BRISTOL WORKSHOP MANUAL

TYPE 407 and 408

(UP TO CHASSIS No. 408/7200)

BRISTOL CARS

FILTON - BRISTOL - ENGLAND

BRAKES

Dunlop hydraulic self adjusting servo-assisted disc brakes on all wheels. Disc diameters 11¼ inch. Pull up type handbrake cable and rod operating.

WHEELS AND TYRES

Dunlop pressed steel perforated bolt-on disc wheels, wide base rims, Dunlop R.S.5 6.00 x 16 tyres and tubes.

Normal cruising	Front and Rear - 28 p.s.i.
Sustained high speeds	Front and Rear - 33 p.s.i.

ENGINE

Eight cylinder 90° VEE with overhead push rod operated valves; mechanical tappets. Canada Chrysler V8.
Bore 3.88 inch (98.55 M/M). Stroke 3.31 inch (84.07 M/M).
Capacity 313 cu. inch (5130 c.c.).
Compression Ratio 9.0 to 1.
Power Output 250 bhp at 4400 rpm.
Maximum torque 240 lb.ft. at 2800 rpm.
Cast iron cylinder block and cylinder heads; special highlift camshaft, chain driven and supported in five main bearings; aluminium pistons and forge-steel connecting rods; forge-steel crankshaft statically and dynamically balanced; supported in five main bearings.
Lubrication system by rotary-type oil pump with integral relief valve and by-pass type oil filter.
Carter 4 choke downdraft carburettor, automatic choke for cold starting, manifold heat control valve for rapid warm up. Large paper element air cleaner/silencer.

TRANSMISSION

Chrysler torque-flite, three forward speeds and reverse automatic transmission, with fluid torque converter, variable ratio drive, incorporating intermediate gear hold, permitting engine braking.

Gears selected by illuminated push buttons mounted on facia panel.

RATIOS:-		
	Low	8.1
	Intermediate	4.8
	High	3.31
	Reverse	7.28

Torque converter stalled ratio on low, intermediate and reverse gears 2.2 to 1.

HEATING AND VENTILATING

Built-in heater system; fresh air at desired volume or temperature, incorporating screen demisting and defrosting, controls on facia panel, separate cold air system.

FUEL SYSTEM

Carter mechanical pump. Tank mounted behind rear seats. Capacity 18 gallons (Imp) 82 litres including 2½ gallons (11 litres) reserve supply, controlled by switch on facia panel. Lockable filler cap.

RADIATOR

Pressure vent 14 lbs/sq.inch with an oil cooler for the transmission permanently embodied into the bottom tank of the radiator and provision in the header tank for a thermostat switch controlling the "Kenlowe" fans.

Capacity	36 Imperial Pints (20.46 litres) (Includes the heater of the car)

ELECTRICAL

Lucas 12 volt system. Current is supplied by a large capacity air cooled generator in conjunction with a voltage regulator with automatic cut-out and a 12 volt 72 ampere battery.

ENGINE AND CHASSIS RECOMMENDED

LUBRICANTS AND CAPACITIES

ENGINE CAPACITY	ENGINE LUBRICATION
Including the Oil Filter 10 pints (Imp.)	Mobiloil Special 10W/30 Esso Extra Motor Oil 20W/30 Energol SAE.30 or Energol Visco Static Shell X-100-30 or Shell X-100 Multigrade 10W/30 Castrolite Advanced Havoline 10W/30 or Advanced Havoline 30
Not including the Oil Filter 8 pints (Imp.) (4.55 Litres) Above 32°F	
10°F to 32°F	Mobiloil Special 10W/30 Esso Extra Motor Oil 20W/30 Energol SAE 20W or Energol Visco Static Shell X-100 20/20W or Shell X-100 Multigrade 10W/30 Castrolite Advanced Havoline 10W/30
-10°F to 10°F	Mobiloil Special 10W/30 Esso Extra Motor Oil 20W/30 Energol SAE 10W or Energol Visco Static Shell X-100-10W or Shell X-100 Multigrade 10W/30 Castrolite Advanced Havoline 10W/30
	Mobiloil Special SAW 5W Esso extra Motor Oil 5W/20

Below -10°F	Energol SAE 5W Shell X-100 Multigrade 5W/20 Castrolite Advanced Havoline 10W/30

AUTOMATIC TRANSMISSION CAPACITY	AUTOMATIC TRANSMISSION LUBRICATION
16 pints (Imp.) (9.09 Litres)	Mobilfluid 200 Esso Automatic Transmission Fluid 55 Energol ATF. Type A. Shell Donax T6 Castrol TQ Regent 3528 Texamatic Fluid.

REAR AXLE CAPACITY	REAR AXLE LUBRICATION
3 pints (Imp.) (1.7 Litres)	Mobilube GX.90 Esso Gear Oil GP.90 (Above -10°F) Esso Gear Oil GP.80 (Below -10°F) Energol SAE 90 EP Shell Spirax 90 EP Castrol Hypoy Regent Universal Thurban 90

STEERING BOX CAPACITY	STEERING BOX. THROTTLE CONTROLS. HANDBRAKE CABLE LUBRICATION.
½ pint (Imp.) (0.28 Litres)	Mobilube GX.90 Esso Gear Oil GP.90 Energol SAE 90 EP. Spirax 90 EP. Castol Hypoy Regent Universal Thurban 90

DISTRIBUTOR AND GENERATOR LUBRICATION

Mobil - As engine
Esso - As engine
B.P. - As engine
Shell - As engine
Castrol Everyman Oil
Regent Havoline 20/20W

EXHAUST MANIFOLD HEAT CONTROL VALVE LUBRICATION.

Graphited Kerosene

FRONT WHEEL HUBS. REAR SUSPENSION UNITS. PROPELLOR SHAFT JOINTS. HANDBRAKE COMPENSATOR. REAR AXLE HUBS.

Mobilgrease M.P.
Esso Multi-purpose Grease H.
Energrease L.2.
Shell Retinax A
Castrolease LM
Regent Marfax Multi-purpose Grease 2

BRAKE FLUID

Dunlop Disc Brake Fluid.
Specification SAE 70R1 and SAE 70R3

POINTS NOT REQUIRING LUBRICATION SERVICE.

ENGINE

Water Pump.
Starter Motor Bearings.
Automatic Choke Linkage.
Fen Belt Idler Pulley.

CHASSIS

Steering Joints.
Front Suspension Top and Bottom Joints.
Wishbone Bushes.
Steering Idler Box Bushes.
Brake Pedal Bushes.
Steering Column Bushes.
Rear Suspension Arms.
Watts Linkage-Rear Suspension.

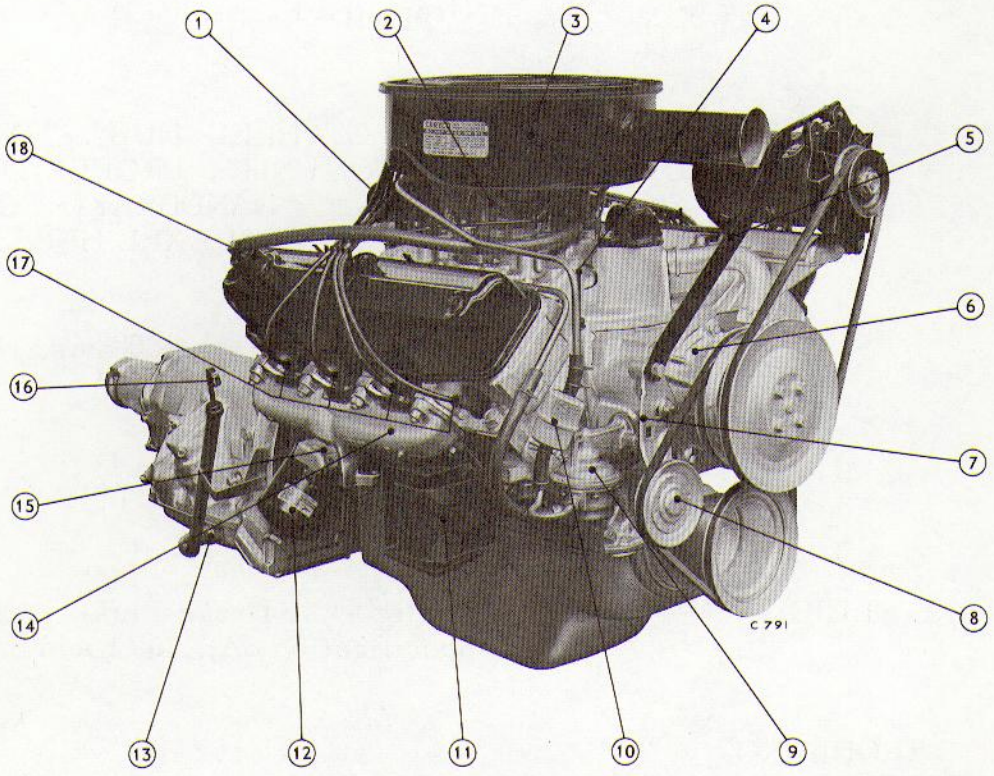


Fig.5 R.H. View of Engine and Transmission

KEY TO FIG. 5

1. Coil.
2. Carburettor.
3. Carburettor Air Cleaner.
4. Engine Dipstick.
5. Generator Belt Adjustment Strap.
6. Water Pump.
7. Idler Pulley Adjustment Bracket.
8. Idler Pulley.
9. Fuel Pump.
10. Fuel Filter.
11. Engine Mounting.
12. Oil Filter.
13. Transmission Drain Plug.
14. Exhaust Manifold.
15. Manifold Heat Control Valve.
16. Transmission Dipstick and Oil Filler Tube.
17. Sparking Plugs and Leads.
18. Smog Pack.

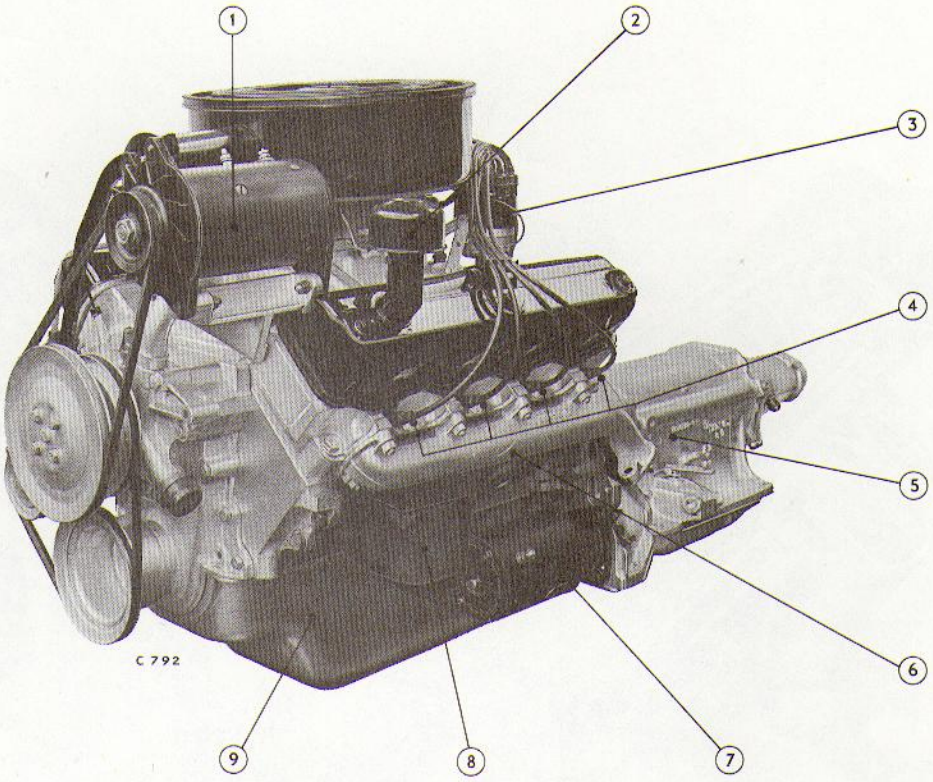
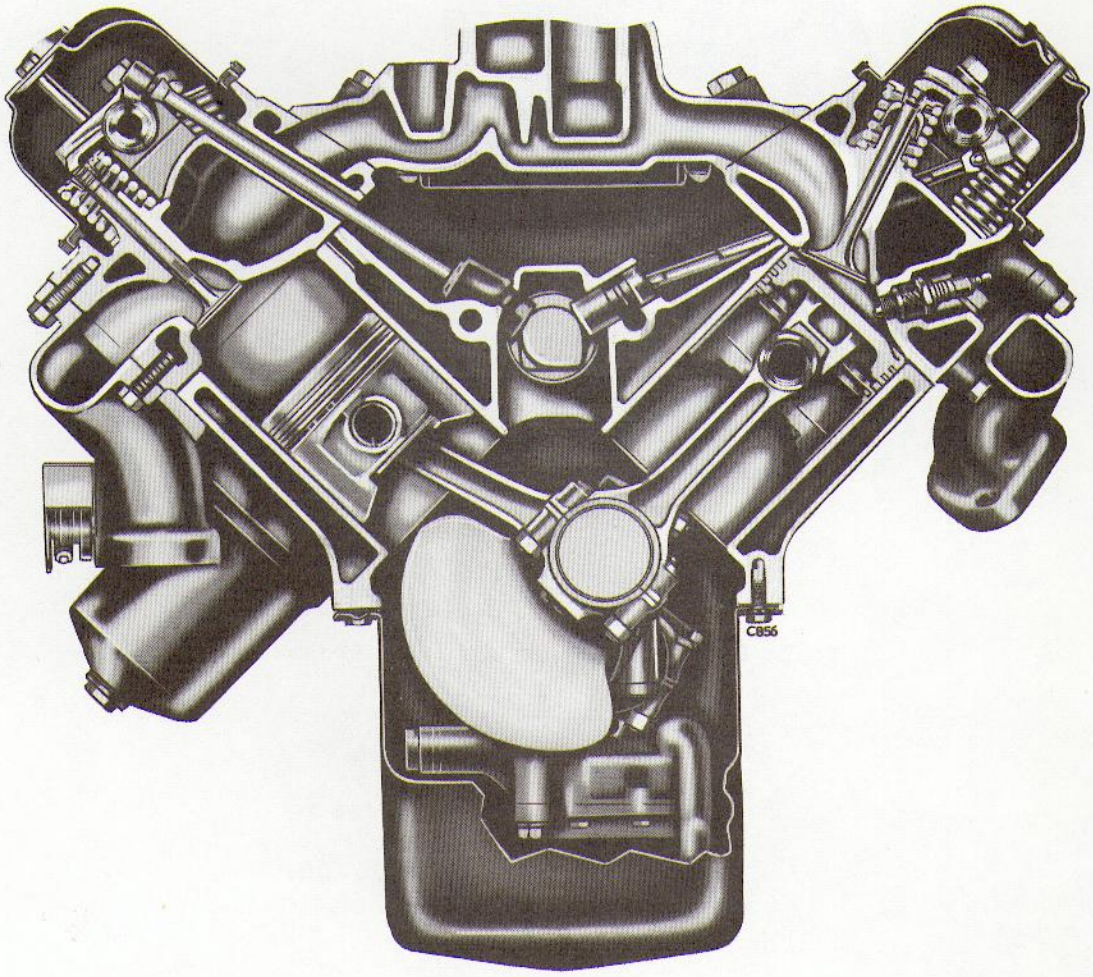


Fig.6 L.H. View of Engine and Transmission

KEY TO FIG. 6

1. Generator.
2. Oil Filler Pipe Cap Air Cleaner.
3. Distributor.
4. Sparking Plugs and Leads.
5. Transmission Unit.
6. Exhaust Manifold.
7. Starter Motor.
8. Engine Mounting.
9. Oil Pan (Sump).



313 Cu In. Engine
(End Sectional View)

ENGINE

SPECIAL TOOLS

C-385	Piston Ring Compressor.
C-897	Driver - Camshaft Welch Plug.
C-3028	Tappet Bore Reamer.
C-3049	Piston Pin Reamer.
C-3052	Distributor Drive Shaft Bushing Puller.
C-3053	Distributor Drive Shaft Bushing Installer.
C-3132A	Camshaft Bearing Remover and Installer.
C-3221	Piston Remover and Installer.
C-3422A	Compressor - Valve Spring.
C-3427	Valve Guide Reamer .030 o/s.
C-3430	Valve Guide Reamer .015 o/s.
C-3433	Valve Guide Reamer .005 o/s.
C-3466	Engine Lifting Bracket.
C-3586	Piston Ring Installer.
C-3695	Compressor - Rocker Arm Valve Spring.
C-3927	Gauge - Valve Stem Length.

TORQUE REFERENCE

ENGINE

	Ft/lbs.	inch/lbs.
Cylinder Head Bolt	85	
Intake Manifold Bolt	30	
Main Bearing Cap Bolt	85	
Connecting Rod Nut - Plain	45	
Crankshaft Bolt	135	
Camshaft Sprocket Retainer Screw	35	
Camshaft Thrust Plate Screw	15	
Chain Case Cover (Cast) Bolt	35	
Water Outlet Elbow Bolt	35	
Rocker Cover Attachment Bolt	3	
Carb. to Intake Manifold Nut	7	
Water Pump Attachment Bolt	30	
Fuel Pump Attachment Bolt	30	
Fan Belt Idler Pulley Nut	45	
Spark Plug	30	
Starter Mounting Bolt	50	
Generator Bracket Bolt	50	
Generator Mounting Nut	20	

	Ft/lbs.	inch/lbs.
Generator Adj. Strap Bolt (Engine End)	30	
Generator Adjusting Bolt (Generator End)	15	
Distributor Vacuum Line Tube Nut		95
Distributor Clamp Bolt	15	
Exhaust Manifold Nuts and Bolts	30	
Exhaust Pipe Flange Nut	40	
Manifold Heat Control Counterweight Bolt		50
Oil Filter Case Centre Bolt	30	
Oil Pan (Sump) Drain Plug	35	
Oil Pan (Sump) Attachment Bolt	15	
Oil Pump Attachment Bolt	35	
Oil Pump Cover Bolt	10	

TORQUEFLITE TRANSMISSION

Trans. Case to Torque Converter Housing Bolt	40	
Extension to Trans. Case Bolt	25	
Oil Pan (Sump) Bolt		175
Torque Converter Housing to Block	30	
Torque Converter to Crankshaft Nut	55	
Converter Drain Plug		130
Converter Dust Cover		130

ENGINE AND/OR TRANSMISSION REMOVAL FROM THE CAR

It is possible to remove the engine and transmission through the engine bay but special equipment is needed to raise the front of the engine to an acute angle to do this. For practical purposes it is best to remove the transmission at the torque converter housing and then remove the engine and torque converter as an assembly.

