

Bulletin
Number 5036

Issue 1

Date 8.12.48

Sheet 1 of 5 Sheets

MODELS AFFECTED

1948-49 "60" and "75"
LAND-ROVER

UNIT AFFECTED

ENGINE

COMPLAINT

SUBJECT

ENGINE TUNING

Points to which attention should be paid when dealing with engine tuning may be classified under two headings, i.e., General Tuning and Carburettor Adjustment.

Unsatisfactory engine performance is too often attributed to poor carburation, where in actual fact the trouble is caused by other defects in the engine. For this reason carburettor adjustment must only be undertaken after it has been established that the engine is otherwise in a satisfactory condition.

This Bulletin sets out the diagnosis and remedy of the more common engine defects.

PART I. GENERAL ENGINE TUNING.

1. LOSS OF COMPRESSION.

Crank the engine by hand, with the ignition switch "off", and test the compression on each cylinder in turn. If any cylinder feels weaker on compression than the others, it must receive attention before proceeding with the diagnosis.

Loss of compression may be due to one of the following causes:—

(a) **Incorrect tappet clearance.** The correct clearance is .010 in. (0,25 mm.) on the inlet valves and .012 in. (0,30 mm.) on the exhaust valves, with the engine either cold or fully warmed up; the tappets should not be set with the engine slightly warm. See Service Bulletin 5005 for method of adjustment.

If the tappet clearances are in order, remove the cylinder head and check:—

(b) **Valves and seatings.** If the inlet or exhaust valves or valve seats are pitted, they should be refaced and lapped in accordance with the instructions in Service Bulletin 5025.

Occasionally the trouble may be due to:—

(c) **Faulty cylinder head gasket.** A damaged gasket may allow the cylinder contents to escape on the compression stroke.

NOTE. A reduction in compression ratio was made midway during the 1948 season on "60" and "75" engines; high compression engines may be recognised either from the serial number (see Service Bulletin 5003) or by the piston crown shape (see Service Bulletin 5035).

Low compression "60" engines have a Corrijoint gasket.

High compression "60" engines have a copper and asbestos gasket.

All "75" engines have a copper and asbestos gasket.

All Land-Rover engines have a copper and asbestos gasket.

2. MISFIRING.

The cause of misfiring should be located by investigation in the order set out below.

First of all check the number of cylinders affected:—

(i) **Misfiring on some cylinders only.** Disconnect the H.T. lead from the sparking plug or plugs concerned, start the engine and hold the lead about 1/4 in. (7 mm.) away from a metal part of the engine.

If the SPARKS are REGULAR:—

(a) Check for condensation in the sparking plug cover. Remove and clean the cover and check that it has a 1/16 in. (1,5 mm.) hole drilled through one side; rectify as necessary. Check that the rubber sealing ring for the cover is properly fitted and in good condition.

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(b) Remove the sparking plug ; if it is found to be oily or fouled, clean thoroughly.

(c) Check the sparking plug gap. Early 1948 "60" and "75" engines were fitted with Lodge HL14P plugs, while later car and all Land-Rover engines have Lodge HLNK plugs.

The correct gap is :—

HL14P type018 in. (0,45 mm.)

HLNR type023 to .026 in. (0,60 to 0,65 mm.).

If the misfiring is still present on the cylinder in question, fit a new sparking plug.

If NO SPARK is present :—

(a) Check that the distributor contact breaker is opening on the cam concerned. Check, clean and re-set the contact points to .012 in. (0,30 mm.) gap as necessary.

(b) Check the sparking plug leads for faulty insulation and moisture. If the plug lead is "earthing", a spark will be seen jumping to earth ; this can sometimes be heard as a "click". Replace the faulty leads as necessary.

(c) Carefully examine the distributor cap for cracks which can be seen upon close examination ; carbon will have formed in the crack and "tracked" to earth via the distributor body. Renew the cap if necessary.

(ii) **Misfiring on all cylinders.**

(a) Loose or faulty L.T. leads to the coil and distributor. Replace the leads as necessary.

