WORKSHOP MANUAL

CHRYSLER 160

CHRYSLER 160-G.T.

CHRYSLER 180

ENGLISH
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WORKSHOP MANUAL

CHRYSLER 160

CHRYSLER 160-G.T.

CHRYSLER 180

CLASSIFICATION SYSTEM
COMMON TO ALL AFTER-SALES MANUALS

A - ENGINE

- A0 - Engine assembly
- A1 - Cylinder-block
- A2 - Moving parts
- A3 - Cylinder head
- A4 - Timing gear

B - LUBRICATION

- B0 - General
- B1 - Oil sump
- B2 - Oil pump
- B3 - Oil filter

C - FUEL SYSTEM

- C0 - General
- C1 - Petrol tank
- C2 - Petrol pump and pipes
- C3 - Air filter and warm air intake
- C4 - Carburettor
- C5 - Exhaust

D - COOLING

- D0 - General
- D1 - Radiator
- D2 - Fan
- D3 - Hoses
- D4 - Water pump

E - ENGINE ELECTRICAL SYSTEM

- E0 - General
- E1 - Starting
- E2 - Charging
- E3 - Ignition

F - TRANSMISSION

- F0 - General
- F1 - Clutch
- F3 - Gear box
- F4 - Automatic gear box
- F5 - Drive shaft
- F6 - Differential and wheel shafts

G - SUSPENSION

- G0 - General
- G1 - Front suspension
- G2 - Rear suspension
- G3 - Wheels
- G4 - Tyres

H - STEERING

- H0 - General
- H1 - Steering
- H3 - Adjustment of vehicle trim
  Adjustment of front wheel set geometry

J - BRAKES

- J0 - General
- J2 - Front brakes (discs)
- J3 - Rear brakes (drums)
- J4 - Rear brakes (discs)
- J5 - Brake control system - servo-brakes

K - BODY ELECTRICAL SYSTEM

- K1 - Wiring diagram
- K2 - Inner electrical instruments
- K3 - Indicator lights
- K4 - Windscreen-wipers
- K5 - Horns and control system
- K6 - Air conditioning

L - BODY IN WHITE AND TRIM

- L0 - General
- L1 - Front end
- L2 - Central section
- L3 - Rear end

M - PAINT - APPLICATION PROCEDURES

N - ACCESSORIES

- N1 - Car radio
- N4 - Trailer attachment

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PRESENTATION OF MANUAL

This manual is part of the series of publications designed with a common classification system for easier maintenance of our vehicles:

- Spare Part Catalogue
- Workshop Manual
- Time Schedule
- List of Specific Tooling

The classification system common to these manuals will be found on page 1.

This manual is divided into chapters corresponding to the main units of the vehicle.

Chapters are identified by a letter.

Within the framework of a chapter, the classifications of sections, i.e. of information concerning the units of which a given assembly is comprised, is identified by the letter corresponding to the relevant chapter followed by a number used to identify the individual unit.

For easier information finding, the section reference is followed by a roman number, which specifies the nature of the information given on the unit in the section concerned:

I. Description - General - General specifications.

II. Tightening torque values.

III. Specific tooling.

IV. Unit maintenance and adjustment procedures, on car.

V. Unit removal and re-fitting procedures.

VI. Removed unit dismantling and re-assembly procedures, inclusive of inspection after re-assembly.

VII. Reconditioning procedure - Acceptance criteria for recoverable components.

The information classification reference, or section symbol, appears in the box printed on the top outer corner of each page.

Page numbers are shown immediately below the classification reference or section number, and page numbering starts from 1 for each individual section.

The structure of our classification system, therefore, is as follows:

1 - Chapters : identified by a letter. They correspond to the main vehicle assemblies.
2 - Sections : identified by the chapter identification letter followed by a number identifying the unit concerned, and a roman numeral indicating the nature of the information.
3 - Page numbers : progressive numbering of pages for each section.

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KEEPING MANUAL UP-TO-DATE

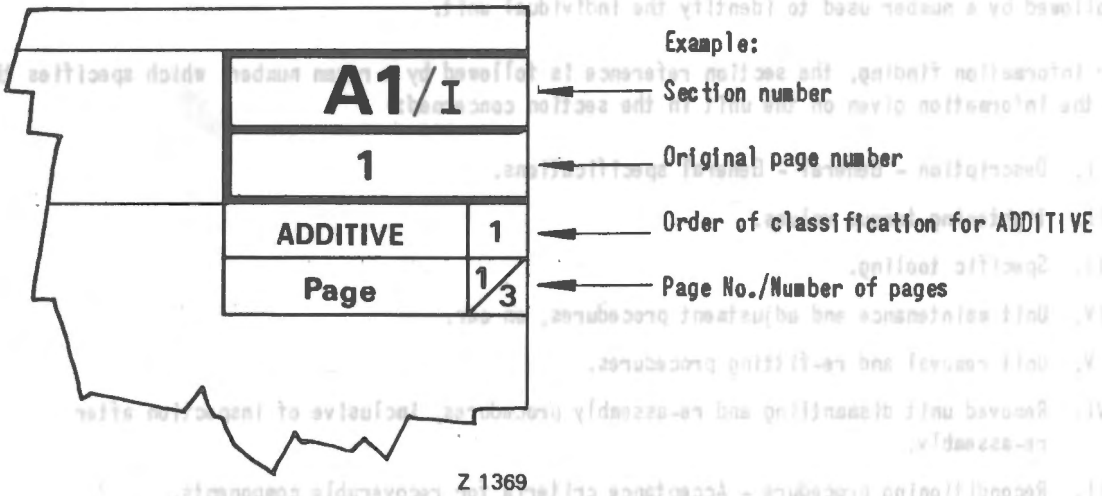
Up-dating is a continuous process. It is achieved by the publication of additional pages to the basic text. which have to be inserted before the corresponding modified pages.

Additional pages are coloured for easier identification.

The classification reference - section number - of each "additive" corresponds to the reference number of the basic page it modifies.

Two additional boxes are provided under the section number:

- the first box will contain the word ADDITIVE followed by a number indicating the order of classification, in cases where several ADDITIVES correspond to the same original page;
- the second box will contain the page number, and an indication of the number of pages of the ADDITIVE concerned.



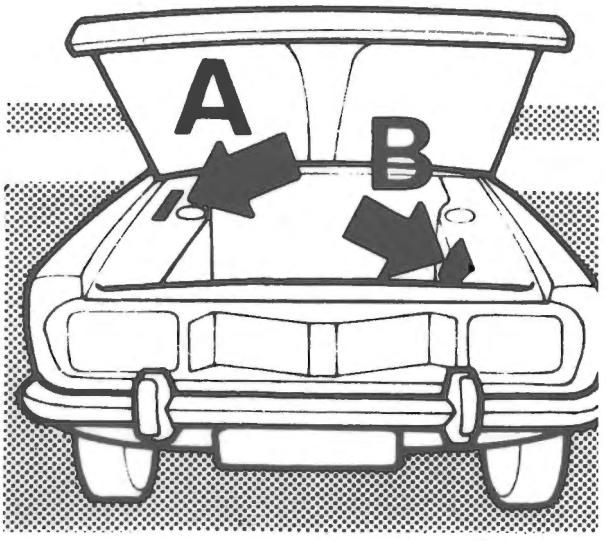
Note: Approximately every 3 years, a new manual pooling all previously issued additives is published.

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GENERAL

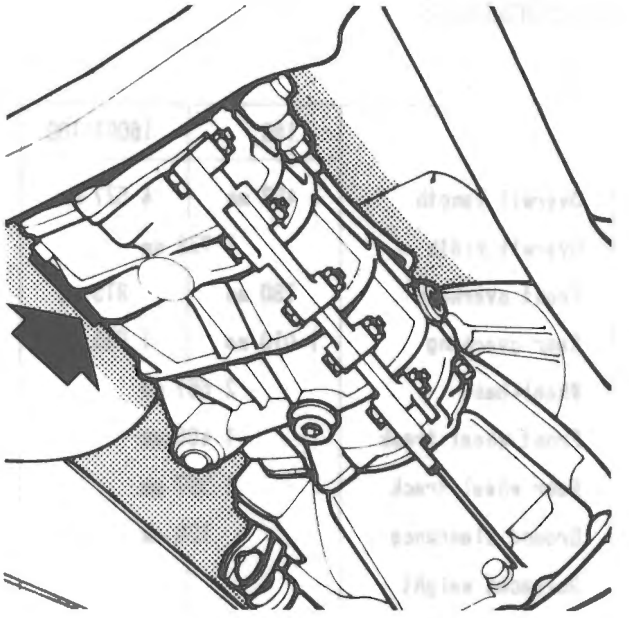
- Vehicle identification
- Dimensions and weights
- Jacking the vehicle
- Operations to be carried out before delivery
- Operations to be carried out for free overhaul
- Certified and recommended maintenance operations

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G.001

Fig. 1 - A : Type Serial No.
B : Original body paint identification.



G.003

Fig. 3 - Gear-box No.

Fig. 2 - Engine No. G.002

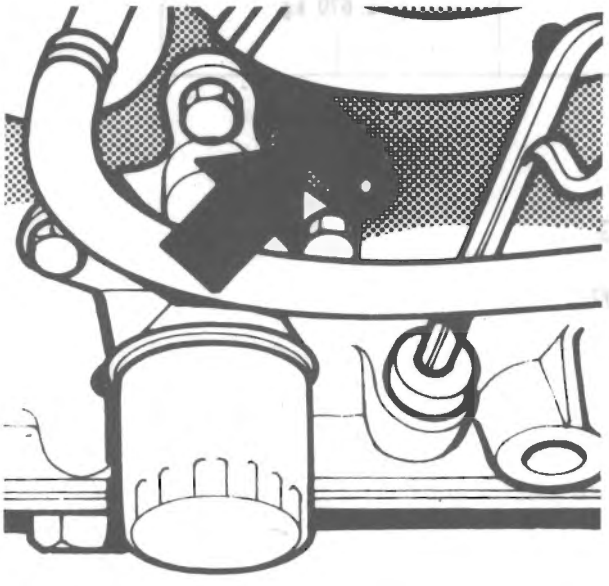
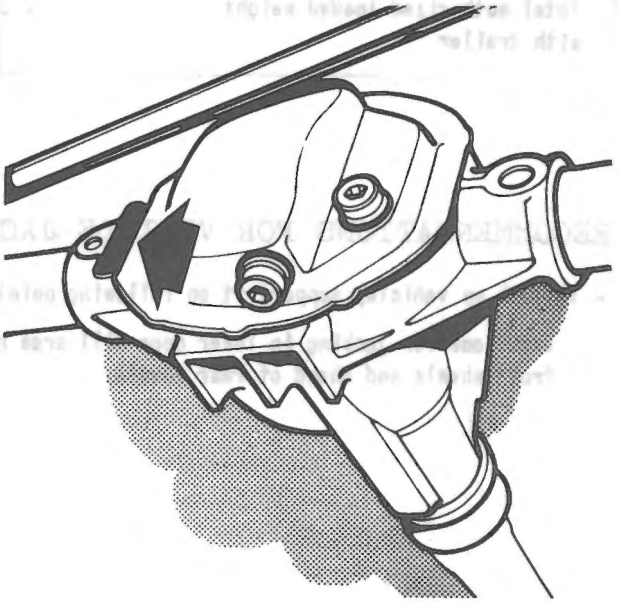


Fig. 4 - Differential No. G.004



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DIMENSIONS

	160	160GT-180
Overall length	4 457 mm	4 527 mm
Overall width	1 728 mm	
Front overhang	780 mm	815 mm
Rear overhang	1 010 mm	1 045 mm
Wheel-base	2 667 mm	
Front wheel track	1 400 mm	
Rear wheel track	1 397 mm	
Ground clearance	120 mm	
Unloaded weight		
Loaded weight		

WEIGHTS

	160		160GT-180	
	Manual Trans.	Auto. Trans.	Man. Trans.	Auto. Trans.
Unloaded weight in running order	1 065 kg	1 080 kg	1 095 kg	1 110 kg
i.e. at front	572 kg	585 kg	585 kg	595 kg
at rear	493 kg	495 kg	510 kg	515 kg
Total authorized loaded weight	1 490 kg		1 520 kg	
i.e. at front				
at rear				
Total authorized loaded weight with trailer	2 390 kg		2 670 kg	

RECOMMENDATIONS FOR VEHICLE JACKING

- To jack up vehicle, support it on following points only:
  . locations for jacking in lower door sill area behind front wheels and ahead of rear wheels.

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OPERATIONS TO BE CARRIED OUT BEFORE DELIVERY

BEFORE TESTING

- Remove protective coating and wash car.
- Check wheels are properly tightened.
- Inflate tyres to correct pressure.
- Check levels of all fluids.
- Check sealing for all systems.
- Check that battery is correctly charged.

ROAD TEST

- Check operation of:
  - . all mechanical units
  - . all electrical units and accessories
  - . all body components and equipment

AFTER TESTING

- Correct all possible faults.
- Check that headlights are set properly.
- Adjust idle setting.

FINISHING

- Clean inside and outside.
- Check overall appearance.

OPERATIONS TO BE CARRIED OUT FOR FREE OVERHAUL

1 - VEHICLE RESTING ON GROUND

- Check operation of bonnet catch release control.

Operations in engine compartment

- Remove air filter assembly with cool air intake sleeve, oil fume suction tube, carburettor air intake connection, and cylinder-head cover.
- Remove 4 spark-plugs.
- Re-tighten cylinder-head setscrews to a 9 m da N torque in the prescribed order; this operation is to be carried out when engine is cold.
- Set valve clearance to:
  - . .25 mm for inlet valves
  - . .35 mm for exhaust valves.

SETTING PROCEDURE

Put vehicle into gear (4th), release hand-brake, and move a wheel to rotate engine in order to set valves of a given cylinder in a balanced position, so that play between valve stem and bearing bush of opposite cylinder can be adjusted.

Example: to adjust rocking levers for cylinder No. 1, set cylinder No. 4 in balanced position; rocking-levers for cylinder No. 2: cylinder No. 3 valves; rocking-levers for cylinder No. 3: cylinder No. 2 valves; rocking-levers for cylinder No. 4: cylinder No. 1 valves.

- Re-fit cylinder-head cover after checking condition of gasket.
- Check, clean, and adjust spark plugs : electrode gap .6 mm.
- Re-fit spark plugs.
- Check and clean carburettor.
- Check accelerator control stroke, oil linkage.
- Check operation and clearance of choke control, on 160 model only.
- Check cleanliness of fuel pump filter.
- Check engine oil and brake fluid levels.
- Check that the following are correctly tightened:
  - . radiator
  - . inlet manifold
  - . water outlet cover and elbow
  - . carburettor
  - . water pump
  - . timing gear cover
  - . water draining plug on cylinder block
  - . 4 upper nuts on exhaust manifold
  - . 2 upper nuts fastening exhaust flange to manifold
  - . front shock-absorber upper attachments
  - . servo-brake and clutch and brake master-cylinders.

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- Check connection of electric fan and its thermo-switch on 160 GT and 180 models.
- Check sealing of cooling system and condition of all hoses, together with radiator level.
- Check sealing of fuel supply system.
- Re-fit air filter assembly.
- Adjust belt tension.

Operations in luggage compartment

- Check proper operation of luggage trunk opening control.
- Check proper operation of lock.
- Check that retainer is tightened correctly, adjust it if necessary.
- Check that rear shock-absorber fastening nuts are tightened properly.

Operations inside car

- On front doors, check proper operation of:
  - door opening controls
  - door locking systems
  - window-lifters
  - locks
  - courtesy light switch on lower front pillar
- On rear doors, check proper operation of:
  - door opening controls
  - door locking systems
  - window lifters
- If necessary, adjust front and rear door strikers.
- On front seats, check:
  - correct sliding of seats
  - correct locking in various positions
  - proper inclination and locking of seat backs in position.
- Check proper operation of:
  - side ventilators
  - roof light
  - "night and day" rear view mirror
  - electric clock on 160 and 180 models
  - cigar lighter on 180 model
  - trip recorder resetting device on 180 model
- Check that glove box is closing properly and that lock operates correctly.
- Check proper operation of:
  - clutch and brake pedal stops
  - side lights
  - number plate light
  - instrument cluster lighting
  - dipped headlights
  - headlights (if need be, adjust headlights)
  - headlight indicator light on instrument cluster
  - ignition and starting switch, anti-joy-ride device
  - oil warning light
  - water temperature indicator
  - fuel gauge
  - charging indicator light
  - front and rear R.H. and L.H. trafficators
  - trafficator indicator light
  - steering-wheel trafficator control return system
  - horn
  - windscreen-wiperw (on both positions)
  - windscreen-washer (adjust nozzles if necessary)
  - air-conditioner fan
  - air distributor and defroster.

2 - VEHICLE ON LIFTING RAMP (operations on underside of car)

- Check that the following are properly tightened:
  - R.H. and L.H. engine mountings
  - oil filter to cylinder block
  - 4 exhaust manifold lower nuts
  - 2 lower nuts fastening exhaust flange to manifold
  - gear box fastening reinforcement to cylinder block
  - rack to front cross-member
  - starting motor to clutch housing and cylinder block
  - clutch receiver cylinder
  - gear box and clutch housing
  - gear box rear cover
  - engine central mounting to gear box and cross-member to body
  - drag links to king pin arm
  - stabilizer rod to body
  - drag link lock-nuts
  - tachometer tapping to gear box.

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- Check condition and proper operation of rack sealing bellows.
- Check sealing of crankcase and of gear box and differential housings.
- Check that the following are properly tightened:
  . king pin
  . screws fastening king pin lower knuckle
  . wheel play tie-rods
  . alternator to cylinder block
  . transmission coupling joint
  . transmitter relay to body
  . differential cover
  . rear suspension lower arms to body
  . differential to suspension arm
  . upper suspension arms to differential and body
  . anti-roll bar to body and differential
  . petrol tank
  . exhaust straps
  . exhaust collars
  . brake equalizer to body
  . rear shock absorber lower attachments.
- Check hydraulic brake system sealing.
- Check gear box level
- Check differential level
- Check fuel gauge connection and its attachment to tank.

Operations on outside of car

- Inflate tyres to required pressure (inclusive of spare wheel tyre); required pressure : Saloon Front : 1.7 bar - Rear : 1.9 bar.
- Verify and check that bolts are correctly tightened on all 4 wheels.
- Check and, if necessary, adjust hand-brake setting.
- Lift front and balance front wheels (if necessary).

Start engine

- Check proper operation of choke.
- Check alternator output.
- Check that oil warning light is off.
- Check and, if necessary, adjust closing angle of distributor contacts.
- Check and, if necessary, adjust initial setting of distributor, using stroboscopic lamp.
- Adjust idle setting.
- Check gear shifting and selection.

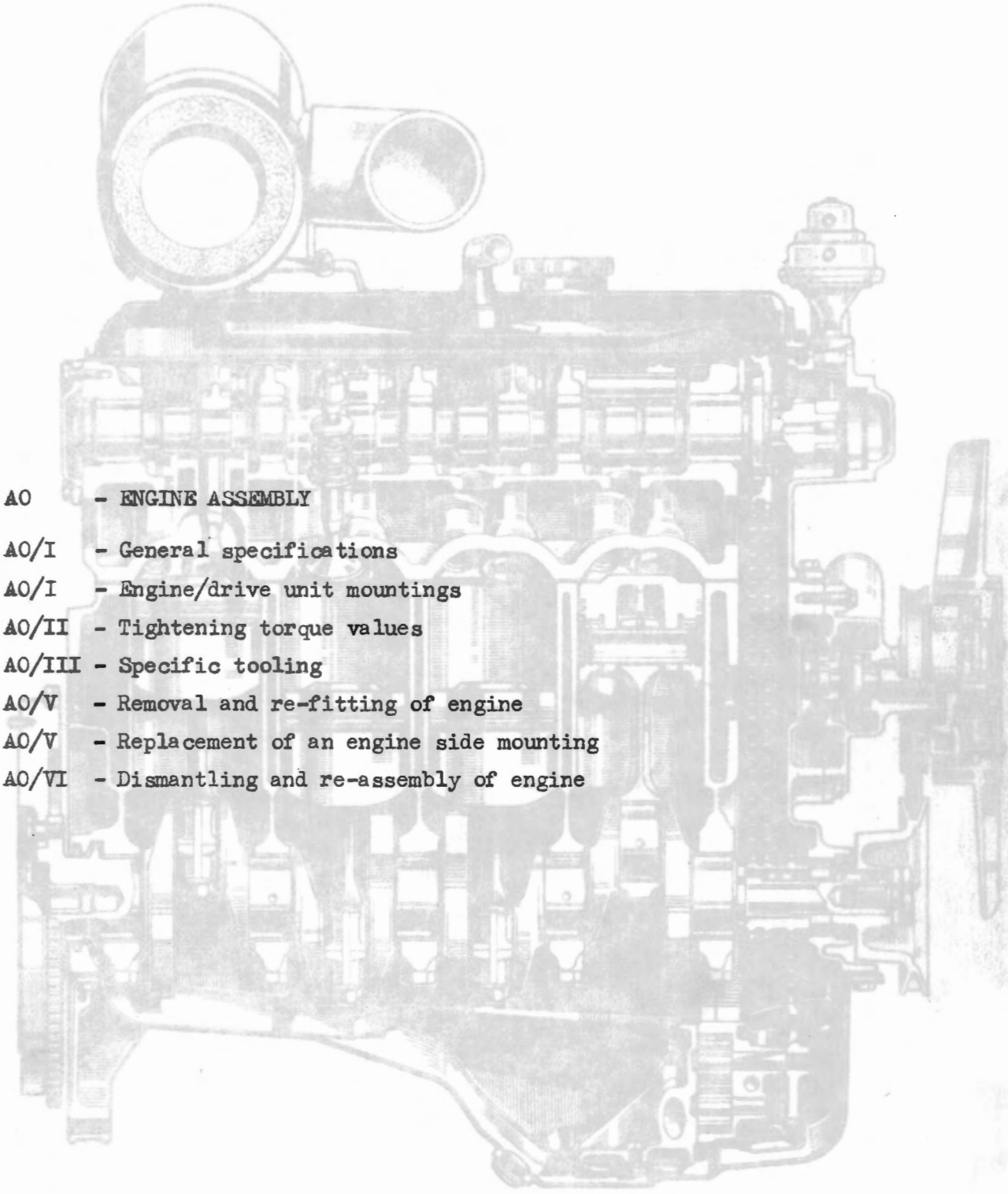
ROAD TESTING

- During this test, check proper operation of:
  . releasable fan
  . air-conditioner
  . revolution indicator
  . speedometer

CERTIFIED AND RECOMMENDED MAINTENANCE OPERATIONS

Please, kindly consult guarantee booklet for year under consideration.

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A0 - ENGINE ASSEMBLY

A0/I - General specifications

A0/I - Engine/drive unit mountings

A0/II - Tightening torque values

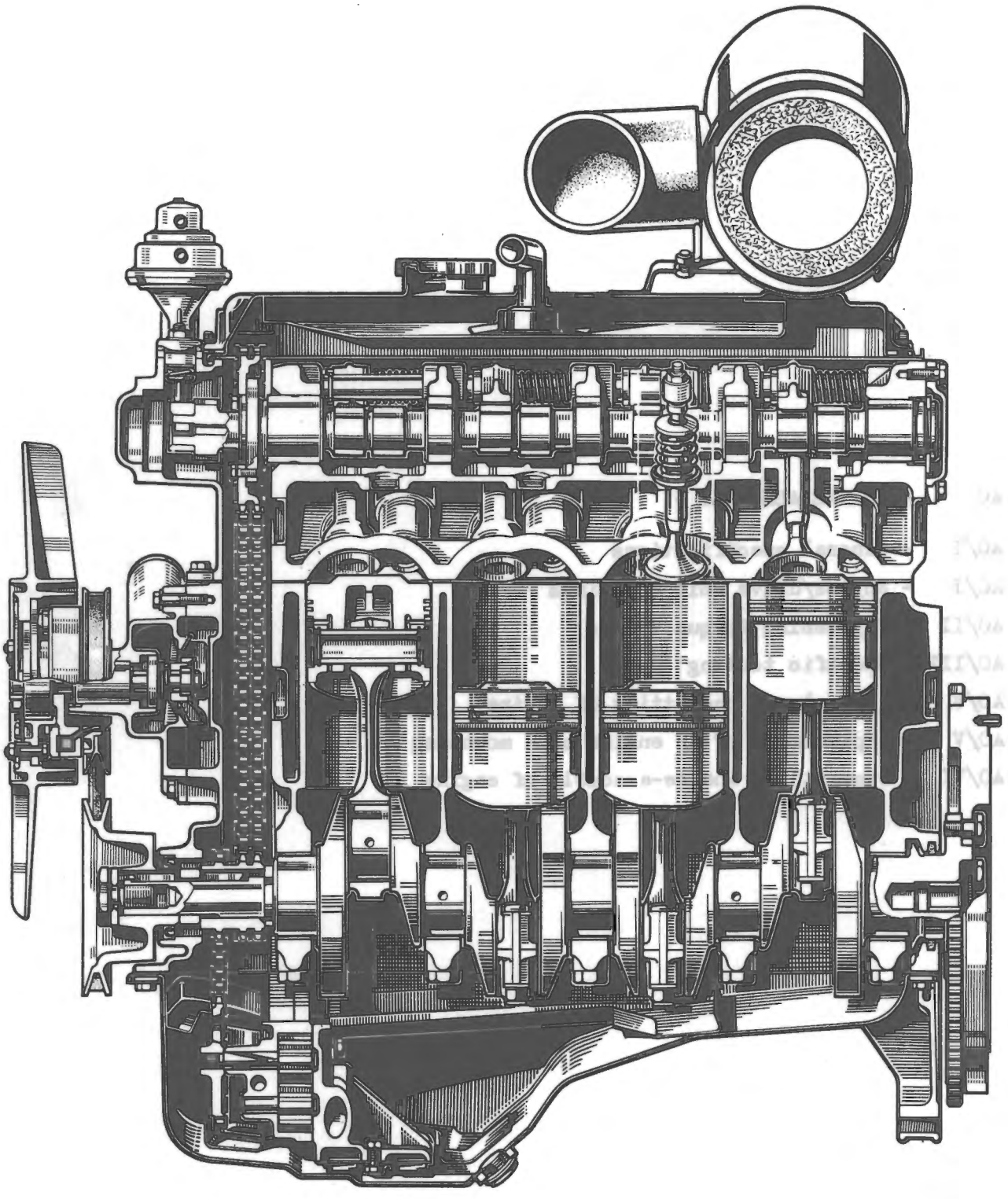
A0/III - Specific tooling

A0/V - Removal and re-fitting of engine

A0/V - Replacement of an engine side mounting

A0/VI - Dismantling and re-assembly of engine

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W.1317

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Type: Internal combustion engine, 4 stroke, 4 cylinders in line with 15° transverse inclination, overhead camshaft.

Location on car: at front, longitudinally.

Firing order: 1 - 3 - 4 - 2

Direction of rotation: Clockwise when observer is facing front of engine.

Overall dimensions of engine-drive unit:

length (with flywheel and fan) : 685 mm
width (without air filter) : 560 mm
height (without air filter) : 700 mm

Weight of engine only with accessories: 155 kg approx.

Weight of engine-drive unit: 200 kg approx.

	361 Engine	341 Engine
Trade name	CHRYSLER 160	CHRYSLER 180
Bore	83.40 mm	87.70 mm
Stroke	75 mm	75 mm
Cubic capacity	1639 c.c.	1812 c.c.
Stroke/Bore ratio	0.899	0.855
Compression ratio	9.2 ± 0.1	9.2 ± 0.1
Recommended fuel	Super	Super
Minimum RM octane index	98	98
For countries with low octane index		
Compression ratio	8.2	8.2
Recommended petrol	ordinary	ordinary
Minimum RM octane index	90-91	90-91
Fiscal power (French standards)	9 CV	10 CV
Effective DIN power	80 CV at 5600 r.p.m.	97 CV at 5600 r.p.m.
DIN maximum torque	12.5 mdaN at 3000 r.p.m.	14.7 mdaN at 3000 r.p.m.
Specific power	51.9 CV/litre	53.5 CV/litre

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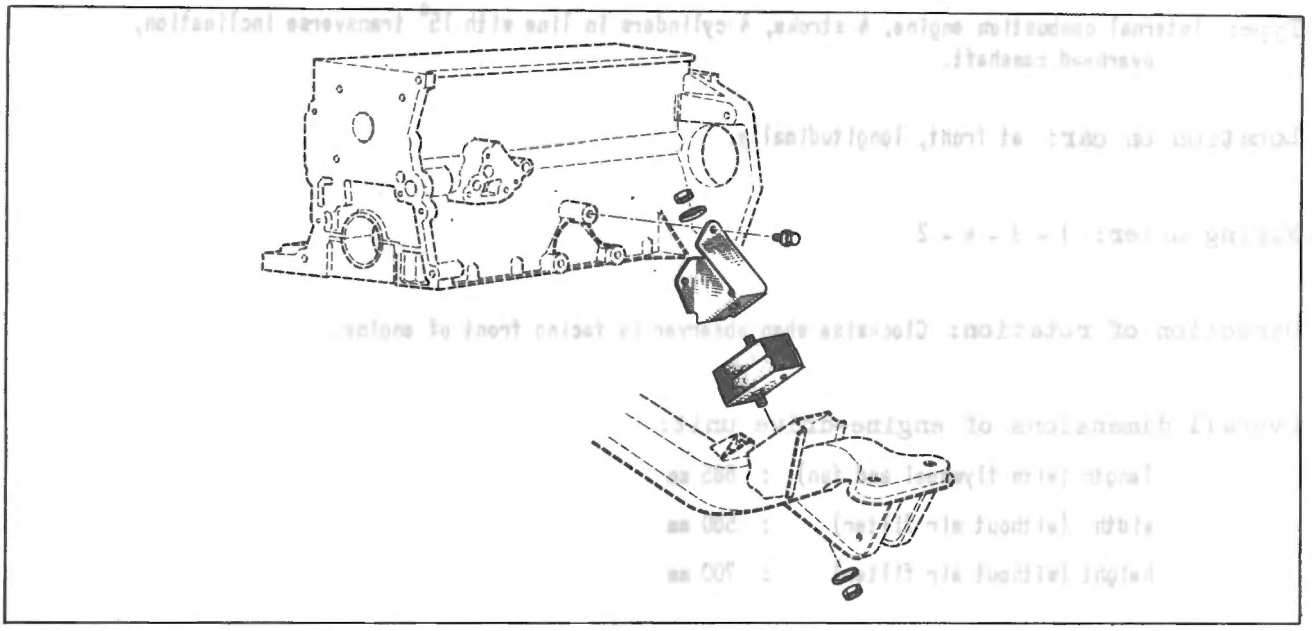


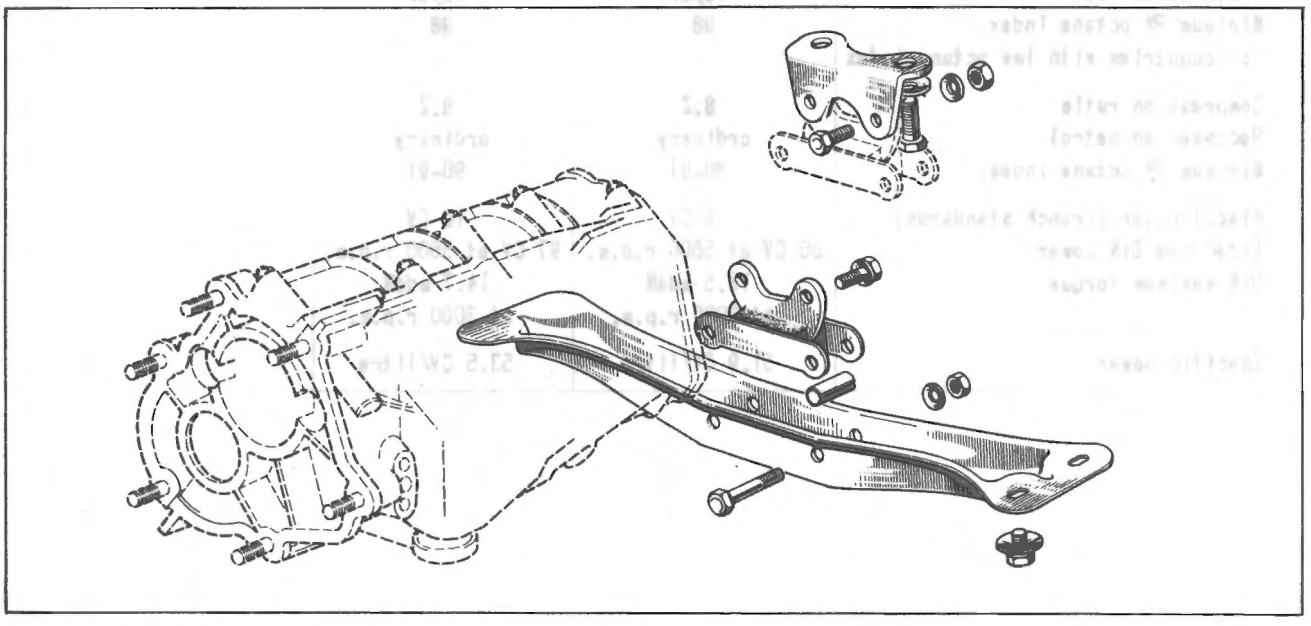
Fig. 1 G.005

The engine drive unit is fastened in three points:

- a side point on either side of the cylinder block, by means of brackets and rubber blocks (Fig. 1) bearing against R.H. and L.H. side-members;
- a central rear point : a cross-member fitted between side-members carries a "silentbloc" vulcanized on a tab; this tab, which protrudes from the silentbloc, directly supports the gear box extension (Fig. 2).

Note: The side mountings attached to the cylinder block have different fastening distances between centres.

Fig. 2 G.006



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	m da N
Distributor to front cover	1
Alternator to cylinder block	5
Rocking lever, adjustment screw and nut	1.5
Draining plug to cylinder block	2
Valve cap	3
Oil draining plug	4
Inspection plug for chain tensioner	4
Spark-plug to cylinder head	3
Starting motor terminal	1.5
Side tie-piece to cylinder head	1.5
Earthing cable to terminal	0.5
Positive cable to terminal	1
Carburettor to inlet manifold	2
Oil sump to cylinder block	1
Filter cartridge to support bracket	1
Front cover to cylinder head	1.25
Timing gear cover to cylinder block	1.25
Connecting rod cap	7.5
Bearing cap to cylinder block	11
Inlet manifold to cylinder head	1.5
Exhaust manifold to cylinder head	2
Spark-plug harness duct to cylinder head	1.5
Oil pump body to cylinder block	1.25
Cover to oil pump body	1.5
Side cover to cylinder head	1.25
Cover on water outlet	1.25
Cylinder head cover	0.75
Cylinder head to cylinder block	9
Starting motor to cylinder block	5
Diaphragm to crankshaft	8
Pressure switch	3.5

	m da N
Anti-vibration pad to cylinder block	1.5
Guiding pad to cylinder block	1.5
Oil pump to cylinder block	1.25
Water pump to timing gear cover	1.25
Petrol pump to front cover	2
Crankshaft pulley	9
Temperature tapping	1.5
Gear wheel to camshaft	1.5
Water outlet to cylinder head	1.25
Filter cartridge support bracket to cylinder block	1.25
Engine mounting to engine	2.5
Alternator supporting bracket to timing gear cover	1.5
Bearing seal supporting bracket	1
Strainer to cover	1.25
Bracket assembled to support	2.5
Bracket assembled to cross-member	2.5
Rear bracket to rear cross-member	2.5
Rear bracket to gear box extension	2.5
Chain adjuster to cylinder block	1
Adjuster to alternator	2
Alternator adjuster to timing gear cover	2
Pressure switch	1.5
Rear cross-member to body	2.5
Fan and pulley to 341 engine	0.5
Fan and pulley to 361 engine	1.25
Engine flywheel to crankshaft	8

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Distributor to front cover	
Harness to cylinder block	
Rocking lever, adjustment screw	
Heating plug to cylinder block	
Valve cap	
Oil draining plug	
Inspection plug for chain tensioner	
Spark-plug to cylinder head	
Starting motor terminal	
Side flap-piece to cylinder head	
Earthing cable to terminal	
Positive cable to terminal	
Carburettor to inlet manifold	
Oil sump to cylinder block	
Filter cartridge to support bracket	
Front cover to cylinder head	2.5
Timing gear cover to cylinder block	1.25
Connecting rod cap	
Bearing cap to cylinder block	11
Inlet manifold to cylinder head	1.5
Exhaust manifold to cylinder head	2
Spark-plug harness duct to cylinder head	1.5
Oil pump body to cylinder block	1.25
	1.25
	1.25
Fan and pulley to Jet engine	5
Fan and pulley to 'D' engine	
Engine flywheel to crankshaft	

Anti-vibration pad to cylinder block	
Guiding pad to cylinder block	
Oil pump to cylinder block	
Water pump to timing gear cover	
Petrol pump to front cover	
Crankshaft pulley	
Temperature sending	
Gear wheel to camshaft	
Water outlet to cylinder head	1.25
Filter cartridge support bracket to cylinder block	1.25
Engine mounting to engine	4.5
Alternator supporting bracket to timing gear cover	
Bearing cap supporting bracket	
Strainer to cover	
Bracket assembled to support	1.5
Bracket assembled to cross-member	11
Rear bracket to rear cross-member	1.5
Rear bracket to gear box extension	2
Chain adjuster to cylinder block	1.5
Adjuster to alternator	1.25
Alternator adjuster to timing gear cover	
Pressure switch	1.25
Rear cross-member to body	1.25

CHRYSLER
160 - 160 GT - 180

Description	Spare Part Ref. No.	Fig. No.
Extractor	15525 F	
Perfect-circle Plastic gauges, type PG1	20782 S	
Plate	20833 M	
Fitting tool	21601 S	
Spanner for rocking-lever adjustment	31174 G	
Bush, FACOM 750 T or MULLER 582 bis T 60		
10-12 FACOM Polygonal half-moon wrench		
Starting motor crown locking tool	to be made by user	1
Retaining bar	to be made by user	2
Engine supporting rig	to be made by user	3
Camshaft handling tool	to be made by user	4

