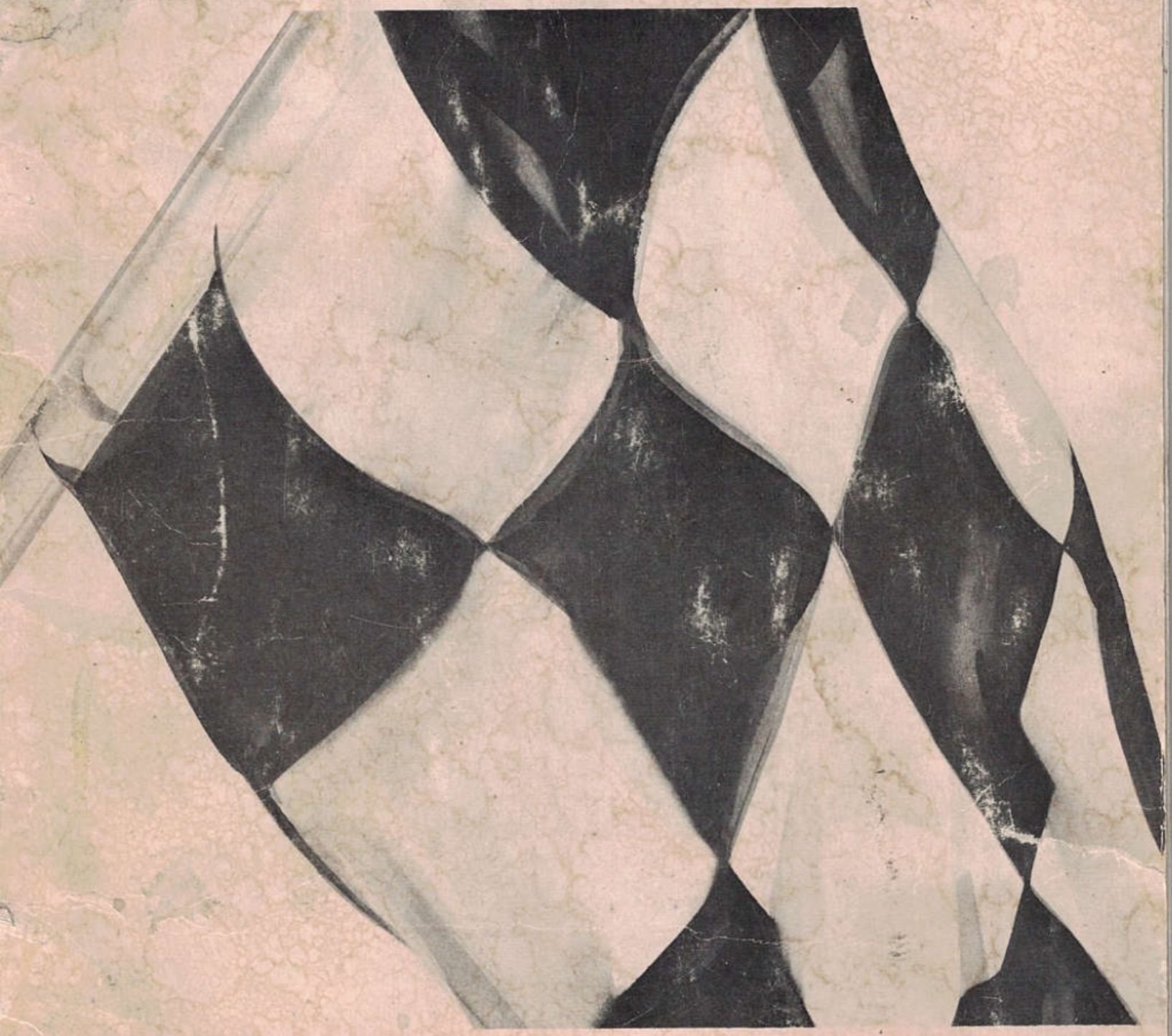
A GUIDE TO TUNING



WEBER CARBURETTORS

A GUIDE TO TUNING WEBER CARBURETTORS

A BORG-WARNER EDUCATIONAL PUBLICATION

2nd EDITION 1976

INTRODUCTION

This book is to assist those who are adapting DCOE and IDA Weber carburettors, in the interest of performance, to vehicles not so equipped by the manufacturer.

No attempt has been made to discuss the design feature of carburettors in general or Weber carburettors specifically.

The fuel and air metering devices employed in the DCOE and IDA carburettors are given consideration by a brief function description followed by selection criteria.

Being a 'guide', the book takes the broad view and yet gives the answer to most specific questions on "normal" use of the carburettors.

By permutation and combination the 45 DCOE offers an enormous number of jet settings, this book will eliminate most of the trial and error selection method.

It is recommended that the Weber publication "Master Catalogue — Technical Introduction" 3rd Edition (1973) be read for design and operating features.

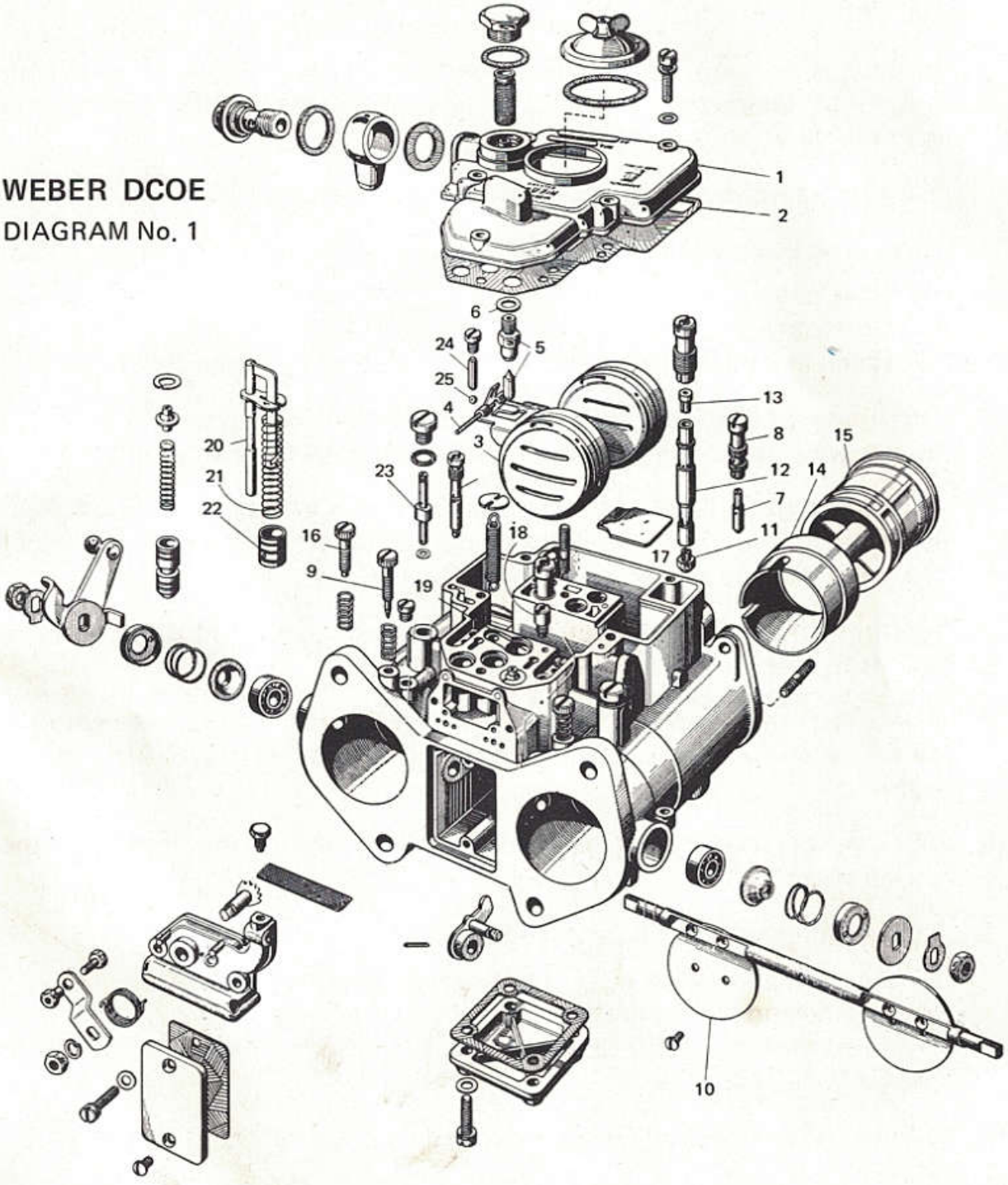
GENERAL

Carburettors are often blamed for many engine malfunctions for which they are not responsible. Before attempting to alter any carburettor settings, first be certain that:

