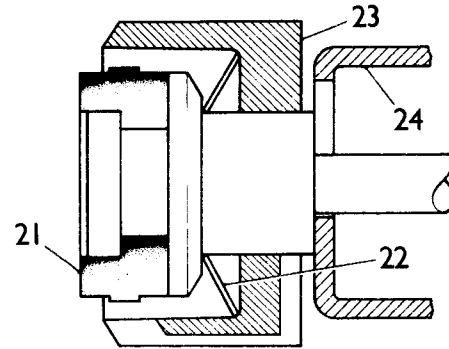
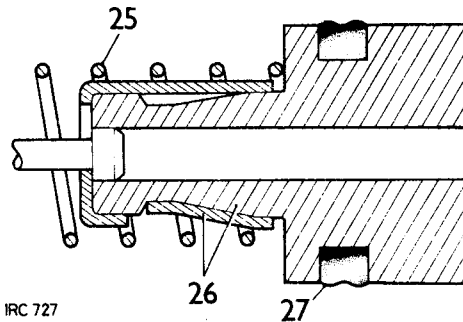


**Assembling**

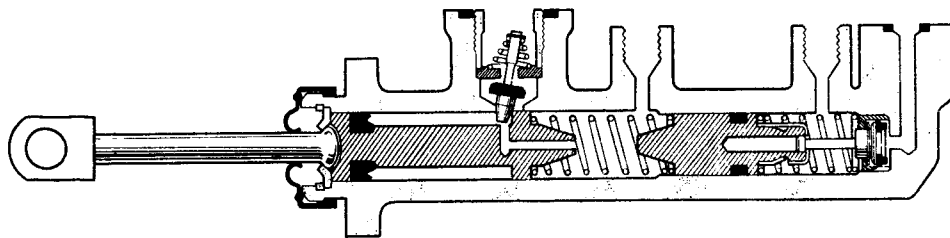
- 20 During assembly, smear the seals with Castrol-Girling rubber grease and the remaining internal items with Castrol-Girling Brake and Clutch Fluid.
- 21 Fit the valve seal, flat side first, to the end of the valve stem.
- 22 Fit the wave washer, domed side toward the valve head.
- 23 Fit the valve spacer, legs first.
- 24 Fit the valve retainer.
- 25 Locate the spring over the retainer and squarely seat on the valve spacer.
- 26 Insert the inner piston into the spring and compress until the locking prong in the valve retainer engages in the groove in the piston. If necessary, depress the locking prong to ensure that the free end is fully engaged with the groove shoulder.
- 27 Fit the piston seal.
- 28 Insert the inner piston and valve assembly, valve end first, into the cylinder.
- 29 Reverse 5 to 9. Torque loading for tipping valve retainer is 4,9 to 6,2 kgf. m. (35 to 45 lbf. ft.).
- 30 Reverse 2 to 4. Do not overtighten the reservoir fixings. Torque load 0,3 to 0,4 kgf. m. (2 to 3 lbf. ft.).
- 31 Refit the master cylinder. 70.30.08.



IRC 726



IRC 727



4RC IO65

**DATA**

Master cylinder bore size:

- |                  |                              |
|------------------|------------------------------|
| 88 models .....  | 22,2 mm (0.875 in.) diameter |
| 109 models ..... | 25,4 mm (1.0 in.) diameter   |

**FLUID RESERVOIR Non-Servo Systems**

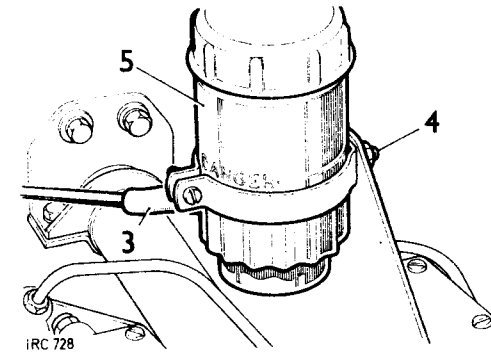
Remove and refit 70.30.15

**Removing**

- 1 Lift the bonnet and prop open.
- 2 Make provision to catch the fluid which will be released.
- 3 Disconnect the fluid outlet pipe.
- 4 Remove the clamp fixings.
- 5 Withdraw the reservoir.

**Refitting**

- 6 Reverse instructions 2 to 5.
- 7 Bleed the hydraulic system. 70.25.02.
- 8 Close the bonnet.



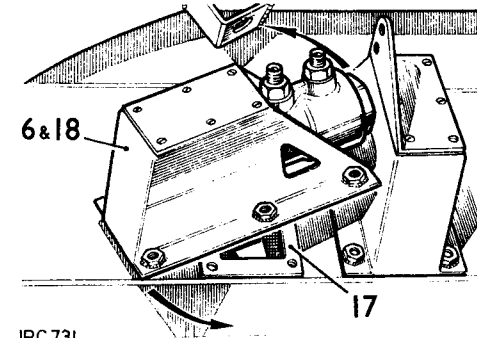
IRC 728

**BRAKE PEDAL, Non-servo systems**

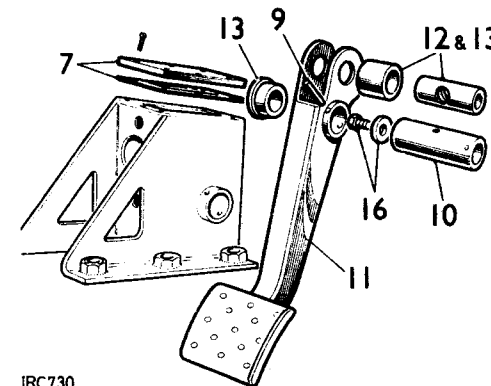
Remove and refit 70.35.01

**Removing**

- 1 Lift and prop the bonnet.
- 2 Disconnect the inlet pipe at the master cylinder.
- 3 Disconnect the outlet pipe.
- 4 Disconnect the return spring from the brake pedal.
- 5 Remove the fixings securing the brake pedal bracket to the toe box.
- 6 Carefully withdraw the brake pedal and bracket assembly from the engine compartment, manoeuvring the pedal through the aperture in the toe box.
- 7 Remove the top cover and gasket from the brake pedal bracket.
- 8 Remove the nut and plain washer retaining the master cylinder push rod to the brake pedal trunnion, and push the rod into the master cylinder to clear the trunnion.
- 9 Using a suitable punch, drift out pin, from the pedal shaft.
- 10 Remove pedal shaft.
- 11 Withdraw the brake pedal complete with bushes and trunnion.
- 12 If required, remove the bushes, trunnion and distance piece from the brake pedal.



IRC 731

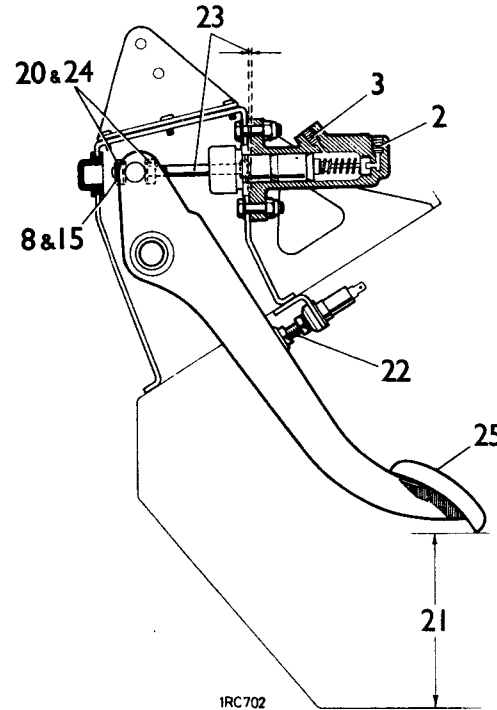


IRC 730

*continued*

**Refitting**

- 13 If removed, fit the distance piece, trunnion and bushes to the brake pedal. Lubricate the trunnion and distance piece with general purpose grease on assembly. New pedal bushes must be reamed to 15,9 mm (0.75 in).
- 14 Smear the pedal bushes and shaft with general purpose grease; locate the pedal in position in the bracket and secure with the shaft and pin.
- 15 Locate the master cylinder push rod through the pedal trunnion and fit the locknut and washer.
- 16 Remove the oil plug from the pedal shaft; fill the shaft bore with SAE 20 oil, then replace the plug and joint washer.

**(Non-Servo systems)**

- 17 Place the gasket in position on the securing flange of the brake pedal bracket. If necessary, use a little Bostik adhesive to retain the gasket.
- 18 Carefully locate the brake pedal and bracket assembly in position on the toe box, manoeuvring the pedal through the aperture in the toe box.
- 19 Secure the brake pedal and bracket assembly to the toe box, ensuring that the gasket remains in position.

**Master cylinder and pedal setting, items 20 to 25**

- 20 Slacken both nuts on the master cylinder push rod.
- 21 Check the pedal setting which should be 158 mm (6.250 in.) with the stop light switch depressed to the 'off' position.
- 22 Adjust the pedal stop, as required, to obtain the correct distance.
- 23 Adjust the master cylinder push rod until there is 1,55 mm (0.062 in.) approximately free play between the push rod and the master cylinder piston.

- 24 Tighten both locknuts.
- 25 Ensure there is 3,17 mm (0.125 in.) minimum free movement at the pedal before pressure is felt. If necessary, re-adjust the master cylinder push rod to obtain the movement.
- 26 Fit the pedal bracket cover and gasket.
- 27 Reverse instructions 1 to 4.

**BRAKE PEDAL, Servo Systems**

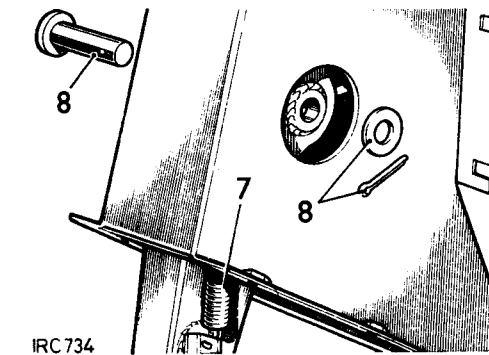
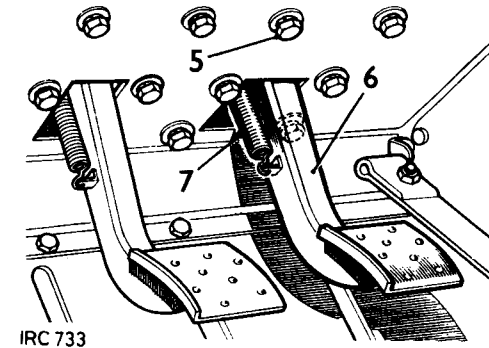
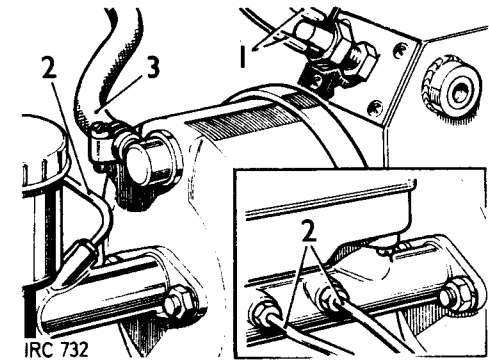
Remove and refit 70.35.01

**Removing**

- 1 Disconnect the electrical lead from the stop light switch.
- 2 Disconnect the outlet pipe/s from the master cylinder. Fit a blanking plug to the outlet aperture/s or drain the fluid reservoir, to prevent fluid spillage.

**NOTE:** The illustration inset shows a tandem master cylinder, where fitted.

- 3 Disconnect the vacuum pipe from the servo unit.
- 4 Remove the toe-board finisher panel.
- 5 Remove the fixings securing the brake pedal bracket to the toe box.
- 6 Withdraw the brake pedal and bracket assembly from the engine compartment, manoeuvring the pedal through the aperture in the toe box.
- 7 Disconnect the brake pedal return spring.
- 8 Remove the split pin and pivot pin from the brake pedal to servo coupling.
- 9 Using a suitable punch, drift out pin from the pedal shaft.
- 10 Remove the pedal shaft.

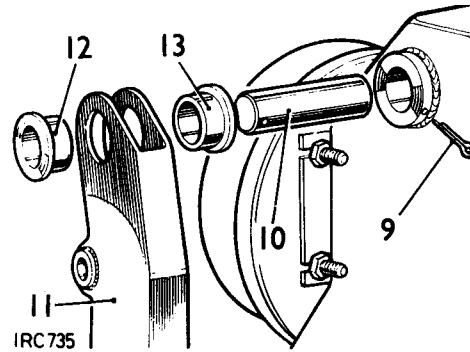
*continued*

**(Servo Systems)**

- 11 Withdraw the brake pedal complete with bushes.
- 12 If required, remove the bushes from the pedal.

**Refitting**

- 13 If removed, fit the bushes to the brake pedal. New bushes must be reamed to 15,9 mm (0.75 in).
- 14 Reverse instructions 7 to 10, using general purpose grease to lubricate moving parts.
- 15 Apply a waterproof sealant between the joint flanges of the pedal bracket and the toe box.
- 16 Reverse instructions 1 to 6.
- 17 Check, and if necessary, adjust the brake pedal switch located on the pedal box top cover to operate at 19mm to 25mm (0.750 in. to 1 in.) of pedal movement.
- 18 Bleed the complete braking system. 70.25.02.



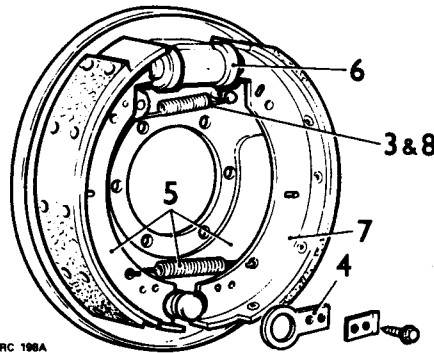
IRC 735

**BRAKE SHOES - 88 models**

**Remove and refit**  
 Front shoes 70.40.02  
 Rear shoes 70.40.03

**Removing**

- 1 Remove the road wheel.
- 2 Remove the brake drum. 70.10.02 or 70.10.03 as applicable.
- 3 Remove the leading shoe pull-off spring.
- 4 Remove the trailing shoe anchor plate.
- 5 Withdraw the brake shoes together from the pivot end first; part them by disconnecting the return spring.
- 6 Retain the pistons in the wheel cylinder, using a rubber band.
- 7 If required, re-line the brakes. 70.40.10.



3RC 100A

**Refitting**

- 8 Reverse 2 to 6, refitting the leading shoe pull-off spring with its longest extremity hooked over the post on the shoe web.
- 9 Adjust the brakes fully on, then back off two serrations on the adjuster.
- 10 Fit the road wheel.

**DATA**

Brake shoe width . . . . .

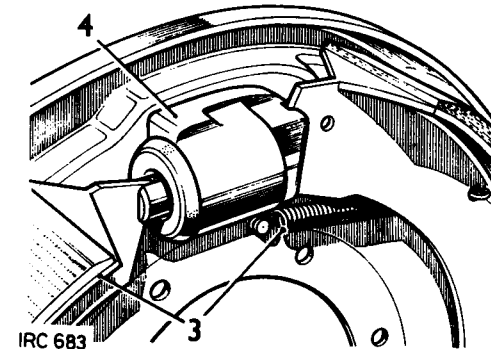
38 mm (1.5 in.)

**FRONT BRAKE SHOES – 109 models**

**Remove and refit** 70.40.02

**Removing**

- 1 Remove the road wheel.
- 2 Remove the brake drum. 70.10.02.
- 3 Release the brake shoes and pull-off springs by levering the trailing edges away from the wheel cylinders.
- 4 Retain the pistons in the wheel cylinders, using a rubber band.
- 5 If required, re-line the brake shoes. 70.40.10.



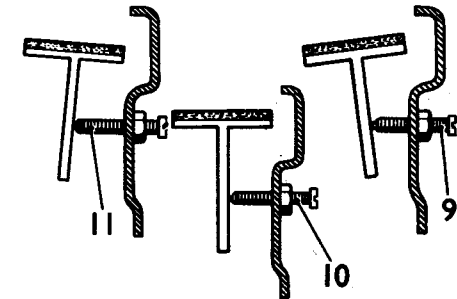
IRC 683

**Refitting**

**NOTE:** Ensure that the correct width of brake shoe is fitted as follows:

109 models with 4-cylinder engines – 57 mm (2.250 in.) wide; 109 models with 6-cylinder engines – 76 mm (3.0 in.) wide.

- 6 Reverse instructions 2 to 4.
- 7 Adjust the brakes fully on, then back-off two serrations on the adjusters.
- 8 If the brake shoe steady posts have been disturbed, reset as follows, items 9 to 11.
- 9 Screw back the steady posts clear of the brake shoes and apply the brakes.
- 10 Screw in the steady posts to contact the brake shoes then secure.
- 11 Do not tilt the brake shoes by screwing in the steady posts too far.
- 12 Fit the road wheel.



IRC 686

**DATA**

Brake shoe width  
 4 cylinder engine models . . . . .  
 6 cylinder engine models . . . . .

57 mm (2.250 in.)  
 76 mm (30 in.).

## REAR BRAKE SHOES — 109 models

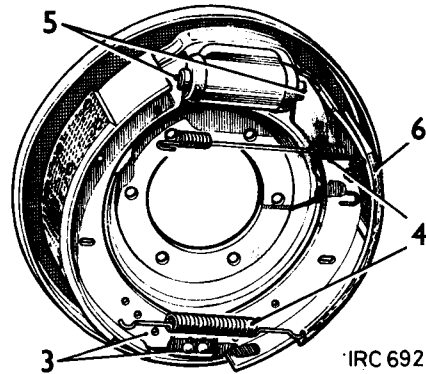
Remove and refit 70.40.03

### Removing

- 1 Remove the road wheel.
- 2 Remove the brake drum. 70.10.03.
- 3 Release the brake shoes by levering the shoes away from the pivot.
- 4 Disconnect the springs.
- 5 Retain the pistons in the wheel cylinder, using a rubber band.
- 6 If required, re-line the brake shoes. 70.40.10.

### Refitting

- 7 Reverse instructions 2 to 4.
- 8 Adjust the brakes fully on, then back-off two serrations on the adjuster.
- 9 Fit the road wheel.



## BRAKE LININGS

Remove and refit 70.40.10

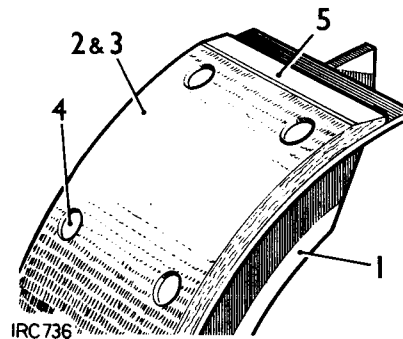
### Removing

- 1 Remove the brake shoes.
- 2 Remove the old linings from the shoes by shearing the riveted end of the rivets.

**NOTE:** Brake shoes fitted with bonded linings: If the shoes incorporate rivet holes, the bonded linings can be removed and riveted linings can be fitted in their place. If the shoes are not pre-drilled, replacement shoe and lining assemblies must be fitted.

### Refitting

- 3 Attach the new linings to the shoes, commencing at the centre and working outwards, but peen the rivets only sufficient to locate the linings.
- 4 With all the rivets loosely fitted, fully secure, commencing from the centre.
- 5 Chamfer both ends of each lining.
- 6 Fit the brake shoes.



## TRANSMISSION BRAKE, HAND LEVER AND LINKAGE

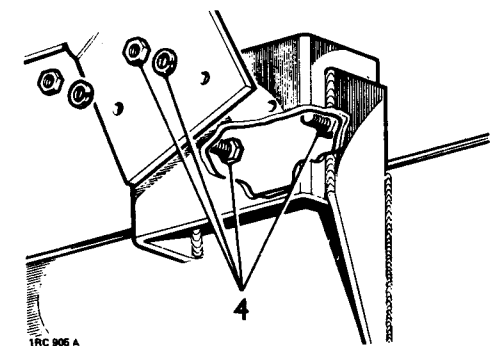
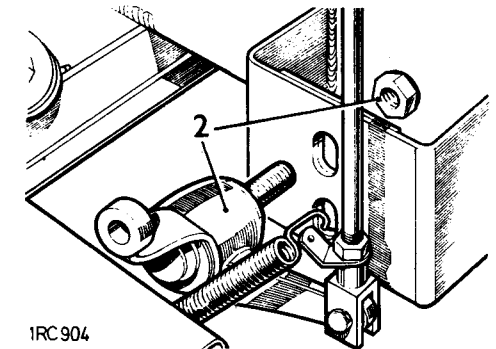
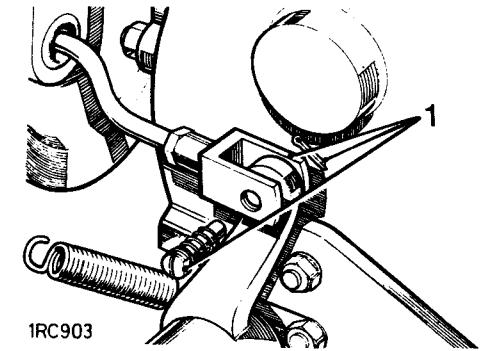
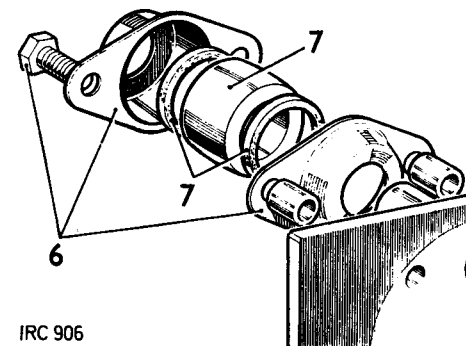
Remove and refit 70.45.01

### Removing

**CAUTION:** Before commencing work on the hand brake mechanism, chock the road wheels to prevent the vehicle moving.

- 1 From under the vehicle, disconnect the hand brake expander rod from the relay lever.
- 2 Remove the relay lever fixings.
- 3 LHS models—Remove the fixings between the hand brake cross-shaft and the R.H. chassis member.
- 4 Remove the fixings securing the hand brake lever to the chassis.
- 5 Remove the hand brake assembly complete from the vehicle, withdrawing the lever grip carefully through the rubber draught excluder in the front of the seat box.  
LHS models—To facilitate removal, release the hand brake lever to ratchet fixings and withdraw the cross-shaft and lever separately.
- 6 LHS models—If required, remove the split housings from the cross-shaft support brackets.
- 7 Remove the felt dust seals and self-lubricating bushes supporting the hand brake cross-shaft.

*continued*



- 8 Remove the brake catch pin, catch and distance pieces.
- 9 RHStg models—Remove the fulcrum pin, ratchet fixings and ratchet from the hand brake lever.
- 10 Unscrew the plunger and withdraw the spring, washer and the plunger rods.
- 11 If required, remove the relay lever and spindle. If necessary, press the bush from the lever.

#### Refitting

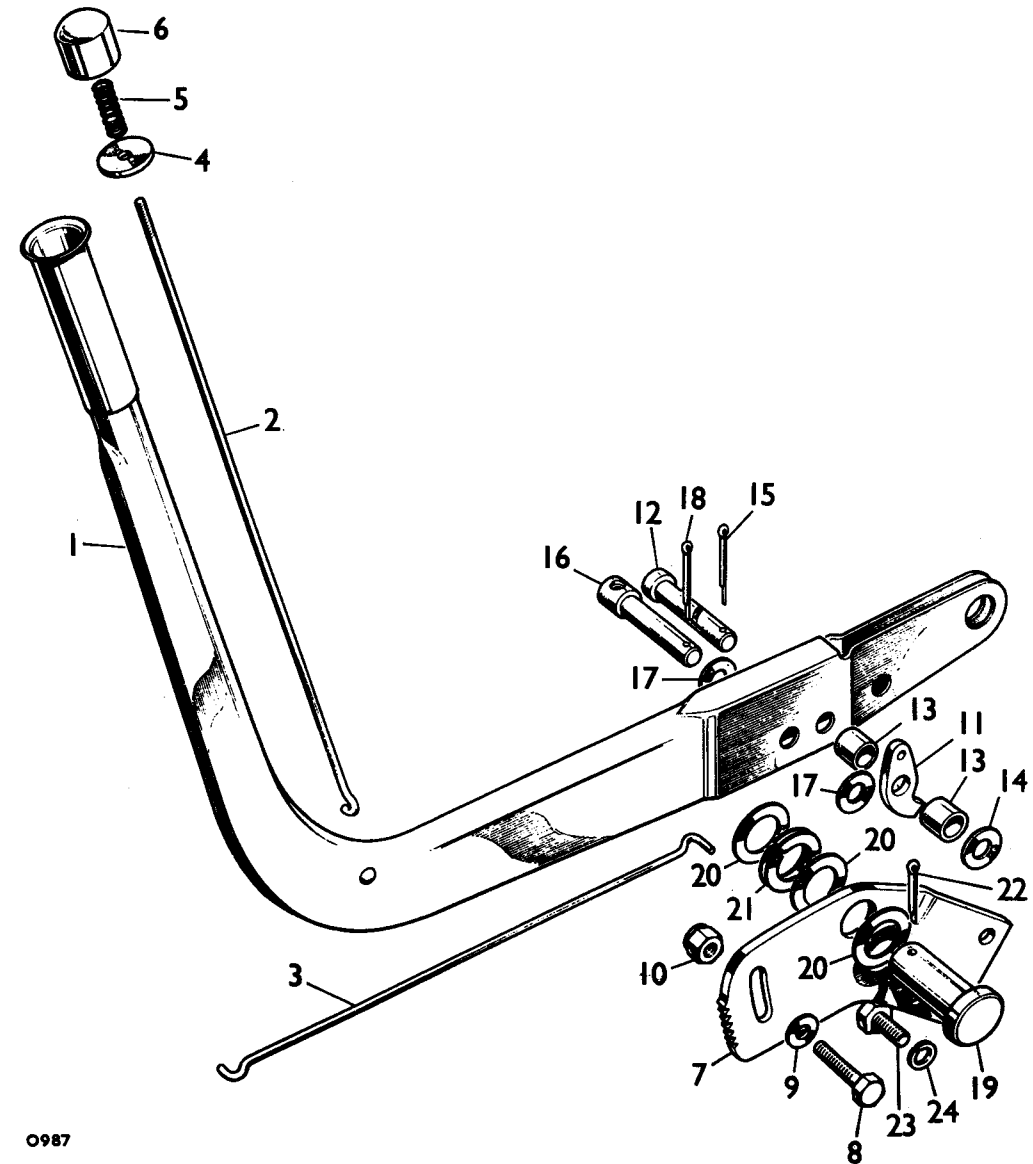
- 12 If removed, fit the bush to the relay lever and fit the relay lever and spindle to the chassis.

