

PETROL INJECTION

FUEL SYSTEM OPERATIONS

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Air cleaner – renew element	19.10.08 P.I.
Air intake manifold – remove and refit	19.70.01 P.I.
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** Cold start linkage – remove and refit	19.20.27 P.I. **
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Fault diagnosis	19.00.01 P.I.
Fuel filter element – remove and refit	19.25.07 P.I.
– filler cap – remove and refit	19.55.08 P.I.
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– injectors – spray check	19.60.02 P.I.
– main filter – remove and refit	19.25.02 P.I.
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– metering distributor – remove and refit	19.35.07 P.I.
– metering distributor union seals – remove and refit	19.35.14 P.I.
– metering distributor inlet union and filter – remove and refit	19.40.00 P.I.
– pipes	19.40.00 P.I.
Fuel Pump	
– data and description	19.45.00 P.I.
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– inertia cut out switch – remove and refit	refer to 86.65.58
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Injector pipe No. 5 – remove and refit	19.60.19 P.I.
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Continued



FUEL SYSTEM — P.I. OPERATIONS — *Continued*

Injector pipes — overhaul	19.60.24 P.I.
Petrol pipe main line rear end — remove and refit	19.40.02 P.I.
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Pipe — filter outlet to pump — remove and refit	19.40.10 P.I.
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Pipe — P.R.V. to main line — remove and refit	19.40.12 P.I.
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PETROL INJECTION FAULT DIAGNOSIS

Primary Checks

Experience has shown that very often faults attributed to the Petrol Injection System are in fact caused by the engine being in poor state of tune. It is therefore essential that before attempting any fault diagnosis of the P.I. System the Primary Checks, detailed below, must be carried out first.

1. Check fuel supply is clean and adequate.
2. Ensure the battery is charged and in good condition.
3. Clean, check and set spark plug gaps.
4. Check and adjust valve clearances. 12.25.48.
5. Check compression pressures. 12.25.61.
6. Check ignition timing. 86.35.15.
7. Renew faulty rubber balance pipe connectors linking the three manifolds, and check the tightness of the vacuum adaptors.
8. Check and adjust throttle butterflies. 19.20.05.
9. Check manifold depression. 12.49.03.

Special Equipment.

1. Pressure gauge 0 to 120 lb f/in² (0 to 8.4 kg/cm²)
2. Ammeter 0 to 10 amps
3. Voltmeter 0 to 20 volts.
4. Pressure test adaptor.
5. 15ft. (4.6 m) of twin cable 28/012 in. Two nipples soldered on one end of cable. Cable Connector for connection in series to pump.
6. Air-flow meter.
7. Vacuum gauge.
8. Metering unit outlet union seal removal and renewal tools. — see 19.35.14.

SYMPTOM	CAUSE	ACTION
Engine will not start.	a. Inertia cut-out switch has operated.	Push switch down to complete pump circuit — 86.65.59
	b. Blocked fuel filter.	Check fuel filter and renew element — 19.25.07
	c. Pump inoperative	Check pump end-float. Check brushes. Check for gear seizure — 19.45.15.
	d. No spray from injectors.	Remove each injector in turn and test — 19.60.02
	e. Incorrect or no line pressure.	Check line pressure and adjust pressure relief valve — 19.65.01
	f. Incorrect injection order.	Check that the pipes are fitted to the injectors in correct order.
Engine cutting out.	a. Slipping drive belt.	Check drive belt tension.
	b. Incorrect line pressure.	Check line pressure statically and during road test with pressure gauge and ammeter. 19.45.01.
	c. Fuel tank breather pipe blocked.	Clear or renew pipe.
	d. Blocked fuel filter.	Renew filter. 19.25.07

Continued



FUEL SYSTEM — PI

SYMPTOM	CAUSE	ACTION
<p>Erratic Idling or lack of response.</p>	<ul style="list-style-type: none"> a. Incorrect injection order. b. Incorrect idling speed. c. Excess fuel lever incorrectly adjusted. d. Incorrect line pressure. e. Metering Unit incorrectly timed to the engine. f. Continuous injection. g. Fuel leaks. 	<p>Check that the injector pipes are fitted to the injectors in correct order.</p> <p>Check and adjust idling. 19.20.05</p> <p>Check and if necessary adjust clearance. 19.35.02</p> <p>Check and if necessary adjust line pressure at the pressure relief valve. 19.65.01</p> <p>Check and if necessary adjust timing. 19.35.01</p> <p>Check each injector in turn 19.35.14. Check outlet union seals and renew if necessary.</p> <p>Check for leaks from metering unit.</p>
<p>Engine Mis-firing.</p>	<ul style="list-style-type: none"> a. Lack of fuel in tank or blockage. b. Excess fuel lever incorrectly set. c. Faulty injection. d. Faulty non-return valve in one of the metering unit unions. e. Incorrect line pressure. f. Faulty pressure relief valve. g. Constantly fouled spark plugs on Nos. 2 and 5 cylinders. 	<p>Replenish with fuel of the correct octane rating and check tank outlet to line.</p> <p>Check lever is returning to the off position. Check clearance — 19.35.02</p> <p>Remove each injector in turn and test — 19.60.02</p> <p>Renew the union concerned 19.35.14</p> <p>Check line pressure and adjust pressure relief valve. 19.65.01</p> <p>Check by substitution.</p> <p>Check banjo seals on Nos. 2 and 5 injector pipes at metering unit connection.</p>
<p>Excessive fuel consumption.</p>	<ul style="list-style-type: none"> a. Fuel leakage. b. Excess fuel lever out of adjustment. c. Loose Calibration Cover Securing Screws letting in air. d. Incorrect line pressure. 	<p>Check for fuel leakage from all connections and pedestal seals.</p> <p>Check excess fuel lever is returning to the off position. Check clearance — 19.35.02</p> <p>Check tightness and sealing of cover.</p> <p>Check line pressure statically and during road test. Adjust if necessary — 19.65.00</p>



AIR CLEANER — P.I.

— Remove and refit

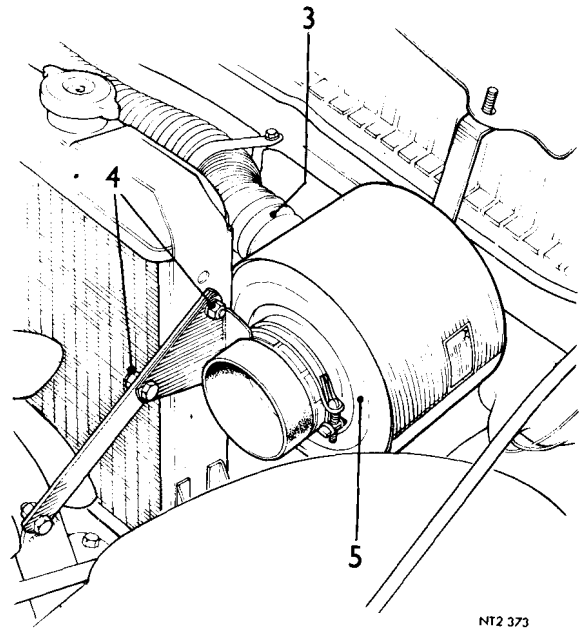
19.10.01

Removing

1. Remove the radiator cowling 76.79.04
2. Remove the hose connecting the air cleaner outlet to the air intake manifold.
3. Disconnect the inlet hoses to the air cleaner, running forward of the radiator.
4. Remove the nut and bolt and single nut securing the air cleaner bracket to the radiator stay.
5. Remove the air cleaner and bracket from the car.

Refitting

6. Reverse instructions 1 to 5.



AIR CLEANER — P.I.

— Renew element

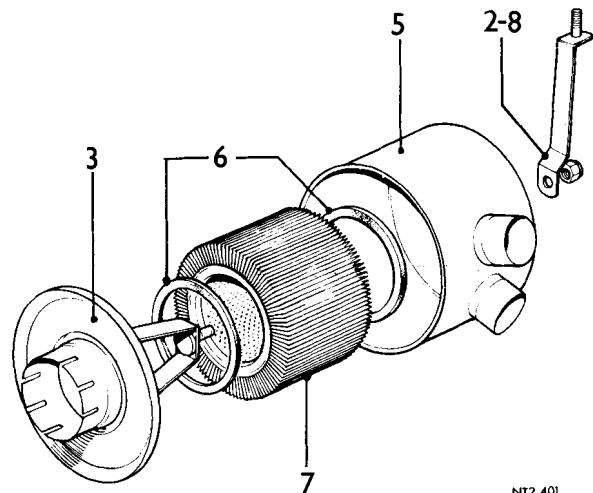
19.10.08

Dismantling

1. Remove air cleaner from the car 19.10.01.
2. Remove the cover plate retaining nut and steady bracket.
3. Withdraw the cover plate and discard the element.
4. Remove and if necessary discard the sealing rings.
5. Clean the container and cover plate.

Reassembling

6. Place the sealing rings in position at both ends of the element.
7. Insert the new paper element into the container.
8. Refit the cover and steady bracket and secure with the nut.
9. Refit the air cleaner assembly to the car 19.10.01.



FUEL SYSTEM PI

THROTTLE PEDAL

– Remove and refit

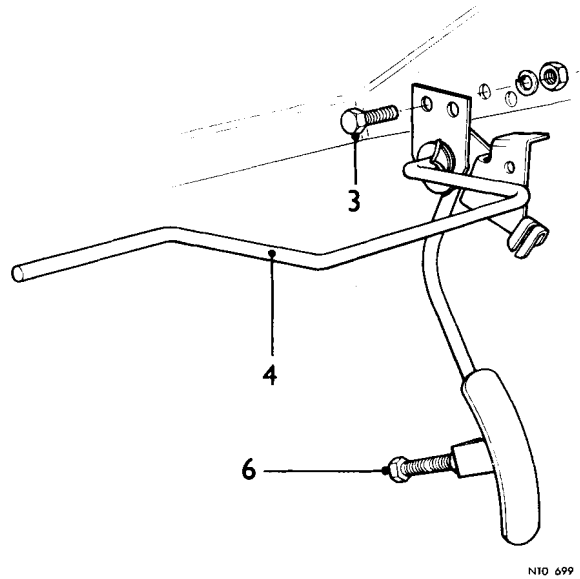
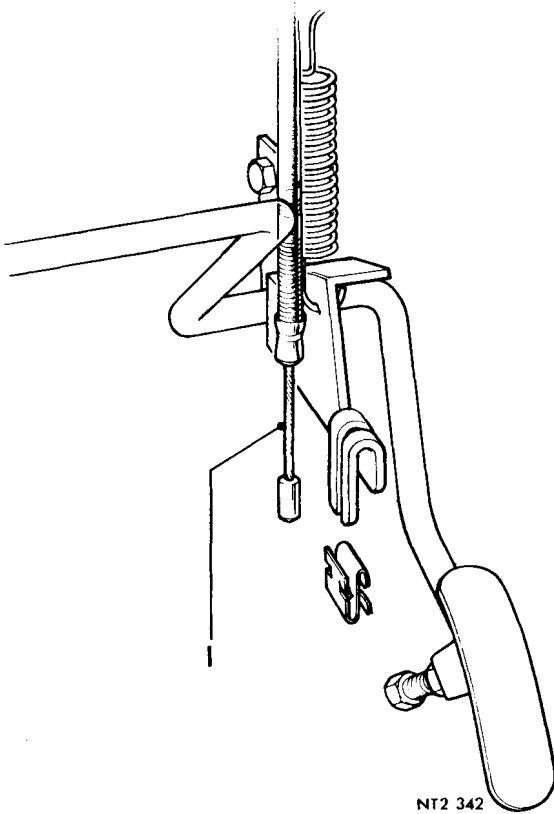
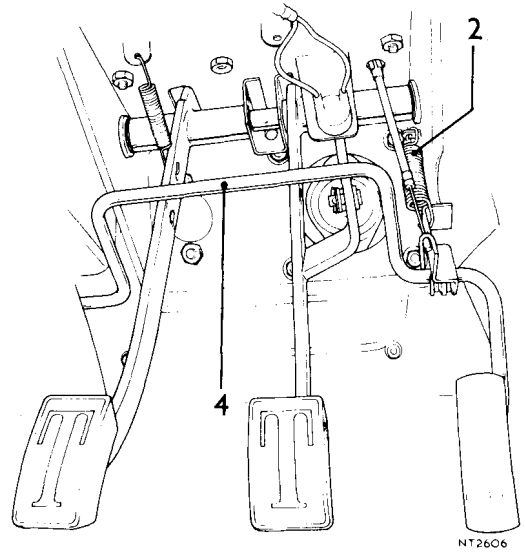
19.20.01

Removing

1. Disconnect the throttle cable from the pedal bracket.
2. Disconnect the pedal return spring.
3. Remove the two bolts and nuts securing the pedal assembly and pivot bracket to the body.
4. Withdraw the pedal and shaft assembly from the bulkhead bush and remove from the car.

Refitting

5. Reverse instructions 1 to 4.
6. Adjust pedal stop bolt so that the head touches the floor with the throttle butterflies in the fully open position.



THROTTLE BUTTERFLIES

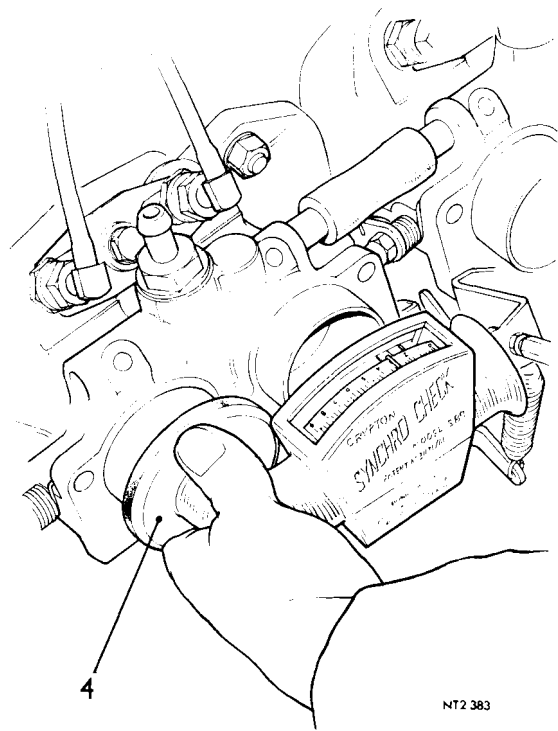
**** (Up to Engine No. CP 77609E) ****

– Check and adjust

19.20.05

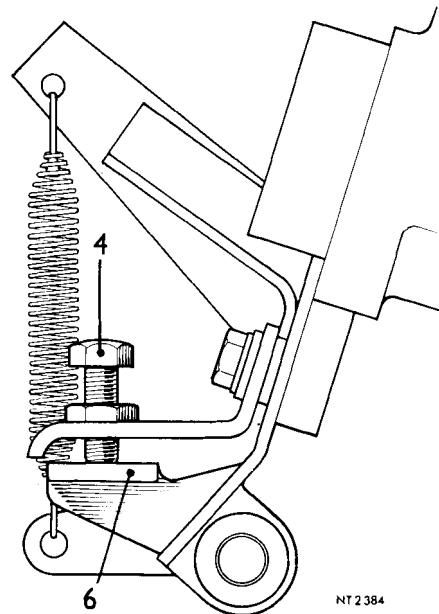
Check

1. Start the engine and warm to normal operating temperature.
2. Remove the air intake manifold 19.70.01.
3. Ensure that the cold start lever on the metering unit is back against its stop and that there is clearance between the cam and adjusting screw on the manifold linkage.
4. Hold a Crypton synchro check meter against number six intake and open the butterflies by turning the throttle adjusting screw clockwise sufficiently for a reading to register on the meter scale (eg 3).**



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5. With the engine revolutions maintained compare the readings from number three and one intakes with that of number six.
6. If the readings are all the same no adjustment is required and the throttle adjusting screw should be reset and locked so that it just touches the countershaft operating lever.



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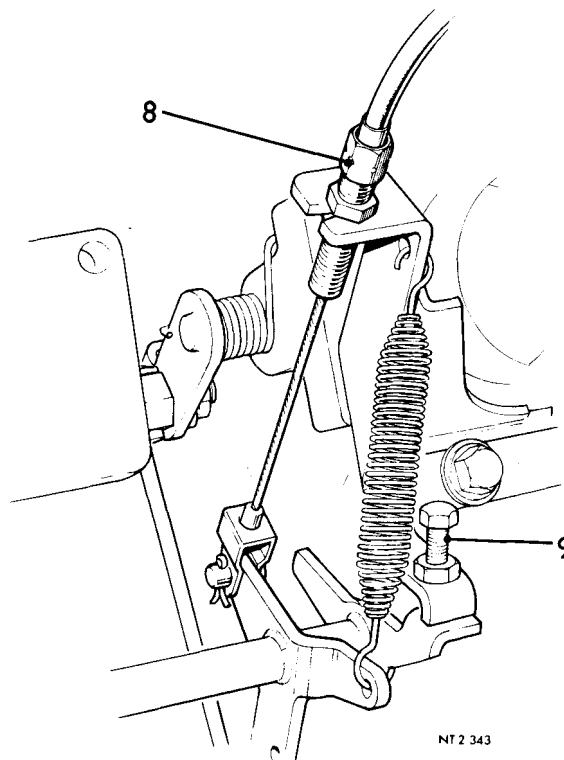


FUEL SYSTEM PI

Adjustment

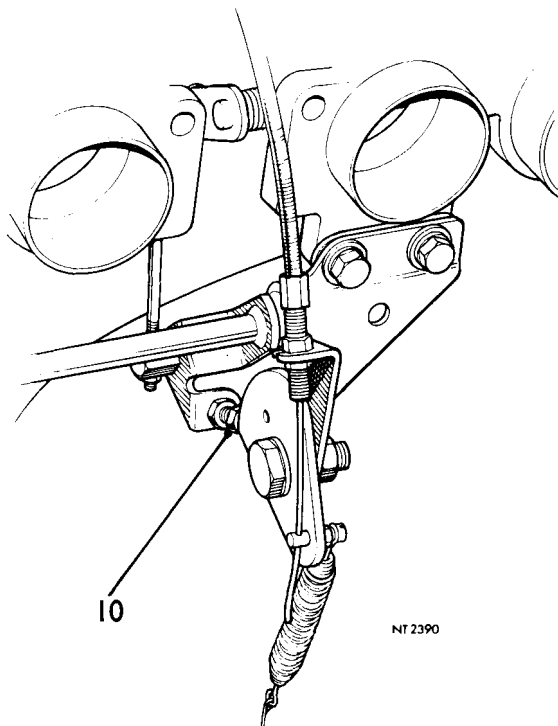
7. Should adjustment of the butterflies be necessary, maintain the engine at normal operating temperature, check as in instruction 3 and with the air intake manifold removed proceed as follows:-

8. Slacken the throttle cable adjuster so that there is no tension in the cable.



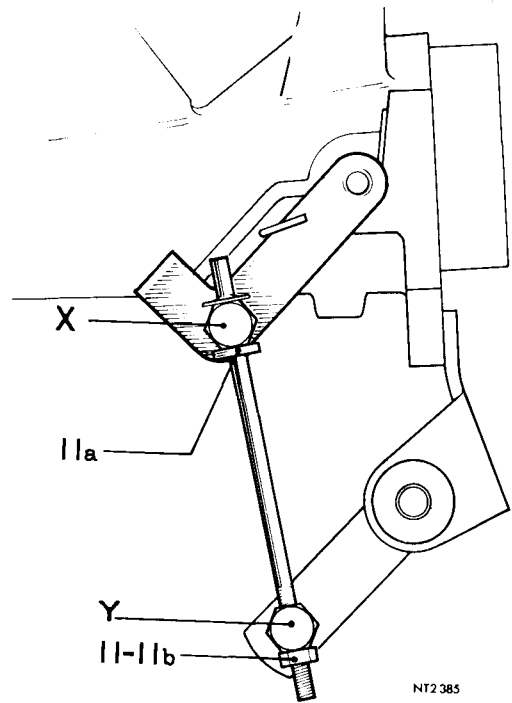
9. Turn the throttle adjusting screw anti-clockwise so that it is well clear of the countershaft operating lever.

10. Slacken the cold start adjusting screw clockwise so that the screw head is well clear of the cam.



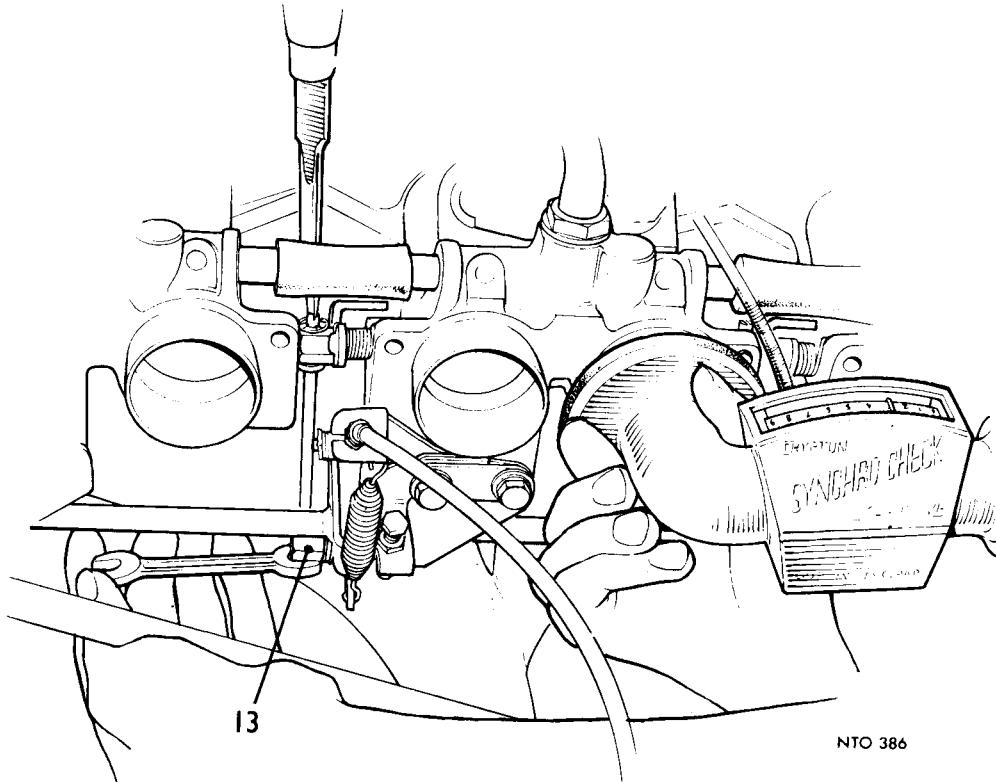
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11. Release the lock nut of the rear vertical link and
 - a. adjust the link so that the brazed-on washer just touches the butterfly shaft trunnion.
 - b. Lock the nut against the lower trunnion.



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12. Start the engine and again hold the crypton synchro check meter against number six intake and by means of the throttle adjusting screw (turning clockwise) open the intake butterflies thereby increasing the engine revolutions until a convenient reading (say 3), registers on the meter scale.
13. Slacken the centre vertical link lock-nut and hold the meter against number three intake and by means of the centre vertical link adjust the butterflies of numbers three and four intakes so that the same reading as in instruction 12 is recorded. Lock the nut against the lower trunnion.



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14. Release the locknut on the front vertical link and hold the meter against number one intake and adjust the link until the meter reading registers the same as in instructions 12 and 13. Lock the nut against the lower trunnion.

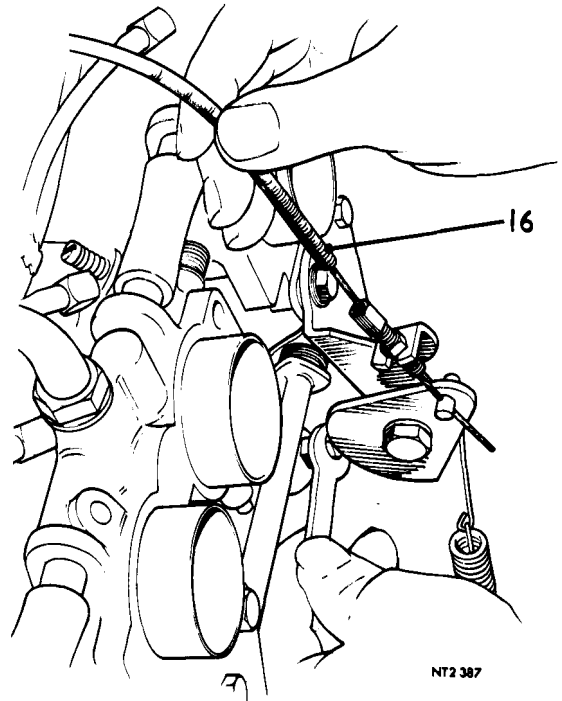
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FUEL SYSTEM PI

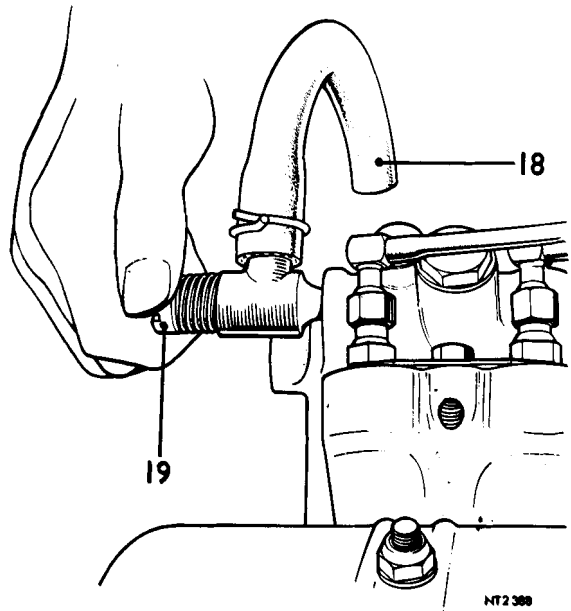
15. Re-check the metering readings on numbers three and six intakes and re-adjust if necessary.
16. Adjust the fast idle speed by pulling the cold start cable out of the adjuster with the cam turned to its maximum lift position. Turn the adjusting screw against the cam until the engine revolutions maintain a steady 1500 to 1800 r.p.m.

NOTE: Do not pull the cold start cable with the control knob on the control panel since it will also operate the excess fuel lever on the metering unit thereby increasing the quantity of fuel delivered to the injectors.



17. Turn the throttle adjusting screw so that it just touches the countershaft operating lever and secure with the lock nut. See instruction 6.

18. As a check to ensure that all the butterflies are fully closed hold a finger over the end of the air valve pipe so that the engine stalls.
19. Start the engine and by means of the air valve adjusting screw regulate the air bleed to give an idling speed of 750 to 800 r.p.m.



20. Adjust the throttle and cold start cables to remove excessive slack and secure with the locknuts.
21. Stop the engine and refit the air intake manifold. 19.70.01.

Data

Idling speed	750 to 800 r.p.m.
Fast idling speed	1500 to 1800 r.p.m.



