MOTOR REPAIR

1964—1966 Models

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TRIUMPH TR4

INDEX TO REPAIR OPERATIONS

BODYWORK

To remove complete unit, remove battery, drain cooling, fuel and hydraulic systems. Remove bonnet, front bumpers and bumper support brackets, rear bumpers and bumper support brackets, spare wheel and tool kit. Disconnect oil pressure pipe from engine, revolution counter from base of distributor, clutch fluid pipe at flexible pipe, brake fluid pipe from top of three-way connector, heater water hoses, heater control cable, choke and accelerator control, cables from distributor, generator, starter motor and stop lamp, and fuel pipe at tank union.

Remove screws securing starter solenoid and move solenoid clear of engine, water control valve, water pipe from left-hand side of engine, upper pinch bolt from lower steering coupling. Slacken impact coupling and push the steering shaft upwards clear of lower coupling.

Remove carburetters, both seats, knob and grommet from change speed lever, grommet from base of handbrake lever and four bolts securing facia support bracket to floor.

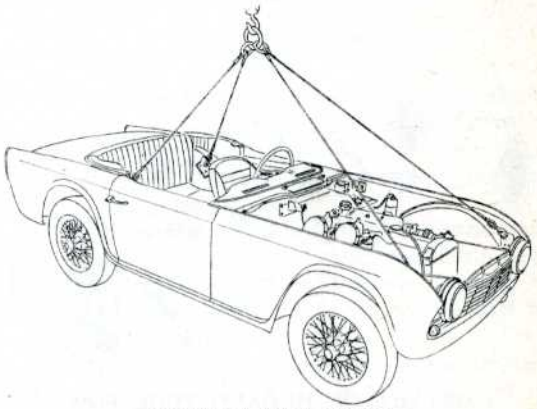
Remove 27 body mounting bolts from the following locations: Front of car: Two on front cross-member, one in each down member. Inside car: Four groups of four bolts, forward and rearward of door apertures, two each side transmission tunnel in line with front end of gearbox, two each side of rear edge of seat runner. Rear of car: One at each side of rear end frame, one bolt through centre of spare wheel panel.

The method of lifting the body from the chassis will be determined by the equipment available to the repairer. In the example illustrated, four plates are made from 10SWG mild steel.

One plate is secured to each rear wheel arch utilising the safety harness anchorage screws, the remaining plates being secured to the front wing valance utilising the bonnet to valance hinge-securing bolts. To refit: Secure body mounting pads in position using Bostik 1261 or similar compound. Using two ¼ in. diameter rods, line up the holes in the body with those in the chassis as the body is lowered into position. Apply sealing compound between washers and main floor panel before fitting body mounting bolts inside the car. Reassemble by reversing the removal procedure and bleed the brake and clutch hydraulic systems.

REMOVING WINDSCREEN.—Pull off the draught welting from the screen pillars. Remove three bolts (22) with cover plates (21), one nut (24) with washer (25) from the bottom of each screen pillar (11). These nuts are accessible under the facia. Slacken bolts (16) and (17) which are accessible when the door is opened. Lift out the windscreen assembly (11). Remove the rubber weatherstrip (23) from the back of the windscreen assembly.

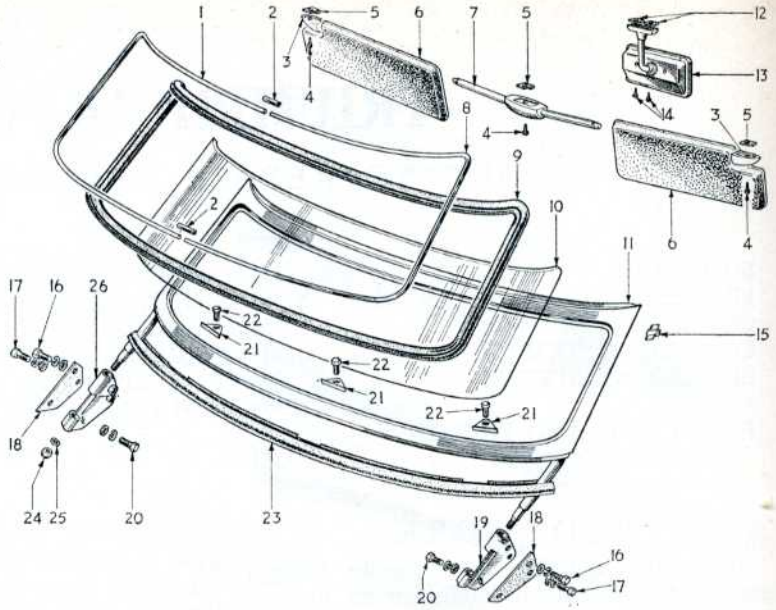
To refit, remove old sealing compound from the contacting surfaces of the windscreen weatherstrip and the scuttle panel. Apply a fresh piece of sealing strip along the underside of the rubber and refit the windscreen assembly. There is provision



LIFTING THE BODY

EXPLODED VIEW OF WINDSCREEN

1. Moulding
2. Cover plate
3. Mounting
4. Screw
5. Spire fix
6. Visor
7. Mounting
8. Moulding
9. Rubber weatherstrip
10. Windscreen glass
11. Frame
12. Packing piece
13. Mirror
14. Screws
15. Bracket
16. Bolt
17. Bolt
18. Packing piece
19. Mounting bracket
20. Bolt
21. Cover plate
22. Bolt
23. Seal
24. Nut
25. Washer
26. Mounting bracket



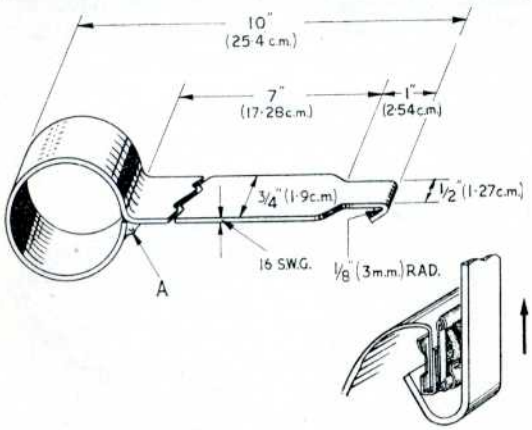
for limited adjustment between the windscreen frame and door glass.

If adjustment is required, slacken the bolts (16), (17) and (20) on both sides of the car, raise both door glasses, and move the top of the windscreen to provide a uniform clearance between the glass and the windscreen. Retighten the bolts.

Seal the windscreen frame to the rubber with sealing compound.

REMOVING DOOR GLASS.—Remove trim panel, loosely refit handle and lower the glass. Remove the inner weatherstrip by pushing its lower edge upwards from inside the door using a screwdriver. This weatherstrip is retained in position by seven small spring clips.

Partially raise the glass and remove two clips and leather washer and disconnect the regulator arms from the channel. Lift the glass out of the door, taking care not to damage the water deflector panel which is attached to the glass by the channel.



DETAILS OF HOOKED TOOL FOR FITTING SPRING CLIPS

To refit, fold the deflector flat against the inner side of the glass and place the glass into the door. Reconnect the regulator and lower the glass. Reposition the deflector panel. Using the hooked tool, hold the spring clips in position and push the inner weatherstrip back into place. The hooked tool may be used to fit any clip which may require renewing. Refit the trim panel.

BRAKES

The Girling hydraulic braking system is used, with front callipers and discs and rear drums ($9 \times 1\frac{3}{4}$ in. leading and trailing shoes). The self-adjusting front brakes have Girling 11 in. discs with cast iron double-acting calliper units, each containing two quickly detachable friction pads.

REPLACING PADS.—Jack up the car and remove front wheels. Release two spring retainers and remove the pad retainer pins. Lift the friction pads and the anti-squeal plates from the calliper and renew them if worn. Do not attempt to reline worn pad assemblies.

Before fitting new pads, push pistons back to the full extent of their travel. Refit the pads and anti-squeal plates, positioning the arrow in the direction of wheel rotation. Insert the retainer pins and secure them with the spring retainer clips.

Calliper cylinder maintenance.—To replace piston sealing rings or dust excluders, dismantle as follows: Release the rigid pipe and locknut at the support bracket, unscrew the flexible hose from the calliper. Remove two bolts securing the calliper to its support bracket. Remove the calliper and withdraw the pistons from the body.

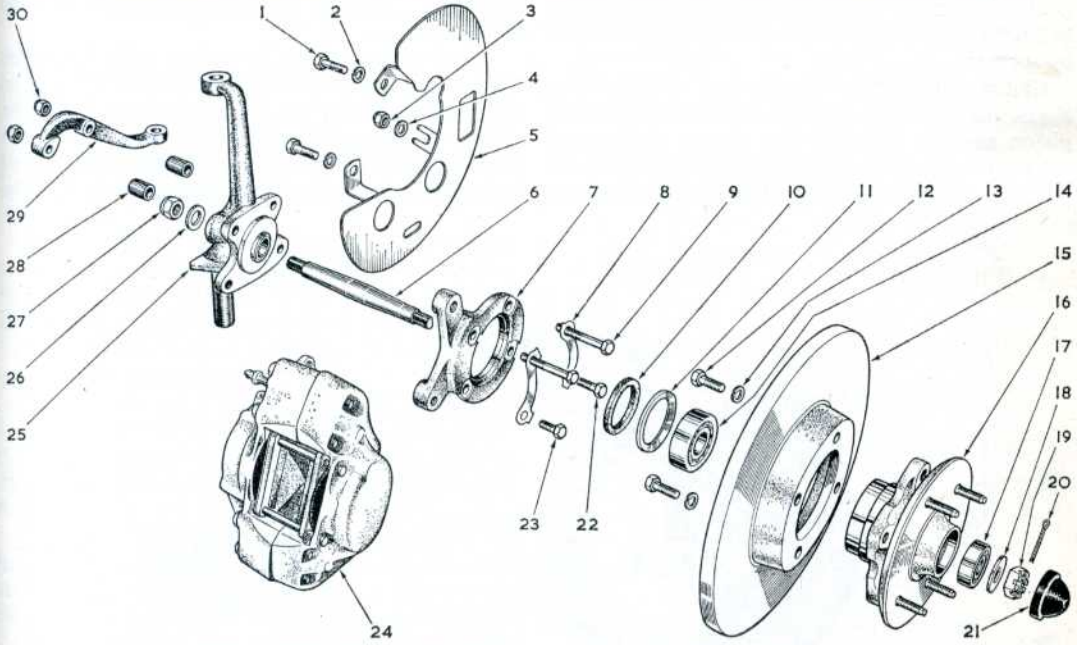
Carefully remove the rubber sealing ring from its recess. Clean the piston, cylinder and rubbers with clean brake fluid. Examine all components for serviceability and renew where necessary.

