

# BRAKES

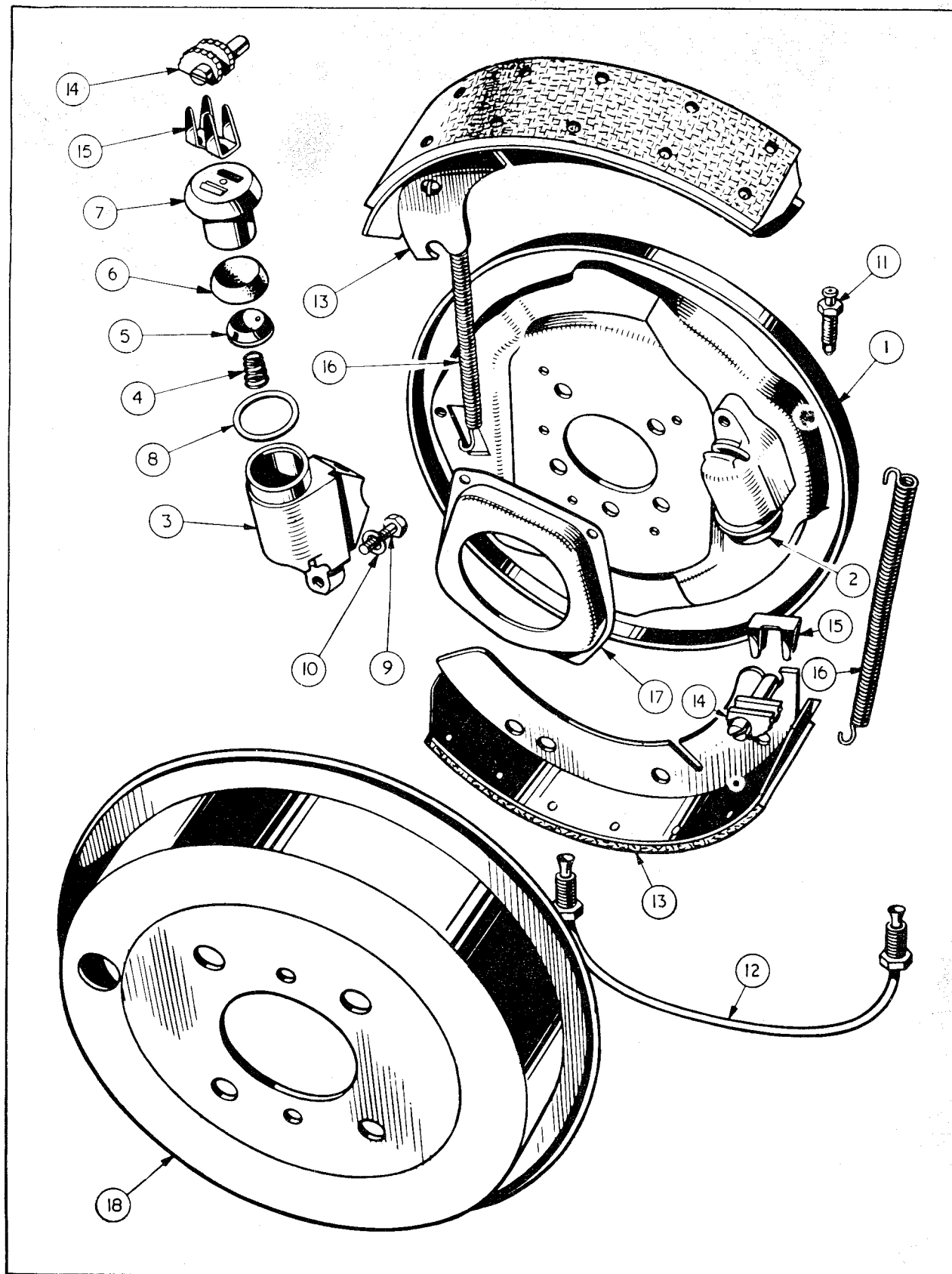


Fig. 5

Exploded view of Front Brake details.

## BRAKES

### 25. TO FIT FRONT WHEEL CYLINDERS

- (a) Mount the wheel cylinders on the back plate and secure each with a bolt and lock washer.
- (b) Connect bridge pipe to bottom bore of each wheel cylinder, utilising the union nuts trapped on the pipe. Ensure that the pipe is located on its seat before attempting to attach the nut. Tighten nut sufficiently to give an oil and air tight joint.
- (c) Attach the flexible hose to the upper bore of the rear cylinder, checking first that the copper gasket is in good order. Fit flexible hose to bracket on the chassis frame as described on page 5.
- (d) Fit bleed screw to upper bore of front wheel cylinder.
- (e) Fit brake shoes, taking care to locate the "micram" adjusters in the slots in the leading tip of each shoe, with the masks in position.
- (f) Fit brake drum and bleed hydraulic system as described on page 3.
- (g) Adjust brake as described on page 3.
- (h) Check the system for fluid leakage by applying a firm pressure to the pedal and inspecting the pipe line and connections.
- (i) Fit road wheel and nave plate. Remove jacks.

### 26. TO DISMANTLE FRONT WHEEL CYLINDER

- (a) Withdraw the piston complete with piston cover from cylinder body.
- (b) Apply low air pressure to the flexible hose connection, the rubber cup, the cup filler and spring can readily be removed.

### 27. TO ASSEMBLE FRONT WHEEL CYLINDER

Ensure absolute cleanliness during the assembly of these components. Assemble parts with a generous coating of clean Lockheed Brake Fluid.

- (a) Fit the smaller end of the coil spring over the projection in the cup filler and insert both parts into the cylinder body, with the spring leading.
- (b) Follow up with the rubber cup, lip end foremost, taking care not to damage or turn back this lip.
- (c) Feed in piston with cover in position.

### 28. REAR WHEEL CYLINDER

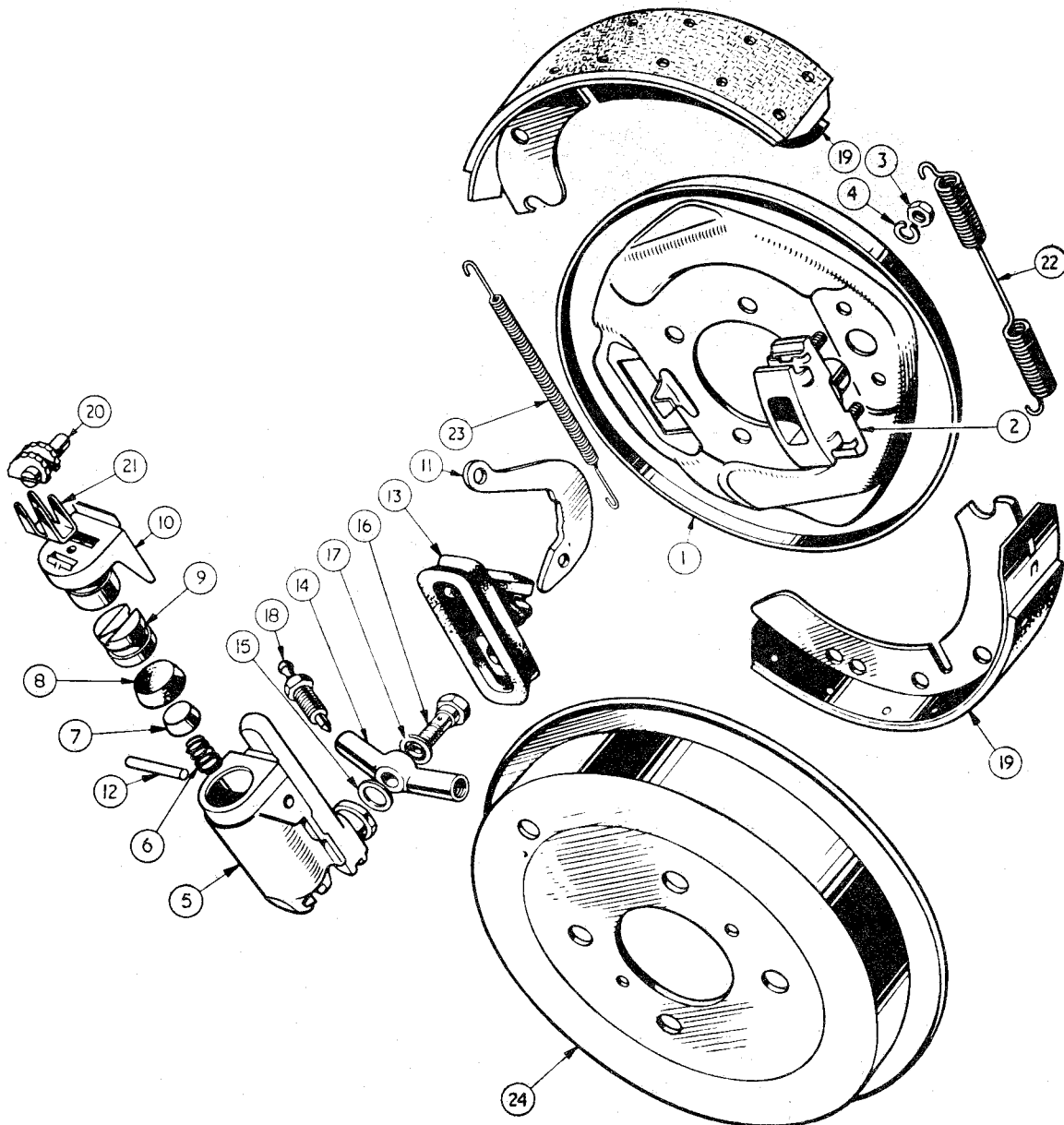
#### Description

The cylinder, which is fitted in an elongated slot in the rear brake plate, is free to slide in the slot between the tips of the brake shoes which are of the leading and trailing shoe type. The cylinder has a single piston operating on the tip of the leading shoe and this shoe abutts against a fixed anchor block at the bottom of the back plate, the web of the shoe being free to slide in a slot in a block. The trailing shoe is located in a similar manner between the anchor and the closed end of the cylinder and is free to slide and therefore self centring.

The trailing shoes are operated by movement of the reaction of the leading shoe against the brake drum. A "micram" adjuster is located in a slot in the top of the leading shoe.

The wheel cylinder contains a single piston, split in two, the inner piston being hydraulically operated while the outer piston is manually operated by the hand brake lever. A rubber cup mounted in the cup filler is loaded upon the inner piston by a spring. When operated hydraulically, the inner piston abuts against the outer piston leaving the handbrake lever undisturbed, and applies a thrust to the tip of the leading shoe through the dust cover, micram adjuster and mask. When operated manually, an inward movement of the hand brake lever brings the head of the contact lever into contact with the outer piston, thrusting it outwards against the leading shoe without disturbing the inner piston. A rubber boot is fitted to exclude water and foreign matter.

## BRAKES



**Fig. 6**

**Exploded view of Rear Brake details.**

### NOTATION FOR Fig. 6

Ref. No.	Ref. No.
1 Rear brake plate.	13 Rubber boot.
2 Abutment assembly.	14 Banjo connection.
3 Abutment attachment nut.	15 Small copper gasket.
4 Lock washer.	16 Banjo bolt.
5 Wheel cylinder body.	17 Large copper gasket.
6 Spring in body.	18 Bleed nipple.
7 Cup filler.	19 Brake shoe assembly.
8 Cup.	20 Micram adjuster.
9 Hydraulic piston.	21 Micram adjuster mask.
10 Handbrake piston assembly.	22 Tension spring.
11 Handbrake lever.	23 Brake shoes pull-off spring.
12 Handbrake lever pivot pin.	24 Rear brake drum.

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### 29. TO REMOVE REAR WHEEL CYLINDER

- (a) Jack up rear of car. Remove nave plate, road wheel and brake drum. Slacken off micram adjuster.
- (b) Drain off hydraulic fluid, disconnect handbrake cables and remove banjo bolt from banjo connection which is situated on the inner side of the brake plate.
- (c) Pull the trailing shoe against the load of the pull-off springs and away from its abutment at either end; on releasing tension of the pull-off springs the leading shoe will fall away. Collect the micram adjuster and mask.
- (d) Remove the rubber boot and the handbrake piston.
- (e) Swing the handbrake lever until the shoulder is clear of the back plate and slide the cylinder casting forward. Pivot the cylinder about its forward end and withdraw its rear end from the slot in the back plate. A rearward movement of the cylinder will now bring its forward end clear of the back plate.

### 30. TO FIT REAR WHEEL CYLINDERS

- (a) Offer up the rear wheel cylinder to the back plate with the handbrake lever to the slot. Engage the forward end of the cylinder in the slot and slide it well forward, taking care to position the lever so that the shoulder clears the back plate. Engage the rear end of the cylinder in the slot and slide it back to hold it in position.
- (b) Place the rubber boot over the handbrake lever and ease the boot round the wheel cylinder so that it provides maximum weather protection. Connect handbrake cable to lever, utilising a new split pin for the securing of the clevis pin.
- (c) Mount the banjo connection with new copper gaskets on the wheel cylinder and secure with banjo bolt.
- (d) Assemble the brake shoes, ensuring that the micram adjuster is in the slot in the leading shoe with the mask in position. Fit the brake drum.

- (e) Bleed the hydraulic system as described on page 3. Adjust the brake shoes as described on page 3.
- (f) Check the system for fluid leakage by applying firm pressure to the pedal and inspecting the line and connections.
- (g) Fit road wheel and nave plate. Remove jacks.

### 31. TO DISMANTLE REAR WHEEL CYLINDER

- (a) Withdraw the piston complete with piston cover from the cylinder body.
- (b) Remove the seal from the piston by easing out of its groove.
- (c) Drift out the handbrake lever pivot pin to remove handbrake lever.
- (d) Apply low air pressure to the inlet connection, the rubber cup, the cup filler and spring can readily be removed.

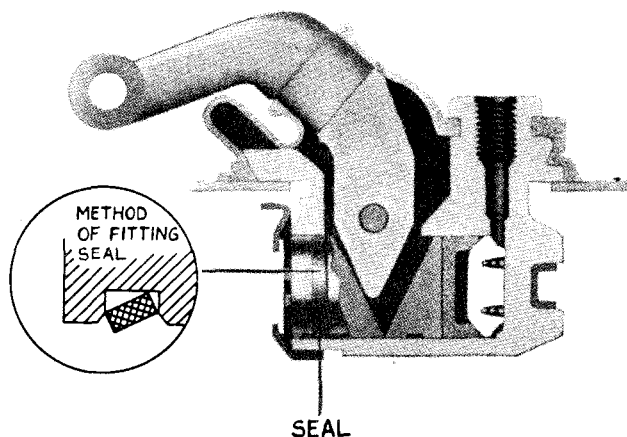


Fig. 7 Sectional view of Rear Wheel Cylinder.

### 32. TO ASSEMBLE REAR WHEEL CYLINDER (Fig. 7)

Ensure absolute cleanliness during the assembly of these components. Assemble hydraulic parts with a liberal smear of clean Lockheed Brake Fluid.

- (a) Fit the smaller end of the coil spring over the projection in the cup filler and insert both parts into the cylinder body with spring leading.

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- (b) Follow up with the rubber cup, lip end forward, taking care not to damage or turn back this lip.
- (c) Insert hydraulic piston into body ensuring that the slot coincides with the lever slot in the cylinder body.
- (d) Place the handbrake lever in position and fit pivot pin.
- (e) Stretch the handbrake piston rubber seal over the handbrake piston and place with dust cover in cylinder body, ensuring that the hand lever is engaged in the slot of the piston. The seal is to be twisted on its side so that the edge which tends to protrude from the groove enters the bore last.

### 33. TO REMOVE HYDRAULIC PIPE LINE FROM REAR AXLE

- (a) Remove rear flexible hose as described on page 6.
- (b) Disconnect the Bundy tubing at the brake plate by withdrawing union nut from banjo connection at each side.
- (c) Repeat operation (b) at three-way connection.
- (d) Remove Bundy tubing from axle by releasing pipe clips at each side.
- (e) The three-way connection can be removed after withdrawing bolt and lock washer.

### 34. TO FIT HYDRAULIC PIPE LINE TO REAR AXLE

The fitting of the Bundy tubing is the reversal of the removal but the following points should be noted:

- (a) The olives of the Bundy tubing should be correctly seated before securing the union nut.
- (b) The pipe clips should be attached in such a manner that the pipe is in no way squeezed or damaged.
- (c) The flexible hose is fitted as described on page 6.
- (d) The connections should be inspected for leaks by applying firm pressure to the foot pedal.

### 35. FITTING REPLACEMENT BRAKE SHOES

- (a) Jack up car and remove wheels, brake drums and slacken off all adjustment of micram adjusters.

- (b) Remove brake shoes and collect pull-off springs and adjusters.
- (c) Fit the replacement shoes and **new** pull-off springs after ascertaining that the brake linings are of the same material (see page 2).
- (d) Fit brake drum and adjust brakes as described in page 3.

### 36. TO REMOVE PEDAL ASSEMBLY

- (a) Working under the bonnet, drain both hydraulic systems and remove clevis pins from piston rods of twin master cylinder and disconnect pipe lines from rear of master cylinder.
- (b) Remove four nuts and lock washers from front end of master cylinder support bracket adjacent to pedal push rods.
- (c) From inside the car withdraw the two bolts and lock washers securing the side flanges of the pedal shaft casing to the bulkhead.
- (d) Remove the two bolts and lock washers from the front and rear flange of the shaft casing and remove pedal assembly from bulkhead. The support bracket with master cylinder attached can also be removed from top of bulkhead.

An alternative method of pedal assembly removal is to omit the draining of the hydraulic system and the disconnection of the pipe lines mentioned in operation (a), leaving the master cylinder and support bracket in position.

### 37. TO FIT PEDAL ASSEMBLY

- (a) Working inside the car, secure the pedal assembly to the bulkhead, utilising two bolts and lock washers and the front and rear mounting flanges.
- (b) Position the support bracket and master cylinder on the four studs protruding through the bulkhead shelf in such a manner that the clutch and brake piston fork ends engage with the two pedal levers.

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### NOTATION FOR Fig. 8

- 1 Pedal shaft cover assembly.
- 2 Clutch pedal.
- 3 Brake pedal.
- 4 Rubber pad for pedals.
- 5 Pedal pivot bush.
- 6 Pedal shaft.
- 7 Supporting bracket for pedal shaft.
- 8 Lock washer.
- 9 Bolt securing brackets to shaft.
- 10 Pedal return spring.
- 11 Lock washer.
- 12 Bolt securing pedal assembly to bulkhead.
- 13 Master cylinder support bracket.
- 14 Bolt securing pedal assembly and master cylinder support bracket to bulkhead.
- 15 Lockwasher.
- 16 Nut securing pedal assembly and master cylinder support bracket to bulkhead.
- 17 Clevis pin.
- 18 Double coil spring washer.
- 19 Plain washer.
- 20 Split pin.
- 21 Jam nut.
- 22 Pedal limit stop.