1. Battery is charged, battery leads and general wiring are in good condition—all connections clean and tight. Fan belt tension correct and water circulation not impeded.
2. Tappets are correctly set and compression pressures even.
3. The correct spark plugs are being used:
   a) Heat range.
   b) Correct reach.
   c) Clean and correctly gapped.
4. Distributor/coil wiring, coil and condenser in good order. Distributor points are clean, correctly set and have the correct spring tension.
5. Rotor and distributor cap segments clean, not eroded and not cracked. High tension leads, particularly carbon type, in good order and firmly seated in distributor cap and connecting tightly onto spark plugs.
6. Ignition timing correctly set, centrifugal and vacuum (if used) advance curves to specifications.
7. There are no air leaks in the intake manifold area, P.C.V. valve working correctly and vacuum operated auxiliaries such as power brakes, not leaking.
8. The fuel pump has been checked for both pressure and volume at the carburettor.
9. The carburettor/s are in good condition:
   a) Throttle shafts not worn, bearings and bearing seals O.K.
   b) Needle and seat in good order.
   c) Float level correctly set, float not damaged or punctured.
   d) No fuel leaks evident.
10. The throttle opens fully when operated by accelerator.
11. Air cleaners are clean and capable of supplying the volume of air necessary, particularly at full throttle. Use 'WARNEFORD DESIGN' air cleaners.
12. There are no obstructions, sharp bends or leaks in the exhaust system.

WEBER DCOE

DIAGRAM No. 1



DCOE PARTS REFERRED TO IN TUNING GUIDE.

PART 1 (FLOAT LEVEL)

DIAGRAM NO.	DESCRIPTION
1.	FLOAT CHAMBER COVER
2.	FLOAT CHAMBER COVER GASKET
3.	FLOAT
4.	FLOAT PIVOT PIN
5.	NEEDLE & SEAT
6.	NEEDLE & SEAT WASHER

PART 2 (IDLE JET)

7.	IDLE JET	
8.	IDLE JET CARRIER	
9.	IDLE MIXTURE SCREW	
10.	THROTTLE DISC	
11.	MAIN JET	ASSEMBLY
12.	EMULSION TUBE	
13.	AIR CORRECTION JET	
14.	CHOKE TUBE	
15.	SECONDARY OR AUXILIARY VENTURI	
16.	IDLE SPEED SCREW	

PART 3 (CHOKE TUBE)

14.	CHOKE TUBE

PART 4 (SECONDARY OR AUXILIARY VENTURI)

15.	SECONDARY OR AUXILIARY VENTURI

PART 5 (MAIN JET, EMULSION TUBE, AIR CORRECTION JET ASSEMBLY)

11	MAIN JET	ASSEMBLY
12.	EMULSION TUBE	
13.	AIR CORRECTION JET	
15.	SECONDARY OR AUXILIARY VENTURI	
17.	EMULSION TUBE WELL	
14.	CHOKE TUBE	

PART 6 (ACCELERATOR PUMP – POWER CIRCUIT)

18.	INTAKE VALVE WITH EXHAUST ORIFICE	
19.	PUMP WELL	
20.	PUMP ROD	ASSEMBLY
21.	PUMP SPRING	
22	PUMP PISTON	
18.	EXHAUST ORIFICE (INTAKE VALVE WITH EXHAUST ORIFICE)	
23.	PUMP JET	
24.	ROD	HIGH SPEED POWER DEVICE CIRCUIT
25.	BALL	

WEBER CARBURETTORS

TUNING DCOE & IDA SERIES CARBURETTORS

PART 1

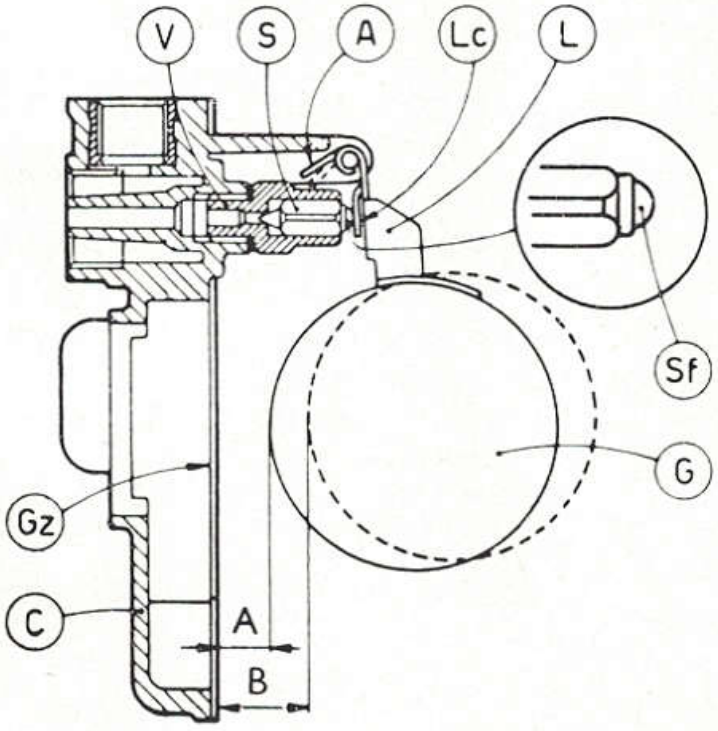
FLOAT LEVEL

The float level should be set with a Weber gauge, (SEE DIAGRAMS NO. 3 & 4) care being taken where a spring loaded needle is used to ensure that a correct reading is obtained.

With the DCOE unit, the angle that the carburettor is set to the engine has a great bearing on the float level. For example the "Warneford Design" kit for Morris/Austin Cooper 'S' has an angle of 7½°, the carburettor used is a 45DCOE 13 and this has a float level setting of 7mm. and 15mm.

DCOE DIRECTION FOR LEVELLING THE FLOAT

Diagram No. 2



It is essential that the following directions be complied with in order to obtain correct levelling of the float:-

- Make sure that the weight of the float (G) be the correct one, that float can freely move on the fulcrum pivot and does not show any pit on the float tongue where it is in contact with the float needle.
- Make sure that needle valve (V) is tightly screwed in its housing and that pin ball (Sf) of the dampening device, incorporated in the needle (S), is not jammed.
- Keep the carburettor cover (C) in vertical position as indicated since the weight of float (G) could lower the pin ball (Sf) fitted on the needle (S).
- With carburettor cover (C) in vertical position and float tongue (Lc) in light contact with the pin ball (Sf) of the needle (S) the distance of both half-floats from upper surface of carburettor cover (C) with gasket (Gz) in its place, must measure — see float level settings Table No. 1. (A).
- After the levelling has been done, check that the stroke of float (G) is — see float level settings, Table No. 1. If necessary adjust the position of the lug (A).
- In case float (G) had not been rightly set, rectify the position of float tongue (Lc) till the required setting is reached, taking care that tongue (Lc) does not show any pit on the contact surface that could affect the free sliding of the needle (S).
- Fit up the carburettor cover making sure that float can move without any hindrance or friction.

Note

The operations of levelling of float must be carried out whenever is necessary to replace float and needle valve: in this case it is advisable to replace also the sealing gasket, making sure that the new needle valve is tightly screwed in its housing.

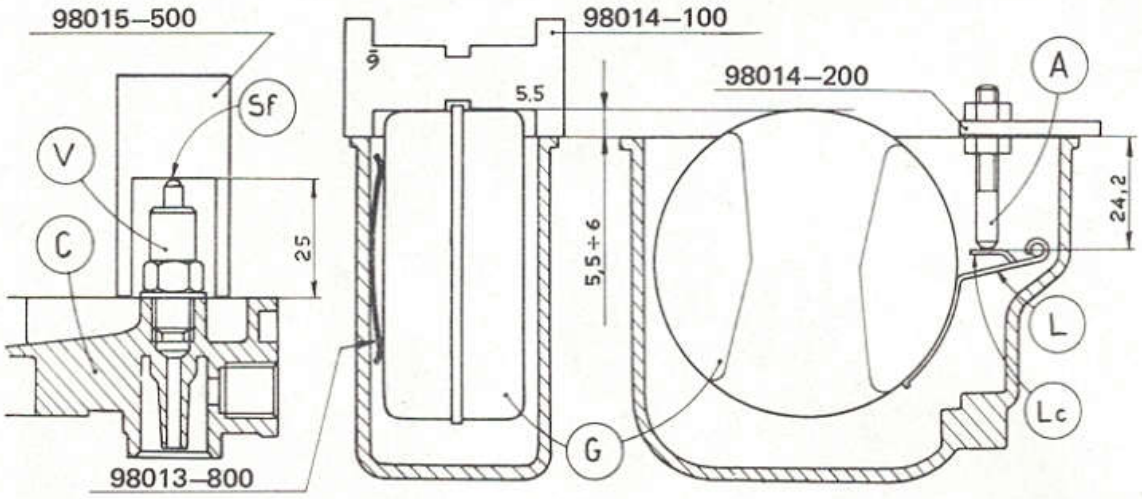
TABLE No. 1

A HELPFUL LIST OF FLOAT SETTINGS.
FOR VEHICLES CONVERTED TO 'WARNEFORD DESIGN' MANIFOLDS AND USING DCOE TYPE CARBURETTORS.