Removing Transmission

This must be carried out from inside the car. Drain the cooling system. Drain the transmission by detaching the transmission dipstick/filler tube. Remove the carpets, seats, tunnel and floorboards. Remove the handbrake lever and ratchet. Disconnect the propellor shaft. Disconnect the oil cooler tubes, the throttle linkage and the gearshift control cable. Disconnect the nylon semi-rigid fuel pipe at the engine. Slacken the bolts attaching the exhaust pipes to the manifold and without removing the bolts run the nuts to the extreme end of the thread. Disconnect the heater pipe at engine and disconnect the oil pressure pipe.

Remove the air cleaner and carburettor and attach the engine lifting fixture Tool C-3466 to the carburettor flange studs on the intake manifold.

Take the weight of the engine with a hoist and disconnect the transmission mounting to the chassis.

Remove the oil filler air cleaner and raise the back of the engine by the use of slings or jacking sufficiently to allow the transmission to be clear of the chassis.

Support the transmission and remove the four bolts attaching it to the torque converter casing. With adapted lifting tackle it can now be removed from the car.

Removing Engine

Remove the bonnet. Drain the cooling system and disconnect the battery. Release the nuts holding the fan assemblies to the radiator and allow the fan and shroud assemblies to drop forward. Remove all hoses, oil cooler lines and thermostat connections and remove the radiator. Disconnect the fuel lines, linkage and wires attached to the engine and remove the air cleaner and carburettor. Attach the engine lifting fixture Tool C-3466 to the carburettor flange studs on the intake manifold.

Remove the transmission as described. Disconnect the engine mountings at the chassis. Raise the engine and manipulate it carefully out of the engine bay. It may be necessary to remove the generator and water pump to allow the engine to go forward sufficiently for the torque converter casing to clear the bulkhead and its controls.

ENGINE

CYLINDER BLOCK

GENERAL DATA

Material	Cast Iron.
Type	O.H.V. V.8.
Cylinder Numbering	Left Bank 1-3-5-7
(from Drivers Seat - Front to Rear)	Right Bank 2-4-6-8
Cylinder Bore - Standard	3.875/3.877 inch.
Bore Spacing (C/L to C/L)	4.46 inch.
Cylinder Bore Out-of-round	.005 inch.
(Max. allowable before reconditioning)	
Cylinder Bore Taper	.020 inch.
(Max. allowable before reconditioning)	
Reconditioning Working Limits	.001 inch.
(for Taper and Out-of-Round)	
Maximum allowable oversize bore	.040 inch.
Tappet Bore Diameter - Standard	.905 - .9058 inch.
Distributor Lower Drive Shaft Bushing	
(press fit in block)	.0005 - .004 inch.
Finished Bore	.4865 - .488 inch.
Clearance - Shaft to Bush	.0007 - .0027 inch.

Cylinder Bores

The cylinder block is not sleeved and can be rebored to .005, .020 and .040 inch oversize for which pistons are available.

Bores should be finally honed to suit the piston using the following procedure to obtain the correct running clearance.

Use a spring scale and a strip of ½ inch wide feeler stock .0015 inch thickness long enough to extend into the cylinder bore to the full length of the piston travel.

At normal room temperature and with the cylinder bore and piston perfectly clean, coat the bore lightly with SAE 10W engine oil. Insert the piston into the bore upside down with the feeler stock between the thrust face of the piston and the cylinder wall. Hold the piston and draw the feeler stock straight out using a spring scale. The amount of pull required should be from 5 to 10 lbs.

Camshaft Bearings

Removal

With the engine completely dismantled, drive out the welch plug from the rear camshaft bearing.

Using Tool C-3132A fit the correct size adaptor and horseshoe washer at the back of each bearing shell to be removed and drive out the bearing shells.

Fitting the Bearings

Using the same tool, as for removal, lubricate the bearing and position it over the proper adaptor. Fit the horseshoe lock and carefully drive the bearing shell into place.

Fit the remaining shells in a similar manner, carefully noting that No.1. camshaft bearing should be fitted 1/32 inch inward from the front face of the cylinder block and that the oil holes in the camshaft bearings and cylinder block must be in exact alignment to ensure correct lubrication. Inspect the oil hole alignment with a pencil flashlight when the camshaft bearing oil hole should be perfectly aligned with the drilled oil passage from the main bearing also Number 4 bearing must index with the two passages to the cylinder heads. If the oil holes are not aligned remove and refit the bearings.

Finally apply sealer to a new welch plug and use Tool C-897 to fit it to the rear camshaft bearing. Be sure that this plug does not leak.

Distributor Drive Shaft Bushing

Removal

Insert Tool C-3052 into the old bushing and thread down until a tight fit is obtained. Hold the puller screw and tighten puller nut until the bushing is removed.

Fitting the Bushing

Slide a new bush over the burnishing end of Tool C-3053 and insert the tool and bush into the bore. Drive the bush and tool into position using a soft hammer.

As the burnisher is pulled through the bush by tightening the puller nut, the bush is expanded tight in the block and burnished to the correct size. DO NOT REAM THIS BUSH.

ENGINE

CYLINDER HEAD AND VALVE OPERATING

GENERAL DATA

Cylinder Head		
Material		Cast Iron.
Valve Seat Run-out (Maximum)		.002 inch.
Intake Valve Seat Angle		45°
Seat Width (finished)		.060 - .085 inch.
Exhaust Valve Seat Angle		45°
Seat Width (finished)		.040 - .060 inch.
Cylinder Head Gasket		
(Thickness compressed)		.028 inch.
Valve Guide		Cast-in-Head.
Ream for next oversize Valve Stem		
	Standard	.374 inch.
	.005 o/s	.379 inch.
	.015 o/s	.389 inch.
	.030 o/s	.404 inch.
Valve Stem diameter		.372 inch.
Valve Stem to Valve Guide clearance		
	Intake	.001 - .003 inch.
	Exhaust	.002 - .004 inch.
Valve Springs		
Load when compressed (valve closed)		1.11/16 inch 78-88 lbs.
Load when compressed (valve open)		1.5/16 inch 170-184 lbs.
Max. allowable out of plumb		1/16 inch.
Installed Height (spring seat to retainer)		1.5/8 - 1.11/16 inch.
Valve Timing		
Intake opens		13° B.T.D.C.
Intake closes		55° A.B.D.C.
Exhaust opens		51° B.B.D.C.
Exhaust closes		17° A.T.D.C.
Camshaft		
Material		Hardenable Cast Iron.
Drive		Chain.
End Play		.002 - .006 inch.
Max. allowable		.010 inch.
Camshaft Journals		
Diameter	No.1.	1.998 - 1.999 inch.
	No.2.	1.982 - 1.983 inch.
	No.3.	1.967 - 1.968 inch.
	No.4.	1.951 - 1.952 inch.
	No.5.	1.5605 - 1.5615 inch.

Camshaft Bearings		
Diameter	No.1.	2.000 - 2.001 inch.
	No.2.	1.984 - 1.985 inch.
	No.3.	1.969 - 1.970 inch.
	No.4.	1.953 - 1.954 inch.
	No.5.	1.5625 - 1.5635 inch.
Rocker Shaft Assembly		
Clearance between Rocker Arm and Shaft		.001 - .003 inch.
Tappets		
Type		Mechanical.
Body diameter		.9040 - .9045 inch.
Clearance in Block		.0005 - .0018 inch.
Service Tappets available in standard		.001, .008 and .030 inch o/s.
Operating Tappet Clearance (Hot)		.010 inch Intake. .018 inch Exhaust.

Cylinder Head

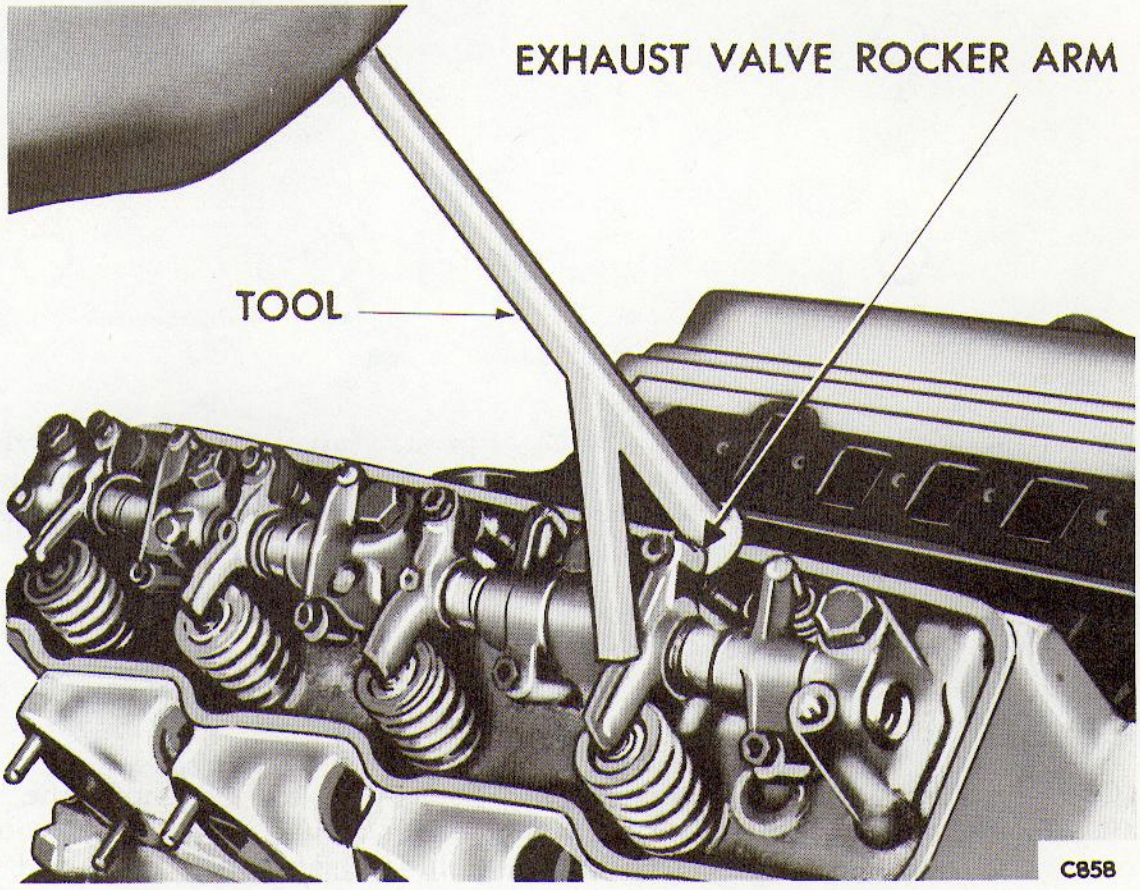


Fig. 1 Compressing Exhaust Valve Spring

Removal

Drain the cooling system. Remove the carburettor air cleaner, fuel line, generator and distributor vacuum lane. Disconnect the water temperature capilliary and stow it carefully to prevent damage. Disconnect the throttle linkage, coil leads and all hoses at the engine. Remove the distributor cap complete with the sparking plug leads.

When the intake manifold is quite clear of all connections remove the sixteen attachment bolts and remove the manifold, carburettor and coil as an assembly.

Remove the cylinder head rocker covers and disconnect the exhaust pipes from the manifolds.

Using Tool C-3695 as shown in Fig. 1 (C858) and making certain LOW POINT OF CAMSHAFT IS UNDER TAPPET compress the valve springs and remove the push rods. It may be necessary to shift the rocker arm slightly to one side to do this.

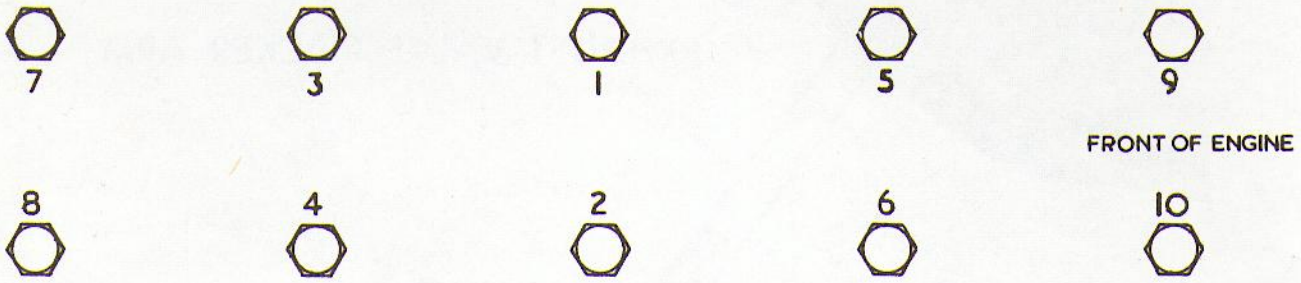


Fig. 2 Cylinder Head Bolt Sequence

In the correct sequence Fig. 2 (R215) progressively release the cylinder head attachment bolts and remove them completely. Carefully manipulate the cylinder head, complete with rockers and exhaust manifolds, clear of the car. The exhaust manifolds can now be removed.

Valves and Valve Springs

Remove the rocker shaft locating plug and slide out the rocker shaft, at the same time releasing the rocker arms and springs.

Compress the valve springs, using Tool C-3422A. Remove the valve retaining locks (they are different for Intake and Exhaust), remove the tool and then remove the valve spring retainers, oil shields (Intake valves only) and valve springs.

Remove any burrs from the valve stem lock grooves to prevent damage to the valve guide when the valves are taken out.

Valve Inspection

Clean the valves thoroughly and discard any burned, warped or cracked valves.

Measure the valve stems for wear. The valve stem diameters are given in General Data and if the wear exceeds .002 inch the valve should be replaced.

Remove the carbon and varnish deposits from inside the valve guide and measure the bores using the valve stem diameter plus the desired clearance in the valve guide, as given in General Data.

If the clearance is excessive, ream the guides and fit valve with the next oversize valve stem. Refer to special Tool list for Reamers.

Refacing Valves and Valve Seats

The valve face angle is 45° and if the remaining margin of the head is less than 3/64 inch after refacing, the valve should be replaced.

The width of the intake seats should be 1/16 to 3/32 inch and the exhaust seats 3/64 to 1/16 inch.

The design of the valve mechanism includes a safety factor to allow for a limited amount of wear and for the refacing of valves and seats. If this is excessive the dimension from the valve spring seat in the cylinder head to the valve tip should be measured with Gauge Tool C-3927.

If the valve stem extends above the gauge, grind the end of the stem to fall between the maximum and the minimum limits.

Valve Springs

The springs should conform to the dimensions and loading given in General Data.

Using a square and surface plate, check the spring and reject it if the out of square exceeds 1/16 inch.

Re-assembly - Valves to Head

Coat the valve stems with lubricating oil and insert them in the cylinder head. Fit the oil shield (Intake valve only) spring and retainer, compress with Tool C-3422A, fit the correct locks and release the tool.

Measure the installed height of the springs, from the bottom of the spring seat in the cylinder head to the bottom face of the spring retainer. If the height is greater than 1.11/16 inch, dismantle the valve and fit a 1/16 inch spacer into the cylinder head counterbore to bring the spring height back to normal.

Re-assembly of Rocker Shaft and Rocker Arms

Slide the rocker shaft into the bore of the cylinder head strut and at the same time engage the appropriate rocker arm, then the spring and a further arm until they are all fitted. Line up the half round grooves in the shaft with the cylinder head bolt holes, at the same time line up the rocker shaft locating plug hole. Tap in a new locating plug.

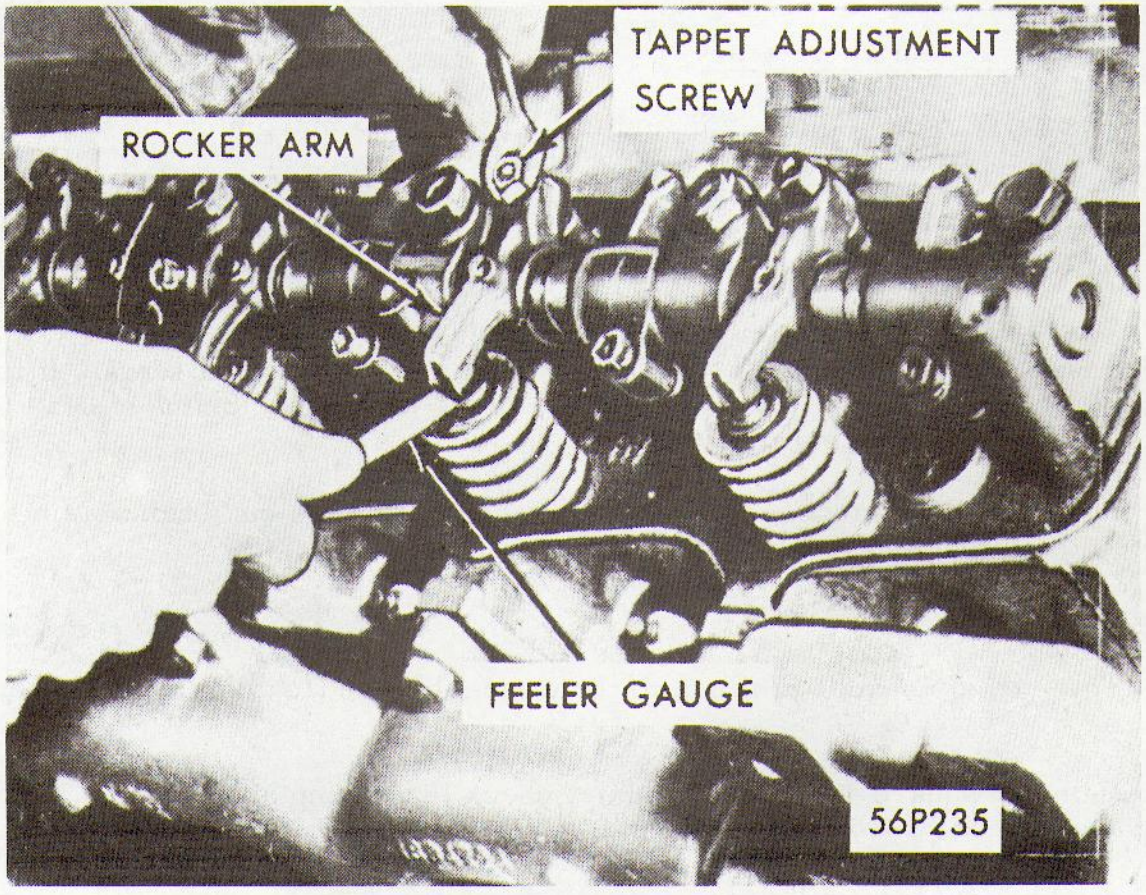


Fig. 3 Adjusting Mechanical Tappets

Tappets (Mechanical)

Tappets are easily removable when the intake manifold and push rods are removed consequently tappet examination is best carried out during a decarbonising process and/or complete engine overhaul.

During the latter service, tappets are available in the oversizes given in General Data and Tool C-3028 Tappet Bore Reamer should be used to control the bores.

