THE COMPLETE OFFICIAL TRIUMPH TR2 & TR3

Model Years 1953-1961

Complete Service Manuals published by Robert Bentley, Inc.

Volkswagen Beetle and Karmann Ghia Official Service Manual Type 1, Model Years 1966-1969. Volkswagen of America, Inc.

Volkswagen Super Beetle, Beetle and Karmann Ghia Official Service Manual Type 1, Model Years 1970-1976. Volkswagen of America, Inc.

Volkswagen Station Wagon/Bus Official Service Manual Type 2, Model Years 1968-1976. Volkswagen of America, Inc.

Volkswagen Fastback and Squareback Official Service Manual Type 3, Model Years 1968-1973. Volkswagen of America, Inc.

Capri Complete Service Manual, Model Years 1970-1974. Robert Bentley, Inc.

Complete Official Triumph TR2 & TR3, 1953-1961—includes Driver's Instruction Book and Service Instruction Manual. British Leyland Motors

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THE COMPLETE OFFICIAL TRIUMPH TR2 & TR3

Model Years 1953-1961

Comprising the official

driver's instruction book
service instruction manual

Robert Bentley, Inc.
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Preface

To the 1976 Edition

Taken as a whole, the Triumph TR2s and TR3s represent one of the most successful sports car designs in history; so successful that, by the early nineteen-sixties, they had helped to make Standard Triumph the second-best selling imported car marque in the United States. During the late nineteen-fifties and early nineteen-sixties, countless fledgling race drivers gained their early experience in these machines. Among them was three-time World Champion Jim Clark, who owned one of the first—if not the very first—TR3 in Scotland.

Today, in the nineteen-seventies, TR2s and TR3s are as eagerly sought after as they were twenty years ago when the cars were in production. This should not be surprising since there has never been a time during those twenty years when TR2s and TR3s were not proving their worth. In 1965, fully ten years after the TR2 was discontinued and almost five years after the last TR3 had been built, the cars remained highly competitive in racing. In that year, the Sports Car Club of America's U.S. F-Production Championship was won by Brian Fuerstenau in a TR3—with Lee Midgely's TR2 solidly in second place.

Wise collectors began to acquire TR2s and TR3s even before their long and successful history had been written on the race track. (As recently as 1975 a TR3 made the field for The Champion Spark Plug Road Racing Classic—an event that determines the ultimate standings in U.S. amateur road racing.) In 1970, at a time when the newest TR3 was on the verge of becoming a ten-year-old relic, well-maintained examples of its predecessor, the TR2, were already being purchased by collectors for more than the cars had cost when new. The prices of fully restored TR3s have since begun to follow suit and will undoubtedly continue to rise as fewer examples of the type become available on the open market.

This is as it should be; the TR2 and TR3 are landmarks in the evolution of the sports car. Before the TR2 arrived on the automotive scene, enthusiasts of limited means had very few cars from which to choose. The TR3 was a windfall particularly to sports car-starved Americans who, in buying a Triumph, could acquire 100-mph capability at a cost little greater than that required to obtain an 80-mph MGTF.

Because the value of TR2 and TR3 sports cars is increasing, it is impossible to overstate the importance of correct maintenance and repair. Unfortunately, original workshop manuals and owner's manuals have, since the assimilation of Standard Triumph by British Leyland Motors, become virtually impossible to obtain. Indeed, original books are now collector's items in their own right. No vintage Triumph enthusiast would choose to risk one by placing it on an oil-stained workbench or on a garage floor! A new, readily available and easily replaceable manual that duplicates the orginal manuals' contents is clearly needed.

This Manual has been compiled in order to meet that need, thereby supplying complete, accurate, and comprehensive maintenance and repair data to both car owners and professional mechanics. The *Driver's Instruction Book*, which comprises the first part of this Manual, is similar to the handbook provided with every new TR3. The *Service Instruction Manual*, which comprises the second—and largest—portion of this Manual, is the official factory manual and was originally intended for use by dealer service departments. Owners of TR3s and the so-called TR3A or TR3B model will find it informative to read the Foreword to the TR3 Supplement, which appears on page 419.

Assembly work on small, highly-tuned machines such as the Triumph sports cars must be carried out with greater precision than is commonly practiced on large American cars. Particular emphasis must be given to the proper use of torque wrenches and to strict adherence to the tightening torque specifications which are given in this Manual. A fastener that is too tight can be worse than one that is too loose—especially on a lightweight sports car. Stretched or broken bolts and distorted parts, which result from overtightening by musclebound mechanics, become a serious concern where the precision fitting of light alloy and thin-wall iron castings is involved.

The importance of cleanliness cannot be overemphasized. Under no circumstances should an engine or gearbox be repaired on the ground or on a garage floor. Thoroughly clean the exteriors of major components prior to disassembly in order to keep road dirt and other grime out of the working parts. No more than a pinch of abrasive dust in a gearbox can cause rapid failure of the synchronizers and bearings.

During the final assembly of an engine or gearbox, the cleaned parts should be laid out on a clean workbench that has been covered with clean sheets of new cardboard or wrapping paper. The engine or gearbox itself, if not mounted on a special stand, should likewise be placed on a clean workbench. Sandpapering, valve grinding, or the use of bench grinders should not be permitted near the area where final assembly is taking place. If assembly cannot be completed in a day, enclose the partially-assembled engine or gearbox in a large plastic bag—such as a new trash bag or a dry cleaner's garment return bag—so that dust and dirt will be excluded until assembly work resumes.

By observing these precautions during the maintenance, repair, or restoration of your TR2 or TR3, you will be preserving the value and the life of a car that is rapidly becoming one of the classics among post-World War II sports cars. If at any time you lack the skills, special equipment, tools, or workshop facilities for making repairs as they are described in this Manual, we suggest you leave such repairs to an Authorized Dealer or other qualified shop.

Note on the Table of Contents

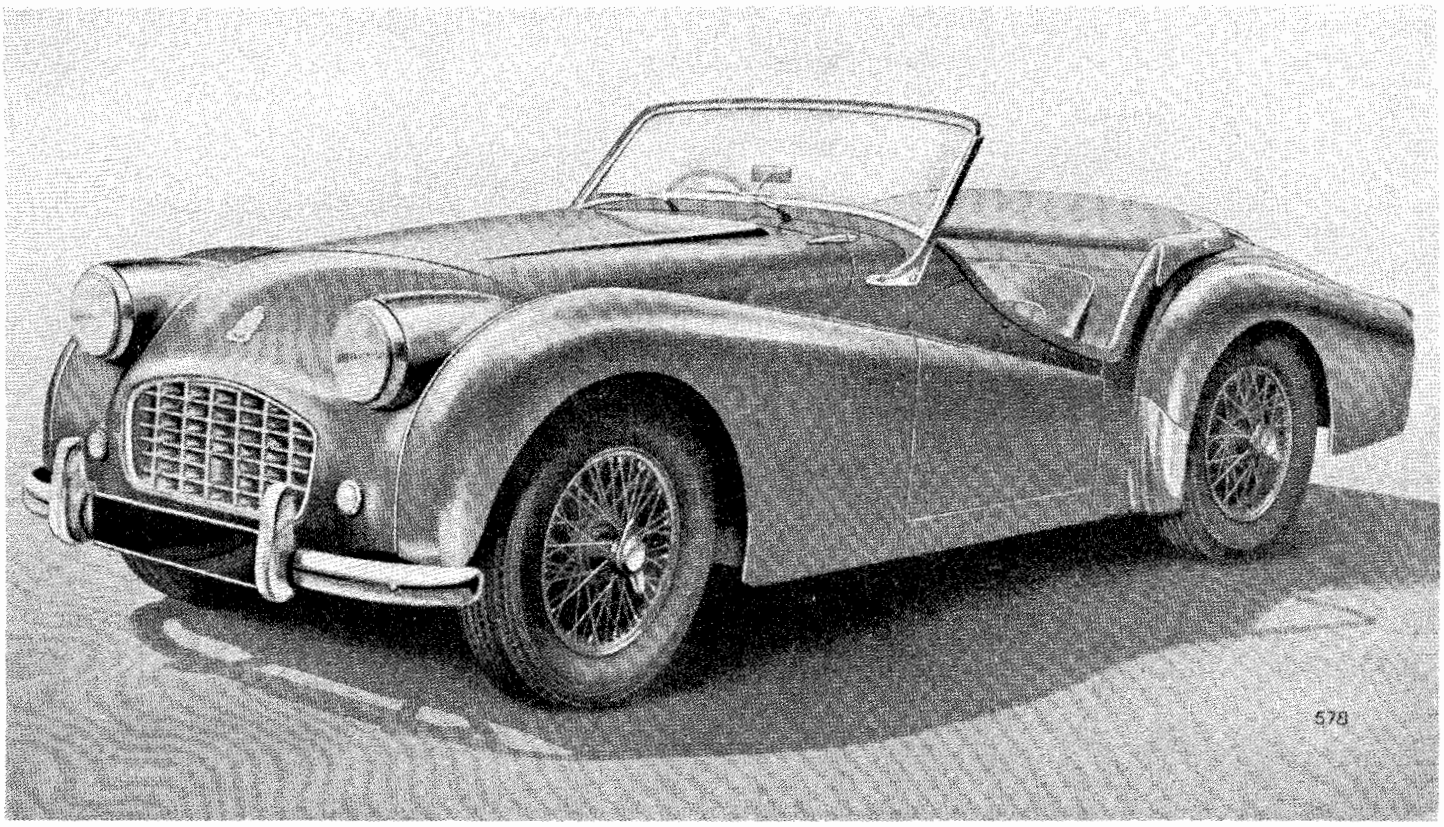
Both the *Driver's Instruction Book* and the *Service Instruction Manual* are presented here exactly as originally published by the Standard Motor Co.—including the original page numbers. (The small numbers in the center at the bottom of each page are the original page numbers.) We have added the large, bold page numbers at the lower outside margin of each page. **It is these large numbers that are referred to in the Table of Contents starting on the next page.**

Contents

TRIUMPH
TR2 & TR3
DRIVER'S INSTRUCTION BOOK

PART 1

Issued by
STANDARD-TRIUMPH SALES LTD.



THE TRIUMPH TR3 SPORTS CAR

FOREWORD

The vehicle has been designed so that a minimum of attention is required to keep it in satisfactory running order. There are, however, certain maintenance operations which must be undertaken regularly, and the object of this instruction book is to assist even the non-technical owner to understand the various operations required, and so ensure that the vehicle receives regular and correct attention.

If in any doubt about the vehicle's performance the owner should at once consult a Triumph dealer, preferably the one from whom the car was purchased. Triumph dealers are very carefully selected and are suitably equipped to give satisfactory and expert after sales service.

There is a Service School at the factory at which our dealers' representatives acquire a first hand knowledge of up-to-date service procedure. Valuable information is given regarding special methods and equipment which greatly assists in getting the various operations performed more expeditiously.

SPARE PARTS SERVICE

To ensure the best possible service on replacement parts it is important to note the following points :—

(a) The policy of the Triumph Motor Company is not to supply spare parts direct to the general public, but all supplies are directed through Distributors who, in turn, will supply their Dealers. The name and address of the Distributors and Dealers can be obtained from the Service and Spares Directory included with each motor vehicle.

(b) It is recommended that only **"Stanparts"** (*i.e.*, genuine Standard/ Triumph spare parts) are used, only these carry a guarantee. Experience gained by the manufacturers ensures that only highest quality material is used and the strictest accuracy maintained in manufacture.

(c) If in doubt about a particular part required, it is always advisable to give the vehicle commission number and engine number, in addition to the fullest description possible.

THE STANDARD CAR REVIEW is a journal published monthly which gives authentic information regarding the activities and products of The Standard & Triumph Motor Co. Ltd. It is obtainable from most Triumph dealers. Please write to the Publicity Department **for a free specimen copy.**

Owners of this model who wish to be kept informed of modifications and competition tuning hints should register as a member of the Triumph Sports Owners' Association ; details are given in the booklet enclosed with this literature, or apply to the Publicity Dept., Triumph Motor Co. (1945) Ltd., Canley, Coventry, for a copy of the book, together with enrolment form.

The Company reserves the right, on the sale of any vehicle, to make before delivery, without notice, alterations to or departures from the specification, design or equipment, detailed, described or illustrated in this or other Company publications.

LICENCE DATA

Car number (Commission number)	Plate on dash
Engine number	On cylinder block
	(Both numbers are to be seen by lifting the bonnet).
Cubic capacity	121.5 cu. in. (1991 c.c.)

GENERAL SPECIFICATION

Number of cylinders			4
Bore of cylinders			3.268 in. (83 mm.)
Stroke of crank			3.622 in. (92 mm.)
Compression ratio			8.5
Firing order			1, 3, 4, 2
Brake H.P. (Road Setting)	TR2		90 at 4,800 r.p.m.
	TR3		100 at 5,000 r.p.m.

Oil Capacity	Imperial Pints	U.S. Pints	
Engine From Dry (see page 13)	11	13.2	(6.25 litres)
Drain and Refill	10	12	(5.7 litres)
Gearbox	1½	1.8	(0.8 litres)
„ with overdrive—From dry	3½	4.2	(2.0 litres)
Drain and Refill	2¾	3.3	(1.6 litres)
Rear Axle	1½	1.8	(0.8 litres)
Water Capacity of cooling system	14	16.8	(8.0 litres)
with heater fitted	14½	17.4	(8.3 litres)

		Gallons		
Fuel Capacity	TR2	12½	15	(57 litres)
	TR3	12	14.4	(54.5 litres)

Dimensions:			
Wheelbase	7′ 4″		(224 cm.)
Track—Front	3′ 9″		(114 cm.)
Rear	3′ 9½″		(116 cm.)
Ground clearance (under axle)	6″		(15.2 cm.)
Turning circle (between kerbs)	32′ 0″		(9.75 metres)
with disc brakes	35′ 0″		(10.6 metres)
Tyre size			5.50″—15″

Overall Dimensions:			
Length	12′ 7″		(384 cm.)
Width	4′ 7½″		(141 cm.)
Height (unladen)—Hood erect	4′ 2″		(127 cm.)
Top of screen	3′ 10″		(117 cm.)
Hood down and screen removed	3′ 4″		(102 cm.)

Weights (excluding extra equipment)

Complete, tank full of	TR2	TR3
petrol	18 cwts. 3 qrs. 7 lbs. (2107 lb.) (955 kg.)	19 cwts. 0 qrs. 7 lbs. (2135 lb.) (970 kg.)
Shipping weight	17 cwts. 2 qrs. 21 lbs. (1980 lb.) (900 kg.)	17 cwts. 3 qrs. 21 lbs. (2009 lb.) (910 kg.)

VALVE TIMING. [With valve-rocker clearance set at 0.015″ (0.38 mm.)].

Inlet valve opens 15° before top dead centre.
Exhaust valve closes 15° after top dead centre.

(15° *before or after T.D.C. is equivalent to* 0.081″ *piston travel or* 1.5″ (3.81 *cm.*) *measured round the flywheel adjacent to the starter teeth*).

VALVE-ROCKER CLEARANCES (see page 26).

IGNITION TIMING (see page 27).

Set to fire at 4° before top dead centre (distributor contact points just opening). As the advance is fully automatic, the setting is at full retard.

Contact breaker gap should be set at 0.015″ (0.4 mm.).

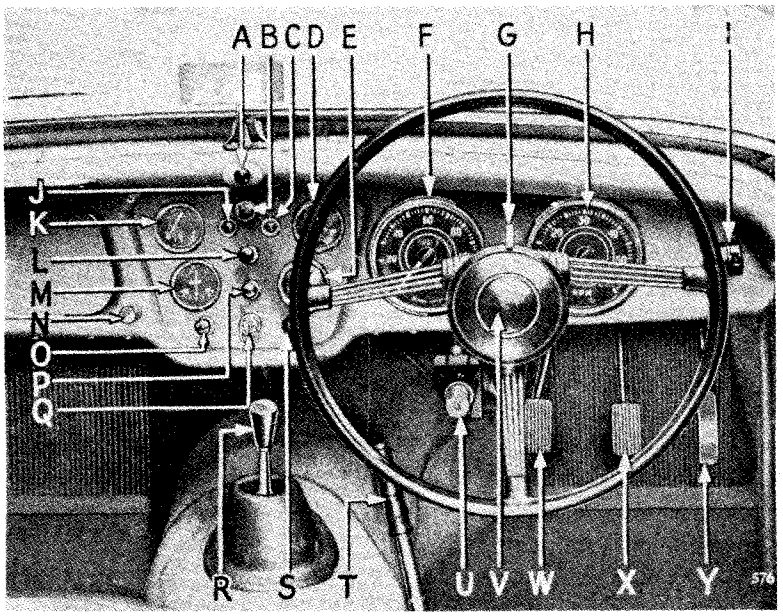
ROAD SPEED DATA

	O.D. Top	Top	O.D. 3rd	3rd	O.D. 2nd	2nd	1st	Re-verse
Gearbox Ratios	0.82	1.00	1.09	1.325	1.64	2.00	3.38	4.35
Overall Ratios :								
3.7 Axle	3.03	3.7	4.02	4.9	6.07	7.4	12.5	16.1
4.1 Axle	3.28	4.1	4.35	5.3	6.57	8.0	13.5	17.8
Engine Speeds (3.7 axle) Using Dunlop Tyres :								
at 10 m.p.h.	410	500	540	660	820	1000	1630	2180
at 10 km./hr.	250	310	340	410	510	620	1050	1350
Using Michelin X Tyres :								
at 10 m.p.h.	420	515	560	680	850	1020	1720	2240
at 10 km./hr.	250	320	350	420	530	630	1070	1390
Engine Speeds (4.1 axle) Using Dunlop Tyres :								
at 10 m.p.h.	440	550	580	710	890	1080	1830	2400
at 10 km./hr.	270	340	360	440	550	670	1140	1480
Using Michelin X Tyres :								
at 10 m.p.h.	450	565	600	730	910	1100	1860	2460
at 10 km./hr.	290	360	380	460	510	690	1160	1570

MANAGEMENT OF CAR

CONTROLS, SWITCHES AND INSTRUMENTS

The position of the controls, switches and instruments will readily be understood by reference to Fig. 1.



A	Scuttle Ventilator Control.	H	Tachometer.	P	Side-head Lamp Switch.
B	Instrument Panel Light Switch.	I	Overdrive Control Switch.	Q	Ignition Lock.
C	Direction Indicator Warning Light.	J	Ignition Warning Light.	R	Gear Change Lever.
D	Oil Pressure Gauge.	K	Fuel Contents Gauge.	S	Choke Control.
E	Water Temperature Gauge.	L	Windscreen Wiper Switch.	T	Handbrake Lever.
F	Speedometer.	M	Ammeter.	U	Headlamp Dipper Switch.
G	Direction Indicator Switch.	N	Screen Wash Control.	V	Horn Button.
		O	Starter Switch.	W	Clutch Pedal.
				X	Brake Pedal.
				Y	Accelerator Pedal.

Note :- In left-hand drive cars D changes with K and E with M. F and H remain in the same relationship to the steering wheel.

Fig. 1. Controls, switches and instruments (R.H. Drive).

CONTROLS

Clutch. Press pedal to disengage drive from engine to gearbox. **Do not rest your foot on the pedal when driving, or hold clutch out to free wheel.**

Bonnet Locks. To release, on earlier models pull the knob under the dash panel on the right hand side. On later models insert the end of the carriage key, provided for the boot lid, in the two patented fasteners at either side of the front of the bonnet and twist to release. The safety catch in both cases is situated under the front of the bonnet and can be released by the fingers.

Choke Control. See page 9 for full instructions.

Gear Lever. See Fig. 2 for gear positions.

Handbrake. Pull to operate rear wheel brakes. The lever will be held in any position by pressing the button on top of the lever and releasing the lever. To release ratchet, first pull lever when the pawl will automatically spring out of engagement with the ratchet and the lever is free to release the brakes.

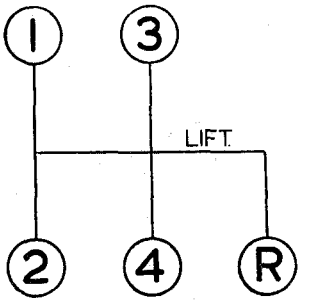


Fig. 2. Gear positions.

Radio Controls. See page 42.

Overdrive Control. See page 42.

Petrol Tap. This is situated on the left-hand side of the frame adjacent to the front wheel panel. To turn on the supply, pull the tap upwards (see Fig. 29, lubrication chart), twist to lock in the open position.

Seat Adjustment. The seats are adjustable for "leg length" after operating the lever which is situated at the side of the seat.

Screen Washer (where fitted). To operate, push the control knob.

Scuttle Ventilator. To open ventilator pull control knob.

SWITCHES

Brake Light. The switch is connected to the brake pedal mechanism, but will operate the red rear light only with the ignition switched on.

Direction Indicators. These self-cancelling indicators will only operate with the ignition switched on, and a warning light will flash on the dash panel when the switch is operated.

Head, Tail and Parking Lamps. Pull knob to switch on parking lights. Turn slightly clockwise and pull again to switch on the head lights. Press foot operated switch to dip head lights, press again for " full on " position, in which position a small red light appears at the bottom of the speedometer dial.

Horn. Press button in centre of steering wheel to operate horns.

Ignition. Insert key and turn clockwise to switch on. Do not leave the switch " on " when engine is stationary, to avoid the battery being discharged by the current flowing through the coil windings.

Panel Lights. Pull knob to switch on panel lights. These lights will only operate when the parking lights are switched on.

Starter Motor. Press to operate engine starter (see page 9 for full instructions).

Windscreen Wiper. Pull to operate wipers; they will only function when the ignition is switched on. Push to stop when arms are in the desired parking position.

Heater Switch. See page 42.

INSTRUMENTS

Ammeter. Indicates the flow of current into or out of the battery.

Fuel Gauge. Registers the amount of fuel in the tank. It operates automatically when the ignition is switched on.

Oil Pressure Gauge. Indicates pressure of oil being pumped to the bearings.

The gauge should read 70 lb./sq. in. (4.9 kg./sq. cm.) minimum when the car is travelling at normal speeds and the oil is hot. Only a low pressure may be registered when the engine is idling or running at low speeds; this is quite normal.

Speedometer. Registers vehicle's speed and total distance covered, and is fitted with a trip which is cancelled by pushing up the serrated knob (situated under the instrument) and turning anti-clockwise.

Tachometer. Indicates the speed of rotation of the engine in revolutions per minute. (See page 10).

Ignition Warning Light. Glows red when ignition is switched on with the engine idling or stopped. It is an indication that current is being drawn from the battery for the ignition circuit, or other purposes that are controlled by the ignition switch.

Water Temperature Gauge. The gauge shows the temperature of the cooling water at the thermostat. Under normal motoring conditions the water temperature should not exceed 185°.

DRIVING THE CAR

TO START THE ENGINE

IMPORTANT—When starting the engine at any time :

If the engine does not start when the starter is operated, **do not re-operate until both starter motor and engine have come to rest.** This is to avoid damage to the starter pinion.

Starting when Engine is Cold

Place the gear lever in the neutral position and see that the handbrake is on. Pull the carburettor choke control out to the stop, switch on the ignition and press the starter switch button. When the engine has become sufficiently warmed up, turn the choke control and allow the control to spring back to the **half-out** position and turn to lock in this position. After one or two minutes driving, as the engine warms up, it will be possible to permit the control to return home without causing the engine to run with undue hesitation. If the battery has been allowed to get into a run-down condition, it is better to use the starting handle. When the engine fails to start, do not keep the choke control out too long or the sparking plugs will become wet with petrol and it will be necessary to remove and dry them. When the car has been left standing for some considerable time, the fuel level in the carburettor float chambers may have become rather low, due to evaporation. The hand primer on the fuel pump can be used under such circumstances, before the starter is operated, (see page 29).

When starting in very cold conditions, the clutch pedal may be depressed when operating the starter to relieve the motor of the considerable drag in the gearbox.

Starting with Engine Warm or Hot

When restarting the engine while it is still hot the accelerator pedal should be depressed to about one-third of its travel before pressing the starter button, the choke control should not be used.

Warming up

In order to minimise cylinder wear the engine should be warmed up quickly when starting from cold in winter ; the engine may be " idled " for a minute to let the oil circulate, but it should not be allowed to idle for long periods, neither should the engine be raced up to high speeds.
An engine speed of approx. 1,500 r.p.m. may be regarded as a desirable warming up speed.

DRIVING

Gear Changing

For a smooth gear change into a synchronised gear (4th, 3rd & 2nd) the movement should be slow and deliberate. The gear lever must always be moved right home to secure full engagement. First and reverse gears are not synchromesh, gear engagement being achieved by sliding the respective gear into mesh. To avoid a noisy change do not engage first gear with the car stationary and the engine revving at a speed greater than 800 r.p.m., or when travelling in access of 15 m.p.h.
Do not attempt to engage reverse gear whilst the car is travelling forward.

Desirable Speed Limits (Particularly in gears lower than top)

The engine is capable of " revving " very fast, yet the driver should avoid continued " over-revving," which is most likely to occur in the lower gears. **We strongly recommend that in all gears the driver shall not drive the car continuously at engine speeds above 4,500 r.p.m. However, during acceleration in the gears it is permissible to attain 5,000 r.p.m. for short periods, which speed is indicated by the red mark on the tachometer.**

NEW ENGINES (see running adjustments)

During the early stages of a new vehicle's life, for at least the first 500 miles (800 km.), the working surfaces of the engine will be bedding down. The power and performance will improve only if during the running-in period the vehicle is carefully driven at moderate speeds.

We recommend that the engine should be driven at speeds not exceeding 3,500 engine r.p.m. during this period, and suggest that " running-in " should be progressive. No harm is done if the engine is allowed to " rev " fairly fast so long as it is thoroughly warm and provided it is not **pulling hard.** Do not let the engine pull hard at low speeds, always select a lower gear.

GENERAL UPKEEP

REGULAR INSPECTION

Every 250 miles (400 km.) the oil level should be checked when the engine is cold, and topped up if necessary. Withdraw dipstick ((**F**) Fig. 3) and wipe clean, then insert and push fully home before withdrawing for reading. Should the level be at the lower mark on the dipstick, 4 pints (2.2 litres) of oil will be required for topping up. The regular addition of oil not only maintains the correct level, but also tends to keep up the quality of the lubricant. Replenishment is via the cap (**D**) which does NOT require unscrewing but may be lifted straight off.

Weekly,

Check: The water level in the radiator and if necessary replenish. Use clean rain water and keep the neck of the filler at least half full of water. Re-check after the engine has been warmed. The use of hard water results in a deposit on the inner side of the cooling surfaces, thus reducing efficiency.

Tyre pressures. The correct pressures are given on page 21. It is usually a good plan to have the spare tyre inflated to a slightly higher pressure than that recommended, as it is a simple matter to reduce the pressure should the tyre be required for use.

The acid level in the battery at (**A**) and maintain it so that it is just **level** with the top of the separators. **Overfilling may cause the acid to spill and subsequently attack the surrounding metal panels.** Use only distilled water when replenishing (obtainable from the local chemist or garage). Keep the filler plugs screwed tight to prevent leakage of acid. Do not overfill or the acid may splash out and do damage, and never use a naked light when checking the acid level.