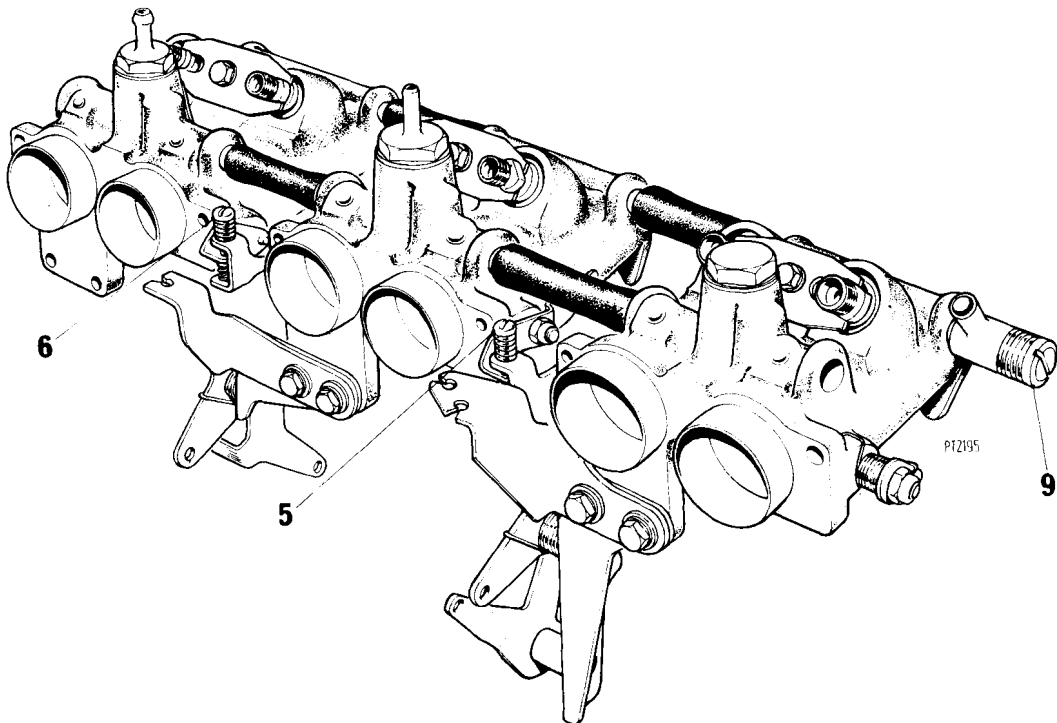
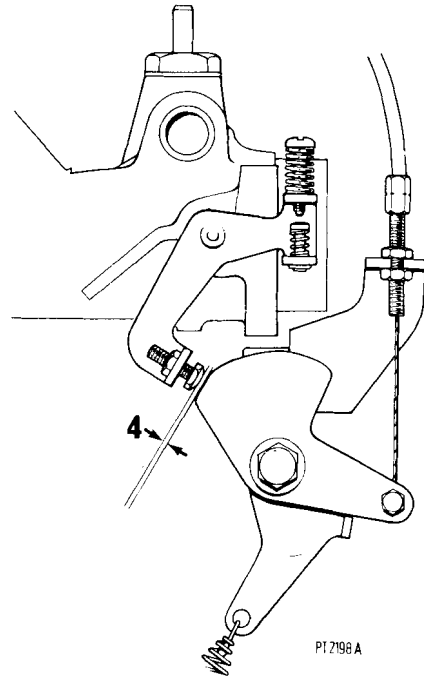
THROTTLE BUTTERFLIES

(From Engine No. CR 1E)

– Check and adjust

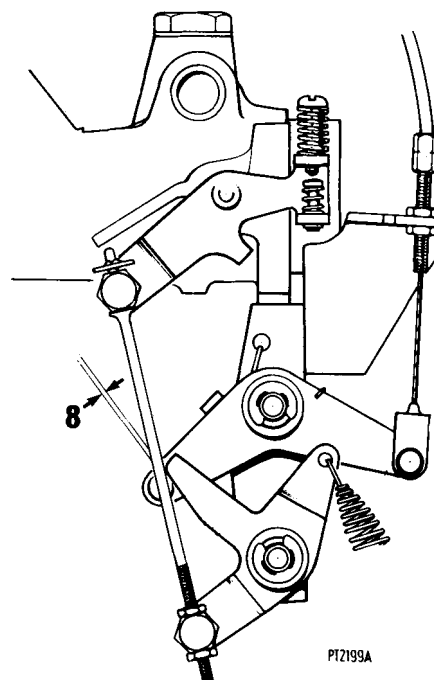
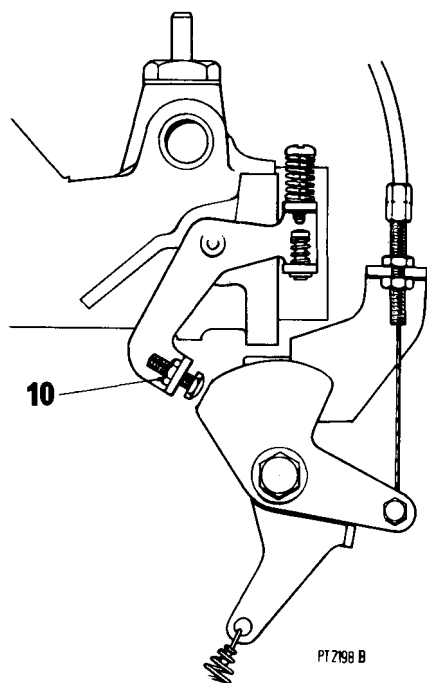
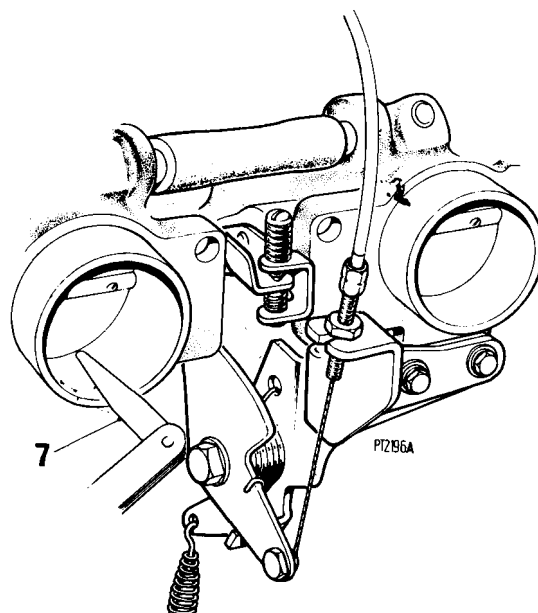
19.20.05

1. Start the engine and warm to the normal operating temperature.
2. Remove the air intake manifold 19.70.01.
3. Check that the throttle cable is correctly adjusted.
4. Ensure that the cold start lever on the metering unit is back against its stop and that there is clearance between the cam and adjusting screw on the manifold linkage.
5. Screw in the front adjuster until the centre pair of butterflies are just opening and the front pair are just closing. Back off the adjuster until the centre butterflies just close.
6. Screw in the rear adjuster until the rear pair of butterflies are just opening and the centre pair are just closing. Back off the adjuster until the rear butterflies just close.



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7. Check the closure of all the butterflies with a 0.002 in. (0.05 mm) feeler gauge. The feeler gauge should not pass between the butterfly plate and the bore.
8. Adjust the link rod to obtain a clearance of 0.020 – 0.030 in. (0.5 – 0.75 mm) between the nylon roller on the primary lever and the link rod lever.
9. Start the engine and adjust the air bleed valve to achieve an idling speed of 750 – 800 r.p.m. Screwing in the valve increase the speed.
10. Open the fast idle cam and check the engine speed. If necessary slacken the locknut and adjust the contact screw to achieve a fast idle speed of 1500 – 1800 r.p.m.
11. Refit the air intake manifold 19.70.01



THROTTLE CABLE

– Remove and refit

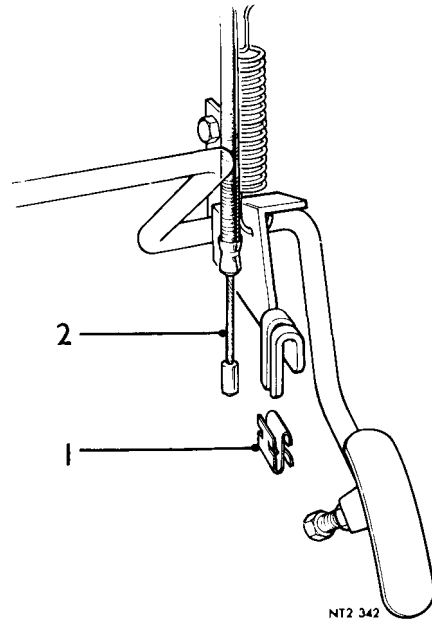
19.20.06

Removing

1. Remove the spring clip retaining the inner cable to the throttle pedal.
2. Disconnect the inner cable from the pedal.
3. Remove the rubber sealing washer from the brass ferrule on the bulkhead.
4. Pull the outer cable complete through the bulkhead hole sufficiently to enable the cable gripper to be removed.

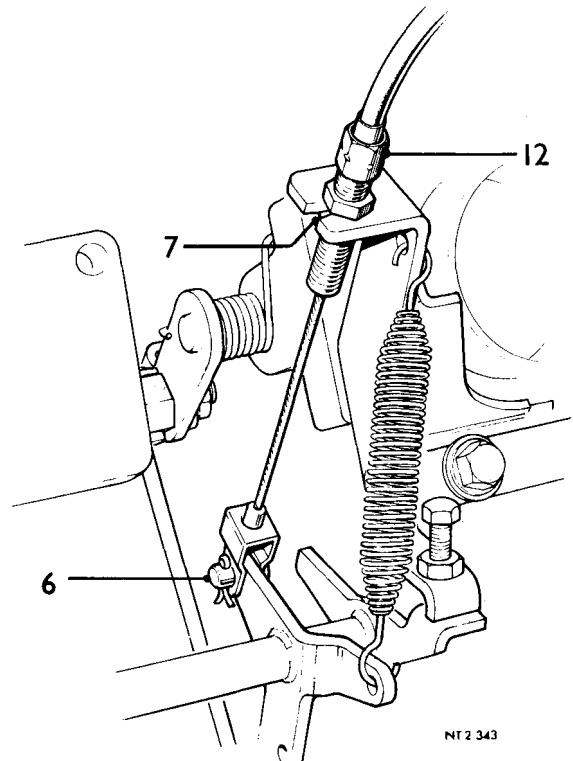
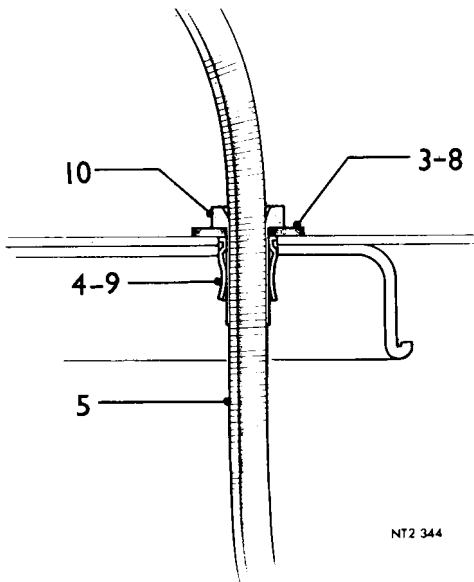
NOTE: The spring steel cable gripper in the bulkhead cable clearance hole must be removed before the complete cable is withdrawn from the bulkhead, otherwise the ferrule at the end of the outer cable will be pulled off.

5. Remove the cable from the bulkhead.
6. Remove the split pin from the clevis pin securing the inner cable fork to the countershaft lever.
7. Remove the lower locknut from the cable adjuster and remove the cable complete from the bracket.



Refitting

8. Thread the rubber sealing washer on to the pedal end of the cable.
9. Thread the cable gripper over the cable and insert the cable into the bulkhead.
10. Position the cable gripper into the bulkhead hole and push the brass ferrule into the hole so that it is held firm by the gripper and the shoulder is flush with the bulkhead.
11. Reverse instructions 1 to 3 and 6 and 7.
12. Adjust the cable tension by means of the cable adjuster.



FUEL SYSTEM P.I

THROTTLE LINKAGE – P.I.

** (Up to Engine No. CP 77609E) **

– Remove and refit

19.20.07

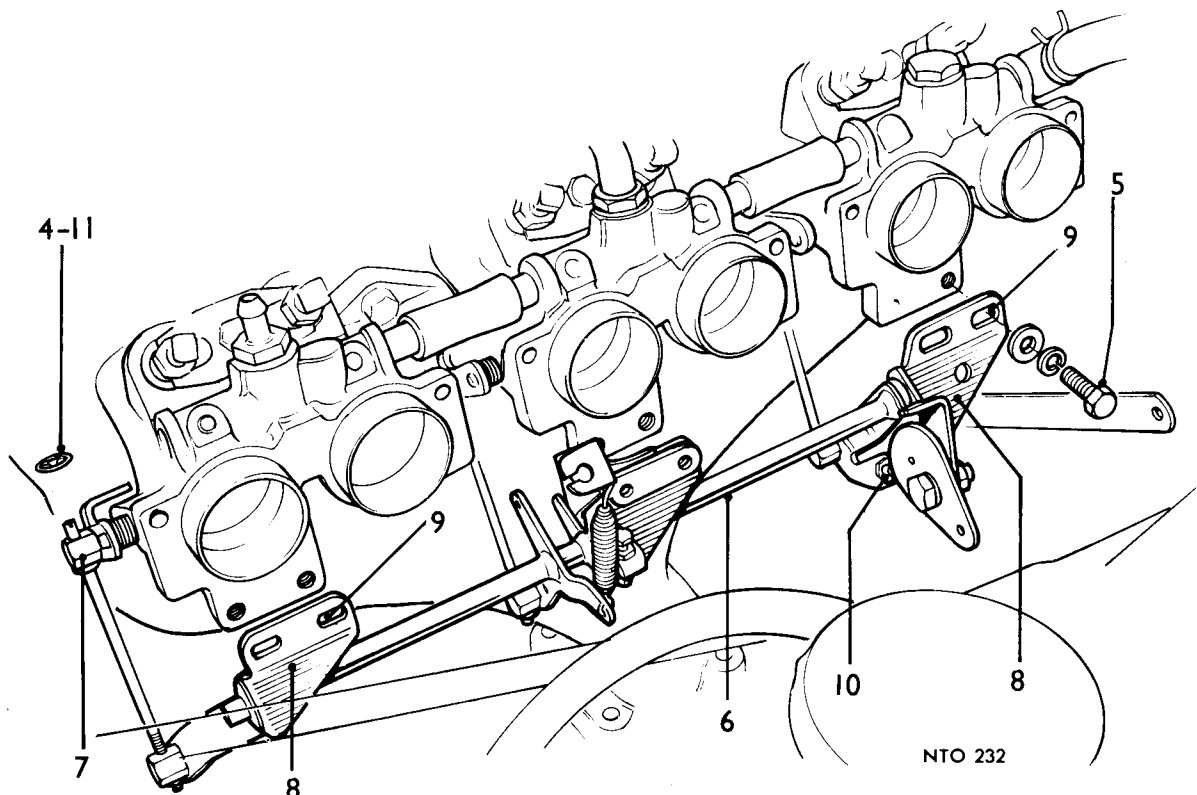
Removing

1. Remove the air intake manifold 19.70.01
2. Disconnect the throttle cable and the return spring from the linkage 19.20.06.
3. Disconnect the cold start control cable and return spring 19.20.26.
4. Remove the spring clips from three vertical links.
5. Remove the six bolts complete with washers securing the linkage to the induction manifold.
6. Remove the linkage complete from the engine.

Refitting

7. Offer-up the linkage to the manifold passing each of the three vertical links through the throttle spindle trunnions. Secure the linkage by the centre throttle bracket only using two bolts, plain and spring washers.

8. Loosely secure the two endbrackets to the manifold so that the brackets may be moved laterally within the limits of the elongated holes.
9. Adjust the countershaft by means of the elongated holes in the two end brackets so that no end-float exists in the shaft. Ensure, however that the vertical links are at right angles to the countershaft. Tighten the four securing bolts.
10. Check and if necessary adjust the position of the cold start cam in relation to its adjusting screw, ensuring that the cam is central on the screw head.
11. Fit the spring clips to the trunnion end of the vertical links.
12. Reconnect the throttle cable and spring.
13. Reconnect the cold start cable and spring.
14. Adjust the linkage 19.20.05.
15. Refit the air intake manifold 19.70.01.



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COLD START CABLE

– Remove and refit

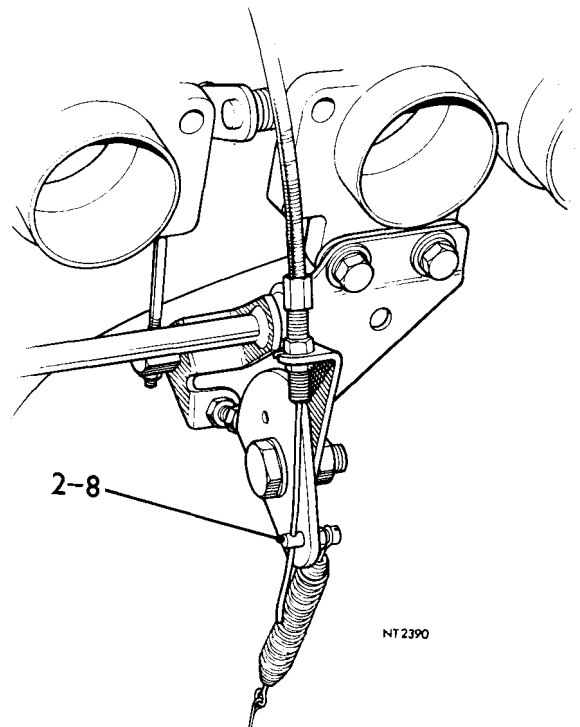
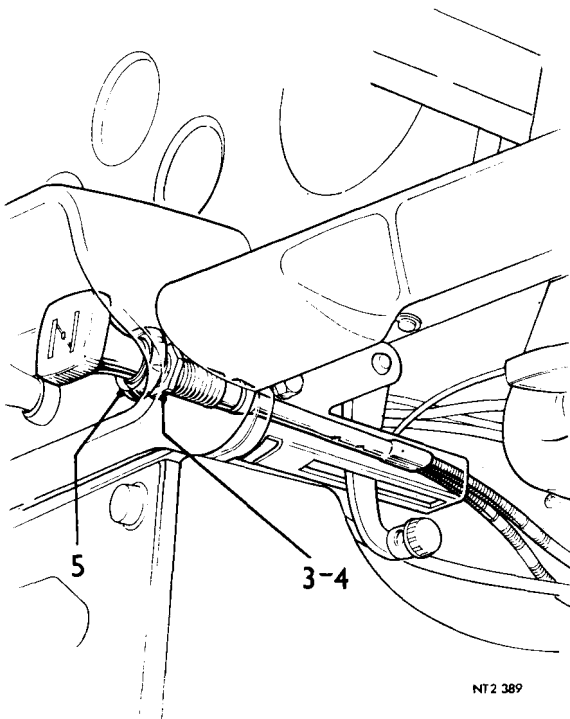
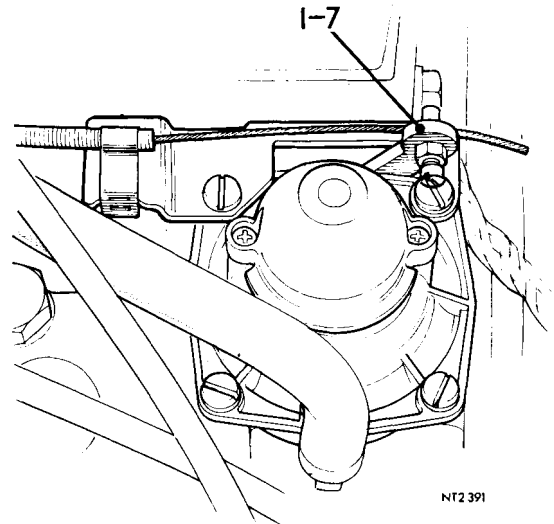
19.20.26

Removing

1. Disconnect the inner cable from the metering distributor excess fuel lever.
2. Disconnect the inner cable from the cold start cam on the throttle linkage and release the spring.
3. Unscrew the locknut behind the control panel and withdraw the cable complete through the control panel, locknut and bulkhead.

Refitting

4. Feed the cable complete through the control panel hole and pass the locknut over the cables.
5. Secure the outer cable to the control panel with the locknut so that the end of the threaded part of the outer cable is flush with the plated ferrule on the control panel.
6. Feed the engine end of the cable through the bulkhead.
7. Connect the inner cable to the metering distributor excess fuel lever and ensure that there is sufficient slack in the cable to allow the lever to rest against its stop when the control knob is pushed fully home.
8. Connect the inner cable to the cam on the throttle linkage and adjust the cable by means of the adjuster. Ensure that there is clearance between the cam and adjusting screw.



COLD START CABLE

– Remove and refit

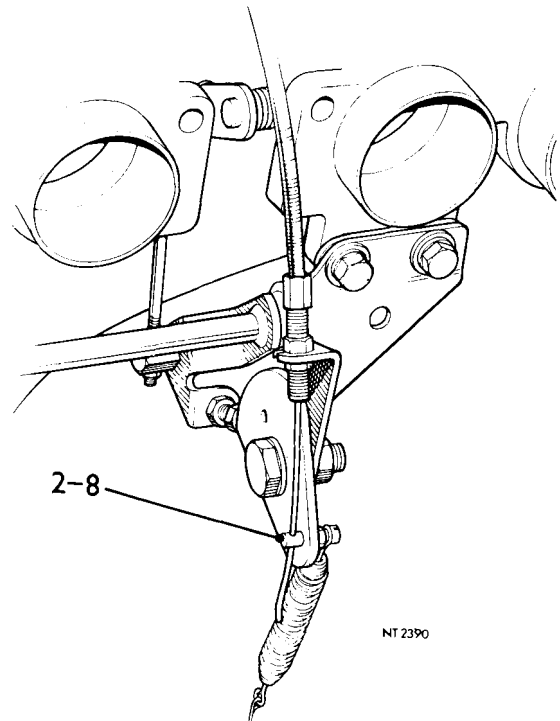
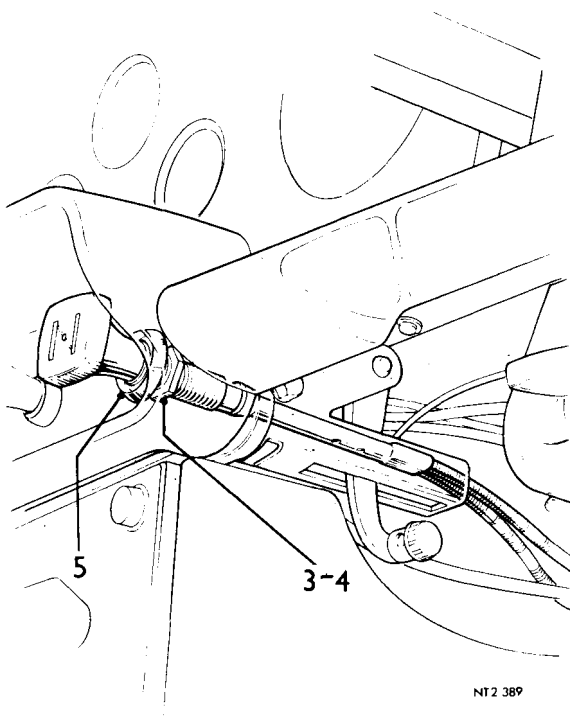
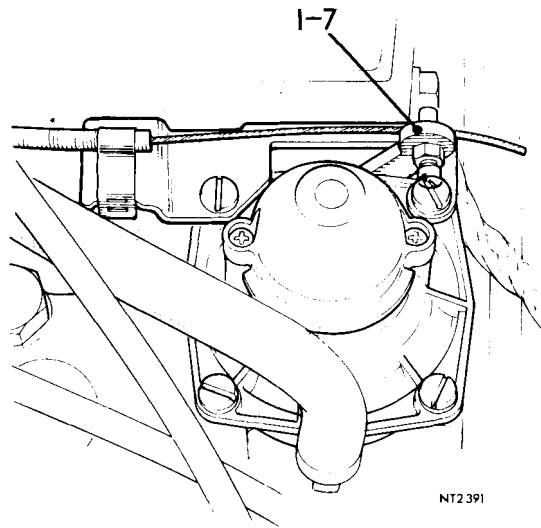
19.20.26

Removing

1. Disconnect the inner cable from the metering distributor excess fuel lever.
2. Disconnect the inner cable from the cold start cam on the throttle linkage and release the spring.
3. Unscrew the locknut behind the control panel and withdraw the cable complete through the control panel, locknut and bulkhead.

Refitting

4. Feed the cable complete through the control panel hole and pass the locknut over the cables.
5. Secure the outer cable to the control panel with the locknut so that the end of the threaded part of the outer cable is flush with the plated ferrule on the control panel.
6. Feed the engine end of the cable through the bulkhead.
7. Connect the inner cable to the metering distributor excess fuel lever and ensure that there is sufficient slack in the cable to allow the lever to rest against its stop when the control knob is pushed fully home.
8. Connect the inner cable to the cam on the throttle linkage and adjust the cable by means of the adjuster. Ensure that there is clearance between the cam and adjusting screw.



FUEL SYSTEM PI

FUEL MAIN FILTER

– Remove and refit

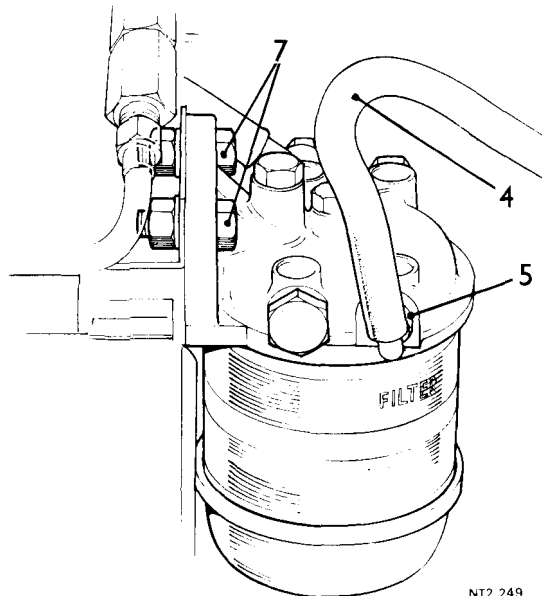
19.25.02

Removing

1. Isolate the battery.
2. Remove the spare wheel.
3. Remove the luggage compartment forward trim panel 76.13.17.
4. Clamp the gravity feed hose from the fuel tank to the filter inlet union.
5. Disconnect the gravity feed supply to the filter at the inlet union.
6. Disconnect the outlet feed from the filter at the pump inlet union.

NOTE: As an alternative, the outlet feed hose may be detached from the extension pipe at the filter outlet, providing damage is not caused by using undue force to remove a tightly gripped hose.

7. Remove the two nuts and bolts securing the filter assembly to the car body and remove the filter from the car.



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Refitting

8. Reverse instructions 1 to 7.

FUEL MAIN FILTER ELEMENT

– Remove and refit

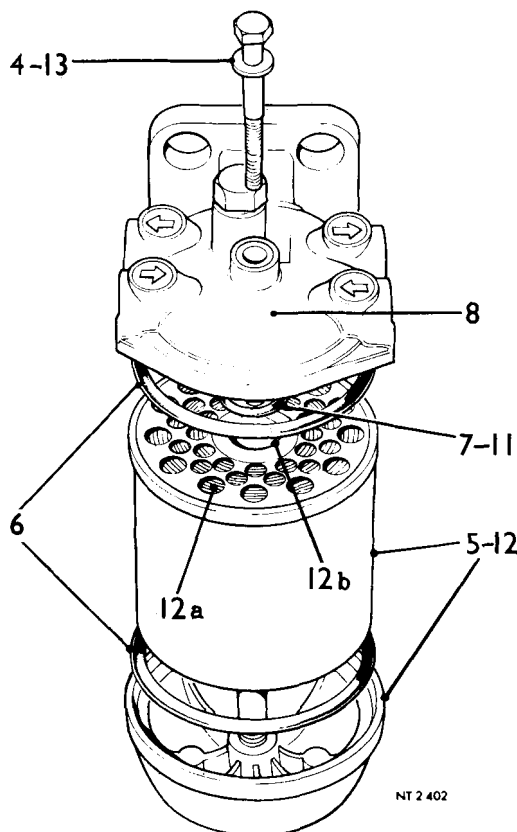
19.25.07

Removing

1. Isolate the battery.
2. Remove the spare wheel.
3. Clamp the gravity supply hose to the filter.
4. Remove the centre retaining bolt and sealing washer.
5. Remove the filter element and lower casing.
6. Remove the upper and lower sealing rings.
7. Remove the 'O' ring on the element location spigot.

Refitting

8. Clean the filter head and lower body.
9. Fit a new sealing ring to the filter head, ensuring that it seats properly in its groove.
10. Locate a new sealing ring to the filter lower body.
11. Fit a new 'O' ring to the filter element spigot, ensuring that it locates in its groove.
12. Fit a new filter element to the filter body ensuring:–
 - a. The element is fitted so that the circular holes in the end of the element are uppermost.
 - b. The large hole in the centre of the element locates correctly over the spigot and 'O' ring.
13. Secure the assembly with the central retaining bolt and sealing washer.
14. Remove the hose clamp, reconnect the battery and run the engine whilst checking for fuel leaks from the filter.
15. Refit the spare wheel.



NT 2 402

19.25.02 P.I.

19.25.07 P.I.



COLD START LINKAGE

(From Engine No. CR1E)

— Remove and refit

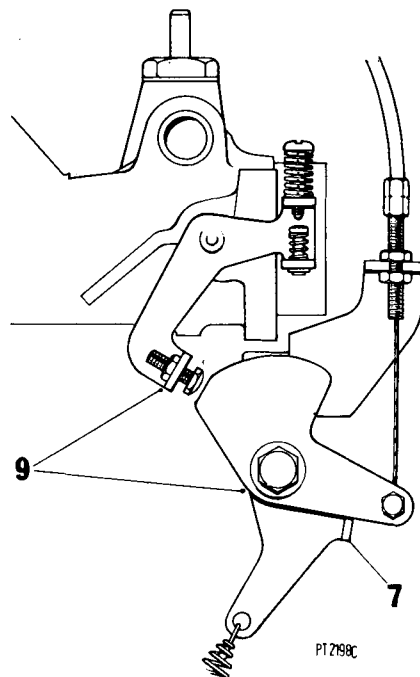
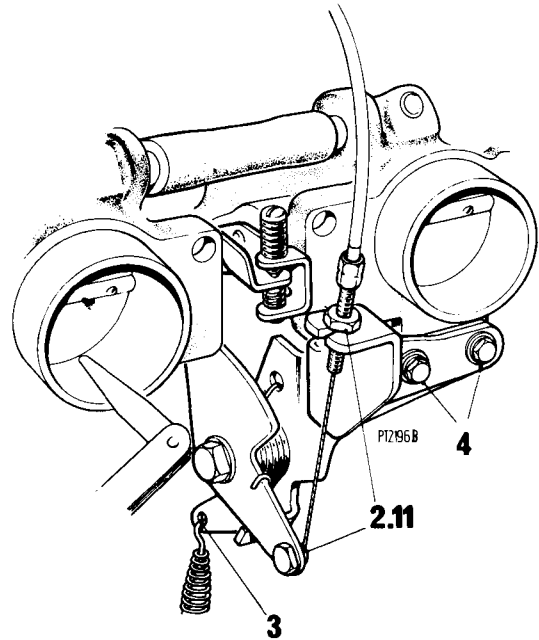
19.20.07

Remove

1. Remove the air intake manifold. 19.70.01
2. Disconnect the cold start cable from the manifold linkage.
3. Disconnect the cold start cam return spring.
4. Remove the two bolts, plain and spring washers securing the linkage to the manifold.
5. Lift off the linkage.

