Land-Rover

Owner's Instruction Manual Supplement

To USA Specification

LAND-ROVER

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BRITISH LEYLAND — LAND-ROVER

Instruction Manual Supplement to USA Specification covering the Land-Rover 88 Station Wagon with emission controlled 2¼ Litre Petrol Engine

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INTRODUCTION

This Supplement concerns the Land-Rover 88 in. Station Wagon fitted with a 2¼ litre, emission controlled, petrol engine. The engine unit identification number range is from number 30600001K for 7.0:1 compression ratio engines, and from number 30700001A for 8.0:1 compression ratio engines.

The Supplement, which should be used in conjunction with the Land-Rover Owner's Instruction and Maintenance Manuals and the Workshop Manual is in Two Parts. Part One is for the Owner's Instruction, Part Two concerns maintenance and overhaul procedures applicable to engine emission control components.

Emission Control

Current regulations require that harmful engine emissions be limited to an acceptable and clearly defined degree. This requirement therefore determines the type and specification of certain equipment fitted to the vehicle, and also the calibration requirements, where applicable, for such equipment. Land-Rover vehicles with emission control have a label attached, under bonnet, bringing the attention of the owner or operator to the following notice:

> **U.S. Federal Standards, Control of Air Pollution**
>
> The engine of this vehicle is equipped to conform to the requirements of the above standards. Special instructions have been issued by the makers covering the correct methods of engine maintenance and tuning. Unauthorised interference with, or adjustments to, the carburetter, induction system, ignition or valve settings and breather system must not be made, and if made would almost certainly result in the vehicle failing to meet the legal requirements in respect of air pollution.

On the Land-Rover 2¼ litre petrol engine, crankcase emission control is achieved by venting the crankcase fumes to the carburetter adaptor to be burnt in the combustion chambers; fuel tank emissions are controlled by venting the fuel vapours, via a separate expansion tank and a charcoal-charged container, to the carburetter air inlet; exhaust emissions are controlled

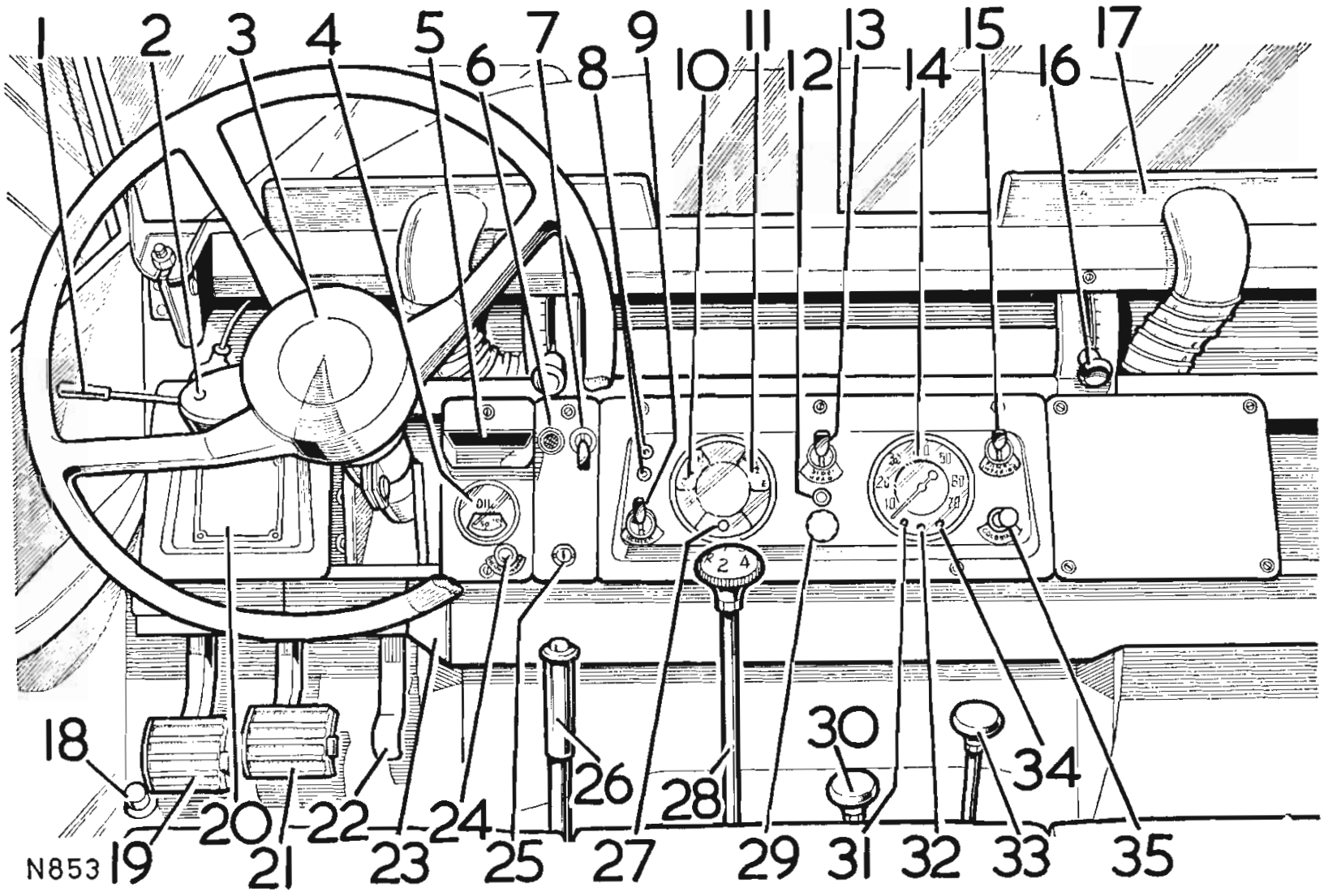
by alterations to the carburation characteristics and by retarding the ignition timing at the lower speed range. Under the bonnet is attached a label headed 'Emission Control Setting', which states the engine settings for emission control. As the emission control regulations may vary between vehicles of different year of manufacture, so may the engine setting requirements differ. Therefore all servicing personnel must be made aware of, and strictly adhere to, the engine setting conditions stipulated on the vehicle label.

To obtain control of engine and exhaust emissions, modifications, as detailed in the relevant Sections of this Supplement, have been made to the 2¼ litre petrol engine as follows:

1. Fuel system—Modifications to carburetter, engine idling speed and setting procedure, fuel filtration and to fuel tank breathing.
2. Engine—Modifications to distributor advance curve, distributor vacuum supply line, spark plug type, exhaust valve arrangement, ignition timing procedure and engine breathing system.

Controls and Instruments

The layout of the vehicle controls and instruments is shown in the accompanying illustration.



Layout of instruments and controls

Key to layout of instruments and controls

1. Direction indicator switch
2. Direction indicator warning light
3. Horn push
4. Oil pressure gauge
5. Ashtray
6. Hazard warning indicator light
7. Hazard warning switch
8. Inspection lamp sockets
9. Heater switch
10. Water temperature indicator
11. Fuel level gauge
12. Blanking plug
13. Main light switch
14. Speedometer
15. Panel and interior light switch
16. Windscreen ventilator
17. Windscreen demister
18. Headlamp dipper switch
19. Clutch pedal
20. Windscreen wiper motor panel
21. Brake pedal
22. Accelerator
23. Heater flap
24. Heater control valve
25. Ignition/starter switch
26. Handbrake lever
27. Charging warning light
28. Main gear lever
29. Windscreen wiper/washer switch
30. Front wheel drive control
31. Oil pressure warning light
32. Headlamp main beam warning light
33. Transfer box lever
34. Choke warning light
35. Choke control

SUPPLEMENT—PART ONE

OWNER'S INSTRUCTION MANUAL

The following additional items are fitted as standard equipment

1. Oil pressure indicator is located on a panel at the left hand side of the instrument panel.

   It gives continuous indication of the oil pressure. Should the oil pressure fail under normal working conditions, the green oil pressure warning light will glow. Stop the engine and ascertain the cause, that is low oil level in engine, overheating engine, etc.

2. Key operated private locks on driver's door and rear door.

   The front passenger door is fitted with an internally operated security catch. Push knob inwards and turn through 180° to lock.

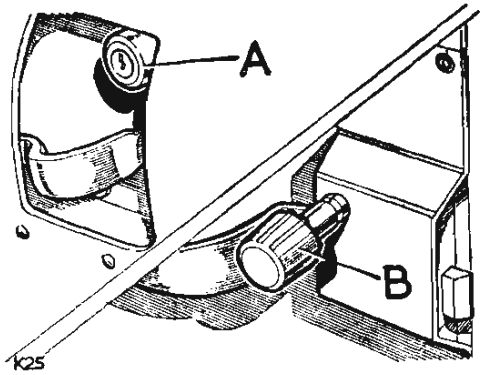
3. Hard top with sliding windows. The windows are fitted with internally operated security catches.

4. The doors, floor, dash and roof are completely trimmed with a hard wearing plastic material. To clean, wash with mild soap and warm water.

5. De-luxe type front seats are fitted with fore-and-aft adjustment on the driver's seat and the right-hand front passenger's seat.

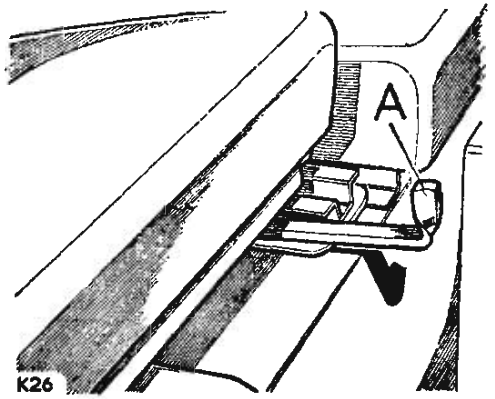
   Adjust the seat by pushing the lever at the side of the seat base, then move the seat into the most convenient position. Release lever and ensure locking device has engaged in seat slide.

   The seat cushions can be removed by lifting at the front and pulling forwards.



Door locks

A—Private lock, driver's door B—Security lock, passenger's door



Seat adjustment

A—Lever, push to adjust seat

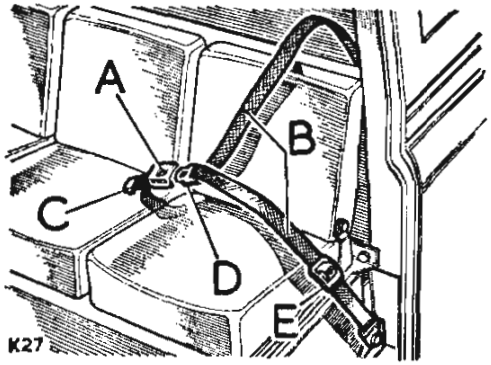
6. Windscreen, laminated safety type, non-starring if impacted by road surface debris.

7. A switch-operated hazard warning device causes all direction indicator lamps to flash simultaneously to warn other road users of a road hazard.

8. Safety harness is provided for the driver and right-hand side passenger, with attachment points only for centre position.

   The layout of the safety harness is shown in the illustration.

Note: An alternative type of safety harness is available for Land-Rover models. If the harness fitted in the vehicle differs from that illustrated below, refer to the Alternative Safety Harness description, paragraph 9, for details.



Layout of safety harness

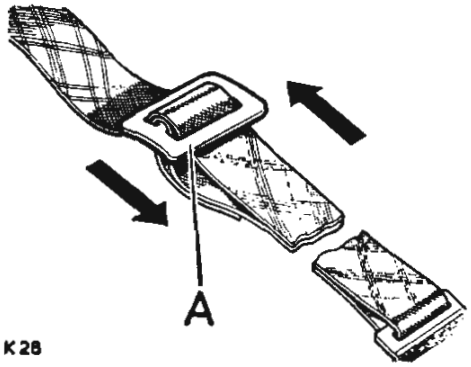
A—Quick adjustment buckle
B—Shoulder strap with tongue and main adjustment buckle
C—Housing strap with quick adjustment buckle
D—Tongue on shoulder strap
E—Main adjustment

Before carrying out the main adjustment on the shoulder strap, seat position must be adjusted to suit occupant.

Main adjustment

(a) With shoulder strap over the outboard shoulder, position tongue on strap round the body until it is about 6 inches (152 mm) from the seat back rest at the hip position.

(b) Slide adjuster up or down to achieve this condition.



Main adjustment

A—Main adjustment buckle, pull up to shorten strap, down to lengthen strap

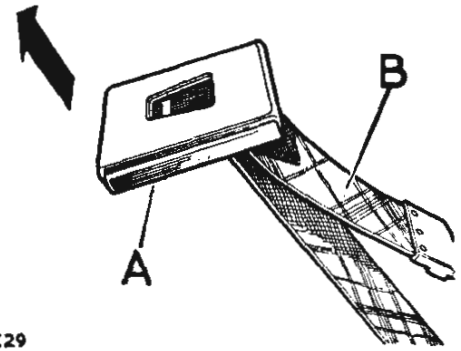
Day-to-day use of safety harness

To obtain the maximum designed protection from the safety harness, it is essential that it be properly fitted and adjusted.

(a) With the occupant in the front seat the shoulder harness must be over the outboard shoulder.

(b) Hold tongue of shoulder strap at hip position.

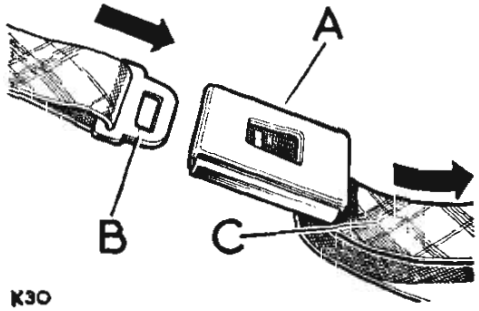
(c) Hold quick-release buckle on housing strap at right angles to strap as shown at Stage 1, then pull up until buckle and tongue can be engaged together.



Quick-release buckle adjustment—Stage 1

A—Buckle B—Housing strap

(d) Engage tongue in buckle, then adjust by pulling end of housing strap in direction of arrow as shown at Stage II.



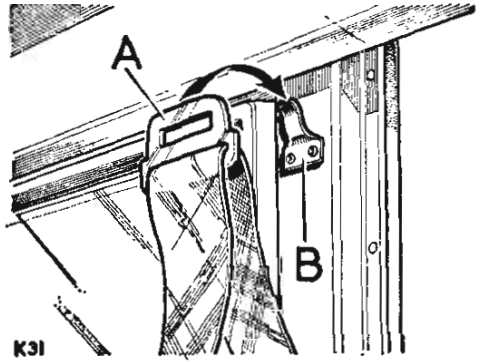
Quick-release buckle adjustment—Stage II

A—Quick release buckle
B—Tongue on shoulder strap
C—End of housing strap

To undo the buckle and leave the seat, simply press centre of buckle and the two sections of the harness will instantly fall apart.

Seat harness which has been used in an accident or has been frayed or cut must be replaced.

To avoid soiling and twisting the safety harness when it is not in use, the tongue of the shoulder strap should be stowed on the door pillar stowage hook.



Safety harness stowage

A—Tongue on shoulder strap B—Stowage hook

9, Alternative type safety harness.

The layout of the safety harness is shown in the full-page illustration, panel 1.

(A) Shoulder strap. (B) Housing strap with quick-release buckle. (C) Main adjustment buckle. (D) Tongue on shoulder strap. (E) Quick-release buckle.