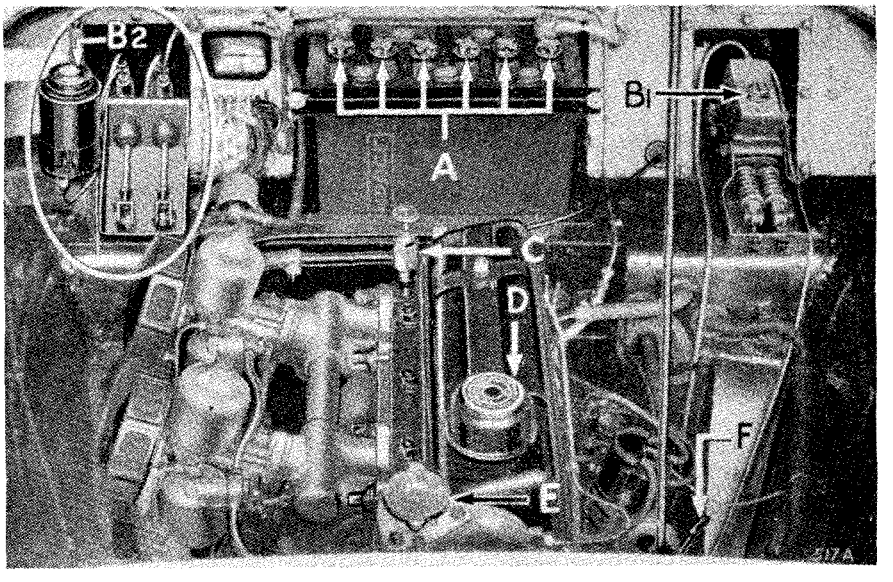


Fig. 3. View under bonnet.

COOLING SYSTEM

Filling (see page 11).

Draining

For the purpose of draining, taps are provided in the bottom tank of the radiator and at the rear of the cylinder block on the right-hand side. As the cooling system is pressurised it will be necessary, when draining, to remove the radiator cap (**E**), Fig. 3.

If a heater is fitted, ensure that the cock is open before draining.

Anti-Freeze Mixtures

We recommend the use of Smith's " Bluecol," Duckham's Anti-freeze, Esso Anti-freeze or Shell " Snowflake " Anti-freeze (inhibited Glycol base compound) in order to protect the cooling system during frosty weather and reduce corrosion to a minimum. The cooling system is fitted with a thermostat and there is a risk of the radiator block freezing while the engine is running during the warming up period when the thermostat is shut, even though the car has been left in a warm garage and water is not frozen at the start of the run.

We recommend that you provide for the cooling system ample protection against a sudden fall in temperature down to 0° F. (—18° C.) during frosty weather by using 3 pints of anti-freeze.

In countries where sub-zero temperatures prevail, consult your Triumph dealer regarding the quantity of anti-freeze required.

It is inadvisable to use anti-freeze for more than one season since the inhibitor becomes exhausted and the components in contact with the cooling water may corrode.

LUBRICATION

This is one of the most important subjects in connection with the upkeep of a car, and careful attention to the following instructions will be amply repaid by the results obtained

For the recommended periods of lubrication, see the lubrication chart folded inside the rear cover of this book. The correct lubricants to be used are given on pages 51 and 52.

Draining

To drain the engine, gearbox and rear axle, remove the plug provided beneath each unit. This process is assisted by opening the filler to allow ingress of air and by draining when the oil is hot, *i.e.*, immediately after a run.

ENGINE

Only first quality oils are recommended for use in the engine sump. These are each of the correct viscosity and character to afford complete lubrication protection. Additives which dilute the oil or otherwise impair this protection must **not** be used. After many thousands of miles running the rate of oil consumption will increase. When the rate becomes higher than 1 gallon per 1,000 miles (1 litre per 400 km.), it will be desirable to use the next heavier grade of the brand of oil you normally employ.

Engine Oil Drain Period

The frequency of the drain period should be related to the driving conditions to which the vehicle is subjected. A period of 3,000 miles (5,000 km.) is recommended as the interval for average driving conditions as defined below. It should be reduced for unfavourable conditions and may be extended for definitely favourable conditions.

Favourable

Long distance journeys, with little or no engine idling, on well surfaced roads, reasonably free from dust.

Average

Medium length journeys on well surfaced roads with a small proportion of stop/start operation.

Unfavourable

Any of the following :

(*a*) Frequent stop/start driving.

(*b*) Operation during cold weather, especially when appreciable engine idling is involved.

(*c*) Where much driving is done under dusty conditions.

We have found the use of an upper cylinder lubricant to be an advantage, particularly in new engines, and recommend the use of such a lubricant, particularly until the engine is thoroughly " run-in." The lubricant should be mixed with the fuel in the proportions given on the container. Such lubricants may be used with advantage throughout the life of the vehicle, particularly during wintry weather.

Carburettors

Every 6,000 miles (10,000 km.) unscrew the brass hexagon plug in the top of each of the carburettors and top up with current engine oil to the level of the inner hollow shaft. Apply oil also to the throttle linkages on the engine, do not oil the bearings of the transverse rod attached to the scuttle as this will seriously deteriorate the sealing composition.

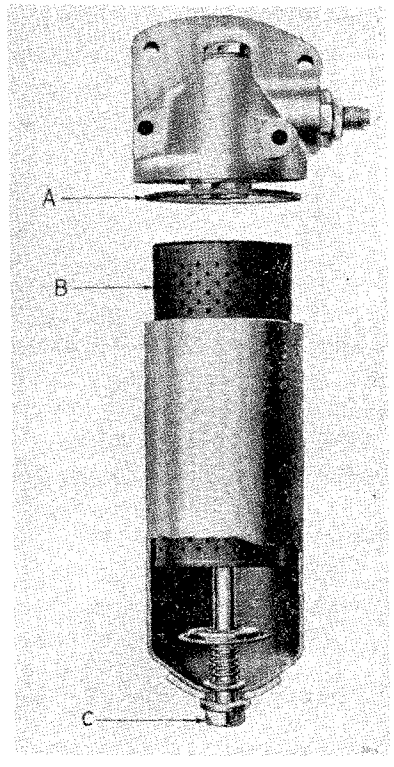


Fig. 4. Oil Cleaner "full-flow" type.

The Oil Cleaner

The oil cleaner has been designed to filter the oil to a very fine degree and the only attention it requires is to see that the filtering cartridge (**B**) is removed and that a new replacement cartridge is fitted at periods not exceeding 6,000 miles (10,000 km.). Later models employ a "full-flow" cleaner, and since a very "fine" filter cartridge is fitted it is important that this operation is carried out, otherwise, as the filter becomes choked, unfiltered oil will be passed to the engine via the balance valve in the cleaner. To renew the cartridge, unscrew the securing bolt and remove the container, the cartridge can then be withdrawn. On some models it may be necessary to unclip and swing the crankcase breather tube rearwards to provide sufficient room for container removal.

Wipe out the container to remove foreign matter trapped by the filter, using a non-fluffy cloth, and inspect afterwards to make certain that no cloth fibres remain.

It may be desirable to discard the old container washer (**A**), replacing it with a new one each time the cartridge is renewed. When re-assembling the container, ensure that the washer is correctly positioned in the groove in the filter body. Do not tighten the bolt (**C**) more than is necessary to obtain an oil-tight joint.

Approximately one pint of oil will be lost due to the removal of the container, and the sump should be topped up with new oil after assembly.

The container should not be disturbed until cartridge renewal is required ; as the accumulated dirt on the outside of the container may fall inside and thus be carried into the bearings when the engine is re-started.

Ignition Distributor (see Fig. 5)

Every 6,000 miles (10,000 km.), the cam (**B**) should be smeared lightly with engine oil. A pronounced squeak occurs when the cam is quite dry. Withdraw the moulded rotor arm from the top of the spindle and apply a few drops or thin machine oil around the edge of the screw (**A**) to lubricate the cam bearings and distributor spindle. At the same time, place a single drop of clean engine oil on the pivots (**C**) and (**D**).

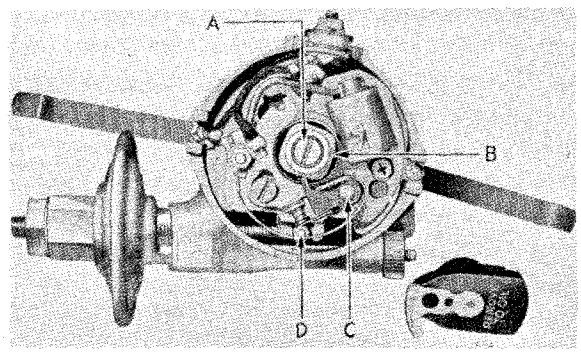


Fig. 5. Ignition distributor.

Water Pump

There is one nipple provided(see arrow, Fig. 6) to which the grease gun should be applied every 6,000 miles. (10,000 km.). Give **five strokes only with the gun.**

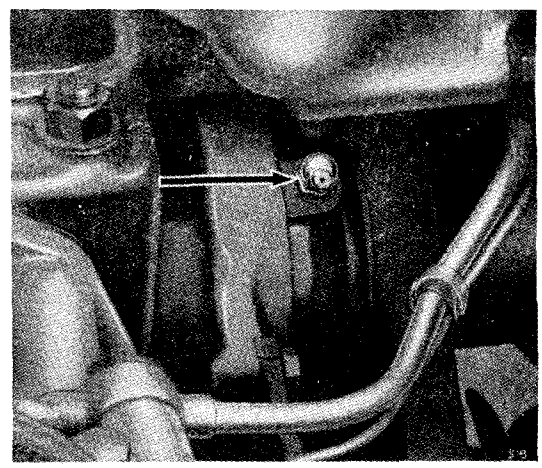


Fig. 6. Water pump lubrication.

Dynamo and Starter

The dynamo front bearing is packed with grease before leaving the works, and after a considerable mileage the dynamo should be removed for cleaning, adjustment and repacking of the bearing with grease. This should be done preferably by the nearest Triumph or Lucas Service Depot. Every 12,000 miles (20,000 km.) pour a few drops of engine oil through the hole in the centre of the rear end cap. The hole is sealed from dust with a small rubber plug.

The Starter is fitted with special bearings which require no lubrication.

Air Cleaners. Every 6,000 miles (10,000 km.) it is advisable to remove the air cleaners and wash in petrol, particularly the gauzes, after which soak the gauzes in oil and allow to drain before finally wiping over and refitting. It is very important to refit the air cleaners in the correct manner. Ensure that the holes immediately above the setscrew holes in the carburettor are lined up with the similarly positioned holes in the cleaner.

Oil Filler Cap. Every 6,000 miles (10,000 km.) remove and swill the cap in fuel, dry off and re-fit.

GEARBOX

Every 6,000 miles (10,000 km.) the oil level should be checked and topped up if necessary.

To check the oil level, remove the rubber plug from the gearbox domed cover, thus exposing the dipstick (see Fig. 7). Withdraw dipstick and wipe clean, then insert stick and push it fully home before withdrawing for reading. The correct level is to the top mark. The dipstick orifice is also the gearbox oil filler.

If an overdrive is fitted, see also page 42.

Every 12,000 miles (20,000 km.) the gearbox should be drained and refilled with new oil.

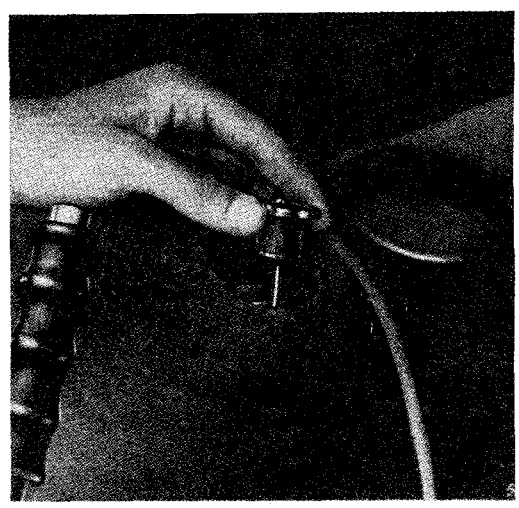


Fig. 7. Gearbox oil filler and dipstick.

REAR AXLE

The hypoid bevel gears fitted in the rear axle require special lubricants to ensure efficient operation and long life. As these are special oils, it is advisable to completely drain and replenish with new "Hypoid" oil every 6,000 miles (10,000 km.); and in any event do not exceed a period of 12,000 miles (20,000 km.).

It is advisable to have the oil level checked during this period, and especially after the first 1,000 miles, and replenish if necessary to level with the bottom of the threads in the filler orifice. Should a top-up be necessary, investigate the cause of oil loss. The filler plug is accessible from underneath the car, being fitted to the rear axle cover (see arrow **A** Fig. 8). Clean away mud before unscrewing the filler plug to avoid grit falling into the axle.

BRAKE AND CLUTCH OPERATION

It is important that the filler cap on the combined hydraulic fluid reservoir, integral with the master cylinders (see arrow **B1 or B2** Fig. 3, page 11), should be removed every 6,000 miles (10,000 km.), the fluid level checked and topped up if necessary. The reservoir should be filled to within one inch (2.5 cm.) of the top, and never less than half full (see page 51 or 52 for the correct fluid).

Later models with disc brakes have a circular reservoir which has an inner chamber; this supplies the clutch operation mechanism. The correct fluid level is to the top of this inner chamber.

As the cups in the master and all operating cylinders are pure rubber, it is imperative to use only the recommended special fluid. Mineral oils would, in a very short time, distort and ruin them.

Clutch Shaft Bearings

The grease gun should be applied to the clutch shaft bearing grease nipples (one at each side of the clutch housing) every 6,000 miles (10,000 km.). One shot only is sufficient. The nipples are accessible from underneath the car. [See arrow (C), Fig. 19, page 31].

Clutch and Brake Pedal Bearings

The oil can should be applied to the various pivots, etc., of the pedal linkages, both under the bonnet and in the driving compartment.

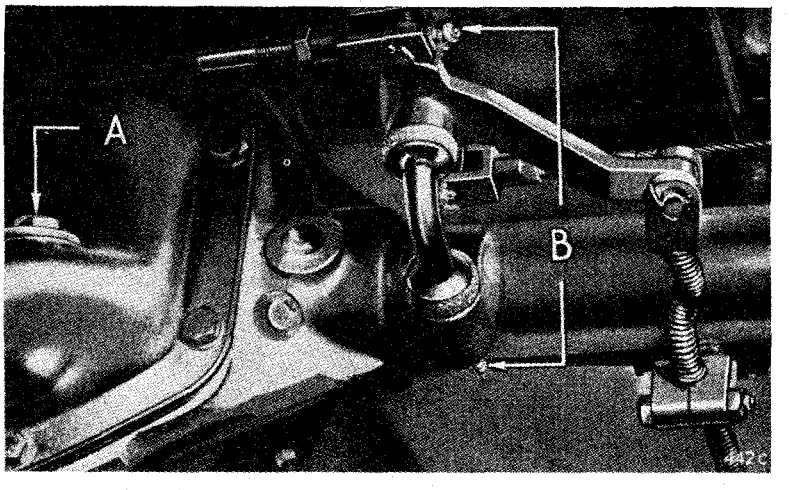


Fig. 8. Rear axle oil filler and handbrake compensator.

Handbrake Cable Conduit

A grease nipple is fitted in the conduit, as shown in the lubrication chart, to which the grease gun should be applied every 6,000 miles (10,000 km.).

During the winter months it is very important to keep the cable regularly lubricated, as this prevents the entry of water which on cold nights will freeze, thus locking the brake cable.

When lubricating the cable, grease is forced both ways and the gun should be pumped until grease exudes at the end of the conduit.

Handbrake Compensator

Two grease nipples are provided on the compensator which is situated on the rear axle casing (see arrow **B**, Fig. 8).

ROAD WHEEL HUBS

Front

Recharging the hubs with grease on later models involves removing the hubs, washing the bearings to remove all traces of the old grease before liberally coating the rollers and races with new grease. This should be carried out every 12,000 miles (20,000 km.). Where disc brakes are fitted do not disturb the pipe unions but unbolt and move the complete caliper, to allow the hub and disc to be removed, taking care not to loose shims which may be fitted between the caliper and the vertical link.

When replacing, ensure that the inner race is tight against its shoulder. Tighten the hub nut until resistance is felt to hub rotation, then slacken off the nut by one flat of the hexagon and fit the split pin. This work should be preferably undertaken by your local Triumph agent who has the necessary equipment for the task.

If disc brakes are fitted and the car is being used in competitions, slacken off the hub nut one half flat and insert the split pin through one of the two holes provided.

Rear

These bearings are lubricated via a nipple (see arrow, Fig. 9) situated facing downwards at the rear of the brake backing plate. Give five strokes of the grease gun every 6,000 miles (10,000 km.).

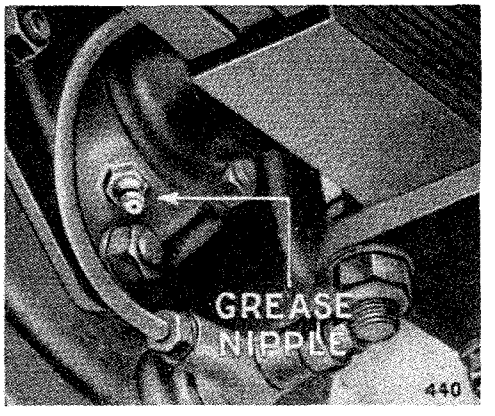


Fig. 9. Rear hub lubricator.

FRONT SUSPENSION AND STEERING

Nipples are provided for the lubrication of the steering swivels (**A**), outer tie rod, ball joints, outer bushes of the lower wish-bones (see **B** Fig. 10),

and the steering slave drop arm pivot. Do not lubricate the joints attached to the drop arms as they contain rubber. The inner bushes of the wish-bones on early models also contains rubber. Later models have nylon bushes which should be lubricated with oil occasionally. A pronounced squeak develops should these bushes become dry. It is an advantage when greasing the lower suspension swivels to jack up, under the road spring frame, until the front wheel is free of the ground. This will allow grease to cover the thrust faces. Greasing of these points should be carried out at least every 1,000 miles (1,600 km.).

To lubricate the steering box, remove the rubber plug situated on the steering column and top up with oil to the level of the orifice. This should be carried out every 6,000 miles (10,000 km.).

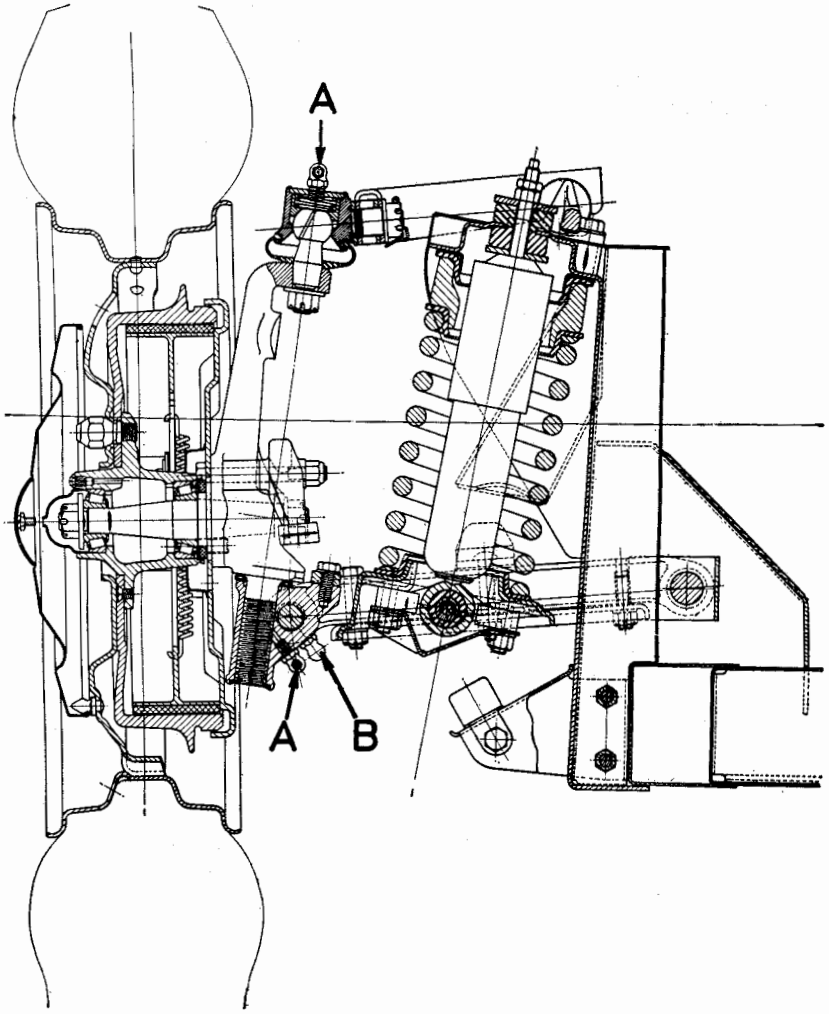


Fig. 10. Front suspension lubrication.

PROPELLER SHAFT

The universal joints are of the needle roller bearing type and together with the splines should be lubricated every 6,000 miles (10,000 km.).
The nipple (**B**) at each end of the shaft should be supplied with oil for the bearings and the nipple (**A**) with grease for the splines.

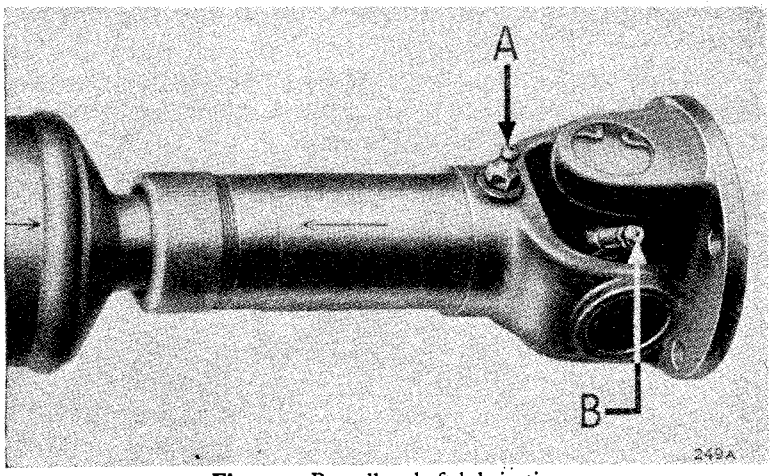


Fig. 11. Propeller shaft lubrication.

REAR ROAD SPRINGS

The spring blades should be painted over with old rear axle or engine oil, particularly around the blade tips and clips.

Rubber bushes are fitted in all the rear spring eyes and must not be lubricated.

HYDRAULIC DAMPERS

The front telescopic dampers do not require "topping up."
The rear dampers should be topped up with **Armstrong Shock Absorber Fluid (Crimson)** to the level of the bottom of the plug hole every 12,000 miles (20,000 km.). It is absolutely essential for the proper functioning of the dampers that dirt is prevented from finding its way into the interior. If the dampers become inoperative they should be serviced by the makers.

HINGES, CONTROLS, DOOR LOCKS, ETC.

The bonnet catches, hinges and several small control joints should be given occasional attention with the oil can. Door locks should receive a drop of oil every month to ensure easy operation and to prevent corrosion. The connections on the handbrake and ratchet mechanism, etc., all require attention to allow the controls to work freely and prevent unnecessary wear.

TYRES

The maintenance of correct tyre pressure is a large factor in tyre life and the steering and suspension of the car.

Examine the tyres occasionally for flints or other road matter which may have become embedded in the tread. Clean off any oil which may have got on the tyres by using fuel sparingly. Driving into or over sharp edged kerbs is liable to fracture the walls of the tyres and should be avoided where possible.

Tyre Pressures

Dunlop : Front ..... 22 lb./sq. in. (1.55 kg./sq. cm.).
Rear ..... 24 lb./sq. in. (1.7 kg./sq. cm.).

These recommendations listed below apply to cars used under ordinary road conditions either in the U.K. or Overseas. Where cars are to be used for racing or special high speed testing where a sustained speed of more than 110 miles per hour is anticipated, it is desirable that the Dunlop Rubber Company should be consulted as to the need for tyres of full racing construction.

Operating Conditions	Maximum Road Speed	
	Up to 100/105 m.p.h.	Over 100/105 m.p.h.
(a) Normal motoring in G.B. and under similar road and traffic conditions elsewhere.	N.E.	R.S.
(b) Continental type touring with lengthy periods at sustained speeds in excess of 85/90 m.p.h.	N.E. + 6 lb./sq.in. (0.42kg./sq.cm.)	R.S. + 6 lb./sq. in. (0.42 kg./sq.cm.)
(c) Motoring which is predominantly and regularly of the high speed Continental touring type.	R.S.	R.S. + 8 lb./sq. in. (0.56 kg./sq.cm.)

Key:—

N.E. Normal equipment, *i.e.* Dunlop or Dunlop Fort, as case may be, at regular inflation pressures.

R.S. Road Speed tyres at regular inflation pressures.

Michelin X Tyres : Front ..... 24 lb./sq. in. (1.7 kg./sq. cm.).
Rear ..... 28 lb./sq. in. (1.97 kg./sq. cm.).

These pressures should be increased by 3 lb./sq. in. (0.35 kg./sq. cm.). if the car is driven consistently hard and fast.

Changing Position of Tyres

It is recommended that front tyres be interchanged with rear tyres at least every 3,000 miles (5,000 km.). Diagonal interchanging between left front and right rear and between right front and left rear provides the most satisfactory first change, because it reverses the direction of rotation and keeps the wear of the tyres even and uniform.

FRONT WHEEL ALIGNMENT

The alignment of the front wheels is most important in its effect on tyre wear and good steering. Excessive toe-in will lead to severe tyre wear, particularly on the " kerb side " front tyre.

Correct Wheel Alignment. The wheels should **Toe-in** $\frac{1}{8}''$.

When using Michelin X tyres set **Parallel to Toe-in** $\frac{1}{16}''$.

To Check and Adjust Wheel Alignment

If adjustment is found necessary it should be carried out equally on the two outer tie-rods. When adjustment is complete ensure that the ball joints are in the centre of " swing " before securely tightening the tie-rod locking nuts.

THE JACK

A screw jack is provided which is adapted to lift either side of the car as required.

To fit the jack in position shown, turn up the carpet and remove the small cover plate situated just in front of the seat.

Engage the lower lip of the boss with the bottom edge of the square hole, then swing the jack into a vertical position and lift to ensure correct engagement, making sure that it is right home in its socket. Apply the handbrake or chock the wheels which will remain on the ground before operating the jack handle.

If a jack is used under the rear axle case, **take care** to ensure that the jack pad does not touch the rear cover plate when lifting, otherwise there is a risk of damage and consequent oil leak.

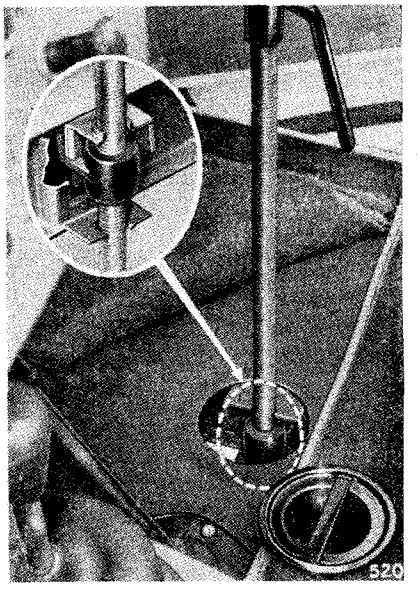


Fig. 12. Jacking the car.