Reassembly.—Lubricate the surfaces of the bore and piston with clean brake fluid. Fit a new piston seal into the recess in the cylinder. Locate the projecting lip of the rubber dust excluder in its recess in the cylinder. Insert the piston, closed-end leading, into the cylinder, taking care not to damage the polished surface. Push piston fully home and engage the outer lip of the dust excluder with the recess in the piston. Replace the friction pads. Assemble the calliper over the disc, and refit shims between calliper and mounting bracket. Refit the flexible brake hose and bleed the system.

the toe of the leading shoe is adjacent to the wheel cylinder piston, and its heel is located in a slot in the abutment. The heel of the opposite shoe locates in a slot at the closed end of the wheel cylinder body.

Lightly smear a thin film of white (zinc base) grease over the six shoe-contact pads and over the area on which the wheel cylinder and spring plate slide. Do not contaminate the shoe linings with grease or oil.

Assemble the brake shoes, pull-off springs and shoe anchor-pins to the left hand brake assembly. The right hand side assembly is symmetrically opposite. Refit the brake drum; turn the adjuster fully 'in' and turn it back one notch to free the drum. Refit the road wheel and lower the jack.



EXPLODED VIEW OF DISC BRAKE AND HUB ASSEMBLY

1. Bolt
2. Spring washer
3. Nyloc nut
4. Plain washer
5. Dust shield
6. Stub axle
7. Calliper bracket
8. Tab plate
9. Bolt
10. Felt seal
11. Seal retainer
12. Bolt
13. Spring washer
14. Inner tape race
15. Disc
16. Hub
17. Outer tape race
18. Washer
19. Slotted nut
20. Split pin
21. Hub cap
22. Bolt
23. Bolt
24. Calliper unit
25. Vertical link
26. Plain washer
27. Nyloc nut
28. Distance pieces
29. Steering arm
30. Nyloc nut

DISCS.—Maximum permissible run-out on the friction faces of the discs is ·002 in. (0·0508 mm.). The discs may be machined to a thickness of ·440 in. (11·18 mm.) to rectify excessive run-out or scored faces. Maximum permissible finish of the disc machining is 15–30 micro inches measured circumferentially, 50 micro inches measured radially.

BRAKE SHOES.—The rear brake-shoe linings are shorter in length than the platforms to which they are attached. The end of the shoe having the greater length of platform exposed is the 'toe', whilst the other end is the 'heel'. When installed,

To renew piston seal.—Remove the brake shoes, drain the hydraulic system, uncouple the brake pipe and disconnect the cable from the wheel cylinder lever. Remove the dust cover, abutment plate and spring plates.

Withdraw the wheel cylinder and handbrake lever from the backplate. Extract the piston from the wheel cylinder body and renew if scored or damaged. Reassemble the brake components by reversing the removal procedure.

BRAKE ADJUSTMENT.—Front brakes are self-adjusting. Each rear brake is provided with an adjuster protruding from the backplate.

The procedure for adjusting is as follows: Jack up the rear of the vehicle. Screw in each adjuster until solid resistance is felt, then slacken back one notch, which should allow the drum to rotate freely. If excessive binding is felt, slacken the adjuster a further notch. Do not confuse binding with the normal drag caused by hub grease and the oil in the differential unit, particularly when cold.

BRAKE TYPES.—Girling hydraulic. Front—calliper disc. Rear—drum (leading and trailing shoes). Adjustment: Rear brakes only (one adjuster each wheel). Dimensions: Rear shoes—9 × 1¾ in.

CLUTCH

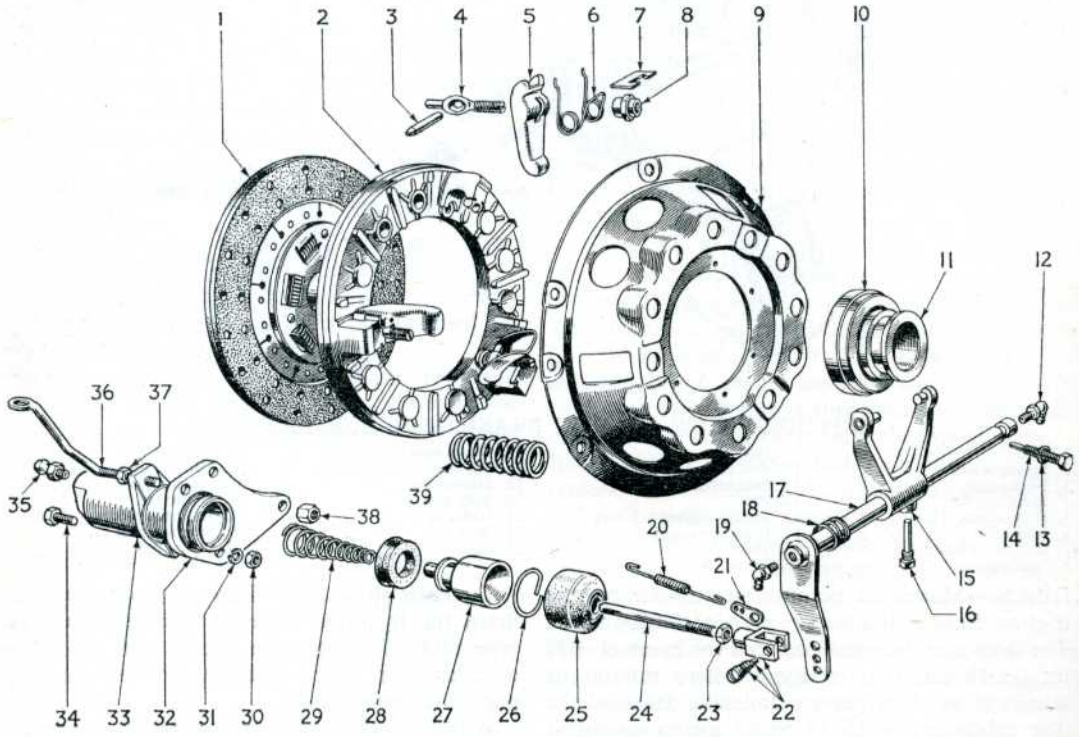
This is of the single dry-plate type, hydraulic, with adjustment by slave cylinder pushrod, the Belleville-washer type driven plate being cushioned by springs.

Clutch adjustment.—Check, and if necessary, adjust the clearance between the clutch operating piston and the pushrod. The correct clearance is 0·1 in. To adjust: Slacken the nut and unscrew the pushrod until all clearance between the pushrod and the cupped end of the operating piston (inside slave cylinder) is taken up. Adjust the position of the locknut until a feeler gauge of 0·1 in. thickness may be inserted between the locknut face and the clevis form. Without disturbing the locknut on the pushrod, screw the pushrod into the clevis until the nut contacts the clevis face, then lock up the nut.

Clutch Removal.—Remove the gearbox and progressively unscrew the clutch attachment setscrews. Lift the cover assembly and driven plate from the flywheel face.

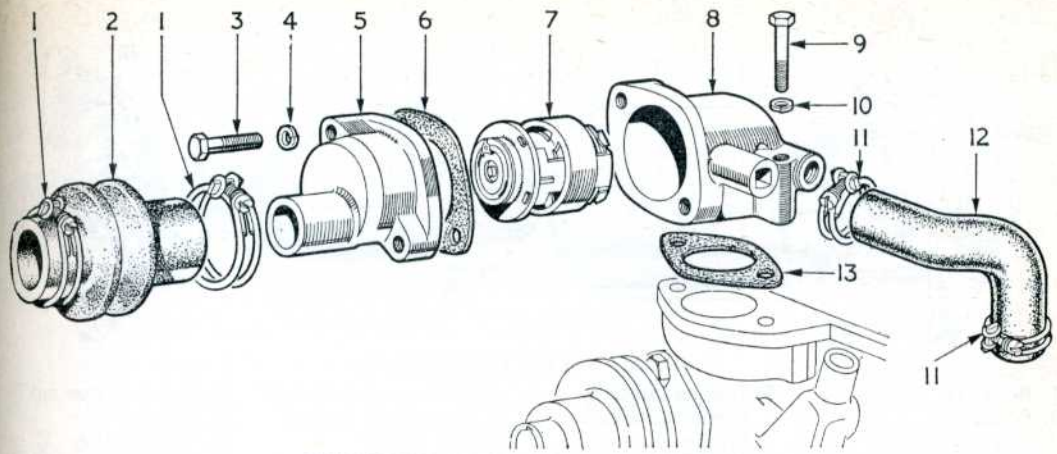
Dismantling. A Churchill clutch fixture, No. 99A, is recommended for dismantling and reassembling the clutch unit. Before dismantling, mark the following parts to facilitate reassembly and maintain the original degree of balance: 1. Cover pressing. 2. Lugs on the pressure plate. 3. Release levers.

Clean the top of the base plate and place three (No. 3) spacers on the appropriate positions. Place the cover assembly on the base plate so that the release levers are directly above the spacers, and the bolt holes of the cover are in line with tapped holes in the base plate. Screw the actuator into the



CLUTCH AND SLAVE CYLINDER DETAILS

1. Driven plate assembly
2. Pressure plate
3. Release lever pin
4. Eyebolt
5. Release lever
6. Anti-rattle spring
7. Strut
8. Adjusting nut
9. Clutch cover
10. Release bearing
11. Bearing sleeve
12. Grease nipple
13. Washer
14. Shaft locating bolt
15. Clutch operating fork
16. Screwed taper pin
17. Clutch operating fork
18. Fork return spring
19. Grease nipple
20. Pushrod return spring
21. Spring anchor plate
22. Clevis fork, spring and pin
23. Locknut
24. Pushrod
25. Rubber end cover
26. Circlip
27. Piston
28. Piston seal
29. Piston return spring
30. Nut
31. Spring washer
32. Slave cylinder bracket
33. Slave cylinder
34. Bolt
35. Bleed nipple
36. Stay
37. Nut
38. Nut
39. Clutch thrust spring



EXPLODED VIEW OF THERMOSTAT

1. Clips
2. Top water hose
3. Bolt
4. Spring washer
5. Top elbow
6. Gasket
7. Thermostat
8. Thermostat housing
9. Bolt
10. Spring washer
11. Clips
12. By-pass hose
13. Gasket

centre hole and press the handle down to clamp the cover housing to the base plate. Use six bolts to secure the cover pressing to base plate. Remove the actuator.