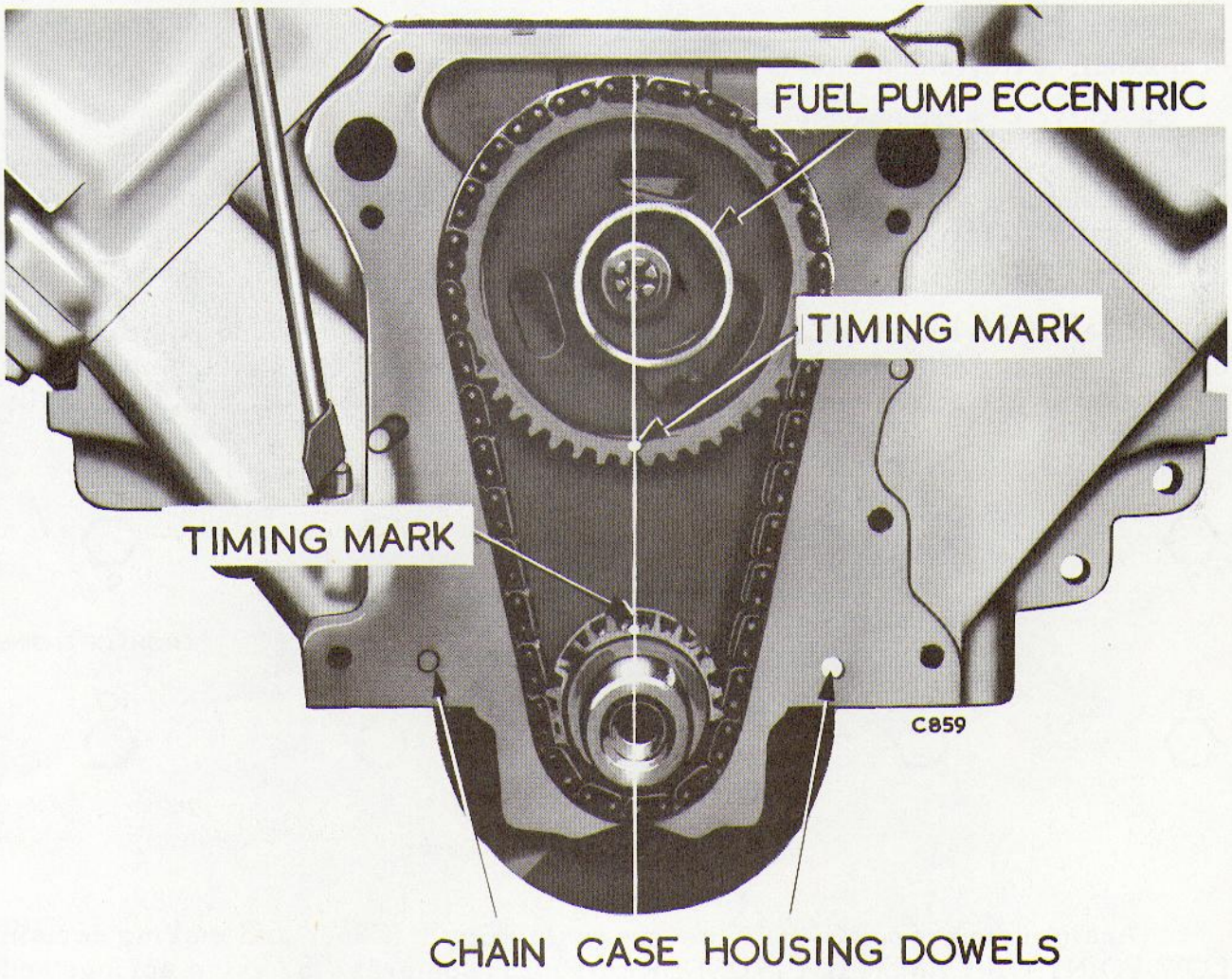


Fig. 4 Timing Marks

Tappet Adjustment

Tappet adjustment should be made after the engine reaches normal operating temperature and with the engine slow running. Adjust intake rocker arms to have .010 inch clearance and the exhaust rocker arms to have .018 inch clearance. Fig. 3 (C857). The adjustment is made at the self locking rocker arm adjusting screw. This screw should have a minimum of 3 ft/lbs. tension as it is turned. If less than this, replace the adjusting screw and, if necessary, the rocker arm.

Timing Marks

Timing marks are shown on the camshaft and crankshaft sprockets. They should be positioned at their nearest point opposite to each other on the exact imaginary centre line through both camshaft and crankshaft bores. Fig. 4 (C859).

Timing marks are also given at the front of the engine by a zero line on the crankshaft pulley and an indicator plate bolted to the chain case cover.

Installing the Cylinder Head

Assuming that the valves have been fitted, and that the cylinder head face is perfectly flat, fit the exhaust manifolds with new gaskets, finally tightening to 30 ft/lbs. torque.

Coat new cylinder head gaskets with Mopar sealer 1122893 and position them on the block. Fit the cylinder heads and insert all head attachment bolts. Progressively tighten them using the sequence given in Fig. 5 (R215) finally tightening to 85 ft/lbs. torque.

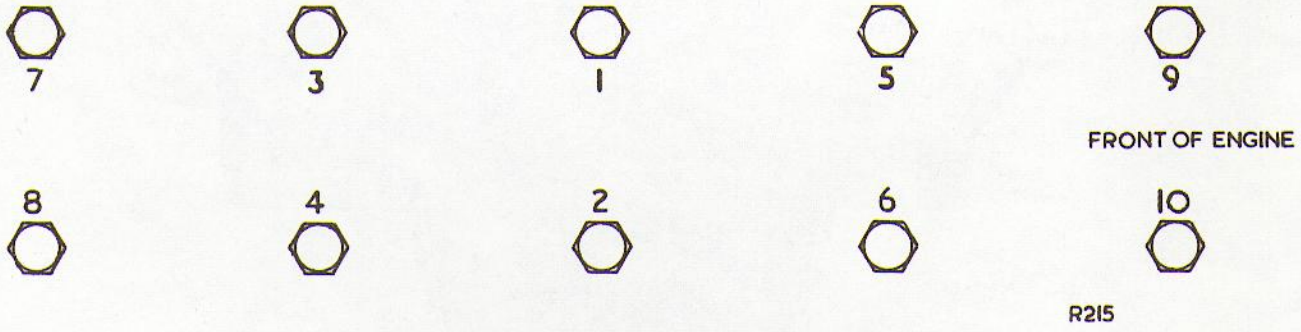


Fig. 5 Cylinder Head Bolt Sequence

Again using Tool C-3695 as shown in Fig. 6 (C858) and making certain LOW POINT OF CAMSHAFT IS UNDER TAPPET, compress the valve springs and insert the push rods. It may be necessary to shift the rocker arm slightly to one side to do this. See that the rocker arm adjusting screw is seating in the cup of the push rod.

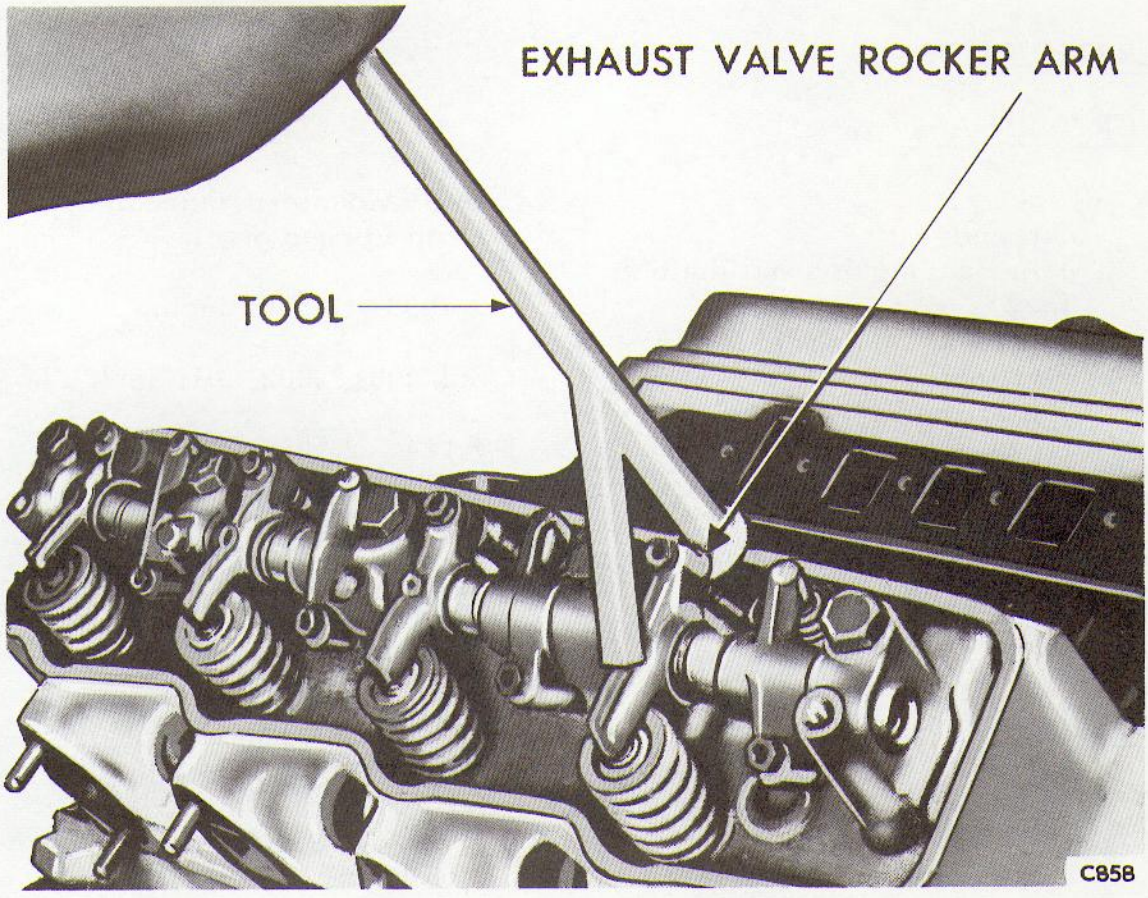


Fig. 6 Compressing Exhaust Valve Spring

Using new gaskets (four pieces) fit the intake manifold and progressively tighten the 16 bolts to 40 ft/lbs. torque. Fit new gaskets and connect up and tighten the exhaust pipe to manifold.

Assuming that the sparking plugs have been given attention, fit the distributor cap and the leads to the plugs and coil. Reconnect the various hose connections, the water temperature capilliary, the distributor vacuum line, the fuel line and the throttle linkage. Fit the generator, adjust the belt and fit the carburettor air cleaner. When all connections are made, fill the cooling system, start the engine and run until the normal operating temperature is reached.

Adjust the tappets to the given procedure. Fit the rocker covers, using new gaskets and tighten the attachment bolts to 36 in/lbs. Reconnect the smog pack hose.

ENGINE

CRANKSHAFT, PISTONS & CONNECTING RODS

GENERAL DATA

CRANKSHAFT

Type	Fully Counterbalanced.
Material	Drop Forged Steel.
Main Bearing Journal diameter (new)	2.4995 - 2.5005 inch.
Main Bearing available for Service	Std. .001, .002, .010 inch u/s.
Connecting Rod Journal diameter (new)	2.124 - 2.125 inch.
Connecting Rod Bearings available for service	Std. .001, .002, .010, .020 inch u/s
Maximum allowable out-of-round or taper on all journals	.001 inch.
Main Bearing	Steel Backed Babbitt.
Diametral Clearance between Journal and Bearing	
Desired	.0005 - .0015 inch.
Allowed	.0025
Thrust taken by	No.3 Main Bearing.
End Play	.002 - .007 inch.
Maximum allowable	.010 inch.

PISTONS

Type Material	Aluminium Alloy - Tin Coated.
Clearance in Cylinder Bore (with .0015 x ½ inch feeler stock)	5 - 10 lbs. pull.
Pistons for service	Std. .005, .020, .040 inch o/s.

Piston Pins

Type	Full Floating.
Diameter	.9842 inch.
Length	2.995 inch.
Clearance in Piston (Tight thumb push at 70 F)	.0000 - .0005 inch.
End Play	.004 - .026 inch.
Clearance in Rod	.0001 - .0004 inch.
Pins for Service	Std. .003, .008 inch o/s.

Piston Rings

Number of Rings per Piston	3
Compression Rings	2
Oil Rings with Expander	1
Piston Ring Gaps	.010 - .020 inch.
Ring Side Clearance	
Top and Intermediate	.0015 - .003 inch.
Oil (Service Ring)	.009 inch (Max).
Width of Rings	
Compression	.0775 - .0780 inch.
Oil	.1860 - .1865 inch.

Connecting Rods

Length (Centre to Centre)	6.123 inch.
Side Clearance (two rods)	.006 - .014 inch.
Piston Pin Bore diameter	1.027 - 1.039 inch.
Connecting Rod Bushing	Steel Back Bronze.

Connecting Rod Bearings

Type	Steel Backed Grid Type
Diameter and Width	2.126 x .842 inch.
Clearance between Journal and Bearing.	
Desired.	.0005 - .0015 inch.
Maximum allowable.	.0025 inch.

PISTONS AND CONNECTING RODS

Piston Removal

Pistons and connecting rods must be removed from the top of the cylinder block. When removing the piston and connecting rod assemblies from the engine rotate the crankshaft so that each connecting rod is centred in the bore.

Remove the top ridge of the cylinder bores with a reliable ridge reamer before removing the piston from the block taking care to cover the tops of the pistons during this operation.

With the engine oil pan (sump) and timing chain removed followed by the oil pump, tube and strainer, mark all bearing caps as necessary for correct re-location. Remove the connecting rod cap. Fit Tool C-3221 on one connecting rod bolt and fit the protector over the other bolt, then push each piston and rod assembly out of the cylinder bore. After removal fit each bearing cap to its rod.

Piston (Gudgeon) Pins

Remove the piston pin retaining rings and press out the pins.

The piston pins fit in the connecting rod and the piston should be a tight thumb push fit at normal room temperature 70°F. If there is excessive clearance between the piston pin and piston use Tool C-3049 and ream the piston and connecting rod to the next oversize, as given in General Data. If there is excessive clearance between the piston pin and the connecting rod bush replace the bush and size it to suit the pin. New pistons are supplied with fitted pins.

Assembly of Pistons and Rods

Assemble pistons and rods for the L.H. cylinder bank (1-3-5-7) with the piston boss marked 'FRONT' and indent on piston head on the same side as the large chamfer on the large end of the connecting rod.

Assemble pistons and rods for the R.H. cylinder bank (2-4-6-8) with 'FRONT' and indent opposite the large chamfer on the large end of the connecting rod.

Piston Rings

Measure the piston ring gap about 2 inches from the bottom of the cylinder bore in which it is to be used. An inverted piston can be used to push the rings down into position to ensure them being exactly square with the bore. The ring gap should be from .010 to .047 inch for the compression rings and .015 to .062 inch for the oil ring steel rails in standard size bores (for new service rings).

Install the oil ring in the lower ring groove using the instructions on the package. Using Tool C-3586 fit the compression rings into the middle and top grooves with the side marked 'Top' up.

Fitting Pistons and Rods to Bores

Before fitting the piston and rod assemblies to the bores position the oil control ring gap in line with the oil hole in the connecting rod. Position the gap in the compression rings opposite each other with neither in line with the oil control ring gap.

Immerse the piston head and rings in clean engine oil, slide the ring compressor Tool C-385 over the piston and tighten with the special wrench. Be sure the position of the rings does not change during this operation.

With the connecting rod bearing cap removed, screw the connecting rod bolt protector (part of Tool C-3221) on one rod bolt, and insert the rod and piston into the cylinder bore. Rotate the crankshaft so that the appropriate connecting rod journal is on the centre of the cylinder bore.

The notch or groove on the top of the piston must be pointing toward the front of the engine and the larger chamfer of the connecting rod bore must be fitted toward the crankshaft journal fillet.

Attach the puller part of Tool C-3321 on the other bolt and guide the rod over the crankshaft journal. Tap the piston down into the bore using the handle of a hammer. Assuming that the correct connecting rod bearings have been fitted, fit the connecting rod cap and tighten the nuts to the torque reference figure.

CRANKSHAFT

Removal

With the cylinder heads, oil pan, torque converter, timing chain, oil pump and piston and connecting rod assemblies removed, check that the main bearing caps are marked for correct re-positioning. Remove the caps and take out the crankshaft.

Crankshaft Journals

The crankshaft journals should be inspected for excessive wear, taper and scoring. Journal grinding should not exceed .012 inch under the standard journal diameter. DO NOT grind the thrust faces of No.3. bearing. DO NOT nick the crankpin or main bearing fillets. After regrinding, remove the rough edges from the crankshaft oil holes and clean out all oil passages.

Crankshaft Main Bearings

The upper main bearings are not interchangeable with the lower main bearings, but bearing numbers 1, 2 and 4 are interchangeable as complete bearings. No.3. bearing halves are flanged to carry the thrust load. Undersize bearings are available to the sizes given in General Data.

Connecting Rod Bearings

Connecting rod bearing caps have a small 'V' groove across the parting face. When fitting a lower bearing the 'V' groove of the bearing must be placed on the 'V' groove side of the cap. This provides lubrication of the cylinder wall in the opposite bank. Also, the tangs in the steel back must be positioned in the grooves in the rods and caps. Undersize bearings are available to the sizes given in General Data.

ENGINE LUBRICATION

Engine Oil Capacity

10 pints (Imp) including Oil Filter.
8 pints (Imp) not including Oil Filter.

Oil Filter

The oil filter element should be changed at least every 4000 miles at the same time the joint ring between the block and the filter shell should be changed. It is recommended that a special joint ring 'Bristol' Part No. 907-1-35058 is used and the centre bolt tightened to a Torque loading of 30 ft/lbs.

Oil Filler Pipe Cap Air Cleaner

This cleaner should be washed in kerosene, drained and re-oiled with SAE.30 at each engine oil change.

Oil Pressure

Normal oil pressure is 45 to 65 p.s.i. at 2000 engine RPM.

ENGINE COOLING SYSTEM

Water Temperature

The normal running temperature is 80°C to 92°C with a maximum permissable temperature of 100°C.

Radiator

Pressure Vent 14 p.s.i. with an oil cooler for the transmission permanently embodied into the bottom tank of the radiator and provision in the header tank for a thermostat switch controlling the 'Kenlowe' cooling fans.

The water capacity of the cooling system is 36 pints including the heater of the car. Fill to about 3/8 inch below the radiator header tank baffle plate. To drain, ease or remove the radiator cap, open the drain tap at the bottom of the radiator and remove the two drain plugs from the cylinder block. These plugs are situated one on either side of the cylinder block behind the engine mountings, and they are only accessible from beneath the car.

Thermostat

A thermostat is fitted into the intake manifold and elbow connected by a hose

to the water pump. If there is evidence of overheating the cause could be the thermostat and this can be removed by partially draining the system and removing the elbow.

To test, immerse the lower portion of the thermostat in heated water and at approximately 85°C the valve should open a minimum of ½ inch.