BODYWORK

Dust may be removed from the exterior using a soft cloth only, but if it has been wet at any time it is advisable to use a sponge and water. Always use water when removing mud and when the car is clean finally wipe over with an almost dry chamois leather. Washing alone will not keep up the brilliance of the paintwork over an indefinite period and it may become necessary to use a cleaner to remove all grease and dirt. It is advisable to acquire the cleaner from a reputable dealer who will be able to advise you on the best cleaner to suit the particular paintwork of your car, afterwards polishing with some suitable preparation.

Special cleaners are available for removing traffic film and tar. Chromium plated parts need cleaning with soap and water, and wax polishing is beneficial. If, due to neglect, the plate becomes spotted, it may be necessary to use a chromium plate cleaner.

The interior of the car should be dusted occasionally and the carpets brushed with a stiff brush. The upholstery may be cleaned by the application of a little soap and damp cloth, followed by a final wipe down with an almost dry sponge or wash leather. When a vacuum cleaner is available it can be used with advantage to help clean the interior.

DOOR ADJUSTMENT

The doors are provided with special locks which, when correctly adjusted, prevent any movement of the closed door. Only the striking plate requires repositioning when adjustment becomes necessary.
This adjustment should preferably be carried out by a coach fitter.

SOFT TOP STOWAGE

It is necessary to remove the soft top altogether when the car is required to run in the open condition. Take care not to fold the material too sharply. The supports may then be hinged down flat behind the seats. When refitting the soft top after erecting the supports always fasten it to the body first and then pull it over the supports to fasten to the screen. When fastened down the rubber backed roll of material attached to the top and running along the top edge of the windscreen should be opened out and fitted over the top lip of the windscreen frame to complete the sealing.

SOFT TOP FASTENERS

Two types of fasteners are used, " Lift the Dot " and " Tenax " (early models only had " Tenax "). When fitting either type it is only necessary to push the fasteners over the securing stud as shown in Fig. 13. With the " Tenax " type (as illustrated) do not press or pull the small knob before engagement as there will be a risk of damage to the inner prongs. After fitting, the knob may be pressed to ensure correct engagement.
To remove the fasteners, either pull the small knob or in the case of the " Lift the Dot," do as its title suggests, lift the outer edge.

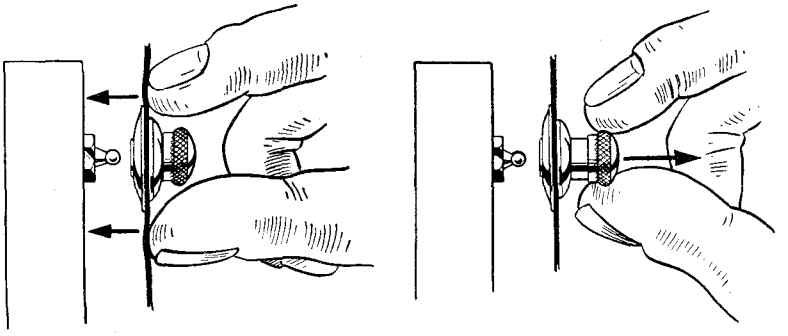


Fig. 13. "Tenax" soft top fasteners.

It may be found advantageous when removing the fasteners from the screen, to relieve the tension on the fasteners by applying a slight hand pressure, in the forward direction, to the corner of the soft top where it passes over its supports.

SPARE WHEEL AND TOOL STOWAGE

The spare wheel is housed in a compartment under the luggage locker. A key is provided for the panel locks and to open, insert the key and give a half turn towards the centre of the car to release each catch. The tools are stowed as shown in Fig. 14. To place them in position the spare wheel should be withdrawn about six inches (15 cm.).

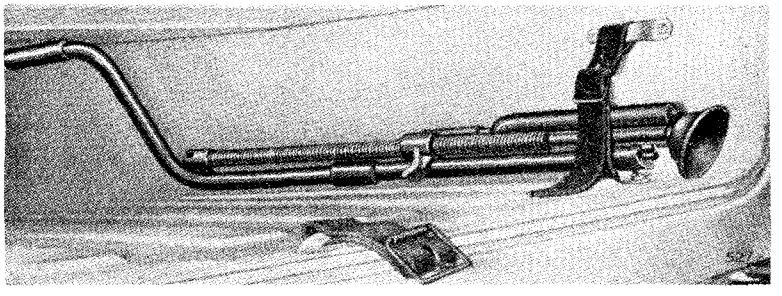


Fig. 14. Tool stowage.

RUNNING ADJUSTMENTS

Various adjustments are necessary from time to time in order to keep the mechanism in efficient running order. The periods between depend largely upon the manner in which the car is used and no definite time can be given here for carrying out these corrections. The car should be examined however every 6,000 miles (10,000 km.) and any adjustments which appear necessary can then be made (see page 35).

ENGINE

Decarbonising and Valve Grinding

It is recommended that the cylinder head be removed for decarbonising and valve grinding after the first 5,000 miles (8,000 km.). This is chiefly to give attention to the valve seats, the metal of which becomes stabilised during this period. Thereafter it will be found that decarbonisation will be required only after a period of about 20,000 miles (32,000 km.). Providing that the engine is running satisfactorily after this period and that each cylinder gives a normal compression, showing that the valves are seating reasonably well, it is much better to leave it alone.

The grinding of the valves becomes necessary in order not only to increase the efficiency of the engine, but to prevent a badly seating valve becoming worse and getting burnt.

We recommend that the work should be carried out by the skilled mechanics at your nearest Triumph Dealer. For those who desire to do this work themselves, the main points to watch are outlined below:

1. The procedure of turning the crankshaft in order that the compression will " break " the seal of the cylinder head should not be practised with this design of engine.
   Once the cylinder head has been removed it is important that the crankshaft is not rotated unless the cylinder sleeves are firmly clamped down against their seatings. This can be accomplished by using two tubes and washers fitted over the cylinder head studs marked 4 and 5, Fig. 15, to overlap the adjoining cylinder liners, each being secured with a cylinder head nut. If this precaution is not observed the sleeves may rise, with consequent risk of water leaking into the crankcase after assembly. On removal of the head and withdrawal of the push rods, the passage ways in the block leading to the camshaft and thence to the crankcase and sump must be sealed off with a clean rag or masking tape. The same applies to the rocker shaft oilway, both in the head and the block, to prevent the entry of carbon particles which could do serious harm to the engine.
2. A stick of soft solder is the most suitable tool for removing the carbon. On no account should emery cloth or sandpaper be used.
3. It has been found advantageous to remove the tappets and clean the insides just prior to refitting the cylinder head to ensure that any chips of carbon which may have fallen into the chamber are removed from the push-rod seatings.

4. A new gasket must be fitted each time the cylinder head is removed. The plain side of the gasket must be downwards against the cylinder block and should be coated on both sides with "WELLSEAL" or similar non-setting sealing compound.

5. When replacing the cylinder head nuts, tighten them gradually in the sequence shown in Fig. 15, in order to produce an even pressure on the gasket and prevent undue strain in the cylinder head casting.
It will be necessary to recheck the nut tightness when cold to 100-105 lb. ft.

6. The valve springs are close-coiled at one end and should have the close-coiled end towards the cylinder head when refitting. Before tightening down the rocker pedestals, screw back each adjusting screw and ensure that the ball ends of these screws engage correctly with the push-rods. Failure to attend to these items may result in damage to the push-rods. The auxiliary inner valve springs must be fitted to the exhaust valves.

7. Smother the rocker gear with oil, particularly where the rockers bear on to the valves before replacing the rocker cover. Ensure that the cork washer is undamaged and shellaced to the cover, otherwise oil may leak through the joint.

Cylinder Head Nuts

After the first 1,000 miles (1,600 km.) the cylinder head nuts should be checked for tightness, with engine hot, in the order shown in Fig. 15.

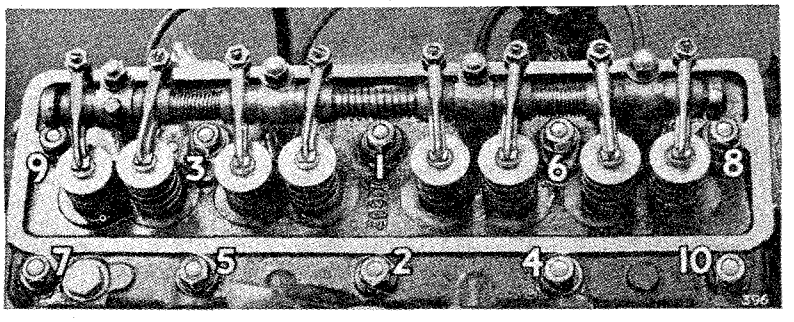


Fig. 15. Order of tightening cylinder head nuts.

Valve-Rocker Clearances (measured cold)

On earlier models the running clearances are .010″ (0.25 mm.) inlet and .012″ (0.3 mm.) exhaust. Where aluminium rocker pedestals are fitted (later models) the valve-rocker clearances should be set at 0.010″ (0.25 mm.) inlet and exhaust for both normal and high speed motoring.

Adjustment

Remove the rocker cover and turn the engine crank with the aid of the starting handle for half a revolution after the valve to be adjusted has closed. It is easier to do this if the sparking plugs are removed. This also provides an opportunity for inspecting and checking the sparking plug gaps.

Slacken the lock nut and adjust the rocker screw with a screwdriver until the gauge is a sliding fit between the top of the valve stem and the rocker face.

Now tighten the lock nut and check that the clearance has not altered.

Ignition Timing

On initial assembly the ignition is set as stated on page 5.

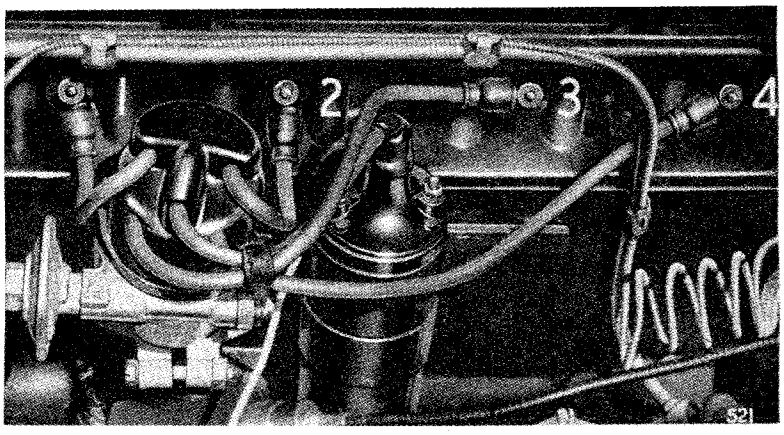


Fig. 16. Ignition leads.

Premium grade fuels of 95 octane (research method) or higher must be used for these engines, and with this fuel a " clean " engine will not " pink." However, with a substantial amount of carbon build up, it may be necessary to retard the ignition slightly so that " pinking " is only just audible when pulling hard with the engine speed above 1,500 r.p.m. To advance ignition, rotate the knurled screw as indicated. Each division on the distributor vernier scale represents 2° of the distributor, *i.e.*, 4° on the crankshaft.

The firing order is 1, 3, 4, 2.

To obtain **T.D.C.** position turn the crankshaft until the small hole in the belt pulley is in line with the pointer attached to the timing cover. Four degrees is equivalent to $\frac{3}{16}$ (4.7 mm.) measured on the circumference of the crankshaft fan pulley.

Valve Timing

See page 5 for correct valve timing.

Sparking Plugs

The sparking plugs were adopted for original equipment after lengthy tests and as sparking plug types vary in suitability for different engines, it is important that the correct type of plug be fitted when making replacements, this is : Champion No. L10S—½" reach.

In countries where the octane rating of the fuel is low, making it necessary to use the lower compression ratio, it may be desirable to use Champion L10 plugs.

For high speed touring however, use Champion No. L11S—½" reach. The gaps (*i.e.*, the width between the firing point of the centre electrode and earth point) are originally set and should be maintained at 0.025" (0.62 mm.). Incorrect gap settings may cause misfiring or erratic slow running. Faulty plug leads or cracked porcelain insulation in the sparking plug will also cause faulty ignition, see also page 9.

Sparking plugs should be thoroughly cleaned, checked and adjusted (if necessary) for gap setting after 6,000 miles (10,000 km.) use and at 12,000 miles (20,000 km.) should be replaced by new plugs.

Carburettors (Twin S.U.)

TR2 : Type H4, Standard Needle **F.V.**
For high speed and competition work use **G.C.** needles.
When carburettors are fitted with oil bath air cleaners use AH needles.

TR3 : Type H6, correct needle for normal and competition work **S.M.**
When carburettors are fitted with oil bath air cleaners use CIW needles.

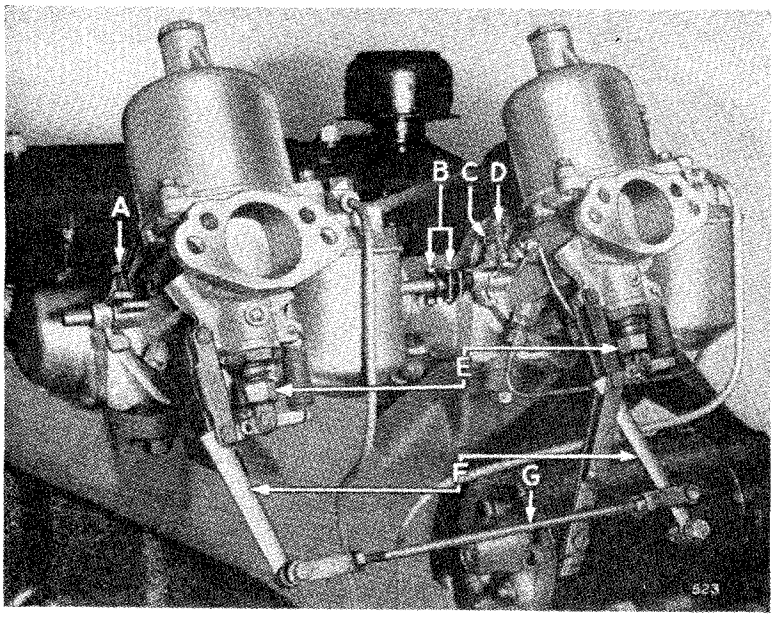


Fig. 17. Carburettors.

Adjustment

As the needle size is determined during engine development, adjustment of the carburettors is confined to correct idling adjustment. Remove the air cleaners and run the engine until it has attained its normal running temperature slacken one of the clamping bolts (**B**) on the throttle spindle connection and disconnect the mixture control link (**G**) by removing one of the fork swivel pins. Adjust the idling speed to approximately 500 r.p.m. by moving each throttle adjusting screw (**A**) & (**C**) an equal amount. By listening to the hiss in the intakes, adjust the throttle adjusting screws until the intensity of the hiss is similar on both intakes. This will synchronise the throttles. When this is satisfactory, the mixture should be adjusted by screwing both the jet adjusting nuts (**E**) up or down to exactly the same extent, at the same time keeping the jet levers (**F**) pressed forward to ensure that the jets are hard up against the nuts, until even running is obtained. As these are adjusted, the engine will probably run faster, and it may therefore be necessary to unscrew the throttle adjusting screws a little, each by the same amount, in order to reduce the speed. When the mixture is correct on both carburettors, lifting the piston of one of them with a penknife blade should make the engine beat become irregular from excessive weakness. If lifting the piston about $\frac{1}{8}''$ (3 mm.) on one carburettor stops the engine and lifting the other about $\frac{1}{8}''$ increases the engine speed, this indicates that the mixture on the first carburettor is set weak and the second is set rich. The first one should, therefore, be enriched by unscrewing the jet adjusting nut one flat at a time and the second should be weakened off by screwing up the jet adjusting nut in a similar manner. When the mixture is correct, the exhaust beat should be regular and even.

If it is irregular, with the splashy type of misfire and a colourless exhaust, the mixture is too weak. If there is a regular or rythmical type of misfire in the exhaust beat, together with a blackish exhaust, then the mixture is too rich. This should be noted when the air cleaners are again in position. When reconnecting the mixture control link, make sure that the jet levers are pressed forward and the control rod adjusted correctly for length so that the clevis pins may be inserted freely while the jets are in this position. The throttle spindle interconnection clamping bolts (**B**) should now be tightened.

The desired fast idle necessary when the choke is in operation is controlled by adjusting screw (**D**).

For further information on the tuning, adjustment and maintenance of S.U. carburettors, you are advised to get in touch with the S.U. Carburettor Co. Ltd., Wood Lane, Erdington, Birmingham 24, from whom the necessary literature may be obtained.

Fuel Pump

The mechanically operated fuel pump, mounted on the left-hand side of the crankcase, provides a constant pressure of fuel to the carburettor. A hand primer is fitted, which can be used to pump fuel to the carburettors

if the float chamber is not already full, under which condition a slight pumping resistance is felt before the lever reaches its stop. This resistance ceases when the chamber is full.

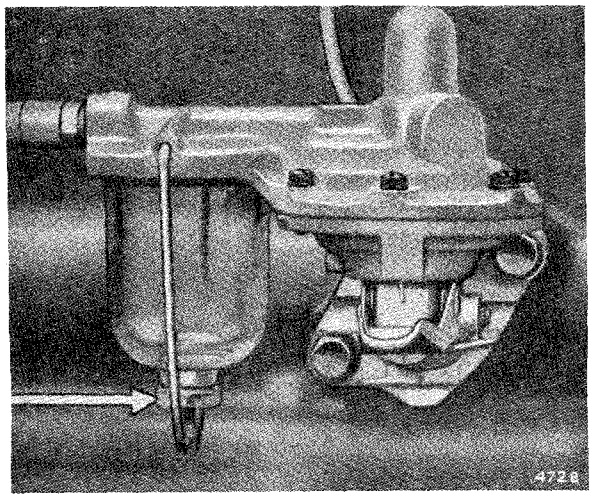


Fig. 18. Fuel pump.

The glass bowl acts as a sediment chamber for the petrol passing to the pump. The foreign matter collects on the underside of the gauze and, being washed off by petrol, sinks to the bottom of the bowl. To remove the sediment, detach the bowl by unscrewing the nut at its base and wash out the bowl with the fuel that will be in it. When refitting the bowl, tighten the nut just sufficient to ensure a fuel-tight joint, as over-tightening may result in damage.

If the pump fails to supply fuel to the carburettors it is advisable to attend to the following points : (a) inspect the fuel pipe unions, which (if any are loose) should be tightened up, (b) a blockage may have been caused in the fuel pipe, which may be removed by blowing through the pipe with the aid of a tyre pump.

If, after attending to the above points, the pump still fails to operate, it should be renewed and the old pump sent to the nearest A.C. or Triumph Service Station.

Before doing any work on the carburettors or fuel pump which involves disconnecting a fuel pipe it is important to turn off the fuel supply at the tap on the chassis end of the flexible pipe. Failure to do this will allow the petrol to drain away from the tank.

CLUTCH

A Borg & Beck single dry plate hydraulically operated clutch is fitted and as it is correctly set before leaving the works, it will be some considerable time before it requires re-adjustment. The hydraulic master cylinder for the clutch has a common filler with the brake system. (See arrow (**B**) Fig. 3, page 11.)

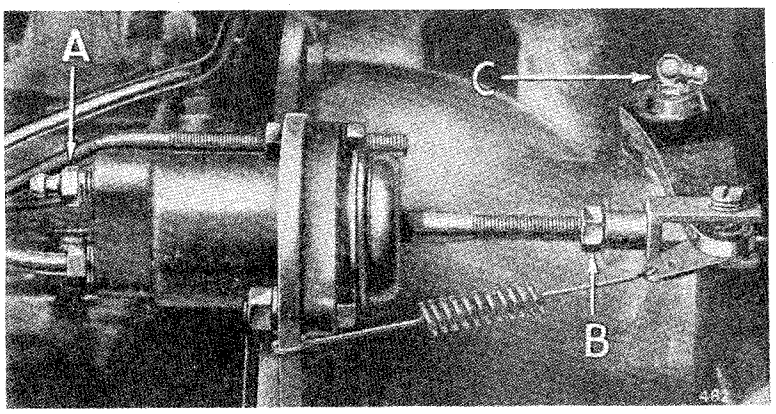


Fig. 19. Clutch adjustment.

There is, however, a partition in the container to ensure that any possible defect in one system does not affect the other.

Adjustment of the mechanism can normally only be judged as necessary at the connecting rod between the operating cylinder and the shaft operating lever end, see Fig. 19. The correct setting is when there is .075″ (1.9 mm.) end float of the rod between operating cylinder and lever, in the " foot off " condition. To achieve the correct setting, measure the total movement of the operating lever by hand and if different from the specified amount release the locknut (B, Fig. 19) and adjust the length of the connecting rod to the correct figure. The adjustable connection between pedal and master cylinder is set on initial assembly and MUST NOT be tampered with as it will never require adjustment. If a pipe has been disconnected, it will be necessary to bleed the system. A bleeder nipple is shown by the arrow (A fig. 19). For instruction on bleeding the system, see page 34.

BRAKES

The pedal operates the brakes on all four wheels hydraulically, whilst the handbrake control operates the brakes on the rear wheels by means of cables.

See page 17 for checking level of fluid in reservoir. If it is found to be particularly low, it is an indication that a leak has developed somewhere in the system and it should be traced and rectified without delay.

It must be remembered that the presence of oil, grease or similar foreign matter on a drum brake shoe will seriously affect the coefficient of friction and in

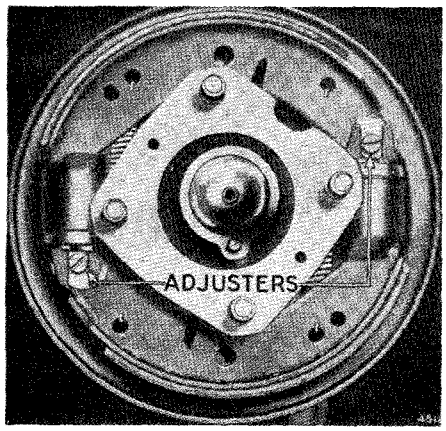


Fig. 20A. Front assembly.

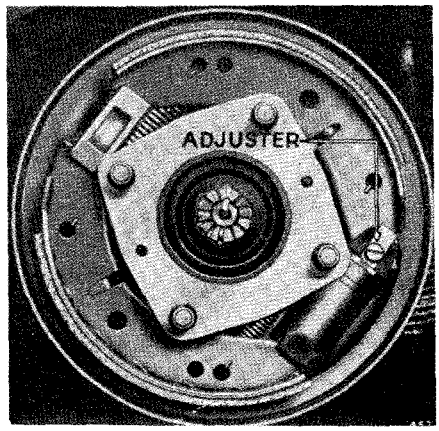


Fig. 20B. Rear assembly.

Lockheed Brakes.

consequence the retarding effect of that particular brake, in spite of the fact that it is being applied with the same force as the others. In such cases the brake drum should be thoroughly cleaned with fuel and the brake shoes replaced by new replacement shoes. Cleaning the brake shoe is not satisfactory.

Do not re-line the shoes but fit either genuine Lockheed or Girling replacement shoes, depending upon the installation. These shoes have the right type of lining machined to the correct radii.

Should the shoes be removed, care must be exercised to ensure that the pull-off springs are located behind the shoes and hooked through the correct holes, as shown.

Adjustment of Brake Shoes

Lockheed Brakes (fitted on earlier models)

After a considerable mileage it may be found necessary to adjust the brakes. This is evident when the brake pedal has to be depressed to within 1" of the floor before the brakes operate. There are TWO adjusters to each front wheel and ONE to each rear wheel as shown.

The following procedure should be followed to correctly adjust the brakes:

1. Apply the brakes hard, with the car stationary, to position the shoes in the drum, then release brake.
2. Jack up the car, remove the nave plates and road wheels.
3. Rotate hub until hole provided in the brake drum coincides with screwdriver slot in micram adjuster.
4. Insert a screwdriver and turn the adjuster clockwise until the shoe contacts the brake drum, then turn adjuster back one notch. There is a constant drag on the rear wheels due to the action of the differential and the axle oil. Do not confuse this with the brake drag.
5. Replace wheels and nave plates, then remove jack.

Girling Brakes (fitted on later models)

The disc brakes, fitted to the front axles, are self-adjusting and should only need replacing when the shoe pads are reduced to approximately $\frac{1}{8}''$ (3 mm.) thickness.

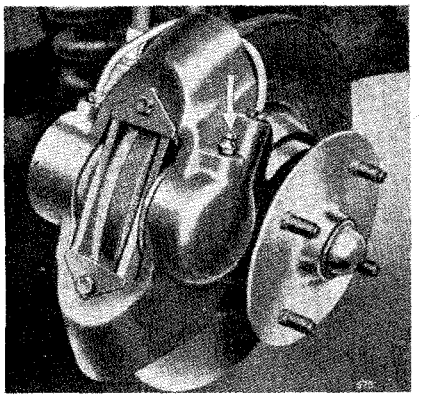


Fig. 21A Front Assembly.

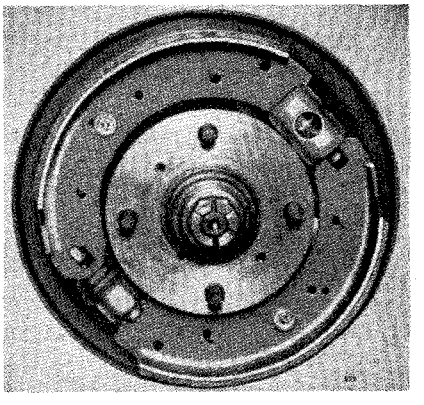


Fig. 21B Rear Assembly.

Girling Brakes.

The rear brakes are provided with a small adjuster which is positioned on the backing plate, above the axle case, and easily accessible with the road wheel removed. To correctly adjust the shoes, turn the adjuster clockwise until the shoes are hard against the drum, then slacken off adjuster by one notch. The general precautionary remarks as mentioned for the Lockheed brakes applies equally to the Girling assemblies.

Handbrake Adjustment (both makes)

Adjustment of the rear brake shoes as previously described automatically readjusts the handbrake mechanism. The cables are correctly set before leaving the works, and only maladjustment will result from tampering with the mechanism.

Bleeding the Brake and Clutch Hydraulic System

If a pipe joint is uncoupled, the wheel cylinder cups or clutch operating cylinder are inspected or replaced, the system must be bled in order to expel any air which may have been admitted.

Air is compressible, and its presence in the system will affect the working of the brakes and clutch.

Whilst the majority or owners will prefer to have these operations carried out by a Triumph Agent, for the benefit of those desiring to carry out their own running adjustments, the procedure is as follows :

1. Wipe clean the bleeder nipple and fit a piece of rubber tube over it, allowing the tube to hang in a clean container partially filled with fluid, so that the end of the pipe is below the level of the fluid.
2. Unscrew the bleeder nipple one complete turn with a suitable spanner. There is only one bleeder nipple to each wheel and one nipple on the clutch operating cylinder.
3. The fluid reservoir should be filled before commencing the bleeding operation, and must be kept at least half-filled during the whole operation, otherwise more air will be drawn into the system via the master cylinder. Always clean the area around the plug before removing it; this will lessen the risk of grit falling into the chamber after removal of the plug.
4. Depress the pedal quickly and allow it to return without assistance. Repeat this pumping operation with a slight pause between each depression of the pedal. Observe the flow of fluid being discharged into the glass jar and when all air bubbles cease to appear, hold the pedal firmly down and securely tighten the bleeder nipple.

NOTE.—Depending upon the position at which a pipe joint in the brake system has been uncoupled, it will be necessary to bleed the system at either both front or both rear wheels. If the pipe was uncoupled at the master cylinder, then the system must be bled at all four wheels.