Fig. 1

A - Crown sector
Engine flywheel brazed to bush

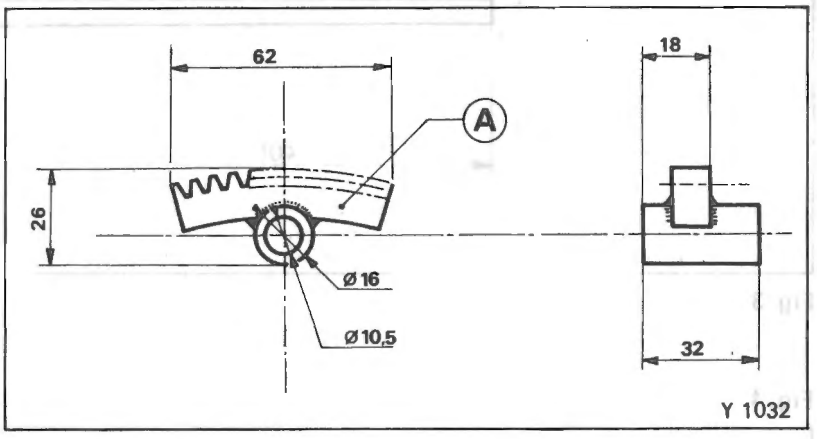
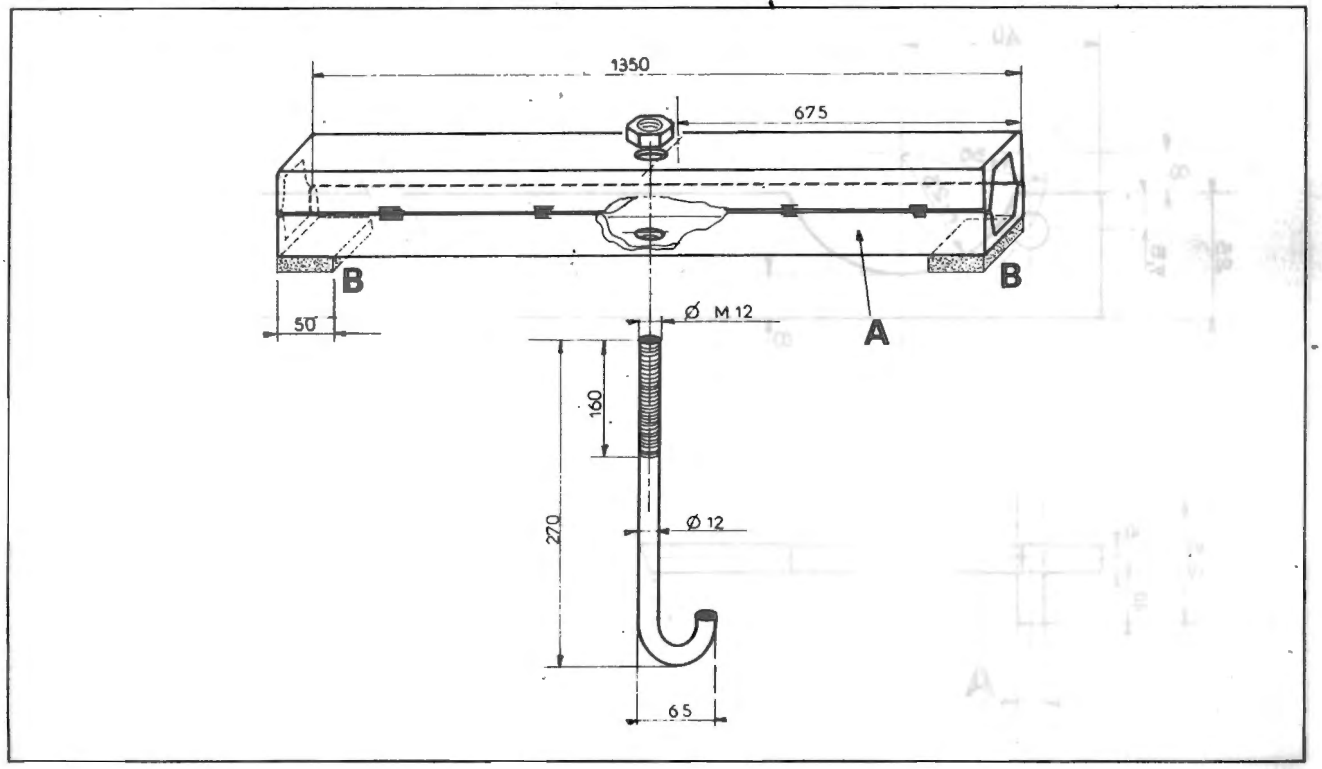


Fig. 2 A - 50 x 38 x 5 channel or 45 x 45 square tube B - Rubber pads G.007



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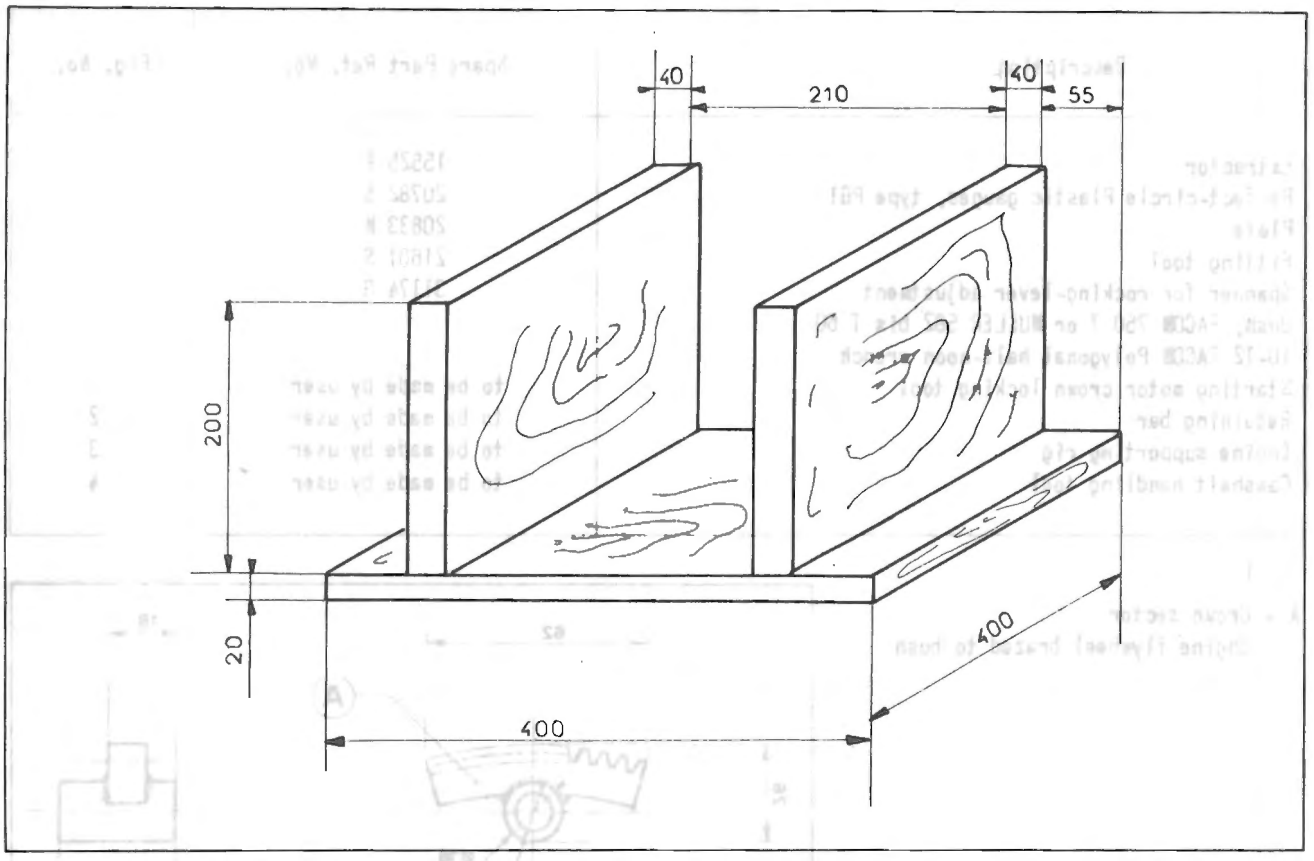
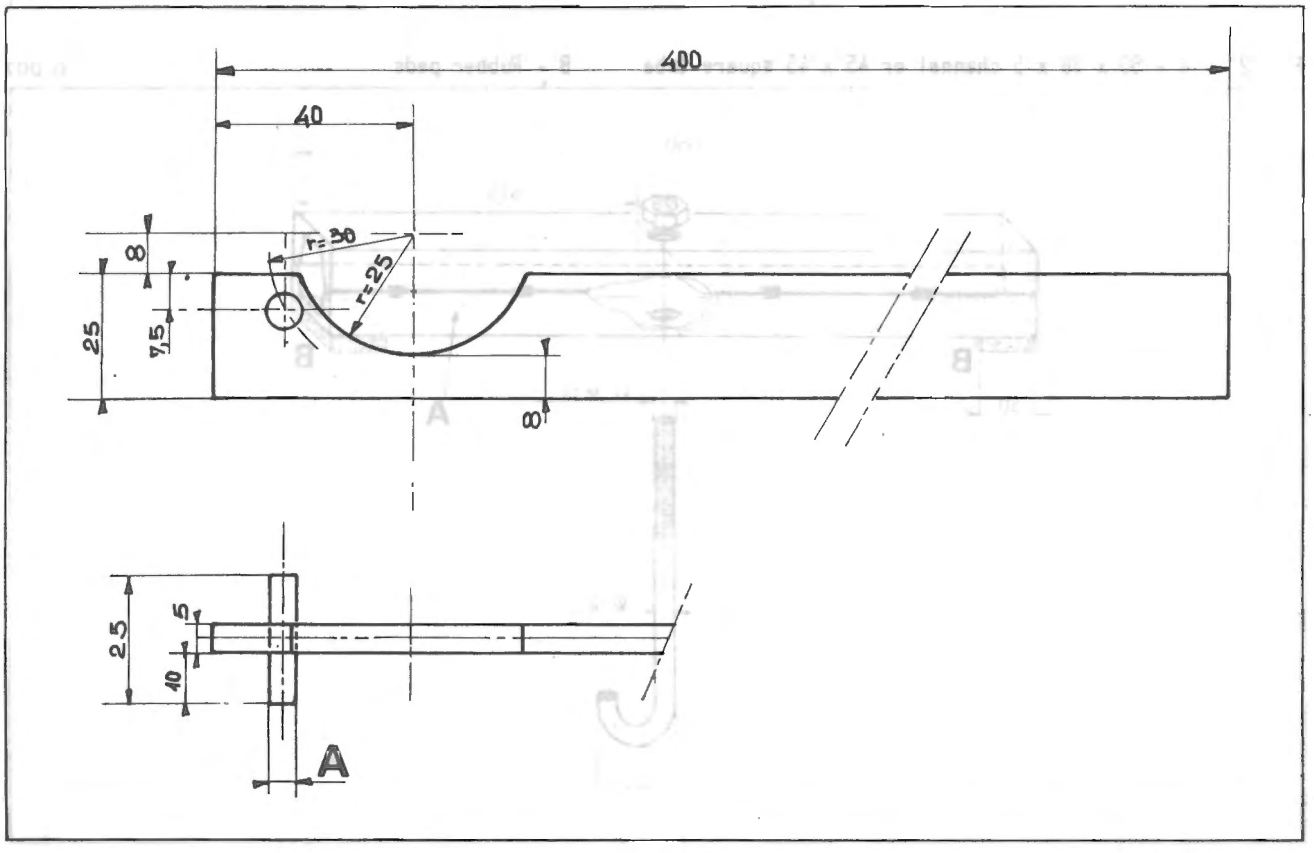


Fig. 3 G.008

Fig. 4 G.009



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REMOVING AND RE-FITTING THE ENGINE

To enable workshops with different types of equipment to remove and re-fit the engine, three different methods have been provided for:

FIRST METHOD

This is the most rational method, and the only one which will be described in detail in this manual. The other two methods will be described, after the first method, and differentially in relation to the first.

The first method is divided into two main stages:

- 1st stage : remove gear box and extract it from underneath after disconnecting the transmission;
- 2nd stage : extract engine from engine compartment from above, after removing bonnet (Fig. 1 and 2).

Removing the engine

- Place vehicle on lifting ramp.
- Place protection covers on fenders and front seat.
- Disconnect and remove battery
- Drain cooling circuit from radiator (recover water + antifreeze mixture).
- Use chalk to mark position of articulation linkage on bonnet and remove same.
- Remove air filter assembly with carburettor air inlet connection and oil fume recovery system (Fig. 3).

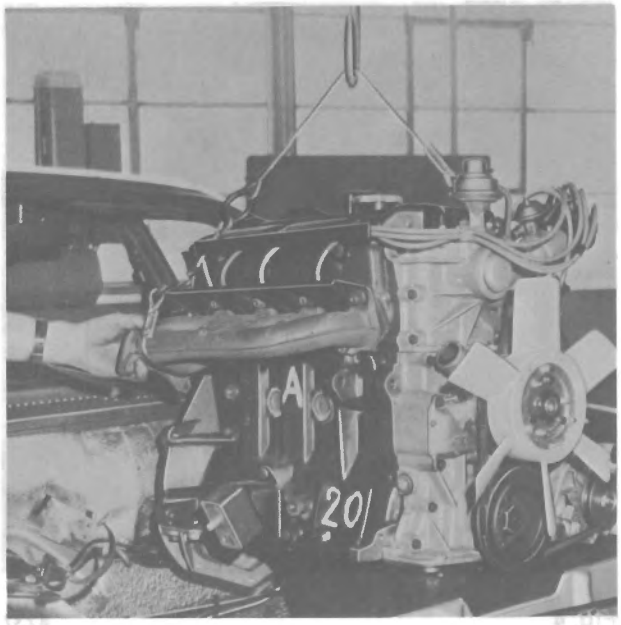


Fig. 2 4235

- Disconnect accelerator cable and sheath. To begin with, clear swivel pin from fixed point supporting tab, and push cylinder through centre of flap control drum.
- Disconnect choking coil; low and high voltage wires; starting motor solenoid and its supply cable; pressure-switch; alternator, thermistor, and releasable fan wires; braided earthing wire on alternator; thermo-switch wires on radiator.

Fig. 1 4234

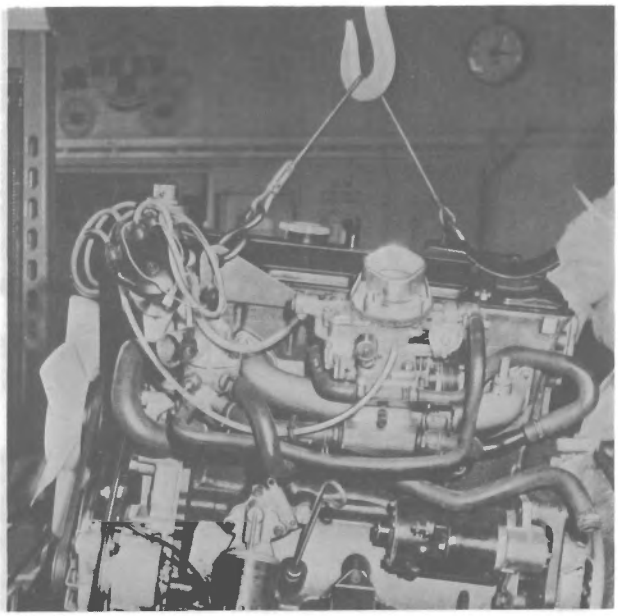
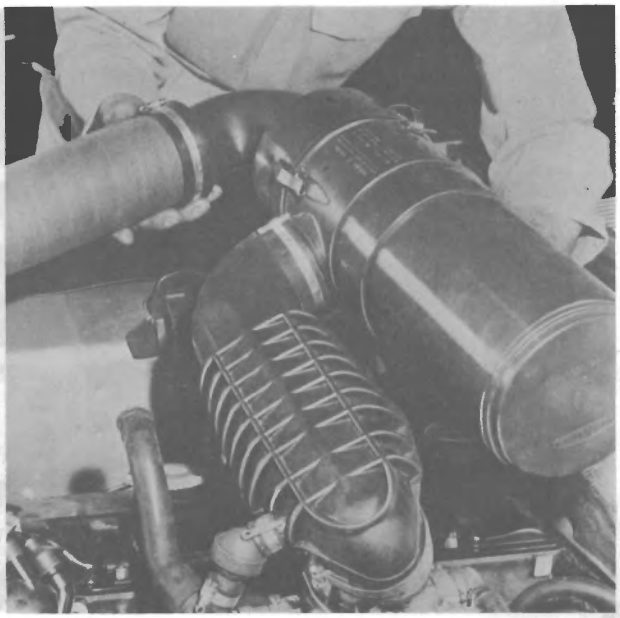


Fig. 3 4236



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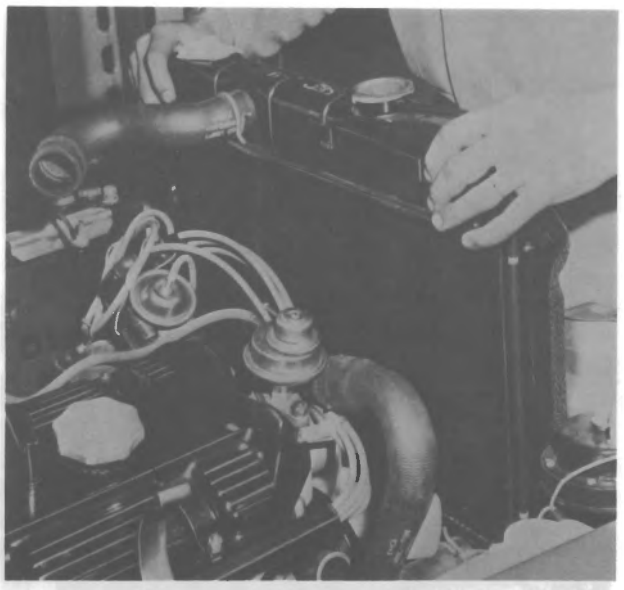


Fig. 4 4237

- Disconnect petrol supply tube, on pump side, and clear it from its support bracket.
- Disconnect both radiator hoses, on cylinder block side.
- Remove radiator with its two hoses (Fig. 4).
- Disconnect servo-brake vacuum hose (on manifold side) as well as both air-conditioner hoses (on dash-panel side).
- Unscrew nut fastening starting motor to gear box.
- Unscrew both upper nuts fastening exhaust flange to manifold.
- Fasten engine lifting tab to cylinder head, on L.H. front side (Fig. 5).

Fig. 5 4238



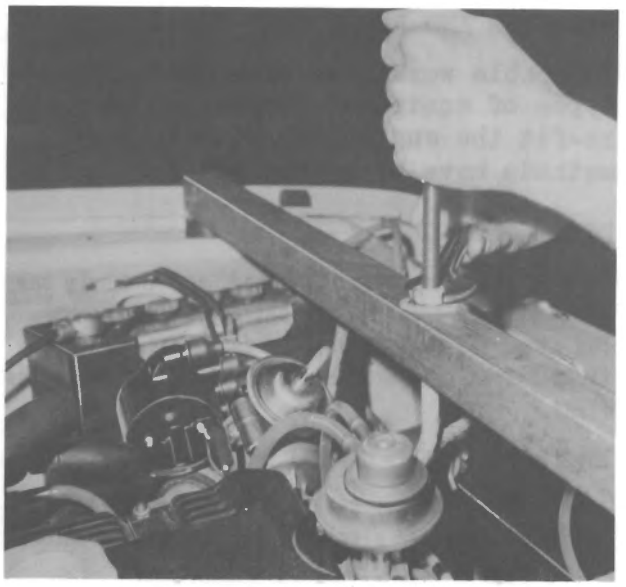
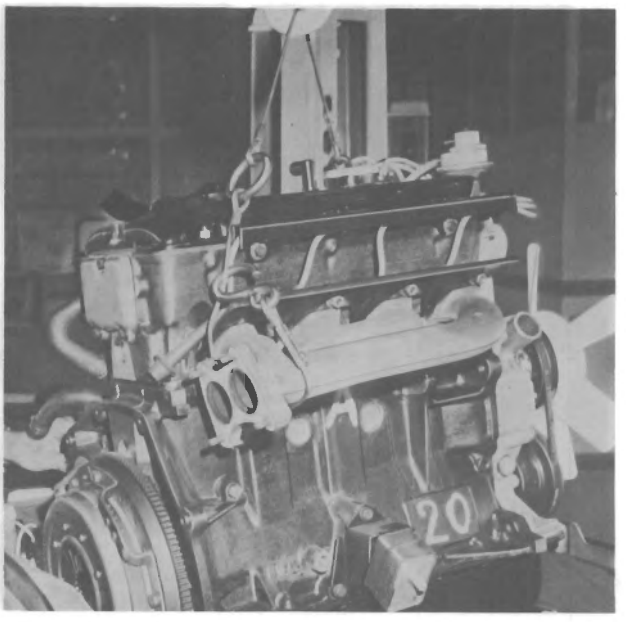


Fig. 6 4239

- Drain cylinder block, using plug located on R.H. side, under exhaust manifold.
- Fit retaining bar on both fender flanges, and clear engine, using a rope running behind crankshaft pulley (Fig. 6).
- Raise lifting ramp.
- Unscrew and remove lower fastening nut from each engine mounting.
- Unscrew both lower nuts fastening exhaust flange to manifold, and remove both rubber rings from support under body in order to clear flange from manifold.
- Remove gear box, applying the method described in chapter F3.

Fig. 7 4240



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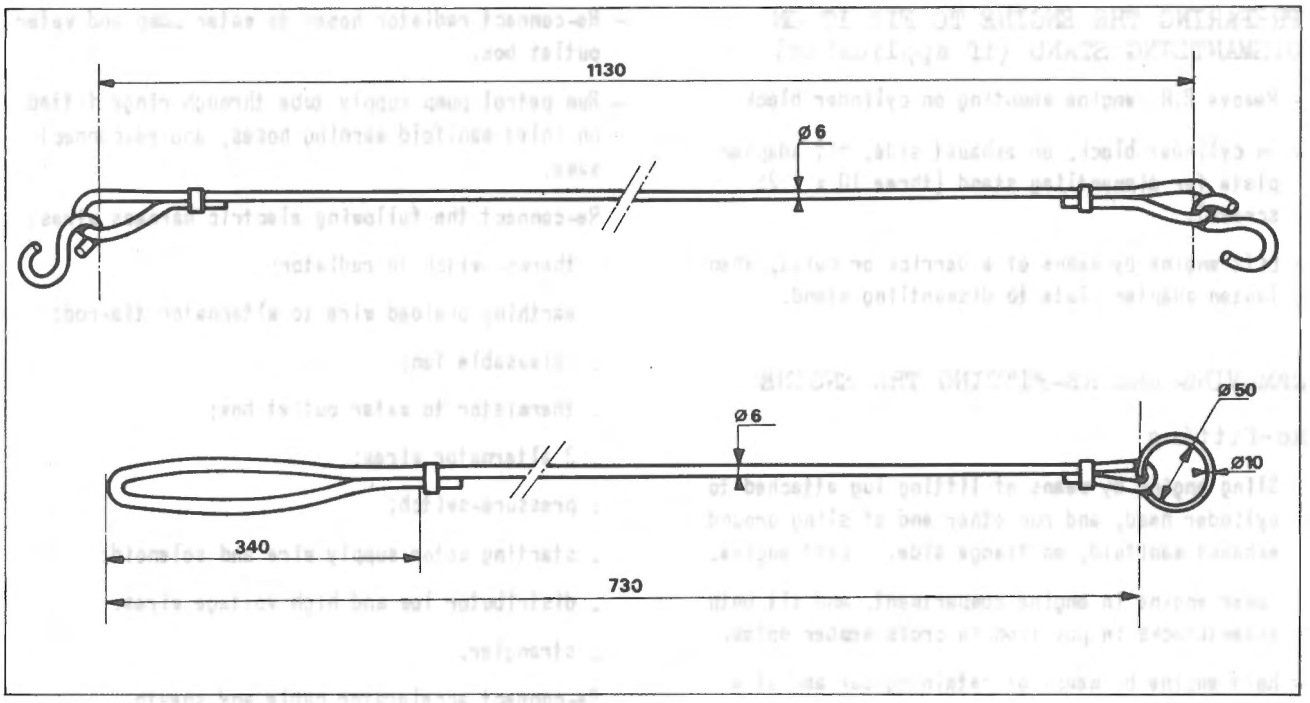


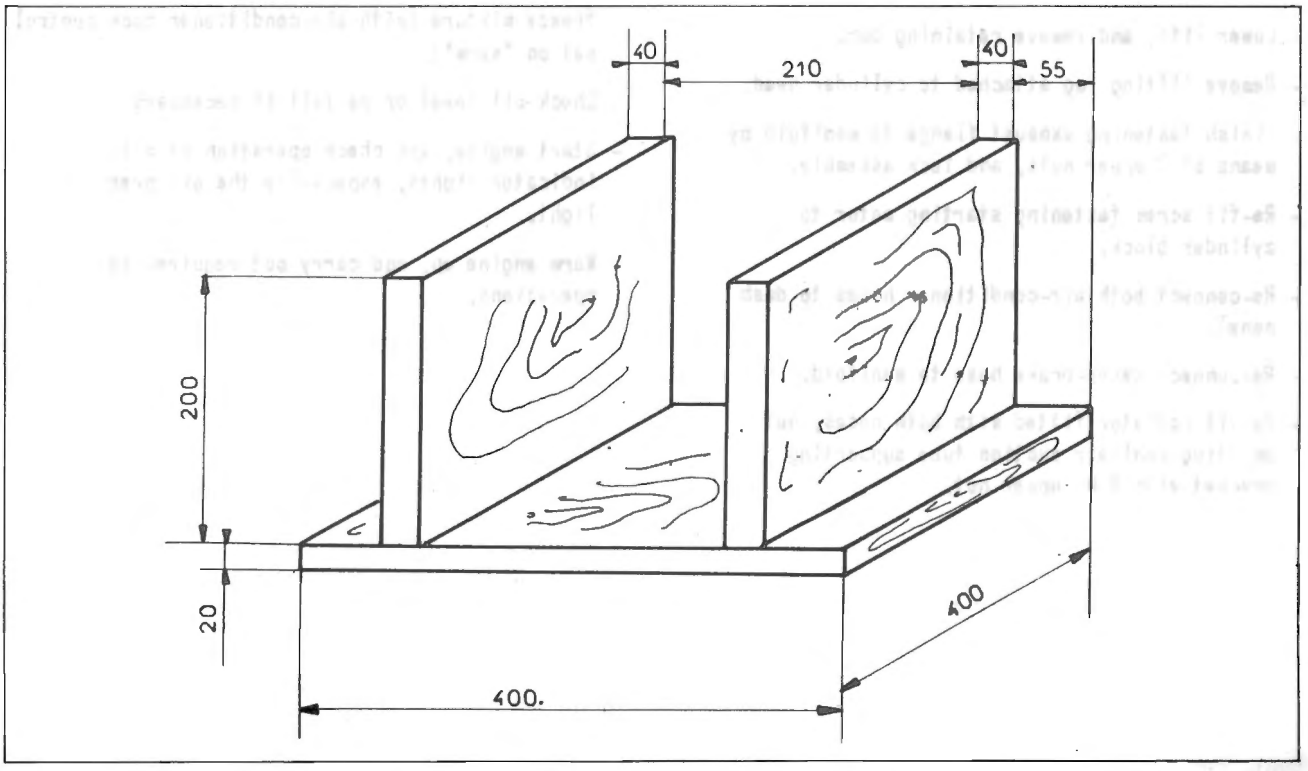
Fig. 7 Y.1034

- Use long end of sling already used for 1100 engine (Fig. 7) to sling engine:
  a) by means of lifting tab fixed to cylinder head;
  b) by running sling around exhaust manifold, on flange side.

Run sling once around hoist hook, as a precautionary measure, and lift engine, whilst guiding it, to remove it from engine compartment (Fig. 8).

Important: the engine must never be made to rest on the ground on its oil sump in order not to damage the oil pump; the clearance between the bottom of the sump and the oil pump strainer is, indeed, low; the engine must be made to rest on a wooden supporting rig made in the workshop as shown on (Fig. 9).

Fig. 9 G.008



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PREPARING THE ENGINE TO FIT IT ON DISMANTLING STAND (if applicable)

- Remove R.H. engine mounting on cylinder block.
- On cylinder block, on exhaust side, fit adapter plate for dismantling stand (three 10 x 1.25 screws).
- Lift engine by means of a derrick or hoist, then fasten adapter plate to dismantling stand.

REMOVING AND RE-FITTING THE ENGINE

Re-fitting

- Sling engine by means of lifting lug attached to cylinder head, and run other end of sling around exhaust manifold, on flange side. Lift engine.
- Lower engine in engine compartment, and fit both silentblocks in position in cross-member holes.
- Hold engine by means of retaining bar and of a rope or sling running around underside of crank-shaft pulley.
- Remove hoist or derrick and its pulley-block.
- Re-fit gear box (see chapter 3).
- Fit exhaust flange in position on manifold, using a new gasket, and fasten with 2 lower nuts;
- Hang exhaust pipe by means of 2 flexible rings on cross-member.
- Fasten R.H. and L.H. engine mountings.
- Lower lift, and remove retaining bar.
- Remove lifting lug attached to cylinder head.
- Finish fastening exhaust flange to manifold by means of 2 upper nuts, and lock assembly.
- Re-fit screw fastening starting motor to cylinder block.
- Re-connect both air-conditioner hoses to dash panel.
- Re-connect servo-brake hose to manifold.
- Re-fit radiator fitted with both hoses, not omitting cool air suction tube supporting bracket with R.H. upper nut.
- Re-connect radiator hoses to water pump and water outlet box.
- Run petrol pump supply tube through rings fitted on inlet manifold warming hoses, and re-connect same.
- Re-connect the following electric harness wires:
  - . thermo-switch to radiator;
  - . earthing braided wire to alternator tie-rod;
  - . releasable fan;
  - . thermistor to water outlet box;
  - . 3 alternator wires;
  - . pressure-switch;
  - . starting motor supply wire and solenoid;
  - . distributor low and high voltage wires;
  - . strangler.
- Re-connect accelerator cable and sheath.
- Re-fit air filter assembly with air intake connection to carburettor and oil fume recovery system.
- Re-fit bonnet, locating it to reference marks which were chalked on at removal stage.
- Re-fit battery, and re-connect cables.
- Make sure water drain cock on cylinder block is correctly tightened, as well as radiator cock, and re-fill cooling system with water + anti-freeze mixture (with air-conditioner cock control set on "warm").
- Check oil level or re-fill if necessary.
- Start engine, and check operation of all indicator lights, especially the oil pressure light.
- Warm engine up, and carry out required setting operations.

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SECOND METHOD
(Applicable to manual gear box vehicles only)

Those workshops where no lifting ramp is available may yet remove the engine by leaving the gear box in position on the vehicle.

The R.H. and L.H. engine mountings must be removed, on the cylinder block side, and the stabilizer rod must be disconnected from the side members for easier engine removal.

Consequently, re-fitting operations will be a little more difficult and will call for the use of a small jack to relieve the front end of the gear box and to enable it to be fitted in better alignement with the engine.

Two operators will be required to locate and re-fit the engine at the end of the gear box to enable the crankshaft pulley to be rotated, and for proper guiding of the (previously centred) clutch plate grooves and of the gear box input shaft.

THIRD METHOD
(Applicable to all models)

The engine-drive unit may be removed and extracted from underneath on condition, however, that the sling is fitted differently around the engine.

The sling must, on the one hand, hook on the lifting plate and, on the other hand, run around the exhaust manifold at the centre, opposite the 3rd spark-plug; in this manner, the rear end of the gear box, will tilt downwards, and may be cleared more easily (Fig. 10).

To carry out this operation satisfactorily, it is advisable to remove the gear shift linkage and to turn it towards the rear of the vehicle; similarly, the fan and R.H. and L.H. engine mountings must be removed (Fig. 11).

Fig. 10 4241

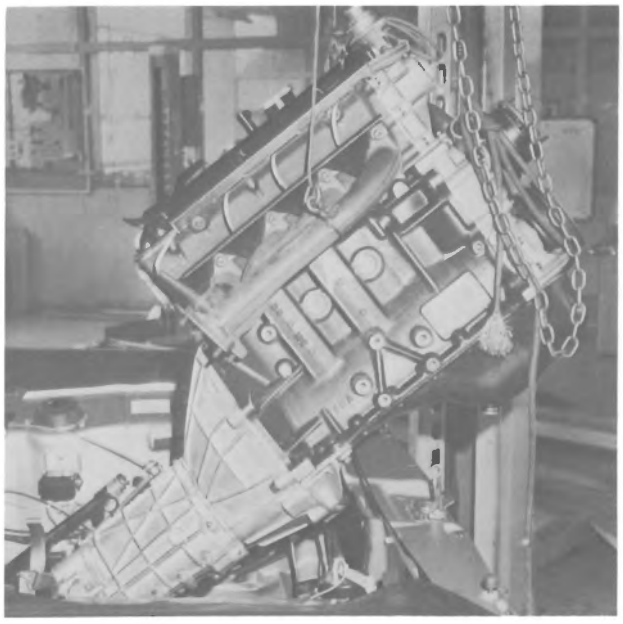
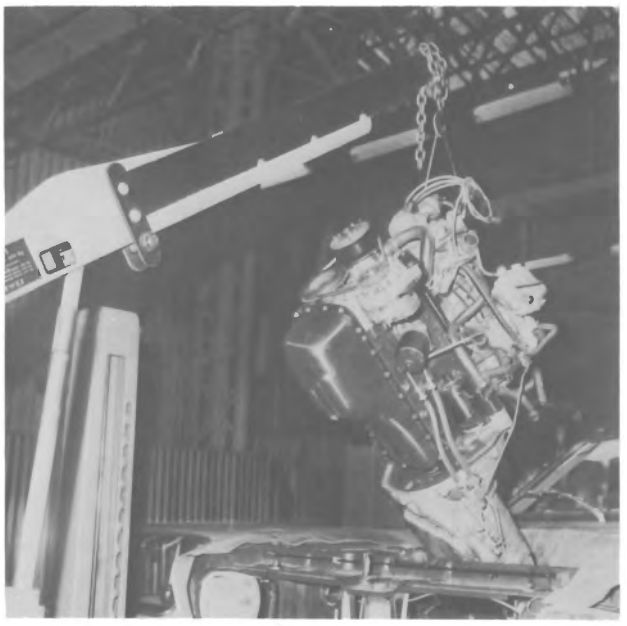


Fig. 11 4242



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REPLACEMENT OF AN ENGINE SIDE MOUNTING

- Set car on a lifting ramp.
- Disconnect battery earthing cable.
- Relieve engine by means of retaining bar (see "Specific tooling"), running a rope under crankshaft pulley.
- Raise lifting ramp, and remove nut fastening silentbloc to cross-member.
- Remove mounting on block.
- Silentbloc may then be easily dismantled from supporting bracket.

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SUMMARY OF DISMANTLING PROCEDURE

- Removal of accessories.
- Removal of cylinder head.
- Removal of oil sump and timing gear cover.
- Removal of timing gear
- Removal of connecting rod/piston assemblies and shaft line.

EQUIPMENT OF ENGINE AS REMOVED FROM CAR

Engines removed from cars (Fig. 1) are without:

- lower and upper radiator hoses,
- air-conditioner hoses,
- air filter,
- carburettor air intake elbow.

REMOVAL OF ACCESSORIES

- When removing hose circlips, scrupulously follow procedure described in section D3.
- Successively remove and set the following on a table, or preferably on an assembly panel (Fig. 2):
  - . dipstick
  - . pressure-switch
  - . alternator with adjuster
  - . fan belt
  - . starting motor (fastened by 2 remaining THM 10 x 1.25-40 screws)
  - . fan (fastened by means of 3 nylstop nuts, and spacers to be recovered)
  - . distributor and H.V. harness protection: to do this, only loosen both 7 screws fastened on R.H. side of cylinder-head, and remove protection; remove both harness retaining tabs attached with cylinder-head cover, and remove distributor cap with protection and harness assembly.
- Disconnect vacuum tube, on carburettor side.
- Remove clamp retaining distributor to cylinder head front cover, and remove distributor.
- Remove petrol pump fastened with 2 nuts, and insulating spacer.
- Remove water header, fastened with 2 nuts, from inlet manifold, disconnecting:
  - . water pump-to-water header hose,
  - . water return hose from inlet manifold to water header
  - . hose from carburettor heater to water header.
- Remove water pump fastened by 2 THM 7 x 1.00 - 75 screws and 5 THM 7 x 1.00 - 30 screws.

Fig. 1 3878

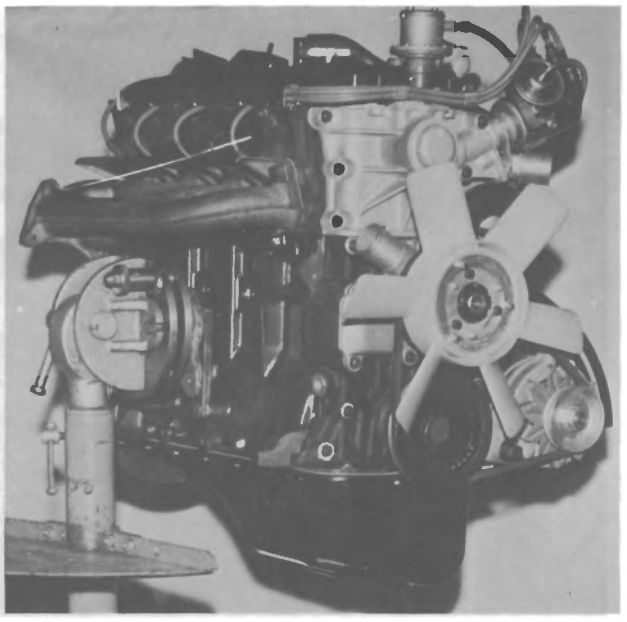
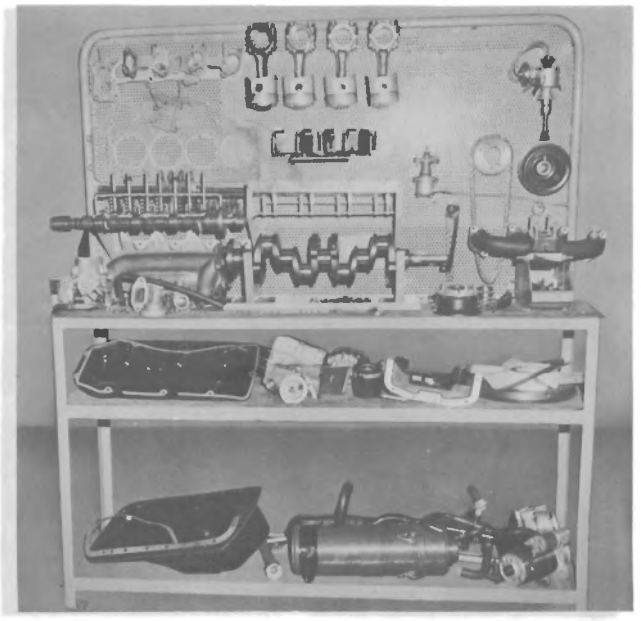


Fig. 2 3879



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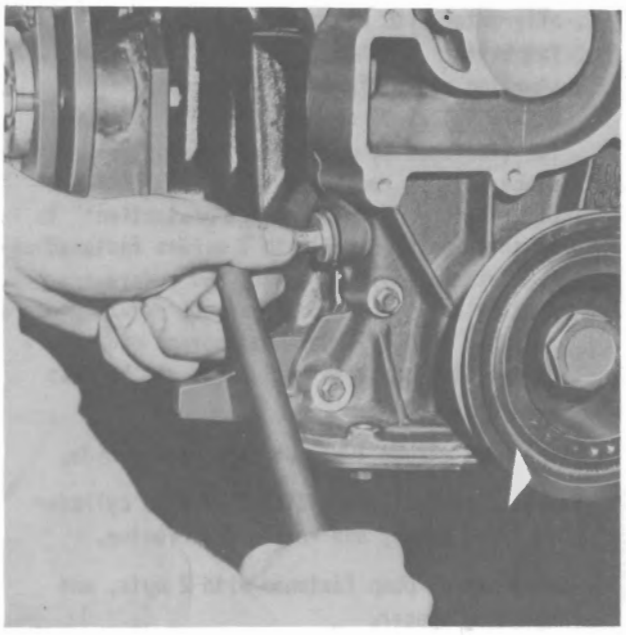


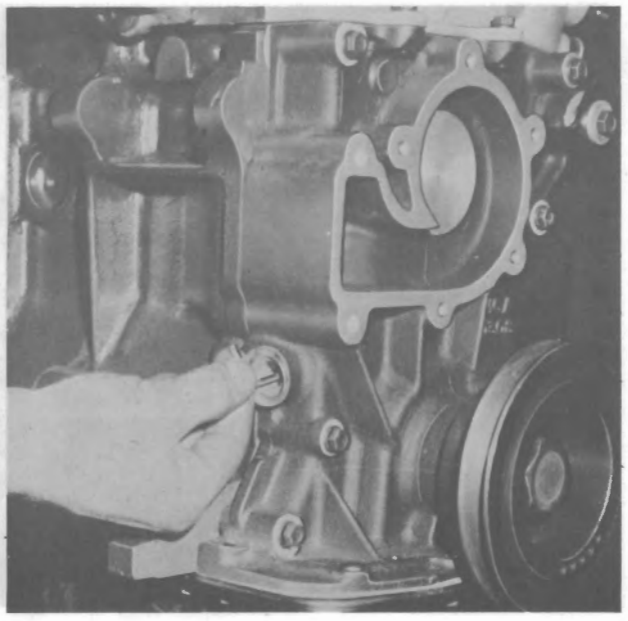
Fig. 3 3880

REMOVING THE CYLINDER HEAD

Important: this operation can only be carried out when engine is cold (after a minimum of 6 hours).

- Release automatic timing chain adjuster, proceeding as follows:
  - remove cap screwed on R.H. side of timing gear cover (Fig. 3),
  - fold stop screw sheet metal retainer back on adjuster body,
  - remove screw, taking care not to allow it to fall in lower case; for this reason, operators are advised to pack grease in bottom of wrench (or a 12 mm long magnet section).