**NOTE:** The bore size of a new relay lever bush is 19,088 mm—0,0254 mm (0.7515 in.—0.001 in.).

- 13 Reverse instructions 1 to 11; lubricate the cross shaft bearings with general purpose grease.
- 14 Set the hand brake linkage at the vertical adjuster rod, so that the hand brake has one or two clicks free movement in the 'off' position.

#### Key to hand brake lever arrangement, RH Steering

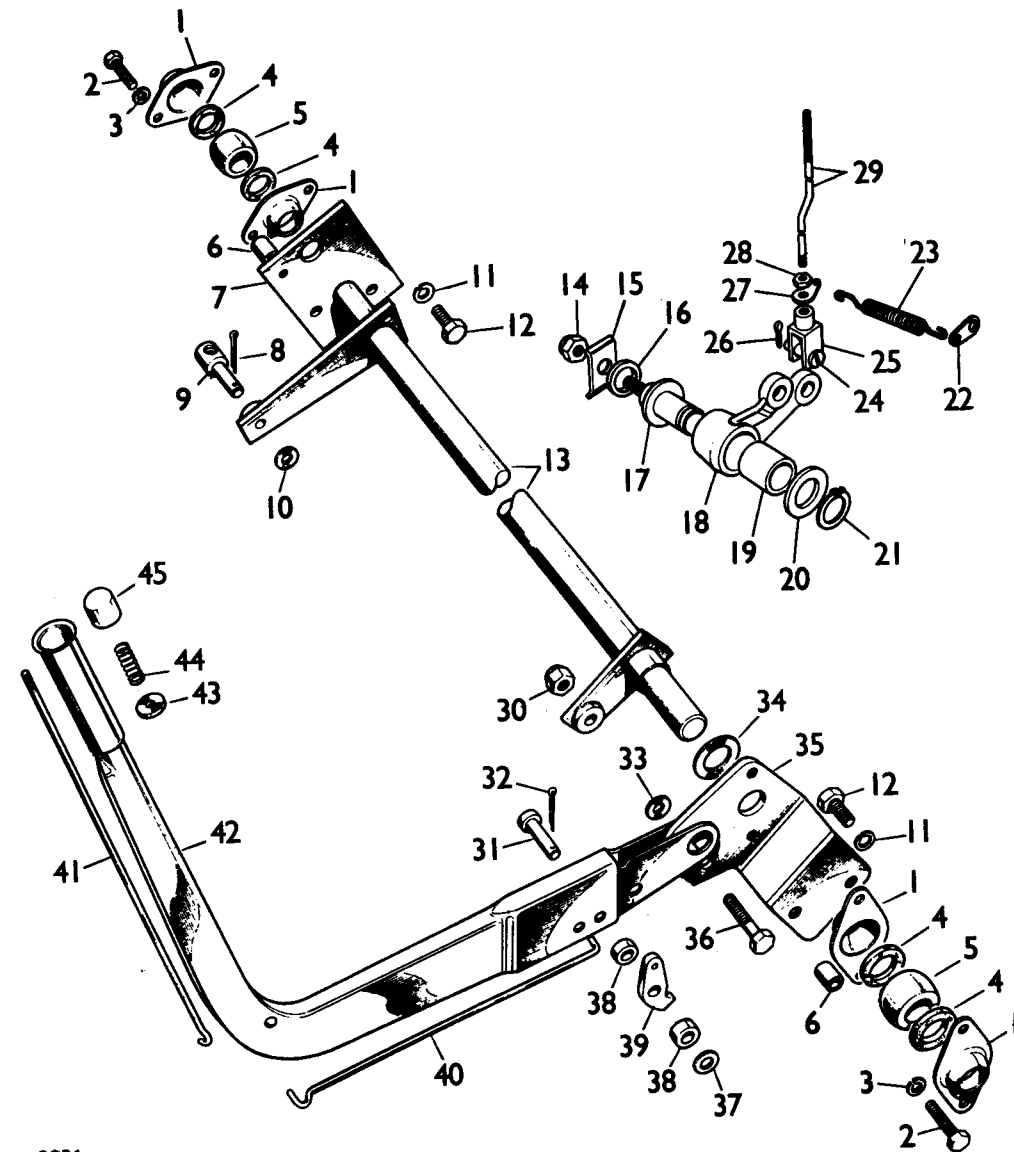
- |    |   |  |
|----|---|--|
| 1  | Hand brake lever                                      |  |
| 2  | Plunger rod, upper                                    |  |
| 3  | Plunger rod, lower                                    |  |
| 4  | Washer for plunger spring                             |  |
| 5  | Spring for plunger rod                                |  |
| 6  | Plunger   |  |
| 7  | Ratchet for hand brake                                |  |
| 8  | Bolt ( $\frac{3}{8}$ in UNF x $1\frac{1}{4}$ in long) | } Fixing lever to ratchet                  |
| 9  | Plain washer  |  |
| 10 | Self-locking nut ( $\frac{3}{8}$ in UNF)              |  |
| 11 | Brake catch   |  |
| 12 | Pin   |  |
| 13 | Distance piece  | } Fixing catch                             |
| 14 | Plain washer  |  |
| 15 | Split pin   |  |
| 16 | Pin for hand brake adjuster rod                       |  |
| 17 | Plain washer  | } Fixing pin to hand brake lever           |
| 18 | Split pin   |  |
| 19 | Fulcrum pin for hand brake lever                      |  |
| 20 | Plain washer  | } Fixing pin to ratchet and lever          |
| 21 | Spring washer   |  |
| 22 | Split pin   |  |
| 23 | Bolt ( $\frac{3}{8}$ in UNF x $\frac{7}{8}$ in long)  | } Fixing hand brake lever to chassis frame |
| 24 | Spring washer   |  |
|    | Nut ( $\frac{3}{8}$ in UNF)                           |  |



0987

## Key to hand brake lever arrangement LH Steering

- |    |                             |    |                   |
|----|-----------------------------|----|-------------------|
| 1  | Housing—cross shaft bearing | 24 | Clevis pin        |
| 2  | Bolts                       | 25 | Fork—clevis       |
| 3  | Spring washer               | 26 | Split pin         |
| 4  | Felt ring                   | 27 | Spring anchor     |
| 5  | Bearing—cross shaft         | 28 | Nut               |
| 6  | Distance piece              | 29 | Rod               |
| 7  | Support plate               | 30 | Nut—self-locking  |
| 8  | Split pin                   | 31 | Clevis pin        |
| 9  | Pin—adjuster rod            | 32 | Split pin         |
| 10 | Plain washer                | 33 | Plain washer      |
| 11 | Spring washer               | 34 | Washer            |
| 12 | Bolt                        | 35 | Ratchet           |
| 13 | Cross shaft                 | 36 | Bolt              |
| 14 | Nut—self-locking            | 37 | Plain washer      |
| 15 | Plate washer                | 38 | Distance piece    |
| 16 | Washer                      | 39 | Pawl              |
| 17 | Shaft                       | 40 | Plunger rod—lower |
| 18 | Relay lever                 | 41 | Plunger rod—upper |
| 19 | Bush                        | 42 | Hand brake lever  |
| 20 | Washer                      | 43 | Washer            |
| 21 | Circlip                     | 44 | Spring            |
| 22 | Spring anchor               | 45 | Plunger           |
| 23 | Spring                      |    |                   |



## TRANSMISSION BRAKE ASSEMBLY

Adjust. Instructions 36 to 39 70.45.09  
 Remove and refit Instructions 1 to 39 70.45.16

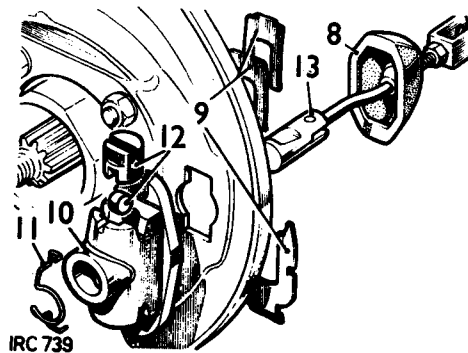
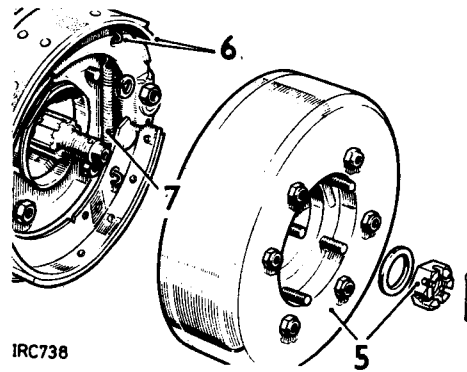
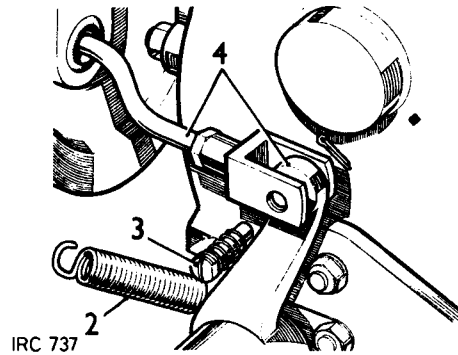
## TRANSMISSION BRAKE SHOES

Remove and refit Instructions 1 to 7, and 32 to 39 70.45.18

### Removing

**NOTE:** Brake shoe components are accessible after removing the brake drum, which can be detached from the gearbox output flange and pushed back over the propeller shaft.

- 1 Chock the road wheels.
- 2 Disconnect the brake return spring.
- 3 Remove the expander rod fork fixings.
- 4 Disconnect the expander rod from the relay lever, and remove the propeller shaft on the 109 in Land-Rover.
- 5 Remove the fixings and withdraw the brake drum.
- 6 Remove the brake shoes together with the pull-off springs.
- 7 Separate the shoes by detaching the springs.
- 8 Withdraw the dust excluder.
- 9 Remove the expander unit fixing plates.
- 10 Withdraw the expander unit.
- 11 Remove the spring clip from the expander unit.
- 12 Withdraw the plungers and rollers.
- 13 Withdraw the operating rod.
- 14 Remove the adjuster unit assembly.
- 15 Pull out the adjuster plungers.
- 16 Unscrew the adjuster cone.



### Inspecting

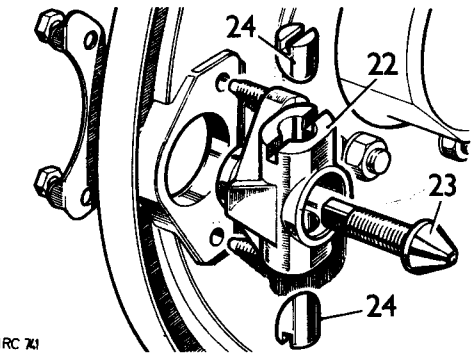
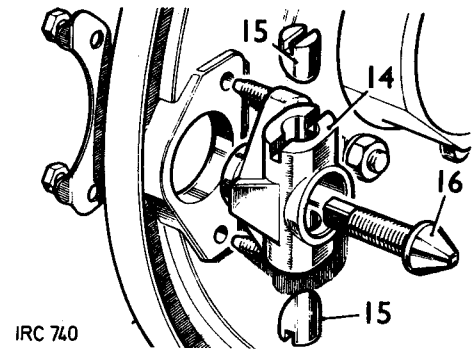
- 17 Clean all components in Girling cleaning fluid and allow to dry.
- 18 Examine all items for obvious wear and replace as necessary.
- 19 Examine the brake drum for scoring and ovality and skim if required. Standard diameter is 228,6 mm (9.0 in.); reclamation limit is 0,75 mm (0.030 in.) oversize.
- 20 If the brake linings are oily, check and if necessary replace the output shaft oil seal, Division 37.
- 21 If required, reline the brake shoes. 70.40.10.

### Assembling

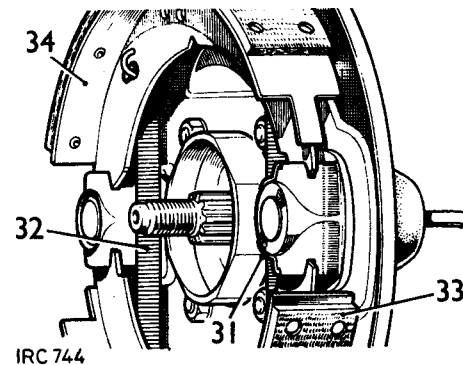
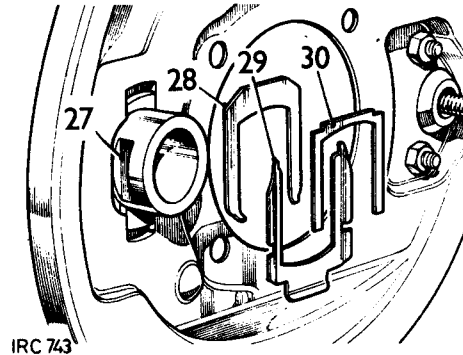
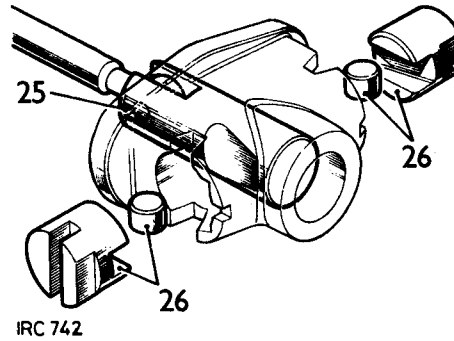
- 22 Fit the adjuster unit housing, do not tighten the fixings at this stage.
- 23 Screw in the adjuster cone.
- 24 Grease and refit the adjuster plungers.

**NOTE:** The two plungers are identical and may be fitted to either bore. Align the chamfered ends of the plungers with the cone on the adjuster.

*continued*



- 25 Grease and fit the expander rod.
- 26 Grease and fit the plungers and rollers.
- 27 Position the adjuster housing on the back plate.
- 28 Fit the packing piece.
- 29 Fit the locking plate.
- 30 Fit the retainer spring.
- 31 Fit the spring clip to the expander unit.
- 32 Fit the brake shoes and pull-off springs together.
- 33 The fully lined end of the lower shoe must be toward the expander housing.
- 34 The fully lined end of the upper shoe must be toward the adjuster housing.
- 35 Reverse instructions 2 to 5.
- 36 Turn the adjuster cone fully in and tighten the fixings.
- 37 Slacken off the adjuster cone two 'clicks'; give the brake a firm application to ensure that the shoes have centralised at the expander end. The brake drum should now be free to rotate.
- 38 Set the hand brake linkage at the vertical adjuster rod, so that the hand brake has one or two clicks free movement in the 'off' position.
- 39 Remove the road wheel chocks.



## SERVO ASSEMBLY

Remove and refit

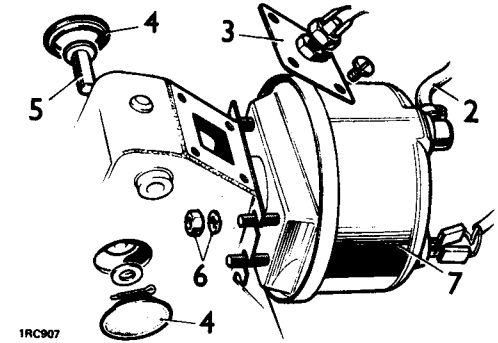
70.50.01

### Removing

- 1 Remove the brake master cylinder. 70.30.01 or 70.30.08 as applicable.
- 2 Disconnect the vacuum hose from the servo assembly.
- 3 Remove the switch plate.
- 4 Remove the rubber plugs from the pedal box.
- 5 Remove the split pin and withdraw the clevis pin securing the servo rod to the pedal.
- 6 Remove the fixings.
- 7 Withdraw the servo assembly.

### Refitting

- 8 Reverse instructions 1 to 7. Torque load for servo fixings is 1,2 kgf. m. (9 lbf. ft.).



## VACUUM RESERVOIR TANK – Diesel models with Servo

Remove and refit

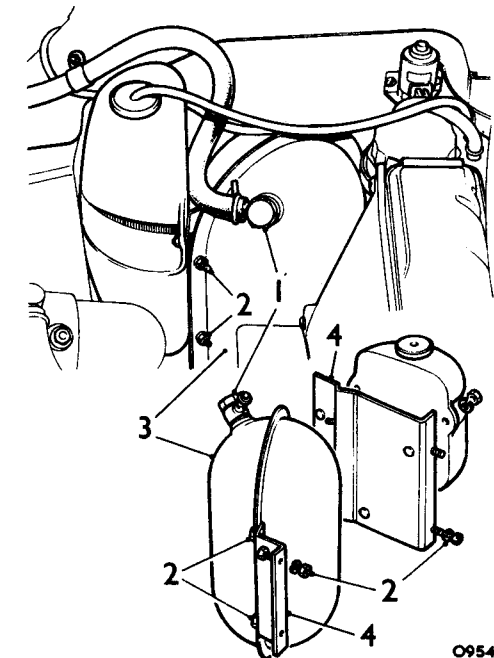
70.50.04

### Removing

- 1 Remove the union bolt and washers securing the vacuum pipes to the vacuum tank.
- 2 Remove the bolts, washers and nuts securing the vacuum tank brackets to the vehicle.
- 3 Withdraw the vacuum tank and brackets from the vehicle.
- 4 Remove the brackets from the vacuum tank.

### Refitting

- 5 Reverse instructions 1 to 4.





## SERVO ASSEMBLY

Overhaul

70.50.06

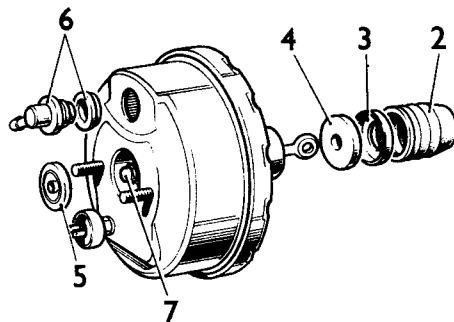
**NOTE:** The Supervac servo unit can be serviced, with a kit that is available, without completely dismantling the servo. In the event of the servo developing a major fault, the unit must be renewed.

### Dismantling

- 1 Remove the servo. 70.50.01.
- 2 Pull back the dust cover.
- 3 Remove the end cap.
- 4 Withdraw the filter.
- 5 Remove the seal and plate assembly from the front shell recess.
- 6 Remove the non-return valve and grommet.
- 7 **CAUTION:** Do not attempt to remove or adjust the operating rod which is pre-set and locked at the manufacturers.

### Reassembling (using the service kit)

- 8 Lubricate the non-return valve grommet with Girling Grease (64949009), and fit to the front shell.
- 9 Fit the new non-return valve into the grommet.
- 10 Smear the new seal and plate assembly with Girling Grease (64949008), and press into the front shell, ensuring the plate faces inwards.
- 11 Fit the new filter into the neck of the diaphragm plate.
- 12 Fit the new end cap.
- 13 Locate the new dust cover over the lugs of the rear shell.
- 14 Fit the servo. 70.50.01.



1RC908A

## WHEEL CYLINDER, 88 models

### Front wheel cylinder

- Remove and refit. Instructions 1 to 5 and 14 to 18 70.60.03  
Overhaul. Instructions 6 to 13 70.60.11

### Rear wheel cylinder

- Remove and refit. Instructions 1 to 5 and 14 to 18 70.60.18  
Overhaul. Instructions 6 to 13 70.60.26

### Removing

- 1 Remove the road wheel.
- 2 Remove the brake drum. 70.10.02.
- 3 Remove the brake shoes. 70.40.02.
- 4 Disconnect and seal the brake fluid pipe.
- 5 Remove the wheel cylinder.

### Dismantling

- 6 Withdraw the dust covers.
- 7 Withdraw the pistons and seals.
- 8 Withdraw the seal supports.
- 9 Withdraw the spring.
- 10 Remove the bleed screw.

### Inspecting

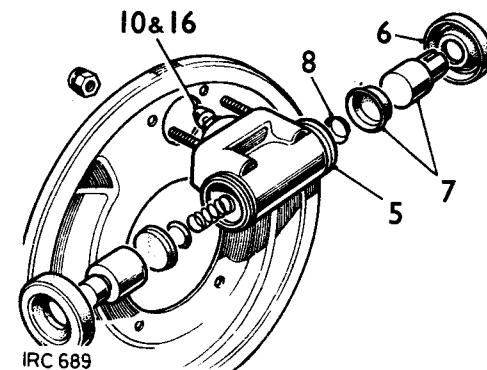
- 11 Clean all components, using Girling cleaning fluid, and allow to dry.
- 12 Inspect the cylinder bore and pistons for corrosion, scores and wear. If any component is not satisfactory, replace the complete wheel cylinder assembly.
- 13 Provide new seals and dust covers from the wheel cylinder overhaul kit.

### Assembly

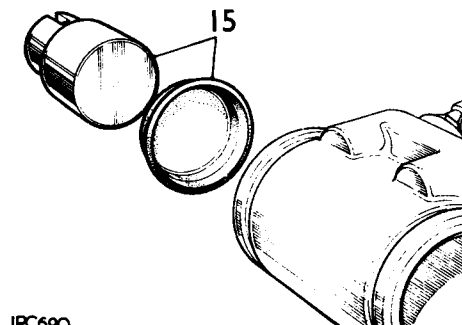
- 14 Lubricate the components, using the recommended Girling brake fluid.
- 15 Reverse 6 to 9. Fit the piston seal with the flat face toward the piston.
- 16 Fit the bleed screw, do not over-tighten. Torque 0,5 to 0,8 kgf. m. (4 to 6 lbf. ft.).

### Refitting

- 17 Reverse instructions 1 to 5.
- 18 Bleed the brakes. 70.25.02.



IRC 689



IRC 690

## FRONT WHEEL CYLINDERS – 109 models

Remove and refit. Instructions 1 to 5  
and 16 and 17 70.60.03  
Overhaul. Instructions 6 to 15 70.60.11

### Removing

- 1 Remove the road wheel.
- 2 Remove the brake drum. 70.10.02.
- 3 Remove the brake shoes. 70.40.02.
- 4 Disconnect and seal off the brake fluid pipe.
- 5 Remove the bleed screw (lower cylinder only).
- 6 Remove the wheel cylinder.

### Dismantling

- 7 Withdraw the dust cover.
- 8 Withdraw the piston and seal.
- 9 Withdraw the spring.

### Inspecting

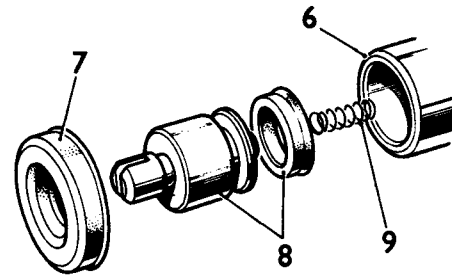
- 10 Clean all components, using Girling cleaning fluid, and allow to dry.
- 11 Inspect the cylinder bore and piston for corrosion, scores and wear. If any component is unsatisfactory, replace the wheel cylinder assembly complete.
- 12 Provide new seals and dust covers from the wheel cylinder overhaul kit.

### Assembling

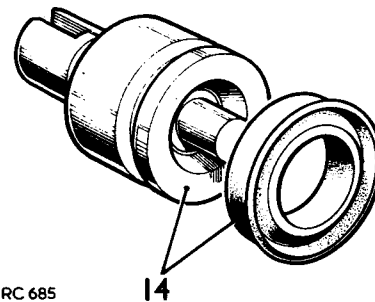
- 13 Lubricate the components, using the recommended Girling brake fluid.
- 14 Reverse instructions 6 to 8. Fit the piston seal with the lipped side away from the slotted end.
- 15 Fit the bleed screw, do not over-tighten. Torque 0,5 to 0,8 kgf. m. (4 to 6 lbf. ft.).

### Refitting

- 16 Reverse instructions 1 to 5.
- 17 Bleed the brakes. 70.25.02.



IRC 684A



IRC 685

## REAR WHEEL CYLINDER – 109 models

Remove and refit. Instructions 1 to 5  
and 16 and 17 70.60.18  
Overhaul. Instructions 6 to 15 70.60.26

### Removing

- 1 Remove the road wheel.
- 2 Remove the brake drum. 70.10.03.
- 3 Remove the brake shoes. 70.40.03.
- 4 Disconnect and seal off the brake fluid pipe.
- 5 Remove the wheel cylinder.

### Dismantling

- 6 Withdraw the dust covers.
- 7 Withdraw the pistons and seals.
- 8 Withdraw the spring and seal supports.
- 9 Remove the bleed screw.

### Inspecting

- 10 Clean all components, using Girling cleaning fluid, and allow to dry.
- 11 Inspect the cylinder bore and piston for corrosion, scores and wear. If any component is unsatisfactory, replace the wheel cylinder assembly complete.

### (109 models)

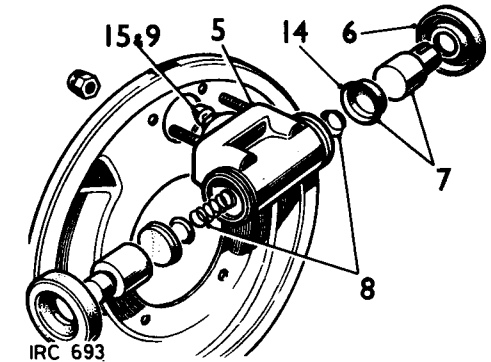
- 12 Provide new seals and dust covers from the wheel cylinder overhaul kit.

### Assembling

- 13 Lubricate the components, using the recommended Girling brake fluid.
- 14 Reverse 6 to 8. Fit the piston seal with the lipped side away from the slotted end.
- 15 Fit the bleed screw, do not over-tighten. Torque 0,5 to 0,8 kgf. m. (4 to 6 lbf. ft.).

### Refitting

- 16 Reverse instructions 1 to 5.
- 17 Bleed the brakes. 70.25.02.



IRC 693

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## WHEELS AND TYRES

### General

74.10.00

Tyres of correct type and dimension form an essential part of vehicle design. Regular tyre inspection and maintenance contributes not only to safety but also to the proper functioning of the vehicle. Road holding, steering and braking can be impaired by incorrect tyre pressure, badly fitted tyres and by worn treads.

Tyres of the same size but of different makes and tread patterns may possess widely varying characteristics. For this reason it is advised that tyres of the same make, type and tread pattern are fitted to all wheels. Tyres of different dimensions, even if paired, must never be fitted or transmission 'wind-up' on four wheel drive will occur. This will stress transmission components.

Where chevron tread type tyres are fitted the apex of the vee must lead in the direction of forward wheel rotation. Attention to this factor is necessary when interchanging wheels.

Refer to Section 04 for wheel and tyre data.