PROPELLER SHAFT

If the propeller shaft has been taken apart for any resaon it is essential when re-assembling the front end splines to see that the arrows on the universal joint and propeller shaft end are in line (see Fig. 11, page 20), so that the propeller shaft will transmit uniform motion.

HYDRAULIC DAMPERS

The front telescopic dampers fitted do not require any adjustment or topping up. If the dampers are removed, or for some reason new ones are fitted, it is advisable to hold them the right way up (in the case of the rear dampers check the level of the fluid and replenish if necessary), then pump the pistons to each end of the stroke. This pumping action dispels any air which may have entered the chambers. After this operation check the fluid level in the rear dampers, and in both cases keep the dampers the right way up until they are fitted into place.

LOOSE BOLTS AND NUTS

All the vital nuts are locked in position by split pins, locking wire, or by an additional lock nut or lock washer. It is, however, desirable that the car should be examined every 6,000 miles (10,000 km.) so that if any nut is found to be loose it may be tightened. The wheel nuts can periodically be checked by the owner himself and occasionally removed, oiled and refitted.

The general examination of the chassis is a mechanic's job.

ELECTRICAL SYSTEM

A 12 volt earth return (or one wire) lighting and starting set is fitted. **One cable should be disconnected from the battery terminal before removing any electrical unit, otherwise there is a risk of a serious "short."**

A list of the maker's numbers and descriptions of all electrical equipment will be found on page 41.

IGNITION

Failure of the red warning light will not affect the ignition system, but the bulb should be replaced at the earliest opportunity. The high tension leads should be examined occasionally and if they are perished or worn through, replace with the correct ignition cable, which should be obtained only from your dealer, and should be of the correct length.

The moulded distributor cover should be removed occasionally and wiped all over with a soft cloth. See that the carbon brush on the inside of the moulding works freely in its holder. Clean away any trace of dirt or dust around the contact breaker points. The points should be adjusted to give a maximum gap of 0.015" (0.5 mm.). The distributor fitted to this vehicle has the radio suppressor built into the distributor head. This, of course, means that an outward inspection of the ignition and coil leads a suppressor will not be apparent. **If a replacement or spare distributor head is required, take care to ensure that it is of the correct type with the long carbon pick-up, which is, in fact, the suppressor.**

THE BATTERY

Keep the terminals clean and well covered with petroleum jelly. If they are corroded, scrape them clean, assemble and cover with petroleum jelly. Wipe away all dirt and moisture from the top of the battery, and make sure that the connections are clean. Do not over-tighten the wing nuts securing the battery as this may result in the case becoming cracked.

THE DYNAMO

The dynamo is of the compensated voltage type and operates in conjunction with the regulator unit which is housed alongside the cut-out in the control box. The regulator unit ensures that the dynamo charges the battery at the rate best suited to its condition. It automatically provides a large charging

current for a discharged battery and a low trickle charge for a battery in the fully charged state. The cut-out, operated by dynamo voltage, prevents discharge of the battery through the dynamo when the dynamo is not charging, in which condition the ignition warning light will be glowing.

Belt Tightness

It is important that the belt is sufficiently tight to drive the dynamo but not too tight as would put undue load on the dynamo and water pump bearings. The correct tension is achieved when the belt can be pressed inwards $\frac{1}{2}$"—$\frac{3}{4}$" (13—19 mm.) on the longest run, *i.e.*, from the dynamo pulley to the crank pulley. **It is essential after adjustment has been made to securely tighten the fixing bolts.**

THE STARTER MOTOR

Cleaning and Lubrication

The starter brush gear and commutator will not normally require attention. After 48,000 miles (80,000 km.) however, it is advisable to have the unit serviced at a Triumph or Lucas Service Depot.

Should the starter pinion become jammed in mesh with the flywheel, then it can be released by turning the crankshaft with the starting handle in the normal manner, or select top gear and rock the car backwards and forwards until the pinion releases itself. Do not forget to switch off the ignition when carrying out this operation.

CONTROL BOX

The control box, mounted on the scuttle, houses the voltage regulator and cut-out. These units are carefully and accurately set before leaving the works and must not be tampered with.

FUSES

The fuse carrier is located forward of the control box and houses two operating and two spare fuses. The top fuse (50 amp.) protects the horn, while the other fuse (35 amp.) protects those items which can only operate when the ignition is switched on, *i.e.*, direction indicators, windscreen wipers, brake light, petrol gauge and heater (if fitted). When replacing a fuse, it is important to use the correct replacement; the fusing value is marked on a coloured paper slip inside the tube.

A blown fuse will be indicated by the failure of all the units protected by it and is confirmed by examination of the fuse. If it is not possible to locate the cause of the trouble and the new fuse blows immediately, the equipment should be examined by a Triumph or Lucas Agent or Service Depot.

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To Check and Adjust Alignment

Park the car in front of a garage door or wall and square to it. The car must stand on level ground and the front of the lamps should be approximately 25 ft. (7.5 m.) from the " screen." The car should be unladen and the tyres at the correct pressures.

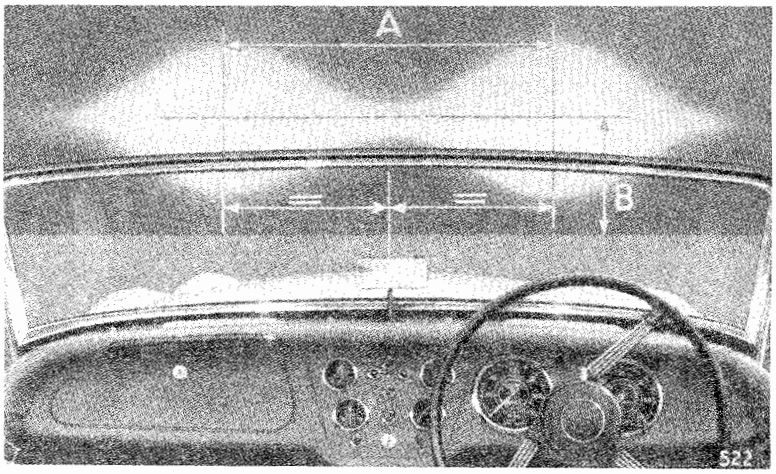

Fig. 23. Head lamps correctly aligned.

A point should be marked on the screen in line with the centre of the bonnet. Two crosses should be drawn on the " screen " 27" (680 mm.) above the ground level as indicated by (**B**), and 35½" (1,150 mm.) apart (**A**), measured equally about the centre point (see Fig. 23). Switch on the head lamps and adjust the lamps, if necessary, until the centre of each circle of light coincides with the centre of its respective cross.

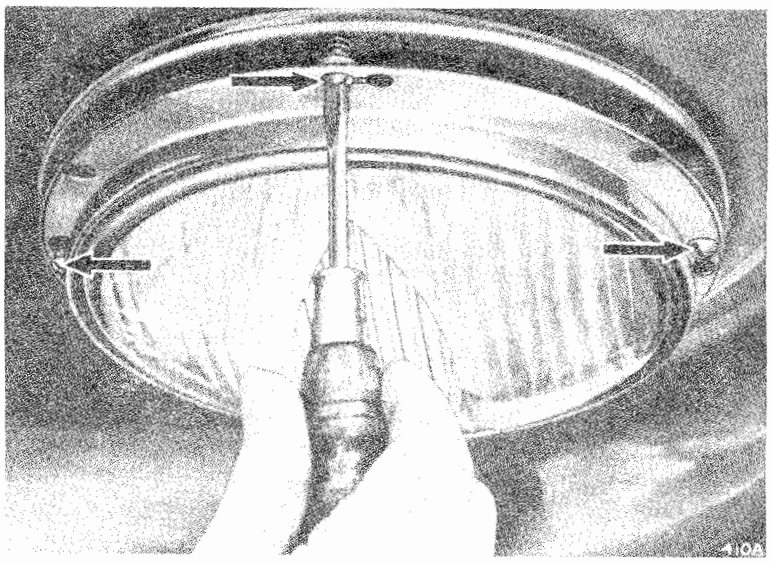

Fig. 24. Adjusting head lamp alignment.

If adjustment is necessary, proceed as follows :

Withdraw the front rim after removing the securing screw. Remove the dust-excluding rubber. This will reveal three screws (see arrows, Fig. 24), which can be adjusted to align the reflector correctly. When the correct alignment has been obtained, replace the rubber and rim.

It is advisable to start adjustment with each screw screwed out half-way ; this will ensure correct fitting of the rim when assembled.

Parking Lamps (Front) and Direction Indicator Flashing Lamps

To remove bulb, peel back the rubber ring and remove rim, then the bulb can be withdrawn. When replacing rim, first slip the edge over the two small lugs, then peel back rubber as rim is fitted. Ensure that the rubber is located correctly over the rim edge, otherwise vibration may cause the rim to become detached.

Tail and Direction Indicator Flashing Lamps

To gain access to the bulb, remove the cover, which is secured by two screws.

Number Plate Illuminator and Brake Lamp

To gain access to the bulbs, remove the securing screw and withdraw the cover.

Ignition Warning Light
Direction Indicator Warning Light
High Beam Warning Light

Each bulb holder can easily be withdrawn from the rear of the panel for bulb renewal.

Instrument Panel Lights

Replacing these bulbs is best left to the safe hands of a Service Station.

WINDSCREEN WIPER

For operation, see page 8.

DIRECTION INDICATORS

These are of the flashing type operating in the dual filament bulbs in the parking lamps at the front and the tail lights at the rear. The flasher unit is situated close to the control box underneath the bonnet.

WINDTONE HORNS

Each electric horn, before being passed out of the works, is adjusted to give its best performance and will give long periods of service without any attention. No adjustment is required in service.

If for any reason the note is unsatisfactory, do not attempt to dismantle the horn, but return it to a Lucas Service Depot for examination.

ELECTRICAL COMPONENT SPECIFICATION

Specification of Equipment	Model	Service No.
Battery	GTW9A/2	4011557
Control Box	RB106/2	37182
Coil	B12 type L	45012D
Dynamo	C39PVL/2 type LO	22258B
Distributor	DM2 type V167	40403A or 40480A
Starter	M418G type V164	25541F
Fuse Box	S.F.6	033240
Flasher Unit	F.L.3	35003A
Horns	WT618LN	69046E
	HN	69047E
Windscreen Wiper Motor	DR 2	073105
Petrol Gauge Tank Unit	Jaeger No. TA 163	

Bulbs	Lucas No.	Voltage	Watt.
Head Lamps			
Left-hand dip, both lamps (home model)	404	12	60/36
Left-hand dip, both lamps (export model)	354	12	42/36
Right-hand dip „	301	12	36/36
" Vertical dip " „	350	12	45/35
Front Parking Lamps, Tail Lamps, Number Plate Illumination and Brake Lamp	380	12	6/21
Ignition and High Beam Warning Lights, Panel Lights and Direction Indicator Warning Lights	987	12	2.2

Fuses		Service No.
	50 amp.	188219
	35 amp.	188218

OPTIONAL EXTRAS

RADIO

For operating instructions, see the radio leaflet provided with the set. The set is protected against possible electrical damage due to a short by a 5 amp. fuse housed in the main lead union. The aerial mast should always be lowered when the set is not operating.

HEATER

The heater is of the re-circulating type, with a combined rheostat and ON/OFF switch on the dash panel to regulate the speed of the fan. At the right-hand rear end of the cylinder head, under the bonnet, a screwed cock can be turned to vary the amount of hot water which is to be fed to the heater unit from nil to maximum flow. Shutters on the underside of the heater unit control the downward flow of air from the heater into the car. Closing the shutters will not affect the air flow to the demister slots.

OVERDRIVE

Operation

The Laycock de Normanville overdrive unit effects a reduction in overall gear ratio by means of a train of epicyclic gears which are brought into action by a hydraulically operated cone clutch. Movement of the electrical switch mounted on the outside of the dash panel will bring the overdrive into operation. To take the overdrive out of operation, return the switch to its original position. The electrical circuit is only complete when the gear lever is in the position of top gear on earlier models and top, 3rd or 2nd gears on later models. Care should be taken on the earlier models not to move the gear lever out of the position of top gear at road speeds in excess of 75 m.p.h. (120 k.p.h.), and it should be remembered also that if the overdrive switch is made, returning the gear lever from third to top gear will automatically re-engage the overdrive unit.

Lubrication

The oil used for both lubrication and for the hydraulic pump is the same as and connected with that of the gearbox. The two units also having a common filler orifice in the gearbox top cover. With an overdrive fitted it is inadvisable to use hypoid gear oils as these may be detrimental to the operation of the unit.

Draining

There is a drain plug fitted to the overdrive unit, and when draining the gearbox it is necessary to remove both the drain plug on the gearbox and the drain plug on the overdrive unit.

WIRE WHEELS

Cars fitted with disc brakes have detachable hub extensions each secured by four nuts. This should be checked occasionally for tightness and especially after the first 500 miles from new or when replacement parts are fitted. The correct tightness is 60-65 ft. lb.

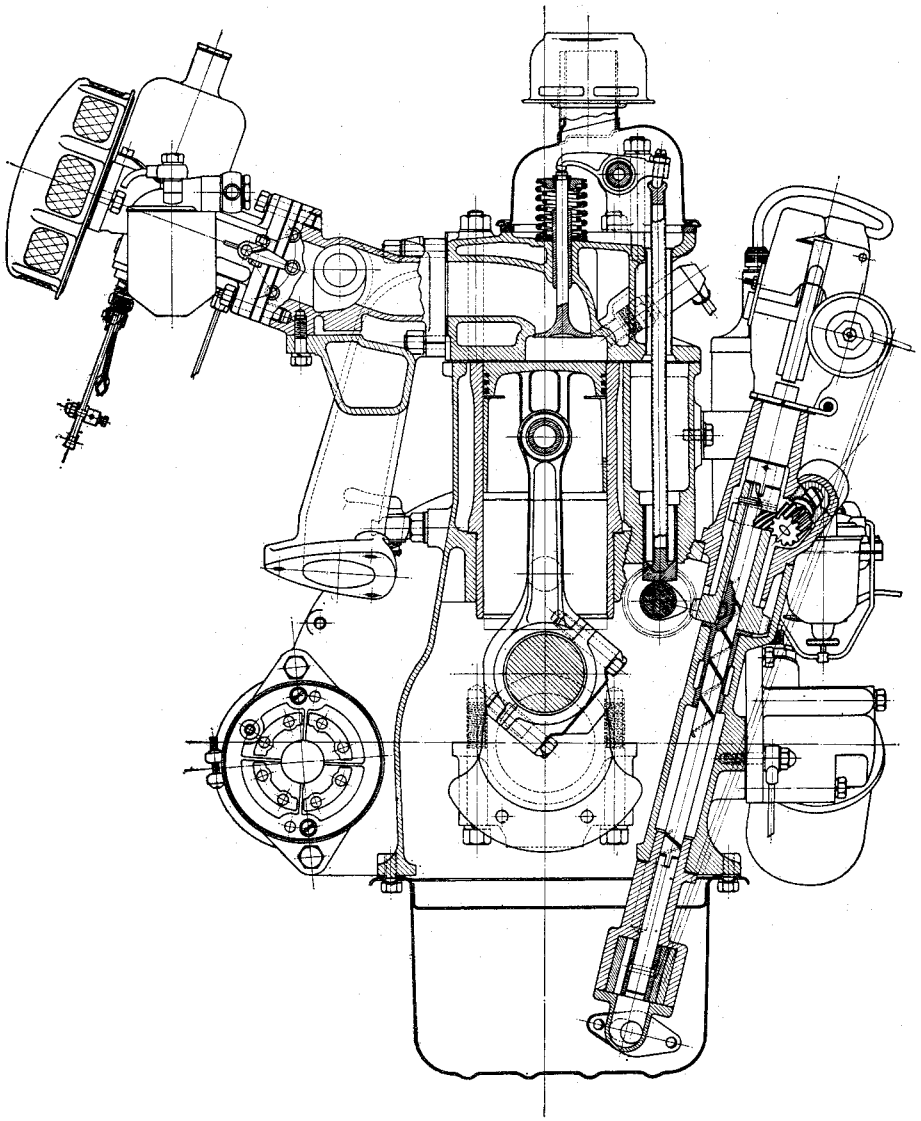

Fig. 25 Engine cross section.

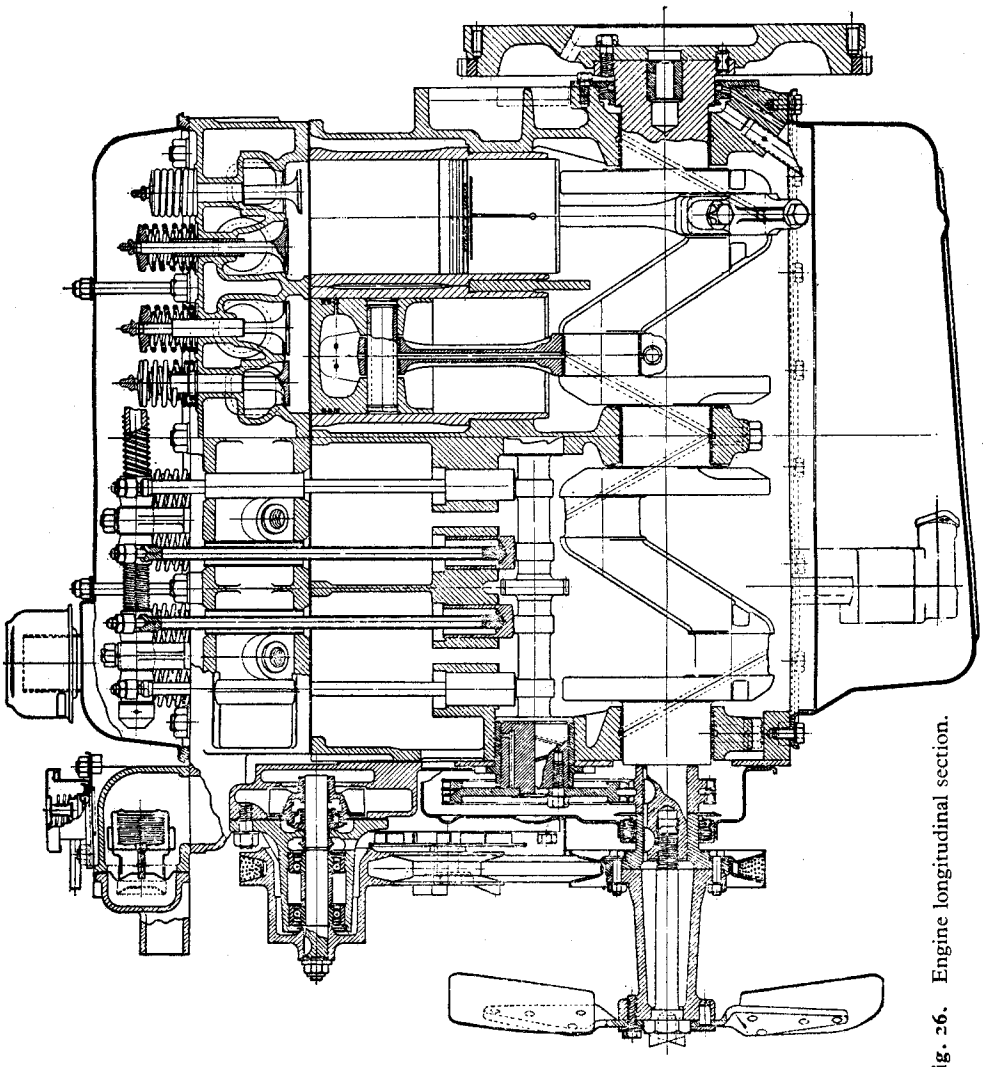

Fig. 26. Engine longitudinal section.

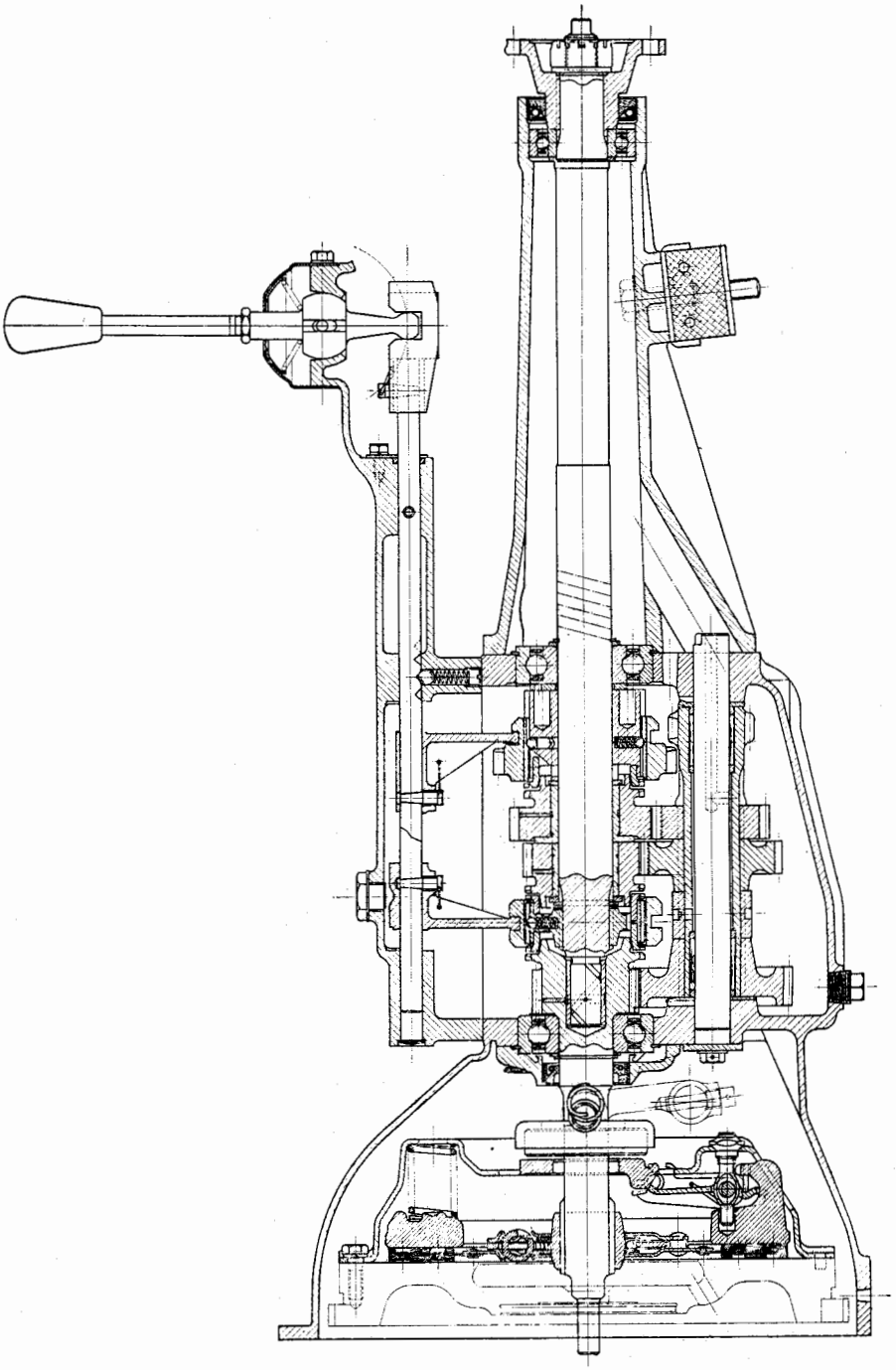

Fig. 27. Gearbox Section.

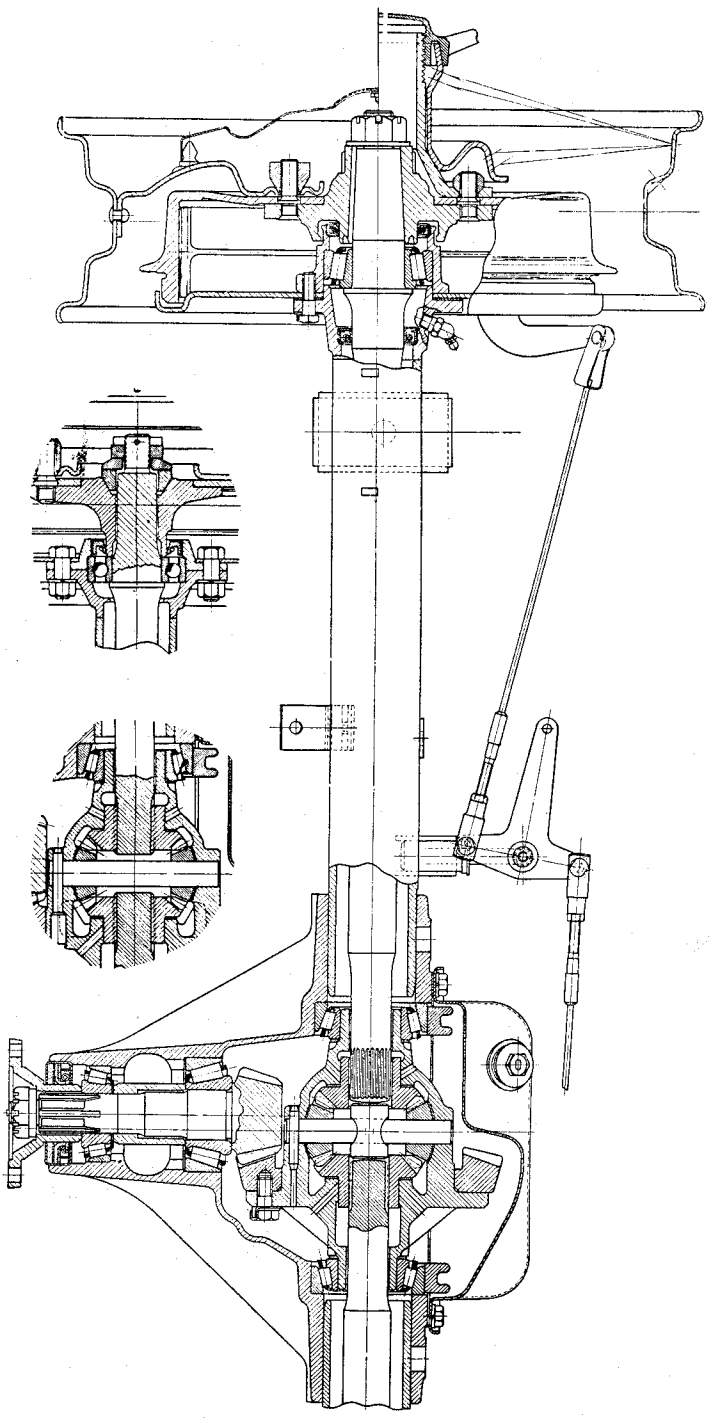

Fig. 28. Rear axle section (inserts indicate axle arrangement for cars fitted with Lockheed brakes).