(b) Distributor contact breaker. Check, clean and re-set the contact points to .012 in. (0,30 mm.) gap as necessary. If the points show signs of "blueing", a faulty distributor condenser should be suspected ; this will be confirmed if the sparks are weak and yellow. Renew the condenser as necessary.

(c) Cracked distributor cap. Renew if necessary.

(d) Check the sparking plugs as described under MISFIRING (i) (Sheet 1).

(e) Check the security and quality of the joint washers between the carburettor and inlet manifold and between the manifold and cylinder head. Replace as necessary.

(f) Re-set the slow-running adjustment. SEE "CARBURETTOR ADJUSTMENT". (Sheet 4).

3. LOSS OF POWER.

(i) When dealing with complaints of this nature on "60" and "75" models, first road test the car and check the figures obtained against the standard performance :—

Model	Top gear acceleration 10—30 M.P.H. (15—50 K.P.H.)	Maximum speed
"60"	13.5 secs.	72 M.P.H. (116 K.P.H.)
"75"	10.5 secs.	75 M.P.H. (121 K.P.H.)

These performance figures should be obtained after the engine has been run-in, i.e., after about 3,000 miles (5,000 Km.).

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- (ii) If the car performance is below standard or when dealing with similar complaints on Land-Rover, pay attention to the following points:—
- (a) Compression. See "LOSS OF COMPRESSION" (Sheet 1).
 - (b) Ignition system. See "MISFIRING" (Sheet 1).
 - (c) Ensure that the carburettor throttle butterfly is opening fully.
 - (d) Check that a carburettor jet is not blocked. See "CARBURETTOR ADJUSTMENT" (Sheet 5).
 - (e) Fuel supply. Check that the flow from the S.U. pump is unrestricted; the pump should deliver a maximum of 8 gallons per hour (36 litres per hour). Clean the pump and carburettor intake filters as necessary. In addition, on the Land-Rover, the sediment bowl should be stripped and cleaned if necessary; ensure that the glass bowl seats firmly on the cork sealing washer.
 - (f) Check that the carburettor accelerator pump is functioning correctly. See "CARBURETTOR ADJUSTMENT" (Sheet 5).
 - (g) Ignition timing. See Service Bulletin 5005.
 - (h) Valve timing. See Service Bulletin 5005.
 - (i) See para (vii) of "EXCESSIVE FUEL CONSUMPTION" (Sheet 4).
 - (k) The engine may need decarbonising. See Service Bulletin 5025.

PART II. CARBURETTOR ADJUSTMENT.

I. EXCESSIVE FUEL CONSUMPTION.

When dealing with complaints of excessive fuel consumption, before any adjustments are made, the vehicle should be subjected to a consumption check on the road with a test tank of known size. The fuel consumption should be:—

"60"	30 M.P.G. (9.25 litres per 100 Km.)	} At 30—40 M.P.H. (50—65 K.P.H.).
"75"	25 M.P.G. (11 litres per 100 Km.)	
LAND-ROVER	25 M.P.G. (11 litres per 100 Km.) at 30 M.P.H. (50 K.P.H.).	

If the consumption proves to be below average, proceed as follows:—

- (i) Ensure that the carburettor jet sizes are standard in accordance with the table:—

	"60"	LAND-ROVER	"75"
Choke size	23	23	21
Main jet(s)	139 c.c. (102.5)	139 c.c. (102.5) or 107.5 †	97.5
Air correction jet(s)	160	160	240
Slow-running jet(s)	45	45	60
Pump or speed jet(s)	55	50	65
Economy jet	55	50	60

† See Service Bulletin 5037.