The illustrations on the next page show the initial adjustment required to suit the individual driver or passenger and also the sequence to be followed when fastening the seat belts after the initial adjustment has been carried out.

Before carrying out the main adjustment on the shoulder strap, seat position must be adjusted, where applicable, to suit the occupant.

Main adjustment, panel 2

(a) With shoulder strap over the outboard shoulder, make visual assessment of adjustment required, tongue on strap should be about 6 inches (152 mm) from seat back rest at the hip position.

(b) Then adjust the strap of the adjustment buckle fitted to the sill bracket, by relieving the retaining bar 'A' and pulling strap in direction of arrow 'B' to shorten and in the direction of arrow 'C' to lengthen.

Day-to-day use of safety harness

To obtain the maximum designed protection from the safety harness, it is essential that it be properly fitted and adjusted.

(a) With the occupant in the front seat the shoulder harness must be over the outboard shoulder. See panel 1.

(b) Hold tongue of the shoulder strap at the hip position.

(c) Push on retaining bar finger grips (C), panel 3, on quick-release buckle and slide buckle across the body to engage with tongue. See panel 4.

(d) To shorten harness, pull on the housing strap (A), panel 3.

(e) To lengthen the harness, grasp the retaining bar finger grips (C), panels 3 and 4, and pull the quick-release buckle across the body. When the finger grips are released, the housing strap (B), panel 3, is prevented from further extending by the retaining bar in the quick-release buckle.

(f) Straps should be comfortably tight, just enough to allow the hand to be passed between the upper shoulder strap and body. It is important to ensure that the lap belt is worn low so that it rests on the bony part of the hip.

Panel 5 shows the safety harness correctly fitted.

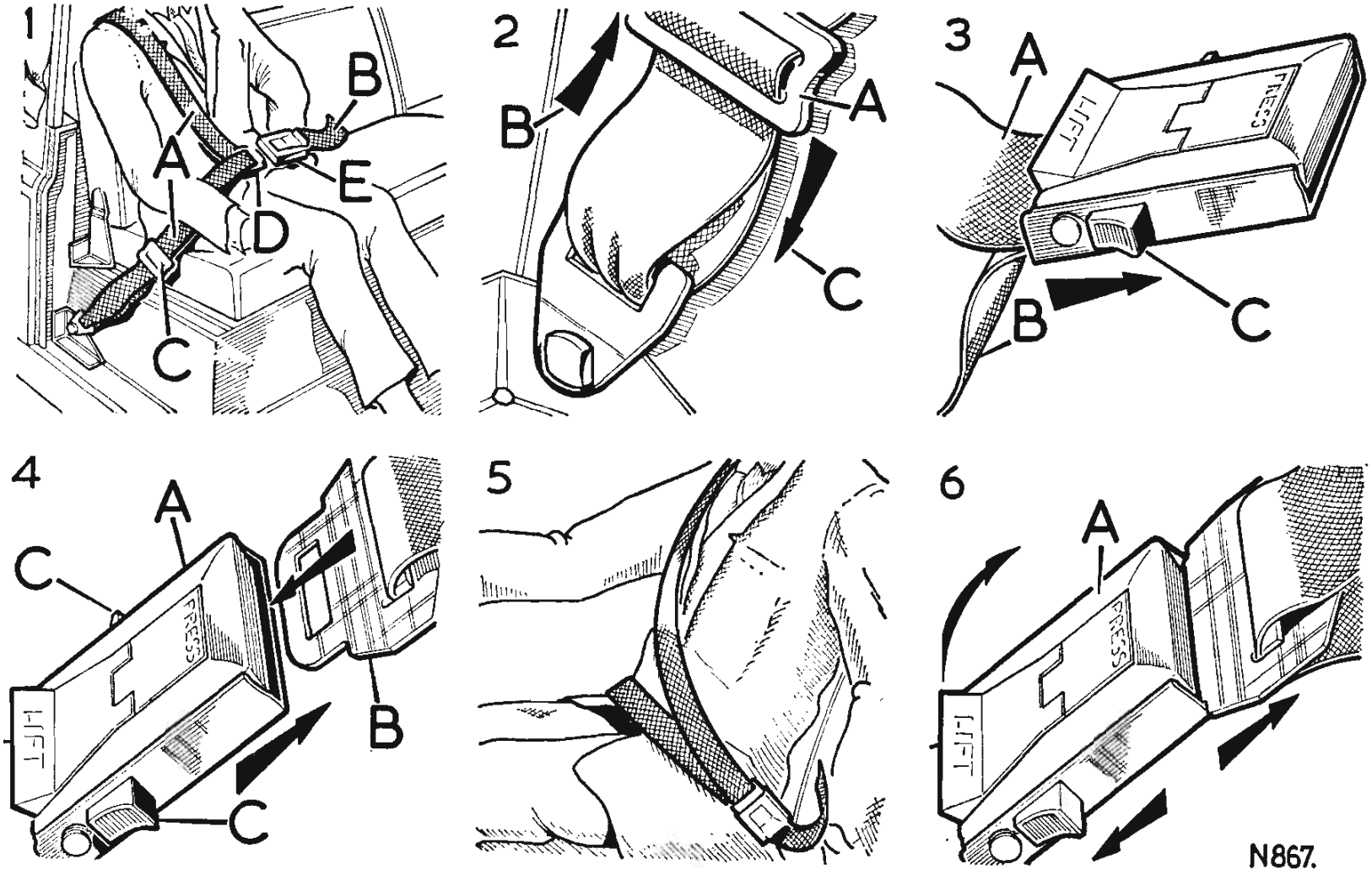
(g) To release the harness, either **LIFT** or **PRESS** where so marked on the quick-release buckle (A), panel 6, and disengage the tongue from the buckle.

Important

Safety harness which has been used in an accident or has been frayed or cut must be replaced.

Harness cleaning

The safety harness may be washed in hand-hot water with soap or household detergent. Do not use any other cleaning fluid. To avoid soiling and twisting the safety harness when it is not in use, the tongue or hooks of the shoulder strap should be stowed on the door pillar stowage.

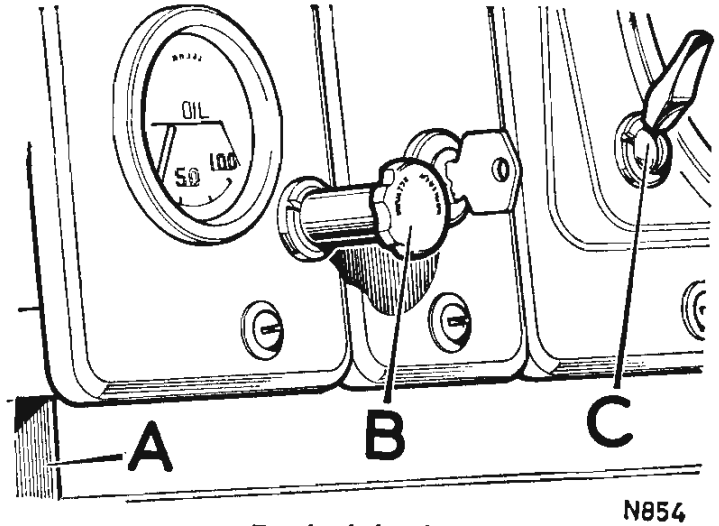


Alternative safety harness

10. Fresh air heater and demister. The fresh air heater blower is controlled by a toggle switch at the left-hand bottom corner of the instrument panel, as follows:—
    1. Switch in upper position, blower off.
    2. Switch in centre position, blower at half-speed.
    3. Switch in down position, blower at full-speed.

    The amount of heat is controlled by the push-pull knob on the panel at the left of the instrument panel.
    1. Control out—switch on, cold air to vehicle and demisters.
    2. The temperature of the air is progressively increased as the control is pushed in.

    Distribution of heat is controlled as follows:—
    1. Warm air to body—open one or both end flaps as required.
    2. Maximum air flow to demisters—set heater switch to full speed and close both flaps.



Fresh air heater

A—End flap, for heater B—Push-pull knob for heater C—Switch for heater

    In warm weather, the heater can be used for air circulation with the control knob on the panel pulled fully out.

11. Mirrors. Two flat type driving mirrors on spring-back arms are mounted on the front door hinges. To meet U.S. Federal requirements, the mirrors must be used in the horizontal position.

    The interior rear view mirror is the safety type, which has a stem to break off under impact.

12. Rubber pads are fitted to the brake and clutch pedals.

13. Goodyear 7.10 x 15 in. Ultra-grip tubed tyres are fitted

    Tyre maintenance information is as detailed in the Owner's Maintenance Manual.

    The required tyre pressures under various loads are as follows:—

	Normal				**Emergency soft**			
	Load under 550 lb (250 kg)		Load over 550 lb (250 kg)		Load under 550 lb (250 kg)		Load over 550 lb (250 kg)	
	Front	Rear	Front	Rear	Front	Rear	Front	Rear
lb/sq in.	25	25	25	30	15	15	15	20
Kg/cm²	1,7	1,7	1,7	2,1	1,0	1,0	1,0	1,4

14. A ribbed rubber mat is tailored to fit into the rear body compartment.

PART TWO—ENGINE

MAINTENANCE AND WORKSHOP MANUAL SUPPLEMENT

Part Two of this Supplement concerns maintenance and overhaul procedures for multi-purpose vehicles to U.S. Federal Standards. The items that follow replace similar information in the Land-Rover Owner's Maintenance Manual and Workshop Manual. All other items not mentioned in this Supplement require maintenance attention and overhaul procedures as detailed in the Land-Rover Owner's Maintenance Manual and Workshop Manual respectively.

Part Two is divided into two Sections, namely Engine and Fuel System.

The Engine Section concerns the distributor, sparking plugs, exhaust valve arrangement, throttle-controlled vacuum switch, ignition timing and crankcase emission control.

The Fuel System Section concerns the carburetter, additional fuel filter and evaporative and exhaust emission control.

Note: Carburetter adjustments and ignition timing are accurately set at the factory and under normal circumstances do not require attention. However, should it become necessary to check any aspect of carburetter adjustment or ignition timing, the work must be carried out by a qualified Rover Dealer, who has the specialised equipment needed to carry out adjustments to the close limits necessary to ensure that the engine conforms to the U.S. legal requirements in respect of exhaust emission.

A Defect Location chart, circuit diagram and Engine and Fuel System Data Supplement are included at the end of Part Two.

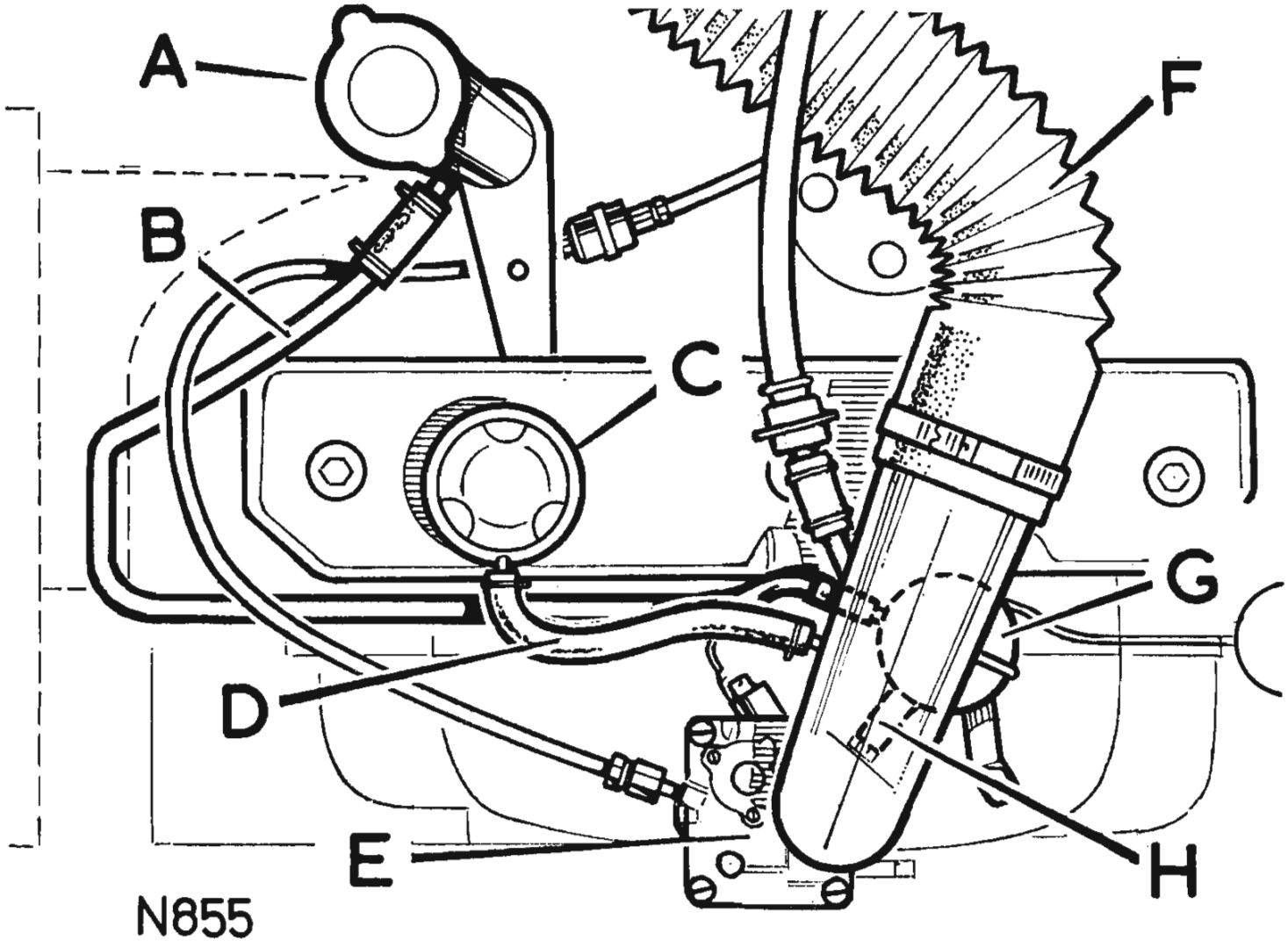
If advice is needed, see the nearest Rover Dealer. When in the USA or Canada, a list of Rover Dealers may be obtained from the appropriate address listed inside the front cover of this Supplement, or if touring Europe, contact the local Rover Distributor, details in Distributors and Dealers book supplied with this vehicle.

All Land-Rover models for the USA and Canada are provided with equipment which enables the vehicle to comply with emission control regulations current at the time of entry into the country. As the regulations become more stringent for later models, the equipment is revised to comply with the later regulations, therefore all the emission control equipment described in this section will not necessarily be fitted to earlier models.

Crankcase emission control

To comply with current regulations concerning engine emission control, the emission from the Land-Rover 2¼-litre engine, for use in the USA are vented into the combustion system to be burnt with the fuel/air mixture.

The system provides positive emission control under all conditions.