Fig. 4 3881



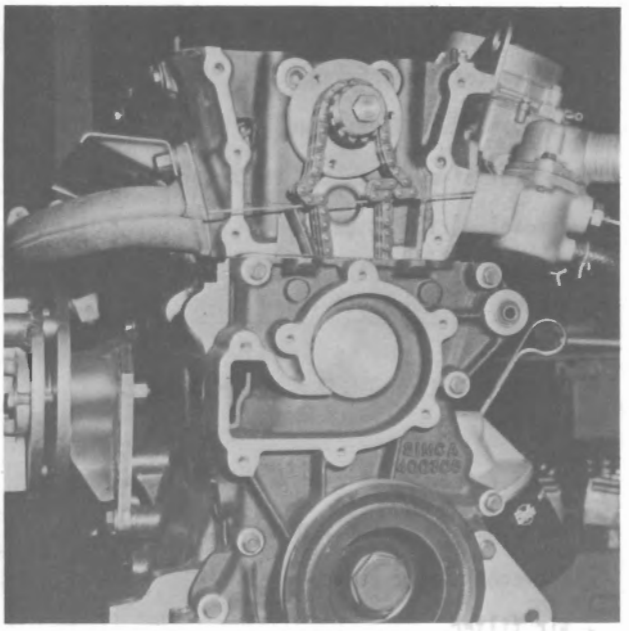
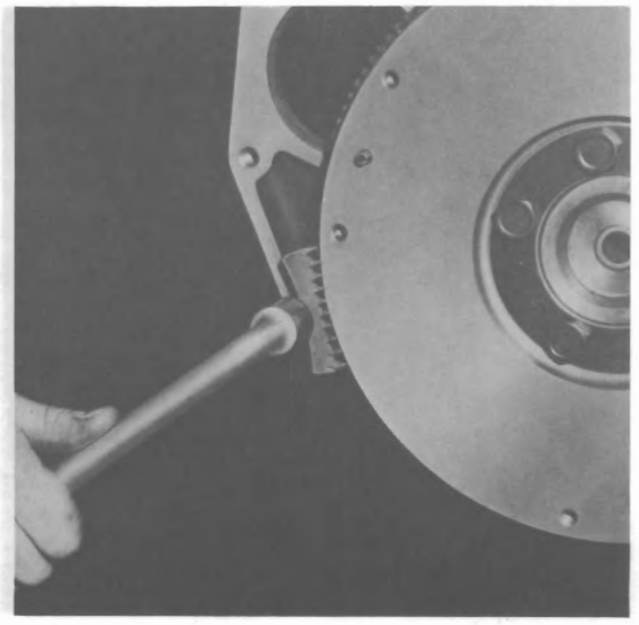


Fig. 5 3882

  - through hole, insert a 3 mm Allen spanner in piston hexagonal hole (Fig. 4),
  - turn spanner to right to free shoe from effect of spring.
- Disconnect oil fume re-cycling system hoses on cylinder head cover side and carburettor side.
- Remove cylinder head front cover fastened by means of:
  2 THM 7 x 1.00-20 screws
  4 THM 7 x 1.00-30 screws
  2 THM 7 x 1.00-70 screws
- Unlock and remove camshaft driving sprocket, which is fastened by means of 3 THM 7 x 1.00-18 - class 80 screws.

Fig. 6 3883



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- Retain timing chain by means of a length of wire inserted through two chain links, to prevent it from falling in lower case (Fig. 5).
- Loosen 10 cylinder head setscrews, proceeding in reverse order to tightening sequence.
- Remove cylinder head complete.
- Remove gasket.
- Fit starting motor crown-wheel locking tool in position, using a 10 x 125 screw (Fig. 6).

REMOVING THE OIL SUMP AND TIMING GEAR COVER

- Loosen oil filter cartridge, and remove cartridge supporting bracket, which is fastened by means of 3 THM 7 x 1.00-20 screws.
- Turn engine upside down.
- Remove lower oil sump fastened by 22 THM 7 x 1.00-18 screws, and recover fastening retainers.
- Turn engine over vertically, with crankshaft pulley uppermost.
- Loosen crankshaft pulley.
- Remove pulley and key.
- Remove timing gear cover fastened to cylinder block by means of 3 THM 7 x 1.00-70 screws and 3 THM 7 x 1.00-55 screws.

DISMANTLING THE TIMING GEAR

- Remove automatic adjuster, which has been previously released (Fig. 7).
- Remove adjuster body, which is fastened to cylinder block by means of 2 THM 6 x 1.00-30 screws, together with its sole plate.
- Remove spacer fitted on crankshaft pinion.
- Remove oil pump fastened to cylinder block by means of 2 THM 8 x 1.25-80 screws.
- Remove oil pump assembly with its chain, clearing it from crankshaft pinion.
- Recover chain adjustment spacers fitted under pump sole plate.
- Clear camshaft double driving chain.

  Note: There is no dismantable link on either oil pump single chain or double chain. In addition, neither chain can be removed if oil pump is not removed.
- Remove both chain adjustment shoes, each fastened by means of 2 THM 7 x 1.00-12 screws to the cylinder block.
- Remove crankshaft pinion, using a wooden driver or a mallet, and recover key.

  Note: If pinion is set hard to crankshaft end, use extractor Ref. 15525 F and SIVA plate Ref. 20833 M (Fig. 8)

Fig. 7 3884

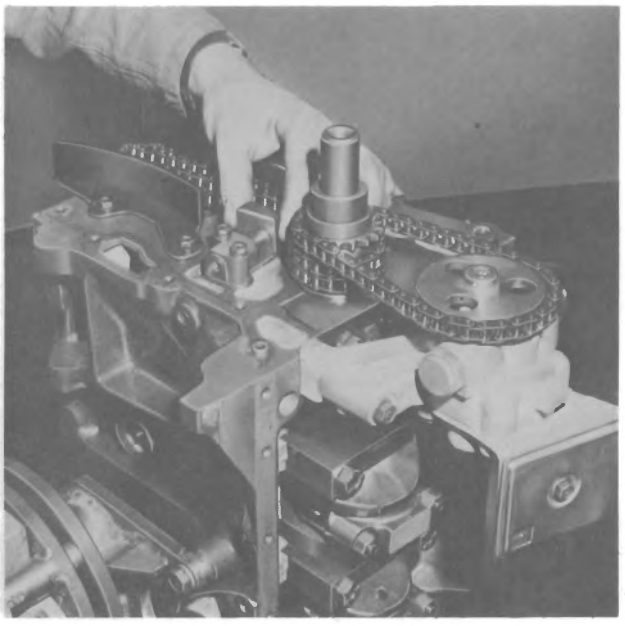
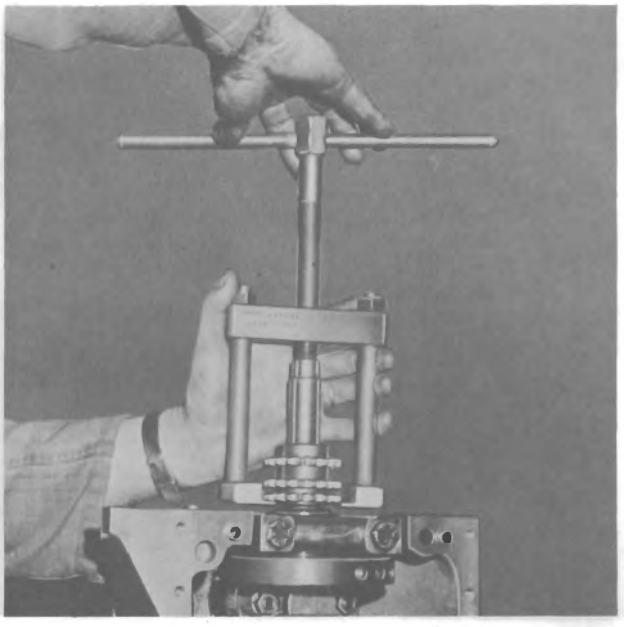


Fig. 8 3885



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REMOVAL OF CONNECTING ROD/PISTON ASSEMBLIES AND OF SHAFT ASSEMBLY

- Remove clutch mechanism, 6 THM 8 x 1.25 screws.
- Turn cylinder block upside down.
- Loosen 5 engine flywheel setscrews.
- Remove starting motor crown-wheel locking tool.
- Remove connecting rod caps.
- Fit protections on connecting rod screws (nylon sections with inner diameter of 10 mm) (Fig. 9).
- Extract connecting rod/piston assemblies after setting crankshaft on T.D.C. or B.D.C.

  Important: Prior to removing pistons, carbon deposits must be eliminated from opening of cylinders.
- Remove bearings, and set them aside in appropriate order, then re-fit caps in position on connecting rods without locking the screws.
- Turn cylinder block over vertically (engine flywheel uppermost).
- Remove flywheel and screw bearing washer.
- Re-set engine upside down.
- Remove packing holder cap, and recover both side sealing tubes.
- Remove bearing caps
- Extract crankshaft.
- Remove all bearings, and set them aside in appropriate order together with side adjustment half-rings.
- Re-fit bearing caps in position, but do not lock screws.
- If necessary, remove centering bushes (Fig. 10) used for:
  - clutch housing,
  - cylinder head,
  - timing gear cover,
  - oil pump,
  - engine flywheel.

Fig. 9 3886

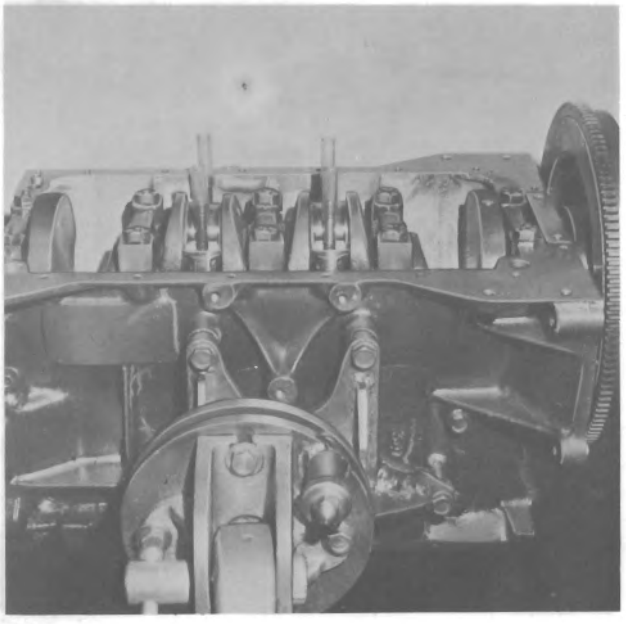
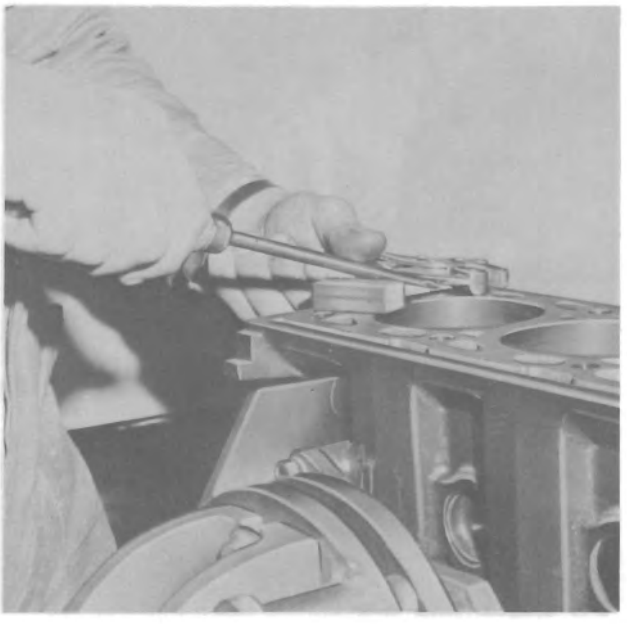


Fig. 10 3887



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SUMMARY OF RE-ASSEMBLY PROCEDURE

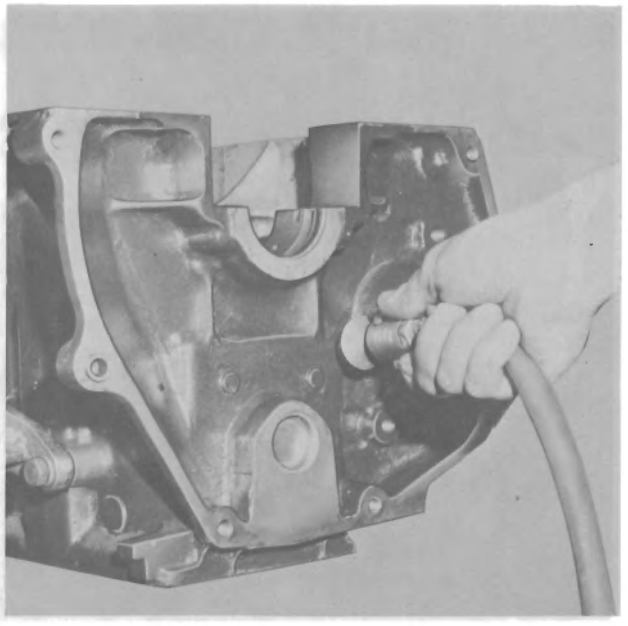
- Re-fitting the crankshaft.
- Checking crankshaft or connecting rod play.
- Checking crankshaft side play.
- Re-fitting flywheel and crankshaft self-lubricating bush (manual gear only).
- Fitting connecting rod/piston assemblies in cylinders.
- Re-fitting the cylinder head.
- Re-fitting the timing gear.
- Re-fitting the oil pump assembly.
- Re-fitting the timing gear cover.
- Re-fitting the oil sump.
- Re-fitting the water pump.
- Re-fitting accessories.

RECOMMENDATIONS

When re-assembling the engine:

- Systematically fit new gaskets.
- Operations, which may have to be carried out on gaskets and seals before they are re-fitted, are listed in the procedure.
- Check gasket bearing faces, and rub them with emery-cloth or face them if necessary.
- Lubricate nuts, bolts, and screws before use.

Fig. 11 3888



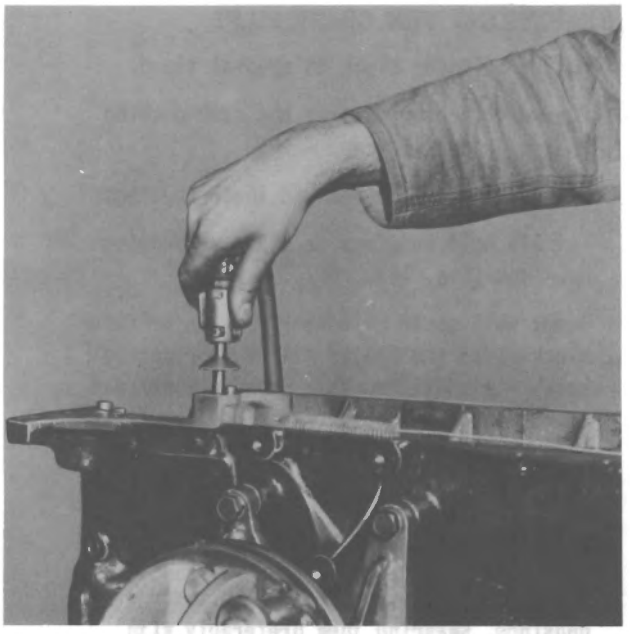


Fig. 12 3889

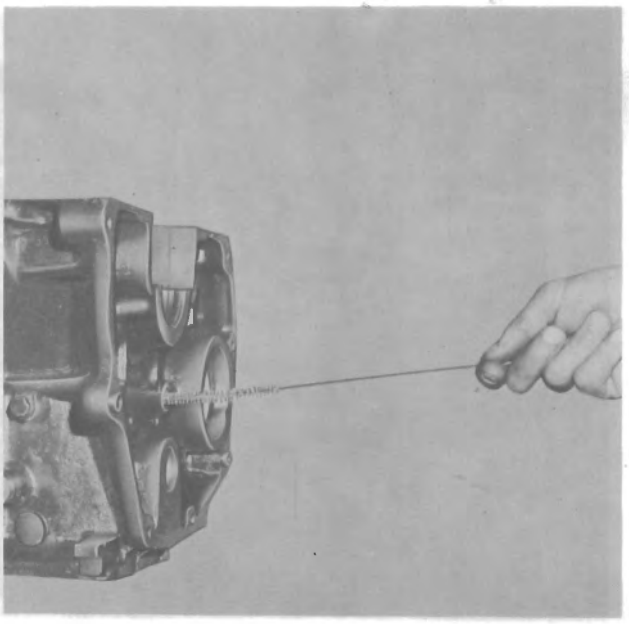
- Systematically fit new screw or nut retainers.

Note: The timing gear cover sealing ring may be used again if its lip is in good condition.

- Scrupulously follow the procedure given in section D3 for fitting hose clips.

Important: the cylinder block must be perfectly clean, all oil channels must be flushed (Fig. 11) with a detergent liquid, and blown with compressed air (Fig. 12), and the longitudinal lubricating distributor must be cleaned with an appropriate brush (Fig. 13).

Fig. 13 3890



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RE-FITTING THE CRANKSHAFT

- Fasten cylinder block to special stand.
- Remove five bearing caps and rear packing gasket supporting cap.
- Wipe all half-bearings and their housings.
- Fit all half-bearings in their respective housings (Fig. 14).

  Note: all upper half-bearings (on cylinder block side) are fitted with a lubricating hole; in addition, Nos. 2 and 4 upper and lower intermediate half-bearings are fitted with a lubricating groove.

  The other half-bearings are smooth (Fig.15).
- Smear all half-bearings with oil.
- Place half-seals in position in their housings, smearing them preferably with tallow, and fitting them be means of a wooden driver. Do not plane or cut them even.

  Note: these packing seals are supplied pre-formed and to the appropriate length.
- Use grease to fit bearing half-rings to central bearing cheeks (Fig. 16) with anti-friction material facing outwards.
- Wipe all crankpins and crankshaft journals, and fit crankshaft simultaneously on its five bearings; previously, the crankshaft must have been flushed and blown with compressed air.

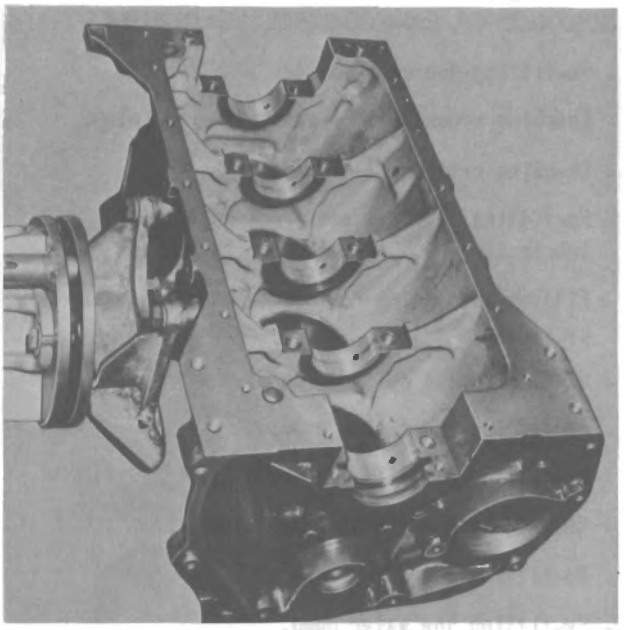


Fig. 15 3892

- Re-fit bearing caps in appropriate order, and tighten bearing cap screws to torque, starting with central cap screws.

  Note: half-bearing anchorings must face one another, only one fitting orientation is possible.
- Re-fit packing seal cap and tighten it to torque.
- Rotate crankshaft over several turns (clockwise and anticlockwise) for perfect fitting of packing seals.

Fig. 14 3891

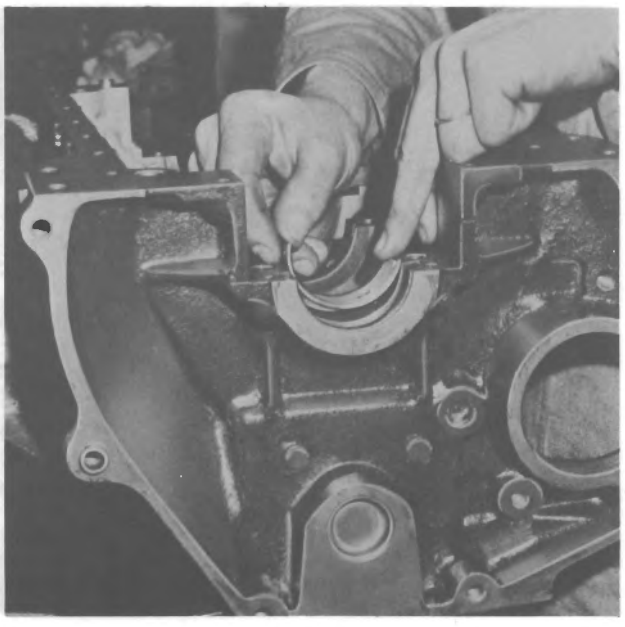
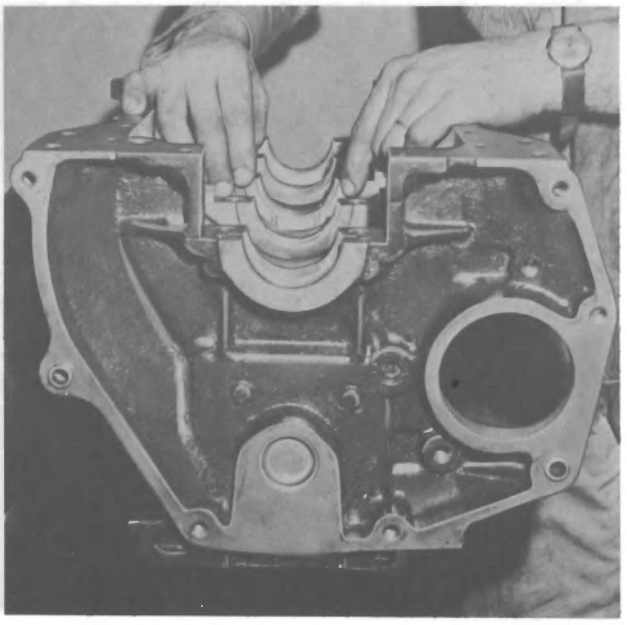


Fig. 16 3893



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CHECKING CONNECTING ROD OR CRANKSHAFT PLAY

This check can be carried out, if required in case of a seemingly abnormal tight spot or play, using "PERFECT CIRCLE PLASTIGAGE" plastic gauges.

Plays between .025 mm and .075 mm can be checked with green PG 1 type gauges.

Shaft alignment play must fall between .039 and .077 mm.

Connecting rod play must fall between .028 and .062 mm.

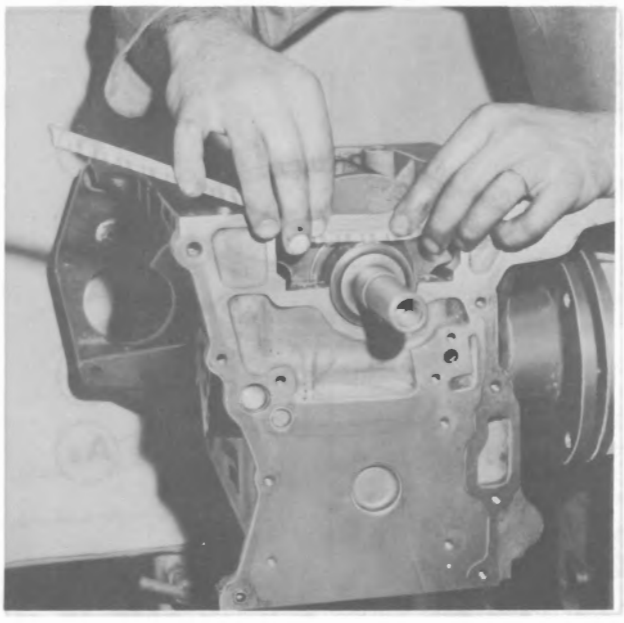
For further information, please consult tables in section A2 "Moving Parts".

Procedure for checking plays

- Dip a length of "Perfect Circle" plastic wire in hot water to soften it, and fit it on each crankshaft journal or crankpin to be checked, in the direction of the crankshaft centre-line.
- Re-fit cap screws, remove caps, and compare width of crushed wire with graduated scale used for packing (Fig. 17).

  Important: this check must be carried out without oil being present; afterwards, fragments of crushed wire must be removed, and journals and crankpins must be wiped over again.
- Smear each crankshaft bearing with oil.
- Re-fit caps, and tighten cap screws to torque.

Fig. 17 3894



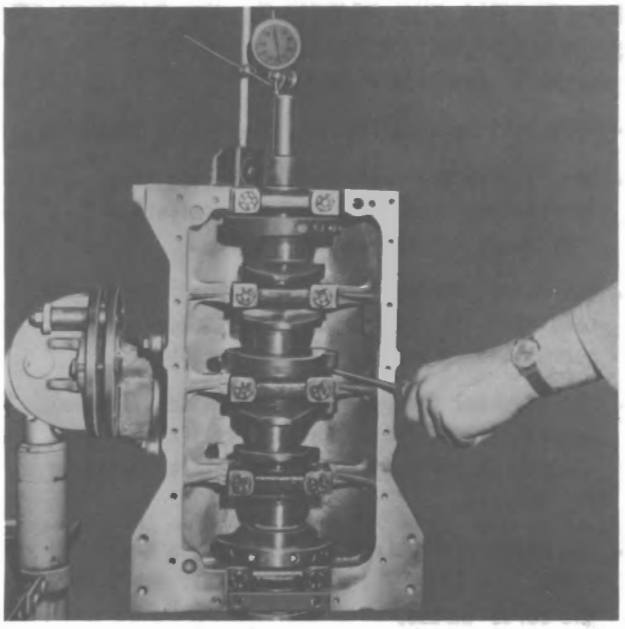


Fig. 18 3895

CHECKING CRANKSHAFT SIDE PLAY

For these checking operations, use a magnetic base comparator:

- Turn cylinder block over vertically, and place comparator feeler to rest against end of crankshaft.
- With a large screw driver inserted between a crankshaft bearing and a crankshaft web, cause longitudinal play of crankshaft (Fig. 18).

  Crankshaft play must fall between .09 and .27 mm.

  Note: This operation may, if necessary, be carried out using a set of spacers (Fig. 19).

Fig. 19 3896



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RE-FITTING THE FLYWHEEL AND CRANKSHAFT SELF-LUBRICATING BUSH (manual gear-box only)

- Wipe self-lubricating bush housing in crankshaft.
- Use fitting tool Ref. 21601 S to fit self-lubricating bush until bush comes flush with crankshaft fixing plate (Fig. 20).
- Make sure starting motor crown wheel is in good condition; if it has to be replaced, consult corresponding procedure under section A2.
- Fit flywheel to crankshaft, and match flywheel and crankshaft fixing holes; as fixing holes are not equidistant, only one fitting position is possible.
- Use screw thread Loctite compound to smear its 5 THM 10 x 1.00-22 screws over half the length of the screw thread.
- Fasten flywheel, not omitting the bearing ring.
- Tighten to torque.

Note: the flywheel will be prevented from turning by means of the starting motor crown-wheel locking tool held by a 10 x 1.25 screw fastened to the cylinder block.

FITTING THE CONNECTING ROD/PISTON ASSEMBLIES IN THE CYLINDERS

- Remove crown wheel locking tool, and set cylinder block in normal horizontal position.

Fig. 20 3897



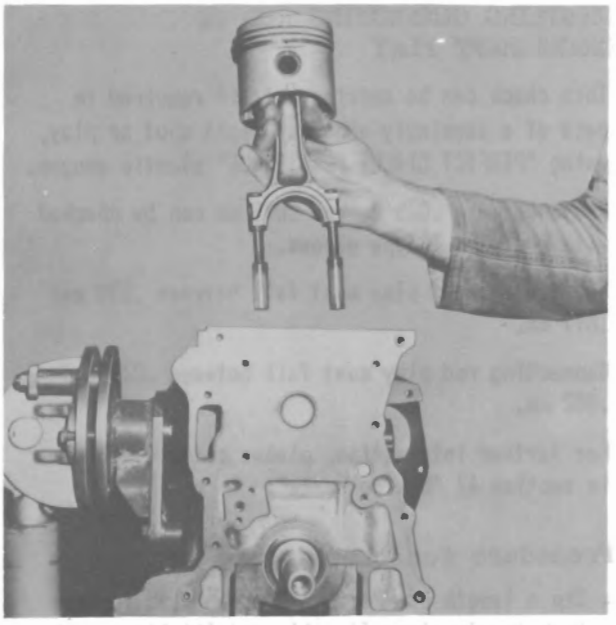
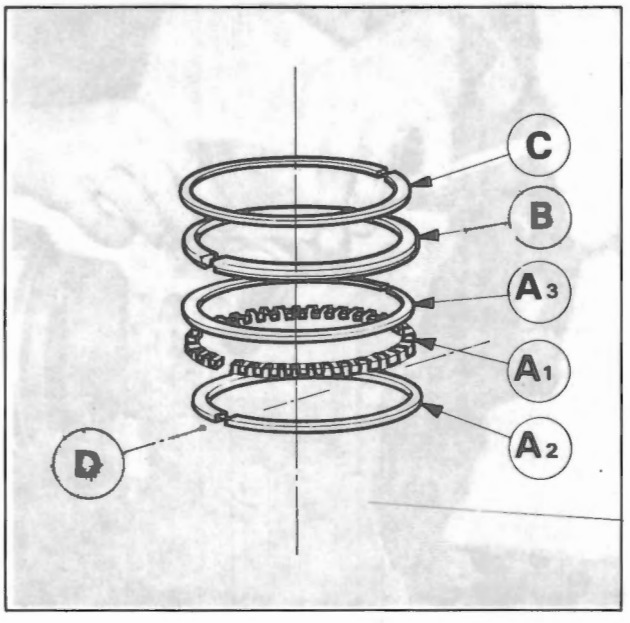


Fig. 21 3898

- Clean all connecting rod half-bearings and their housings.
- Manually anchor all connecting rod half-bearings in position in their housings.
- Smear crankpins and cylinders with oil, and place crankpins in vertical position.
- Fit protections on connecting rod screws (Fig.21).
- Oil pistons.
- Space piston ring gaps 120° apart (Fig. 22).

Fig. 22 A = Compression ring
B = Oil scraper ring
C = Sealing ring
D = Gudgeon pin G.010



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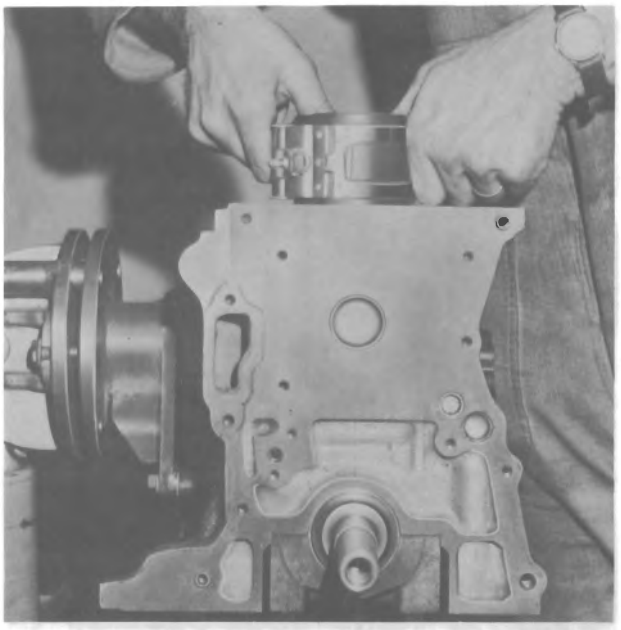


Fig. 23 3899

- Fit each connecting rod/piston assembly in position in its cylinder, compressing piston rings by means of an expanding bush (Fig. 23), and with piston reference mark set the right way.

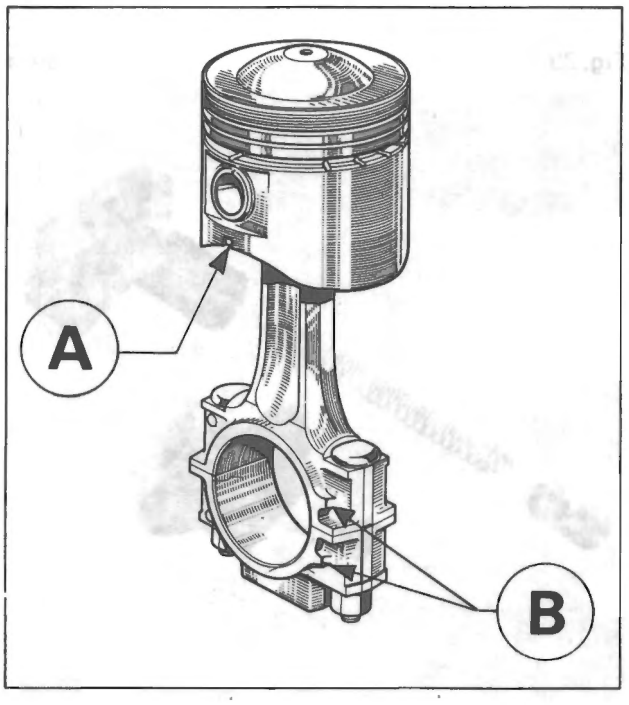
  This reference mark must be facing the front of the engine (Fig. 24).

  Note: the following two rules must be scrupulously followed:

  1° Avoid striking top of piston, even with a wooden handle, to force it down into cylinder.

  2° Avoid shock marking connecting rod big end when fitting it in position.

Fig. 24 A=Ref. mark B=Assembly References G.011



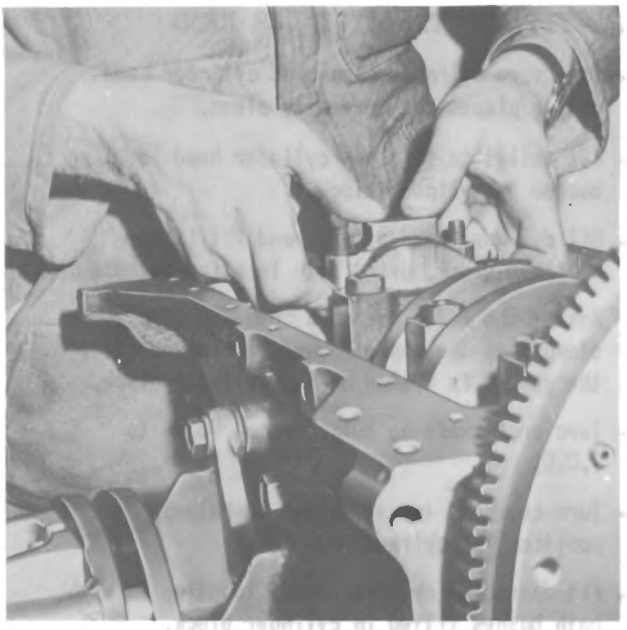


Fig. 25 3900

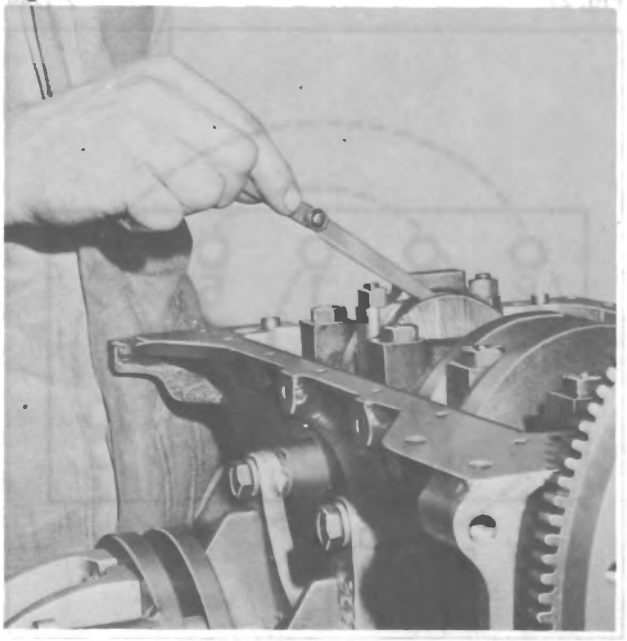
- Turn cylinder block upside down, and fit connecting rod caps (Fig. 25). Assembling cap to body must be done freely by hand in correct direction. Half-bearing notches must face one another, and must be turned towards oil filter side.

- Tighten connecting rod nuts to torque (take care with direction of nuts).

- Manually check that connecting rod assemblies can turn freely, without any tight spot (if necessary, see play checking procedure, section A0).

- On each crankpin, check connecting rod side play (Fig. 26). This play must fall between .10 and .37 mm.

Fig. 26 3901



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RE-FITTING THE CYLINDER HEAD

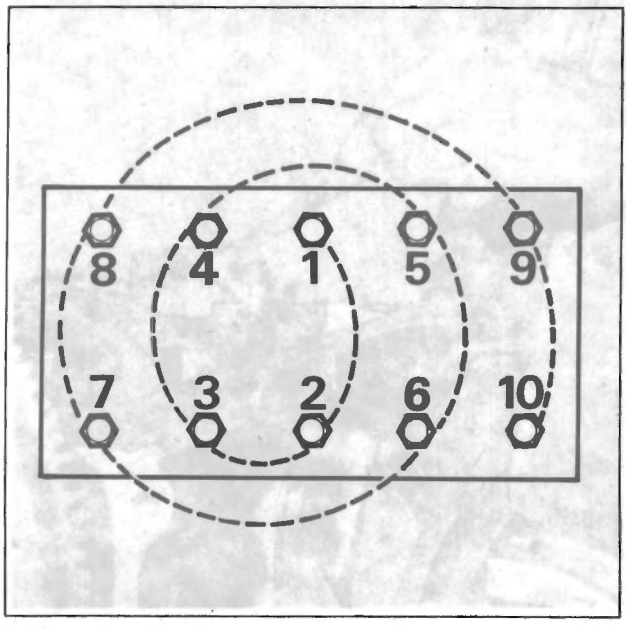
- Make sure cylinder block and cylinder head mating planes are perfectly clean.
- Use mallet to fit both cylinder head locating bushes to cylinder block.
- Oil cylinder head gasket, and fit it on cylinder block, using both locating bushes.

  Note: The reference mark "DESSUS" (top), stamped on the gasket, must be visible after the gasket is fitted on the cylinder block.
- Turn crankshaft to bring piston No. 4 to T.D.C.
- Turn camshaft to set valves in balance position for cylinder No. 1.
- Fit assembled cylinder head, locating it with both bushes fitted in cylinder block.
- Oil and fit setscrews fitted with their flat washers.
- Following the tightening sequence shown on Figure 27, use torque wrench to achieve:
  - preliminary tightening to 6 m da N,
  - final tightening to 9 m da N.

RE-FITTING THE TIMING GEAR

- Turn cylinder block over vertically, flywheel downwards.