RECOMMENDED LUBRICANTS—OVERSEAS

Component		Wakefield	B.P. Energol	Shell	Esso	Duckham's	Mobil	S.A.E.
ENGINE	Air Temperature °F. Over 70° / °C. Over 20°	Castrol XXL	Energol Motor Oil S.A.E. 40	Shell X-100, 40	Essolube 40	Duckham's NOL "Forty"	Mobiloil "AF"	40
	40° to 70° / 0° to 20°	Castrol XL	Energol Motor Oil S.A.E. 30	Shell X-100, 30	Essolube 30	Duckham's NOL "Thirty"	Mobiloil "A"	30
	10° to 40° / —10° to 0°	Castrolite	Energol Motor Oil S.A.E. 20W	Shell X-100, 20/20W	Essolube 20	Duckham's NOL "Twenty"	Mobiloil Arctic	20
	—10° to 10° / —25° to —10°	Castrol Z	Energol Motor Oil S.A.E. 10W	Shell X-100, 10W	Essolube 10	Duckham's NOL "Ten"	Mobiloil 10W	10
	Below —10° / Below —25°	Castrol ZZ	Energol Motor Oil S.A.E. 5W	Shell X-100, 5W	Esso Extra Motor Oil "Zero"	Duckham's NOL "Five"	Mobiloil 5W	5
	Upper Cylinder Lubricant	Castrollo	Energol U.C.L.	Shell Donax U	Esso Upper Motor Lubricant	Duckham's Adcoids	Mobil Upperlube	—
GEAR-BOX	Over 70° / Over 20°	Castrol XXL	Energol Motor Oil S.A.E. 50	Shell X-100, 50	Essolube 50	Duckham's NOL "Fifty"	Mobiloil BB	50
	10° to 70° / —10° to 20°	Castrol XL	Energol Motor Oil S.A.E. 30	Shell X-100, 30	Essolube 30	Duckham's NOL "Thirty"	Mobiloil A	30
	Below 10° / Below —10°	Castrolite	Energol Motor Oil S.A.E. 20W	Shell X-100, 20/20W	Essolube 20	Duckham's NOL "Twenty"	Mobiloil Arctic	20
STEERING GEARBOX AND REAR AXLE	Over 10° / Over —10°	Castrol Hypoy	Energol E.P. S.A.E. 90	Shell Spirax 90EP	Esso XP Compound 90	Duckham's Hypoid 90	Mobilube GX 90	EP 90
	Below 10° / Below —10°	Castrol Hypoy 80	Energol EP S.A.E. 80	Shell Spirax 80EP	Esso XP Compound 80	Duckham's Hypoid 80	Mobilube GX 80	EP 80
PROPELLER SHAFT JOINTS		Castrol Hi-Press	Energol EP S.A.E. 140	Shell Spirax 140EP	Esso XP Compound 140	Duckham's NOL EP 140	Mobilube GX 140	EP 140
FRONT WHEEL HUBS		Castrolease W.B.	Energrease C3	Shell Retinax A	Esso Multi-purpose Grease H.	Duckham's LB10	Mobilgrease M.P.	—
REAR WHEEL HUBS and **ENGINE WATER PUMP** (*Hand Gun*)		Castrolease Heavy						
CHASSIS. Grease Nipples (*Hand or Pressure Gun*)		Castrolease CL						
	Oil Points (*Oil Can*) Body and Chassis	Wakefield Everyman Oil	Energol Motor Oil S.A.E. 20W	Shell X-100, 20/20W	Esso Handy Oil	Duckham's General Purpose Oil	Mobil Handy Oil	20
REAR ROAD SPRINGS		PAINT WITH OLD REAR AXLE OR ENGINE OIL						
HANDBRAKE CABLES		Castrolease Brake Cable Grease	Energrease C3G	Shell Retinax A	Esso Spring Grease	Duckham's Keenol KG16	Mobilgrease M.P.	—
BRAKE AND CLUTCH RESERVOIR	**Lockheed**	GENUINE LOCKHEED HYDRAULIC BRAKE FLUID						
	Girling	WAKEFIELD GIRLING BRAKE AND CLUTCH FLUID						

RECOMMENDED LUBRICANTS—BRITISH ISLES

COMPONENT	DUCKHAM'S	MOBIL	WAKEFIELD	B.P.	SHELL	ESSO
ENGINE Summer	Duckham's NOL " Thirty "	Mobiloil A	Castrol XL	Energol S.A.E. 30	Shell X-100 30	Esso Extra Motor Oil 20W/30
Winter	Duckham's NOL " Twenty "	Mobiloil Arctic	Castrolite	Energol S.A.E.20W	Shell X-100 20/20W	
Upper Cylinder Lubricant	Duckham's Adcoids	Mobil Upperlube	Castrollo	Energol U.C.L.	Shell Donax U	Esso U.C.L.
GEARBOX	Duckham's NOL " Thirty "	Mobiloil A	Castrol XL	Energol S.A.E. 30	Shell X-100 30	Essolube 30
REAR AXLE STEERING GEARBOX	Duckham's Hypoid 90	Mobilube G.X. 90	Castrol Hypoy	Energol EP S.A.E. 90	Shell Spirax 90 E.P.	Esso Expee Compound 90
PROPELLER SHAFT JOINTS	Duckham's NOL EP 140	Mobilube G.X. 140	Castrol Hi-Press	Energol E.P. S.A.E. 140	Shell Spirax 140 E.P.	Esso Expee Compound 140
FRONT WHEEL HUBS	Duckham's LB10	Mobilgrease M.P.	Castrolease W.B.	Energrease C3	Shell Retinax A	Esso Multi-purpose Grease H.
REAR WHEEL HUBS and **ENGINE WATER PUMP** (*Hand Gun*) **CHASSIS. Grease Nipples** (*Hand or Pressure Gun*)			Castrolease Heavy			
			Castrolease CL			
Oil Points (*Oil Can*) Body and Chassis	Duckham's General Purpose Oil	Mobil Handy Oil	Wakefield Everyman Oil	Energol S.A.E. 20W	Shell X-100 20/20W	Esso Handy Oil
REAR ROAD SPRINGS	PAINT WITH OLD REAR AXLE OR ENGINE OIL					
HANDBRAKE CABLES	Duckham's Keenol KG 16	Mobilgrease M.P.	Castrolease Brake Cable Grease	Energrease C3G	Shell Retinax A	Esso Graphite Grease
BRAKE AND CLUTCH RESERVOIR **Lockheed**	GENUINE LOCKHEED HYDRAULIC BRAKE FLUID					
Girling	WAKEFIELD GIRLING BRAKE AND CLUTCH FLUID					

TRIUMPH
TR2 & TR3
SERVICE INSTRUCTION MANUAL

PART 2

Issued by
STANDARD-TRIUMPH SALES LTD.

FOREWORD

This Manual has been prepared with a view to assisting Standard Distributors and Dealers, at Home and Overseas, to give an efficient repair and maintenance service to owners of this Model.

The book is divided into seventeen sections, which are separately indexed and indicated alphabetically. These sections deal with the main components, equipment, specialised tools and general data.

Dimensions and working clearances, together with other useful data, are summarised at the beginning of various sections with a view to facilitating reference by repairers.

The Manual covers the specification of this Model existing at the time of printing. Revised editions or supplements will be made available as developments are considered to justify such issues. In the meantime all our Agents are kept fully up-to-date on Service matters by the monthly issue of Service Information Sheets.

Although this Manual is primarily intended for the use and guidance of Standard Distributors and Dealers and other members of the Motor Trade, owners of this Model can purchase copies through their local Standard Distributor, but such orders will not be accepted direct by Standard-Triumph Sales Ltd.

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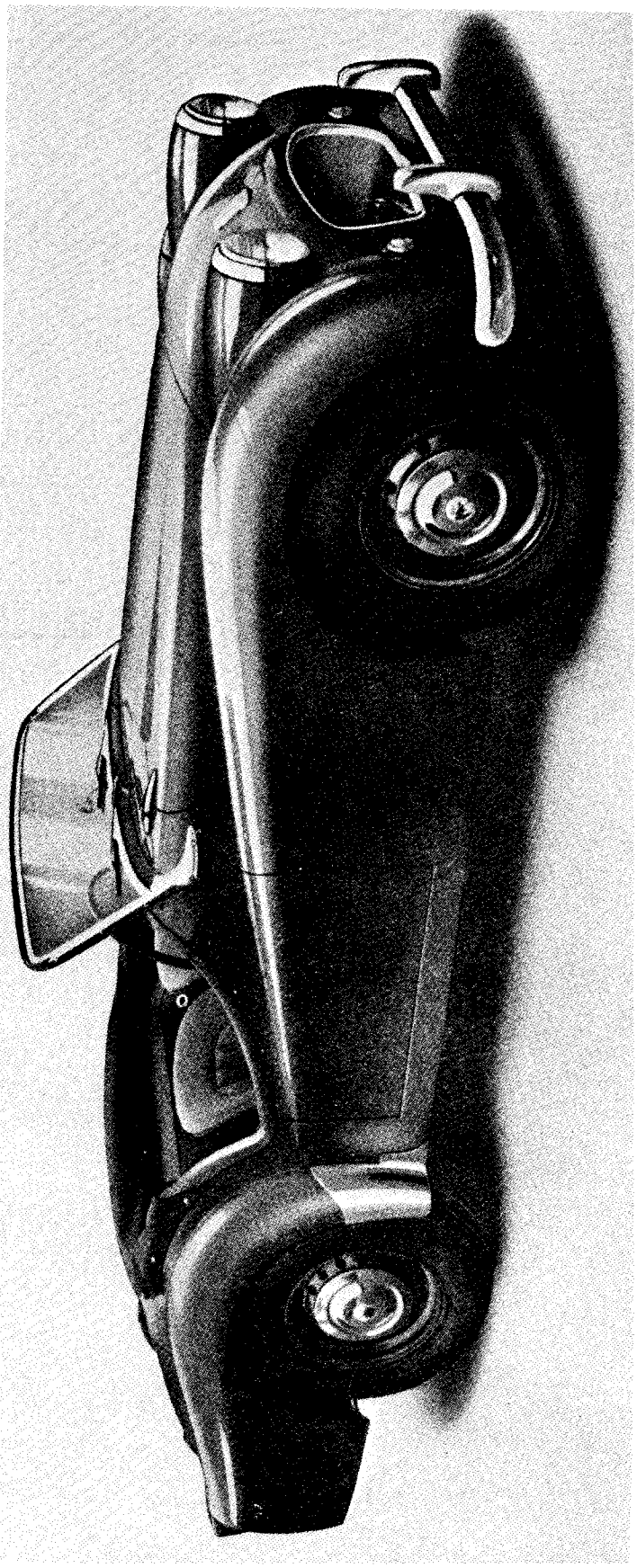

Service Instruction Manual

A

GENERAL DATA

SECTION A

GENERAL DATA

INDEX

ILLUSTRATIONS

GENERAL DATA

GENERAL DATA

Summaries of dimensions and tolerances, relative to various components are given at the commencement of the respective sections to which they refer. Whilst data given, in some instances, in this section appears elsewhere in the body of this manual, such information being frequently required, it is considered desirable that it should be summarised in this section for easy reference.

For the convenience of overseas readers, a table of metric equivalents is included in this section.

CHASSIS SPECIFICATION

Engine Details

Type	O.H.V. Push Rod Operated.
Bore of Cylinder	3.268″ (83 mm.)
Stroke of Crank	3.622″ (92 mm.)
Cubic Capacity (Swept Volume)	121.5 cu ins. (1,991 c.cs.)
Compression Ratio	8.5
Firing Order	1, 3, 4, 2
Compression Pressure (With three Sparking Plugs fitted and compression gauge in fourth cylinder engine warm, throttle set at tick over, using 20 SAE oil and operating the starter)	Average reading 120 lbs. per sq. in. (8.4 kgs. per sq. cm.)
Sparking Plug Make and Type	Champion No. L10S High speed work No. L11S.
Sparking Plug Reach	½″ (12.700 mm.)
Sparking Plug Gap	.032″ (.8 mm.)
Distributor	Lucas DM2 P.4
Distributor Break Gap	.015″ (.4 mm.)
Ignition Setting (Full Retard)	4° B.T.D.C. (Based on the use of fuel with a minimum Octane value of 80).
Vacuum Advance	Basic setting 4 divisions.
Inlet Rocker Clearance	Touring .010″ (.25 mm.) High Speed Motoring .013″ (.33 mm.)
Exhaust Rocker Clearance	Touring .012″ (.30 mm.) High Speed Motoring .013″ (.33 mm.)

The above measurements are based on a cold engine.

Crankshaft	Three journal molybdenum manganese steel stamping with integral balance weights.
Crankshaft Bearings	Vandervell bi-metal shell bearings.
Crankshaft Thrust	Four half semi-circular white metal faced washers fitted in pairs either side of the centre bearing.
Connecting Rods	60-ton molybdenum manganese steel stamping with big end caps offset to camshaft side. Floating gudgeon pin secured by circlips.
Connecting Rod Bearings, Big End	Lead indium bronze bearings.
Small End	Clevite Bush.
Pistons	Aluminium alloy split skirt compensating type, graded F. G or H.
Piston Rings	All fitted above gudgeon pin.
Compression Rings	Cast iron, .062″ wide.
Scraper Ring	Cast iron, .156″ wide.
Camshaft	Special cast iron with four bearings and silent contour symmetrical cams. Driven by Duplex chain.

GENERAL DATA

Camshaft Bearings	Front Bearing—cast iron sleeve ; 2nd, 3rd and 4th direct in crankcase. After Engine No. TS 9095E engines will be fitted with replaceable Vandervell shell bearings, See TR3 Supplement Engine Section "B".
Lubricating System.....	Wet Sump. Capacity 11 pints.
Oil Pump	Hobourn Eaton high capacity double eccentric rotor. Feed to main bearings, big end bearings and all camshaft bearings under pressure.
Oil Pressure	70 lbs. sq. in. at 2,000 r.p.m. (4.9 kg. sq.cm.)
Oil Cleaner	Purolator by-pass flow system with replaceable cartridge.
Carburettors	Twin S.U. H.4. Standard needles FV. For high speed motoring G.C. needles.
Valve Timing	With valve rocker clearance set at .015" (.38 mm.) Inlet Valve opens at 15° B.T.D.C. Exhaust Valve closes at 15° A.T.D.C. 15° is equivalent to .081" piston travel or 1.5" (3.81 cms.), measured round the flywheel adjacent to the starter teeth. Dims. on fan pulley = .72".
Cooling System	Thermostatically controlled.
Pressurised Radiator	Pressure release at 3¼—4¼ lbs.
Radiator Temperature	Normal running should not exceed 185°F. (85°C.).
Capacity of Cooling System	13 pints (7.4 litres).
With Heater	14 pints (8 litres).
Thermostat	Commences to open at 150°F. (70°C.). Fully open at 197°F. (92°C.).
Frost Precautions	With " Smith's Bluecol " anti-freeze mixture. Other brands as recommended by their manufacturers.

Degrees of Frost (Fahrenheit)	15°	25°	35°
Proportion	10%	15%	20%
Amount of " Bluecol " (Pints)	1.5	2.5	3

Piston Speed.....	2,850 ft./min. at 4,800 r.p.m. (This speed is equivalent to 100 m.p.h. in " Normal " top gear.)
Flywheel	Cast Iron with induction hardened shrunk-on steel starter ring gear.

Transmission

Clutch	Borg and Beck 9" single dry plate. Hydraulically operated. Ball bearing clutch throw out.
Gearbox	Four forward ratios and reverse. Synchromesh on 2nd, 3rd and top forward ratios. Silent helical gears. Oil filler combined with dipstick.

Ratios

	Overdrive Top	Top	3rd	2nd	1st	Rev.
Gearbox	.82	1.00	1.325	2.00	3.38	4.28
Overall	3.03	3.7	4.9	7.4	12.5	15.8

Rear Axle	Hypoid Bevel Gears. Taper roller bearings on differential and for Hypoid Pinion Shaft. Ball bearings for road wheels. Shim adjustment for Pinion and Crown Wheel adjustment.

Rear Axle Ratio	3.7. (37T × 10T).
Wheels	Steel Disc Type with chrome nave plates (wire wheels optional extra.).
Suspension	Coil springs for independent front suspension with telescopic dampers Wide semi-elliptic springs at rear, controlled by piston type dampers.
Brakes	Lockheed Hydraulic 10″ × 2¼″ front, 9″ × 1¾″ rear. (After Commission No. TS.5481 10″ × 2¼″ front and rear.) Two leading shoe type used on front wheels, leading and trailing shoe type on rear wheels. Alloy cast iron brake drums. Foot operation hydraulic on all four wheels. Hand operation mechanical on rear wheels only.
Steering	High Gear Cam and Lever type unit. Optional for use on right or left hand drive. 17″ (431 mm.) steering wheel with three spoke spring type.
Battery	12 volt, 51 amp. hour capacity, located under bonnet.
Performance Data	B.H.P. (Road Setting): 90 at 4,800 r.p.m. Maximum torque : 1,400 lb./ins. at 3,000 r.p.m., equivalent to 145 lbs./sq. ins. B.M.E.P. (See also Fig. 1).

Maximum Speeds

(Touring Trim)

Top Gear	110 m.p.h.	175 km.p.h.
3rd Gear	75	120
2nd Gear	45	75
1st Gear	25	40
Engine R.P.M. at	10 m.p.h.	10 km.p.h.
Top Gear	500	310
3rd Gear	660	410
2nd Gear	1,000	620
1st Gear	1,680	1,050
Rev. Gear	2,130	1,325

Acceleration Two Up

Gear	Speed	Time
Top	20—40 M.P.H. (32—64 Km.P.H.)	9 secs.
	30—50 M.P.H. (48—80 Km.P.H.)	9 secs.
Through Gears	0—50 M.P.H. (0—80 Km.P.H.)	8 secs.
	0—60 M.P.H. (0—96 Km.P.H.)	12 secs.

Fuel Consumption

Petrol	26—32 m.p.g. (10.87—8.83 litres per 100 km.).
Oil	3,000 m.p.g. (1,100 km. per litre.)

Car Dimensions

Wheelbase	7′ 4″	224 cms.
Track—Front	3′ 9″	114 cms.
Rear.....	3′ 9½″	116 cms.
Front wheel alignment	"Toe in" ⅛″.	
Ground clearance (under axle)	6″	15.2 cms.
Turning Circle (between Kerbs)	32′ 0″	9.75 metres

Overall Dimensions

Length	12′ 7″	384 cms.
Width	4′ 7½″	141 cms.
Height (unladen) Hood erect	4′ 2″	127 cms.
Top of Screen	3′ 10″	117 cms.
Hood down and Screen removed	3′ 4″	102 cms.
Luggage Space	See page 5 of this section.	

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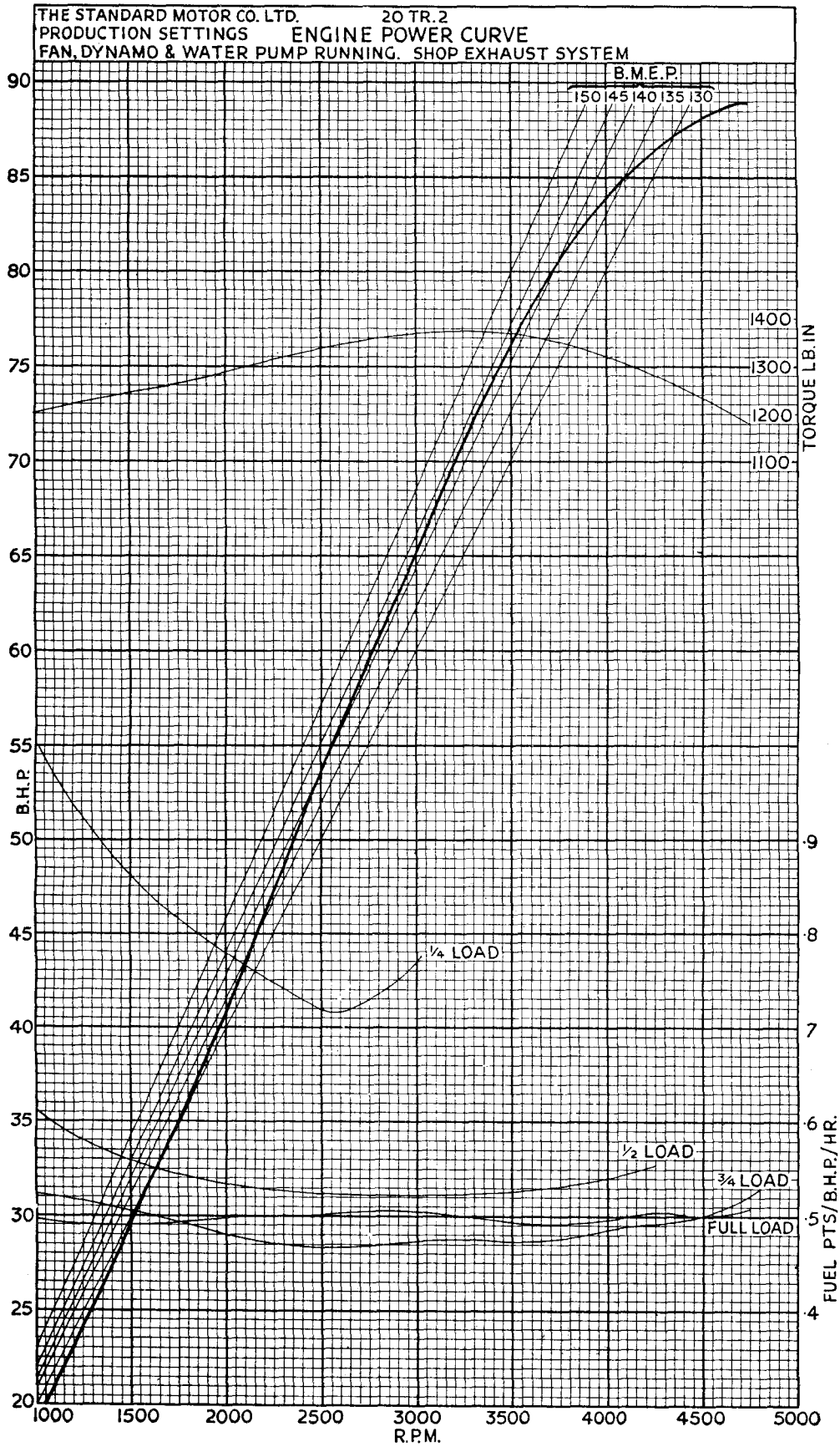


Fig. 1 Power Curve.

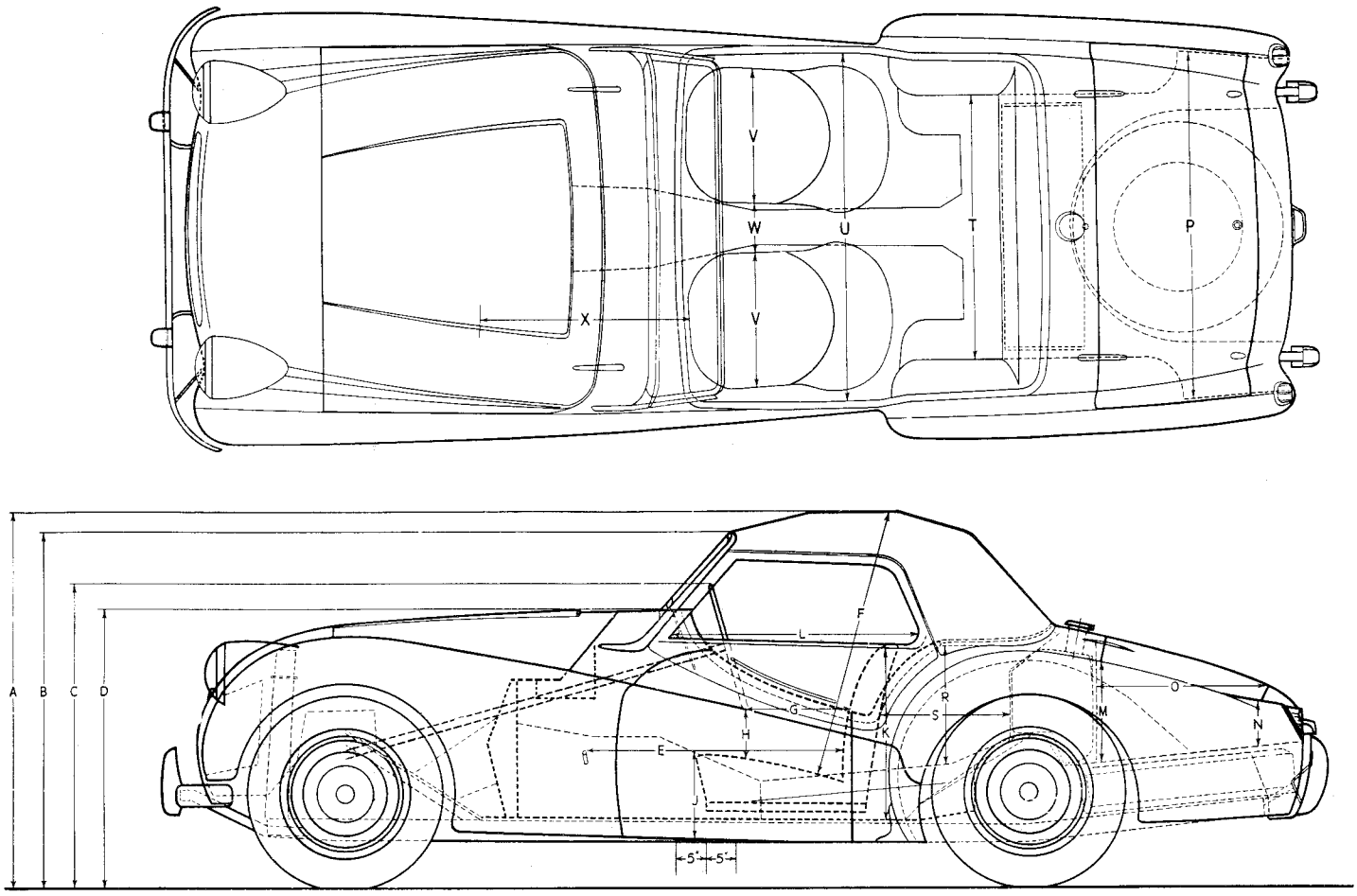


Fig. 2 Body Dimensions.

Body Dimensions (See Fig. 2).

A	Hood erect	50″	1,270 mm.
B	Top of Windscreen	46″	1,168 mm.
C	Top of Steering Wheel	40″	1,016 mm.
D	Road to Top of Scuttle	37″	940 mm.
E	Pedal to Squab	32½″ to 42½″	825 to 1,079 mm.
F	Seat to Hood	36″	914 mm.
G	Squab to Steering Wheel	8″ to 18″	203 to 457 mm.
H	Seat to Steering Wheel	6″ app.	152 mm.
J	Seat to Floor	8½″	216 mm.
K	Squab Height	19″	482 mm.
L	Sidescreen Width	31½″	800 mm.

Boot

M	Height at Hinges	14½″	368 mm.
N	Height at Locks	7″	177 mm.
O	Length of Opening	Max. 26¾″	679 mm.
		Min. 18¾″	476 mm.
P	Width of Opening	Max. 45″	1,143 mm.
		Min. 41½″	1,054 mm.

Luggage Space Behind Seats

R	Depth of Space	Max. 23″	584 mm.
		Min. 13½″	342 mm.
S	Length of Space	Max. 20″	508 mm.
		Min. 15″	381 mm.
T	Width of Space	34½″	876 mm.
U	Width at Elbows	45″	1,143 mm.
V	Width of Seat	18″	457 mm.
W	Space between Seats	5½″	139 mm.
X	Passenger Leg Room	Max. 34″	863 mm.
		Min. 24″	609 mm.

Car Weight

Complete Car with Tools, Fuel and Water		
18 cwts. 3 qrs.	7 lbs.	(955 kg.)
Shipping Weight		
17 cwts. 2 qrs.	21 lbs.	(902 kg.)

Tyre Sizes and Pressure

Tyre Size .... 5.50″—15″.
Tyre Pressures
Front ..... 22 lbs./sq. in. 1.55 kgsq./.cm.
Rear ..... 24 lbs./sq. in. 1.7 kg./sq. cm.
Where cars are to be used for racing or special high testing it is desirable that the Dunlop Rubber Company be consulted for special tyres.