CARBURETTOR	*VEHICLE*	*A*	*B*	*STROKE*
40 DCOE 2	Austin/Morris Mini 998c.c.	8.5	15	6.5
40 DCOE	Colt	8.5	15	6.5
40 DCOE 2	Datsun 1600	8.5	15	6.5
40 DCOE	Datsun 1200, 120Y	8.5	15	6.5
40 DCOE 2	Ford 105E, 109E, 113E, 116E, 122E	8.5	15	6.5
40 DCOE 2	Ford, Cross-flow Head, 1300 and 1600 c.c. Escort, Cortina, Pinto	8.5	15	6.5
40 DCOE 2	Toyota. Corolla all	7.5	14	6.5
40 DCOE 2	Toyota. Corona	8.5	15	6.5
40 DCOE 2	Triumph. 2000 and GT6	8.5	15	6.5
42 DCOE 8	Austin/Morris Mini and Cooper	8.5	15	6.5
42 DCOE 8	Datsun 1600	7.0	13.5	6.5
42 DCOE	Datsun 240/260Z	7.5	13.5	6.0
42 DCOE 8	Ford 122E	8.5	15	6.5
42 DCOE	Toyota Celica	7.5	13.5	6.0
42 DCOE 8	Triumph TR2, 3 and 4	5.0	13.5	8.5
42 DCOE 8	Volvo—all 4 cyl. models	8.5	15	6.5
45 DCOE 13	Austin Healey Sprite	7.0	15	8.0
45 DCOE 13	Austin/Morris Cooper 'S'	7.0	15	8.0
45 DCOE	BMW 2002	7.5	14	6.5
45 DCOE	Datsun 1600	7.0	15	8.0
45 DCOE	Ford, Cortina 2000. TC and TD Pinto 2 litre	8.5	15	6.5
45 DCOE	Galant 1600 c.c.	8.5	15	6.5
45 DCOE	Holden EH on. Torana (Long Ram Manifold)	8.5	15	6.5
45 DCOE 9	Jaguar XK 'E'	5.0	13.5	8.5
45 DCOE 13	M.G. 'B'	5.0	13.5	8.5
45 DCOE	Toyota Celica	8.5	15	8.5

IDA DIRECTIONS FOR LEVELLING THE FLOAT

Diagram No. 3



- Remove float chamber cover (C), remove the gasket taking care not to damage it, check that the float can move easily on the fulcrum pin.
- Insert spring 98013–800 between float and the side of the carburettor bowl.
- Insert gauge 98014–200 so that the appendage (A) is in contact with tongue (Lc).
- Check that the float is 5.5 to 6mm. above the carburettor body surface, without the gasket, by using gauge 98014–100.
- Should the float level be incorrect, modify the position of the tongue (Lc) taking care that they are perpendicular to the axis of the gauge tab and show no indentation that might affect free movement of the needle valve.
- Check with gauge 98015–500 that the valve (V) with the ball (Sf) not depressed is 25mm. from the surface of the carburettor float chamber (C). The carburettor cover (C) must be inverted to carry out this operation.

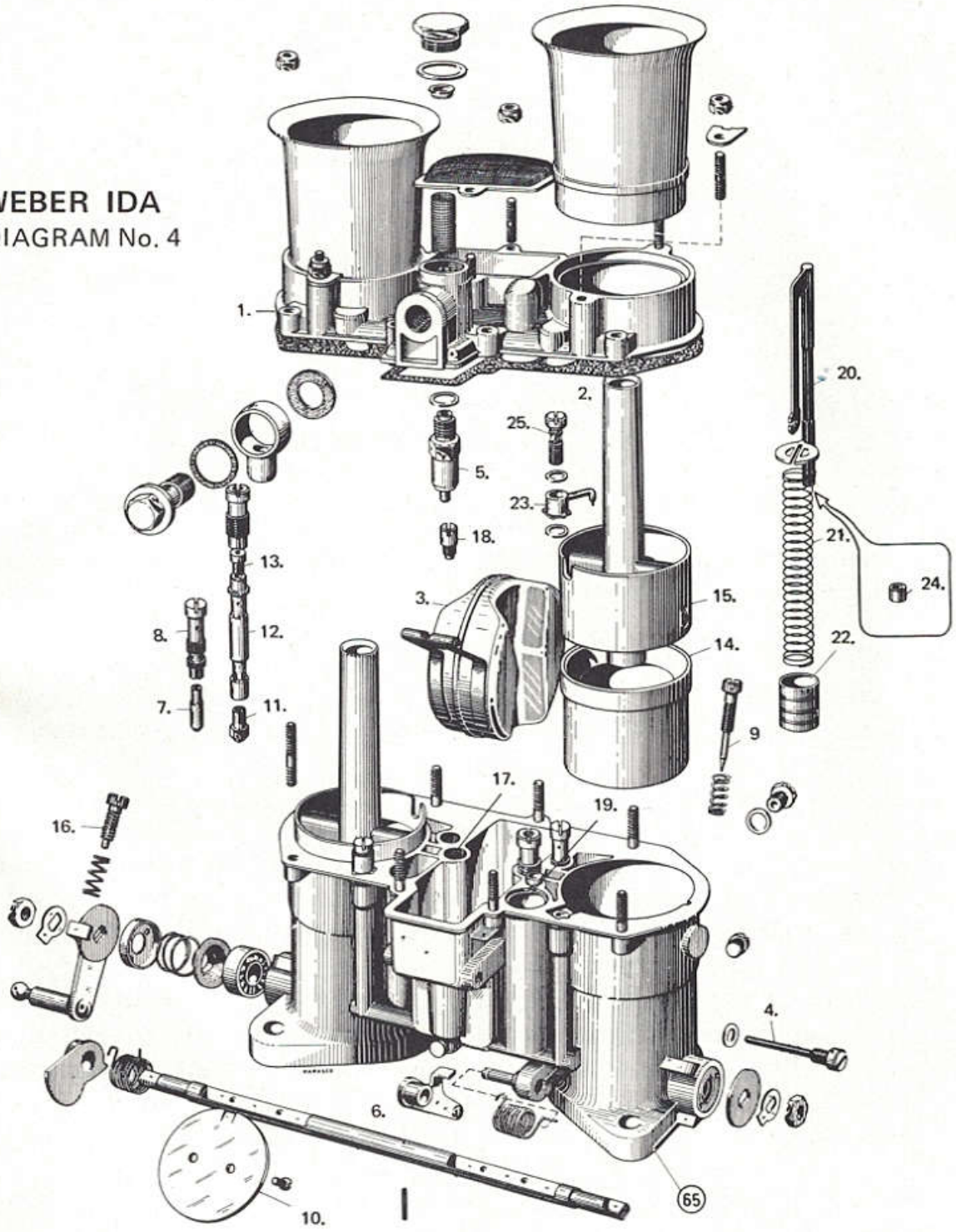
Note

This operation must be carried out every time it is necessary to replace the needle valve.

Important

The float level setting naturally alters the fuel level in the carburettor bowl and can affect the selection of jets.