### Wheel nuts

Wheel nuts should be evenly tightened to 10,3 to 11,7 kgf m (75 to 85 lbf ft).

### Wheel tolerance

#### Lift

On a truly mounted and revolving wheel the difference between the high and low points measured at any location on either tyre seat should not exceed 2,30 mm (0.090 in.) maximum; 1,50 mm (0.060 in.) desired.

#### Wobble

The lateral variation measured on the vertical inside face of a flange should not exceed 2,30 mm (0.090 in.) maximum; 1,50 mm (0.060 in.) desired.



## BODY REPAIRS

General information

76.00.00

### Body panels

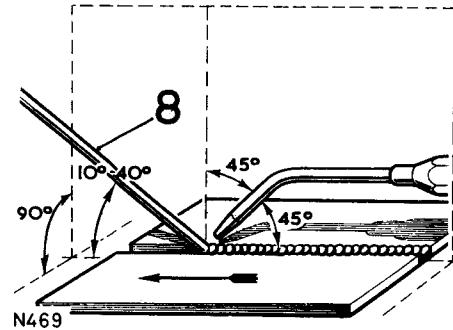
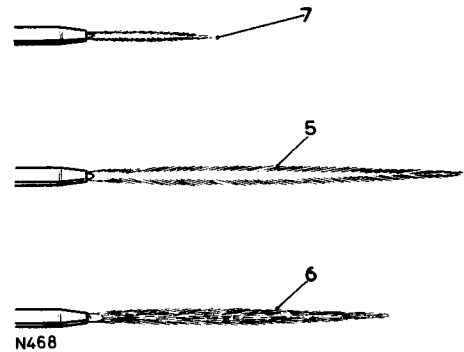
- 1 Land Rover body panels are manufactured from a special aluminium-alloy known as 'Birmabright'.
- 2 'Birmabright' melts at a slightly lower temperature than pure aluminium and will not rust nor corrode under normal circumstances. It is work-hardening, but is easily annealed. Exposed to the atmosphere, a hard oxide skin forms on the surface.

### Panel beating 'Birmabright'

- 3 'Birmabright' panels and wings can be beaten out after accidental damage then must be annealed, by the application of heat, followed by slow air-cooling; as the melting point is low, heat must be applied slowly and carefully. A practical temperature control is to apply oil to the cleaned surface to be annealed. Play the welding torch on the underside of the cleaned surface and watch for the oil to clear, leaving the surface clean and unmarked; then allow to cool naturally in the air, when the area so treated will again be soft and workable. Do not quench with oil or water. Another method is to clean the surface to be annealed and then rub it with a piece of soap. Apply heat beneath the area, as described above, and watch for the soap stain to clear. Then allow to cool, as for the oil method. When applying the heat for annealing, always hold the torch some little distance from the metal, and move it about, so as to avoid any risk of melting it locally.

### Gas welding 'Birmabright'

- 4 A small jet must be used, one or two sizes smaller than would be used for welding sheet steel of comparable thickness. For instance, use a No. 2 nozzle for welding 18 swg (0.048 in.) sheet, and a No. 3 for 16 swg (0.064 in.) sheet.



- 5 The flame should be smooth, quiet and neutral and have a brilliant inner core with a well defined, rounded end. The hottest point of the flame is close to the jet, and the flame should have a blue to orange envelope becoming nearly colourless at the end.
- 6 A slightly reducing flame may also be used, that is, there may be a slight excess of acetylene. Such a flame will have a brilliant inner core with a feathery white flame and a blue to orange envelope.
- 7 Do not use an oxydising flame, which has a short pointed inner core bluish white with a bluish envelope.

- 8 Use only 5 per cent magnesium/aluminium welding rod (5 Mg/A). Sifalumin No. 27 (MG.5 Alloy) (Use Sifbronze Special flux with this rod) or a 'Birmabright' offcut sheet. Do not use too wide or thick an offcut or trouble may be experienced in making it melt before the material which is being welded.
- 9 Clean off all grease and paint, dry thoroughly then clean the edges to be welded, and an area at least half an inch on either side of the weld, with a stiff wire scratch-brush or wire wool. Cleanliness is essential. Also clean the welding rod or strip with wire wool.
- 10 A special acid flux must be used, and we recommend 'Hari-Kari' which is obtainable from:  
The Midland Welding Supply Co. Ltd.,  
105 Lakey Lane,  
Birmingham 28, England.  
or  
Sifbronze Special Flux, which is obtainable from:  
Suffolk Iron Foundry (1920) Ltd.,  
Sifbronze Works,  
Stowmarket, England.
- 11 A small quantity of 'Hari-Kari' may be made into a paste with water, following the directions on the tin, and the paste must be applied to both surfaces to be welded and also to the rod. In the case of Sifbronze Special Flux, use in powder form as directed. Remember that aluminium and its alloys do not show 'red-hot' before melting, and so there is nothing about the appearance of the metal to indicate that it has reached welding temperature. A little experience will enable the operator to gauge this point, but a useful guide is to sprinkle a little sawdust over the work; this will sparkle and char when the right temperature is approached; a piece of dry wood rubbed over the hot metal will sparkle at the point of contact.

- 12 As the flux used is highly acid, it is essential to wash it off thoroughly immediately after a weld is completed. The hottest possible water should be used, with wire wool or a scratch-brush. Very hot soapy water is good, because of the alkaline nature of the soap, which will tend to 'kill' the acid.
- 13 It is strongly recommended that a few welds are made on scrap metal before the actual repair is undertaken if the operator is not already experienced in welding aluminium and its alloys.
- 14 The heat of welding will have softened the metal in the area of the repair, and it may be hardened again by peening with a light hammer. Many light blows are preferable to fewer heavy ones. Use a 'dolly' or anvil behind the work to avoid denting and deformation, and to make the hammering more effective. Filing of surplus metal from the weld will also help to harden the work again.

### Welding tears and patching

- 15 If a tear extends to the edge of a panel, start the weld from the end away from the edge and also at this point drill a small hole to prevent the crack spreading, then work towards the edge.
- 16 When welding a long tear, or making a long welded joint, tack the edges to be welded at intervals of from 50 to 100 mm (2 in. to 4 in.) with spots. This is done by melting the metal at the starting end and fusing into a small amount of the filler rod, repeating the process at the suggested intervals. After this, weld continuously along the joint from right to left, increasing the speed of the weld as the material heats up.
- 17 After the work has cooled, wash off all traces of flux as described previously, and file off any excess of build-up metal.
- 18 When patching, cut the patch to the correct shape for the hole to be filled, but of such size as to leave a gap of 0,8 mm (0.030 in.) between it and the panel, and then weld as described above. Never apply an 'overlay' patch.

continued

**Electric welding**

- 19 **CAUTION:** The battery earth lead must be disconnected before commencing electric welding, otherwise the alternator will be damaged.
- 20 At the Rover Factory the 'Argon-Arc' process is used, all atmospheric oxygen being excluded from the weld by the Argon gas shield. For all body repair work normally undertaken by a Distributor's or Dealer's service department, the gas welding method is sufficient and quite satisfactory.

**Spot-welding**

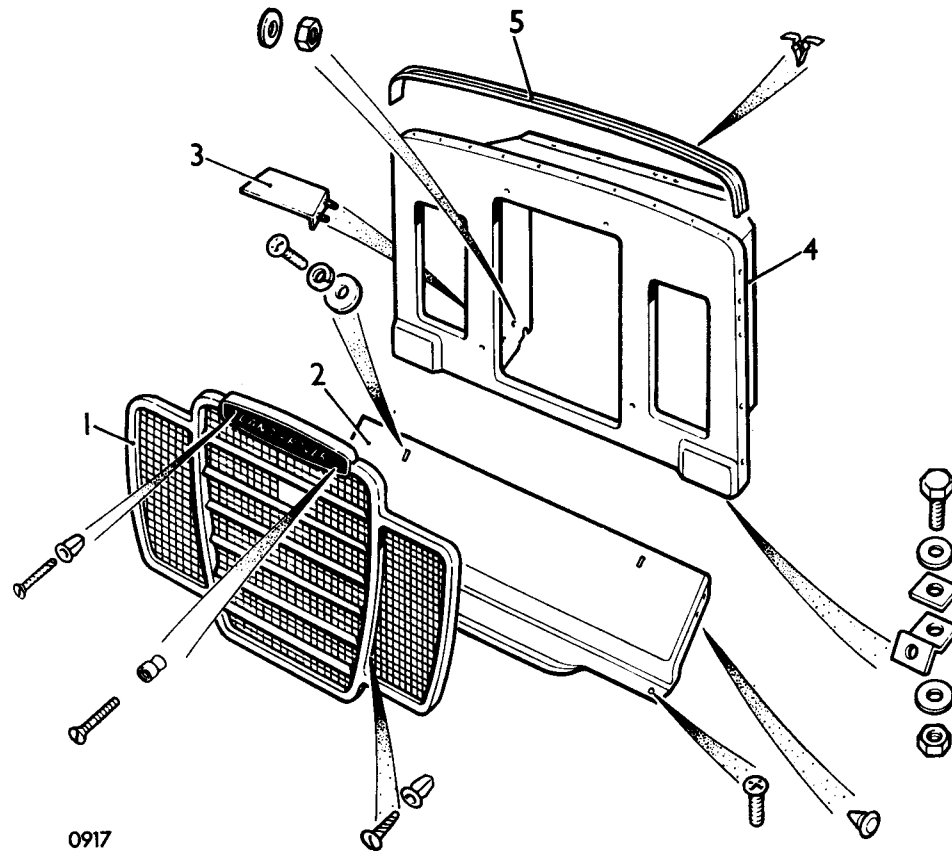
- 21 Spot-welding is largely used in the manufacture of Land-Rover bodies, but this is a process which can only be carried out satisfactorily by the use of the proper apparatus. Aluminium and its alloys are very good conductors of heat and electricity, and thus it is most important to maintain the right conditions for successful spot-welding. The correct current density must be maintained, and so must the 'dwell' of the electrodes. Special spot-welding machines have been developed, but they are expensive, and though the actual work can be carried out by comparatively unskilled labour, supervision and machine maintenance must be in the hands of properly qualified persons.

**Riveting**

- 22 Where both sides of the metal are accessible and it is possible to use an anvil or 'dolly', solid aluminium rivets may be used, with a suitable punch or 'pop' to ensure clean, rounded heads on the work. For riveting blind holes, 'pop-rivets' must be used. These are inserted and closed by special 'Lazy-Tong' 'pop-rivet' pliers.

**Painting 'Birmabright'**

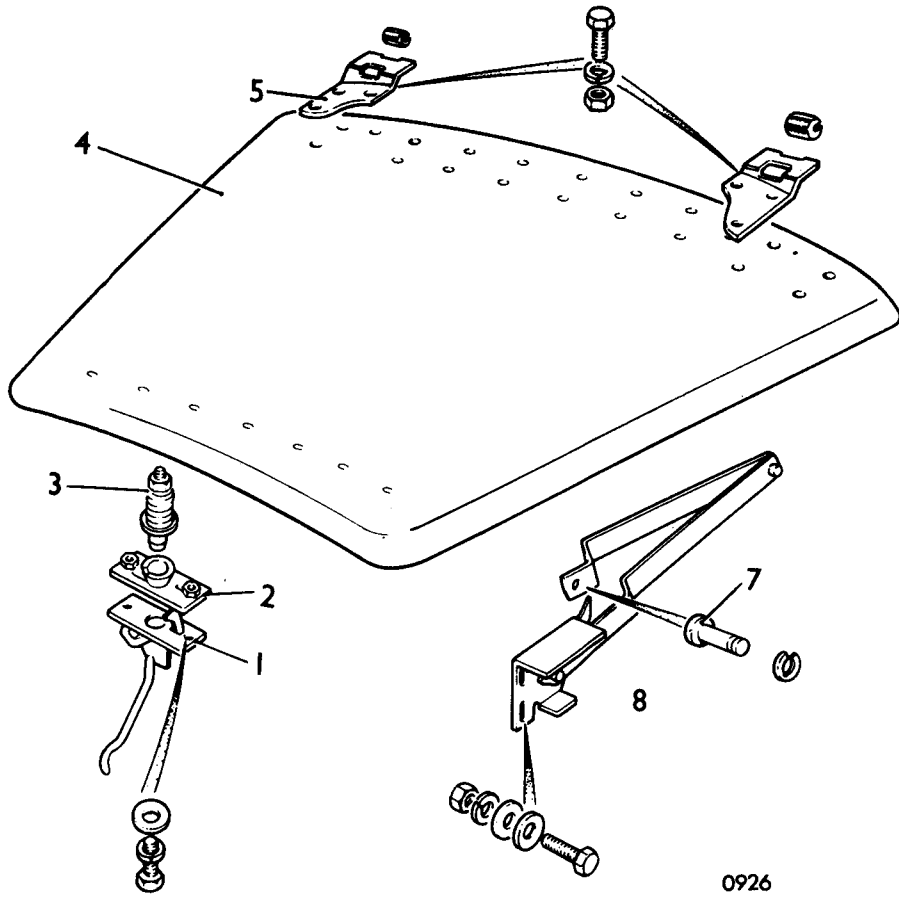
- 23 Refer to the procedure detailed in Paintwork Section 78.



0917

**Radiator grille, front apron and grille panel****Key**

- 1 Radiator grille.
- 2 Front apron panel
- 3 Horn protector plate
- 4 Radiator grille panel
- 5 Bonnet rest strip

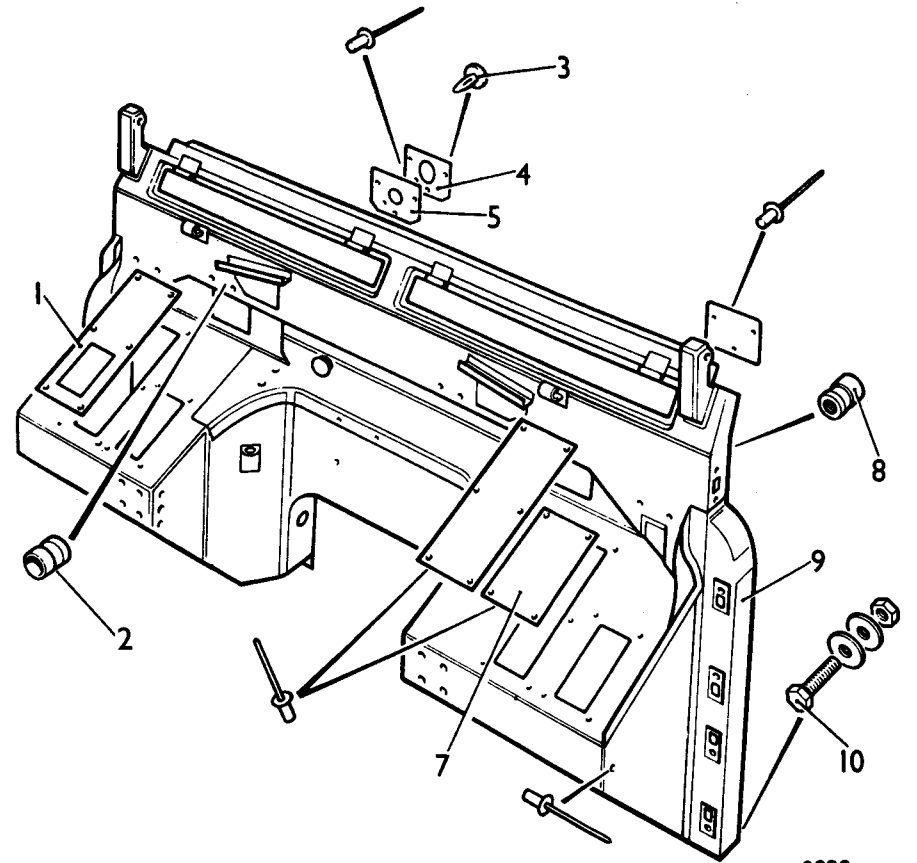


0926

**Bonnet**

**Key**

- 1 Bonnet control
- 2 Washer plate
- 3 Striker pin
- 4 Bonnet
- 5 Hinge
- 6 Bush — bonnet hinge
- 7 Pivot pin
- 8 Bonnet prop

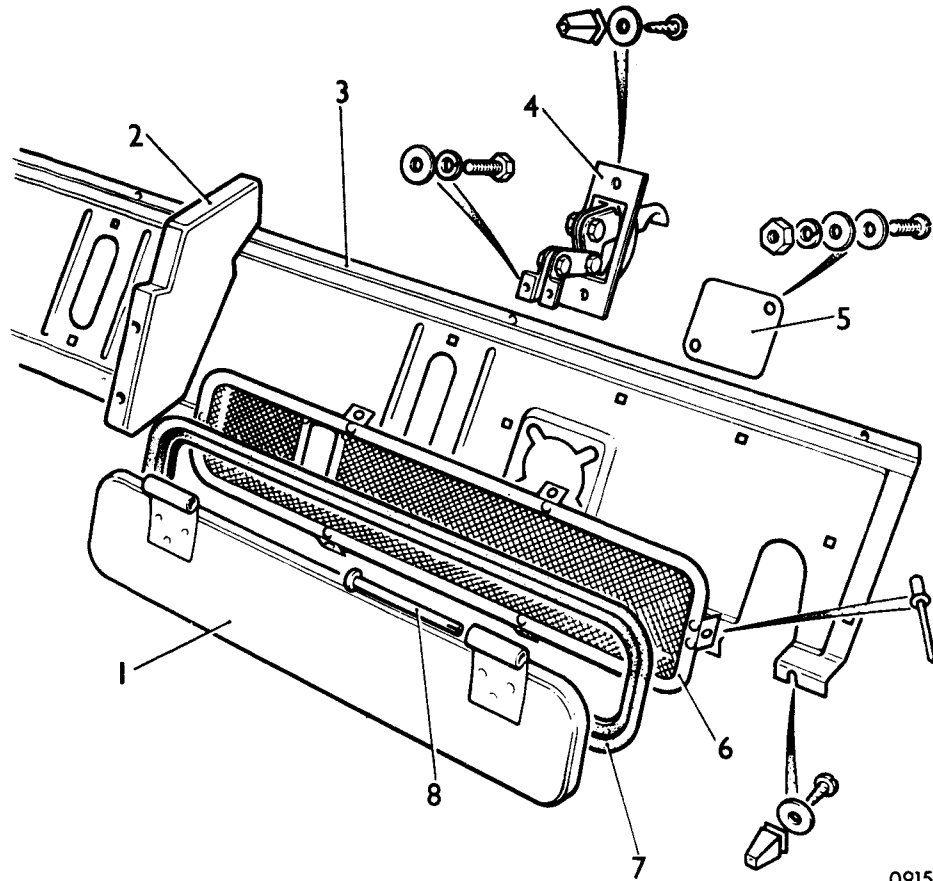


0920

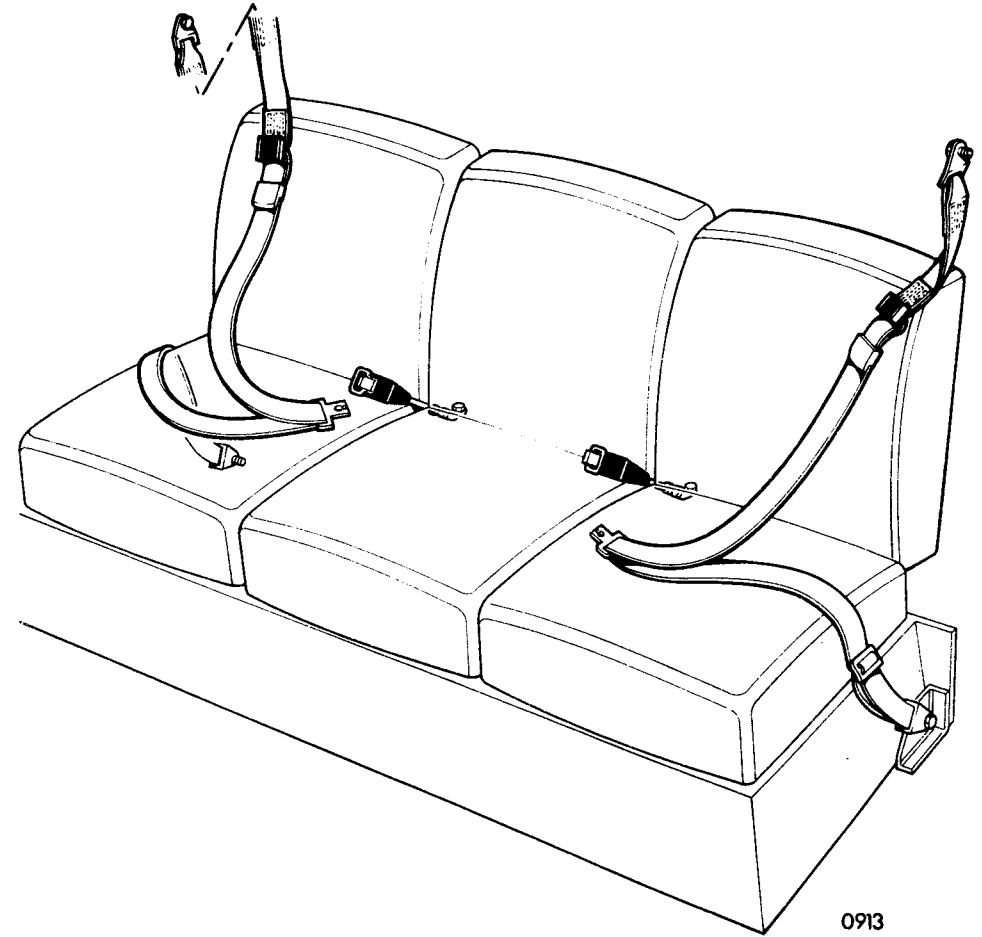
**Dash**

**Key**

- 1 Pedal hole cover plate
- 2 Nutserts
- 3 Drive fasteners
- 4 Backing plate for seal
- 5 Seal
- 6 Pedal hole cover plate
- 7 Heater hole cover plate
- 8 Nutserts
- 9 Dash panel
- 10 Tie bolts, dash to chassis



0915



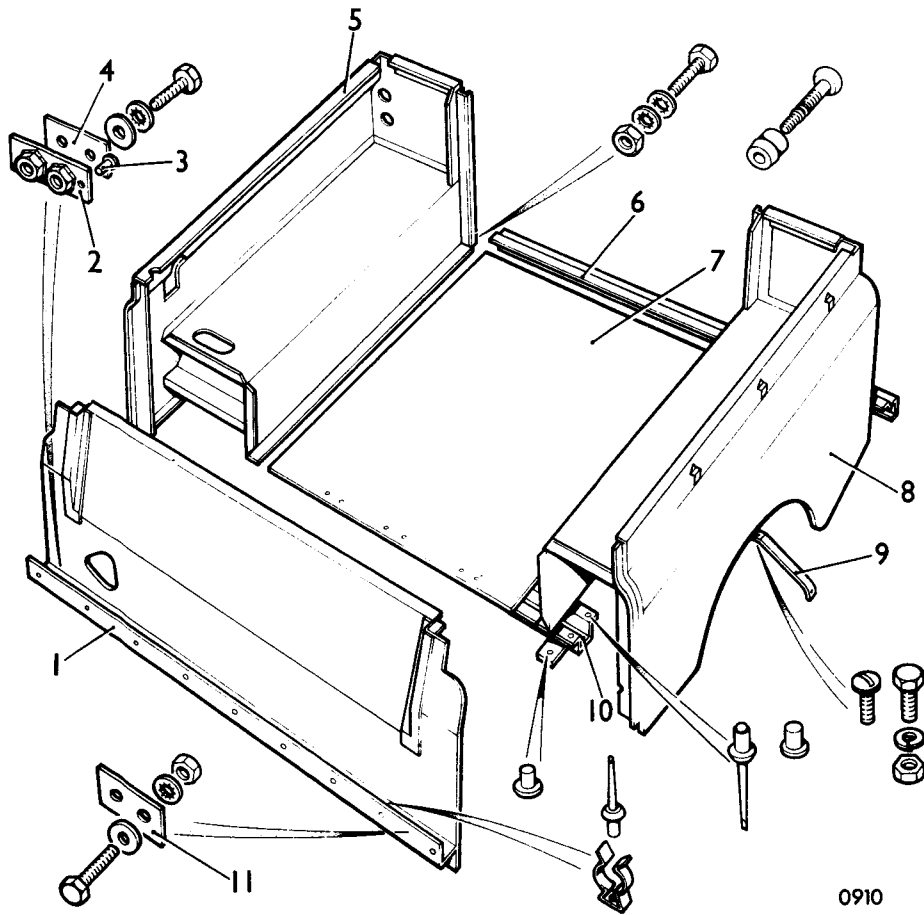
0913

### Ventilator and flyscreen

#### Key

- 1 Dash ventilator lid
- 2 Air flow divider panel
- 3 Fascia - support panel
- 4 Ventilator mechanism assembly
- 5 Blanking plate
- 6 Flyscreen
- 7 Sealing rubber
- 8 Hinge pin



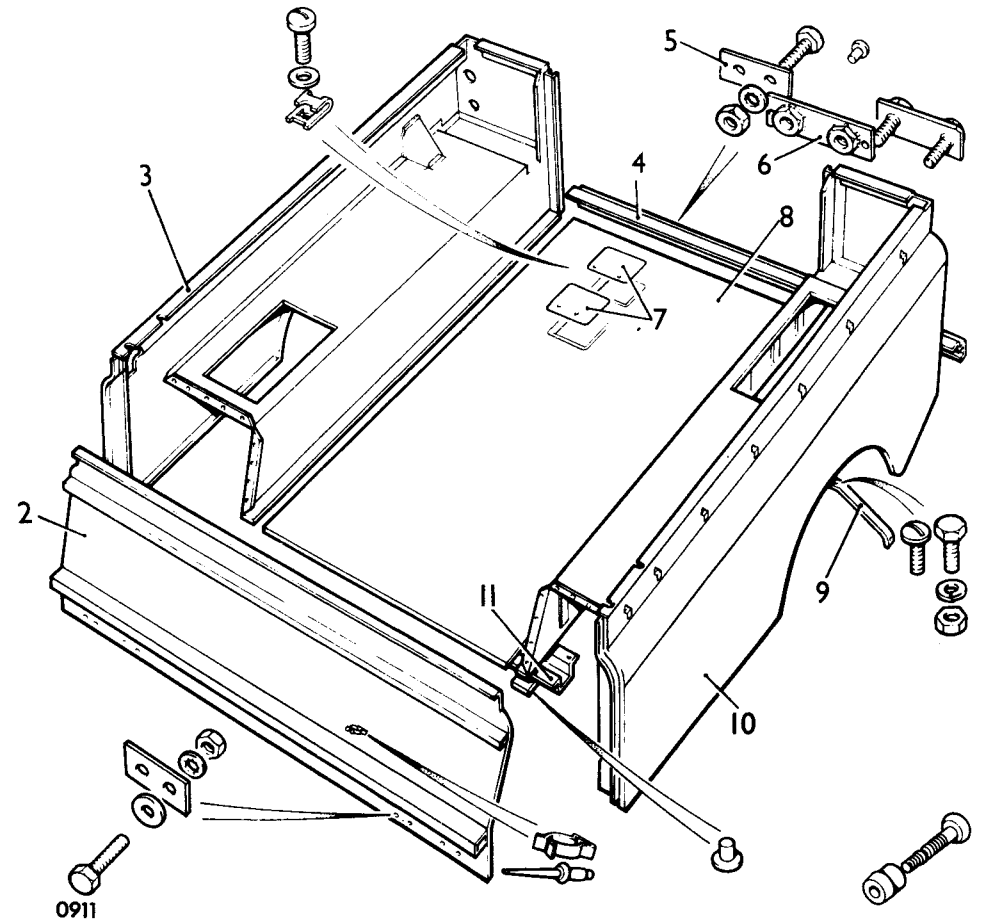


0910

**Rear body – 88**

**Key**

- 1 Front end panel
- 2 Nut plate
- 3 Rivet
- 4 Shim
- 5 Body side – right hand
- 6 Rear mounting angle
- 7 Floor panel
- 8 Body side – left hand
- 9 Stay
- 10 Cross member
- 11 Shim