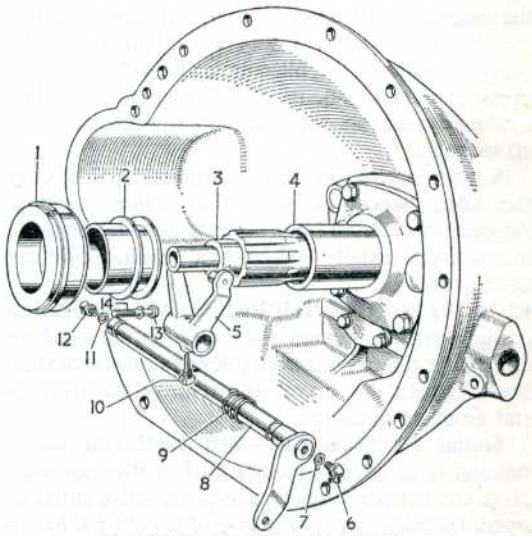
Remove three adjusting nuts. Considerable torque may be necessary. Release the cover pressing from base plate, lift nine thrust springs from the pressure plate and remove three anti-rattle springs from the cover. Lift up inner end of each release lever and disengage the strut.

Gripping the tip of the release lever and the eye bolt, lift out assembly from the pressure plate. Repeat procedure for 2nd and 3rd levers. Remove the eye bolts from release levers and take out pins. Remove the struts from pressure plate.

Assembly.—Before assembling, lubricate all bearing surfaces and arrange the components with strict regard to the markings made previously. Place strut in position in lug of pressure plate. Assemble pin to eye bolt and feed threaded portion through release lever. By holding the strut in the pressure plate to one side, feed the plain end of the eye bolt (assembled to release lever) into the pressure plate. Place strut into groove in outer end of release lever. Repeat with remaining levers.

Place the pressure plate and the assembled release levers, with the latter over the spacers, on the base plate of the fixture. Assemble the springs to their seats on the pressure plate. Fit the anti-rattle springs and place the cover pressing over the pressure plate, allowing the lugs to protrude through the cover. Secure cover pressing to base plate. Screw on adjuster nuts until their heads are flush with the tops of the eye bolts.

Fit the actuator into the centre hole of the base plate and pump handle up and down half a dozen times to settle the components. Remove actuator. Secure pillar firmly into centre of base plate and to it assemble adaptor No. 7, recessed side down-



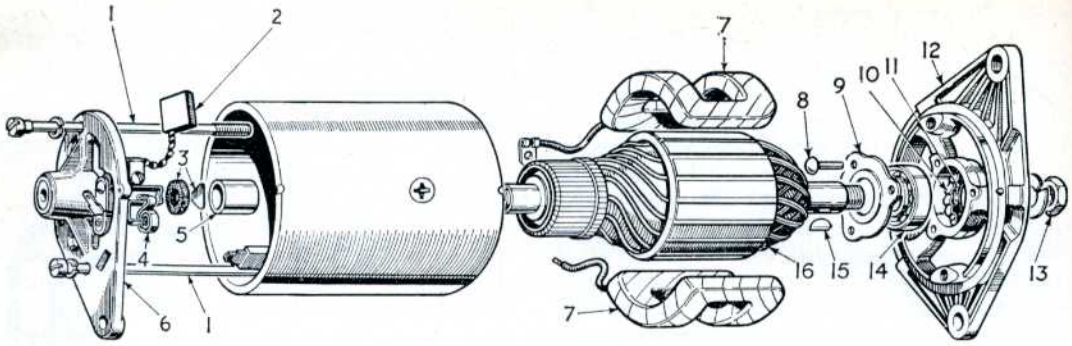
CLUTCH RELEASE DETAILS

1. Release bearing
2. Bearing sleeve
3. Input shaft
4. Front cover
5. Fork
6. Grease nipple
7. Fibre washer
8. Cross-shaft
9. Anti-rattle spring
10. Tapered locking bolt
11. Fibre washer
12. Grease nipple
13. Locating bolt
14. Lockwasher

wards, and gauge finger. Adjust nuts to raise or lower the release levers sufficiently to just contact the finger gauge. Remove pillar, refit actuator and operate the clutch a dozen or so times. Recheck with finger gauge and make any adjustments necessary. Lock the adjusting nuts by peening over the collars into the nuts of the eye bolts. Remove completed assembly from base plate.

COOLING SYSTEM

Circulation of water in the pressurised cooling system is assisted by a belt driven water pump of the impeller type and controlled by a thermostat.



DISMANTLED GENERATOR

1. Bolts
2. Brush
3. Felt ring and aluminium sealing disc
4. Brush spring
5. Bearing brush
6. Commutator end bracket
7. Field coils
8. Rivet
9. Bearing retainer plate
10. Corrugated washer
11. Felt washer
12. Driving end bracket
13. Pulley retainer nut
14. Bearing
15. Woodruff key
16. Armature

PRESSURE TESTING.—Use an A.C. pressure tester to test the cooling system as follows: With the engine warm, remove the filler cap, and top up the water level. Using an adaptor, fit the pressure tester to the filler neck and pump up to a pressure of 4 lb./sq. in. (0·281 kg./sq. cm.). The cooling system should maintain this pressure for 10 seconds.

A more severe test may be applied by following the same procedure with the engine running. Absence of external leaks accompanied by pressure fluctuations usually indicates a leaking cylinder head gasket.

REMOVING THE THERMOSTAT.—Drain the cooling system, detach the bolts, spring washers and swing the outlet cover sideways on the flexible hose. Detach the gasket and remove the thermostat from its housing.

Testing the thermostat.—Test the thermostat by heating it in water together with a thermometer. Note the temperatures at which the valve starts to open. Opening temperatures—70°C (158°F). Maximum valve lift—0·281 in./0·407 in. (7·137/10·337 mm.).

REMOVING THE WATER PUMP.—Disconnect the battery and drain the cooling system. Slacken the generator attachments, swing the generator inwards and remove the driving belt. Disconnect the lower radiator hose and by-pass hose. Remove three bolts and spring washers and detach the water pump from the cylinder block.

ELECTRICAL SYSTEM

The system is 12-volt, 51 amp. hr., positive earth, with Model RB 106–2 control box and Model C 40–1 generator.

GENERATOR.—To dismantle, remove the generator from the engine, extract the driving pulley and take out the woodruff key. Remove two bolts and withdraw the commutator end bracket from the yoke. Note the fibre thrust washer adjacent to the commutator.

Withdraw the armature and drive end bracket complete with bearing. Support the bearing retaining plate and press the shaft from the drive end bracket.

FIELD COILS.—Renew as follows. Drill out the rivet securing the field terminal assembly to the yoke and unsolder the field coil connections. Remove the insulation piece which prevents the junction of field coils from contacting the yoke. Mark the yoke and pole shoes so that they can be refitted to their original positions. Unscrew the pole shoe retaining screws, remove the pole shoes and lift off the coils.

Fit the new field coils over the pole shoes and reposition them inside the yoke. Locate the pole shoes and field coils by lightly tightening the retainer screws; fully tighten them by using a wheel operated screwdriver. Lock the screws by caulking. Replace the insulation piece between the field coil connections and the yoke. Resolder the field coil connections to the field coil terminal tags and rivet the assembly to the yoke.

Brushes.—Check that the brushes move freely in their holders, by holding back the tension springs and pulling gently on the flexible connectors. If a brush is inclined to stick, remove it from its holder and clean its sides with a petrol-moistened cloth.

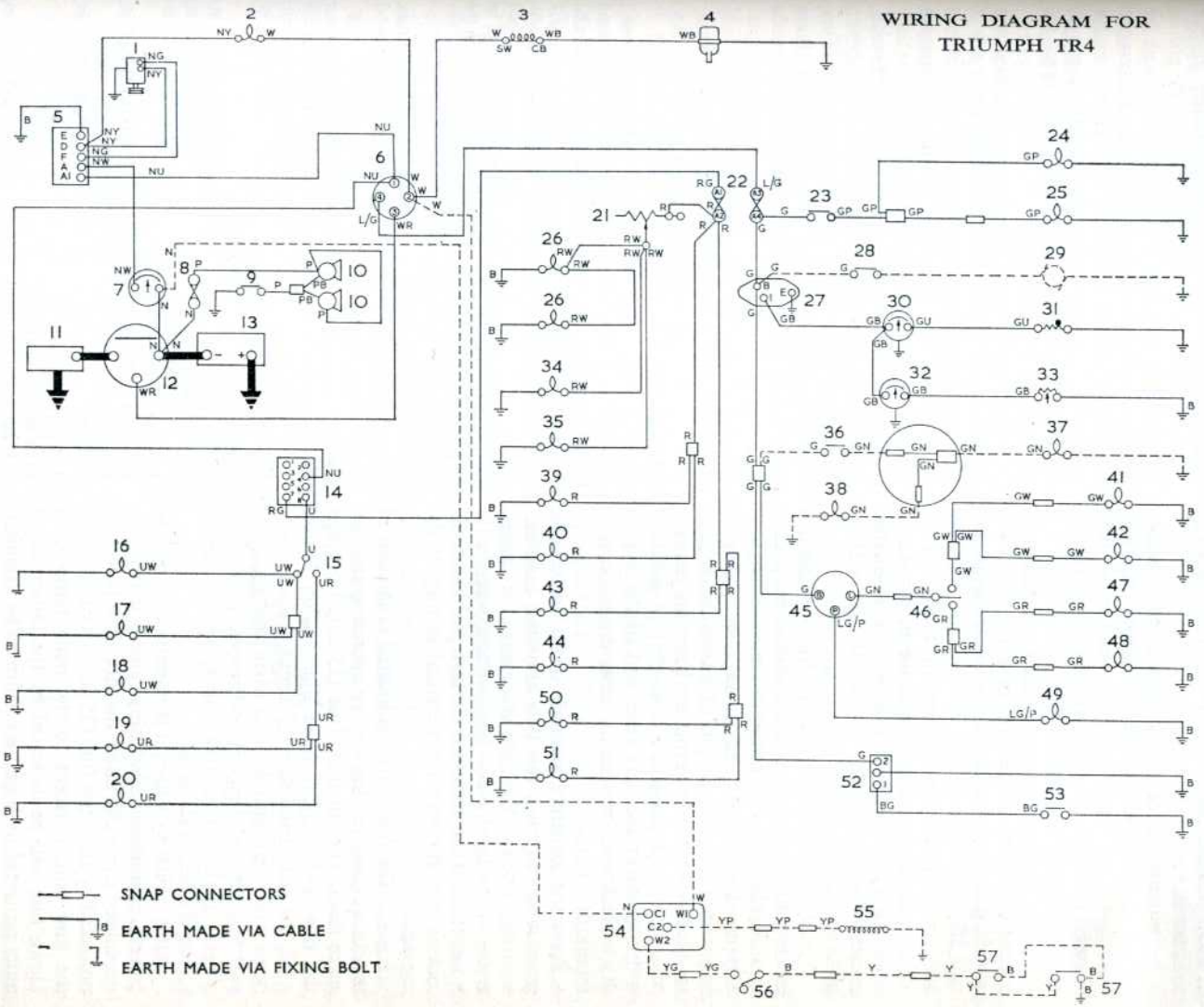
Replace the brushes in their original position or renew those which are less than $\frac{11}{32}$ in. (8·7 mm.) in length.