Belt Adjustment

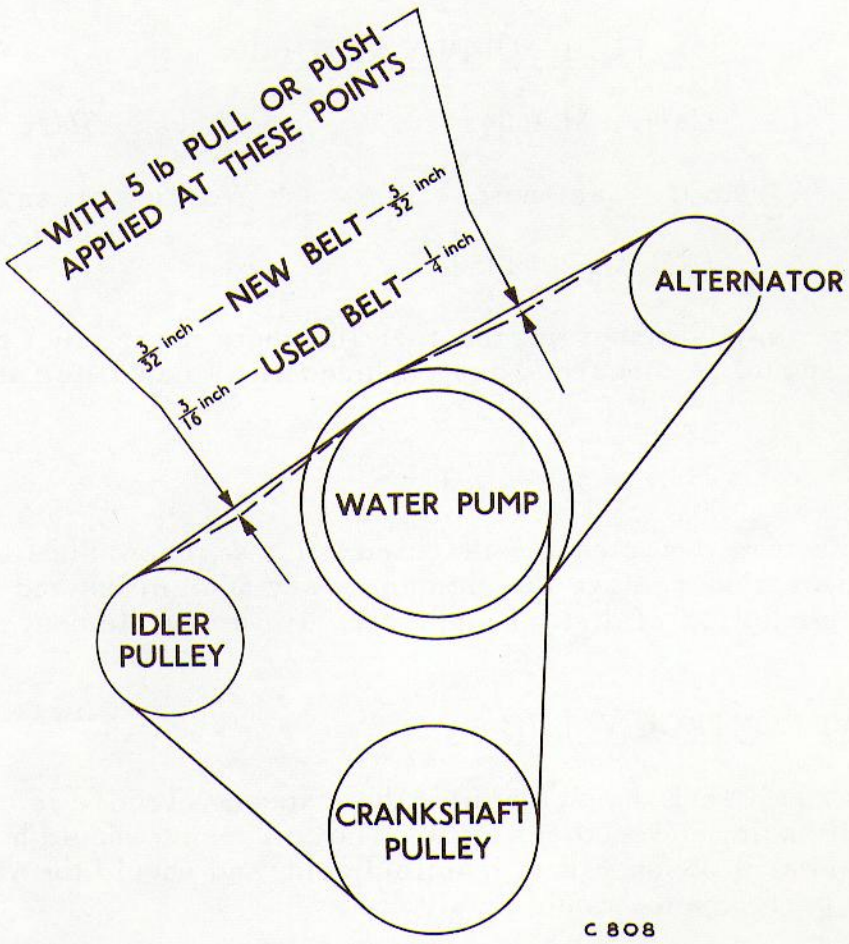


Fig. 7 Belt Tensioning

Cooling Fans

Two cooling fans ensure maximum cooling irrespective of engine speeds. They are 'Kenlowe' electrically operated and thermostatically controlled by a switch embodied into the radiator header tank. The fans will automatically switch on and off, but in the event of failure to do so a manual push pull switch has been fitted below the dashboard, in the vicinity of the ignition key, on late Type 407 Cars and all Type 408 Cars. This switch should only be used if the fans fail to operate automatically.

Water Pump

Special tools are required for reconditioning the water pump, in particular a seat refacing tool.

Reconditioned pumps are available from the Car Manufacturers.

ENGINE

FUEL SUPPLY SYSTEM

Fuel Pump	Carter M.25045	Chrysler Part No. 1843400.
Mechanical, driven from the Camshaft.		Working pressure 4-5 p.s.i.
Fuel Filter	MOPAR 2084258	

This filter is positioned in the fuel line between the fuel pump and the carburettor and should be discarded and replaced with a new filter at least every 10,000 miles.

AIR CLEANER

The carburettor air cleaner is fitted with a renewable filter element. Under normal operation remove the element every 5000 miles and tap gently to remove any accumulation of dirt. Do not wet. Fit a new element every 20,000 miles.

MANIFOLD HEAT CONTROL VALVE

Situated in the R.H. Exhaust Manifold the heat control valve is controlled by a thermostat coil spring and counterweight. The coil spring should hole the valve in the closed (forward) position with manifold cold, and should the valve become stuck the engine performance would be affected.

Every 2000 miles the valve should be lubricated with Kerosene containing graphite. This can be carried out beneath the car by squirting the lubricant liberally into the spindle on both sides of the exhaust manifold and working the valve backwards and forwards a few times. The liquid itself will dry out when the manifold becomes heated.

FUEL TANK

An 18 (Imp) gallon tank, including 2 (Imp) gallons reserve, is housed behind the rear seat squab. A nylon semi-rigid tube connects the petrol tank to the rigid pipe in the engine bay.

AFB FORE-BORE DOWNDRAUGHT CLIMATIC CONTROL
'CARTER' CARBURETTOR 3131 S.

SPECIFICATIONS

DIMENSIONS	Flange - four bore four bolt type. Throttle Bore 1.7/16 inch. Primary Venturi, primary side 7/16 inch. secondary side 11/32 inch. Main Venturi 1.3/16 inch.
VENTS	Inside (4) in air horn, outside (5) in air horn.
LOW SPEED CIRCUIT	(Primary side only) Jet No.67 .032 inch. By-Pass No.54 .055 inch. Economizer .0492 inch. Idle bleed No.54 .055 inch. Idle port .198 x .030 inch. Idle needle turns $\frac{1}{4}$ to $2\frac{3}{4}$.
IDLE R.P.M.	500 RPM in neutral.
MAIN NOZZLE	Installed permanently. DO NOT REMOVE. Anti-percolating bleed. Primary No.68 (.031 inch). Secondary No.60 (.040 inch).
MAIN VENT TUBE	Side holes primary. 1-No.70 .028 inch and 3-No.65 .035 inch. Side holes secondary (all) 1-No.70 .028 inch and 2-No.57 .043 inch. Air bleed to tube primary. No.70 .028 inch. Under strut bleed primary. No.60 .040 inch.
ACCELERATING PUMP	Primary side only. Pump Jet (twin) No.70 .028 inch. Intake Check Seat .115 to .120 inch. Discharge Needle seat No.50 .070 inch.
CHOKE	Carter climatic (Cross over type) Setting on Index. Heat Suction Hole in Air Horn No.44 .086 inch.
VACUUM SPARK PORT	.045 x .110 inch.

GENERAL DESCRIPTION

The major castings of the AFB (aluminium four barrel) carburettor are aluminium, with the throttle body cast integral with the main body.

The section containing the accelerator pump is termed the primary side of the carburettor. The rear section is the secondary. Five conventional systems are used, being two float systems, two low speed systems (primary side only) two high speed systems, one accelerator pump system and one automatic choke control system.

The step-up rods, pistons and springs are accessible for service without removing the air horn, or the carburettor from the engine. The venturi assemblies (primary and secondary) are replaceable and contain many of the calibration points for both the high and low speed system. One fuel bowl feeds both the primary and secondary nozzles on the right side, while the other fuel bowl takes care of the primary and secondary nozzles on the left side. This provides improved performance in cornering, quick stops and acceleration.

Tools used for servicing carburettors.

T.109-287S	Elevating Legs.
T.109-22	Bending Tool.
T.109-29	.020 Wire Gauge.
T.109-31	¼" unloader Gauge.
T.109-41	Bending Tool (fast idle and unloader).
T.109-107	Float Gauge 5/16 inch.
T.109-213	Bending Tool.
T.109-58	Screwdriver Bit.
T.109-59	Screwdriver Bit.

REMOVING THE CARBURETTOR FROM THE ENGINE

Remove the air cleaner by releasing the wing nut in the centre of the cover. Lift off of the centre stud taking care not to lose the gasket, between the air filter casing and the carburettor. For convenience remove the centre stud.

Disconnect the petrol pipe and the vacuum pipe from the carburettor using two spanners for this operation in each instance.

Disconnect the smog pack breather hose from the carburettor. Remove the spring clip and disconnect the choke link.

Remove the accelerator return spring and spring the accelerator rod from its ball joint.

Remove the four carburettor holding down nuts and lift off the carburettor taking care of the gasket between the carburettor and the intake manifold.

REFITTING THE CARBURETTOR

Using a new gasket (Chrysler 2121953) between the base of the carburettor and the air filter manifold, position the carburettor correctly over the studs, fit the nuts, and screw them down progressively and evenly until tight.

Reconnect the accelerator return spring and the accelerator rod ball joint. Reconnect the choke link and fit the spring clip. Fit the smog pack breather hose and reconnect the petrol and vacuum pipes using two spanners in each instance. Screw in and tighten the centre stud for the Air Cleaner.

Fit a new gasket (Chrysler 1821170) to the top of the carburettor, fit the air cleaner unit over the stud and locate it correctly on the carburettor locations so that it seats on the gasket. Fit the washer and wing nut, and tighten.

1. SERVICING THE CARBURETTOR

Dirt, dust and gummy deposits are some of the main causes for poor carburettor operation. Careful cleaning and the renewal of parts, where required, will restore the carburettor to its original performance.

When overhauling the AFB Carburettor, several items of importance should be observed as follows:

The carburettor should be carefully dismantled.
All parts cleaned in a suitable solvent, then inspected for wear or damage.
Air pressure only should be used to clean the various orifices and channels.
Questionable parts should be replaced with new ones. When inspecting parts removed from the carburettor it is sometimes difficult to determine if they are satisfactory for further service. In such instances it is recommended that new parts are fitted.

2. DISMANTLING THE CARBURETTOR

To dismantle the carburettor for cleaning or overhaul refer to Fig.8. and proceed as follows:

(1) Place the carburettor assembly on Tool No.T.109-287S elevating legs to protect the throttle valves from damage and to provide a suitable base for working.

(2) Remove the hairpin clip that attaches the fast idle connector rod to the choke lever. Disengage the rod from the lever, then swing the rod at an arc until it can be disengaged from the fast idle cam.

(3) Remove the retainer and spring that holds the throttle connector rod in the centre hole of the accelerator pump arm. Remove the hair pin clip that attaches the lower end of the rod in the primary throttle shaft lever. Disengage the rod from the arm and lever, then remove from the carburettor.

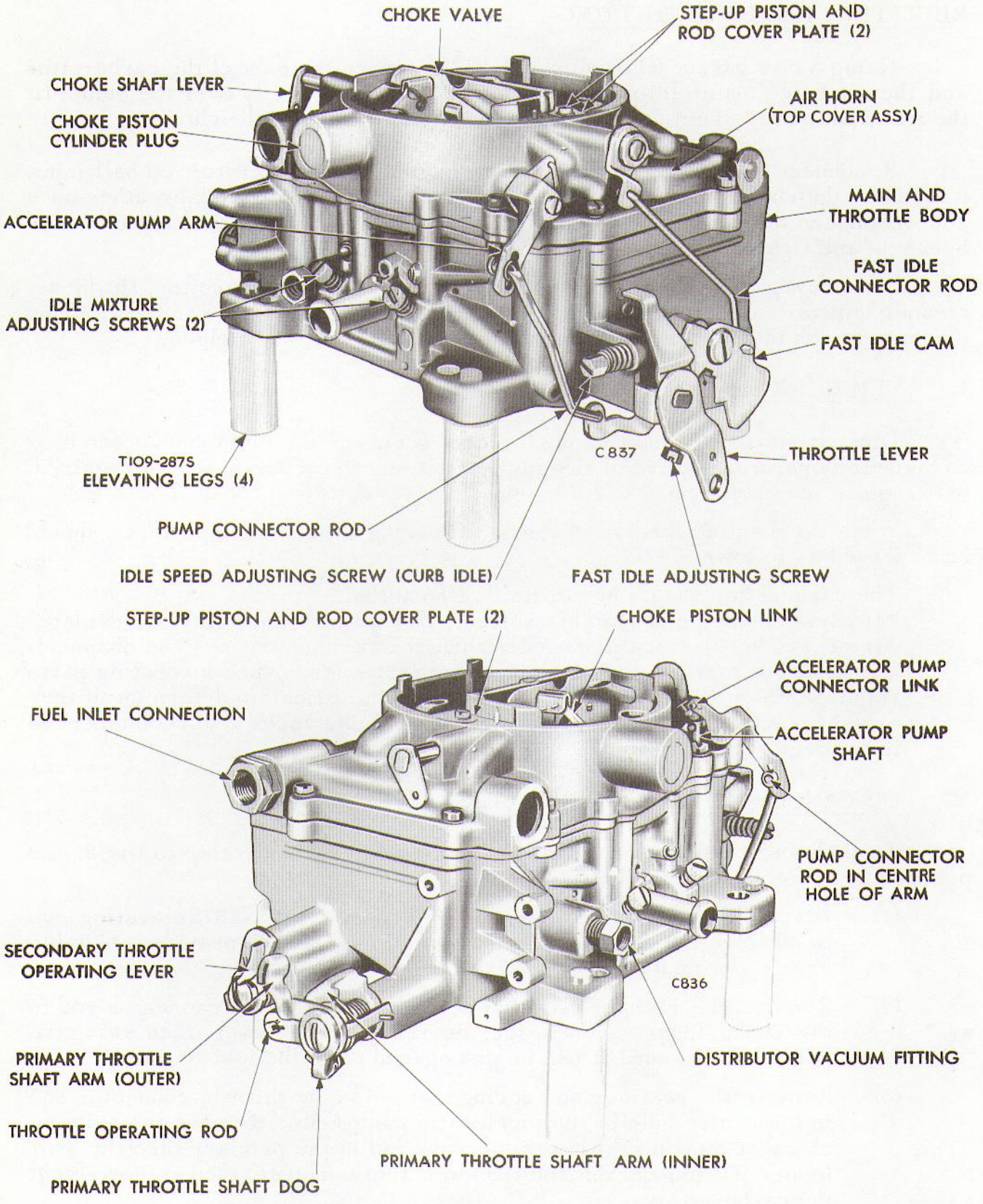


Fig. 8 Carburettor Assembly

(4) Remove the screws attaching the step-up piston and rod cover plates. Hold cover down with a finger to prevent the piston and rods from flying out. Lift off the plates and slide the step-up pistons out of the air horn, as shown in Fig.9. Remove the step up piston springs.

(5) Remove the ten screws that attach the air horn to the main body. (1 screw in hole in air horn). Lift air horn straight up and away from the main body. When removing air horn, use care as as not to bend or damage the floats. Remove the accelerator pump, plunger lower spring from the pump cylinder.

DISMANTLING THE AIR HORN

Place the air horn in an inverted position on the bench (to protect the floats) then proceed as follows:

(1) Using a suitable tool, remove the float fulcrum pins (left and right) then lift the floats up and out of the bosses on air horn. It is suggested that the float on the pump side be marked so that the floats can be refitted in their respective positions.

(2) Remove the two needle valves from their respective seats, after marking the one on the pump side for identification. Using a wide blade screwdriver, remove the needle valve seats. Be sure each needle valve is returned to its original seat at re-assembly.

(3) Remove the hairpin clip that holds the accelerator pump connector link in the pump arm and plunger shaft. Disengage link from pump arm and shaft. Slide the accelerator pump plunger and spring out of the air horn. Remove the air horn to main body gasket and discard.

(4) Place the accelerator pump plunger in a jar of clean petrol or paraffin to prevent the leather from drying out.

(5) Remove the fuel inlet fitting and filter screen from the air horn.

(6) Using a prick punch, pierce the welch plug and remove it from the end of the choke piston cylinder. Remove cotter pin that attaches the piston link to the choke valve lever. Slide choke piston and link out of cylinder.

MAIN BODY DISMANTLING

(1) Remove the screws that attach the accelerator pump jet housing to the main body. Lift out the jet housing and gasket as shown in Fig.10. Discard the gasket. Now invert the main body and drop out the discharge check needle from the discharge passage.

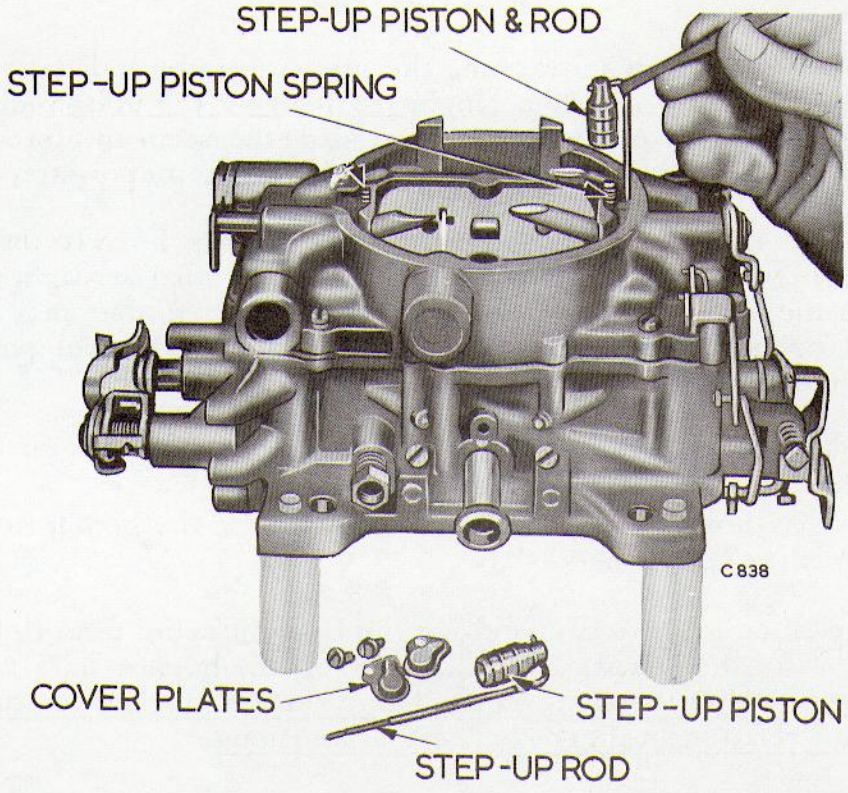


Fig. 9 Removing or Installing Step-Up Pistons and Rods

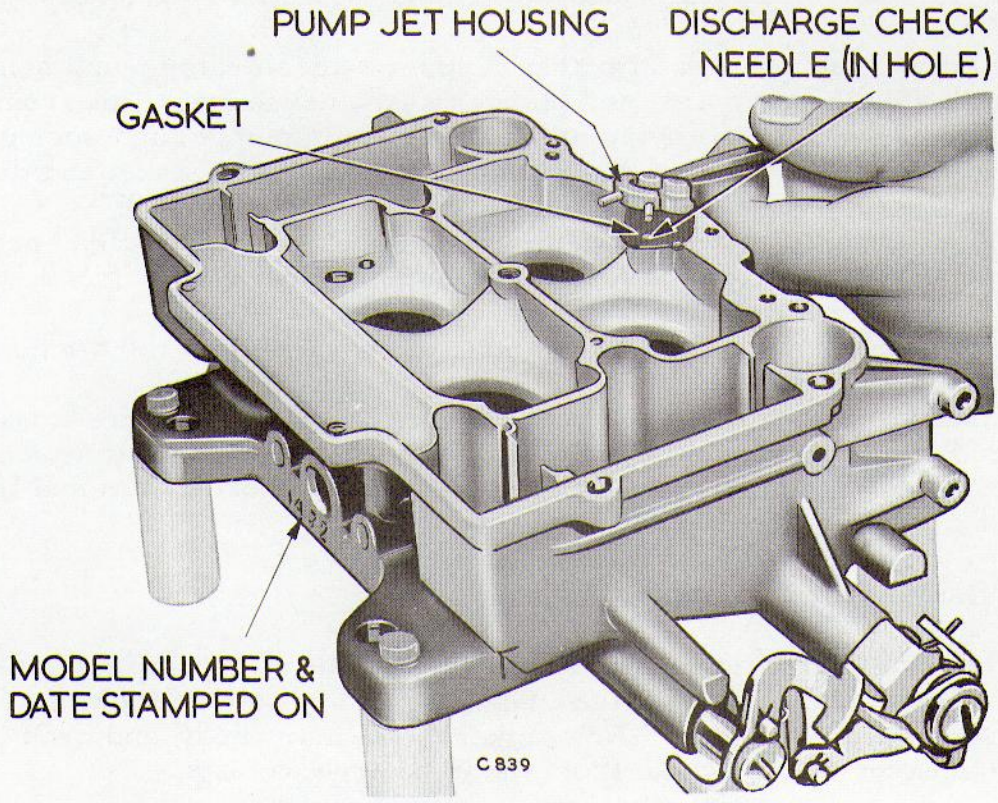


Fig. 10 Removing or Installing Accelerator Pump Jet Housing

(2) Using Tool T.109-58 remove the main metering jets (primary side), as shown in Fig.11. The primary and secondary main metering jets are not interchangeable. It is very important that these jets are refitted in their respective locations in the main body at reassembly.