Layout of crankcase emission control

Key to layout of crankcase emission control

A—Oil filler tube, sealed
B—Hose, oil filler tube to non-return valve
C—Top cover breather filter
D—Hose, top cover breather to air cleaner elbow
E—Carburetter
F—Pipe, air cleaner to carburetter
G—Non-return valve
H—Hose, non-return valve to carburetter adaptor

Brief description of control system

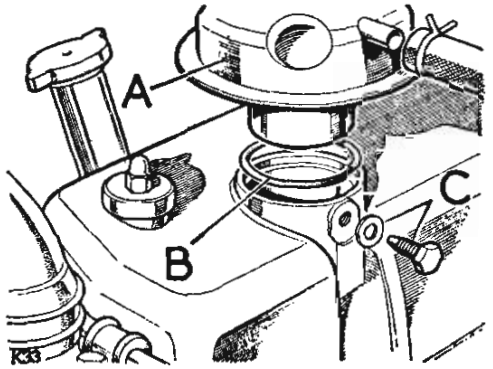
A hose is connected between the top cover breather and the air cleaner elbow. A further hose is connected between the sealed crankcase oil filler tube and the carburetter adaptor, via a non-return valve.

During engine running, blow-by gases which may collect in the crankcase are vented to the carburetter and clean air is admitted through the top cover breather to assist in purging.

Top cover breather filter. Every 8000 miles (12,000 km)

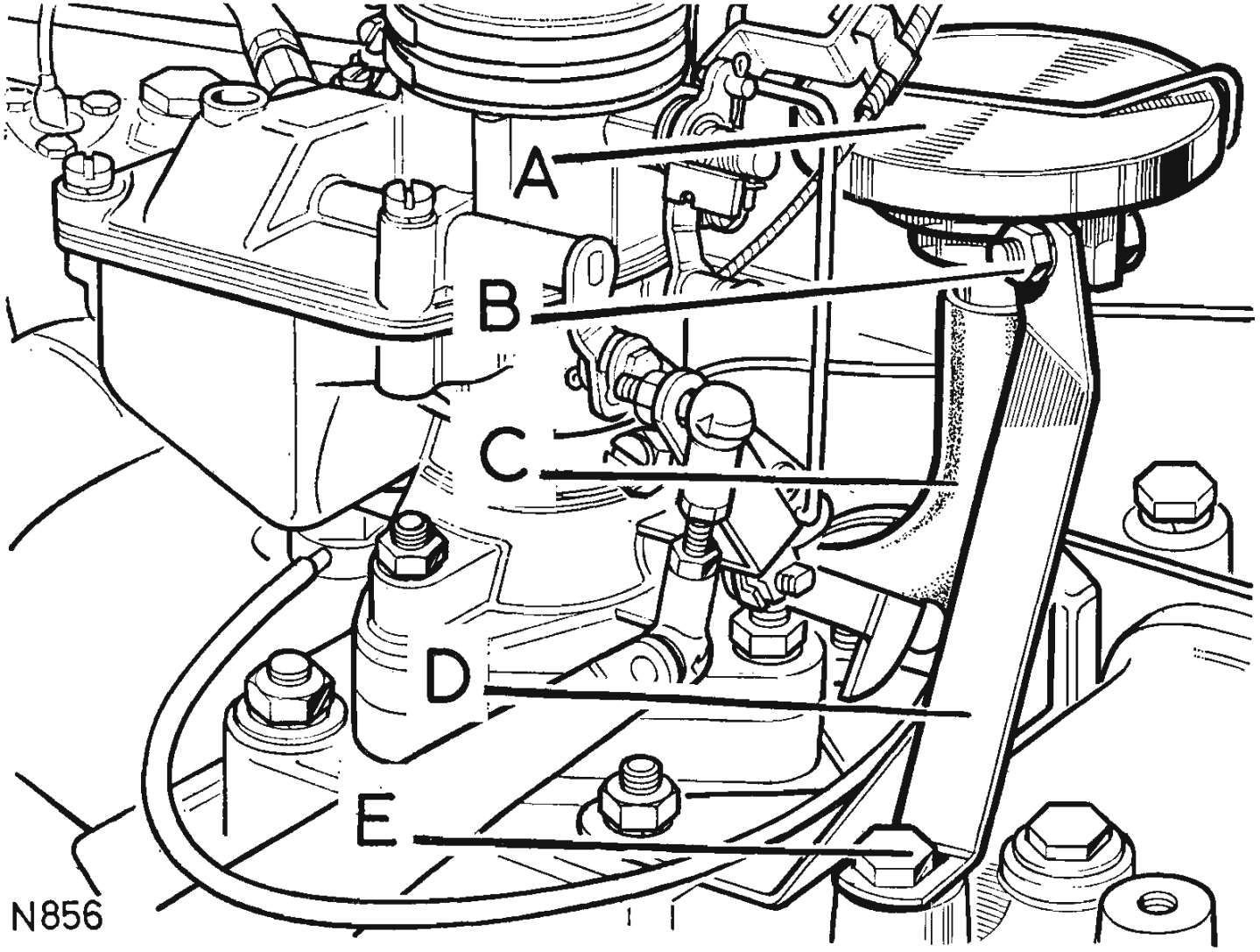
The top cover breather filter is sealed and should be removed and cleaned as follows:—

1. Remove rubber hose from filter.
2. Remove set bolt and sealing washer at left-hand side of breather.
3. Lift off breather and remove 'O' ring.
4. Clean unit thoroughly by swilling in clean petrol.
5. Immerse unit in clean engine oil and allow to drain.
6. Refit complete unit to top cover. Ensure 'O' ring and sealing washer are in good order and correctly fitted. Fully tighten set bolt.



Top cover breather filter

A—Top cover breather filter
B—'O' ring for breather filter
C—Set bolt and sealing washer fixing breather filter



Crankcase emission control, non-return valve location and fixings

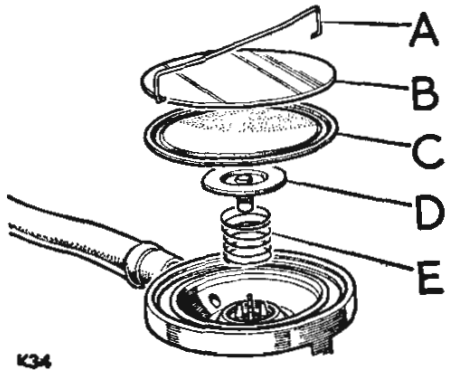
Key to crankcase emission control, non-return valve location and fixings

A—Non-return valve
B—Fixings, valve to bracket
C—Hose, outlet to carburetter adaptor
D—Mounting bracket
E—Fixings, bracket to engine

Emission control non-return valve. Every 8,000 miles (12.000 km)

Clean as follows:—

1. Remove the spring clip retaining the cover, which can now be removed together with the diaphragm unit and spring.
2. Clean orifices, control body and the cover in methylated spirits. (Ethanol).
   Note: The diaphragm must not be cleaned.
3. Check all components for damage.



Crankcase emission control, non-return valve

A—Spring clip retaining cover
B—Cover for control
C—Diaphragm unit
D—Orifice plunger
E—Spring for diaphragm

To re-assemble:—

1. Replace the spring, locating it in the body.
2. Locate the diaphragm in the body and onto the spring.
3. Replace the cover and refit the spring clip. Ensure diaphragm is seating properly and the cover fits evenly to the body.
4. Warm up engine and re-adjust carburetter if necessary.

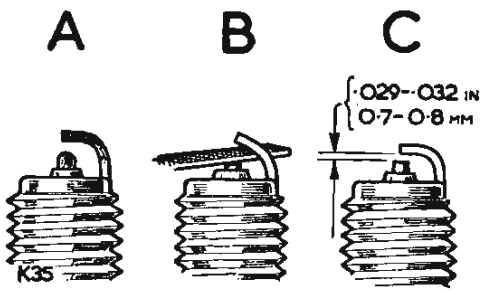
Sparking Plugs. Check every 4,000 miles (6000 km)
Replace every 8,000 miles (12000 km)

To maintain efficient emission control, the correct function of sparking plugs and their leads and connections is of prime importance.

1. Remove the plug covers and HT leads from the sparking plugs.
2. Using a plug spanner, remove the plugs and washers.
3. Clean the sparking plugs as follows:
   (a) Fit the plug into the 14 mm adaptor of an approved sparking plug cleaning machine.
   (b) Wobble the plug in the adaptor with a circular motion for three or four seconds only with the abrasive blast in operation.
   Caution. Excessive abrasive blasting will lead to severe erosion of the insulator nose.
   (c) Continue to wobble the plug in its adaptor with air only blasting the plug for a minimum of 30 seconds; this will remove abrasive grit from the plug cavity.

(d) Wire brush the plug threads, open the gap slightly, and vigorously file electrode sparking surfaces with a point file. This operation is important to ensure correct plug operation by squaring the electrode sparking surfaces.

4. Set the electrode gap to the recommended clearance of .029 to .032 in. (0,7 to 0,8 mm).



Cleaning sparking plug points

A—Dirty plug B—Filing electrodes C—Clean plug set to correct gap

5. Test the plugs in accordance with the plug cleaning machine manufacturer's recommendations.

6. If satisfactory, the plugs may be replaced in the engine.

   Important. If it is found necessary to fit new sparking plugs, it is essential that only the correct grade and make is used, that is: Champion UN12Y. Incorrect grades of plug may lead to piston overheating and engine failure.

7. A careful examination should be carried out of all high tension leads, including the coil to distributor lead, every 4,000 miles (6,000 km). Look for any signs of insulation cracking or deterioration and corrosion at the end contacts. Replace faulty harness.

Distributor

A special ignition distributor is included in the specification. The distributor provides a retarded ignition setting at the lower speed range whilst maintaining the normal advance characteristics at higher engine speeds. This distributor, together with the other modifications embodied, reduces exhaust emissions to an acceptable level.

As the distributor differs in minor detail only from that previously fitted, amplification of the existing instructions laid down in the Workshop Manual and Owner's Maintenance Manual is not felt to be necessary.

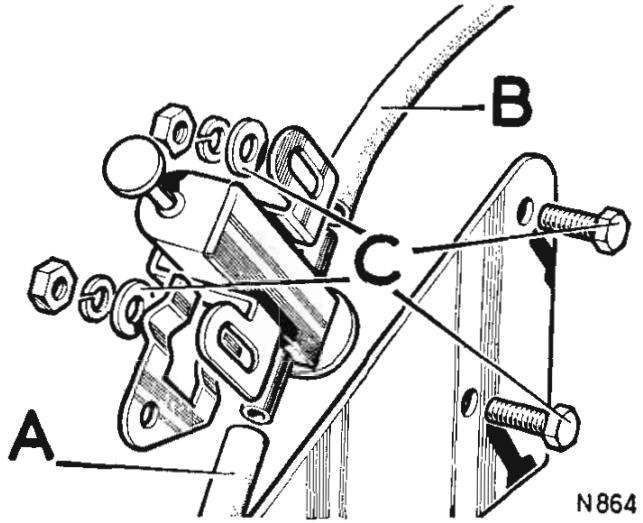
Throttle-controlled vacuum switch

Check clearance with throttle cam every 10,000 miles (16.000 km).

The switch is interposed in the vacuum line between the inlet manifold banjo connection and the distributor vacuum retard capsule. A throttle-operated cam governs the switch position progressively from open to closed. At the open position (switch plunger out) the switch closes off the vacuum line and opens the distributor capsule to atmosphere which allows ignition to advance. At the closed position (switch plunger in) the switch opens the vacuum line to the distributor capsule, which retards the ignition.

To remove the switch

1. Note the vacuum pipe positions at the switch.
2. Disconnect pipes from switch.
3. Remove the fixings, mounting bracket to engine.
4. Remove the fixings, switch to mounting bracket, and withdraw switch.



Throttle-controlled vacuum switch

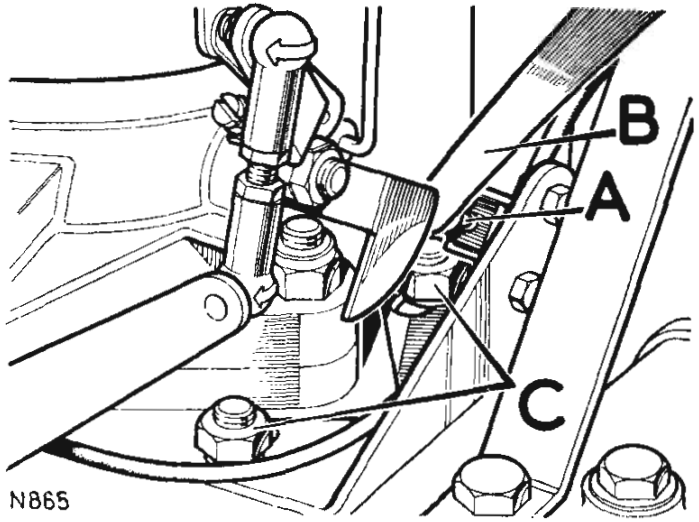
A—Vacuum pipe from manifold
B—Vacuum pipe to distributor
C—Fixings, switch to bracket

To refit

5. Reverse the removal procedure. When refitting switch to mounting bracket, position the fixings centrally in the fixing holes.

To check and adjust switch position

6. Ensure that the throttle linkage is fully in the idle position.
7. Push the plunger fully into the switch and hold in this position.
8. Measure the clearance between the plunger and the cam on the throttle linkage. This must be 0.030 in. (0,76 mm).
9. Adjust as necessary by slackening the fixings, mounting bracket to inlet manifold, and moving the switch and bracket complete in the required direction.



Checking the switch position

A—Plunger fully in
B—Clearance with throttle cam, measure with feeler gauge
C—Bracket fixings

10. Recheck the clearance with the bracket fixings fully tightened.

Ignition Timing

Important

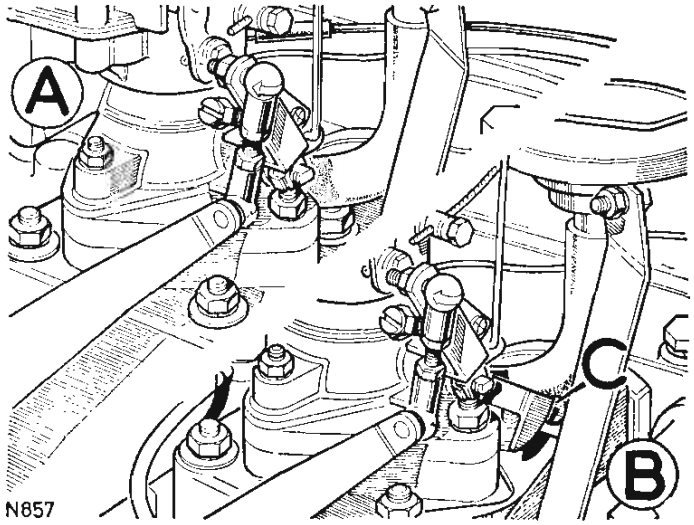
Before commencing the timing procedure, check the method employed of supplying a vacuum signal to the ignition distributor capsule. This will indicate the ignition timing setting

required as follows:

Engines with the vacuum supplied from the inlet manifold via a throttle-controlled vacuum switch—ignition setting 6° ATDC.

Engines with the vacuum supplied from the carburetter body and without a throttle-controlled vacuum switch—ignition setting 3° ATDC.

The ignition timing setting is also displayed on the under-bonnet 'Emission Control Setting' label.