Fig. 27 Z.1249



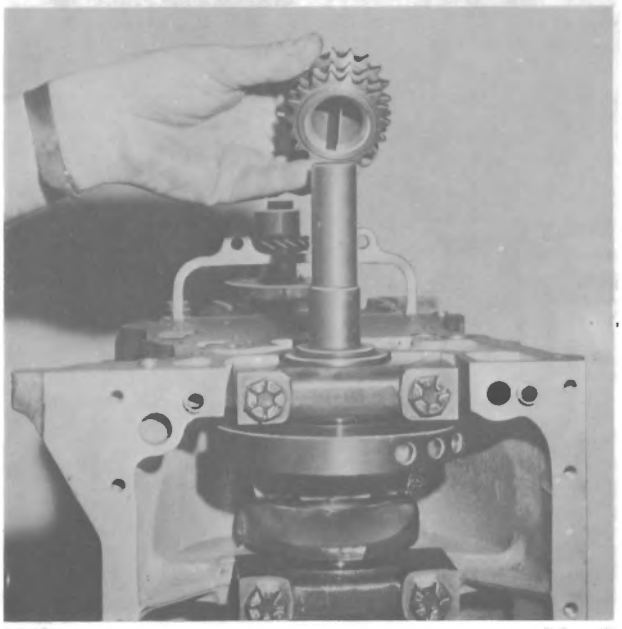
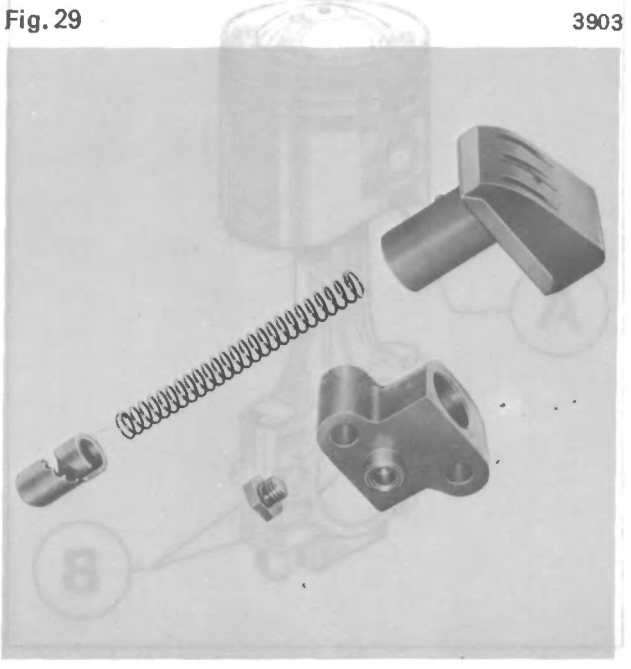


Fig. 28 3902

- Fit crankshaft key in its housing, and fit crankshaft pinion in position, setting its bore edge chamfer to first crankshaft journal joining radius (Fig. 28); in this manner, the double row of teeth, which is intended for the camshaft control double chain, will be located against the cylinder block; the other, single, row of teeth being used for the oil pump drive.
- Assemble timing chain hydraulic adjuster following the order shown on Figure 29. Fit shoe (1), its spring (2), and plunger (3) by means of a male 3 mm hexagonal wrench, turning wrench to the right to lock it in zero position.

Fig. 29 3903



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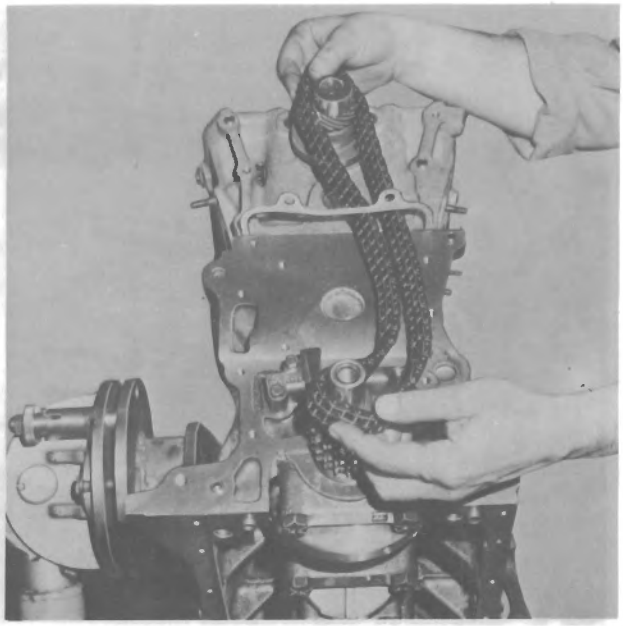
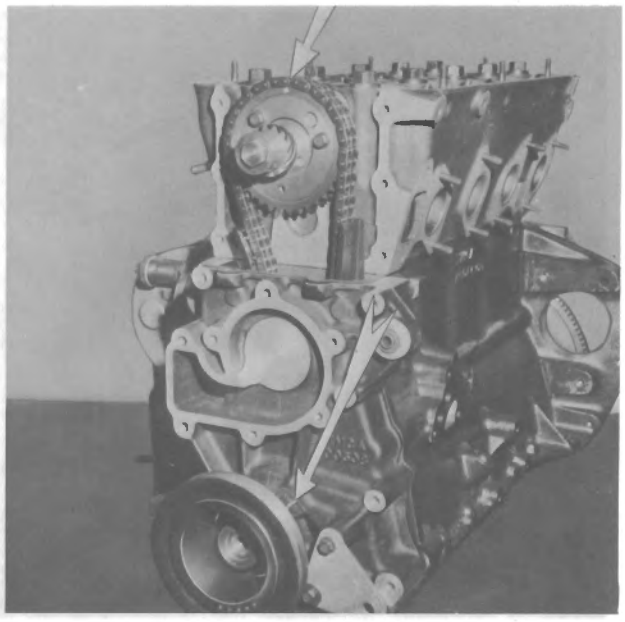


Fig. 30 3904

- Check that calibrated oil delivery hole to adjuster, in locating bush, is not obstructed.
- Fit assembly (4) to cylinder block, together with backing plate, and tighten it to torque. Insert shoe in its housing, making sure it can slide freely.
- Use appropriate tool (see "Specific tooling") to rotate camshaft in order to bring wheel reference mark opposite cast reference mark at top of bearing No. 5.
- Make sure piston No. 4 is still at T.D.C., as it was set when cylinder head was being re-fitted. This check can be carried out by temporarily fitting the timing gear cover with 2 screws and tentatively fitting the pulley in position.

Fig. 31 3905



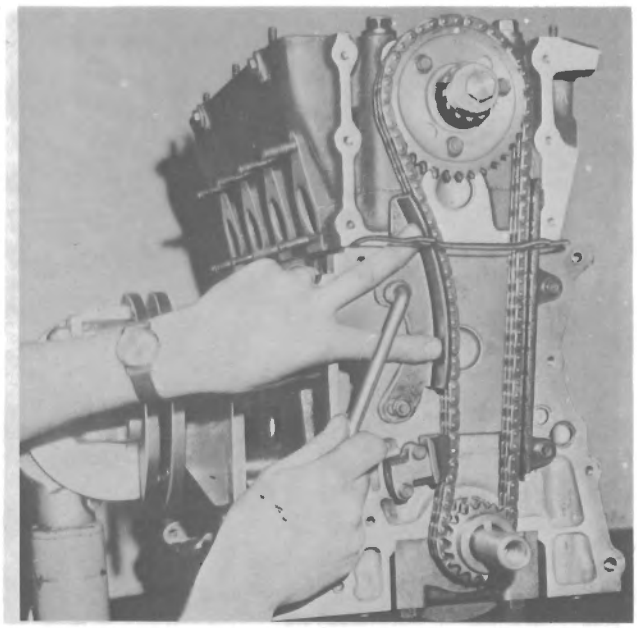


Fig. 32 3906

- Remove camshaft driving wheel.
- Run double chain through cylinder head gasket opening, taking special care not to tear gasket, then simultaneously fit it on camshaft end and crankshaft end, whilst pivoting it around its own axis (Fig. 30).
- Place driving wheel, at camshaft end, between distributor control screw and fixing plate.
- Fit chain on crankshaft pinion, and place camshaft wheel inside of chain, whilst setting reference mark in appropriate direction after tightening chain in direction of engine rotation (tight strand in opposite position to hydraulic adjuster).
- Check position of reference marks (Fig. 31), and fasten and tighten wheel to torque, locking the 3 THM 7 x 1.00-15 screws.
- On front face of cylinder block, fasten both chain guiding shoes.

  Note: Only one fitting position to the cylinder block is possible for each of these two guiding shoes. The straight shoe will be fastened finally and tightened to torque by means of 2 THM 7 x 1.00-12 screws, whilst the curved shoe (anti-vibration) will be brought in position by hand (Fig. 32) and will be made to bear against the chain prior to being tightened to torque with its 2 THM 7 x 1.00-12 screws.
- Load hydraulic adjuster.

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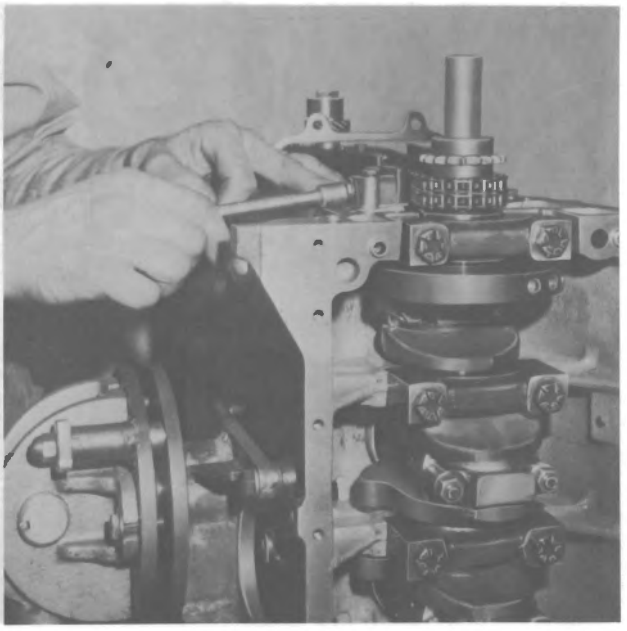


Fig. 33 3907

- Fit and lock adjuster (Fig. 33) plugging screw (5) (Fig. 29).
- Use mallet to fit both cylinder head front cover locating bushes, and use grease to fit both gaskets to cylinder block.
- Fasten front cover, and tighten it to torque, using both bushes to locate it in position.

RE-FITTING THE OIL PUMP ASSEMBLY

- Use mallet to fit both pump locating bushes on lower joint plane.
- Bring oil pump assembly, fitted with its driving chain, into position, and fit it into place on

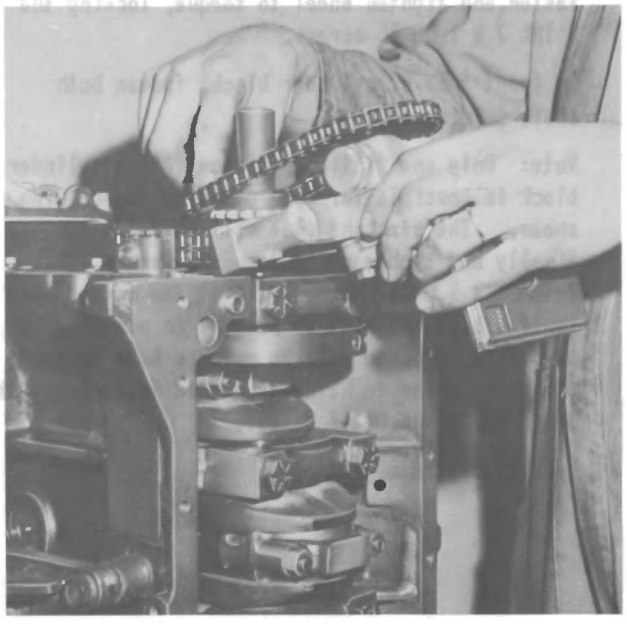


Fig. 34 3908

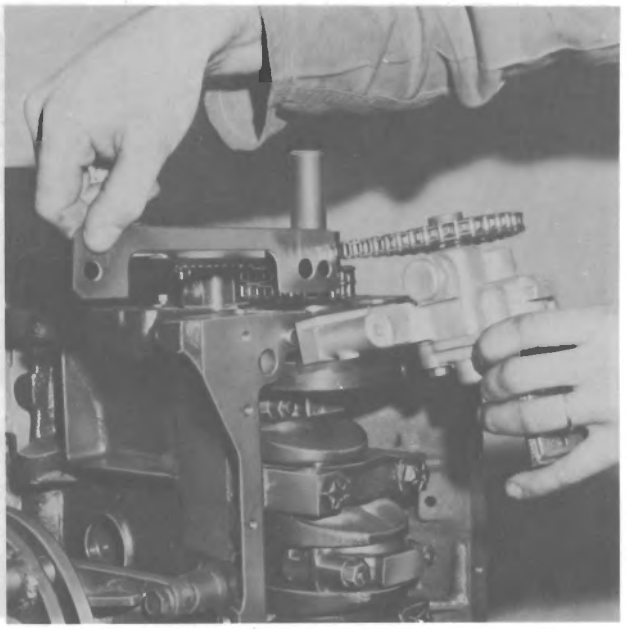


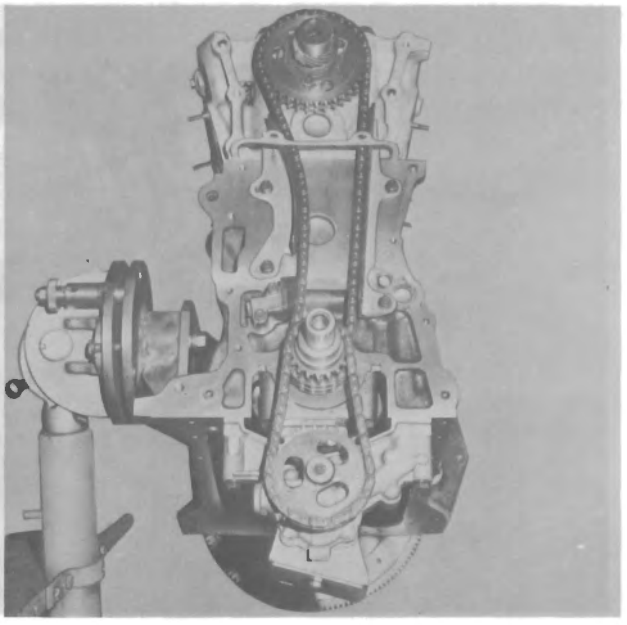
Fig. 35 3909

crankshaft pinion (Fig. 34).

- Place pump in position on cylinder block, making use of its locations to set it correctly.
- Manually check chain tension.
- Insert an additional spacer between cylinder block and pump supports to verify whether an additional spacer would cause chain tension to be excessive (Fig. 35).

  Note: Chain tension must not be excessive. Spacers have a thickness of .05 and .1 mm.
- Fasten pump to cylinder head, and tighten it to torque by means of its 2 THM 8 x 1.25-80 screws (Fig. 36).

Fig. 36 3910



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RE-FITTING THE TIMING GEAR COVER

- At end of crankshaft, fit spacer to rest against crankshaft pinion.
- Use grease to fit timing gear cover gaskets to cylinder head.
- Use grease to smear cover sealing bush.
- Fasten cover by means of 3 THM 7 x 1.00-70 screws and 3 THM 7 x 1.00-55 screws, and tighten to torque; then fit both front cover screws, and tighten them to torque.
- Fit crankshaft pulley key in its housing, and fit pulley on crankshaft.
- Place starting motor crown-wheel locking tool in position to prevent engine from rotating, and tighten pulley screw to torque after its washer has been placed in position.
- Remove crown-wheel locking tool.

RE-FITTING THE OIL SUMP

- Turn engine over upside down.
- In each packing holder cap side groove, slide a tubular sealing piece between cylinder block and cap, over whole height of cap (Fig. 37); cut sealing pieces off if necessary.
- Use grease to fit oil sump gasket to cylinder block.
- Fit oil sump, and set retainers in position.

  Note: front and rear corner retainers are different; front retainers are longer, and elbowed at 90°; rear retainers are elbowed at 114°.
- Allow 22 THM 7 x 1.00-18 screws, previously smeared with a drop of screw thread light loctite compound, to set, and tighten to torque.
- Fasten oil drain plug, fitted with its seal, in position, and tighten it to torque.

RE-FITTING THE WATER PUMP

- Turn engine over vertically, with flywheel downwards.
- Use grease to fit water pump gasket to timing gear cover.
- Fit water pump assembly with its fan for 361 engine, or with its releasable hub for 341 engine, and tighten 2 THM 7 x 1.00-75 and 5 THM 7 x 1.00-30 screws to torque.

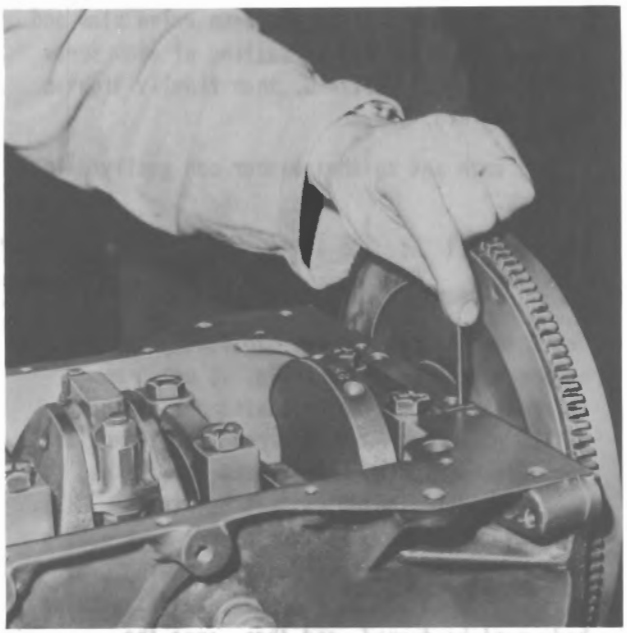


Fig. 37 3911

RE-FITTING THE ACCESSORIES

- Re-fit automatic adjuster plug and its seal to timing gear cover.
- Adjust rocking-levers by successively setting each piston to compression stroke, or by setting valves of same cylinder in balance, to adjust valves of opposed cylinder.

To adjust rocking-levers of cylinder No.	Set rocking-levers in balance for cylinder No.
1	4
2	3
3	2
4	1

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- Insert adjustment spacer between valve stem and bearing bush, and adjust setting of each screw with wrench Ref. 31174 G, then finally tighten lock-nut (Fig. 38).
- Adjust each set so that spacer can easily slip through.

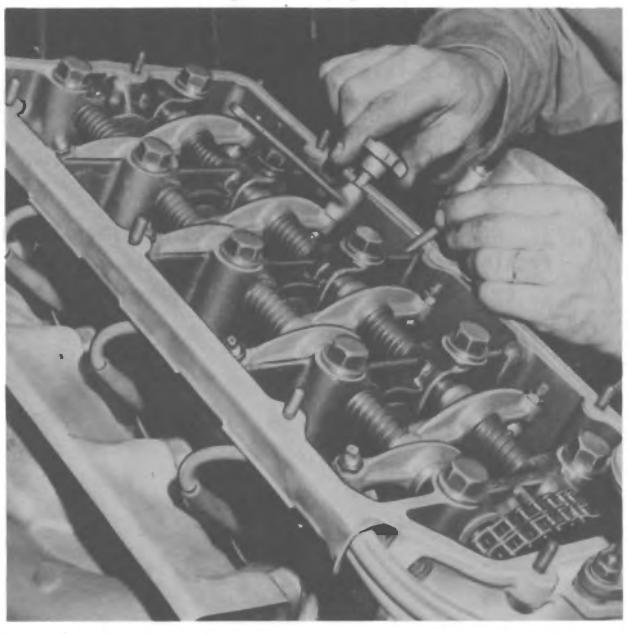
Play : inlet : .25)
exhaust : .35) with engine cold.

- Refit the distributor and statically set the advance joint on cylinder No. 1, using an indicator lamp, with the assistance of the pulley reference mark, and rotating the pulley in the direction of rotation of the engine. Cause the distributor contact points to separate when the pulley reference mark passes by the 10° reference mark on the timing gear cover. To obtain this point, the distributor body must be turned, and then, once the correct position is achieved, fasten it in position by means of its retaining clamp.

Note: a dynamic adjustment will be carried out with a stroboscopic lamp when the engine is started on the vehicle.

- Re-fit:
  - cylinder head cover with 7 nuts; both front nuts will be fitted when H.V. harness is set in position.
  - petrol pump, fitting a thermal spacer placed between 2 paper gaskets, with two 8 x 1.25 nuts.

Fig. 38 — 3912



  - exhaust manifold with its gasket and spark plug wire protection shield with 4 upper nuts, eight 8 x 1.25 hexagonal nuts.
  - inlet manifold with its paper gasket, and water header fastened by means of 2 lower nuts.
  - water outlet box on cylinder head, with 1 paper gasket, by means of 2 THM 7 x 1.00-25 screws.
  - thermostat and water outlet box cover, 2 THM 7 x 1.00-20 screws, with a cardboard gasket under cover.
  - carburettor, inserting a thermal spacer, placed between 2 paper gaskets, under base, with four 8 x 1.25 nuts for 341 engine, and two 8 x 1.25 nuts for 361 engine.
- Re-connect all hoses:
  - water-pump to water header,
  - inlet manifold to water header,
  - carburettor to water header,
  - water outlet box to inlet manifold,
  - water outlet box to automatic choke system,
  - automatic choke system to carburettor base, etc.
- Re-connect:
  - vacuum tube from distributor to carburettor,
  - petrol pipe from pump to carburettor (after immersion in hot water for easier fitting).
- Re-fit pressure switch, temperature tapping to water outlet box, and spark plugs.
- Re-fit:
  - oil filter base, 3 THM 7 x 1.00-20 screws, inserting a paper gasket between cylinder block and filter base,
  - ignition distributor fitted with spark plug cable harness to be fixed by means of 2 tabs with 2 cylinder head cover front nuts, then harness channel by means of 2 screws on cylinder head side.
  - starting motor by means of 2 THM 10 x 1.25-40 screws fitted at top and bottom; 3rd central screw to be fitted only on car, and to be used for assembly of gear box,
  - alternator with 1 THM 10 x 1.25-120 screw.
- Run belt over 3 pulleys, and fasten adjuster to timing gear cover silentbloc, and alternator with 2 THM 8 x 1.25-56 screws.

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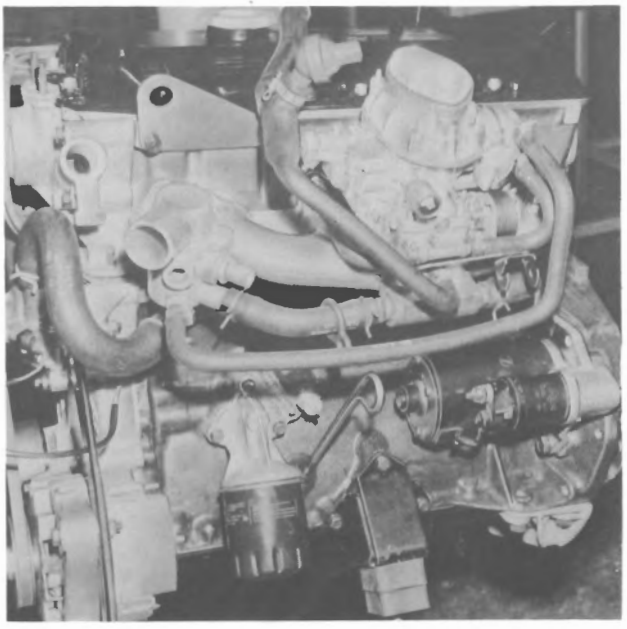
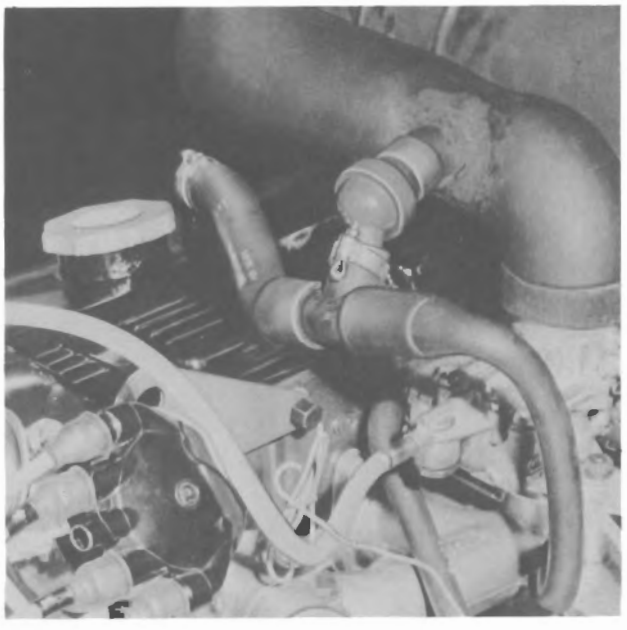


Fig. 39 3913

- Re-fit:
  - water drain plug on cylinder block, with its seal,
  - dipstick.
- Re-connect oil fume recovery hoses (Figs. 39 and 40), one running from cylinder head cover to T junction, the other from T junction to carburettor. Fit oil fume filter on T junction, and fit hose connecting it with air filter inlet connection.
- Fasten fan on releasable hub on 341 engine, not omitting to fit 3 spacers (three 6 mm nuts).
- Re-fit engine lifting lug to cylinder head by means of 2 THM 8 x 1.25-20 screws.

Fig. 40 3914



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A1 - CYLINDER BLOCK

A1/I - General specifications

A1/II - Tightening torque values

A1/III - Specific tooling

A1/VII - Removal and re-fitting of sealing caps on cylinder block, cylinder head, inlet manifold, rocking-lever spindles

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GENERAL SPECIFICATIONS

Material : Tin cast-iron.

Cylinder bore dia. :

	341 engine	361 engine
- Class A :	87.692 to 87.702	83.392 to 83.402
- Class B :	87.702 to 87.712	83.402 to 83.412
- Class C :	87.712 to 87.722	83.412 to 83.422

Accepted rebore dimensions :+.1 to + .4.

Accepted conicity : .01 mm large dia. lowermost .....) For machining
Accepted ovalization and out-of-round : .005 max....) inspection on re-bored cylinder block.

Dia. of cylinder block bearings for crankshaft: divided into 2 classes:

- Class A : 60.826 to 60.836 red) touch of paint
- Class B : 60.836 to 60.846 blue) on bearing caps

Width of crankshaft central bearing : 28.18 to 28.22.

Tapping for:

- crankshaft bearing setscrews: M 12 x 1.25
- cylinder head setscrews: M 12 x 1.25
- clutch housing setscrews: M 10 x 1.25
- water drain plug: M 10 x 1.00
- packing holder setscrews: M 6 x 1.00

Foundry cleaning plugs or stopping plugs:

- chain adjuster line dia. 8.3 to 8.5 - coefficient : 1,
- oil distributor dia. 16 - coefficient : 2,
- oil delivery line to distributor dia. 20 - coefficient : 1
- cylinder block clean off dia. 36 - coefficient : 4.

TIGHTENING TORQUE VALUES FOR FIXED UNITS TO CYLINDER BLOCK

(See section "A0 - Engine Assembly")

SPECIFIC TOOLING

Fitting tools ..... 20876 Y
20878 A
21603 U
21604 V

Tool-holder ..... 15522 C.

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As replacement procedures for sealing caps on cylinder block, manifold, or cylinder head are identical, a single procedure is applicable to these various units, as follows.

The cylinder block is fitted with:

- on rear face:
  - 1 foundry clean-off dia. 36 sealing cap,
  - 1 dia. 16 sealing cap closing main oil distribution line,
- on front face:
  - 1 foundry clean-off dia. 36 sealing cap
  - 1 dia. 16 sealing cap closing main oil distribution line,
  - 1 dia. 20 sealing cap, for oil supply line,
- on L.H. side face:
  - 2 foundry clean-off dia. 36 sealing caps,
  - 1 dia. 8.5 sealing cap, oil supply to chain adjuster.

The cylinder head, both on the rear face and on the front face, is fitted with : 1 foundry clean-off dia. 32 sealing cap.

On the upper face : 4 foundry clean-off dia. 20 sealing caps.

A dia. 32 sealing cap is fitted on the inlet manifold.

In addition, rocking-lever spindles are fitted with a dia. 10 sealing cap at each end : see replacement procedure for crankshaft sealing caps.

REMOVAL OF SEALING CAPS ON CYLINDER BLOCK - CYLINDER HEAD - MANIFOLD

- Use scraper to eliminate surplus of sealing compound caulking effects, which may lock some sealing caps in position.
- Pierce a 7 mm. dia. hole in centre of each cap to be replaced.
  Note: see crankshaft sealing cap replacement procedure for sealing caps with a diameter greater than 12 mm.
- To loosen each cap, push it in very slightly with the appropriate fitting tool assembled to tool-holder.
- Successively place in each 7 mm. dia. hole a screw-driver or a tapered spindle, and tilt caps to extract them, using a small wooden block as a fulcrum to avoid scratching edge of bore (Fig. 1).

  Note: For large diameter caps, tilting may be obtained by striking edge of cap with a flat ended pin driver or with a length of rod.



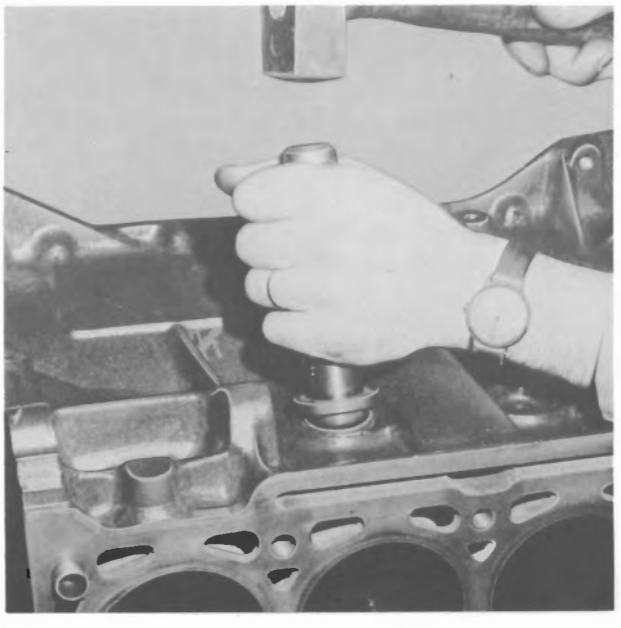
Fig. 1 3915

RE-FITTING THE SEALING CAPS FOR CYLINDER BLOCK - CYLINDER HEAD - MANIFOLD

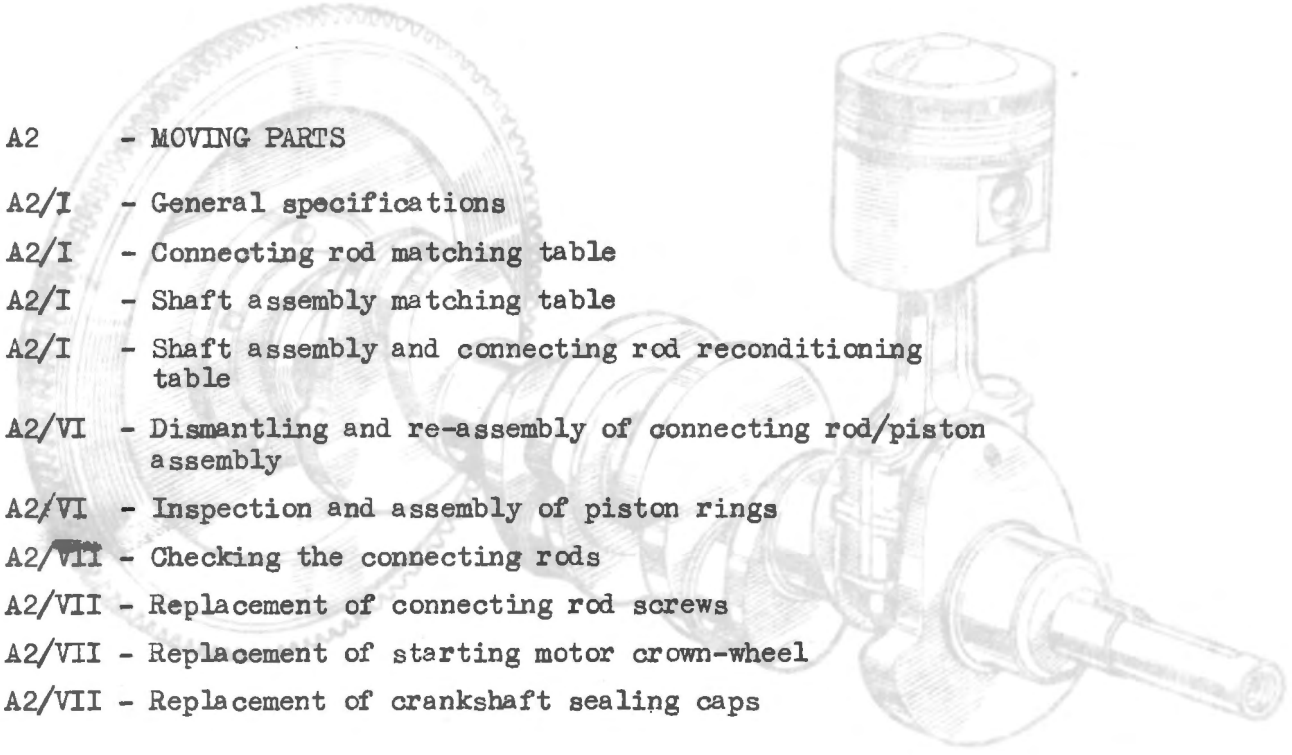
- Use scraper or emery cloth lightly to clean all cap housings.
- Smear all housings with sealing compound (Plastex, for instance).
- Use appropriate fitting tool to fit each cap in its housing until it stops against edge of bore (Fig.2).
- Use flat-ended caulking tool three or four times to stop cylinder head and inlet manifold sealing caps in position by slightly caulking edge of each bore over cap.

  Note: after fitting, no cap must stand proud of outer faces.

Fig. 2 3916



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A2 - MOVING PARTS

A2/I - General specifications

A2/I - Connecting rod matching table

A2/I - Shaft assembly matching table

A2/I - Shaft assembly and connecting rod reconditioning table

A2/VI - Dismantling and re-assembly of connecting rod/piston assembly

A2/VI - Inspection and assembly of piston rings

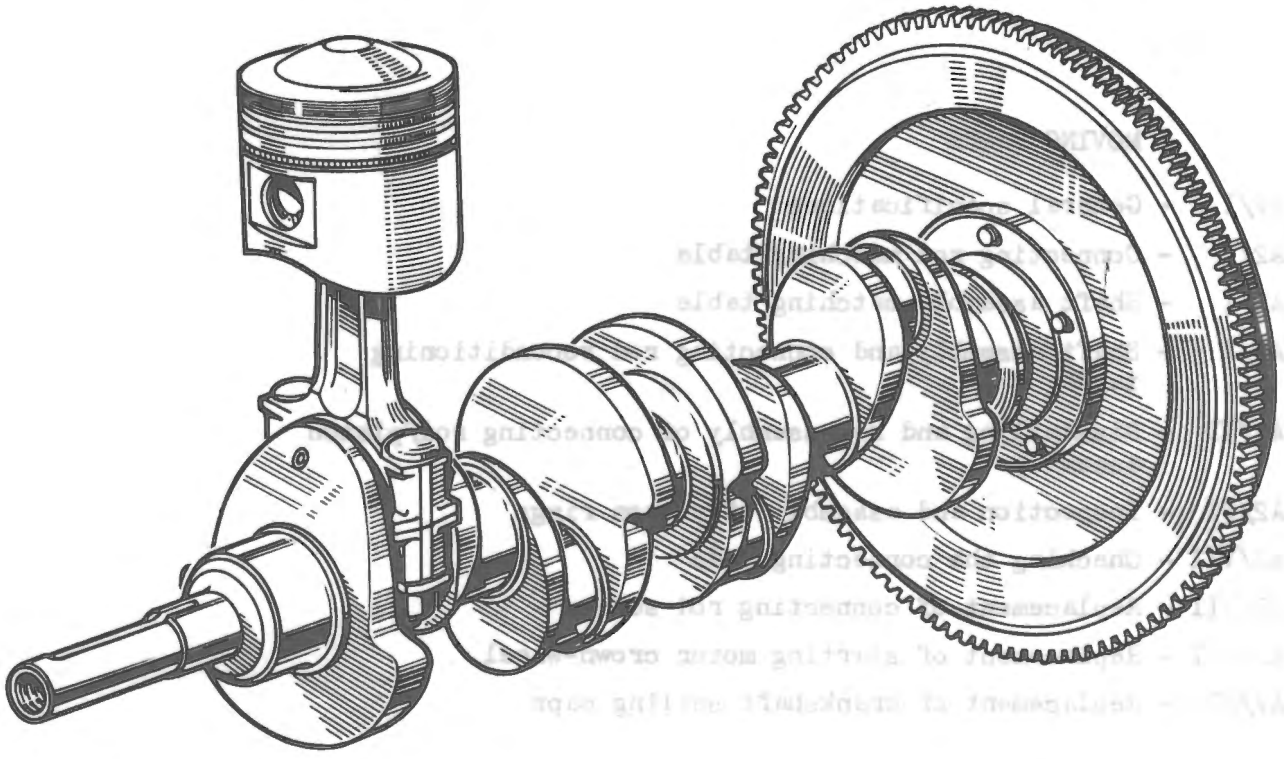
A2/VII - Checking the connecting rods

A2/VII - Replacement of connecting rod screws

A2/VII - Replacement of starting motor crown-wheel

A2/VII - Replacement of crankshaft sealing caps

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W.1318

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GENERAL SPECIFICATIONS

Crankshaft

Material: Semi-hard steel.

Stroke : 75 mm.

Crankshaft journal diameter :

- red class : 56.977 to 56.987
- blue class : 56.967 to 56.977.

Crankpin diameter:

- class A red : 51.959 to 51.967
- class B blue : 51.951 to 51.959

Width of central crankshaft journal : 32.03 to 32.07.

Admissible taper on journals : .008 max.

Dynamic balancing in relation to centre-line : 20 g/cm.

Shouldering half-rings

Material: Trimetal

Standard thickness: 2.31 to 2.36.

Crankshaft self-lubricating bush

Material: Sintered bronze.

Inner diameter: 15.03 to 15.05.

Outer diameter: 19.11 to 19.15.

Length: 23.8 to 24.2.

Engine flywheel

Material: Cast-iron.

Balancing:

- maximum want of balance: 15 g/cm.
- "light point" marking with paint mark.

Distance between centres for pin holes:

- 361 Engine : 203.52,
- 341 Engine : 212.18.

Face : Inner diameter:
- 361 Engine : 127 max.
- 341 Engine : 140 max.

Outer diameter:
- 361 Engine : 211,
- 341 Engine : 226.

Fastening system for clutch mechanism : 6 THM 8 x 1.25 screws (diaphragm for vehicles with automatic transmission).

Starting motor crown-wheel

Material: Hardened steel.

Number of teeth: 136.

Outer diameter: 292.

Module: 2.116.

Crankshaft bearing

Material: Trimetal

Standard thickness:

- red class : 1.891 to 1.900
- blue class : 1.901 to 1.910

Piston

Material: Aluminium alloy.

The 4 pistons of the same engine must have the same weight, with a tolerance of ± 1 g.

Nominal dia. measured 18.5 mm. below gudgeon pin hole:

	361 Engine	341 Engine
- 3 classes : A	83.347 to 83.357	87.647 to 87.657
B	83.357 to 83.367	87.657 to 87.667
C	83.367 to 83.377	87.667 to 87.677

Admissible play in cylinder: .035 to .055.

Piston rings

Material: Alloyed cast-iron.

Number: 3.

Play at gap:

- sealing : .35 to .50
- scraper : .30 to .45
- compression : .25 to .40

The sealing ring has a chromium plated surface.

Gudgeon pin

Material: steel.

Diameter: 23.991 to 23.995.

Length: 69.5

Assembly of gudgeon pin in piston : fitting .006 to .002 play, retained in piston by means of 2 circlips fitted in grooves.

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Connecting rods

Material: Steel.

Notes:

- 341 Engine connecting rods differ from 361 engine connecting rods, the former being fitted with two reinforcing ribs on half-bearing anchoring side.
- With original assemblies, the steel grade of the 341 engine connecting rod differs from the grade of the 361 engine connecting rod. As spare parts, only 341 engine connecting rods are supplied.

Distance between centres : Big end/small end: 137 ± .075.

Diameter of big end bore:
- red class A : 55.877 to 55.885.
- blue class B : 55.885 to 55.893.

Diameter of small end bore: 25.939 to 25.982.

Diameter of small end bore with bronze bush: 24.002 to 24.009.

Fitting of bush in connecting rod: .08 to .15.

Maximum admissible twist: .2% max.

Parallelism of small and big end centre-lines: tolerance of .08%.

The 4 connecting rods of the same engine must have the same weight, with a tolerance of 3 g.

Fastening of cap to body : by means of 10 x 100 screws.

Side play of connecting rod on crankpin: .10 to .37.

Connecting rod half-bearings

Material: Trimetal.

Standard thickness:

- red class A : 1.932 to 1.941
- blue class B : 1.940 to 1.949.

TIGHTENING TORQUE VALUES
(See section "A0 - Engine Assembly")

SPECIFIC TOOLING

Fitting tools Ref. 21602 T
21605 W

Gudgeon pin chasing tool Ref. 21600 D.

