jet needles

	A9	AKN
1	.098	.099
2	.0946	.0962
3	.0913	.0933
4	.088	.0905
5	.085	.087
6	.0834	.082
7	.0818	.0782
8	.0802	.0747
9	.0787	.0718
10	.077	.069
11	.0755	.066
12	.074	.063
13	.0722	.060
14	.0706	.057
15		.054
16		.051

	BAW	BAX	BAY	BAZ	BBA	BBB	BBC
1	.099	.099	.099	.099	.099	.099	.099
2	.095	.0958	.0956	.0952	.0957	.0956	.095
3	.0918	.0926	.0926	.0926	.0934	.0926	.093
4	.0887	.0896	.0895	.0896	.0899	.0896	.0902
5	.086	.0861	.0858	.0866	.0861	.0865	.0873
6	.0827	.0814	.0815	.0820	.0826	.0815	.0848
7	.0799	.0774	.0774	.0781	.0791	.0774	.0820
8	.0774	.0742	.0742	.0751	.0757	.0742	.0752
9	.0755	.0718	.0718	.0727	.0723	.0718	.0687
10	.0735	.0694	.0694	.0703	.0688	.0694	.0620
11	.0715	.0673	.0673	.0678	.0653	.0673	.0554
12	.070	.0652	.0652	.0654	.0618	.0652	.0487
13	.069	.063	.063	.0629	.0584	.063	.042
14	.068	.061	.061	.0605	.0550	.061	.042
15	.067	.059	.059	.058	.0516	.059	.042
16	.065	.057	.057	.056	.0482	.057	.042

	BC	BAA	BAB	BAC	BAD	BAE	BAF
1	.099	.099	.099	.099	.099	.099	.099
2	.095	.095	.095	.095	.095	.095	.095
3	.091	.0925	.0924	.0932	.0928	.0915	.093
4	.088	.0895	.0897	.0907	.090	.0885	.0905
5	.085	.087	.0876	.0875	.0873	.0860	.0875
6	.0825	.085	.0858	.0852	.0852	.0840	.0832
7	.0803	.0823	.084	.0823	.083	.0815	.080
8	.0785	.0792	.0822	.0763	.0808	.0790	.0768
9	.0765	.076	.0803	.0703	.0782	.0768	.0738
10	.075	.0729	.0784	.0642	.0755	.0743	.0709
11	.073	.0697	.0759	.058	.073	.0729	.0677
12	.072	.0665	.0734	.052	.0702	.0715	.0646
13	.071	.0633	.071	.046	.0675	.0700	.0616
14	.070	.060	.069	.040	.065	.0685	.0584
15		.0567	.067	.040	.0624	.0670	.0554
16		.0534	.065	.040	.0598	.0655	.0523

	BBD	BBE	BBF	BBG	BBH	BBJ	BBK
1	.099	.099	.099	.099	.099	.099	.099
2	.095	.095	.095	.095	.095	.095	.095
3	.092	.093	.0929	.0932	.092	.0932	.092
4	.090	.0905	.0905	.0905	.090	.0905	.089
5	.088	.0882	.0877	.0878	.0879	.0877	.086
6	.0862	.085	.0845	.0852	.0853	.0855	.0827
7	.0844	.082	.0813	.0829	.082	.0827	.0799
8	.0825	.078	.0795	.0806	.079	.0798	.0780
9	.0818	.0757	.0777	.0783	.0755	.077	.0767
10	.0808	.0733	.0761	.076	.0725	.074	.0753
11	.0798	.071	.0744	.0737	.0698	.0712	.0740
12	.0788	.069	.072	.0713	.0668	.0683	.0727
13	.0778	.067	.0695	.069	.0638	.0655	.0713
14	.0768	.065	.067	.0668	.0608	.0627	.0700
15	.0758	.063	.0647	.0644	.0578	.0598	.0687
16	.0748	.061	.0623	.0622	.0548	.057	.0675

	BAG	BAH	BAJ	BAK	BAL	BAM	BAN
1	.099	.0995	.099	.099	.0972	.099	.099
2	.095	.0967	.095	.095	.0957	.095	.095
3	.0926	.0939	.0932	.0932	.0926	.0915	.0925
4	.090	.0909	.0905	.0907	.0898	.088	.0905
5	.0873	.0881	.0877	.0875	.0870	.0848	.0882
6	.0845	.0848	.0845	.0852	.0826	.0821	.0853
7	.081	.0781	.081	.0823	.0787	.0796	.082
8	.0782	.074	.0782	.0792	.0752	.0773	.079
9	.0758	.0703	.0758	.076	.0727	.0790	.0755
10	.0735	.0677	.0735	.0729	.0703	.0730	.0725
11	.0713	.0661	.0713	.0697	.0678	.0713	.0698
12	.069	.0649	.069	.0665	.0653	.0692	.0668
13	.067	.0636	.067	.0633	.0629	.0672	.0638
14	.0648	.0624	.0648	.060	.0605	.0650	.0608
15	.0625	.0618	.0625	.0568	.0580	.0630	.0578
16	.0603	.0618	.0603	.0536	.0555	.0610	.0548

	BBL	BBM	BBN	BBP	BBQ	BBR	BBS
1	.099	.099	.099	.099	.099	.099	.099
2	.095	.095	.095	.095	.095	.095	.095
3	.0925	.093	.0925	.0912	.093	.0926	.0915
4	.0893	.0905	.0905	.0886	.0908	.0902	.0885
5	.0862	.087	.0874	.0859	.0877	.0881	.0870
6	.083	.0843	.0862	.0832	.0852	.0861	.0850
7	.0825	.0795	.0846	.0803	.0813	.0840	.0823
8	.082	.075	.083	.0775	.0795	.0825	.0806
9	.0818	.074	.082	.0752	.0777	.0810	.0792
10	.0808	.073	.0805	.0727	.076	.0788	.0777
11	.0798	.071	.080	.0710	.0744	.0770	.0763
12	.0788	.069	.079	.0689	.072	.0750	.0748
13	.0778	.067	.078	.0669	.0695	.0730	.0734
14	.0768	.065	.077	.0647	.067	.0710	.0719
15	.0758	.063	.076	.0627	.0647	.0690	.0709
16	.0748	.061	.075	.0607	.0623	.0670	.0689

	BAP	BAQ	BAR	BAS	BAT	BAU	BAV
1	.099	.099	.099	.099	.099	.099	.0995
2	.0962	.095	.095	.095	.095	.095	.0967
3	.0934	.093	.0915	.0925	.0918	.0925	.0939
4	.0899	.0905	.0895	.0905	.0887	.0893	.0909
5	.0861	.088	.0877	.088	.086	.0862	.0881
6	.0826	.0845	.0853	.0845	.084	.083	.0851
7	.0791	.0810	.0820	.081	.0815	.080	.080
8	.0757	.0787	.079	.0787	.0790	.078	.0757
9	.0723	.0767	.0755	.0767	.0768	.077	.0727
10	.0688	.0745	.0725	.0745	.0743	.0764	.070
11	.0653	.0725	.0698	.0725	.0729	.0758	.0682
12	.0618	.0705	.0668	.0705	.0715	.0752	.0667
13	.0584	.0685	.0638	.0685	.070	.0747	.0655
14	.0550	.0665	.0608	.0665	.0685	.0740	.0645
15	.0516	.0645	.0578	.0645	.067	.0734	.0635
16	.0482	.0625	.0548	.0625	.0655	.0728	.0625

	BBT	BBU	BBV	BBW	BBX	BBY	BBZ
1	.099	.099	.099	.099	.099	.099	.098
2	.096	.095	.095	.095	.095	.095	.0955
3	.0932	.0932	.0932	.0923	.0932	.0915	.0924
4	.0903	.0907	.0907	.090	.0905	.0882	.0892
5	.0877	.0876	.0875	.0870	.0875	.0867	.0862
6	.0850	.0859	.0852	.0832	.0852	.0848	.0819
7	.0827	.0840	.0829	.0792	.0829	.0821	.0780
8	.0807	.0822	.0805	.0750	.0806	.0803	.0751
9	.0792	.0805	.0773	.0717	.0782	.0790	.0713
10	.0778	.0788	.0742	.0682	.0755	.0775	.0678
11	.0765	.0770	.0710	.0647	.0730	.0761	.0653
12	.0753	.0752	.0679	.0610	.0702	.0746	.0629
13	.0740	.0734	.0648	.0577	.0675	.0732	.0605
14	.0725	.0718	.0617	.0540	.0650	.0717	.0580
15	.0713	.0700	.0595	.0505	.0624	.0707	.0560
16	.0700	.0680	.0552	.0470	.0598	.0687	.0540

	BCA	BCB	BCC	BCD	BCE	BCF	BCG
1	.099	.099	.099	.1000	.099	.099	.099
2	.0955	.095	.095	.0960	.095	.095	.095
3	.093	.0912	.0924	.0930	.090	.093	.0914
4	.0897	.0886	.0897	.0902	.0872	.0899	.0886
5	.0854	.0859	.0855	.0872	.0835	.0858	.0837
6	.0795	.0841	.0820	.0843	.0795	.0825	.0786
7	.073	.0823	.0800	.0814	.0768	.0784	.0736
8	.0676	.0806	.079	.0786	.0740	.0739	.0665
9	.0639	.0792	.0775	.0757	.0705	.0674	.0582
10	.0575	.0777	.077	.0727	.0675	.0623	.0493
11	.0519	.0763	.0759	.0700	.0645	.0577	.0414
12	.0498	.0749	.0734	.067	.0615	.0533	.0331
13	.045	.0734	.0710	.064	.0585	.0502	.0331
14	.040	.0719	.0690	.061	.0555	.0472	.0331
15	.040	.0709	.0670	.058	.0525	.0444	.0331
16	.040	.0689	.0650	.055	.0495	.0444	.0331

	BDE	BDF	BDG	BDH	BDJ	BDK	BDL
1	.099	.099	.0992		.0988	.0964	.099
2	.095	.095	.0964		.0955	.0950	.0955
3	.0923	.0931	.0936		.0933	.0930	.0924
4	.090	.0909	.0909		.0904	.0899	.0893
5	.0879	.0886	.0881		.0878	.0858	.0865
6	.0853	.0866	.0848		.0841	.0825	.0834
7	.082	.0878	.0781		.0799	.0784	.0798
8	.079	.0868	.074		.0763	.0739	.0774
9	.0755	.0863	.0703		.0729	.0674	.0743
10	.0725	.0857	.0671		.0676	.0623	.071
11	.0698	.0851	.065		.0616	.0577	.068
12	.0668	.0840	.063		.0540	.0533	.065
13	.0638	.0830	.061		.0490	.0502	.062
14	.0608	.0820	.059		.0450	.0472	.059
15	.0578	.0810	.057		.0450	.0442	.056
16	.0548	.0800	.056		.0450	.0412	.053

	BCH	BCJ	BCK	BCL	BCM	BCN	BCP
1	.099	.0995	.099	.099	.099	.099	.099
2	.095	.0967	.0953	.095	.096	.096	.095
3	.092	.0939	.0922	.093	.0932	.0932	.0929
4	.0892	.0909	.0903	.0902	.0905	.0905	.0905
5	.0863	.0881	.0881	.0873	.0882	.088	.0881
6	.0833	.0848	.0832	.0848	.0860	.0857	.0858
7	.0800	.0781	.080	.0813	.0842	.0837	.0835
8	.0772	.0740	.0768	.0795	.0827	.082	.0804
9	.0745	.0703	.0738	.0777	.0815	.0805	.0793
10	.0722	.0671	.0709	.076	.0806	.0794	.0781
11	.0700	.0650	.0677	.0744	.0797	.0786	.0759
12	.0678	.0630	.0646	.072	.0790	.078	.0737
13	.0656	.0610	.0616	.0695	.0785	.0775	.0715
14	.0634	.0590	.0584	.067	.0780	.077	.0693
15	.0612	.0570	.0554	.0647	.0775	.0765	.0671
16	.0592	.0560	.0523	.0623	.0770	.076	.0649

	BDM	BDN	BDP	BDQ	BDR	BDS	BDT
1	.099	.099	.099	.099	.099	.099	.099
2	.0955	.095	.095	.096	.095	.095	.095
3	.0927	.094	.0924	.0932	.092	.0931	.0927
4	.0900	.0917	.0897	.0905	.0895	.0904	.0898
5	.0874	.0887	.0866	.0883	.087	.0879	.0873
6	.0846	.0847	.0837	.0863	.0837	.0851	.0858
7	.0822	.0808	.0803	.0847	.0805	.0826	.0815
8	.0805	.0757	.0745	.0831	.0760	.078	.0792
9	.079	.0723	.0685	.0818	.0715	.0701	.0772
10	.0777	.0688	.0636	.0805	.0670	.0621	.072
11	.0765	.0653	.0585	.079	.0625	.0543	.069
12	.0753	.0618	.0538	.077	.058	.0505	.0658
13	.074	.0584	.0487	.075	.0535	.047	.0627
14	.0728	.055	.0444	.073	.049	.0435	.0597
15	.0715	.0516	.0444	.071	.0445	.0435	.0566
16	.0703	.0482	.0444	.069	.040	.0435	.0534