Throttle-controlled vacuum switch, where fitted

A—Engine **without** switch, ignition timing 3° ATDC
B—Engine **with** switch, ignition timing 6° ATDC
C—Switch location

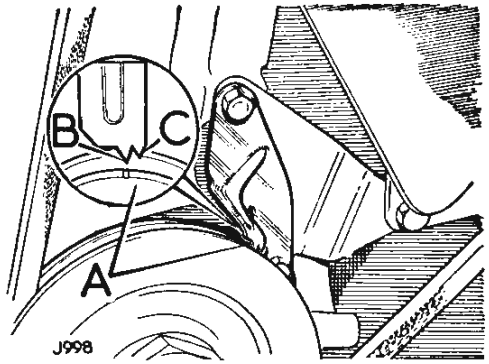
Failure to set ignition timing correctly, as subsequently described, will almost certainly result in the vehicle failing to comply with emission control regulations.

To ensure correct combustion, and therefore compliance with the exhaust emission regulations, it is essential that the ignition timing is dynamically set with the engine at idling speed. This requires the use of a suitable tachometer, for determining engine speed, and a stroboscopic lamp for determining the points in the engine cycle at which the ignition sparks occur.

Static ignition timing may be used as an initial setting procedure after distributor remove and refit, but this must not be accepted as a final setting. Refer to Data pages at the end of this Supplement for the Static settings. The timing mark for the engine appears on the crankshaft pulley.

Procedure for dynamic ignition timing

1. Ensure that the throttle-controlled vacuum switch (where fitted) is correctly set and that all pipes to the switch are sound and correctly fitted.
2. Connect a stroboscopic timing light to the engine in accordance with the manufacturers instructions. The HT connection should be made on No. 1 cylinder sparking plug.
3. Connect a suitable tachometer to the engine. If a tachometer Rover Part No. 601284 is used, the red lead must be attached to battery positive (+) and the black lead to battery negative (–) or any good earthing point. The green lead should be attached to the (+) terminal on the side of the ignition coil.



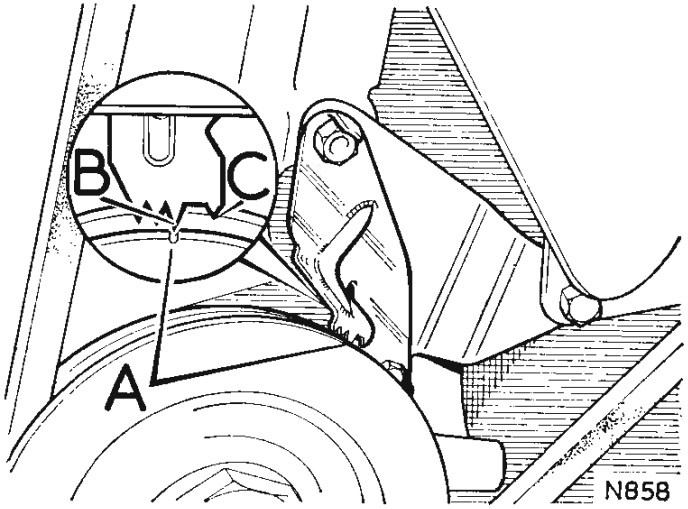
Ignition timing mark and pointer, early models

A—Timing notch on crankshaft pulley
B—Pointer for top dead centre
C—Pointer for 3 degrees after top dead centre (ATDC)

4. Set the engine idling speed to between 750 and 800 rpm and as close to 800 rpm as possible without exceeding this speed. This speed setting is extremely important and any deviation, particularly in an upwards direction, will cause incorrect timing and subsequent failure to pass the emission requirements.

5. Where fitted, set the vernier advance and retard adjustment on the distributor to the extreme advance position. (The purpose of this operation is to minimise the possibility of subsequent advancing of the ignition point indiscriminately.)

6. Slacken the distributor clamping plate bolt and rotate the distributor until the stroboscopic light synchronises the timing pointer and the timing mark at 3° or 6° (as applicable) after top dead centre (ATDC).



Ignition timing mark and pointer, later models

A—Timing mark on crankshaft pulley
B—Pointer for TDC
C—Pointer for 6° ATDC

7. Retighten the distributor clamping bolt securely and recheck timing.

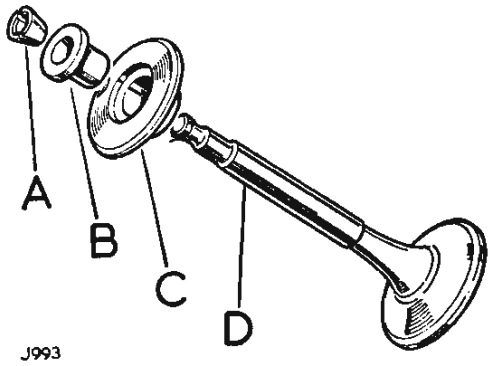
8. Remove stroboscopic timing light and tachometer.

Engine exhaust valve freeing mechanism

Modifications embodied in the exhaust valve arrangement for this engine have resulted in the following design changes.

1. The exhaust valve spring cap and split collets have been modified to accept a valve sleeve which permits the valve to move under the vibration effect exerted by the valve springs during engine running.
2. The exhaust valve spring free length is increased by 0.070 in. (1,8 mm).

Dismantling and rebuilding procedure for the exhaust valve arrangement is as detailed in the Land-Rover Workshop Manual, except for the addition of the new valve sleeve which is fitted between the split collets and the valve spring cap, as illustrated.



View of exhaust valve arrangement

A—Split collets
B—Valve sleeve
C—Spring cap
D—Exhaust valve

FUEL SYSTEM

FOREWORD

Section N—Fuel system in this Supplement deals with the following topics:

Introduction to exhaust emission control

Modifications to fuel system

Removing and refitting fuel system components

Carburetter overhaul

Evaporative emission control (later models)

All other fuel system items not covered by this Supplement are covered by the Land-Rover Workshop Manual or Owner's Maintenance Manual as applicable.

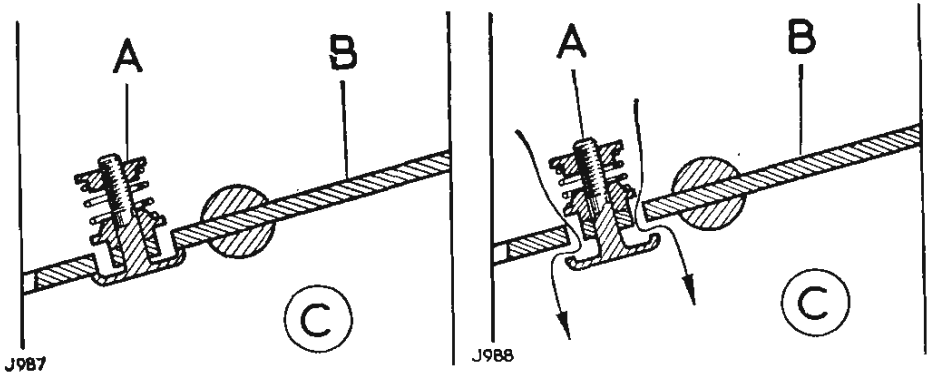
Introduction

To comply with current U.S. Regulations concerning engine exhaust emission control, certain modifications have been embodied in the fuel system specified for the 2¼-litre petrol engine for use in the USA. These modifications, in altering the carburation and combustion characteristics, result in controlling harmful emissions to within the legal tolerance. The modifications are as follows:—

1. **Throttle butterfly**

   This has been modified in two ways, namely—

   (a) The incorporation of a spring loaded poppet valve which compensates for high manifold depression conditions (that is, engine over-run at closed throttle conditions).



Butterfly poppet valve

A—Poppet valve, closed
B—Throttle butterfly disc
C—Low manifold depression

Butterfly poppet valve

A—Poppet valve, open
B—Throttle butterfly disc
C—High manifold depression

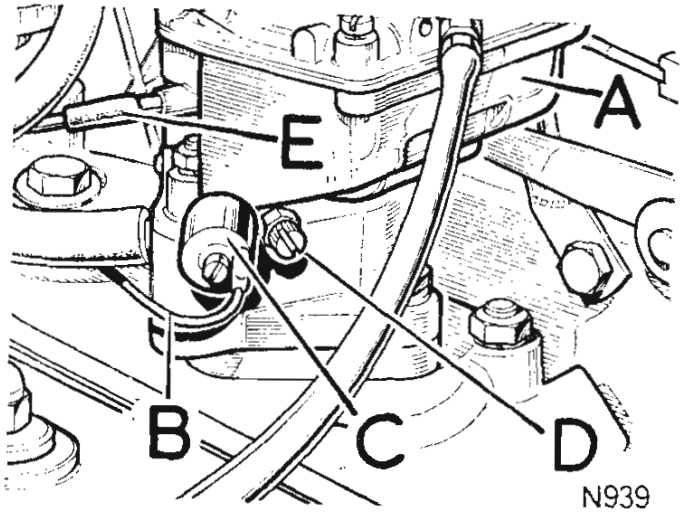
   (b) A .098 in. (2,5 mm) hole has been added to compensate for the throttle butterfly angle at idling. The incorporation of this hole obviates the necessity of re-siting progression and suction advance drillings.

2. **Solenoid operated fuel cut-off valve**

   The idle speed of the 2¼-litre engine has been increased to 750-800 rpm. This has been done to increase the airflow past the throttle butterfly under closed throttle conditions and is complementary to the throttle butterfly modifications.

To prevent running-on due to the high idle speed, a solenoid operated fuel cut-off valve has been incorporated in the carburetter. This takes the form of a solenoid operated needle valve operating to cut-off the idle by-pass drilling and progression chambers when the ignition is switched off.

The solenoid is located externally on the carburetter body casting adjacent to the idling volume control screw and is electrically connected to the switch side (+) of the ignition coil.



Solenoid operated fuel cut-off valve in position

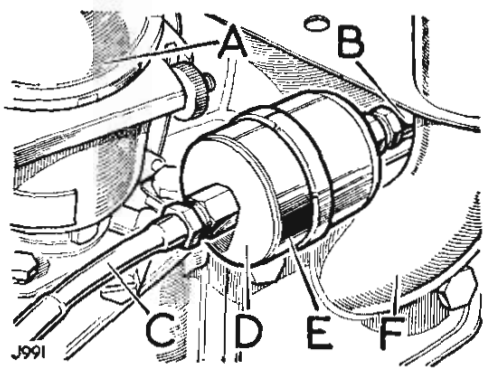
A—Carburetter
B—Electrical lead from coil
C—Fuel cut-off valve
D—Idling volume control screw
E—Distributor vacuum supply, early models

Fuel Filter. Every 24,000 miles (36,000 km)

The filter assembly, located between the carburetter and the fuel pump at the right hand side of the engine, provides additional filtration to the fuel system. The filter mesh is sealed inside the filter body and no servicing is possible on the assembly; the filter assembly complete must be discarded at the stipulated maintenance intervals, or before if the presence of foreign matter is suspected in the fuel system, and a new assembly fitted.

Replace the filter as follows:—

1. Disconnect fuel pipes from each end of filter.
2. Slacken clip securing filter and withdraw unit. It will be necessary also to replace the pipe connection olives.
3. Fit the new filter with the end marked 'IN' towards the fuel pump. If the filter is marked with an arrow, this indicates fuel flow direction and the filter must then be fitted with the arrow pointing away from the fuel pump.



Location and view of fuel filter, RH side of engine

A—Distributor
B—Hose, filter to carburetter
C—Hose, pump to filter
D—Fuel filter
E—Filter mounting bracket
F—Oil filler tube

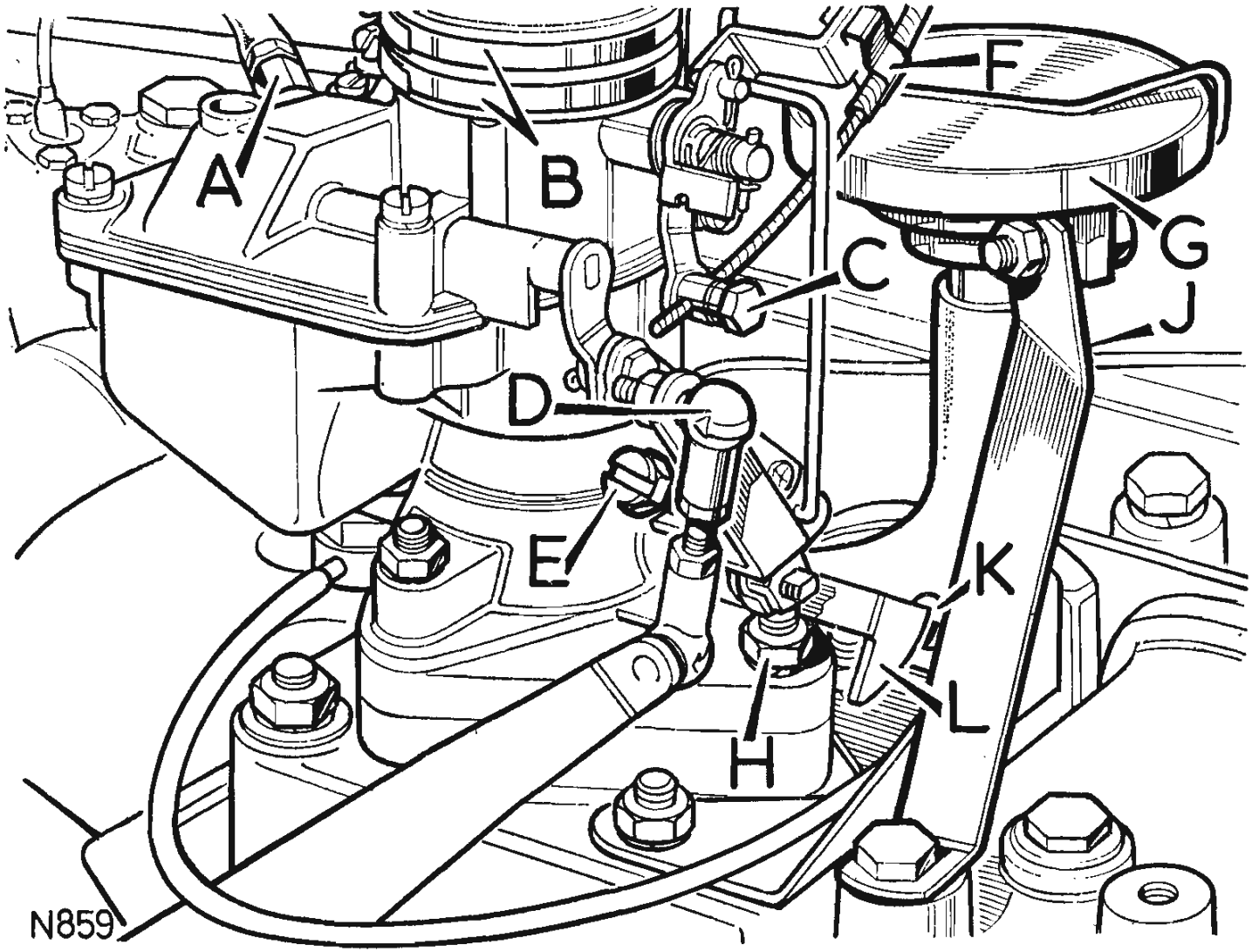
CARBURETTER, TO REMOVE AND REFIT

Carburetter to remove

1. Release the screws securing the clips at the carburetter air inlet and detach the air inlet pipe.
2. Unscrew the fuel inlet pipe at the carburetter top cover.
3. Unscrew the clamp bolt securing the choke inner cable to the choke swivel linkage, release the spring clamp securing the choke outer cable to carburetter bracket and detach choke cable assembly complete from carburetter.
4. Where applicable, detach the hose which connects the distributor vacuum capsule with the carburetter adaptor union.
5. Disconnect the accelerator linkage from the throttle lever by releasing the clips at the spherical joint.
6. Detach the electrical lead at the solenoid cut-off valve.
7. Remove the two nuts and washers which secure the carburetter to the inlet manifold and remove the carburetter from the engine.