Refitting

6. Reverse instructions 3 to 5.
7. Ensure that the cold start cam is against its stop.
8. Start the engine and warm to the normal operating temperature.
9. Slacken the locknut and turn the cam to the fully open position.
10. Adjust the screw until a fast idle speed of 1500 – 1800 r.p.m. is attained.
11. Reconnect and adjust the cold start cable.
12. Refit the air intake manifold.



FUEL SYSTEM PI

FUEL MAIN FILTER

– Remove and refit

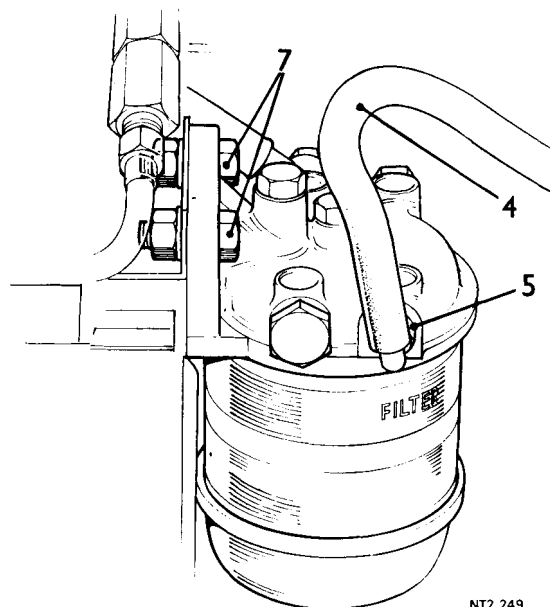
19.25.02

Removing

1. Isolate the battery.
2. Remove the spare wheel.
3. Remove the luggage compartment forward trim panel 76.13.17.
4. Clamp the gravity feed hose from the fuel tank to the filter inlet union.
5. Disconnect the gravity feed supply to the filter at the inlet union.
6. Disconnect the outlet feed from the filter at the pump inlet union.

NOTE: As an alternative, the outlet feed hose may be detached from the extension pipe at the filter outlet, providing damage is not caused by using undue force to remove a tightly gripped hose.

7. Remove the two nuts and bolts securing the filter assembly to the car body and remove the filter from the car.



Refitting

8. Reverse instructions 1 to 7.

FUEL MAIN FILTER ELEMENT

– Remove and refit

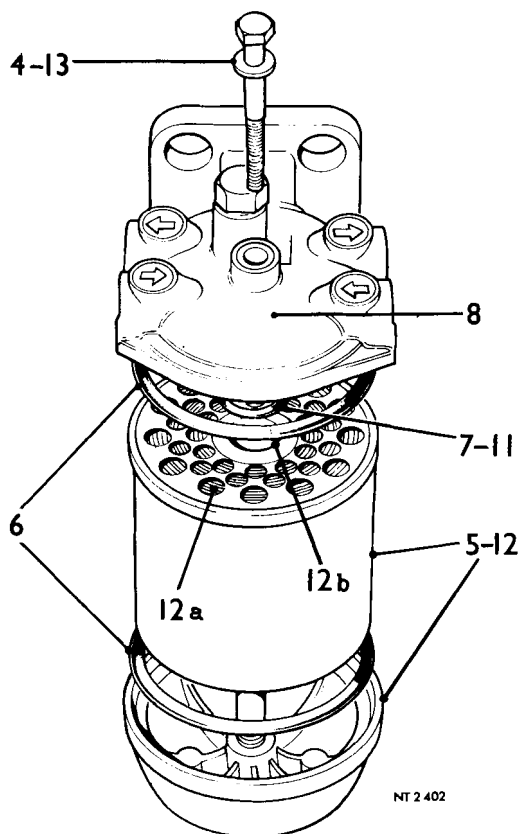
19.25.07

Removing

1. Isolate the battery.
2. Remove the spare wheel.
3. Clamp the gravity supply hose to the filter.
4. Remove the centre retaining bolt and sealing washer.
5. Remove the filter element and lower casing.
6. Remove the upper and lower sealing rings.
7. Remove the 'O' ring on the element location spigot.

Refitting

8. Clean the filter head and lower body.
9. Fit a new sealing ring to the filter head, ensuring that it seats properly in its groove.
10. Locate a new sealing ring to the filter lower body.
11. Fit a new 'O' ring to the filter element spigot, ensuring that it locates in its groove.
12. Fit a new filter element to the filter body ensuring:—
 - a. The element is fitted so that the circular holes in the end of the element are uppermost.
 - b. The large hole in the centre of the element locates correctly over the spigot and 'O' ring.
13. Secure the assembly with the central retaining bolt and sealing washer.
14. Remove the hose clamp, reconnect the battery and run the engine whilst checking for fuel leaks from the filter.
15. Refit the spare wheel.



PETROL INJECTION SYSTEM

General Description

19.35.00

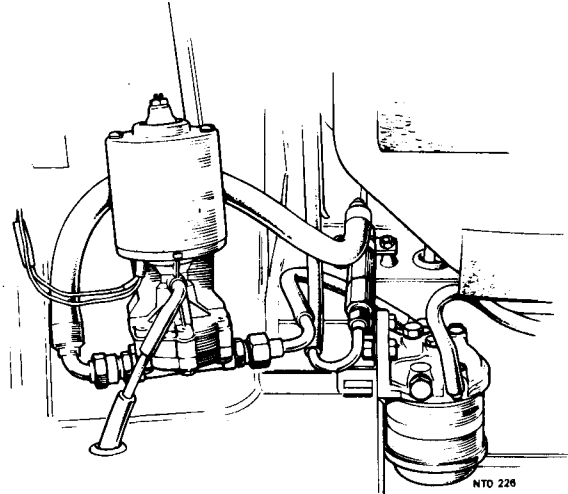
The Lucas Mk. II petrol injection equipment used on the Triumph TR6 engine replaces carburettors as a means of inducing a combustible petrol-air mixture into the cylinders.

Essentially, the system consists of a pump, a pressure relief valve and a metering distributor, the latter delivering precisely timed and measured quantities of fuel to six injectors housed in an induction manifold. A normal petrol-air mixture is then induced, and compressed and ignited by a conventional ignition system.

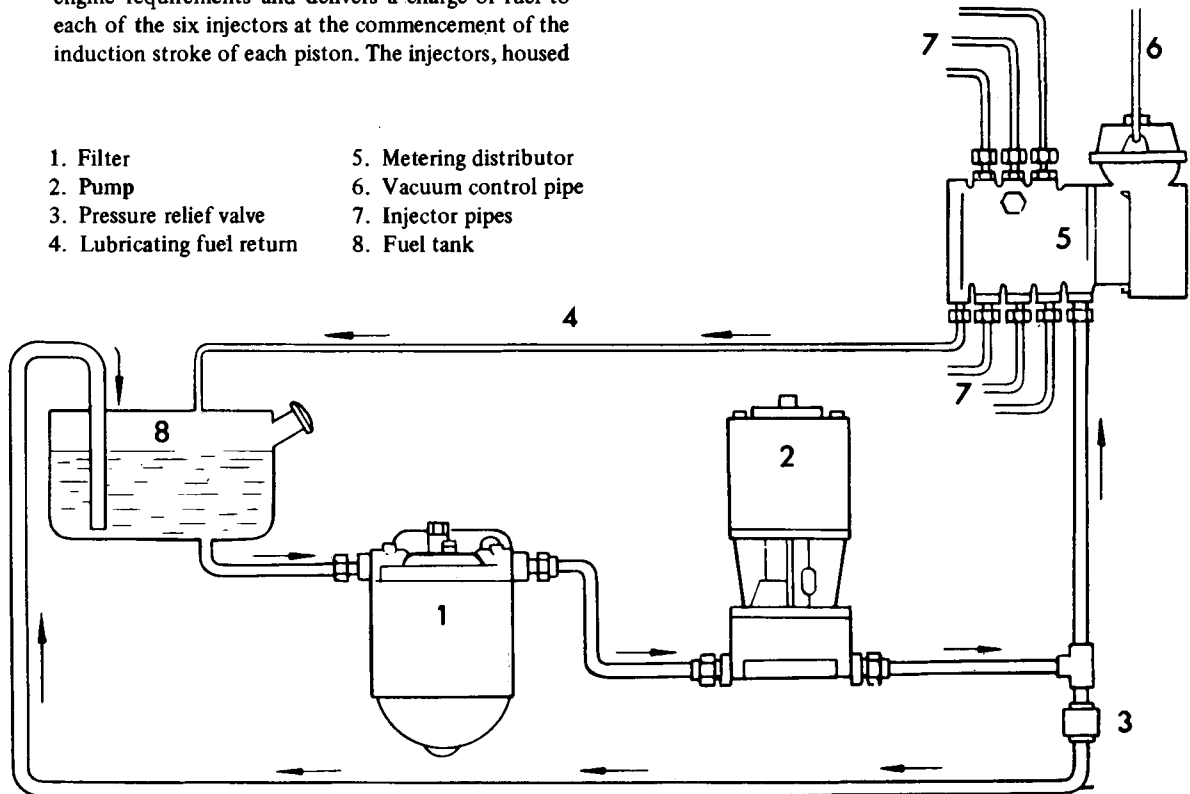
Description of the Petrol Injection Circuit and Components Petrol Injection Circuit.

Fuel, gravity fed from the tank to a paper element filter is drawn into an electrically driven pump which delivers pressurised fuel to a metering distributor via a pressure relief valve. The valve, which is adjustable, maintains a constant pressure of fuel to the metering distributor and releases excess fuel pressure back to the tank via a return pipe. The metering distributor, controlled by vacuum from a pipe to the induction manifold measures, subject to engine requirements and delivers a charge of fuel to each of the six injectors at the commencement of the induction stroke of each piston. The injectors, housed

in the induction manifold, contain a poppet valve which is set to open at 50 p.s.i. (3.52 kgf cm²) and allows a charge of fuel in the form of a hollow cone spray into the induction manifold. Fuel which also lubricates the metering distributor is returned to the tank via the lubricating fuel return pipe.



- | | |
|----------------------------|-------------------------|
| 1. Filter | 5. Metering distributor |
| 2. Pump | 6. Vacuum control pipe |
| 3. Pressure relief valve | 7. Injector pipes |
| 4. Lubricating fuel return | 8. Fuel tank |

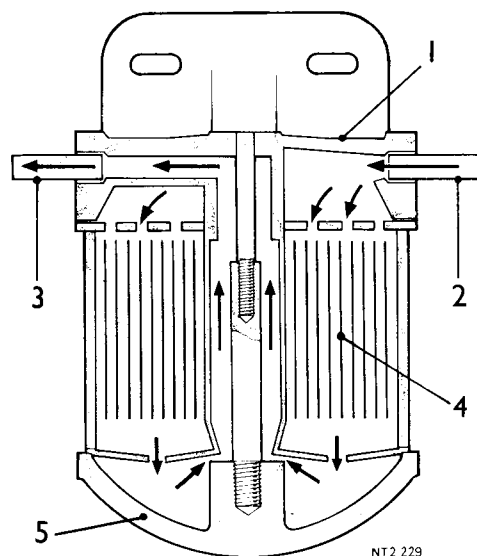


NTO 325



Fuel Filter

The fuel filter, which is gravity fed, is situated in the luggage compartment below the level of the fuel tank. The filter comprises a top assembly which is fixed to the luggage compartment floor and has inlet and outlet connections. A paper element housed in a metal canister is secured in position between the top assembly and a bottom sediment bowl by a single bolt.



NT2 229

1. Top assembly
2. Inlet
3. Outlet
4. Paper element
5. Bottom bowl

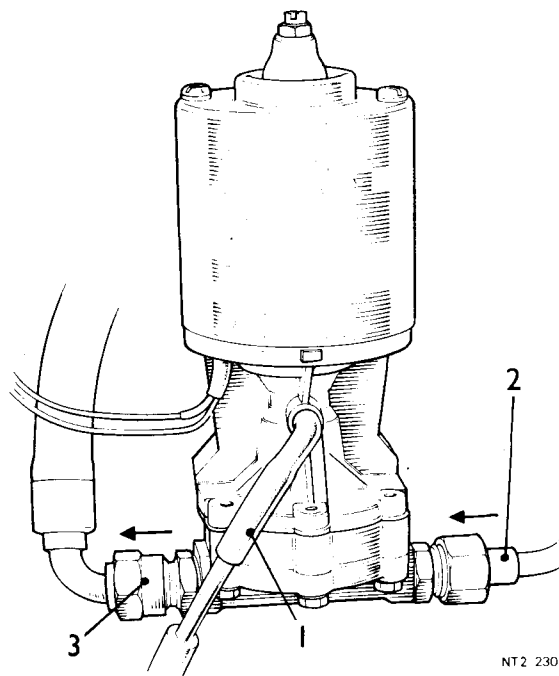
Fuel Pump Unit

The fuel pump unit mounted in the luggage compartment consists of two main parts, an electric motor and a twin-gear pump.

The electric motor which drives the fuel pump by means of a nylon coupling, is a 12 volt high performance permanent magnet unit.

The motor is protected against the entry of fuel from the pump by a shaft seal. A 'Tell-tale' pipe in the motor base casting indicates whether the fuel has passed this seal.

Filtered fuel enters the pump through the inlet union and is expelled through the pump outlet by the rotating action of the spur-type gears. The pump pressure is dependent upon the setting of the pressure relief valve.



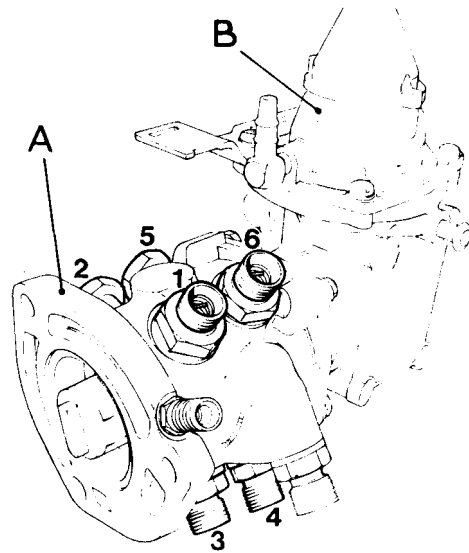
NT2 230

- 1 "Tell-tale" pipe
- 2 Pump inlet
- 3 Pump outlet

Metering Distributor Assembly

The metering distributor assembly is mounted on the engine and is driven by a pinion shaft gear off the ignition distributor driving gear. The assembly comprises two main units namely the metering unit and the control unit.

- A Metering Unit
- B Control Unit



Metering Unit

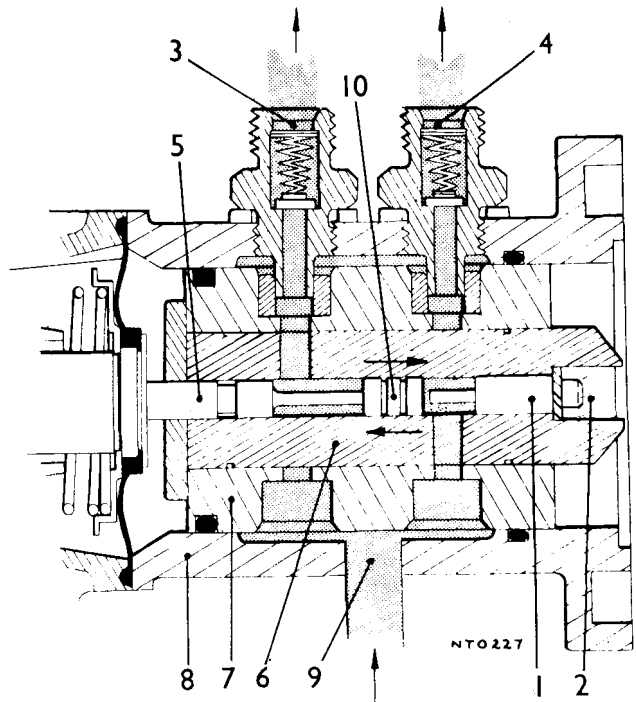
The metering unit consists of an outer casing with one inlet and six outlet ports. Located and seated inside the casing so that it cannot revolve or move axially is a sleeve with six inlet and six outlet ports arranged in spaced pairs 60° apart, inlet and outlet alternating. A space between the body and the sleeve forms a reservoir for pressurised fuel. The six outlet ports are coincident with the outlet ports in the outer casing and sealed unions containing non-return valves connect the sleeve and body ports to injector delivering pipes. A rotor which has two radial ports to a central bore and is driven by the pinion shaft gear, revolves within the sleeve. The central bore of the rotor contains a shuttle with a fixed stop at one end and a variable stop at the other.

When the engine is started and the rotor turns within the sleeve, the rotor port at the variable stop end becomes coincident with the port in the sleeve leading to the fuel reservoir in the outer casing. Fuel at high pressure enters the rotor bore and drives the shuttle to the fixed stop end of the rotor. This movement of the shuttle displaces fuel in the rotor bore through the ports in the rotor and sleeve and out through the non-return valve in the union serving number one cylinder.

A further 120° rotation of the rotor causes the rotor ports at the fixed stop end to align with the sleeve port leading to the pressurised fuel reservoir. Fuel now enters at the fixed stop end of the rotor and drives the shuttle back towards the variable stop end. The displaced fuel from the rotor bore ports passes to number five cylinder via the sleeve port and non-return valve union.

The shuttle continually moves between the two stops displacing an accurate amount of fuel to each cylinder in turn. The quantity of fuel delivered at each injection is dependent upon the distance the shuttle travels which is determined by the control unit.

- 1. Fixed stop
- 2. Rotor drive
- 3. Outlet to No. 1 injector
- 4. Outlet to No. 2 injector
- 5. Variable control stop
- 6. Rotor
- 7. Sleeve
- 8. Body
- 9. Fuel inlet from pump
- 10. Shuttle



FUEL SYSTEM — PI

Control Unit

The control unit is attached to the metering unit by four bolts. A cam follower with a diaphragm seal set in an annular groove around its periphery projects through the leading face of the unit. The rear end of the cam follower bears against the outer two of three rollers carried on the control links, whilst the third roller of smaller diameter runs against the fuel cam or datum track.

The control links are pivoted at the top where they are attached to the centre of a spring controlled rubber diaphragm — the lower part of the control links are free.

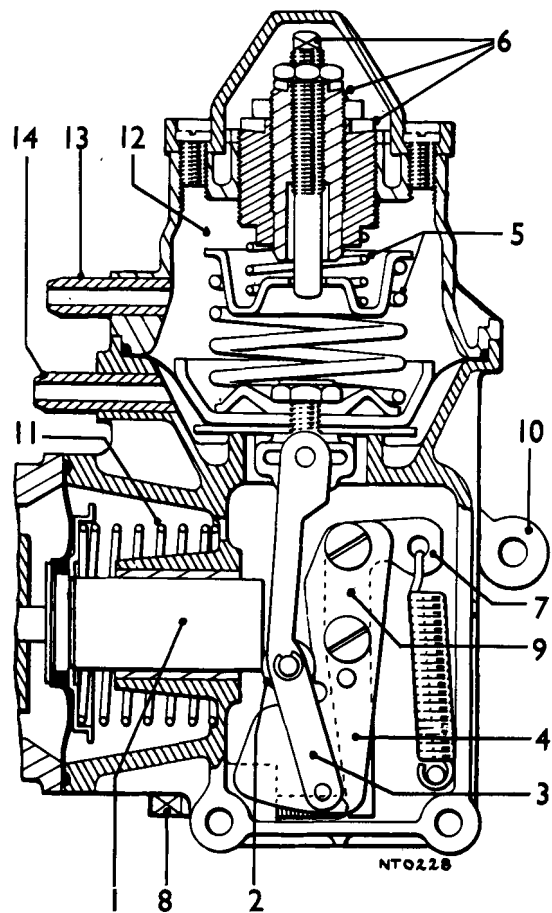
Two springs are positioned between the diaphragm and three concentric calibration screws. The top of the diaphragm and the calibration screws are in a chamber connected by a pipe to the manifold.

The fuel cam or datum track is secured by two screws to a carrier which is in contact with an external control screw. The carrier is pivoted at point X and the pivot extends through the rear face of the unit. The excess fuel lever is pivoted at the rear face of the unit and has a cam face at the lower end which contacts the cam carrier pivot.

Engine fuel demands, according to throttle openings and load, are reflected in changes in inlet manifold depression. The change is sensed by the spring loaded diaphragm which takes up a position balancing the loading of the springs against the depression in the chamber. The central links are thus raised or lowered along the cam track allowing the follower in or out of the forward face of the unit and so regulate the metering unit variable stop. To prevent the full hydraulic force of the variable stop from impinging on the control linkage a balancing spring is fitted on the cam follower which results in only light pressure between the follower and the rollers. Movement of the excess fuel lever for cold starting is effected by pulling the choke control knob on the control panel. This alters the position of the excess fuel lever and the carrier for the cam is drawn away from the cam follower thus causing the shuttle to travel further. When the control knob is pushed back the carrier is returned to the normal operating position by the action of a tension spring.

CAUTION: It is important that under no circumstances must the following adjustments be altered:-

- a) Calibration screws
- b) Full load setting screw
- d) Datum track screws



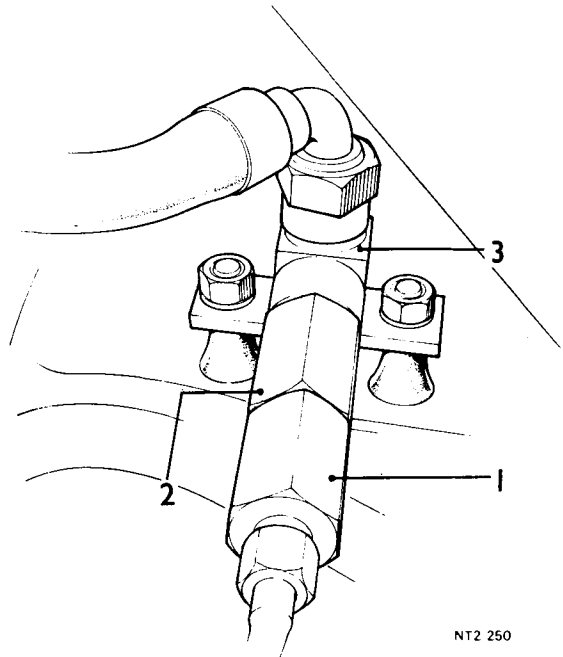
1. Cam follower
2. Rollers
3. Control links
4. Fuel cam (datum track)
5. Calibration springs
6. Calibration screws
7. Fuel cam carrier
8. Full load setting screw
9. Point X
10. Excess fuel lever
11. Balance spring
12. Depression chamber
13. To manifold
14. To atmosphere



Pressure relief valve assembly

The pressure relief valve is mounted in the luggage compartment between the pump and the filter. The unit consists of three parts, namely an adjustable valve, a strainer housing and a brass 'T' piece.

Fuel from the pump enters and leaves the assembly through the 'T' piece. The valve is set to provide a constant pressure of 106 – 110 p.s.i. (7.45 – 7.70 kgf/cm²) to the metering distributor and fuel in excess of this pressure is fed back to the tank through the strainer housing and valve.

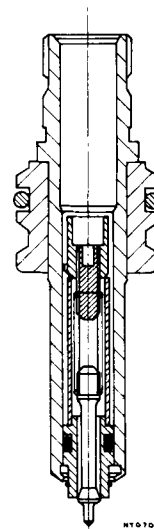


NT2 250

- 1. Adjustable Valve
- 2. Strainer housing
- 3. T piece

Injectors

The injectors are fitted into the inlet manifold and secured in pairs by a clamping plate. Fuel pipes from the metering unit are secured to the injectors by union nuts. The unions are numbered one to six for identification purposes. A poppet valve in the injector is set to open at 50 p.s.i. (3.52 kgf m²) to provide a 60° hollow cone spray of atomised fuel.



HT6700



FUEL SYSTEM PI

FUEL METERING DISTRIBUTOR TIMING

** (Up to Engine No. CP 77609E)**

– Check and adjust

19.35.01

Check

1. Isolate the battery.
2. Turn the engine until the T.D.C. mark on the crankshaft pulley is in line with the pointer and number one piston is on its firing stroke.
3. Disconnect number six injector pipe from the metering distributor.
4. Remove number six outlet union from the metering distributor body and observe the relationship of the sleeve port to the rotor port.
5. Illustration A shows the **ACCEPTABLE** range of rotor port positions in relation to the rotor sleeve port. The direction of rotation of the rotor is clockwise looking at the drive end of the rotor.

NOTE: Black shading represents the rotor.

The arrow indicates direction of rotor rotation.

AA shows the sleeve port almost covered by the rotor.

AB shows the sleeve port half covered by the rotor.

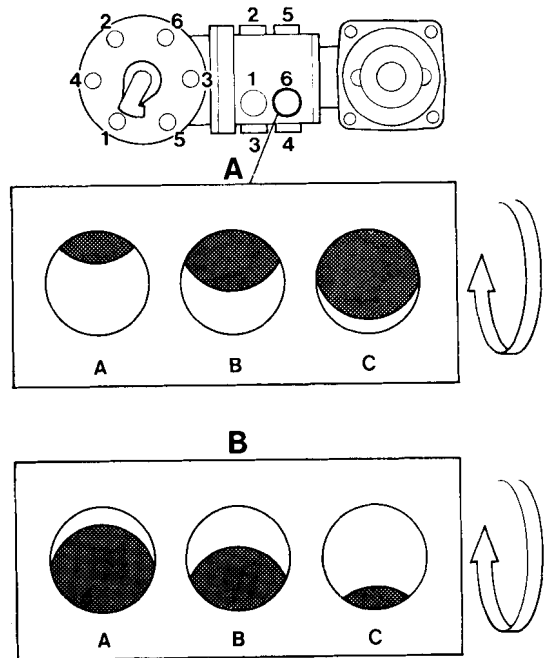
AC shows the sleeve port and the rotor port almost in line moving towards a full hole.

6. Illustration B represents an **UNACCEPTABLE** range of rotor and sleeve port positions.

BA shows the rotor and sleeve port almost in line.

BB shows the rotor covering half of the sleeve port.

BC shows the rotor almost covering the sleeve port and moving towards total closure of the sleeve port.



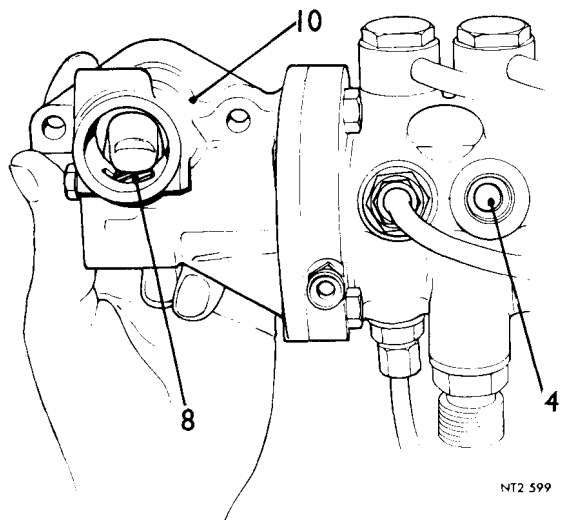
NT2 231

Adjust

7. In the event of the timing being incorrect, remove the metering distributor and pedestal complete instructions 1 to 8 12.10.22.
8. Insert a finger in the distributor shaft bore and turn the pinion gear anti-clockwise (towards the engine) until a full rotor hole is visible through number six outlet.
9. Continue to turn the gear anti-clockwise until the rotor hole just disappears from view, and then rotate the gear one extra tooth.
10. Lower the pedestal and metering distributor into position and recheck the position of the rotor hole.

NOTE: If the position of the hole is still not correct the gear may not have been turned sufficiently, therefore repeat instructions 8 to 10.

11. Secure the pedestal to the cylinder block, refit the ignition distributor and distributor cap and H.T. leads.
12. Reverse instructions 1 to 4, 12.10.22.