Water Capacity

Cooling System	13 pints	7.4 litres
With Heater Fitted	14 pints	8 litres

Oil Capacity

Engine—From Dry	11 pints	6.25 litres
Drain and Refill	10 pints	5.7 litres
Gearbox	1½ pints	.85 litres
„ with Overdrive From Dry	3½ pints	2.0 litres
Rear Axle	1½ pints	.85 litres

Petrol

Petrol Tank capacity	12½ galls.	57 litres

Body Specification

Two seater open sports, all weather equipment.
Detachable windscreen of Triplex safety glass.
Provision for fitting aero screens.
Steel body rust-proofed.
Front wings, rear wings and complete front panel are bolted on detachable type.
Door hinged at front.

SPIRE SPEED NUTS

1. GENERAL NOTES

These speed nuts are being used in increasing numbers on our products at the present time in the place of nuts and lock washers, as, in many instances, they simplify manufacturing processes and speed up assembly work.

Although no particular skill is required in their application, an elementary knowledge of the correct way to fit them is necessary. It is not intended to refer to each type of speed nut in detail and, in any case, the types at present in use are likely to be increased as production proceeds and the desirability of their employment becomes apparent.

2. DESCRIPTION

Spire speed nuts provide a compensating thread lock. As the screw is tightened, the two arched prongs move inwards to engage and lock against the flanks of the screw thread. The prongs compensate for tolerance variations in the screw. A spring locking action is provided by compression of the arch in both prongs and base as the screw is tightened. The combined forces of the threaded lock and that provided by the spring prevent loosening due to vibration.

3. TIGHTENING TORQUES

Unlike normal threaded nuts, spire speed nuts do not require a great deal of torque when tightening the screw. The retention of the screw by the nut depends on spring tension alone. When tightening a screw into a speed nut, only sufficient torque should be used to produce the thread and spring lock shown in Fig. 3. Excessive

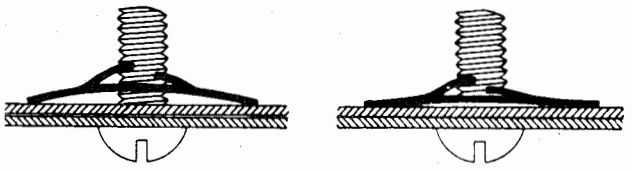
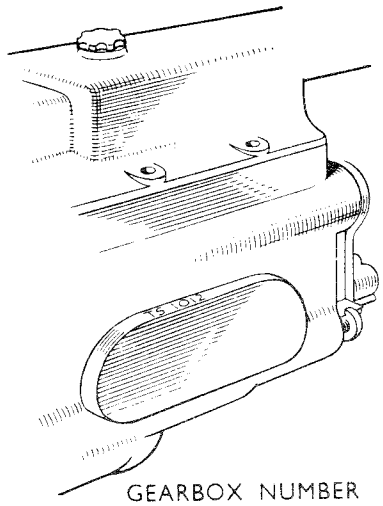
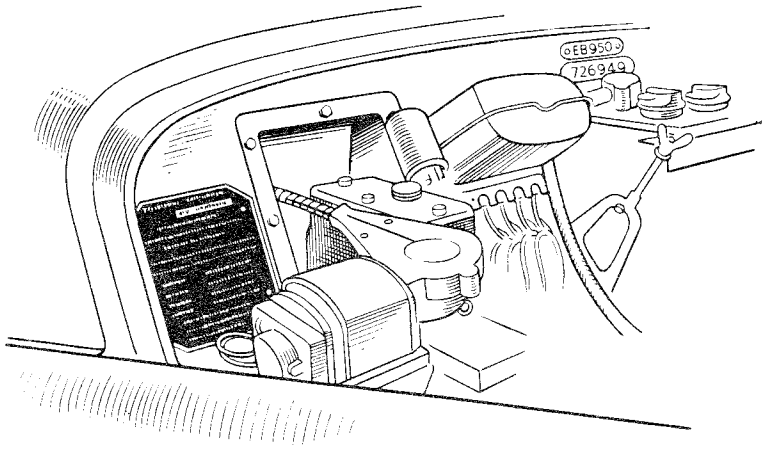


Fig. 3 **Showing an Untightened Spire Nut on the left of the illustration and on the other side a fully tightened one.**

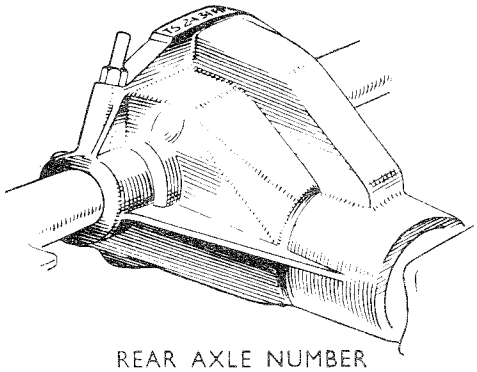
torque will only distort the ends of the prongs and affect their spring tension and may even break them.
Spire speed nuts can be used indefinitely providing they have not been damaged by over-tightening.



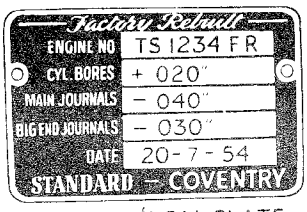
GEARBOX NUMBER



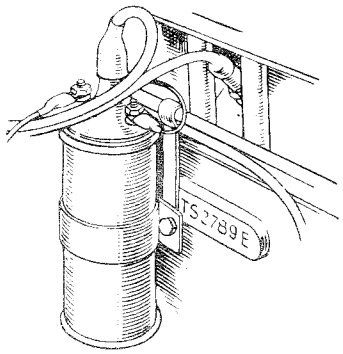
COMMISSION NUMBER



REAR AXLE NUMBER



RECONDITION PLATE



ENGINE NUMBER

Fig. 4 Commission Numbers.

4. COMMISSION NUMBER (Chassis Number)

This number is found on a plate attached to the bulkhead under the bonnet at the right-hand side (see Fig. 4). It has the prefix letters "TS."

NOTE: **It is important that this number is quoted when writing to the Company concerning the car and particularly when ordering spare parts.**

5. BODY NUMBER

This number is stamped on an oval plate affixed in the centre of the bulkhead under the bonnet (see Fig. 4). It is a number with six numerals.

6. ENGINE NUMBER

This number is stamped on a boss situated on the cylinder block casting below No. 3 plug (see Fig. 4). It has a prefix "TS" and a suffix letter "E."

Factory Rebuilt Engines

All factory rebuilt engines have the previous number erased and the new number stamped on a plate which is attached to the same boss (see Fig. 4).

This plate also gives information as to the size of the crank pins and journals, also the date on which the unit was rebuilt. This number has a prefix "TS" and a suffix "FR."

7. GEARBOX NUMBER

This number is stamped on the left-hand side of the box on the upper wall of the cast oval (see Fig. 4). This number has the prefix "TS."

8. REAR AXLE NUMBER

This number is stamped on the upper rim of the flange to which the rear cover plate is attached (see Fig. 4). This number has the prefix "TS."

RECOMMENDED LUBRICANTS

BRITISH ISLES

COMPONENT	SHELL	ESSO	DUCKHAM'S	VACUUM	WAKEFIELD	B.P. ENERGOL
ENGINE Summer	Shell X-100 30	Essolube 30	Duckham's NOL " Thirty "	Mobiloil A	Castrol XL	Energol S.A.E. 30
Winter	Shell X-100 20/20W	Essolube 20	Duckham's NOL " Twenty "	Mobiloil Arctic	Castrolite	Energol S.A.E. 20
Upper Cylinder Lubricant	Shell Donax U	Essomix	Duckham's Adcoids	Mobil Upperlube	Castrollo	Energol U.C.L.
GEARBOX	Shell X-100 30	Essolube 30	Duckham's NOL " Thirty "	Mobiloil A	Castrol XL	Energol S.A.E. 30
REAR AXLE **STEERING GEARBOX**	Shell Spirax 90 E.P.	Esso Expee Compound 90	Duckham's Hypoid 90	Mobilube G.X. 90	Castrol Hypoy	Energol EP S.A.E. 90
PROPELLER SHAFT JOINTS	Shell Spirax 140 E.P.	Esso Expee Compound 140	Duckham's NOL EPT 140	Mobilube G.X. 140	Castrol Hi-Press	Energol E.P. S.A.E. 140
FRONT WHEEL HUBS	Shell Retinax A	Esso High Temperature Grease	Duckham's LB10	Mobilgrease No. 5	Castrolease W.B.	Energrease C3
REAR WHEEL HUBS and **ENGINE WATER PUMP** (*Hand Gun*)		Esso Grease	Duckham's H.B.B.	Mobil Hub Grease	Castrolease Heavy	
CHASSIS. Grease Nipples (*Hand or Pressure Gun*)			Duckham's Laminoid Soft	Mobilgrease No. 4	Castrolease CL	
Oil Points (*Oil Can*) Body and Chassis	Shell X-100 20/20W	Essolube 20	Duckham's NOL " Twenty "	Mobil Handy Oil	Castrolite	Energol S.A.E. 20
REAR ROAD SPRINGS	Shell Donax P	Esso Penetrating Oil	Duckham's Laminoid Liquid	Mobil Spring Oil	Castrol Penetrating Oil	Energol Penetrating Oil
	ALTERNATIVELY USE REAR AXLE OR ENGINE OIL					
HANDBRAKE CABLES	Shell Retinax A	Esso Graphite Grease	Duckham's Keenol KG 16	Mobil Graphited Grease	Castrolease Brake Cable Grease	Energrease C3G
BRAKE RESERVOIR	GENUINE LOCKHEED HYDRAULIC BRAKE FLUID					

RECOMMENDED LUBRICANTS

OVERSEAS COUNTRIES

AI

COMPONENT		DUCKHAM'S	VACUUM	WAKEFIELD	B.P. ENERGOL	SHELL	ESSO	S.A.E.
ENGINE	Air Temp. °F. Over 70°	Duckham's NOL " Forty "	Mobiloil " AF "	Castrol XXL	Energol Motor Oil S.A.E. 40	Shell X-100 40	Essolube 40	40
	40° to 70°	Duckham's NOL " Thirty "	Mobiloil "A"	Castrol XL	Energol Motor Oil S.A.E. 30	Shell X-100 30	Essolube 30	30
	10° to 40°	Duckham's NOL " Twenty "	Mobiloil Arctic	Castrolite	Energol Motor Oil S.A.E. 20W	Shell X-100 20/20W	Essolube 20	20
	—10° to 10°	Duckham's NOL " Ten "	Mobiloil 10W	Castrol Z	Energol Motor Oil S.A.E. 10W	Shell X-100 10W	Essolube 10	10
	Below—10°	Duckham's NOL " Five "	Mobiloil 5W	Castrol ZZ	Energol Motor Oil S.A.E. 5W	Shell X-100 5W	Esso Extra Motor Oil " Zero "	5
	Upper Cylinder Lubricant	Duckham's Adcoids	Mobil Upperlube	Castrollo	Energol U.C.L.	Shell Donax U	Esso Upper Motor Lubricant	—
GEARBOX	Over 70°	Duckham's NOL " Fifty "	Mobiloil BB	Castrol XXL	Energol Motor Oil S.A.E. 50	Shell X-100 50	Essolube 50	50
	Over 10° to 70°	Duckham's NOL " Thirty "	Mobiloil A	Castrol XL	Energol Motor Oil S.A.E. 30	Shell X-100 30	Essolube 30	30
	Below 10°	Duckham's NOL " Twenty "	Mobiloil Arctic	Castrolite	Energol Motor Oil S.A.E. 20W	Shell X-100 20/20W	Essolube 20	20
STEERING GEARBOX	Over 10°	Duckham's Hypoid 90	Mobilube GX 90	Castrol Hypoy	Energol EP S.A.E. 90	Shell Spirax 90EP	Esso XP Compound 90	EP 90
REAR AXLE	Below 10°	Duckham's Hypoid 80	Mobilube GX 80	Castrol Hypoy 80	Energol EP S.A.E. 80	Shell Spirax 80EP	Esso XP Compound 80	EP 80
PROPELLOR SHAFT JOINTS		Duckham's NOL EPT 140	Mobilube GX 140	Castrol Hi-Press	Energol EP S.A.E. 140	Shell Spirax 140EP	Esso XP Compound 140	EP 140
FRONT WHEEL HUBS		Duckham's LB10	Mobilgrease M.P.	Castrolease W.B.	Energrease C3	Shell Retinax A	Esso Bearing Grease	—
REAR WHEEL HUBS and ENGINE WATER PUMP	*(Hand Gun)*	Duckham's H.B.B.		Castrolease Heavy			Esso Chassis Grease	—
CHASSIS Grease Nipples	*(Hand or Pressure Gun)*	Duckham's Laminoid Soft		Castrolease CL				
Oil Points	*(Oil Can)* Body & Chassis	Duckham's NOL " Twenty "	Mobiloil Arctic	Castrolite	Energol Motor Oil S.A.E. 20W	Shell X-100 20/20W	Esso Handy Oil	20
REAR ROAD SPRINGS		Duckham's Laminoid Liquid	Mobilgrease M.P.	Castrol Penetrating Oil	Energol Penetrating Oil	Shell Donax P	Esso Penetrating Oil	—
		ALTERNATIVELY USE REAR AXLE OR ENGINE OIL						
HANDBRAKE CABLES		Duckham's Keenol KG16	Mobilgrease M.P.	Castrolease Brake Cable Grease	Energrease C3G	Shell Retinax A	Esso Spring Grease	—
BRAKE RESERVOIR		GENUINE LOCKHEED HYDRAULIC BRAKE FLUID						

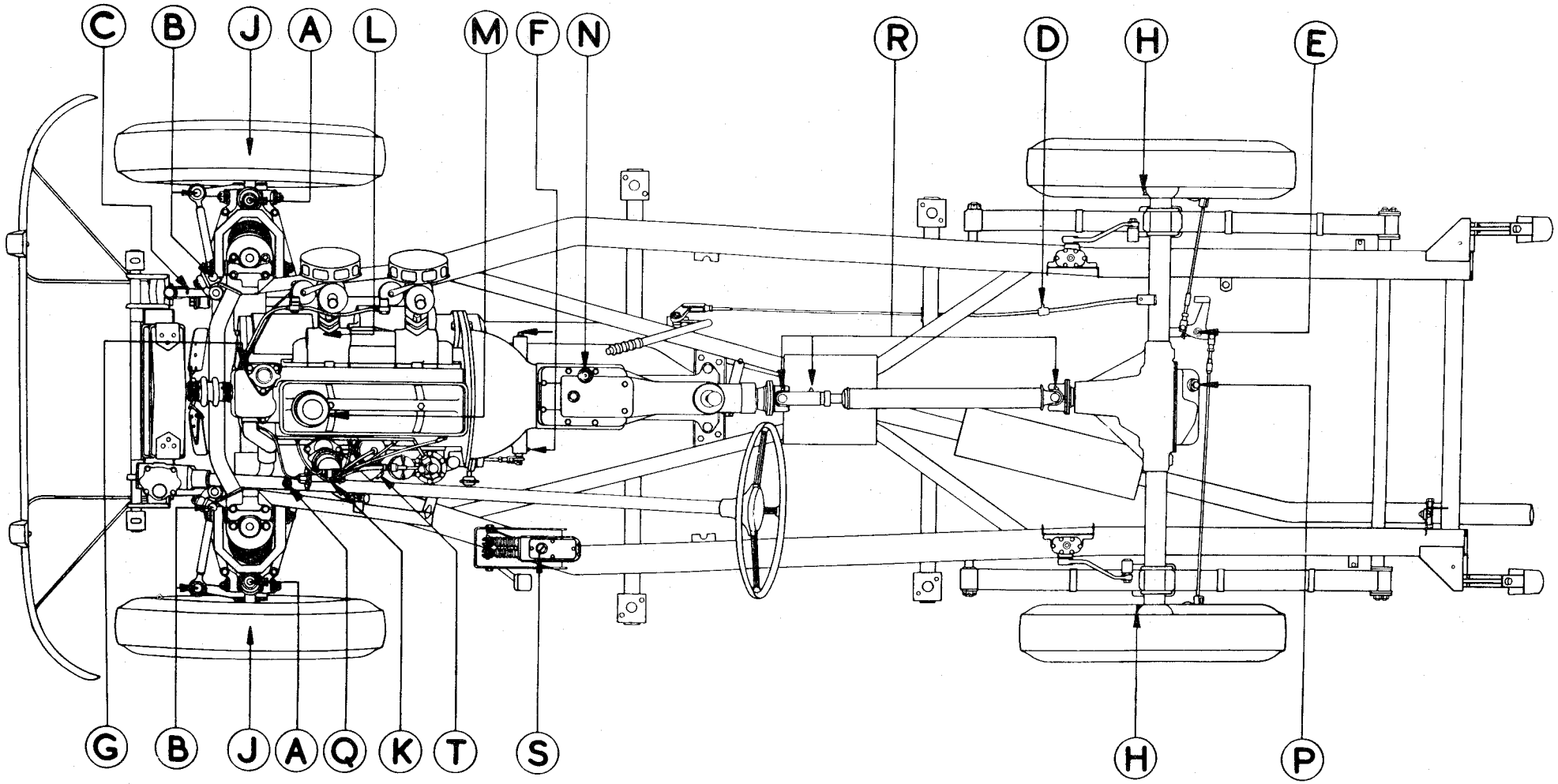


Fig. 5 **Lubrication Chart.**

GENERAL DATA

Ref.	ITEMS	DETAILS		Mileage Interval (Thousands of Miles)
A	Steering Swivels .... (4 nipples)	THREE OR FOUR STROKES	GREASE GUN	1
B	Steering — Outer Tie Rod Ball Joints .... (4 nipples)			1
C	Steering — Slave Drop Arm Pivot (1 nipple)			1
	Lower Wishbone Outer Bushes (4 nipples)			1
D	Handbrake — Cable .... (1 nipple)	FIVE STROKES		5
E	Handbrake — Compensator ..... (2 nipples)			5
F	Clutch Shaft Bearings .... (2 nipples)			5
G	Engine Water Pump .... (1 nipple)			5
H	Hubs — Rear .... (2 nipples)			5
J	Hubs — Front .... (2 nipples) Fitted up to Commission No. TS. 5348 only			5
K	Ignition Distributor	OIL AS RECOM-MENDED	OIL CAN	5
	Handbrake Lever			5
	Carburettor Dashpots and Control Linkages			5
	Door Locks, Hinges, Bonnet Safety Catch, Boot and Spare Wheel Locks			5
L	Dynamo			10
M	Engine Sump — 250 MILES	TOP UP OIL LEVEL		
		DRAIN & REFILL WITH NEW OIL		$2\frac{1}{2}$
	Oil Filler Cap	WASH		5
N	Gearbox	TOP UP OIL LEVEL		5
		DRAIN & REFILL WITH NEW OIL		10
P	Rear Axle			5
Q	Steering Gearbox	TOP UP OIL LEVEL		5
R	Propeller Shaft — Splines ..... (1 nipple)	THREE OR FOUR STROKES WITH OIL GUN		5
	Propeller Shaft — Universal Joints (2 nipples)			5
	Road Springs	CLEAN AND OIL		5
	Air Cleaners	OIL AS RECOMMENDED		5
S	Hydraulic Brake and Clutch Reservoir	TOP UP FLUID LEVEL		5
T	Oil Cleaner	RENEW CARTRIDGE		10

GENERAL DATA

NUT TIGHTENING TORQUES

Operation	Description	Detail No.	Specified Torque Range lb./ft.	Remarks
ENGINE				
CYLINDER HEAD	½" UNF and UNC Stud	106960 106959	100—105	Tighten nuts with engine cold.
CONNECTING ROD CAPS	7/16" UNF Bolt	105312	55—60	
MAIN BEARING CAPS	½" × 13 NC Setscrew	57121	85—90	
FLYWHEEL ATTACHMENT TO CRANKSHAFT	⅜" × 24 NF Setscrew	102065	42—46	
TIMING CHAIN WHEEL TO CAMSHAFT	5/16" × 18 NC Setscrew	56370	24—26	
MANIFOLD ATTACHMENT	⅜" NC Stud	58688 102475 107055	22—24	
OIL PUMP ATTACHMENTS	5/16" × 24 UNF Stud	HN.2008	12—14	
REAR OIL SEAL ATTACHMENT	¼" × 20 UNC Setscrew	UN.0755	8—10	
CLUTCH ATTACHMENT	5/16" × 18 UNC Setscrew	HU.0856	20	
ATTACHMENT OF END PLATES	5/16" × 18 UNC Bolt	HU.0856	14—16	Tapped into Aluminium
ATTACHMENT OF OIL FILTERS	5/16" × 18 × 24 UNC Bolts Cap Nut Bolt	HB.0874 HB.0882 DN.3408 HB.0856	18—20	
TIMING COVER	5/16" × 18 and 24 NC Setscrew	HU.0805 HU.0857	14—16	
SUMP ATTACHMENT	5/16" × 18 NC Setscrew	100749	16—18	
PULLEY TO WATER PUMP SPINDLE	5/16" × 24 UNF Simmonds Nyloc Nut	TN.3208	16—18	
DYNAMO BRACKET TO BLOCK	5/16" × 18 UNC Setscrew	HU.0856	16—18	
DYNAMO TO BRACKET AND PEDESTAL	5/16" × 24 UNF Setscrew and Bolt	59115 HU.0808	16—18	
ROCKER PEDESTAL	⅜" NF and NC Stud	108205	24—26	
OIL GALLERY PLUGS	7/16" × 14 UNC ⅜" × 16 UNC	102785 HU.0954	32—36 24—26	Tighten on to copper washer.
ATTACHMENT OF STARTER MOTOR	⅜" × 24 NF Bolt	NB.0915	26—28	
WATER PUMP ATTACHMENT	⅜" × 16 UNC Bolt ⅜" × 16 UNC Bolt	HB.0971 HB.0968	26—28 26—28	
PETROL PUMP ATTACHMENT	5/16" NF and NC Stud	31ST 131C056	12—14	
THERMOSTAT ASSEMBLY TO CYLINDER HEAD	5/16" × 18 UNC Bolt 5/16" × 18 UNC Bolt	HB.0878 HB.0866	16—18 16—18	
INLET TO EXHAUST MANIFOLD	5/16" × 24 UNF Stud	100419	12—14	
DYNAMO TO PEDESTAL FRONT	5/16" × 24 UNF Bolt	59115	16—18	

NUT TIGHTENING TORQUES (continued)

Operation	Description	Detail No.	Specified Torque Range lb./ft.	Remarks
GEARBOX				
FRONT COVER TO GEARBOX	$\frac{5}{16}$" × 18 NC Setscrew	55771	14—16	
EXTENSION TO GEARBOX	$\frac{5}{16}$" × 18 UNC Bolt	HB.0866 HB.0858	14—16	
TOP COVER TO GEARBOX	$\frac{5}{16}$" × 18 Bolts and Setscrews	HU.0851 HB.0871 HB.0873	14—16	
ATTACHMENT OF ENGINE TO GEARBOX	$\frac{5}{16}$" × 18 NC and NF Bolt and Stud	HB.0858 125C056	14—16	
REAR MOUNTING TO GEARBOX EXTENSION	$\frac{1}{2}$" × 20 UNF Bolt	HB.1112	50—55	
FRONT SUSPENSION				
BACK PLATE AND TIE ROD LEVERS TO VERTICAL LINKS	$\frac{3}{8}$" × 24 UNF Setscrews and Bolts	HB.0925 HB.0922 HU.0905	24—26	
WHEEL STUDS AND NUTS	$\frac{7}{16}$" NF	100869	45—55	
BALL PIN TO VERTICAL LINK	$\frac{1}{2}$" × 20 UNF Nut—Slotted	2211 LN	55—65	To suit pin hole.
TOP WISHBONE TO FULCRUM PIN	$\frac{7}{16}$" × 20 UNF Nut—Slotted	2210 LN	26—40	To suit pin hole.
SPRING PAN TO WISHBONE	$\frac{3}{8}$" × 24 UNF Stud $\frac{3}{8}$" × 24 UNF Bolt	107350 107351	26—28	
TIE ROD TO IDLER LEVER AND DROP-ARM	$\frac{3}{8}$" × 24 UNF Simmonds Nyloc Nut	TN.3209	26—28	
TOP INNER FULCRUM PIN TO CHASSIS	$\frac{3}{8}$" × 24 UNF Bolt $\frac{3}{8}$" × 24 UNF Setscrew	HB.0913 HU.0908	26—28	
LOWER FULCRUM BRACKET TO CHASSIS	$\frac{5}{16}$" × 24 UNF Bolt	HB.0805	16—18	
LOWER WISHBONE TO FULCRUM PIN	$\frac{7}{16}$" × 20 UNF Nyloc Nut	TN.3210	26—28	
FRONT HUB TO STUB AXLE	$\frac{1}{2}$" × 20 UNF Nut—Slotted	LN.2211	Tighten up and unscrew one flat.	
REAR AXLE				
BEARING CAPS TO HOUSING	$\frac{3}{8}$" × 24 UNF Setscrew	100878	34—36	
HYPOID PINION FLANGE	$\frac{5}{8}$" × 18 UNF	100892	85—100	To suit split pin holes.
CROWN WHEEL TO DIFFERENTIAL CASE	$\frac{5}{16}$" × 24 UNF $\frac{3}{8}$" × 24 UNF	107880 109735	22—24 35—40	Fitted from Commission No. TS.2181.