	BCQ	BCR	BCS	BCT	BCU	BCV	BCW
1	.099	.099	.099	.099	.099	.0995	.099
2	.095	.095	.095	.095	.095	.0962	.095
3	.0914	.0927	.093	.0926	.0923	.0933	.0926
4	.0886	.0907	.091	.0902	.090	.0904	.0902
5	.0860	.0888	.0885	.0881	.0883	.0875	.0879
6	.0835	.0868	.085	.0845	.0845	.0832	.0844
7	.0802	.0828	.0811	.0805	.0813	.0788	.0815
8	.0780	.0800	.0795	.0787	.0793	.0746	.0795
9	.0758	.0770	.0775	.0771	.0777	.0687	.0775
10	.0733	.0742	.0755	.0755	.0761	.0637	.0755
11	.0714	.0719	.0735	.074	.0744	.0571	.0735
12	.0692	.0690	.0715	.0725	.072	.0497	.0716
13	.0672	.0664	.0695	.071	.0695	.0445	.0695
14	.0652	.0637	.067	.0695	.067	.0445	.0671
15	.0632	.0610	.065	.068	.0647	.0445	.0655
16	.0612	.0583	.063	.066	.0623	.0445	.0635

	BDU	BDV	BDW	BDX	BDY	BDZ	BEA
1	.099	.099	.099	.099	.099	.099	.099
2	.0973	.097	.0963	.0962	.096	.0955	.0955
3	.0945	.0934	.0945	.0944	.094	.0935	.0935
4	.0922	.0906	.0924	.0922	.092	.0906	.0907
5	.0903	.088	.0897	.0899	.0897	.0878	.0874
6	.0887	.0855	.0855	.0865	.0855	.0852	.0845
7	.0872	.0837	.0824	.0835	.0824	.0829	.082
8	.0858	.0816	.0801	.0817	.0801	.0809	.0798
9	.0848	.0794	.0789	.0798	.0788	.0792	.0776
10	.0839	.077	.0775	.079	.0778	.0777	.0755
11	.0833	.0748	.0763	.0782	.0768	.0759	.0734
12	.0829	.0728	.075	.0773	.0759	.0735	.0715
13	.0825	.0708	.074	.0766	.0749	.0716	.0695
14	.0822	.0688	.0728	.0757	.0738	.0706	.0687
15	.0819	.0668	.0716	.075	.0728	.070	.068
16	.0815	.0648	.0704	.0741	.072	.0691	.0673

	BCX	BCY	BCZ	BDA	BDB	BDC	BDD
1	.099	.099	.099	.099	.099	.0990	.099
2	.095	.096	.096	.095	.0955	.0955	.0962
3	.0924	.0932	.0932	.0918	.0932	.0926	.0937
4	.0897	.0911	.0905	.0888	.0912	.0898	.0907
5	.086	.0891	.0875	.0859	.0895	.0871	.085
6	.0835	.0874	.0836	.0832	.0880	.0844	.0795
7	.081	.086	.0808	.0803	.0865	.0816	.0753
8	.0785	.085	.0789	.0775	.0853	.0797	.072
9	.0775	.0841	.0763	.0752	.0844	.0777	.0694
10	.077	.0835	.0736	.0727	.0837	.0762	.0673
11	.0765	.083	.071	.0710	.0830	.0748	.0653
12	.076	.0827	.069	.0689	.0828	.0733	.0635
13	.0775	.0823	.067	.0659	.0824	.0717	.0618
14	.075	.0818	.065	.0647	.0820	.0703	.0602
15	.0745	.0815	.063	.0627	.0817	.0687	.0585
16	.074	.081	.061	.0607	.0813	.0673	.057

	BEB	BEC	BED	BEE	BEF	BEG	BEH
1	.109	.100	.099	.099	.099	.100	.099
2	.09725	.09725	.0974	.0956	.0968	.09725	.0964
3	.0945	.0945	.0937	.0935	.0941	.0944	.0942
4	.0924	.0923	.0910	.0902	.0917	.0923	.0916
5	.090	.090	.0889	.0869	.0892	.0903	.0896
6	.0878	.0874	.086	.0838	.0862	.0882	.0865
7	.0858	.0849	.0843	.0807	.083	.0864	.0840
8	.0841	.083	.0818	.0788	.0805	.0849	.0816
9	.0827	.0817	.0797	.0768	.0784	.0838	.0796
10	.0815	.0806	.0772	.0743	.077	.0829	.0776
11	.0708	.080	.075	.0699	.0761	.0824	.0756
12	.080	.0795	.073	.066	.0753	.0821	.0736
13	.0793	.079	.071	.0639	.075	.0817	.0716
14	.0787	.0785	.069	.063	.0746	.0815	.0696
15	.078	.078	.067	.062	.0742	.081	.0676
16	.0773	.0775	.065	.061	.0733	.0808	.0656

	BEJ	BEK	BEL	BEM	BEN	BEP	BEQ
1	.099	.099	.099	.099		.100	.100
2	.096	.0967	.096	.0961		.09725	.09725
3	.0932	.0936	.094	.0941		.09455	.0944
4	.0908	.0919	.092	.0917		.0922	.0922
5	.0883	.0893	.0897	.0891		.0895	.0898
6	.086	.0864	.0855	.0865		.0865	.0872
7	.0832	.083	.0825	.083		.084	.0847
8	.0813	.0787	.0793	.0802		.082	.0827
9	.080	.0775	.0772	.0782		.0806	.081
10	.079	.0748	.0758	.0772		.0796	.080
11	.078	.0731	.0741	.0768		.079	.0796
12	.077	.0716	.0728	.0765		.0785	.079
13	.076	.0700	.0712	.0762		.078	.0785
14	.075	.0684	.0698	.0759		.0776	.078
15	.074	.0668	.0684	.0756		.0772	.0775
16	.073	.0652	.067	.0753		.0767	.077

	BFN	BFP	BFQ	BFR	BFS	BFT
1	.0990	.0990	.0990	.0990	.0990	.0990
2	.0958	.0958	.0958	.0958	.0955	.0967
3	.0921	.0920	.0922	.0922	.0933	.0937
4	.0898	.0898	.0898	.0896	.0910	.0910
5	.0883	.0881	.0887	.0882	.0884	.0884
6	.0857	.0863	.0872	.0862	.0854	.0855
7	.0823	.0845	.0845	.0836	.0826	.0828
8	.0800	.0827	.0827	.0811	.0792	.0795
9	.0778	.0813	.0813	.0788	.0755	.0775
10	.0752	.0797	.0797	.0762	.0720	.0750
11	.0733	.0783	.0783	.0748	.0684	.0725
12	.0710	.0767	.0767	.0734	.0648	.0701
13	.0690	.0753	.0753	.0718	.0610	.0676
14	.0669	.0738	.0738	.0703	.0575	.0652
15	.0648	.0728	.0728	.0687	.0540	.0632
16	.0628	.0707	.0707	.0672	.0505	.0610

	BER	BES	BEU	BEV	BET	BEW	BEX
1	.099	.099	.099	.099			
2	.096	.096	.096	.096			
3	.0933	.0929	.0939	.0932			
4	.0913	.0902	.090	.0901			
5	.0882	.0872	.0861	.0875			
6	.0855	.0847	.0821	.085			
7	.0833	.0817	.0765	.0825			
8	.0812	.078	.0722	.0807			
9	.080	.0756	.0678	.0802			
10	.0788	.0725	.0639	.0785			
11	.0777	.0695	.0611	.0775			
12	.0767	.0665	.0584	.0765			
13	.0757	.0635	.055	.075			
14	.0747	.0605	.0517	.0735			
15	.0737	.0575	.050	.072			
16	.0727	.0547	.049	.0705			

	BFU	BFV	BFW	BFX	BFY	BFZ
1	.0990	.0990	.0990	.0990	.0990	.0990
2	.0967	.0955	.0962	.0960	.0950	.0960
3	.0937	.0944	.0939	.0932	.0936	.0933
4	.0910	.0912	.0914	.0908	.0897	.0913
5	.0884	.0885	.0887	.0883	.0866	.0886
6	.0855	.0852	.0860	.0860	.0834	.0859
7	.0828	.0830	.0830	.0844	.0798	.0837
8	.0795	.0812	.0799	.0827	.0774	.0815
9	.0761	.0793	.0768	.0812	.0743	.0800
10	.0732	.0785	.0736	.0798	.0710	.0788
11	.0709	.0777	.0705	.0785	.0680	.0777
12	.0687	.0770	.0674	.0772	.0650	.0767
13	.0662	.0767	.0643	.0759	.0620	.0757
14	.0637	.0753	.0618	.0746	.0590	.0747
15	.0619	.0746	.0550	.0733	.0560	.0737
16	.0576	.0737	.0550	.0720	.0530	.0727

	BEY	BEZ	BFA	BFB	BFC	bfd	BFE
1	.099	.099	.099	.0966	.100		
2	.096	.0956	.096	.0952	.0963		
3	.093	.0931	.0937	.0932	.0932		
4	.0896	.0895	.0902	.0897	.0914		
5	.0863	.0859	.086	.0855	.0898		
6	.0839	.0833	.083	.0815	.088		
7	.0813	.0807	.0769	.0773	.0858		
8	.0797	.0787	.0746	.0732	.0834		
9	.0787	.0773	.0718	.0685	.0802		
10	.0765	.0759	.0674	.064	.0768		
11	.0747	.0745	.063	.0596	.0731		
12	.0732	.0730	.062	.0534	.0696		
13	.0717	.0711	.061	.0503	.0658		
14	.0700	.0701	.060	.0472	.0624		
15	.069	.0695	.059	.0472	.059		
16	.068	.0686	.058	.0472	.0554		

	BGA	BGB	BGC	BGD	BGE	BGF
1	.0990	.0990	.0990	.0990	.0990	
2	.0963	.0963	.0962	.0962	.0962	
3	.0932	.0932	.0939	.0939	.0944	
4	.0910	.0908	.0917	.0913	.0917	
5	.0845	.0848	.0891	.0887	.0883	
6	.0813	.0813	.0864	.0858	.0861	
7	.0763	.0763	.0839	.0832	.0832	
8	.0717	.0707	.0814	.0810	.0814	
9	.0665	.0660	.0785	.0776	.0798	
10	.0638	.0640	.0756	.0753	.0790	
11	.0603	.0618	.0727	.0722	.0782	
12	.0576	.0584	.0698	.0690	.0773	
13	.0550	.0560	.0668	.0658	.0766	
14	.0525	.0530	.0639	.0626	.0757	
15	.0505	.0510	.0610	.0594	.0750	
16	.0485	.0490	.0580	.0562	.0741	

	BFF	BFg	BFH	BFJ	BFK	BFL	BFM
1	.099	.099	.100	.100	.099		
2	.0955	.096	.097	.097	.096		
3	.0927	.0932	.0944	.0944	.0932		
4	.0900	.0908	.092	.0922	.0905		
5	.0875	.0885	.0895	.0894	.0876		
6	.0853	.0864	.0872	.086	.0857		
7	.0832	.0845	.0852	.0846	.0837		
8	.0814	.0831	.084	.083	.0825		
9	.0800	.082	.083	.082	.0813		
10	.0791	.0807	.082	.0813	.0804		
11	.0784	.0796	.0815	.0805	.0795		
12	.078	.0785	.081	.080	.0785		
13	.0775	.0775	.0805	.0794	.0775		
14	.077	.0765	.080	.0787	.0765		
15	.0765	.0755	.0796	.078	.0755		
16	.076	.0745	.079	.0775	.0745		

	BGG	BGH	BGJ	BGK	BGL	BGM
1			.0990	.0990	.0990	
2			.0962	.0968	.0967	
3			.0934	.0930	.0940	
4			.0907	.0910	.0917	
5			.0874	.0883	.0888	
6			.0839	.0840	.0854	
7			.0788	.0790	.0800	
8			.0735	.0730	.0750	
9			.0725	.0715	.0735	
10			.0714	.0683	.0714	
11			.0700	.0665	.0693	
12			.0640	.0655	.0671	
13			.0595	.0644	.0650	
14			.0548	.0631	.0630	
15			.0500	.0618	.0610	
16			.0450	.0605	.0590	

	BC	C1	CIW	CV	DF	DG	DX
1	.099	.099	.099	.099	.100	.100	.099
2	.095	.095	.0955	.094	.098-1/16	.098-1/16	.0958
3	.091	.0916	.093	.090	.096	.096	.0926
4	.088	.0889	.0905	.0867	.091	.0905	.0888
5	.085	.0861	.0875	.084	.088	.087	.0859
6	.0825	.084	.0856	.0815	.085	.0836	.0820
7	.0803	.0818	.0836	.0795	.082	.0804	.0775
8	.0785	.0796	.0819	.0775	.0782	.0772	.0740
9	.0765	.0778	.080	.076	.075	.074	.0705
10	.075	.076	.078	.0745	.0725	.071	.0670
11	.073	.074	.076	.0732	.070	.0689	.0635
12	.072	.073	.0752	.072	.0685	.067	.0600
13	.071	.072	.0746	.071	.067	.0653	.0665
14	.070	.071	.074	.070	.0655	.0636	.0630
15					.064	.062	

	KS	KT	KTA	KU	KV	KW	KW1
1	.099	.100	.100	.099	.099	.100	.100
2	.095	.095	.095	.095	.095	.095	.095
3	.092	.0905	.0895	.0927	.0913	.091	.0915
4	.0892	.087	.0865	.0897	.088	.0877	.0885
5	.0875	.0845	.0835	.0868	.0838	.084	.0851
6	.085	.0822	.0815	.084	.080	.0805	.082
7	.079	.0802	.0802	.0812	.0736	.077	.079
8	.075	.079	.0788	.0783	.0650	.073	.076
9	.070	.0775	.0775	.0756	.058	.0695	.0728
10	.065	.076	.076	.0729	.0506	.0661	.0695
11	.060	.075	.075	.070	.0435	.063	.0663
12	.055	.074	.074	.0673	.0363	.060	.063
13	.050	.073	.073	.0645	.0363	.057	.060
14	.045	.072	.072	.0618	.0363	.054	.057