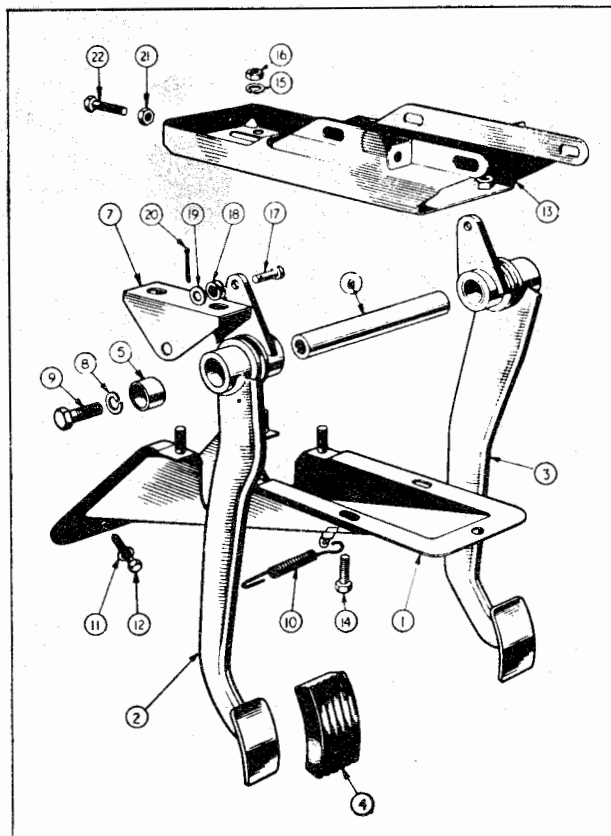


Fig. 8 Exploded view of Pedal Assembly.  
(R.H.S. shown.)

Attach bracket to bulkhead utilising four nuts and plain washers, these nuts are left loose at this juncture.

- (c) Inside the car the pedal assembly is further secured to the bulkhead by two bolts and lock washers, these bolts are fully tightened.
- (d) Under the bonnet, tighten the four nuts mentioned in operation (b). Connect the two pipe lines to their appropriate outlet ports and attach pedal levers to master cylinder fork end assemblies, utilising clevis pins.
- (e) Adjust pedal clearances as described on page 4.
- (f) Replenish reservoir with Lockheed Hydraulic Fluid.
- (g) Bleed and adjust clutch as described in Clutch Section "D".
- (h) Bleed brakes as described on page 3.
- (i) Adjust brake shoes as described on page 3.

### 38. TO DISMANTLE PEDAL ASSEMBLY

- (a) Suitably identify the pedals relative to their positions.
- (b) Release the tension of the return spring by withdrawing end from the anchoring tab. The spring can now be removed from the pedal.
- (c) Withdraw the two bolts and lock washers from pedal shaft support brackets and remove these brackets.
- (d) Drift out pedal shaft.
- (e) Lift out pedal assemblies from pedal shaft cover.

### 39. TO ASSEMBLE PEDALS

During assembly note the marked components and return them to their original positions.

- (a) Fit the pedals to the shaft cover assembly in such a manner that the wall of the cover pressing is accommodated in the recess in the revolving collar on each pedal.
- (b) Feed the pedal shaft through the pivots.

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- (c) Position the support brackets on the shanks of the welded bolts and allow the cut away side to drop into the recess of the revolving collar. Slight pressure may be necessary to bed this bracket.
- (d) Secure the bracket to the pedal shaft, utilising two bolts and lock washers, one each side.
- (e) Hook the return springs in the shaft of the pedals and anchor the other to the welded tab.

### 40. TO REMOVE HANDBRAKE LEVER

- (a) Chock the wheels, jack up the car and release handbrake.
- (b) Remove the bakelite handle grip and tape the thread for protection.
- (c) Withdraw the three self tapping screws securing the draught excluder plate to floor. Remove plate and draw draught excluder up the handbrake lever.
- (d) Working under the car, withdraw the clevis pin from the front fork end of the handbrake cable after first removing split pin and washer.
- (e) Release the tabs of the locking plate and withdraw two bolts securing attachment plate.
- (f) Remove the nyloc nut, locking pivot bolt to chassis frame.
- (g) Withdraw pivot bolt. The handbrake lever can be drawn downward through the floor.

### 41. TO FIT HANDBRAKE LEVER

- (a) Feed the pivot bolt through, first the lever assembly and then the mounting plate.
- (b) Working beneath the car feed the lever through the floor assembly and attach lever to chassis by the pivot bolt which is left loose at this juncture.
- (c) Utilising two bolts and a locking plate secure the lever mounting plate to the chassis frame and lock bolts with tabs of locking plate.

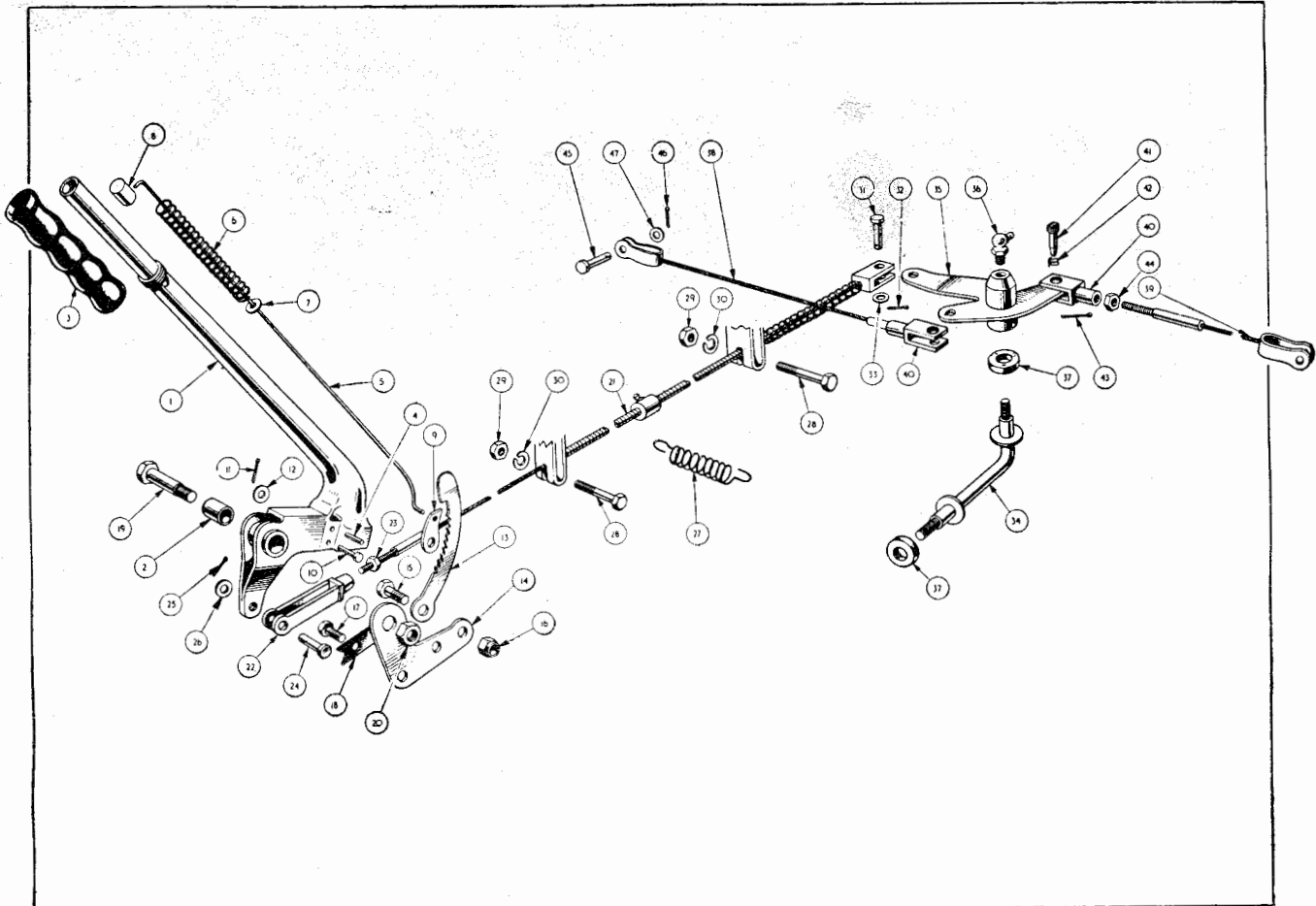
- (d) Tighten the pivot bolt leaving the lever freedom of movement and attach the locking nut to the pivot bolt from inside the cruciform. When tightening this nut the head of the pivot bolt must be held to ensure the freedom of movement of the lever.
- (e) Attach the fork end of the cable to the brake lever and secure with clevis pin, split pin and plain washer.
- (f) Working inside the car, feed the draught excluder on to the lever and secure to floor with plate and three self tapping screws.
- (g) The tape can now be removed from the thread and the bakelite grip screwed into position.
- (h) Lower the car and remove chocks from the wheels. No readjustment of the handbrake should be necessary as the lengths of the cables have not been altered.

### 42. TO DISMANTLE HANDBRAKE ASSEMBLY

- (a) Remove the bakelite grip and protect thread with tape.
- (b) Detach the attachment plate from the ratchet by removing the bolt and nyloc nut.
- (c) Remove the split pin and plain washer from the clevis pin, applying pressure to the press button at the top of the hand, withdraw clevis pin. This will allow the ratchet to become disengaged from the pawl and enable it to be withdrawn.
- (d) Releasing the pressure on the button and allow it to protrude through the lever casing under the influence of the spring. Remove button from push rod, followed by the spring and plain washer.
- (e) The push rod and pawl can now be withdrawn from the lower end of the lever and the pawl removed from the push rod.

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## BRAKES



**Fig. 9**

**Exploded view of Hand Brake Assembly.**

### NOTATION FOR Fig. 9

Ref. No.	Ref. No.
1 Lever assembly.	25 Split pin.
2 Lever pivot bush.	26 Plain washer.
3 Handbrake lever grip.	27 Anti-rattle spring.
4 Pawl stop mills pin.	28 Bolt.
5 Pawl release push rod.	29 Nut.
6 Pawl release spring.	30 Lock washer.
7 Plain washer between spring and lever.	31 Clevis pin.
8 Push rod button.	32 Split pin.
9 Pawl.	33 Plain washer.
10 Clevis pin, pawl to lever.	34 Compensator bar assembly.
11 Split pin.	35 Compensator lever assembly.
12 Plain washer between split pin and lever.	36 Grease nipple.
13 Ratchet.	37 Felt seal.
14 Attachment plate.	38 R.H. cable assembly 12.97" long. 12.47" } 10"
15 Set screw. Ratchet to attachment plate.	39 L.H. cable assembly 26.85" long. 26.35" } brakes.
16 Nyloc nut.	40 Fork end.
17 Set screw. Ratchet to attachment plate.	41 Swivel pin.
18 Tab washer on setscrews.	42 Anti-rattle spring.
19 Pivot bolt.	43 Split pin.
20 Nyloc nut.	44 Jam nut.
21 Cable assembly (handbrake to compensating lever).	45 Clevis pin.
22 Fork end.	46 Split pin.
23 Jam nut.	47 Plain washer.
24 Clevis pin.	



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### 43. TO ASSEMBLE HANDBRAKE ASSEMBLY

- (a) Feed the push rod into the lever from below so that its shape corresponds with that of the handle.
  - (b) Attach the pawl to the push rod so that it points rearward.
  - (c) Allow the push rod to protrude through the upper portion of the handle and feed on a plain washer and coil spring, followed by the button. Apply pressure to the button to compress spring.
  - (d) Hold the pressure on the button and feed the ratchet, teeth facing forward, into the lower portion of the casing, ensuring that it is positioned well inside the lever. Manipulate the pawl until its fulcrum hole is aligned with the hole in the lever and insert the clevis pin; pressure on the button can now be released. Secure clevis pin with plain washer and split pin.
  - (e) Secure the attachment plate to the ratchet, utilising a bolt and nyloc nut. Tighten the nut sufficiently to allow the attachment plate to swing on the ratchet. Failure to observe this instruction will result in imperfect handbrake operation.
  - (f) The tape protecting the thread can now be removed and the grip fitted.
- (c) Release the tension of the spring securing the brake cable to the gearbox tunnel. Withdraw the two bolts from the cable abutment brackets and remove cable assembly.
  - (d) Withdraw the split pins and clevis pins attaching the transverse cables to the levers on the brake backing plate.
  - (e) Remove the split pins and clevis pins at their inner ends, taking care to collect the anti-rattle springs. Remove cables from car.
  - (f) The compensator assembly can be removed from the axle by turning lever and bar assemblies independently in an anti-clockwise direction.

### 44. TO REMOVE HANDBRAKE CABLES

- (a) Let off the handbrake, lock the rear brakes on by turning the micram adjuster.
- (b) Withdraw the split pins and clevis pins at each end of the handbrake cable assembly.

### 45. TO FIT HANDBRAKE CABLES

The fitting is the reversal of the removal but the following points should be noted :—

- (a) The transverse cables should be of the correct length. R.H.  $12.97'' \pm .06''$  L.H.  $26.85'' \pm .06''$ . These measurements for 10" brakes are 12.47" and 26.35" respectively.
- (b) All cables and fulcrums should be thoroughly greased before fitting.
- (c) The bar assembly is attached to the axle with a new felt seal and then turned back one turn. This instruction also applies to the lever assembly when fitted to the bar assembly.
- (d) The handbrake is adjusted as described on page 3.

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# **Service Instruction Manual**

## **EXHAUST SYSTEM**

**S1**

**SECTION S**

# EXHAUST SYSTEM

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# EXHAUST SYSTEM

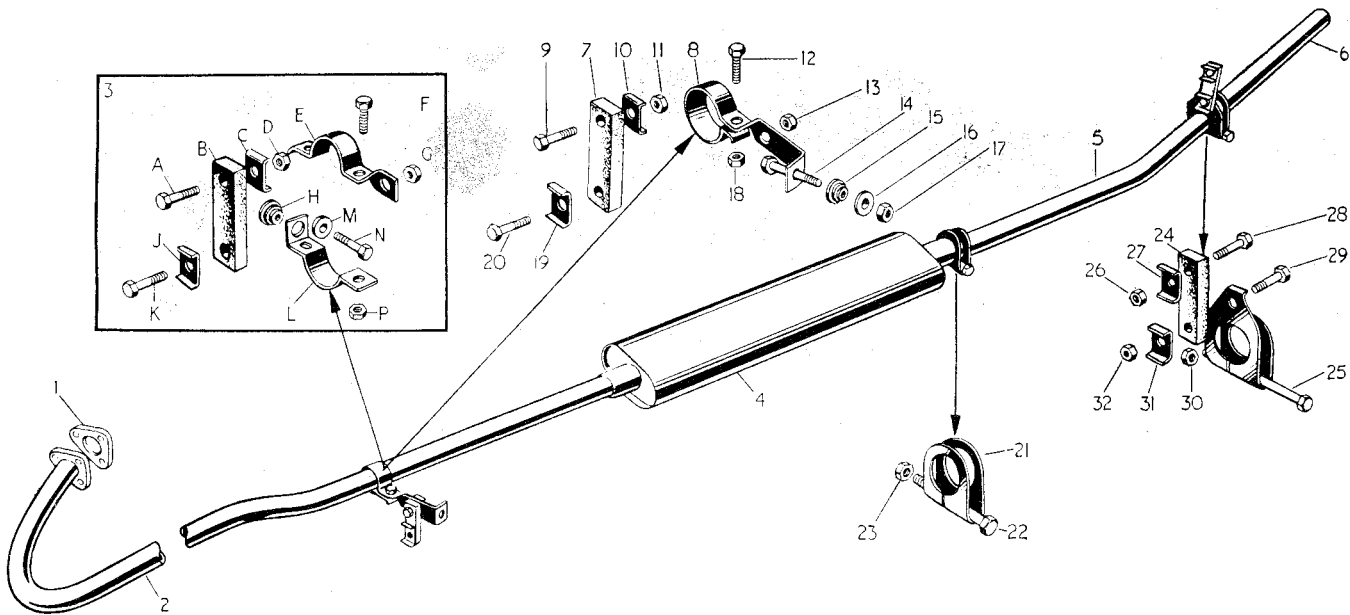


Fig. 1

Exploded view of Exhaust System.

## NOTATION FOR Fig. 1.

Ref. No.	Ref. No.
1 Exhaust flange joint.	10 Clamp plate.
2 Front exhaust pipe.	11 Attachment nut.
3 Prior to Commission No. TS.4310 only :	12 Clamp bolt
A Attachment bolt to chassis.	13 Attachment nut.
B Flexible mounting strip.	14 Attachment bolt to chassis frame.
C Clamp plate.	15 Rubber and steel grommet.
D Attachment nut.	16 Rubber and steel grommet.
E Exhaust pipe clip (Upper half).	17 Attachment nut.
F Clamping bolt.	18 Clamp nut.
G Attachment nut.	19 Clamp plate.
H Rubber and metal grommet.	20 Attachment bolt (Support bracket).
J Clamp plate.	21 Pipe clip.
K Attachment bolt.	22 Pinch bolt.
L Exhaust pipe clip (Lower half).	23 Nut for pinch bolt.
M Rubber washer.	24 Flexible mounting strip.
N Attachment bolt (Lower half clip).	25 Pinch bolt.
P Nut for clamp bolt.	26 Attachment nut.
4 Silencer.	27 Clamp plate.
5 Tail pipe assembly.	28 Attachment bolt to chassis.
6 Tail pipe extension.	29 Pipe clip attachment bolt.
7 Flexible mounting strip.	30 Nut for pinch bolt.
8 Exhaust pipe support bracket.	31 Clamp plate.
9 Attachment bolt to chassis.	32 Clip attachment nut.

## EXHAUST SYSTEM

### EXHAUST SYSTEM

#### 1. DESCRIPTION

The manifolds are attached to one another by studs in the aluminium alloy induction manifold and lugs moulded in the cast iron exhaust manifold. There is no "hot spot" for easy starting.

The exhaust system is situated on the right-hand side of the engine and passes down to the rear of the car through the centre of the cruciform to a position adjacent to the left-hand chassis member. The front exhaust pipe is attached to the engine by a flange and is flexibly mounted to the chassis frame at a point forward of the cruciform centre. This attachment also secures the pipe to the outside of the silencer. Cars with Commission No. TS.4310 and before has this clip in two halves as shown in Fig. 1.

Two types of silencers have been used in production, the former 18" silencer being changed for a 24" type at Commission No. TS.2532. A modified tail pipe incorporating a 12" silencer can be fitted, at the owner's discretion, to the shorter type silencer, if the exhaust note is considered too loud (see Fig. 2). This modified tail pipe fits into the main silencer and is attached with the existing clip.

At the rear the tail pipe is attached to the chassis by a flexible mounting strip and the clip secures the chromium plated extension piece inside the tail pipe.

#### 2. MAINTENANCE

The exhaust system should be inspected periodically to ensure its correct function. Attention should be paid to the gaskets at the cylinder head, carburettor and front exhaust pipe flanges to ascertain their condition. If signs of "blowing" are detected then gasket must be replaced as soon as possible. Manifold gaskets should be replaced as a pair and no gasket should ever be used twice.

The flexible mounting strips should be inspected and replaced if any deterioration is apparent.

The position of the silencer assembly in relation to the cruciform centre should always be such that during any vibratory period the exhaust system cannot come into contact with the cruciform.

#### 3. TO REMOVE AND DISMANTLE EXHAUST SYSTEM

- Working from the rear of the car loosen the bolt of the rear pipe clip attachment and withdraw exhaust pipe extension.
- Withdraw the lower bolt securing pipe clip attachment to flexible mounting strip and collect nut and lock washer.
- Loosen the pinch bolt of the pipe clip attachment at the rear of the silencer and withdraw tail pipe assembly.