WEBER IDA
DIAGRAM No. 4



IDA PARTS REFERRED TO IN TUNING GUIDE

PART 1 (FLOAT LEVEL)

DIAGRAM NO.	DESCRIPTION
1.	FLOAT CHAMBER COVER
2.	FLOAT CHAMBER COVER GASKET
3.	FLOAT
4.	FLOAT PIVOT PIN
5.	NEEDLE & SEAT
6.	NEEDLE & SEAT WASHER

PART 2 (IDLE JET)

7.	IDLE JET	
8.	IDLE JET CARRIER (IDLE JET AIR CORRECTION)	
9.	IDLE MIXTURE SCREW	
10.	THROTTLE DISC	
11.	MAIN JET	ASSEMBLY
12.	EMULSION TUBE	
13.	AIR CORRECTION JET	
14.	CHOKE TUBE	
15.	SECONDARY OR AUXILIARY VENTURI	
16.	IDLE SPEED SCREW	

PART 3 (CHOKE TUBE)

14	CHOKE TUBE

PART 4 (SECONDARY OR AUXILIARY VENTURI)

15.	SECONDARY OR AUXILIARY VENTURI

PART 5 (MAIN JET, EMULSION TUBE, AIR CORRECTION JET ASSEMBLY)

11.	MAIN JET	ASSEMBLY
12.	EMULSION TUBE	
13.	AIR CORRECTION JET	
15.	SECONDARY OR AUXILIARY VENTURI	
17.	EMULSION TUBE WELL	
14.	CHOKE TUBE	

PART 6 (ACCELERATOR PUMP – POWER CIRCUIT)

18.	INTAKE VALVE WITH EXHAUST ORIFICE	
19.	PUMP WELL	
20	PUMP ROD	ASSEMBLY
21	PUMP SPRING	
22.	PUMP PISTON	
18.	EXHAUST ORIFICE (INTAKE VALVE WITH EXHAUST ORIFICE)	
23.	PUMP JET	
24.	COLLAR	
25.	BALL CHECK VALVE.	

TABLE No. 2

Size per cylinder in cc's	Idle Jet Fuel Bleed Hole Size in mm.
200	.35 or .40
250	.40 or .45
300-350	.45 or .50
400	.50
450-500-550	.50 or .55
600	.55 or .60
650	.60 or .65
700	.65 or .70
750-800-850	.70 or .75

TABLE No. 3

'F' Number	One Hole Type Hole Size in mm	Two Hole Type Hole Size in mm
F1		1.35
F2	1.30	
F3		1.60
F4	1.30	
F5	1.60	
F6	0.70	
F7		1.20
F8	1.20	
F9	1.00	
F10	No hole for use in IDA carburettors where air correction is in idle jet carrier or holder.	
F11	1.20	
F12	0.90	
F13		0.90
F14	1.20	

TABLE No. 4

Idle jet air correction or bleed holes arranged from rich to lean

Rich	F6
	F12
	F9
	F8–F11–F14
	F13
	F2–F4
	F5
	F7
	F1
Lean	F3

PART 2

IDLE JET

Both the DCOE and IDA carburettors have an idle jet assembly which meters both fuel and air into the idle circuit.

At idling speed the idle mixture adjustment can be set to control the volume of mixed or emulsified fuel and air provided by the idle jet assembly and if a correct jet has been selected the setting of the idle mixture screw should be between a half and one full turn open.

As the throttle is opened from the idling position the throttle disc crosses a series of holes which are referred to as the secondary idle bleed circuit or progression ports. These are fixed holes having no adjustment and are also fed by the idle jet assembly. Naturally it is important that a controlled mixture is fed through them so that smooth acceleration takes place from idle until the main jet assembly comes into operation. The control of this mixutre is very closely associated with the idle jet air bleed (the 'F' number in DCOE units or the idle jet carrier in IDA models).

SELECTION

To determine these jet hole sizes, tables have been prepared, table number 2 deals with the fuel bleed hole designated by the numbers 35, 40, 45, 50, 55 etc. and the sizes are given in mm. against the capacity of each cylinder. Where an engine has Siamese inlet ports it may be necessary to go one size larger than quoted.

Table number 3 gives the size of the idle jet air correction or bleed hole or holes against each 'F' number in mm's. It will be seen that the 'F' numbers do not run in sequence, but in table number 4 they have been arranged in their order from rich to lean.

EXAMPLE

Take a four cylinder engine of 1275 c.c., divide by 4, this is 319 c.c., per cylinder. From TABLE No. 2 it shows that both 300 and 350 c.c., can use, as a starting point, either a 45 or 50 idle fuel bleed hole size, but as the example has siamesed ports, 50 is the jet to start with.

To get a reading for the correct selection of the idle air bleed or 'F' number hole size, it is recommended that a midway choice, say F8 (1.20MM) be used which will give an idle jet assembly number of 50F8.

To check this selection, start engine and bring it up to normal operating temperature; leaving chokes, secondary venturi, mains, emulsions, air corrections, etc., as fitted. Carefully set the idle mixture screws (diagrams 1 & 2) to obtain the most even idling. This is done in conjunction with the idle speed screw (diagrams 1 & 2). Take time to allow engine to settle down after each adjustment—due allowance should be made if a competition camshaft is fitted as this generally produces rough idling.

PROGRESSION PORT CHECK. Having correctly set the idle speed mixture and rate, increase engine speed, by turning idle speed screw, to a point just below that at which mixture is seen to come from the secondary venturi discharge nozzle. To check for correct progression port mixture, turn idle mixture in and out.

If mixture is correct, turning screw either way will drop engine speed. Should speed increase when screw is turned in, it means the mixture is too rich. Conversely, if speed increases when screw is turned out, the mixture is too lean.

Correction of lean mixture may be accomplished by increasing the idle fuel jet diameter or reducing the idle air jet diameter. Determination for either of these can be found by reference to the number of turns out the the idle mixture screw had to be turned to achieve a smooth idle. Optimum setting on an idle mixture screw should be 1/2—1 turn out; if it was necessary to go beyond this setting and progression stage as outlined above is weak increase fuel jet diameter. If idle mixture screw setting was acceptable and progression stage is lean—decrease the idle air jet diameter. Should progression port mixture be rich, obviously the reverse procedure would apply.

This setting is very critical to ensure a smooth changeover from idle to main jet operation.

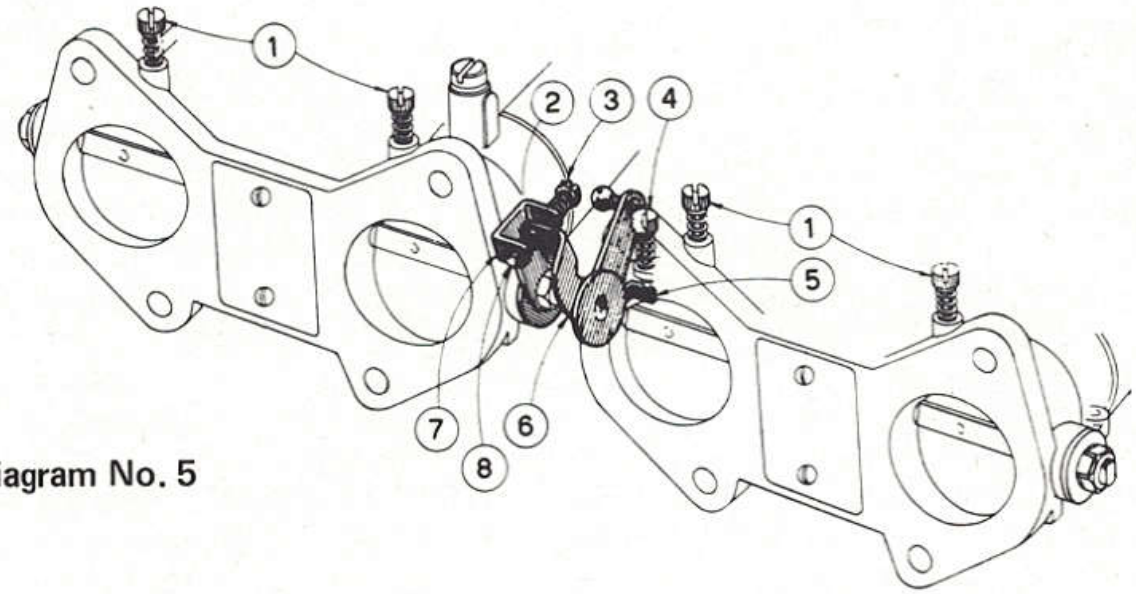


Diagram No. 5

To ensure proper engine idle operation with paired WEBER DCOE series carburettors proceed as directed below.

- Disconnect the tie rod at accelerator lever **(6)**.
- Slacken the throttle setting adjustment screw **(4)** of the rear carburettor.
- Slacken screw **(3)** of lever **(7)** on front carburettor.
- Check spindles for free movement by actuating levers **(6)** and **(7)**.