	GK	K	KA	KB	KC	KD
1	.100	.100	.099	.099	.099	.099
2	.094	.095	.095	.095	.0935	.095
3	.089	.0905	.092	.0917	.090	.0908
4	.085	.0865	.0895	.090	.087	.0883
5	.081	.083	.0876	.0886	.084	.0856
6	.078	.080	.0855	.0972	.082	.083
7	.075	.0777	.0835	.086	.080	.0775
8	.072	.076	.0814	.085	.0785	.074
9	.069	.074	.0793	.0845	.0765	.0705
10	.066	.0722	.0784	.084	.075	.067
11	.063	.0705	.078	.0835	.073	.0635
12	.060	.0685	.078	.083	.0715	.060
13	.057	.0667	.078	.0825	.0695	.0565
14	.054	.065	.078		.0675	.053

	KW2	KWR	LB1	LB2	LFN	LBA
1	.100	.100	.100	.100	.099	.100
2	.095	.095	.096	.095	.094	.096
3	.095	.090	.0925	.091	.0885	.093
4	.0875	.087	.0895	.0895	.085	.0906
5	.0845	.084	.087	.086	.0815	.0883
6	.0815	.081	.085	.084	.078	.0863
7	.0788	.0786	.083	.0825	.075	.0848
8	.076	.076	.082	.0815	.0723	.0829
9	.0728	.0728	.081	.0805	.0695	.0830
10	.0695	.0695	.080	.0795	.0668	.0821
11	.0663	.0663	.079	.0785	.064	.0812
12	.063	.063	.078	.0775	.061	.0804
13	.060	.060	.077	.0765	.0585	.0796
14	.057	.057	.076	.0755	.0556	.0788

	KE	KF	KG	KH	KI	KK	KL
1	.099	.099	.099	.099	.098	.099	.099
2	.095	.095	.095	.0935	.094	.095	.095
3	.0917	.091	.0915	.0883	.090	.0925	.0925
4	.090	.089	.0895	.0863	.0865	.0893	.0895
5	.0885	.0875	.0875	.0843	.083	.086	.087
6	.087	.0855	.0855	.0825	.080	.0828	.085
7	.0848	.0835	.0841	.0805	.0777	.0795	.0823
8	.0838	.082	.0834	.0785	.076	.0738	.0792
9	.083	.081	.0827	.076	.074	.0615	.076
10	.0822	.080	.0820	.0735	.0722	.0517	.0729
11	.0815	.0795	.0810	.071	.0705	.042	.0697
12	.0808	.079	.0800	.0685	.0685	.042	.0655
13	.080	.079	.0790	.066	.0667	.042	.0633
14	.0792	.079	.0790		.065	.042	.060

	MC	53	55	58
1	.100		.100	.100
2	.095		.095	.095
3	.0915		.090	.090
4	.0885		.0858	.0858
5	.0851		.0815	.0815
6	.082		.0777	.078
7	.079		.0738	.074
8	.076		.070	.070
9	.0728		.0668	.067
10	.0684		.0636	.064
11	.064		.0606	.062
12	.060		.0579	.060
13	.0555		.0552	.057
14	.051		.053	.055

	KM	KN	KN cont.	KO	KP	KQ	KR
1	.099	.099	.066	.099	.099	.099	.099
2	.095	.0962	.063	.095	.095	.095	.095
3	.0924	.0933	.060	.0925	.092	.093	.0932
4	.0897	.0905	.057	.0895	.0893	.0903	.0907
5	.0876	.087	.054	.087	.0867	.088	.0875
6	.0858	.082	.051	.085	.0842	.0855	.0852
7	.084	.0782		.0825	.0817	.082	.0823
8	.0822	.0747		.0795	.078	.0795	.077
9	.0803	.0718		.0765	.070	.0775	.071
10	.0784	.069		.074	.0635	.0755	.0658
11	.0759			.0715	.058	.0735	.0603
12	.0734			.069	.0523	.0715	.057
13	.071			.067	.0465	.0695	.0534
14	.069			.065	.0418	.0675	.050

	OA6	OA7	OA8
1	.100	.100	.100
2	.096	.096	.097
3	.0917	.093	.094
4	.0887	.0902	.0913
5	.0856	.0872	.0888
6	.0825	.0843	.086
7	.0794	.0814	.0835
8	.0762	.0786	.0808
9	.0731	.0757	.0782
10	.070	.0727	.0755
11	.067	.070	.073
12	.064	.067	.0702
13	.061	.064	.0675
14	.058	.061	.065

	RA	RB	RC	RD	RE	RF	RG
1	.100	.099	.099	.099	.099	.100	.100
2	.094	.095	.0946	.095	.095	.095	.095
3	.088	.0907	.090	.090	.092	.090	.0905
4	.083	.0866	.0855	.0865	.089	.0863	.087
5	.0785	.0825	.081	.0835	.0856	.0825	.0836
6	.0763	.0784	.0765	.081	.0805	.0788	.0802
7	.0722	.074	.072	.079	.0753	.075	.0768
8	.069	.070	.0674	.077	.0712	.0712	.0732
9	.0658	.0657	.0627	.0757	.0670	.0675	.070
10	.0627	.0615	.0583	.0742	.0628	.0637	.0665
11	.0595	.0575	.0537	.073	.0587	.060	.0630
12	.0564	.0532	.0492	.0715	.0543	.057	.060
13	.053	.049	.0446	.0703	.0501	.054	.057
14	.050	.045	.040	.069	.0460	.051	.054

	SR	SS	ST	SU	SV	SW	SX
1	.099	.099	.099	.099	.099	.099	.099
2	.095	.0945	.095	.095	.0955	.0955	.095
3	.092	.0905	.0925	.0902	.0923	.0925	.0902
4	.089	.086	.0895	.0868	.089	.088	.0888
5	.086	.084	.087	.0834	.0867	.086	.084
6	.083	.080	.0852	.0802	.0845	.084	.0808
7	.0804	.0755	.0831	.0764	.0818	.082	.0774
8	.0778	.0715	.0805	.0728	.079	.0795	.0744
9	.075	.0655	.0787	.069	.0755	.077	.0713
10	.0743	.059	.077	.0655	.072	.0745	.0686
11	.0737	.0535	.0753	.062	.0685	.072	.0657
12	.073	.0485	.0737	.0586	.0665	.0695	.063
13	.0722	.045	.071	.0552	.0653	.067	.060
14	.0715	.042	.069	.0518	.064	.0645	.0572

	RH	RI	RJ	RK	RL	RN	RP
1	.100	.099	.100	.100	.100	.099	.099
2	.095	.095	.095	.095	.095	.095	.095
3	.0915	.0912	.0910	.0915	.0920	.092	.0905
4	.0878	.0881	.087	.088	.089	.089	.087
5	.0846	.0846	.0844	.0854	.086	.0859	.085
6	.0813	.0804	.0818	.0830	.0835	.0808	.0832
7	.078	.0763	.0792	.0805	.0810	.076	.082
8	.075	.0722	.0786	.078	.0785	.0721	.0815
9	.072	.067	.0740	.0756	.0760	.0688	.0809
10	.069	.0605	.0714	.0732	.0735	.0651	.080
11	.066	.0567	.0688	.0708	.0710	.0617	.0794
12	.063	.0525	.0662	.0683	.0685	.0581	.0786
13	.060	.049	.0630	.066	.0660	.0547	.0778
14	.057	.045	.0610	.0635	.0636	.0510	.077

	SY	SZ	TA	TC	TD
1	.099	.099	.099	.099	.099
2	.095	.0945	.095	.095	.095
3	.091	.0903	.0915	.0915	.0925
4	.0875	.0858	.0882	.089	.090
5	.0855	.0837	.0867	.087	.0875
6	.0825	.0798	.0852	.085	.0845
7	.078	.0753	.0831	.0832	.0803
8	.075	.0707	.0805	.0825	.077
9	.069	.0643	.0787	.0815	.073
10	.063	.0570	.0770	.0805	.0678
11	.0575	.0508	.0753	.0795	.0631
12	.0525	.0470	.0737	.0785	.0585
13	.049	.0445	.0710	.0775	.0538
14	.046	.0420	.0690	.0765	.049

	RR	RU	RV	SA	SB
1	.099	.100	.100	.099	.099
2	.095	.095	.095	.095	.095
3	.0922	.089	.089	.0915	.091
4	.0895	.084	.084	.0885	.0875
5	.086	.081	.081	.086	.084
6	.0808	.0785	.0785	.084	.080
7	.076	.0756	.0755	.0815	.076
8	.0721	.0733	.073	.079	.072
9	.0688	.071	.070	.0768	.0695
10	.0651	.0688	.067	.0743	.067
11	.0617	.066	.0645	.072	.064
12	.0581	.0636	.0618	.070	.062
13	.0547	.061	.059	.068	.059
14	.051	.059	.056	.066	.057

	TE	TF	TG	TH	TJ	TK	TL
1	.099	.099	.099	.099	.099	.099	.099
2	.095	.096	.095	.092	.095	.095	.095
3	.092	.0925	.0922	.0908	.092	.092	.092
4	.0895	.089	.0895	.0893	.0895	.090	.089
5	.087	.0855	.0878	.0878	.0877	.0885	.086
6	.0837	.082	.0862	.0863	.086	.087	.0835
7	.0805	.0782	.0847	.0848	.0845	.086	.081
8	.076	.0748	.0837	.0825	.084	.0855	.0793
9	.0715	.0714	.0827	.074	.083	.0845	.0776
10	.067	.068	.0818	.065	.082	.0835	.0759
11	.0625	.0645	.0812	.055	.081	.0825	.0746
12	.058	.061	.0806	.049	.080	.0815	.0733
13	.0535	.0575	.0800	.044	.079	.0805	.072
14	.049	.054	.0794	.040	.078	.0795	.071

	SC	SD	SE	SF	SG	SH	SJ
1	.100	.100	.100	.100	.100	.099	.099
2	.095	.095	.095	.095	.095	.0952	.095
3	.0915	.0912	.0915	.09125	.0917	.0917	.092
4	.0882	.088	.0903	.0895	.090	.0885	.0895
5	.0865	.0862	.0888	.08825	.0887	.0865	.0875
6	.0845	.0842	.087	.087	.0878	.0845	.0855
7	.0823	.0822	.0852	.08575	.0869	.082	.0835
8	.080	.080	.0845	.085	.0862	.0793	.0815
9	.079	.079	.084	.0845	.0859	.077	.0792
10	.078	.078	.084	.084	.0855	.0743	.077
11	.077	.077	.084	.084	.0855	.0722	.075
12	.076	.076	.084	.084	.0855	.070	.073
13	.075	.075	.084	.084	.0855	.068	.071
14	.074	.074	.084	.084	.0855	.066	.069

	TM	TN	TO	TP	TR	TS	TT
1	.099	.099	.099	.099	.099	.099	.099
2	.095	.0945	.095	.0955	.095	.095	.0941
3	.092	.091	.092	.092	.092	.0915	.0904
4	.0894	.087	.0893	.090	.089	.088	.0883
5	.0867	.085	.0865	.0875	.0869	.0863	.0861
6	.0842	.082	.0845	.0856	.084	.0833	.0825
7	.0814	.078	.083	.0836	.0817	.0812	.0799
8	.0785	.073	.082	.0819	.0791	.0782	.078
9	.0775	.0665	.081	.080	.0765	.0742	.0766
10	.077	.060	.080	.078	.0738	.0710	.0748
11	.077	.0535	.079	.076	.071	.0675	.0733
12	.077	.050	.078	.0752	.0685	.061	.0721
13	.077	.0475	.077	.0746	.063	.055	.0715
14	.077	.045	.076	.074	.062	.049	

	SK	SL	SM	SN	SO	SP	SQ
1	.099	.099	.099	.099	.100	.099	.100
2	.0954	.095	.095	.095	.096	.095	.095
3	.093	.092	.0915	.0915	.092	.0915	.0915
4	.090	.089	.0885	.089	.089	.0892	.088
5	.0867	.0867	.0855	.0865	.086	.0871	.0854
6	.0833	.0833	.0825	.0845	.083	.0852	.083
7	.080	.080	.0795	.0835	.0804	.0834	.0812
8	.077	.077	.0765	.082	.0778	.0810	.0794
9	.074	.074	.0735	.080	.075	.0786	.0775
10	.0714	.0714	.071	.078	.0743	.0762	.0757
11	.0695	.0695	.069	.0765	.0737	.0738	.0738
12	.0676	.0676	.067	.075	.073	.0714	.0719
13	.065	.065	.065	.074	.0722	.069	.070
14		.063	.063	.073		.0666	.068