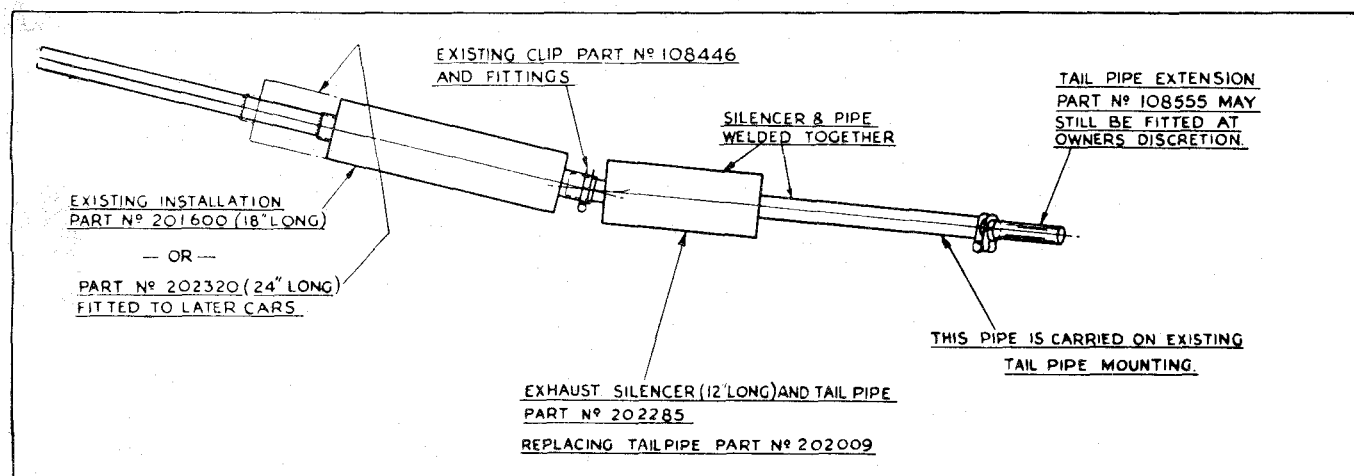


Fig. 2 Method of supplementary silencing provided by 18" Silencer, fitted prior to Com. No. T.S.2532.

## EXHAUST SYSTEM

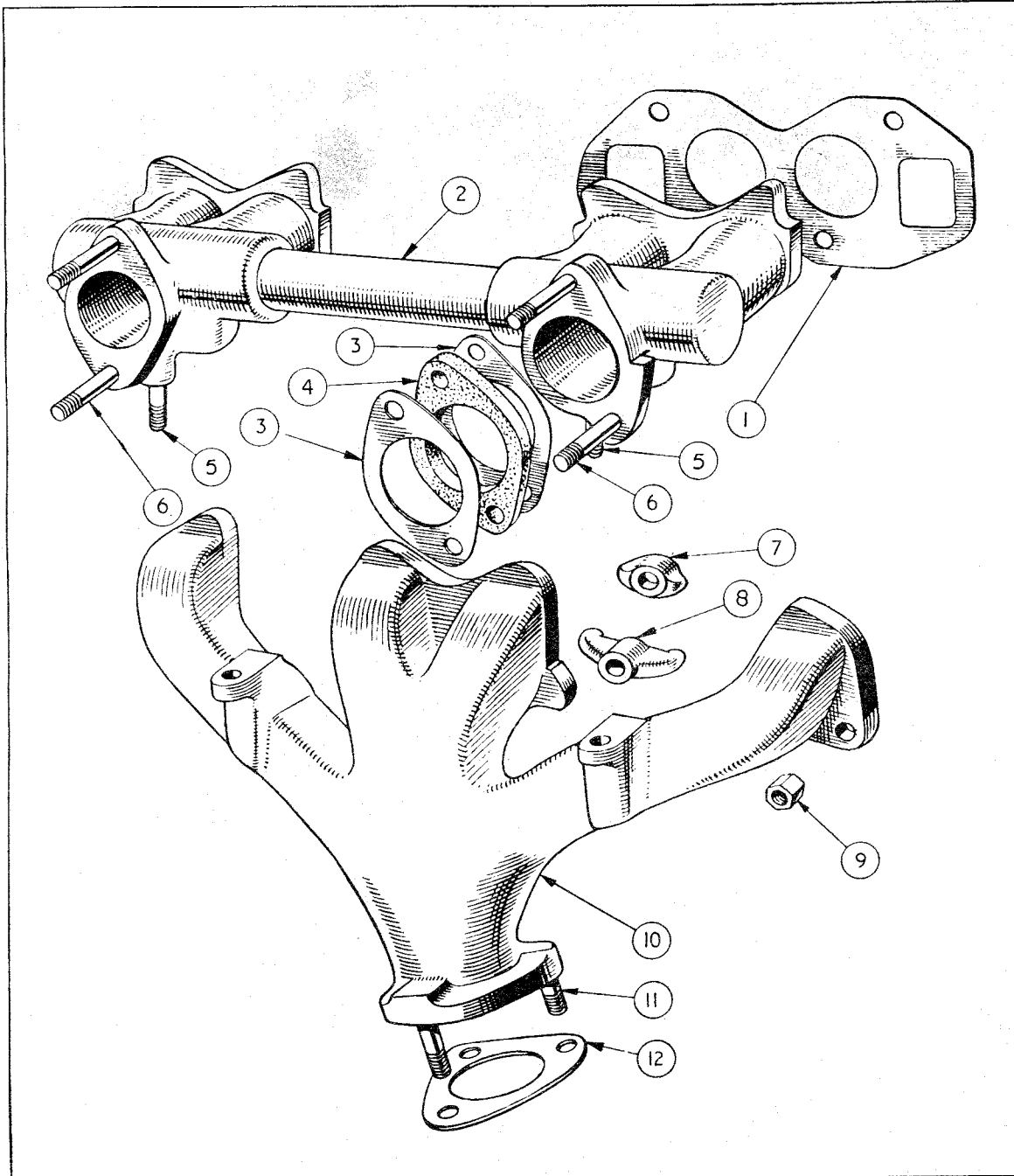


Fig. 3.

Manifold details.

### NOTATION FOR Fig. 3.

Ref. No.	Ref. No.
1 Manifold gasket.	7 Small manifold clamp.
2 Inlet manifold.	8 Large manifold clamp.
3 Joint washer.	9 Manifold securing nut.
4 Insulating washer.	10 Exhaust manifold.
5 Exhaust manifold attachment stud.	11 Exhaust pipe attachment stud.
6 Carburettor attachment stud.	12 Flange joint washer.

## EXHAUST SYSTEM

- (d) Loosen the pinch bolt (or bolts) forward of the cruciform centre and withdraw the silencer rearward.
- (e) Remove the lower bolt attaching flexible mounting strip to chassis frame. Remove the nut and bolt, collecting the rubber grommet and rubber washer securing the bracket to the chassis frame.
- (f) The front exhaust is detached from the exhaust manifold by the removal of three nuts with spring washers. After the joint is broken the front exhaust pipe is moved clear of the car.

### 4. TO FIT EXHAUST SYSTEM

The fitting of the system is the reversal of the removal but the following points should be noted:

- (a) It is suggested that work is started at the front as each component fits into the one in front.
- (b) Each mounting should be left loose and finally tightened when the position of the silencer is set. The front tube of the silencer assembly which passes through the cruciform centre will need setting to avoid the possibility of it vibrating against the cruciform centre. The mountings can be tightened progressively from front to rear.

- (c) If the tail pipe incorporating the small silencer is being fitted it is attached in a similar manner to the pipe and uses the existing clips. Fig. 2.

### 5. TO REMOVE MANIFOLDS

- (a) Remove the carburettors as described in the "Fuel" Section P.
- (b) Disconnect the exhaust pipe at the flange by removing the three nuts and spring washers.
- (c) Remove the eight nuts, spring washers and six clamps. Both manifolds together with the gaskets can be removed from the combustion head.
- (d) The manifolds can be separated by removing the two nuts and spring washers situated below the carburettor mounting flanges.

### 6. TO FIT MANIFOLDS

The fitting is the reversal of the removal but the following points should be noted :—

- (a) New gaskets should be used and so ensure gas tight joints.
- (b) The manifolds should be attached to the cylinder head before finally tightening the inter-connection nuts.
- (c) The carburettors must be synchronised before the car is ready for the road.



# **SERVICE INSTRUCTION MANUAL**

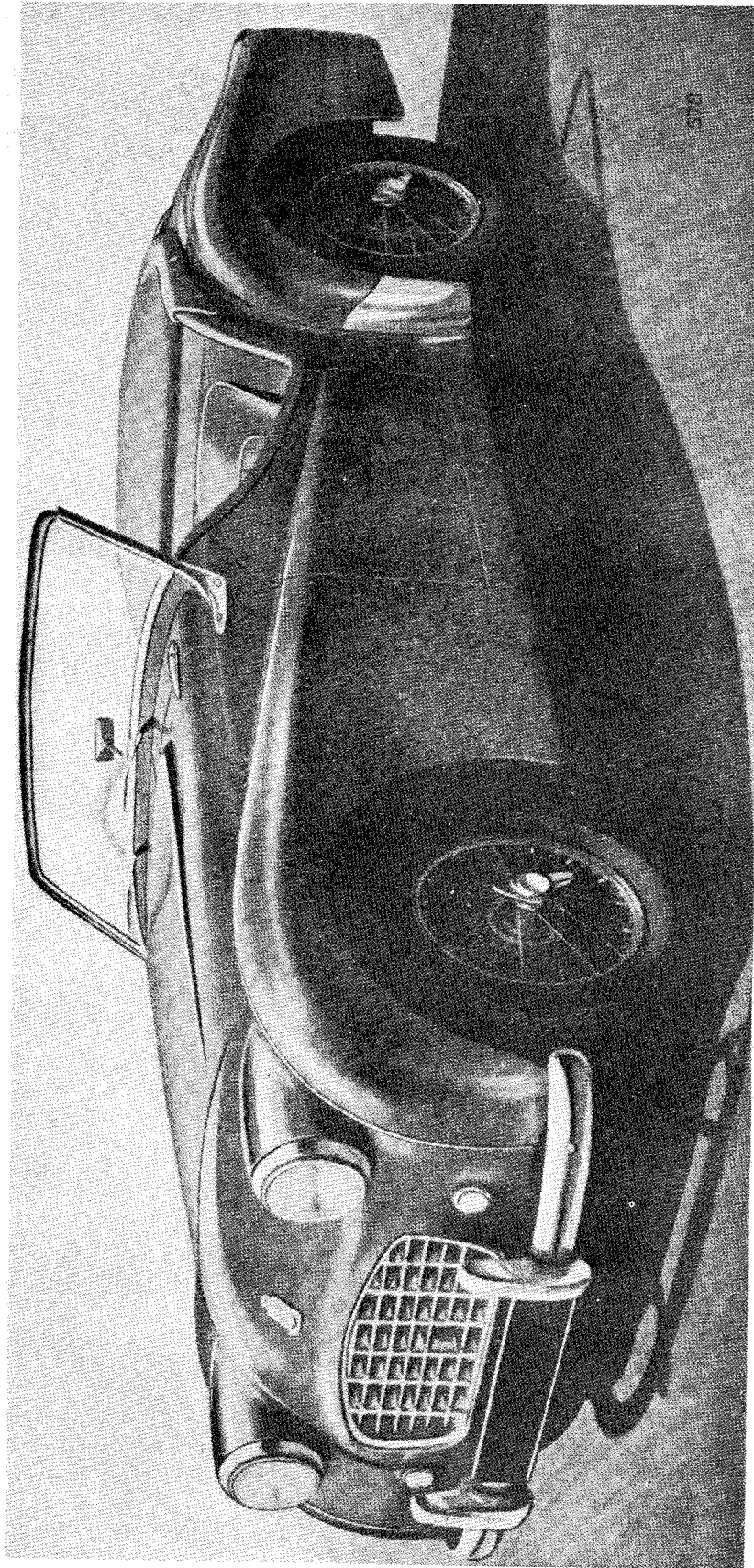
**SUPPLEMENT**

**TR3 MODELS**

**Issued by the**

**SERVICE DIVISION, THE STANDARD MOTOR CO. (1959) LTD.**

**COVENTRY, ENGLAND**



TR3

# Foreword

(1976 Edition)

The TR3 is a result of The Standard Motor Company's attempting to improve the appearance and the performance of the TR2. The improvements consist of a more stylish grille, a one-half gallon reduction in fuel capacity, a ten-horsepower increase in engine output, and the greater potential for the application of the overdrive. With the exception of the differences described in this Supplement, the specifications for the TR3 are the same as those previously set forth in this Manual for the TR2.

The TR3 was introduced in 1956 and was discontinued after 1961. During these years, "TR3" was the only designation used for the cars by the manufacturer. It has since become common to refer to the later models of the TR3 as the "TR3A" or "TR3B". The custom of adding letter suffixes to the TR3 designation deserves some explanation.

Owing to the larger carburetors and an increased compression ratio, the engine of the TR3 is more powerful than that of the TR2. In the United States, the TR3 was always advertised as having 100 B.H.P. at 5,000 R.P.M.—though the General Data given in this Supplement list the power as 95 B.H.P. at 4,800 R.P.M., which is the British rating. On TR3 cars with overdrive, the overdrive can be engaged on the top three gears whereas, on the TR2, overdrive is available on top gear only.

The 1957 TR3 is the earliest model equipped with the disc front brakes, the separate brake and clutch master cylinders, and the tapered-

roller bearing rear axle that are described in this Supplement. Also introduced on the 1957 models was an optional 4.1:1 ring and pinion gearset for cars equipped with overdrive. Road speed and ratio data for cars with the 4.1:1 rear axle can be found in Part 1 of this Manual.

The 1958 TR3 is the first model commonly referred to as a "TR3A" or "TR3B". The only significant differences between this model and the 1957 model are a wider grille, external door handles, reinforced bumper overriders, and redesigned bucket seats. The "TR3A" and "TR3B" are not different models; they are simply different people's designations for "wide grille" TR3 cars.

Only one important change was made to the TR3 between 1959 and 1961. During the last several months of manufacture, the 1991-cc TR3 engine was fitted with the "high port" cylinder head that was continued on the subsequent 2138-cc TR4. (The TR4 was also available on special order with a 1991-cc engine that had the "high port" head.) This cylinder head, which offers superior opportunities for high-performance modification, has intake ports that are set high in the casting so that there is no water jacket space above them. The first TR3 models with the "high port" head had a compression ratio of 8.5:1. The 1961 model was advertised, at least in the United States, as having a compression ratio of 9.0:1—the same as that of the TR4.



# GENERAL DATA

## GENERAL DATA

The information given in this section should be studied in conjunction with that given in the appropriate pages of the main Manual.

## CAMSHAFT BEARINGS

Vandervell shell bearings are fitted to the 2nd, 3rd and rear journals.

## CARBURETTORS

Two S.U. Type H6 carburettors are fitted. The early TR3 cars were fitted with carburettors having "TD" needles, but this needle was changed to type "TE" early in normal production and was, at Engine No. TS.10037E, superseded by type "SM". Where replacement needles are required for carburettors fitted with the early needles, both needles should be replaced by the "SM" needle.

## PERFORMANCE DATA

95 B.H.P. at 4,800 R.P.M.

## TRANSMISSION

### Ratios

	O/D Top	Top	O/D 3rd	3rd
Gearbox	.82	1.00	1.08	1.325
Overall	3.03	3.7	4.02	4.9

	O/D 2nd	2nd	1st	Rev.
Gearbox	1.64	2.00	3.38	4.28
Overall	6.07	7.4	12.5	15.8

### Engine Speed at

	10 m.p.h.	10 km.p.h.
	410 R.P.M.	245 R.P.M.
O/D Top	500	310
Top	540	340
O/D 3rd	660	410
3rd	820	510
O/D 2nd	1,000	620
2nd	1,680	1,050
1st	2,130	1,325
Rev.		

**AI**

# GENERAL DATA

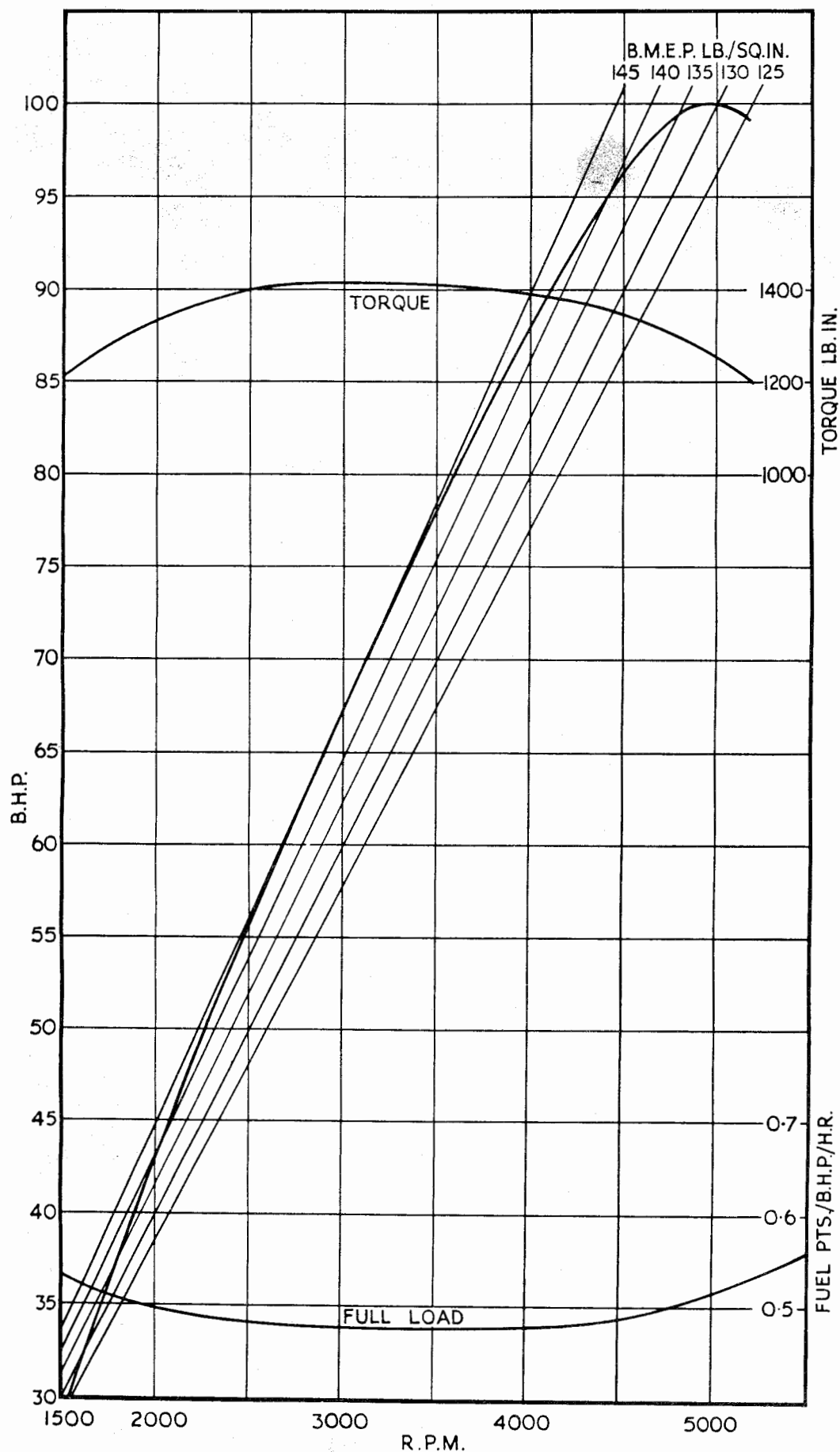


Fig. 1 Power Curve.