After performing the above check proceed with the synchronization of the opening of the throttles in both carburettors as follows:

- Press lever **(6)** so as to overcome the load of plunger **(8)** on lever **(7)** and make sure the throttles in both carburetors are perfectly closed.
- Still pressing on lever **(6)**, turn screw **(3)** of lever **(7)** until it contacts lug **(2)** of lever **(6)**.
- Under this condition, the throttles must result still set in fully closed position.
- Next, turn adjusting screw **(4)** until it rests lightly on lug **(5)** of lever **(6)**.
- Tighten half a turn screw **(4)** and back out 3/4 turn from locked position the four screws **(1)** thus obtaining a rough adjustment of idle speed.

The final setting adjustment of engine idle speed rate must be made with engine warm and running, proceeding as follows:

- Initially adjust the minimum opening of throttles by operating on screw **(4)** until engine runs steadily.
- Next, by screws **(1)** adjust the mixture metering of each barrel to obtain the fastest, steadiest and more balanced rate allowed by the position of throttles as set above.
- Should engine idle operation still be unsatisfactory after these adjustments on account of an imperfect matching of the two carburettors, correct slightly the setting of screw **(3)**.
- Then, reduce the opening of throttles by slackening screw **(4)**, until optimum idle speed rate is ensured.
- Finally, re-connect accelerator control linkage tie rod.

PART 3

CHOKE TUBE

The choke tube governs the gas speed through the carburettor.

As the choke tube and carburettor size is very closely associated the following information can be used as a guide to carburettor size selection as well, if this has not already been done.

The main points to be kept in mind when selecting choke tube sizes are as follows.

1) Use of the vehicle – road or track, if track a) hill climbing, good torque characteristics required, smaller chokes.
   b) Road racing, fast circuits which require more power at the top end of the rev. range, larger chokes. Slow circuits, which require better torque, smaller chokes.
2) Weight of the vehicle, the lighter the vehicle for a set engine capacity, increase the choke size.
3) Number of forward speed gears and gear ratios, with 5 and 6 speed close ratio gear boxes giving an ability to keep the motor up to maximum torque and power output, use larger chokes.
4) For engines of the same capacity and number of cylinders the following design features affect choke tube selection.
   a) Bore and stroke ratio – oversquare, this design allows for high revs, larger chokes, undersquare smaller chokes.
   b) Position and number of camshafts.
      i) Push rod, smaller chokes.
      ii) Single overhead camshaft, larger chokes.
      iii) Twin overhead camshaft even larger again.
   c) Valve Timing – where camshafts have a long duration of valve open- and a high lift larger chokes can be used.
   d) Exhaust system – a well designed extractor exhaust system, larger chokes.

The following tables numbered 5,6,7 and 8 give a guide to the selection of choke tubes for 4 cylinder (an inlet port per cylinder), 4 cylinder (siamese ports). 6 cylinder and V8 Engines respectively. The capacities given are in CC's per cylinder.

TABLE NO. 5

A Guide to Choke Tube Selection

4 cylinder engine, with an inlet port per cylinder. (Push rod valve operated engines in production touring or sports cars e.g. Volvo, Morgan).

STATE OF TUNE OF ENGINE

Capacity Per Cylinder in cc's	Standard Choke Size in mm	High Performance. Choke Size in mm	Competition Choke Size in mm	Carburettor/s
200			27	38DCOE. X2
250	27	28	30	38 DCOE. X2
	27	28	30	40 DCOE. X2
300	27	29	31	40 DCOE. X2
350	29	31	33	40 DCOE. X2
400	30	33	36	40 DCOE. X2
	30	32	35	42 DCOE. X2
450	32	34	36	40 DCOE. X2
	32	34	36	42 DCOE. X2
500	33	35	37	45 DCOE. X2
550	33	35	38	45 DCOE. X2
600	34	36	40	45 DCOE. X2

TABLE No. 6

4 cylinder engine, with siamese inlet ports. (Push rod valve operated engine, in production touring or sportscars e.g. Renault, MG Midget, M.G. 'B')

STATE OF TUNE OF ENGINE

Capacity per Cylinder in cc's	Standard Choke size in mm	High Performance. Choke size in mm	Competition. Choke size in mm.	Carburettor/s
200	27	28	30	40 DCOE X1
			30	42 DCOE X1
250	28	32	35	40 DCOE X1
	27	31	34	42 DCOE X1
300	33	35		42 DCOE X1
	32	34	38	45 DCOE X1
350	33	34	38	45 DCOE X1
400	33	35	40	45 DCOE X1
450	34	36	40	45 DCOE X1
500	36	38	40	45 DCOE X1

TABLE NO. 7

6 cylinder engine, with an inlet port per cylinder. (Push rod and overhead camshaft valve operated engines in production touring and sports cars. e.g. Triumph 2000, GT6, Jaguar 'E' Type.)

STATE OF TUNE OF ENGINE

Capacity per Cylinder in cc's	Standard Choke size in mm.	High Performance. Choke size in mm.	Competition Choke size in mm	Carburettor/s
300	27	28	30	38 DCOE X3.
	27	28	30	40 DCOE X3.
350	27	29	31	40 DCOE X3.
400	28	30	33	40 DCOE X3.
	28	30	33	42 DCOE X3.
450	30	31	34	42 DCOE X3.
	30	30	34	45 DCOE X3.
500	30	32	35	42 DCOE X3.
	30	30	35	45 DCOE X3.
550	32	33	36	42 DCOE X3.
	32	32	35	45 DCOE X3.
600	33	34	36	45 DCOE X3.
650	33	35	38	45 DCOE X3.
700	36	38	40	45 DCOE X3.

TABLE NO. 8

V8 Engine, with an inlet port per cylinder (Push rod valve operated engines in production touring or sports cars. e.g. Mustang, Corvette).

STATE OF TUNE OF ENGINE.

Capacity per Cylinder in cc's	High Performance Choke size in mm	Competition Choke size in mm	Carburettors.
450		38	48 IDA x 4.
500		39	48 IDA x 4.
550	38	40	48 IDA x 4
600	38	41	48 IDA x 4
650	40	42	48 IDA x 4
700	40	43	48 IDA x 4
750	42	44	48 IDA x 4
800	42	45	48 IDA x 4
850	42	45	48 IDA x 4

PART 4.

Secondary or Auxiliary Venturi.

Secondary venturies are supplied in the following sizes 3.0, 3.5, 4.0, 4.5, 5.0 depending on the various model DCOE and IDA carburettors. These sizes relate to the cross feed hole which delivers fuel from the main jet assembly. The feed hole is rectangular in shape having a radiused edge at feed end and tapered slightly towards the delivery point in the venturi proper.

Small secondary venturies (3.5) should be used where a large choke tube has been selected in relation to the cylinder capacity.

PART 5.

Main jet, Emulsion Tube, Air correction jet Assembly.

This assembly screws into a fuel well having three delivery points.

1) Bottom – inlet hole through which the main jet draws fuel from the float chamber.
2) Top – Air inlet through which the air correction jet supplies air to the emulsion tube.
3) Side – mixed or emulsified fuel and air outlet to the secondary or auxiliary venturi.

Function

When the air flow through the secondary venturi is of sufficient velocity, fuel is drawn from the annular space in the emulsion tube well. This space can be varied by the use of emulsion tubes having the same number, size and disposition of holes but of different diameters e.g. F2 and F15; F3 and F7. Therefore to obtain a large initial flow of fuel a small diameter emulsion tube should be used. As the fuel level drops in the well, the main jet replaces it up towards its normal level subject to the volume of fuel being drawn from the emulsion tube well through the secondary venturi. The rate of fuel drawn from the emulsion tube is governed by the air speed through the secondary venturi and this speed varies according to the engine demands, consequently as the fuel level drops, it uncovers the correction holes in the emulsion tube, resulting in a corrected mixture. So it will be seen that a number of factors control the delivery of fuel to the engine.

1) Size of the secondary Venturi.
2) Diameter of the emulsion tube.
3) Size of the main jet.
4) Size of the air correction jet.
5) Number and disposition of air bleed holes in the emulsion tube.

Dealing with the above items, 1 and 2 have already been discussed, Item 3, the main jet, usually can be calculated, as a good starting point by multiplying the choke tube size by 4, e.g. 30 choke tube multiplied by 4 equals a 120 main jet.