Bem Muller circlip gripper 593.

Muller instrument.

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DESCRIPTION	GENERAL DIMENSIONS	A CLASS RED	B CLASS BLUE
Dia. Con-Rod Bore	55.877 - 55.893	55.877 - 55.885	55.885 - 55.893
Thickness of ½ bearings	1.932 - 1.949	1.932 - 1.941	1.940 - 1.949
Dia. of crankpin	51.951 - 51.967	51.959 - 51.967	51.951 - 51.959

RECOMMENDED MATCHING								
DIMENSIONS	MIN.	MAX.	MAX.	MIN.	MIN.	MAX.	MAX.	MIN.
CASES	1st Case				3rd Case			
Con-Rod	55.877		55.885		55.885		55.893	
Bearings		2 x 1.941		2 x 1.932		1.941÷1.949		1.932÷1.940
Crankshaft		51.967		51.959		51.967		51.959
PLAY	0.028		0.062		0.028		0.062	
CASES	2nd Case				4th Case			
Con-Rod	55.885		55.893		55.877		55.885	
Bearings		2 x 1.949		2 x 1.940		1.941÷1.949		1.932÷1.940
Crankshaft		51.959		51.951		51.959		51.951
PLAY	0.028		0.062		0.028		0.062	
NON CONGRUENT MATCHING								
CASES	1st Case				4th Case			
Con-Rod	55.877		55.885		55.877		55.885	
Bearings		2 x 1.949		2 x 1.940		2 x 1.949		2 x 1.940
Crankshaft		51.967		51.959		51.959		51.951
PLAY	0.012		0.046		0.020		0.054	
CASES	2nd Case				5th Case			
Con-Rod	55.885		55.893		55.885		55.893	
Bearings		2 x 1.941		2 x 1.932		2 x 1.949		2 x 1.940
Crankshaft		51.959		51.951		51.967		51.959
PLAY	0.044		0.078		0.020		0.054	
CASES	3rd Case				6th Case			
Con-Rod	55.885		55.893		55.877		55.885	
Bearings		2 x 1.941		2 x 1.932		2 x 1.941		2 x 1.932
Crankshaft		51.967		51.959		51.959		51.951
PLAY	0.036		0.070		0.036		0.070	

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SHAFT ASSEMBLY MATCHING TABLE

DESCRIPTION	GENERAL DIMENSIONS	A CLASS RED	B CLASS BLUE
Cyl. Block bore dia.	60.826 - 60.846	60.828 - 60.836	60.836 - 60.846
Thickness ½ bearings	1.891 - 1.910	1.891 - 1.900	1.901 - 1.910
Dia. of journals	56.967 - 56.987	56.977 - 56.987	56.967 - 56.977

RECOMMENDED MATCHING								
DIMENSIONS	MIN.	MAX.	MAX.	MIN.	MIN.	MAX.	MAX.	MIN.
CASES	1st Case				3rd Case			
Cyl. Block	60.826		60.836		60.836		60.846	
Bearings		2 x 1.900		2 x 1.891		1.910+1.900		1.901+1.891
Crankshaft		56.987		56.977		56.987		56.977
PLAY	0.039		0.077		0.039		0.077	
CASES	2nd Case				4th Case			
Cyl. Block	60.836		60.846		60.826		60.836	
Bearings		2 x 1.910		2 x 1.901		1.900+1.910		1.891+1.901
Crankshaft		56.977		56.967		56.977		56.967
PLAY	0.039		0.077		0.039		0.077	
NON CONGRUENT MATCHING								
CASES	1st Case				4th Case			
Cyl. Block	60.826		60.836		60.826		60.836	
Bearings		2 x 1.910		2 x 1.901		2 x 1.910		2 x 1.901
Crankshaft		56.987		56.977		56.977		56.967
PLAY	0.019		0.057		0.029		0.067	
CASES	2nd Case				5th Case			
Cyl. Block	60.836		60.846		60.836		60.846	
Bearings		2 x 1.900		2 x 1.891		2 x 1.910		2 x 1.901
Crankshaft		56.977		56.967		56.987		56.977
PLAY	0.059		0.097		0.019		0.067	
CASES	3rd Case				6th Case			
Cyl. Block	60.836		60.846		60.826		60.836	
Bearings		2 x 1.900		2 x 1.891		2 x 1.900		2 x 1.891
Crankshaft		56.987		56.977		56.977		56.967
PLAY	0.049		0.087		0.049		0.097	

SUMMARY OF MATCHING PROCEDURES

Connecting Rods

If the connecting rod and crankpin belong to the same class (blue or red), the bearings will be of the colour applied for this class.

. Red Con-Rod and Crankpin : red bearings.
. Blue Con-Rod and Crankpin: blue bearings.

If the connecting rod and crankpin belong to classes identified by different colours (blue and red), a blue bearing and a red bearing must be fitted.

Shaft assembly

If the crankshaft and cylinder block belong to the same class (blue or red), bearings identified by the colour of this class must be fitted.

If the crankshaft and cylinder block belong to classes identified by different colours (blue and red), a blue bearing and a red bearing must be fitted.

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BEARINGS

NATURE OF OPERATIONS		Value of + or - differences	Dimensions and class	Con-Rod ½ Bearings	½ Bearings for crkshaft bearings, lower Nos. 1-3-5	½ Bearings for crkshaft bearings, upper Nos. 1-3-5	½ Bearings lower & upper for crkshaft bearings Nos. 2 and 4
				Stamped Reference			
	Undersize crankpins	Standard dia.	51.959 - 51.967 Red 51.951 - 51.959 Blue	160 032 160 127			
		- 0.10	51.859 - 51.867 Red 51.851 - 51.859 Blue	160 638 160 639			
		- 0.20	51.759 - 51.767 Red 51.751 - 51.759 Blue	160 640 160 641			
		- 0.50	51.459 - 51.467 Red 51.451 - 51.459 Blue	160 642 160 643			
		- 0.75	51.209 - 51.217 Red 51.201 - 51.209 Blue	160 644 160 645			
		- 1.00	50.959 - 50.967 Red 50.951 - 50.959 Blue	160 646 160 647			
	Undersize journals	Standard dia.	56.977 - 56.987 Red 56.967 - 56.977 Blue		160 016 160 122	160 017 160 123	160 018 160 124
		- 0.10	56.877 - 56.887 Red 56.867 - 56.877 Blue		160 612 160 632	160 613 160 633	160 614 160 634
		- 0.20	56.777 - 56.787 Red 56.767 - 56.777 Blue		160 660 160 663	160 661 160 664	160 662 160 665
		- 0.50	56.477 - 56.487 Red 56.467 - 56.477 Blue		160 666 160 669	160 667 160 670	160 668 160 671
		- 0.75	56.227 - 56.237 Red 56.217 - 56.227 Blue		160 672 160 675	160 673 160 676	160 674 160 677
		- 1.00	55.977 - 55.987 Red 55.967 - 55.977 Blue		160 678 160 681	160 679 160 682	160 680 160 683

HALF BEARING WASHERS

Nature of operations	Width	Dimensions	Stamped Ref.
Side oversizing of crankshaft central bearing	Standard	32.03 - 32.07	160126
	+ 0.20	32.23 - 32.27	160752
	+ 0.30	32.33 - 32.37	160753
	+ 0.40	32.43 - 32.47	160754

IMPORTANT NOTE

When matching bearings, it must be remembered that, if 2 parts, between which the bearing is to be fitted, belong to a class of identical colour, the half-bearings will be of this same colour, whilst, if they belong to classes identified by different colours, a red half bearing and a blue half bearing must be fitted.

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DISMANTLING PROCEDURE

- Remove both gudgeon pin circlips.
- Immerse bottom end of piston to be dismantled in boiling water for a short time, and drive gudgeon pin out with driver Ref. 21600 D (Fig. 1).
- Mark references for proper direction of assembly of connecting rod with piston if these components are to be re-assembled, so that they can be re-assembled as they were initially.

  Note: Anchoring housings for half-bearings must face oil filter side, and piston reference mark must face front of engine, on timing gear side (Fig. 2).

RE-ASSEMBLY OPERATIONS

- Fit a circlip in one of piston grooves.
- Raise temperature of piston to be assembled, either in heating oven, or by immersion in boiling water (100°C max.).
- Use a cloth to extract piston.
- Oil gudgeon pin, insert it by hand in piston, through connecting rod, until it stops against circlip (Fig. 3).
- Re-fit circlip No. 2.

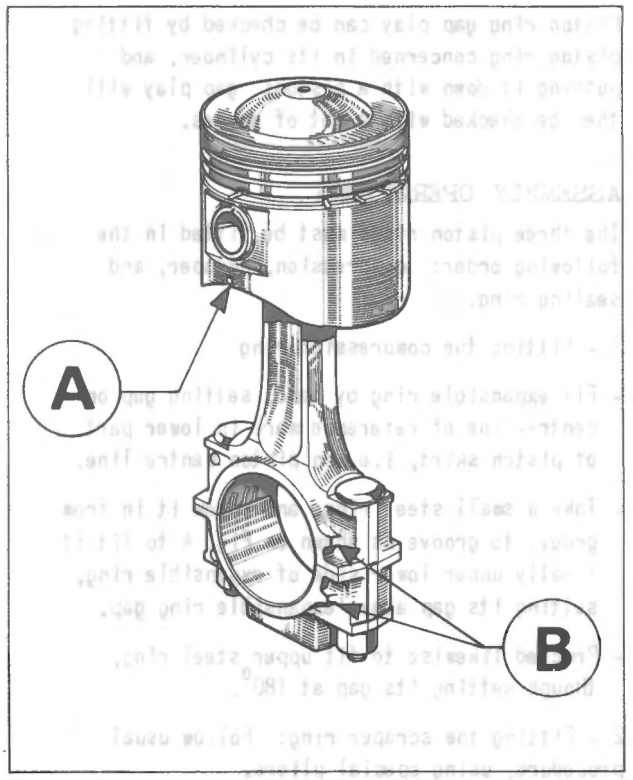
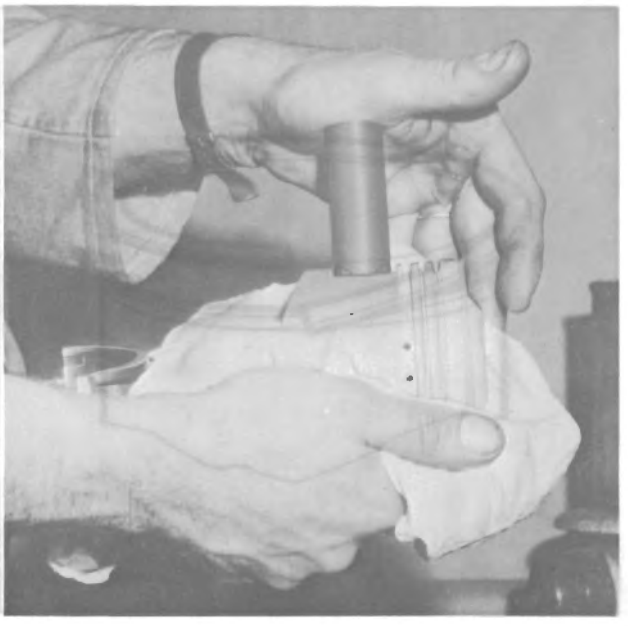


Fig. 2 A - Piston Ref. Mark
B - Assembly Ref. Points
G.011

Fig. 1 3917



Fig. 3 3918



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CHECKING AND ASSEMBLING THE PISTON RINGS

Piston ring gap play can be checked by fitting piston ring concerned in its cylinder, and pushing it down with a piston; gap play will then be checked with a set of gauges.

ASSEMBLY OPERATIONS

The three piston rings must be fitted in the following order: compression, scraper, and sealing ring.

1 - Fitting the compression ring

- Fit expansible ring by hand, setting gap on centre-line of reference mark in lower part of piston skirt, i.e. on piston centre line.
- Take a small steel ring, and screw it in from groove to groove as shown on Fig. 4 to fit it finally under lower side of expansible ring, setting its gap above expansible ring gap.
- Proceed likewise to fit upper steel ring, though setting its gap at 180°.

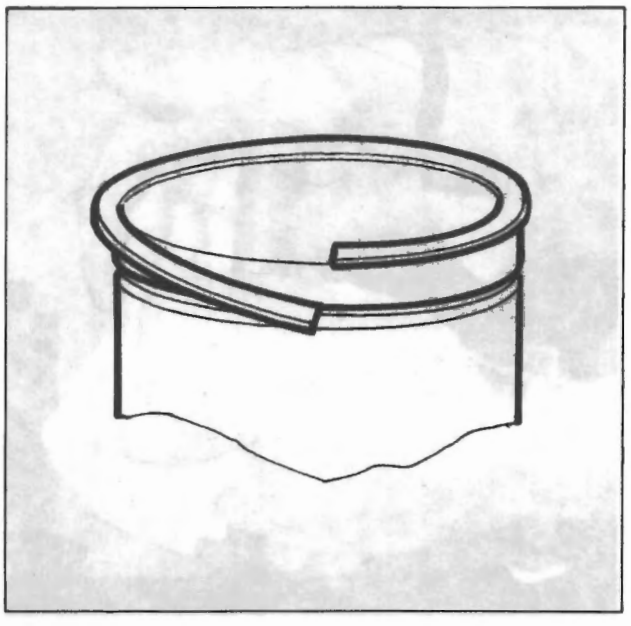
2 - Fitting the scraper ring: Follow usual procedure, using special pliers.

Important: This ring has a T.O.P. reference mark which must face top of piston; otherwise, excessive oil consumption would result.

Set its gap at 180° in relation to previous small steel ring gap, i.e. still on piston centre-line.

3 - Fit sealing ring, setting its gap at 180° in relation to previous scraper ring.

Fig. 4 G.012



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Connecting rod bushings are fitted with a press, and a finish fit operation follows. This is an operation which is difficult and costly to carry out in a workshop; replacing the connecting rod complete, therefore, is preferable; the connecting rod will always be supplied with its bushing fitted. However, the bushing may be replaced by a local reboring specialist with the appropriate tooling. On request, the After Sales Technical Department will supply the replacement procedure together with the appropriate drawings for this special tooling.

The parallelism and twist can be checked on the bare connecting rod, on an engineer's table, with the connecting rod held by a mandrel and V blocks (Figs. 1 and 2).

Checking procedure for squaring with assembled piston

- Set piston-connecting rod assembly on an engineer's table (Fig. 3).
- With this arrangement, both plates fitted on the vertical shaft must touch the piston.

  Otherwise, use press to straighten the connecting rod.

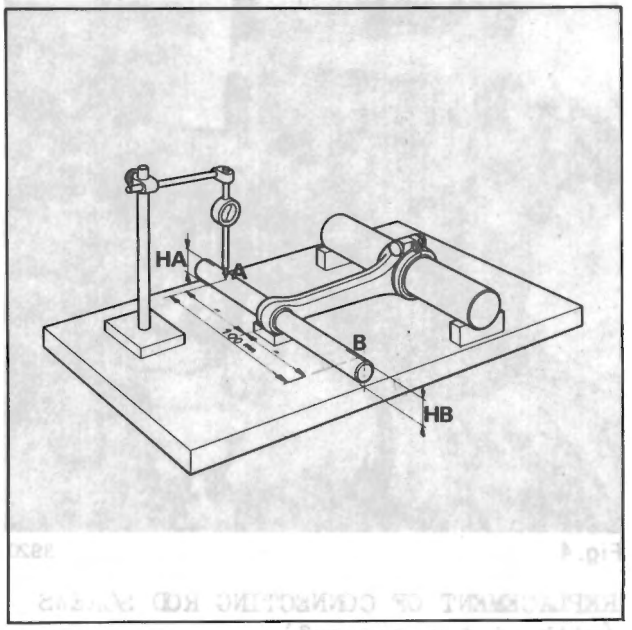


Fig. 2 HA - HB twist = 20/100 Z.886

Fig. 3 3919

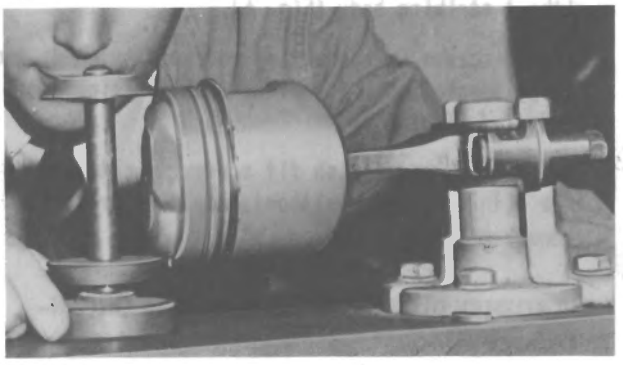
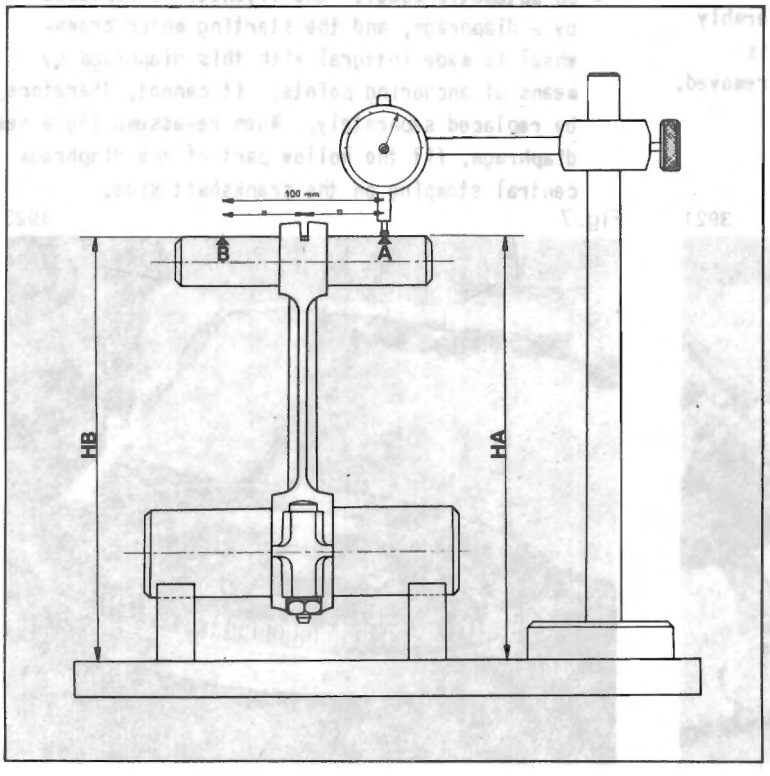


Fig. 1 HA - HB Parallelism = 8/100 Y.983



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REPLACEMENT OF CONNECTING ROD SCREWS (with piston removed)
REPLACEMENT OF STARTING MOTOR CROWN-WHEEL

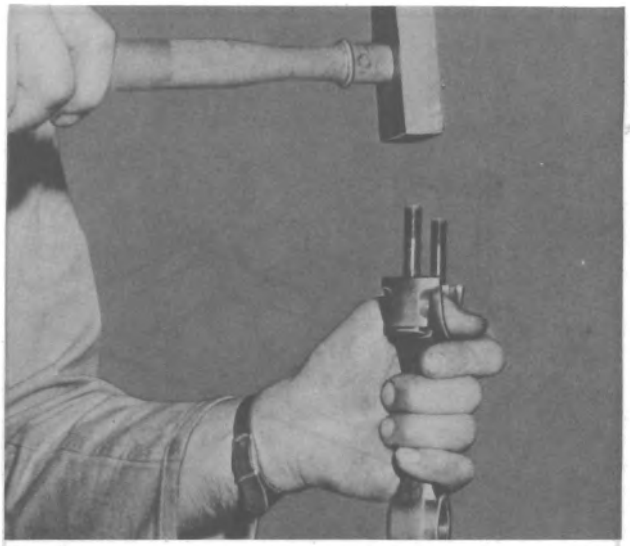


Fig. 4 3920

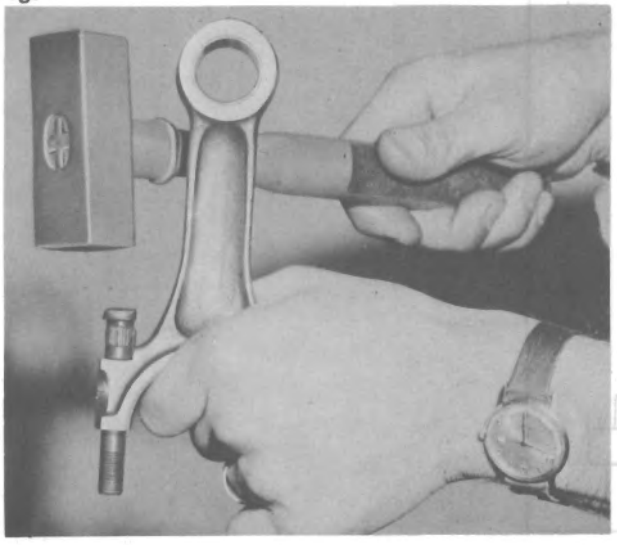
REPLACEMENT OF CONNECTING ROD SCREWS (with piston removed)

- Drive worn screws out, using a small bronze hammer, without striking body (Fig. 4).
- Fit new screws on connecting rod held by hand, and taking special care for directional setting of head flat (Fig. 5).
- Re-fit caps, and finish fit screws, tightening them with used nuts, without exceeding prescribed torque.

REPLACEMENT OF STARTING MOTOR CROWN-WHEEL

- Place flywheel on a circular support, preferably made of wood, so that a certain clearance is available to enable the crown-wheel to be removed.

Fig. 5 3921



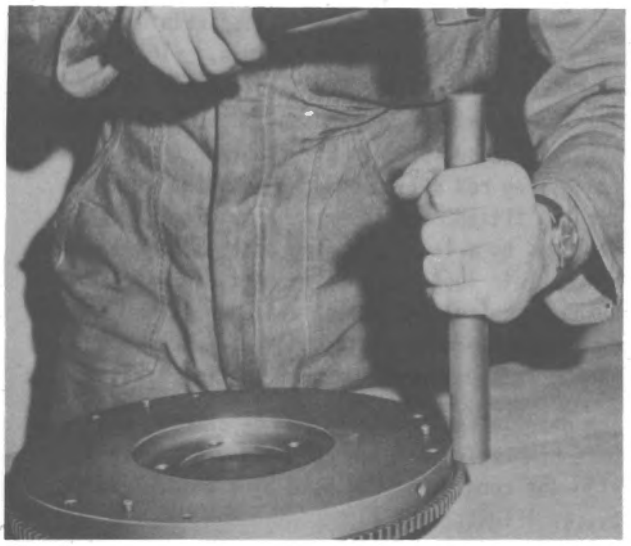
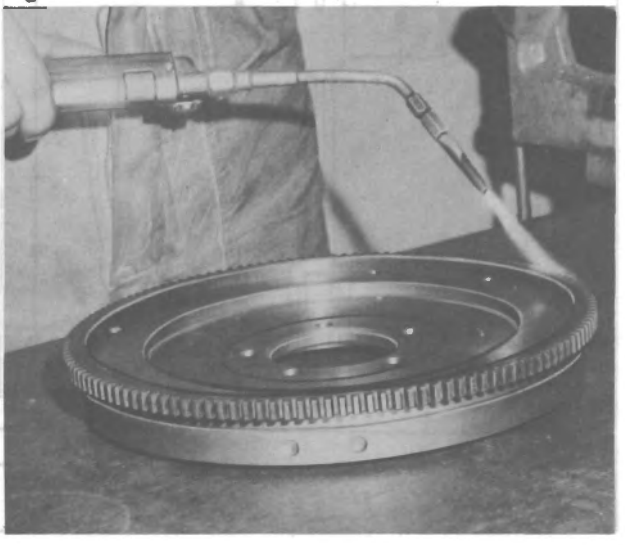


Fig. 6 3922

- Strike around periphery with a bronze or steel tool (Fig. 6) to clear crown-wheel.
- Turn flywheel over, and set it flat.
- Place new crown in position on flywheel.
- With a torch fitted with a non-oxidizing nozzle, slowly and progressively apply heat around periphery of crown-wheel (Fig. 7).
- Interrupt application of heat when crown-wheel starts to slip down onto flywheel, and fit it in its final position, striking it lightly with a bronze tool, taking care not to strike tip of teeth.
- On automatic model: the flywheel is replaced by a diaphragm, and the starting motor crown-wheel is made integral with this diaphragm by means of anchoring points; it cannot, therefore, be replaced separately. When re-assembling a new diaphragm, fit the hollow part of the diaphragm central stamping on the crankshaft side.

Fig. 7 3923



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REMOVING THE SEALING CAPS

This operation is to be carried out systematically after crankshaft journal or crankpin bearings have been reground or, occasionally, if a sealing cap shows a leak or is dislodged.

4 sealing caps are fitted on the crankshaft; two sealing cap diameters can be fitted:

- 1 - the 8.55 dia. cap,
- 2 - the 9.25 dia. cap.

Consequently, before removing a sealing cap, its housing bore diameter must be checked. Use a drill shank to do so.

To extract caps, use a portable drill to carry out a counter-piercing operation: counter-pierce 8.5 dia. caps to a 7.5 mm dia., and counter-pierce 9.25 dia. caps to a dia. of 8.5 mm (Fig. 8).

Remove the remainder of each cap with an extractor or with a tap of the corresponding diameter if it cannot be extracted with counter-piercing bit.

RE-FITTING THE SEALING CAPS

1 - If crankshaft has been reground, it must be cleaned by immersion.

2 - In all cases, it must be flushed with paraffin and blown with compressed air.

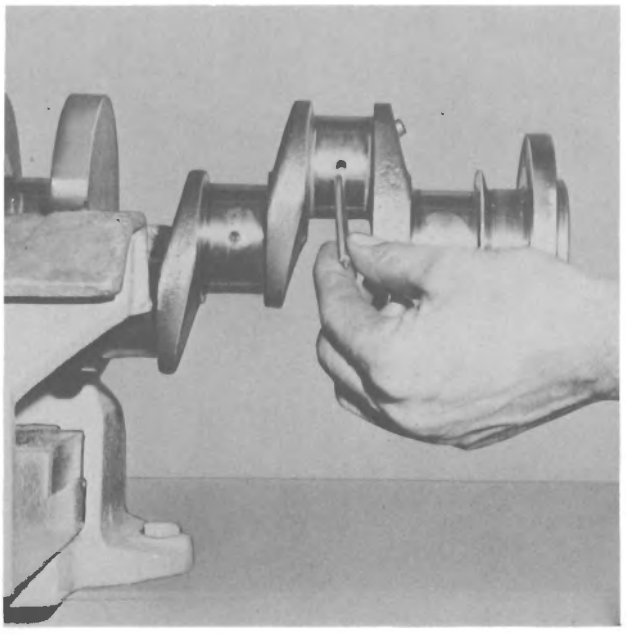


Fig. 9 3925

3 - To re-fit sealing caps, use fitting tool Ref. 21605 W. Clamp crankshaft in a vice fitted with lead claws. Insert spindle in lubricating hole of intermediate crankshaft journal, which is closest to sealing cap being replaced (Fig. 9).

4 - Use fitting tool to insert cap until it stops against spindle (Fig. 10).

Note: rocking-lever spindle caps and chain adjuster lubricating line cap will be replaced, following the same procedure, using fitting tools Ref. 21602 T and 21605 W.

Fig. 8 3924

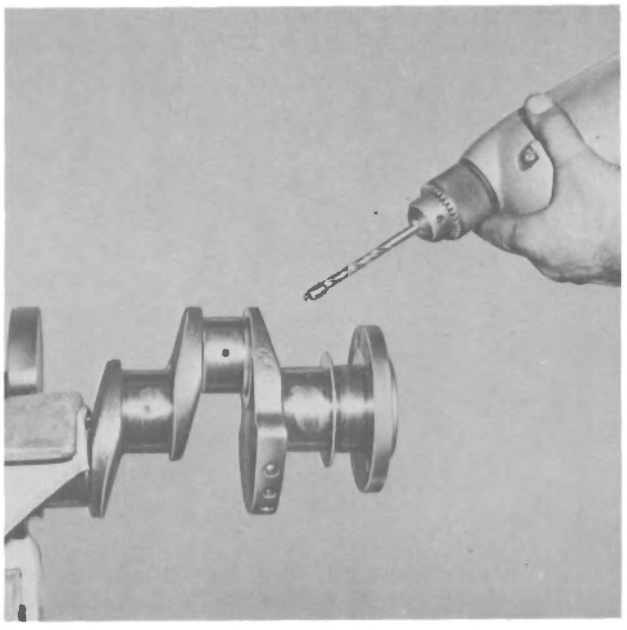
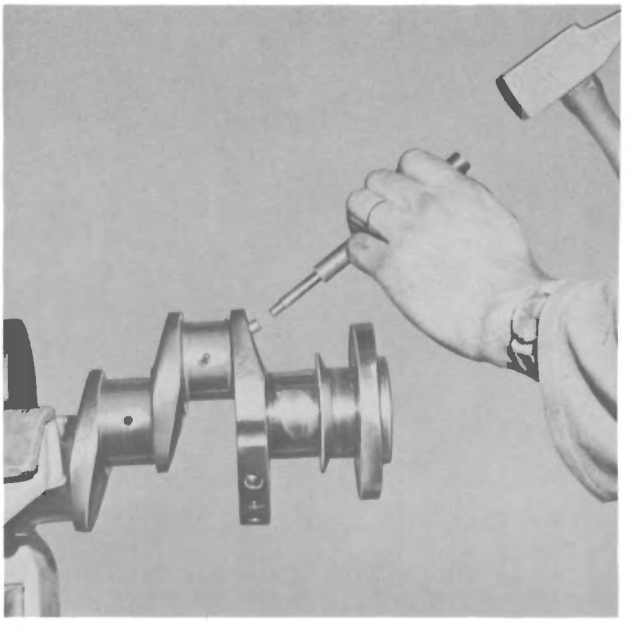
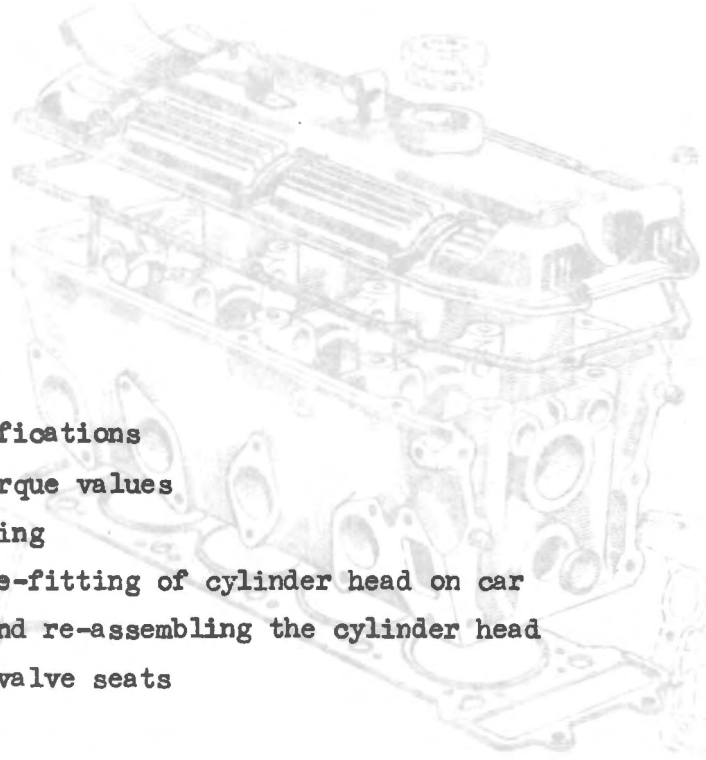


Fig. 10 3926



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A3 - CYLINDER HEAD

A3/I - General specifications

A3/II - Tightening torque values

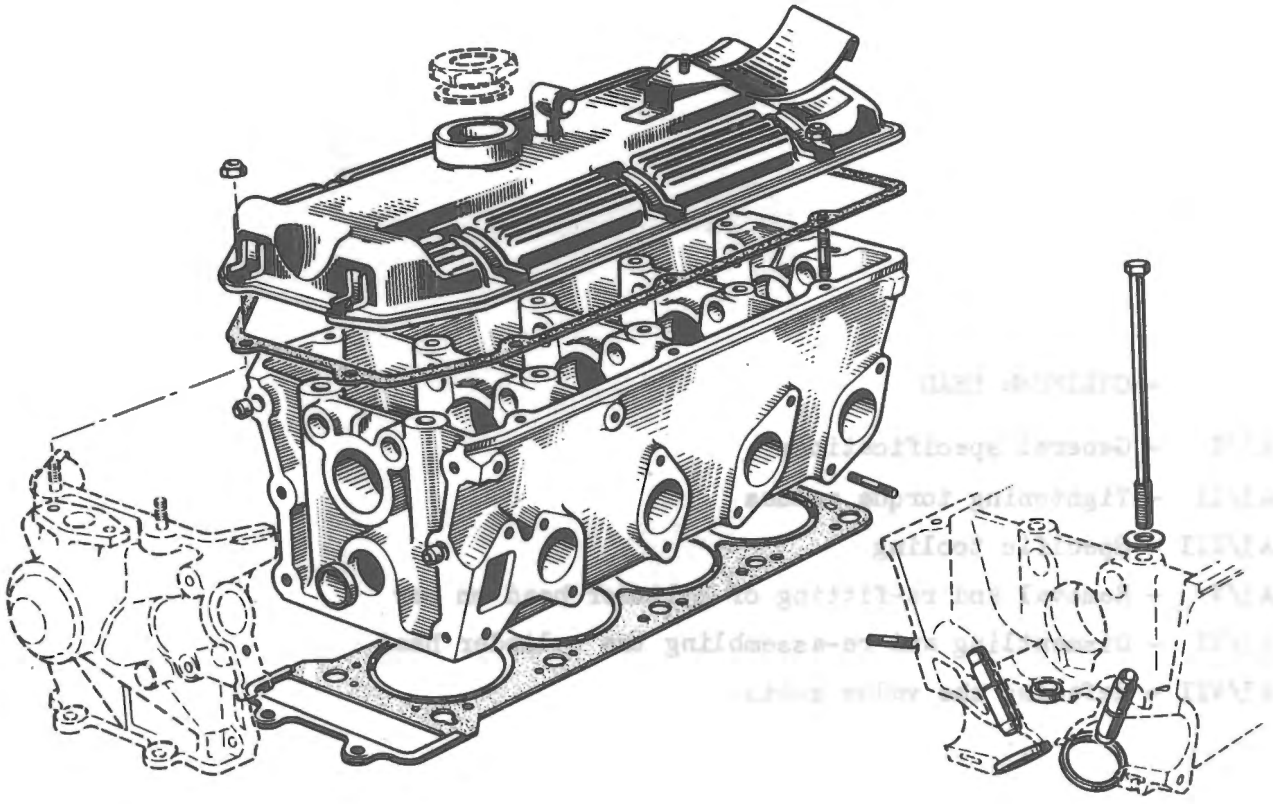
A3/III - Specific tooling

A3/V - Removal and re-fitting of cylinder head on car

A3/VI - Dismantling and re-assembling the cylinder head

A3/VII - Refacing the valve seats

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G.075

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GENERAL SPECIFICATIONS

Cylinder head

Material: Aluminium alloy.

The cylinder head includes:

- in its upper section: 5 cast bearings designed to accommodate the camshaft, which runs directly, without bushings, on this aluminium;
- in its lower section: 4 bi-spherical chambers, with overhead valves.

  The 4 exhaust valves are inclined at an angle of $20^0 \pm 10'$.

  The 4 inlet valves are inclined at an angle of $25^0 \pm 10'$ in relation to the vertical centre-line of the camshaft;
- on its L.H. side face (when sitting in the driver's seat): 4 inlet lines and a water outlet line;
- on its R.H. side face: 4 exhaust lines;
- on its rear face: a joint plane to receive the camshaft side cover;
- on its front face: a joint plane to receive the front cover; the latter will carry the ignition distributor and the petrol pump.

Foundry clean-off sealing caps

- On front face: a 32 dia. sealing cap, coefficient 1.
- On rear face: a 32 dia. sealing cap, coefficient 1
- on upper section: four 20 dia. sealing caps, coefficient : 4.

Guide housing inner diameter: 14.928 to 14.958.

Diameter of exhaust valve seat housing: 39.975 to 40.000.

Diameter of inlet valve seat housing: 44.975 to 45.000.

Inlet manifold fastened by 8 M 7 x 1.00 stud bolts.

Water outlet elbow fastened by 2 M 7 x 1.00 screws.

Cylinder head cover fastened by 9 M 7 x 1.00 stud bolts.

Exhaust manifold fastened by 8 M 8 x 1.25 stud bolts.

Camshaft bearing inner diameters:
- No. 1 : 44 to 44.025
- No. 2 : 46 to 46.025
- No. 3 : 46.5 to 46.525
- No. 4 : 47 to 47.025
- No. 5 : 47.5 to 47.525

Valve guides

Material: Cast-iron.

Inner diameter: 9.022 to 9.040.

Outer diameter: 15.

Length: 56.

Cylinder head gasket

Thickness: $1.2 \pm .1$.

Valve seats

Inlet:

Material: Special cast-iron.

Outer diameter: 45.105 to 45.125.

Absolute seating diameter: 41.5.

Seating angle: 44^0 to 44^0 30 in relation to centre-line of guide.

Exhaust:

Material: Special cast-iron.

Outer diameter: 40.105 to 40.125.

Absolute seating diameter: 36.

Seating angle: 44^0 to 44^0 30 in relation to centre-line of guide.

Locking for assembly of inlet or exhaust valve seats in cylinder head: .105 to .150.

TIGHTENING TORQUE VALUES

(See Section "A0 - Engine Assembly")

SPECIFIC TOOLING

Holder ..... 20969 D

Cover ..... 21647 X

Wrench ..... 31174 G

Facom U 43 cylinder head support.

Facom U 43 valve lifting tool.

Neway-Sales refacing kit.

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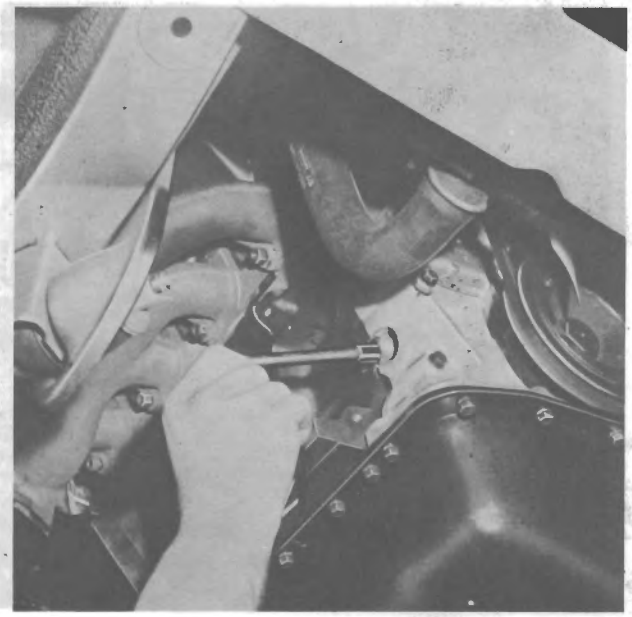
REMOVAL OF CYLINDER HEAD ON CAR

The cylinder head must be removed only when the engine is cold, i.e. after the engine has not been used for 6 hours.

- Place vehicle on a lifting ramp, and fit covers on fenders.
- Drain cooling system through cylinder block drain plug and radiator cock.
- Disconnect battery earthing cable.
- Remove air filter with air inlet connection to carburettor, and oil fume recovery system.
- Disconnect accelerator cable and sheath.
- Disconnect servo-brake pipe on header, and both air-conditioner hoses on dash panel.
- Disconnect choking-coil and thermistor wires.
- Disconnect ignition distributor vacuum tube, fuel delivery pipe to carburettor, and petrol pump supply pipe.
- Disconnect water pump to water header hose, and radiator upper hose (on cylinder head side).
- Disconnect both screws fastening H.V. harness shield to cylinder head.
- Disconnect spark plugs.
- Remove 9 cylinder head cover fastening nuts, and remove cover.
- Turn crankshaft pulley to set piston No. 4 at T.D.C., and cylinder No. 1 valves in balanced position.
- Disconnect coil L.V. and H.V. wires, and remove ignition distributor cap with its harness.
- Mark position of distributor and rotor.
- Loosen distributor retaining clamp to remove distributor.
- Remove petrol pump with its insulating spacer and its two paper gaskets.
- Unscrew both upper nuts fastening exhaust flange to manifold.
- Raise lifting ramp.
- Unscrew both lower nuts fastening exhaust flange to manifold, release both exhaust pipe suspension rings, and clear flange from manifold
- Proceed as follows to unload hydraulic adjuster:
  - Remove adjuster plug on timing gear cover (Figure 1);
  - Unlock and loosen plugging screw through cover opening; remove it, taking care not to allow it to fall in lower section, using an 11 mm socket wrench fitted with a magnet section of 12 mm in the centre (glued to the "vibradamp").