# ENGINE

## I. CYLINDER BLOCK

Vandervell replaceable shell bearings have been introduced for the 2nd, 3rd and rear camshaft journals. These are manufactured to very fine limits, and whilst certain fitting precautions must be observed, line boring of the assembled bearings is unnecessary. Removal of the rear bearing will necessitate the removal of the sealing disc behind it, which, in turn, will require the removal of the gearbox, clutch and flywheel. The tool illustrated in Fig. 1 is designed to assist in the removal and replacement of the bearings.

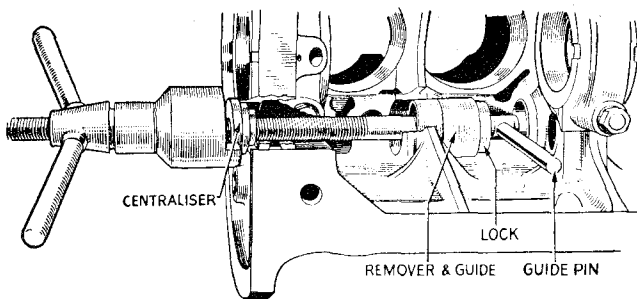


Fig. 1. Fitting Intermediate Camshaft Bearing using Churchill Multipurpose Tool No. 32 with Adaptors S.32-1.

### (a) Camshaft Bearings

To remove, proceed as follows :—

- (i) Using a suitable tool, drift the sealing disc out of the rear camshaft bearing housing.
- (ii) Unscrew and remove the three shouldered setscrews and plain washers which retain the bearings in position.
- (iii) Assemble the extracting tool and adaptors into the cylinder block as illustrated, and withdraw each bearing in turn.

### (b) To Fit New Bearings

See Fig. 1 and observe the following: The oil feed holes must be correctly aligned and when drawing the bearings into position all possible precautions should be taken to ensure that these **do not turn** and so misalign the holes. Ensure also that the locating hole in each bearing is centrally disposed in the tapped hole which accommodates the locating screw. Failure to observe

this instruction may result in the bearing becoming distorted when the locating screw is tightened.

Fit a plain steel washer of  $\frac{1}{16}$ " thickness (1.588 mm.) between the head of each locating screw and the cylinder block. Refit or replace the camshaft sealing disc if necessary.

## 2. ALUMINIUM PEDESTALS FOR ROCKER SHAFT

New rocker pedestal brackets of aluminium alloy were incorporated in normal production at Engine No. TS.12564E. The new metal, by reason of its higher degree of expansion when hot, enables the same rocker clearances to be used for exhaust valves as were previously applied only to the inlets. This reduction in the exhaust valve clearances has the advantage of reducing "tappet" noise when the engine is cold without any sacrifice of performance. Where it is desired to fit the new pedestal brackets, these should be fitted as a complete set, the part numbers being as follows :—

- Aluminium Pedestal Bracket (Plain)—  
3 off—Part No. 112546
- Aluminium Pedestal Bracket (Drilled)—  
1 off—Part No. 112545

## 3. PISTONS

From Engine No. TS.9731E, the pistons are fitted with :—

- 1 Plain ring.
- 1 Taper ring.
- 1 Oil scraper ring.

## 4. COMBUSTION HEAD

To further improve performance, "High Port" type combustion heads were incorporated in production at Engine No. TS.9350E. In countries where high octane fuel is unobtainable, the compression ratio may be lowered to 7.5/1 by the use of a compression plate, Part No. 200906. This plate must be used in conjunction with a steel "Corrojoint" gasket, Part No. 202775 in addition to the normal gasket.

When using this low compression plate it will also be necessary to use Champion L.10 sparking plugs gapped to 0.025" and special push rods, Part No. 114048.

## ENGINE

### 5. ENGINE OIL FILTER

In order to give the maximum protection to the engine when subjected to high speed or rally conditions, a new filter of the "full flow" type has been introduced on the TR3 models. This type of filter ensures that all the oil in circulation passes through the filtration system.

The "full flow" type of filter was introduced into normal manufacture at Engine No. TS.12650E., part numbers affected by this change being as follows :—

Oil filter assembly, Part No. 301994, is replaced by Part No. 203271.

The replacement Element, Part No. 101963, remains the same for both types of filter.

The oil pressure on the "full flow" type of filter remains at 70 lbs. per sq. in. with an oil temperature of 70°C. at an engine speed of 2,000 r.p.m.

The new filter assembly can be fitted if desired to an engine prior to TS.12650E.

### 6. SUMP

A special cast aluminium sump, Part No. 301318, and tray, Part No. 201984, are available as optional extras.

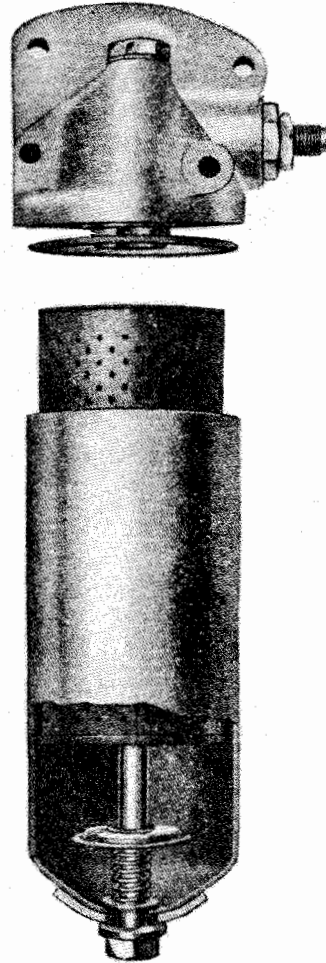


Fig. 2 Oil cleaner "full-flow" type.



# CLUTCH

## CLUTCH DRIVEN PLATE ASSEMBLY

An improved clutch driven plate incorporating a Belleville washer friction centre was fitted after Engine No. TS.7830E. (TR2).

The new driven plate can be recognised by four small tongues (or tabs) protruding through the spring retaining plates adjacent to the longer side of the splined hub and by the colour of the six cushioning springs, white and light green.

## HYDRAULIC OPERATING MECHANISM

This is described under "Girling Brakes and Hydraulic Clutch" in the "Brake" supplement.

DI

## REAR AXLE

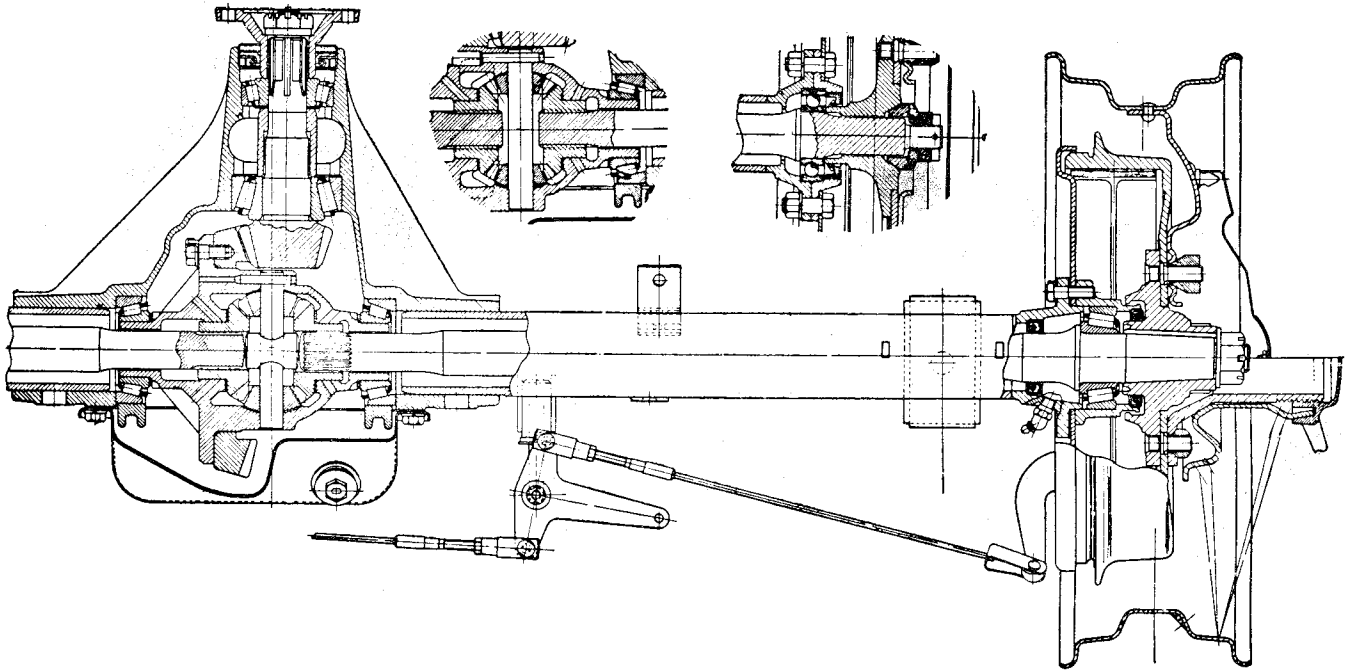


Fig. 1 Rear axle section (inserts indicate axle arrangement for cars up to Commission No. T.S. 1300).

# REAR AXLE

## I. GENERAL

A new rear axle assembly, Part No. 302177, bearing the Serial No. 13511, was introduced at Commission No. 13046 and fitted on all subsequent cars.

The major differences incorporated in the new axle include new half shaft and hub assemblies, a thrust button mounted on the differential cross-pin and adjustable taper roller hub bearings, as shown in Fig. 1. The sectioned insert views indicate the axle arrangement for cars prior to this change.

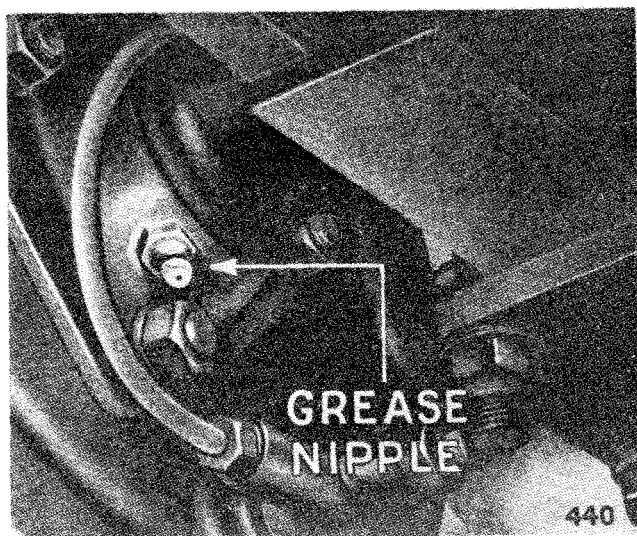


Fig. 2

Rear hub lubricator.

## 2. LUBRICATION OF REAR HUB BEARINGS

The rear hub bearings are each lubricated by a grease nipple located behind the brake backing plate and facing downwards, as shown in Fig. 2. The nipples should receive a small but regular supply of grease, as specified on pages 9-12 (Section "A"). Six strokes of the hand grease gun every 6,000 miles (10,000 km.) will normally be sufficient, as it is inadvisable to overload with grease.

## 3. AXLE SHAFT, WHEEL BEARINGS AND OIL SEALS

### (a) To Dismantle

The procedure is as follows:—

- (i) Jack up the rear of car, remove road wheel, unscrew two securing setscrews and detach brake drum from hub.

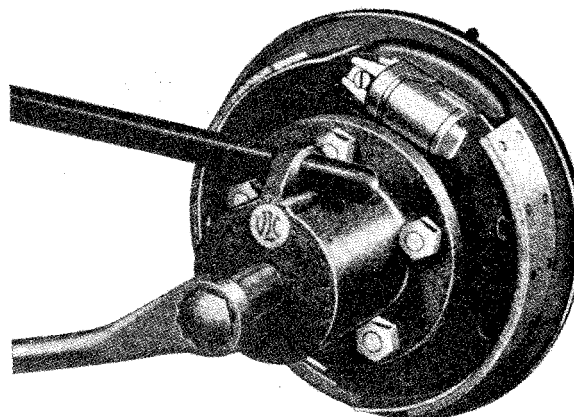


Fig. 3

Extraction of rear hub.

- (ii) Withdraw split pin and remove castellated nut from end of half shaft and remove rear hub with extractor, as shown in Fig. 3.
- (iii) Remove six setscrews securing the brake backing plate and bearing housing to the axle sleeve outer flange, then detach the bearing housing complete with the bearing outer ring.

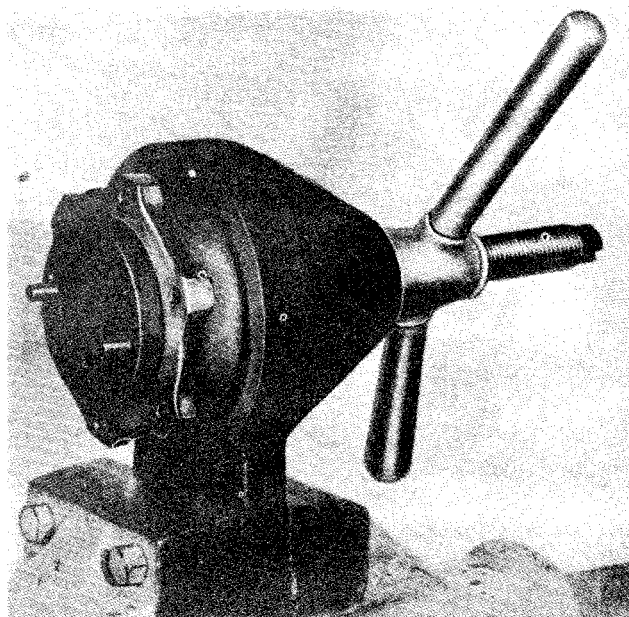


Fig. 4 Extracting outer ring of hub bearing from housing.

**Note.**—Removal of a half shaft does not normally require detachment of the brake backing plate, but if its removal is necessary, then the

## REAR AXLE

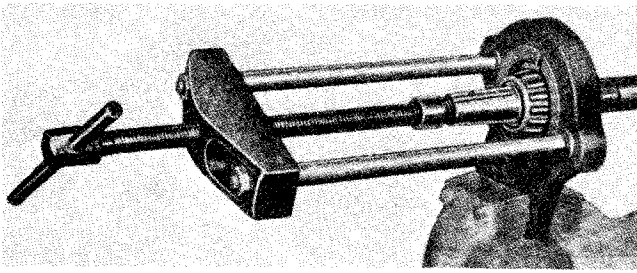


Fig. 5 Removing hub bearing inner ring.

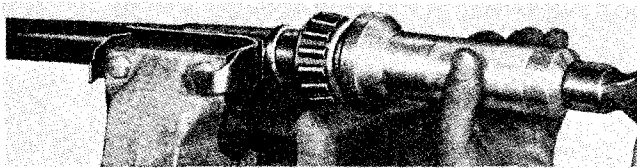


Fig. 6 Fitting hub bearing inner ring to axle shaft.

brake fluid pipe and the hand-brake attachments must first be disconnected and the backing plate subsequently removed.

- (iv) Extract the bearing outer ring from the housing, as shown in Fig. 4, after first tapping out the oil seal which should be renewed during re-assembly.
- (v) Withdraw the axle shaft and inner bearing ring. After first removing the driving key, the bearing inner ring is then removed by using the extractor, as shown in Fig. 5.

### (b) Inspection

Inspect bearing for looseness and roughness; the axle shaft for cracks and worn splines; the hub for loose wheel studs and worn keyway. Replace all parts which are excessively worn or defective in any way.

**Note.**—When inspecting rear axle hub bearings, apply as much load as possible by hand, as this enables noise and roughness to be more readily detected.

### (c) To Re-assemble

Continue as follows :—

- (i) Using a special tool, drive the hub bearing inner ring on to the axle shaft, as shown in Fig. 6, and refit key.

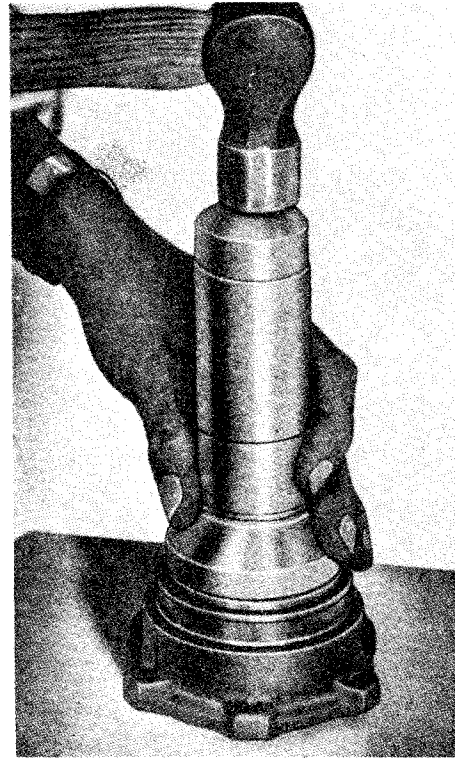


Fig. 7 Fitting oil seal into bearing housing.

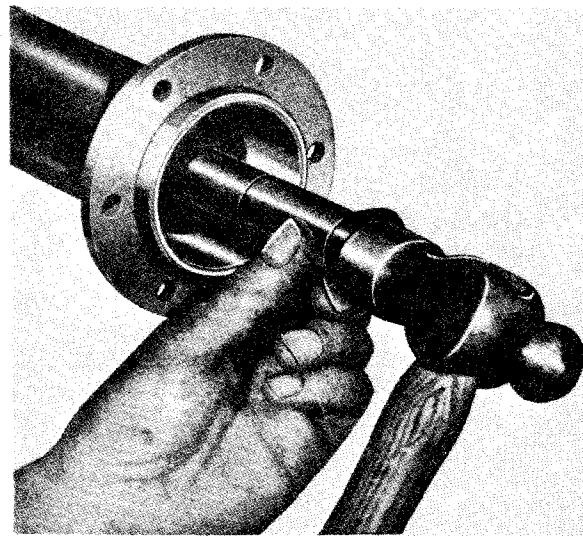


Fig. 8 Fitting oil seal into axle sleeve.

- (ii) Draw the bearing outer ring into the housing by using the same tool as shown in Fig. 4, and install a new oil seal (Fig. 7).
- (iii) Exercising care to avoid damage to the fabric face of the seal, thread the assembled bearing housing on to the shaft and refit

## REAR AXLE

hub, plain washer and castellated nut, tightening this to a torque of 125-145 lbs. ft. (17.29-19.71 kg. metres) and securing it with a split pin.

- (iv) Examine the inner oil seal and, if a replacement is necessary, proceed as shown in Fig. 8. Oil seal renewal is recommended in all cases of axle overhaul.
- (v) Replace the original shim pack over the spigoted portion of the axle sleeve, followed by the brake backing plate.
- (vi) Again exercising care in the case of the inner oil seal, thread the assembled axle shaft through the seal and into the axle casing. After locating the shaft splines in those of the sun wheel, secure the bearing housing by inserting and tightening six setscrews with lock-plates.