Item 4, the air correction jet size, does not have a simple formula as the main jet. It can be classified in three basic groups.

a) Standard and high performance engines using DCOE carburettors, (but not siamese ported 4 cylinder engines) the air correction jet size is usually the main jet size plus 60, e.g. 120 main gives a 180 air correction jet.

b) DCOE carburettors used on racing engines, the air correction can be as suggested in a) or the same size as the main jet (this is usually the case when large choke tubes are used in relation to cylinder capacity and carburettor size) e.g. 2.5 litre 4 cylinder Coventry Climax engine 58 DCO 3 carburettors 47mm chokes 200 main jets and 200 air correction jets.

c) IDA carburettors only on competition vehicles, the air correction jet is usually the main jet size minus 50 to 60. A 170 main uses a 110 to 120 air correction jet.

TABLE No. 9

Selecting an Emulsion Tube

NORMAL FUNCTION	*TYPE*
Most current usage	F2–F3–F4–F7–F9 F11–F14–F15–F16–F20
To richen at low RPM and/or during minimal acceleration	F7
To weaken at low RPM and/or during minimal acceleration	F2–F3–F11–F14 F15–F16
To lean top end when air correction jet is bigger than 2.00 mm.	F11–F19
Alcohol usage	F2–F3–F4 F7–F17

EMULSION TUBE PART No's.

The following are all applicable to 38, 40, 42, 45 & 48 DCOE & 48 IDA.

PART No.	*REF.*	*PART No.*	*REF.*
61450.026	F1	61450.054	F34
61450.027	F2	61450.071	F6
61450.028	F3	61450.091	F7
61450.029	F5	61450.092	F8
61450.030	F9	61450.111	F10
61450.031	F11	61450.131	F12
61450.032	F15	61450.166	F14
61450.051	F4	61450.181	F16
61450.052	F17	61450.210	F19
61450.053	F20		

PART 6

Accelerator Pump – Power circuit

The pump circuit is made up by several parts, listed below are the items in order of their operation.

1) Intake valve.
2) Pump well.
3) Pump rod, spring and piston assembly.
4) Exhaust orifice.
5) Pump jet.
6) High speed power device.

1) Intake valve, this is found in the bottom of the float chamber between the "jet block" and the pump well. The valve incorporates the exhaust orifice 4) which shall be explained later. The intake valve is a fixed size and therefore is not necessary to consider when tuning is being carried out; its function is to allow fuel to pass into the pump well.
2) Pump well is a fixed size store for the pump jet, but is metered by two units, the pump rod and the exhaust orifice.
3) Pump rod, spring and piston assembly, the pump rod governs the amount of fuel in the pump well. The DCOE model carburettor has varying lengths of rods available to change this volume factor while the IDA unit can be changed by the use of a collar on the pump rod to shorten its stroke. Piston spring, the speed of thrust of the pump piston can be altered by the use of springs of different pressures.
4) Exhaust orifice: the feature of this unit is to control the amount of fuel at the disposal of the pump jet. Consequently there are varying sizes of this unit starting with the "closed" or type with no exhaust orifice which gives the pump jet all the fuel available in the pump well to the pump jet, whereas the others exhaust an amount in accord with their size back into the float chamber.
5) Pump jet, this does exactly as the name suggests, and that is to meter the amount of fuel available from the pump well or govern the volume and time of flow of fuel.
6) High speed power device, in the DCOE and IDA carburettors the pump jet also acts as a high speed power device. When the depression in the carburettor bodies or throats becomes great enough, the ball and rod weight is lifted off its seat in the DCOE and a ball check valve in the IDA and fuel bleeds into the system via the pump jets.

For assistance in the selection of the pump circuit parts, refer to table number 12, the suggested jet setting list.

TABLE No. 10

WEBER METERING PARTS
AVAILABLE CALIBRATIONS

PART No.	REF.	APPLICATION	AVAILABLE CALIBRATIONS IN MM. ALL SIZES INCL.	INCREMENTS MM.	SPECIAL EXTRA SIZES
SECOND OR AUXILIARY VENTURI					
31866.009		48IDA	3.50; 4.00; 4.50; 5.00		
31886.002		45,48DCOE	3.00; 3.50; 4.00; 4.50; 5.00		
31904.004		45DCOE	3.50; 4.50		
31906.001		38; 40DCOE	3.50; 4.50		
31906.002		42 DCOE	3.50; 4.50		
31906.003		40DCOE	3.50; 4.50		
31906.004		40DCOE	3.50; 4.50		
31906.005		40DCOE	3.50; 4.50		
CHOKE TUBE					
34914.018		48IDA	36 to 45	1mm	34
34924.001		45DCOE	27 to 40	1mm	41.5
34924.008		48DCOE	40 and 42		
34926.009		38; 40; 42DCOE	24 to 36		
MAIN JET					
41110.001		38; 40; 42; 45; 48DCOE; 48IDA	.80 to 2.50	0.05mm	No Hole/ Blank
41110.001		38; 40; 42; 45; 48DCOE; 48IDA	1.07 to 1.22	0.05mm	2.60 & 2.90
IDLE JET					
41165.051	F1	38; 40; 42; 45; 48DCOE	.40 to .65	0.05mm	
41165.052	F2	38; 40; 42; 45 48DCOE	.40 to .70	0.05mm	
41165.053	F3	38; 40; 42; 45; 48DCOE	.40 to .60	0.05mm	
41165.054	F4	38; 40; 42; 45; 48DCOE	.40 to .65	0.05mm	
41165.055	F5	38; 40; 42; 45; 48DCOE	.40 to .70	0.05mm	
41165.056	F6	38; 40; 42; 45; 48DCOE	.40 to .80	0.05mm	
41165.057	F7	38; 40; 42; 45; 48DCOE	.40 to .65	0.05mm	.80

IDLE JET (CONTD.)					
41165.058	F8	38; 40; 42; 45; 48DCOE	.40 to .65	0.05mm	
41165.059	F9	38; 40; 42; 45; 48DCOE	.35 to .65	0.05mm	
41165.060	F10	48IDA	.40 to .80	0.05mm	0.90
41165.061	F11	38; 40; 42; 45; 48DCOE	.40 to .70	0.05mm	
41165.062	F12	38; 40; 42; 45; 48DCOE	.40 to .65	0.05mm	
41165.063	F13	38; 40; 42; 45; 48DCOE	.40 to .65	0.05mm	
41165.064	F14	38; 40; 42; 45; 48DCOE	.50	0.05mm	
PUMP JET					
41254.003		48IDA	.35 to .55	0.05mm	.70
41280.001		38; 40; 42; 45; 48DCOE	.30 to .90	0.05mm	
41280.004		38; 40; 42; 45; 48DCOE	.40 to .50	0.05mm	
AIR CORRECTION JET					
41365.001		38; 40; 42; 45; 48DCOE, 48IDA	.90 to 2.80	0.05mm	70; 80; 2.90
NEEDLE & SEAT					
64240.004		40; 42; 45; 48 DCOE	1.25 to 3.00	0.25mm	
64240.005		48IDA	1.50; 1.75; 2.00; 2.50 3.00		
64240.011		38DCOE	1.25; 1.50; 1.75; 2.00 2.25; 2.50; 2.75; 3.00		
INTAKE VALVE WITH EXHAUST ORIFICE					
64290.001		38; 40; 42; 45; 48DCOE, 48IDA	.35 to .90	0.05mm	No Hole/ Blank
64290.001		38; 40; 42; 45; 48DCOE, 48IDA	1.00; 1.50		

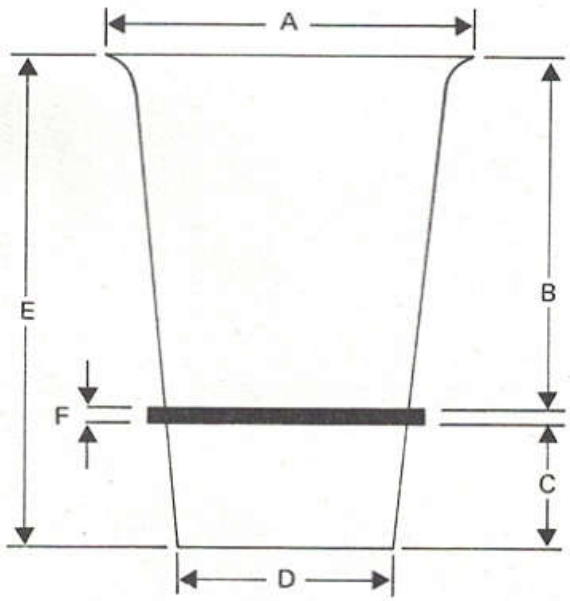
TABLE No. 11

RAM TUBE – AIR HORN DIMENSIONS

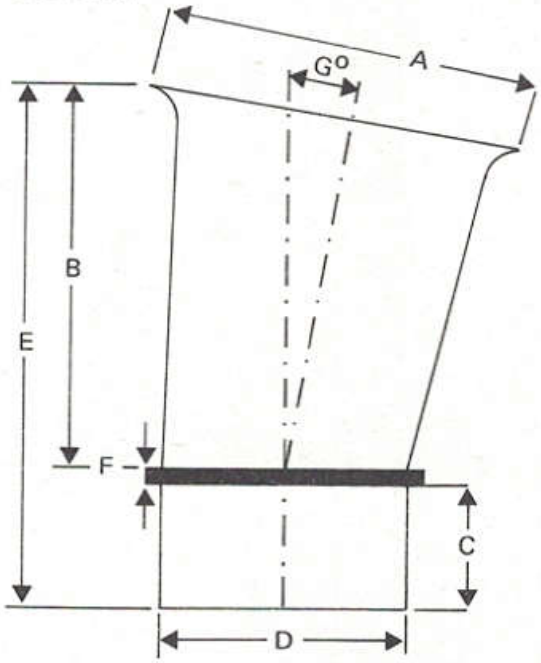
TYPE 1.