	TU	TV	TW	TX	TY	TZ
1	.099	.099	.099	.099	.099	.099
2	.095	.095	.095	.095	.095	.095
3	.091	.0925	.0925	.091	.0918	.0915
4	.088	.090	.0895	.0894	.0887	.0893
5	.085	.083	.087	.0867	.086	.087
6	.083	.086	.0852	.0842	.0836	.0847
7	.081	.084	.0831	.0814	.0825	.0827
8	.0793	.0825	.0805	.0785	.0805	.0805
9	.0776	.081	.0775	.078	.0775	.0787
10	.0759	.080	.075	.078	.075	.077
11	.0746	.0795	.0722	.078	.0722	.0753
12	.0733	.0785	.070	.078	.070	.0737
13	.072	.0775	.068	.078	.068	.071
14	.071	.0765	.066	.078	.066	.069

	WO2	WO3	WO4	ZA	ZB		ZC	ZD	ZE	ZF	ZG	ZH
1	.100	.100	.100	.099	.099	1	.099	.099	.099	.099	.099	.099
2	.095	.095	.095	.095	.095	2	.095	.095	.095	.095	.095	.095
3	.091	.091	.090	.0905	.0915	3	.091	.090	.0895	.089	.089	.0915
4	.087	.08775	.086	.0875	.089	4	.088	.0865	.0858	.085	.0845	.0893
5	.0835	.0845	.082	.0847	.0865	5	.0855	.084	.083	.0821	.0815	.087
6	.081	.0822	.0794	.0822	.084	6	.083	.0815	.0805	.0798	.079	.0847
7	.0785	.080	.0768	.080	.082	7	.081	.079	.0782	.0775	.0765	.082
8	.076	.078	.074	.0778	.0795	8	.0785	.077	.076	.075	.074	.0795
9	.0732	.0755	.0712	.0768	.0775	9	.0765	.0745	.0732	.072	.071	.0776
10	.071	.0735	.069	.0737	.0755	10	.0745	.072	.0703	.0687	.0675	.0755
11	.0683	.0712	.066	.071	.0735	11	.0725	.069	.0673	.065	.063	.0735
12	.0657	.069	.0634	.0675	.071	12	.0695	.065	.0629	.0608	.059	.0715
13	.063	.067	.061	.063	.067	13	.065	.0605	.0584	.0563	.054	.0695
14	.061	.065	.058	.0585	.063	14	.0605	.056	.054	.052	.050	.0675
15				.054	.059	15	.056	.0515	.0495	.0475	.045	

0.125 Jet needles

	NA	UA	UB	UC	UD	UE
1	.124	.124	.124	.124	.124	.124
2	.1205	.1205	.1205	.1205	.1205	.1205
3	.1170	.1175	.1165	.118	.1178	.1155
4	.1144	.1146	.113	.1153	.1158	.1135
5	.1125	.1117	.111	.1128	.114	.1112
6	.1108	.1074	.109	.1107	.1126	.109
7	.1090	.1023	.107	.1086	.1115	.107
8	.1078	.0974	.1055	.107	.1104	.105
9	.1068	.0931	.104	.1056	.1092	.103
10	.1065	.0890	.103	.1046	.108	.1015
11	.1065	.0849	.102	.104	.1069	.100
12	.1065	.0808	.101	.1032	.1064	.099
13	.1065	.0767	.100	.1025	.1058	.098
14	.1065	.0726	.099	.1018	.1047	.0965
15	.1065	.0685	.098	.101	.1036	.095
16	.1065	.0644	.097	.1002	.1025	.0935

	VA	VB	VC	VD	VE	VF	VG
	UVA	UVB	UVC	UVD	UVE	UVF	UVG
1	.124	.124	.124	.124	.124	.124	.124
2	.1188	.1188	.1188	.1184	.1178	.1172	.1166
3	.1145	.1145	.1145	.1135	.1125	.1114	.1103
4	.111	.111	.111	.1096	.108	.1063	.1047
5	.108	.108	.108	.106	.104	.102	.100
6	.1061	.1056	.1052	.103	.1008	.0985	.0962
7	.1044	.1035	.1025	.100	.0975	.095	.0925
8	.1025	.101	.0997	.097	.0943	.0915	.0887
9	.1006	.0986	.097	.094	.091	.088	.085
10	.0987	.0964	.0943	.091	.0877	.0845	.0813
11	.0968	.094	.0915	.088	.0846	.081	.0775
12	.095	.0917	.0888	.0852	.0814	.0775	.0737
13	.0932	.0895	.086	.0822	.078	.074	.070
14	.0913	.0872	.0833	.079	.075	.0715	.0662
15	.0895	.0848	.0805	.076	.0715	.067	.0625
16	.0875	.0825	.0777	.0732	.0685	.0635	.0586

	UF	UG	UH	UI	UJ	UK	UL
1	.124	.124	.124	.124	.124	.124	.124
2	.1205	.1205	.1205	.1205	.1205	.1205	.1205
3	.1163	.116	.1165	.1172	.1165	.116	.1173
4	.113	.112	.1135	.114	.1135	.113	.1140
5	.1106	.1084	.1105	.1114	.1105	.1106	.1113
6	.1073	.1054	.1085	.1092	.108	.1073	.1090
7	.1035	.1023	.1065	.107	.1055	.1035	.1076
8	.0997	.099	.104	.1051	.103	.0997	.106
9	.0960	.0954	.1015	.1032	.100	.0960	.1035
10	.0926	.0923	.099	.1018	.097	.0927	.1006
11	.089	.0895	.0965	.1006	.094	.090	.098
12	.0854	.0875	.094	.0995	.091	.0875	.0956
13	.0819	.086	.0915	.0895	.0875	.0860	.0937
14	.0783	.0845	.089	.0975	.0845	.0845	.0917
15	.0748	.083	.0865	.0965	.0815	.0830	.0897
16	.0713	.0815	.084	.0955	.080	.0815	.0877

	VH	VI	VJ	VK	VL	VM	VN
	UVH	UVI	UVJ	UVK	UVL	UVM	UVN
1	.124	.124	.124	.124	.124	.124	.124
2	.116	.1154	.1146	.1134	.1122	.1122	.1122
3	.109	.1077	.1065	.1046	.103	.103	.103
4	.103	.1015	.0997	.0977	.0956	.0946	.0946
5	.098	.096	.094	.092	.090	.088	.087
6	.094	.0917	.0895	.0874	.085	.0827	.080
7	.090	.0875	.085	.0825	.080	.0775	.0734
8	.086	.0833	.0805	.0778	.075	.0722	.067
9	.082	.079	.076	.073	.070	.0668	.0604
10	.078	.0748	.0715	.0684	.065	.0615	.055
11	.074	.0715	.067	.0635	.060	.0563	.0494
12	.070	.0662	.0625	.0588	.055	.051	.044
13	.066	.062	.058	.054	.050	.0457	.039
14	.062	.0577	.0535	.0493	.045	.0405	.034
15	.058	.0535	.049	.0445	.040	.035	.0295
16	.054	.0492	.0445	.0396	.035	.030	.025

	UM	UN	UO	UP	UR	US	UT
1	.124	.124	.124	.124	.124	.124	.124
2	.1205	.1205	.1205	.1205	.1205	.1205	.1205
3	.1165	.1165	.1155	.116	.116	.1172	.1147
4	.114	.113	.1135	.114	.1128	.1133	.1114
5	.1123	.110	.110	.1105	.1094	.1105	.1084
6	.1104	.107	.108	.1075	.106	.1092	.1054
7	.1086	.104	.1055	.1045	.103	.1085	.1023
8	.107	.1005	.103	.1025	.0997	.1068	.0990
9	.1056	.0985	.101	.101	.096	.1043	.0954
10	.1046	.0965	.0985	.0995	.0927	.102	.0917
11	.104	.0945	.0965	.0985	.090	.1006	.088
12	.1032	.0915	.094	.0975	.0875	.0995	.0858
13	.1025	.0885	.093	.096	.0860	.0985	.0836
14	.1018	.0855	.0915	.0945	.0845	.0975	.0813
15	.101	.0830	.090	.093	.083	.0965	.079
16	.1002	.0805	.089	.0915	.0815	.0955	.0768

	VO	VP	VR	VT	UVU	UVV	UVW
	UVO	UVP	UVR	UVT	UVU	UVV	UVW
1	.124	.124	.124	.125	.1240	.124	.124
2	.121	.121	.119	.121	.1205	.1205	.1205
3	.117	.117	.1145	.116	.1172	.1165	.1157
4	.113	.113	.1108	.1115	.1135	.1146	.1107
5	.110	.110	.1075	.107	.1115	.113	.1077
6	.1075	.107	.1038	.103	.1103	.1115	.105
7	.105	.104	.1004	.099	.1091	.1098	.1012
8	.1022	.100	.097	.095	.1078	.1085	.0977
9	.0995	.0965	.0925	.091	.1062	.1071	.0942
10	.097	.093	.088	.087	.1047	.106	.0908
11	.0935	.089	.0835	.084	.1025	.1052	.0872
12	.0895	.0855	.079	.081	.1015	.1045	.0837
13	.0855	.082	.076	.0775	.1002	.1037	.0803
14	.082	.0782	.073	.0745	.0994	.1032	.0767
15	.078	.0745	.070	.072	.0984	.1025	.0732
16	.074	.0707	.067	.069	.0974	.1018	.0698
17					.0964		

	UU	UV	UW	UX	UY	UZ
1	.124	.124	.124	.124	.124	.124
2	.1205	.1205	.1205	.1205	.1205	.1205
3	.1165	.1182	.1175	.1165	.1174	.1172
4	.114	.1160	.1146	.114	.1145	.1135
5	.112	.1135	.1117	.112	.1128	.1113
6	.1095	.1112	.1074	.1095	.1107	.1095
7	.107	.1095	.1023	.107	.1086	.1084
8	.105	.108	.0974	.105	.107	.1066
9	.1025	.1065	.092	.1025	.1056	.1048
10	.100	.1053	.0865	.100	.1046	.103
11	.099	.1047	.081	.099	.104	.102
12	.098	.1042	.0755	.098	.1032	.101
13	.097	.1036	.070	.0955	.1025	.100
14	.096	.1029	.064	.0931	.1018	.099
15	.0945	.1029	.058	.091	.101	.098
16	.093	.1029	.052	.089	.1002	.097

	.25	35	45	50	59	60
	UVX	U25	U35	U45	U50	U60
1	.124	.124	.124	.124	.124	.124
2	.1205	.123	.123	.123	.117	.116
3	.1165	.116	.116	.116	.111	.111
4	.1146	.109	.109	.109	.104	.104
5	.1126	.100	.100	.101	.099	.101
6	.1091	.092	.092	.094	.092	.096
7	.1071	.084	.085	.089	.086	.091
8	.1065	.076	.078	.082	.080	.087
9	.1059	.067	.071	.076	.073	.083
10	.1056	.059	.064	.070	.068	.079
11	.1050	.051	.057	.064	.062	.075
12	.1045	.042	.050	.057	.056	.071
13	.1037	.034	.042	.051	.050	.067
14	.1032	.025	.035	.045	.044	.063
15	.1025				.038	.059
16	.1018					.050

	70 U70	74 U74	75 U75	76 U76	78 U78	79 U79	01 U01
1	.125	.124	.125	.124	.124	.124	.124
2	.119	.117	.119	.117	.117	.1178	.123
3	.113	.112	.113	.112	.112	.1147	.1175
4	.1085	.108	.1087	.109	.109	.1115	.1115
5	.104	.104	.105	.1055	.107	.1084	.1065
6	.0995	.100	.1001	.1022	.104	.1053	.1015
7	.095	.097	.097	.099	.101	.1022	.097
8	.0905	.094	.093	.0958	.0978	.0991	.092
9	.086	.090	.089	.0924	.094	.096	.087
10	.081	.087	.085	.0892	.091	.093	.082
11	.077	.084	.081	.086	.088	.090	.0775
12	.072	.081	.077	.083	.085	.087	.0725
13	.068	.078	.073	.080	.082	.084	.0675
14	.063	.076	.069	.078	.080	.082	.063
15	.059	.074	.065	.076	.078	.080	.058
16		.072		.074	.076	.078	