Test the brush spring tension using a spring scale. Fit new springs if the tension is below 15 oz.

Voltage regulator.—It is important that only a good quality moving coil voltmeter (0·20 volts) is used when checking the regulator.

Remove the cover and insert a thin piece of cardboard between the armature and the core face of the cut-out to prevent the contacts from

WIRING DIAGRAM FOR TRIUMPH TR4



1. Generator
2. Ignition warning lamp
3. Ignition coil
4. Distributor
5. Control box
6. Ignition switch
7. Ammeter
8. Horns fuse
9. Horn push
10. Horns
11. Starter motor
12. Starter solenoid
13. Battery
14. Lighting switch
15. Dipper switch
16. High beam indicator lamp
17. Headlamp high beam, R.H.
18. Headlamp high beam, L.H.
19. Headlamp dip beam, R.H.
20. Headlamp dip beam, L.H.
21. Instrument illumination rheostat
22. Fuse unit
23. Stop lamp switch
24. Stop lamp, R.H.
25. Stop lamp, L.H.
26. Ammeter and gauges illumination
27. Voltage stabiliser
28. Heater blower motor switch } Optional Extra
29. Heater blower motor
30. Temperature indicator gauge
31. Temperature transmitter
32. Fuel gauge
33. Tank unit
34. Speedometer illumination
35. Tachometer illumination
36. Reversing lamp switch } Optional Extra
37. Reversing lamp
38. Reversing lamp
39. Parking lamp, R.H.
40. Parking lamp, L.H.
41. Direction indicator, R.H. Front
42. Direction indicator, L.H. Front
43. Tail lamp, R.H.
44. Plate illumination lamp, R.H.
45. Flasher unit
46. Direction indicator switch
47. Direction indicator, R.H. Rear
48. Direction indicator, L.H. Rear
49. Direction indicator monitor lamp
50. Tail lamp, L.H.
51. Plate illumination lamp, L.H.
52. Windscreen wiper motor
53. Windscreen wiper motor switch
54. Relay } Overdrive Optional Extras
55. Solenoid
56. Column control
57. Transmission switches

CABLE COLOUR CODE

B	Black	S	Slate
U	Blue	W	White
N	Brown	Y	Yellow
G	Green	D	Dark
K	Pink	L	Light
P	Purple	M	Medium
R	Red		

closing. Start the engine and slowly increase its speed until the generator reaches 3,000 r.p.m., when the open circuit voltage reading should be between the appropriate limits given according to the ambient temperature:

10°C	(50°F)	16·1–16·7
20°C	(68°F)	16·0–16·6
30°C	(86°F)	15·9–16·5

If the voltage, at which the reading becomes steady, occurs outside these limits adjust the regulator by turning the adjusting screw clockwise in order to raise the voltage or counter clockwise to lower it.

Adjustment of regulator open-circuit voltage should be completed within 30 seconds otherwise heating of the shunt windings will cause false settings to be made. Remove the cardboard to restore normal operation.

Voltage regulator—mechanical setting.—A copper separator, in the form of a disc or square, is welded to the core face of the voltage regulator, and affects the gap setting between the core-face and the underside of the armature as follows: Where a round separator is used, the air gap should be 0·015 in. (0.38 mm.). Where a square-shaped separator is used, the air gap should be 0·021 in. (0·53 mm.).

To adjust the air gap, slacken the fixed contact locking nut and unscrew the contact screw until it is well clear of the armature moving contact. Slacken the voltage adjustment spring-loaded screw until it is well clear of the armature tension spring. Slacken the two armature assembly securing screws. Insert a gauge or a shim-strip of sufficient width to cover the core face, and of the appropriate thickness, between the armature and copper separator.

Press the armature squarely down against the gauge and retighten the two armature assembly securing screws. Without removing the gauge, screw in the fixed contact adjustment screw until it just touches the armature contact. Retighten the locking nut. Recheck the electrical setting of the regulator.

Fuses.—The fuse carrier is located at the side of the control box and houses two operating and two spare fuses. The left hand fuse (25 amp.) protects the side and number plate illumination lamps, while the right hand fuse (25 amp.) protects those items which can only operate when the ignition is switched on, i.e. direction indicators, windscreen wipers, brake lamp, fuel gauge, reverse lamp, screen washer, and heater.

When replacing a fuse, it is important to use the correct replacement. The fusing value is marked on a coloured paper clip inside the tube. The horns are protected by an in-line fuse (35 amp.) located below the fuse unit, adjacent to the main harness. A blown fuse will be indicated by the failure of all units protected by it and is confirmed by examination of the fuse. If the new fuse blows immediately, locate the cause of the trouble which will almost certainly lie elsewhere.

Temperature indicator.—The temperature indicator, comprising a temperature transmitter and a gauge on it, operates on a 10 volts system controlled by a voltage stabiliser.

Temperature transmitter.—This is mounted in the right hand side of the thermostat housing and consists of a temperature-sensitive resistance element contained within a brass sleeve.

Gauge unit.—This comprises a heater winding round a bimetal strip which is linked to the pointer of the gauge unit. The flow of current through the heater winding is controlled by the temperature transmitter which reacts to any change in the engine coolant temperature by varying the current drawn through the heater windings and hence the stressing of the metal strip.

Voltage stabiliser.—This is a small sealed unit located under the facia on the right hand side of the car and is used to provide a constant current of 10 volts for the operation of the fuel contents gauge and the temperature indicator.

Since it is not possible to repair any of the units, a defective item must be replaced. To establish which unit is defective, test for circuit continuity, using an Ohmmeter, or by substituting a known correct unit. Do not connect any unit direct to the battery.

ENGINE

ENGINE DATA

General	
Bore	3·386 in. (86 mm.)
Stroke	3·622 in. (92 mm.)
Cubic capacity	130·5 cu. in. (2,138 c.c.)
Compression ratio	9:1
Valve rocker clearances	Inlet and exhaust—0·010 in. (cold)
Valve timing, with valve rocker clearances set at 0·0165 in. (0·42 mm.)	Inlet and exhaust valves to be equally open at t.d.c. on the exhaust stroke
Performance data: Net	100 b.h.p. at 4,600 r.p.m.
Firing order	1-3-4-2
Lubrication	
Pump	Hobourn-Eaton eccentric rotor
Filter	Purolator. A.C. Delco. Tecalemit full flow (replaceable element)
Pressure	70 lb./sq. in.
Piston rings	
Width: Top	0·0615–0·0625 in.
Centre	0·0615–0·0625 in.
Scraper	0·1552–0·1562 in.
Ring to groove clearance, all rings	0·0010–0·0030 in.
Gaps in position, all rings	0·010–0·015 in.
Valve springs	
Free length—auxiliary Inner (exhaust only)	1·55–1·57 in.

inner	1·88 in.
outer	1·94 in.
Connecting rods	
Type	Big end offset, will pass through liner bore
Big end bore	2·2327–2·2335 in.
End float on crankpin	0·007–0·014 in.
Undersize big end bearings available	0·010–0·020–0·030 in.
Crankshaft	
Crankpin diameter	2·0861–2·0866 in.
Crankpin width	1·1865–1·1915 in.
Main journal diameter	2·4790–2·4795 in.
Main journal length Front	1·776–1·786 in.
Centre	1·7498–1·7507 in.
Rear	1·808–1·818 in.
Main bearing clearance	0·0015–0·0025 in.
End float	0·004–0·006 in.
Camshaft	
No. of bearings	4
Front journal diameter	1·871–1·872 in.
Front bearing length	1·870 in.
End float	0·0040–0·0075 in.
Valves	
Seat angle	45°
Diameter	Inlet 1·558 in. Exhaust 1·299 in.
Valve guide bore	Inlet 0·312 in. Exhaust 0·3745 in.

ENGINE AND GEARBOX REMOVAL.—Remove the battery and drain the cooling system, engine and gearbox. Disconnect oil pressure pipe, fuel pipe, vacuum pipe, coil S.W. cable, temperature transmitter cable, horns, fan belt and engine earthing strap.

On left-hand side of engine, disconnect heater valve control, hoses, mixture control cable, accelerator rod, carburetters and exhaust pipe flange. On right-hand side of engine, remove coupling bolt, release two 'U' bolts, move the steering unit as far forward as possible and remove the front cross tube.

Remove starter motor, bonnet, radiator and air deflector, engine torque reaction arm, clutch slave cylinder (accessible from under vehicle) and allow it to hang on hose.

Working inside the vehicle, remove seat cushions and carpets, facia support, centre floor cover, speedometer cable, front end of propeller shaft and overdrive solenoid cables (if fitted). Remove gearbox top cover and fit a temporary cardboard cover to prevent the entry of foreign matter into the interior of the unit.

Attach a lifting cable to the engine lifting eyes and, supporting the engine unit on a hoist, release front engine mounting, rear mounting and cross-member. Lift the engine and gearbox unit, tilting it rearwards at an angle of 35–40°. Manoeuvre the unit clear of the vehicle.

CRANKSHAFT.—Check the end-float by moving the crankshaft endwise. The correct end-float is 0·004–0·006 in. (0·1–0·15 mm.). Excess end-float can be reduced by fitting 0·005 in. (0·127 mm.) oversize thrust washers.

PISTONS AND LINERS.—The cylinder liners are of the wet type with flanged upper faces, on the sides of which are machined two pairs of flats, at 90° to one another. These flats provide alternative fitting positions to overcome wear along the axis of thrust.