(3) Again using Tool 109-58, remove the main metering jets (secondary side) as shown in Fig.11.

(4) Remove the screws that attach the primary venturi (choke and pump side) to the main body. Lift the venturi straight up and away from the main body, as shown in Fig.12. Discard the gaskets.

The venturi assemblies are not interchangeable, side for side, and must be refitted in their original locations at re-assembly.

(5) Remove the screws that attach the secondary venturi (choke and pump side) to the main body. Lift the secondary venturi assemblies straight up and away from the body, as shown in Fig.13.

(6) Using Tool T.109-59, screwdriver bit, remove the accelerator pump intake check valve, located inside the fuel bowl, adjacent to the accelerator pump cylinder. Refer to Fig.11.

(7) Remove the two idle mixture adjusting screws and springs from the throttle body portion of the main casting. The carburettor has now been dismantled into two units, namely, the air horn and the main and throttle body casting. The component parts of each have been dismantled as far as necessary for cleaning and inspection.

It is usually not advisable to remove the throttle shafts or valves, unless wear or damage necessitates the installation of new parts. During the manufacture of the carburettor the locations of the idle transfer ports and the idle discharge ports to the valve is carefully established for one particular assembly as shown in Fig.14. The valves are milled to give proper part relation.

If new throttle shafts should be fitted into an old worn body, it would be very likely that the original relationships of these ports to the valves would be obtained. A very slight change in the port relationship to the valves would adversely affect normal carburettor operation between the speeds of 15 and 30 miles per hour.

It is recommended that if the throttle shafts are excessively worn, that a new carburettor be installed. However, if the throttle valves have become nicked, burred or damaged, new valves may be installed providing the following instructions are carefully followed.

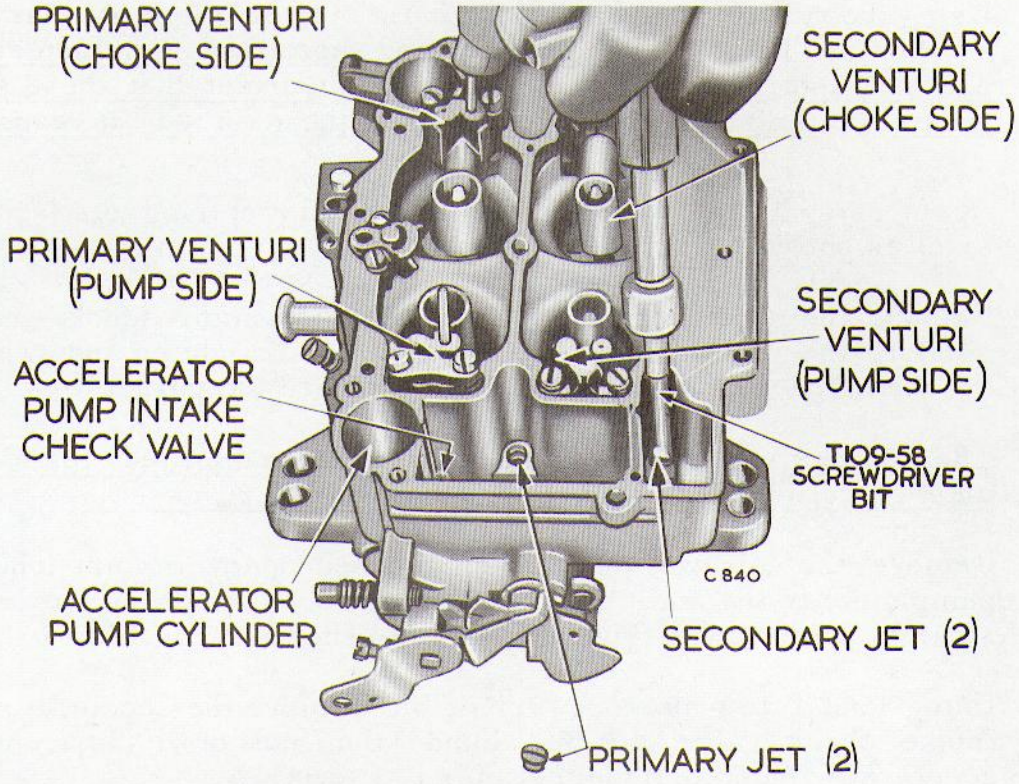


Fig. 11 Removing or Installing Main Metering Jets

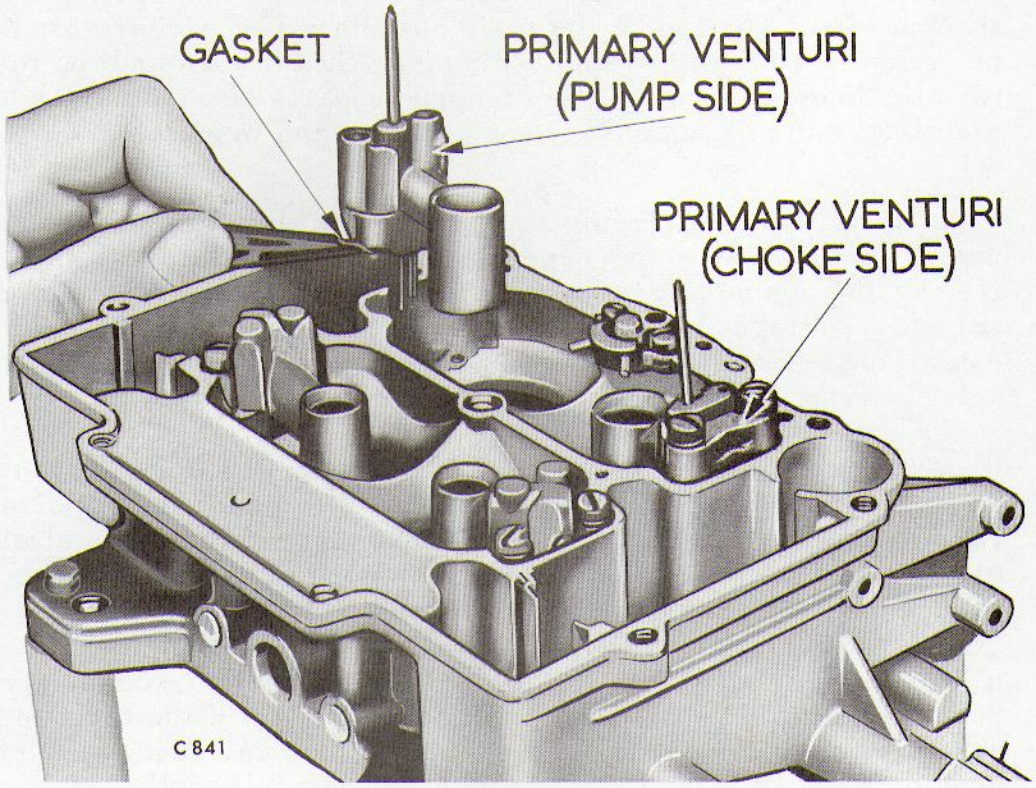


Fig. 12 Removing or Installing Primary Venturi

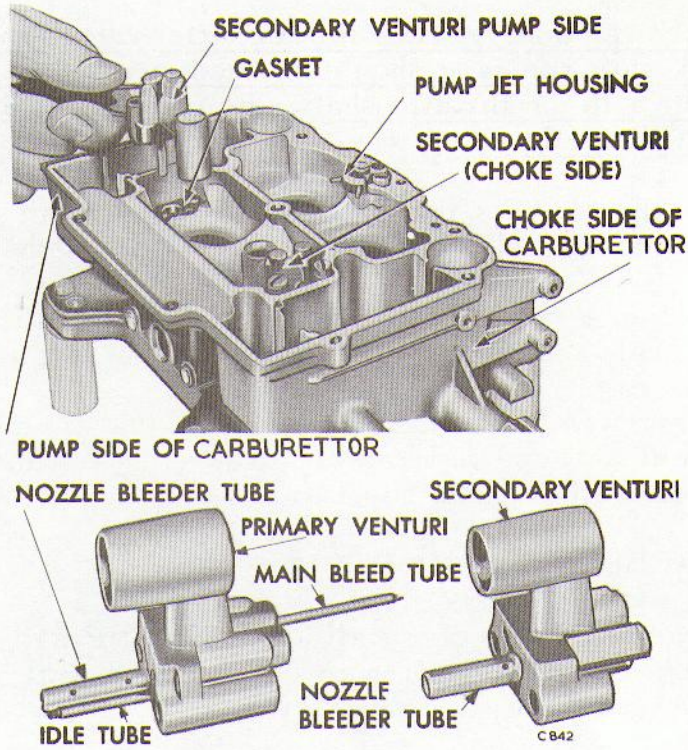


Fig. 13 Removing or Installing Secondary Venturi

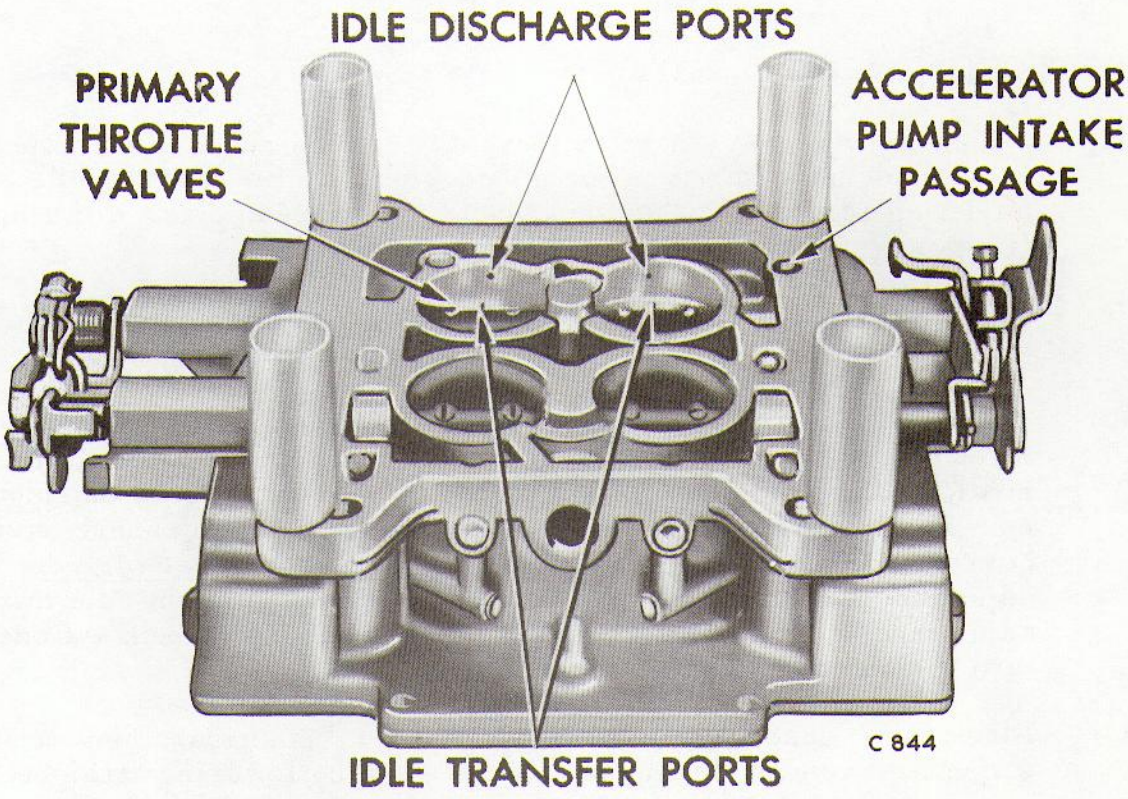


Fig. 14 Ports in Relation to Throttle Valves

The screws that attach the throttle valves are 'staked' on the opposite side and care should be used in removal so as not to break the screws in the throttle shaft. Remove the 'staked' portion of the screws with a file.

Remove the screws that attach the primary throttle valves to the throttle shaft and slide valve (or valves) out of the bores.

Remove the screws that attach the secondary throttle valves to the throttle shaft and slide valve (or valves) out of the bores.

The primary valves and secondary valves are not interchangeable and should be kept separate in order that each may be returned to its respective bore (See Fig.15).

3. CLEANING CARBURETTOR PARTS

Thoroughly wash off and clean all the parts. Finally wash off in clean petrol and where available dry off with compressed air. Avoid the use of a cloth that would leave any deposits on the parts.

Take particular care when cleaning the jets. The use of wire, drills or other mechanical means should be avoided as enlargement of the holes or orifices could result in making the mixture too rich for the proper performance of the carburettor.

4. INSPECTION AND RE-ASSEMBLY

(1) Slide the primary throttle valve (or valves) into their respective bores, use new screws, but do not tighten. Be sure the idle speed adjusting screw is backed out. Hold the valves in place with fingers, (Fingers pressing on the high side of the valves).

(2) Tap the valves lightly in this position, and tighten the screws securely. 'Stake' the screws by squeezing with pliers.

(3) Install the two idle mixture adjusting screws and springs in the throttle body portion of the casting. The tapered portion must be straight and smooth. If the tapered portion is grooved or ridged, a new idle mixture adjusting screw should be fitted to ensure having a correct idle mixture control. Do not use a screwdriver. The adjustment should be made with the fingers. Turn the idle mixture adjusting screws lightly against their seats, then back off one full turn for an approximate adjustment.

(4) Place new secondary venturi gaskets in position, then refit the secondary venturi (pump and choke side) by lowering straight down

on gaskets. Fit attaching screws and tighten securely. Be sure all the metering and vent tubes are clean, in both the primary and secondary venturi.

(5) Place new primary venturi gaskets in position, then refit the primary venturi (pump and choke side) by lowering straight down on the gaskets. Refer to Fig.12. Fit attaching screws and tighten securely.

(6) Install the primary and secondary main metering jets using Tool T.109-58. Tighten jets securely.

(7) Invert the carburettor and install the accelerator pump intake check ball. Install seat and tighten securely, using Tool T.109-59 (Refer to Fig.11.). Fit screw plug and tighten securely.

ACCELERATOR PUMP TEST

(1) Pour clean petrol into the carburettor bowl (approximately $\frac{1}{2}$" deep). Remove the accelerator pump plunger from the jar of petrol or paraffin. Flex the leather several times, then slide into the pump cylinder.

(2) Install the accelerator pump discharge check needle in the discharge passage. Raise the pump plunger and press lightly on the plunger shaft to expel air from the pump passages. Using a small clean brass rod, hold the discharge check needle firmly on its seat. Again raise the plunger and press downward. No fuel should be emitted from either the intake or discharge passage.

(3) If fuel does emit from the intake passage, remove the intake check ball and re-clean the passage. Fuel leakage at the discharge check needle indicates the presence of dirt or a damaged check needle. Clean again and then fit a new check needle. Re-test for leakage.

(4) If either the intake check ball or discharge check needle leaks after test, attempt to reseat as follows:-

INTAKE CHECK BALL

Remove the screw plug, gasket, ball seat and ball from the bottom of the throttle body flange. Install a new ball and ball seat. Refit the screw plug and a new gasket, then retest as described previously.