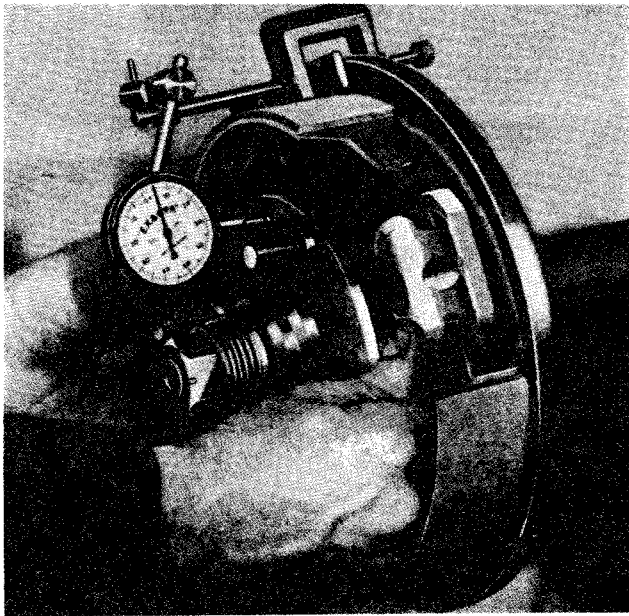


Fig. 9 Checking axle shaft end float.

### *Axle Shaft End-Float*

The specified axle shaft end-float is 0.004"-0.006" (0.102-0.152 mm.).

This can be checked by mounting a dial indicator on the backing plate, as shown in Fig. 9, then moving the hub

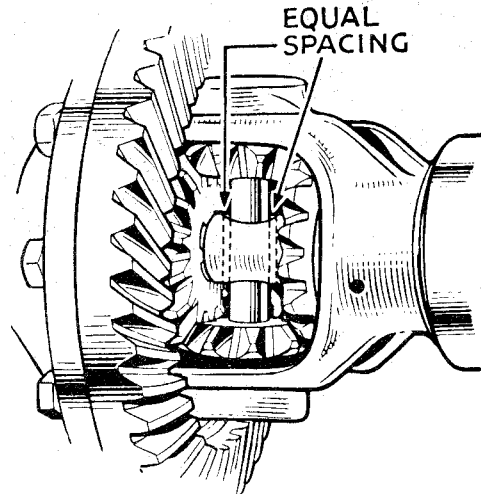


Fig. 10 Showing position of differential cross-pin in relation to thrust block.

towards and away from the axle casing. The dial indicator will then record the axle shaft end-float.

Adjustment is effected by adding to, or subtracting from the shim pack interposed between the axle sleeve flange and the brake backing plate, thus increasing or decreasing respectively the axle shaft end-float.

**Important.**—In addition to the existence of the specified end-float, it is important that the thrust block which separates the inner extremities of the two axle shafts, should have a clearance on the cross-pin, as shown in Fig. 10. To ensure centralization of the thrust block with the cross-pin, the shim packs behind both backing plates will be approximately of equal thickness.

- (vii) Replace brake drum, road wheel and, before removing the lifting jack, it is essential to grease the hub bearing.

## 4. DIFFERENTIAL AND PINION ASSEMBLIES

Except for the addition of a thrust block (item 15, Fig. 13), the crown wheel and pinion assemblies remain the same as fitted to the previous axle. Therefore, instructions for the servicing and adjustment of these assemblies are unaltered.

## REAR AXLE

### 5. HIGH SPEED AND COMPETITION WORK

#### (a) Rear Axle Assembly—ratio 4.1/1

A rear axle of the above ratio is available for high speed and competition work but is **only suitable for cars fitted with Overdrive**. The installation and servicing procedure is the same as for standard ratio axles.

Crown wheel (41 teeth) Part No. 202579

Pinion (10 teeth) Part No. 202580

Complete axle assembly (for wire wheels) Part No. 505179  
(for disc wheels) Part No. 503930

#### (b) Speedometer

The following special ratio speedometers are necessary when using 4.1/1 axles :—

Speedo — Kilo. Part No. 113632  
Speedo — Mile Part No. 113631

#### (c) Centre Lock Adaptors

(Wire Wheel)

These splined hub extensions are attached to the hubs by shorter studs than normally used for disc wheels. Figs 11. and 12 show the extensions being fitted and the existing studs sawn-off flush with the outside of the wheel nuts.

Hub Extension

(L H ) Part No 202447

(R.H.) Part No. 202446

Knock-off Wheel Nut

(L.H.) Part No. 107949

(R.H.) Part No. 107948

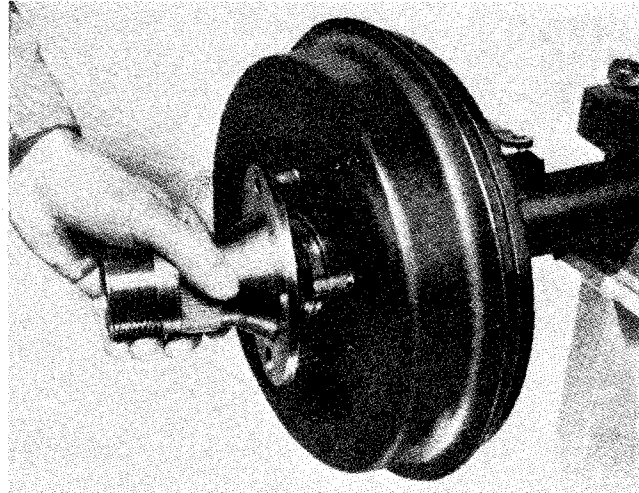


Fig. 11 Fitting splined hub extension to normal hub.

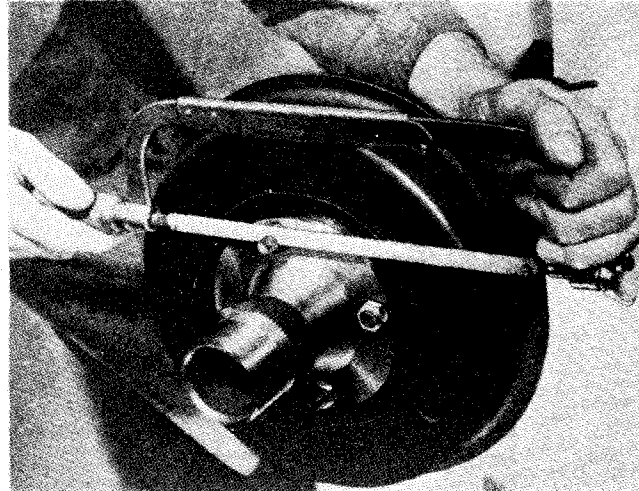


Fig. 12 Reducing length of studs to enable wire wheels to be fitted.

#### NOTATION FOR EXPLODED ARRANGEMENT OF REAR AXLE (Fig. 13)

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
1	Axle casing assembly.	18	Crown wheel securing bolt.	35	Fibre washer for (34).
2	Bearing cap setscrew.	19	Plain washer for (18).	36	Axle half shaft.
3	Spring washer.	20	Three hole lockplate for (18).	37	Rear hub bearing.
4	Axle case breather.	21	Two hole lockplate for (18).	38	Hub bearing housing.
5	Fibre washer.	22	Pinion head bearing.	39	Oil seal for hub bearing housing.
6	Drain plug.	23	Adjusting shims for (22).	40	Adjusting shims for hub bearing.
7	Differential bearing.	24	Bearing spacer.	41	Lockplate.
8	Adjusting shims for (7).	25	Pinion tail bearing.	42	Setscrew for securing housing.
9	Differential casing.	26	Adjusting shims for (25).	43	Hub.
10	Differential sun gear.	27	Pinion shaft oil seal.	44	Road wheel attachment stud.
11	Thrust washer for (10).	28	Pinion driving flange.	45	Hub driving key.
12	Differential planet gear.	29	Driving flange securing nut.	46	Hub securing nut.
13	Thrust washer for (12).	30	Plain washer for (29).	47	Plain washer for (46).
14	Cross pin.	31	Split pin for (29).	48	Split pin for (46).
15	Thrust block.	32	Rear cover.	49	Cover plate securing screw.
16	Lock pin for securing (14).	33	Joint washer for (32).	50	Spring washer for (49).
17	Crown wheel and pinion.	34	Oil filler plug.	51	Axle tube oil seal.

# REAR AXLE

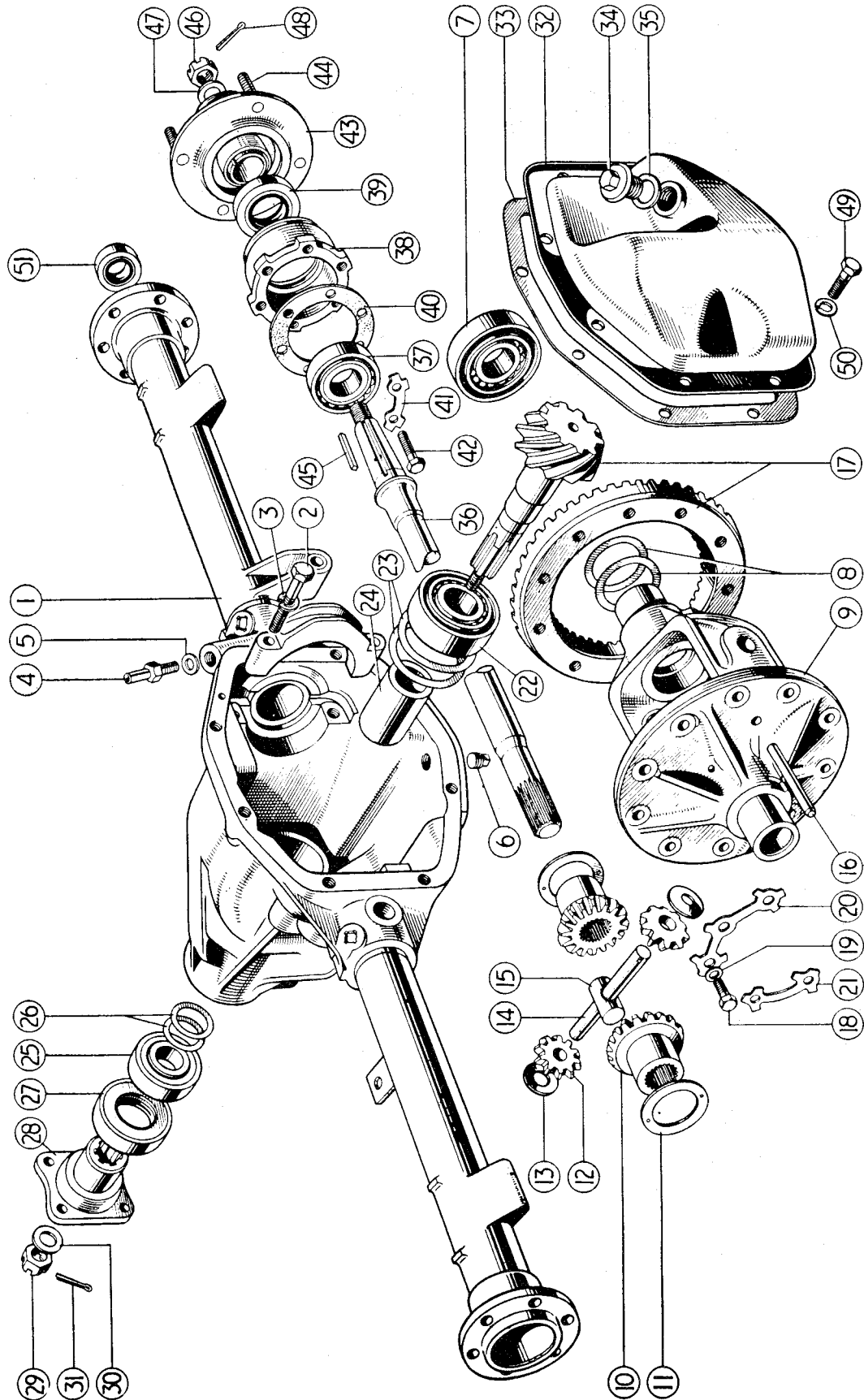


Fig. 13

Arrangement of Axle Components.

F





# FRONT SUSPENSION AND STEERING

## NYLON BEARINGS

### LOWER INNER WISHBONE ATTACHMENT

These bearings supersede the rubber bushes and were introduced into production at car Commission No. TS.9121.

They are as follows :—

- (a) Nylon bearing. 4 off. Pressed into each wishbone arm.
- (b) Steel bush. 4 off. Fitted to fulcrum pin.
- (c) Sealing rings. 8 off. Fitted to outside edge of nylon washers.
- (d) Nylon washers. 8 off. Fitted each side of wishbone arms.

When these bearings are being fitted the following instructions must be observed :—

- (i) Fit the rubber sealing rings to the nylon washers.
- (ii) Press the nylon bushes into the inner ends of the wishbone arms.

The following four instructions supersede the operations **x** and **xii** on page 12 in the main manual Front Suspension Section "G".

- (i) Smear the fulcrum pin situated on the upper face of the chassis frame with grease and feed on the steel bushes.
- (ii) Smear the outside of the bushes with grease and feed on a pair of nylon washers complete with sealing rings.
- (iii) Feed the wishbone arms on to the steel bushes on the inner fulcrum pin and on the shackle pins of the vertical link simultaneously; followed by a second pair of nylon washers and sealing rings.
- (iv) Fit the triangular support plates and secure with nyloc nuts but leave finger tight at this juncture. Refer to the main section of the manual as mentioned previously for the wishbone arm outer attachments.

**GI**



# BODY

## 1. BODY SPECIFICATION

Provision is made for the installation of an occasional bench seat in the luggage compartment immediately behind the driver and passenger seats.

## 2. REVEAL MOULDING AND GRILLE

A chromium plated moulding is fitted to the front rim of the air intake with a grille mounted immediately behind.

## 3. STAINLESS STEEL WING BEADING

The stainless steel wing beadings are positioned between the front and rear wings and the body of the car.

## 4. PASSENGER SEAT

A folding squab seat is now fitted to allow easier access to the luggage space behind or to the occasional seat if the car is so fitted.

## 5. OCCASIONAL REAR SEAT

These seats are an optional extra on the TR3 models. Provision is made for the installation of this seat in each car.

## 6. TO REMOVE REVEAL MOULDING AND GRILLE

- (a) Withdraw the self-tapping screw from each end of two horizontal grille bars.
- (b) Ease the upper portion of the grille into the air intake and withdraw the assembly when it is inclined approximately 30°.
- (c) Slide the moulding joint plates to one side to expose the joint in the mouldings.
- (d) Remove the nuts and lock washers from the stud plates securing the mouldings to the air intake and withdraw the two half mouldings. Access to these nuts entail working behind the front cowl.
- (e) The stud plates can be withdrawn by sliding them to the end of each half moulding.

## 7. TO REFIT REVEAL MOULDING AND GRILLE

- (a) Slide the joint plates on to the ends of any one moulding.
- (b) Position five stud plates in the upper half of the beading and six in the lower half at intervals to align with the holes in the air intake periphery.
- (c) Attach the two halves of the reveal mouldings to the air intake with nuts and lock washers.
- (d) Slide the joint plates from one moulding to the other and position in such a manner that the joint is covered.
- (e) Feed the grille in, top side first, and settle the extremities of the vertical struts adjacent to the reveal moulding already installed.
- (f) Secure the grille by four self-tapping screws one at each end of two of the horizontal bars.

## 8. TO REMOVE OR FIT WING BEADING

This is effected by removing or fitting the front and rear wings as described on page 4 of the Body Section in the main portion of the Manual.

## 9. TO REMOVE PASSENGER SEAT SQUAB

- (a) Remove the cushion from the seat pan.
- (b) Remove the two domed nuts at the base of the seat squab.
- (c) Spring the squab from the seat pan.

## 10. TO FIT PASSENGER SEAT SQUAB

- (a) Position the seat squab on the seat pan studs and attach with the dome nuts.
- (b) Fit the back of the seat cushion under the spring clip at the rear of the seat pan and settle cushion into position.

## **BODY**

### **II. TO FIT OCCASIONAL SEATS**

- (a) Slide the driver and passenger seats forward to their fullest extent.
- (b) Lift up the carpet at the rear of the two seats and remove the two bolts and washers so exposed.
- (c) Make two small holes in the carpet to align with the tappings in the floor assembly.
- (d) Withdraw the two chrome headed bolts and washers from the trim at the rear of the passenger compartment.

- (e) Position the occasional seat behind the driver and passenger seats and secure with four bolts removed during the previous operations.

### **12. TO REMOVE OCCASIONAL SEAT**

- (a) Withdraw the four attachment bolts and plain washers.
- (b) Remove the seat from the rear of the passenger compartment.
- (c) Return the bolts and plain washers to their tappings for safe keeping.

## BODY

# TR2 & 3 "HARD TOP" INSTALLATION

### Description

The "Hard Top" is of pressed steel construction, incorporating channel sections which are spot welded to the main panel. These channels considerably stiffen the assembly and also accommodate the front and rear mounting brackets. The sides of the main panel are folded to form a "U" section which further strengthens the construction and also serves as a means of securing the drip channels and draught sealing rubbers. The "Hard Top" is supplied completely trimmed less the rubber sections and the rear window light, all of which are included in the kit for fitting at a final stage.

The "Hard Top" Kit No. 900771 (less side screens) contains the following items :—

Detail No.	Description	No. off.
800840	Drip channel R.H.	1
800839	Drip channel L.H.	1
603328	Seal rubber screen top	1
603116A	Seal rubber backlight	1
603116B	Seal rubber backlight filler	1
602269	Seal strip waist	1
603089	Seal rubber drip channel	2
553132	Backlight (Perspex)	1
553742	Hard top (Metal)	1
	Headlining (fitted)	1
602299	Tapping plate	5
WQ0305	Spring washer	10
502406	Screw (drip channel attachment)	24
602295	Fixing screw (screen bracket)	3
602938	Protection plate (side cappings)	2
500488	Round headed screw (protection plate)	10
603189	Bracket (windscreen fitting)	3
602380	Fix washer (windscreen fitting)	3
602939	Protection plate (rear cappings)	3
602943	Washer	5
602326	Bridge piece	5
602327	Dome headed screw	5
501434	Screw (bracket to screen)	6
TR.6503	Round headed screw (tapping plate)	10

Detail No.	Description	No. off.
500229	Round headed PK screw (drip channel)	10
502233	Countersunk screw (screen rubber)	12
WN.0705	Shake proof washers (bracket to screen)	6
CD13515	Cup washers	22

When required for TR2 cars, sliding side lights must be ordered separately.

### Caution

The fitting of "Hard Tops" to early cars may present some difficulty due to the inconsistencies of body dimensions, a feature not uncommon with hand made bodies. Present manufacturing methods make use of more elaborate assembly jigs which result in the maintenance of close body tolerances. A further cause of a badly fitting "Hard Top" may be the result of bent screen pillars which have become displaced by heavy drivers or passengers pulling on the windscreen to remove themselves from the car. When fitting, the "Hard Top" must be initially positioned from the screen, it should be appreciated, therefore, that any misplacement of the screen itself will move the "Hard Top" out of position at the rear of the car. No difficulty should be experienced with cars in normal condition after Commision Number TS.6824.