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- (ii) Check compression. See "LOSS OF COMPRESSION" (Sheet 1).
- (iii) Check ignition. See "MISFIRING" (Sheet 1).
- (iv) Check performance. See "LOSS OF POWER" (Sheet 2).
- (v) Ensure that the engine reaches a satisfactory working temperature. Enquiries should be made regarding this point, to ascertain under what conditions the car is normally used and advice given as follows:—
In cold weather, all models will benefit if the lower half of the radiator is blanked off with a baffle or muff. On vehicles used for short runs only, a complete muff is advantageous.
- (vi) Adjust the carburettor to give an even "tick-over". The carburettor is fitted with an accelerator pump and for this reason the idling speed should be set rather higher than normal practice, i.e., 500—600 R.P.M. in the case of "60" and Land-Rover, and 500—700 R.P.M. on "75" engines. There will be a tendency for stalling to result if lower idling speeds are used.

The slow-running mixture strength is adjusted by means of the volume screw or screws and the operation must be carried out with the engine at normal running temperature.

Adjust as follows:—

(a) "60" and Land-Rover.

1. Screw the volume screw in an anti-clockwise direction until the engine begins to "hunt".
2. Screw it carefully clockwise until the hunting just disappears.

(b) "75".

1. Screw both volume screws fully home, then unscrew them one turn each, when the screwdriver slots should lie at the same angle.
2. If the engine now "hunts", screw in carefully both adjustments the same amount, so that the slots remain parallel. If on the other hand, the engine fires erratically, the mixture is too weak and the screws must be turned slightly anti-clockwise until it runs evenly.

The engine is very sensitive to these adjustments and great care should be taken to turn the screws in unison.

Now road test the vehicle again under the same conditions as at first.

If the consumption is still too high:—

- (vii) Check the speed jet diaphragm for signs of perforation. To do this, remove the air cleaner and float chamber cover and fully open the throttle. If fuel seeps into the inlet manifold from the depression channel outlet just below the throttle butterfly, the diaphragm is faulty and the accelerator pump complete must be renewed.
- (viii) Fit new calibrated main jets, obtainable from our Spares Department.

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2. STALLING.

- (i) Check the carburettor idling. See "EXCESSIVE FUEL CONSUMPTION". (Sheet 4).
- (ii) Remove and clean the slow-running jet(s) and the main jet(s), which feed(s) fuel to the slow-running jet(s).
- (iii) Check that the fuel level in the float chamber is correct, i.e. $5/8$ in. $\pm 1/8$ (16 mm. ± 3) below the top of the chamber. The level is best measured by screwing a glass sighting-tube into the main jet tapping in the carburettor body; switch on the ignition and measure the level in the tube from the top of the chamber.
- (iv) See para. (vii) of "EXCESSIVE FUEL CONSUMPTION" (Sheet 4).

3. POOR ACCELERATION.

- (i) See "LOSS OF COMPRESSION" (Sheet 1).
- (ii) See "MISFIRING" (Sheet 1).
- (iii) Check that the accelerator pump is functioning correctly. To do this, open the throttle two or three times with the engine stationary, when a fuel discharge from the manifold drain pipe should be produced.

If there is no discharge :—

(a) Check that the accelerator pump jet is not blocked. This jet is also known as the speed jet or injector calibration; on "60" and Land-Rover engines it is located externally to the left of the pump unit. "75" engines have two jets located under the injector nozzles at the top of the choke tubes; access to them is gained by removing the air cleaner, float chamber cover and injector nozzles, when the jets will be found screwed into the base of the injector tubes.

(b) If the pump jet(s) appear to be satisfactory, examine the exterior of the pump body for signs of fuel leakage; fuel leaking down the pump operating arm will indicate that the pump diaphragm is perforated and a new pump unit must be fitted.

If there is an adequate discharge from the manifold :—

- (a) Remove and clean the slow-running jet and the main jet(s).
- (b) Remove and clean the economy jet; this is located to the right of the pump unit on "60" and Land-Rover engines, and on top of the pump unit on "75" engines.
- (c) See para. (vii) of "EXCESSIVE FUEL CONSUMPTION" (Sheet 4).
- (iv) See "EXCESSIVE FUEL CONSUMPTION" (Sheet 3).

4. INCORRECT IDLING.

See para. (vi) of "EXCESSIVE FUEL CONSUMPTION" (Sheet 4).

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