DISCHARGE CHECK NEEDLE

(1) With the discharge check needle installed, insert a piece of drill rod down on the needle. Lightly tap the drill rod with a hammer to form

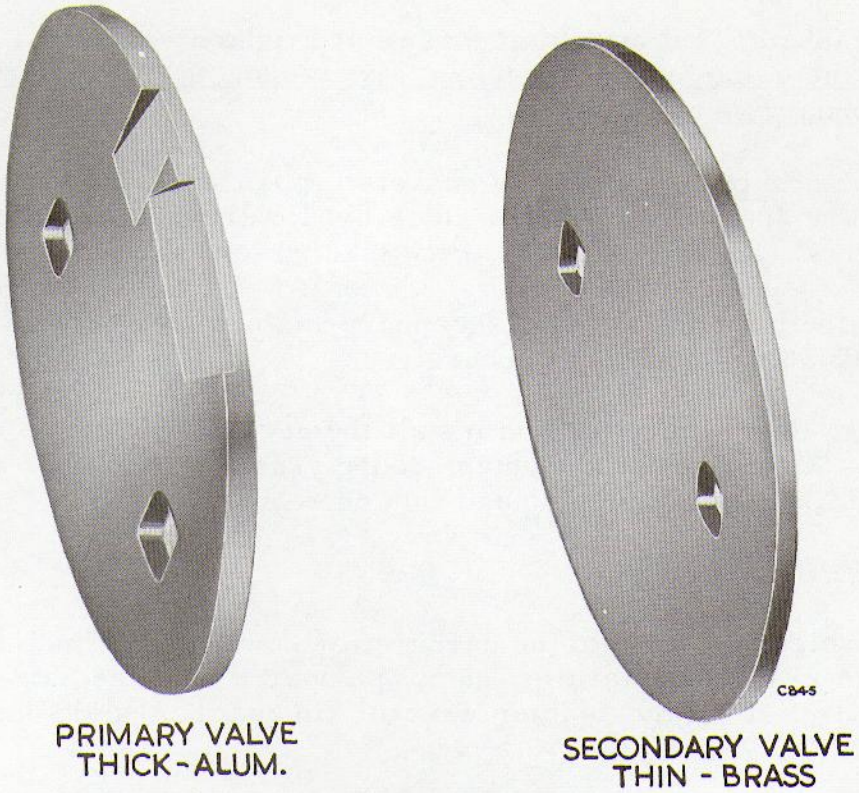


Fig. 15 Throttle Valve Identification

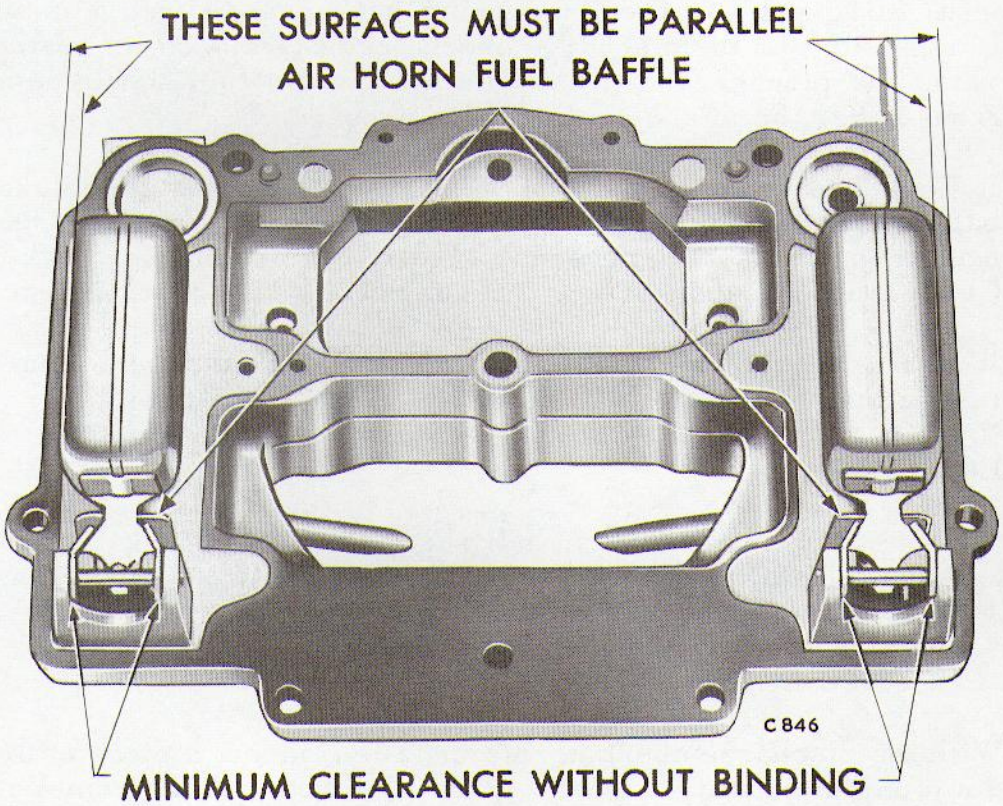


Fig. 16 Check Float Alignment

a new seat. Remove and discard the old needle and fit a new one. Retest as described previously. If this does not correct the condition a new carburettor will have to be fitted.

(2) Install the accelerator pump discharge check needle, jet housing and gasket. Install housing and attaching screws, and tighten securely.

(3) Press down on the accelerator pump plunger shaft, and as the plunger is being depressed, a clear straight stream should emit from each jet. If the streams are identical, (if either one is diverted or restricted) a new accelerator pump jet housing should be fitted. After test, pour the petrol from the carburettor bowl and remove the pump plunger.

ASSEMBLING THE AIR HORN

(1) Slide the fuel inlet screen into the fuel line fitting, then install fitting in air horn. Tighten securely.

(2) Check to see if the leather on the accelerator pump plunger is hard, cracked or worn. If any sign of wear of deterioration is evident, install a new plunger assembly.

(3) Slide the accelerator plunger into air horn, then install the accelerator pump link. Fit the retaining hairpin clip to secure.

(4) Place a new air horn to main body gasket in position on the air horn, then fit the float needle valve seats (Be sure each needle seat and needle is refitted into its original position).

(5) Slide the right and left floats into position in the air horn, then fit the float fulcrum pins. (Be sure the marked float is fitted on the pump side of the air horn).

(6) After the floats have been fitted, check the float alignment, level and drop settings as follows:

FLOAT ALIGNMENT SETTING

(1) Sight down the side of each float shell to determine if the side of the float is parallel to the outer edge of the air horn casting as shown in Fig.16.

(2) If the sides of the float are not in alignment with the edge of the casting, bend the float lever by applying pressure to the end of the float shell with the fingers while supporting the float lever with the thumb. To avoid damage to the float, apply only enough pressure to bend the float lever.

(3) After aligning the floats, remove as much clearance as possible between the arms of the float lever and the lugs on the air horn. To do this, bend the float lever. The arms of the float lever should be as parallel as possible to the inner surfaces of the lugs or the casting.

FLOAT LEVEL SETTING

(1) With the air horn inverted, the air horn gasket in place and the float needle seated, slide the float gauge between the top of the float (at outer end) and the air horn gasket as shown in Fig.17. Float should just touch gauge.

(2) Check the other float in the same manner. If an adjustment is necessary, bend the float arm using Tool T.109-22 until correct clearance has been obtained. After bending arm, re-check the float alignment.

FLOAT DROP SETTING

(1) Holding the air horn in an upright position, measure the distance from the top of the floats (outer end) to the air horn gasket, as shown in Fig.18. This measurement should be 23/32 inch. If an adjustment is necessary, bend the stop tabs on the float levers until the correct drop setting has been obtained. Bend the tap towards the needle seat to lessen the drop, or away from the seat to increase the drop.

(2) After the floats have been checked and adjusted, continue to assemble the carburettor as follows:

(3) Place the accelerator pump plunger lever spring in the pump cylinder, then lower, the air horn carefully down on the main body.

Caution: Be sure the fuel baffles on the air horn slide down in front (bowl side) of the float chamber baffles, or the air horn will not index correctly with the main body and can cause the floats to hang up. Be sure the leather on the plunger does not curl or wrinkle. Accelerator pump operation will be affected if this precaution is not observed.

(4) Fit the ten air horn attaching screws and tighten securely. (The two long screws should be fitted into the holes that are located at the air cleaner mounting surface. The 1 inch screw at the front and the 1½ inch long screw at the rear).

(5) Slide the step-up piston springs into the piston cylinder, followed by the step-up pistons and the step-up rods. Fit the cover plates and attaching screws while holding the step-up pistons down in position. Tighten the screws securely.

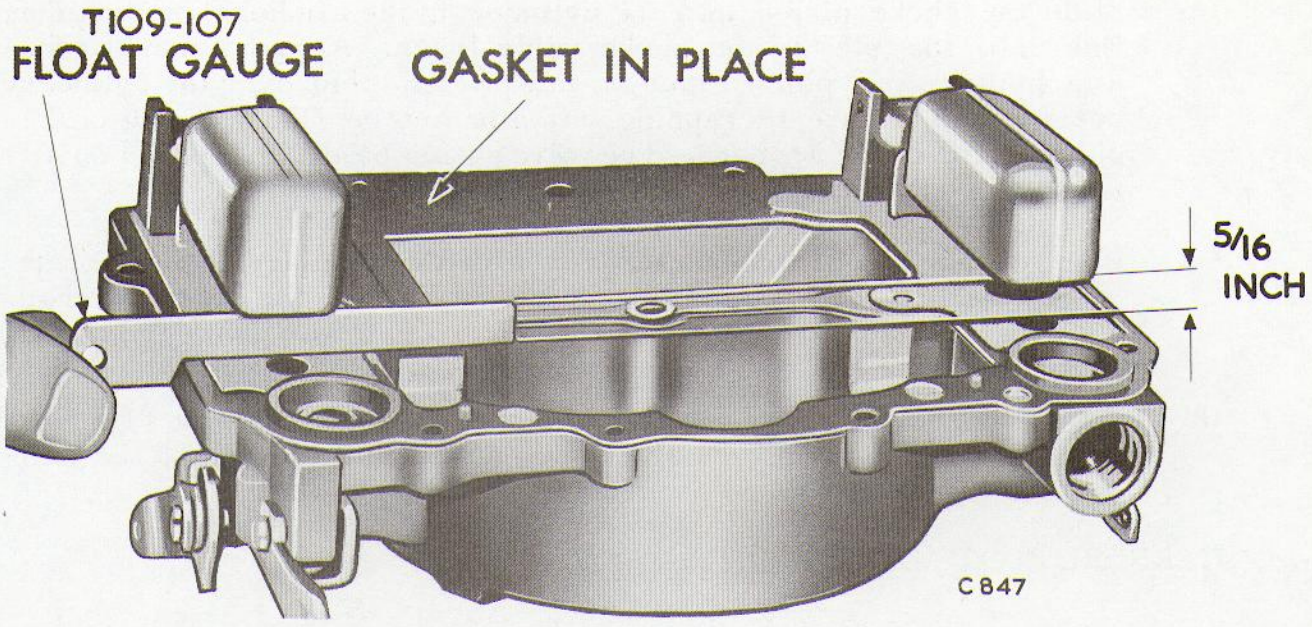


Fig. 17 Checking Float Height

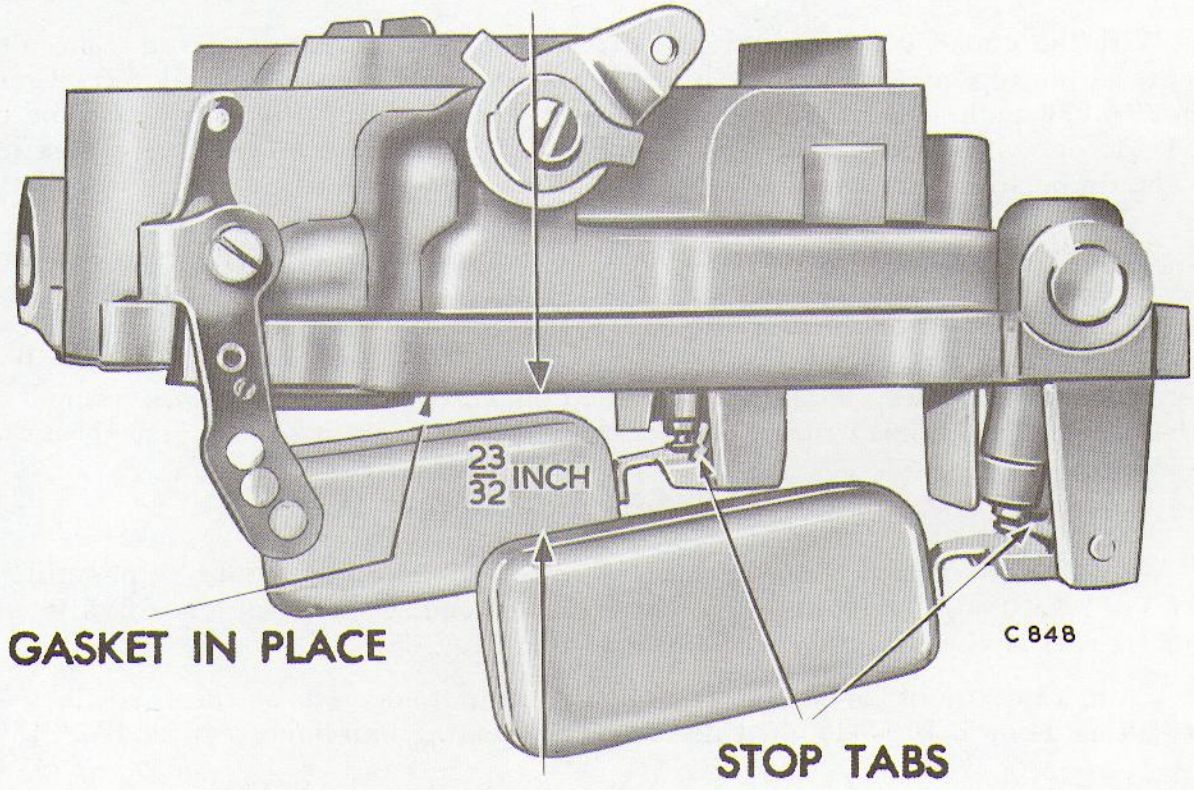


Fig. 18 Checking Float Drop

(6) Slide the choke piston into its cylinder in the air horn, guiding the link into the slot in the choke valve lever. Align hole and fit the attaching cotter pin. Place a new welch plug over the cylinder opening and secure by rapping with a hammer. Check the fit of the choke valve in the air horn. The valve should be evenly spaced on all sides. Loosen the screws and re-position if necessary.

(7) Engage the throttle connector rod with the primary throttle shaft lever, then fit the hairpin clip. Slide the flat washer over the other end of the rod and engage it with the accelerator pump arm. Fit retainer spring and retainer secure.

(8) Engage the lower end of the fast idle connector rod with the fast idle cam, then swing in an arc to lock in cam. Slide other end of rod into the choke shaft lever and secure with the hairpin clip.

5. CARBURETTOR ADJUSTMENTS

The following adjustments should be made with the carburettor on the bench for ease of working, and should be made in the following order:-

Fast Idle Adjustment

With the choke valve held tightly closed and carburettor inverted tighten the fast idle adjusting screws (on the high step of the fast idle cam) until Wire Gauge T109-29 .020 inch can be inserted between the primary throttle valve and the bore (side opposite idle port) as shown in Fig.19. The index mark on the fast idle cam should be in direct line with the fast idle screw shank.

With the carburettor inverted, open the throttle valves to wide open position. Close the choke valve tightly and then close the throttle valves. Release the choke valve. This will position the fast idle cam to fast idle. The index mark on the cam should split the centre of the fast idle adjusting screw, as shown in Fig.20. If an adjustment is necessary, bend the fast idle connector rod at the angle, using Tool T.109-213, until the index mark on the cam indexes the fast idle adjusting screw.

Choke Unloader Adjustment

With the throttle valves in the wide open position, it should be possible to insert Tool T.109-31 ($\frac{1}{4}$ inch) gauge between the upper edge of the choke valve and the inner wall of the air horn, as shown in Fig.21.

If an adjustment is necessary, bend the unloaded lip on the throttle shaft lever, using Tool T.109-41, until the correct opening has been obtained.

Accelerator Pump Adjustment

Move the choke valve to wide open position, to release the fast idle cam.

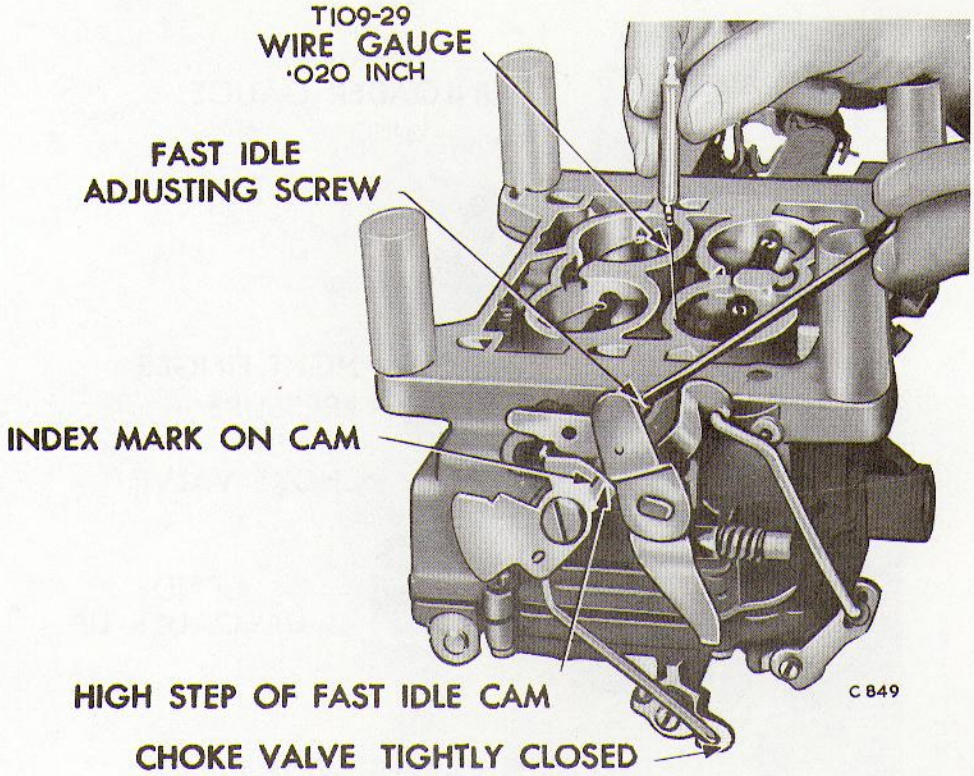


Fig. 19 Checking Fast Idle Adjustment

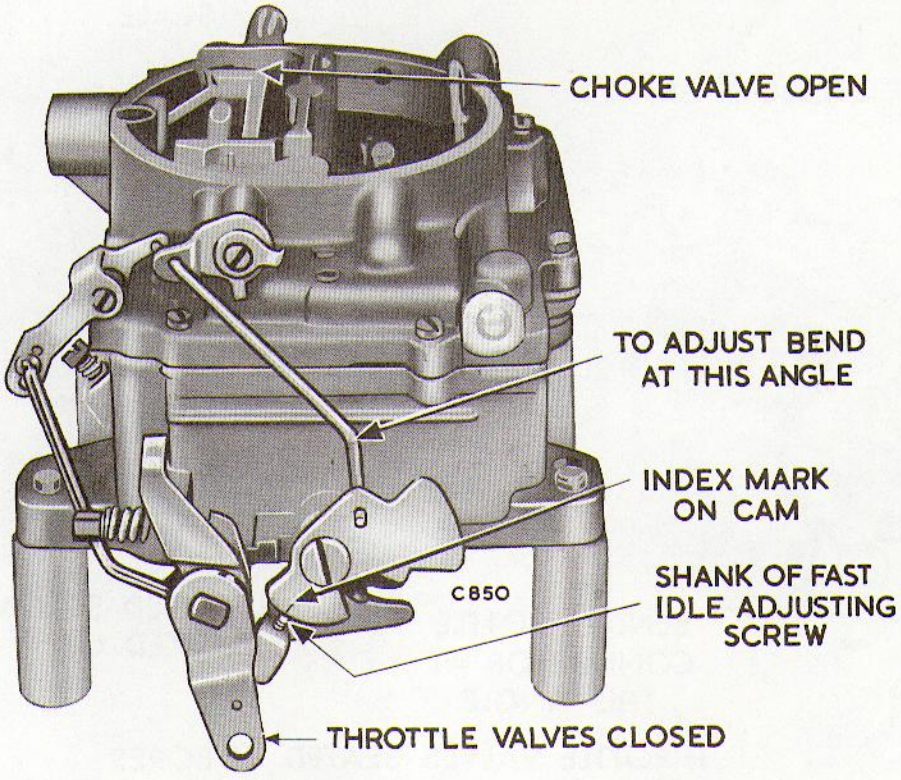


Fig. 20 Fast Idle Cam Indexing

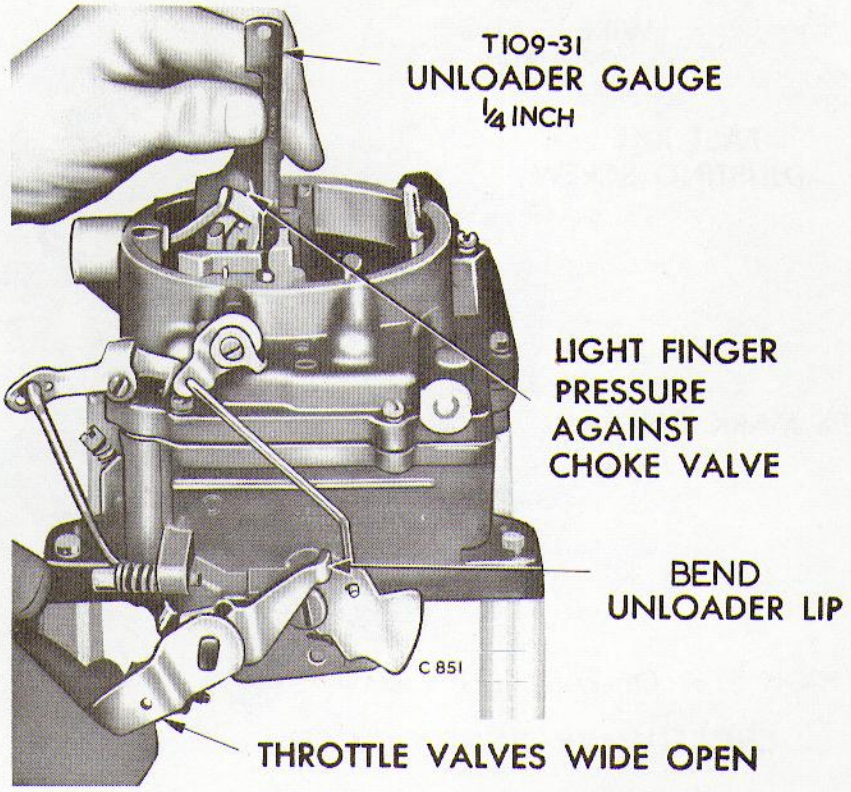


Fig. 21 Checking Choke Unloader (Wide Open Kick)