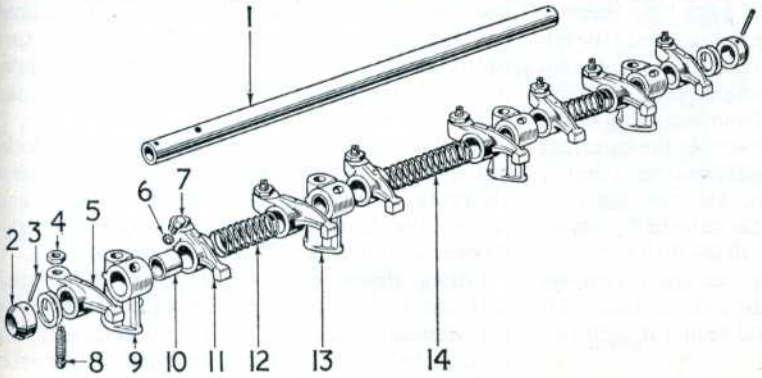
The lower portion of each liner is provided externally with a reduced diameter, surmounted by a flanged face for spigoting into a machined recess in the cylinder block. This spigot also accommodates the liner gasket which is used for water sealing.

Pistons and liners are graded 'F', 'G' or 'H' according to their dimensions. The appropriate symbol is stamped on the top face of each piston and liner. When fitting new pistons and liners, ensure that they are both of the same grade, for example, 'F' piston to 'F' liner.

Piston measurement: The piston dimensions are the maximum when measured across the thrust faces at the top of the skirt 'BB' and bottom of the skirt 'AA'. The maximum variation in weight between four pistons comprising a 'set' must not exceed 4 drams (7·09 grams).

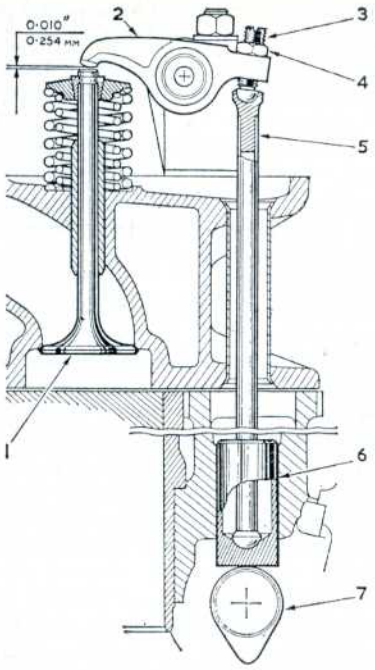
Piston Rings.—Rings are as follows: 1. Compression ring (plain). 2. Taper faced compression ring. Fit with taper towards top and 'T' or 'Top' marking on upper face. 3. Oil control ring.

Flywheel clutch face.—If the flywheel clutch face is deeply scored, renew the flywheel, or alterna-



1. Rocker shaft
2. End cap
3. Mills pin
4. Locknut
5. Rocker, R.H.
6. Shakeproof washer
7. Screw
8. Adjuster
9. Rocker pedestal (rear)
10. Rocker bush
11. Rocker, L.H.
12. Spring
13. Rocker pedestal
14. Spring

ROCKER SHAFT DETAILS



SECTION SHOWING VALVE OPERATING DETAILS

1. Valve
2. Rocker
3. Adjuster
4. Locknut
5. Push rod
6. Tappet
7. Camshaft

tively, skim the face in a lathe, maintaining the following tolerances: Maximum flywheel face run-out relative to spigot face is ·003 in. (·0762 mm.) at a radius of 5 in. Balance—1 dram.

Fitting the flywheel to the crankshaft.—Ensure that the flywheel attachment flange on the crankshaft and the corresponding spigot and face on the flywheel are clean. Screw a $\frac{3}{8}$ in. U.N.F. stud into one of the crankshaft holes as a pilot and fit the flywheel to the crankshaft flange, ensuring that the dowel and dowel hole correspond. Tighten the flywheel attachment bolts and secure them with the lock-plates. Using a dial indicator gauge, measure the flywheel face for run-out. Maximum run-out must not exceed figure quoted.

Engines are now being serviced under a new condition as follows: Flywheel bolts have been replaced by bolts which dispense with the need for tab washers. These new bolts have been redesigned to ensure that correct torque tightening loads are maintained, thus preventing bolts from becoming loose.

CAMSHAFT.—End-float: Assemble the camshaft front bearing to the camshaft and temporarily attach the camshaft sprocket. Measure the end-float of the front bearing on the camshaft journal. It should be 0·003–0·0075 in. (0·08–0·19 mm.).

Installation.—Lubricate the camshaft bearings and insert the camshaft into the cylinder block. Fit the front camshaft bearing and secure it with two bolts and spring washers.

CYLINDER HEAD AND VALVE GEAR.—Remove carbon from the cylinder head and examine the valve seats for scores, burns and wear. Inspect the valve springs for cracks or distortion and check the fitted load. Check the cylinder head core plug for evidence of leakage and, renew it if necessary.

Valve guides.—Check valve guide wear by inserting a new valve lifting it $\frac{1}{8}$ in. (3·2 mm.) from its seat and rocking it sideways. Movement of the valve head across its seat must not exceed 0·020 in. (0·5 mm.). If required, renew the guide by using Churchill Tool No. S60A–2. Valve guide protrusion above top face of the cylinder head is 0·78 in. (19·84 mm.).

Valve seats.—When recutting the valve seats, ensure that the pilot of the cutter is a close fit in the valve guide. Should it be necessary to use a 15° cutter for reducing the seat width, do not exceed these dimensions, inlet—1·716 in. max. (43·59 mm.), exhaust—1·438 in. max. (36·51 mm.). Valve seat angle is 45°.

Cylinder head reassembly.—Remove the cylinder liner retainers, coat a new cylinder head gasket with jointing compound and fit this over the cylinder head studs. Lower the cylinder head on to the block, and fit the lifting eye, plain washers and nuts. Tighten the nuts in the correct order as follows:

9 3 1 6 8
7 5 2 4 10

Insert the eight pushrods, ensuring that their lower ends engage correctly in the tappets.

Lubricate and assemble the components on to the rocker shaft. Note that each pair of rockers is offset and that a shouldered screw and shakeproof washer are used to locate the rear pedestal on the shaft. Slacken off the locknuts and screw in the adjusters to avoid bending the pushrods. Lower the rocker shaft assembly over the four studs, simultaneously locating the rocker adjusters in the pushrod cups. Fit and progressively tighten the four rocker-shaft nuts.

Rocker clearance.—Check and if necessary adjust the rocker clearances when the tappet is resting on the back of the cam. To obtain this position, turn the camshaft until No. 1 pushrod has reached its highest point, then turn a further full revolution to ensure that the pushrod is fully down and the tappet is resting on the back of the cam.

If adjustment is necessary, slacken off the locknut and turn the adjusting screw until the correct clearance is obtained. Tighten the locknut and recheck the clearance. Treat each rocker similarly. Rocker clearance is 0·01 in. (0·25 mm.) cold.

Fitting timing chain.—Exercising the greatest care, remove the timing sprocket without disturbing the camshaft. Encircle both sprockets with the timing chain and offer up the camshaft sprocket

to the camshaft. Manoeuvre the sprocket by slipping a link at a time or by reversing the sprocket until a pair of holes exactly coincides with those of the camshaft. The camshaft timing sprocket is provided with four holes which are equally spaced but offset from a tooth centre. Half tooth adjustment is obtained by rotating the sprocket 90° from its original position.

A quarter tooth adjustment may be obtained by turning the sprocket 'back to front'. By rotating it 90° in this reversed position three-quarters of a tooth variation is obtained.

After securing the sprocket, recheck the timing to ensure that the camshaft has not been disturbed during this operation. With No. 1 piston t.d.c., Nos. 7 and 8 rocker clearances should be identical. Adjust the rocker clearances to 0·010 in. (0·254 mm.).

VALVE TIMING

Inlet opens	17° b.t.d.c.
Inlet closes	57° a.b.d.c.
Exhaust opens	57° b.b.d.c.
Exhaust closes	17° a.t.d.c.

Inlet and exhaust cam period 127° at 0·0093 in. (0·236 mm.) tappet clearance.

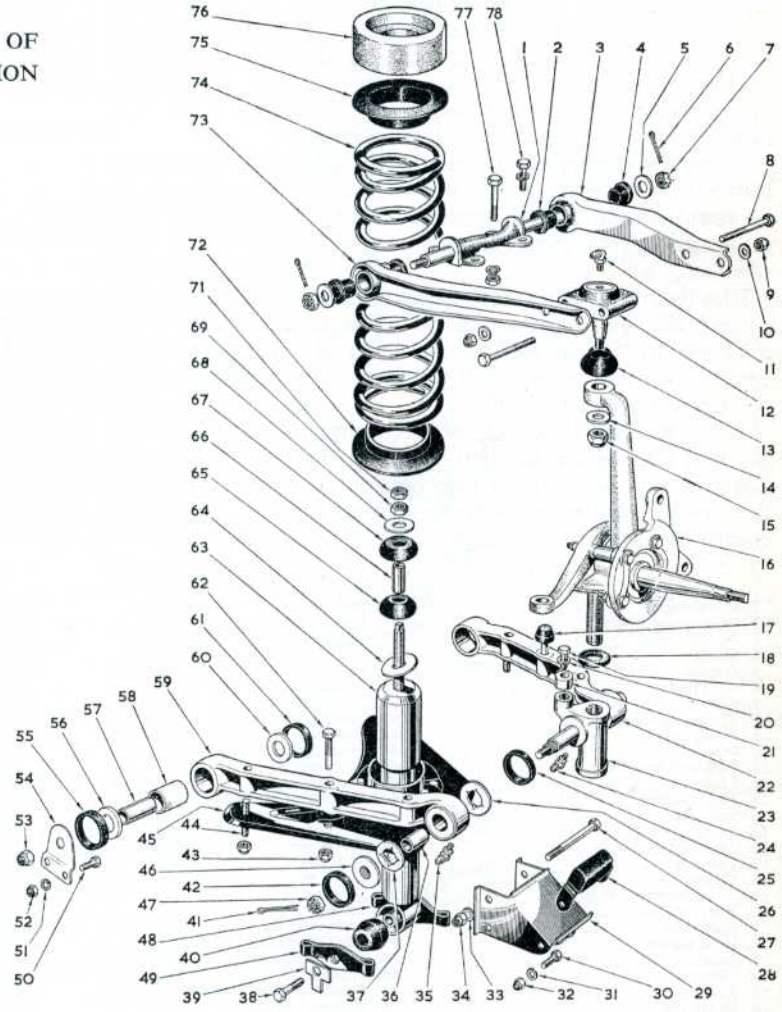
LUBRICATION

Type of pump	Hobourn-Eaton eccentric rotor
Oil filter	Purolator; A.C. Delco; Tecalemit
Release pressure	70 lb./sq. in.