    Note: if the retainer or screw falls in, it can be recovered from the channel, cast in this purpose in the timing gear cover;
  - through opening, insert a 3 mm hexagonal male wrench in piston hole; turn wrench to the right to free the shoe from the effect of the spring.
  - Lower lifting ramp.
  - Loosen cylinder head, proceeding in reverse order from tightening sequence, and remove screws. (See Section "A0 - Re-fitting the Cylinder Head").
  - Remove 8 screws from camshaft front cover.
  - Loosen cylinder head, and remove front cover.
  - Plug opening of timing gear cover with a clean cloth.
  - Unlock 3 screws fastening camshaft sprocket, and remove screws.
  - Clear sprocket from its location, and remove chain from sprocket.

Fig. 1 4186



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REMOVAL AND RE-FITTING OF CYLINDER HEAD ON CAR

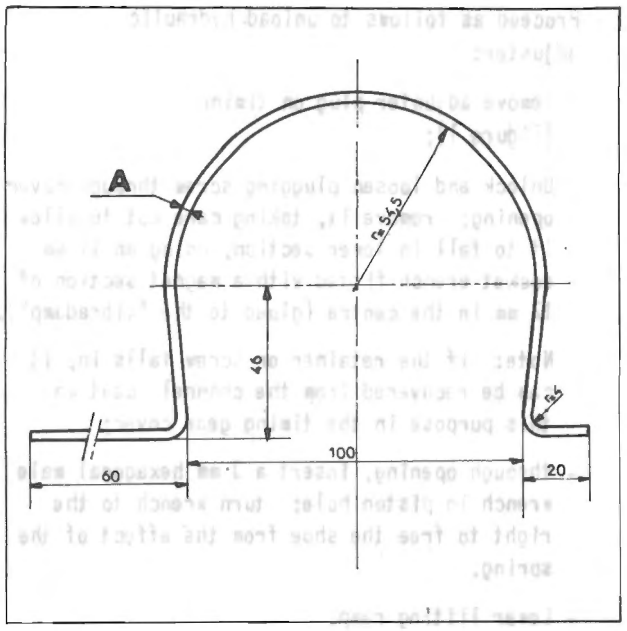


Fig. 2 A - Brass wire dia. 3 G.047

- Remove sprocket and retain chain by means of a bent wire (Fig. 2) to prevent it from falling in lower section (Fig. 3).
- Remove cylinder head, lifting rear section higher than front section in order to clear camshaft from chain (Fig. 4).
- Remove cylinder head gasket, and clean joint plane.

RE-FITTING OF CYLINDER HEAD ON CAR

- Place camshaft driving sprocket in position at end of camshaft, and set its fixing holes opposite the tapping.

Fig. 3 4187



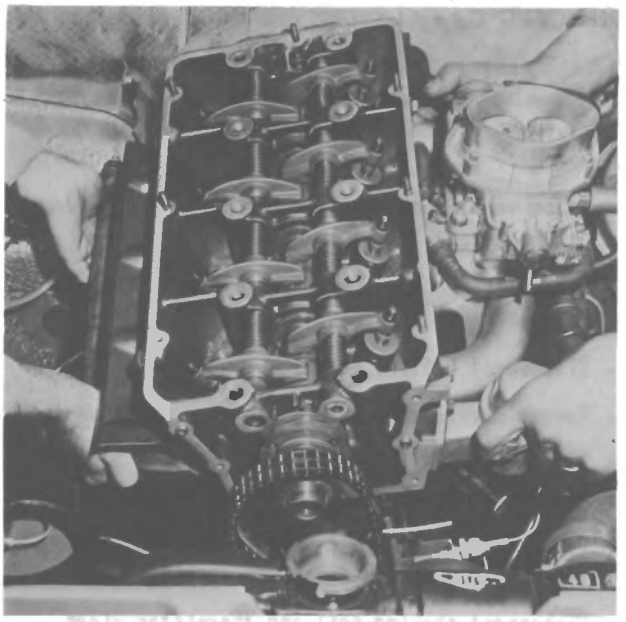


Fig. 4 4188

- Use stick of grease paint, for instance, to mark position of sprocket proper setting reference in relation to camshaft.
- Remove sprocket, and turn camshaft using special tool (see specific tooling - Section A0) in order to set the grease paint ref. mark so that it faces the front bearing reference.
- Smear cylinder head gasket with oil, and fit it on cylinder block, locating it by means of the 2 locating bushes.

  Note: the reference mark "Dessus" (top), stamped on the gasket, must be visible after the gasket has been fitted to the cylinder block.
- Ascertain that piston No. 4 is at T.D.C.
- Fit fully assembled cylinder head, passing the end of the camshaft under the timing chain.
- Re-fit sprocket to camshaft and timing chain, turning its setting reference mark so that it faces the front bearing Ref. mark.
- Use a cloth to plug the timing gear cover opening, and fasten sprocket by tightening it to torque, lock 3 screws, and remove cloth.
- Use grease to fit both cylinder head front cover paper gaskets, and fasten cover to cylinder head using 6 screws only.
- Oil and fit cylinder head setscrews fitted with their flat washer.

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- Following the prescribed tightening sequence, pre-tighten to 6 m da N with the torque wrench, then finish tighten to 9 m da N.
- Fasten both cylinder head front cover setscrews, and tighten them to torque.
- Re-fit exhaust flange to manifold after fitting a new gasket, and tighten.
- Raise lifting ramp, and anchor both exhaust pipe flexible suspension rings.
- Proceed as follows to load hydraulic adjuster:
  - insert a 3 mm male hexagonal wrench in piston hole, and free the latter;
  - use grease to fit plugging screw-retainer to adjuster body;
  - fit and lock plugging screw in position;
  - re-fit inspection plug on timing gear cover.
- Lower lifting ramp.
- Re-fit petrol pump with its insulating spacer between 2 paper gaskets, and re-connect supply pipes.
- Re-fit ignition distributor, taking previously marked references into account.
- Re-fit distributor and L.V. and H.V. harnesses. Re-connect spark plugs, fastening H.V. harness shield to cylinder head.
- Re-connect the following hoses:

  . water pump to water header,
  . radiator upper to water outlet box,
  . air-conditioner to dash panel,
  . servo-brake to header.
- Re-connect accelerator cable and sheath.
- Re-connect choking coil and thermistor wires.
- Adjust rocking-lever play (see A0 for procedure).
- Re-fit cylinder head cover with a new gasket if necessary.
- Fill cooling system with water + antifreeze mixture (air conditioner tap control set to "warm").
- Re-fit air filter assembly.
- Re-connect battery.
- Start engine, and check advance setting.

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A3\Y

3

- Set cylinder head complete on Facom U 43 dismantling stand (Fig. 1).
- Remove exhaust manifold 8 fastening nuts.
- Remove spark plug wire protection shield; clear exhaust manifold, and remove gasket.
- Remove spark plug.
- Remove water outlet box cover, which is fastened by 2 THM 7 x 1.00-25 screws.
- Extract thermostat and remove gasket.
- Disconnect automatic choke supply and inlet manifold warming hoses.
- Remove temperature tapping on water outlet box.
- Remove water outlet box fastened by 2 THM 7 x 1.00-20 screws.
- Disconnect water outlet hose from automatic choke.
- Remove carburettor fastened by four 8 x 1.25 nuts (12 between flats).
- Remove insulating spacer.
- Remove inlet manifold fastened by means of six 7 x 1.00 nuts.
- Remove gasket.
- Remove supporting plate previously fixed to sling engine with 2 THM 8 x 1.25-20 screws (if necessary).
- Remove camshaft side rear cover fastened by 3 THM 7 x 1.00-20 screws.
- Remove gasket.
- Unlock both camshaft side tie-piece setscrews.
- Loosen 8 rocking-lever adjustment screw lock-nuts, and loosen screws to the maximum, using wrench Ref. 31174 G.
- Insert a small wooden spacer of approximately 22 mm in width between a rocking-lever base and the next camshaft bearing, by moving rocking-lever laterally by hand (Fig. 2).
- Clear this rocking-lever bearing bush so that the flexible ring can be uncovered.

Fig. 1 3927

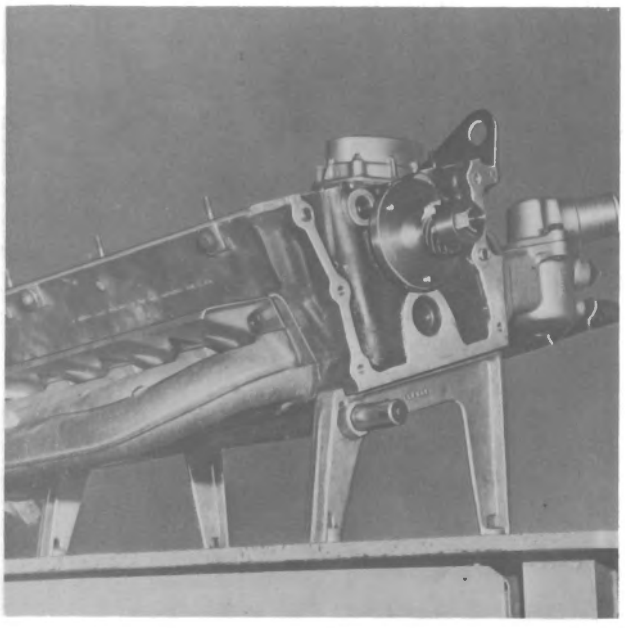
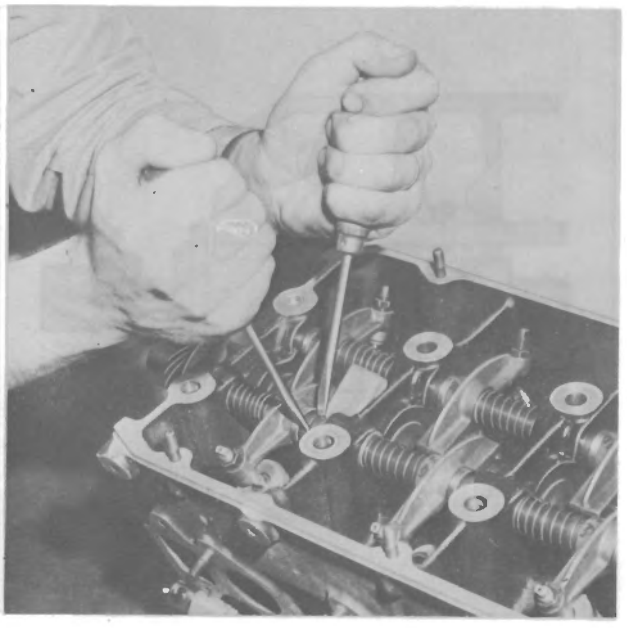


Fig. 2 3928



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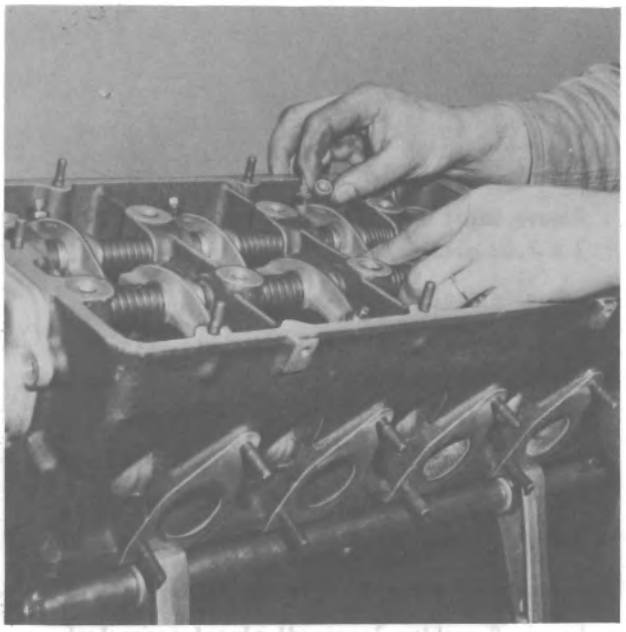
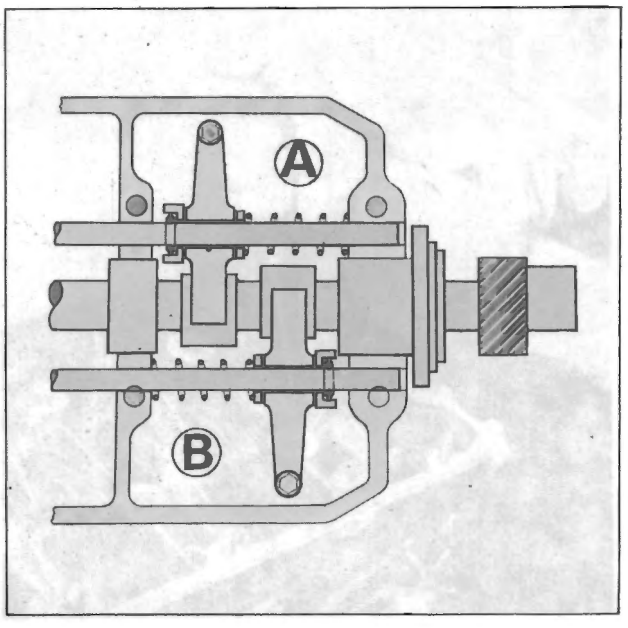


Fig. 3 3929

- Setting directionally so that both ends of its gap are in uppermost position; then, using 2 screwdrivers, clear ring downwards (Fig. 2). Use pinion, re-fitted with 2 screws, to turn camshaft.
  Displace each rocking-lever laterally to cause each bearing bush to fall out (Fig. 3); turn camshaft, if necessary, to free "engaged" valves.
- Recover 8 snap rings and 8 bearing bushes.
- Remove camshaft side tie-piece fastened by 2 THM 7 x 1.00-14 screws.
- Drive rocking-lever spindles out, taking care to note how each part is positioned (Fig. 4) in order to match them again afterwards in the proper order (use a dummy spindle to drive the spindle out).

Fig. 4 A - Inlet B - Exhaust 3930



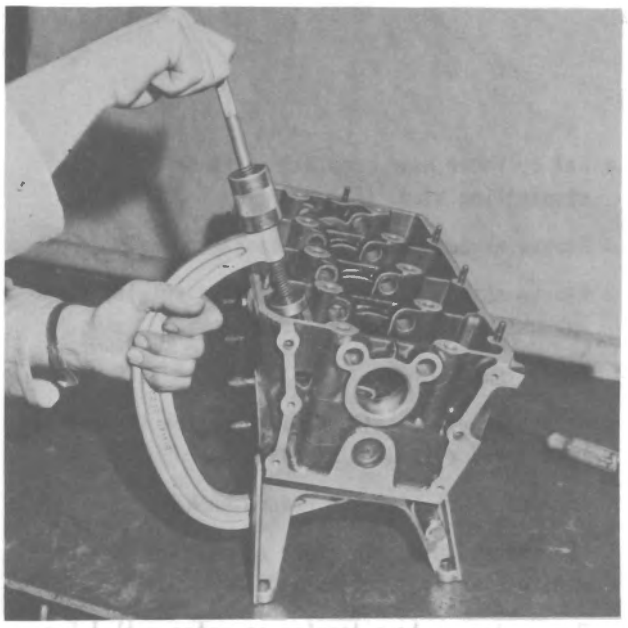
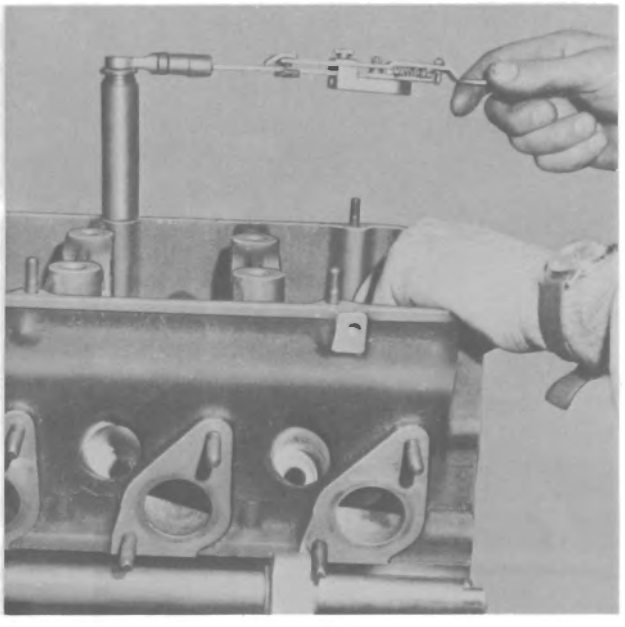


Fig. 5 3931

Caution: exhaust rocking-lever spindles differ from the inlet rocking-lever spindles insofar as they are fitted with 5 slots for fitting the cylinder head setscrews, and with 5 lubricating holes instead of 9.

- Remove camshaft.
- Use the percussion hammer of the valve lifting tool to dislodge valve keys (Fig. 5).
- Remove keys, upper cups, springs, lower cups, and valves.
- Remove inlet valve seals using pliers Ref. 20969 D.

Fig. 6 3932



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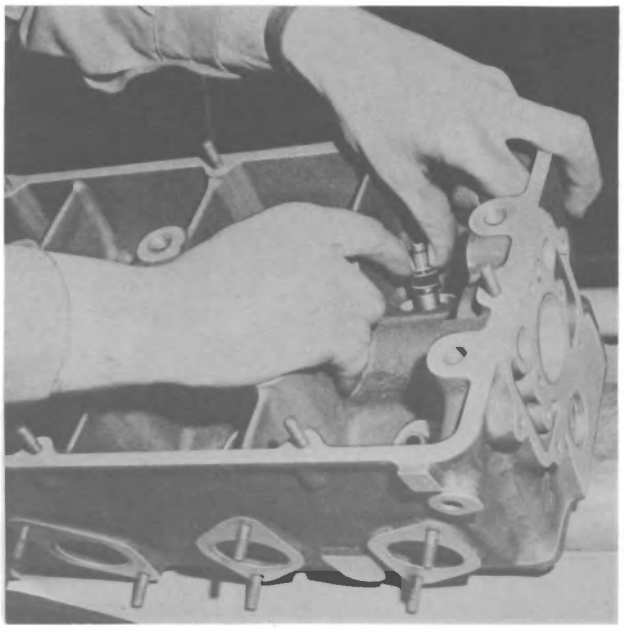


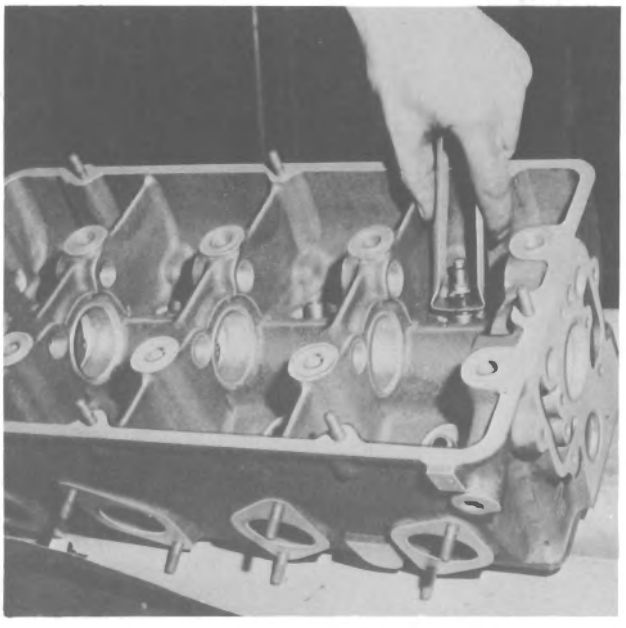
Fig. 7 3933

- Check all cylinder head joint faces, and clean them with emery cloth or face them if necessary.
- Oil all threaded parts before use.
- Systematically fit new gaskets.
- Prior to re-fitting, the cylinder head must be washed and blown with compressed air.

Fitting the stud bolts

- Fit 7 cylinder head cover 7 x 1.00 stud bolts (Fig. 6) in position.
- Fit 8 inlet manifold 7 x 1.00 stud bolts in position.
- Fit 8 exhaust manifold 8 x 1.25 stud bolts in position.

Fig. 8 3934



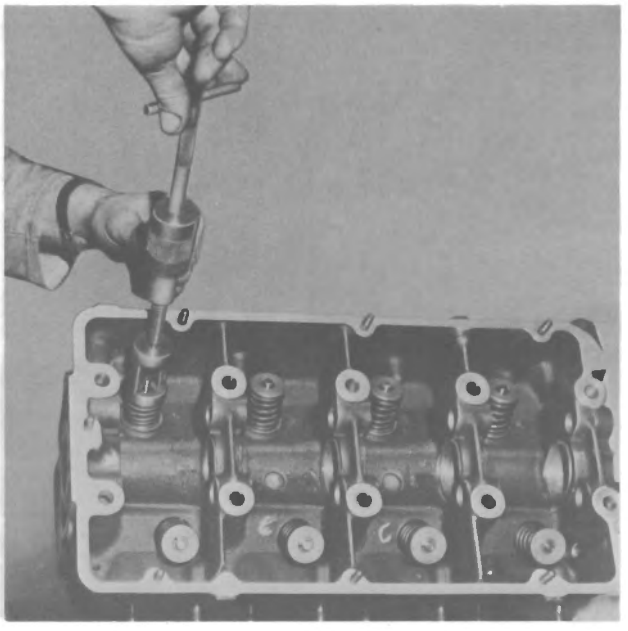


Fig. 9 3935

Re-fitting

- Wash and blow each part to be re-fitted with compressed air.
- Oil valve stems (with E.P. oil preferably).
- Fit valves on their respective seats.
- Fit lower cups.
- Fit plastic cap Ref. 21647 X on end of valve stem to protect seal teflon ring.
- Fit seal on cap until it comes to stop against end of guide, using fingers to hold white part (teflon) in order not to dislodge it (Fig. 7).
- Continue fitting seal on end of guide using grip Ref. 20969 D until stop is reached (Fig. 8).
- Remove plastic cap.
- Fit springs and upper cups, and fit keys in valve stem grooves after using Facom U 43 L valve lifting tool to compress springs (Fig. 9).
- Oil camshaft journals, and fit camshaft in its bearings.

To re-fit each rocking-lever spindle, proceed as follows:

- Identify the exhaust rocking-lever spindle, which is fitted with 5 slots for cylinder head setscrews.
- Oil spindles, and fit them in cylinder head from the rear; the flat used as a location for the camshaft side tie-piece will thus be facing the rear.

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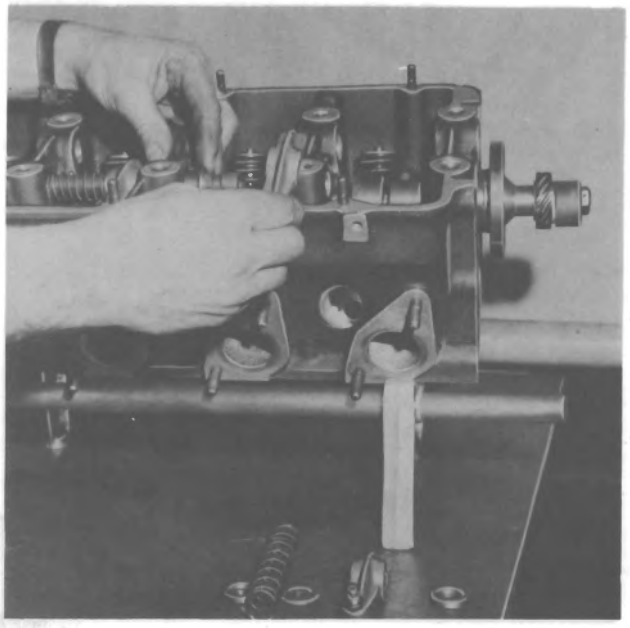


Fig. 10 3936

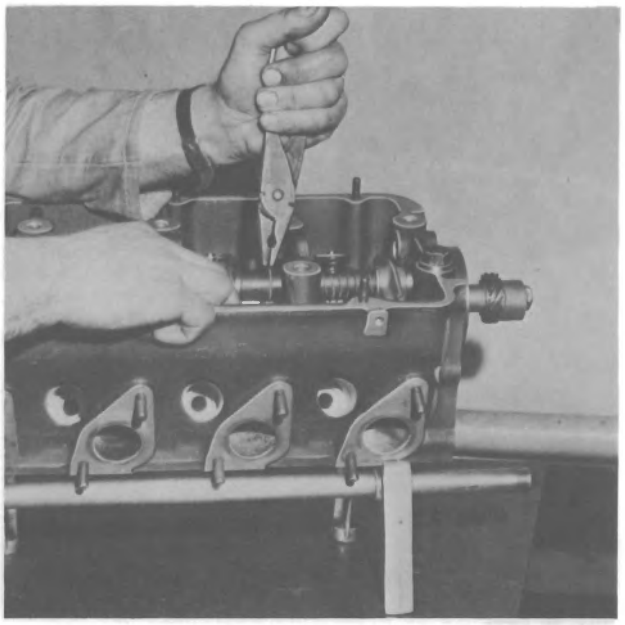


Fig. 11 3937

- Successively and in this order, between each spindle bearing, fit a side spring, a flat washer, a rocking-lever fitted with its adjustment screw, the bearing ring turned with its flat face against the rocking-lever, with the flexible ring housing turned to face the next bearing (Fig. 10) (for the inlet rocking-lever spindles, the reverse order will apply).
- Use a cylinder head setscrew to check the correct lateral positioning of cylinder head setscrew slots.
- Use flat nosed pliers to take each flexible stop ring, and fit it, with one sharp stroke, in its groove whilst keeping the rocking-lever assembly compressed with the other hand (Fig. 11).
- Set the stopping flats of each spindle correctly, and fit the camshaft side tie-piece in position fastening it by means of 2 THM 7 x 1.00-14 screws.
- Tighten both screws to torque, and lock them.
- Fit camshaft side cover paper gasket, and fasten cover by means of 3 THM 7 x 1.00-20 screws; tighten to torque.
- Then place each bearing bush between valve stem and rocking-lever adjustment screw, rotating the camshaft if necessary.
- Bring each adjustment screw in contact with the bearing bush to prevent it from falling afterwards.

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REFACING THE VALVE SEATS

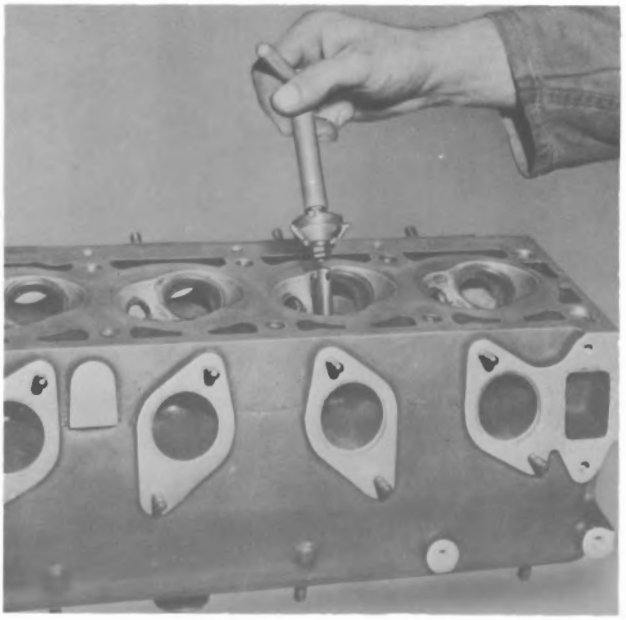


Fig. 1 3938

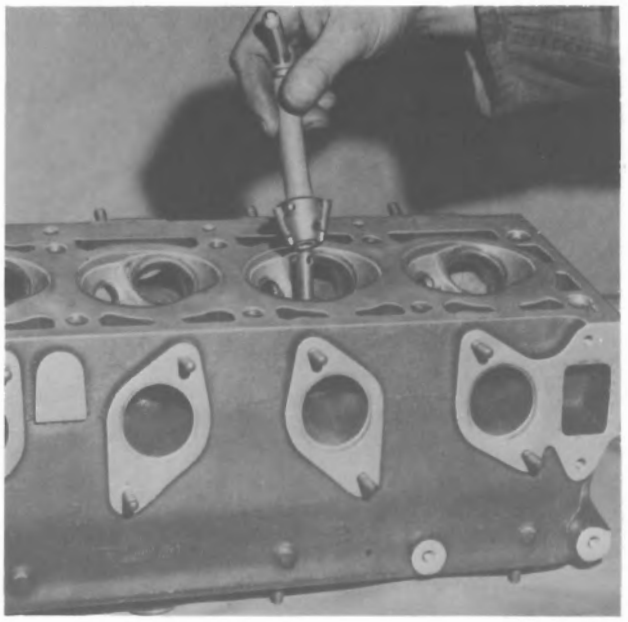
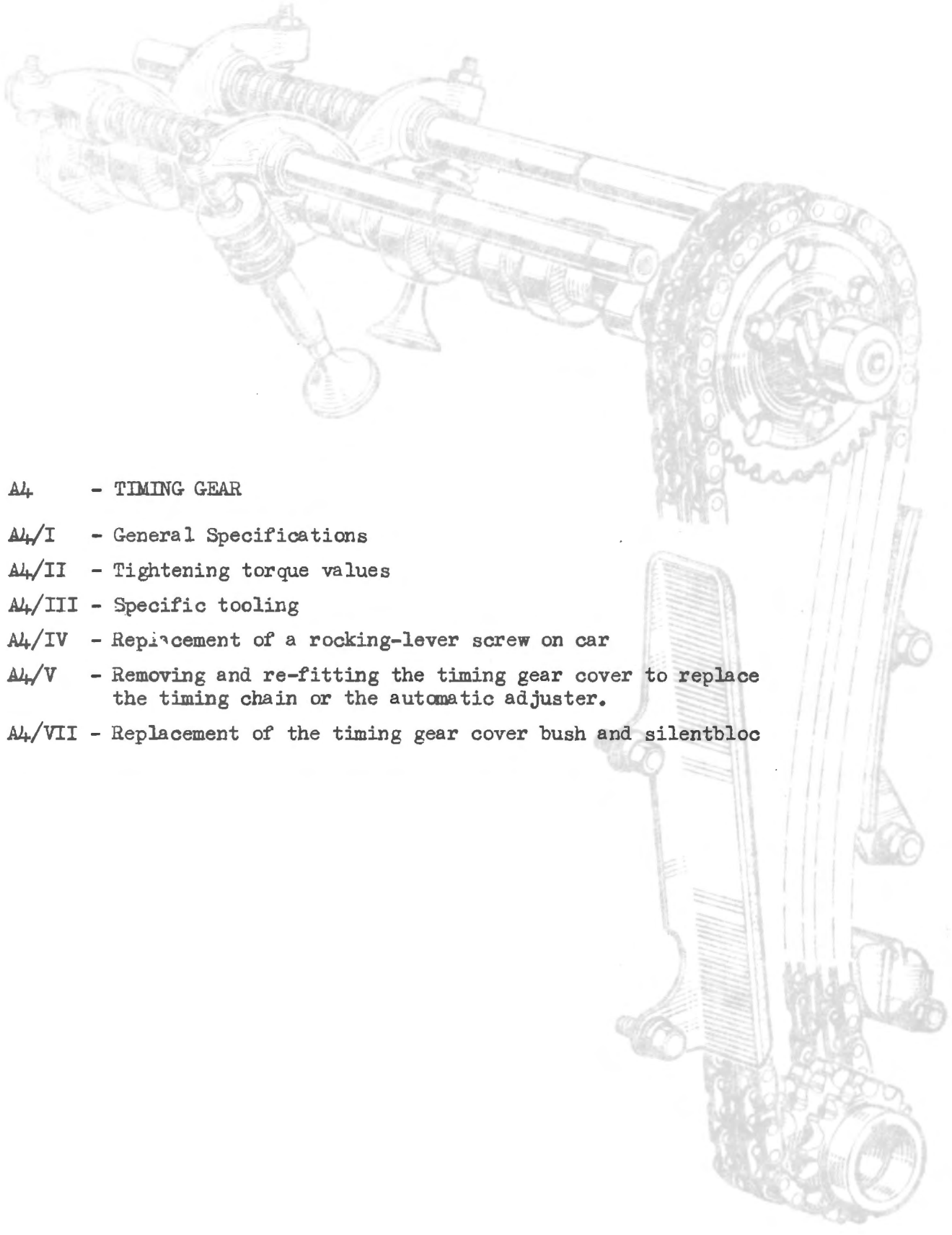


Fig. 2 3939

Operation to be carried out on removed and dismantled cylinder head.

- Set cylinder head on Facom U 43 stand placed on work bench.
- Insert expansible pilot fully in a guide and lock it in position.
- Set utilized diameter of 221 cutter knives to the diameter of the seat being refaced.
- Introduce cutter on pilot, and using driving wrench, reface seat by turning tool (at least a turn, at most five turns) (Figs. 1 and 2).
- Check aspect of seating area and carry out finishing operations if necessary.
- For exhaust valve seats, the width of the seating area will be reduced to a maximum of 1.5 mm by using the upper tool-holder of the 221 cutter on the upper part of the seat.
- For inlet valve seats, the width of the seating area will then be reduced to a maximum of 1.3 mm with cutter 222, working on inside of seat.

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A4 - TIMING GEAR

A4/I - General Specifications

A4/II - Tightening torque values

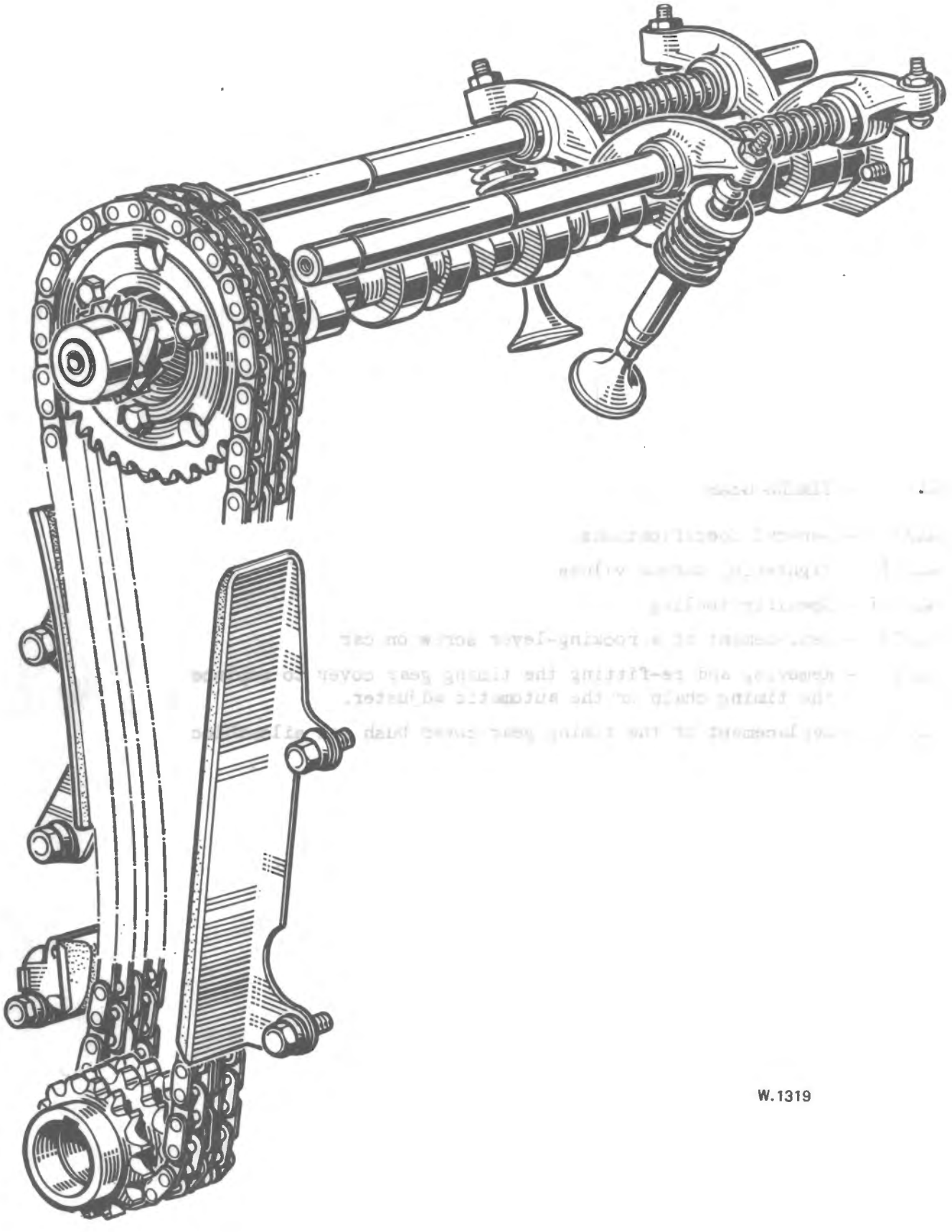
A4/III - Specific tooling

A4/IV - Replacement of a rocking-lever screw on car

A4/V - Removing and re-fitting the timing gear cover to replace the timing chain or the automatic adjuster.

A4/VII - Replacement of the timing gear cover bush and silentbloc

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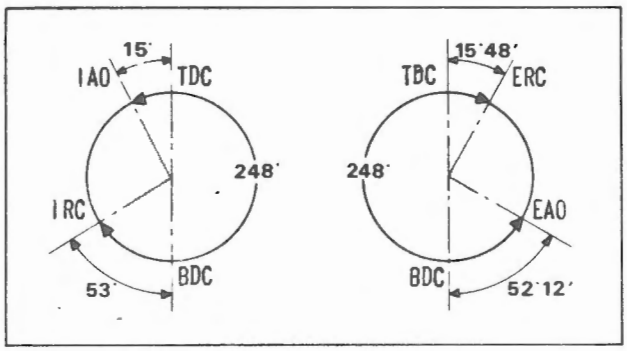


W.1319

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GENERAL SPECIFICATIONS

Overhead valves with overhead camshaft.



Timing diagram G.013

Camshaft

Material: cast-iron.

Inlet cam lift: 6.04

Exhaust cam lift: 6.04.

Dia. journal No. 1 : 43.940 to 43.965
No. 2 : 45.940 to 45.965
No. 3 : 46.440 to 46.465
No. 4 : 46.940 to 46.965
No. 5 : 47.440 to 47.465

Admissible camshaft play in bearings: .035 to .085.

Maximum side play: .2

Camshaft side tie-piece

Material: sheet metal.

Fastened to cylinder head by means of 2 M 7 x 1.00 screws.

Timing sprocket

Material: cast-iron.

Number of teeth: 36

Fastened by 3 TH 7 x 1.00 screws.

Timing gear

Material: cast-iron.

Number of teeth: 18

Dual timing chain

Chain pitch: 9.525

Dia. of rollers: 6.35

Length: 96 links.

Chain adjuster

Brampton SCD type
hydraulic control with shoe return limiter (Fig. 29 - A0/VI).

Rocking-lever

Material: steel.
Step-up ratio: 1.37.
Rocking-lever adjustment screw: Dia. M 8 x 1.00.
Play, inlet : .20) With engine cold
Play, exhaust : .35)
Rocking-lever bore: 18.018 to 18.040. Admissible play on spindle: .01 to .048.

Rocking-levers are fitted on specific inlet or exhaust spindles; they are retained laterally by a flexible ring capped by a bearing washer on one side, and by a spring spacer, on the other side, bearing against a cylinder head bearing.

Both inlet or exhaust rocking-lever spindles are fitted, in the cylinder head, in bores on either side of each camshaft bearing, in the upper section.