NI

### I. CAR PREPARATION

To prepare the car for the installation of a "Hard Top", prepare as follows :—

- (a) Starting at the screen rail, remove the hood by lifting the fasteners from around the edge of the body.
- (b) Release the hood webbing at the rear by removing the two flat headed screws and the two hood fastener screws. (Fig. 1.)

## BODY

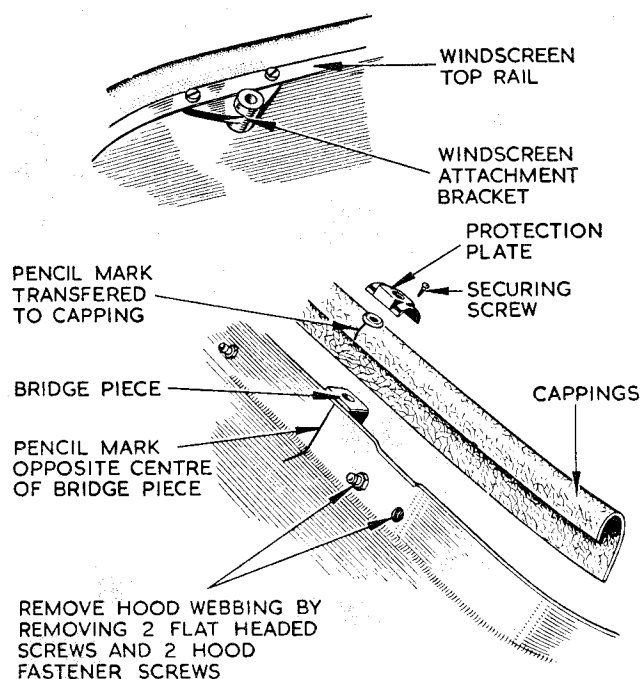


Fig. 1 Marking and fitting Rear Cappings.

- (c) Unscrew and remove the four counter-sunk screws securing the hood frame to the body, and then lift the frame out of the body.
- (d) Detach the five cappings from the elbow rail after removing the P.K. securing screws. Remove the two wood blocks from the elbow rail. (Fig. 2.)
- (e) Remove the millboard from the front of the petrol tank after removing the P.K. securing screws. (Fig. 2.)

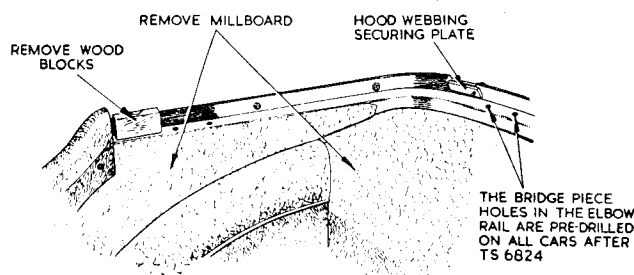


Fig. 2 Showing Cappings removed.

**NOTE**—The P.K. screws securing the bottom of the millboard can be removed after lifting the rear of the carpet.

## 2. HARD TOP PREPARATION

- (a) Loosely assemble the three windscreen attachment brackets on the "Hard Top" front rail.
- (b) If not already fitted, insert the three shorter angle brackets through slots in the stiffener rail at the rear of the "Hard Top", and a longer angle bracket at each side. Using short flat headed screws and lockwashers, secure the brackets in position. (Fig. 4.)

**NOTE**—It will be necessary to neatly cut the trim fabric to allow entry of the brackets into the slots in the stiffener channel.

## 3. WINDSCREEN ATTACHMENT BRACKETS—TO FIT

**CAUTION**—To guard against the possibility of damage to paintwork, masking tape should be applied to that part of the body which will be in contact with the hard top during fitting operations.

- (a) Position the hard top on the car and feed the assembled brackets under the windscreen top rail.

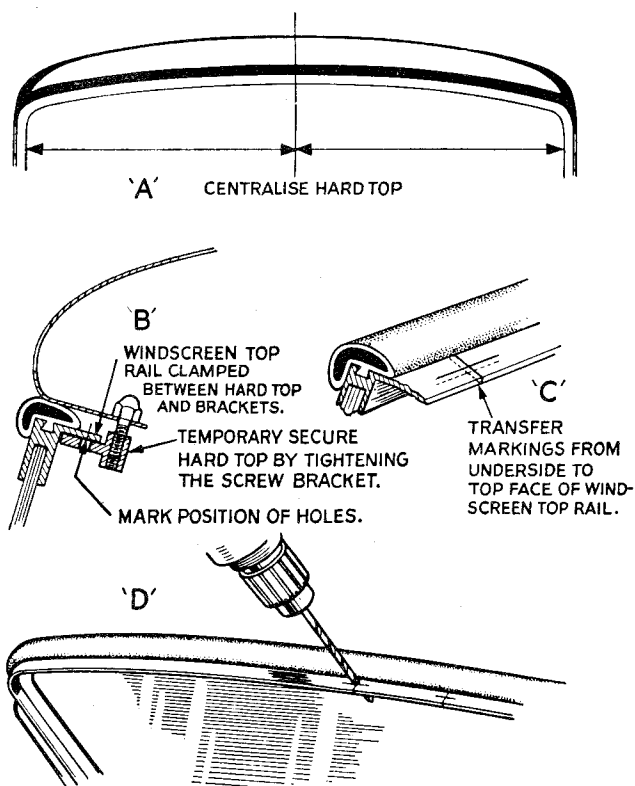


Fig. 3a, b, c and d Positioning "Hard Top" and drilling Screen Rail.

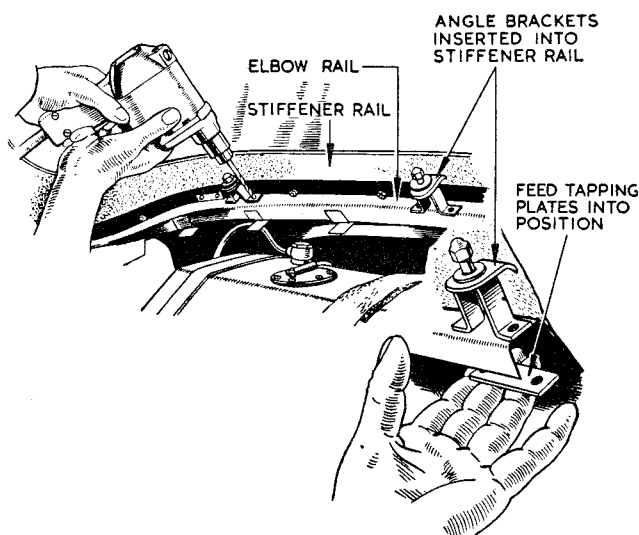
## BODY

Centralise the "Hard Top" over the windscreen and temporarily secure by tightening the three attachment brackets. (Fig 3A.)

- (b) Mark the position of the attachment bracket holes on the underside of the windscreen top rail (Fig 3B). Slacken off the brackets then remove the "Hard Top" from the car.
- (c) Mark the top side of the screen exactly in line with the markings previously made on the underside (Fig. 3C). Using a No. 11 drill, carefully drill six holes from the above screen and  $\frac{3}{16}$ " from the edge. (Fig. 3D.)
- (d) Remove the windscreen attachment brackets from the "Hard Top" and finally secure to the underside of the windscreen top rail by six chromium plated screws and lock washers. (Fig. 1.)

### 4. BRIDGE PIECES—TO FIT

- (a) Loosely secure the five bridge pieces to the angle brackets previously fitted in the rear stiffener rail. (Fig. 4.)
- (b) Reposition the "Hard Top" to the car and secure to the three windscreen attachment brackets. The bridge pieces will now be resting on the elbow rail channel. (Fig. 4.)



**Fig. 4 Drilling the Elbow Rail and installing Bridge Pieces.**

**NOTE:** Drilling should only be necessary on Cars prior to TS.6824.

- (c) Mark the position of the bridge pieces on the elbow rail and identify them to these positions. Release the "Hard Top" at the windscreen and remove from the car.
- (d) Using a No. 11 drill, drill ten holes through the markings on the elbow rail.
- (e) Remove the bridge pieces from the "Hard Top" and secure to the elbow rail channel, using flat headed screws which screw into tapping plates fed into position under the channel. (Fig. 4.)

### 5. REAR CAPPINGS—TO FIT

- (a) Opposite to the centre of each bridge piece, scribe a line with a pencil on the body protection tape. Attach the cappings to the body, loosely securing with the P.K. screws. (Fig. 1.)
- (b) Over the cappings, extend the markings previously scribed on the body. Remove the cappings from the car. Scribe the inside of the cappings exactly in line with the marks on the outside. (Fig. 1.)
- (c) Using a  $\frac{3}{8}$ " drill, drill the cappings at the positions marked on the insides and ensure that when drilled, the holes are aligned with those in the bridge pieces.
- (d) Attach the millboard to the front of the petrol tank and secure with P.K. screws. Refit the cappings over the bridge pieces and secure.
- (e) Select the three narrow protection caps and position these on the rear cappings, aligning the centre holes with the threaded centres of the bridge pieces. Drill the cappings through the protection caps and secure with P.K. self tapping screws. The two larger caps are fitted in a similar manner to the side elbow rails. (Fig. 1.)

- (f) Fit four countersunk screws and chromium washers in the holes previously used to accommodate the hood bracket screws. Remove the protecting tape from the body of the car.

## BODY

### 6. DRIP CHANNELS—TO FIT (See Figs. 5 and 6)

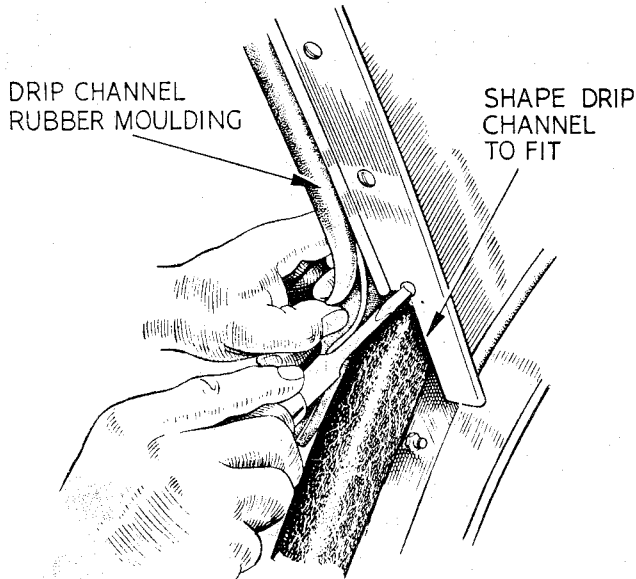


Fig. 5 Fitting lower part of Drip Channel.

After correctly shaping the ends of the drip channels, position the channels and draught rubbers "C" on the "Hard Top" as illustrated and secure with the screws "A" and "B". (Fig. 6.)

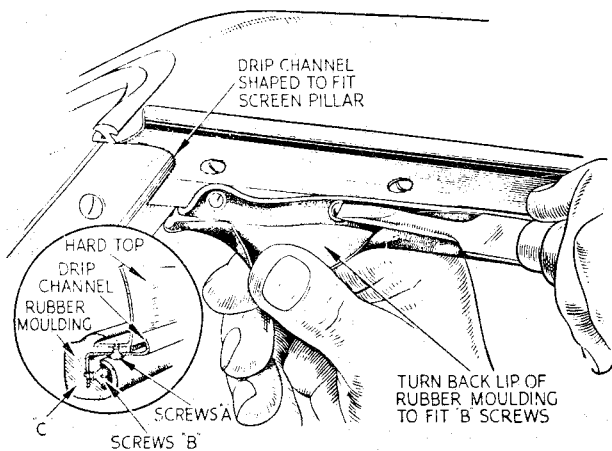


Fig. 6 Fitting Drip Channel and Draught Rubber.

### 7. SEALING RUBBERS—TO FIT

Using "Seelastik", secure the rubber mould "D" (Fig. 7) to the rear lower edge, and the rubber section "E" (Fig. 8) to the front top edge of the "Hard Top".

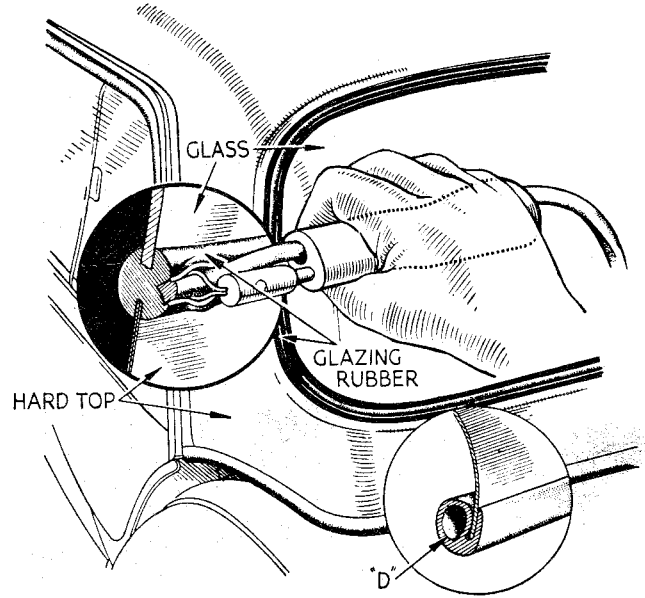


Fig. 7 Fitting Rear Window and Waist Rubber.

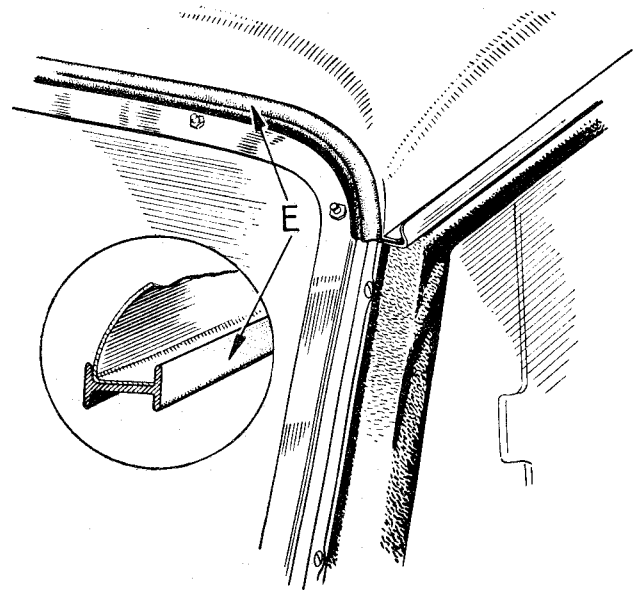


Fig. 8 Fitting Screen Rubber.

### 8. HARD TOP—TO FIT

Re-position the "Hard Top" on the body and after loosely assembling the attachment bolts, progressively tighten them until the "Top" is finally secured.



## BODY

### 9. REAR WINDOW LIGHT—TO FIT

(See Fig. 7)

Fit the rubber moulding around the glass with the filler section positioned towards the rear of the car. Offer the glass with the rubber attached, to the aperture in the "Hard Top" and with the help of an assistant

manipulate the inner rubber lip into position. Using a special tool (see Fig. 7) finally secure the glass by feeding the filler strip into position. With the aid of a "Seelastik gun", complete the installation by forcing Sealastik compound between the "Hard Top" and the outer lip of the glazing rubber to effect water sealing.

NI



# FUEL SYSTEM

## 1. PETROL TANK

The petrol tank has been modified slightly to accommodate the occasional seat, its capacity is thereby reduced to 12 gallons.

## 2. FLEXIBLE FUEL PIPES

A flexible fuel pipe connects the twin carburettors and is integral with a short feed line which is connected to the Bundy tubing at a point adjacent to the thermostat housing.

## 3. CARBURETTORS

S.U. H6 type carburettors are fitted to this engine. This carburettor has a four-point mounting but is similar in other respects to the H4 used on the TR2, is identical in operation and requires the same maintenance.

Carburettors fitted to early cars were equipped with "TD" needles, while with later cars "TE" needles were used, this needle in turn was superseded by type "SM" at Engine No. TS.10037E. When needles are changed for any reason a pair of type "SM" should be fitted.

## 4. AIR CLEANERS

The air cleaners are similar to those fitted to the TR2 apart from the off-set mountings.

## 5. INLET MANIFOLD

This has been modified to accommodate the four-point fixing H6 carburettor, and manifolds fitted to engines after TS.9350E have a larger bore to align with the enlarged throat area of the high port combustion head.

## 6. TO REMOVE FLEXIBLE FUEL HOSE ASSEMBLY

- (a) Hold the hexagon of the flexible hose assembly and disconnect the union nut of the rigid pipe adjacent to the thermostat housing.
- (b) Withdraw the banjo bolt from one carburettor, collecting the gauze filter and retaining spring.
- (c) Repeat operation (b) with the second carburettor.

## 7. TO FIT FLEXIBLE FUEL HOSE ASSEMBLY

- (a) Position the filter assembly in the rear carburettor float chamber, spring first.
- (b) Feed a fibre washer on to the banjo bolt, followed by the banjo connection and a second fibre washer, and then attach to the rear carburettor and leave finger tight at this juncture.
- (c) Repeat operation (a) and (b) with the front carburettor.
- (d) Holding the hexagon of the flexible hose with a spanner, attach the union nut of the rigid supply pipe and secure to give a petrol tight joint.
- (e) Adjust the position of the banjo connections on the float chambers of the twin carburettors so as to avoid any strain, and tighten banjo bolts to give a petrol tight joint.
- (f) Start the engine and observe the fuel pipes for leaks.

## 8. CARBURETTOR DETAILS

The instructions given for the H4 carburettor as fitted to the TR2 apply to the H6 type apart from the four-point mountings. The jet needles at present used in normal manufacture are of the "SM" type, although with early releases of the TR3 model the "TD" or "TE" needle was fitted.

The "TD" or "TE" needles in both carburettors should be replaced by type "SM" if damage or wear justifies the exchange in either unit.

## 9. AIR CLEANERS

The air cleaners have off-set mounting and must be positioned on the carburettor air intake in such a manner that the off-set is rearward.