NT2 599

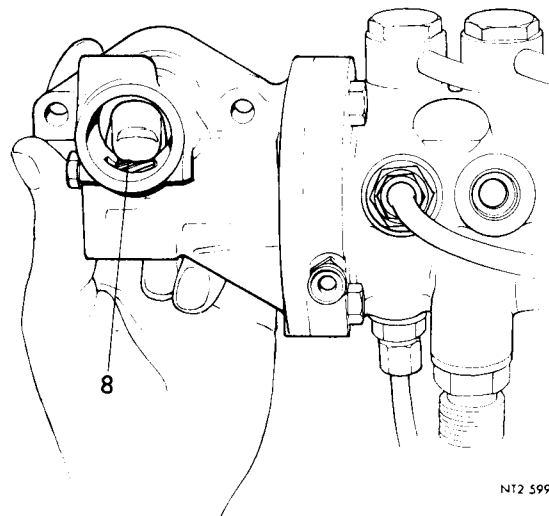
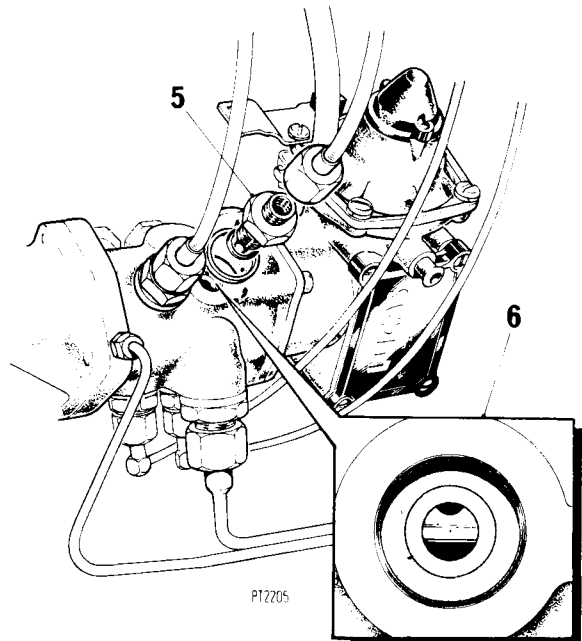
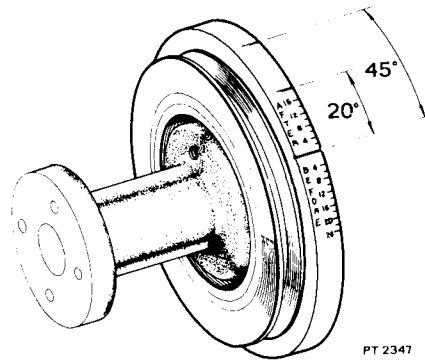
FUEL METERING DISTRIBUTOR TIMING
(From Engine No. CR1E)

– Check and adjust

19.35.01

Check

1. Isolate the battery.
 2. Remove the spark plugs and rocker cover.
 3. Turn the engine in a running direction until No. 6 piston is at T.D.C. induction stroke, i.e. No. 6 inlet and exhaust valves on the rock.
 4. Using a thin steel rule, mark off lines from the T.D.C. line on the crankshaft pulley 1 1/8 in. and 2 5/8 in. (29 mm and 67 mm) on the A.T.D.C. side of the pulley. The mark off lines should be sufficiently clear to be observed as timing marks and represent 20° and 45° A.T.D.C. respectively.
 5. Remove number six outlet union from the metering distributor body. (No portion of the rotor hole should be visible in the outlet port).
 6. Turn the crankshaft in a running direction until the leading edge of the hole in the rotor just appears on the upper side of the outlet port hole (the 'cracking' point); note the crankshaft angle at which this occurs. If this 'cracking' point occurs between the lines marked in 4, i.e. 20° – 45° A.T.D.C. the injection timing is satisfactory; if not, proceed as follows:
 7. Remove the metering distributor and pedestal complete, 12.10.22 (instructions 1 to 8).
 8. Insert a finger in the distributor shaft bore and turn the pinion gear anti-clockwise (towards the engine) until a full rotor hole is visible through number six outlet.
 9. Continue to turn the gear anti-clockwise until the rotor hole just disappears from view, and then rotate the gear one extra tooth.
 10. Lower the pedestal and metering distributor into position and recheck the position of the rotor hole.
- NOTE:** If the position of the hole is still not correct the gear may not have been turned sufficiently, therefore repeat instructions 8 to 10. •
11. Secure the pedestal to the cylinder block, refit the ignition distributor cap and H.T. leads.
 12. Reverse instructions 1 to 4, 12.10.22.

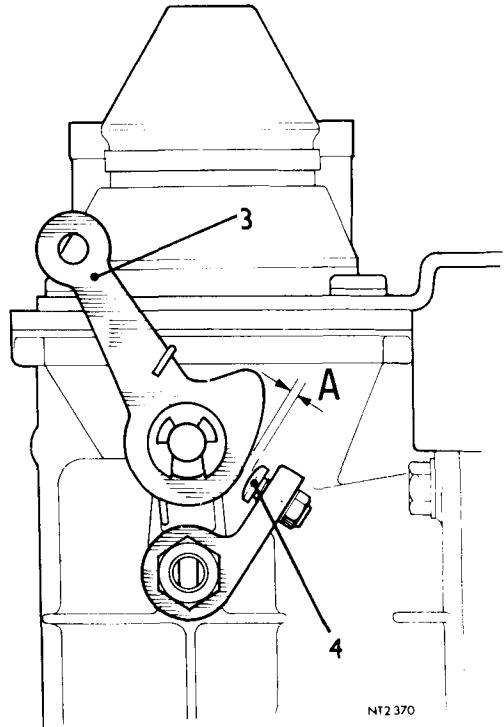


EXCESS FUEL LEVER

– Check and adjust 19.35.02

1. Isolate the battery.
2. Remove the metering distributor 19.35.07.
3. Hold the excess fuel lever back against its stop and with a feeler gauge check the clearance A which should be 0.006 – 0.008 in (0.15 – 0.2 mm).
4. If adjustment is required slacken the locknut and turn the screw clockwise to increase and anti-clockwise to decrease the clearance. Tighten the locknut.
5. Reverse instructions 1 and 2.

NOTE: Clearance adjustment of the excess fuel lever should not be necessary during normal service. Should the adjustment be suspect, establish first, whether free play exists at the cable end of the lever. Providing that there is approximately ¼ in (6 mm) free play it is unlikely that the excess fuel lever is causing any malfunction and therefore the removal of the metering distributor would be unnecessary.



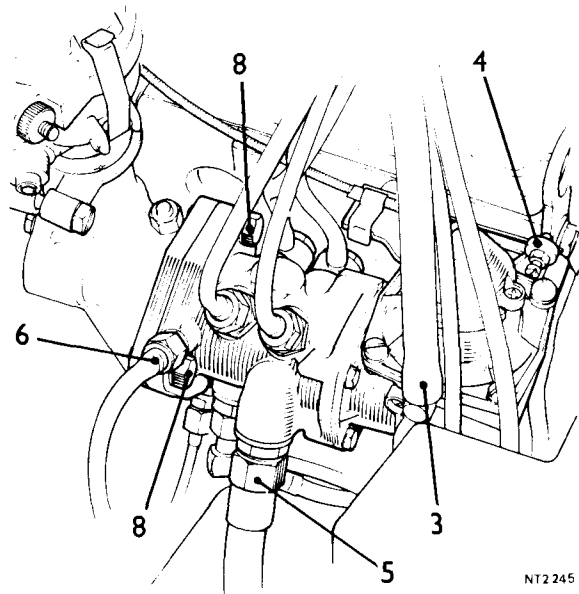
FUEL METERING DISTRIBUTOR

– Remove and refit 19.35.07

Removing

1. Isolate the battery.
2. Disconnect the injector pipes at the injector.
3. Disconnect the vacuum pipe at the metering distributor.
4. Disconnect the cold start cable at the metering distributor.
5. Disconnect and blank off the main fuel feed pipe to the metering distributor.
6. Disconnect the metering distributor bleed off pipe.
7. Turn the engine over until numbers one and six pistons are at T.D.C. with number one cylinder firing. Do not turn the engine over again until completion of the operation.

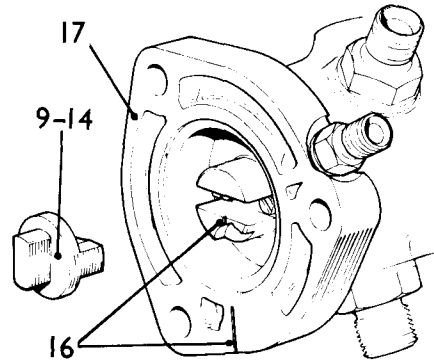
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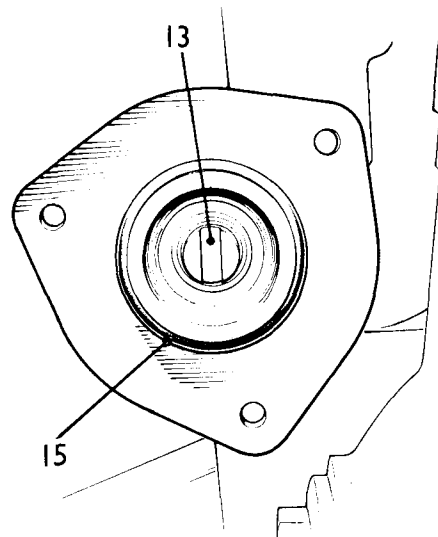
8. Remove the three bolts and washers securing the metering distributor to the pedestal flange and remove the unit from the engine.
9. Remove the plastic drive dog and the 'O' ring from the pedestal flange.
10. If necessary, remove the injector pipes.

Refitting

11. Fit the injector pipes (if removed) to the metering distributor.
12. Check and if necessary adjust the cold start lever clearance 19.20.26.
13. Ensure that the engine has not been turned over and the drive gear pinion slot is in a vertical position with numbers one and six pistons at T.D.C. – number one firing and the ignition distributor rotor arm electrode pointing to number one cylinder electrode in the distributor cap.
14. Fit the plastic drive dog into the pinion gear drive slot using, if necessary a little grease to retain it in position. Ensure that it is fitted the correct way round i.e. the small driving member locating in the pinion drive slot.
15. Fit a new 'O' ring to the pedestal flange and ensure that the face is clean.
16. Turn the drive member of the metering distributor so that the scribed lines on the drive member and flange face coincide.
17. Clean the flange face and fit the metering distributor to the pedestal flange ensuring that the driving dog member locates properly in the drive member of the metering distributor.
18. Secure the metering distributor with the three bolts and washers and tighten evenly.
19. Reverse instructions 1 to 7.



NT2 247

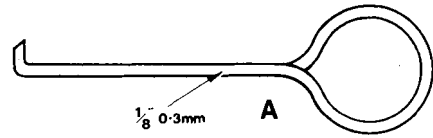


NT2 246

FUEL METERING DISTRIBUTOR OUTLET UNION AND ADAPTOR SEALS

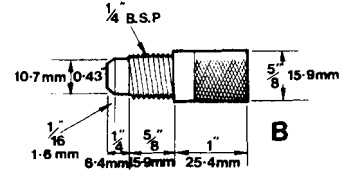
— Remove and refit

19.35.14



Special tools to make in the workshop.

- A — Hook for removing sleeve sealing rings.
- B — Sleeve alignment tool.
- C — Tool for fitting sealing rings to the sleeve.

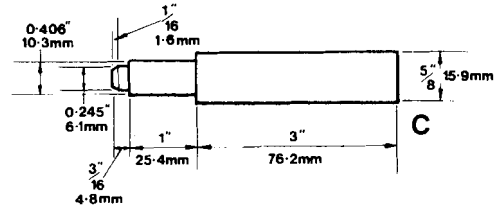


Removing

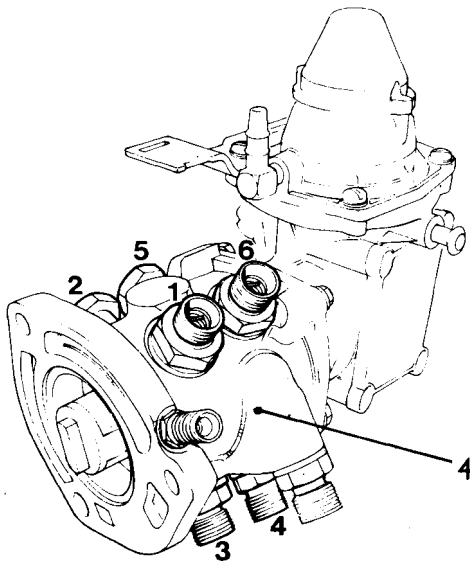
1. Isolate the battery.
2. Remove the metering distributor 19.35.07.
3. Remove the injector pipes from the metering distributor.
4. Hold the metering distributor in a vice and remove numbers one, six, three and four outlet unions complete with 'O' rings and sealing washers.

NOTE: The seals for numbers two and five outlets are removed when their respective injector pipes are removed.

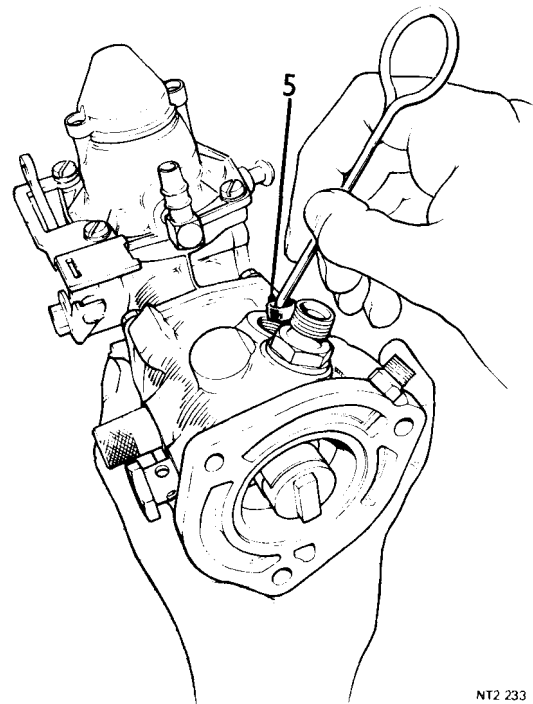
5. Using special tool A, remove the six adaptor seals from the outlet ports.



NT2 248



NT2 237



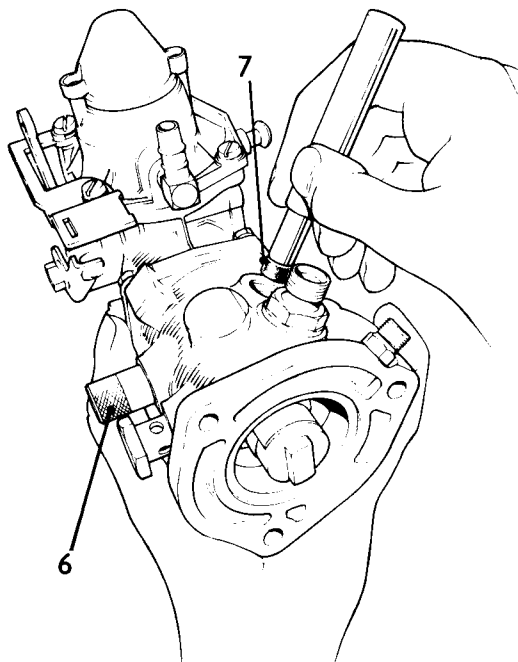
NT2 233

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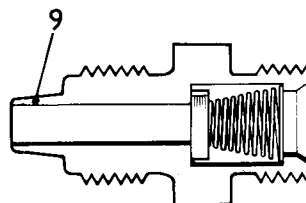
Refitting

6. Fit the alignment tool B to one of the outlet ports in the metering unit body so that it locates in the sleeve port.
7. Fit a new adaptor seal to each outlet port using the special seal location tool C, ensuring that the seals are pushed firmly into the sleeve locations.
8. Remove the alignment tool B and fit a seal in its place.



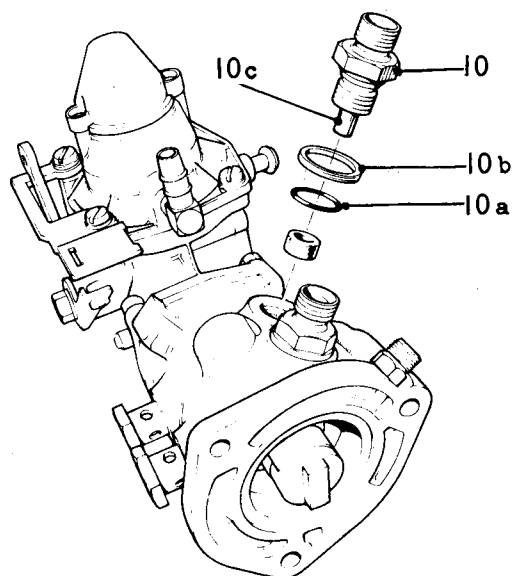
NT2 235

9. Check the non-return valves in the outlet unions – and banjo bolts as follows. Place the tapered end of the union in Kerosene and blow through the opposite end to see if the valve is leaking. **Caution:** Do not use an air line since the valve seat may be damaged due to the high pressure. If the valve proves to be leaking, even very slightly, renew the union complete.



NT2874

10. Fit the outlet unions to the metering distributor body ensuring:-
 - a) New 'O' rings are fitted if originals are faulty.
 - b) The 'O' rings are located properly in the grooves formed by the sealing washers.
 - c) The 'O' ring groove and the unthreaded end of the union are smeared with Petroleum Jelly.

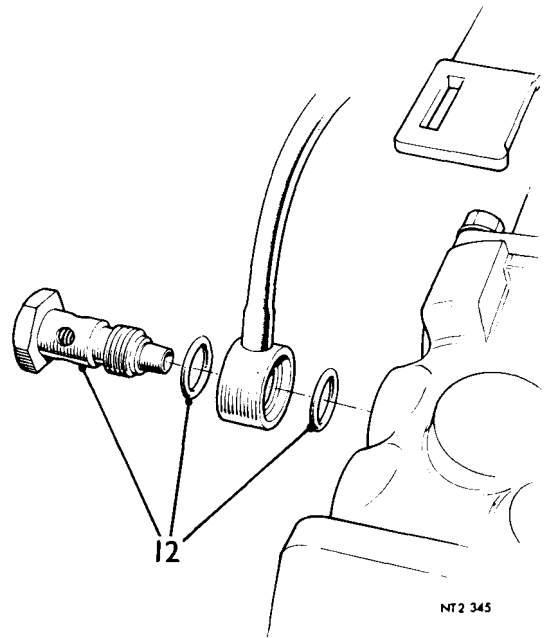
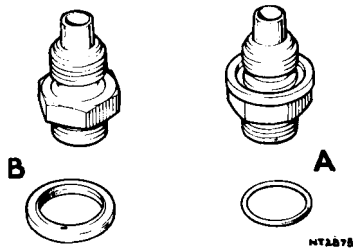


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Continued

11. Refit the injector pipes to the distributor.
12. Refit the banjo connectors ensuring new seals are fitted. Tighten the banjo bolts to 150 – 200 lb ins.
13. Check the excess fuel lever clearance 19.35.02.
14. Refit the metering distributor 19.35.07.
15. Reconnect the battery, start the engine and check for fuel leaks from the system.

NOTE: Later distributor units A employ 'O' rings to seal the outlet unions and these may be refitted providing they are in good condition. Earlier units B however, used 'Dowty' type seals and these *must* be renewed each time a union is removed.



FUEL METERING DISTRIBUTOR INLET UNION AND FILTER

– Remove and refit 19.35.15

Removing

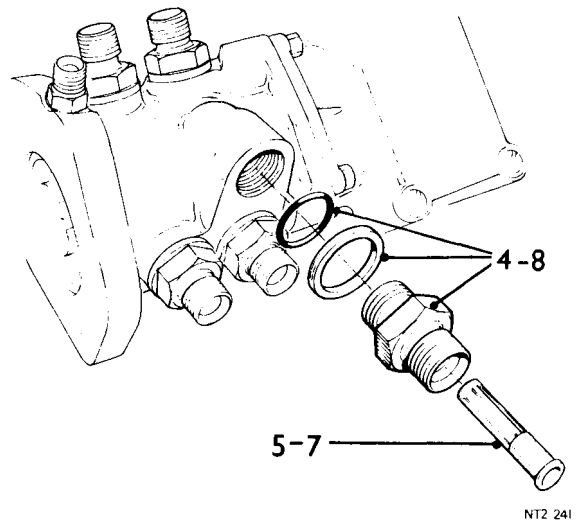
1. Isolate the battery.
2. Hold the union steady with an open ended spanner and disconnect the inlet pipe union nut.
3. Plug the inlet pipe to prevent fuel loss.
4. Remove the union complete with the 'O' ring, sealing washer and filter.
5. Remove the filter from the union.

Refitting

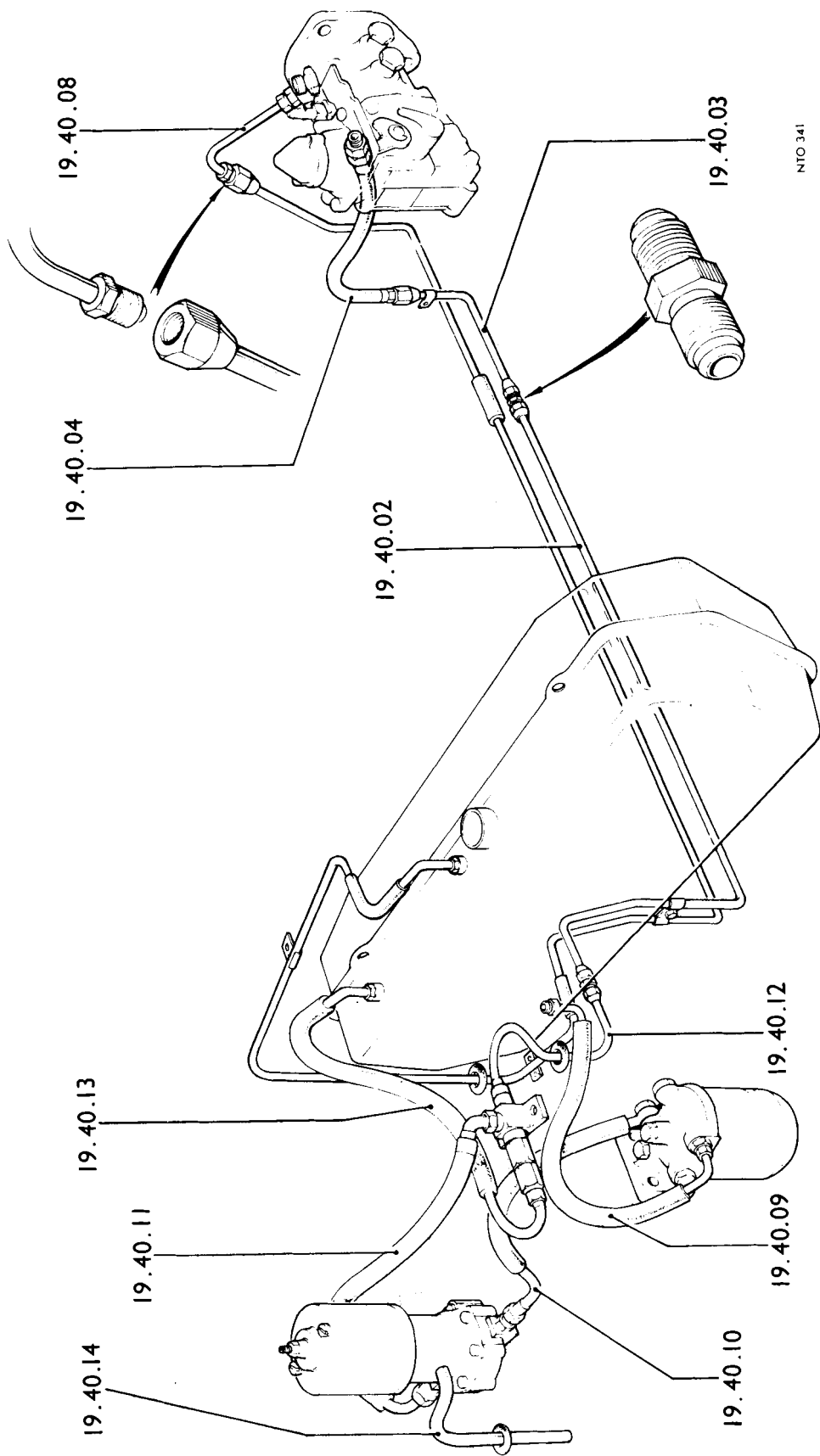
6. Wash the filter in petrol or renew if damaged.
7. Insert the filter into the union.
8. Refit the union ensuring that a new 'O' ring is fitted and that it locates properly in the groove formed by the sealing washer.

NOTE: To ensure that the 'O' ring is retained in the groove whilst fitting smear a little petroleum jelly into the groove.

9. Reconnect the inlet supply pipe, reconnect the battery. Start the engine and check for fuel leaks.



FUEL SYSTEM PI



FUEL PIPES

19.40.00

NOTE: The pipes and hoses of the Petrol injection fuel system are illustrated with annotations giving operation numbers for removing and refitting. Detailed instructions for these operations are omitted since they are self explanatory. Access to the pipes within the luggage compartment is gained by removing the spare wheel cover, spare wheel and removing the forward trim panel 76.13.17.

PETROL PIPE MAIN LINE

19.40.02

PETROL PIPE MAIN LINE — CENTRE SECTION 19.40.03

PETROL PIPE MAIN LINE — ENGINE SECTION 19.40.04

PETROL PIPE METER TO TANK RETURN 19.40.08

PIPE — TANK TO FILTER INLET 19.40.09

PIPE — FILTER OUTLET TO PUMP 19.40.10

PIPE — PUMP OUTLET TO P.R.V. 19.40.11

PIPE — P.R.V. TO MAIN LINE 19.40.12

PIPE — P.R.V. RETURN TO TANK 19.40.13

PIPE — PUMP LEAK — DRAIN 19.40.14

HOSE — FILLER TO TANK — P.I.

— Remove and refit

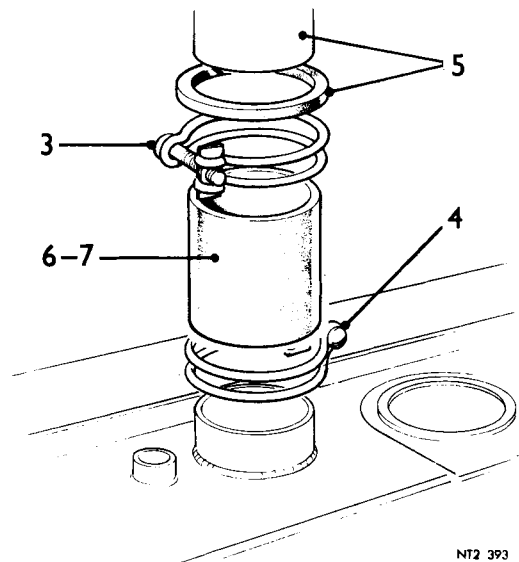
19.40.19

Removing

1. Remove the luggage compartment forward trim panel. 76.13.17
2. Remove the rear compartment trim panel 76.13.20.
3. Working from the rear compartment, slacken the top hose clip securing the filler cap assembly to the filler hose.
4. From the luggage compartment slacken the hose clip securing the hose to the fuel tank.
5. Withdraw the filler cap assembly and the rubber sealing grommet.
6. Remove the filler hose complete with clips.

Refitting

- * 7. Fit the hose to the fuel tank (using a sealant a-necessary) and secure with a hose clip. **
8. Fit the filler cap securing clip to the hose, assemble the sealing grommet to the filler cap and fit the assembly to the tank filler hose. Secure with the hose clip.
9. Reverse instructions 1 and 2.



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FUEL SYSTEM — PI

FUEL PUMP

Data and description

19.45.00

CAUTION: The fuel pump is controlled directly by the ignition/starter switch. The motor will therefore run continually while the ignition is on. If, during servicing, the ignition has to remain on for a long period with the engine not running isolate the unit as follows:

Early vehicles not fitted with fuel pump inertia cut out switch only—

Open the luggage boot lid. Remove the floor carpet. Remove the spare wheel cover panel. Remove two screws and washers and turn back the trim panel. Disconnect the white wire snap connector to isolate the unit.

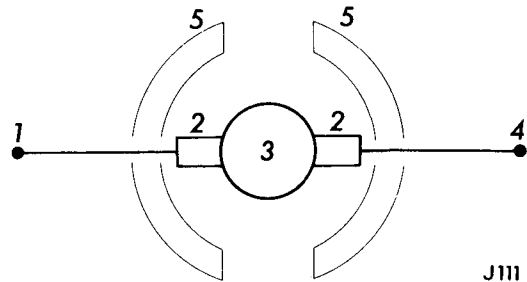
Later vehicles fitted with fuel pump inertia cut out switch only —

Open the bonnet. Locate the switch mounted in a clip attached to the bulkhead. Pull up the button to trip the switch and isolate the fuel pump.

Data

Manufacturer	Lucas
Lucas part No.	54073012
Stanpart No.	214347
Running current	4 amp approximately
Light running — speed	2200 rev/min
current	1.4 amp
volts	13.5 volt
Armature winding resistance — adjacent commutator bars	0.16 to 0.24 ohm at 15 degrees C
Armature end float	0.004 to 0.010 in (0.10 to 0.25 mm)
Brush length — new	0.375 in (9.53 mm)
renew if less than	0.188 in (4.76 mm)
Brush spring pressure — when compressed to 0.158 in (4 mm)	5 to 7 oz (140 to 200 g)
Maximum delivery	16 gal (73 litres) per hour
Delivery pressure — controlled by pressure relief valve unit	100 to 110 lbf/in ² (690 to 760 kN/m ²)

The fuel pump consists of a permanent magnet electric motor driving a precision built twin gear pump. The drive is transmitted by a drive coupling which features a spiral formed on its upper surface to throw fuel up to lubricate the shaft seal. Failure of the shaft seal would be indicated by fuel leakage from the 'tell tail' pipe projecting from the base casting which is fitted with a drain pipe.