FRONT END AND FRONT SUSPENSION

Before carrying out measurements and adjustments position the vehicle on a smooth level

EXPLODED VIEW OF FRONT SUSPENSION



1. Upper inner fulcrum
2. Rubber bush
3. Upper wishbone arm—rear
4. Rubber bush
5. Washer
6. Split pin
7. Slotted nut
8. Bolt
9. Nyloc nut
10. Plain washer
11. Grease nipple
12. Upper ball joint
13. Rubber gaiter
14. Plain washer
15. Nyloc nut
16. Calliper bracket and vertical link
17. Bump rubber
18. Rubber seal
19. Bolt
20. Spring washer
21. Lock stop collar
22. Lower wishbone arm—rear
23. Lower trunnion bracket
24. Grease nipple
25. Rubber seal
26. Thrust washer
27. Bolt
28. Rebound rubber
29. Bracket
30. Bolt
31. Spring washer
32. Nyloc nut
33. Plain washer
34. Nyloc nut
35. Grease nipple
36. Bush—nylon
37. Thrust washer
38. Bolt
39. Tab washer
40. Rubber bush
41. Split pin
42. Rubber seal
43. Nyloc nut
44. Stud
45. Spring pan
46. Serrated washer
47. Slotted nut
48. Damper attachment bracket—rear
49. Damper attachment bracket—front
50. Bolt
51. Spring washer
52. Nut
53. Nyloc nut
54. Fulcrum bracket
55. Rubber seal
56. Thrust washer
57. Steel sleeve
58. Nylon bush
59. Lower wishbone—front
60. Thrust washer
61. Rubber seal
62. Bolt
63. Damper
64. Washer
65. Rubber bush
66. Sleeve
67. Rubber bush
68. Washer
69. Nut
71. Locknut
72. Rubber collar
73. Upper wishbone arm—front
74. Spring
75. Rubber collar
76. Distance piece
77. Bolt
78. Bolt

surface, inflate the tyres to the correct pressures and place a load of 150 lb. (68 kg.) on each seat. At Commission Numbers CT.6344 (wire wheels) and CT.6390 (disc wheels) the castor angle was changed from 0° to 3° positive. This was achieved by the incorporation of modified wishbone arms, ball joints and vertical link trunnions.

Track adjustment.—Centralise the steering unit by turning the steering wheel, counting the number of turns necessary to move the steering from lock to lock and turning the wheel back half the number of turns. In this position, the steering wheel spokes should assume a horizontal position.

Using Weaver or similar wheel alignment equipment, measure the front wheel alignment. If adjustment is required, slacken the tie-rod and locknuts and the outer gaiter clips and rotate the tie-rods until the correct alignment is obtained. Take one reading, roll the vehicle forward so that the wheels rotate 180°, then obtain a second reading and adjust the tie-rods to a mean of the two readings. This allows for a wheel-rim run out. When correct adjustment has been obtained, tighten the tie-rod locknuts and gaiter clips.

Castor and camber measurement.—The following instructions for measuring castor and camber are applicable to the Weaver instrument. Other types of measuring equipment may, however, be equally effective.

Run the front wheels on to wheel turning radius gauges and place wood blocks of equivalent thickness to that of each gauge under the rear wheels. Zero the gauges with the front wheels in the straight ahead position.

Using the No. 10 U.N.F. setscrew supplied in the tool kit, remove the hub cap from the hub. Ensuring that the split pin does not foul it, place the spacer washer with flange outwards, and engage the claws of the adaptor on the stub axle thread between two of the nut slots. Secure the spirit level unit to the adaptor and tighten the knurled nut.

With the wheels in the straight ahead position, measure the camber from the left-hand scale. Turn the wheel to 20° back lock and zero the bubble on the right-hand scale. Turn the wheel to 20° front lock and read the castor angle from the right-hand scale. Repeat the operations on the opposite wheel.

Check the camber angle (2° positive) and castor angles. Appreciable differences indicate distorted suspension components, worn suspension bushes or settled front springs.

To avoid using jigs for rear wheel alignment, it is recommended that optical equipment be used enabling the front and rear wheels to be aligned simultaneously. This equipment projects a beam of light in a plane at right angles to each individual wheel axle, on to a graduated screen. The various angles and dimensions may be read directly and accurately off the screens.

FRONT END DATA

Castor angle	3°
Camber angle	2° (static laden)
Kingpin inclination	7°
Front wheel alignment	parallel with $\frac{1}{8}$ in. toe-in
Turning circle	33 ft.

FRONT SUSPENSION.—Before disturbing any part of the front suspension assembly, jack up the front of the vehicle and lower it on to stands placed under the chassis side members, rearward of the front cross-member. Remove the road wheels and dismantle either the right- or left-hand front suspension unit, as follows:

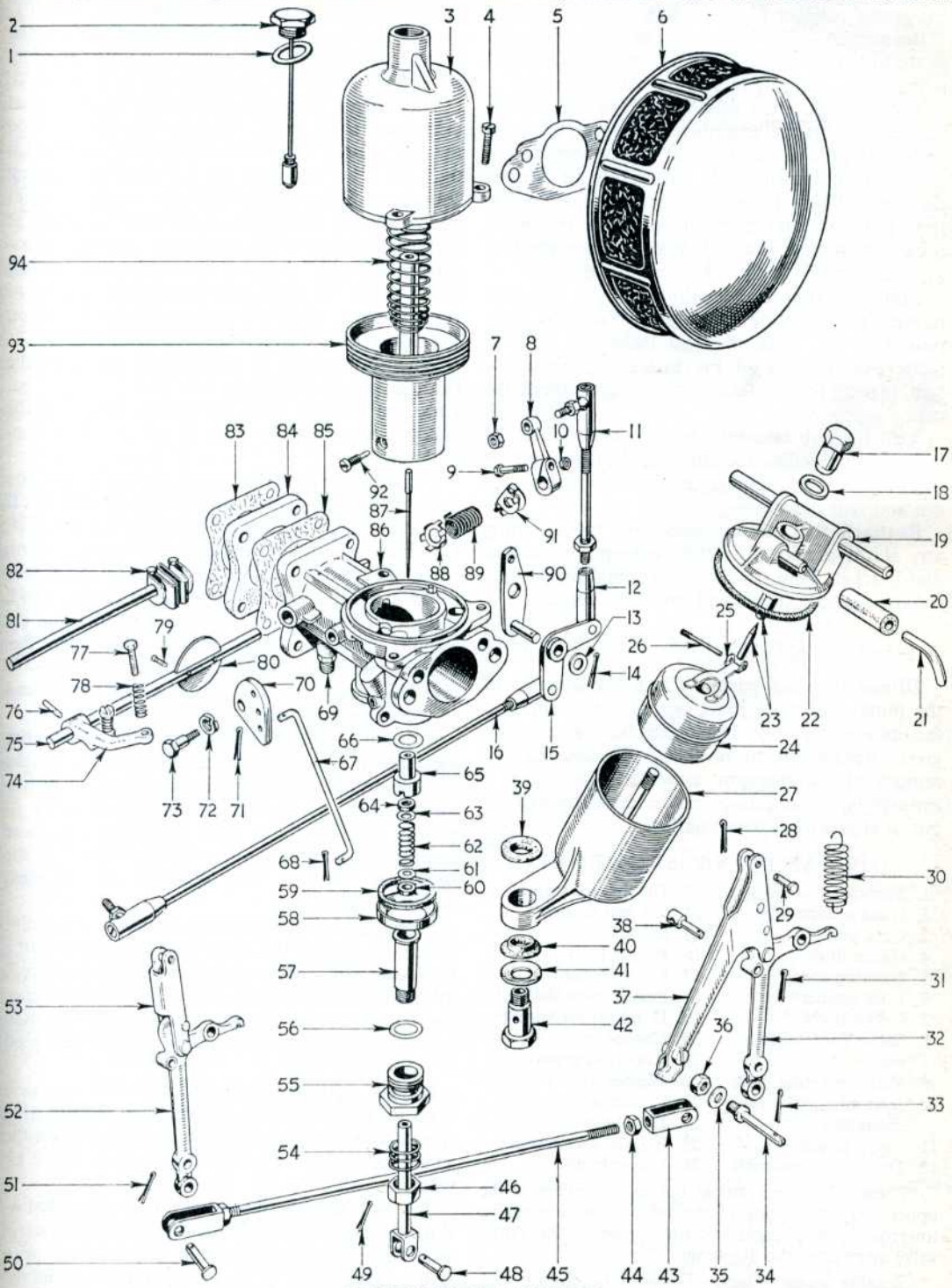
Front hub removal.—Unscrew the bolts and remove the calliper assembly. Note the number and position of shims fitted between the calliper

KEY TO CARBURETTER

1. Fibre washer
2. Damper assembly
3. Suction chamber
4. Screw
5. Gasket
6. Air cleaner
7. Nut
8. Throttle lever
9. Pinch bolt
10. Nut
11. Link rod coupling
12. Link rod coupling
13. Plain washer
14. Split pin
15. Relay lever
16. Link rod assembly
17. Cap nut
18. Washer
19. Front chamber cover
20. Fuel pipe coupling
21. Fuel pipe
22. Joint washer
23. Needle valve
24. Float
25. Fork
26. Hinge pin
27. Float chamber
28. Split pin
29. Clevis pin
30. Jet lever return spring
31. Split pin
32. Jet lever
33. Split pin
34. Choke cable connector
35. Washer
36. Nut
37. Jet link and choke cable support
38. Clevis pin
39. Washer
40. Shouldered washer
41. Washer
42. Float chamber attachment bolt
43. Fork end
44. Nut
45. Jet control connecting link
46. Jet adjusting nut
47. Jet head
48. Clevis pin
49. Split pin
50. Clevis pin
51. Split pin
52. Jet lever
53. Jet lever link
54. Loading spring
55. Jet locking nut
56. Washer
57. Bottom half jet bearing
58. Sealing ring
59. Cork washer
60. Cork gland washer
61. Copper gland washer
62. Spring between gland washer
63. Copper gland washer
64. Cork gland washer
65. Top half jet bearing
66. Washer
67. Choke/throttle interconnecting link
68. Split pin
69. Vacuum union
70. Lever cam
71. Split pin
72. Double spring washer
73. Shouldered bolt
74. Throttle stop
75. Throttle spindle
76. Pin
77. Stop adjusting screw
78. Spring
79. Throttle butterfly screw
80. Butterfly
81. Throttle connecting rod
82. Coupling
83. Gasket
84. Insulator
85. Gasket
86. Carburetter body
87. Needle
88. Anchor plate
89. Return spring
90. Pivot lever
91. End clip
92. Needle locking screw
93. Piston
94. Piston spring

and bracket. They are used to align the calliper relative to the disc. Support, or tie up the calliper assembly in order to prevent its weight being taken by the flexible hydraulic brake hose.