NUT TIGHTENING TORQUES (continued)

Operation	Description	Detail No.	Specified Torque Range lb./ft.	Remarks
REAR COVER ATTACHMENT	$\frac{5}{16}$" × 24 UNF Setscrew	HU.0805	16—18	
BACKING PLATE ATTACHMENT	$\frac{3}{8}$" × 24 UNF Setscrew	HU.0908	26—28	
HUB TO AXLE SHAFT	$\frac{5}{8}$" × 18 UNF Nut—Slotted	100892 112635	110—125 125—145	From axle No. TS.8039
REAR SUSPENSION				
SPRING FRONT END TO FRAME	$\frac{1}{2}$" × 20 UNF Bolt	106251	28—30	
SPRING SHACKLE (NUT TO PIN)	$\frac{3}{8}$" × 24 UNF Nut Shackle Pin	HN.2009 104953	26—28	
ROAD SPRING TO REAR AXLE	Clip Nyloc Nut $\frac{3}{8}$" × 24 UNF	107688 YN.2909	28—30	
SHOCK ABSORBER TO FRAME BRACKET	$\frac{3}{8}$" × 24 UNF Setscrew $\frac{3}{8}$" × 24 UNF Nyloc Nut	HU.0908 TN.3209	26—28	

FRACTIONAL AND METRICAL EQUIVALENTS

Inches Frac.	Dec.	mm.	Inches Frac.	Dec.	mm.	Inches Frac.	Dec.	mm.
	.0039	.100	19/64″	.2968	7.540		.6500	16.510
1/128″	.00781	.200		.3000	7.620	21/32″	.6562	16.668
	.0118	.300	5/16″	.3125	7.937		.6693	17
1/64″	.0516	.3968		.3150	8	43/64″	.6719	17.065
	.0157	.400	21/64″	.3281	8.334	11/16″	.6875	17.462
	.0197	.500	11/32″	.3437	8.731		.7000	17.780
	.0236	.600		.3500	8.890	45/64″	.7031	17.859
	.0276	.700		.3543	9		.7087	18
1/32″	.0312	.794	23/64″	.3594	9.128	23/32″	.7187	18.256
	.0315	.800	3/8″	.3750	9.525	47/64″	.7344	18.652
	.0354	.900	25/64″	.3906	9.921		.7480	19
	.0394	1		.3937	10	3/4″	.7500	19.050
3/64″	.0469	1.191		.4000	10.160	49/64″	.7656	19.446
	.0500	1.270	13/32″	.4062	10.319	25/32″	.7812	19.843
1/16″	.0625	1.587	27/64″	.4219	10.716		.7874	20
5/64″	.0781	1.984		.4331	11	51/64″	.7969	20.240
	.0787	2	7/16″	.4375	11.112		.8000	20.230
3/32″	.0937	2.381		.4500	11.430	13/16″	.8125	20.637
	.1000	2.540	29/64″	.4531	11.509		.8268	21
7/64″	.1094	2.778	15/32″	.4687	11.906	53/64″	.8281	21.034
	.1181	3		.4724	12	27/32″	.8437	21.431
1/8″	.1250	3.175	31/64″	.4844	12.303		.8500	21.590
9/64″	.1406	3.572	1/2″	.5000	12.700	55/64″	.8594	21.827
	.1500	3.810		.5118	13		.8661	22
5/32″	.1562	3.969	33/64″	.5156	13.096	7/8″	.8750	22.225
	.1575	4	17/32″	.5312	13.493	57/64″	.8906	22.621
11/64″	.1719	4.365	35/64″	.5469	13.890		.9000	22.859
3/16″	.1875	4.762		.5500	13.970		.9055	23
	.1968	5		.5512	14	29/32″	.9063	23.018
	.2000	5.080	9/16″	.5625	14.287	59/64″	.9219	23.415
13/64″	.2031	5.159	37/64″	.5781	14.684	15/16″	.9375	23.812
7/32″	.2187	5.558		.5906	15		.9449	24
15/64″	.2344	5.953	19/32″	.5937	15.081		.9500	24.129
	.2362	6		.6000	15.240	61/64″	.9531	24.209
1/4″	.2500	6.350	39/64″	.6094	15.478	31/32″	.9687	24.606
17/64″	.2656	6.745	5/8″	.6250	15.875	63/64″	.9844	25
	.2756	7		.6299	16	1″	1.000	25.400
9/32″	.2812	7.144	41/64″	.6406	16.271			

STANDARD MEASURE AND METRIC EQUIVALENTS

English to Metric (linear)

1 inch = 2.54 centimetres
1 foot = 30.4799 centimetres
1 yard = 0.914399 metre
1 mile = 1.6093 kilometre
10 miles = 16.093 kilometres

Metric to English (linear)

1 centimetre = 0.3937 inch
1 metre = 39.3702 inches
= 1.0936 yard
1 kilometre = 0.62137 mile

English to Metric (square measure)

1 square inch = 6.4516 square centimetres
1 square foot = 9.203 square decimetres
1 square yard = .836126 square metre

Metric to English (square measure)

1 square centimetre = .15500 square inch
1 square metre = 1550.01 square inches
= 10.7639 square feet
= 1.196 square yard

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GENERAL DATA

English to Metric (cubic measure)

1 cubic inch	=	16.387 cubic centimetres
1 cubic foot	=	28.317 litres
1 gallon (0.1605 cu. ft.)	=	4.546 litres

Metric to English (cubic measure)

1 litre (1,000 cu. cms.)	=	0.22 gallons, or 1.7598 pints
1 cubic centimetre	=	0.61 cubic inches

English to Metric (weight)

1 pound (Avoirdupois)	=	0.45359 kilogrammes
1 cwt. (112 pounds)	=	50.8 kilogrammes
1 ton (2,240 pounds)	=	1,016 kilogrammes

Metric to English (weight)

1 kilogramme	=	2.20462 pounds
100 kilogrammes	=	1.968 cwt.
1,000 kilogrammes	=	0.9842 tons

Service Instruction Manual

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ENGINE

SECTION B

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ENGINE

INDEX

ILLUSTRATIONS

ENGINE—Dimensions and Tolerances

PART AND DESCRIPTION	DIMENSIONS NEW	CLEARANCE NEW	REMARKS
Crankshaft			
Journal diameter	2.4795″ 2.4790″	.0010″ to .0025″	
Bearing Internal Diameter	2.4815″ 2.4805″		
Bearing Housing Internal Diameter	2.6255″ 2.6250″		
Undersize bearings are available in the following sizes :—.010″, —.020″, —.030″, —.040″.			
Crankshaft End Float			
Intermediate Journal Length	1.7507″ 1.7498″	.0048″ to .0117″	Clearance of .004″ to .006″ is specified and obtained by selective assembly of Thrust Washers.
Intermediate Bearing Cap Width. (Plus thickness of two Thrust Washers.)	1.7450″ 1.7390″		
Main Bearing Cap Width	1.5050″ 1.4950″		
Big End			
Crank Pin Diameter	2.0866″ 2.0860″	.0016″ to .0035″	
Bearing Internal Diameter	2.0895″ 2.0882″		
Internal Diameter of Bearing Housing	2.2335″ 2.2327″		
Bearing Width	.9670″ .9650″		
Undersize bearings are available in the following sizes :—.010″, —.020″, —.030″, —.040″.			
Big End Float			
Crankpin Width	1.1915″ 1.1865″	.007″ to .014″	
Con. Rod Width	1.1795″ 1.1775″		
Ovality and Taper			
Journals and Crankpins	Should not exceed .002″		

ENGINE—Dimensions and Tolerances

PART AND DESCRIPTION	DIMENSIONS NEW	CLEARANCE NEW	REMARKS
Small End			
Bore for Bush	1.0000″ .9950″		
Bush External Diameter	1.0005″ .995″	Press Fit in Con. Rod.	
Internal Diameter of Bush	.8752″ .8748″	.0002″	
Gudgeon Pin Diameter	.87510″ .87485″	at 68°F.	
Piston Rings			
Compression Ring Width	.062″ .061″	.0015″	
Groove Width	.0645″ .0635″	to .0035″	
Scraper Ring Width	.156″ .155″	.001″	
Groove Width	.158″ .157″	to .003″	
Ring Gap in Cylinder Sleeves		.003″ to .010″	

Piston Rings are obtainable in the following oversizes :+.010″, +.020″, +.030″, +.040″.

Pistons and Cylinder Sleeves

	F	G	H	
Bore Diameter	3.2676″ 3.2673″	3.2680″ 3.2677″	3.2684″ 3.2681″	
Top Diameter of Piston Skirt	3.2626″ 3.2622″	3.2630″ 3.2626″	3.2634″ 3.2630″	
Bottom Diameter of Piston Skirt	3.2641″ 3.2637″	3.2645″ 3.2641″	3.2649″ 3.2645″	
Top—Skirt Clearance	.0054″ .0047″			Applicable to " F," " G " & " H " Pistons
Bottom—Skirt Clearance	.0039″ .0032″			

PART AND DESCRIPTION	DIMENSIONS NEW	CLEARANCE NEW	REMARKS
Height of Cylinder Sleeves above face of Cylinder Block		.003″ to .0055″	

Pistons are available in the following oversizes: +.020″, + 030″, +040″.

Camshaft

Front Journal Diameter	1.8720″ 1.8710″	.0028″ to .0047″	
Front Journal Bearing Bore	1.8757″ 1.8748″		
External Diameter of Front Bearing	2.2498″ 2.2493″	Push Fit in Cylinder Block.	
Bore in Block for Front Bearing	2.2507″ 2.2498″		
Diameter of 2nd, 3rd and Rear Camshaft Journal	1.7157″ 1.7152″	.0026″ to .0046″	
Bore in Cylinder Block for 2nd, 3rd and Rear Journals	1.7198″ 1.7183″		
End Float		.003″ to .0075″	

Valves and Valve Guides

Inlet Stem Diameter	.3110″ .3100″	.001″ to .003″	
Inlet Guide Diameter	.3130″ .3120″		
Exhaust Stem Diameter	.3715″ .3705″	.003″ to .005″	
Exhaust Guide Diameter	.3755″ .3745″		
Included Angle of Valve Faces	90°		
Inlet Valve Head Diameter	1.5620″ 1.5580″		
Width of Inlet Valve Seating	.0469″ approx.		

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PART AND DESCRIPTION	DIMENSIONS NEW	CLEARANCE NEW	REMARKS
Exhaust Valve Head Diameter	1.3030″ 1.2990″		
Width of Exhaust Valve Seating	.0469″ approx.		
Oil Pump			
Outer Rotor Outside Diameter	1.5975″ 1.5965″	.0055″ to .0075″	
Housing Internal Diameter	1.6040″ 1.6030″		
Depth of Rotor	1.4995″ 1.4985″	.0005″ to .0025″	
Housing Depth	1.5010″ 1.5000″		
Bush in Cylinder Block	.5010″ .5005″	.0015″ to .0030″	
Distributor Driving Shaft	.4990″ .4980″		
End Float of Distributor and Tachometer Gear Assembly		.003″ to .007″	
Inner Rotor			
Major Diameter	1.1720″ 1.1710″		
Minor Diameter	.7310″ .7290″		
Rotor Depth	1.4995″ 1.4985″	.0005″ to .0025″	
Housing Depth	1.5010″ 1.5000″		
Clearance on Rotors Min.		.0005″ to .0025″	
Max.		.001″ to .004″	

PART AND DESCRIPTION	DIMENSIONS NEW	CLEARANCE NEW	REMARKS
Valve Springs			
Outer Springs Inlet and Exhaust			
Fitted Length	1.560″		
Fitted Load	38 lbs.		
Free Length, approx.	1.980″		
Inner Spring Inlet			
Fitted Length	1.500″		
Fitted Load	33 lbs.		
Exhaust			
Fitted Length	1.450″		
Fitted Load	36.5 lbs.		
Inlet and Exhaust			
Free Length, approx.	2.080″		
Auxiliary Inner Spring Exhaust Valve Only			
Fitted Length	1.140″		
Fitted Load	10 lbs.		
Free Length, approx.	1.540″		

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Valve Insert Dimensions

	Combustion head		Insert			
	Bore	Depth	O/D	I/D	Depth	Detail
Inlet	1.717″ 1.716″	.253″ .250″	1.723″ 1.722″	1.471″ 1.466″	.253″ .250″	111913
Exhaust	1.439″ 1.438″	.253″ .250″	1.445″ 1.444″	1.193″ 1.188″	.253″ .250″	102941

The seating of both valves is .044″ × 89°

NOTE : To convert lbs. to Kgs. divide by 2.204.
„ „ ins. to Millimetres multiply by 25.4.

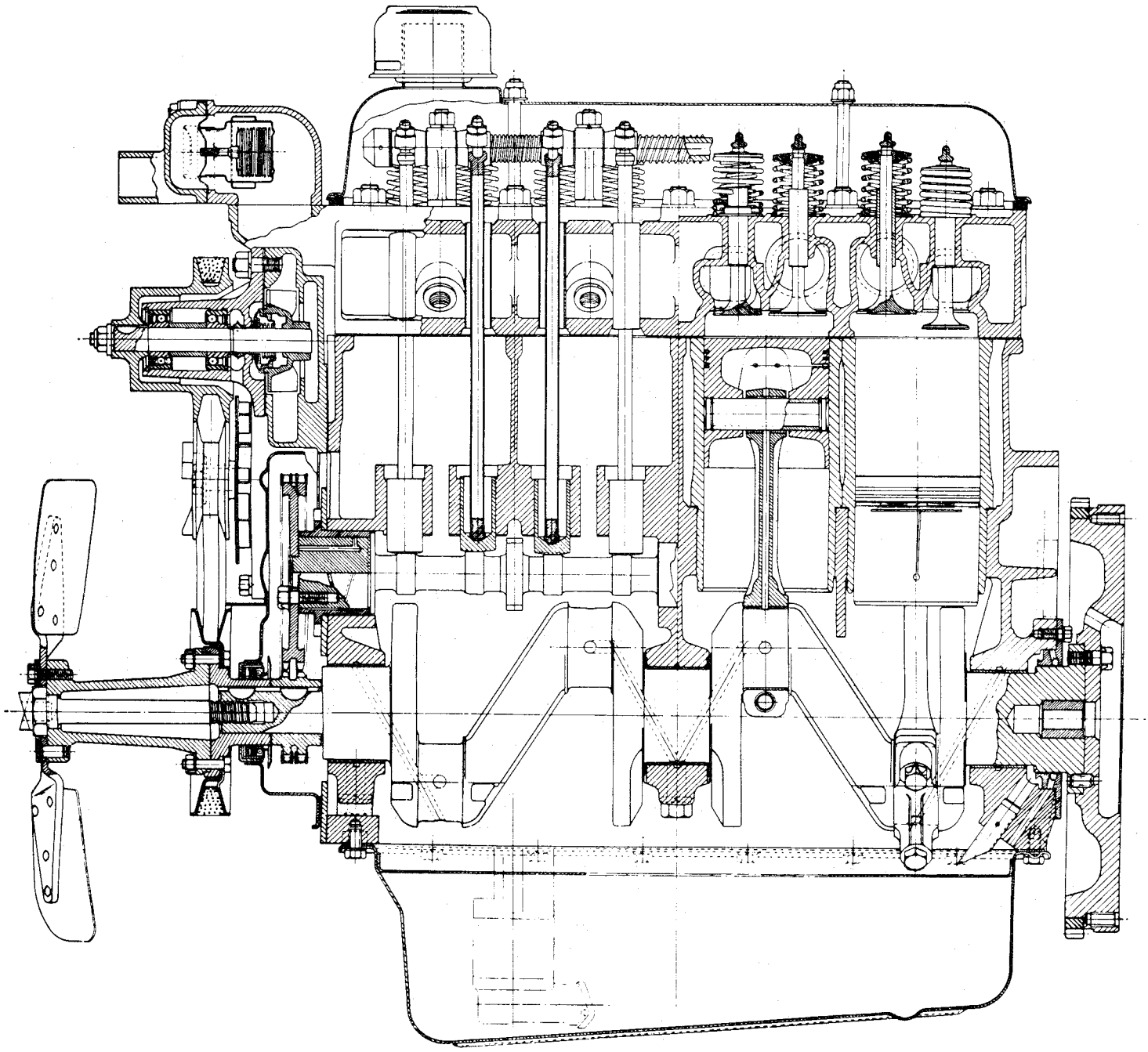

Fig. 1 **Longitudinal view of Engine. For illustration purposes the sump oil filter has been omitted.**

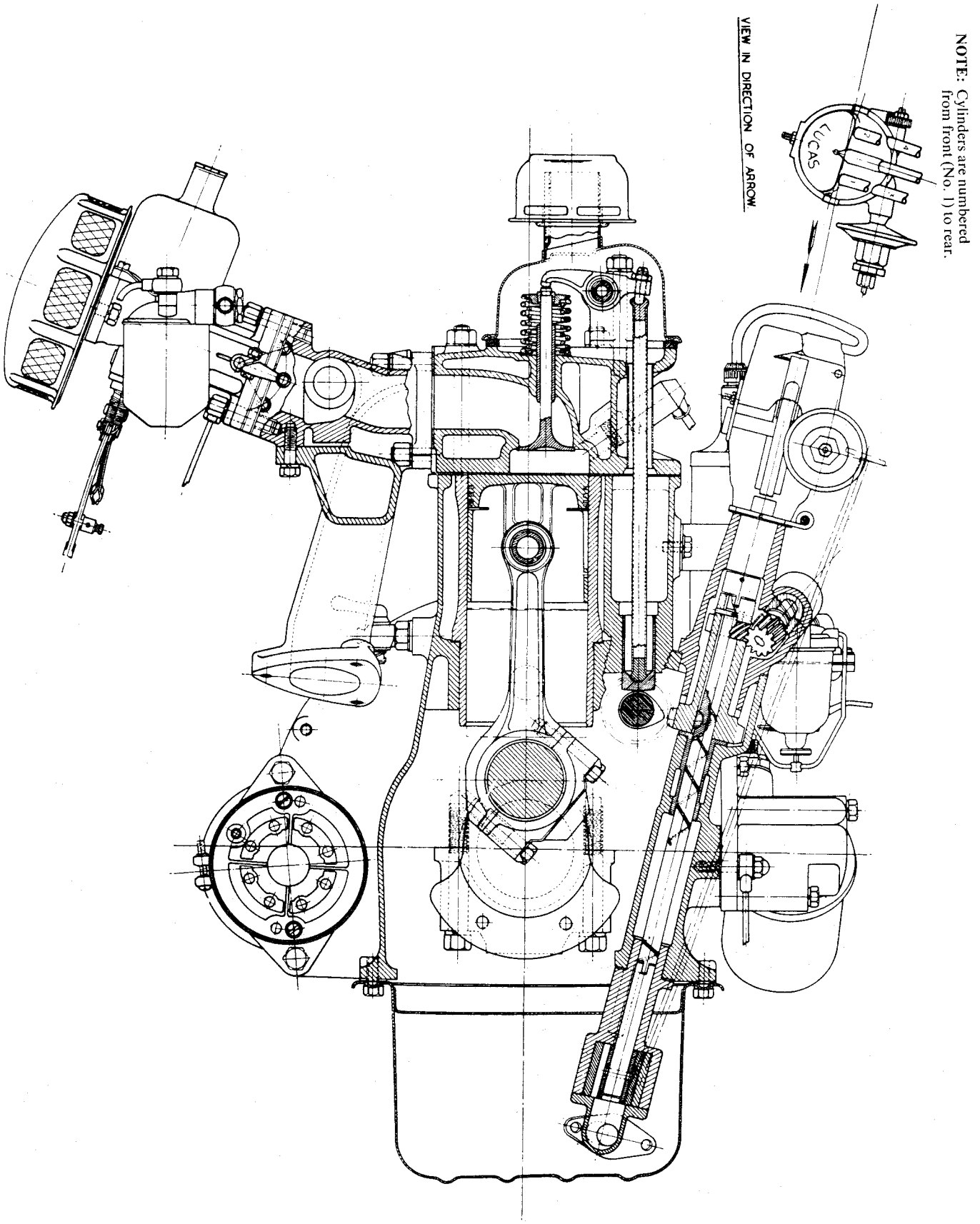

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Fig. 2 **Cross section view of Engine. For illustration purposes the sump oil filter has been omitted.**

ENGINE

1. GENERAL DESCRIPTION (Figs. 1 and 2)

(a) **The Engine** has four cylinders and the overhead valves are push rod operated, the 83 mm. bore and 92 mm. stroke give a capacity of 1,991 cubic centimetres. The compression is 8.5 to 1.

A low compression kit (see page 27) is available and reduces the compression ratio to 7.5 to 1.

(b) **The Cylinder Block** is an integral casting in cast iron, the abutments for the cylinder sleeves, the three rear camshaft bearings and the crankshaft bearing housings are machined in a single unit. The main bearing housings are line bore machined; the bearing caps are not interchangeable and are stamped together with the casting to assist identification.

After Engine No. 9095E four Vandervel bi-metal bearings were fitted to accommodate the camshaft. A recognition feature of engines so fitted with these bearings will be that three setscrews retaining the three rearmost bearings will clearly be seen on the left-hand side of the cylinder block. See TR3 Supplement Engine Section "B".

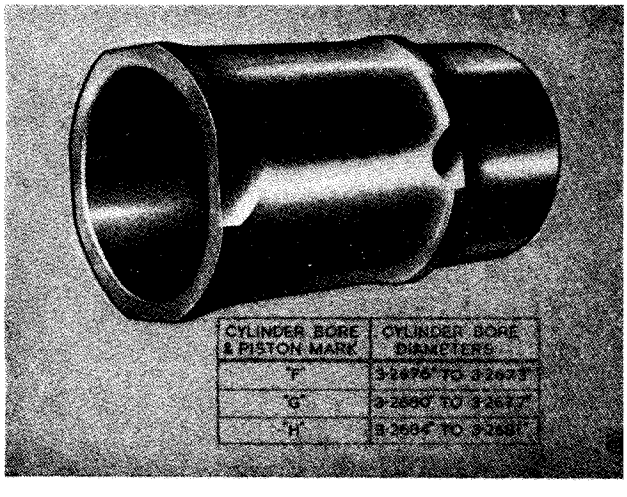

Fig. 3 **Cylinder Sleeves and Dimensions.**

(c) **The Cylinder Sleeves** (Fig. 3) are of the wet type, being centrifugally cast in nickel chrome iron and provided with flanged upper faces, having two pairs of flats at 90° to one another. These two pairs of flats provide alternative fitting positions to deal with piston slap which normally occurs due to wear along the axis of thrust.

The sleeves are machined all over and ground on their upper faces. The lower portion of each liner is provided externally with a reduced diameter, surmounted by a flanged face for spigoting into machined recesses in the cylinder block and a water seal provided by a plastic covered steel joint.

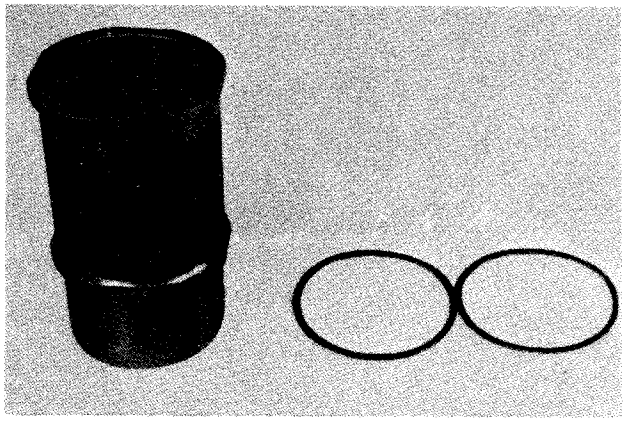

Fig. 4 **A Figure of Eight Joint.**

The Figure of Eight joint (Fig. 4) is made of steel and is plastic coated to provide the necessary sealing properties. Care must be exercised when handling or storing these joints and they should always be examined for chipping or peeling of the plastic coat before use.

If doubt exists as to the condition of the plastic coat the joint should be discarded. Only in the cases of extreme emergency should they be used and then with a liberal application of a sealing compound.

The sleeves are spigot mounted and held in position by the combustion head, the initial position of the sleeve allowing this to stand proud of the cylinder block .003″ minimum to .0055″ maximum (Fig. 5). The bores are graded F, G or H, and the appropriate symbol is engraved on the upper face of each sleeve. (See page 2.)

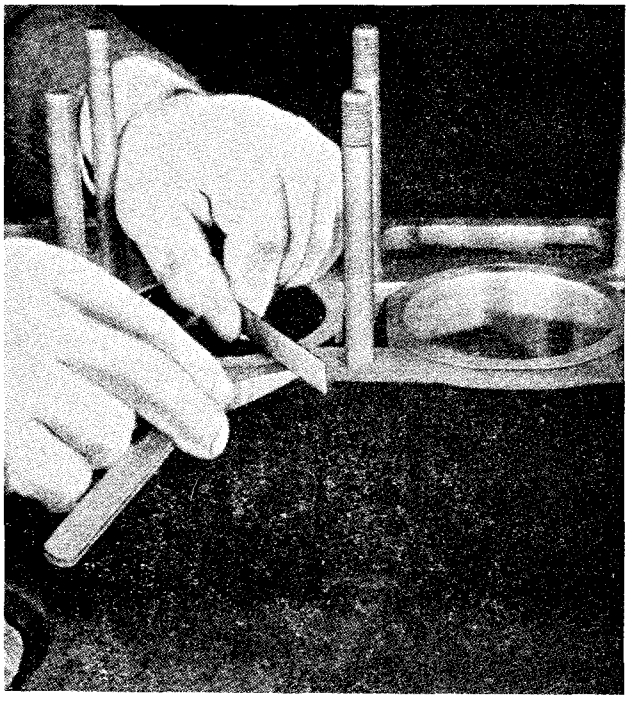

Fig. 5 **Checking Cylinder Sleeve projection above Cylinder Block.**

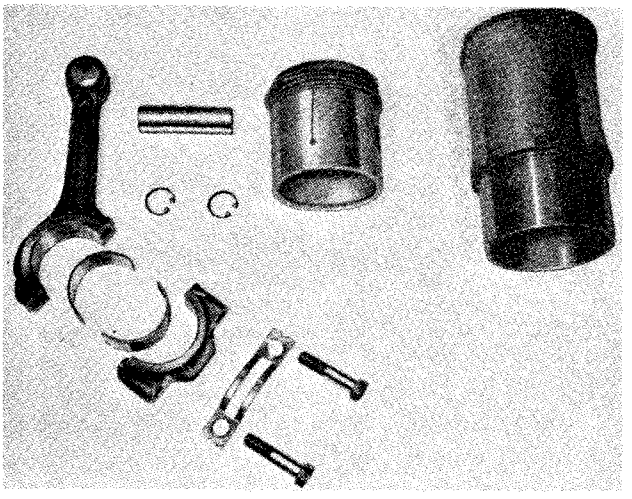

Fig. 6 **The Piston and Connecting Rod Assembly in exploded form.**

(d) **The Connecting Rods** (Fig. 6) are molybdenum manganese steel stampings being provided with phosphor bronze small end bushes and precision type big end bearings. The rod is drilled from the big end bearing end to the small end bearing to provide for the passage of oil under pressure from the main supply. The big end bearing cap is of a special design, the cap securing bolts being inclined at an angle to the centre line of the connecting rod. The caps are dowelled to the connecting rods and located by these dowels. This form of cap provides a more convenient position for tightening and loosening bolts, and also has the added virtue of allowing the bearing caps to be removed progressively from below without the danger of their dropping into the repair pit immediately the bolts have been withdrawn. This connecting rod design permits the piston and connecting rod assembly to pass upward through the sleeve bores and also has an important advantage in reducing the stresses in the connecting rod bolts. The bolts themselves are secured by a locking plate made from 20-gauge material.

With the bearing cap removed, it is possible to examine and replace the bearings without removing the piston assembly from the engine.

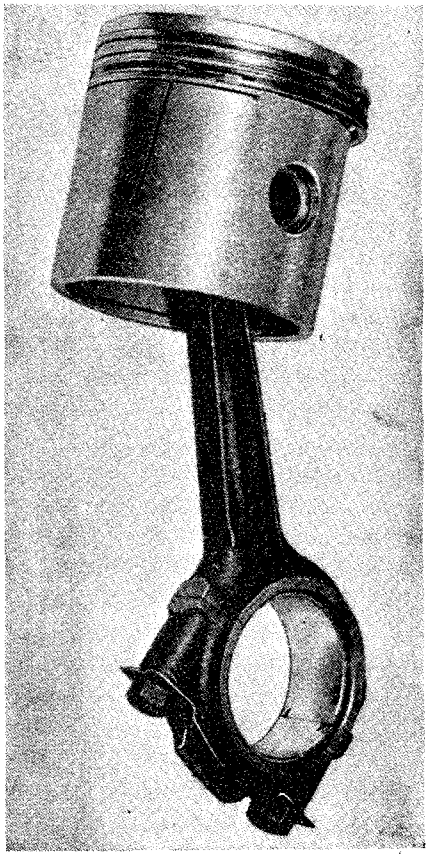

Fig. 7 **The Piston and Connecting Rod Assembly. Note position of cap in relation to split in piston skirt.**

(e) **Aeroflex Compensating Pistons** (Fig 6) are employed, which are made from a special aluminium alloy and each provided with two compression rings and one oil scraper ring.
The pistons are graded F, G or H (dimensions on page 2) and this symbol is stamped on the crowns. The piston skirt has a $\frac{1}{32}$" slot on the non-pressure side and is fitted to the connecting rod so that this slot is away from the point of maximum thrust, Fig. 7 (facing the camshaft side of the engine).