1. Supply connection
2. Brushes
3. Commutator
4. Earth connection
5. Permanent magnets

Component wiring diagram



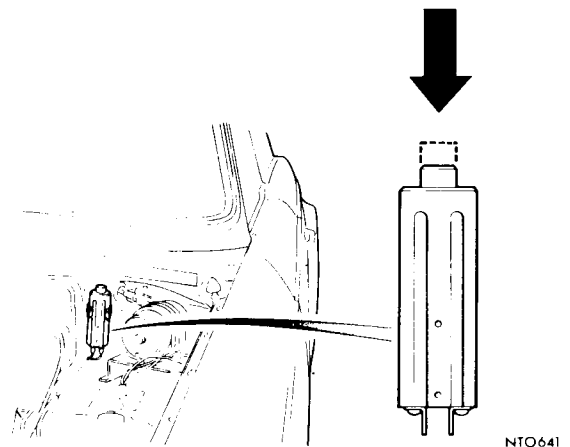
FUEL PUMP

— Test on vehicle

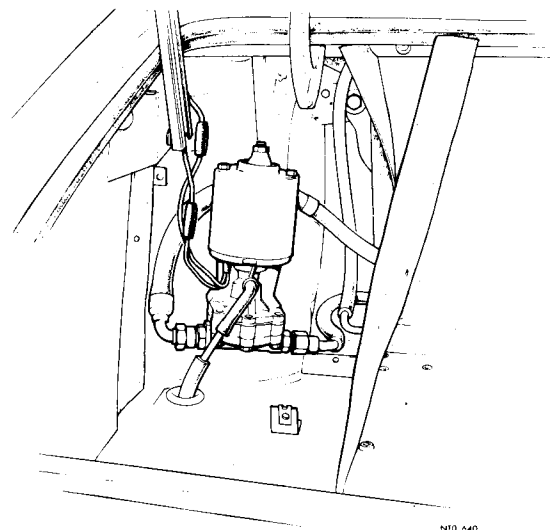
19.45.01

Service tools: S351, CBW 1B

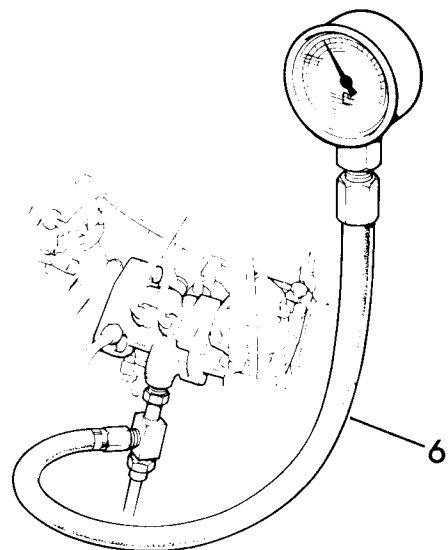
1. Later vehicles fitted with fuel pump inertia cut out switch only —
Open the bonnet. Locate the switch mounted in a clip attached to the bulkhead. Ensure that the button is depressed so that the switch is in its normal operating condition, with the contacts closed.
2. Obtain access to the fuel pump as follows:
Open the luggage boot lid. Remove the floor carpet. Remove the spare wheel cover panel. Remove two screws and washers and turn back the trim panel as shown.
3. Check that the fuel pump runs as follows:
Switch on the ignition. Check that the pump is running audibly or by touch.
4. Check electrical supply and earth as follows:
Disconnect two snap connectors. Switch on the ignition. Use a voltmeter to check that a supply of 12 volts exists between the white wire and a good electrical earth. Use a suitable test circuit to check that the black wire is providing a good electrical earth. Connect two snap connectors observing polarity to ensure that the pump motor runs in the correct direction.
5. Check the running current as follows:
Disconnect the white wire snap connector. Restore the circuit with an ammeter included in the white supply wire. Switch on the ignition. Check that the pump is running with the ammeter reading 3.5 to 5.0 amp. If the ammeter reading is not within this range the indication is that the pump requires overhaul or replacement.
6. Check the pressure output as follows:
Open the bonnet. Prepare for fuel spillage. Insert a PI pressure test adaptor Churchill tool No. S351 in the fuel line as shown. Connect a pressure gauge Churchill tool No. CBW 1B to the adaptor. Switch on the ignition. The pressure gauge reading should now be 100 to 110 lb/in² (690 to 760 kN/m²). If the pressure gauge reading is low the indication is that the pump requires overhaul or replacement or a fault exists in the fuel line — refer to 19.00.01. If the pressure gauge reading is high the indication is that the pump is serviceable but a fault exists in the fuel line — refer to 19.00.01.



NT0641



NT0 640



NT0 645

FUEL SYSTEM — PI

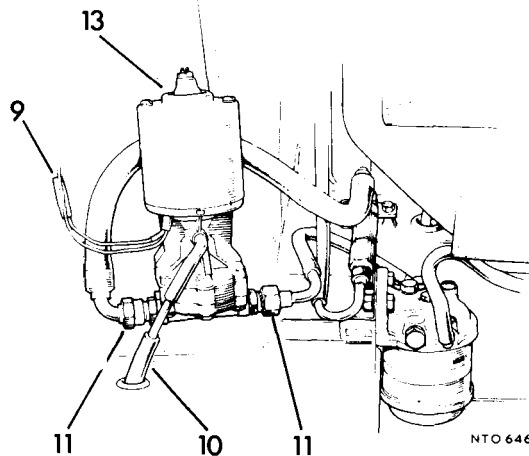
FUEL PUMP

— Remove and refit

19.45.08

Removing

1. Open the luggage boot lid.
2. Remove the floor carpet.
3. Remove the spare wheel cover panel.
4. Remove two screws securing the luggage boot lamp.
5. Withdraw the lamp assembly from the petrol tank trim panel.
6. Disconnect two Lucar connectors.
7. Remove eight screws and washers and withdraw the petrol tank trim panel.
8. Isolate the battery.
9. Disconnect two snap connectors.
10. Pull the drain pipe upwards from the body aperture grommet and then pull from fuel pump pipe.
11. Prepare for fuel spillage. Disconnect the inlet pipe coupling and the outlet pipe coupling.
12. Under wheel arch, remove three nuts and spring washers. Three plain washers may remain stuck to the body underseal.
13. Withdraw the fuel pump from its mounting.
14. Unscrew three special rubber mounting studs.



Refitting

15. Reverse instructions 10 to 14.
16. Connect two snap connectors observing polarity to ensure that the pump motor runs in the correct direction.
17. Connect the battery.
18. Turn on ignition to energise the fuel pump. Check the disturbed fuel pipe couplings to ensure no fuel leakage.
19. Reverse instructions 1 to 7.

FUEL PUMP

— Overhaul

19.45.15

Dismantling

1. Remove the inlet connection and the outlet connection. Withdraw the strainer from the inlet connection.
2. Slacken six bolts equally and remove the gear pump assembly.
3. Remove the drive coupling.
4. Remove two through bolts.
5. Carefully withdraw the cover and armature about 0.5 in (12 mm). The brushes will drop clear of the commutator. Push each brush back to clear the circlip and thrust washer. Complete the withdrawal of the cover and armature.
6. Remove the thrust washer.
7. Pull the armature from the cover against the action of the permanent magnet.
8. If necessary remove the circlip.
9. Remove the brush assembly. Release the wires by carefully manoeuvring the rubber grommet upwards through the hole.
10. If necessary force the shaft seal from the base casting. Do not perform this operation unless a new shaft seal is available.

Bearings

11. The two self aligning motor bearings are not replaceable.

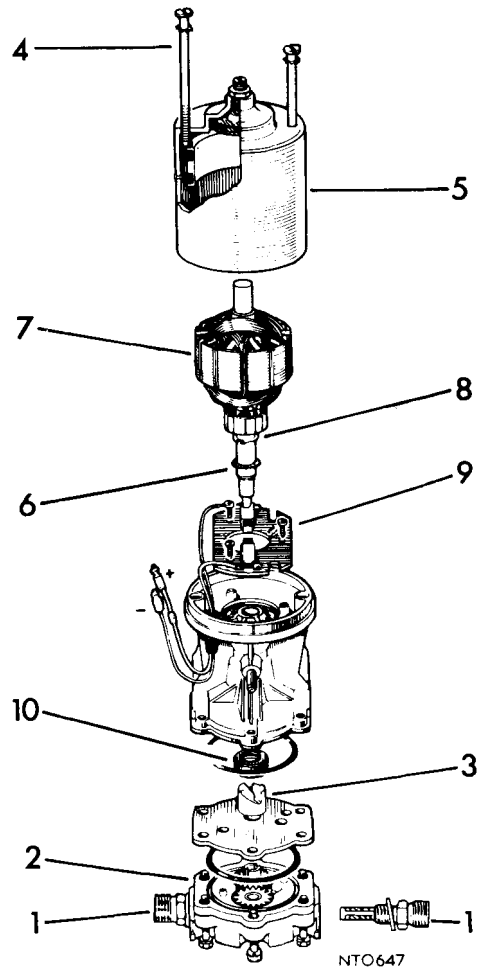
Brushes

12. Clean the brushes with a petrol moistened cloth. Ensure that the brushes move freely in the brushplate.
13. Check the brush length. Renew the brushplate assembly if less than 0.188 in (4.76 mm).
14. Using a suitable push type spring scale check the brush spring pressure. The pressure should be 5 to 7 oz (140 to 200 g) when compressed to 0.158 in (4 mm). If the pressure is low renew the brushplate assembly.

Commutator

15. Clean the commutator with a petrol moistened cloth. If the unit is in good condition it will be smooth and free from pits or burned spots. If necessary polish with fine glass paper. If excessively worn replace the armature.

Continued



FUEL SYSTEM — PI

Gear pump

16. If necessary an indication of the gear pump condition may be obtained by performing a flow test. With a motor terminal voltage of 13.5 volt approximately 1 gallon (4.5 litres) should be delivered in 3 minutes 45 seconds at 100 lbf/in² (700 kN/m²).
17. Examine the interior of the gear pump. If there are indications of wear or damage replace the gear pump assembly.
18. Do not replace the gears or the housing individually. The components are mated and replacement must be by a complete gear pump assembly only.

Shaft seal

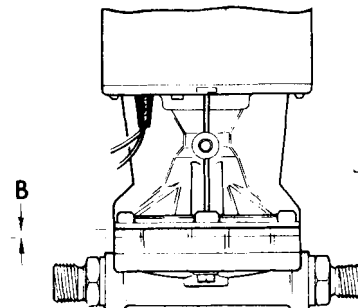
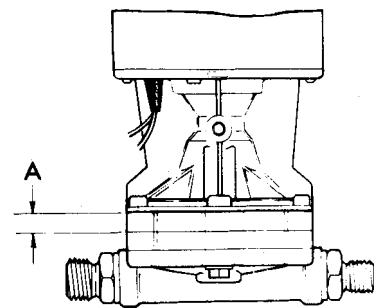
19. Failure of the shaft seal would be indicated by fuel leakage from the drain pipe.
20. If necessary an indication of the seal condition may be obtained by performing a bubble test. Connect a short pipe to the inlet connection and a short pipe to the outlet connection. Position the petrol pump above an open tank of paraffin. Immerse the free end of each pipe in the paraffin. Run the petrol pump. A continuous flow of bubbles from the outlet pipe indicates a defective seal.
21. If seal failure is suspected petrol may have contaminated the motor. The unit should therefore be dismantled as detailed above and all components inspected before a new shaft seal is fitted.

Spares

22. The motor and gear pump may be considered as two units. On the majority of vehicles replacement of either may be undertaken.
23. A few early vehicles were fitted with a gear pump with a narrow top plate as shown. On these units the top plates were matched to the motor base castings during production to prevent the possibility of top plate distortion causing gear binding. A 'narrow top plate' gear pump should not be fitted with a replacement motor. If a new motor is required it should be obtained by replacement of the complete fuel pump.

Strainer

24. Remove the inlet connection. Withdraw the strainer from the connection. Inspect and wash in clean petrol.

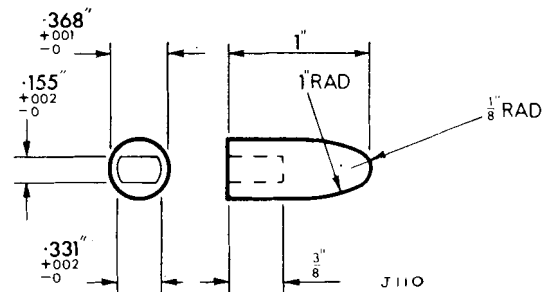
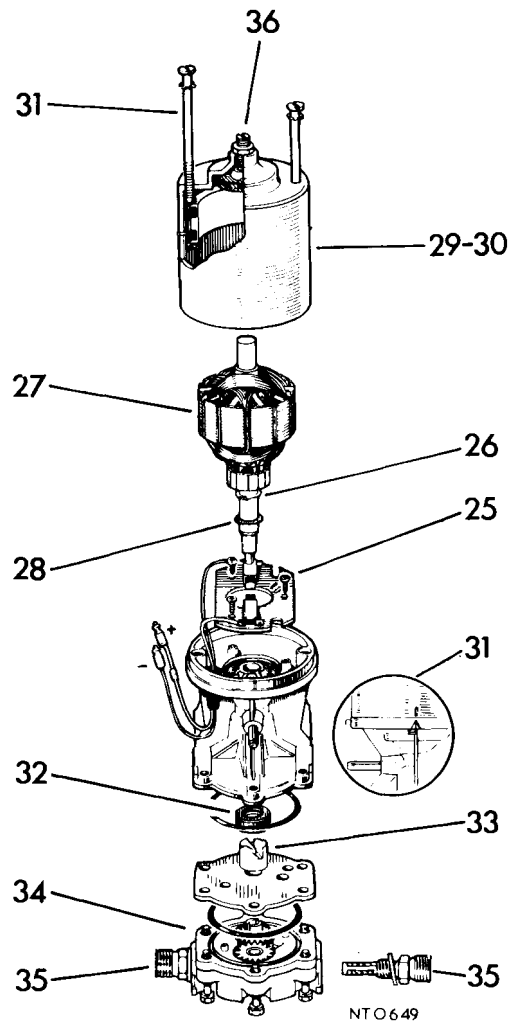


A Normal top plate
B Narrow top plate

Continued

Assemble

25. Fit the brush assembly.
26. If necessary fit the circlip.
27. Position the armature to the cover against the action of the permanent magnet.
28. Fit the thrust washer.
29. If the shaft seal is fitted only —
Provide a protective bullet as shown. Position the protective bullet over the shaft key. Lightly grease the bullet. Carefully insert the armature shaft through the base casting. Align the bullet to the shaft seal. Push each brush back to clear the thrust washer, circlip and commutator.
30. If the shaft seal is not fitted only —
Carefully insert the armature shaft through the base casting. Push each brush back to clear the thrust washer, circlip and commutator.
31. Seat the cover against the base casting flange. Turn the cover to align the marks shown. Fit the through bolts.
32. If the shaft seal is not fitted only —
Provide a protective bullet as shown. Position the protective bullet over the shaft key. Lightly grease the bullet. Carefully insert the shaft seal into the base casting.
33. Position the drive coupling to the motor.
34. Renew all disturbed rubber 'O' rings. Note that effective seals cannot be assured if new rubber 'O' rings are not fitted to the disturbed joints. Fit the gear pump assembly. Tighten six bolts equally.
35. Insert the strainer through the inlet connection. Fit the inlet connection and the outlet connection.
36. Adjust the armature end float as follows:
Hold the fuel pump vertical with the adjuster uppermost. Slacken the locknut. Screw the adjuster out until resistance is felt. Screw the adjuster out a quarter of a turn — maintain in this position and tighten the locknut.



FUEL SYSTEM — P.I.

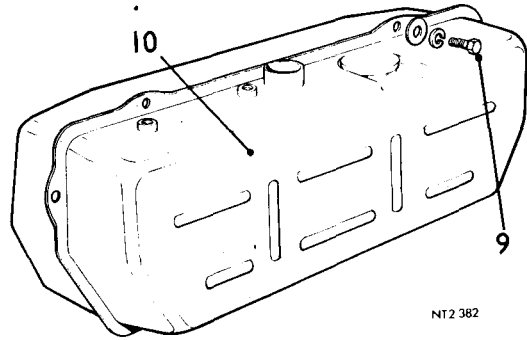
FUEL TANK — P.I.

— Remove and refit

19.55.01

Removing

1. Isolate the battery.
2. Remove the luggage compartment forward trim panel 76.13.17.
3. Drain the fuel tank 19.55.02.
4. Disconnect the pipe-tank to filter inlet 19.40.09.
5. Disconnect the pipe-PRV return to the fuel tank 19.40.13.
6. Disconnect the metering distributor lubrication fuel return to the tank, pipe 19.40.08.
7. Remove the fuel filler to tank hose 19.40.19.
8. Disconnect the tank gauge unit leads.
9. Remove the six bolts complete with plain and spring washers securing the fuel tank to the body.
10. Remove the fuel tank.



Refitting

11. Reverse instructions 3 to 10 inclusive.
12. Reconnect the battery, start the engine and examine for fuel leaks.
13. Refit the luggage compartment forward trim panel 76.13.17.

FUEL TANK — P.I.

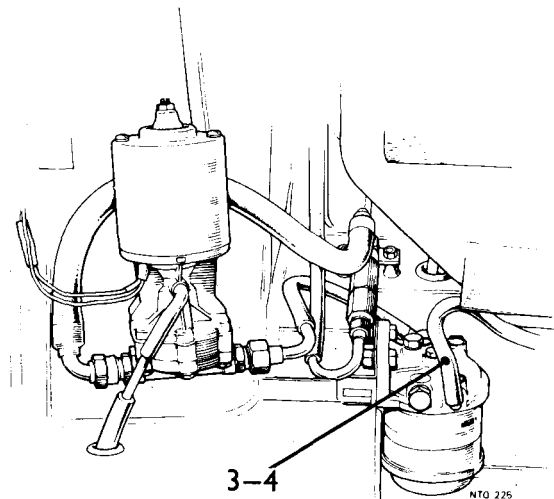
— Drain

19.55.02

WARNING: Extinguish all naked lights before commencing this operation.

1. Remove the spare wheel cover and spare wheel.
2. Place a suitable clean receptacle under the fuel tank gravity outlet point.
3. Disconnect the hose from the filter inlet and allow the fuel to drain.
4. Reconnect the hose to the filter inlet when the tank is empty.
5. Refit the spare wheel and cover.

CAUTION: If the fuel is to be returned to the tank ensure absolute cleanliness whilst draining and during storage, otherwise foreign matter and fluids may cause serious damage to the P.I. fuel system.



FUEL FILLER CAP — P.I.

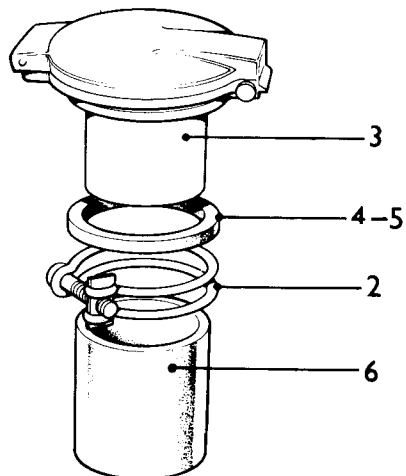
— Remove and refit **19.55.08**

Removing

1. Remove the rear compartment trim panel 76.13.20.
2. Working from the rear compartment slacken the hose clip securing the filler hose to the filler cap extension.
3. Withdraw the filler cap complete assembly.
4. Remove the rubber sealing grommet.

Refitting

5. Assemble the rubber sealing grommet to the filler cap extension.
6. Fit the assembly to the body ensuring that the filler cap extension locates properly in the filler hose.
7. Secure the hose to the filler cap with the hose clip.
8. Refit the rear compartment trim panel 76.13.20.



NT2 706

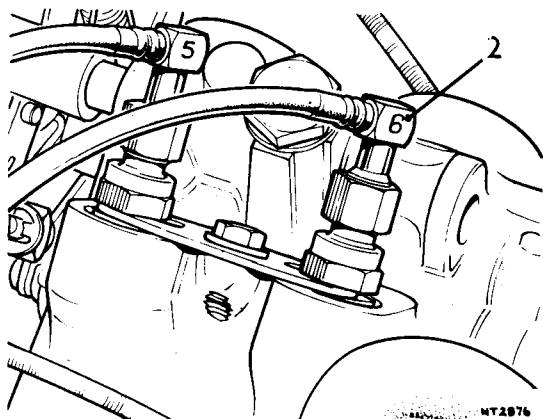
INJECTORS — SET

— Remove and refit **19.60.01**

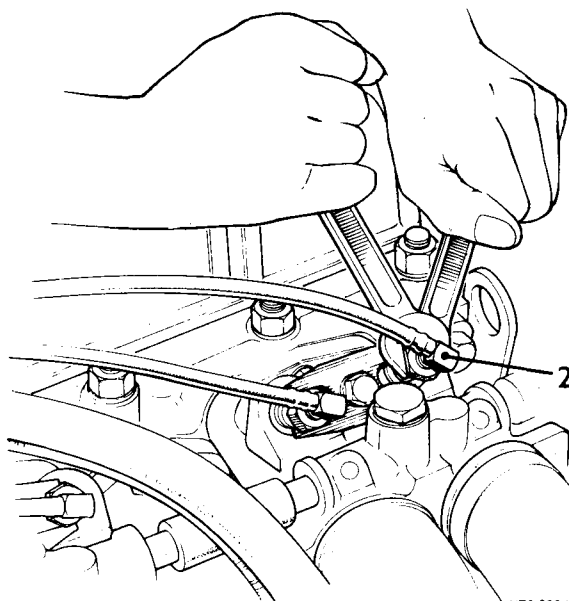
Removing

1. Isolate the battery.
2. Disconnect the fuel pipe at the injector and check identification of the pipe for reassembly.

Note: The pipes are numbered 1 to 6 starting at the front of the engine.



NT2876

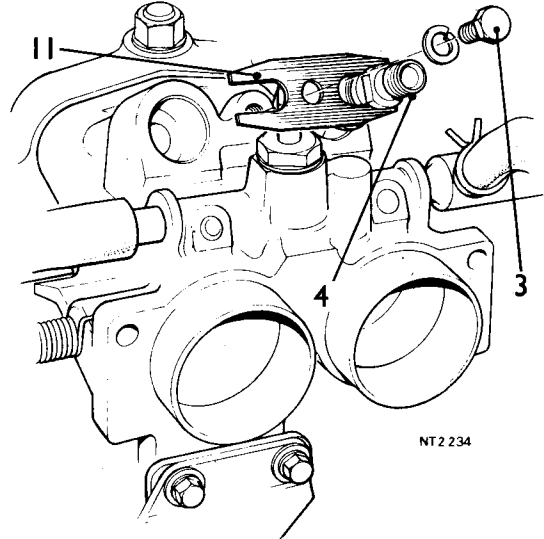


NT2 233A

Continued



- Remove the bolt securing the injector clamp plate to the injector manifold and remove the plate.



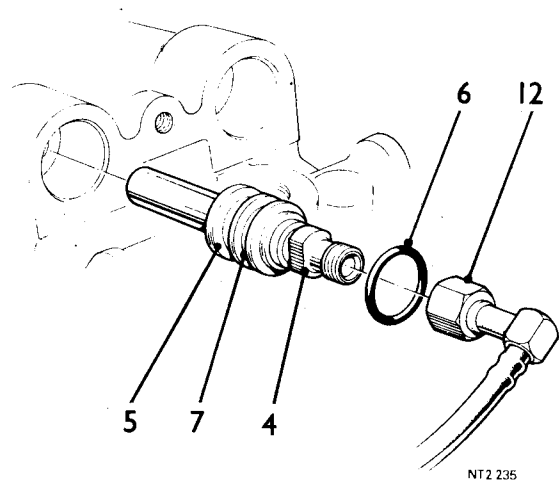
- Grip the injector firmly and pull the injector from the manifold.

NOTE: Whilst the injector should come out of the manifold complete with the insulating block, it may in some instances leave the insulating block behind in the manifold.

- If necessary – see above note – remove the insulating block from the manifold using a suitable tool taking care not to damage the manifold.
- Remove the 'O' ring from the insulating block.

Refitting

- Fit a new 'O' ring to the insulating block, ensuring that it is located in the top groove of the block i.e. the chamfered end of the block.
- Insert the injector into the insulating block ensuring that the chamfered end of the block is uppermost and firmly up against the shoulder of the injector.
- Lubricate the 'O' ring with engine oil – to prevent the ring from being torn – and push the assembly into the manifold location.
- Repeat instructions 3 to 9 on the adjacent injector.
- Refit the clamp plate ensuring that the fork ends locate correctly in the groove below the milled flats of the injector.
- Reconnect the fuel feed pipes.
- Repeat the foregoing instructions on the remaining injectors.
- Reconnect the battery.



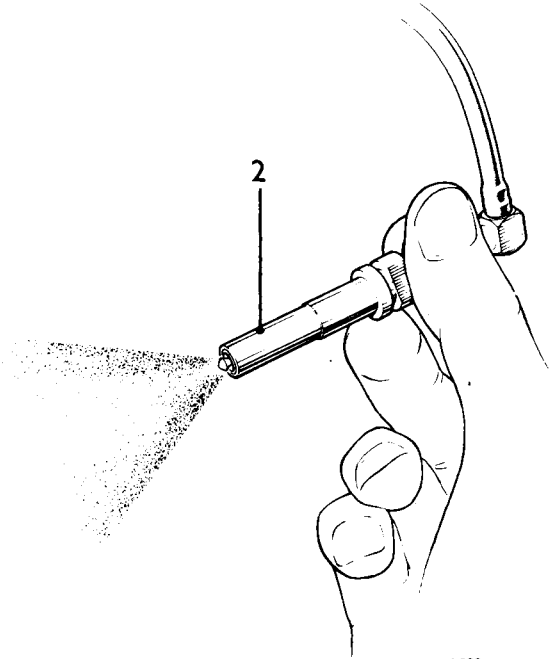
FUEL INJECTORS

– Spray check

19.60.02

Testing without a rig

1. Remove the bolt securing the injector clamp plate to the manifold and remove the plate.
2. Start the engine and pull number one injector out of the manifold and observe the emission of fuel. The check should show a 60° hollow cone spray in regular pulsations. If there is any sign of dribbling or irregular cone formation the injector should be disconnected from its injection pipe – instruction 3, 19.60.01 and cleaned by passing dry filtered air through the injector in the direction of the fuel flow at a pressure of approximately 80 lb/in² (5.624 kg/cm²)
3. Reconnect the injector to its injection pipe – test again and if satisfactory refit to the manifold. If unsatisfactory, renew the injector.
4. Repeat instructions 2 and 3 on number two injector.
5. Refit the clamp plate and secure with the bolt.
6. Repeat instructions 1 to 5 on the remaining injectors and stop the engine.

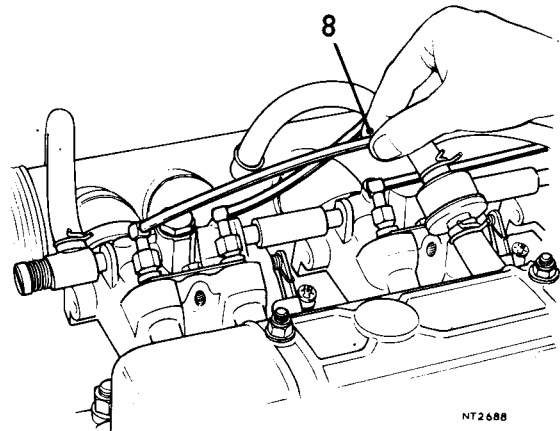


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CAUTION: When checking fuel emission, direct spray into a glass jar to prevent atomized fuel being sprayed over the engine.

NOTE: A possible faulty injector may be identified without the necessity of removing each injector in turn as described in instruction 1 to 6 by following instructions 7 to 9.

7. Remove the cleats holding injection pipes together, and separate them to prevent the transmission of pulsations from one pipe to another.
8. Start the engine and hold each injector pipe in turn between the thumb and forefinger. A regular pulsation should be felt but a weak or missing pulsation suggests a possible faulty injector. No pulsation on two consecutive pipes, in the firing order, indicates that the first injector of the two is blocked.
9. Stop the engine and remove the suspect injector and clean as described in instruction 2. Refit or renew the injector and refit the cleats.



NT2 688

Continued



FUEL SYSTEM — PI

Testing — with a test rig on which the line pressure can be varied from 0 to 100 lbf/in² (0 to 689.50 Kn/m²)

10. Remove each injector in turn 19.60.01.
11. Use Fawley white spirit '100' plus 50 parts per million Santolene 'C' or Shell calibrating fluid 'C' for testing purposes.
12. Flow test the injector at 50 to 60 g.p.h. (227.298 to 272.758 litres per hour) at 100 lbf/in² (689.50 Kn/m²) pressure. During this test the cone or needle must freely vibrate off its seat and the injector must produce an evenly distributed cone of fuel at an angle of 55° to 60°.
13. Flow the injector with an applied pressure of 100 lbf/in² (689.50 Kn/m²) and gradually reduce the pressure to zero. Use compressed air to remove fuel from the nozzle tip. Increase applied pressure to 40 lbf/in² (275.80 Kn/m²) and check the time taken for a droplet of fuel to appear at the injector tip. This should not be less than 60 seconds.
14. Flow the injector with an applied pressure of 100 lbf/in² (689.50 Kn/m²) and gradually reduce the pressure to zero and remove fuel from the nozzle tip with compressed air. Increase the applied pressure gradually and observe the pressure at which the injector sprays an evenly distributed cone of fuel. This should be between 45 and 55 lbf/in² (310.26 to 379.21 Kn/m²).
15. Renew any injectors that fail the above test.