Screw a No. 10 N.F. setscrew into the grease cap and force the cap from the hub. Extract the split pin, unscrew the slotted nut and withdraw the hub assembly from the stub axle. Remove the inner



CARBURETTER DETAILS

member of the bearing from the stub axle.

To dismantle, remove the bolts with lockwashers and detach the disc from the hub. Using a soft drift, drive the outer rings of the bearings and the grease retainer from the hub.

Reassembly.—Fit the outer rings of the bearings to the hub, placing the tapered faces outwards, and refit the disc securing it with bolts and washers.

Assemble the inner members of the bearings to the hub and fit the assembly to the stub axle. Fit the washer, the slotted nut and, whilst rotating the hub, tighten the nut only sufficiently to remove slackness. Slacken the nut back to the nearest split pin hole and mark its position by centre punching the nut and stub axle. Remove the hub assembly and pack the bearings with grease.

Attach a new hub sealing felt to the seal retainer with jointing compound. When the compound is dry, soak the seal in engine oil and squeeze out surplus oil. Fit the seal retainer to the hub, placing the felt face towards the centre of the car.

Refit the hub assembly, washer, and nut to the stub axle, tightening the nut until the centre punch marks correspond. Secure the nut with a new split pin and refit the cap.

Reattach the calliper assembly, repositioning any shims previously fitted between the calliper and bracket. Refit the road wheel and nave plate, remove the axle stands and lower the vehicle.

FUEL SUPPLY SYSTEM

Dismantling fuel pump.—Clean the exterior of the pump and file a mark across both flanges to facilitate reassembly. Dismantle in the sequence given. Reassemble by reversing the sequence. To remove the diaphragm assembly, first turn it through 90° in an anti-clockwise direction and lift out of engagement with link lever.

DISMANTLING SEQUENCE

1. Stirrup
2. Glass sediment bowl
3. Cork seal
4. Gauze filter
5. Securing screw
6. Lock washer
7. Upper body
8. Screw for retaining plate
9. Valve retaining plate
10. *Inlet and outlet valve assemblies
11. Valve gasket
12. Diaphragm assembly
13. Diaphragm spring
14. Oil seal retainer
15. Oil seal
16. Primer lever
17. Cork washer
18. Primer lever shaft
19. Hand primer spring
20. Circlip
21. Rocker arm pin
22. Washer
23. Rocker arm
24. Link lever
25. Rocker arm spring
26. Lower body

*These valves are identical, but on fitting them to the upper body the spring of the inlet valve is pointing towards the diaphragm and the spring of the outlet valve away from the diaphragm.

Cleaning pump filters.—Loosen the thumb nut below the glass sediment bowl. Swing the wire frame to one side and remove the sediment chamber, cork gasket, and gauze filter for cleaning. When reassembling, renew the cork washer if damaged. Run the engine and check for leakage.

Tuning carburetters.—Twin carburetter installations cannot be successfully tuned unless the general condition of the engine, ignition, and fuel system is satisfactory. Procedure is as follows:

Warm up the engine, remove air cleaners, and disconnect choke cable. Slacken clamping bolts on throttle spindle and detach connecting rod. Ensure that the screw is clear of its abutment during subsequent adjustments. With the engine idling at approximately 500 r.p.m. check the hiss of air at carburetter intakes with a piece of tubing approximately 0·3 in. (7·5 mm.) bore. Maintaining this idling speed, set both throttle adjusting screws to equalise the level of hiss at the carburetter intakes. To reduce hiss, unscrew the adjusting screw.

When adjustment is satisfactory, retighten the throttle spindle clamping bolt and recheck hiss. Check mixture at each carburetter by lifting the piston approximately $\frac{1}{8}$ in. (3 mm.) with a penknife blade.

If the engine speed increases, the mixture is too rich and the nut should be screwed up one flat. If the engine speed decreases unscrew nut one flat. Continue adjustment on each carburetter until, when the piston is lifted no increase, or a very slight increase followed by a fall in engine speed, is noticed. The mixture is then satisfactory and the exhaust note should be regular and even. Reconnect the choke controls and reset the screw to give 0·062 in. (1·6 mm.) clearance between the end of the screw and rocker lever. Refit air cleaners.

Adjusting and synchronising twin carburetter installation.—Loosen the clamping bolts on the throttle spindle coupling between the two instruments. Next, unscrew the throttle stop screw to permit the throttle in each carburetter to close completely, and tighten the clamping bolts on the couplings between the spindles of the two carburetters.

Screw in the throttle stop screws to the point where the end of the screw is just contacting the stop lever attached to each throttle spindle. From this point, rotate the stop screw in each carburetter one complete turn to open the throttles an equal amount to provide a basis from which final speed of idle can be set.

Having reconnected the throttles and set each open an equal amount, regulate the jet adjusting screws three turns down from the point where the jet orifice comes into contact with base of the air valve.

Jet and throttle interconnection adjustment.—With the choke control fully 'in', the engine warm and idling on a closed throttle, adjust the screw to give a clearance of $\frac{1}{16}$ in. (1.587 mm.) between the end of the screw and the rocker lever. Always

check this adjustment when the throttle stop screw is altered. *Note.* Remember that the idle quality depends to a large extent upon the general engine condition, and such points as tappet adjustment, spark plugs, and ignition timing should be inspected if idling is not stable. It is also important to eliminate any leaks in the induction system.

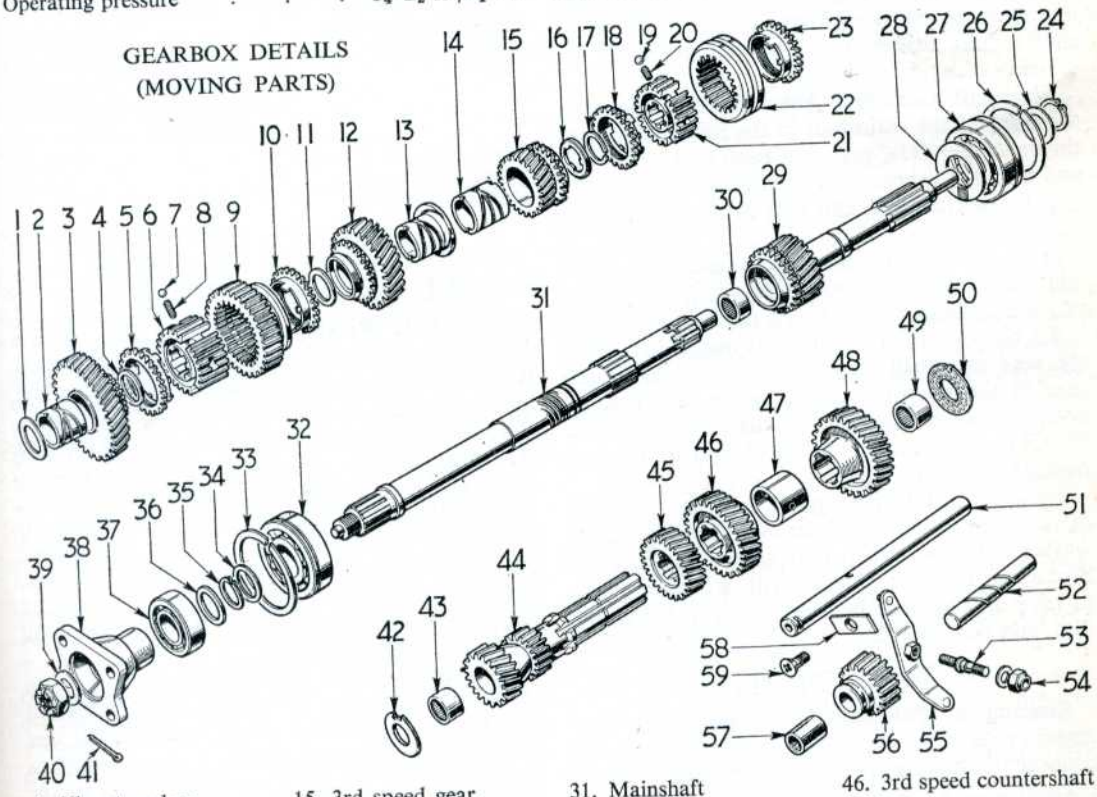
FUEL SYSTEM DATA

Fuel tank	Non-pressure type
Carburetters	Twin S.U. H6
Needle size	SM
Air cleaners	Wire gauze type
Fuel pump	A.C. mechanical with filter and sediment bowl
Operating pressure	1¼–2¼ lb./sq. in.

GEARBOX

TO REMOVE GEARBOX LEAVING ENGINE IN POSITION.—Raise the vehicle on a ramp or support it on axle stands. Disconnect the battery, drain the gearbox, and remove the seat cushions and front carpets. Disconnect cables from heater control switch, control cable from heater unit, control cable from control panel. Remove facia support (two bolts top, two bolts each side bottom), dipper switch (leave cables attached), centre floor cover (17 bolts and washers), propeller shaft. Remove clevis pin, two bolts, and stay, clutch slave cylinder (allowing it to hang by its flexible hose) and clutch cover plate from lower portion of clutch housing. Disconnect the speedometer cable and

GEARBOX DETAILS
(MOVING PARTS)



1. Thrust washer
2. Bush—1st speed gear
3. 1st speed gear
4. Thrust washer
5. 1st speed synchro cup
6. 1st/2nd speed synchro hub
7. Synchro ball
8. Spring
9. Reverse mainshaft gear and synchro outer sleeve
10. 2nd speed synchro cup
11. Thrust washer
12. 2nd speed gear
13. Bush—2nd speed gear
14. Bush—3rd speed gear
15. 3rd speed gear
16. Thrust washer
17. Circlip
18. 3rd speed synchro cup
19. Synchro ball
20. Spring
21. 3rd/top synchro hub
22. Synchro sleeve
23. Top gear synchro cup
24. Circlip
25. Distance washer
26. Circlip
27. Ball race
28. Oil deflector plate
29. Input shaft
30. Needle roller bearing
31. Mainshaft
32. Ball race
33. Circlip
34. Distance washer
35. Circlip
36. Distance washer
37. Rear ball race
38. Flange
39. Plain washer
40. Slotted nut
41. Split pin
42. Rear thrust washer
43. Needle roller bearing
44. Countershaft hub
45. 2nd speed countershaft gear
46. 3rd speed countershaft gear
47. Distance piece
48. Countershaft gear
49. Needle roller bearing
50. Front thrust washer
51. Countershaft
52. Reverse gear shaft
53. Pivot stud
54. Nyloc nut and washer
55. Reverse gear operating lever
56. Reverse gear
57. Reverse gear bush
58. Locating plate
59. Screw

over-drive connectors. Using a block of wood to protect the sump, take the weight of the engine and gearbox with a jack placed as far as possible towards the rear of the sump. Release the exhaust pipe bracket and detach the rear mounting from the gearbox and cross-member. Raise the engine and gearbox and remove the cross-member by sliding it forwards.