The rotation of these two spindles is limited by a small plate fastened to the rear section of the cylinder head, and housed in a flat machined on each spindle.

Lubricating holes are different on both spindles; the exhaust rocking-lever spindle also has 5 slots provided for the cylinder head setscrews.

The spherical head of each rocking-lever adjustment screw is accommodated in a shoe bearing against the valve stem.

The valve guides are fitted with teflon valve seals.

Valves

Inlet:
Material: steel.
Outer dia. of valve head: 43.
Dia. of valve stem: 8.985 to 9.00.
Seating angle: 90° to 90° 30.
Lift: 8.27 when there is no play between rocking-lever and valve stem.

Exhaust

Material: Austenitic steel.
Outer dia. of valve head: 38.
Dia. of valve stem: 8.965 to 8.980
Seating angle: 90° to 90° 30
Lift: 8.27 when there is no play between rocking-lever and valve stem.

Valve spring

Outer diameter: 31.5 max.
Inner diameter: 22.7 min.
Dia. of wire: 4.1
Free height: 52.3
Height under load of 48 da N ± 1.6 - 37 mm.

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TIGHTENING TORQUE VALUES

(See Section "A0 - Engine Assembly")

SPECIFIC TOOLING

Tool-holder	15522 C
Fitting tool	20861 Z
Bush	20904 V
Tool	21611 K

Facom U 41 Extractor.

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REPLACEMENT OF A ROCKING-LEVER SCREW ON CAR

- To replace a rocking-lever screw on the car, the adjacent screw of the same cylinder rocking-lever must be fully unscrewed, and the snap-ring of this opposed rocking-lever must be removed.
- Hold this rocking-lever against the adjacent bearing.
- Use an elbowed screw-driver as shown on Fig. 1, use area beneath the spindle of the rocking-lever concerned as a fulcrum, and compress valve spring so that it can be made to slide on the spindle and can be freed from the pressure applied by the spring.
- With this first rocking-lever cleared, the operator may then slide the other on the spindle to swivel it and to reach the screw concerned.

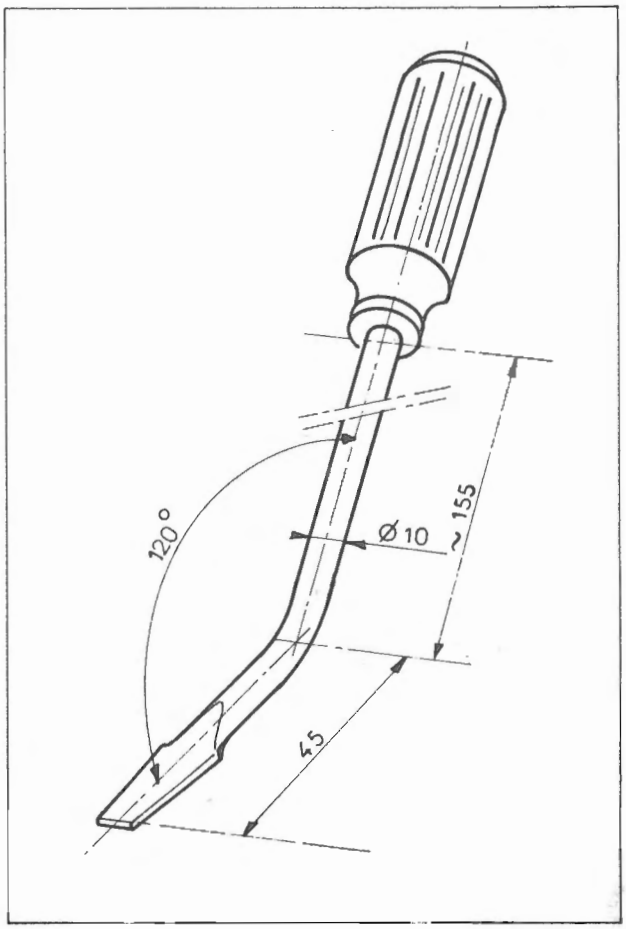


Fig. 1 G.016

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A4-17

REPLACEMENT OF A ROCKING-LEVER SCREW ON CAM

REMOVING AND RE-FITTING THE TIMING GEAR COVER TO REPLACE THE TIMING CHAIN OR THE AUTOMATIC ADJUSTER

REMOVAL OPERATIONS

- Remove cylinder head (see Section A 3).
- Disconnect thermo-switch on radiator, and remove radiator with its 2 hoses.
- Remove fan.
- Disconnect alternator wires.
- Remove alternator tie-rod on timing gear cover, loosen other end, then remove alternator. Remove belt.
- Loosen crankshaft pulley (with hand-brake applied, and vehicle in 4th gear), and extract pulley.
- Remove timing gear cover setscrews fitted in upper section.
- Raise lifting ramp, and remove remaining screws from lower section.
- Remove 6 screws fastening oil sump to timing gear cover, and loosen all other screws as access is available.
- Detach oil sump and remove timing gear cover; the operator then has access to the automatic adjuster.

  To replace a timing gear chain or an oil pump chain it is first necessary to drain the oil sump, and to remove it, so that the oil pump can be removed.

  Both chains can then be removed easily.

RE-FITTING OPERATIONS

- Check condition of oil sump gasket and replace it if necessary.
- Clean timing gear cover joint planes.
- Use grease to fit paper gasket on cylinder block, re-fit and fasten cover to cylinder block, and tighten to torque.
- Re-fit oil sump to timing gear cover, without omitting the retainers, and tighten all screws which had been loosened at the removal stage.
- Re-fit crankshaft pulley, and tighten to torque.
- Check position of T.D.C.
- Re-fit alternator and its tie-rod, re-fit and tighten belt.
- Re-fit fan.
- Re-fit radiator with its 2 hoses.
- Re-fit cylinder head (see Section A 3).

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REMOVING AND RE-FITTING THE TIMING GEAR COVER TO REPLACE THE TIMING CHAIN OR THE AUTOMATIC ADJUSTER

RE-FITTING OPERATIONS

Check condition of oil sump gasket and replace if necessary.

Clean fixing gear cover joint plane.

Use grease to fit paper gasket on cylinder block re-fit and fasten cover to cylinder block, and tighten to torque.

Re-fit oil sump to fixing gear cover, without omitting the retainers, and tighten all screws which had been loosened at the removal stage.

Re-fit crankshaft pulley, and tighten to torque.

Check position of T.D.C.

Re-fit alternator and its fixing, re-fit and tighten belt

Re-fit fan.

Re-fit radiator with its 2 hoses.

Re-fit cylinder head (see Section A 3).

the operator then acts as to the automatic adjuster.

To replace a timing gear chain or an oil pump drive it is first necessary to drain the oil sump, and to remove it, so that the oil pump can be removed.

Both chains can then be removed easily.

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CHRYSLER
160 - 180 GT - 180



Fig. 1 3940

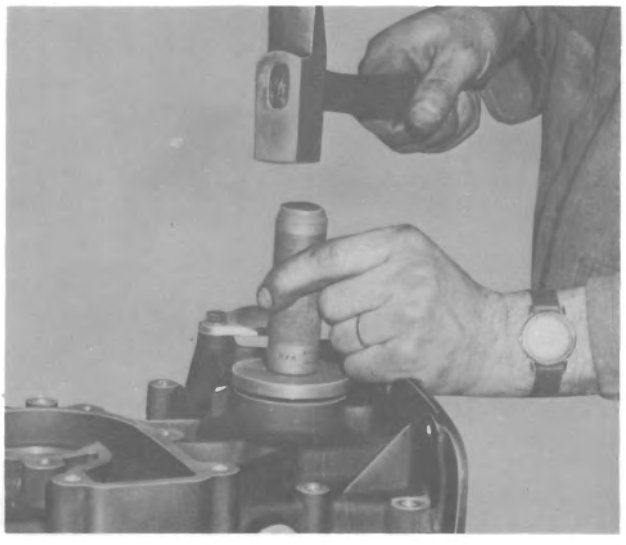
Bush

- Use inertia Facom U 41 extractor (Fig. 1) to remove worn bush.

  Caution: do not damage cover bore with extractor claws.

- Clean bore, and make sure it has not been damaged.
- Smear periphery and lip of new bush with oil or tallow after making sure that the direction of rotation of the engine corresponds to the direction shown on the seal (see arrow).
- Carefully set cover flat, and place bush on fitting tool Ref. 20861 Z (tool-holder Ref. 15522 C), with the lip pressure spring facing the inside of the timing gear cover.
- Fit assembly in cover until stop is reached (Fig. 2).

Fig. 2 3941



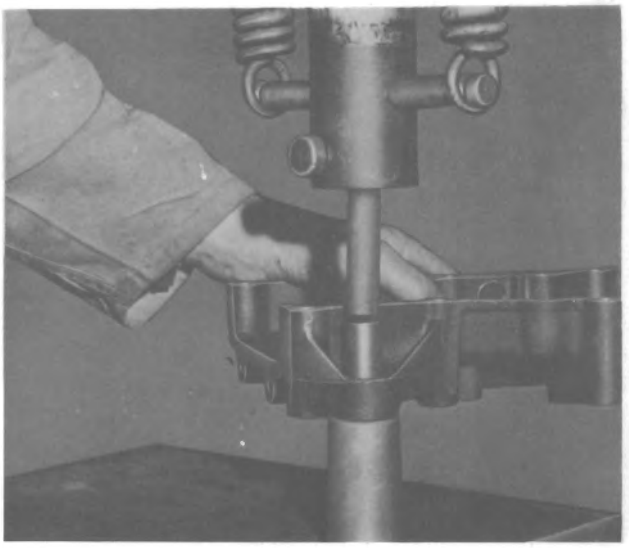
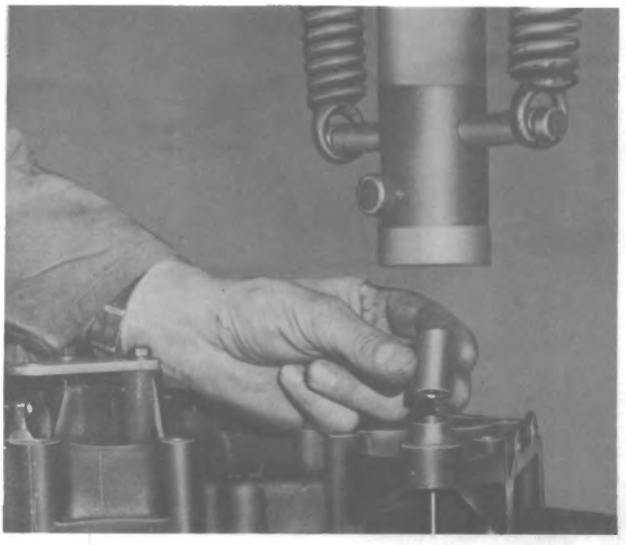


Fig. 3 3942

Silentbloc

- Use press to extract silentbloc with tool Ref. 21611 K, using bush Ref. 20904 V as a fulcrum, for instance, or a section of tube allowing the silentbloc to be cleared freely (Fig. 3).
- The new silentbloc will be fitted into place from the machined face of the timing gear cover; in this purpose, its housing has a fitting chamfer.
- Carefully place timing gear cover flat under press nose, smear silentbloc with tallow, and fit it in lightly (5 to 10 mm), using tool Ref. 21611 K (Fig. 4).
- Raise press nose and insert 63.85 long pin Ref. 21611 K in silentbloc central spacer, with the pin bearing on the press table.
- Use press to lower silentbloc until it stops against the pin; the silentbloc has then reached its final position.

Fig. 4 3943



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Fig. 3 3943

- Use press to extract silentbloc with tool Ref. 21611 K, using bush Ref. 2090A V as a fulcrum, for instance, or a section of tube allowing the silentbloc to be cleared freely (Fig. 3).

- The new silentbloc will be fitted into place from the machined face of the timing gear cover; in this purpose, its housing has a fitting chamfer.
- Carefully place timing gear cover flat under press nose, smear silentbloc with tallow, and fit it in lightly (5 to 10 mm), using tool Ref. 21611 K (Fig. 4).
- Raise press nose and insert 83,85 long pin Ref. 21611 K in silentbloc central spacer, with the pin bearing on the press table.

- Use press to lower silentbloc until it stops against the pin; the silentbloc has then reached its final position.

Fig. 4 3943

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B0 - GENERAL

B0/I - Description of engine lubricating system

B0/I - Filter cartridge

B0/II - Tightening torque values

B0/II - Specific tooling

B1 - OIL SUMP

B1/I - Gas and oil fume recirculation system

B2 - OIL PUMP

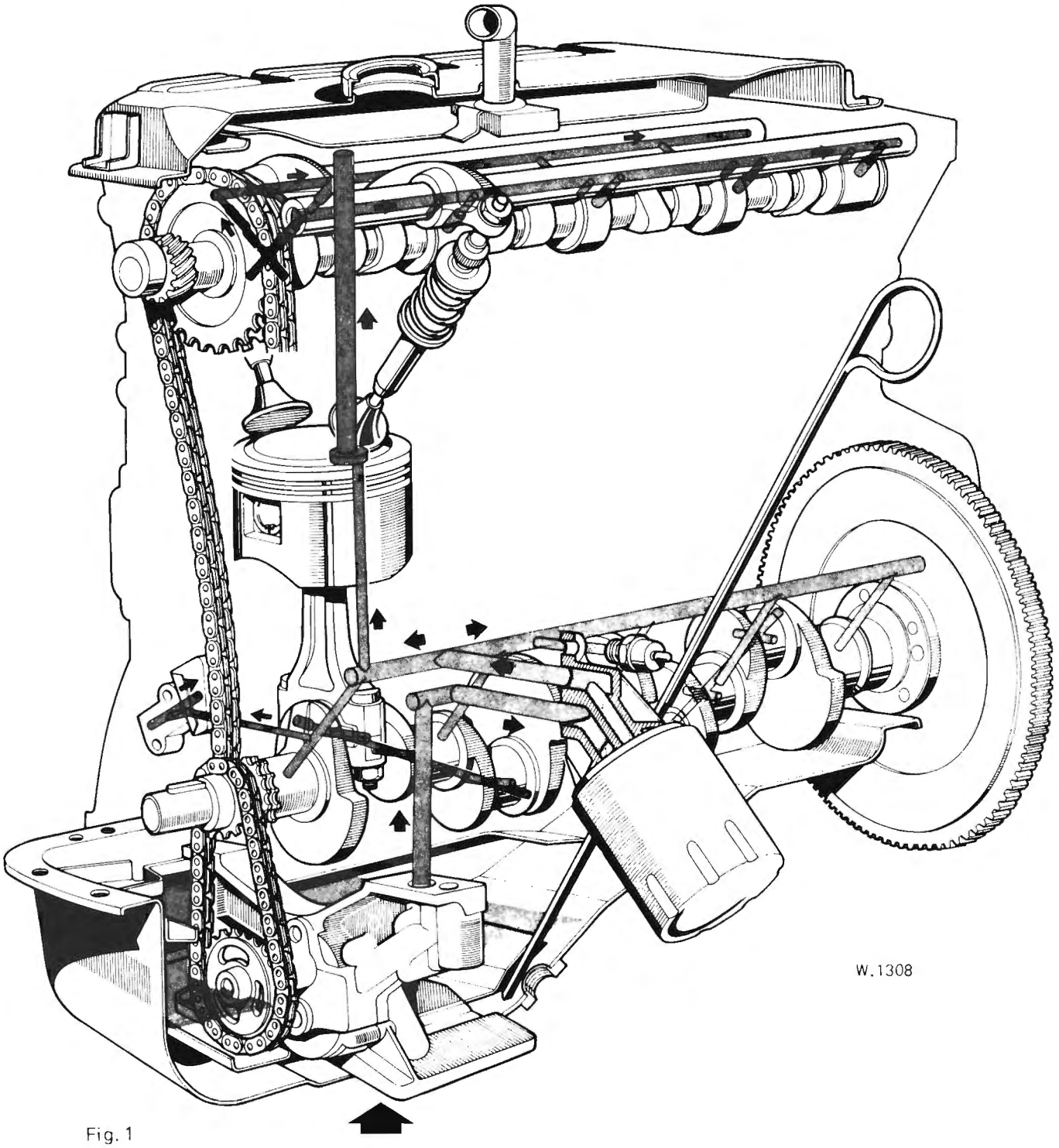
B2/I - General specifications

B2/II - Tightening torque values

B2/III - Specific tooling

B2/VI - Dismantling and re-assembling the oil pump

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W.1308

Fig. 1

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ENGINE LUBRICATION

The system is as follows:

. Pressure lubrication for:
- shaft assembly and connecting rods,
- camshaft bearings and rocking-lever shafts.

. Splash lubrication for:
- cams and rocking lever shoes

. Projection lubrication for:
- cylinder barrels, pistons and gudgeon pins, valve stems.

DESCRIPTION OF ENGINE LUBRICATING SYSTEM

A gear type pump draws the oil contained in the oil sump (4 litres) through a strainer.

This pump is driven by a sprocket controlled by a single chain and a gear fitted at the end of the crankshaft. The tension of this chain is adjusted by means of spacers, which are inserted, at the assembly stage, under the base of the pump.

A relief valve, housed in the pump body, regulates the pressure required to lubricate the engine, and allows the surplus to be recirculated.

When it leaves the pump, the oil runs up a channel drilled in the cylinder block, and then runs through the full-flow filter cartridge.

The filter cartridge is fastened on the cylinder block left-hand side face, on an aluminium base; after running through the filter, the oil reaches a distributor line drilled longitudinally in the cylinder block and feeding the crankshaft bearings and, consequently, the crankpins.

A vertical duct in the cylinder block L.H. front face directs the oil up to the first cylinder head setscrew hole. From this point, a channel takes the oil towards the inlet rocking-lever spindle which in turn, feeds the exhaust rocking-lever spindle through the camshaft front journal which, on this occasion, is lubricated. The rocking-lever drilled spindles allow, on each shaft, for the lubrication of the rocking-levers and of the camshaft bearings other than the front bearing.

A relief valve, fitted on the oil pump body, normally limits the oil pressure in the system to 4 to 4.5 bars at 3,000 r.p.m., at approximately 80°C.

A pressure switch fitted on the oil distributor, on the outlet side of the filter, signals abnormally low pressures : from .6 bar ± .1 bar.

The level differential between the dipstick minimum and maximum reference marks represents approximately 1.5 litre.

TIGHTENING TORQUE VALUES

(See Section "A0 - Engine Assembly")

SPECIFIC TOOLING

Extractor	15525 F
Fork	20950 E
Base and pin	21607 Y

FILTER CARTRIDGE

Special for "Full-Flow" filtration.

Maximum filtration capacity: 25 l/min.

Fitted with a safety valve calibrated to 1 bar ± .12, which would maintain a circulation of oil if the filter became obstructed.

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OIL SUMP

Material: Sheet metal.

Fastened by 22 M 7 x 1.00 screws.

Capacity: 4 litres.

GAS AND OIL FUME RECIRCULATION SYSTEM

To meet the European standard against pollution, the breather system is complemented by a vacuum system for the engine at low r.p.m.'s.

With this system, gases and oil fumes are directed in the air filter to be drawn by the carburettor and burnt in the cylinders when the butterfly valve is opened; a by-pass of this system allows the gases and oil fumes to be drawn directly into the inlet manifold, through a calibrated end-piece, when the butterfly valve is closed.

A filter fitted before the carburettor is acting as a condenser, and prevents frosting effects from taking place.

On the 361 engine only, this filter is complemented by a valve which closes when the butterfly valve is closed, and this inhibits the interconnection between the air intake on the filter and the inlet manifold.

The connection between the cylinder head cover, the carburettor, and the inlet manifold is by means of rubber hoses with ends held by circlips.

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GENERAL SPECIFICATIONS

Oil pump driven by chain from crankshaft.

Material: Aluminium alloy.

Cover: Fastened by 6 M 7 x 1.00 screws, also used as suction strainer.

Fitted with 2 gears with 9 teeth each.

Delivery valve body: steel.

Ball seat: steel.

Valve spring: free height: 45.

Height under load of 4.5 ± .2 kg = 25 mm.

Oil pump driving sprocket: Cast-iron.

Number of sprocket teeth: 29.

Single driving chain: pitch 9.52.

Dia. of rollers: 6.35.

CHECKING OIL PUMP ON CAR

- Set car on lifting ramp, and fit fender protection covers.
- Disconnect battery earthing cable, and remove dipstick.
- Raise lifting ramp.
- Drain oil sump.
- Disconnect stabilizer rod from side-members.
- Loosen clutch receiver cylinder to enable clutch housing reinforcement to be cleared for easier extraction.
- Remove reinforcement from cylinder block and clutch housing.
- Remove 22 oil sump setscrews with retainers.
- Clear oil sump after setting crankshaft in ¼ turn position after setting reference (Fig. 1).
- Valve is then accessible, and may be inspected easily after cap has been removed.
- The pump can be removed easily after unscrewing the 2 setscrews used to fasten it to the cylinder block. (See chapter B 2).
- For re-fitting operations, proceed in reverse order.

Note: For the replacement of the driving chain, please consult section A4.

TIGHTENING TORQUE VALUES

(See section "A0 - Engine Assembly").

SPECIFIC TOOLING

Extractor	15525 F
Fork	20950 E
Base and pin	21607 Y

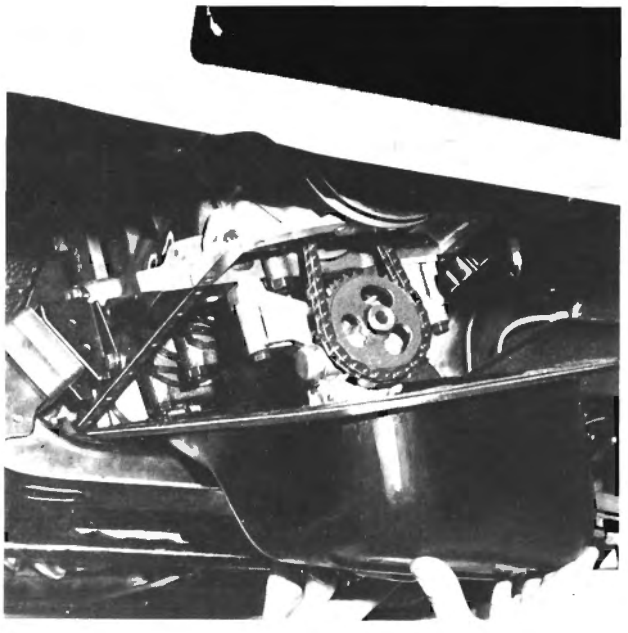


Fig. 1 4245

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DISMANTLING AND RE-ASSEMBLING THE OIL PUMP

DISMANTLING PROCEDURE

- Remove anti-unpriming sheet metal piece and strainer.
- Remove cover.
- Extract driven gear.
- Remove valve cap (Fig. 1).
- Unscrew valve body, and extract ball retaining spring, ball, and pressure spring.
- Extract sprocket, using extractor Ref. 15525 F and fork Ref. 20950 E.
- Extract driving gear and its shaft.

RE-ASSEMBLY PROCEDURE

- Insert driving gear and its shaft in body bore.

  Note: the driving gear is sold as assembled on its shaft. A driving gear separated from its shaft must absolutely never be re-used.

- Set assembly on fitting base, with its pin Ref. 21607 Y; the end of the driving gear shaft being fitted in the base grooving; adjust stop screw, which is sunk in base, until it comes to bear against end of shaft (Fig. 2).
- Locate driving sprocket at end of driving shaft so that the boss on its hub is facing outwards.
- Use press to fit sprocket in until a .1 mm spacer inserted between the sprocket and the pin screwed on the base slides firmly (Fig. 3).

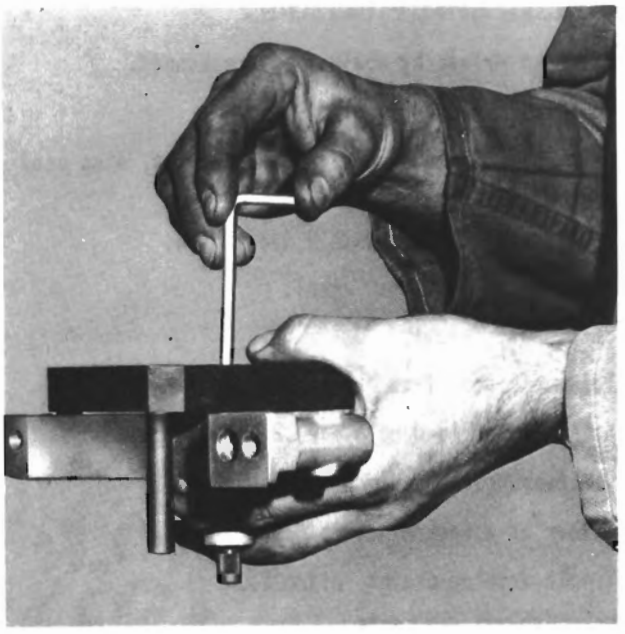


Fig. 2 3945

- Fit ball retaining spring, ball, pressure spring, and screw valve body on; tighten fully.
- Screw cap fitted with its copper gasket, and tighten to torque.
- Fit driven gear in its housing, and re-fit cover, fastening it with 6 THM 7 x 1.00-28 screws, and tighten to torque.
- Re-fit strainer and anti-unpriming sheet metal piece with 1 THM 7 x 1.00-18 screw; tighten to torque.

Fig. 1 3944

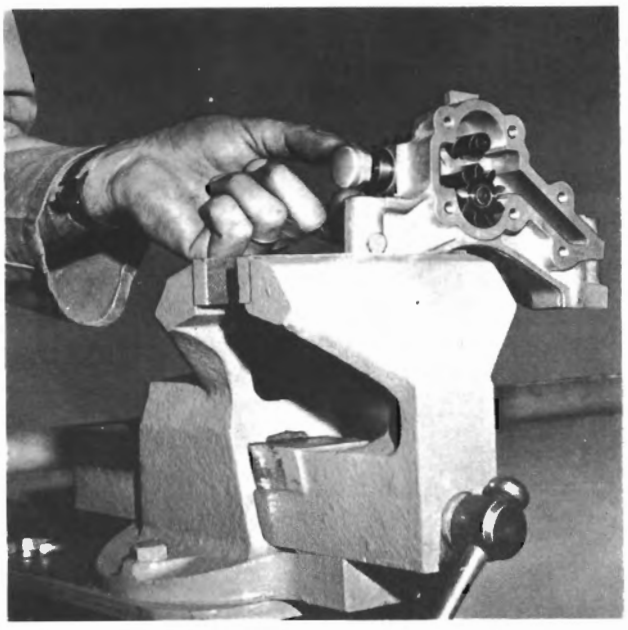
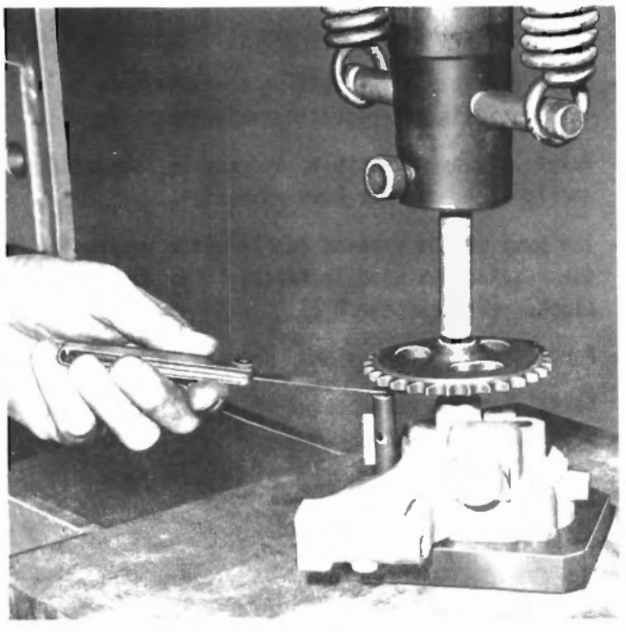


Fig. 3 3946



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C1 - PETROL TANK

C1/I - General specifications

C1/V - Removing and re-fitting the petrol tank and fuel gauge

C2 - PETROL PUMP AND PIPES

C2/I - General specifications

C3 - AIR FILTER AND WARM AIR INTAKE

C3/I - General specifications

C4 - CARBURETTOR AND INLET MANIFOLD

C4/I - Carburettor adjustments

C4/I - Inlet manifold specification

C5 - EXHAUST

C5/I - Description of exhaust system.

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GENERAL SPECIFICATIONS

Capacity: 65 litres.

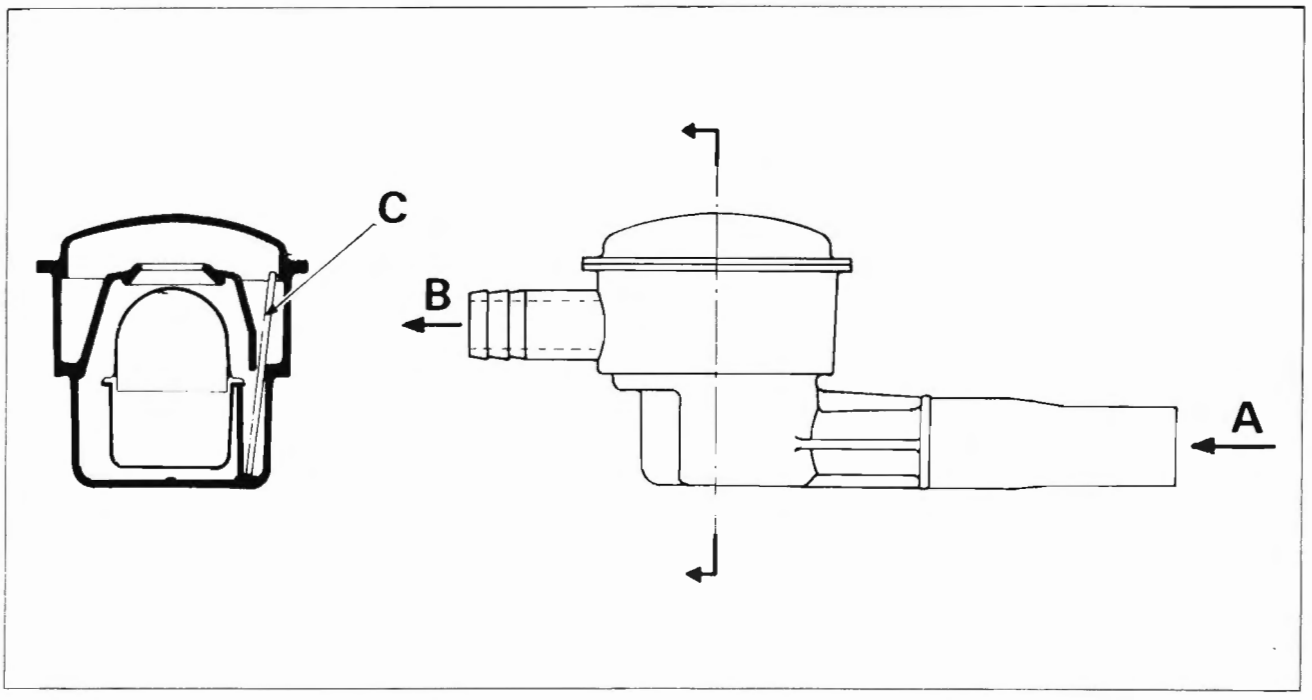
The petrol tank is fitted under the trunk floor at the rear of the vehicle between the side-members, and it is fastened by means of 4 THM 6 x 1.25 screws; the petrol tank filler cap is a sealing cap, which fits in an opening in the rear R.H. fender; the petrol filler neck is fastened to the fender inner flange by means of a collar.

The petrol gauge is fastened to the petrol tank front face, and slightly offset to the right; this float gauge controls the fuel level gauge on the instrument panel.

The vent tube, welded to the upper section of the petrol tank, runs up in the trunk along the rear seat back to run down again under the trunk floor; a regulator is fitted on this tube, at the petrol tank outlet, to avoid any risk of petrol leaks through this duct.

It consists of a nylon body comprising an internal partition and a float; in its upper section, the partition has an opening allowing the air to flow through; this opening may be plugged by the float if petrol flows in the regulator, and this inhibits any leak to the outside. (However, a 2 mm dia. hole, fitted with a 1.6 mm pin, allows a permanent flow of air through the partition when the float obstructs the main opening). (Fig. 1).

Fig. 1 A = Petrol from tank B = Vent tube outlet C = 1.6 dia. Pin G.014



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REMOVING AND RE-FITTING THE PETROL TANK AND FUEL GAUGE



Fig. 1 4243



Fig. 2 4244

Removing operations

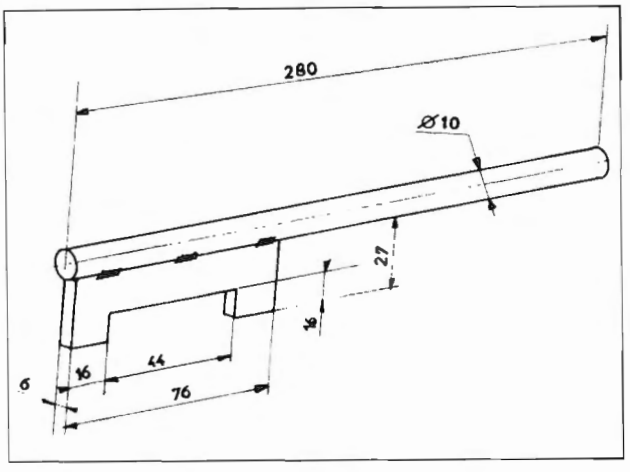
- Remove cap, and remove filler neck rubber in fender.
- Set car on lifting ramp. Raise lifting ramp.
- Disconnect flexible supply connection between tank and rilsan tube, and siphon tank to drain it.
- Disconnect gauge, taking note of wire colours.
- Disconnect vent tube regulator.
- Remove collar used to fasten filler tube to side reinforcement.
- Extract tank filler tube, and remove it from fender (Fig. 1).
- Remove 4 screws fastening tank to side-member, and remove tank.
- Use special wrench made as per (Fig. 3) to remove fuel gauge (Fig. 2).
- Recover vent tube and supply tube on gauge.

Note: the gauge may be removed, on the car, if the operator uses this special wrench after draining the tank, and disconnecting the electric wires.

Re-fitting operations

- Use special wrench to re-fit gauge.
- Re-connect vent tube and supply tube.
- Insert filler tube in fender, then slip rubber seal over it, and fit it into place in fender.
- Fit tank in position between both side-members, inserting the vent tube through the cross bar reinforcement (Panhard bar).
- Fasten tank.
- Slip filler tube fastening collar over tube, and insert tube in tank. (If necessary, smear end of tube with soapy water).
- Fasten filler tube collar to fender side reinforcement.
- Raise lifting ramp and re-connect vent tube to regulator, and supply tube to rilsan tube.
- Re-connect gauge.
- Lower lifting ramp, and fill tank after checking that it is properly sealed.
- Re-fit tank cap.

Fig. 3 G.051



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GENERAL SPECIFICATIONS

- Conventional diaphragm type, controlled by eccentric fitted on front end of camshaft.
- Fastened to cylinder head front cover.
- Delivery pressure: 245 to 295 millibar maximum, without delivery, whatever the number of cycles.
- Mean delivery pressure at 3,000 r.p.m. : 167 millibar for a delivery of at least 45 litre/hour.
- The petrol pump supply pipe is made of a polyamid; it runs in the tunnel, and is attached by means of tabs, which are welded to the body.

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GENERAL SPECIFICATIONS

Air filter

Cylindrical, in plastic material, fastened across the cylinder head cover by means of a strap surrounding it at the centre.

Access to the filter element is achieved by removing the cover fitted at the end of the air filter. This cover is held to the body by means of 4 fasteners.

The air enters the filter through a duct fastened to the fender flange by means of an end supporting bracket.

A rubber hose connects the filter to the carburettor; this hose is fitted with a side end-piece, which allows the oil fumes to be admitted in the carburettor; this fits directly on the carburettor cover for the 361 engine, and on an air inlet nozzle for the 341 engine; the air inlet nozzle is fastened to the carburettor by means of 4 stud bolts with nuts and washers; it is sealed by a paper gasket.

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CARBURETTOR SETTINGS

	361 Engine from No. 9.000.021	341 Engine from No. 1.000.001	
Make	WEBER	WEBER	
Type	34 ICR 8	38 ADS	
Nozzle	28	33	33
Emulsion block	4.5	4.5	4.5
Main jet	145	190	190
Correction jet	150	200	200
Emulsion tube	F.20	F.6	F.6
Enrichment - petrol			
- air	80		
- mixture	100		
Idling jet	50	55	55
Idling air	120	110	110
Progression holes	110 x 3	95/120/115/120	95/120/115/120
Pump jet	50 short	45	
Pump stroke	3 mm		
Pump bleed or discharge	Nil	40	
Needle valve	175	175	
Float weight	11 g	11 g	
Float level (with gasket)	7 mm		
Idling outlet hole			
Choke	manual	automatic, with choke valve	
Butterfly opening with choke valve closed	1.05	0.55	
Calibration of starting valve spring	23 to 30 g		

INLET MANIFOLD

Material: Aluminium alloy.

Foundry clean off sealing cap, Dia. 32, water chamber for warming air-fuel mixture. Hoses connect this chamber with the water outlet elbow on the cylinder head, and with the return system to the water pump.

Manifolds for 361 and 341 engines have different carburettor wells and different casting shapes:

- on 361 engine: a single well with a maximum diameter of 36.5, with 2 side stud-bolts designed for fastening the single body carburettor;
- on 341 engine: two twin wells with a minimum diameter of 39.7 separated by a screen with a central balancing 1.5 mm deep groove; 4 stud bolts for fastening the dual body carburettor.

In both cases, the inlet manifold is fastened to the L.H. side face of the cylinder head by means of 8 HM 7 x 1.00 nuts and tapered washers; it is sealed to the cylinder head by means of an untearable paper gasket, which is common to both types. A boss, which is drilled and tapped to M 14 x 1.50 is cast on the first cylinder duct to receive an end-piece for the servo-brake. A small end-piece is also screwed, at the centre, in a hole which is tapped to M 10 x 1.00, and which opens up in the carburettor central well to produce the required vacuum effect at low r.p.m.'s for the anti-pollution system.

The Swedish option, fitted with the 361 engine manifold and carburettor, also has a hole, tapped to M 10 x 1.00, on the 4th cylinder duct (hole provided for control system for a second ignition distributor cap).

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EXHAUST MANIFOLD

Material: Cast-iron.

Fastened to cylinder head R.H. side face by means of 8 HM 8 x 1.25 nuts.

Sealing: by means of a metalloplastic gasket.

The assembly joint plane with the front discharge tube has two outlets.