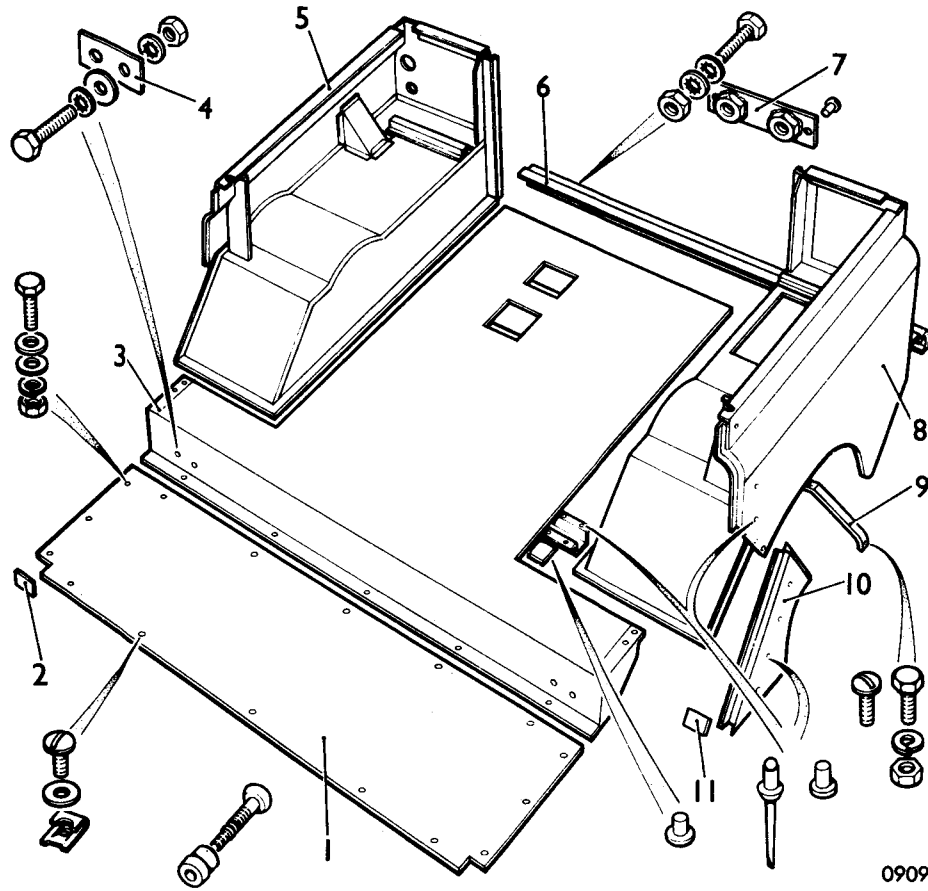


0911

**Rear body – 109 (Except station wagon)**

**Key**

- 1 Shim
- 2 Front end panel
- 3 Body side, right hand
- 4 Rear mounting angle
- 5 Shim
- 6 Nut plate
- 7 Cover plates, right hand
- 8 Floor panel
- 9 Stay
- 10 Body side, left hand
- 11 Cross member

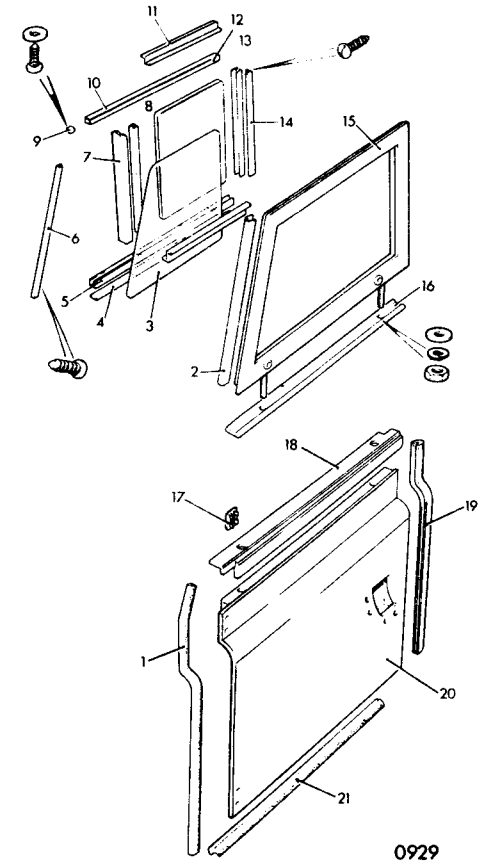


**Body - 109 Station Wagon  
Key**

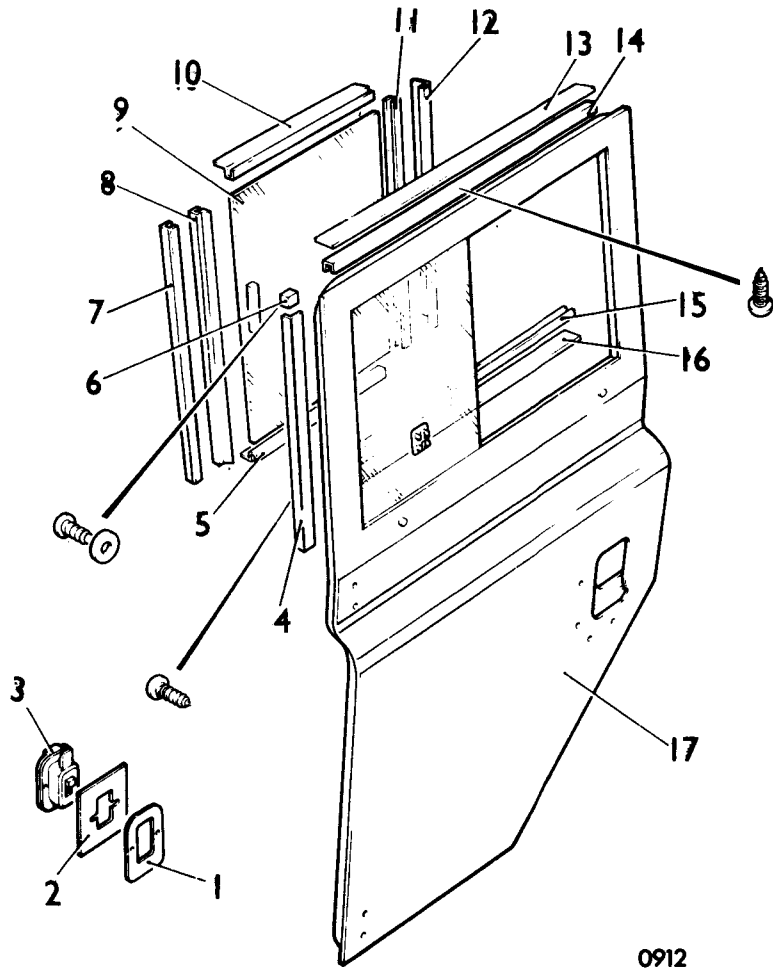
- 1 Floor - intermediate
- 2 Sealing rubber
- 3 Floor - rear
- 4 Shim
- 5 Body side, right hand
- 6 Mounting angle
- 7 Nut plate
- 8 Body side, left hand
- 9 Stay
- 10 Front extension, left hand
- 11 Sealing rubber

**Front Door  
Key**

- 1 Door seal
- 2 Door seal - side frame
- 3 Fixed glass
- 4 Packing strip
- 5 Glass channel - bottom
- 6 Retainer
- 7 Channel
- 8 Sealing rubber
- 9 Buffer
- 10 Channel
- 11 Filler
- 12 Sliding glass
- 13 Filler
- 14 Channel
- 15 Side screen frame
- 16 Sealing strip
- 17 Plug - window catch
- 18 Capping
- 19 Door seal
- 20 Door - front
- 21 Door seal

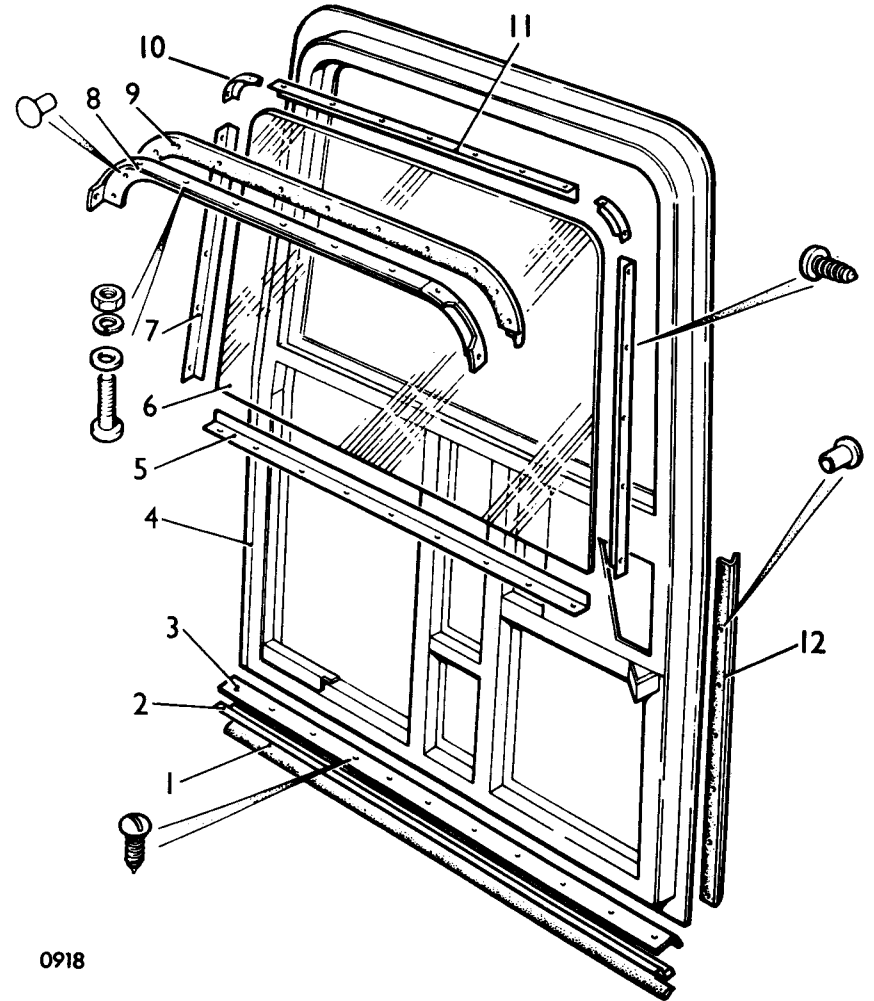


0929



0912  
 Door – rear – 109 station wagon  
 Key

- |                        |                  |
|------------------------|------------------|
| 1 Seal – window catch  | 10 Retainer      |
| 2 Mask – window catch  | 11 Channel       |
| 3 Window catch         | 12 Filler        |
| 4 Retainer             | 13 Packing strip |
| 5 Filler               | 14 Channel       |
| 6 Buffer               | 15 Channel       |
| 7 Channel              | 16 Packing strip |
| 8 Sealing rubber       | 17 Rear door     |
| 9 Door glass – sliding |                  |

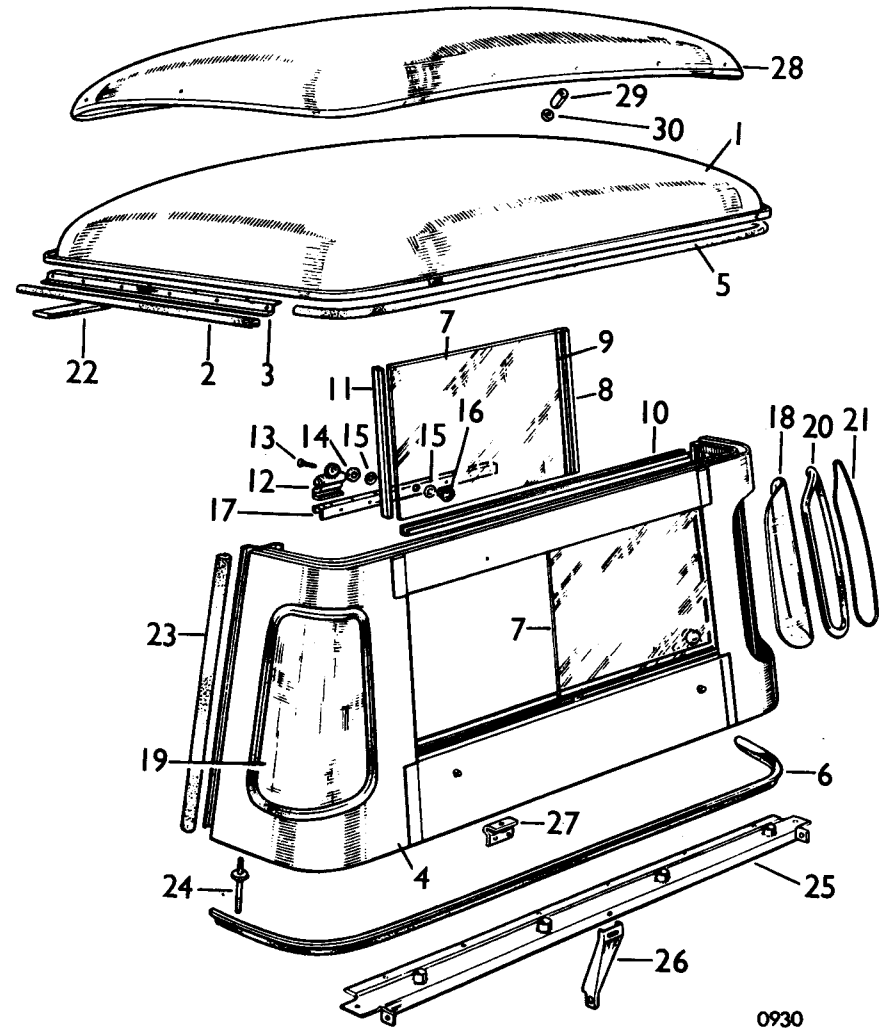


0918  
 Tail door – station wagon  
 Key

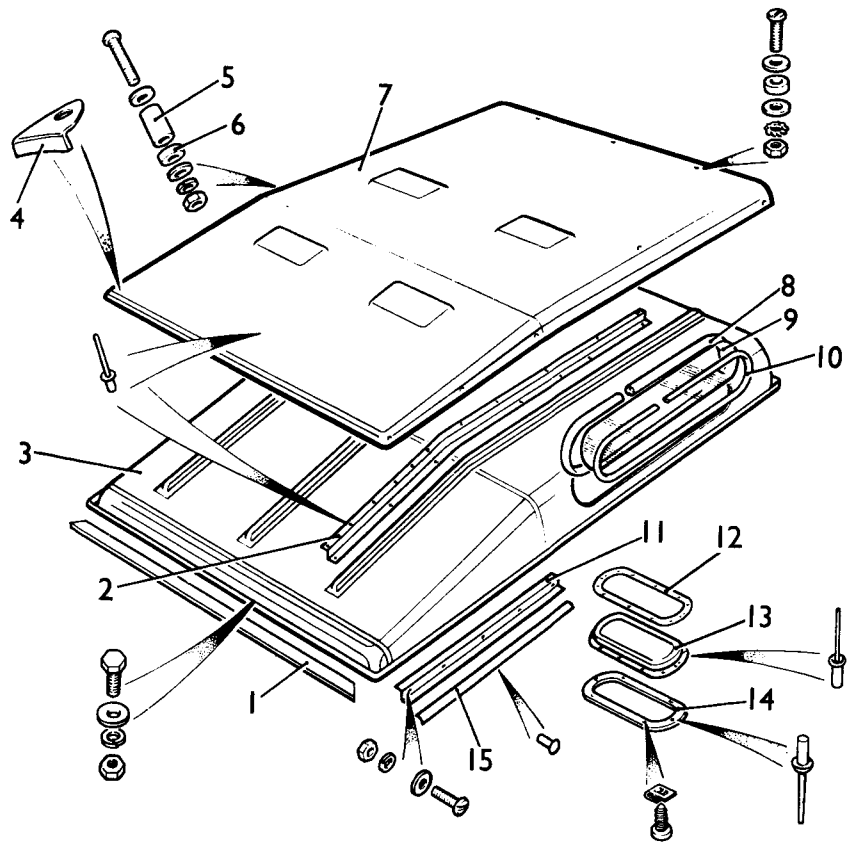
- |                                 |                                  |
|---------------------------------|----------------------------------|
| 1 Seal                          | 7 Glass retainer strip – side    |
| 2 Seal retainer                 | 8 Arch-hard top                  |
| 3 Protection strip              | 9 Sealing rubber                 |
| 4 Rear door                     | 10 Glass retainer – corner piece |
| 5 Glass retainer strip – bottom | 11 Glass retainer strip – top    |
| 6 Glass                         | 12 Seal                          |

**Cab and tropical roof  
Key**

- 1 Cab roof
- 2 Sealing rubber, door top
- 3 Retainer for seal
- 4 Cab rear panel assembly
- 5 Rubber seal, roof to back panel, top
- 6 Rubber seal back panel to rear body
- 7 Sliding back light
- 8 Sealing rubber for back light
- 9 Channel for rubber
- 10 Channel, top and bottom } For back light
- 11 Channel, sides }
- 12 Back light catch
- 13-16 Fixing for catches
- 17 Runner for sliding back light catch
- 18 Cab quarter light, RH
- 19 Cab quarter light, LH
- 20 Weather strip } For quarter
- 21 Sealing strip } light
- 22 Sealing rubber, windscreen to roof
- 23 Sealing rubber, door side
- 24 Mounting stud
- 25 Mounting rail for cab
- 26 Mounting rail support bracket
- 27 Cab mounting distance piece
- 28 Cab tropical roof panel
- 29 Distance piece } Fixing tropical roof
- 30 Rubber } panel to cab roof



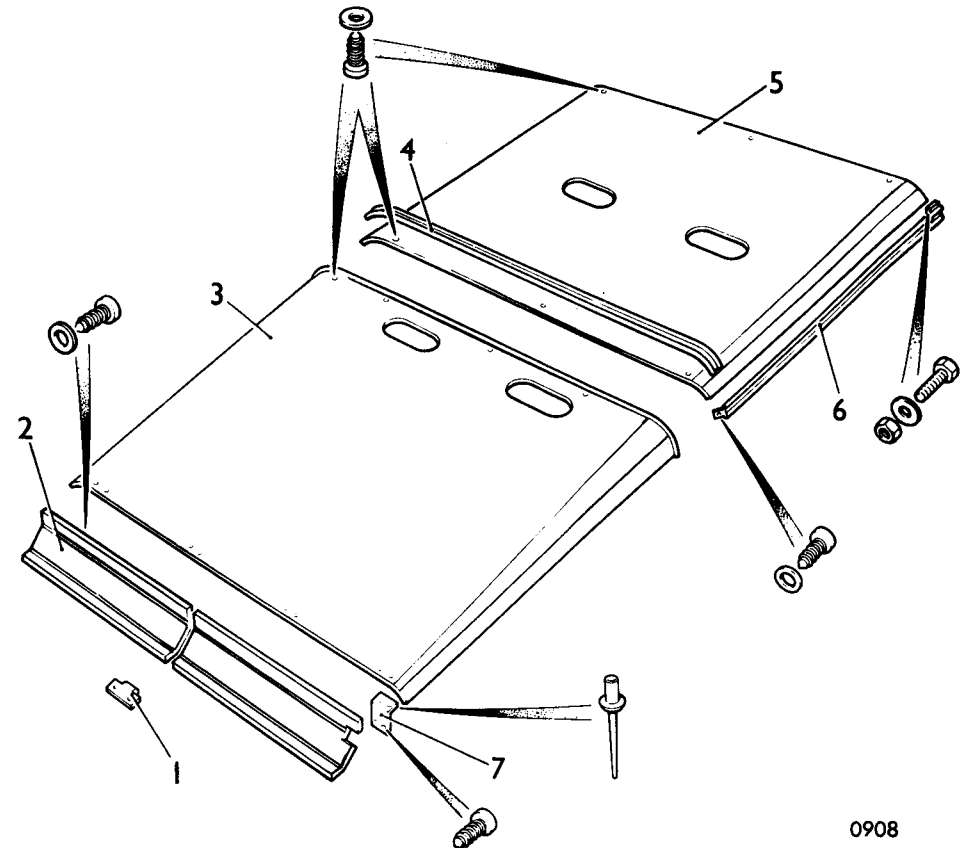
0930



0931

**Body, roof – 88 station wagon  
Key**

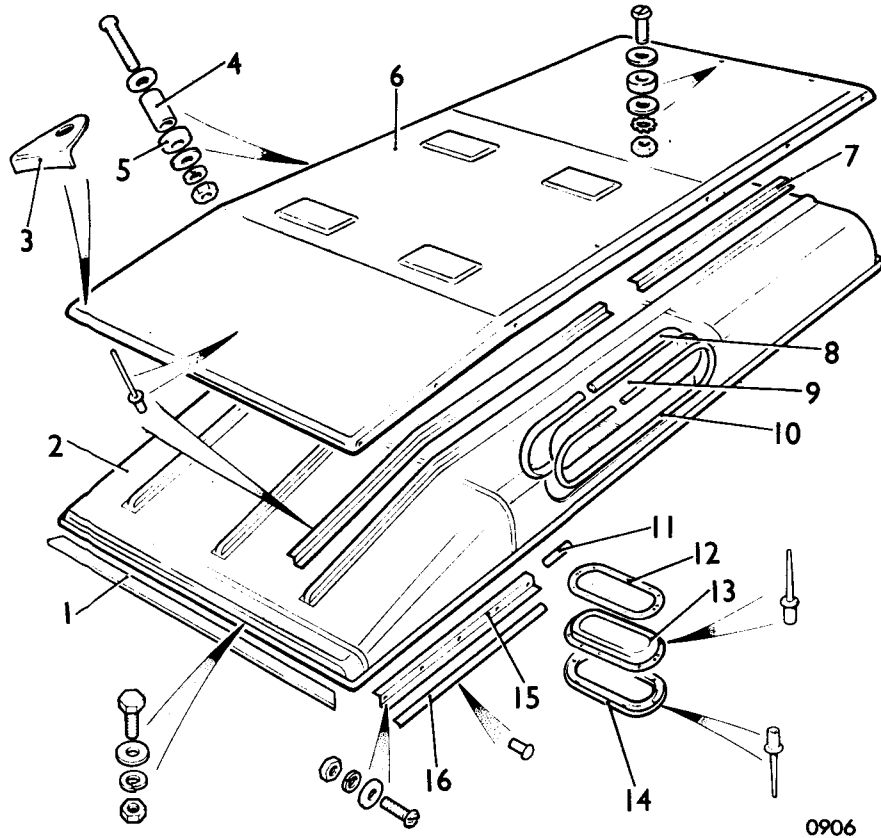
- |                   |                   |
|-------------------|-------------------|
| 1 Sealing strip   | 9 Roof glass      |
| 2 Stiffener strip | 10 Filler strip   |
| 3 Roof            | 11 Seal retainer  |
| 4 Corner capping  | 12 Rubber seal    |
| 5 Spacer          | 13 Ventilator     |
| 6 Rubber washer   | 14 Retainer plate |
| 7 Tropical roof   | 15 Seal           |
| 8 Weather strip   |                   |



0908

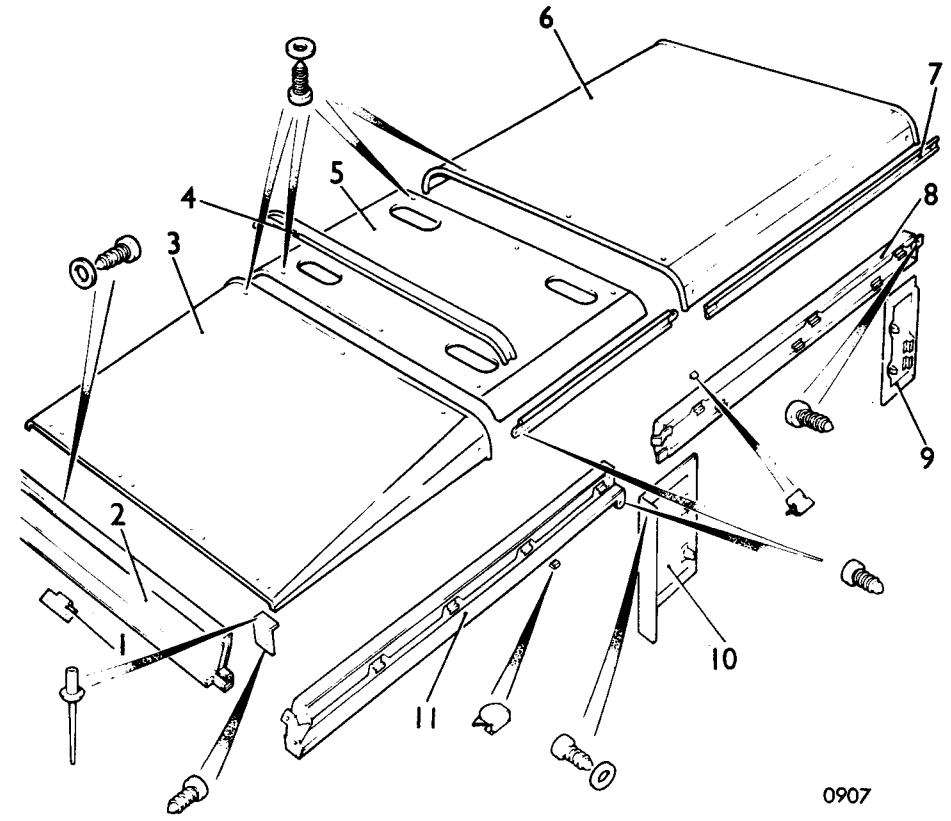
**Roof trim – 88 station wagon  
Key**

- |                |
|----------------|
| 1 Bracket      |
| 2 Trim panel   |
| 3 Roof trim    |
| 4 Centre strip |
| 5 Head cloth   |
| 6 Side rail    |
| 7 Bracket      |