PART No.	USE	DIMENSIONS IN mm.					
		A	B	C	D	E	F
52840,001	45/48DCOE	64.5	62	34	48	99	3
52840.002	58DCO	80	66.5	15.5	60	85	3
52840.003	45DCO	70	56.5	15.5	50	75	3
52840.004	38,40DCOE	58	57	33	45	94	4
52840.006	40DCOE	58	16	33	45	53	4
52840.011	45DCO	70	77	15.5	50	95.5	3
52840.012	40DCOE	58	38	33	45	75	4
52840.019	38DCOE	58	88	33	45	125	4
52840.024	40DCOE	58	45	33	45	82	4
52840.027	46/48IDA	70	56.5	15.5	53	75	3
52850.029	58DCO	80	65	17	60	85	3

TYPE 1.



TYPE 2.



TYPE 2.

PART No.	USE	A	B	C	D	E	F	G
52840.009	45DCOE	65	90	34	48	127	3	10°
52840.008	40DCOE	58	90	33	45	127	4	10°
52840.009	42DCOE	65	76.5	33	45	116.5	7	8°
52840.030	45/48DCOE	60	56	34	48	93	3	10°

NOTES

TABLE No. 12

WEBER CARBURETTOR SETTINGS

THIS LIST IS BASED ON DYNAMOMETER TESTS, BUT DUE TO VARIED MODIFICATIONS TO INDIVIDUAL ENGINES, THE SETTINGS LISTED ARE TO BE TAKEN AS STARTING POINTS ONLY

Make and Model	Engine Details	Carburettors	Choke	Secondary Venturi	Main
AUSTIN					
1800	Std. engine, with extractor ex. system	1 X 45DCOE	32	5.0	130
Cooper	997c.c. Full Comp. engine	1 X 42DCOE	34	4.5	130
Cooper	997c.c. Std. engine	1 X 42DCOE	28	4.5	105
Mini	998c.c. Std. engine	1 X 40DCOE	30	4.5	130
Cooper	998c.c. mild cam Port and Pol. Head	1 X 42DCOE	33	4.5	135
Cooper	998c.c. mild cam (34–64, 64–34)	1 X 45DCOE	32	5.0	130
Cooper 'S'	1275c.c. full Comp. engine	1 X 45DCOE	40	3.5	195
Cooper 'S'	1275c.c. Std. engine	1 X 45DCOE	34	3.5	130
Cooper 'S'	1370c.c. full comp. engine	1 X 48IDA	40	4.5	195
AUSTIN – HEALEY					
Sprite	948c.c. full comp. engine	1 X 45DCOE	34	5.0	150
Sprite	1098c.c. Std. engine	1 X 45DCOE	32	5.0	140
Sprite	1098c.c. mild cam, Port and Pol. head	1 X 45DCOE	34	4.5	135
Sprite	1098c.c. full comp. engine	1 X 45DCOE	37	3.5	180
Sprite	1275c.c. Std. engine	1 X 45DCOE	34	3.5	130
Sprite	1275c.c. full comp. engine	1 X 45DCOE	40	3.5	200
3000	Full comp. engine	3 X 45DCOE	34	3.5	130
3000	Std. engine	3 X 45DCOE	32	4.5	140
B.M.W.					
1600–1800c.c.	Stock	2 X 40DCOE	32	4.5	130
2002	Stock	2 X 45DCOE	34	5.0	130
DATSUN					
1000 and 1200	Stock	1 X 40DCOE	27	4.5	110
1600	Stock	1 X 45DCOE	32	5.0	130
1800 – 180B	Stock	1 X 45DCOE	34	5.0	140
1800 – 180B	Stock	2 X 40DCOE	32	4.5	140
1000 Sunny	Mild cam	2 X 40DCOE	30	4.5	115
1600	Mild cam	2 X 40DCOE	33	4.5	135
1800 – 180B	Stock	2 X 42DCOE	33	4.5	115
1800 – 180B SSS	Stock	2 X 42DCOE	33	4.5	115
1800 – 180B SSS	Stock	2 X 45DCOE	30	4.5	120
240Z and 260Z	Stock	3 X 42DCOE	32	3.5	135

Emulsion	Air	Idle	Pump	In Valve With Ex.	Ram Tubes	Throttle Lever	Air Cleaners
F16	165	45F9	55	closed	Not fitted	45034.042	CCL 45
F15	160	45F9	50	50	52840.006	45034.042	—
F 2	170	45F9	40	50	52840.006	45034.042	CCL 2053
F16	190	50F6	35	closed	52840.006	45034.042	CCL 2053
F 9	185	45F9	50	50	52840.006	45034.042	CCL 2053
F 9	165	45F9	50*	50	52840.030	45034.042	CCL 2052
F 2	200	50F9	50*	50	52840.030	45034.042	—
F 2	175	50F9	50*	50	52840.030	45034.042	CCL 2052
F 2	170	60F10 (120 Carrier)	50	closed	Standard	Standard	—
F 2	165	50F6	40*	50	52840.001	45034.042	—
F16	180	45F6	40*	50	52840.001	45034.042	CCL 45VS
F15	180	45F9	50*	50	52840.001	45034.042	CCL 45VS
F 2	200	50F9	50*	50	52840.001	45034.042	—
F 2	175	50F9	50*	50	52840.001	45034.042	CCL 2052
F 2	195	50F9	50*	50	52840.001	45034.042	—
F 2	160	50F2	45*	closed	52840.001	45034.042	—
F 2	180	50F2	45	closed	52840.001	45034.042	CCL 45
F 9	185	45F12	35	45	52840.024	45034.084	CCL 2050/ 2050VS
F 9	180	50F8	40	45	52840.030	45041.025 45034.084	CCL 2051/ 2051VS
F 7	165	50F9	50	50	52840.012	45034.044	CCL 40
F20	170	45F9	50	closed	52840.030	45034.044	CCL 2051VS
F20	175	45F9	40	closed	52840.030	45034.044	CCL 2051VS
F15	165	50F8	40	50	52840.024	45034.044	CCL 40/40VS
F16	185	45F6	35	50	52840.004	45034.042	CCL 20/40VS
F15	160	50F8	40	50	52840.004	45034.042	CCL 40/40VS
F15	160	50F8	40	50	52840.009	45034.042	CCL 40/40VS
F15	175	50F8	40	50	52840.009	45034.042	CCL 40/40VS
F15	195	50F8	40	50	52840.030	45034.044	CCL 45/45VS
F15	170	55F2	40	50	52840.009	45034.044	CCL 2050/ 2X 2050VS

* Use pump rod with overall length of 5.95 cm. Part No. 10410.015.