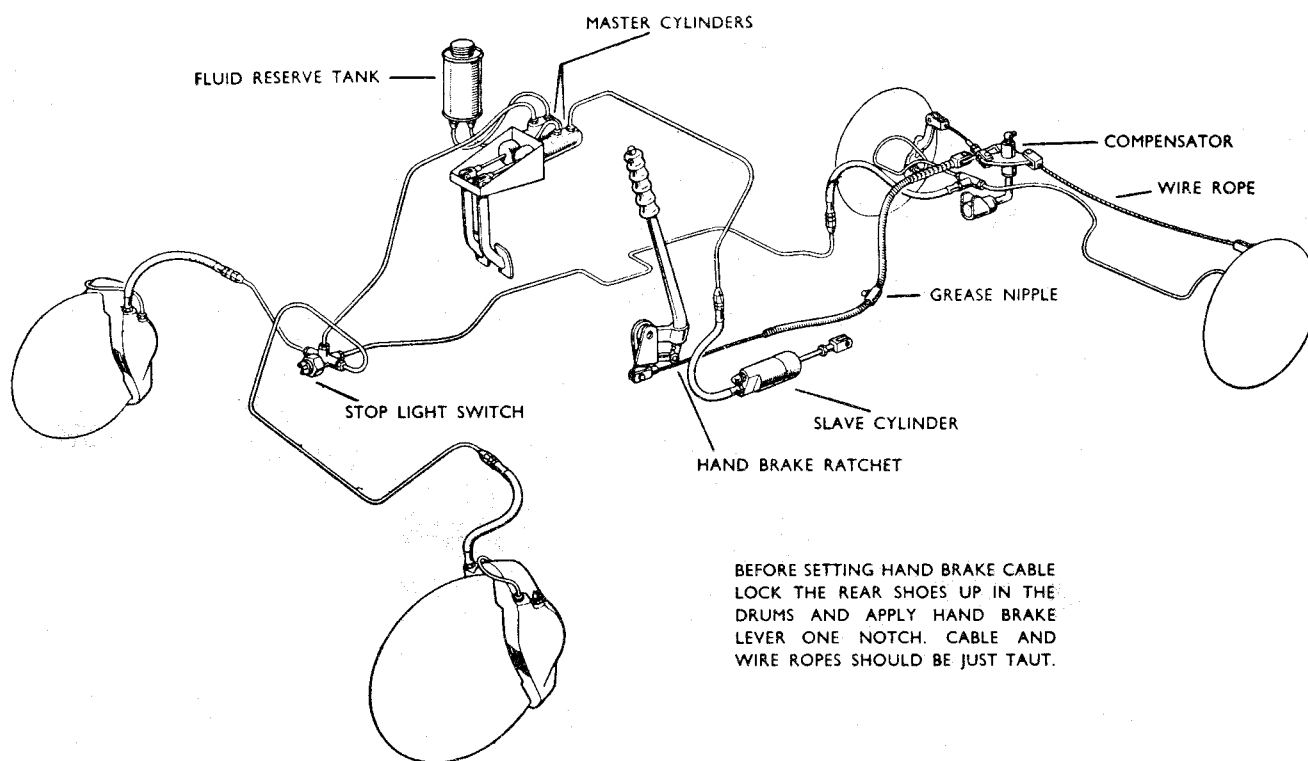
## 10. INLET MANIFOLD

The inlet manifold is removed and fitted as those fitted to the TR2 engine.

PI



# BRAKES



BEFORE SETTING HAND BRAKE CABLE LOCK THE REAR SHOES UP IN THE DRUMS AND APPLY HAND BRAKE LEVER ONE NOTCH. CABLE AND WIRE ROPES SHOULD BE JUST TAUT.

Fig. 1

Brake and Clutch layout

## GIRLING BRAKES AND HYDRAULIC CLUTCH

(From Chassis No. TS.13101)

### 1. DESCRIPTION

The brakes on the front wheels are the Girling Disc Brakes and on the rear are Girling HL.3 Drum Brakes. All four wheels are hydraulically operated by foot pedal operation, directly coupled to a CV master cylinder in which the hydraulic pressure is originated. A supply tank which provides fluid reserve for both brake and clutch systems is installed to allow for fluid replenishment.

An independent mechanical linkage (see Fig. 6), actuated by a hand lever control, operates the rear brakes by levers attached to the wheel cylinder bodies, thus acting as a hand or parking brake.

### 2. FRONT BRAKES (Fig. 1)

The front brakes are the 11" dia. Girling Disc Brakes, which are extremely simple in construction, consisting of the 11" disc

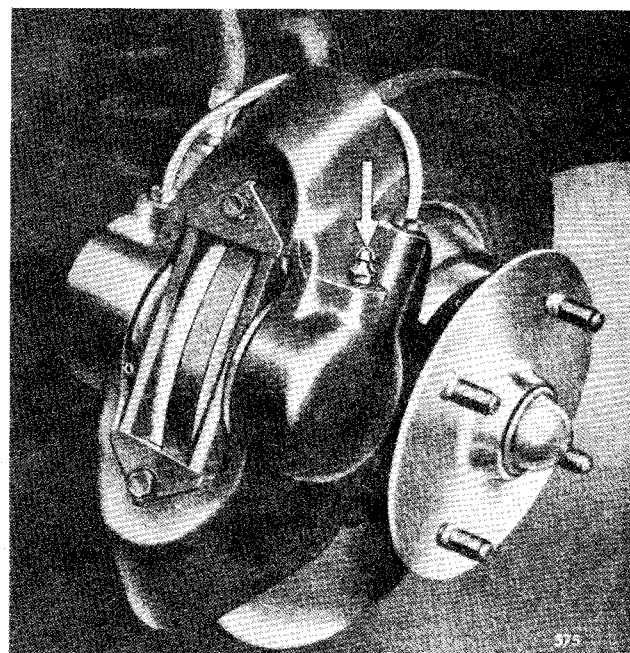


Fig. 2

Front Disc Brakes Assembly.

which is made from high quality cast iron and cast iron calipers mounted to a support bracket.

## BRAKES

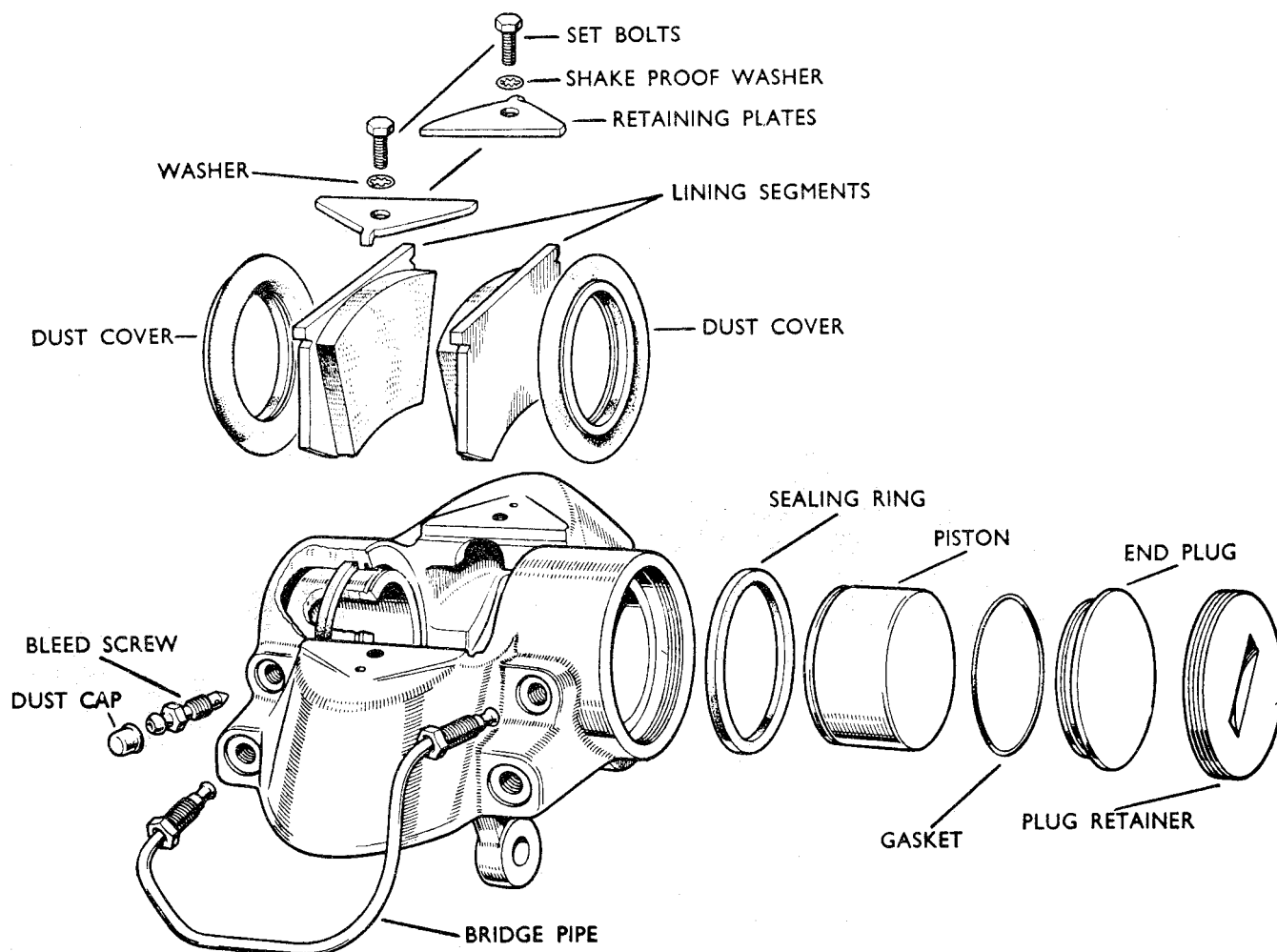


Fig. 2

Exploded arrangement of Disc Brake Caliper Assembly.

Due to the simplicity of these disc brakes the only normal servicing which will be carried out by the owner or garage will be the replacement of worn lining segments, seals and boots of the hydraulic caliper.

### (a) Lining Segment Replacement (Fig. 2)

Jack up the front of car and remove road wheels. On the top of the caliper body are two setscrews which secure the segment retaining plates. The release of these will enable the retaining plates to be raised out of engagement with the casting and swung through an arc of 180°. The segments are then fully exposed and can be lifted out of the caliper.

Under no circumstances should attempts be made to relined worn segments and these must be replaced by new parts.

In order to fit new segments the pistons in the caliper bore should be pushed to the bottom, and the new segments placed into position. When the segments are positioned correctly, the retaining plates should be replaced in their original position and the setscrews tightened down.

The replacement of segments is then complete and bleeding is unnecessary, but the foot pedal should be pumped until a solid resistance is felt.

Jack down the front of the car and road test.

### (b) Caliper Cylinder Maintenance To Replace the Rubber Seals

In order to replace the rubber "O" rings or seals it is necessary to remove the caliper assembly from the vehicle. The brake segments should be removed in the manner described above.

## BRAKES

Instead of pushing the pistons to the bottom of the bore withdraw them from the caliper body, taking great care not to damage the bores. The sealing rings may then be removed by inserting a blunt tool under the seals and prising out, taking care not to damage the locating grooves. Examine the bores and pistons carefully for any signs of abrasion or "scuffing." No attempt should be made to remove the end plug retainer, as this is screwed in tightly by mechanical means.

It is important that in cleaning the components no petrol, paraffin, trichlorethylene or mineral fluid of any kind should be used. Clean with methylated spirits and allow to vaporise, leaving the component clean and dry.

After cleaning and examining, lubricate the working surfaces of the bores and piston with clean genuine Girling Crimson Brake and Clutch Fluid.

### (c) Assembling

Fit new rubber seals into the grooves of caliper cylinder bore. Locate the rubber dust cover with the projecting lip into the groove provided which is the outer one of the cylinder bore.

Insert the piston, closed end first, into

the bore, taking great care not to damage the polished surface. Push the piston right home and then engage the outer lip of the rubber boot into the groove of piston.

The replacement of the lining segments as described under the heading "Segment Replacement" will retain the pistons in position.

Refit the caliper assembly to the support bracket by means of the two securing bolts ensuring that the disc passes between the two lining segments.

Re-connect the pressure hose and bleed the brake, as described under "Bleeding the System."

## 2. DISCS

To ensure that the brake functions at maximum efficiency a check should be made to see that the disc runs truly between the segments. The maximum run-out permissible on the disc is .004".

(For instructions regarding wheel bearing settings refer to page 7, Section "G," in the main part of this manual.) If excessive run-out is present this will cause the knocking back of the pistons which will possibly cause judder.

If it is found that the discs have been damaged in any way, which is extremely unlikely, it will be necessary to remove the discs from the car in order for them to be "trued" up. Under no circumstances should more than .060" be removed, with the finish to be 32 micro ins. maximum measured circumferentially and 50 micro ins. measured radially.

## 3. REAR BRAKES (Figs. 3 and 4)

From the illustration it will be seen that they are of the drum type with a wheel cylinder and adjuster affixed to a backplate supporting the two shoes which are held in position by two return springs. The shoes, which are hydraulically operated by the Girling single acting wheel cylinder (incorporating lever handbrake mechanism), are not fixed but are allowed to slide and centralize. Lining wear is adjusted by a Girling wedge type mechanical adjuster common to both shoes. At the cylinder end, the leading shoe is located in a slot in the

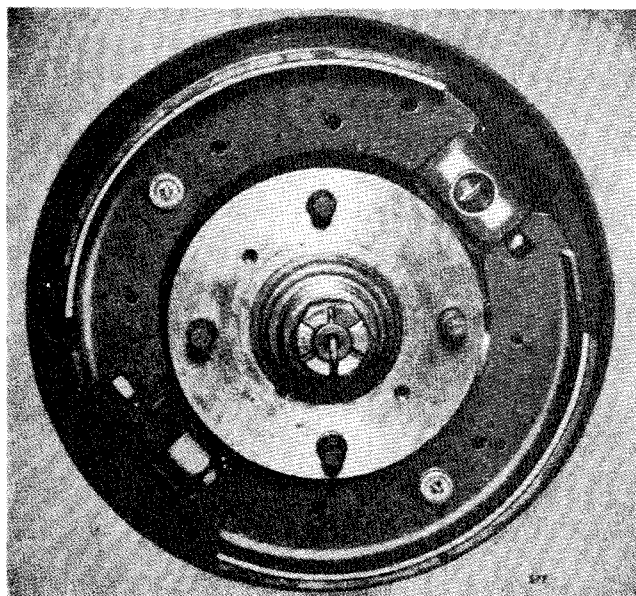
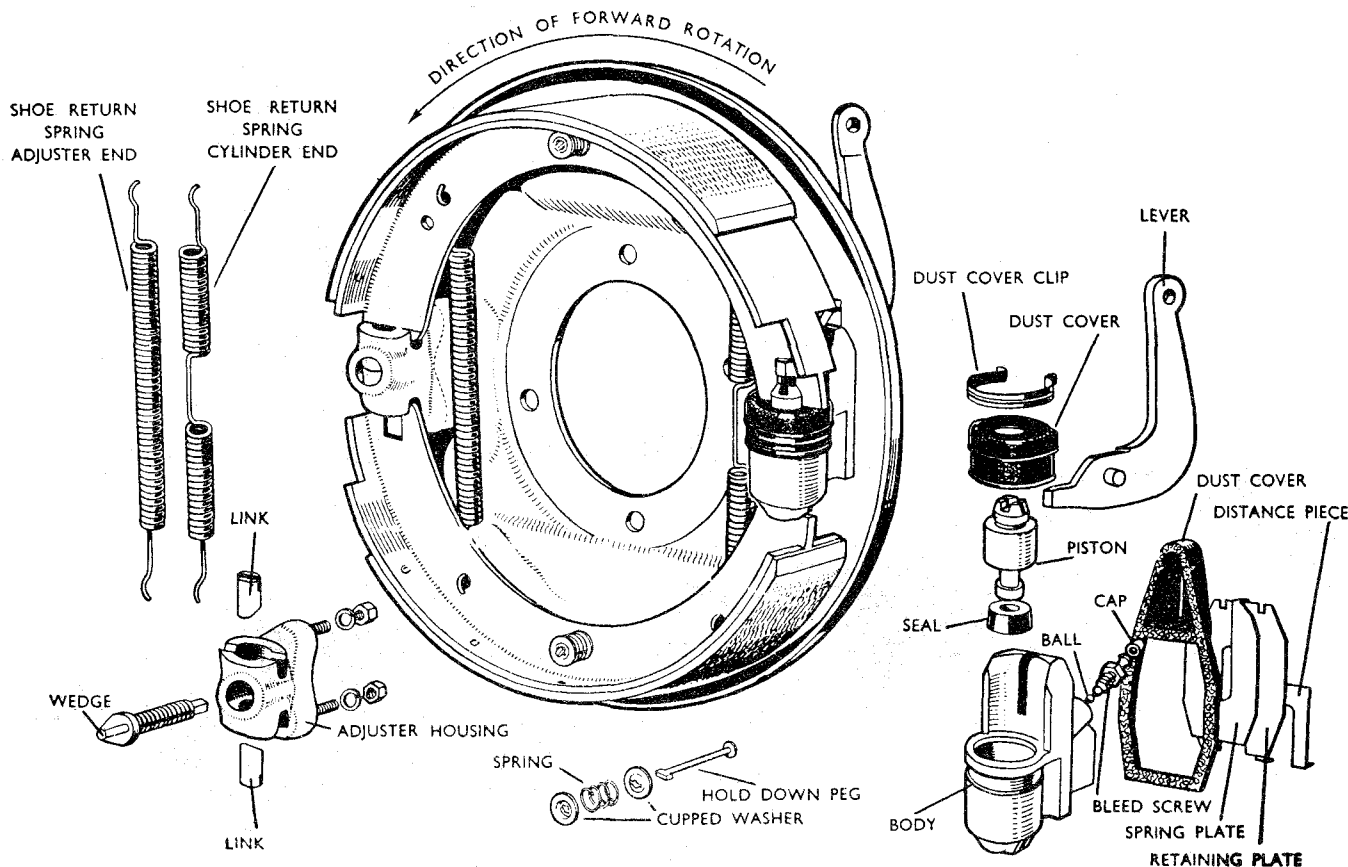


Fig. 3

Rear Drum Brake Assembly.

## BRAKES



**Fig. 4**

**Details of Rear Brake Assembly.**

piston, while the trailing shoe rests in a slot formed in the cylinder body. At the adjuster end the shoe ends rest in slots in the adjuster links. The shoes are supported by platforms formed in the backplate, these being held in position by two hold-down springs fitted on each shoe with a peg passing through a hole in the backplate.

The adjuster consists of an alloy housing with studs, which is spigoted and secured firmly to the inside of the backplate by nuts and spring washers.

The housing carries two opposed steel links, the outer end slotted to take the shoes, and the inclined inner faces bearing on inclined faces of the hardened steel wedge (the axis of which is at right angles to the links).

The wedge has a finely threaded spindle with a square end which projects on the outside of the backplate. By rotating the wedge in a clockwise direction the links are forced apart and the fulcrum of the brake shoe expanded.

A piston and seal moves in the highly

finished bore of a light alloy die cast wheel cylinder body, whilst a slot, machined in the opposite end of the body, serves to carry the trailing shoe. The cylinder, incorporating a bleed screw with rubber cap, is attached to the back plate by spring clips which allow it to slide laterally. The handbrake lever pivots on, and projects at right angles through the back plate.

When the brake is applied, the piston under the influence of the hydraulic pressure moves the leading shoe and the body reacts by sliding on the backplate to operate the trailing shoe.

The handbrake lever is pivoted in the cylinder body and when operated, the lever tip expands the leading shoe and the pivot moves the cylinder body and with it the trailing shoe.

### **(a) Dismantling**

If it is found necessary to remove a rear wheel cylinder, the following procedure should be followed :—



## BRAKES

- (i) Jack up the vehicle, remove the wheels, and disconnect the rod from handbrake lever.
- (ii) Remove the brake drum and shoes. Disconnect the pressure pipe union from the cylinder, and remove the rubber dust cover from rear of backplate.
- (iii) By using a screwdriver, prise the retaining plate and spring plate apart, then tap the retaining plate from beneath the neck of the wheel cylinder.
- (iv) Withdraw the handbrake lever from between the backplate and wheel cylinder.
- (v) Remove the spring plate and distance piece, and finally the wheel cylinder from the backplate.

### (b) Refitting the Rear Wheel Cylinder

Mount the wheel cylinder on to the backplate with the neck through the large slot. Replace the distance piece between cylinder neck and backplate, with the open end away from handbrake lever location. The two cranked lips must also be away from the backplate.

Insert the spring plate between the distance piece and backplate, also with open end away from handbrake lever location and the two cranked lips away from the backplate.