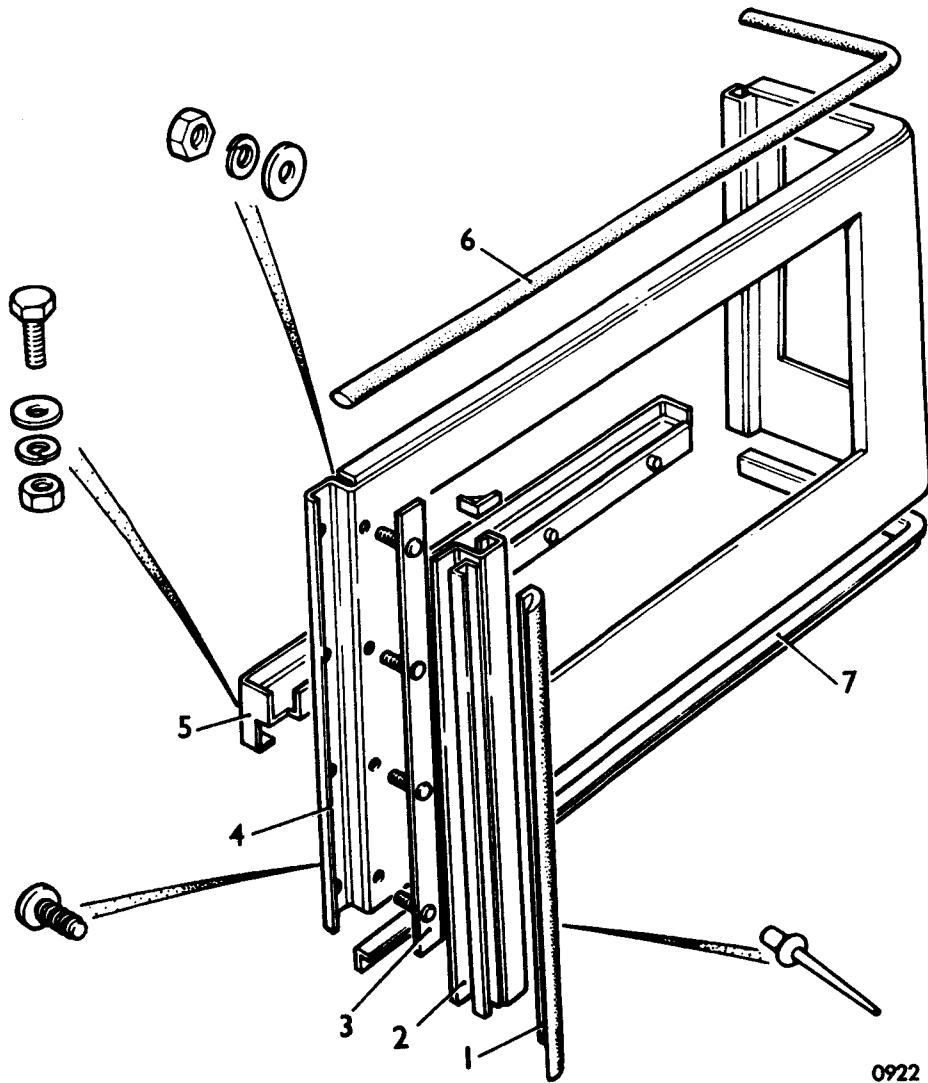
**Body roof – 109 station wagon**  
Key

- |                  |                   |
|------------------|-------------------|
| 1 Sealing strip  | 9 Roof glass      |
| 2 Roof           | 10 Filler strip   |
| 3 Corner capping | 11 Sealing rubber |
| 4 Spacer         | 12 Rubber seal    |
| 5 Rubber washer  | 13 Ventilator     |
| 6 Tropical roof  | 14 Retainer plate |
| 7 Stiffener      | 15 Seal retainer  |
| 8 Weather strip  | 16 Rubber seal    |



**Roof trim – 109 station wagon**  
Key

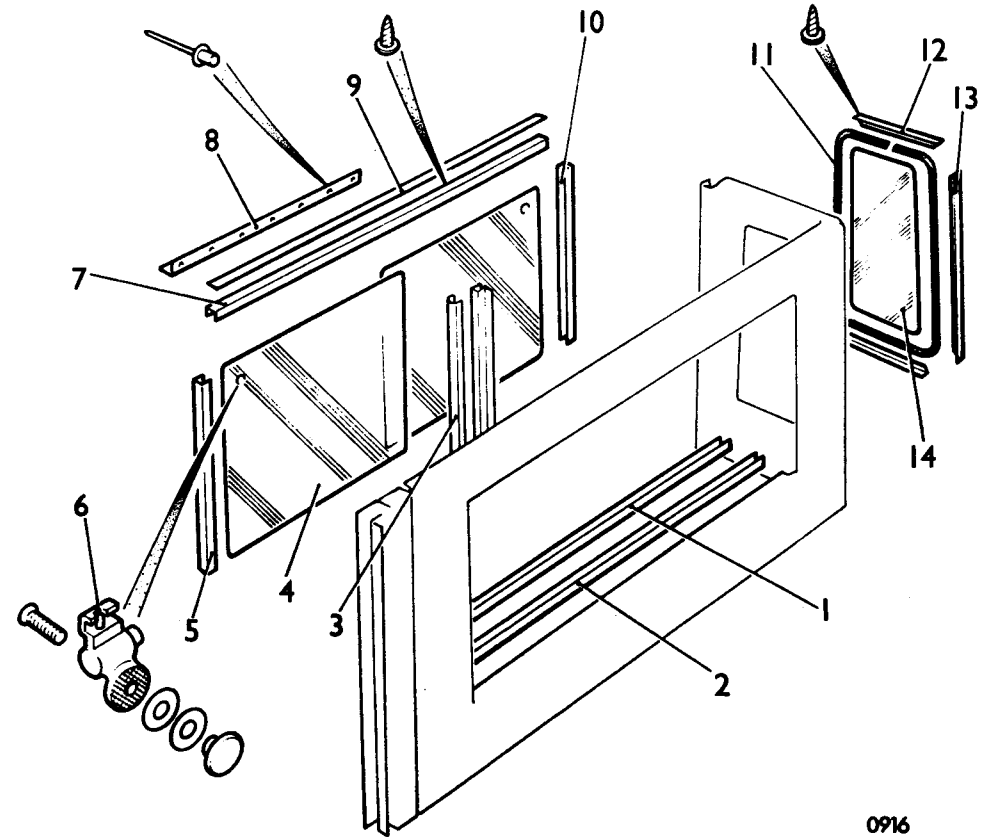
- |                    |
|--------------------|
| 1 Bracket          |
| 2 Trim panel       |
| 3 Roof trim        |
| 4 Centre strip     |
| 5 Headcloth        |
| 6 Headcloth        |
| 7 Strip            |
| 8 Cant rail – rear |
| 9 Casing           |
| 10 Side rail       |
| 11 Casing          |



Side panel and fixings — station wagon  
Key

- |              |                  |
|--------------|------------------|
| 1 Seal       | 5 Drain channel  |
| 2 Capping    | 6 Sealing rubber |
| 3 Stud plate | 7 Sealing rubber |
| 4 Side panel |                  |

0922



Rear windows — station wagon  
Key

- |           |                   |
|-----------|-------------------|
| 1 Channel | 8 Runner          |
| 2 Channel | 9 Packing strip   |
| 3 Channel | 10 Channel        |
| 4 Glass   | 11 Glazing strip  |
| 5 Channel | 12 Retainer strip |
| 6 Catch   | 13 Retainer strip |
| 7 Channel | 14 Glass          |

0916

## CHASSIS FRAME

Alignment check

76.10.02

## Procedure

With the vehicle assembled a check for chassis 'squareness' can be made as follows. Instructions 1 to 7.

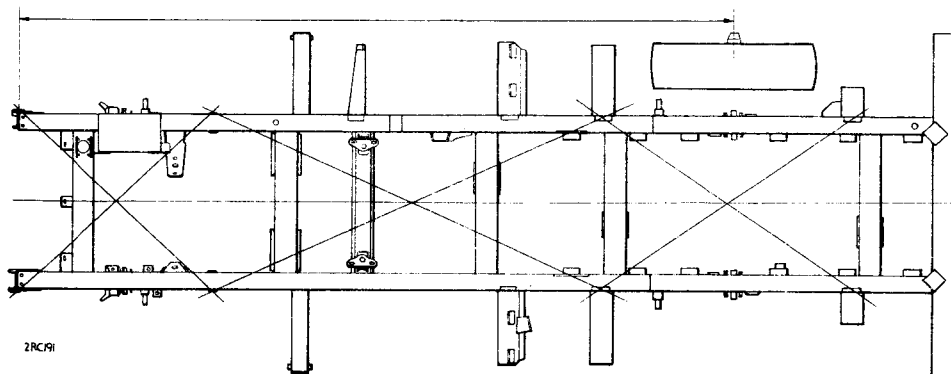
- 1 Place the vehicle on a level floor.
- 2 Hold a plumb line against one of the measuring points as illustrated. (The measuring points are the fixed spring shackle locations.)
- 3 Mark the floor directly beneath the plumb-bob.
- 4 Repeat items 2 and 3 at the remaining measuring points.

**NOTE:** When measuring diagonals, ensure that exactly corresponding points are used on each side of the chassis frame.

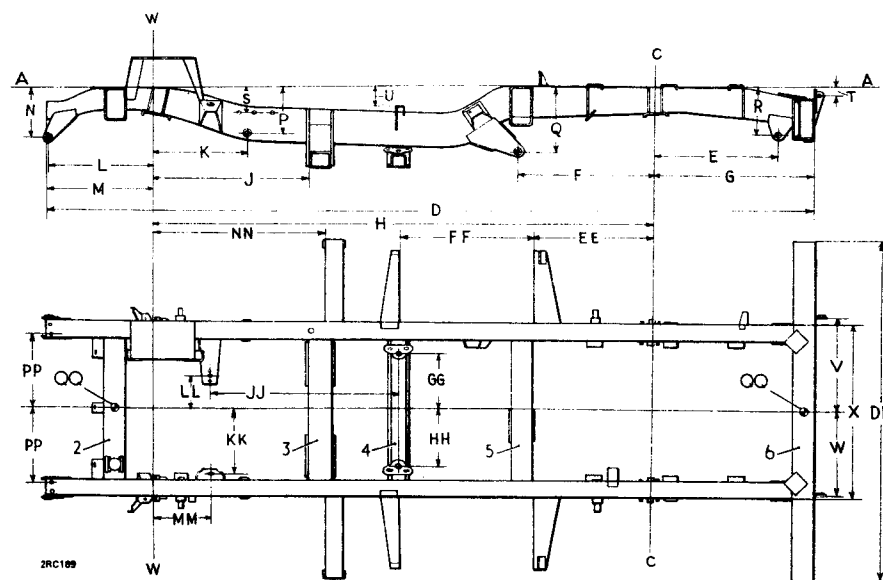
- 5 Move the vehicle and measure between the chalk marks.
- 6 The diagonals between the related measuring points should agree within 9,5 mm (0.375 in.).
- 7 Using a suitable trammel, make comparative side-to-side checks between the front suspension front shackle pin and the rear wheel hub centre.
- 8 With the vehicle upper structure removed, comparative side-to-side checks for chassis frame misalignment can be made, using as datums the 9,5 mm (0.375 in.) diameter holes provided in the No. 2 and also in the rearmost cross-member.

**NOTE:** The vehicle front bumper is regarded as the No. 1 cross-member.

- 9 Chassis frame dimensional checks can be made referring to the applicable illustration and associated key.



ZRC91

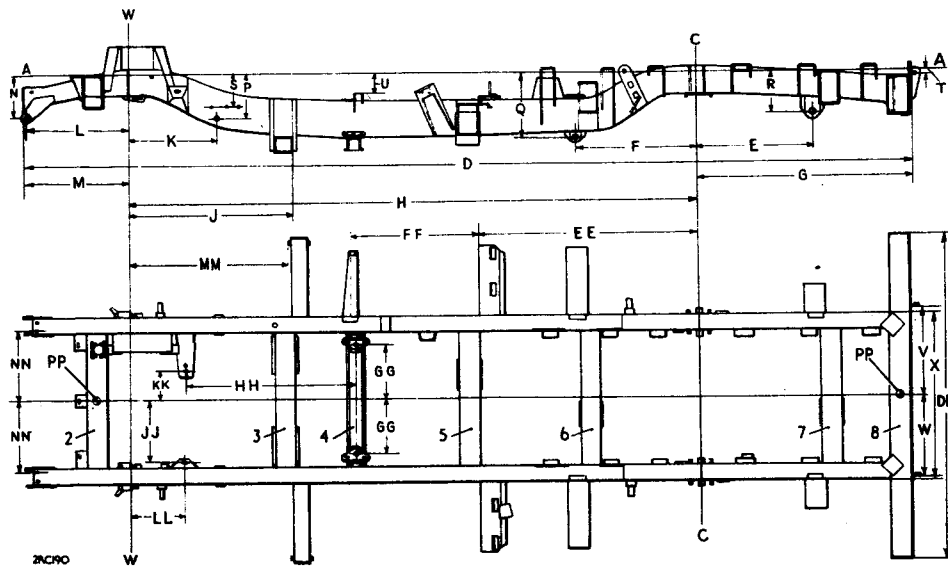


ZRC109

## Chassis frame dimensions, 88 models

AA	- Datum line
WW	- Centre line of front axle
CC	- Centre line of rear axle
D	- 3420 mm (134.6 in.)
E	- 539,7 mm (21.25 in.)
F	- 610 mm (24.0 in.)
G	- 713,2 mm (28.08 in.)
H	- 2235 mm (88.0 in.)
J	- 793,7 mm (31.25 in.)
K	- 422,3 mm (16.625 in.)
L	- 457 mm (18.0 in.)
M	- 472,2 mm (18.58 in.)
N	- 229 mm (9.0 in.)
P	- 212,7 mm (8.37 in.)
Q	- 290,5 mm (11.44 in.)
R	- 198,4 mm (7.81 in.)
S	- 120,6 mm (4.75 in.)
T	- 29,3 mm (1.15 in.)
U	- 82,5 mm (3.25 in.)
V	- 432 mm (17.0 in.)
W	- 387,3 mm (15.25 in.)
X	- 787 mm (31.0 in.)
DD	- 1536 mm (60.5 in.)
EE	- 539,7 mm (21.25 in.)
FF	- 610 mm (24.0 in.)
GG	- 257 ± 0,8 mm (10.12 ± 0.030 in.)
HH	- 254 ± 0,8 mm (10.00 ± 0.030 in.)
JJ	- 835 ± 0,8 mm (32.87 ± 0.030 in.)
KK	- 289,7 mm (11.40 in.)
LL	- 166,7 mm (6.56 in.)
MM	- 250,8 ± 1,5 mm (9.875 ± 0.060 in.)
NN	- 768,3 mm (30.25 in.)
PP	- 331,78 ± 0,5 mm (13.062 ± 0.020 in.)
QQ	- 9,52 mm (0.375 in.) diameter holes





Chassis frame dimensions, 109 models

AA	- Datum line	U	- 82,5 mm (3.25 in.)
WW	- Centre line of front axle	V	- 432 mm (17.0 in.)
CC	- Centre line of rear axle	W	- 387,3 mm (15.25 in.)
D	- 4240 mm (166.9 in.)	X	- 787 mm (31.0 in.)
E	- 539,7 mm (21.25 in.)	DD	- 1536 mm (60.5 in.)
F	- 610 mm (24.0 in.)	EE	- 1070 mm (42.12 in.)
G	- 1000 mm (39.375 in.)	FF	- 641 mm (25.2 in.)
H	- 2770 mm (109 in.)	GG	- 257 ± 0,8 mm (10.125 ± 0.030 in.) 2.6 & 2½ litre
J	- 793,7 mm (31.25 in.)	HH	- 835 ± 0,8 mm (32.87 ± 0.030 in.) 2½ litre
K	- 422,3 mm (16.625 in.)		- 984 ± 0,8 mm (38.74 ± 0.030 in.) 2.6 litre
L	- 457 mm (18.0 in.)	JJ	- 289,71 mm (11.406 in.) 2½ litre
M	- 472,2 mm (18.58 in.)		- 290,51 mm (11.437 in.) 2.6 litre
N	- 229 mm (9.0 in.)	KK	- 166,7 mm (6.56 in.)
P	- 212,7 mm (8.37 in.)	LL	- 250,7 mm (9.87 in.) 2½ litre
Q	- 296,8 mm (11.68 in.)		- 193,7 mm (7.62 in.) 2.6 litre
R	- 204,7 mm (8.06 in.)	MM	- 763 mm (30 in.) 2½ & 2.6 litre
S	- 120,6 mm (4.75 in.)	NN	- 331,8 ± 0,5 mm (13.06 ± 0.062 in.)
T	- 29,3 mm (1.15 in.)	PP	- 9,52 mm (0.375 in.) diameter holes

## FRONT FLOOR

**Remove and refit** 76.10.12  
 2½ litre models, instructions 1 to 7 and 11 to 13  
 2.6 litre models, instructions 1 to 4 and 8 to 13

### Removing

- 1 Unscrew the knob and locknut from the transfer gear lever.
- 2 Remove the fixings and withdraw the dust cover from the transfer gear lever.
- 3 Unscrew the knob and locknut from the four-wheel drive lever.
- 4 Withdraw the spring and ferrule.

### 2½ litre models

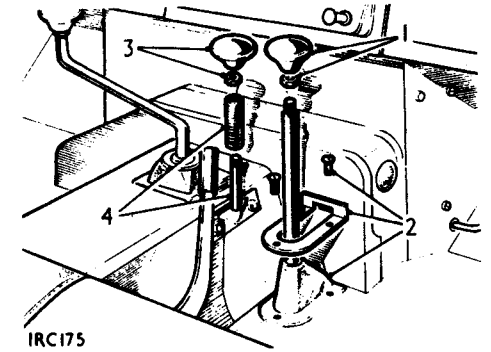
- 5 Remove both halves of the front floor.
- 6 Remove the gearbox tunnel cover.
- 7 Remove a gearbox tunnel front panel.

### 2.6 litre models

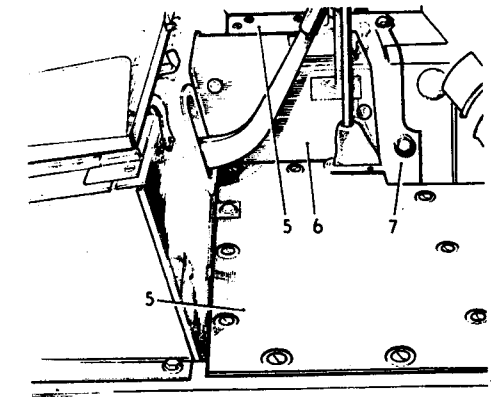
- 8 Remove the gearbox tunnel cover.
- 9 Remove the gearbox tunnel front panel.
- 10 Remove both halves of the front floor.

### Refitting, both models

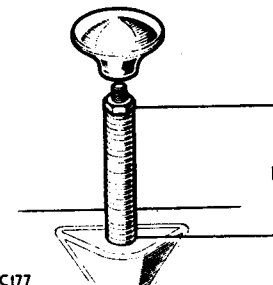
- 11 Reverse instructions 8 to 10 or 5 to 7 as applicable.  
 Use waterproof sealant between the joint flanges.
- 12 Adjust the four-wheel drive lever during assembly, as follows: Fit the ferrule, spring and locknut to the lever, depress the lever and adjust the locknut until the compressed spring length is 58 mm (2.312 in.), then fit the knob and tighten the locknut.
- 13 Reverse instructions 1 and 2.



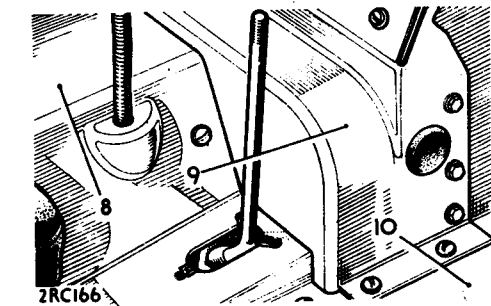
IRC175



IRC176



IRC177



2RC166

**FRONT WING**

Remove and refit

76.10.26

**Removing**

- 1 Disconnect the battery.
- 2 Jack up the vehicle and support securely.
- 3 Remove the front wheel.
- 4 Remove the radiator grille.
- 5 Disconnect the headlamp leads at the snap connectors.
- 6 Disconnect the side lamp and flasher lamp at the snap connectors.
- 7 Remove the bolts securing the wing to the radiator grille panel.
- 8 Remove the bolts securing the wing stay.
- 9 Remove the bolts securing the wing to the sill.
- 10 Remove the bolts securing the wing to the cover plate.
- 11 Remove the bolts securing the mudshield. Remove the mudshield.
- 12 Remove the bolts securing the wing to the scuttle and scuttle pillar.
- 13 Withdraw the front wing.
- 14 Remove the headlamp, side lamp and flasher lamp if required.
- 15 The foregoing instructions outline the basic wing attachment details. Depending upon whether the wing to be removed is left or right hand, the vehicle is fitted with left or right hand steering, is fitted with a heater, or is a servo brake diesel model, the following additional operations may be necessary.

**Bonnet removal.**

Windscreen washer reservoir.

Vacuum tank - servo brake, diesel only.

Heater fan motor and connections.

Heater air intake connections.

Steering drop arm cover box.

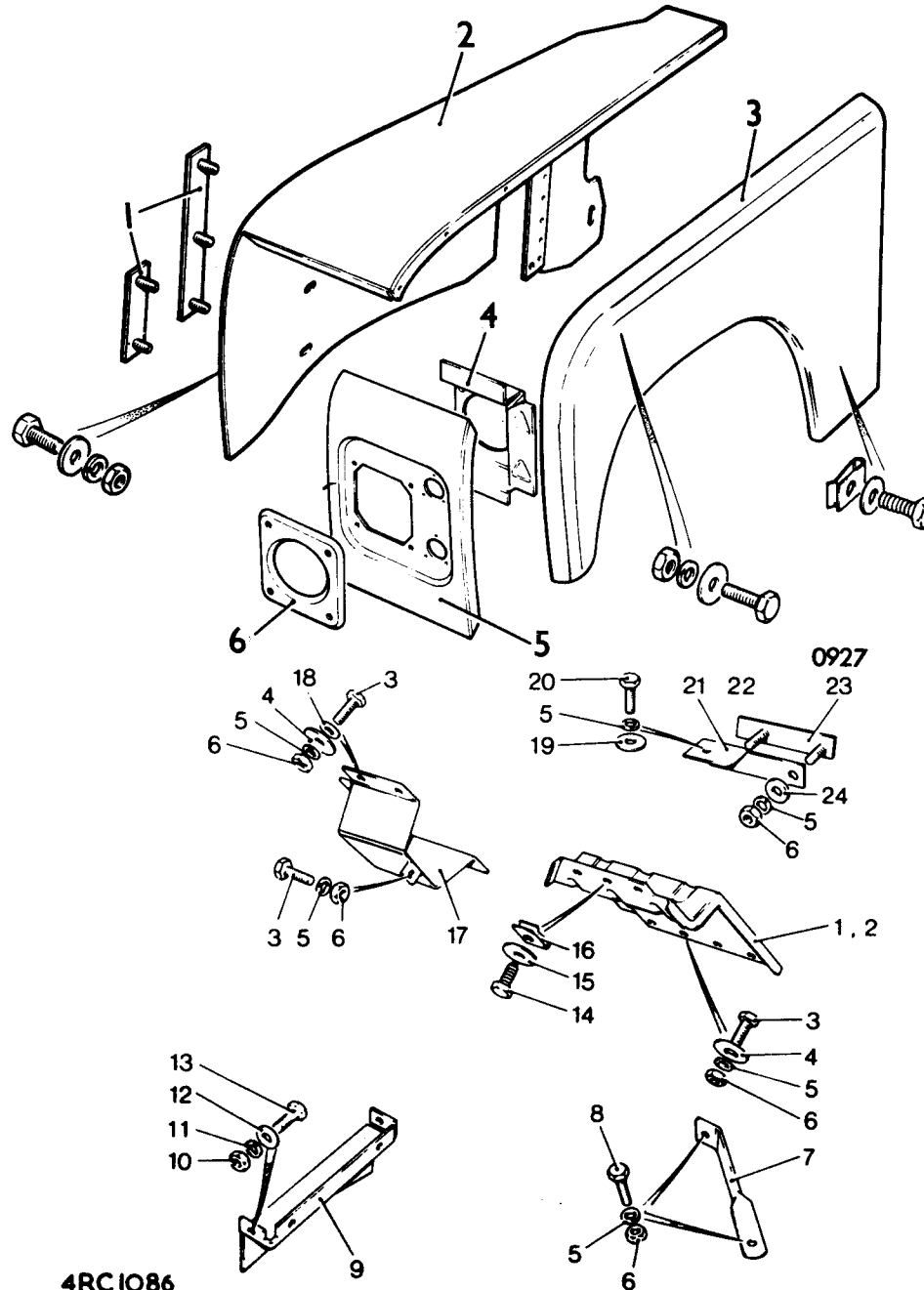
Wiring harness attachment to wing valance.

Windscreen washer hose attachment to wing valance.

Windscreen washer pump.

**Refitting**

- 16 Reverse instructions 1 to 15.

**Front wing****Key**

- 1 Fixing plates
- 2 Wing - rear valance assembly
- 3 Wing - outer panel
- 4 Headlamp mounting panel
- 5 Front panel
- 6 Headlamp surround

**Cover panels - front wing****Key**

- 1 Bottom panel - front wing valance
- 2 Cover plate (2 1/4 Petrol only)
- 3 Cover box - steering drop arm
- 4 Bracket
- 5 Nut plate
- 6 Mudshield
- 7 Wing stay

4RC1086

## SIDE DOOR GLASS

Front door 76.31.01  
Rear door 76.31.02

### Remove and refit

#### Removing

##### Sliding glass

- 1 Remove the screw and rubber stop from the front end of the sliding glass top channel. Remove the remaining channel securing screws.
- 2 Incline the sliding glass inwards complete with top channel and the filler strip.
- 3 Remove the channel and filler strip.
- 4 Lift out the sliding glass.