Carburetter, to refit

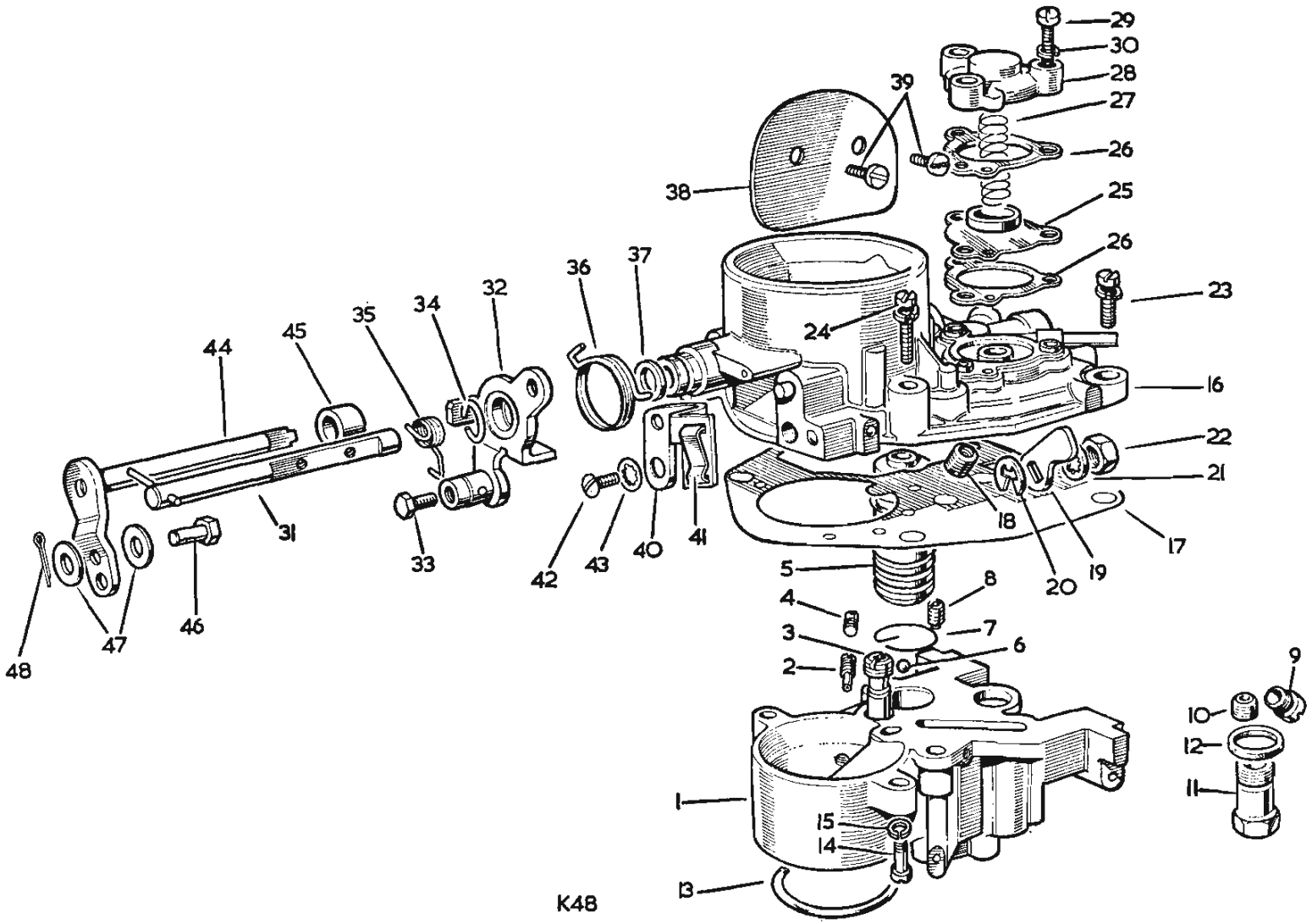
8. To refit, reverse the removal procedure, using new gaskets. When refitting choke control outer cable, ensure that the retaining spring clip is pushed fully home until a double 'click' is felt.



View of carburetter in position on engine

Key to view of carburetter in position on engine

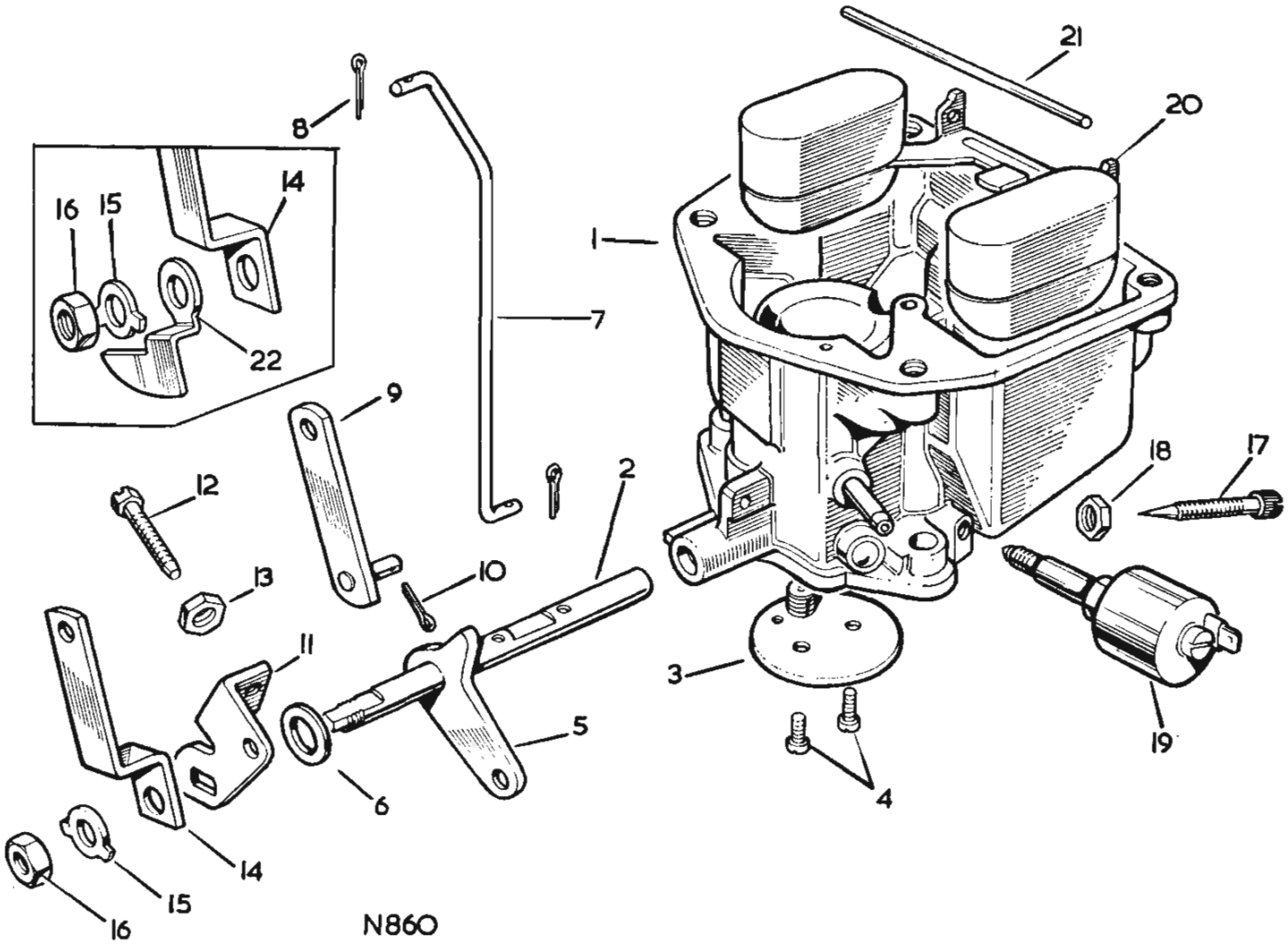
A—Fuel inlet to carburetter from filter
B—Clips on air intake pipe from air cleaner
C—Bolt for choke control inner cable
D—Clip for accelerator ball end at throttle lever
E—Throttle stop screw
F—Spring clip for choke control outer cable
G—Crankcase emission non-return valve (ref. only)
H—Nuts, carburetter to manifold
J—Crankcase emission non-return valve bracket (ref. only)
K—Throttle-controlled vacuum switch, where fitted
L—Cam for vacuum switch, where fitted



Carburetter top cover and emulsion block

Key to carburetter top cover and emulsion block

1. Emulsion block
2. Pump jet
3. Pump discharge valve
4. Plug for pump jet
5. Piston for accelerator pump
6. Ball for piston
7. Circlip for piston
8. Slow running jet
9. Main jet
10. Enrichment jet
11. Needle valve
12. Special washer for needle valve
13. 'O' ring, emulsion block to body
14. Special screw } Fixing emulsion
15. Spring washer } block to body
16. Top cover for carburetter
17. Gasket for top cover
18. Ventilation screw for choke, where fitted
19. Pump lever, internal
20. Retaining ring for pump lever
21. Shakeproof washer } Fixing
22. Special nut } pump lever
23. Screw and spring washer, short } Fixing top cover
24. Screw and spring washer, long } to main body
25. Diaphragm for carburetter
26. Gasket for diaphragm
27. Spring for diaphragm
28. Cover for diaphragm
29. Screw } Fixing diaphragm
30. Spring washer } cover
31. Spindle and pin for choke lever
32. Lever and swivel for choke
33. Screw for choke lever swivel
34. Circlip fixing choke lever to top cover
35. Spring, small } For choke
36. Spring, large } lever
37. Plain washer for choke spindle
38. Butterfiy for choke
39. Special screw fixing butterfiy
40. Bracket and clip for choke cable
41. Clip for choke bracket
42. Special screw } Fixing choke bracket to
43. Shakeproof washer } top cover
44. Spindle and lever for accelerator pump
45. Spacing washer for pump spindle
46. Pin } Fixing relay
47. Plain washer } lever to
48. Split pin } pump lever



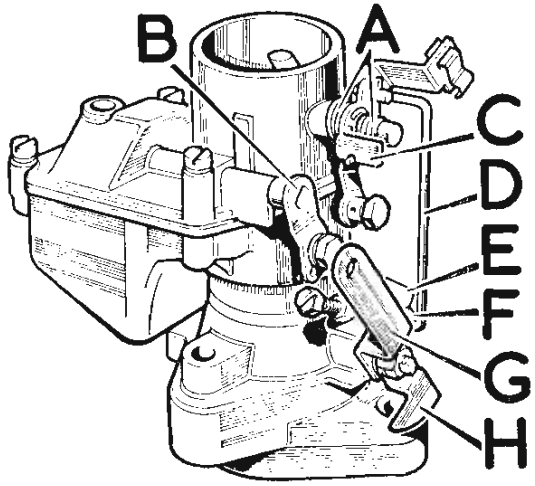
Carburetter main body and components

Key to carburetter main body and components

1. Carburetter main body
2. Throttle spindle
3. Butterfly and poppet valve for throttle
4. Special screw fixing butterfly
5. Floating lever on throttle spindle
6. Plain washer on spindle for floating lever
7. Interconnecting link, throttle to choke
8. Split pin fixing link to levers
9. Relay lever, throttle to accelerator pump
10. Split pin fixing relay lever to floating lever
11. Throttle stop and fast idle lever
12. Special screw } For throttle
13. Locknut } stop
14. Throttle lever
15. Lock washer } Fixing throttle
16. Special nut } levers
17. Volume control screw
18. Locknut for control screw
19. Solenoid, 12 volt, for carburetter
20. Float
21. Spindle for float
22. Cam for throttle-controlled vacuum switch, where fitted

CARBURETTER OVERHAUL

Carburetter to dismantle



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View of carburetter showing interconnecting linkage

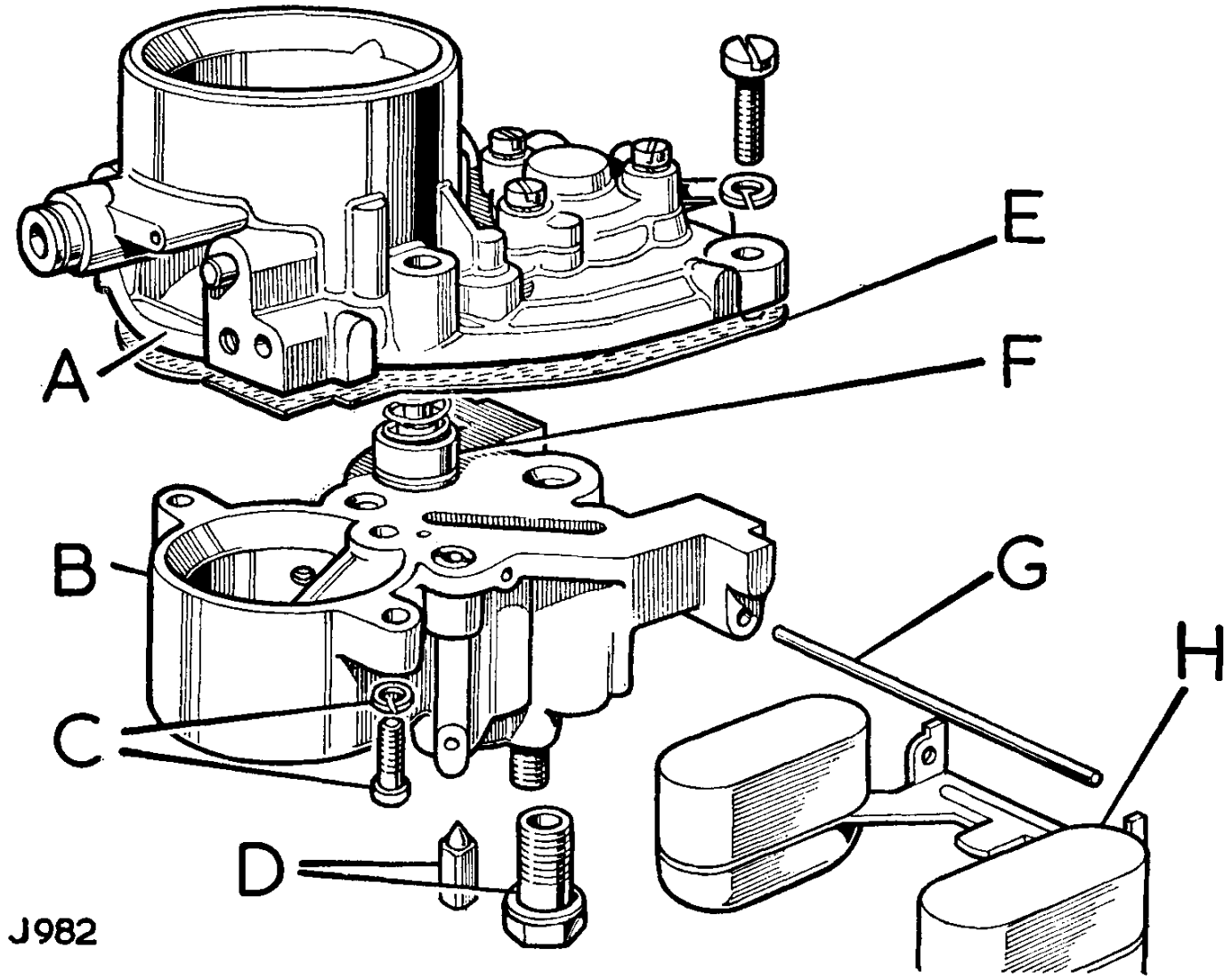
A—Choke linkage return springs
B—Accelerator pump spindle lever
C—Choke operating tab
D—Interconnecting link
E—Throttle relay lever
F—Floating lever
G—Throttle lever
H—Cam for vacuum switch, where fitted

Linkages, to dismantle

1. Remove the two split pins and detach the link which interconnects the choke lever swivel and the floating lever on throttle spindle.
2. Remove the split pin from the throttle relay lever to accelerator pump spindle lever and remove the fixing pin and the two plain washers. No further linkage dismantling is necessary to enable carburetter dismantling to proceed. However, a visual check of the condition of the return springs on the choke linkage assembly should be made to ensure soundness of springs and their locating ends.