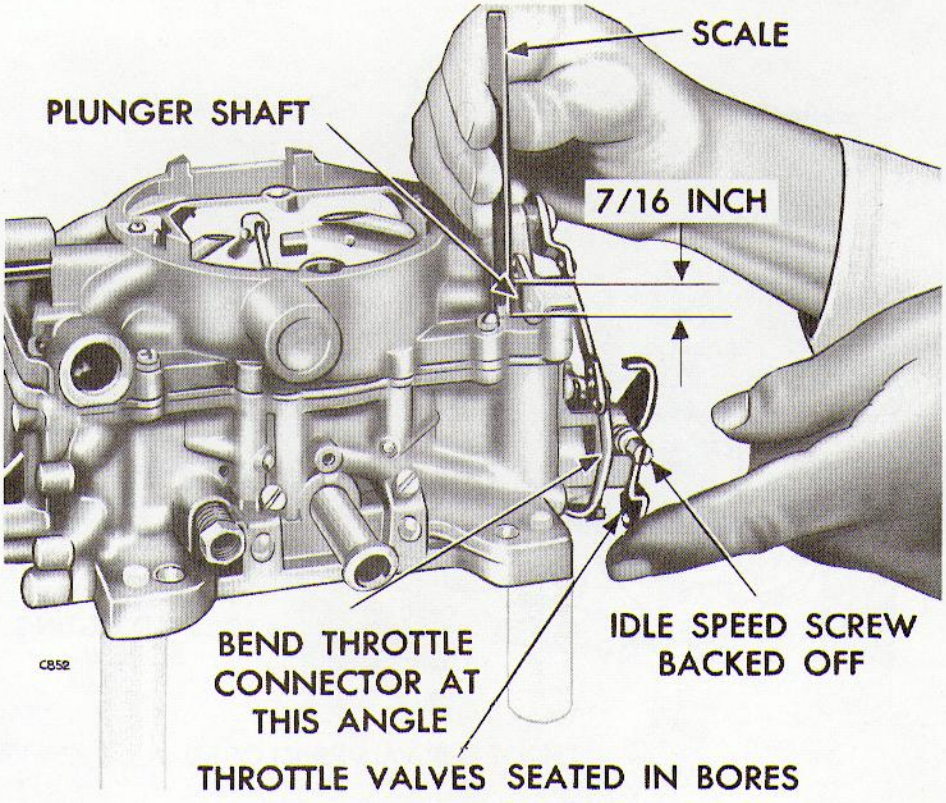


Fig. 22 Checking Accelerator Pump Travel

Back off the idle speed adjusting screw (curb idle) until the throttle valves are seated in the bores.

Measure the distance from the top of the air horn to the top of the plunger shaft, using a scale as shown in Fig.22. This distance should be 7/16 inch.

If an adjustment is necessary, bend the throttle connector rod at the lower angle, using Tool T.109-213, until correct travel has been obtained.

Secondary Throttle Lever Adjustment

To check the secondary throttle lever adjustment, block the choke valve in the wide open position and invert the carburettor. Slowly open the primary throttle valves until it is possible to measure 3/8 inch between the lower edge of the primary valve and the bore (opposite idle port) as shown in Fig.23. At this measurement the secondary valves should just start to open. The stop lugs on both the primary and secondary throttle levers should contact the bosses on the flange at the same time. If an adjustment is necessary, bend the secondary throttle operating rod at the angle, using Tool T.109-213, until the correct adjustment has been obtained. At wide open throttle, the primary and secondary throttle valves should reach the full vertical position.

With the primary and secondary throttle valves in the tightly closed position, it should be possible to insert Tool T.109-29 (.020 inch) wire gauge, between the positive closing shoes on the secondary throttle levers, as shown in Fig.24.

If an adjustment is necessary, bend the shoe on the secondary throttle lever, using Tool T.109-22, until the correct clearance has been obtained.

Secondary Throttle Lock-Out Adjustment

Crack the throttle valves, then manually open and close the choke valve. The tang on the secondary throttle lever should freely engage in the notch of the lockout dog.

If an adjustment is necessary, bend the tang on the secondary throttle lever, until the engagement has been made. Use Tool T.109-22 for this operation.

After adjustments have been made, fit the carburettor to the engine, using a new gasket.

It is suggested that the carburettor bowl be filled with clean petrol. This will help prevent dirt that is trapped in the fuel system, from being dislodged by the free flow of fuel, as the carburettor is primed.

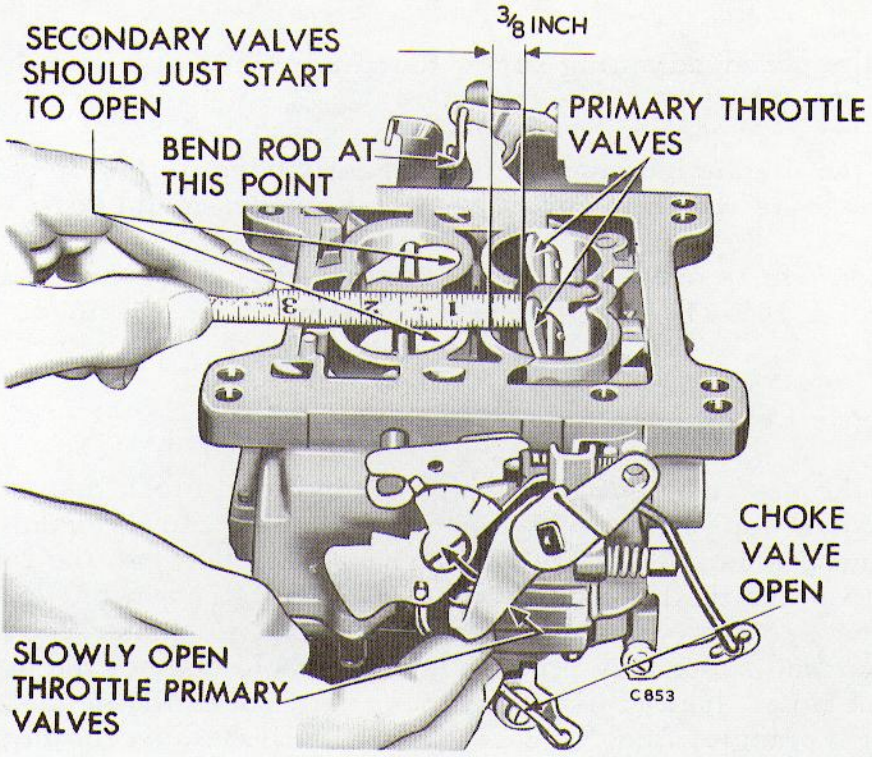


Fig. 23 Checking Secondary Throttle Opening

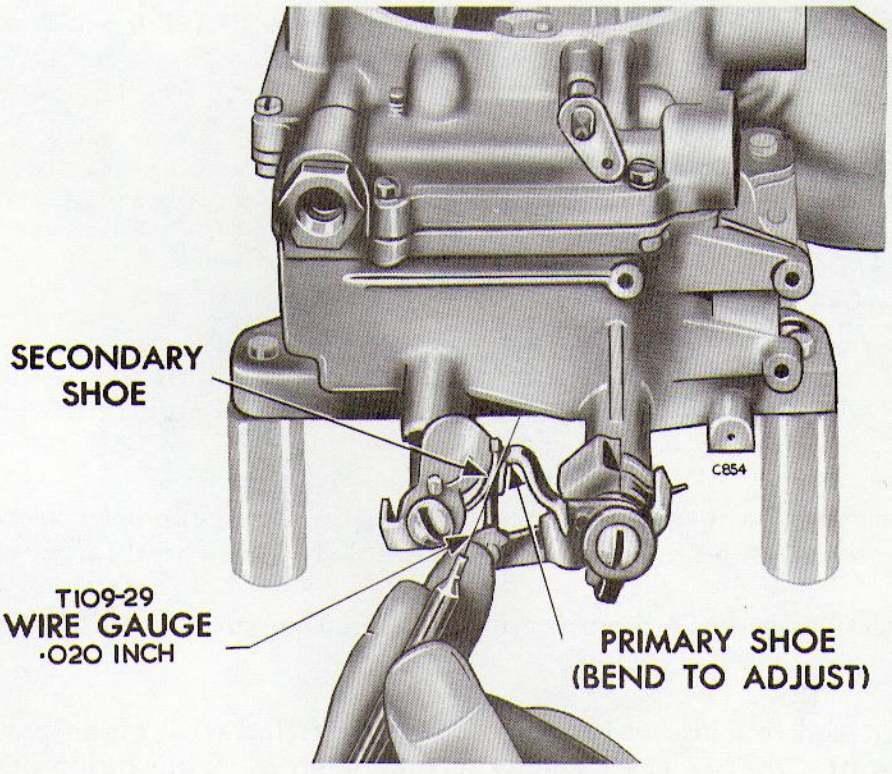


Fig. 24 Checking Clearance Between Closing Shoes

6. AUTOMATIC CHOKE (Well Type)

To function properly, it is important that all parts be clean and move freely. Other than the occasional cleaning the automatic choke control requires no servicing. However, it is very important that the choke control unit works freely at the thermostatic coil spring housing and at the choke shaft. Move the choke rod up and down to check for free movement of the coil housing on the pivot. If the unit binds, a new unit should be fitted. The Well Type Choke control unit is supplied only as a complete unit. Do not attempt to repair it. (See Fig.25).

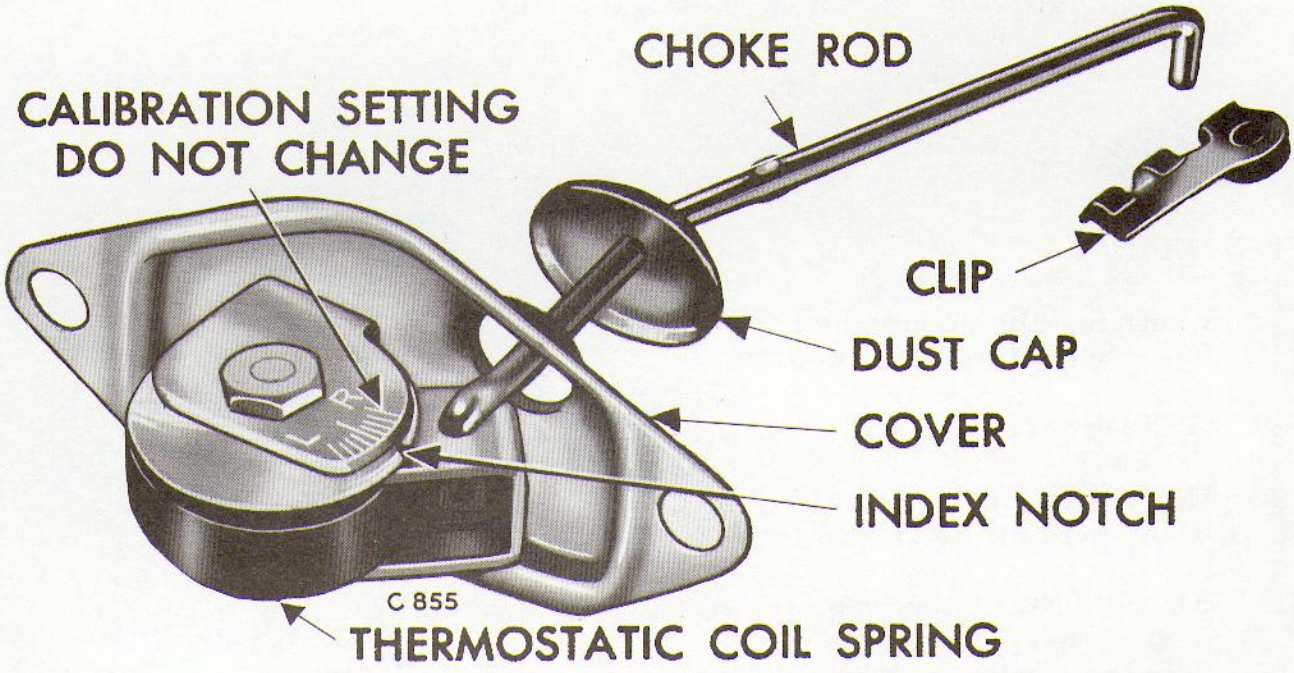


Fig. 25 Well Type Choke Control Unit

When fitting the well type choke unit, make certain that the coil housing does not contact the sides of the wall in the intake manifold. Any contact at this point will affect the choke operation.

Do not lubricate any parts of the choke or control unit since this causes dirt accumulation which would result in the binding of the choke mechanism.

Do not attempt to change the calibration setting. This is predetermined and should it be changed, improper choke action would result.

Clean all choke parts using paraffin or petrol and then blow dry with compressed air. Examine for wear or damage and if in doubt fit a new unit.

Idle Speed Adjustment (Curb Idle)

The idle speed adjustment is made after the carburettor has been fitted to the engine.

(1) With the throttle valves closed and the choke valve wide open (engine at normal operating temperature), adjust the idle screw to give 500 R.P.M.

(2) Adjust the idle mixture screws until the engine operates smoothly then recheck the engine revolutions and again adjust the idle screw to give the correct engine R.P.M.

IGNITION SYSTEM

TUNE UP DATA

Centrifugally - controlled and vacuum controlled advance and retard.
Distributor Chrysler 1889710.

FIRING ORDER 18436572

(Numbering from front, left-bank, 1-3-5-7; Right-bank 2-4-6-8.
Right and Left as viewed from drivers seat).

IGNITION TIMING (At 500 r.p.m.) ... ... 7^{o} b.t.d.c.

(Timing indicator given by zero line on crankshaft pulley and indicator plate on chain case cover).

CONTACT-BREAKER GAP ... ... 0.014 - 0.019 in.

SPARKING PLUGS 14 MM ... ... Autolite A32

Gap ... ... 0.035 in.

Ignition and Generator Warning Light

The ignition system is of the normal battery and coil type and a warning light is embodied into the speedometer.

When the ignition is switched on this will light up GREEN and will remain alight while the engine is idling, or thereabouts. When the engine is accelerated

and when the car is travelling normally, the light should go out. If the light stops on, or appears at any time when the car is travelling, it will indicate that the generator is not charging and the matter should receive immediate attention.

Coil

The coil requires no routine attention other than checking the terminal connections for tightness and cleaning around the terminals at intervals.

Sparking Plugs 14 m/m. Autolite A32

At intervals not exceeding 4000 miles, after the initial 1000 miles service, the sparking plugs should be removed, cleaned and re-gapped, or if necessary, replaced by new.

To remove the plugs, first remove the leads by pulling them from the plugs BY GRIPPING THE RUBBER SHROUD. Pulling on the lead itself may impair the connection. Using the universal joint box spanner, supplied with the tool kit, remove the spark plugs.

If they are to be used again they should preferably be cleaned by a sand-blast type cleaner, but failing this they should have any deposits removed by scraping or brushing. In both instances they should afterwards be thoroughly cleaned by washing in petrol.

THE CORRECT GAP IS - .035 INCH and careful and accurate setting should be made by bending the side electrode and checking the gap with a feeler gauge. See Fig.26.

When the gapping is correct, see that the seating is clean, and if necessary fit new washers. Fit the plugs into the special spanner, insert them, but do not

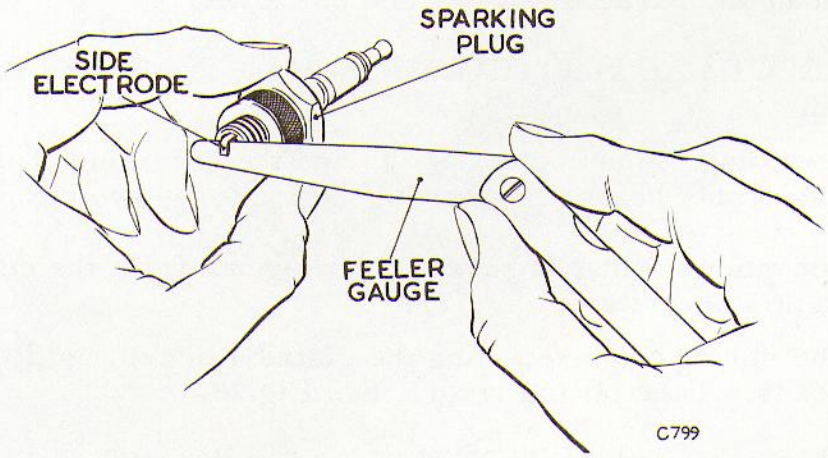


Fig. 26 Setting Spark Plug Gap

overtighten. Do not drop the plugs into their respective positions as this may alter the gapping.