##### Fixed glass

- 5 Remove the sliding glass (instructions 1 to 4 above).
- 6 Remove the front angle strip.
- 7 Carefully release the fixed glass from the sealing compound.
- 8 Withdraw the fixed glass.
- 9 Remove the old sealing compound from glass and door.

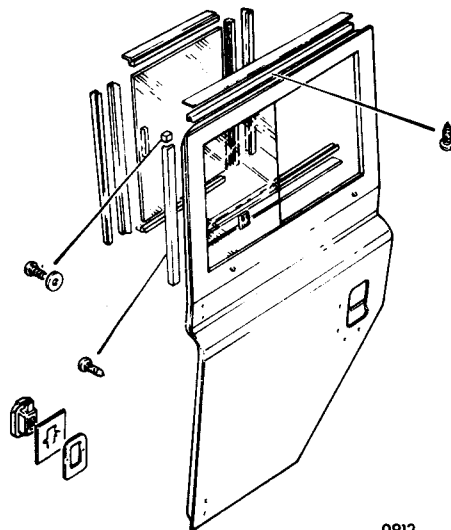
#### Refitting

##### Fixed glass

- 10 Apply fresh sealing compound to the door frame.
- 11 Carefully insert the fixed glass and press firmly into position. Remove surplus sealing compound.
- 12 Fit the front angle sealing strip.

##### Sliding glass

- 13 Fit the sliding glass, top channel and filler strip in reverse order to instructions 1 to 4.



0912

## DOOR LOCK

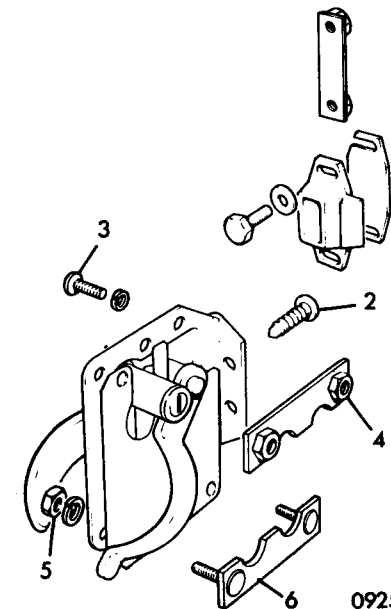
Remove and refit  
Side door, front 76.37.12  
Side door, rear 76.37.13  
Tail door 76.37.16

#### Removing

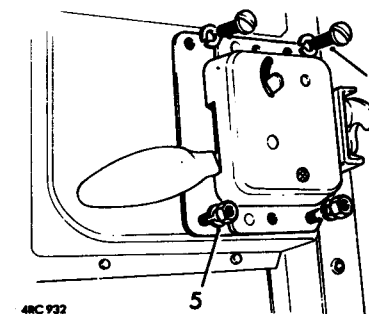
- 1 Remove the door trim where fitted.
- 2 Remove the screws securing the lock to the door edge (not anti-burst type).
- 3 Remove the two screws securing the top of the lock to the door.
- 4 Remove the tapped plate.
- 5 Remove the nuts securing the bottom of the lock to the door.
- 6 Remove the studplate.
- 7 Remove the door lock and sealing plate. (Sealing plates are not fitted to anti-burst type locks.)

#### Refitting

- 8 Reverse instructions 1 to 7.



0925



48C 932

**FASCIA TOP RAIL**

Remove and refit

76.46.04

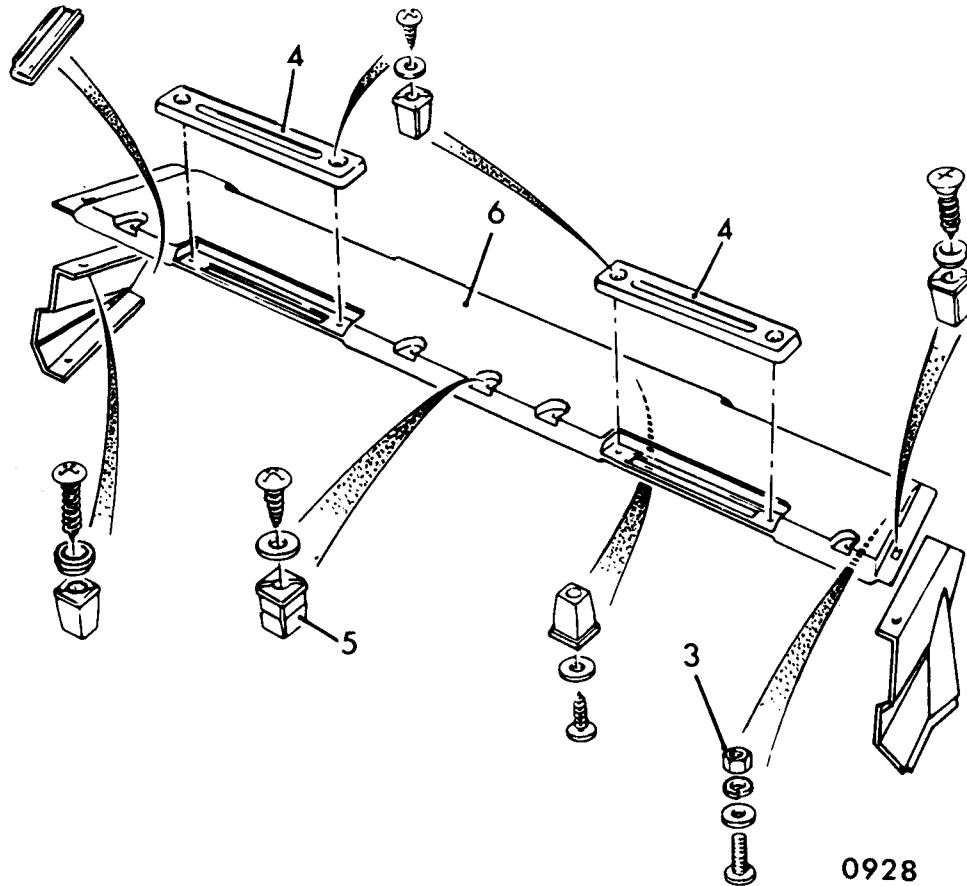
**Removing**

- 1 Remove the screws securing the fascia top rail end cover and heater control. Ease the end cover aside.
- 2 Remove the screws securing the fascia top rail end cover (passenger's side). Withdraw the end cover.

- 3 Remove the two nuts and bolts securing the rear of the fascia top rail to the fascia mounting plate.
- 4 Remove the screws securing the demist outlets. Withdraw the demist outlets.
- 5 Remove the screws securing the front of the fascia top rail.
- 6 Remove the top rail.

**Refitting**

- 7 Reverse instructions 1 to 6.

**LOWER FASCIA**

Remove and refit

76.46.05

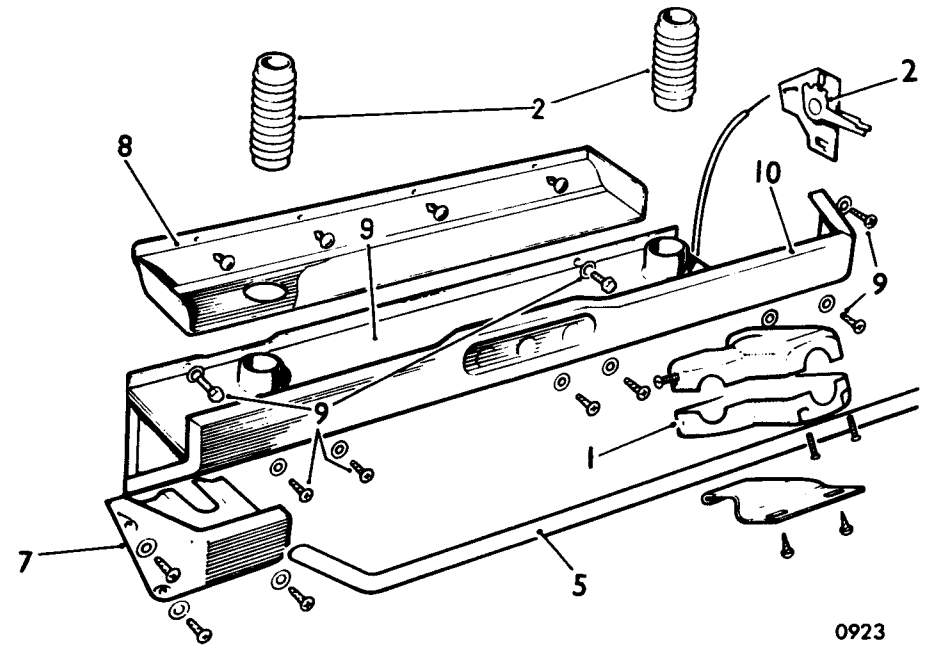
**Removing**

- 1 Release the shroud from the steering column and the lower fascia.
- 2 Remove the heater control panel from the driver's end of the fascia and disconnect the distribution control cable.
- 3 Withdraw the instrument panel clear of the dash.
- 4 Withdraw the demister hoses.
- 5 Withdraw the finisher strip from the top edge of the lower fascia.

- 6 If the vehicle is fitted with auxiliary instruments at the centre of the lower fascia, remove as applicable.
- 7 Remove the end cover from the lower fascia.
- 8 Remove the parcel tray.
- 9 Remove the fixings securing the lower fascia to the dash.
- 10 Withdraw the lower fascia.
- 11 If required, remove the heater duct cover and the distribution flap valves, as applicable.

**Refitting**

- 12 Reverse instructions 1 to 11. Where applicable, ensure that the gasket is fitted between the heater duct and the dash.



## FASCIA SUPPORT PANEL

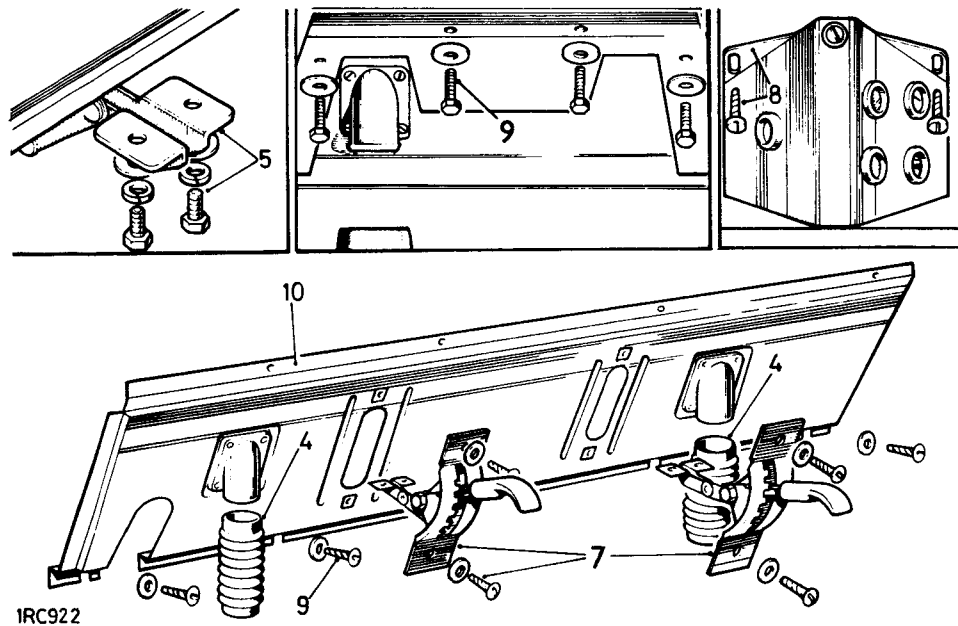
Remove and refit 76.46.06

### Removing

- 1 Disconnect the battery.
- 2 Remove the fascia top rail. 76.46.04.
- 3 Remove the instrument panel.
- 4 Disconnect the heater hoses from the demister nozzles.
- 5 Remove the instrument housing.
- 6 Remove the fixings securing the ventilator control levers to the lids.
- 7 Remove the ventilator controls complete.
- 8 If the vehicle is fitted with an auxiliary instrument panel, remove the fixings securing it to the fascia support panel.
- 9 Remove the fixings securing the fascia support panel to the dash.
- 10 Withdraw the fascia support panel.
- 11 Remove the heater demister nozzles.

### Refitting

- 12 Reverse instructions 1 to 11.



## FRONT SEAT BASE

Remove and refit 76.70.06

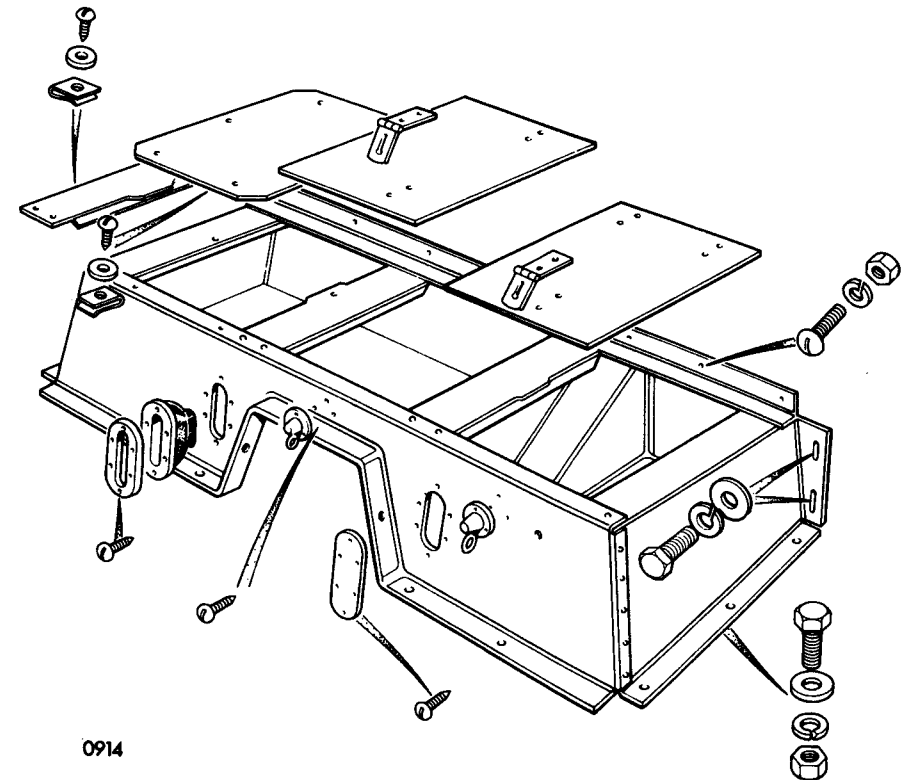
### Removing

- 1 Remove the driver's floor panel.
- 2 Remove the passenger's floor panel.
- 3 Remove the gearbox cover panel.
- 4 Remove all seat cushions.
- 5 Release the safety bolts from their anchor brackets at the seat base.
- 6 Remove the safety belt anchor brackets.

- 7 Remove the bolts securing the seat base.
- 8 Release the passenger's door check stay.
- 9 Remove the handbrake draught excluder.
- 10 Manoeuvre the seat base clear of the handbrake lever.
- 11 Withdraw the seat base.

### Refitting

- 12 Reverse instructions 1 to 11. Use a suitable waterproof sealant when fitting the seat base gearbox cover, and floor panels.



**WINDSCREEN**

Remove and refit

76.81.02

**Removing****Soft top**

- 1 Remove the windscreen wiper arms and blades.
- 2 Release the straps securing the hood to the windscreen frame.
- 3 Detach the hood tape from windscreen hooks.
- 4 Roll back the hood clear of the windscreen.
- 5 Remove the bolts securing the door top channels to the windscreen.
- 6 Slacken the nuts on the windscreen clamp bolts. Swing the clamp bolts clear of the windscreen.
- 7 Disconnect the wiper motor earth lead from the windscreen frame.
- 8 Remove the bolts securing the windscreen to the hinges.
- 9 Remove the windscreen

**Hard top**

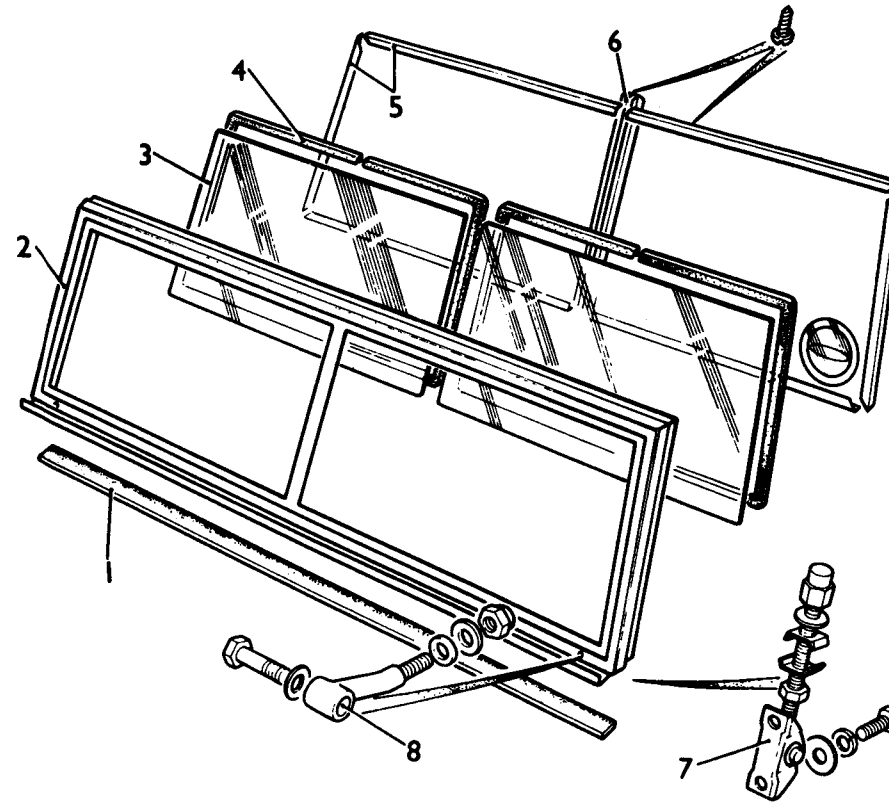
- 10 Remove the bolts securing the roof to the windscreen.
- 11 Slacken or remove the remaining roof fixings.
- 12 Carry out instructions 1 and 6 to 9.

**Refitting****Soft top**

- 13 Reverse instructions 1 to 9. Ensure that the windscreen lower sealing strip is properly located and in good condition.

**Hard top**

- 14 Reverse instructions 1 and 6 to 11. Ensure that the windscreen top and bottom sealing strips are properly located and in good condition before tightening the roof fixings.



0919

**Windscreen assembly  
Key**

- 1 Seal
- 2 Windscreen frame
- 3 Windscreen glass
- 4 Glazing strip
- 5 Glass retaining strips
- 6 Centre cover strip
- 7 Windscreen clamp assembly
- 8 Windscreen hinge arm

## WINDSCREEN GLASS

**Remove and refit** 76.81.03

### Removing

- 1 Remove the windscreen wiper arms and blades.

### Soft top

- 2 Remove the windscreen frame assembly. 76.81.02.

### Hard top

- 3 Remove the sun visors and rear view mirror from the interior of the cab.
- 4 Remove the headlining strip from above the windscreen.
- 5 Remove the fascia top rail. 76.46.04.

### All models

- 6 Remove the screws securing the glass retaining angle strips.
- 7 Carefully ease the glass clear of the screen.
- 8 Remove all traces of sealant from the windscreen frame and glass retaining strips.

### Refitting

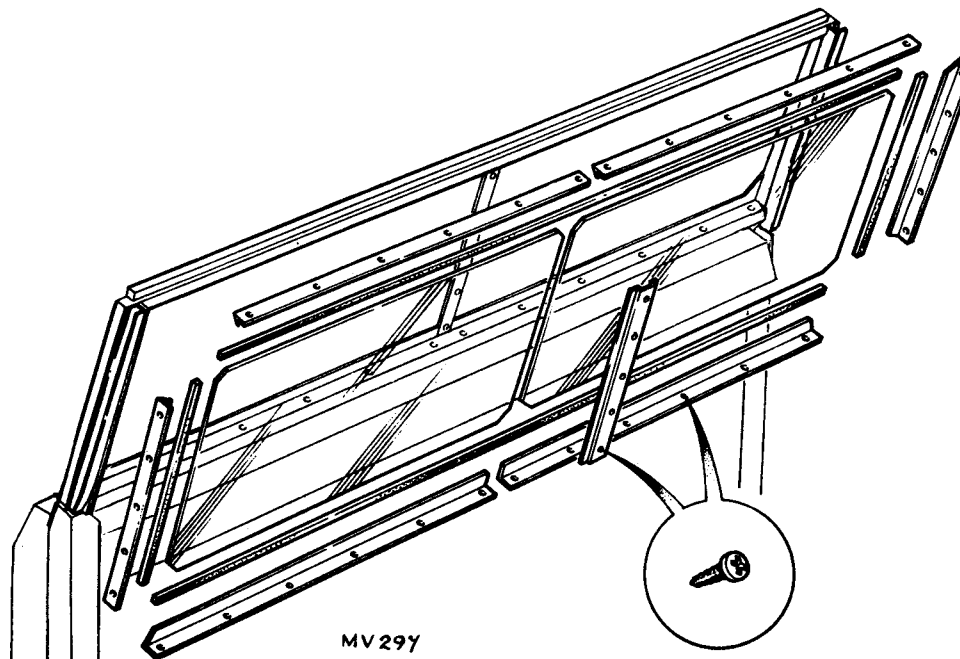
- 9 Line the interior of the windscreen frame with 'Sealastrip'.
- 10 Locate the glass in the windscreen frame and press firmly into the 'Sealastrip'.
- 11 Place 'Sealastrip' around the edges of the glass to seal the angle strips when fitted.
- 12 Fit the angle strips to retain the glass and secure with the retaining screws.
- 13 Remove surplus 'Sealant'.

### Soft top

- 14 Fit the windscreen to the vehicle. 76.81.02.

### Hard top

- 15 Fit the fascia top rail. 76.81.04.
- 16 Fit the headlining strip.
- 17 Fit the sun visors and rear view mirror.







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## PAINTWORK

General information            78.00.00

### Body panels

1 Land Rover body panels are manufactured from a special aluminium-alloy known as 'Birmabright' and the following paintwork procedure should be followed on these panels.

### Painting 'Birmabright'

2 The area to be painted must be flatted to remove the hard oxide skin which forms on the surface of the alloy when exposed to the atmosphere. Degrease and dry the area, then apply a suitable etch-primer. Unless an etch-primer is used, paint is liable to come away as it cannot 'key' into the hard oxide of an untreated alloy surface and the use of ICI Etching Primer P565-5002 is recommended. It is quick and easy to apply, and it prolongs the life of the paint film by ensuring excellent adhesion.

### Application

3 The activated Etching Primer has a limited pot-life of about 8 hours at normal temperatures and should not be used after this time, as it may have inferior adhesion and corrosion resistance. Any Etching Primer which has been mixed for more than 8 hours must be thrown away, and not returned to the can.

4 Apply Etching Primer as soon as possible after cleaning, and paint as soon as the pre-treatment is completed. Undue delay may cause the surface to be contaminated again and thus nullify the treatment. Do not leave pre-treated work overnight before it is painted.

5 Etching Primer, when followed by a suitable paint system, gives a film which is very resistant to moisture, but the Etching Primer itself is water sensitive. It should therefore be coated with paint as soon as possible when it is dry.

6 Activate the Etching Primer by mixing it with an equal volume of Activator P273-5021 and allow to stand for 10 minutes.

7 Adjust the spraying viscosity of the mixture if necessary to 22-25 sec. BSB4 Cup by adding small quantities of Thinner 851-565; never add more Activator.

8 Apply by spray to a clean, dry surface in a thin uniform coat, rather than a thick heavy one which may impair adhesion.

9 Air dry for at least 15 minutes before applying undercoat by spray or for 2 hours before brush application. If required, these times can be shortened by force drying, this also gives increased hardness to the film.

10 Subsequent painting follows normal paintshop practice.

11 When wet flatting the subsequent paint layers take care not to rub through to the Etching Primer. If this does occur allow to dry out thoroughly, dry flat the area and spot in with Etching Primer.



## HEATER CONTROLS

Remove and refit

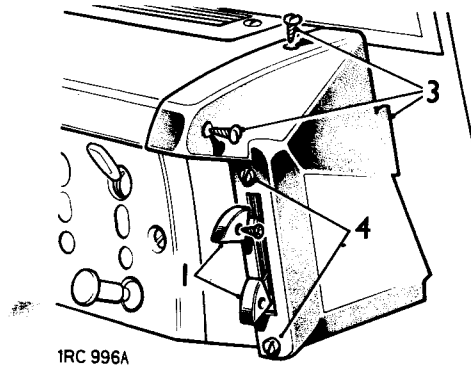
80.10.02

### Removing

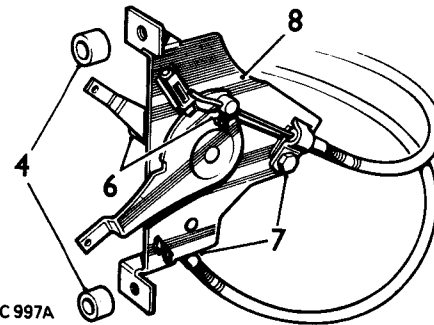
- 1 Remove the screws securing the heater control knobs and withdraw the control knobs. Note that the knob coloured red and blue is fitted to the inner position.
- 2 Remove the screws securing the end panel to the fascia.
- 3 Ease the end panel complete with heater control levers away from the fascia.
- 4 Remove the two screws securing the heater control assembly to the end cover. Note the two distance pieces interposed between the control lever assembly and the end panel.
- 5 Remove the end panel from the control lever assembly.
- 6 Slacken the pinch screws securing the inner cables to their respective levers.
- 7 Slacken the pinch bolt and clamp securing the outer cables to the control lever assembly.
- 8 Remove the control lever assembly.

### Refitting

- 9 Reverse instructions 1 to 9. Note that the water valve control cable is connected to the inboard lever. Check the operation of both levers and controls before refitting the end panel.