## Part 5 Appendix 8

### Needle cross-reference chart

### for SU carburetors

Part Number	Needle Marking						
AUD1000	1	AUD1057	AC2	AUD1114	CX	AUD1171	EX
AUD1001	2	AUD1058	AH1	AUD1115	CY	AUD1172	EY
AUD1002	3	AUD1059	AH2	AUD1116	CZ	AUD1173	EZ
AUD1003	4	AUD1060	A5	AUD1117	CIW	AUD1174	E2
AUD1004	5	AUD1061	A9	AUD1118	CP4	AUD1175	E21
AUD1005	6	AUD1062	BA	AUD1119	CS1	AUD1176	E3
AUD1006	7	AUD1063	BC	AUD1120	CS2	AUD1177	E31
AUD1007	20	AUD1064	BD	AUD1121	DA	AUD1178	E4
AUD1008	21	AUD1065	BE	AUD1122	DC	AUD1179	EX1
AUD1009	24	AUD1066	BF	AUD1123	DE	AUD1180	FA
AUD1010	24A	AUD1067	BG	AUD1124	DF	AUD1181	FB
AUD1011	24B	AUD1068	BH	AUD1125	DG	AUD1182	FC
AUD1012	25	AUD1069	BI	AUD1126	DH	AUD1183	FD
AUD1013	35	AUD1070	BJ	AUD1127	DJ	AUD1184	FE
AUD1014	45	AUD1071	BK	AUD1128	DK	AUD1185	FF
AUD1015	50	AUD1072	BL	AUD1129	DM	AUD1186	FG
AUD1016	53	AUD1073	BM	AUD1130	DN	AUD1187	FH
AUD1017	55	AUD1074	BN	AUD1131	DP	AUD1188	FI
AUD1018	58	AUD1075	BP	AUD1132	DQ	AUD1189	FJ
AUD1019	59	AUD1076	BQ	AUD1133	DR	AUD1190	FK
AUD1020	60	AUD1077	BR	AUD1134	DS	AUD1191	FL
AUD1021	61	AUD1078	BS	AUD1135	DT	AUD1192	FM
AUD1022	62	AUD1079	BT	AUD1136	DU	AUD1193	FN
AUD1023	69	AUD1080	BU	AUD1137	DV	AUD1194	FO
AUD1024	70	AUD1081	BV	AUD1138	DW	AUD1195	FP
AUD1025	74	AUD1082	BW	AUD1139	DY	AUD1196	FQ
AUD1026	75	AUD1083	BX	AUD1140	D1	AUD1197	FR
AUD1027	76	AUD1084	BY	AUD1141	D2	AUD1198	FS
AUD1028	78	AUD1085	BZ	AUD1142	D3	AUD1199	FT
AUD1029	79	AUD1086	BX1	AUD1143	D4	AUD1200	FU
AUD1030	80	AUD1087	BM2	AUD1144	D6	AUD1201	FV
AUD1031	81	AUD1088	BM4	AUD1145	D7	AUD1202	FW
AUD1032	AA	AUD1089	BM6	AUD1146	D8	AUD1203	FY
AUD1033	AB	AUD1090	BM8	AUD1147	D9	AUD1204	FZ
AUD1034	AC	AUD1091	C	AUD1148	EA	AUD1205	GA
AUD1035	AD	AUD1092	CB	AUD1149	EB	AUD1206	GB
AUD1036	AE	AUD1093	CC	AUD1150	EC	AUD1207	GC
AUD1037	AF	AUD1094	CD	AUD1151	ED	AUD1208	GD
AUD1038	AG	AUD1095	CE	AUD1152	EE	AUD1209	GE
AUD1039	AH	AUD1096	CF	AUD1153	EF	AUD1210	GF
AUD1040	AI	AUD1097	CG	AUD1154	EG	AUD1211	GG
AUD1041	AJ	AUD1098	CH	AUD1155	EH	AUD1212	GH
AUD1042	AK	AUD1099	CI	AUD1156	EI	AUD1213	GI
AUD1043	AL	AUD1100	CJ	AUD1157	EJ	AUD1214	GJ
AUD1044	AM	AUD1101	CK	AUD1158	EK	AUD1215	GK
AUD1045	AO	AUD1102	CL	AUD1159	EL	AUD1216	GL
AUD1046	AP	AUD1103	CM	AUD1160	EM	AUD1217	GM
AUD1047	AQ	AUD1104	CN	AUD1161	EN	AUD1218	GN
AUD1048	AR	AUD1105	CO	AUD1162	EO	AUD1219	GO
AUD1049	AS	AUD1106	CP	AUD1163	EP	AUD1220	GP
AUD1050	AT	AUD1107	CQ	AUD1164	EQ	AUD1221	GR
AUD1051	AU	AUD1108	CR	AUD1165	ER	AUD1222	GS
AUD1052	AV	AUD1109	CS	AUD1166	ES	AUD1223	GT
AUD1053	AW	AUD1110	CT	AUD1167	ET	AUD1224	GU
AUD1054	AX	AUD1111	CU	AUD1168	EU	AUD1225	GV
AUD1055	AY	AUD1112	CV	AUD1169	EV	AUD1226	GW
AUD1056	AZ	AUD1113	CW	AUD1170	EW	AUD1227	GX

Part Number	Needle Marking						
AUD1228	GER	AUD1301	RLS	AUD1374	UVB	AUD1447	XT
AUD1229	G2	AUD1302	R3	AUD1375	UVC	AUD1448	XU
AUD1230	HA	AUD1303	R6	AUD1376	UVD	AUD1449	XV
AUD1231	HB	AUD1304	R32	AUD1377	UVE	AUD1450	XW
AUD1232	HC	AUD1305	RM	AUD1378	UVF	AUD1451	XX
AUD1233	HD	AUD1306	RMO	AUD1379	UVG	AUD1452	XY
AUD1234	HE	AUD1307	RM1	AUD1380	UVH	AUD1453	XZ
AUD1235	HF	AUD1308	RM2	AUD1381	UVI	AUD1454	YA
AUD1236	HV2	AUD1309	RM3	AUD1382	UVJ	AUD1455	YB
AUD1237	HV3	AUD1310	RM4	AUD1383	UVK	AUD1456	YC
AUD1238	HV4	AUD1311	RM5	AUD1384	UVL	AUD1457	YD
AUD1239	H1	AUD1312	RM6	AUD1385	UVM	AUD1458	YE
AUD1240	H2	AUD1313	RM7	AUD1386	UVN	AUD1459	ZA
AUD1241	H4	AUD1314	RM8	AUD1387	UVO	AUD1460	ZB
AUD1242	H6	AUD1315	RM9	AUD1388	UVP	AUD1461	ZC
AUD1243	JM	AUD1316	S	AUD1389	UVR	AUD1462	ZD
AUD1244	K	AUD1317	SA	AUD1390	UVT	AUD1463	ZE
AUD1245	KI	AUD1318	SB	AUD1391	VA	AUD1464	ZF
AUD1246	KT	AUD1319	SC	AUD1392	VB	AUD1465	ZG
AUD1247	KW	AUD1320	SD	AUD1393	VC	AUD1466	UL
AUD1248	KTA	AUD1321	SE	AUD1394	VD	AUD1467	UM
AUD1249	KWR	AUD1322	SF	AUD1395	VE	AUD1468	GY
AUD1250	KW1	AUD1323	SG	AUD1396	VF	AUD1469	TZ
AUD1251	KW2	AUD1324	SH	AUD1397	VG	AUD1470	KA
AUD1252	L	AUD1325	SJ	AUD1398	VH	AUD1471	TY
AUD1253	LS	AUD1326	SK	AUD1399	VI	AUD1472	UO
AUD1254	LB1	AUD1327	SL	AUD1400	VJ	AUD1473	GZ
AUD1255	LB2	AUD1328	SM	AUD1401	VK	AUD1474	UN
AUD1256	LBA	AUD1329	SN	AUD1402	VL	AUD1475	SU
AUD1257	LFN	AUD1330	SO	AUD1403	VM	AUD1476	SX
AUD1258	LSI	AUD1331	SP	AUD1404	VN	AUD1477	KB
AUD1259	L11	AUD1332	SQ	AUD1405	VO	AUD1478	AN
AUD1260	L12	AUD1333	SR	AUD1406	VP	AUD1479	BB
AUD1261	M	AUD1334	SS	AUD1407	VR	AUD1480	CA
AUD1262	MA	AUD1335	ST	AUD1408	VS	AUD1481	UG
AUD1263	MO	AUD1336	SV	AUD1409	VT	AUD1482	UP
AUD1264	MW	AUD1337	SW	AUD1410	V2	AUD1483	MB
AUD1265	MME	AUD1338	SY	AUD1411	V3	AUD1484	UR
AUD1266	MOW	AUD1339	SZ	AUD1412	WX	AUD1485	US
AUD1267	M1	AUD1340	S4	AUD1413	WX1	AUD1486	UT
AUD1268	M2	AUD1341	S5	AUD1414	WO2	AUD1487	RE
AUD1269	M5	AUD1342	S6	AUD1415	WO3	AUD1488	RI
AUD1270	M6	AUD1343	TA	AUD1416	WO4	AUD1489	MC
AUD1271	M7	AUD1344	TB	AUD1417	W3	AUD1490	ZH
AUD1272	M8	AUD1345	TC	AUD1418	WA	AUD1491	RN
AUD1273	M9	AUD1346	TD	AUD1419	WB	AUD1492	UU
AUD1274	O1	AUD1347	TE	AUD1420	WC	AUD1493	UV
AUD1275	O7	AUD1348	TF	AUD1421	WD	AUD1494	RR
AUD1276	OA6	AUD1349	TG	AUD1422	WE	AUD1495	KH
AUD1277	OA7	AUD1350	TH	AUD1423	WF	AUD1496	HG
AUD1278	OA8	AUD1351	TJ	AUD1424	WG	AUD1497	UW
AUD1279	PJ	AUD1352	TK	AUD1425	WH	AUD1498	UX
AUD1280	P4	AUD1353	TL	AUD1426	WI	AUD1499	TV
AUD1281	P6	AUD1354	TM	AUD1427	WJ	AUD1500	KC
AUD1282	P61	AUD1355	TN	AUD1428	WM	AUD1501	KD
AUD1283	QA	AUD1356	TO	AUD1429	WN	AUD1502	KE
AUD1284	QW	AUD1357	TP	AUD1430	XB	AUD1503	UY
AUD1285	RA	AUD1358	TR	AUD1431	XC	AUD1504	UO1
AUD1286	RB	AUD1359	TS	AUD1432	XD	AUD1505	U25
AUD1287	RC	AUD1360	TT	AUD1433	XE	AUD1506	U35
AUD1288	RD	AUD1361	TU	AUD1434	XF	AUD1507	U45
AUD1289	RF	AUD1362	TW	AUD1435	XG	AUD1508	U50
AUD1290	RG	AUD1363	TX	AUD1436	XH	AUD1509	U59
AUD1291	RH	AUD1364	UA	AUD1437	XI	AUD1510	U60
AUD1292	RJ	AUD1365	UB	AUD1438	XJ	AUD1511	U70
AUD1293	RK	AUD1366	UC	AUD1439	XK	AUD1512	U74
AUD1294	RL	AUD1367	UD	AUD1440	XL	AUD1513	U75
AUD1295	RO	AUD1368	UE	AUD1441	XM	AUD1514	U76
AUD1296	RP	AUD1369	UF	AUD1442	XN	AUD1515	U78
AUD1297	RS	AUD1370	UH	AUD1443	XO	AUD1516	U79
AUD1298	RU	AUD1371	UJ	AUD1444	XQ	AUD1517	UZ
AUD1299	RV	AUD1372	UK	AUD1445	XR	AUD1518	KF
AUD1300	RLB	AUD1373	UVA	AUD1446	XS	AUD1519	KG