Replace handbrake lever. Locate the retaining plate between the distance piece and spring plate (open end towards the handbrake lever), tap into position until the two cranked tips of the spring plate locate in the retaining plate.

Fit the rubber dust cover. Attach the pressure pipe union to the cylinder and connection to the handbrake lever. Replace the shoes, brake drum, and bleed the system. Finally re-fit wheels.

### (c) Fitting Replacement Shoes

- (i) Jack up the car and remove road wheels and brake drums.
- (ii) Remove the holding down springs by turning the washer under the peg head. Lift one of the shoes out

of the slots in the adjuster link and wheel cylinder piston. Both shoes complete with springs can then be removed. Place a rubber band round the wheel cylinder to keep piston in place.

- (iii) Clean down the backplate, check wheel cylinders for leaks and freedom of motion.
- (iv) Check adjusters for easy working and turn back (anti-clockwise) to full "off" position. Lubricate where necessary with Girling White Brake Grease.
- (v) Smear the shoe platforms and the operating and abutment ends of the new shoes with Girling White Brake Grease.
- (vi) Fit the two new shoe return springs to the new shoes (with the shorter spring at the adjuster end) from shoe to shoe and between shoe web and backplate. Locate one shoe in the adjuster link and wheel cylinder piston slots, then prise over the opposite shoe into its relative position. Remove rubber band. Insert the hold down peg through hole in backplate, and replace spring and cupped washers smeared with Girling White Brake Grease.
- (vii) Make sure drums are cleaned and free from grease, etc., then refit.
- (viii) Adjust brakes.
- (ix) Refit road wheels and jack down.

**Note.**—The first shoe has the lining positioned towards the heel of the shoe and the second shoe towards the toe or operating end in both L.H. and R.H. brake assemblies.

Several hard applications of the pedal should be made to ensure all the parts are working satisfactorily and the shoes bedding to the drums, then the brakes should be tested in a quiet road before normal running is resumed.

*Handbrake Setting—refer to Fig. 1.*

## BRAKES

### 4. RUNNING ADJUSTMENTS

The front disc brakes are entirely self-adjusting. The rear brakes are adjusted for lining wear at the brakes themselves, and on no account should any alteration be made to the hand brake cable for this purpose (Fig. 1).

One common adjuster is provided for each brake assembly. Adjustment of both rear wheels is identical.

Release the handbrake and jack up the car. Turn the square end of the adjuster on the outside of each rear brake backplate in a clockwise direction until a resistance is felt, then slacken back two clicks, when the drum should rotate freely.

Immediately after fitting replacement shoes it is advisable to slacken one further click to allow for possible lining expansion, reverting to normal adjustment afterwards.

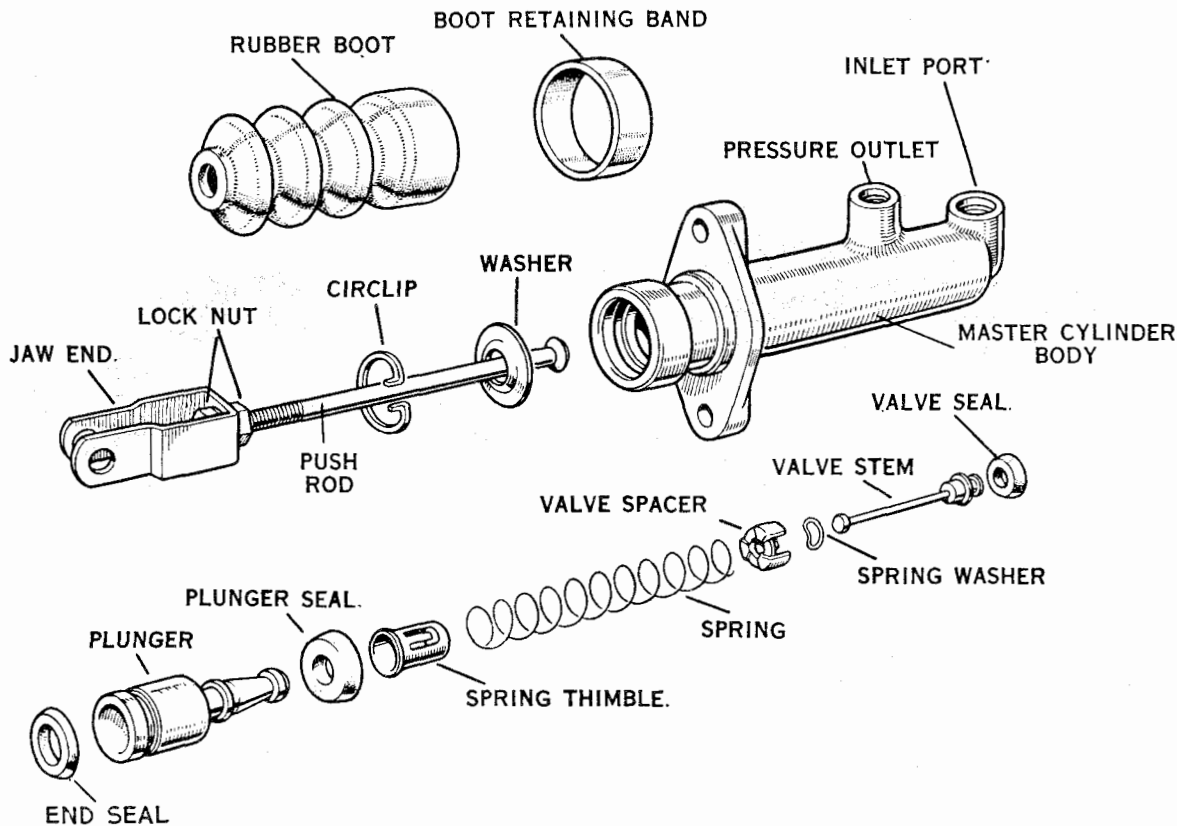


Fig. 5

C.V. Girling Brake and Clutch Master Cylinder.

## CLUTCH HYDRAULIC OPERATING MECHANISM

### 5. HYDRAULIC CLUTCH OPERATION

A slave cylinder mounted on the side of the clutch housing is mechanically connected to the clutch operating mechanism. This assembly, by reason of its hydraulic connection, is actuated by a Girling C.V. master cylinder to which the suspended clutch pedal is coupled.

When pressure on the clutch pedal is applied, the piston of the master cylinder displaces the fluid in the cylinder which in turn moves the piston of the slave cylinder, pushing against the lever of the clutch thrust race.

#### (a) The CV Master Cylinder (For Brake and Clutch, Fig. 5)

This is the Girling CV Type, which consists of an alloy body with a polished finished bore. The inner assembly is made up of the push rod, dished washer, circlip, plunger and seal, plunger seal, spring thimble, plunger return spring, valve spacer, spring washer, valve stem and valve seal. The open end of the cylinder is protected by a rubber dust cover.

## BRAKES

### (b) Dismantling

Disconnect the pressure and feed pipe unions from the cylinder and remove the securing bolts and clevis pin from jaw end. Pull back the rubber dust cover and remove the circlip with a pair of long nosed pliers. The push rod and dished washer can then be removed. When the push rod has been removed the plunger, with seal attached, will then be exposed. Remove the plunger assembly complete. The assembly can then be separated by lifting the thimble leaf over the shouldered end of the plunger. Ease the pressure seal off the plunger and remove back seal. Depress the plunger return spring allowing the valve stem to slide through the elongated hole of the thimble, thus releasing tension of spring.

Remove thimble, spring and valve complete. Detach the valve spacer, taking care of the spacer spring washer which is located under the valve head. Remove the seal from the valve head. Examine all parts, especially the seal, for wear or distortion, and replace with new parts where necessary.

### (c) Assembling

Replace the valve seal so that the flat side is correctly seated on the valve head. The spring washer should then be located with dome side against the underside of the valve head, and held in position by the valve spacer, the legs of which face towards the valve seal. Replace the plunger return spring centrally on the spacer, insert the thimble into the spring and depress until the valve stem engages through the elongated hole of the thimble, making sure the stem is correctly located in the centre of the thimble. Check that the spring is still central on the spacer. Refit new plunger seal on to the plunger with flat of seal seated against the face of plunger, and a new back seal with lip of seal facing plunger seal. Insert the reduced end of plunger into the thimble until the thimble leaf engages under the shoulder of the plunger. Press home the thimble leaf.

Smear the assembly well with Girling brake and clutch fluid, and insert the assembly into the bore of the cylinder, valve end first, easing the plunger seal lips in the bore. Replace the push rod with the dished side of washer under the spherical head into the cylinder, followed by the circlip which engages into groove machined in the cylinder body.

Replace the rubber dust cover, refit the cylinder to the chassis and bleed the system.

## 6. THE CLUTCH SLAVE CYLINDER (Fig. 6)

The slave cylinder is of simple construction, consisting of alloy body, piston with seal, piston stop, spring and bleed screw, the open end of the cylinder being protected by a rubber dust cover. The cylinder is mounted to the clutch housing by a flange and two bolts.

### (a) Dismantling

Remove the rubber dust cap from the bleed nipple, attach a bleed tube, open the bleed screw threequarters of a turn and pump the clutch pedal until all the fluid has been drained. Unscrew the pressure pipe union and remove the bolts from the flange. The cylinder can then be removed.

Remove the rubber cover and piston stop, then, by using an air line, blow out the piston and seal.

The spring will also be removed. Examine all parts, especially the seal, and replace if worn or damaged.

### (b) Assembling

Place the seal on to the stem of the piston, with the back of the seal against the piston, replace the spring with small end on stem, smear well with Girling Crimson Brake and Clutch Fluid, and insert into cylinder. Replace the piston stop and stretch rubber dust cover over cylinder. Mount the cylinder in steel clip, making sure the push rod enters the hole in the rubber boot. Secure the cylinder by the two bolts, and screw in the pipe union.

RI

## BRAKES

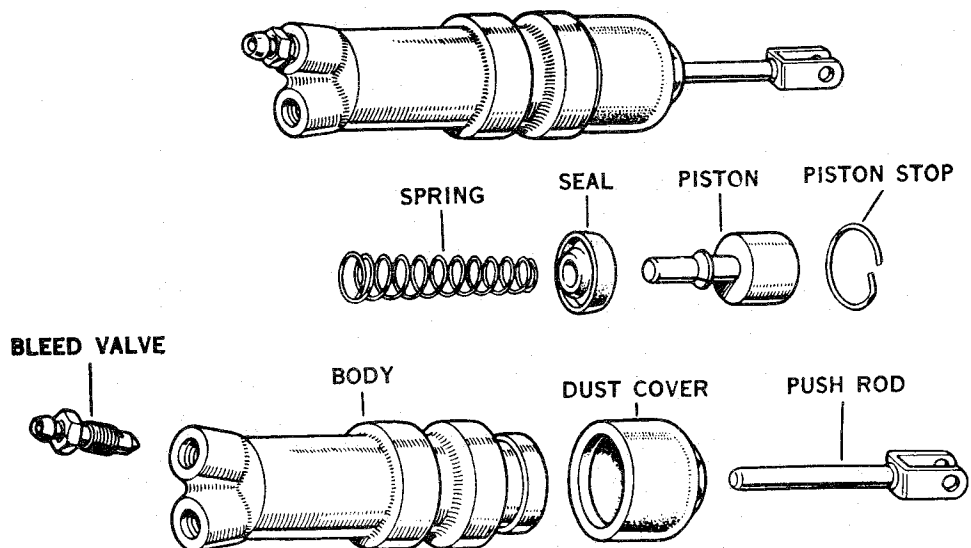


Fig. 6

Clutch Slave Cylinder.

### (c) Bleeding

Remove the bleed screw dust cap, open the bleed screw approximately three-quarters turn and attach a tube, immersing the open end into a clean receptacle containing a little Girling Crimson Brake and Clutch Fluid. Fill the master cylinder reservoir with genuine Girling Crimson Brake and Clutch Fluid, and by using slow full strokes pump the pedal until the fluid entering the container is free from air bubbles. On a down stroke of the pedal, nip up the bleed screw, remove the bleed tube and replace the dust cap. After bleeding, top up the reservoir to its correct level of approximately three-quarters full.

specially prepared and is unaffected by high temperatures or freezing.

**Never top up the system with any other fluid.**

### (b) Bleeding the Hydraulic System

Bleeding is necessary any time a portion of the hydraulic system has been disconnected, or if the level of the brake fluid has been allowed to fall so low that air has entered the master cylinder.

With all the hydraulic connections secure and the reservoir topped up with fluid, remove the rubber cap from the L.H. rear bleed nipple and fit the bleed tube over the bleed nipple, immersing the free end of the tube in a clean jar containing a little Girling Brake and Clutch Fluid.

Unscrew the bleed nipple about three-quarters of a turn and then operate the brake pedal with slow, full strokes until the fluid entering the jar is completely free of air bubbles.

Then during a down stroke of the brake pedal, tighten the bleed screw sufficiently to seat, remove bleed tube and replace the bleed nipple dust cap.

**Under no circumstances must excessive force be used when tightening the bleed screw.**

This process must now be repeated for each bleed screw at each of the three remaining brakes finishing at the

## 7. GENERAL MAINTENANCE

### (a) Replenishment of Hydraulic Fluid for both Brake and Clutch Systems

Inspect the reservoir at regular intervals and maintain at about three-quarters full by the addition of Girling Crimson Brake and Clutch Fluid.

Great care should be exercised when adding brake fluid to prevent dirt or foreign matter entering the system.

**Important.**—Serious consequences may result from the use of incorrect fluids, and on no account should any but Girling Crimson Brake and Clutch Fluid be used. This fluid has been

## BRAKES

wheel nearest the master cylinder. Always keep a careful check on the reservoir during bleeding, since it is most important that a full level is maintained. Should air reach the master cylinder from the reservoir, the whole operation of bleeding must be repeated.

After bleeding, top up the reservoir to its correct level of approximately three-quarters full.

Never use fluid that has just been bled from a brake system for topping up the reservoir, since this fluid may be to some extent aerated.

Great cleanliness is essential when dealing with any part of the hydraulic system, and especially so where the brake fluid is concerned. Dirty fluid must never be added to the system.

## GENERAL ADVICE ON HYDRAULIC COMPONENTS

The following precautions should be studied carefully and observed punctiliously by all concerned.

### Essential Precautions

**Always** Exercise extreme cleanliness when dealing with any part of the hydraulic system.

**Never** Handle rubber seals or internal hydraulics parts with greasy hands or greasy rags.

**Always** Use Girling Crimson Brake and Clutch Fluid from sealed quart tins.

**Never** Use fluid from a container that has been cleaned with petrol, paraffin or trichlorethylene.

**Never** Put dirty fluid into the reservoir, nor that which has been bled from the system.

**Always** Use clean Girling Brake and Clutch Fluid or alcohol for cleaning internal parts of hydraulic system.

**Never** Allow petrol, paraffin or trichlorethylene to contact these parts.

**Always** Examine all seals carefully when overhauling hydraulics cylinders and replace with genuine Girling spares, any which show the least sign of wear or damage.

**Always** Take care not to scratch the highly finished surfaces of cylinder bores and pistons.

**Always** Use WAKEFIELD / GIRLING Rubber Grease No. 3 (Red) for packing rubber boots, dust covers and lubricating parts likely to contact any rubber components.

**Never** Use Girling White Brake Grease or other grease for this purpose.

**Always** Replace all seals, hoses and gaskets with new ones if it is suspected that incorrect fluids have been used or the system contaminated with mineral oil or grease. Drain off the fluid, thoroughly wash all metal parts and flush out all pipes, etc., with alcohol or clean Girling Crimson Brake and Clutch Fluid

**Never** Use anything else for this purpose.

**Always** Use a particular container (reserved for this purpose) for bleeding the system, and always maintain in a clean condition.

**Never** Use a receptacle which has been cleaned with petrol, paraffin or trichlorethylene.

**Always** Remember that your safety and the safety of others may depend on the observance of these precautions at all times.

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# EXHAUST SYSTEM

## EXHAUST SYSTEM

The exhaust system is unchanged from the TR2 apart from the new manifold gasket fitted to the enlarged port combustion head after engine number TS.9350E.

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# Notes on the way this file was produced (and why)

Books on the repair and maintenance of the old Triumphs are becoming more and more difficult to locate; many have been out of print for years or even decades, and good examples are increasingly hard to find at reasonable prices.

Then, too, there are all the people like me who have a copy of a valuable reference book, but in rather forlorn condition. Mine happened to be sitting in the trunk of an immobile 1957 TR3 for a decade before I purchased the car (and the manual), and thus came to me reeking of gasoline and with a binding which no longer bound the book together, but rather produced a crumbly mess any time I turned a page.

So I set about to produce an electronic copy of this, the Robert Bentley manual for the TR2 and TR3 cars, in order to have for myself a copy which I could keep in the garage and use without worrying that it might be ruined (if it became soaked with gearbox oil, I could just print another!). The project took much longer than I expected, but the results are worth it.

I am providing this document so that others, like myself, can have a copy of this most valuable book to use in their shop or to keep in their boot and thus preserve their original for some time to come. I suspect that the publishers of this book might not be terribly happy about the project I've completed, but since they've had the book out of print for nearly a quarter century, I don't think I'm cutting in to their profits in any way. I am not realizing any sort of profit on this myself. Nevertheless, I make the following disclaimer: you should really only be using this electronic copy as a backup to a legitimately-owned printed copy; if you use this electronic copy and don't own the real book, you assume all responsibility for any copyright violation which may have occurred.

That having been said -- I hope that this document provides a valuable service to the Triumph community, and that you find it useful and helpful in the restoration and care of your own Triumph automobile. I also hope to continue this type of operation with other books and documents, though my free time is at a premium right now (whose isn't?).

And now for some notes on the use of this particular file:

I have not yet gone to the trouble of performing OCR (optical character recognition) on the book; that's more time-intensive and indeed computer-intensive than I can deal with right now. The proof-reading alone would kill me

(and it would have to proof-read -- imagine if the software screwed up a torque settings chart, for example!).

Right now, each and every page (except for this one) is a large, black-and-white graphic. You should be able to print this to just about any sort of printer, but you will get the best results on a PostScript-capable laser printer that operates at 600 dpi (dots per inch) or better.

The printing will be slow, however, as each page is a relatively good size (about 3.7 MB). I found that a 600-dpi B&W scan gave me outstanding results when copying the text and illustrations, and also reproduced the photographs acceptably well. This would not be the case with many documents, but given the very high contrast of the pictures in the original manual, and the relatively coarse line screen, it worked out rather well.

If you're interested in the details of the production of this file, I used a G3-upgraded PowerMacintosh 8500 computer, an Agfa SnapScan 1212U scanner (a relatively cheap model, but of acceptable quality), Agfa's own FotoLook scanning software, Adobe Photoshop 5.5 for some quick-and-dirty image retouching, and Adobe Acrobat 4.0 to convert the pages from EPS to PDF. Finally, because each and every page was a separate document, I used AppleScript, a programming language included with the Macintosh operating system, to combine all 455 pages into a single document.

Each scanned page was 3.7 MB in size, and all of the pages together weighed in at over 1.6 gigabytes of data. It took just over 4.5 hours to "distill" the pages into PDF files.

I chose the PDF format because it can be opened, viewed and printed on many different computing platforms, from Windows to Mac to Unix to Linux (and I think even the Amiga).

Enjoy!