Top cover and emulsion block, to separate

3. Remove the two long and two short set screws and spring washers situated at corners of carburetter top cover. Detach top cover and emulsion block complete from carburetter body. Place aside carburetter body for subsequent dismantling.
4. Push out the hinge pin securing the float assembly to the emulsion block lugs. Remove the float assembly and place aside, no further dismantling being possible on this assembly.
5. Tip out the needle valve from its housing and unscrew the needle valve housing and sealing washer from the tapping in the top cover.
6. Unscrew and remove the two set screws and spring washers and detach the emulsion block from the carburetter top cover assembly. Take care not to drop the accelerator pump assembly which is freed during this procedure.
7. Remove the gasket and place aside the top cover assembly for subsequent dismantling.



Top cover and emulsion block

Key to top cover and emulsion block

A—Carburetter top cover
B—Emulsion block assembly
C—Emulsion block attachment screws and washers
D—Needle valve and housing
E—Top cover gasket
F—Accelerator pump piston
G—Hinge pin for float assembly
H—Float assembly

Emulsion block, to dismantle

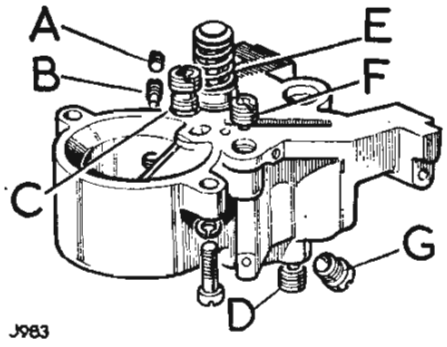
8. Lift out accelerator pump piston from housing bore in emulsion block. This assembly comprises piston, plunger, springs and spring seats and is a complete assembly, no dismantling is possible.

9. At the base of the accelerator pump housing bore is a ball inlet valve retained by a circlip. The valve and circlip are not shown on the illustration as dismantling is not normally necessary; to clean the valve and valve seating use an air blast or wash out with clean fuel to remove any sediment deposit.

10. Unscrew and remove the slow-running jet from the emulsion block upper, flat face. This jet incorporates a non-return ball valve, retained with a peened pin, and cleaning is effected using an air blast or by syringing with clean fuel to remove any sediment deposit.

11. Unscrew and remove the blanked-off jet body from the emulsion block upper face to facilitate cleaning of the accelerator pump fuel line passages.

12. Unscrew and remove the pump jet tapping plug from the side of the emulsion block, followed by the pump jet.



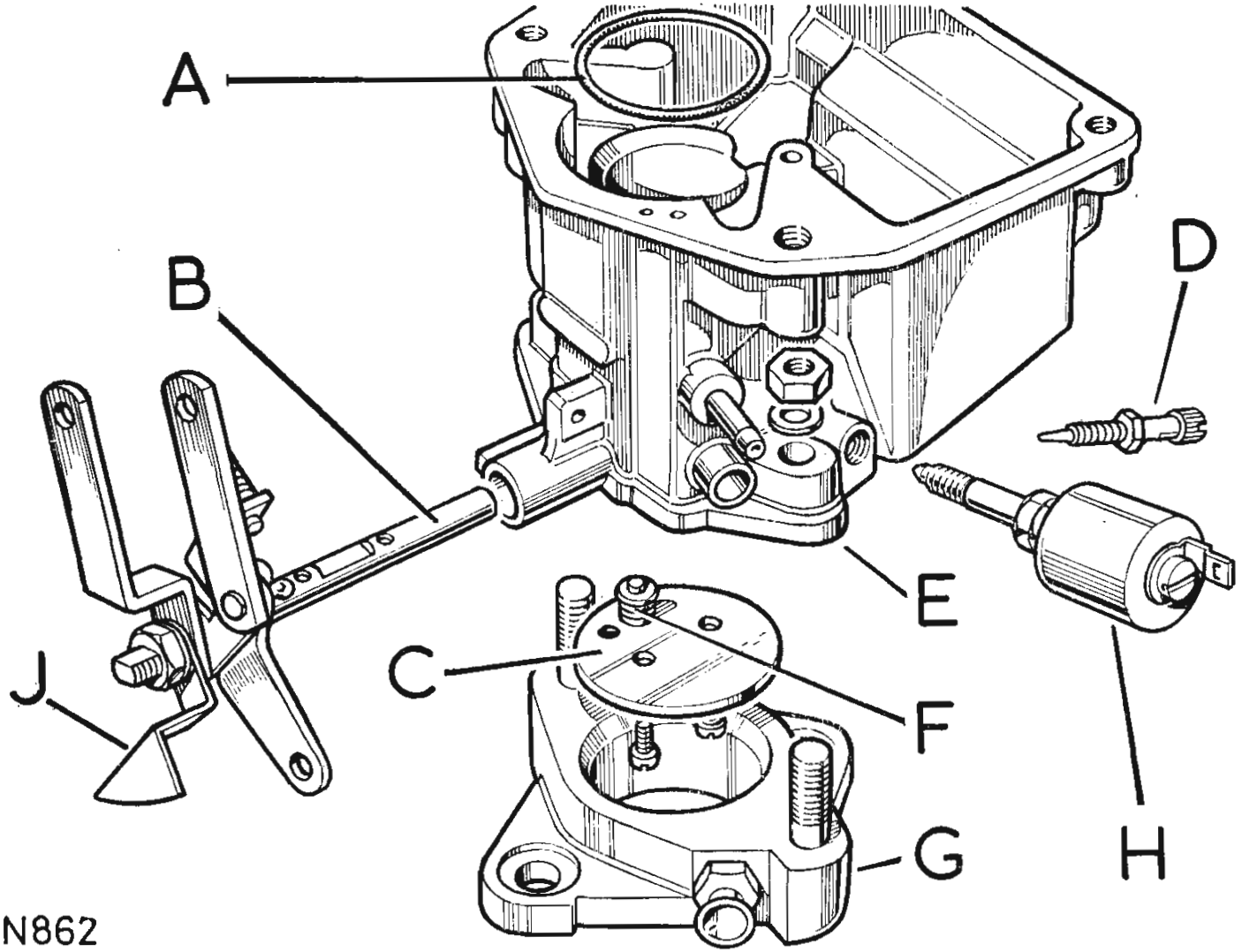
Emulsion block details

A—Plug for pump jet tapping
B—Pump jet
C—Blanked-off jet
D—Enrichment jet
E—Accelerator pump piston
F—Slow running jet
G—Main jet

13. Unscrew and remove the main jet and enrichment jet from the emulsion block. These two jets are cadmium plated to distinguish them from other jets of similar size and shape which have an unplated brass finish. Although the two types appear identical except for surface finish, their flow characteristics are dissimilar and only plated main and enrichment jets are to be used in this carburetter.

Carburetter body dismantling

14. Unscrew and remove the idling volume control screw and spring from the throttle butterfly housing flange and examine the tapered end for wear. Wear on this face, such as that caused by excessive contact with the slow running hole during fitting, will necessitate fitting a replacement idling volume control screw.



Carburetter body details

Key to carburetter body details

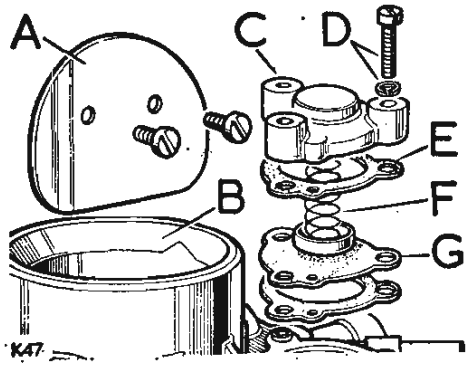
A—'O' ring seal for choke tube
B—Throttle spindle
C—Throttle butterfly disc
D—Idling volume control screw
E—Carburetter body
F—Throttle butterfly disc poppet valve
G—Carburetter adaptor
H—Solenoid cut-off valve
J—Cam for vacuum switch, where fitted

15. Unscrew and remove the solenoid cut-off valve assembly from the butterfly housing flange. No dismantling is possible on this assembly.
16. Remove the two nuts and spring washers and detach adaptor from carburetter body.
17. If required to remove the carburetter throttle spindle to aid cleaning, first remove the two special screws securing the throttle butterfly, taking care not to damage the poppet valve, and remove the butterfly disc from the carburetter body. The throttle spindle and linkage complete may then be withdrawn.

    Note: Two replacement screws must be provided for subsequent re-assembly of butterfly disc to throttle spindle.
18. Remove the 'O' ring seal from its seating around the spigotted top end of the venturi block.

Carburetter top cover

19. Unscrew and remove the three set screws and spring washers from the economy valve diaphragm cover and allow the cover to detach from the joint face under loading from the diaphragm spring. Remove spring and cover.



Carburetter top cover details

A—Choke butterfly
B—Carburetter top cover
C—Economy valve diaphragm cover
D—Diaphragm cover attachment screws and washers
E—Diaphragm gaskets
F—Diaphragm spring
G—Diaphragm assembly

20. Ease the diaphragm gasket away from the locating bosses and remove. Remove diaphragm assembly and remaining gaskets. Examine components for damage, replace with new items as necessary.
21. If required to remove the choke spindle to aid in cleaning, detach end of large spring from choke operating tab and so free choke spindle from spring loading, remove the choke butterfly screws and butterfly from choke spindle and withdraw spindle from housing. Take care to retain the thin washer.

    Note: Provide two new special screws for subsequent re-assembly of the choke butterfly to the choke spindle.

22. Where fitted, remove the ventilation screw from the angled tapping in the top cover lower face.

Special notes

1. **Carburetter cleaning**

   When cleaning fuel passages do not use metal tools (files, scrapers, drills, etc.) which could cause dimensional changes in the drillings or jets. Cleaning should be effected using clean fuel and where necessary a moisture-free air blast.

2. **Joint faces**

   If the joint faces on the emulsion block, top cover or carburetter body show any signs of distortion or the edges are burred, these faces may be reclaimed by flatting, using fine grade abrasive cloth and a surface plate. Examine the faces for deep scores which would lead to leakage taking place when assembled.

3. **Carburetter jets**

   As this carburetter forms part of a fuel system designed to conform with exhaust emission control regulations, carburetter jets used for replacement purposes must conform in size and type with those originally specified; the Fuel System Data section in this Supplement refers.

4. **Joint gasket and seals**

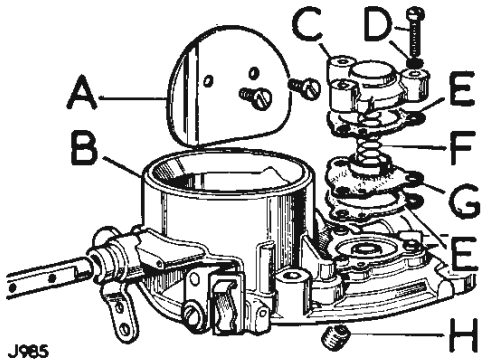
   New gaskets and seals should be used throughout carburetter rebuild. A complete set of gaskets is available for replacement purposes.

CARBURETTER, TO REBUILD

Carburetter top cover, rebuild

1. If previously dismantled, insert the choke spindle into its housing and re-fit the thin washer. Locate the choke butterfly on the spindle and secure with the two special screws. Lock the screws by peening. Engage the spring end onto the choke swivel lever.

2. Fit the economy valve gasket, diaphragm assembly and a further gasket to the top cover upper face, aligning the holes in the gaskets and diaphragm with the drilling in the top cover face.



Carburetter top cover details

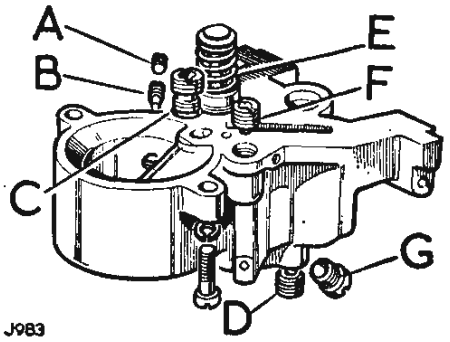
A—Choke butterfly disc
B—Carburetter top cover
C—Economy valve diaphragm cover
D—Diaphragm cover fixings
E—Diaphragm gaskets
F—Diaphragm spring
G—Diaphragm assembly
H—Ventilation jet, where fitted

3. Locate the spring in the seating on the diaphragm assembly, locate the valve cover spigot on the spring free end and align the drilling in the cover casting with the hole in the gasket. Push down on the cover, keeping it square to the diaphragm, and secure with the three screws and spring washers.

4. Where fitted, fit the ventilation screw to the angled tapping in the top cover lower face.

Emulsion block, rebuild

5. Fit the blanked-off jet and the slow-running jet to their respective tappings in the emulsion block upper face, see illustration for positions.



Emulsion block details

A—Pump jet plug
B—Pump jet
C—Blanked-off jet
D—Enrichment jet
E—Accelerator pump piston
F—Slow-running jet
G—Main jet

6. Fit the pump jet, followed by the pump jet tapping plug, to the tapping in the side of the emulsion block.

7. Fit the main jet and the enrichment jet to the emulsion block, the enrichment jet into the vertical tapping and the main jet into the angled tapping. The jets are cadmium plated to aid identification as stated in 'Carburetter dismantling' this Section.