Part Number	Needle Marking						
AUD1520	KJ	CUD1037	ABP	CUD1150	BCC	NZX4027	AEC
AUD1521	UI	CUD1038	ABQ	CUD1151	BCD	NZX4028	AED
AUD1522	DL	CUD1039	ABR	CUD1152	BCE	NZX4029	AEE
AUD1523	DB	CUD1040	ABS	CUD1153	BCF	NZX4030	AEF
AUD1524	NA	CUD1041	ABT	CUD1154	BCG	NZX4031	AEG
AUD1525	DX	CUD1042	ABU	CUD1155	BCH	NZX4032	AEH
AUD1526	BO	CUD1043	ABV	CUD1156	BCJ	NZX4033	AEJ
AUD1527	AAA	CUD1044	ABW	CUD1157	BCK	NZX4034	AEK
AUD1528	DZ	CUD1045	ABX	CUD1158	BCL	NZX4035	AEL
AUD1529	KK	CUD1046	ABY	CUD1159	BCM	NZX4036	AEM
AUD1530	FX	CUD1047	ABZ	CUD1160	BCN	NZX4037	AEN
AUD1531	DD	CUD1048	ACA	CUD1161	BCP	NZX4038	AEP
AUD1532	UVU	CUD1049	ACB	CUD1162	BCQ	NZX4039	AEQ
AUD1533	BB2	CUD1050	ACC	CUD1163	BCR	NZX4040	AER
AUD1534	BB3	CUD1051	ACD	CUD1164	BCS	NZX4041	AES
AUD1535	BB4	CUD1052	ACE	CUD1165	BCT	NZX4042	AET
AUD1536	KL	CUD1053	ACF	CUD1166	BCU	NZX4043	AEU
AUD1537	KM	CUD1054	ACG	CUD1167	BCV	NZX4044	AEV
AUD1539	KO	CUD1055	ACH	CUD1168	BCW	NZX4045	AEW
AUD1541	KP	CUD1056	ACJ	CUD1169	BCX	NZX4046	AEX
AUD1548	UVV	CUD1057	ACK	CUD1170	BCY	NZX4047	AEY
AUD1549	UVW	CUD1058	ACL	CUD1171	BCZ	NZX4048	AEZ
AUD1550	KQ	CUD1059	ACM	CUD1200	CAA	NZX4049	AFA
AUD1552	KR	CUD1100	BAA	CUD1201	CAB	NZX4050	AFB
AUD1553	KS	CUD1101	BAB	CUD1202	CAC	NZX4051	AFC
AUD1554	KU	CUD1102	BAC	CUD1203	CAD	NZX4052	AFD
AUD1583	KV	CUD1103	BAD	CUD1204	CAE	NZX4053	AFE
AUD1586	UVX	CUD1104	BAE	CUD1205	CAF	NZX4054	AFF
AUD1644	KX	CUD1105	BAF	CUD1206	CAG	NZX4055	AFG
AUD1681	NB	CUD1106	BAG	CUD1207	CAH	NZX4056	AFH
AUD1682	KY	CUD1107	BAH	CUD1208	CAJ	NZX4057	AFJ
AUD1683	KZ	CUD1108	BAJ	CUD1209	CAK	NZX4058	AFK
AUD1684	HH	CUD1109	BAK	CUD1210	CAL	NZX4059	AFL
AUD1685	HI	CUD1110	BAL	CUD1211	CAM	NZX4060	AFM
AUD1686	HJ	CUD1111	BAM	CUD1212	CAN	NZX4061	AFN
AUD1687	HK	CUD1112	BAN	CUD1213	CAP	NZX4062	AFP
CUD1000	AAA	CUD1113	BAP	CUD1214	CAQ	NZX4063	AFQ
CUD1001	AAB	CUD1114	BAQ	CUD1215	CAR	NZX4064	AFR
CUD1002	AAC	CUD1115	BAR	CUD1216	CAS	NZX4065	AFS
CUD1003	AAD	CUD1116	BAS	CUD1217	CAT	NZX4066	AFT
CUD1004	AAE	CUD1117	BAT	CUD1218	CAU	NZX4067	AFU
CUD1005	AAF	CUD1118	BAU	CUD1219	CAV	NZX4068	AFV
CUD1006	AAG	CUD1119	BAV	CUD1220	CAW	NZX4069	AFW
CUD1007	AAH	CUD1120	BAW	CUD1221	CAX	NZX4070	AFX
CUD1008	AAJ	CUD1121	BAX	CUD1222	CAY	NZX4071	AFY
CUD1009	AAK	CUD1122	BAY	CUD1223	CAZ	NZX4072	AFZ
CUD1010	AAL	CUD1123	BAZ	CUD1538	KN	NZX8001	BDA
CUD1011	AAM	CUD1124	BBA	NZX4001	ADA	NZX8002	BDB
CUD1012	AAN	CUD1125	BBB	NZX4002	ADB	NZX8003	BDC
CUD1013	AAP	CUD1126	BBC	NZX4003	ADC	NZX8004	BDD
CUD1014	AAQ	CUD1127	BBD	NZX4004	ADD	NZX8005	BDE
CUD1015	AAR	CUD1128	BBE	NZX4005	ADE	NZX8006	BDF
CUD1016	AAS	CUD1129	BBF	NZX4006	ADF	NZX8007	BDG
CUD1017	AAT	CUD1130	BBG	NZX4007	ADG	NZX8008	BDH
CUD1018	AAU	CUD1131	BBH	NZX4008	ADH	NZX8009	BDJ
CUD1019	AAV	CUD1132	BBJ	NZX4009	ADJ	NZX8010	BDK
CUD1020	AAW	CUD1133	BBK	NZX4010	ADK	NZX8011	BDL
CUD1021	AAX	CUD1134	BBL	NZX4011	ADL	NZX8012	BDM
CUD1022	AAY	CUD1135	BBM	NZX4012	ADM	NZX8013	BDN
CUD1023	AAZ	CUD1136	BBN	NZX4013	ADN	NZX8014	BDP
CUD1024	ABA	CUD1137	BBP	NZX4014	ADP	NZX8015	BDQ
CUD1025	ABB	CUD1138	BBQ	NZX4015	ADQ	NZX8016	BDR
CUD1026	ABC	CUD1139	BBR	NZX4016	ADR	NZX8017	BDS
CUD1027	ABD	CUD1140	BBS	NZX4017	ADS	NZX8018	BDT
CUD1028	ABE	CUD1141	BBT	NZX4018	ADT	NZX8019	BDU
CUD1029	ABF	CUD1142	BBU	NZX4019	ADU	NZX8020	BDV
CUD1030	ABG	CUD1143	BBV	NZX4020	ADV	NZX8021	BDW
CUD1031	ABH	CUD1144	BBW	NZX4021	ADW	NZX8022	BDX
CUD1032	ABJ	CUD1145	BBX	NZX4022	ADX	NZX8023	BDY
CUD1033	ABK	CUD1146	BBY	NZX4023	ADY	NZX8024	BDZ
CUD1034	ABL	CUD1147	BBZ	NZX4024	ADZ	NZX8025	BEA
CUD1035	ABM	CUD1148	BCA	NZX4025	AEA	NZX8026	BEB
CUD1036	ABN	CUD1149	BCB	NZX4026	AEB	NZX8027	BEC

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Part Number	Needle Marking	Part Number	Needle Marking
NZX8028	BED	NZX8052	BFD
NZX8029	BEE	NZX8053	BFE
NZX8030	BEF	NZX8054	BFF
NZX8031	BEG	NZX8055	BFG
NZX8032	BEH	NZX8056	BFH
NZX8033	BEJ	NZX8057	BFJ
NZX8034	BEK	NZX8058	BFK
NZX8035	BEL	NZX8059	BFL
NZX8036	BEM	NZX8060	BFM
NZX8037	BEN	NZX8061	BFN
NZX8038	BEP	NZX8062	BFP
NZX8039	BEQ	NZX8063	BFQ
NZX8040	BER	NZX8064	BFR
NZX8041	BES	NZX8065	BFS
NZX8042	BET	NZX8066	BFT
NZX8043	BEU	NZX8067	BFU
NZX8044	BEV	NZX8068	BFV
NZX8045	BEW	NZX8069	BFW
NZX8046	BEX	NZX8070	BFX
NZX8047	BEY	NZX8071	BFY
NZX8048	BEZ	NZX8072	BFZ
NZX8049	BFA	NZX8074	BGA
NZX8050	BFB	NZX8075	BGB
NZX8051	BFC		

# Part 5 Appendix 9

## Jet identification information for SU carburetors

Float Chamber Angle	Carb Type	Inter-connection	Jet Part Number	Identification Information				
				(i)	Sleeve Colours (ii)	(iii)	Jet Size	Jet Head
-	H	-	AUC4185	-	-	-	.125"	-
-	H	-	AUC8182	-	-	-	.09"	-
-	H	-	AUC8183	-	-	-	.10"	-
-	H	-	AUC8188	-	-	-	.09"	-
-	H	-	AUC8189	-	-	-	.10"	-
-	H	-	AUC8186	-	-	-	.09"	-
-	H	-	AUC8187	-	-	-	.01"	-
-	HD	-	AUC8154	-	-	-	.09"	-
-	HD	-	AUC8155	-	-	-	.10"	-
-	HD	-	AUC8156	-	-	-	.125"	-
-	HD	-	AUD9030	-	-	-	.125"	-
-	HD	-	AUD9825	-	-	-	.125"	-
-	HD	-	CUD2637	-	-	-	.125"	-
30°	HS	RH	AUD9098	-	White	-	.09"	Black
H	HS	RH	AUD9103	Black	Grey	-	.09"	Red
H	HS	LH	AUD9104	Black	Brown	-	.09"	Red
H	HS	RH	AUD9105	-	Yellow	-	.10"	Red
H	HS	LH	AUD9106	-	Orange	-	.10"	Red
20°	HS	RH	AUD9141	-	Green	-	.09"	Black
20°	HS	LH	AUD9142	-	Pink	-	.09"	Black
30°	HS	LH	AUD9148	-	Yellow	-	.10"	Black
30°	HS	LH	AUD9149	-	Orange	-	.10"	Black
H	HS	RH	AUD9450	White	-	-	.09"	Red
H	HS	LH	AUD9451	Black	-	-	.09"	Red
H	HS	LH	AUD9480	White	-	-	.125"	Black
H	HS	RH	AUD9481	Black	-	-	.125"	Black
H	HS	RH	AUD9596	Grey	-	-	.09"	Red
H	HS	LH	AUD9814	Red	Blue	-	.09"	White
H	HS	RH	AUD9815	Red	Pink	-	.09"	White
H	HS	RH	AUD9879	White	Orange	-	.09"	Black
H	HS	RH	AUD9883	Black	Orange	-	.09"	Black
H	HS	RH	AUD9888	White	Brown	-	.09"	Red
H	HS	LH	AUD9889	Blue	Brown	-	.09"	Red
H	HS	RH	AUD9971	Blue	-	-	.09"	Black
H	HS	LH	CUD2697	Orange	Grey	-	.125"	Black
H	HS	RH	CUD2698	Green	Grey	-	.125"	Black
H	HS	RH	CUD2708	White	Blue	-	.09"	Black
H	HS	RH	CUS2709	White	Yellow	-	.09"	Black
H	HS	RH	CUD2752	Yellow	Grey	-	.10"	Black
H	HS	LH	CUD2753	Blue	Grey	-	.10"	Black
H	HS	RH	CUD3176	White	Red	-	.125"	Black
H	HS	LH	CUD3177	White	Pink	-	.125"	Black
20°/30°	HS	RH	LZX1052	Violet	Red	Blue	.10"	-
H/10°	HS	RH	LZX1058	Violet	Pink	Grey	.10"	-
H/10°	HS	LH	LZX1059	Violet	Pink	Brown	.10"	-
10°	HS	RH	LZX1110	Red	-	-	.09"	-
10°	HS	LH	LZX1111	Blue	-	-	.09"	-
10°	HS	RH	LZX1112	Yellow	-	-	.09"	-
20°/30°	HS	RH	LZX1114	Red	Blue	-	.10"	-
20°/30°	HS	RH	LZX1116	Green	-	-	.10"	-
20°/30°	HS	LH	LZX1117	Pink	-	-	.10"	-
H/10°	HS	RH	LZX1118	Grey	-	-	.10"	-
H/10°	HS	RH	LZX1120	Pink	Grey	-	.10"	-
H/10°	HS	LH	LZX1121	Pink	Brown	-	.10"	-
20°/30°	HS	RH	LZX1126	White	Orange	-	.10"	-
20°/30°	HS	LH	LZX1127	White	Green	-	.10"	-
-	HIF	LH	LZX1027	-	-	-	.09"	White
-	HIF	LH	LZX1029	-	-	-	.10"	White
-	HIF	RH	LZX1026	-	-	-	.09"	Black
-	HIF	RH	LZX1028	-	-	-	.10"	Black
-	HIF	LH	LZX1068	-	-	-	.10"	White

# Haynes Automotive Manuals



NOTE: New manuals are added to this list on a periodic basis. If you do not see a listing for your vehicle, consult your local Haynes dealer for the latest product information.

## ACURA

- 12020 Integra '86 thru '89 & Legend '86 thru '90
- 12021 Integra '90 thru '93 & Legend '91 thru '95

## AMC

- Jeep CJ - see JEEP (50020)
- 14020 Mid-size models '70 thru '83
- 14025 (Renault) Alliance & Encore '83 thru '87

## AUDI

- 15020 4000 all models '80 thru '87
- 15025 5000 all models '77 thru '83
- 15026 5000 all models '84 thru '88

## AUSTIN-HEALEY

- Sprite - see MG Midget (66015)

## BMW

- \*18020 3/5 Series not including diesel or all-wheel drive models '82 thru '92
- 18021 3-Series incl. Z3 models '92 thru '98
- 18025 320i all 4 cyl models '75 thru '83
- 18025 1500 thru 2002 except Turbo '59 thru '77

## BUICK

- \*19010 Buick Century '97 thru '02  
Century (front-wheel drive) - see GM (38005)
- \*19020 Buick, Oldsmobile & Pontiac Full-size (Front-wheel drive) '85 thru '02  
Buick Electra, LeSabre and Park Avenue; Oldsmobile Delta 88 Royale, Ninety Eight and Regency; Pontiac Bonneville
- 19025 Buick Oldsmobile & Pontiac Full-size (Rear wheel drive)  
Buick Estate '70 thru '90, Electra '70 thru '84, LeSabre '70 thru '85, Limited '74 thru '79  
Oldsmobile Custom Cruiser '70 thru '90, Delta 88 '70 thru '85, Ninety-eight '70 thru '84  
Pontiac Bonneville '70 thru '81, Catalina '70 thru '81, Grandville '70 thru '75, Parisienne '83 thru '86
- 19030 Mid-size Regal & Century all rear-drive models with V6, V8 and Turbo '74 thru '87  
Regal - see GENERAL MOTORS (38010)  
Riviera - see GENERAL MOTORS (38030)  
Roadmaster - see CHEVROLET (24046)  
Skyhawk - see GENERAL MOTORS (38015)  
Skylark - see GM (38020, 38025)  
Somerset - see GENERAL MOTORS (38025)

## CADILLAC

- 21030 Cadillac Rear Wheel Drive all gasoline models '70 thru '93  
Cimarron - see GENERAL MOTORS (38015)  
DeVille - see GM (38031 & 38032)  
Eldorado - see GM (38030 & 38031)  
Fleetwood - see GM (38031)  
Seville - see GM (38030, 38031 & 38032)

## CHEVROLET

- \*24010 Astro & GMC Safari Mini-vans '85 thru '03
- 24015 Camaro V8 all models '70 thru '81
- 24016 Camaro all models '82 thru '92
- 24017 Camaro & Firebird '93 thru '02  
Cavalier - see GENERAL MOTORS (38016)  
Celebrity - see GENERAL MOTORS (38005)
- 24020 Chevelle, Malibu & El Camino '69 thru '87
- 24024 Chevette & Pontiac T1000 '76 thru '87  
Citation - see GENERAL MOTORS (38020)
- 24032 Corsica/Beretta all models '87 thru '96
- 24040 Corvette all V8 models '68 thru '82
- 24041 Corvette all models '84 thru '96
- 10305 Chevrolet Engine Overhaul Manual
- 24045 Full-size Sedans Caprice, Impala, Biscayne, Bel Air & Wagons '69 thru '90
- 24046 Impala SS & Caprice and Buick Roadmaster '91 thru '96  
Impala - see LUMINA (24048)  
Lumina '90 thru '94 - see GM (38010)
- \*24048 Lumina & Monte Carlo '95 thru '03  
Lumina APV - see GM (38035)
- 24050 Luv Pick-up all 2WD & 4WD '72 thru '82
- 24055 Monte Carlo all models '70 thru '88  
Monte Carlo '95 thru '01 - see LUMINA (24048)