Make and Model	Engine Details	Carburettors	Choke	Secondary Venturi	Main
DATSUN (CONT')					
240Z and 260Z	Stock	3 x 45DCOE	34	5.0	145
FORD – ENGLISH					
105E	997c.c. full comp. engine	2 X 40DCOE	30	4.5	155
109E	1098c.c. full comp. engine	2 X 40DCOE	33	4.5	125
113E	1340c.c. full comp. engine	2 X 40DCOE	34	4.5	130
116E	1498c.c. full comp. engine	2 X 40DCOE	36	4.5	135
122E	1498c.c. G.T. Cortina Std. engine	2 X 40DCOE	32	4.5	125
122E	1598c.c. full comp. engine (1498c.c. Bored out)	2 X 42DCOE	35	4.5	135
122E	1650c.c. full comp. engine (1498c.c. Bored out)	2 X 42DCOE	36	4.5	135
122E	1498c.c. full comp. engine	2 X 42DCOE	35	4.5	135
Cross Flow Head	1600c.c. Mild cam	2 X 40DCOE	32	4.5	120
2000	Stock	1 X 45DCOE	34	5.0	145
2000	Stock	2 X 42DCOE	32	4.5	125
GALANT					
1600c.c.	Stock	1 X 45DCOE	32	5.0	125
HOLDEN/TORANA					
6 Cylinder	Red-Street	3 X 45DCOE	36	5.0	150
6 Cylinder	Red-Comp.	3 X 45DCOE	40	5.0	155
6 Cylinder	Red-Street	1 X 45DCOE	32	5.0	150
HONDA					
1200c.c.	Stock	1 X 40DCN	28	4.5	145
JAGUAR					
3.8 and 4.2 XK 'E'	Stock	3 X 45DCOE	38	3.5	165
LOTUS					
Europa (R16)	Stock	1 X 45DCOE	34	3.5	150
M.G. (ALSO SEE AUSTIN HEALEY)					
M.G. 'A' 1500	Derrington Cross Flow Head. Full comp. engine	2 X 42DCOE	32	4.5	130
M.G. 'B'	Stock	1 X 45DCOE	34	3.5	145
M.G. 'B'	Full comp. engine	1 X 45DCOE	36	5.0	165
MORRIS (REF. AUSTIN)					
ROOTES					
1725c.c.	Mild cam fitted	2 X 40DCOE	33	4.5	135
SUNBEAM					
Rapier Mk11 and Alpine	Mild cam. Port and Polished head	2 X 42DCOE	33	4.5	115
Alpine 1725c.c.	Stock	2 X 40DCOE	30	4.5	115
TOYOTA					
Corolla	Full comp. engine	2 X 40DCOE	33	4.5	120
Corolla 1200	Stock	2 X 40DCOE	28	4.5	115
Corolla 1200	Stock	1 X 40DCOE	27	4.5	105
Corona	Mild cam	2 X 40DCOE	30	4.5	125

Emulsion	Air	Idle	Pump	In Valve With Ex.	Ram Tubes	Throttle Lever	Air Cleaners
F15	180	55F2	45	45	52840.030	45034.044	CCL 2051/ 2X 2051VS
F16	180	40F9	35	closed	52840.024	45034.042	
F16	165	45F9	40	closed	52840.024	45034.042	
F16	170	45F9	40	closed	52840.024	45034.042	
F16	165	50F9	40	closed	52840.024	45034.042	
F16	170	45F9	35	closed	52840.024	45034.042	
F16	165	50F9	40	closed	52840.024	45034.042	
F16	160	50F9	40	closed	52840.024	45034.042	
F16	170	50F9	40	closed	52840.024	45034.042	
F16	180	50F9	40	50	52840.024	45034.042	CCL 40
F 2	185	55F4	50	50	52840.030	45034.042	CCL 45
F16	180	50F9	40	50	—	TK 1024/5	CCL 40
F20	160	50F8	45	50			CCL 45
F 2	190	50F8	40	50	52840.030	45034.044	CCL 45
F 2	210	50F8	45	closed	52840.030	45034.044	—
F 2	185	60F3	45	closed	52840.030	45034.042	CCL 45
F33	170	*50 *Idle air Corrector .90	50				CCL 34VS
F 2	190	65F8	40	50	52840.001	45034.044	CCL 45
F 2	180	45F8	40	50	52840.001	45034.044	CCL 1051VS
F15	165	45F9	40	closed	52840.009	45034.042	
F 2	165	50F9	50	50	52840.001	45034.042	CCL 45
F16	160	50F8	60	50	52840.001	45034.042	
F15	165	50F8	45	50	52840.012	45034.042	CCL 40
F16	220	45F9	35	closed	52840.009	45034.042	CCL 40
F16	180	50F9	35	closed	52840.012	45035.042	CCL 40
F16	165	45F9	35	50	52840.012	45034.042	
F11	160	50F9	35	50	52840.006	45034.042	CCL 40
F 7	155	50F11	50	50	52840.006	45034.044	CCL 40
F15	180	50F9	40	50	52840.012	45034.042	CCL 40

Make and Model	Engine Details	Carburettors	Choke	Secondary Venturi	Main
TOYOTA (CONT')					
Celica 1600	Stock	1 X 45DCOE	28	5.0	110
Celica 1600	Modified	1 X 45DCOE	32	5.0	120
Celica 1600	Stock	2 X 42DCOE	27	4.5	115
TRIUMPH					
2000 and G.T. 6	Stock	3 X 40DCOE	29	4.5	120
TR2, 3 and 4	Stock	2 X 42DCOE	32	4.5	140
Spitfire	Full comp. engine with factory 8 port head	2 X 40DCOE	33	4.5	130
VOLVO					
122S and 144	Stock	2 X 42DCOE	32	4.5	125
122 and 144	(Bored out to 2198c.c.) Full comp. engine	2 X 42DCOE	36	4.5	155
P 1800	Factory ext. exh. 30–70, 70–30 cam	2 X 42DCOE	32	4.5	125
THESE SETTINGS APPLY TO ALL 4 CYLINDER VOLVO FROM 1960 ON.					
V.W.					
1500	Stock Single port heads	1 X 40DCN	24	4.5	133
1600	Stock Dual port heads	2 X 40DCN	28	4.5	125
1600	Stock Dual port heads	2 X 48IDA	37	4.5	135
V8 ADAPTOR					
Ford 302 C.I.	Stock	2 X 45DCOE	34	4.5	180
Ford 351 C.I.	Stock	2 X 45DCOE	36	4.5	200
Ford 351 C.I.	Competition	2 X 45DCOE	41½	3.5	240
G.M.H. 308 C.I.	Stock	2 X 45DCOE	30	5.0	160
G.M.H. 308 C.I.	Competition	2 X 45DCOE	38	5.0	245
MOTOR CYCLES					
HARLEY-DAVIDSON					
Harley-Davidson	Stock 900c.c.	1 X 45DCOE	34	3.5	110
HONDA					
Honda '4'	Stock 750c.c.	2 X 40DCOE	30	4.5	115
KAWASAKI					
Kawasaki	Stock 900c.c.	2 X 40DCOE	30	4.5	120

ADDENDUM

Since the compilation of these applications, the 48 DCOE has become available and may be used with advantage in many instances for engines in full competition tune, instead of 45 DCOE.

Whilst the mounting holes are similar to 45 DCOE, it will, of course, be necessary to open out the

TRIUMPH					
Dolomite Sprint	Full Comp.	2 X 48DCOE	42	4.5	170
FORD					
Escort RS2000	Full Comp.	2 X 48IDF	42	4.5	170

Emulsion	Air	Idle	Pump	In Valve With Ex.	Ram Tubes	Throttle Lever	Air Cleaners
F15	200	45F9	50	50	52840.030	TK 1001	
F15	200	45F9	50	50	52840.030	TK 1001	
F16	175	45F9	45	50	52840.009		
F16	190	45F9	40	closed	52840.012	45034.044	CCL 40
F15	150	50F2	50	50	52840.009	45034.044	CCL 40
F15	175	50F8	40	55	52840.012	45034.044	
F15	160	50F8	50	50	52840.009	45034.044 45034.042	CCL 40
F15	170	50F8	50	50	52840.009	45034.044 45034.042	
F15	160	50F8	50	50	52840.009	45034.044 45034.042	CCL 40
F33	200	55*	40	—	—	—	CCL 34VSK
F33	185	50*	40	—	—	TK 358 L & R	CCL 34/ 34VS
F 2	120	70F10** *Idle air Correction .90 **Idle jet Carrier 120	50	50	52840.027	TK 360	CCL 48/48VS
F 2	200	50F9	50	50	52840.001	45034.044/.042	CCL 45
F 2	190	50F9	50	50	52840.001	45034.044/.042	CCL 45
F 4	180	50F9	40	closed	52840.001	45034.044/.042	—
F15	200	50F8	40	50	52840.001	45034.044/.042	CCL 45
F15	180	50F8	40	45	52840.001	45034.044/.042	—
F 2	180	45F9	40	50	52840.030	45034.042	CCL 45
F11	200	45F9	35	50	52840.006	—	CCL 40P/ 40PH
F11	190	45F9	40	50	52840.006	—	CCL 40P/ 40PH

manifold to match the larger bore of the 48 DCOE.

The settings for the two applications listed under addendum are given as a starting point only for competition use, as they have not been dynamometer checked at time of printing.

F9	150	60F8	45	40
F2	190	65	40	Closed.

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