INJECTOR PIPE NUMBER ONE

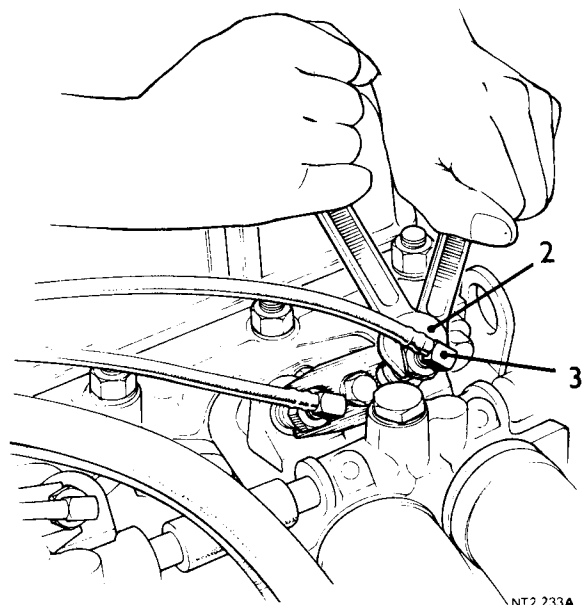
— Remove and refit 19.60.15

Removing

1. Isolate the battery.
2. Using a suitable open ended spanner across the milled flats, hold the injector steady and disconnect the pipe from the injector at the elbow union nut.
3. Check that the pipe is marked for re-assembly, if more than one pipe is to be removed.
4. Disconnect the pipe from the metering unit.

Refitting

5. Reverse instructions 1 to 4 ensuring:-
 - a) A kinked pipe is renewed 19.60.24.
 - b) Absolute cleanliness is observed.



INJECTOR PIPE NUMBER TWO

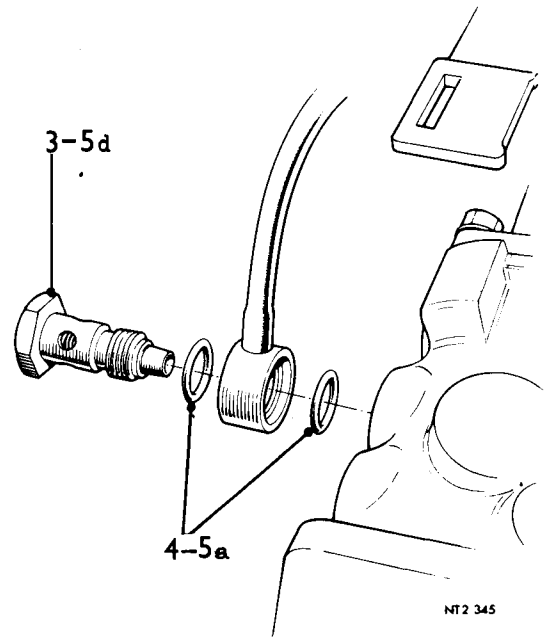
– Remove and refit 19.60.16

Removing

1. Isolate the battery.
2. Remove the fuel metering distributor 19.35.07.
3. Remove the banjo bolt.
4. Remove the two 'O' rings from the banjo connector.

Refitting

5. Reverse instructions 1 to 4 ensuring:-
 - a) New 'O' rings are fitted if originals are faulty.
 - b) Absolute cleanliness is observed.
 - c) A kinked pipe is renewed 19.60.24
 - d) The banjo bolts are tightened to 150 to 200 lb ins.



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INJECTOR PIPE NUMBER THREE

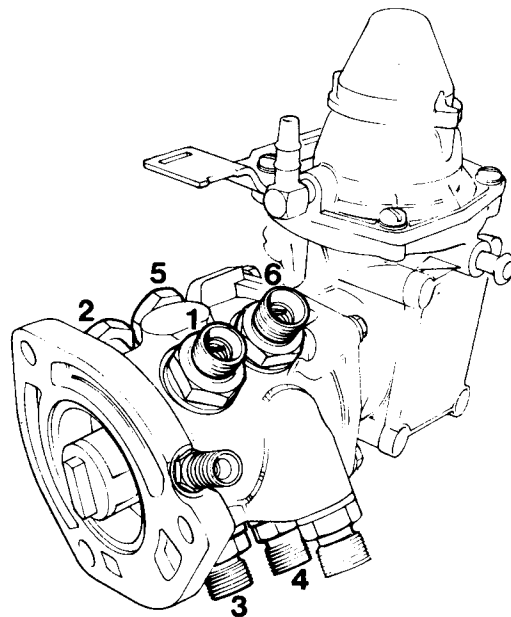
– Remove and refit 19.60.17

Same as 19.60.15.

INJECTOR PIPE NUMBER FOUR

– Remove and refit 19.60.18

Same as 19.60.15 except that for access to the union on the metering distributor number three pipe union on the distributor must be disconnected.



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INJECTOR PIPE NUMBER FIVE

– Remove and refit 19.60.19

Same as 19.60.16

INJECTOR PIPE NUMBER SIX

– Remove and refit 19.60.20

Same as 19.60.15

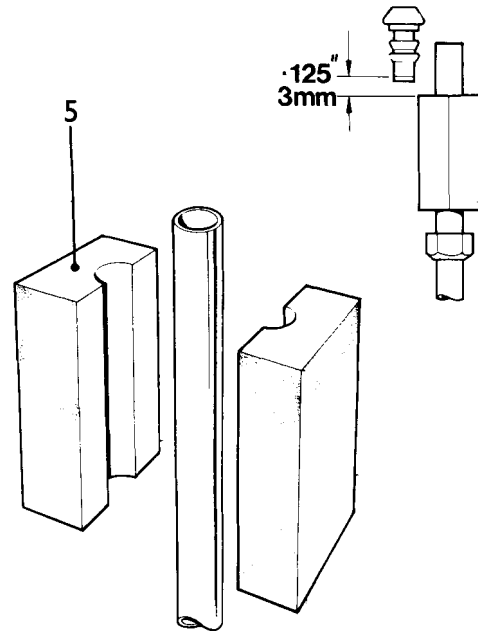


INJECTOR PIPES

— Overhaul

19.60.24

1. Isolate the battery.
2. Remove the metering distributor 19.35.07.
3. Remove the injector pipes from the metering distributor.
4. Cut the old pipes from the union connections.
5. Manufacture a clamp from a Tufnol block 2 in x 1 in x 1 in (50.8 mm x 25.4 mm x 25.4 mm). Drill a hole 0.250 in dia (6.35 mm) through the centre of the block and cut the block in half along the centre line of the hole.
6. Cut the new piping to the required length and clamp it in the block in a vice. Allow approximately 1/8 in (3 mm) protrusion of pipe above the clamp in addition to the length of pipe required to fit to the union connection. If a straight union connection is being fitted to the pipe, place the union nut over the pipe before it is clamped.
7. Locate the union connection into the pipe and gently tap it into position with a soft hammer.
8. Reverse instructions 1 to 3.



NT2 242

PRESSURE RELIEF VALVE

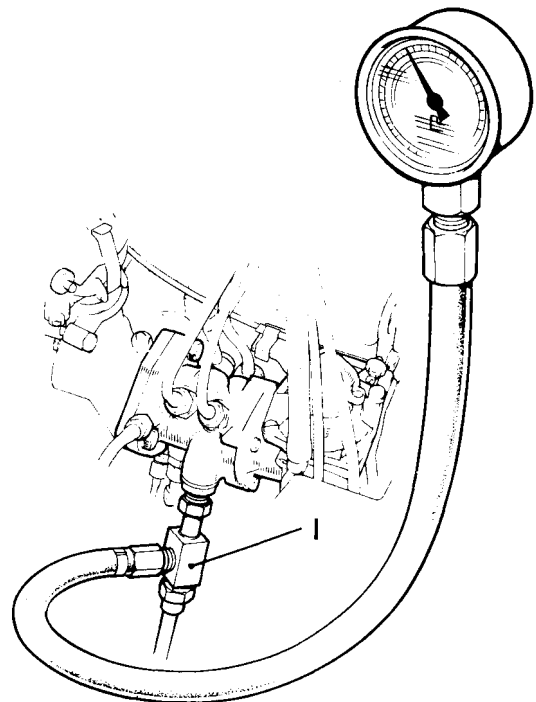
— Pressure test and adjust

19.65.01

Special equipment — 0 to 120 p.s.i. (0 to 850 g/cm²) pressure gauges and hose from the CBW 1A kit, connected to a S351 adaptor.

Test

1. Connect the pressure gauge and adaptor into the fuel line.
2. Switch on the ignition but do not start the engine. Check and note the gauge pressure which should be 106 to 110 p.s.i. (7453 to 7734 g/m²).
3. Switch off the ignition.

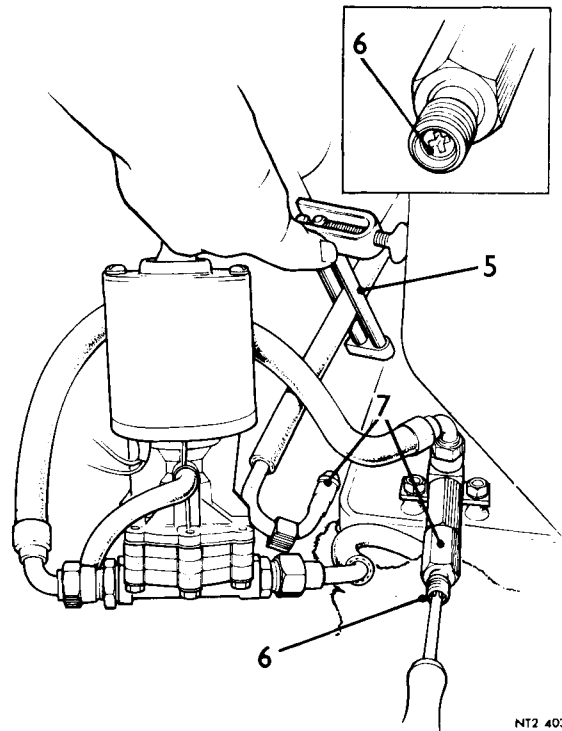


Continued

NT0 645

Adjust

4. Remove the luggage compartment forward trim panel and spare wheel.
5. Clamp the return hose from the pressure relief valve to the fuel tank and disconnect the hose from the pressure relief valve.
6. With a cross recessed screw driver adjust the relief valve by turning the nylon tensioner clockwise to increase the pressure and anti-clockwise to reduce the pressure.
7. Reconnect the hose to the pressure relief valve and release the clamp. Switch on the ignition and observe the pressure.
8. Repeat instructions 5 and 6 until a constant pressure within the limits in instruction 2 is achieved.
9. If a satisfactory pressure cannot be obtained and the pump is known to be working correctly, overhaul the valve 19.65.13 or renew it 19.65.07.
10. Disconnect the pressure gauge and reconnect the fuel line to the metering unit.
11. Refit the luggage compartment trim panel and spare wheel.



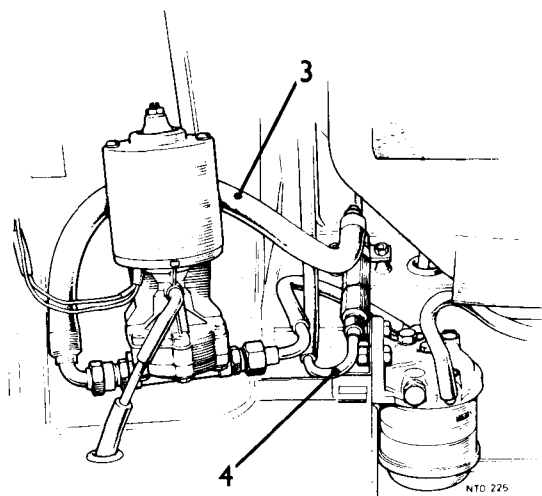
NT2 403

PRESSURE RELIEF VALVE

— Remove and refit 19.65.07

Removing

1. Isolate the battery.
2. Remove the luggage compartment forward trim panel 76.13.17.
3. Disconnect the hose from the pump to the pressure relief valve.
4. Disconnect the pressure relief valve to fuel tank hose.
5. Disconnect from the rear of the 'T' piece the main fuel feed from the pressure relief valve to the fuel metering distributor.

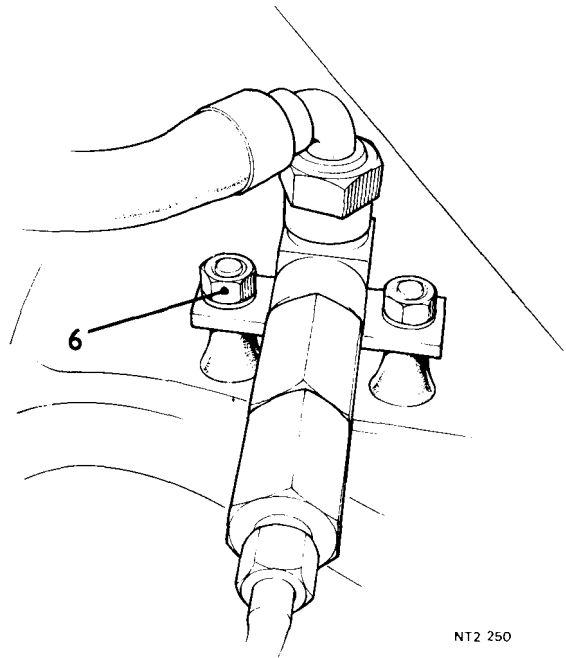


NT0 226

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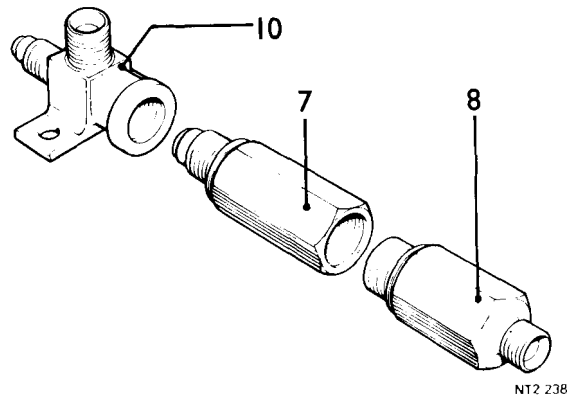
- Remove two nuts complete with spring washers securing the 'T' piece and pressure relief valve assembly to the body and remove the assembly from the car.



- Disconnect the strainer housing complete with the pressure relief from the 'T' piece.
- Remove the pressure relief valve from the strainer housing.

Refitting

- Assemble the pressure relief valve to the strainer housing using a new washer and tightening to 30 – 40 lbf ft (4.1 to 5.5 kgf m).
- Reconnect the strainer housing and pressure relief valve to the 'T' piece using a new washer and tighten to 30 to 40 lbf ft (4.1 to 5.5 kgf m).
- Reverse instructions 1 to 6.



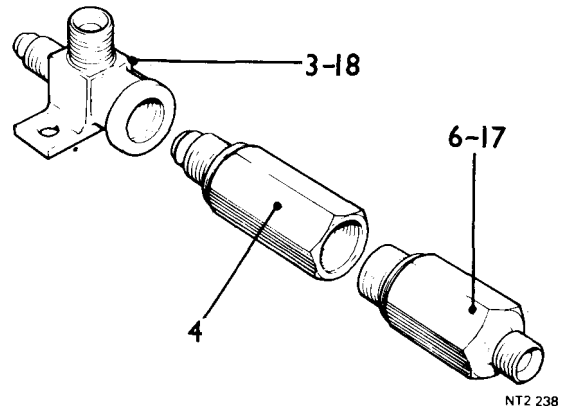
PRESSURE RELIEF VALVE

– Overhaul

19.65.13

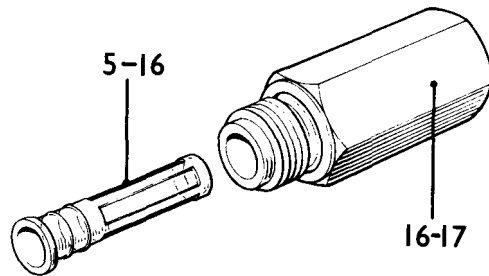
Dismantling

1. Isolate the battery.
2. Remove the pressure relief valve assembly from the car 19.65.07.
3. Disconnect the 'T' piece from the strainer housing.
4. Remove the strainer housing from the pressure relief valve.
5. From the inside of the strainer housing carefully press out the strainer.
6. From the pressure relief valve body remove:-
 - a. The circlip
 - b. The distance sleeve
 - c. The valve and plunger
 - d. The spring
 - e. Plain washer
7. Using a cross recessed screw driver remove from the back of the valve body the nylon spring tensioner.



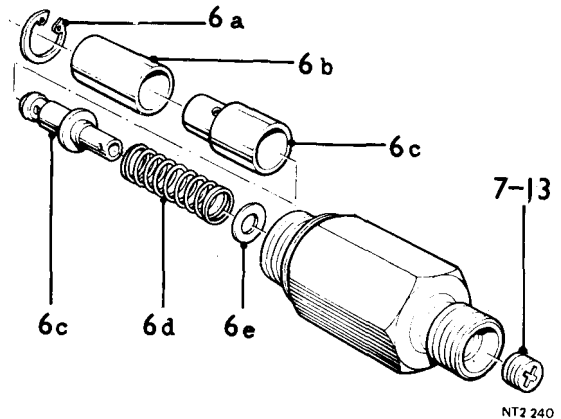
Examination

8. Examine carefully each part of the valve and body and check for wear, pitting and corrosion.
9. Ensure that the plunger moves freely in its housing and the housing is free to move in the valve body.
10. Examine the spring and check for cracks.
11. Examine the strainer and housing and renew the strainer if damaged.



Reassembling

12. Wash all the parts in petrol and dry with an air line. DO NOT USE CLOTH.
13. Screw the nylon spring tensioner into the back of the valve body.
14. Insert the valve plunger in its housing.
15. Assemble the remaining components in the reverse order in instruction 6.
16. Insert the strainer into the strainer housing.
17. Assemble the valve body to the strainer housing using a new washer and tighten to 30 to 40 lbf ft (4.1 to 5.5 kgf m).
18. Fit the 'T' piece using a new washer and tighten as in instruction 17.
19. Reverse instructions 1 and 2.
20. Pressure test and adjust the pressure relief valve – 19.65.01



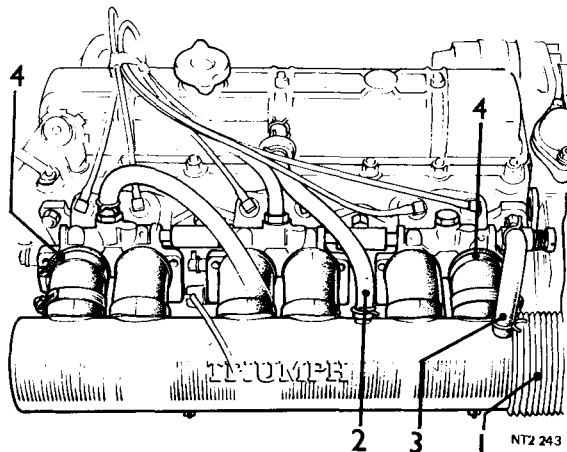
AIR INTAKE MANIFOLD

— Remove and refit

19.70.01

Removing

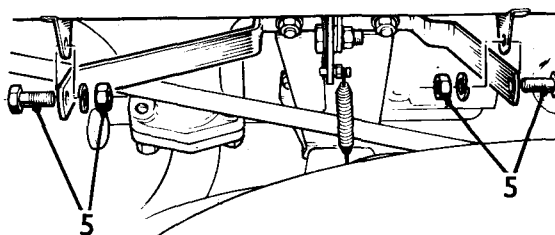
1. Remove the hose connecting the air intake manifold to the air cleaner.
2. Disconnect the engine breather hose.
3. Disconnect the air valve hose.
4. Slacken the hose clips on numbers one and six intakes.



5. Remove two nuts and bolts securing the air intake manifold to the engine brackets.
6. Remove the air intake from the induction manifold.

Refitting

7. Reverse instructions 1 to 6.



FUEL SYSTEM OPERATIONS (TWIN CARBURETTER)

Air cleaner — remove and refit	19.10.01C
— renew element	19.10.08C
Carburetters — car set — remove and refit	19.15.11C
— tune and adjust	19.15.02C
— complete with inlet manifold — remove and refit	19.15.15C
Carburetter — each — overhaul and adjust	19.15.17C
Diaphragm — remove and refit	19.15.35C
Fault diagnosis	19.00.01C
Float chamber levels — check and adjust	19.15.32C
needle valve — remove and refit	19.15.24C
Fuel filler cap — remove and refit	19.55.08C
main filter — remove and refit	19.20.08C
pump — overhaul	* 19.45.15C **
— remove and refit	19.45.08C
— test on vehicle	19.45.01C
filter — clean	19.45.05C
tank — drain	19.55.02C
— remove and refit	19.55.01C
Hose — filler to tank — remove and refit	19.40.19C
Mixture control cable — inner — remove and refit	19.20.14C
— complete — remove and refit	19.20.13C
Petrol pipe — main line — centre section — remove and refit	19.40.03C
— engine end section — remove and refit	19.40.04C
— rear section — remove and refit	19.40.02C
Throttle Linkage — remove and refit	19.20.07C
Pedal and Counter shaft — remove and refit	19.20.01C



EMISSION CARBURETTER — FAULT DIAGNOSIS

NOTE: Before undertaking extensive carburetter servicing it is recommended that other engine factors and components such as cylinder compressions, valve clearance, distributor, sparking plugs, air intake temperature control system, etc., are checked for correctness of operation.

SYMPTOM	CAUSE	ACTION
1. Poor idle quality	a. Air leakage on induction manifold joints.	Remake joints as necessary. Check idle carbon monoxide level with CO meter.
	b. Throttles not synchronized.	Re-balance carburetters and re-set linkage.
	c. Air valve or valves sticking in piston guide-rods.	Clean air valve rods and guides and reassemble. Check piston free movement by hand unit should move freely and return to carburetter bridge with an audible click.
	d. Partially or fully obstructed float-chamber or diaphragm ventilation holes.	Check that gasket(s) are not causing obstruction or piping obstructed.
	e. Incorrect fuel level caused by maladjusted float assemblies or worn or dirty needle valve.	Reset float heights and clean or replace needle valves worn.
	f. Metering needle incorrectly fitted or wrong type of needle fitted.	Ensure shoulder of needle is flush with face of air valve and that needle bias is correct.
	g. Diaphragm incorrectly located or damaged.	Check location with air valve cover removed, piston depression holes should be in line with and face towards the throttle spindle. Renew diaphragm with correct type if damage is in evidence.
	h. Leakage from ignition retard unit pipe connections.	Re-make connections and re-check ignition settings.
	i. Temperature compensator faulty.	With engine and carburetter cold, check that compensator cone is seated, and free to move off seat, If any doubt exists, replace unit with new assembly.
	j. After considerable service leakage may occur at throttle spindle or secondary throttle spindles	Replace spindle seals or spindles as required.

continued



SYMPTOM	CAUSE	ACTION
2. Hesitation or 'flat spot' <i>a, b, c, d, e, f, g</i> and <i>h</i> plus:	Piston damper inoperative	Check damper oil level and top up with specified oil. re-check damper operation by raising piston by hand whereupon resistance should be felt.
	Air valve spring missing or wrong part fitted	Check correct grade of spring and refit as required.
	Ignition timing incorrect	Check and reset as required.
	Throttle linkage operation incorrect	Check operation of linkage between carburettors and operation of secondary throttle links. reset or replace parts as required.
3. Heavy fuel consumption 1 and 2 plus:	Leakage from the fuel connections, float-chamber joints or sealing plug 'O' rings	Replace gaskets and 'O' rings as required.
4. Lack of engine braking	Faulty by-pass valve	Replace by-pass valve with new unit.
	Sticking throttles	Check throttle operation and reset as required.
	Ignition retard unit inoperative	Check ignition setting at idle and ensure correct functioning of retard system.
5. Lack of engine power	Damaged diaphragm	Inspect, and replace if incorrectly fitted or damaged.
	Low fuel flow	Check discharge from fuel pump. Inspect needle valve seating.

NOTE: To ensure compliance with exhaust emission legislative requirements the following items **MUST NOT** be changed or modified in any way:

The fuel jet assembly. the air valve. the depression cover. the position of the fuel metering needle.

The following items must not be adjusted in service but should be replaced completely by factory-set units.

The temperature compensator. the air valve return spring. the by-pass unit. the starter assembly.

FUEL SYSTEM — TC

AIR CLEANER

— Remove and refit

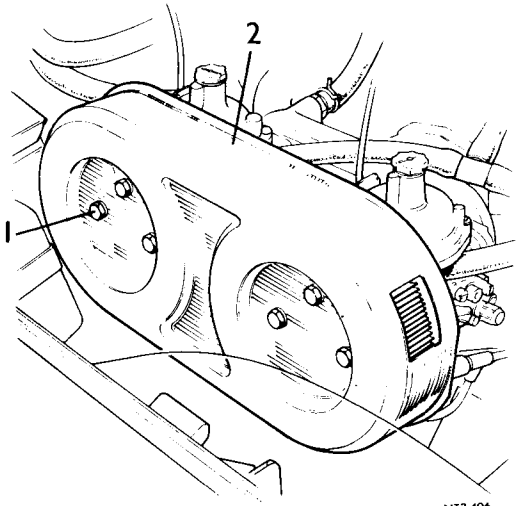
19.10.01

Remove

1. Remove the six bolts securing the air cleaner assembly to the carburetter intakes.
2. Lift off the air cleaner complete with gaskets.

Refitting

3. Reverse instructions 1 and 2 ensuring
 - a) A new gasket is fitted between the air cleaner and carburetter intakes.
 - b) The bolts are tightened evenly to 5 to 8 lbf ft (0.7 to 1.1 kgf m).



AIR CLEANER

— Renew elements

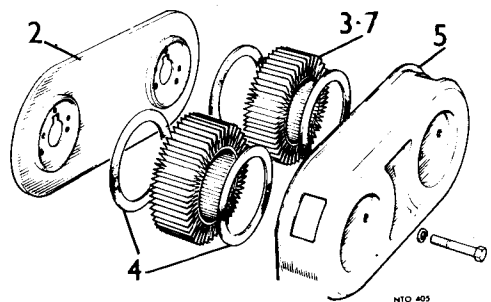
19.10.08

Dismantling

1. Remove the air cleaner from the carburetter intakes 19.10.01.
2. Remove the back plate from the cover.
3. Remove and discard the paper elements.
4. Examine and if unsatisfactory, discard the four sealing rings.
5. Clean the casing assembly.

Re-assembling

6. Place two sealing rings in position on the back plate location.
7. Position the new paper elements on the back plate ensuring that they locate properly.
8. Position remaining two sealing rings on the cover locations and place the cover over the back plate. Ensure that the elements locate correctly.
9. Refit the air cleaner 19.10.01.



CARBURETTOR — CAR SET

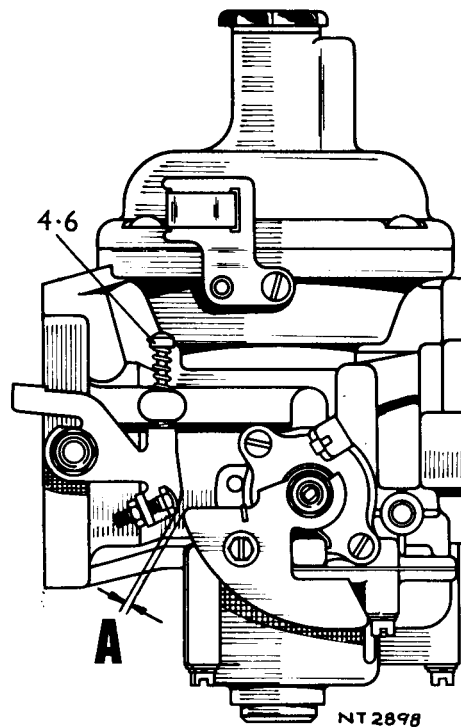
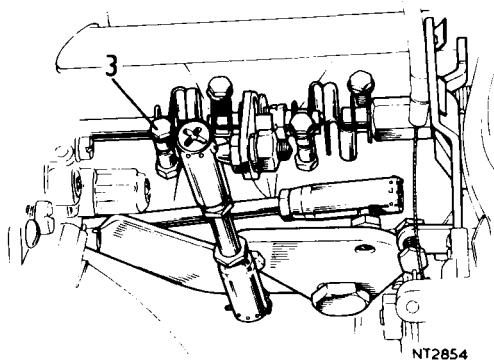
— Tune and adjust

19.15.02

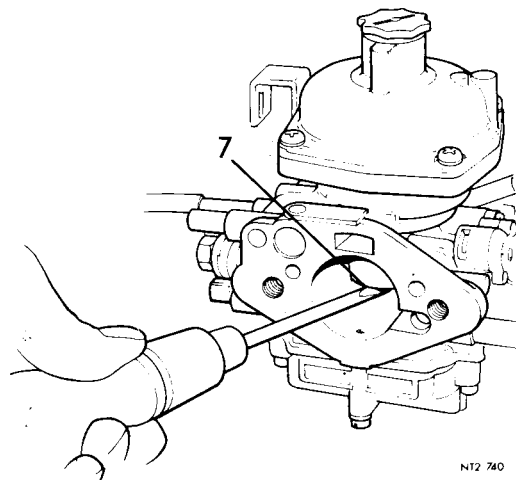
Special tool: S353

Mixture checking

1. Start the engine and run until normal operating temperature is achieved.
2. Stop the engine and remove the air cleaner 19.10.01.
3. Slacken the throttle interconnection, spring coupling nuts and bolts.
4. Unscrew the slow running screw on both carburettors.
5. Ensure that the mixture control knob on the fascia is pushed fully home and that there is clearance 'A' between the fast idle screw and the cam on both carburettors.
6. Turn both throttle adjusting screws approximately 1 1/2 turns to open the butterflies to give a datum setting.