1RC 996A



1RC 997A

## HEATER/VENTILATOR AIR FLOW CONTROL CABLE

Remove and refit

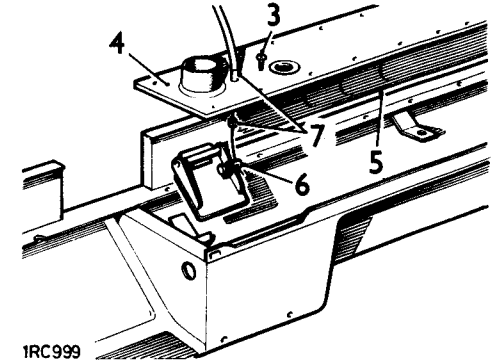
80.10.06

### Removing

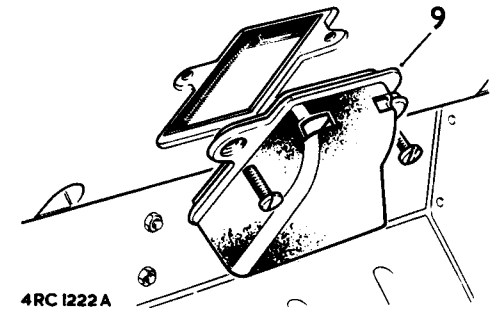
- 1 Remove the heater controls 80.10.02 (instructions 1 to 3) and disconnect the air flow control cable.
- 2 Remove the lower fascia 76.46.05.
- 3 Remove the heater ducting cover fixings.
- 4 Withdraw the ducting cover to gain access to the air distribution flaps.
- 5 Withdraw the distribution flaps from the fascia.
- 6 Disconnect the inner cable at the flaps.
- 7 Withdraw the outer cable, retained at the ducting cover by a tubular clip.

### Refitting

- 8 Reverse instructions 2 to 7.
- 9 Refit the heater controls and air flow control cable ensuring full air distributor flap operation. The flaps are easily checked after removing the air outlet ducts in the lower fascia.



1RC 999



4RC 1222A

## HEATER WATER VALVE CONTROL CABLE

Remove and refit

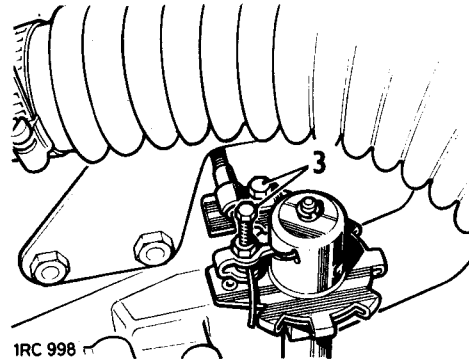
80.10.07

### Removing

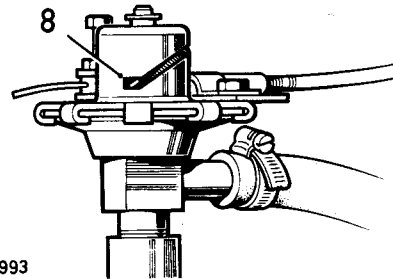
- 1 Remove the heater control assembly and end cover from the fascia.
- 2 Disconnect the water valve inner and outer cable from the control lever.
- 3 Disconnect the inner and outer cable from the water valve.
- 4 Attach a length of cord or thin wire to the end of the cable. This facilitates refitting.
- 5 Withdraw the control cable leaving the cord or wire in position on the vehicle.

### Refitting

- 6 Attach the control cable to the end of the cord or wire and draw the cable into position. Remove the cord or wire.
- 7 Connect the outer and inner cable to the water valve and control lever. (Water valve closed, control lever raised.)
- 8 Check lever and water valve operation and adjust as necessary.
- 9 Fit the heater control assembly and end cover to the fascia.



1RC 998



1RC 993

## HEATER WATER VALVE

Remove and refit

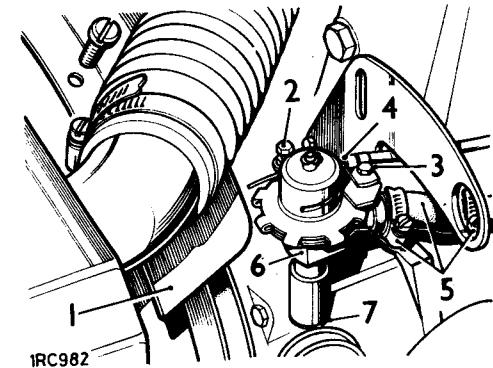
80.10.16

### Removing

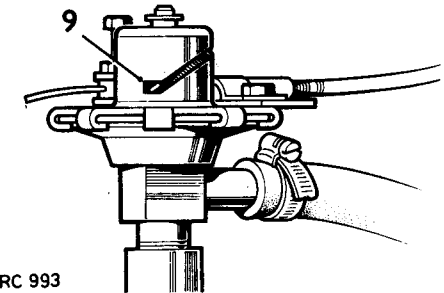
- 1 Partially drain the coolant from the radiator.
- 2 Slacken the inner cable fixing.
- 3 Slacken the outer cable clamp fixing.
- 4 Free the inner cable and withdraw from the valve.
- 5 Release the heater hose clips and slide the hose away from the water valve.
- 6 Unscrew and withdraw the heater water valve complete with adaptor.
- 7 Withdraw the adaptor sealing washer.

### Refitting

- 8 Reverse instructions 3 to 7; do not tighten the inner cable fixing at this stage.
- 9 Set the water valve in the closed position.
- 10 Set the cable control lever in the fully up 'cold' position.
- 11 Take up all slack in the inner cable then secure the outer cable to the water valve.
- 12 Top up the radiator.



1RC 982



1RC 993

## HEATER FAN SWITCH

Remove and refit

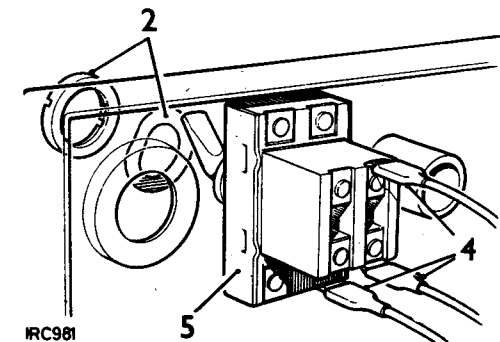
80.10.22

### Removing

- 1 Disconnect the battery.
- 2 Remove the lock ring and wave washer securing the heater switch to the instrument panel.
- 3 Remove the two screws securing the instrument panel and ease the panel towards the steering wheel.
- 4 Release the electrical connections from the heater switch. Note the electrical connection cable colours and their relative position on the switch.
- 5 Withdraw the switch.

### Refitting

- 6 Reverse instructions 1 to 5.



1RC 981

## DEMISTER HOSES

Remove and refit 80.15.01

Passenger's side hose instructions 1 to 3.  
Driver's side hose instructions 4 to 7.

### Removing—passenger's side hose.

- 1 Disengage the hose upper end from the nozzle adaptor.
- 2 Withdraw the hose from the rubber connector.

### Refitting

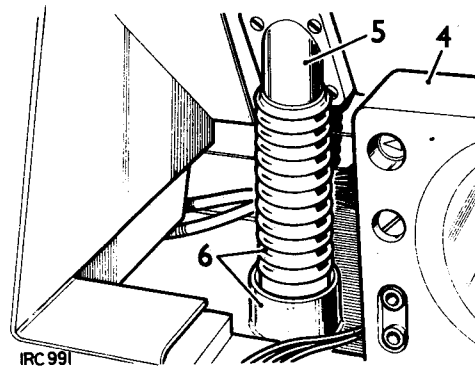
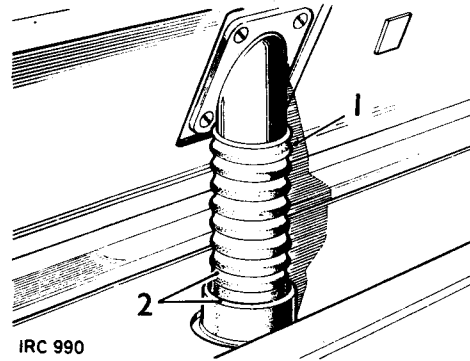
- 3 Reverse instructions 1 and 2.

### Removing—driver's side hose

- 4 Withdraw the instrument panel sufficient to gain access to the hose 88.20.01, instructions 1 to 5.
- 5 Disengage the hose upper end from the nozzle adaptor.
- 6 Withdraw the hose from the rubber connector.

### Refitting

- 7 Reverse instructions 4 to 6.



## DEMISTER NOZZLES

Remove and refit 80.15.03

Passenger's side—instructions 1 to 4.  
Driver's side—instructions 6 to 13

### Removing—passenger's side nozzle

- 1 Remove the demister hose. 80.15.01.
- 2 Remove the fresh air grille.
- 3 Remove the nozzle adaptor.
- 4 Manoeuvre the nozzle out through the fresh air grille aperture.

### Refitting

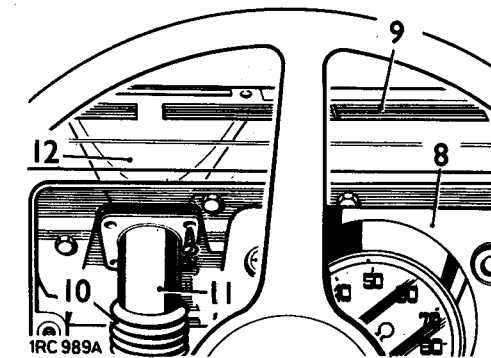
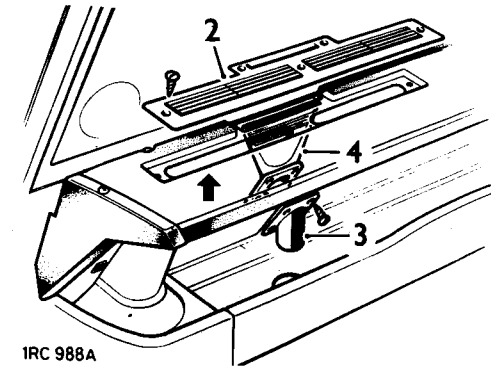
- 5 Reverse instructions 1 to 4.

### Removing—driver's side nozzle

- 6 Disconnect the battery earth lead.
- 7 Remove the switch shrouds from the steering column.
- 8 Withdraw the instrument panel clear of the dash, 88.20.01, instructions 1 to 5.
- 9 Remove the fresh air grille.
- 10 Withdraw the demister hose.
- 11 Remove the nozzle adaptor.
- 12 Manoeuvre the nozzle out through the fresh air grille aperture.

### Refitting

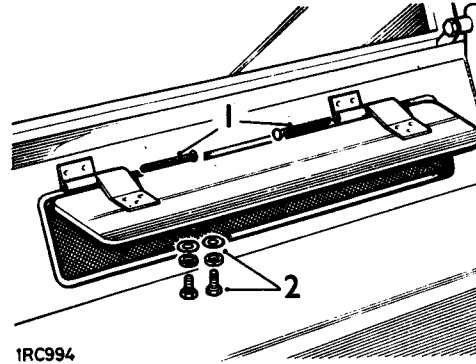
- 13 Reverse instructions 6 to 12.



**AIR DISTRIBUTION FLAPS**

Remove and refit 80.15.09

This operation is described in operation 80.10.06.

**VENTILATOR GRILLE PANEL**

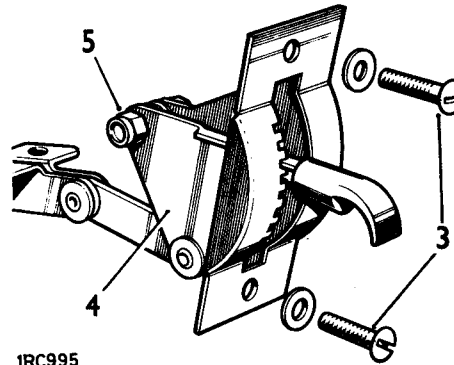
Remove and refit 80.15.16

**Removing**

- 1 Remove the hinge pins.
- 2 Remove the control lever fixings.
- 3 Remove the ventilator control to dash fixings.
- 4 Withdraw the ventilator control and quadrant assembly.

**Refitting**

- 5 Check the lever operation in the quadrant. If required, adjust the special locknut to alter the spring loading on the lever.
- 6 Reverse instructions 1 to 4.

**FRESH AIR INTAKE**

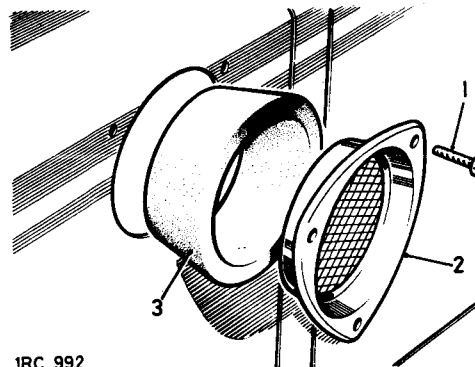
Remove and refit 80.15.29

**Removing**

- 1 Remove the fixings.
- 2 Withdraw the intake grille assembly.
- 3 If required, withdraw the air inlet seal.

**Refitting**

- 4 Reverse instructions 1 to 3.

**HEATER BOX COMPLETE**

Remove and refit 1 to 7, 12 &amp; 13 80.20.01

**HEATER RADIATOR**

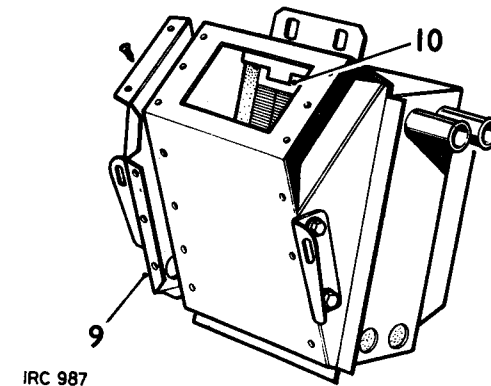
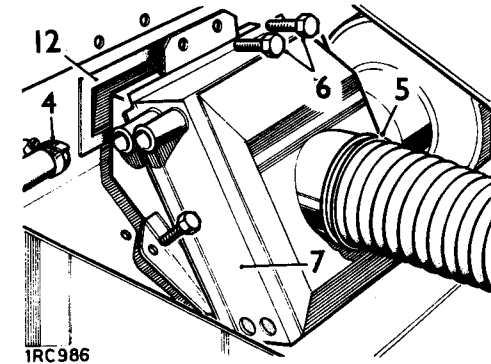
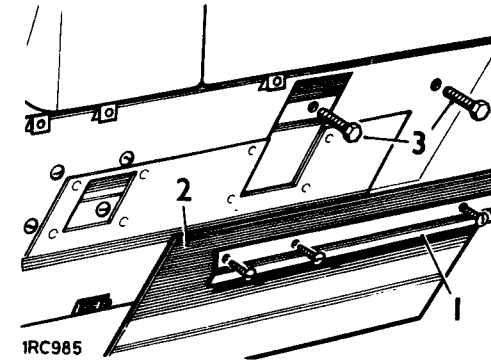
Remove and refit 1 to 13 80.20.29

**Removing**

- 1 From inside the cab remove the trim board rail, if fitted.
- 2 Withdraw the trim board from the clip, if fitted.
- 3 Remove the heater box lower fixings.
- 4 Disconnect the heater water hoses.
- 5 Disconnect the air inlet hose.
- 6 Remove the heater box upper fixings.
- 7 Withdraw the heater box.
- 8 If removal of the heater radiator is required, proceed as follows, instructions 9 and 10.
- 9 Remove the fixings and withdraw the detachable side panel.
- 10 Withdraw the radiator and pipes assembly.

**Refitting**

- 11 If the heater radiator was removed reverse instructions 9 and 10.
- 12 Ensure that the joint seal is present and sound.
- 13 Reverse instructions 1 to 7.



## HEATER/BLOWER FAN MOTOR

Remove and refit

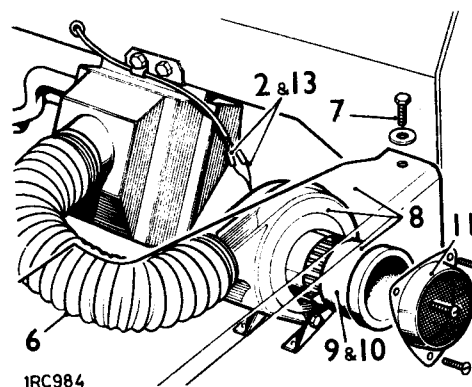
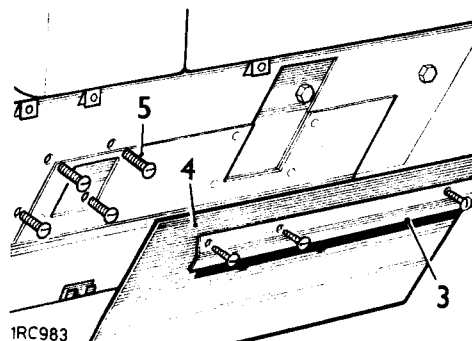
80.20.15

### Removing

- 1 Disconnect the battery.
- 2 Disconnect the blower motor leads.
- 3 From inside the cab remove the trim board rail.
- 4 Withdraw the trim board from the clip.
- 5 Remove the blower motor fixings.
- 6 Disconnect the air hose at the matrix inlet.
- 7 Remove the wing panel rear top fixing bolt.
- 8 Manoeuvre the blower motor assembly clear, lifting the wing panel sufficient to allow passage.
- 9 Withdraw the air inlet seal.

### Refitting

- 10 Fit the blower motor but omit the air inlet seal at this stage.
- 11 Remove the air intake grille.
- 12 Fit the air inlet seal and replace the intake grille.
- 13 Reverse 2 to 7. Connect the electrical leads from the blower motor at the snap connectors as follows: Brown lead with green marker band — to green/slate lead; green/yellow lead — to green/yellow lead.



## HEATER PIPES

Remove and refit  
Feed to heater  
Return from heater

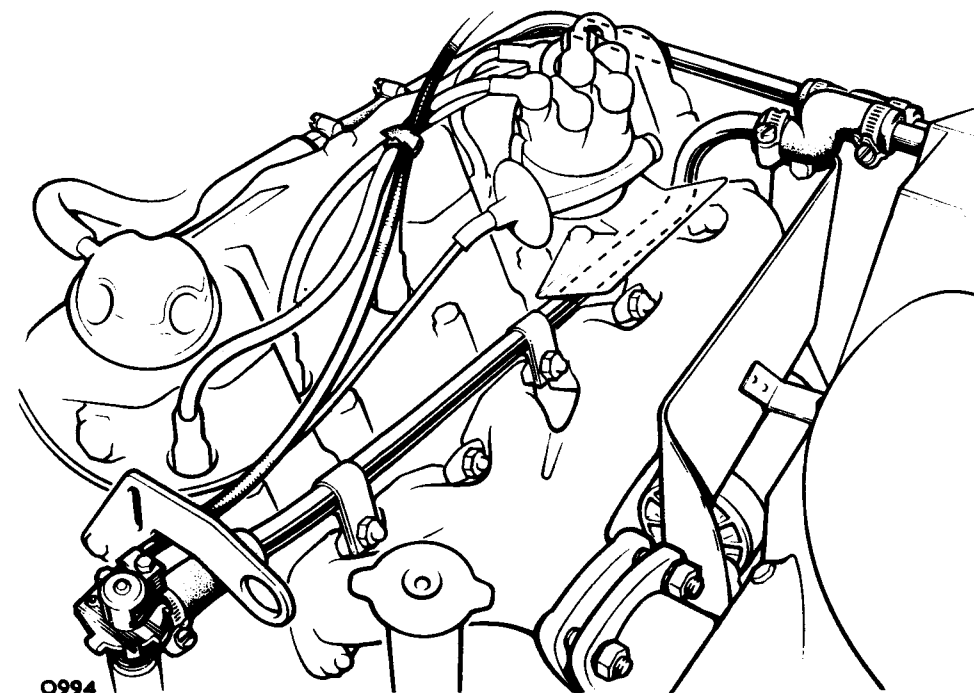
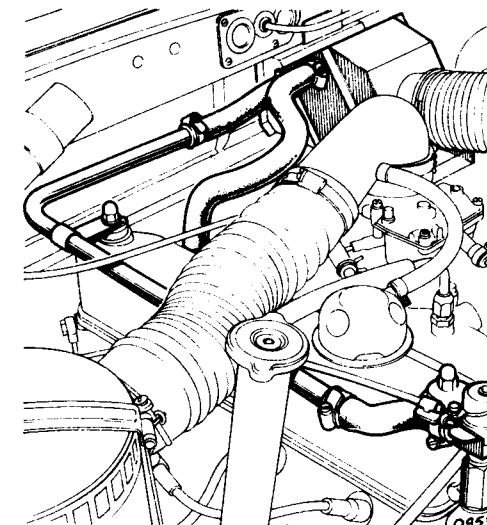
80.25.15  
80.25.16

### Removing

- 1 Partially drain the coolant.
- 2 Disconnect the hoses.
- 3 Remove the fixings and withdraw the pipe.

### Refitting

- 4 Reverse instructions 1 to 3.







## WASHER RESERVOIR

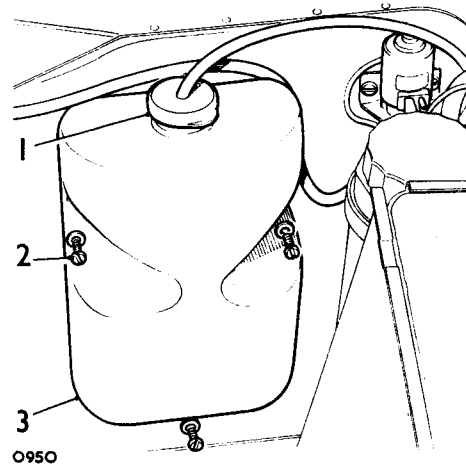
Remove and refit

84.10.01

- 1 Remove the washer reservoir filler cap complete with suction tube and filter from the reservoir.
- 2 Remove the three screws, washers and nuts securing the reservoir to the wing valance.
- 3 Remove the reservoir.
- 4 Diesel models with vacuum tank and servo only.  
Removal of the washer reservoir necessitates the prior removal of the vacuum tank complete with mounting brackets and washer reservoir. For details refer 70.50.04.

### Refitting

- 5 Reverse instructions 1 to 3



## WASHER JETS

Remove and refit

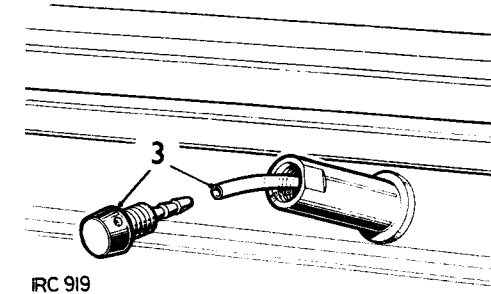
84.10.09

### Removing

- 1 Unscrew the washer jet.
- 2 Withdraw the jet and washer tube from the jet holder.
- 3 Detach the jet from the washer tube.

### Refitting

- 4 Engage the jet in the washer tube.
- 5 Wind the jet and tube anti-clockwise approximately the number of turns required to secure the jet in the jet holder.
- 6 Push the jet and tube into the jet holder and screw the jet into position. The washer tube will unwind to its normal free position.



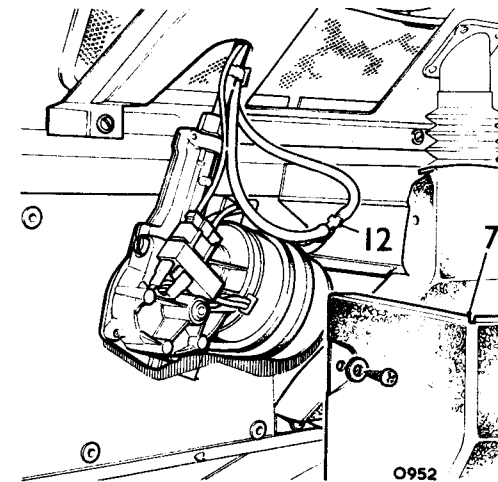
## WASHER TUBES

Remove and refit

84.10.15

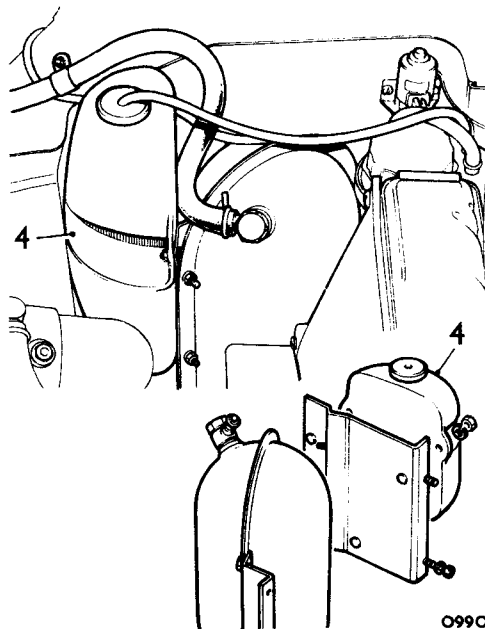
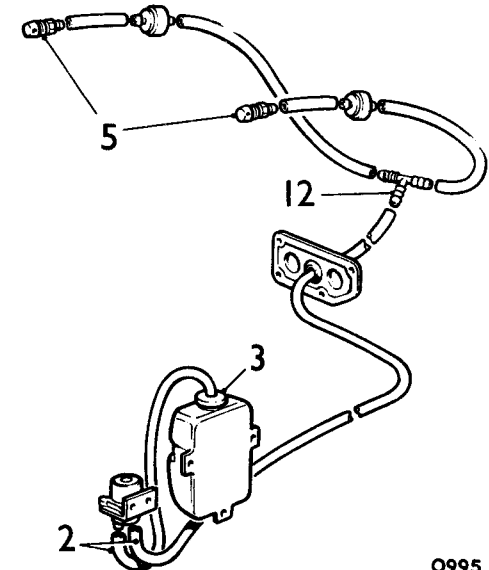
### Removing

- 1 Disconnect the battery.
- 2 Disconnect the washer tubes from the washer pump.
- 3 Remove the washer reservoir cap and withdraw the pump inlet tube complete with filter.
- 4 Release the delivery tube (pump to car) from its retaining clips.
- 5 Unscrew the windscreen washer jets and remove the jets from the washer tubes.
- 6 Ease back the panel tray trim edging from the top of the wiper motor cover.
- 7 Remove the screws securing the wiper motor cover and withdraw the cover.
- 8 Remove the two screws securing the instrument panel and ease the panel towards the steering wheel.
- 9 Release the demist tubes from the upper fascia vents.
- 10 Remove the upper fascia.
- 11 Remove the retaining clips from the washer tubes.
- 12 Withdraw the washer tubes (3) and their connecting tee piece.



### Refitting

- 13 Reverse instructions 1 to 12.  
When threading the tube from the tee piece to the washer pump through the bulkhead it will be found advantageous to unscrew the plate holding the washer tube grommet to the front of the bulkhead.