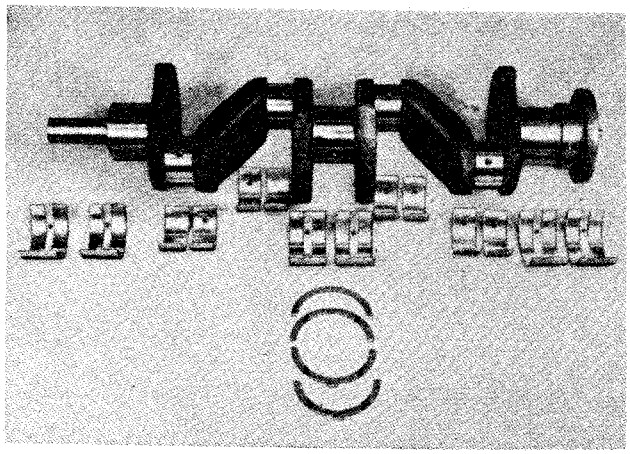

Fig. 8 Crankshaft, Bearings and Thrust Washers.

(f) **The Crankshaft** (Fig. 8) is forged from molybdenum manganese steel, being provided with balance weights which are an integral part of the crankshaft throws, adjacent to the three main bearings.
This shaft is accommodated in three precision type white metal steel back bearings, which are housed in the cylinder block, being secured in position by bearing caps and two bolts and spring washers per journal. Crankshaft thrust is taken by steel white metal covered washers which are fitted in two halves on either side of the centre main bearing housing, being located circumferentially by means of projections on the lower half of each pair of washers.
In the case of extreme necessity and knowing that the crankshaft is in good condition, it is possible to change the main bearings without first removing the engine from the chassis. It is essential however that extreme care be taken when replacing the front and rear oil seals. This operation is described on page 32 and 33.

(g) **The Valves** are overhead, push rod operated. The push rods themselves are tubular being fitted with a ball at one end and a cup at the other, both being spot welded into position.
All valves are made from a chrome nickel silicon valve steel stamping, the inlet valve having a larger head and a smaller stem than the exhaust valve. The stems have a hardened tip. The exhaust valves fitted to engines after Engine No. TS. 481 E were made from a high nickel chromium tungsten valve steel stamping, and the stem was stellite tipped.

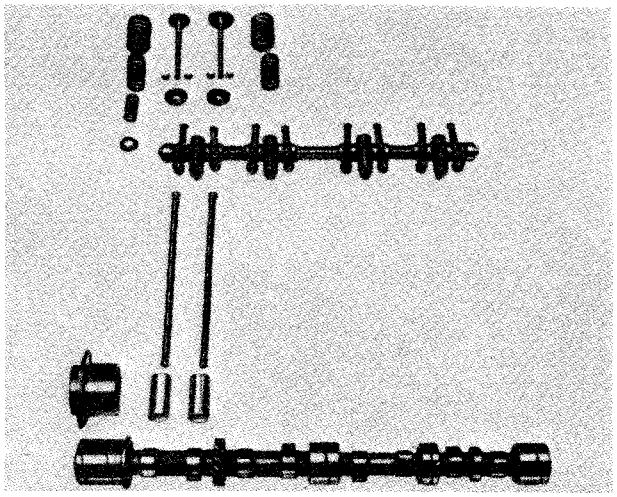

Fig. 9 Exploded view of Valve Operating Gear.

Inlet valves are provided with two springs. Three springs are used on the exhaust valves only (Fig. 9). Valve springs are located by a valve collar and held in position by split taper collars. The close coil of the valve springs must always be fitted to the cylinder head.

(h) **The Camshaft** (Fig 9) is of special iron alloy having chilled cam faces and is provided with four journals. The front journal is accommodated in a flanged cast iron bearing, whilst the other journals are mounted direct in the cylinder block.
In the near future it is proposed to fit four Vandervel bi-metal bearings to accommodate the camshaft. A recognition feature of engines so fitted with

these bearings will be that three set-screws retaining the three rearmost bearings will clearly be seen on the left-hand side of the cylinder block. The front bearing is pressed into the front bearing sleeve.

The camshaft operates directly on flat based hollow cylindrical chilled cast iron tappets which in turn engage hardened spherical-ended push rods, the upper extremities of which are hardened and cup-shaped, accommodating hardened ball ended screws, which are mounted on the outer ends of the respective rockers. Camshaft end thrust is taken by the flanged front bearing, against the timing wheel and a shoulder on the shaft itself. End float is measured by a feeler gauge between the camshaft chain wheel and the front bearing housing or by a dial indicator. To reduce the end float a replacement bearing of increased length must be fitted. To increase the end float it will be necessary to rub the bearing down on a sheet of emery cloth placed on a surface plate to reduce its length.

The rockers are of case hardened steel and provided with phosphor bronze bushes which are lubricated under pressure from the main oil supply. The eight rockers themselves are carried on a hollow rocker shaft which is in turn mounted on four pedestal brackets, the oil being fed along the rocker shaft to the various rockers.

(i) **The Cooling System.** (see Section "C") is thermostatically controlled and pressurised; an impeller pump is utilised to assist the circulation of the cooling fluid.

A four-bladed $12\frac{1}{2}$" fan is mounted on rubber bushes and is attached to the crankshaft. The fan pulley is drilled in its outer periphery and aligning this hole with a pointer welded to the timing chain cover sets Nos. 1 and 4 pistons at T.D.C. (see Fig. 37).

The radiator is attached to the body at the upper corners and secured to the chassis at its sides.

(j) **The Fuel System** (see Section "P") incorporates a petrol shut off cock in the pipe line from the tank to the pump, this is situated on the left-hand chassis member adjacent to the engine. Petrol is supplied by an A.C. Type UE Pump to the twin S.U. Type H4 carburettors. Each carburettor has its individual A.C. air cleaner. The vacuum pipe to the distributor is taken from the front carburettor.

(k) **The Hobourn-Eaton Double Rotor Oil Pump** (Fig. 14) is of the submerged type and is self priming; oil is drawn from the engine sump through a gauze filter. The oil is fed to the oil gallery and to the Purolator oil filter.

(l) **Coil Ignition** is employed and the distributor (Lucas DM.2 Type V.167) has a vacuum and centrifugal automatic advance incorporated. It is suppressed for radio and television.

(m) **The Engine Mountings** are of the flexible type, the front bearer being assembled on the rubber blocks on either side of the chassis frame, the gearbox itself being supported on a rubber pad secured to a cross member of the chassis frame.

(n) **The Flywheel** is manufactured from cast iron and is fitted with a shrunken starter ring of heat treated steel. It is located on the crankshaft by a dowel and secured by four bolts with lock plates. The flywheel is marked by an arrow which, when aligned with a scribe line on the cylinder block, sets Nos. 1 and 4 pistons at T.D.C.

When fitting the flywheel to the crankshaft ensure that both components are free from burrs. After fitting, the run-out should be checked by a D.T.I. to ensure the run-out does not exceed .003". Failure to observe this point may lead to clutch disorders and vibration.

There are two dowel holes in the flywheel 90° removed from one another; this will enable the flywheel to be turned 90° should the teeth of the starter ring gear become increasingly worn and a replacement not be readily available. It must be remembered that the timing mark must be obliterated and a second stamped on the flywheel.

(o) **To Fit Replacement Starter Ring Gear.** When it is necessary to fit a replacement ring gear, certain precautions should be taken to ensure its future life. The installation can be

carried out whilst the flywheel is still cold. The ring should be immersed in boiling water or its temperature raised by some other means; a temperature higher than boiling water is not recommended for the heat properties of the ring may be destroyed. The ring must be fitted with the leading edges of the teeth toward the starter motor. Should a press not be available, fitting of the ring gear can be carried out using four "G" clamps and tapping the ring into position with a brass rod (Fig. 10).

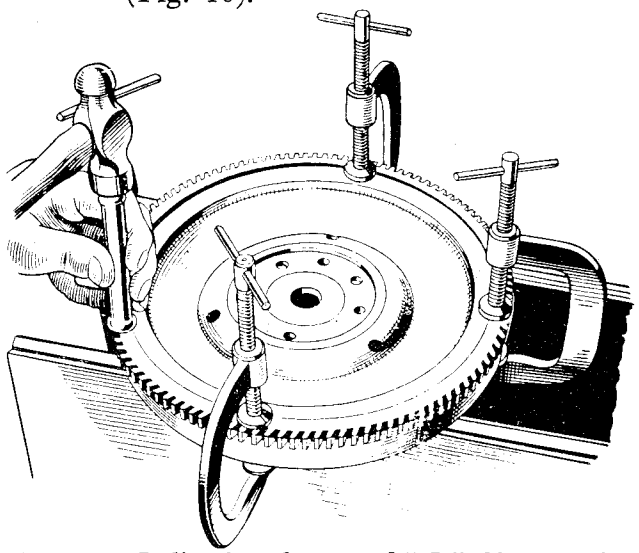

Fig. 10 **Indicating the use of " G " Clamps when fitting a Replacement Starter Ring.**

(p) **Crankcase Ventilation** (Fig. 11) is effected by permitting air to be drawn out of the engine. To enable this ejection a large bore pipe in the form of an inverted "U" is fitted into the left-hand side of the cylinder block by means of an adapter welded to its end. The exposed end is cut away at an angle to provide a wider opening facing away from the slipstream.
The passage of air (the slipstream) created by the cooling fan or the movement of the car causes a depression at the angle opening of the inverted "U" pipe and air is drawn out of the cylinder block.
Fresh air is taken in through the rocker cover oil filler cap, circulating round the valve springs and rockers before passing down the push rod tubes into the cylinder block to replace air which is being drawn out. It is essential therefore that the filler cap is kept as clean as possible to allow free passage of air. This cap, which has a gauze

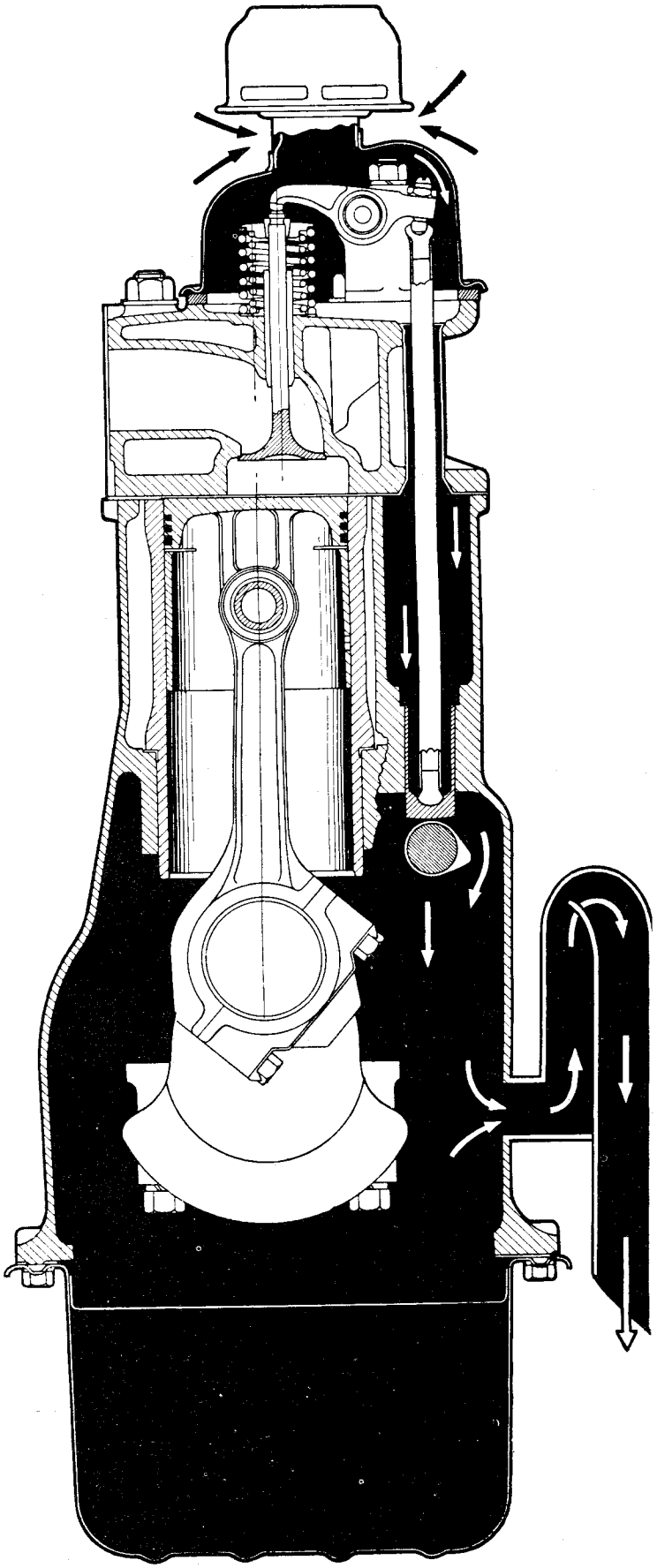

Fig. 11 **A diagrammatic view of Crankcase Ventilation.**

filter incorporated in it, should be washed in petrol and drained on each occasion when the engine oil is changed.

2. ENGINE LUBRICATION
(Figs. 12 and 13)

Description

Lubrication of the engine is by a Hobourn-Eaton pump. The pump is driven by a shaft which is mounted in a bush pressed into the cylinder block, and is provided with a helical gear which engages with a similar gear on the camshaft.

Oil is drawn into the pump through a primary gauze filter and passes through a channel in the pump casting to an annular space around the oil pump shaft. The annular space round the drive shaft is closed by the bush, and the oil thus forced through a hole in the cylinder block into the head of the external oil filter where some of this oil passes directly into the oil gallery which extends the length of the cylinder block; the remainder of the oil passes into the bowl of the oil filter under the pressure of the oil pump. When the oil pressure exceeds 70 to 80 lbs. per sq. inch it opens a spring loaded ball valve and passes into the sump. The oil on its way to the base of the filter is forced through the filtering media and passes up an annular space around the bowl holding bolt through a restrictor into the sump.

The oil passes from the gallery to the three main bearings, through drillings in the crankshaft to the big end bearing; then through further drillings in the connecting rods to the small end bushes and gudgeon pins. Splash lubrication is further assisted by a drilling into the oil passage between the small end and big end just below the piston skirt on each connecting rod.

By drillings from the channels leading to the main bearing oil is conveyed to the front, second and rear camshaft bearings. In the case of the third camshaft bearing this is fed direct from the oil gallery through a metering hole. A by-pass from the rear camshaft bearing conveys oil upwards through a drilling in the combustion head and rearmost rocker pedestal to the rocker shaft. Oil passes along the hollow shaft and through radial holes to the rockers, leaving each rocker by a hole drilled vertically to each tappet ball pin.

The oil is prevented from escaping by the rocker cover and after lubricating the valve springs and ball pins, returns downwards through the push rod tubes lubricating the push rod tappets before entering the sump.

Oil from the front camshaft bearing lubricates the timing chain where four slots cut at 90° to each other on the face of the flange adjacent to the camshaft timing wheel allow oil to escape on to the timing wheel. The oil is thrown out by centrifugal force on to the underside of the flanged portion of the wheel on which the teeth are cut.

Six holes are drilled obliquely, alternatey, from the back and the front of the wheell at equal intervals from the underside of the flange into the space between the two toothed rings. These holes allow the oil to be thrown on to the underside of the timing chain, ensuring its lubrication.

B

3. OIL PUMP

The oil pump is of the double rotor type as shown in Fig. 14.

The smaller centre rotor is driven by a short shaft on which it is pressed and pegged in position. The two rotors are contained in a housing at the base of the oil pump casting, which is provided with a cover plate having a ground face, allowing only sufficient clearance on the two rotors to provide for lubrication. The centres of the rotors are offset.

The rotor shaft has at its upper extremity a recess which engages a tongue on the lower end of the drive shaft. The driving shaft is mounted in a phosphor bronze bush which is pressed into the cylinder block, and at its upper end a helical gear is secured by means of a Woodruffe key. The helical gear on this shaft engages with a similar gear which is an integral part of the camshaft.

The centre rotor, by its engagement with the outer rotor, drives the latter at a slightly lower speed owing to the difference in sizes.

Owing to the relative movement of the outer rotor around the inner rotor; and the close fit of the cover plate, oil is forced round between the lobes of the rotor and forced out of a hole in the top of the rotor casing and upward through a drilled passage to the annular space around the

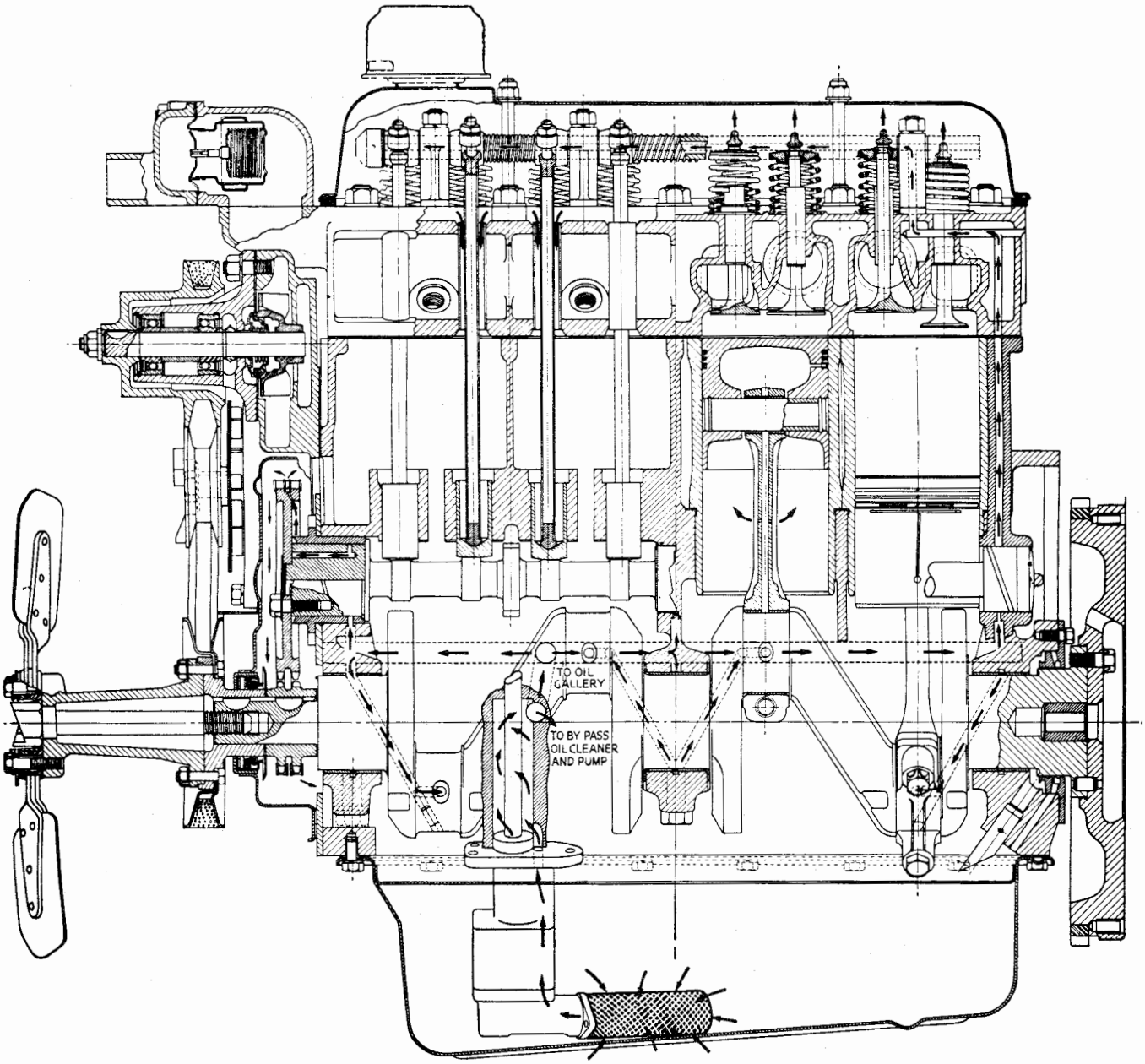

Fig. 12 **Longitudinal view of Oil Circulation.**

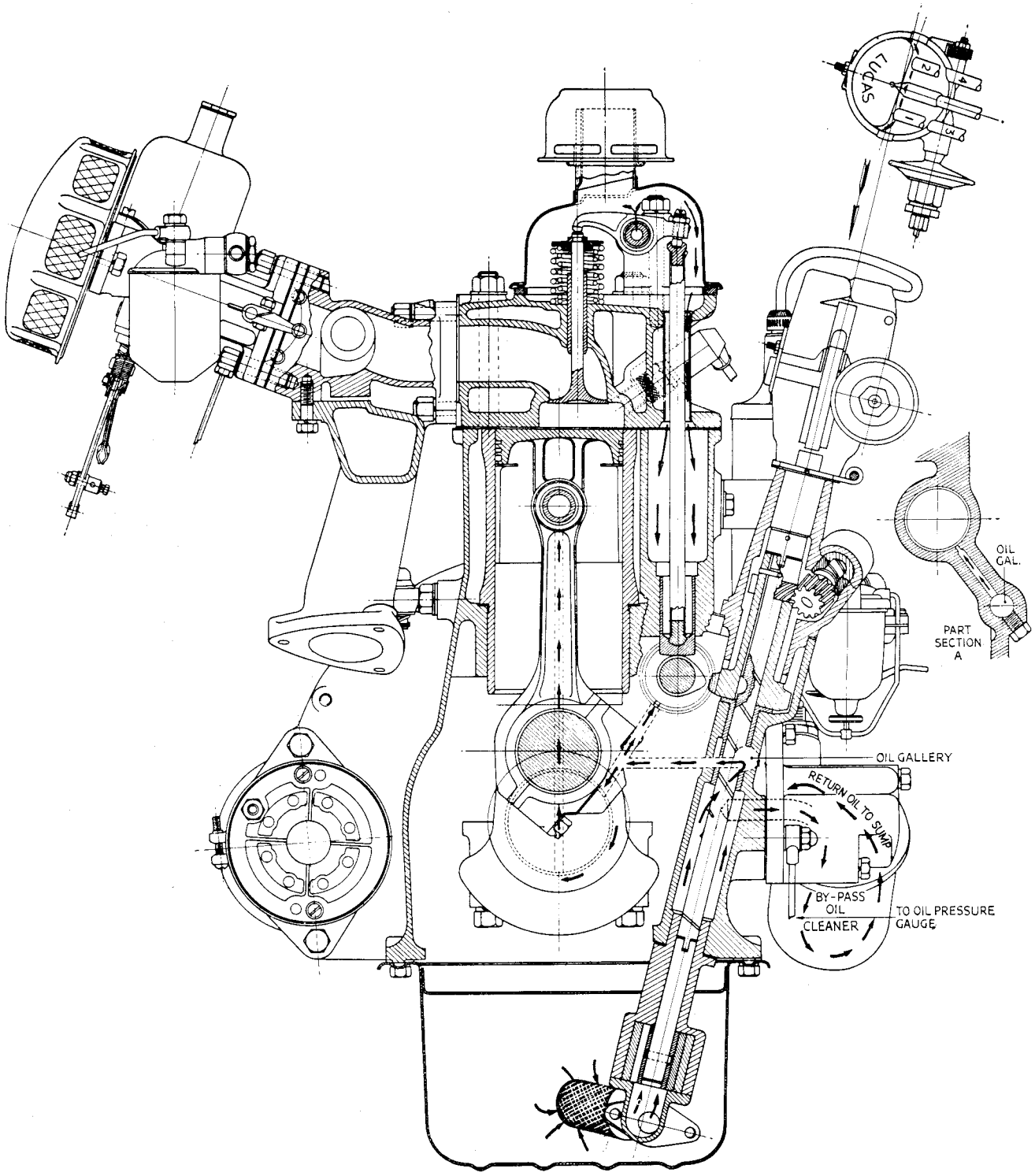

Fig. 13 **Cross section view of Oil Circulation.**

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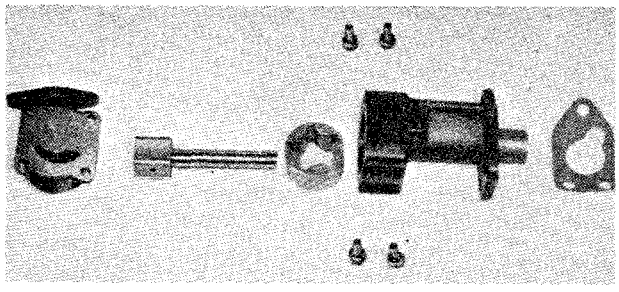

Fig. 14 **Exploded view of Oil Pump.**

distributor drive shaft. From this annular space oil is circulated round the engine as described in "Engine Lubrication."

(a) To Remove Oil Pump from the Engine

(i) Drain the oil from the sump (preferably when the engine is warm) and jack up the car.

(ii) Remove the sump securing bolts and, lowering it at the front, first manoeuvre the sump and tray past the oil pump gauze filter.

(iii) Remove the three pump securing bolts and remove the pump and filter as a unit.

(b) To Dismantle Oil Pump

Remove the two bolts securing the primary filter to the flange on the oil pump elbow. Take note of the position of the filter in relation to the elbow for re-assembly, *i.e.*, the tube projecting inwards should be as near as possible to the bottom of the sump, thus ensuring there is a clearance between the filter and the sump bottom.

To complete the dismantling it is now only necessary to remove the four setscrews. The inner rotor and shaft and the outer rotor can now be removed and the dismantling is complete.

(c) Servicing Oil Pump

As this pump provides a generous surplus of oil to that which is necessary for the engine lubrication, and owing to the design of the unit, very little wear is likely to occur in service, and little maintenance should be necessary to the unit during the life of the engine.

In actual practice, excepting the remote possibility of failures due to defective materials, no adjustments are likely to be required until approximately 200,000 miles have been covered, and then it is only likely to be limited to the elimination of end float in the rotors, and can be satisfactorily dealt with by lapping the joint faces of the pump body and cover. The clearance new between the rotors and cover plate should be from .0005"—.0025" and where a serious drop in oil delivery from the pump is associated with development of excessive end float, steps should be taken to lap the cover plate and body.

(d) Engagement of Oil Pump (Fig. 15) and Distributor Driving Gear

This drive is taken from the helical gear on the camshaft through a similar gear unit mounted on the oil pump driving shaft.

The shaft has a tongue at the lowermost end which engages the oil pump mounted in the sump.

The helical gear unit is secured to the shaft by a Woodruffe key. The upper gear of this unit drives the tachometer and the boss-like extension is fitted with a mills pin to prevent the gear and shaft from rising. The head has an offset recess into which the distributor shaft will seat.

When correctly engaged the slot in the distributor driving boss, with No. 1 cylinder at T.D.C. on the compression stroke, should assume a position approximately "five minutes to five" with the offset towards the rear of the engine (Fig. 16). In this position the slot will point directly towards the exhaust valve rod sealing tube for No. 1 cylinder, the distributor rotor will face No. 1 sparking plug, and the keyway in the helical gear will be aligned with the oil dipstick when fitted.

See also "13 Ignition and Distributor Timing." Page 24.

4. CRANKSHAFT AND MAIN BEARINGS (Fig. 8)

The crankshaft is of molybdenum manganese forging with ground journals and crankpins.