7. Start the engine and lift both carburettor pistons in turn approximately 1/4 in (6 mm) and note the engine response as follows.
 - a) Immediate increase in r.p.m — rich mixture
 - b) Decrease in r.p.m. or stall — weak mixture
 - c) Slight increase in r.p.m. then return to normal — correct mixture.
8. Carry out a C.O. level check.



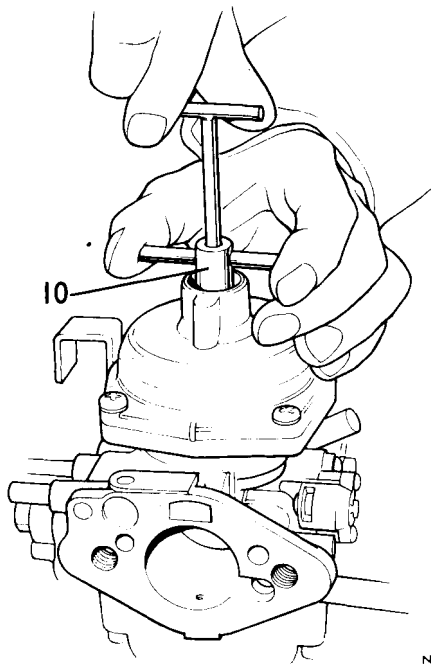
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Mixture adjusting

NOTE: If the mixture in both carburetters is correct ignore the following instructions 9 to 11.

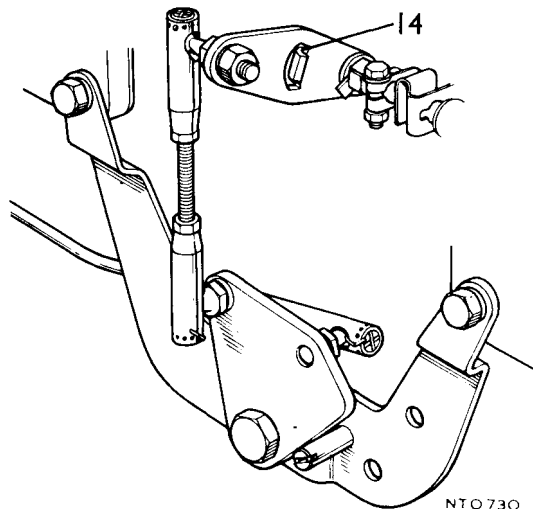
9. Remove the piston dampers from both carburetters or the damper from the carburetter that requires adjustment.
10. Insert the special jet adjusting tool and turn it clockwise to enrich or anti-clockwise to weaken the mixture and top-up dash pot and refit the damper.
11. Repeat instructions 7 and 8 until the mixture is correct.
12. Top up the piston dash-pot and refit the damper.



NT12 741

Idle speed setting and balancing

13. Using a synchro check meter against both carburetter intakes in turn, adjust the fast idle screws to give an r.p.m. of 800 to 850 whilst maintaining an identical air flow reading from both carburetters.
14. Stop the engine, check that the relay lever is against its stop and insert a $\frac{3}{32}$ in (2.4 mm) drill shank between the tongue and the slot of the interconnection lever — and whilst holding it in this position tighten the interconnection spring coupling nuts and bolts. Remove the drill.
15. Start the engine and increase the r.p.m. to 1500 and check the balance with the synchro check meter and if necessary adjust the idle screws to achieve an equal reading.
16. Recheck the balance at the correct idle speed.

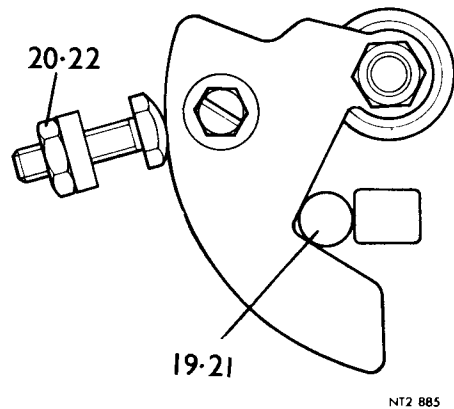
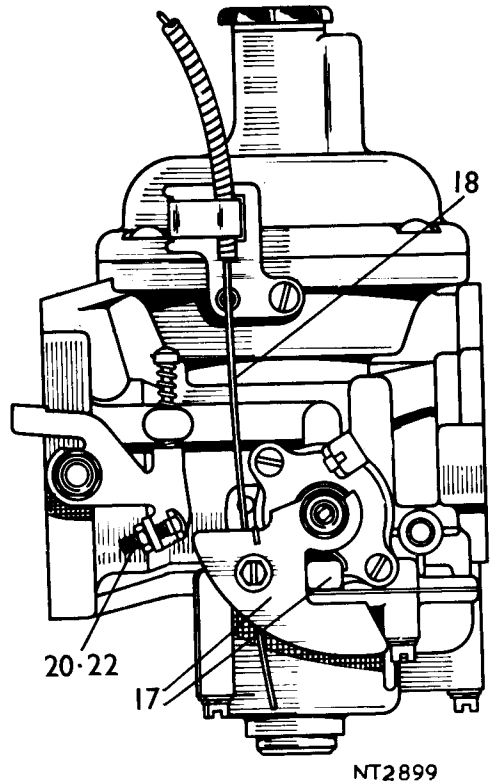


NT0730

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Fast idle speed setting

17. Check that the mixture control cam lever on both carburetters returns to its stop.
18. Ensure that the mixture control cables are so adjusted that they are not slack or too tight.
19. Pull the mixture control knob out on the fascia and insert a 5/16 in (7.937 mm) diameter bar between the cam and its stop on both carburetters in turn.
20. Slacken the fast idle screw lock nut on both carburetters and adjust the screws so that they just touch their respective cams.
21. Remove the bar, push the control knob home and pull the control knob out again to check that the setting gives a fast idle speed of 1100 – 1300 r.p.m. Make any necessary adjustments to the fast idle screw to achieve this setting whilst using the synchro check meter to maintain the carburetters in balance.
22. Tighten the lock nuts, stop the engine, push the control knob fully home and refit the air cleaner.



DATA

Idle speed	800 – 850 r.p.m.
Fast idle speed	1100 – 1300 r.p.m.



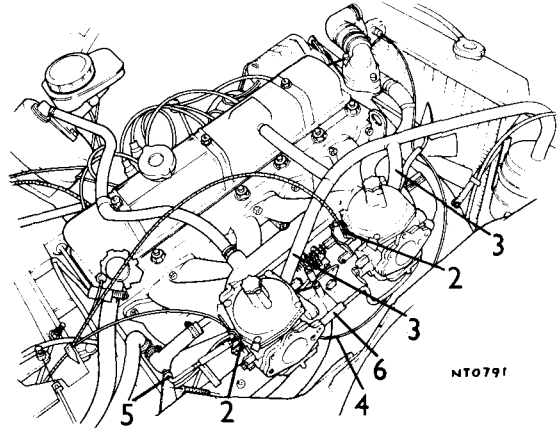
CARBURETTERS — CAR SET

— Remove and refit

19.15.11

Removing

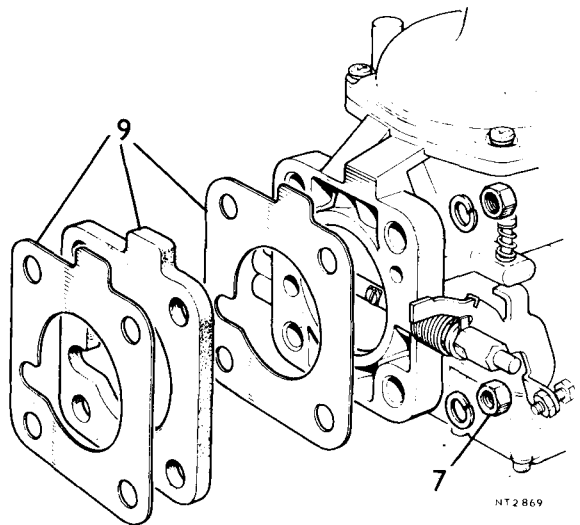
1. Remove the air cleaner assembly 19.10.01.
2. Disconnect the mixture control cables from both carburetters.
3. Disconnect the emission hoses from the carburetters.
4. Disconnect the vacuum pipe to the thermo static vacuum switch at the rear carburetter.
5. Disconnect the throttle linkage at the countershaft.
6. Disconnect the main fuel supply pipe to the carburetter.



7. Remove the eight nuts and spring washers (four per carburetter) securing the carburetters to the inlet manifold.
8. Withdraw the carburetters complete with the linkage.
9. Remove the gaskets from the carburetter intakes.

Refitting

10. Fit new gaskets to both the inlet manifold intakes.
11. Reverse instructions 1 to 8.



CARBURETTERS COMPLETE WITH INLET MANIFOLD

— Remove and refit **19.15.15**

Removing

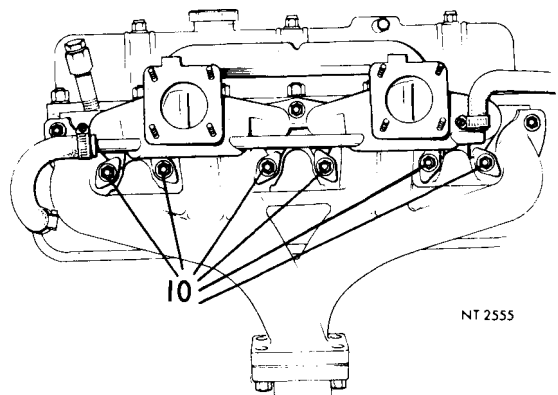
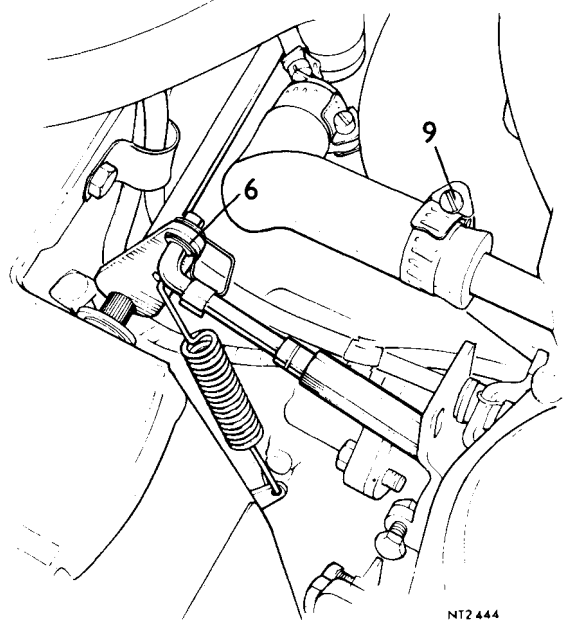
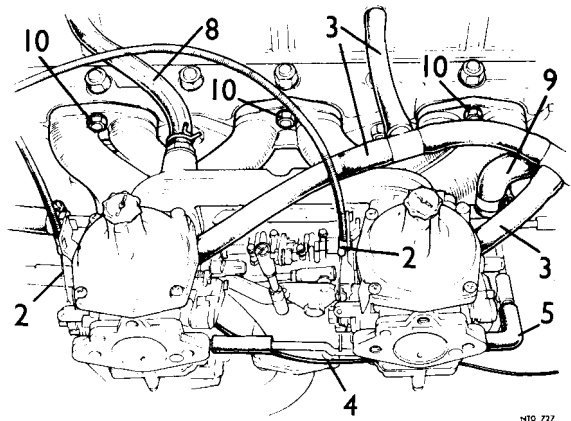
1. Remove the air cleaner 19.10.01.
2. Disconnect the mixture control cables from both carburetters.
3. Disconnect the emission pipes from the carburetters and rocker cover.
4. Disconnect the vacuum pipe at the rear carburetter to the thermo static vacuum switch.
5. Disconnect the main fuel supply pipe to the carburetters.
6. Disconnect the throttle linkage at the countershaft.
7. Partially drain the cooling system.
8. Disconnect brake servo vacuum hose at the inlet manifold.
9. Disconnect the manifold heater hoses at the front and rear of the manifold.
10. Remove the three nuts and spring washers securing the inlet manifold to the cylinder head and the six nuts and plain washers securing the inlet and exhaust manifold to the cylinder head.
11. Withdraw the carburetters complete with the inlet manifold.

Refitting

12. Clean the manifold mating faces and offer up and secure the manifold to the cylinder head with the three nuts and spring washers and the six nuts and plain washers.

NOTE: If the manifold gasket is in any way damaged it should be replaced 30.15.01.

13. Reverse instructions 1 to 9.



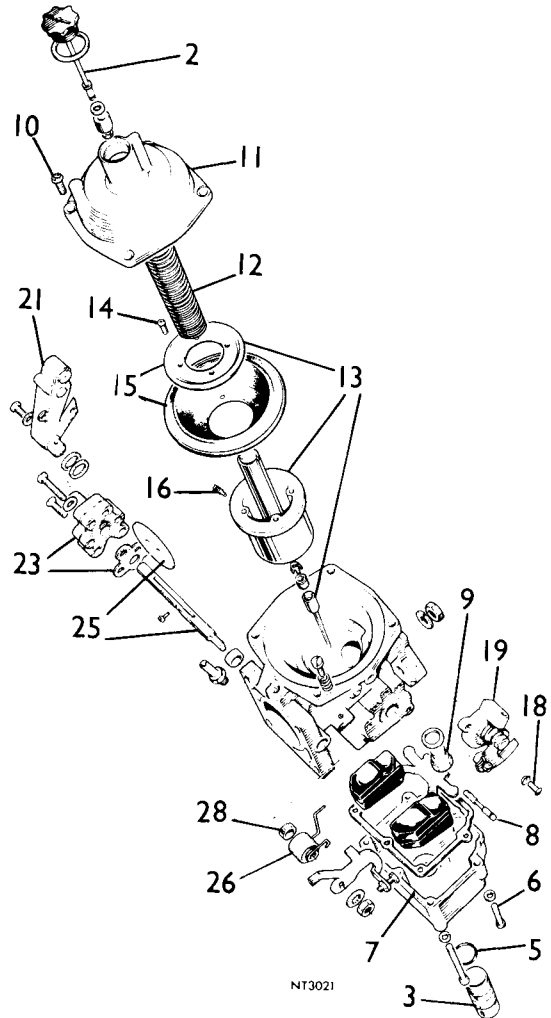
CARBURETTOR — EACH

— Overhaul and adjust

19.15.17

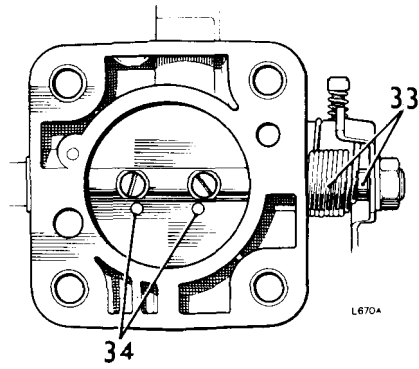
Service tool S353

1. Remove carburettors 19.15.11.
2. Remove damper.
3. Remove bottom plug. (lever-out).
4. Drain carburettor of oil and fuel.
5. Remove 'O' ring from plug.
6. Remove six screws securing float-chamber to body.
7. Remove float-chamber.
8. Remove float assembly by gently prising spindle from clip each end.
9. Remove needle valve.
10. Remove four screws securing top cover to body.
11. Remove top cover.
12. Remove spring.
13. Remove air valve assembly.
14. Remove four screws securing diaphragm and retaining ring to air valve assembly.
15. Remove diaphragm and retaining ring.
16. Slacken grub screw in side of air valve.
17. Insert tool S353 in stem of air valve, turn anticlockwise approximately two turns, withdraw needle and housing by pulling firmly and straight with the fingers.
18. Remove two screws securing starter box to body.
19. Remove starter box.
20. Remove two screws securing the temperature compensator to body.
21. Remove the temperature compensator and two rubber washers of different diameters.
22. Remove three (slotted) screws securing the by-pass valve to body.
23. Remove the by-pass valve and gasket.
24. Remove two screws securing butterfly to spindle.
25. Turn spindle, remove butterfly.
26. Release spindle return spring.
27. Withdraw spindle and spring.
28. Remove spindle seals from body by hooking out with small screwdriver.
29. Wash all components in clean fuel, allow to drain dry or use compressed air. Place all components on a clean surface. Discard all seals and gaskets.
30. Examine the condition of all components for wear, paying special attention to needle and seat, air valve and diaphragm which should be renewed unless in exceptionally good condition.
31. Use clean compressed air to blow through all ports, needle valve and starter box.



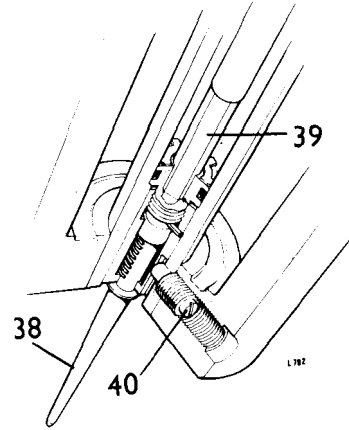
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32. Fit spindle seals to body, tapping gently into position, with metal casing of seals flush with body of carburetter.
33. Insert spindle, loading and locating spindle return spring whilst so doing.
34. Insert butterfly with two protruding spots, outboard and below spindle, tighten screws.

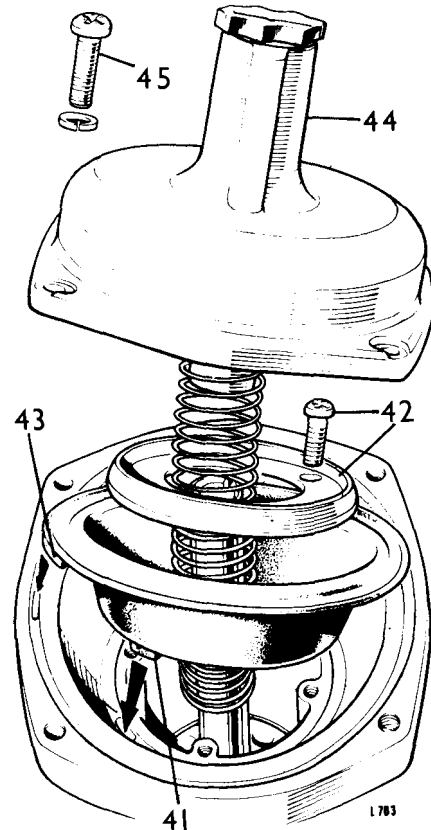


35. Fit starter box, tighten screws.
36. Fit by-pass valve and gasket, tighten screws.
37. Fit temperature compensator, tighten screws.
38. Insert needle housing assembly into the bottom of the air valve.
39. Fit tool S353, turning clockwise to engage threads of needle valve assembly with adjusting screw; continue turning until slot in needle housing is aligned with grub screw.
40. Tighten grub screw.

NOTE: The grub screw does not tighten on the needle housing but locates into the slot. This ensures that, during adjustment, the needle will remain in its operating position, i.e. biased, by a spring in the needle housing, towards the air cleaner side of the carburetter.



41. Fit diaphragm, locating inner tag into recess in air valve.
42. Fit diaphragm retaining ring; secure with four screws.
43. Fit air valve assembly, locating outer tag and rim of diaphragm in complementary recesses in carburetter body.
44. Fit carburetter top cover with bulge on housing neck towards air intake.
45. Fit and evenly tighten top cover screws.

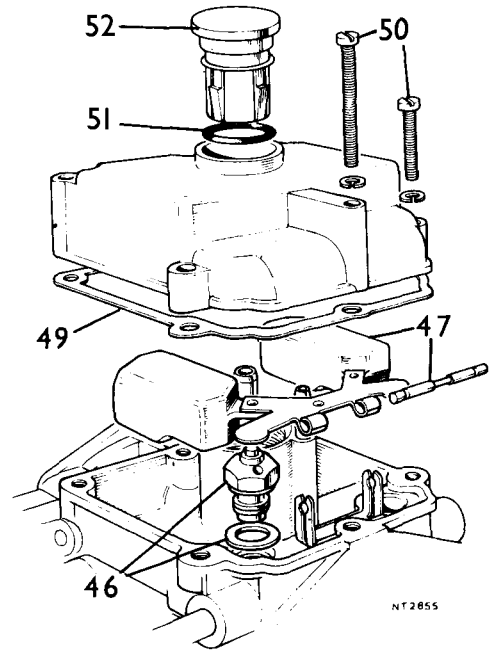


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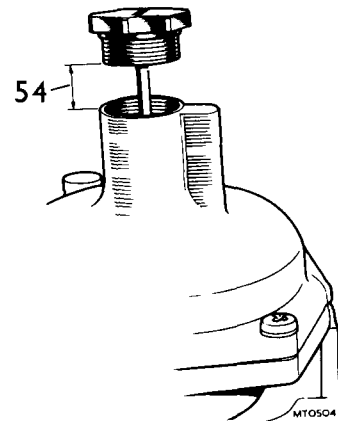
46. Fit needle valve and sealing washers; tighten.
47. Fit float assembly by levering pivot pin gently into position.
48. Check float height by measuring the distance between the carburettor gasket face and the highest point of the floats. See 19.15.32.

NOTE: The float heights must be equal and set to 0.625 to 0.672 in (16 to 17 mm). Adjust by bending tabs ensuring that tab sits on needle valve at right angles.

49. Fit float-chamber gasket.
50. Fit float-chamber, secure with six screws.
51. Fit 'O' ring to bottom plug.
52. Fit bottom plug. (Push fit).



53. Fit carburetters 19.15.11.
54. Fill carburetter damper dashpot with seasonal grade of engine oil until, using the damper as a dipstick, the threaded plug is 0.25 in (6 mm) above the dashpot when resistance is felt.
55. Fit damper.
56. Tune carburetters 19.15.02.



FLOAT CHAMBER NEEDLE VALVE

– Remove and refit

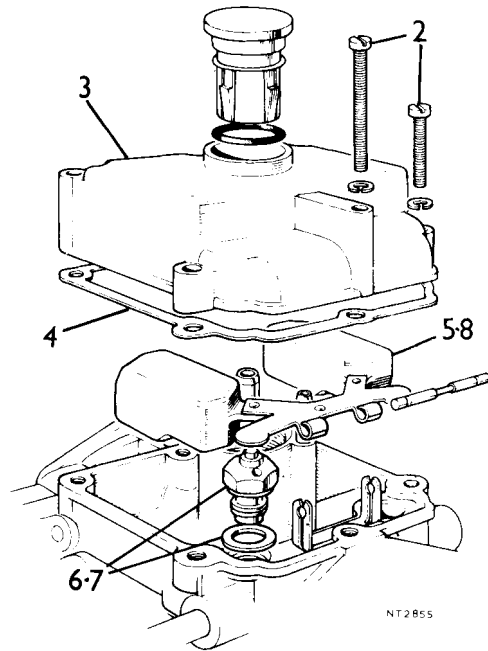
19.15.24

Removing

1. Remove the carburetters 19.15.11.
2. Remove the six screws securing the float chamber to the body.
3. Remove the float chamber.
4. Remove the gasket.
5. Remove the float assembly by gently prising the spindle from the locating clips.
6. Remove the needle valve and washer.

Refitting

7. Fit the needle valve and renew the washer.
8. Fit the float assembly.
9. Check and if necessary, adjust the height of both floats. Instruction 5, 19.15.32.
10. Renew the gasket and refit the float chamber.
11. Refit the carburetters.



FLOAT CHAMBER LEVELS

– Check and adjust

19.15.32

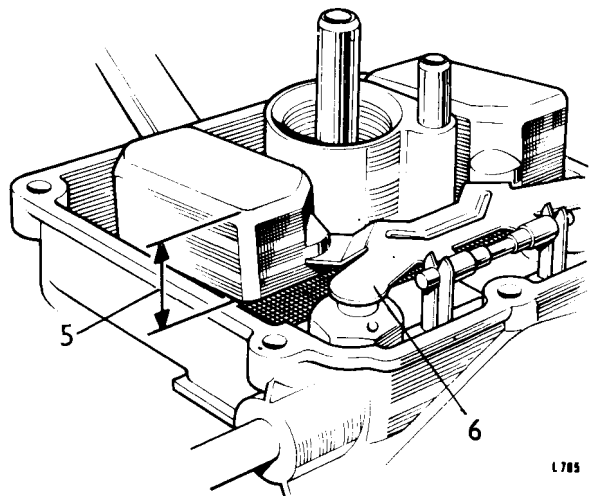
Check

1. Remove the carburetters 19.15.11.
2. Remove the six screws securing the float chamber to the body.
3. Remove the float chamber.
4. Remove the gasket.
5. With the carburetter in the inverted position check the distance between the gasket face on the carburetter body to the highest point of each float.

NOTE: The height of both floats must be the same i.e. 0.625 to 0.627 in (16 to 17 mm).

Adjust

6. Bend the tab that contacts the needle valve but ensure that it sits at right angles to the valve to prevent the possibility of sticking.
7. Fit a new gasket and reverse instructions 1 to 3.



DIAPHRAGM

— Remove and refit

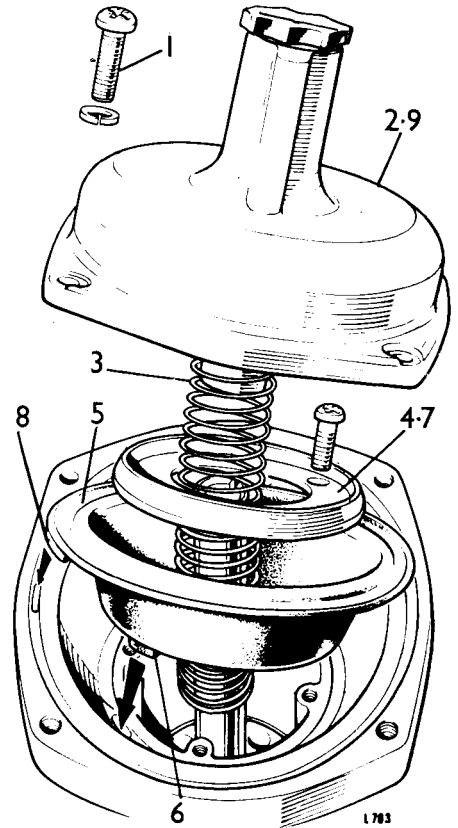
19.15.35

Removing

1. Remove the four screws securing the top cover to the carburettor body.
2. Lift off the top cover.
3. Remove the diaphragm spring.
4. Remove the diaphragm retaining plate.
5. Remove the diaphragm.

Refitting

6. Fit the diaphragm, locating the inner tag in the air valve recess.
7. Fit the retaining plate and ensure the correct diaphragm seating and tighten the screws.
8. Locate the diaphragm outer tag in the recess in the carburettor body.
9. Fit the top cover and evenly tighten the screws.



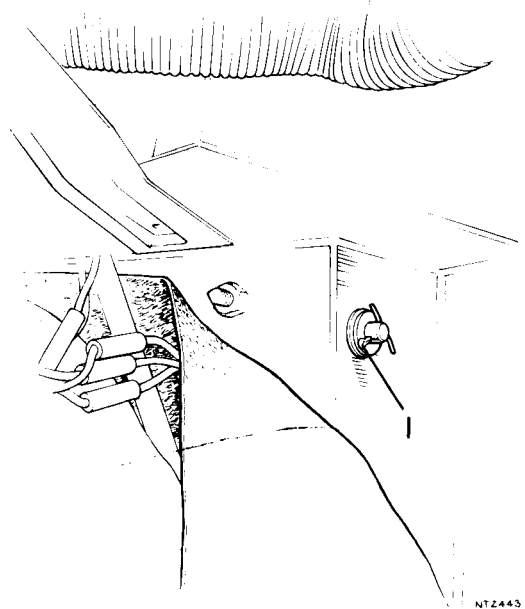
THROTTLE PEDAL AND COUNTER SHAFT

— Remove and refit

19.20.01.

Removing

1. Working inside the car, pull back the carpet trim on the R.H. side of the bulkhead and remove the split pin and washer.