- 24059 Nova all V8 models '69 thru '79
- 24060 Nova and Geo Prizm '85 thru '92
- 24064 Pick-ups '67 thru '87 - Chevrolet & GMC, all V8 & in-line 6 cyl, 2WD & 4WD '67 thru '87; Suburbans, Blazers & Jimmys '67 thru '91
- 24065 Pick-ups '88 thru '98 - Chevrolet & GMC, full-size pick-ups '88 thru '98, C/K Classic '99 & '00, Blazer & Jimmy '92 thru '94; Suburban '92 thru '99; Tahoe & Yukon '95 thru '99
- \*24066 Pick-ups '99 thru '03 - Chevrolet Silverado & GMC Sierra full-size pick-ups '99 thru '02, Suburban/Tahoe/Yukon/Yukon XL '00 thru '02
- 24070 S-10 & S-15 Pick-ups '82 thru '93, Blazer & Jimmy '83 thru '94,
- \*24071 S-10 & S-15 Pick-ups '94 thru '01, Blazer & Jimmy '95 thru '01, Hombre '96 thru '01
- \*24072 Chevrolet TrailBlazer & TrailBlazer EXT, GMC Envoy & Envoy XL, Oldsmobile Bravada '02 and '03
- 24075 Sprint '85 thru '88 & Geo Metro '89 thru '01
- 24080 Vans - Chevrolet & GMC '68 thru '96

## CHRYSLER

- 25015 Chrysler Cirrus, Dodge Stratus, Plymouth Breeze '95 thru '00
- 10310 Chrysler Engine Overhaul Manual
- 25020 Full-size Front-Wheel Drive '88 thru '93  
K-Cars - see DODGE Aries (30008)  
Laser - see DODGE Daytona (30030)  
Chrysler LHS, Concorde, New Yorker, Dodge Intrepid, Eagle Vision, '93 thru '97
- \*25026 Chrysler LHS, Concorde, 300M, Dodge Intrepid, '98 thru '03
- 25030 Chrysler & Plymouth Mid-size front wheel drive '82 thru '95  
Rear-wheel Drive - see Dodge (30050)
- \*25035 PT Cruiser all models '01 thru '03
- \*25040 Chrysler Sebring, Dodge Avenger '95 thru '02

## DATSUN

- 28005 200SX all models '80 thru '83
- 28007 B-210 all models '73 thru '78
- 28009 210 all models '79 thru '82
- 28012 240Z, 260Z & 280Z Coupe '70 thru '78
- 28014 280ZX Coupe & 2+2 '79 thru '83  
300ZX - see NISSAN (72010)
- 28016 310 all models '78 thru '82
- 28018 510 & PL521 Pick-up '68 thru '73
- 28020 510 all models '78 thru '81
- 28022 620 Series Pick-up all models '73 thru '79  
720 Series Pick-up - see NISSAN (72030)
- 28025 810/Maxima all gasoline models, '77 thru '84

## DODGE

- 400 & 600 - see CHRYSLER (25030)
- 30008 Aries & Plymouth Reliant '81 thru '89
- 30010 Caravan & Plymouth Voyager '84 thru '95
- \*30011 Caravan & Plymouth Voyager '96 thru '02
- 30012 Challenger/Plymouth Saporro '78 thru '83
- 30016 Colt & Plymouth Champ '78 thru '87
- 30020 Dakota Pick-ups all models '87 thru '96
- \*30021 Durango '98 & '99, Dakota '97 thru '99
- 30025 Dart, Demon, Plymouth Barracuda, Duster & Valiant 6 cyl models '67 thru '76
- 30030 Daytona & Chrysler Laser '84 thru '89  
Intrepid - see CHRYSLER (25025, 25026)
- \*30034 Neon all models '95 thru '99
- 30035 Omni & Plymouth Horizon '78 thru '90
- 30040 Pick-ups all full-size models '74 thru '93
- \*30041 Pick-ups all full-size models '94 thru '01
- 30045 Ram 50/D50 Pick-ups & Raider and Plymouth Arrow Pick-ups '79 thru '93
- 30050 Dodge/Plymouth/Chrysler RWD '71 thru '89
- 30055 Shadow & Plymouth Sundance '87 thru '94
- 30060 Spirit & Plymouth Acclaim '89 thru '95
- \*30065 Vans - Dodge & Plymouth '71 thru '03

## EAGLE

- Talon - see MITSUBISHI (68030, 68031)
- Vision - see CHRYSLER (25025)

## FIAT

- 34010 124 Sport Coupe & Spider '68 thru '78
- 34025 X1/9 all models '74 thru '80

## FORD

- 10355 Ford Automatic Transmission Overhaul
- 36004 Aerostar Mini-vans all models '86 thru '97
- 36006 Contour & Mercury Mystique '95 thru '00
- 36008 Courier Pick-up all models '72 thru '82
- \*36012 Crown Victoria & Mercury Grand Marquis '88 thru '00
- 10320 Ford Engine Overhaul Manual
- 36016 Escort/Mercury Lynx all models '81 thru '90
- 36020 Escort/Mercury Tracer '91 thru '00
- 36022 Ford Escape & Mazda Tribute '01 thru '03
- 36024 Explorer & Mazda Navajo '91 thru '01
- 36025 Ford Explorer & Mercury Mountaineer '02 and '03
- 36028 Fairmont & Mercury Zephyr '78 thru '83
- 36030 Festiva & Aspire '88 thru '97
- 36032 Fiesta all models '77 thru '80
- \*36034 Focus all models '00 and '01
- 36036 Ford & Mercury Full-size '75 thru '87
- 36044 Ford & Mercury Mid-size '75 thru '86
- 36048 Mustang V8 all models '64-1/2 thru '73
- 36049 Mustang II 4 cyl, V6 & V8 models '74 thru '78
- 36050 Mustang & Mercury Capri all models Mustang, '79 thru '93; Capri, '79 thru '86
- \*36051 Mustang all models '94 thru '03
- 36054 Pick-ups & Bronco '73 thru '79
- 36058 Pick-ups & Bronco '80 thru '96
- \*36059 F-150 & Expedition '97 thru '02, F-250 '97 thru '99 & Lincoln Navigator '98 thru '02
- \*36060 Super Duty Pick-ups, Excursion '97 thru '02
- 36062 Pinto & Mercury Bobcat '75 thru '80
- 36066 Probe all models '89 thru '92
- 36070 Ranger/Bronco II gasoline models '83 thru '92
- \*36071 Ranger '93 thru '00 & Mazda Pick-ups '94 thru '00
- 36074 Taurus & Mercury Sable '86 thru '95
- \*36075 Taurus & Mercury Sable '96 thru '01
- 36078 Tempo & Mercury Topaz '84 thru '94
- 36082 Thunderbird/Mercury Cougar '83 thru '88
- 36086 Thunderbird/Mercury Cougar '89 and '97
- 36090 Vans all V8 Econoline models '69 thru '91
- \*36094 Vans full size '92 thru '01
- \*36097 Windstar Mini-van '95 thru '03

## GENERAL MOTORS

- 10360 GM Automatic Transmission Overhaul
- 38005 Buick Century, Chevrolet Celebrity, Oldsmobile Cutlass Ciera & Pontiac 6000 all models '82 thru '96
- \*38010 Buick Regal, Chevrolet Lumina, Oldsmobile Cutlass Supreme & Pontiac Grand Prix (FWD) '88 thru '02
- 38015 Buick Skyhawk, Cadillac Cimarron, Chevrolet Cavalier, Oldsmobile Firenza & Pontiac J-2000 & Sunbird '82 thru '94
- \*38016 Chevrolet Cavalier & Pontiac Sunfire '95 thru '04
- 38020 Buick Skylark, Chevrolet Citation, Olds Omega, Pontiac Phoenix '80 thru '85
- 38025 Buick Skylark & Somerset, Oldsmobile Achieva & Calais and Pontiac Grand Am all models '85 thru '98
- \*38026 Chevrolet Malibu, Olds Alero & Cutlass, Pontiac Grand Am '97 thru '00
- 38030 Cadillac Eldorado '71 thru '85, Seville '80 thru '85, Oldsmobile Toronado '71 thru '85, Buick Riviera '79 thru '95
- \*38031 Cadillac Eldorado & Seville '86 thru '91, DeVille '86 thru '93, Fleetwood & Olds Toronado '86 thru '92, Buick Riviera '86 thru '93
- 38032 Cadillac DeVille '94 thru '02 & Seville '92 thru '02
- 38035 Chevrolet Lumina APV, Olds Silhouette & Pontiac Venture Sport all models '90 thru '96
- \*38036 Chevrolet Venture, Olds Silhouette, Pontiac Trans Sport & Montana '97 thru '01  
General Motors Full-size Rear-wheel Drive - see BUICK (19025)

## GEO

- Metro - see CHEVROLET Sprint (24075)
- Prizm - '85 thru '92 see CHEVY (24060), '93 thru '02 see TOYOTA Corolla (92036)

(Continued on other side)

\* Listings shown with an asterisk (\*) indicate model coverage as of this printing. These titles will be periodically updated to include later model years - consult your Haynes dealer for more information.

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# Haynes Automotive Manuals (continued)

NOTE: New manuals are added to this list on a periodic basis. If you do not see a listing for your vehicle, consult your local Haynes dealer for the latest product information.

40030 Storm all models '90 thru '93  
Tracker - see SUZUKI Samurai (90010)

**GMC**  
Vans & Pick-ups - see CHEVROLET

**HONDA**  
42010 Accord CVCC all models '76 thru '83  
42011 Accord all models '84 thru '89  
42012 Accord all models '90 thru '93  
42013 Accord all models '94 thru '97  
\*42014 Accord all models '98 thru '02  
42020 Civic 1200 all models '73 thru '79  
42021 Civic 1300 & 1500 CVCC '80 thru '83  
42022 Civic 1500 CVCC all models '75 thru '79  
42023 Civic all models '84 thru '91  
42024 Civic & del Sol '92 thru '95  
\*42025 Civic '96 thru '00, CR-V '97 thru '00, Acura Integra '94 thru '00  
42026 Civic '01 thru '04, CR-V '02 thru '04  
42040 Prelude CVCC all models '79 thru '89

**HYUNDAI**  
\*43010 Elantra all models '96 thru '01  
43015 Excel & Accent all models '86 thru '98

**ISUZU**  
Hombre - see CHEVROLET S-10 (24071)  
\*47017 Rodeo '91 thru '02; Amigo '89 thru '94 and '98 thru '02; Honda Passport '95 thru '02  
47020 Trooper & Pick-up '81 thru '93

**JAGUAR**  
49010 XJ6 all 6 cyl models '68 thru '86  
49011 XJ6 all models '88 thru '94  
49015 XJ12 & XJS all 12 cyl models '72 thru '85

**JEEP**  
50010 Cherokee, Comanche & Wagoneer Limited all models '84 thru '01  
50020 CJ all models '49 thru '86  
\*50025 Grand Cherokee all models '93 thru '04  
50029 Grand Wagoneer & Pick-up '72 thru '91  
Grand Wagoneer '84 thru '91, Cherokee & Wagoneer '72 thru '83, Pick-up '72 thru '88  
\*50030 Wrangler all models '87 thru '00  
50035 Liberty '02 thru '04

**LEXUS**  
ES 300 - see TOYOTA Camry (92007)

**LINCOLN**  
Navigator - see FORD Pick-up (36059)  
\*59010 Rear-Wheel Drive all models '70 thru '01

**MAZDA**  
61010 GLC Hatchback (rear-wheel drive) '77 thru '83  
61011 GLC (front-wheel drive) '81 thru '85  
61015 323 & Protogé '90 thru '00  
\*61016 MX-5 Miata '90 thru '97  
61020 MPV all models '89 thru '94  
Navajo - see Ford Explorer (36024)  
61030 Pick-ups '72 thru '93  
Pick-ups '94 thru '00 - see Ford Ranger (36071)  
61035 RX-7 all models '79 thru '85  
61036 RX-7 all models '86 thru '91  
61040 626 (rear-wheel drive) all models '79 thru '82  
61041 626/MX-6 (front-wheel drive) '83 thru '91  
61042 626 '93 thru '01, MX-6/Ford Probe '93 thru '97

**MERCEDES-BENZ**  
63012 123 Series Diesel '76 thru '85  
63015 190 Series four-cyl gas models, '84 thru '88  
63020 230/250/280 6 cyl sohc models '68 thru '72  
63025 280 123 Series gasoline models '77 thru '81  
63030 350 & 450 all models '71 thru '80

**MERCURY**  
64200 Villager & Nissan Quest '93 thru '01  
All other titles, see FORD Listing.

**MG**  
66010 MGB Roadster & GT Coupe '62 thru '80  
66015 MG Midget, Austin Healey Sprite '58 thru '80

**MITSUBISHI**  
68020 Cordia, Tredia, Galant, Precis & Mirage '83 thru '93  
68030 Eclipse, Eagle Talon & Ply. Laser '90 thru '94  
\*68031 Eclipse '95 thru '01, Eagle Talon '95 thru '98  
68035 Mitsubishi Galant '94 thru '03  
68040 Pick-up '83 thru '96 & Montero '83 thru '93

**NISSAN**  
72010 300ZX all models including Turbo '84 thru '89  
72015 Altima all models '93 thru '04  
72020 Maxima all models '85 thru '92  
\*72021 Maxima all models '93 thru '01  
72030 Pick-ups '80 thru '97 Pathfinder '87 thru '95  
\*72031 Frontier Pick-up '98 thru '01, Xterra '00 & '01, Pathfinder '96 thru '01  
72040 Pulsar all models '83 thru '86  
Quest - see MERCURY Villager (64200)  
72050 Sentra all models '82 thru '94  
72051 Sentra & 200SX all models '95 thru '99  
72060 Stanza all models '82 thru '90

**OLDSMOBILE**  
73015 Cutlass V6 & V8 gas models '74 thru '88  
For other OLDSMOBILE titles, see BUICK, CHEVROLET or GENERAL MOTORS listing.