Fitting emulsion block to carburetter top cover

8. Position the gasket on top cover joint face.

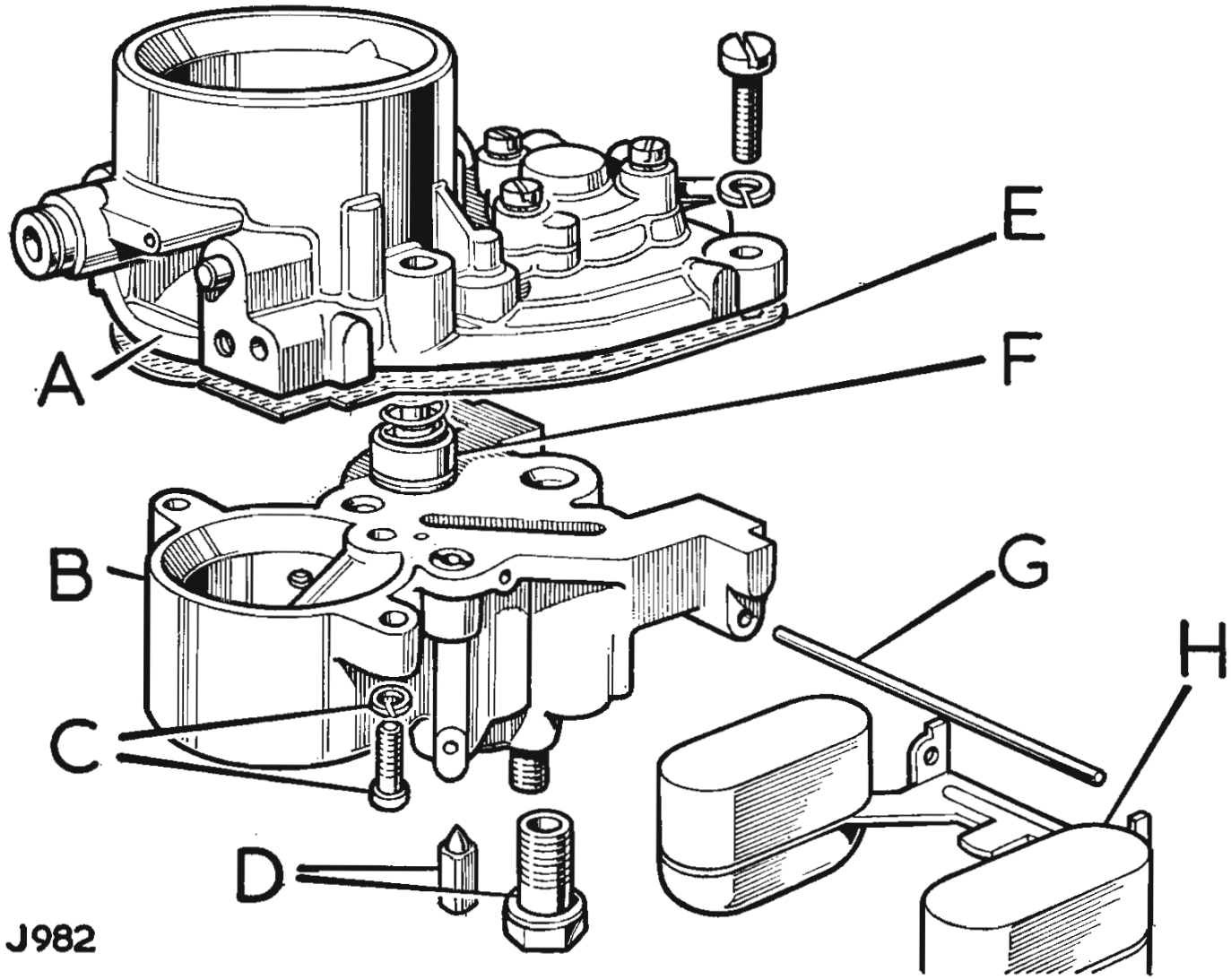
9. Apply a thin smear of clean lubricating oil to the accelerator pump piston and assemble, piston first, into its housing bore in the emulsion block.

10. Ensure that the accelerator pump spindle lever is positioned inboard to align with accelerator pump plunger, position emulsion block and accelerator pump assembly on top cover joint face and fit the two set screws and spring washers. Do not fully tighten at this stage.

11. Check that the fuel passage drillings in the top cover are clear and not masked by misalignment of the gasket. Now fully tighten the emulsion block securing screws.

12. Ensure that the sealing washer for the needle valve housing is in good condition and fit the washer.

13. Fit the needle valve housing threaded end through the clearance hole in the emulsion block flange and engage the threads in the top cover tapping. Tighten firmly using a ring spanner.



Fitting top cover to emulsion block

Key to fitting top cover to emulsion block

A—Carburetter top cover
B—Emulsion block
C—Emulsion block attachment screws and washers
D—Needle valve and housing
E—Top cover gasket
F—Accelerator pump piston assembly
G—Hinge pin
H—Float assembly

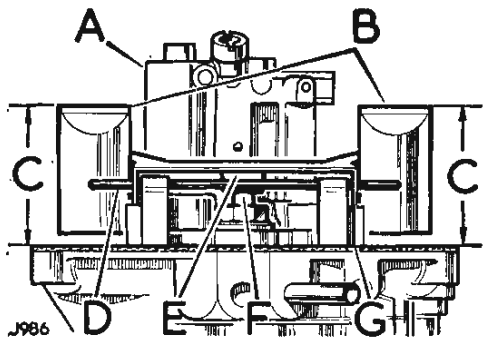
14. Fit the needle valve into its seating in the needle valve housing. Check for leakage past the assembly by holding the needle valve onto its seating and blowing air into the fuel inlet pipe.

Fitting float assembly

15. Position float assembly onto top cover, align pin holes in float carrier and emulsion block flange lugs and secure float carrier with hinge pin.

16. With the needle valve on its seating and the central tongue on the float carrier contacting on the needle valve, measure the distance between the gasket upper face and the highest point on the floats as detailed in the accompanying illustration.

17. The dimension required at this check is $1\frac{7}{32}$ in. (31 mm). Any adjustment must be made by deflecting the central tongue which abuts the needle valve; adjustment must not be made by bending the float carrier arms.



Checking float setting

A—Emulsion block
B—Highest points on floats
C—Dimension to be $1\frac{7}{32}$ in. (31 mm)
D—Hinge pin
E—Central tongue on float carrier
F—Needle valve
G—Gasket

Fitting top cover and emulsion block to carburetter body

18. Fit the 'O' ring seal to the seating around the top end of the venturi barrel. Ensure the 'O' ring is correctly seated.

19. Offer up the cover and emulsion block assembly to the carburetter body. Check that the 'O' ring seal around the venturi barrel is holding off the emulsion block, indicated by a small gap between the top cover gasket and carburetter body joint faces. This will ensure a compression seal on the 'O' ring when assembled.

20. Secure the assembly, using the two long and two short set screws and spring washers.

Carburetter linkage, re-connect

21. Connect the throttle relay lever to the hole nearest to the fulcrum on the accelerator pump spindle lever, using clevis pin, two plain washers and split pin.

    Note: In some applications of the basic carburetter, the hole nearest to the fulcrum is for use only in cold seasons to obtain maximum stroke from the accelerator pump. For this engine, however, this hole is to be used for all seasons.

22. Fit the interconnecting link between choke operating tab and the floating lever on the throttle spindle and secure with split pins.

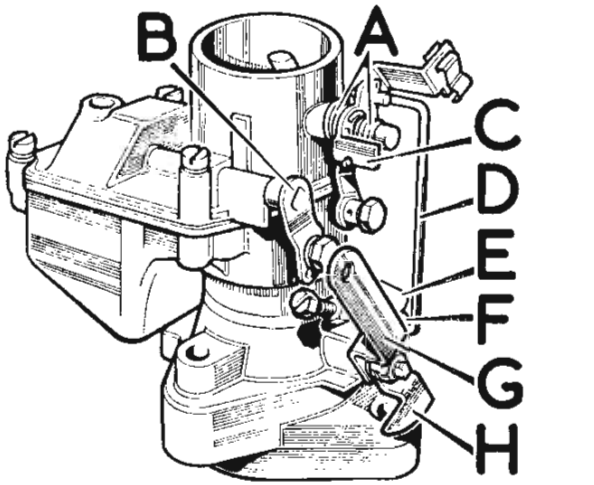
Fast-idle interconnection setting

Fully close choke butterfly by actuating choke operating tab. It should be possible to slide a .055 in. (No. 54) diameter (1,4 mm) drill between throttle butterfly edge and the carburetter body. If necessary, bend interconnection link to achieve this condition.

CARBURETTER, TO SET AND ADJUST

For details of re-fitting carburetter to engine, see under 'Removing and re-fitting Fuel System components' in this Supplement.

Important: The carburetter settings and adjustments must be made only when the ignition timing is correct, as detailed in the Engine Section of this Supplement.



N861

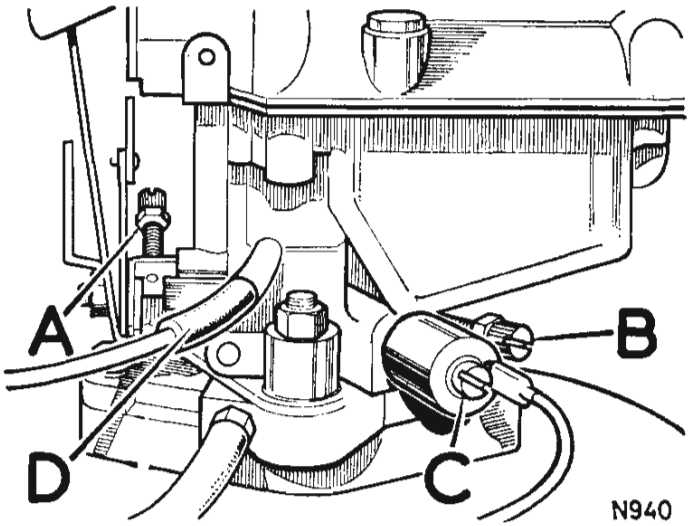
View of carburetter showing linkage

A—Choke linkage return springs
B—Accelerator pump spindle lever
C—Choke operating tab
D—Interconnecting link
E—Throttle spindle relay lever
F—Throttle spindle floating lever
G—Throttle lever
H—Cam for vacuum switch, where fitted

Before any attempt is made to set the idling speed, a thorough check should be made to ensure the throttle linkage between the pedal and the carburetter is free and has no tendency to stick.

1. Start engine and run until warm, denoted by thermostat outlet pipe becoming warm to the touch. Continue running for a further five minutes to thoroughly stabilise engine temperature.

2. Set the idling volume control screw to the position which gives maximum engine speed.
3. Adjust the throttle stop screw to obtain an idling speed of 700 rpm, measured using a suitable stroboscopic tachometer.



Carburetter slow running adjustment

A—Throttle stop screw
B—Idling volume control screw
C—Solenoid
D—Vacuum pipe to distributor, earlier models

4. Turn the idling volume control screw clockwise (that is, to weaken the mixture) until the engine speed tends to decrease, but do not allow any decrease to take place.
5. Secure the idling volume control screw, using the locknut. The screw is then at the setting position required for all engine operating conditions.
6. Adjust the throttle stop screw to increase engine idling speed to as close as possible to 800 rpm without exceeding this figure.
7. Secure the throttle stop screw, using the locknut.
8. When engine idling speed is correct, remove tachometer and switch off engine.

Evaporative emissions from fuel tank

A charcoal-filled adsorption container (E) is situated in the engine compartment, to deal with evaporative emissions from the fuel tank.

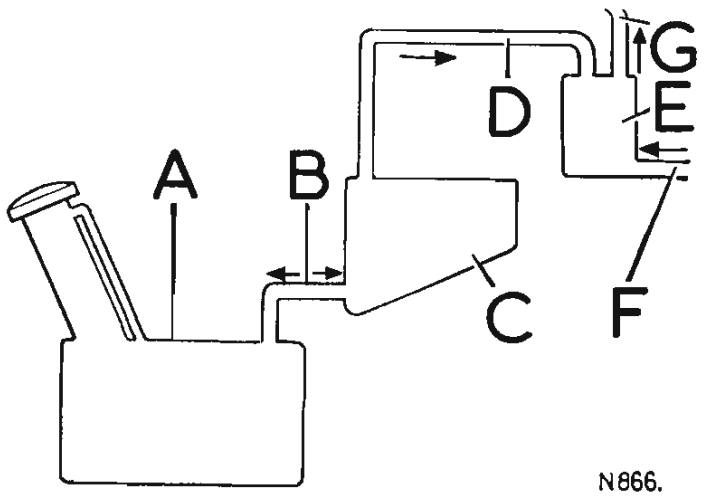
From the main fuel tank (A), the main tank breather pipe (B) is fed into a separate expansion tank (C). From the expansion tank a further breather pipe (D) leads to the charcoal container (E). At the side of the container, an air inlet pipe (F) is open to atmosphere, and from the top, a pipe (G) leads to the carburetter air cleaner elbow.

Normal fuel tank breathing is through the air inlet pipe (F) on the charcoal container (E) and then through the two breather pipes (B, D) via the expansion tank (C).

Any vapours from the fuel in the main or expansion tanks are fed via the pipes (B) and (D) into the charcoal container,

where they are absorbed on the charcoal and do not escape to atmosphere. During engine accelerating conditions air is drawn in through pipe (F) at the side of the container, purging the trapped emissions into the engine through the carburetter air cleaner elbow.

The function of the expansion tank is to provide an overflow reservoir for the main tank, as it is possible when the main tank is completely filled in high ambient temperature conditions for the fuel to expand and force a large quantity along the breather pipe. The size of the expansion tank allows for maximum fuel expansion; under such conditions evaporative emissions are still controlled by the charcoal container and, due to the location of the breather pipe (B) at the bottom of the expansion tank, the overflow fuel will eventually be drawn back into the main tank as fuel is used.



Layout of fuel tank evaporative control system

Charcoal container, fuel tank evaporative emission control system

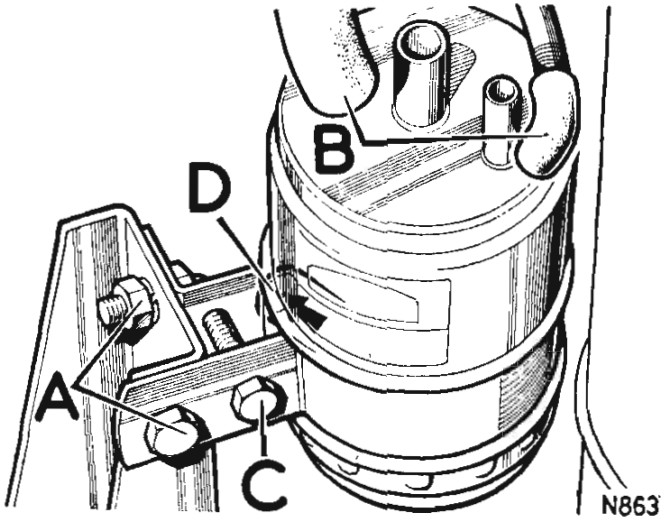
Replace container every 40,000 miles (64.000 km).

Note: Under normal operating conditions the charcoal container, situated at the right-hand rear of the engine compartment, should require replacement only at 40,000 mile (64.000 km) intervals. If, however, severe flooding of the container takes place, which may result in fuel weeping from the tank filler cap or the emission system, or erratic engine running due to enriched mixture, check that all pipes are connected correctly and that there are no obstructions. If flooding persists, change the filter pad in the base of the container; if flooding still persists, replace the container immediately regardless of mileage.

DANGER. No attempt should be made to cleanse the container. The use of compressed air could cause the activated charcoal filling to ignite.

Charcoal container replacement

1. Note the hose positions and disconnect at container.
2. Remove the fixings, container strap to mounting bracket.
3. Slacken the pinch bolt on the strap.
4. Withdraw the container.
5. Fit a new container by reversing the removal procedure. Do not overtighten the strap pinch bolt. Position the container such that the 'open-to-atmosphere' pipe faces inboard and toward the rear of the engine compartment.