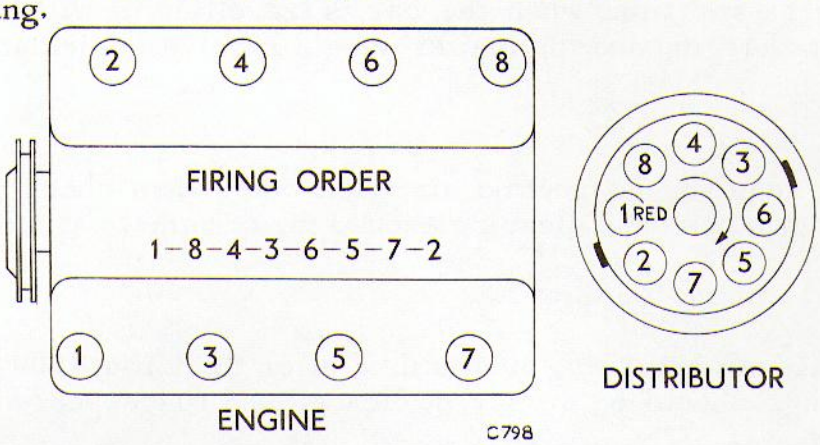


Fig. 27 Firing Order

Should the plug leads become mixed refer to Fig.27. No.1 lead has a red cap attachment to the distributor for ready indentification.

Distributor

The distributor should be lubricated at regular intervals at the following points.

At every 2000 miles - Add 5 to 10 drops of oil (see recommended list) to the cap on the outside of the distributor base.

At every 10,000 miles - Lubricate the felt pad under the rotor with 2 to 3 drops of recommended oil. Take care to keep oil from the contact breaker points.

Contact Breaker Points

It is vitally important, for efficient engine operation, to keep the distributor contact parts clean and parallel, and gapped correctly.

THE CORRECT GAP IS .014 TO .019 INCH and careful and accurate setting is recommended.

As the servicing of the contact points and the servicing of the spark plugs coincide, it considerably helps when setting the points to have the plugs removed.

To set the points, first unscrew the wing nut from the centre of the air cleaner, and lift this unit away.

Release the spring clips retaining the distributor cap, and lift away the cap complete with leads. Take off the rotor. See Fig.28.

Remove the screw and washer 'A' retaining the contacts, and slacken the low tension connecting nut 'B', and lift away the wire connection. The contact assembly will then lift away.

Examine the contact points, and if badly pitted, fit a new set.

To replace or fit a new set, see that the pillar is lightly greased, compress the spring of the contact, to fit into the low tension location, and push the assembly fully down on to the pillar. Replace the low tension wire connection and tighten the screw 'B'. Replace screw 'A' and tighten sufficiently for it to be moved accurately.

With the sparking plugs removed, turn the engine with the belts, or failing this, use a box spanner on the nut in the pulley on the front of the crankshaft, until the rubbing block of the points is on the high spot of the cam. With a screwdriver inserted between the two V cut-outs, adjust the points using feeler gauges to the

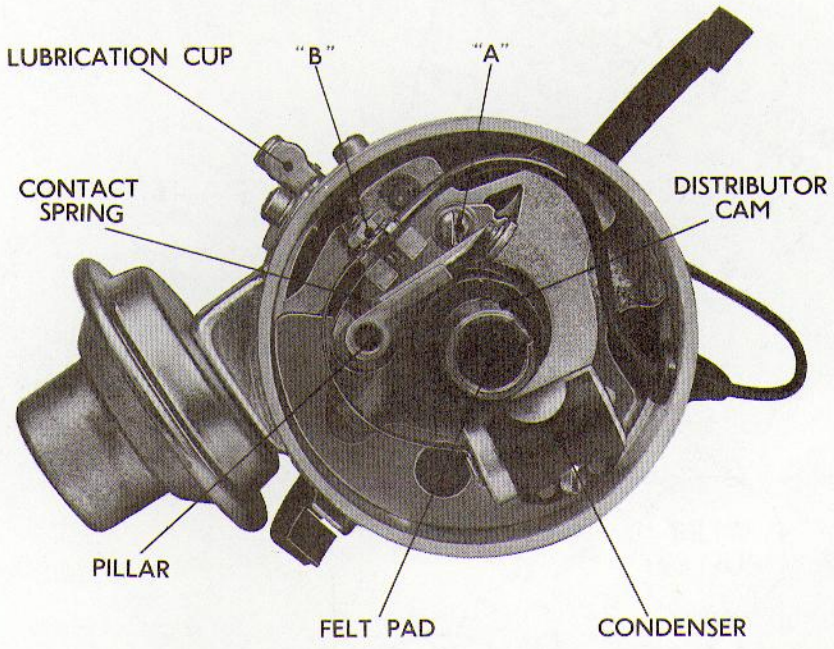


Fig. 28 Distributor

recommended gap. The cam will move sufficiently in itself across the high point to ensure that the setting is made at the peak. Tighten screw 'A'. Turn the engine to another high spot and recheck.

When satisfactory, replace the rotor and the cap with its lead. No.1 red cap lead should position itself centrally forward. Replace the air cleaner.

Generator

At every 2000 miles - Lubricate with 5 to 10 drops of light engine oil in two cups.

Belt Adjustment

Belts adjusted too tightly will cause rapid wear of the generator and water pump bearings, and a loose belt will slip and wear excessively, causing overheating and unsteady generator output.

Generator Belt. Fig.29.

Slacken the generator adjusting strap and the generator bracket mounting bolts, sufficiently to allow the generator to be moved outwards until the belt tension is correct.

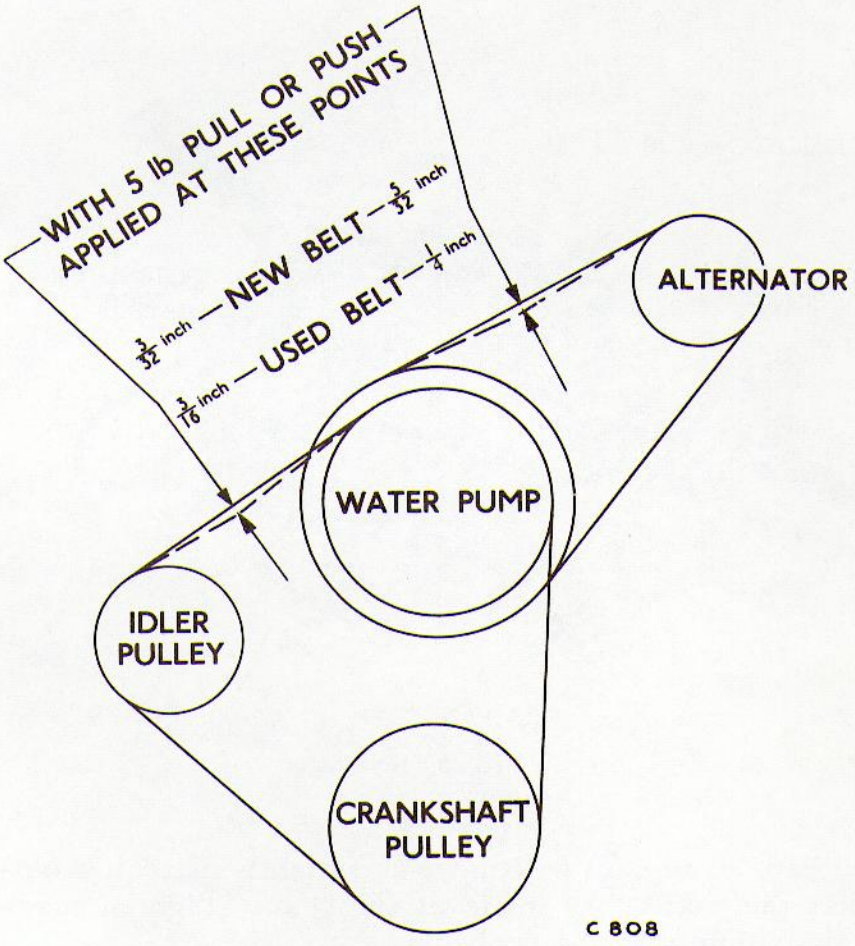


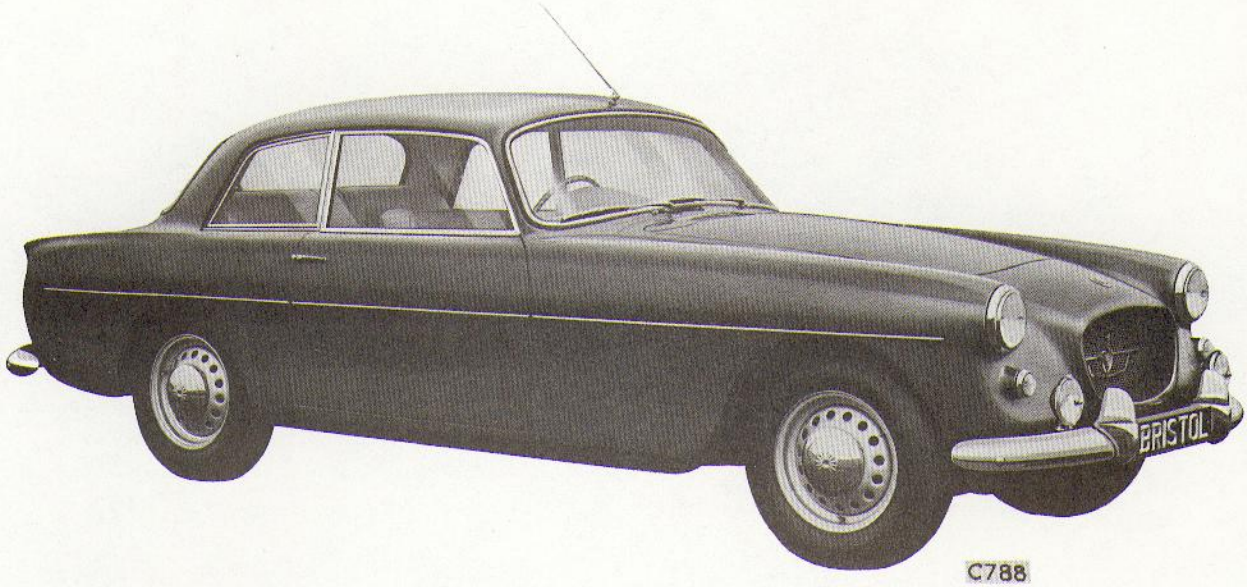
Fig. 29 Belt Tensioning

To remove this belt push the generator in to its full extent.

NOTE: A 'used' belt is one which has operated for a minimum of ½ an hour.

LIST OF CONTENTS

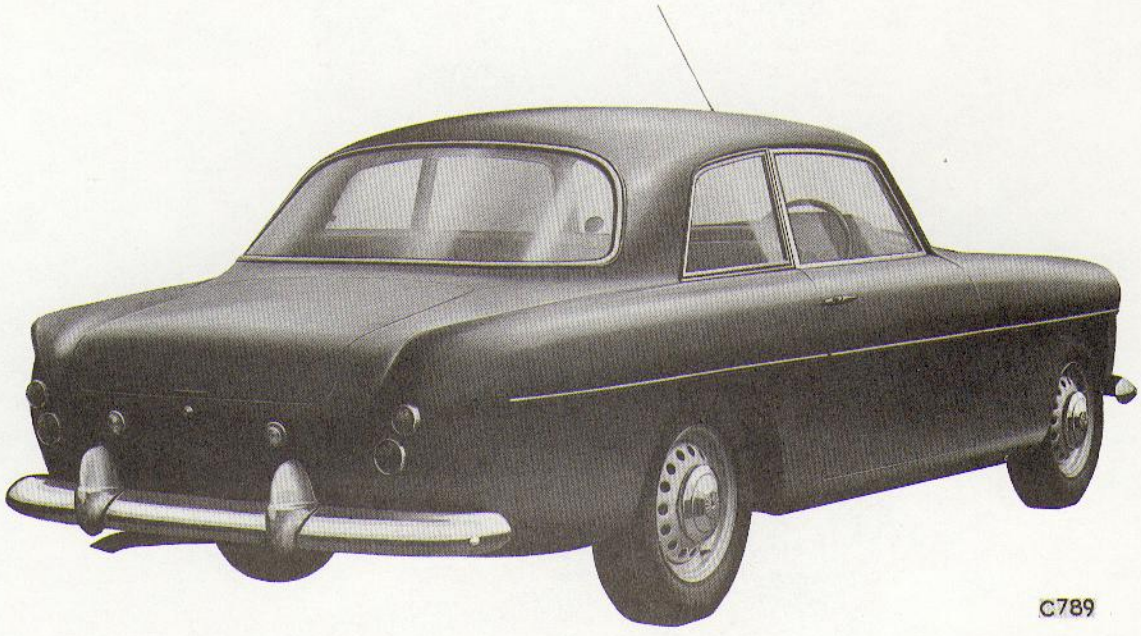
	Page
VIEW OF BRISTOL TYPE 407 CAR	iii
VIEW OF BRISTOL TYPE 408 CAR	v
SPECIFICATIONS	vi
RECOMMENDED LUBRICANTS	3
ENGINE	
R.H. View of Engine and Transmission	6
L.H. View of Engine and Transmission	7
Engine Special Tools	9
Engine and Transmission Torque References	9
Removal of Engine and Transmission	11
Cylinder Block	12
Cylinder Head and Valve Operating	14
Crankshaft, Pistons and Connecting Rods	22
Engine Lubrication	26
Engine Cooling System	26
Fuel Supply System	28
Carburettors	29
IGNITION SYSTEM	50
TORQUE-FLITE TRANSMISSION	1
BRAKES SYSTEM	1
PROPELLOR SHAFT	12
FRONT SUSPENSION	13
STEERING	17
REAR AXLE AND REAR SUSPENSION	19
ELECTRICAL	27
MAINTENANCE CHART	39
HEATING AND VENTILATING	41



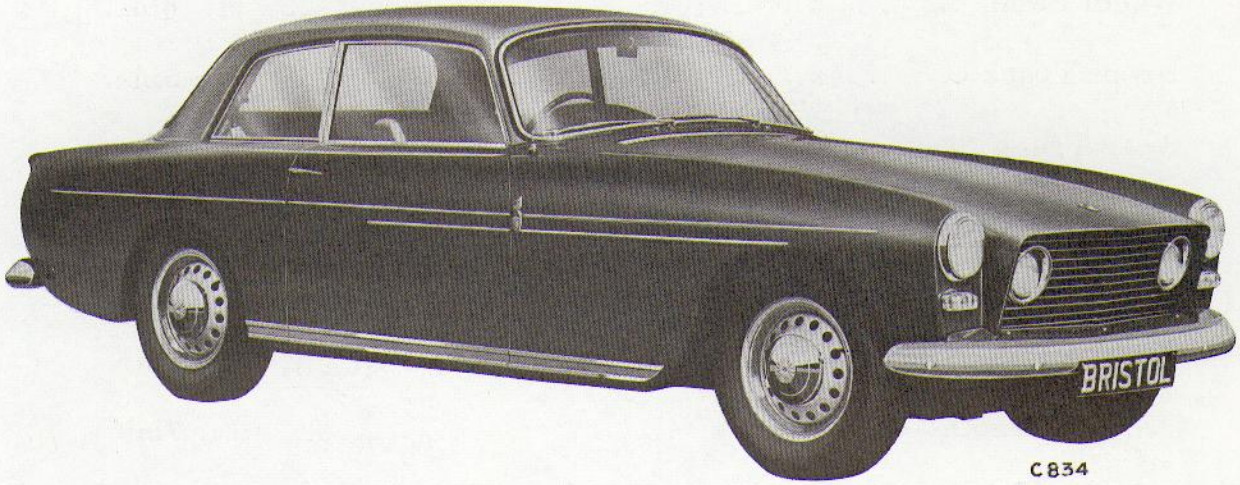
C788

Overall Length	199 inches	Overall Height (Unladen)	60 inches
Overall Width	68 inches	Ground Clearance (Unladen)	6½ inches
Kerb Weight	3584 lbs		

Bristol Type 407 Car



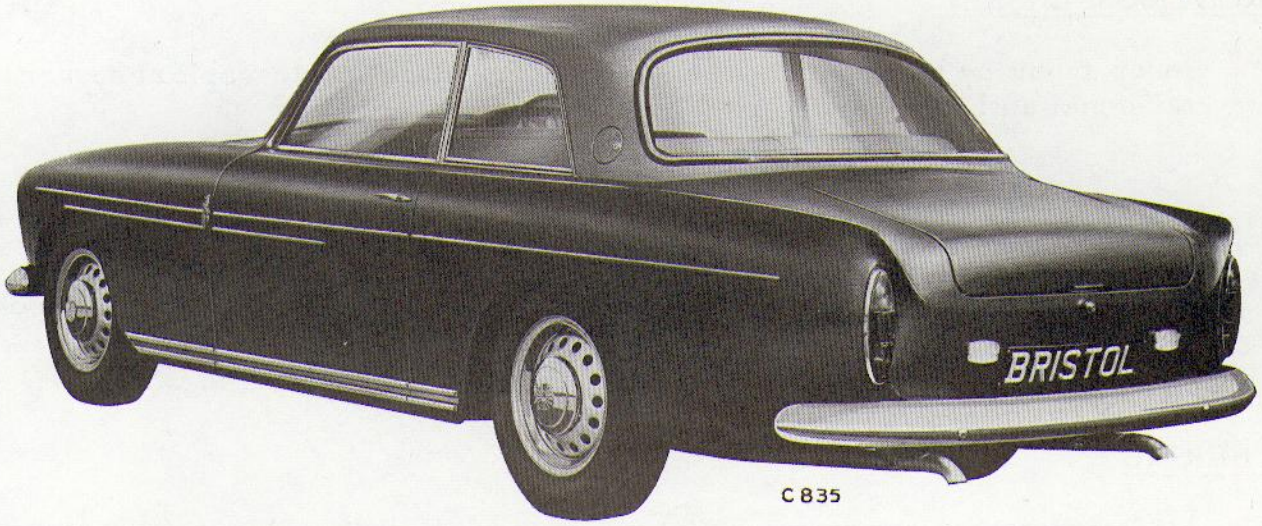
C789



C 834

Overall Length	193½ inches	Overall Height (Unladen)	59 inches
Overall Width	68 inches	Ground Clearance (Unladen)	6½ inches
	Kerb Weight.....3528 lb.		

Bristol Type 408 Mk.1 Car



C 835

SPECIFICATION

DIMENSIONS

Wheel Base	9ft. 6ins.
Front Track	4ft. 5ins.
Rear Track	4ft. 6½ ins.
Turning Circle	39ft. 6ins.
Ground Clearance - (Unladen)	6½ins.
Overall Height - (Unladen)	5ft. 0ins.
Overall Length	16ft. 7ins.
Kerb Weight	3584 lbs.

CHASSIS

Steel sheet construction. Rigid box section side members of 6½ inch depth with three cross members. Open propellor shaft. Smiths bevelift jacking system using built in jacking points.

FRONT SUSPENSION

Independent by wishbones with coil springs, hydraulic telescopic absorbers, tersional anti-roll bar.

REAR SUSPENSION

Longitudinal torsion bars with electrically adjustable telescopic shock absorbers. Watts linkage.

STEERING

Marles worm-type steering. 17 inch 2-spoke adjustable safety design steering wheel.