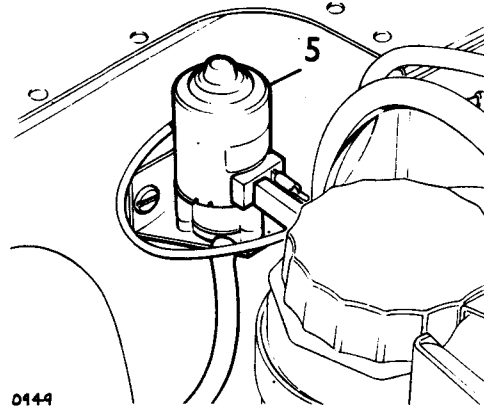
**WASHER PUMP**

Remove and refit

84.10.21

**Removing**

- 1 Disconnect the battery.
- 2 Disconnect the washer tubes from the washer pump. Note the suction tube (washer reservoir tube) is fitted to the pump union adjacent to the radiator.
- 3 Detach the electrical feed wire and earth wire from the pump.
- 4 Remove the two bolts and washers securing the pump, pump bracket and earth wire to the wing valance.
- 5 Remove the pump, pump bracket and earth wire.

**Refitting**

- 6 Reverse instructions 1 to 5.

**WIPER ARMS**

Remove and refit

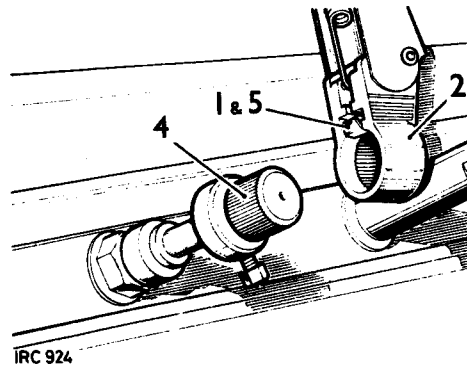
84.15.01

**Removing**

- 1 Using a small screwdriver, hold back the spring clip which retains the wiper arm on the spindle.
- 2 Withdraw the wiper arm from the spindle boss.

**Refitting**

- 3 Allow the motor to move to the 'park' position.
- 4 Push the arm on to the boss, locating it on the splines so that the wiper blade is just clear of the screen rail.
- 5 Ensure that the spring retaining clip is located in the retaining groove on the boss.

**WIPER MOTOR AND DRIVE**

Remove and refit

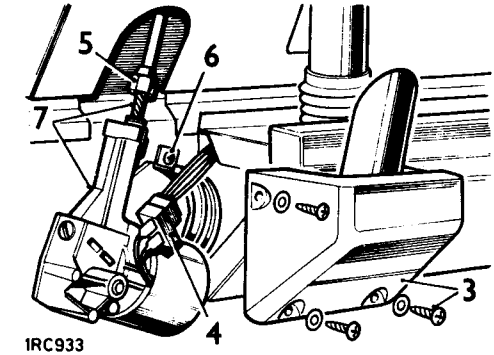
84.15.09

**Removing**

- 1 Disconnect the battery.
- 2 Remove the wiper arms.
- 3 Remove the screws securing the wiper motor cover and withdraw the cover.
- 4 Disconnect the power supply plug from the wiper motor.
- 5 Disconnect the union nut securing the wheelbox drive cable tubing to the wiper motor.
- 6 Remove the screws securing the wiper motor clamp bracket. Note that the screws engage a tapped plate on the engine side of the bulkhead.
- 7 Withdraw the wiper motor complete with clamp and wheelbox drive cable. Note the rubber pad fitted between the wiper motor and the bulkhead.

**Refitting**

- 8 Enter the drive cable in the wheelbox tubing. This may necessitate turning the wheelbox wiper spindles by hand to allow the drive cable to engage the wheelbox gears.
- 9 Reverse instructions 1 to 7.



## WIPER MOTOR DRIVE AND WHEELBOXES

Remove and refit

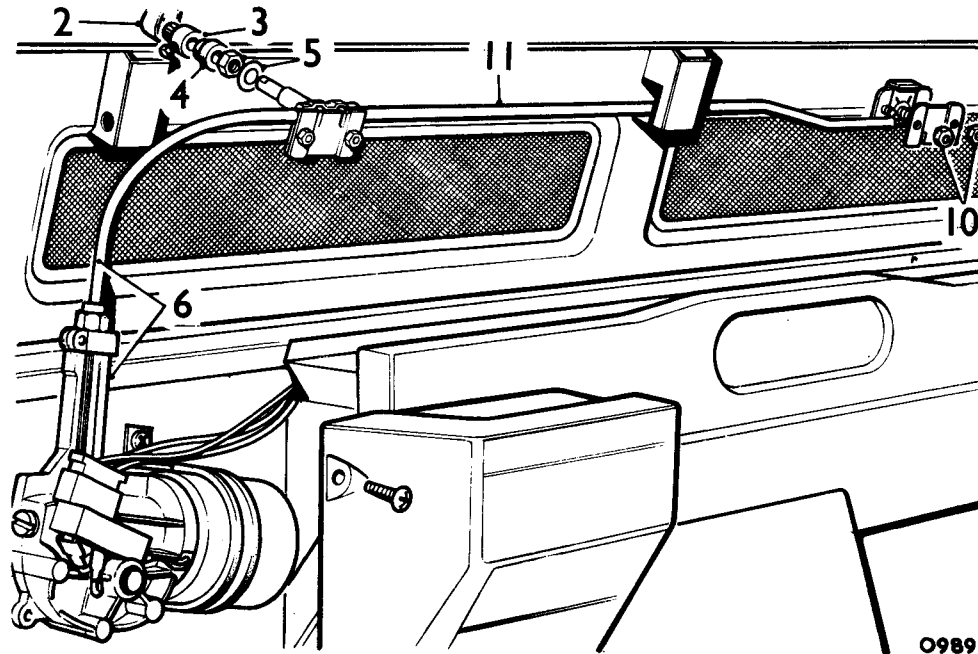
84.15.10

### Removing

- 1 Disconnect the battery.
- 2 Remove the windscreen wiper arms.
- 3 Remove the drive adaptor from the wheelbox spindles.
- 4 Remove the grommet from the wheelbox spindles.
- 5 Remove the nut and washer securing the wheelboxes to the vehicle.
- 6 Remove the wiper motor and drive cable. 84.15.09.
- 7 Remove the two screws securing the instrument panel and ease the panel towards the steering wheel.
- 8 Release the demist tubes from the upper fascia vents.
- 9 Remove the upper fascia. 76.46.04.
- 10 Slacken the nuts securing the wheelbox back plates.
- 11 Release the drive cable tubes from the wheelboxes.
- 12 Remove the drive cable tubes and the wheelboxes.

### Refitting

- 13 Reverse instructions 1 to 12.



O989

## WIPER MOTOR

## Overhaul

84.15.18

## Dismantling

- 1 Remove the wiper motor and drive. 84.15.09.
- 2 Remove the gearbox cover.
- 3 Remove the circlip and plain washer securing the connecting rod.
- 4 Withdraw the connecting rod.
- 5 Withdraw the flat washer.
- 6 Remove the circlip and washer securing the shaft and gear.
- 7 Clean any burrs from the gear shaft and withdraw the gear.
- 8 Withdraw the dished washer.
- 9 Add alignment marks to the yoke and gearbox for reassembly.
- 10 Remove the yoke securing bolts.
- 11 Withdraw the yoke and armature.
- 12 Remove the brush gear assembly.
- 13 Remove the limit switch.

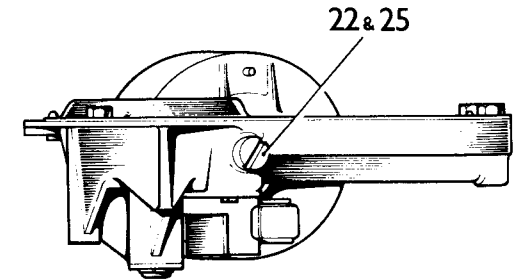
## Inspecting

- 14 Check the brushes for excessive wear, if they are worn to 4,8 mm (0.190 in.) in length, fit a new brush gear assembly.
- 15 Using a push type gauge, check that the brush spring pressure is 140 to 200 g (5 to 7 oz.) when the bottom of the brush is level with the bottom of the slot in the brush box. Fit a new brush gear assembly if the springs are not satisfactory.
- 16 Test the armature for insulation and open- or short-circuits. Use a test lamp (110V, 15W). Fit a new armature if faulty.
- 17 Examine the gear wheel for damage or excessive wear.

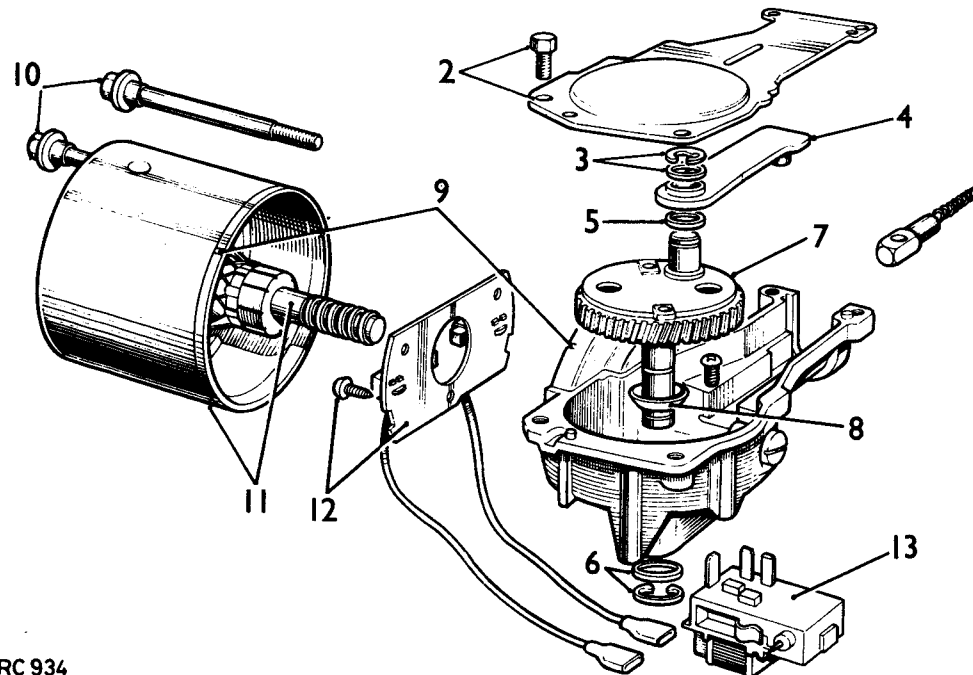
## Assembling.

- 18 Reverse instructions 1 to 13 noting instructions 19 to 26.

- 19 Use Ragosine Listate Grease to lubricate the gear wheel teeth, armature shaft worm gear, connecting rod and pin, cable rack and wheelbox gear wheels.
- 20 Use Shell Turbo 41 oil sparingly to lubricate the bearing bushes, armature shaft bearing journals, gear wheel shaft and wheelbox spindles. Thoroughly soak the felt washer in the yoke bearing with oil.
- 21 Tighten the yoke fixing bolts. Torque 23 kgf. cm. (20 lbf. in.).
- 22 If a replacement armature is being fitted, slacken the thrust screw to provide end-float for fitting the yoke.
- 23 Fit the dished washer beneath the gear wheel with its concave side towards the gear wheel.
- 24 Ensure that the larger of the two washers is fitted to the crankpin beneath the connecting rod.
- 25 Armature end-float: Hold the yoke vertical with the adjuster screw uppermost. Carefully screw in the adjuster until resistance is felt then, screw back a quarter turn. This will give the required end-float.
- 26 Connect the leads between the wiper motor and the limit switch.



IRC 935



IRC 934

## DATA

## Windscreen wiper motor

Armature end float . . . . .	0,1 mm to 0,2 mm (0.004 in. to 0.008 in.)
Brush length, minimum . . . . .	4,8 mm (0.190 in.)
Brush spring tension . . . . .	140 to 200 g (5 to 7 oz.)
Resistance of armature winding at 16°C (69°F) measured between adjacent commutator segments . . . . .	0.23 to 0.35 ohms
Light running, rack disconnected: Current at 13.5V . . . . .	2.0 amps
Speed, 60 seconds from cold . . . . .	60 to 70 rev/min

# HEADLAMP WIPERS AND WASHERS

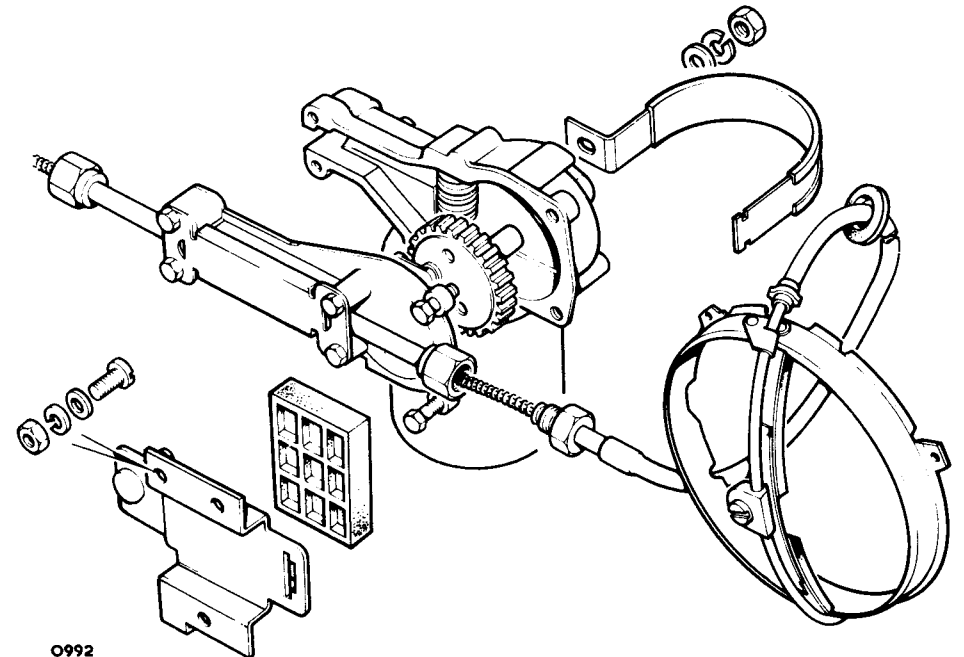
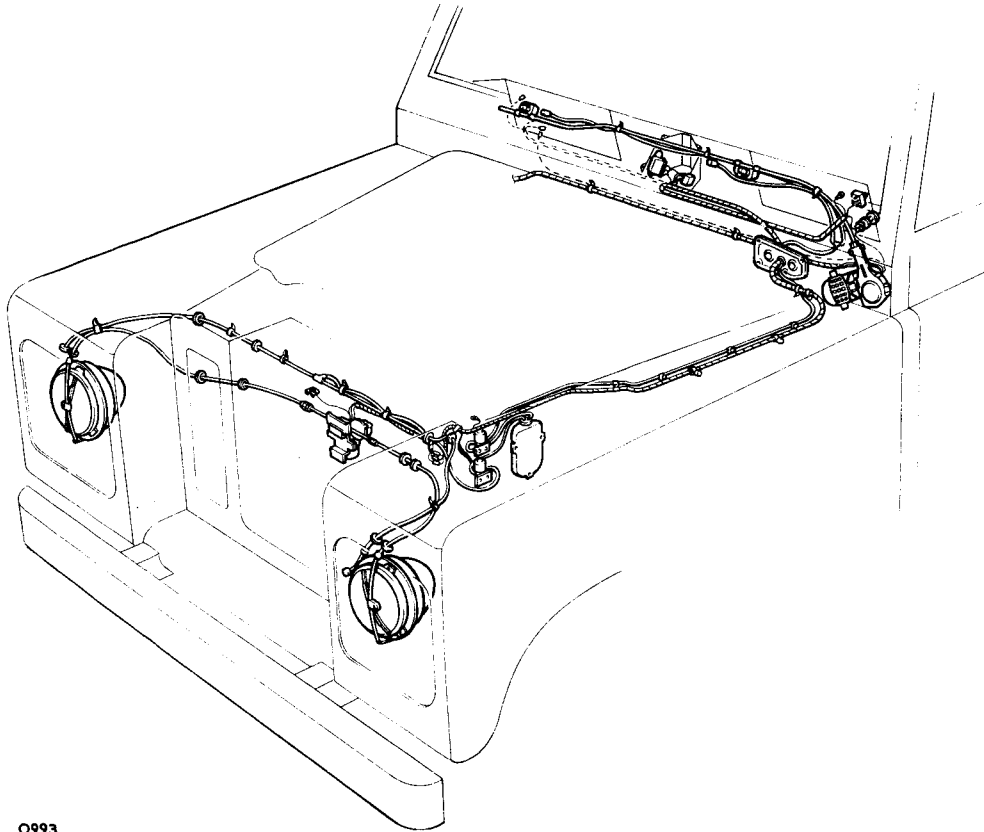
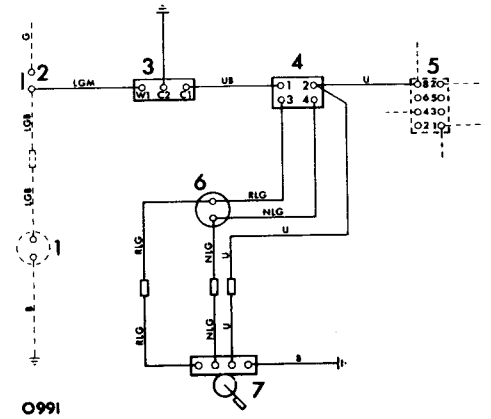
General

84.20.00

For certain markets and as an optional extra, headlamp wipers and washer equipment can be fitted. This installation does not involve extra controls: the headlamp wipers and washers are engineered to function only when the headlamps are illuminated and windscreen washer is operated.

## KEY TO CIRCUIT DIAGRAM

- 1 Windscreen washer pump
- 2 Vehicle washer switch
- 3 Headlamp wiper relay
- 4 Headlamp wiper delay unit
- 5 Vehicle lighting switch
- 6 Headlamp washer pump
- 7 Headlamp wiper motor





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## ELECTRICAL EQUIPMENT

### General

86.00.00

The electrical system is Negative earth, and it is most important to ensure correct polarity of the electrical connections at all times. Any incorrect connections made when reconnecting cables may cause irreparable damage to the semiconductor devices used in the alternator and regulator. Incorrect polarity would also seriously damage any transistorised equipment such as radio and tachometer etc.

Before carrying out any repairs or maintenance to an electrical component, always disconnect the battery.

The V-drive fan belt used with alternators is not the same as that used with d.c. machines. Use only the correct Rover replacement fan belt. Occasionally check that the engine and alternator pulleys are accurately aligned.

It is essential that good electrical connections are maintained at all times. Of particular importance are those in the charging circuit (including those at the battery) which should be occasionally inspected to see that they are clean and tight. In this way any significant increase in circuit resistance can be prevented.

Do not disconnect battery cables while the engine is running or damage to the semiconductor devices may occur. It is also inadvisable to break or make any connections in the alternator charging and control circuits while the engine is running.

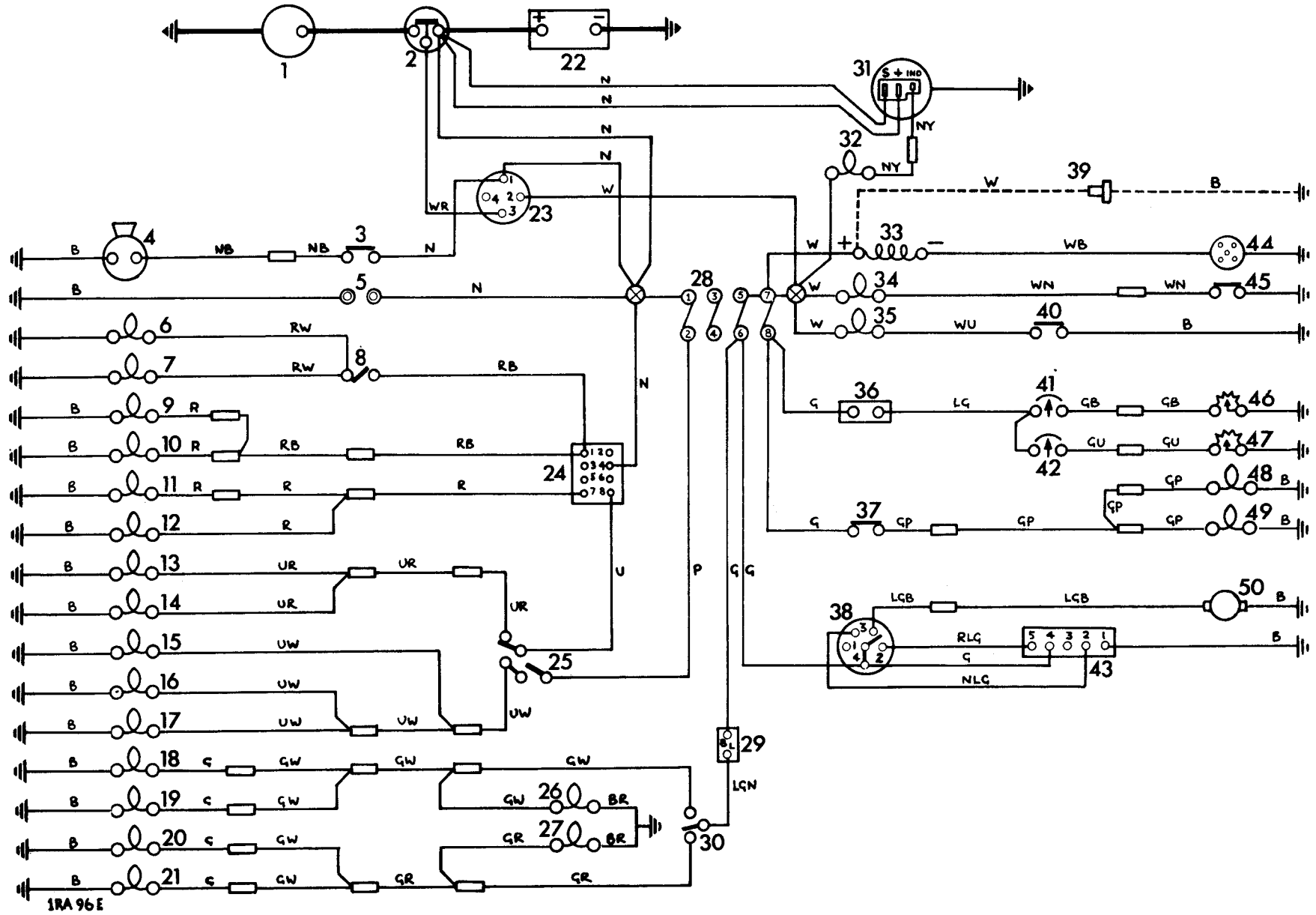
The electronic voltage regulator employs micro-circuit techniques resulting in improved performance under difficult service conditions. The whole assembly is encapsulated in silicone rubber and housed in an aluminium heat sink, ensuring complete protection against the adverse affects of temperature, dust, and moisture etc.

The regulating voltage is set during manufacture to give the required regulating voltage range of 14.1 to 14.5 volts, and no adjustment is necessary. The only maintenance needed is the occasional check on terminal connections and wiping with a clean dry cloth.

The alternator system provides for direct connection of a charge (ignition) indicator warning light, and eliminates the need for a field switching relay or warning light control unit. As the warning lamp is connected in the charging circuit, lamp failure will cause loss of charge. Lamp should be checked regularly and a spare carried.

When using rapid charge equipment to re-charge the battery, the battery must be disconnected from the vehicle.

### BASIC CIRCUIT DIAGRAM 2¼ AND 2.6 LITRE PETROL MODELS, R.H. AND L.H. STEERING, NEGATIVE EARTH





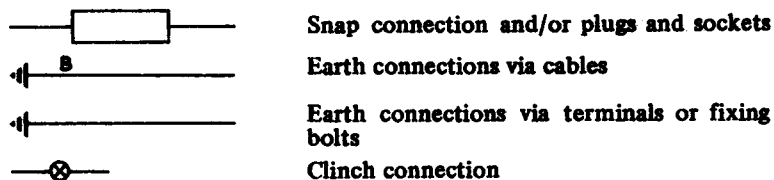
## KEY TO BASIC CIRCUIT DIAGRAM 2¼ AND 2.6 LITRE PETROL MODELS, R.H. AND L.H. STEERING, NEGATIVE EARTH

- |                                       |   |
|---------------------------------------|---|
| 1 Starter motor                       | 26 Warning light, indicator RH                                |
| 2 Solenoid, starter motor             | 27 Warning light, indicator LH                                |
| 3 Switch for horns                    | 28 Fuses, 1 to 8, 35 amp                                      |
| 4 Horn                                | 29 Indicator unit, flasher                                    |
| 5 Inspection sockets                  | 30 Switch, direction indicators                               |
| 6 Instrument panel illumination       | 31 Alternator, Lucas 16 ACR                                   |
| 7 Instrument panel illumination       | 32 Warning light, ignition                                    |
| 8 Switch, panel lights                | 33 Ignition coil  |
| 9 Tail lamp, LH                       | 34 Warning light, oil pressure                                |
| 10 Tail lamp, RH                      | 35 Warning light, choke                                       |
| 11 Side lamp, LH                      | 36 Voltage stabiliser, fuel gauge and water temperature gauge |
| 12 Side lamp, RH                      | 37 Switch, stop lamp  |
| 13 Headlamp, LH dipped beam           | 38 Switch, windscreen wiper                                   |
| 14 Headlamp, RH dipped beam           | 39 Fuel pump, 6-cylinder models only                          |
| 15 Warning light, headlamp main beam  | 40 Switch, cold start warning light                           |
| 16 Headlamp, LH main beam             | 41 Fuel gauge   |
| 17 Headlamp, RH main beam             | 42 Water temperature gauge                                    |
| 18 Direction indicator lamp, rear RH  | 43 Screenwiper motor  |
| 19 Direction indicator lamp, front RH | 44 Distributor  |
| 20 Direction indicator lamp, front LH | 45 Switch, oil pressure                                       |
| 21 Direction indicator lamp, rear LH  | 46 Fuel tank unit   |
| 22 Battery                            | 47 Water temperature transmitter unit                         |
| 23 Switch, ignition and starter       | 48 Stop lamp, LH  |
| 24 Switch, lights                     | 49 Stop lamp, RH  |
| 25 Switch, headlamp flash and dip     | 50 Screenwasher motor (when fitted)                           |

### Key to cable colours

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

The last letter of a colour code denotes the tracer colour



### BASIC CIRCUIT DIAGRAM 2¼ LITRE 4-CYLINDER DIESEL MODELS, R.H. AND L.H. STEERING, NEGATIVE EARTH