Charcoal container

A—Fixings, container strap to mounting bracket
B—Hoses
C—Pinch-bolt for container strap
D—Pipe, open to atmosphere

Filter replacement, if necessary—Remove container as described above. Unscrew end cap from base of container and withdraw filter pad. Fit new filter pad with smooth side inward. Using new rubber seal, screw on end cap and refit container.

When operating for long periods in dusty conditions, check the condition of the filter at such regular periods as experience proves necessary.

DEFECT LOCATION—CARBURETTER

General Fuel System defect location procedure for items other than carburetter is as detailed in the Land-Rover Workshop Manual and Owner's Maintenance Manual.

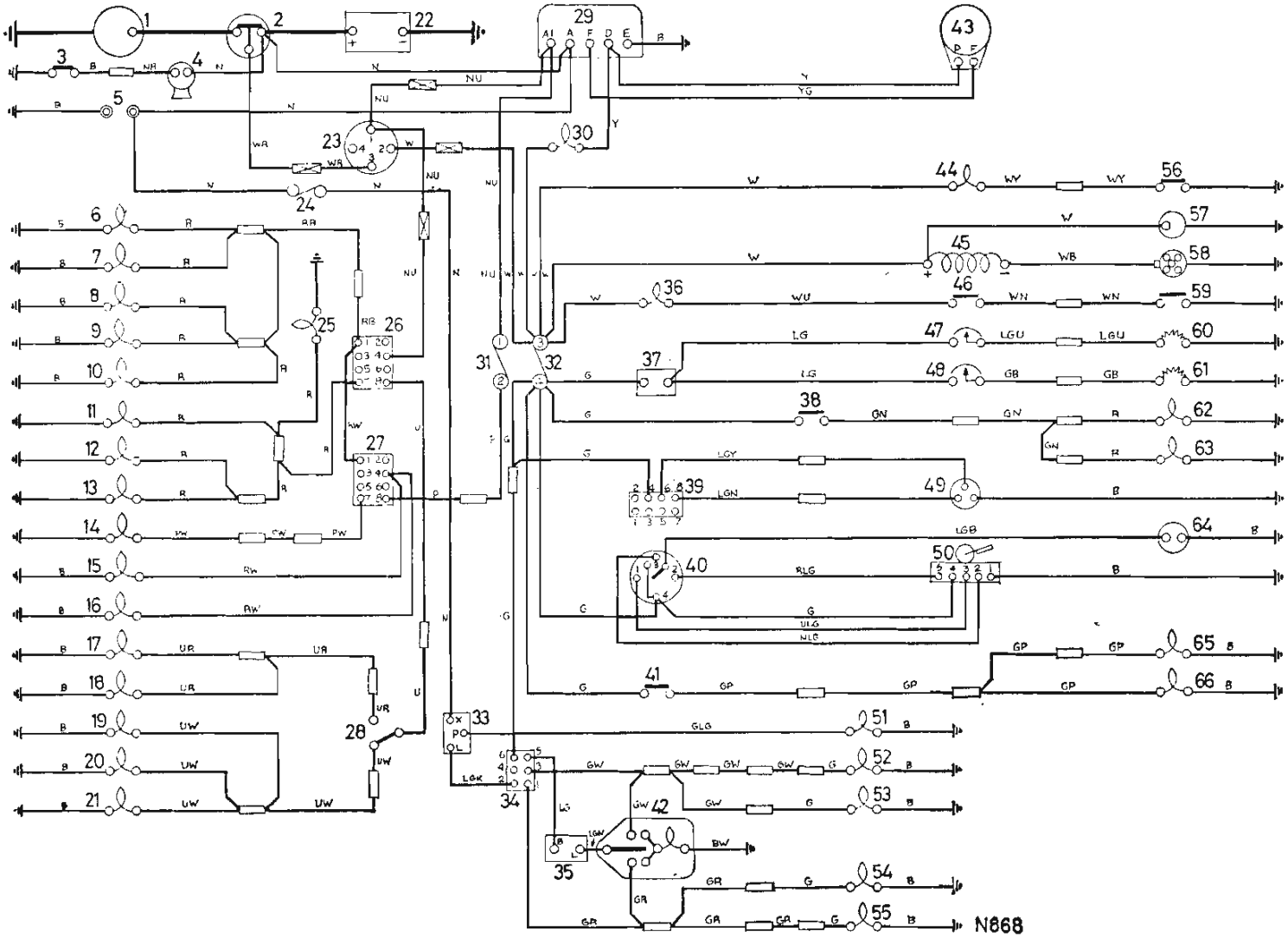
SYMPTOM	POSSIBLE CAUSE	CHECK AND REMEDY
A—Difficult starting engine cold	**Fuel starvation**	
	1. Float chamber fuel level too low	(a) Check needle valve for sticking in seat. Clean as necessary to remove any deposits, using methylated spirits. (b) Check float level setting. Reset as necessary. (c) Blocked fuel filter. (d) Air leakage in crankcase emission control system, that is oil filler cap or pipes.
	2. Choke butterfly not fully closing	(a) Check for broken or detached spring on choke operating tab. Replace as necessary. (b) Friction between choke spindle bearings due to carbon deposits, or choke spindle distortion. Clean or replace as necessary. (c) Choke butterfly fouling in carburetter due to misalignment. Adjust as necessary.
	3. Throttle closed against throttle stop screw with choke butterfly closed	(a) With the choke butterfly closed, the throttle should be open slightly beyond the normal slow run position. Check for distortion of the interconnecting link between choke and throttle linkage. Replace as necessary.
B—Difficult starting engine hot	**Mixture over-rich**	
	1. Float chamber fuel level too high	(a) Check float level setting. Reset as necessary. (b) Check for leakage past needle valve and seating. Check-tighten seating housing. (c) Check needle valve and seat size. Replace as necessary.
	2. Internal leakage	(a) Check that sealing 'O' ring is present around venturi spigot and is sound. Replace as necessary.
	3. Charcoal container flooded	(a) Check air inlet for blockage. Replace charcoal container.

SYMPTOM	POSSIBLE CAUSE	CHECK AND REMEDY
C—Engine will not idle or run smoothly	1. **Carburetter solenoid valve sticking closed**	(a) Check electrical feed lead is sound and terminals clean and secure. Replace lead as necessary. (b) Remove electrical lead at solenoid. With ignition switch 'ON', touch solenoid lead against the solenoid terminal connection. A 'click' will indicate that the valve is operating. If in doubt, proceed to (c) below. (c) Remove solenoid valve from carburetter. Switch ignition 'ON' and earth the solenoid valve body at a convenient point on the engine block. The solenoid valve spindle should withdraw into the valve body when energised. Where solenoid replacement is required, fit a new solenoid valve assembly complete.
	2. **Charcoal container flooded**	(a) Check as in B.3(a).
D—Engine 'runs on' after ignition switched 'OFF'	1. **Carburetter solenoid valve sticking open**	(a) Check as in C.1 (b). (b) Remove solenoid valve from carburetter. Check valve is free to return under its spring loading with the solenoid de-energised. Where solenoid replacement is required, fit a new solenoid valve assembly complete. (c) If the solenoid valve functions correctly, check valve seat in carburetter for foreign matter which could prevent the valve from seating correctly.
E—Erratic slow-running or stalling on deceleration	**Partial fuel starvation** 1. Fuel passages or jets obstructed	(a) Check as in A.1 (a). (b) Check slow-run jet, slow-run fuel passages and slow-run air intake orifice for obstruction. Clean as necessary, take care not to alter jet or orifice sizes. (c) Check idle volume control outlet hole for obstruction. Clean as in (b) above.

SYMPTOM	POSSIBLE CAUSE	CHECK AND REMEDY
		(d) Check volume control (mixture) screw conical end is not worn or malformed. Check screw locknut is sound and effectively retains screw in position when fitted. Replace as necessary.
F—Excessive fuel consumption	1. Choke butterfly not in fully open position during normal running	(a) Check linkage from dash panel control to carburetter. Re-set choke cable as necessary.
	2. Economy device not functioning correctly.	(a) Check tighten diaphragm cover fixing screws. (b) Check condition of diaphragm and gaskets. Replace as necessary. If replacing diaphragm, also fit new diaphragm spring.
	3. Needle valve and seating leaking or oversize	(a) Check and remedy as under B.1 (b) and (c).
	4. Plunger sticking in on throttle controlled vacuum switch	(a) Replace switch
G—Poor acceleration	1. Accelerator pump sticking	(a) Check piston assembly moves freely in its housing bore and will fully return under the spring loading. Clean piston bore also clean non-return valve and seating at base of pump housing bore.
	2. Jet and orifice blockage	(a) Check pump jet is not obstructed. Clean as necessary. (b) Ensure 'progression' holes in throttle bore adjacent to throttle edge are clear and not obstructed. Clean as necessary, **do not enlarge holes.** (c) Ensure economy diaphragm assembly is sound. Replace as necessary.
	3. Plunger sticking in on throttle-controlled vacuum switch	(a) Replace switch

SYMPTOM	POSSIBLE CAUSE	CHECK AND REMEDY
H—Loss of power	1. Fuel passages obstructed	(a) Check emulsion block jets and passages for obstruction. Clean as necessary. **Note:** Do not fit larger jets to this carburetter otherwise exhaust emission regulations will be contravened. Refer to the Data Supplement for jet size details
	2. Throttle not fully opening	(a) Check linkage from accelerator to carburetter.

ELECTRICAL EQUIPMENT



Circuit diagram, 4-cylinder 2¼ litre Station Wagon Petrol Models, negative earth, to US Federal Standards

Key to circuit diagram, 4-cylinder 2¼ litre Station Wagon Petrol models, negative earth, to US Federal Standards

1 Starter motor
2 Solenoid, starter motor
3 Horn push button
4 Horn
5 Inspection sockets
6 Tail lamp, RH
7 Side marker, rear, RH
8 Side marker, rear, LH
9 Tail lamp, LH
10 Number plate illumination
11 Side lamp, RH
12 Side marker, front, LH
13 Side lamp, LH
14 Interior lamp
15 Panel light, instruments
16 Panel light, speedometer
17 Headlamp, RH, dipped beam
18 Headlamp, LH, dipped beam
19 Warning light, headlamp main beam
20 Headlamp, LH, main beam
21 Headlamp, RH, main beam
22 Battery, 12 volt
23 Switch, ignition and starter
24 In-line fuse, 25 amp
25 Side marker, front, RH
26 Switch, lights
27 Switch, panel light
28 Switch, headlamp dip
29 Regulator box
30 Warning light, ignition
31 Fuse, A1-A2 (35 amp)
32 Fuse, A3-A4 (35 amp)
33 Hazard warning flasher unit
34 Hazard warning light switch
35 Indicator unit, flashers
36 Warning light, choke
37 Voltage stabiliser, fuel gauge and temperature gauge
38 Switch, reverse light
39 Switch, heater motor
40 Switch, wiper
41 Switch, stop lamp
42 Switch and warning light for flashers
43 Dynamo
44 Warning light, oil pressure
45 Ignition coil
46 Switch, cold start on control
47 Temperature gauge
48 Fuel gauge
49 Heater motor, two-speed
50 Wiper motor
51 Hazard warning light
52 Rear flasher, LH
53 Front flasher, LH
54 Front flasher, RH
55 Rear flasher, RH
56 Switch, oil pressure
57 Solenoid-operated fuel cut-off valve
58 Distributor
59 Switch, cold start in cylinder head
60 Temperature transmitter unit
61 Fuel tank unit
62 Reverse light, LH
63 Reverse light, RH
64 Motor, windscreen washer
65 Stop-lamp, LH
66 Stop-lamp, RH

Snap and Lucar connections —□—

Earth connections —|||

Cable colour code

B—Black P—Purple W—White R—Red N—Brown Y—Yellow U—Blue G—Green L—Light

The last letter of a colour code denotes the tracer colour

DATA SUPPLEMENT

ENGINE

Distributor

Engines with distributor vacuum supply taken from inlet manifold via a throttle-controlled vacuum switch (later 8.0:1 compression ratio engines).

Distributor type	Lucas 25D4
Distributor direction of rotation	Clockwise viewed from drive end
Vacuum retard unit	1.3.3
Contact breaker gap	0.014 to 0.016 in. (0,35 to 0,40 mm)
Advance commences at	900 rpm (engine) ± 100
Advance at	1,700 rpm (engine) is 18° crank ± 2°
Advance at	4,200 rpm (engine) is 40° crank ± 2°
Maximum advance	4,600 rpm (engine)
Static ignition timing (for use as an initial setting only)	TDC
Dynamic ignition timing	6° ATDC at 750 to 800 rpm. Timing mark on crankshaft pulley

Engines with distributor vacuum supply taken from carburetter body and without a throttle-controlled vacuum switch (7.0:1 and earlier 8.0:1 compression ratio engines).

Distributor type	Lucas 25D4
Distributor direction of rotation	Clockwise viewed from drive end
Vacuum advance unit	4.18.12
Contact breaker gap	0.014 to 0.016 in. (0,35 to 0,40 mm)
7.0:1 compression ratio engines—	
Advance commences at	900 rpm (engine) ± 100
Advance at	1,700 rpm (engine) is 27° crank ± 2°
Advance at	4,200 rpm (engine) is 47° crank ± 2°
Maximum advance	4,200 rpm (engine)
8.0:1 compression ratio engines—	
Advance commences at	900 rpm (engine) ± 100
Advance at	1,700 rpm (engine) is 21° crank ± 2°
Advance at	4,200 rpm (engine) is 40° crank ± 2°
Maximum advance	4,600 rpm (engine)

Both engines (7.0:1 and earlier 8.0:1):	
Static ignition timing (for use as an initial setting only)	3° ATDC
Dynamic ignition timing	3° ATDC at 750 to 800 rpm. Timing mark on crankshaft pulley

Sparking plugs

Make and type	Champion UN12Y
Electrode gap	0.029 to 0.032 in. (0,75 to 0,80 mm)

Valve tappet clearance

Exhaust valve	0.010 in. (0,25 mm)
Inlet valve	0.010 in. (0,25 mm)

FUEL SYSTEM

Carburetter

Make and type	Zenith, type 36IVE
Fast idle interconnection setting	0.055 in. (1,4 mm) clearance at throttle butterfly edge with choke fully closed
Carburetter float level	31 mm ($1\frac{7}{32}$ in.) measured from joint gasket face to highest point on floats

Carburetter jet sizes:

1. Carburetter fitted to 7.0:1 compression ratio engines

Main jet	Size No. 125
Enrichment jet	Size No. 195
Slow run jet (ball type)	Size No. 60
Pump jet	Size No. 65
Ventilation jet	3 mm orifice diameter
Needle valve seat	1,75 mm orifice diameter

2. Carburetters fitted to 8.0:1 compression ratio engines with distributor vacuum supply taken from carburetter body

Main jet	Size No. 120
Enrichment jet	Size No. 150
Slow run jet (ball type)	Size No. 60
Pump jet	Size No. 65
Ventilation jet	3 mm orifice diameter
Needle valve seat	1,75 mm

3. Carburetters fitted to 8.0:1 compression ratio engines with distributor vacuum supply taken from inlet manifold via a throttle-controlled vacuum switch

Main jet	Size No. 125
Enrichment jet	Size No. 150
Slow run jet (ball type)	Size No. 50
Pump jet	Size No. 65
Ventilation jet	Not applicable
Needle valve seat	1,75 mm orifice diameter

Evaporative emission control

Charcoal container	Rover Part No. 578065

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