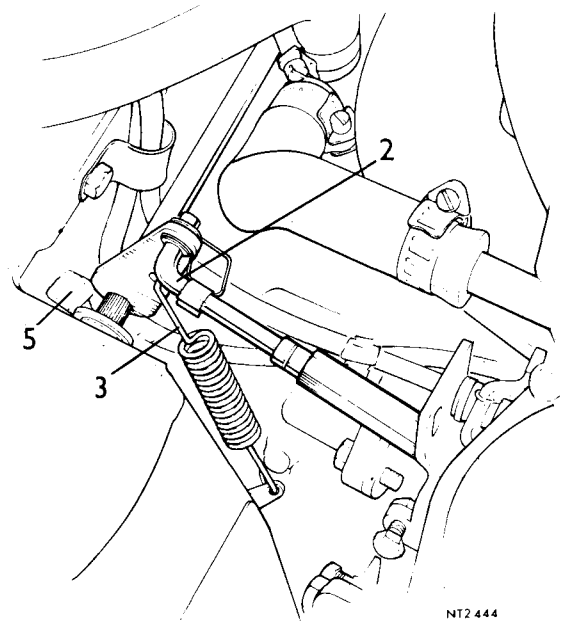


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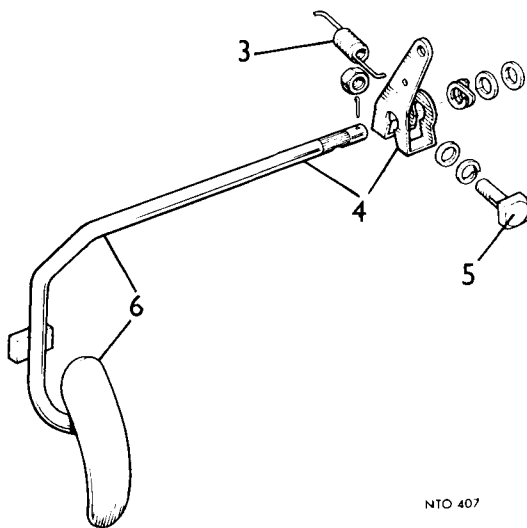
2. Within the engine compartment, disconnect the horizontal control rod from the countershaft lever.
3. Release the countershaft lever return spring.
4. Mark for reassembly the relationship of the countershaft to the lever.
5. Remove the countershaft lever clamp bolt and nut and remove the lever from the shaft together with the double spring and plain washer.
6. From inside the car, remove the throttle pedal and countershaft.
7. If necessary, remove the bushes in the bulkhead.

Refitting

8. Fit new bushes to the bulkhead if necessary.
9. Reverse instructions 1 to 6.



NT2 444



NT0 407

FUEL MAIN FILTER

— Remove and refit

19.20.02

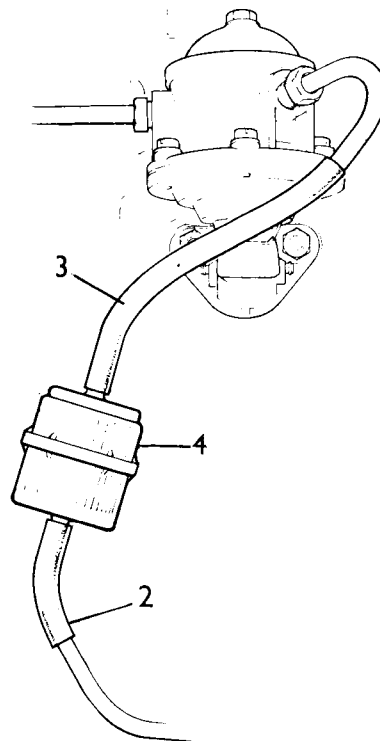
Removing

1. Clamp the inlet hose to the filter.
2. Disconnect the filter from the main line pipe.
3. Disconnect the filter from the inlet pipe to the pump and remove the filter.

****NOTE:** On later engines "Corbin" wire clips are fitted to secure the fuel pipe connections. New clips should be fitted when reassembling the fuel line.**

Refitting

4. Fit a new filter ensuring that the side of the filter marked 'in' faces the direction of flow.
5. Remove the clamp from the inlet pipe.



NT2 733



THROTTLE LINKAGE

— Remove and refit

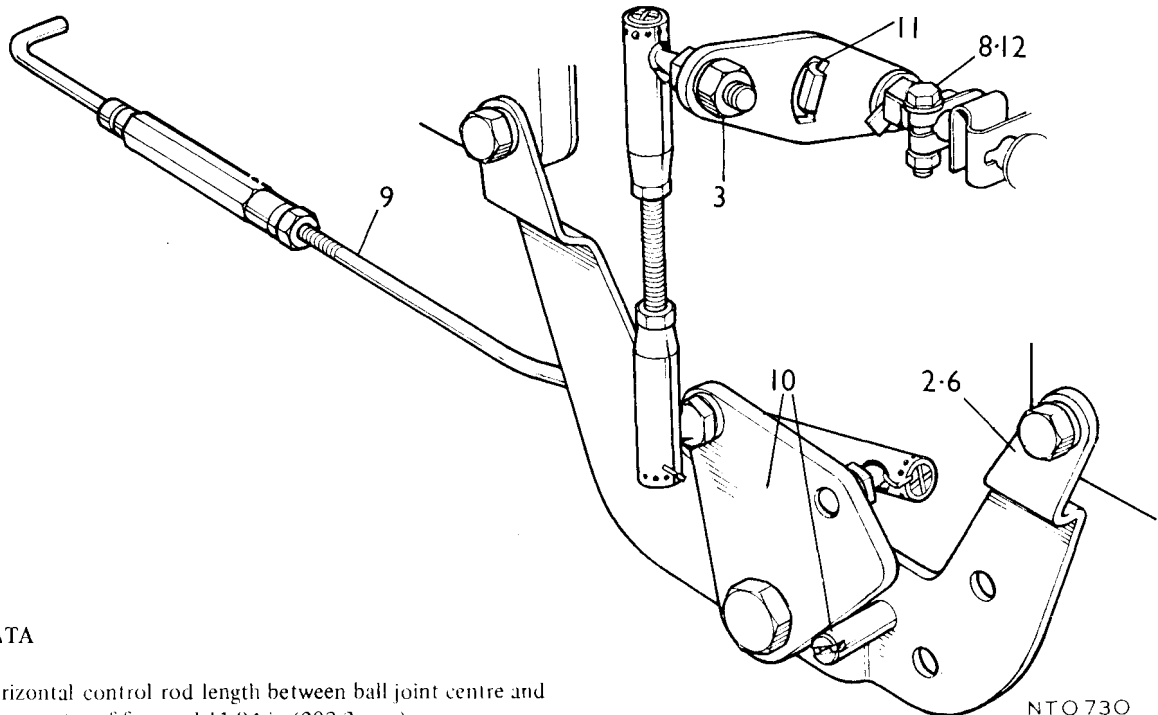
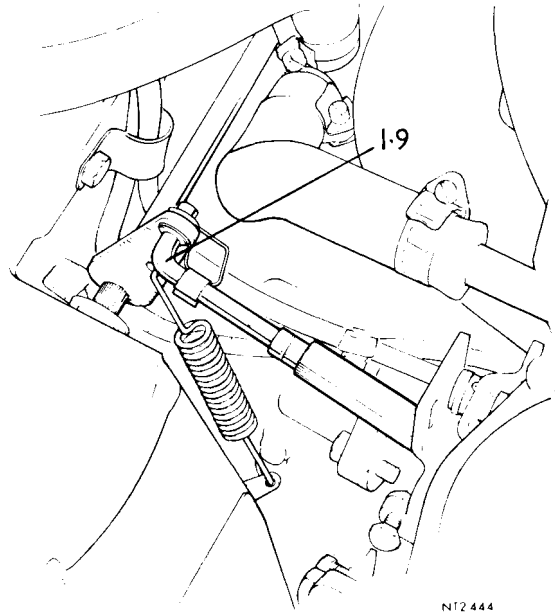
19.20.07

Removing

1. Disconnect the horizontal control rod from the throttle pedal countershaft lever.
2. Remove the relay lever support bracket from the carburetters.
3. Remove the nut and disconnect the short control rod from the interconnection lever.
4. Remove the throttle linkage complete.

Refitting

5. Check the length of the long horizontal and short vertical control rods see DATA.
6. Refit the relay lever support bracket.
7. Fit the short vertical control rod assembly to the interconnection lever.
8. Slacken the spring coupling bolts.
9. Reconnect the long horizontal control rod to the throttle countershaft lever.
10. Check that the relay lever is against its stop.
11. Insert a 3/32 in (2.4 mm) drill shank between the tongue and slot of the throttle interconnection lever.
12. Tighten the spring coupling nuts and bolts.
13. Tune and adjust the carburetters 19.15.02.



DATA

Horizontal control rod length between ball joint centre and centre of free end 11.94 in (303.3 mm);

Vertical control rod length between ball joint centres 3.18 in (80.8 mm)



MIXTURE CONTROL CABLE

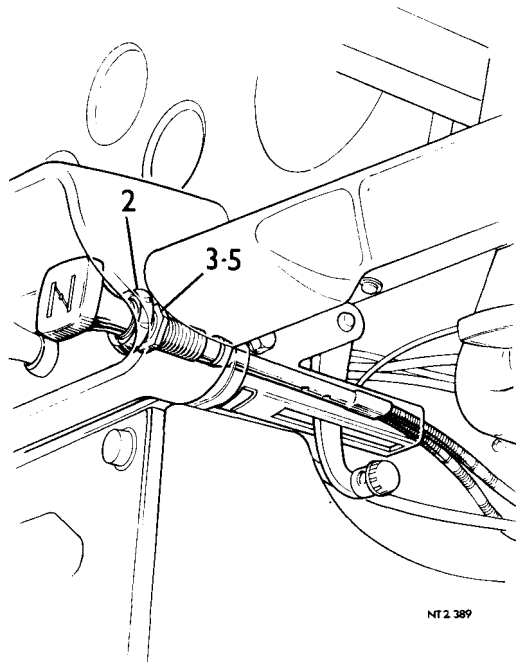
– Remove and refit 19.20.13

Removing

1. Disconnect the inner and outer cables from both carburetters.
2. Slacken the ferrule on the control panel (to facilitate the release of the locknut).
3. Unscrew the locknut behind the control panel and withdraw the cable complete through the locknut, the control panel and the bulkhead.

Refitting

4. Feed the cable complete through the control panel hole and pass the locknut over the cables.
5. Secure the outer cable assemblies to the control panel with the locknut and ferrule so that the end of the threaded part of the outer cable is flush with the ferrule on the control panel.
6. Feed the carburetter ends of the cable through the bulkhead and connect both inner and outer cables to the carburetters.



MIXTURE CONTROL CABLE – INNER

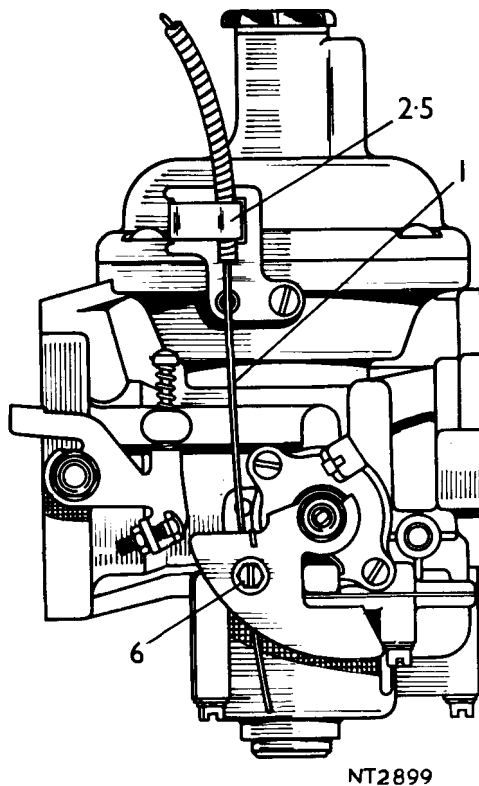
– Remove and refit 19.20.14

Removing

1. Disconnect the inner cables from both carburetters.
2. Release the outer cables from the clips on the carburetters.
3. From within the car pull the mixture control knob out and withdraw the twin inner cables complete with the knob. – see 19.20.13.

Refitting

4. Feed the twin inner cables through the outer cables until the control knob is fully home.
5. Secure the outer cables to the clips on both carburetters.
6. Connect the inner cables to the carburetter trunnions.



FUEL SYSTEM — TC

PETROL PIPE — MAIN LINE — REAR SECTION

— Remove and refit 19.40.02

Removing

1. Place the car on a ramp.
2. Isolate the battery.
3. Drain the fuel tank 19.55.02.
4. Disconnect the pipe from the centre section as illustrated.
5. Remove the pipe from the fuel tank.

Refitting

6. Reverse instructions 1 to 5.

PETROL PIPE — MAIN LINE — ENGINE END SECTION

— Remove and refit 19.40.04

Removing

1. Place the car on a ramp.
2. Isolate the battery.
3. Clamp the connector joining the centre section to the engine end section.
4. Disconnect the pipe from the centre section.
5. Disconnect the pipe from the fuel line filter.

Refitting

6. Reverse instructions 1 to 5.

PETROL PIPE — MAIN LINE — CENTRE SECTION

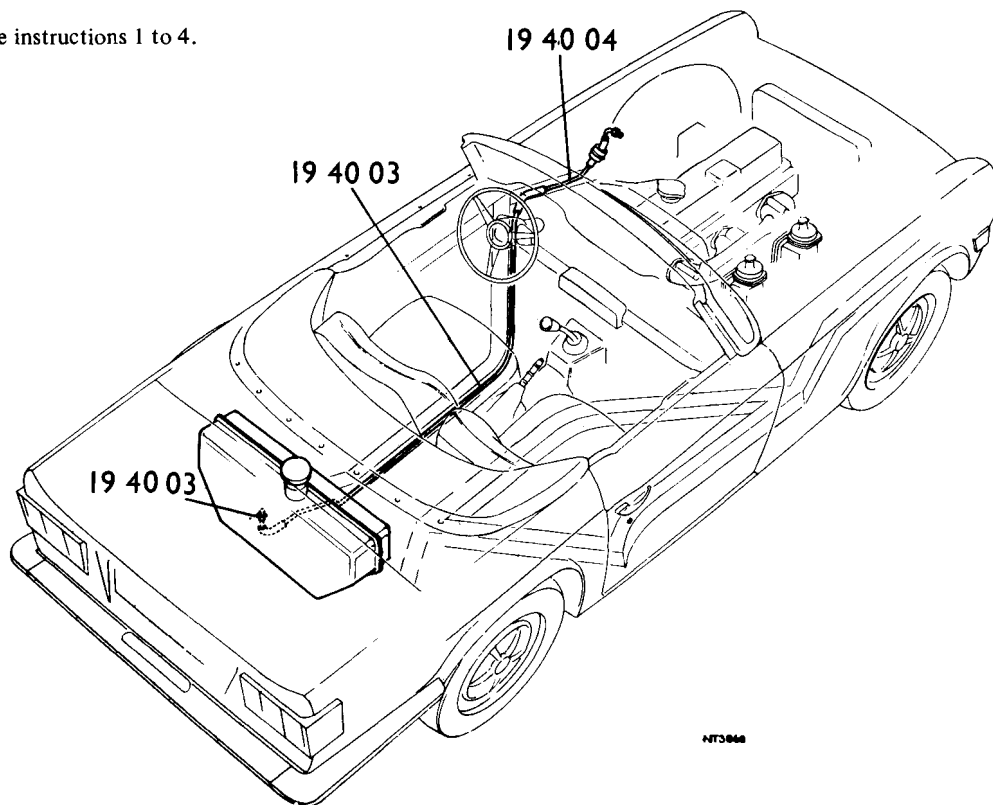
— Remove and refit 19.40.03

Removing

1. Place the car on a ramp.
2. Isolate the battery.
3. Drain the fuel tank 19.55.02.
4. Disconnect the centre pipe from the rear and engine end section as illustrated.

Refitting

5. Reverse instructions 1 to 4.



HOSE — FILLER TO TANK

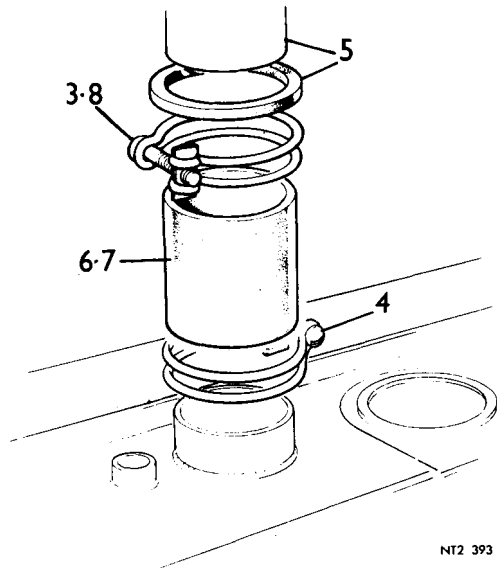
— Remove and refit 19.40.19

Removing

1. Remove the luggage compartment forward trim panel 76.13.17.
2. Remove the rear compartment trim panel 76.13.20.
3. Working from the rear compartment, slacken the top hose clip securing the filler cap assembly to the hose.
4. From the luggage compartment, slacken the hose clip securing the hose to the fuel tank.
5. Withdraw the filler cap assembly and the rubber sealing grommet.
6. Remove the filler hose complete with clips.

Refitting

7. Fit the filler hose to the fuel tank and secure with a hose clip.
8. Fit the filler cap securing clip to the hose, assemble the sealing grommet to the filler cap and fit the assembly to the tank filler hose. Secure with the hose clip.
9. Reverse instructions 1 and 2.



NT2 393

FUEL PUMP

— Test on vehicle 19.45.01

1. Prime the fuel pump to fill the carburetter float chambers.
2. Connect a pressure gauge into the pump to carburetter fuel line.
3. Start the engine and allow it to run on the fuel remaining in the carburetters until the gauge reading on the scale ceases to rise.
4. Stop the engine and observe the gauge pressure which should remain at its highest reading for a short period. See Data for correct pressure.

NOTE: A rapid fall off indicates a leaking diaphragm or a sticking outlet valve. Failure to read within the tolerances in data suggests a defective pump or line blockage. Where the pressure is high it may be reduced by fitting extra paper washers between the pump and cylinder block. Where the pressure is low overhaul — 19.45.15 or renew the pump 19.45.15.

5. Remove the pressure gauge.

DATA

Fuel pump static pressure 1.5 p.s.i. minimum to
2.5 p.s.i. maximum

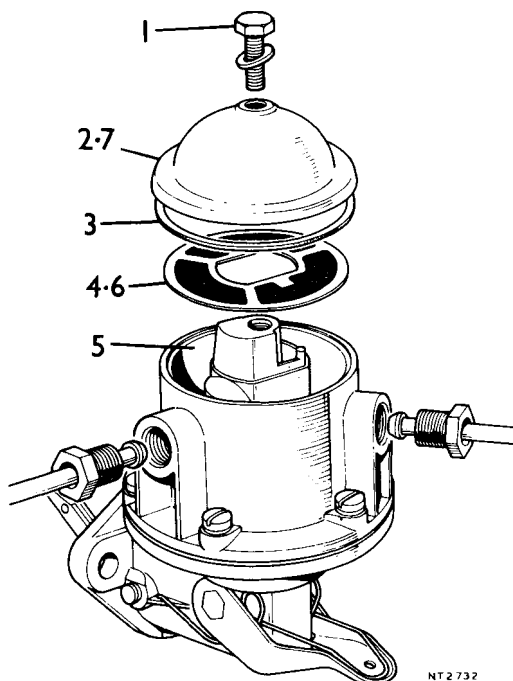


FUEL PUMP

— Clean filter

19.45.05

1. Remove the centre bolt and washer.
2. Remove the cover.
3. Remove the cover washer.
4. Remove the gauze filter and wash in petrol.
5. Loosen any sediment in the pump body and remove with compressed air. Avoid damage to the non-return valves.
6. Refit the gauze filter.
7. Refit the cover with a new cover washer and centre bolt washer. Do not overtighten the bolt.



FUEL PUMP

— Remove and refit

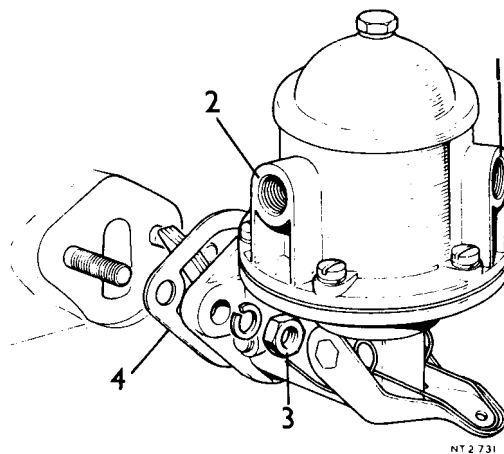
19.45.08

Removing

1. Disconnect the main fuel supply pipe from the pump inlet connection.
2. Disconnect the pipe from the pump outlet.
3. Remove the two nuts and spring washers securing the pump to the cylinder block.
4. Remove the gasket.

Refitting

5. Clean the cylinder block and pump mating faces and fit a new gasket.
6. Reverse instructions 1 to 3 ensuring that the pump rocker arm is located correctly against the camshaft before tightening the attachment nuts.



FUEL PUMP

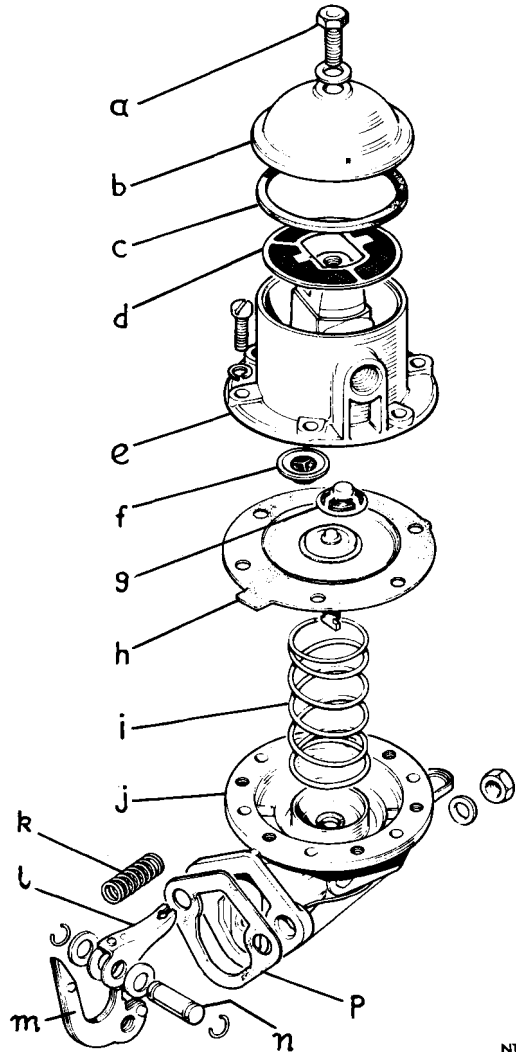
— Overhaul

19.45.15

Dismantling

1. Remove the fuel pump from the engine 19.45.08.
2. Remove the cover retaining bolt and washer and lift off the cover and sealing washer.
3. Remove the filter gauze.
4. Mark the relationship of the upper and lower body for re-assembly and remove the six screws and separate the two assemblies.
5. Remove the diaphragm and spring turning it through 90° and lifting it out of engagement with the link lever.
6. Remove the circlip securing the rocker arm pin.
7. Drive out the pin and remove the rocker and link lever.

- a. Cover retaining bolt
- b. Cover
- c. Cover washer
- d. Filter gauze
- e. Upper body
- f. Inlet valve
- g. Outlet valve
- h. Diaphragm
- i. Diaphragm spring
- j. Lower body
- k. Rocker return spring
- l. Diaphragm actuating lever.
- m. Rocker
- n. Rocker fulcrum pin
- p. Gasket

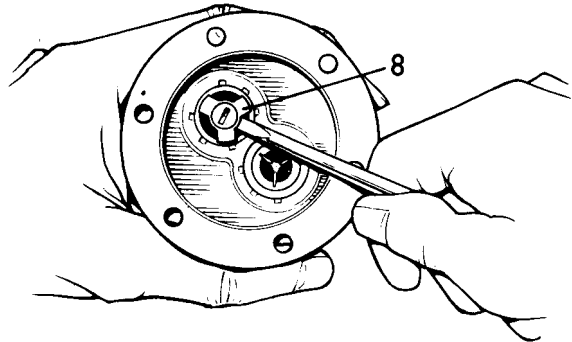


NT0 409

Continued



8. Remove from the upper body the inlet and outlet valves by prising them out with a screwdriver blade.



NT2 410

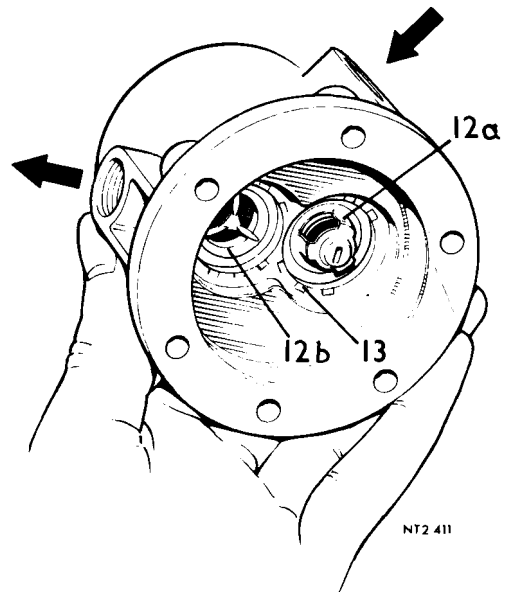
Examination

9. Clean all components in petrol and examine for wear and deterioration.
10. Check in particular the rocker and renew if wear is evident also the diaphragm and spring.
11. Check the upper and lower body mating faces for distortion and the engine mating face.

NOTE: Repair kits are available for this pump and it is advisable to fit all the new components supplied in the kit.

Re-assembling

12. Place a new washer in the base of each valve bore and fit the valves in the upper body by pressing them into the casting with a suitable tool (a piece of steel tubing 9/16 in (14.28 mm) inside diameter and 3/4 in (19.05 mm) outside diameter). Ensure that the valves are positioned correctly.
 - a. Pump inlet valve pressed in with the concave side leading.
 - b. Pump outlet to engine valve pressed in with the raised side leading.
13. Stake the casing round each valve in six places with a suitable punch.
14. Reverse instructions 1 to 7.



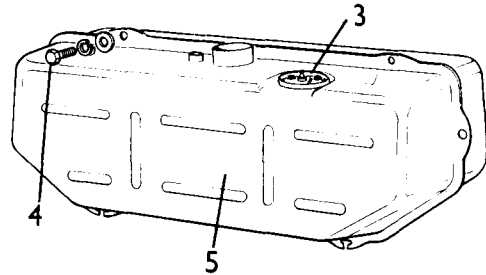
NT2 411

FUEL TANK

– Remove and refit **19.55.01**

Removing

1. Drain the fuel tank 19.55.02 instructions 1 and 2.
2. Remove the filler to tank hose 19.40.19.
3. Disconnect the fuel tank gauge unit leads.
4. Remove the six bolts complete with plain and spring washers securing the fuel tank to the body.
5. Withdraw the fuel tank and disconnect the evaporative emission control pipes.



Refitting

6. Reverse instructions 1 to 5.

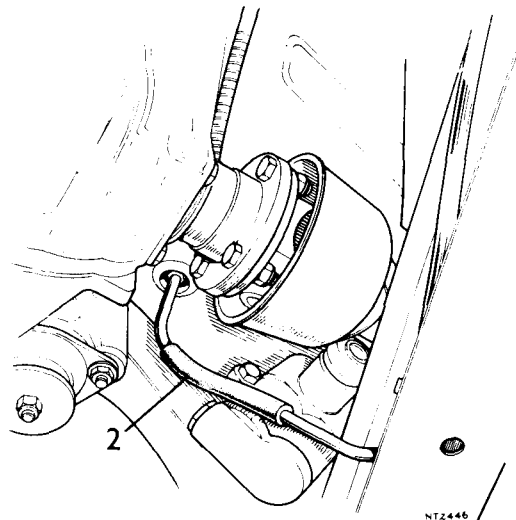
FUEL TANK

– Drain **19.55.02**

WARNING: Extinguish all naked lights.

1. Place the car on a ramp or over a pit.
2. Disconnect the rubber connection hose from the main line pipe and allow the fuel to drain into a suitable clean receptacle.
3. Reconnect the hose to the main line pipe.

CAUTION: If the fuel is to be returned to the tank, ensure that absolute cleanliness is observed during draining and storage. Foreign matter or fluids in the fuel may cause damage or faults in the fuel system.



FUEL FILLER CAP

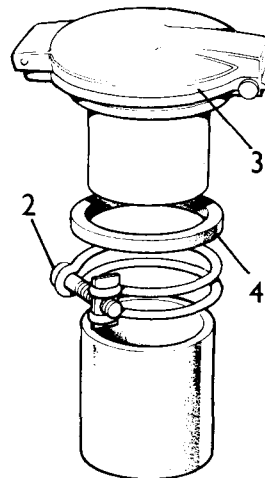
– Remove and refit **19.55.08**

Removing

1. Remove the rear compartment trim panel 76.13.20.
2. Working from the rear compartment slacken the hose clip securing the filler cap extension to the filler hose.
3. Withdraw the filler cap complete assembly.
4. Remove the rubber sealing ring.

Refitting

5. Assemble the rubber sealing ring to the filler cap extension.
6. Fit the assembly to the body ensuring, that the filler cap extension locates properly in the filler hose.
7. Secure the hose to the filler cap with the hose clip.
8. Refit the rear compartment trim panel 76.13.20.



NT2 706