Remove the bolts, nuts, and spring washers securing the clutch housing flange to the engine. Withdraw the gearbox rearwards until clear of the clutch, then manoeuvre the clutch housing to the right and the rear end to the left, tilting the box to permit the clutch operating lever to clear the floor aperture. Lift the gearbox from the vehicle.

To refit.—Reverse the removal procedure. Do not allow the gearbox to hang on the clutch spigot shaft whilst fitting it to the engine. Refill the gearbox with oil.

Mainshaft assembly.—Assemble components to the front of the mainshaft in the following order: thrust washer (11), gear and bush (12), (13), gear and bush (14), thrust washer (16), new circlip (17), 3rd/top synchromesh unit with baulk ring (18) and (23) at each side.

With a baulk ring assembled to each side of the 2nd/1st synchromesh unit, slide this over the rear of the mainshaft and locate on the larger splines.

To the rear of the mainshaft assemble washer (4), gear and bush (2), (3), washer (1). Enter the rear of the mainshaft through the rear bearing housing and manoeuvre the shaft into position. Fit Churchill abutment plate (S.314) to gearbox front face.

Fit circlip (33) to bearing (32) and use Churchill driver S.314 to drift the bearing into position. Fit washer (34) and circlip (35) behind the bearing. Strike rear end of mainshaft with a copper mallet to take up clearance between circlip (35), washer (34), and bearing (32).

IGNITION

Removal of distributor.—Disconnect the low tension cable from the side of the distributor, disconnect the high tension cable from the coil and release the high tension cables from the spark plugs. Uncouple the vacuum pipe from the distributor, unscrew two nuts at the base of the distributor and lift it from the engine.

Setting the timing gear.—Position the crankshaft at t.d.c. with No. 1 piston on the compression stroke. Fit the key to the oil pump drive shaft and lower the shaft into the bush, engaging the driving tongue with the oil pump driving slot. Rotate the shaft so that the key is pointing outwards at right angles to the cylinder block. Lower the distributor drive gear on to the shaft, allowing it to turn as it meshes with the camshaft gear. Fit the paper packing washers and secure the distributor pedestal.

Adjust the distributor points to 0·015 in. (0.4 mm.). Secure the clamp plate to the pedestal and lower the distributor into the pedestal, engaging its driving dog with the slot of the gear. With the crankshaft to t.d.c. and firing on No. 1 cylinder, set the vernier adjustment in the centre of its scale and adjust the distributor in a clockwise direction until the points are commencing to open. Tighten the clamp bolt and rotate the thumb screw until one extra division appears on the scale. One division is equal to 4° crankshaft angle. *Note.* These settings are nominal and should be adjusted to give the best road test performance. Distributor rotation is anti-clockwise.

IGNITION DATA

Contact breaker gap	0·015 in.
Sparking plugs: Type	Lodge CNY (normal)
	Lodge HN (high speed)
	Lodge 2HN (competition)
	Lodge CN (low octane fuel)
Spark gap	0·025 in.
Firing order	1-3-4-2
Ignition timing	4° b.t.d.c.

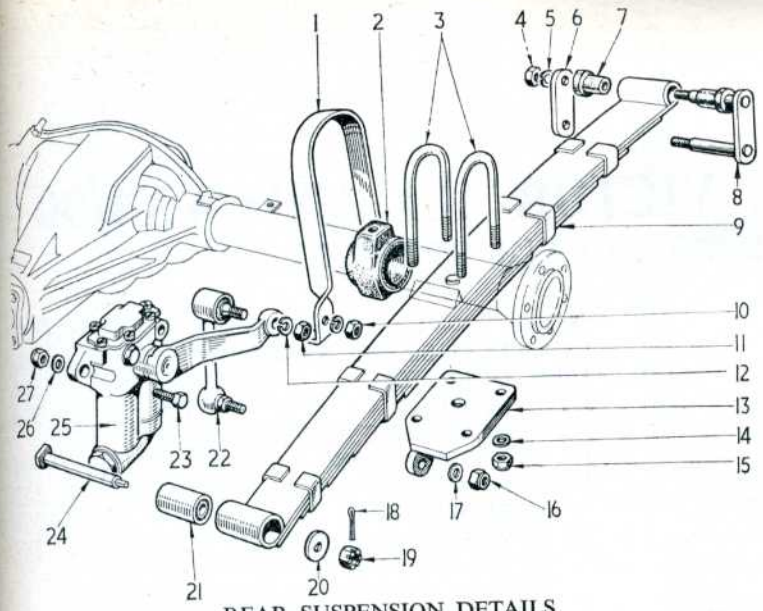
REAR AXLE AND REAR SUSPENSION

REMOVING REAR SPRINGS.—Jack up the rear of the vehicle and support it on chassis stands. Remove the road wheels and take the road spring load with a jack placed beneath the spring blades. Remove the damper link (22) and remove the nuts (15), plain washers (14), spring plate (13), and 'U' bolts (3). Lower the jack to release the road spring tension. Remove the nuts (4), spring washers (5) and detach the shackle plates (6), (8), and rubber bushes (7) from the spring and chassis bracket. Remove the split pin (18), slotted nut (19), washer (20) and withdraw the bolt (24) to release the spring (9) from the vehicle.

REFITTING REAR SPRINGS.—Offer up the spring and fit the pin (24), plain washer (20) and nut (19) leaving the nut slack. Assemble the rear shackle (6) and (8) with bushes (7), spring washers (5) and nuts (4), leaving the nuts slack. Jack up the spring blades until they contact the axle pad and fit the 'U' bolts (3), spring plate (13), plain washer (14) and nuts (15).

Removing rear shock absorbers.—Jack up the rear of the vehicle and support on chassis stands. Remove the rear road wheels. Remove the nuts (11) and (16), washers (12) and (17), and detach the damper links (22). Remove the bolts (23), washers (26), nuts (27) and detach the damper (25).

Refitting shock absorbers.—Hold the damper vertical in a vice, and move the arm through its full arc to expel air from the damper cylinder. Remove the filler plug, top up with oil, and refit the plug. Maintaining the damper in a vertical position, offer it up to the chassis bracket and secure with



1. Bump strap
2. Bump and rebound rubber
3. 'U' bolts
4. Nut
5. Spring washer
6. Shackle plate
7. Rubber bush
8. Shackle
9. Spring
10. Nut
11. Nut
12. Spring washer
13. Spring plate
14. Plain washer
15. Nyloc nut
16. Nyloc nut
17. Plain washer
18. Split pin
19. Slotted nut
20. Washer
21. Bush
22. Damper link
23. Bolt
24. Shackle pin
25. Damper
26. Plain washer
27. Nyloc nut

REAR SUSPENSION DETAILS

bolts (23), washers (26), and nuts (27).

Refit the damper link (22), securing it with nuts (11) and (16) and washers (12) and (17). Refit road wheels, remove axle stands and lower vehicle.

Distance pieces, approximately $3\frac{1}{2}$ in. in height, are located between the bottom of the rear axle and each rear spring centre, and secured by 'U' bolts. A shoulder on the rear edge of each distance piece bears against the rear 'U' bolt of each spring to prevent movement. A flat base at the bottom of each side of the rear axle casing accommodates a dowel which locates and prevents displacement of each distance piece.

Rear shock absorber links (lower mounting points) locate in the centre of each distance piece extension arm at the front leading inner edge. Tendency to roll steer is minimised by fitting recambered rear springs, Part No. 20996–4, with distance pieces, Part No. R.H. 209962 and L.H. 209963.

REMOVING REAR AXLE.—Jack up the rear of the vehicle and lower on to stands positioned beneath the chassis frame adjacent to the forward spring eyes. Remove road wheels and drain axle oil. Disconnect propeller shaft at the rear end. Disconnect the handbrake primary cable from the compensator lever and release the cable from its abutment on the axle tube. Drain the brake system and disconnect the flexible brake hose.

Release the brake pipe assembly from the axle and the handbrake cables from the wheel cylinder levers. Release the lock tabs, remove six bolts and detach the hubs, axle shafts, brake drums and backplates as a unit. Keep the two shim packs separate. Remove the axle bump straps. Jack up each spring until the axle rebound rubbers are clear of the chassis frame. Remove the 'U' bolts allowing the plates to hang on the damper links.

Remove the jacks from the springs. Release the exhaust tail pipe mounting from the chassis. Feed the axle over the left-hand side of the chassis frame. Lower the right-hand side of the axle and move rearwards to allow the axle tube to pass beneath the chassis frame. Manoeuvre axle clear of chassis.

WHEELS AND TYRES

Wheel tolerances.—S.M.M. and T. standard tolerances are:

(A) Wobble.—The lateral variation measured on the vertical inside face of a flange should not exceed 0·070 in. (wire wheels) or 0·060 in. (disc wheels).

(B) Lift.—The difference between the high and low points of a rotating wheel measured at any location on either tyre bead seat should not exceed 0·070 in. (wire wheels) or 0·060 in. (disc wheels).

Radial and lateral eccentricity outside these limits contribute to static and dynamic unbalance respectively. Severe radial eccentricity imposes intermittent loading on the tyre, which cannot be rectified by static or dynamic balancing. Irregular tyre wear will result from this defect.

Ensure that rim seatings and flanges in contact with the tyre beads are maintained free from rust and dirt. If the vehicle is fitted with wire-spoked wheels, the splined hubs, when removed, must be refitted to the correct side of the vehicle, i.e. the knock-on hub cap must tighten in the opposite direction to road wheel rotation. Failure to ensure this may result in a wheel coming off.