**PLYMOUTH**  
For PLYMOUTH titles, see DODGE listing.

**PONTIAC**  
79008 Fiero all models '84 thru '88  
79018 Firebird V8 models except Turbo '70 thru '81  
79019 Firebird all models '82 thru '92  
79040 Mid-size Rear-wheel Drive '70 thru '87  
For other PONTIAC titles, see BUICK, CHEVROLET or GENERAL MOTORS listing.

**PORSCHE**  
80020 911 except Turbo & Carrera 4 '65 thru '89  
80025 914 all 4 cyl models '69 thru '76  
80030 924 all models including Turbo '76 thru '82  
80035 944 all models including Turbo '83 thru '89

**RENAULT**  
Alliance & Encore - see AMC (14020)

**SAAB**  
\*84010 900 all models including Turbo '79 thru '88

**SATURN**  
\*87010 Saturn all models '91 thru '02  
87020 Saturn all L-series models '00 thru '04

**SUBARU**  
89002 1100, 1300, 1400 & 1600 '71 thru '79  
89003 1600 & 1800 2WD & 4WD '80 thru '94

**SUZUKI**  
90010 Samurai/Sidekick & Geo Tracker '86 thru '01

**TOYOTA**  
92005 Camry all models '83 thru '91  
92006 Camry all models '92 thru '96  
\*92007 Camry, Avalon, Solara, Lexus ES 300 '97 thru '01  
92015 Celica Rear Wheel Drive '71 thru '85  
92020 Celica Front Wheel Drive '86 thru '99  
92025 Celica Supra all models '79 thru '92  
92030 Corolla all models '75 thru '79  
92032 Corolla all rear wheel drive models '80 thru '87  
92035 Corolla all front wheel drive models '84 thru '92  
92036 Corolla & Geo Prizm '93 thru '02  
92040 Corolla Tercel all models '80 thru '82  
92045 Corona all models '74 thru '82  
92050 Cressida all models '78 thru '82  
92055 Land Cruiser FJ40, 43, 45, 55 '68 thru '82  
92056 Land Cruiser FJ60, 62, 80, FZJ80 '80 thru '96  
92065 MR2 all models '85 thru '87  
92070 Pick-up all models '69 thru '78  
92075 Pick-up all models '79 thru '95  
\*92076 Tacoma '95 thru '00, 4Runner '96 thru '00, & T100 '93 thru '98  
\*92078 Tundra '00 thru '02 & Sequoia '01 thru '02  
92080 Previa all models '91 thru '95

\*92082 RAV4 all models '96 thru '02  
92085 Tercel all models '87 thru '94

**TRIUMPH**  
94007 Spitfire all models '62 thru '81  
94010 TR7 all models '75 thru '81

**VW**  
96008 Beetle & Karmann Ghia '54 thru '79  
\*96009 New Beetle '98 thru '00  
96016 Rabbit, Jetta, Scirocco & Pick-up gas models '74 thru '91 & Convertible '80 thru '92  
96017 Golf, GTI & Jetta '93 thru '98 & Cabrio '95 thru '98  
\*96018 Golf, GTI, Jetta & Cabrio '99 thru '02  
96020 Rabbit, Jetta & Pick-up diesel '77 thru '84  
96023 Passat '98 thru '01, Audi A4 '96 thru '01  
96030 Transporter 1600 all models '68 thru '79  
96035 Transporter 1700, 1800 & 2000 '72 thru '79  
96040 Type 3 1500 & 1600 all models '63 thru '73  
96045 Vanagon all air-cooled models '80 thru '83

**VOLVO**  
97010 120, 130 Series & 1800 Sports '61 thru '73  
97015 140 Series all models '66 thru '74  
97020 240 Series all models '76 thru '83  
97040 740 & 760 Series all models '82 thru '88  
97050 850 Series all models '93 thru '97

**TECHBOOK MANUALS**  
10205 Automotive Computer Codes  
10210 Automotive Emissions Control Manual  
10215 Fuel Injection Manual, 1978 thru 1985  
10220 Fuel Injection Manual, 1986 thru 1999  
10225 Holley Carburetor Manual  
10230 Rochester Carburetor/SU Carburetors  
10240 Weber/Zenith/Stromberg/SU Carburetors  
10305 Chevrolet Engine Overhaul Manual  
10310 Chrysler Engine Overhaul Manual  
10320 Ford Engine Overhaul Manual  
10330 GM and Ford Diesel Engine Repair Manual  
10340 Small Engine Repair Manual, 5 HP & Less  
10341 Small Engine Repair Manual, 5.5 - 20 HP  
10345 Suspension, Steering & Driveline Manual  
10355 Ford Automatic Transmission Overhaul  
10360 GM Automatic Transmission Overhaul  
10405 Automotive Body Repair & Painting  
10410 Automotive Brake Manual  
10411 Automotive Anti-lock Brake (ABS) Systems  
10415 Automotive Detailing Manual  
10420 Automotive Electrical Manual  
10425 Automotive Heating & Air Conditioning  
10430 Automotive Reference Manual & Dictionary  
10435 Automotive Tools Manual  
10440 Used Car Buying Guide  
10445 Welding Manual  
10450 ATV Basics

**SPANISH MANUALS**  
98903 Reparación de Carrocería & Pintura  
98905 Códigos Automotrices de la Computadora  
98910 Frenos Automotriz  
98915 Inyección de Combustible 1986 al 1999  
99040 Chevrolet & GMC Camionetas '67 al '87 Incluye Suburban, Blazer & Jimmy '67 al '91  
99041 Chevrolet & GMC Camionetas '88 al '98 Incluye Suburban '92 al '98, Blazer & Jimmy '92 al '94, Tahoe & Yukon '95 al '98  
99042 Chevrolet & GMC Camionetas Cerradas '68 al '95  
99055 Dodge Caravan & Plymouth Voyager '84 al '95  
99075 Ford Camionetas y Bronco '80 al '94  
99077 Ford Camionetas Cerradas '69 al '91  
99088 Ford Modelos de Tamaño Mediano '75 al '86  
99091 Ford Taurus & Mercury Sable '86 al '95  
99095 GM Modelos de Tamaño Grande '70 al '90  
99100 GM Modelos de Tamaño Mediano '70 al '88  
99110 Nissan Camioneta '80 al '96, Pathfinder '87 al '95  
99118 Nissan Sentra '82 al '94  
99125 Toyota Camionetas y 4Runner '79 al '95

\* Listings shown with an asterisk (\*) indicate model coverage as of this printing. These titles will be periodically updated to include later model years - consult your Haynes dealer for more information.



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# Common spark plug conditions



## NORMAL

**Symptoms:** Brown to grayish-tan color and slight electrode wear. Correct heat range for engine and operating conditions.

**Recommendation:** When new spark plugs are installed, replace with plugs of the same heat range.



## WORN

**Symptoms:** Rounded electrodes with a small amount of deposits on the firing end. Normal color. Causes hard starting in damp or cold weather and poor fuel economy.

**Recommendation:** Plugs have been left in the engine too long. Replace with new plugs of the same heat range. Follow the recommended maintenance schedule.



## CARBON DEPOSITS

**Symptoms:** Dry sooty deposits indicate a rich mixture or weak ignition. Causes misfiring, hard starting and hesitation.

**Recommendation:** Make sure the plug has the correct heat range. Check for a clogged air filter or problem in the fuel system or engine management system. Also check for ignition system problems.



## ASH DEPOSITS

**Symptoms:** Light brown deposits encrusted on the side or center electrodes or both. Derived from oil and/or fuel additives. Excessive amounts may mask the spark, causing misfiring and hesitation during acceleration.

**Recommendation:** If excessive deposits accumulate over a short time or low mileage, install new valve guide seals to prevent seepage of oil into the combustion chambers. Also try changing gas-oil brands.



## OIL DEPOSITS

**Symptoms:** Oily coating caused by poor oil control. Oil is leaking past worn valve guides or piston rings into the combustion chamber. Causes hard starting, misfiring and hesitation.

**Recommendation:** Correct the mechanical condition with necessary repairs and install new plugs.



## GAP BRIDGING

**Symptoms:** Combustion deposits lodge between the electrodes. Heavy deposits accumulate and bridge the electrode gap. The plug ceases to fire, resulting in a dead cylinder.

**Recommendation:** Locate the faulty plug and remove the deposits from between the electrodes.



## TOO HOT

**Symptoms:** Blistered, white insulator, eroded electrode and absence of deposits. Results in shortened plug life.

**Recommendation:** Check for the correct plug heat range, over-advanced ignition timing, lean fuel mixture, intake manifold vacuum leaks, sticking valves and insufficient engine cooling.



## PREIGNITION

**Symptoms:** Melted electrodes. Insulators are white, but may be dirty due to misfiring or flying debris in the combustion chamber. Can lead to engine damage.

**Recommendation:** Check for the correct plug heat range, over-advanced ignition timing, lean fuel mixture, insufficient engine cooling and lack of lubrication.



## HIGH SPEED GLAZING

**Symptoms:** Insulator has yellowish, glazed appearance. Indicates that combustion chamber temperatures have risen suddenly during hard acceleration. Normal deposits melt to form a conductive coating. Causes misfiring at high speeds.

**Recommendation:** Install new plugs. Consider using a colder plug if driving habits warrant.



## DETONATION

**Symptoms:** Insulators may be cracked or chipped. Improper gap setting techniques can also result in a fractured insulator tip. Can lead to piston damage.

**Recommendation:** Make sure the fuel anti-knock values meet engine requirements. Use care when setting the gaps on new plugs. Avoid lugging the engine.

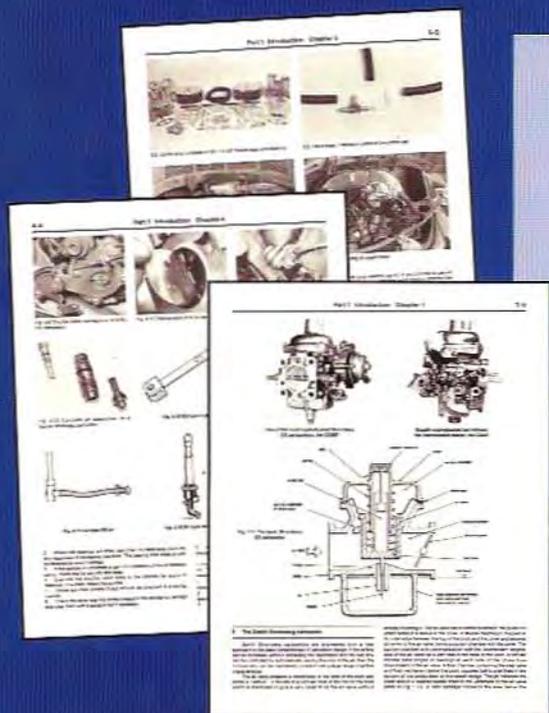


## MECHANICAL DAMAGE

**Symptoms:** May be caused by a foreign object in the combustion chamber or the piston striking an incorrect reach (too long) plug. Causes a dead cylinder and could result in piston damage.

**Recommendation:** Repair the mechanical damage. Remove the foreign object from the engine and/or install the correct reach plug.

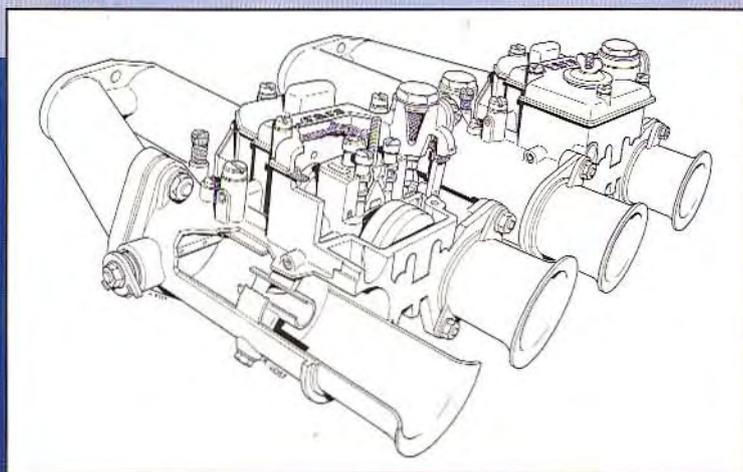
# WEBER CARBURETOR MANUAL



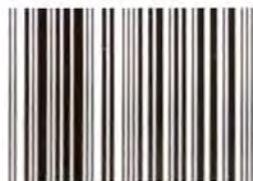
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- All Zenith Stromberg CD "constant depression" carburetors: CD, CDS, CDS-2, CDSE, CD-2E, CDST and CDSET
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