EXHAUST SYSTEM

The exhaust system is comprised of:

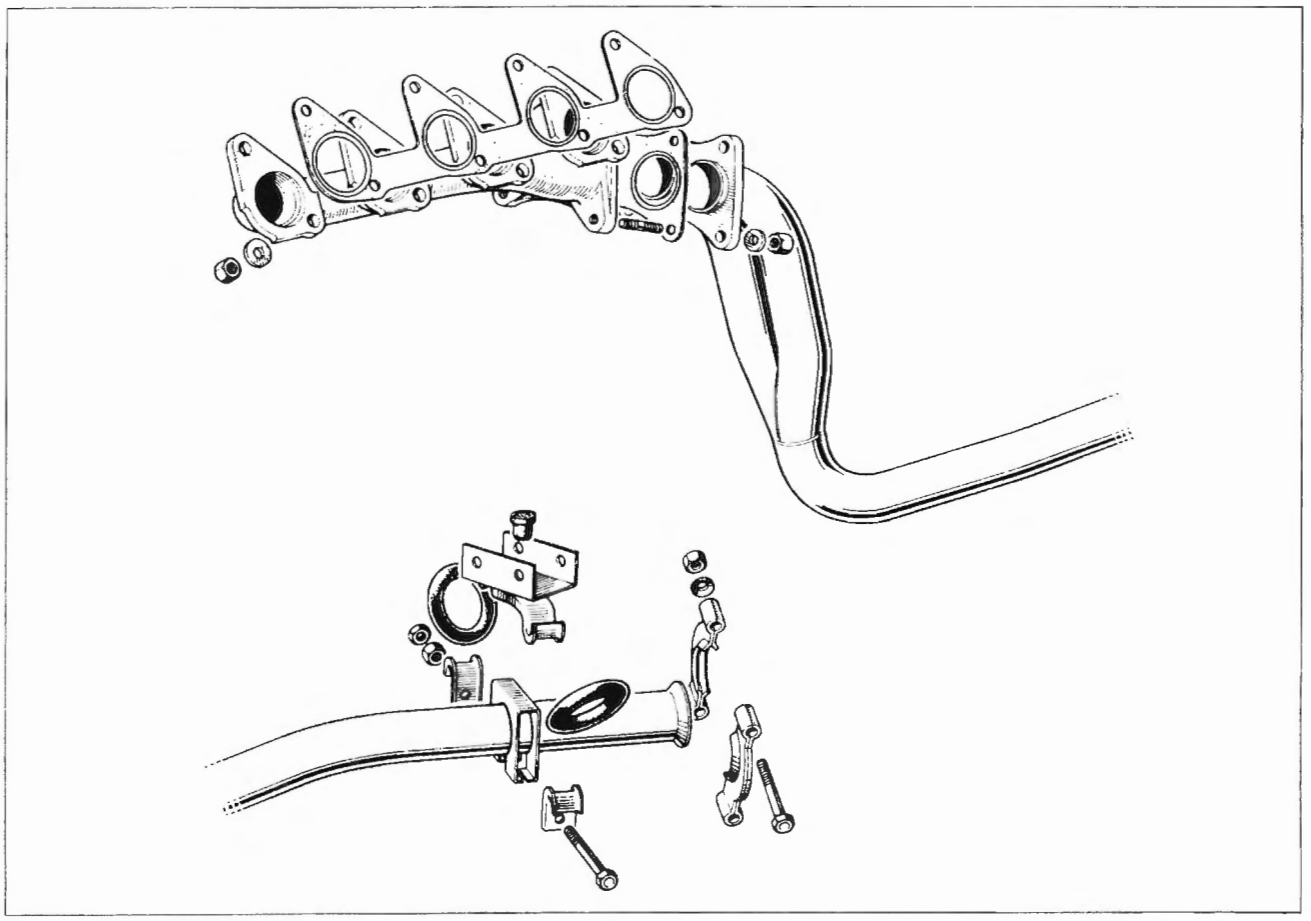
- A double end front section itself comprised of 2 tubes connected as a Y junction;
- A central section comprising: an inlet tube, a main silencer with an eiliptical section, and a swan-neck outlet tube running above the differential housing;
- A rear section comprising: an inlet tube, a rear silencer with a cylindrical section, and an outlet tube discharging the gases longitudinally in relation to the vehicle, but offset to the left.

The front section is connected to the manifold by means of a double flange fastened by M 8 x 1.25 nuts and washers and stud bolts fitted on the manifold joint plane; this assembly is sealed by a gasket.

The complete assembly is supported in three points:

. The front section is held by a stirrup to a sheet metal support bracket fastened to the rear end of the gear box (Fig. 1);

Fig. 1 G.021

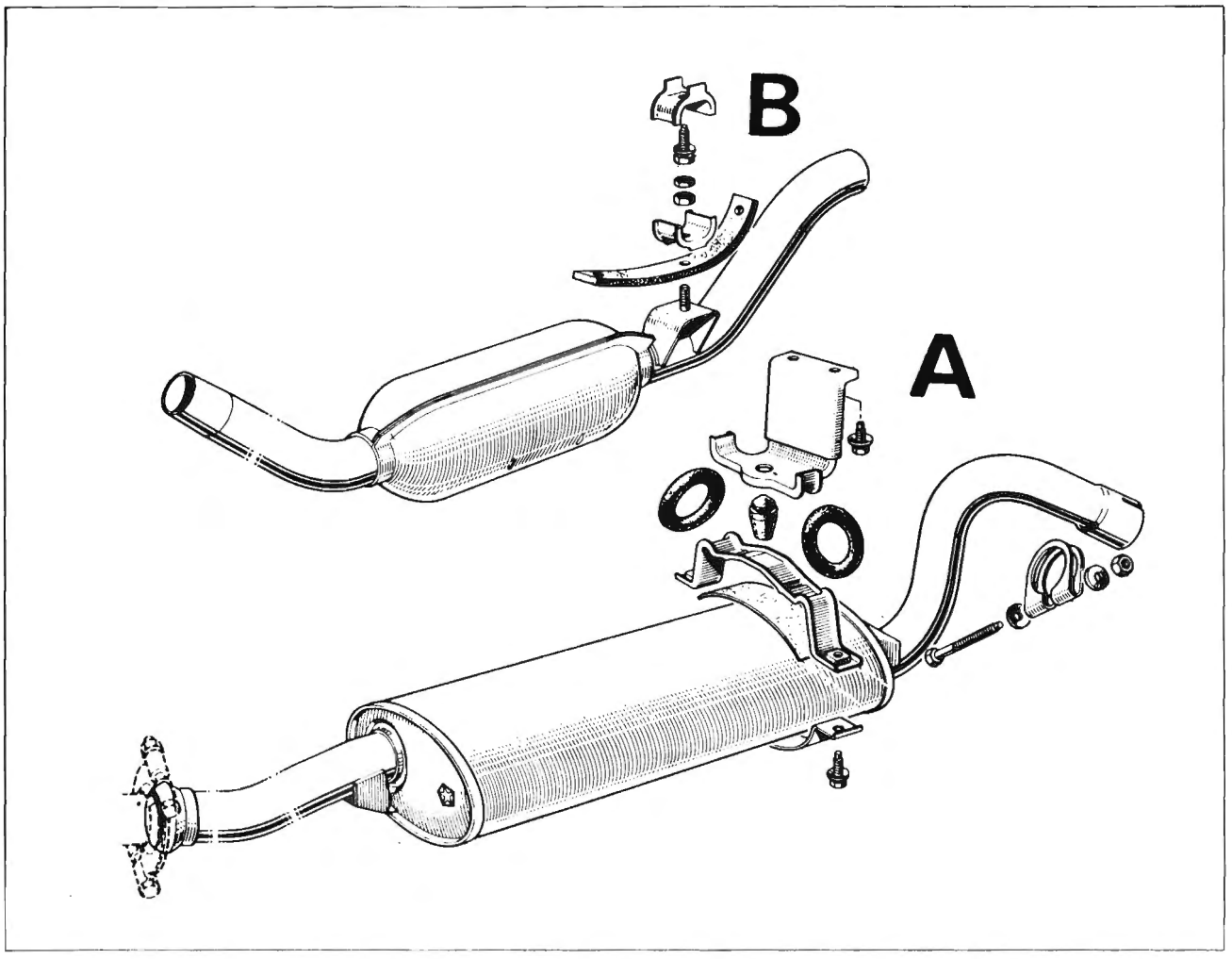


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. The central section is held by two rings shaped straps anchored to two half collars clamping the main silencer, and to an angle bracket fastened to the body by means of 2 THM 8 x 1.25 screws (A) (Fig. 2);

. The rear section is held by a tab welded on the rear silencer outlet tube, and by a drilled strap fastened to the body by means of a screw and a retainer (B) (Fig. 2).

Fig. 2 G.015



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D0 - GENERAL

D0/I - General specifications

D0/I - Thermostat

D0/I - Water outlet box

D0/I - Radiator

D0/I - Fan

D0/I - Water pump

D2 - FAN

D2/IV - Air-gap checking, and adjustment, if required

D2/V - Removing and re-fitting the releasable fan on the 341 engine

D2/VI - Dismantling and re-assembling the releasable fan on the 341 engine

D2/VI - Checking the releasable fan

D3 - HOSES

D3/IV - Procedure for removing and re-fitting hose fastening clips (Corbin collars)

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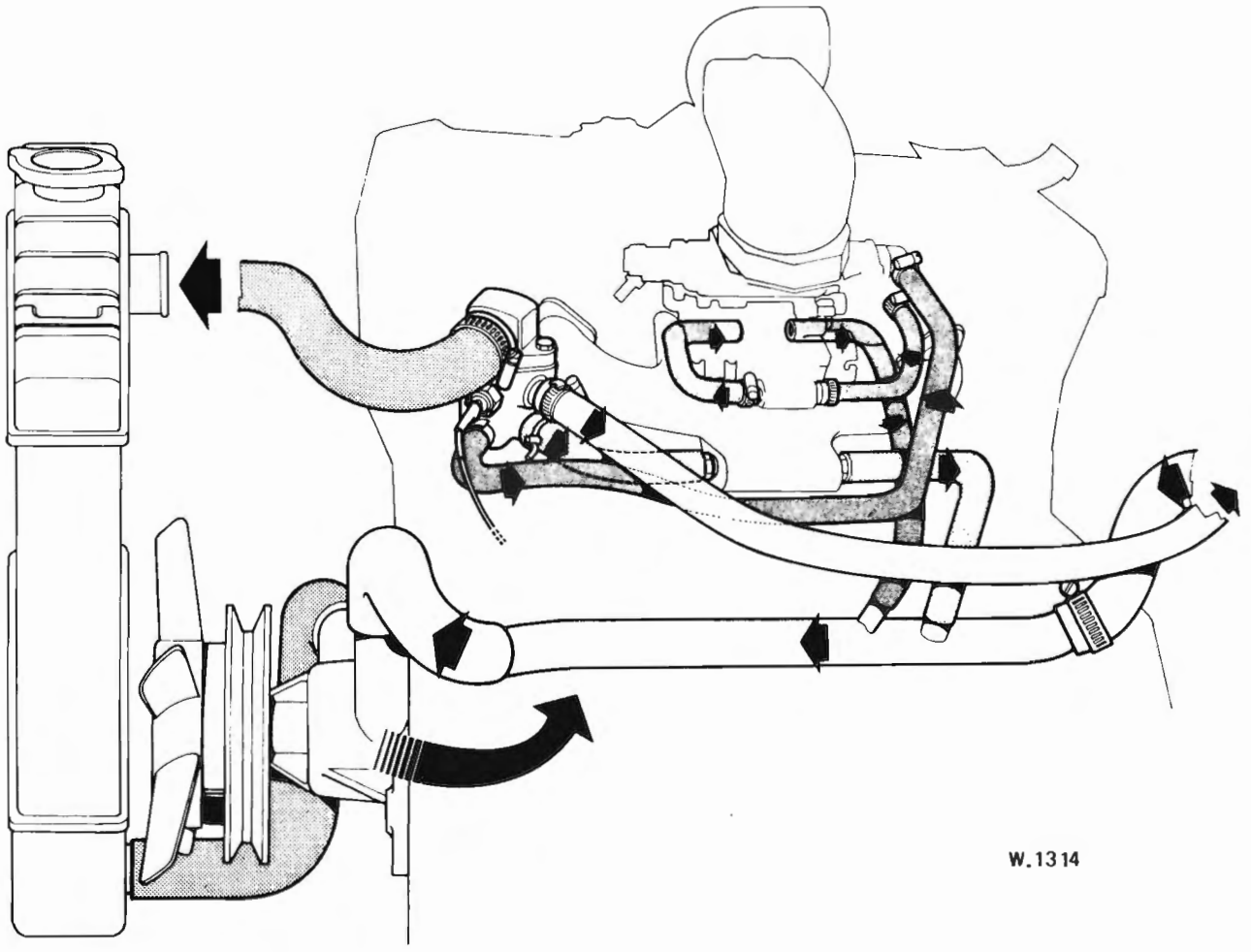


Fig. 1

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GENERAL SPECIFICATIONS (Fig. 1)

The engine is cooled by water, which circulates under pressure through the cylinder block and cylinder head under the effect of a centrifugal pump.

The required water is cooled in a radiator fitted at the front of the vehicle.

341 Engine

A releasable electric fan activates water cooling by accelerating the flow of air through the radiator core.

The releasable fan is actuated by a thermostatic contactor fitted on the radiator lower water box. This contactor closes for a water temperature of $95^{\circ}C \pm 1.5$, and opens for a temperature of $86^{\circ}C \begin{smallmatrix} +2 \\ -1.5 \end{smallmatrix}$.

361 Engine

The fan, which is fitted at the end of the water pump, is controlled by a pulley and a belt.

361 and 341 Engine

A double action thermostat, fitted on the water outlet box on the cylinder head, is used to regulate water circulation; it interrupts the flow of water to the radiator as long as water temperature remains below $78^{\circ}C \begin{smallmatrix} 0 \\ -3 \end{smallmatrix}$, and it cuts out the warming-up system for the inlet manifold, the cold start device, and the carburettor base when water temperature exceeds $90^{\circ}C$.

THERMOSTAT

Thermostat starts to open at a temperature of: $78^{\circ}C \begin{smallmatrix} 0 \\ -3 \end{smallmatrix}$.

Minimum thermostat opening: 9 mm at $90^{\circ}C$.

WATER OUTLET BOX

Material: Aluminium alloy.

Comprised of: a body and a cover.

The thermostat is fitted between the body and cover.

The cover is fitted with a cast end-piece, which has a diameter of 40 mm; it is assembled to the body with a seal.

The body receives 3 threaded end-pieces designed to accommodate the inlet manifold, air-conditioner radiator, and carburettor warming-up hoses.

RADIATOR

Radiator capacity:

Total system capacity:

- 9.5 litres (361 engine),

-10 litres (341 engine).

Radiator cap calibrated at: 500 millibar $\begin{smallmatrix} +50 \\ -75 \end{smallmatrix}$

Core: Steel.

Fastening: 4 points at front of vehicle on two side panels.

FAN

Material: Polypropylene.

6 equidistant blades, fastened to sheet metal pulley on 361 engine, and to releasable hub on 341 engine:

- by means of 4 THM 7 x 1.00 screws on 361 engine,
- by means of 3 THM 6 x 1.00 screws on 341 engine.

Static balancing: 5 g/cm maximum.

WATER PUMP

Type: Centrifugal.

Fitted at front of engine, and fastened by 7 THM 7 x 1.00 screws to timing gear cover; controlled by V belt connecting crankshaft pulley and alternator pulley.

On 361 engine, the driving pulley is made integral with the pump shaft through an assembled hub fastened to the shaft; it is fastened in common with the fan.

On 341 engine, however, the pulley is fastened to the releasable fan assembly, at the rear; the fan is fastened to the releasable hub at the front.

The shaft and pump bearing are integral; the other end of the shaft accommodates an assembled and fastened sheet metal turbine, which activates the circulation of water.

A paper gasket provides a seal between the pump assembly and the timing gear cover.

Operation

The turbine blades draw the cooled water in the radiator lower water box and in the return header from the air-conditioner radiator, carburettor base, and inlet manifold; this water is then directed and made to flow in the cylinder block through the timing gear cover.

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- Drain cooling system (recover water + anti-freeze mixture).
- Disconnect radiator water inlet and water outlet hoses.
- Remove radiator.
- Remove fan blades.
- Loosen 3 nuts (B) (Fig. 1) from adjustment screws (A).
- Turn 3 adjustment screws (A) until a .3 mm clearance, measured with spacers, is obtained.
- Re-tighten 3 nuts (B).
- If, after air-gap has been adjusted, engagement is still unobtainable with direct supply, replace fan assembly.

  Note: Normal air-gap must be .25 to .35 mm.

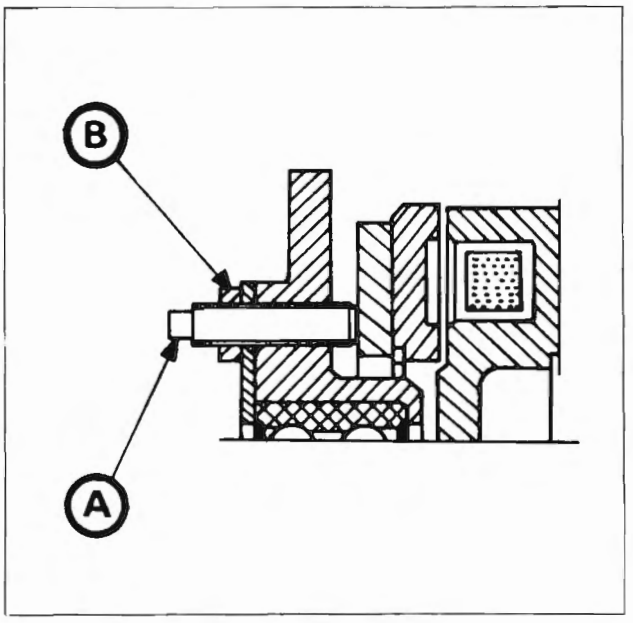


Fig. 1 G.043

Emergency repair

If engagement is unobtainable:

- Loosen 3 adjustment screw lock-nuts.
- Tighten 3 screws, but not excessively.
- Re-tighten lock-nuts.
- Operation will be continuous until appropriate repair can be carried out.

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REMOVING AND RE-FITTING THE RELEASABLE FAN ON THE 341 ENGINE

REMOVAL PROCEDURE

Any operation to be carried out on the water pump or releasable fan calls for the removal of the water pump fan assembly.

- Drain cooling system (recover water + anti-freeze mixture).
- Disconnect radiator water inlet and water outlet hoses.
- Remove radiator.
- Remove fan blades (air-gap adjustment operations may be carried out from this stage).
- Loosen and clear drive belt.
- Remove screws fastening water pump to cylinder block.
- Remove water pump and releasable fan assembly.

RE-FITTING OPERATIONS

- To re-fit the water pump - releasable fan assembly, proceed in reverse order.

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DISMANTLING PROCEDURE

- To dismantle the releasable fan from the water pump, use extractor Ref. 21609 A. This calls for:

  . loosening the crenellated nut fastened at the end, and removing it with a ratchet wrench fitted with end-piece Ref. 20953 V.

- Remove lock and screw extractor in position in its place.
- Tighten central extractor screw until releasable hub is completely separated from water pump.
- Remove extractor.



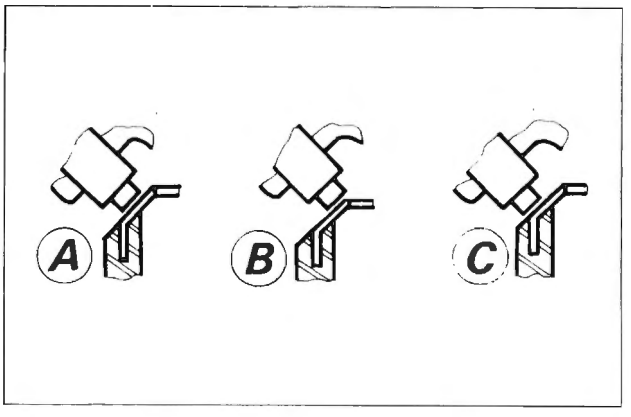
Fig. 1 4125

RE-ASSEMBLY OPERATIONS

A press must be used to re-assemble the releasable fan.

- Place fan assembly, wrong side up, to rest on a bush, Ref. 20906 X, on the table of an hydraulic press.
- On water-pump body, fasten pin-holder Ref.21615 P in replacement of brush-holder.
- Place water pump in position in fan.
- Insert pump in fan, fitting a 10 mm dia., 30 to 40 mm length of rod between press nose and water pump shaft end.
- During this operation, insert pin supplied with pin-holder in pin-holder bore in order to check the position of the brush in relation to the slip-ring (Fig. 1).
- This pin, with an end diameter of 6.5 mm must be perfectly centred on the slip-ring bearing (A) (Fig. 2).
- The purpose of this operation is to check the exact position of the fan in a movement of translation on the water pump shaft to obtain a correct alignment of the pulley.

Fig. 2 A = Correct locating
B and C = Incorrect location A 463



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CHECKING THE RELEASABLE FAN

In case of a faulty operation of the cooling system (e.g. temperature indicator pointer persistently near red area), check as follows, with engine idling:

a) check that thermo-switch + terminal (grey wire) is live;

b) from battery +, directly feed successively points 1 - 2 - 3 of electric circuit (Fig. 3).

If, with direct supply at (1):

. engagement is obtained - feed (2);

. engagement is not obtained - adjust air-gap.

If, with direct supply at (2):

. engagement is obtained - feed (3);

. engagement is not obtained - remove, check and clean brush-holder, clean slip-ring.

If, with direct supply at (3):

. engagement is obtained - replace thermo-switch;

. engagement is not obtained - there is a cut in the wire from the thermo-switch to the brush-holder.

Note: cleaning the slip-ring must be carried out with a clean cloth and, if really necessary, it may be slightly polished with a very fine abrasive paper.

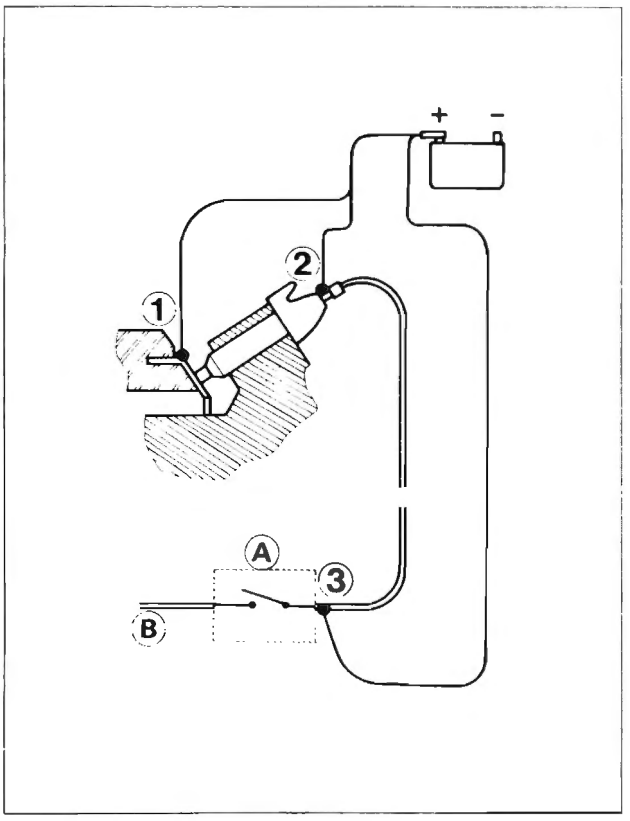


Fig. 3 A = Thermo-switch
B = Red wire input
A 461

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REMOVAL PROCEDURE

- Use special pliers to increase collar diameter slightly to enable it to slide over hose, and to be extracted (Fig. 1).

RE-FITTING OPERATIONS

- Place collar on end-piece of tube to be connected with hose. Fit hose on end-piece (Fig. 2).
- Use special pliers to increase collar diameter slightly to enable it to slide in position over hose (Fig. 3).

After assembly, try to turn collar by hand; if it turns, it must be replaced.

Note: during removal or re-fitting operations, take great care not to open collar more than necessary in order not to exceed its limit of elasticity, as this would prevent collar from returning to its initial diameter, and would be detrimental to proper hose fastening, with all resultant risks.

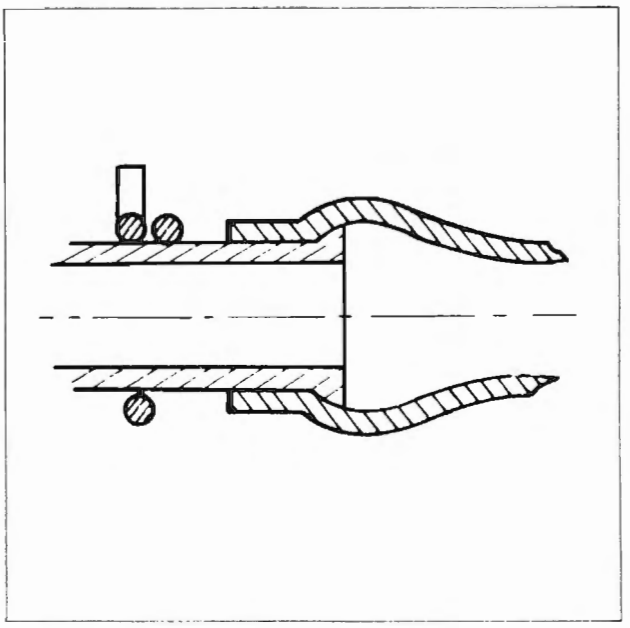


Fig. 2 Z.1261

Fig. 1 Z.1260

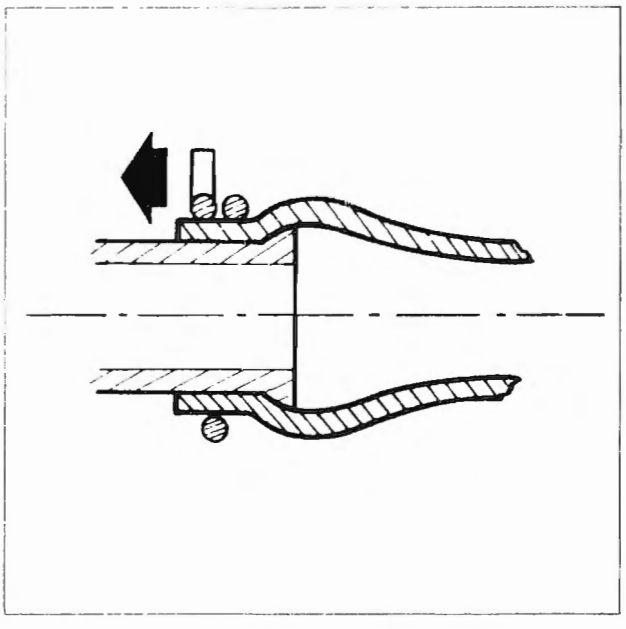
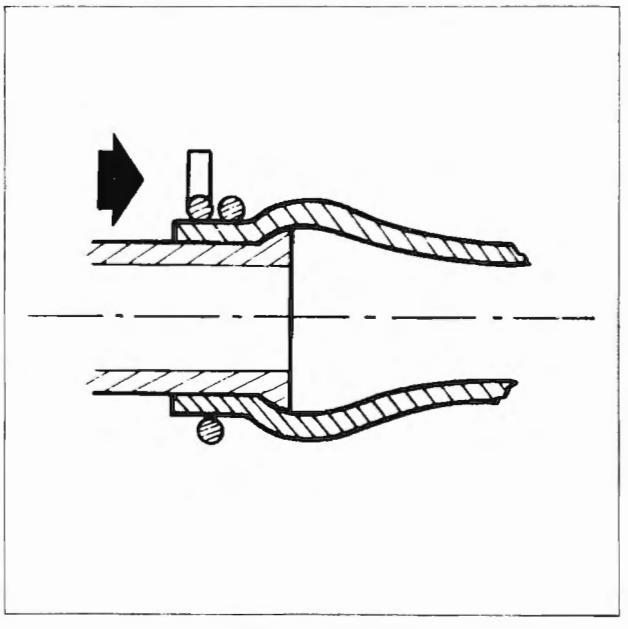


Fig. 3 Z.1260



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E0 - GENERAL

E0/II - Tightening torque values

E0/III - Specific tooling

E1 - STARTING

E1/I - General specifications

E1/V - Removing the starting motor

E1/VI - Dismantling and re-assembling the Paris-Rhone starting motor

E2 - CHARGING

E2/I - General specifications

E2/I - Description of alternator charging system

E2/I - Function of regulator and charge indicator lamp

E2/IV - Belt tension adjustment

E2/IV - Checking charging system on vehicle

E2/V - Removing and re-fitting the alternator on the vehicle

E2/VI - Dismantling and re-assembling the Ducellier alternator

E2/VI - Dismantling and re-assembling the Paris-Rhone alternator

E3 - IGNITION

E3/I - General specifications

E3/I - Advance curves

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TIGHTENING TORQUE VALUES

(See Section "A0 - Engine Assembly")

SPECIFIC TOOLING

Offset 0 Ammeter (scale from 0 to 35 A minimum).

Variable resistor 1 50 Amps. approx.

Multiple scale voltmeter (0-4, 0-20 V, for instance).

Revolution indicator.

Percussion screw-driver BEM 506.

Templet ..... 21610 W

Note: the first three instruments above may be replaced by a carbon-pile ammeter-voltmeter.

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GENERAL SPECIFICATIONS

Battery

Voltage rating: 12 V.

Capacity: 40 A/h.

Location of terminals: positive at left (terminals facing observer).

Negative pole earthed.

Dimensions: L = 260, W = 140, H = 180.

Normal electrolyte density for a charged battery:

$29^{0}5$ to 32^{0} Baume at $40^{0}C$.

31^{0} to 33^{0} Baume at $20^{0}C$.

$32^{0}5$ to 34^{0} Baume at $0^{0}C$.

Starting motor

Positive control solenoid type.

Fastened to cylinder-block by means of 2 screws and 1 bolt.

Gear: 9 teeth.

Gear/Starting motor crown-wheel reduction

ratio $\frac{9}{136}$ or $\frac{1}{15}$ approx.

REMOVING THE STARTING MOTOR

- Disconnect battery.
- Disconnect starting motor wires.
- Remove starting motor bolt and 2 screws.
- Remove starting motor.
- To re-fit starting motor, proceed in reverse order.

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DISMANTLING AND RE-ASSEMBLING THE STARTING MOTOR

DISMANTLING PROCEDURE

- Disconnect field magnet supply wire from solenoid.
- Remove solenoid 3 fastening nuts on starting motor nose.
- Remove solenoid, recover spring.
- Remove dust-cap from armature stop.
- Remove armature stop, using a screw-driver to immobilize the starter gear, and recover spacers, i.e. in the following order:

. 1 metal washer;

. 1 onduflex washer;

. 1 metal washer;

. 1 fibre washer.

- Remove 2 rear flange setscrews.
- Clear rear flange, clear brushes.
- Remove rear flange.
- Recover armature end washers, i.e. in the following order:

. 1 fibre washer;

. 1 flat washer;

. 1 onduflex washer;

. 1 flat washer;

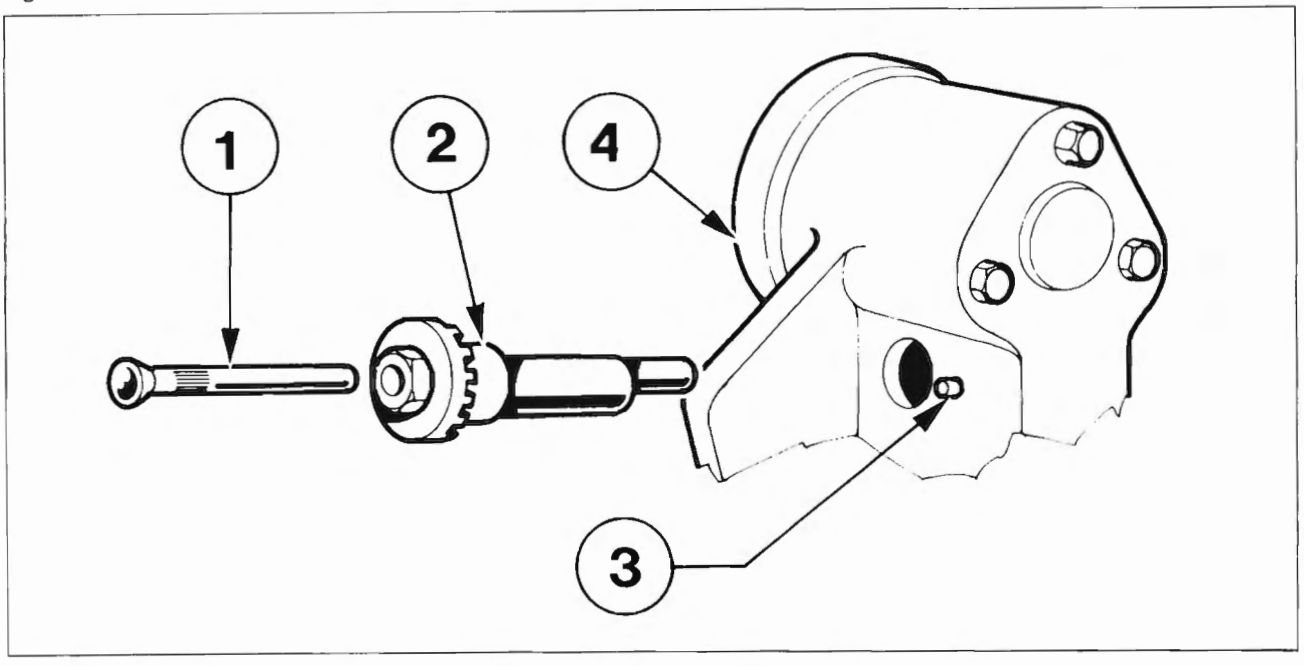
. 1 fibre washer.

- Remove shell.
- Remove moulded rubber between solenoid and shell, and remove rubber bearing washer.
- Apply lever pressure at end of fork shaft, to drive shaft out.
- Remove metal pin (1) (Fig. 1), then plastic pin (2).
- Remove fork and armature.
- Field magnets are removed with a BEM 506 percussion screw-driver.

RE-ASSEMBLY

- Locate fork and armature on starting motor nose.
- Locate plastic pin (2) (Fig. 1) through fork and starting motor nose (4) (Fig. 1), but do not push it fully in to prevent it from being stopped in rotation by stud (3) (Fig. 1).

Fig. 1 G.033



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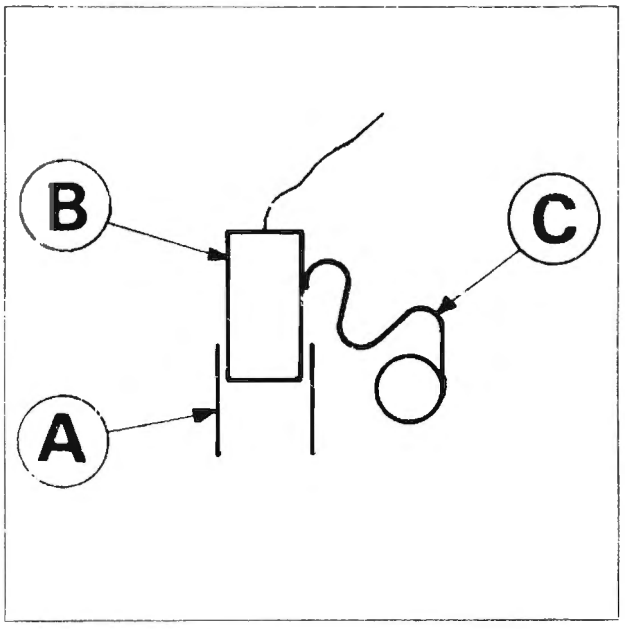
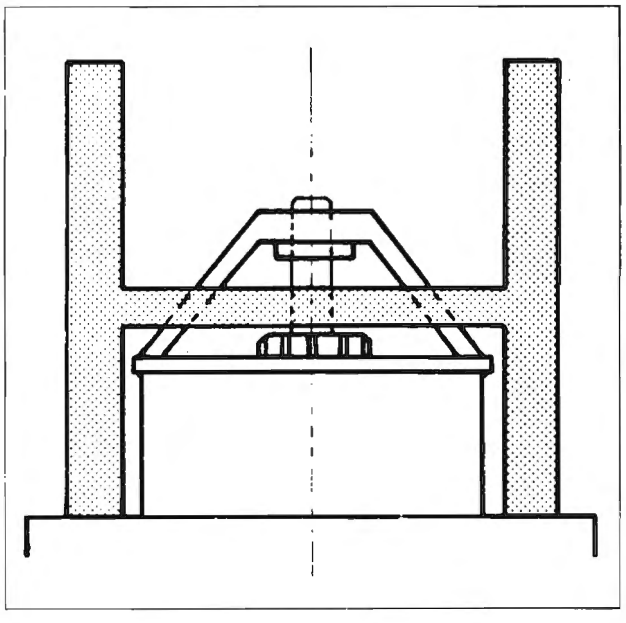


Fig. 2 A - Brush guide G.034
B - Brush
C - Bearing spring

- Fit bearing washer and moulded rubber.
- Fit shell.
- Fit take-up washers at armature end.
- Fit rear flange, holding brushes with their bearing spring (Fig. 2).
- When rear flange is located on slip-ring, reset springs in contact on brushes.
- Fit 2 rear flange assembly screws.
- Re-fit armature stop with its washers

Fig. 3 G.035



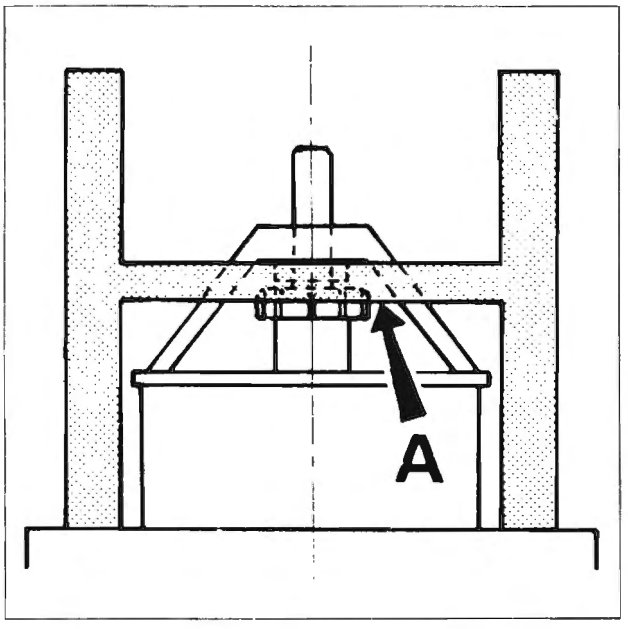


Fig. 4 G.035

- Re-fit cap on rear flange.
- Re-fit solenoid.

Gear setting

- To check gear setting, use templet Ref. 21610 W.

Checking the gear in moved back position

- Use small side of templet (Fig. 3).
- Small side of templet must pass freely without touching upper part of gear.

Checking the gear in forward position

- Feed solenoid with a 12 volt supply.
- Check that, in forward position, gear is not in contact with armature stop.
- With large side of templet, check that upper face of gear is higher than templet face (A) (Fig. 4).
- To adjust setting, use fork plastic pin; the latter is fitted with an eccentric which allows the fork controlling the gear to be moved back or forward.
- Once the correct setting is obtained, push plastic pin in so that it can be stopped in rotation at the notch which is closest to the setting obtained; then fit metal pin through plastic pin.

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GENERAL SPECIFICATIONS

The charging system is comprised of an alternator, a voltage regulator, and a condenser.

Alternator

	341 Engine	361 Engine
Identification	Blue Ref. Mark Single Phase 12 V	Red Ref. Mark Single Phase 12 V
Maximum power	430 W under 14 V	380 W under 14 V
Field magnet resistance	5.5Ω	7Ω

2 rectifier diodes
1 insulating diode
Driving ratio = $\frac{\text{alternator revolutions}}{\text{engine revolutions}}$ = 1.8

Regulator

	341 Engine	361 Engine
Identification	Blue Ref. Mark	Red Ref. Mark
Valid for field magnet resistance of	5.5Ω	7Ω
Regulating voltage	14.6 to 15.1 V Absorption and thermal compensation resistor	

Condenser

Valid for field magnet resistance of:

5.5Ω (341 engine)

7Ω (361 engine)

Capacity: 470 microfarad.

Connexion: fitted between + terminal, regulator, and earth.

Note: the original 341 engine condenser can be fitted on the 361 engine.

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DESCRIPTION OF ALTERNATOR CHARGING SYSTEM

The charging system is essentially comprised of an alternator and a charge regulator (see Fig. 1).

Alternator

The alternator is, fundamentally, an A.C. generator.

Its main components are:

The rotor, or wound field magnet, which runs on 2 bearings and is fed by two brushes rubbing against two polished slip rings.

The field current admitted in the rotor winding is limited by the regulator.

The stator, or armature, which is comprised of two windings.

The housing, which carries the following terminals:

. BAT or + terminal.
. AUXILIARY terminal to connect the charging indicator lamp.
. EARTHING terminal.
. FIELD CURRENT.

In operation, two diodes included in the stator circuit, between earth and the armature winding output, rectify the alternating current produced by the alternator.

Another diode, known as the insulating diode, allows a charging indicator lamp to be fitted, whilst preventing the battery from discharging through this lamp and preventing the field magnets from remaining permanently live when switched off.

Fig. 1

1 : Adjustment resistor.
2 : Compensation resistor.
3 : Absorption resistor.
4 : Relay.
5 : Contact.
6 : Contact.
B : Charging indicator.
C : Current consuming units.
D : Battery.
E : Insulating Diode.
F : Stator.
G : Rotor.
H : Alternator.
J : Indicator lamp protection condenser.
K : Regulator.
L : Starting motor.
M : Rectifying diodes.
N : Auxiliary terminals.

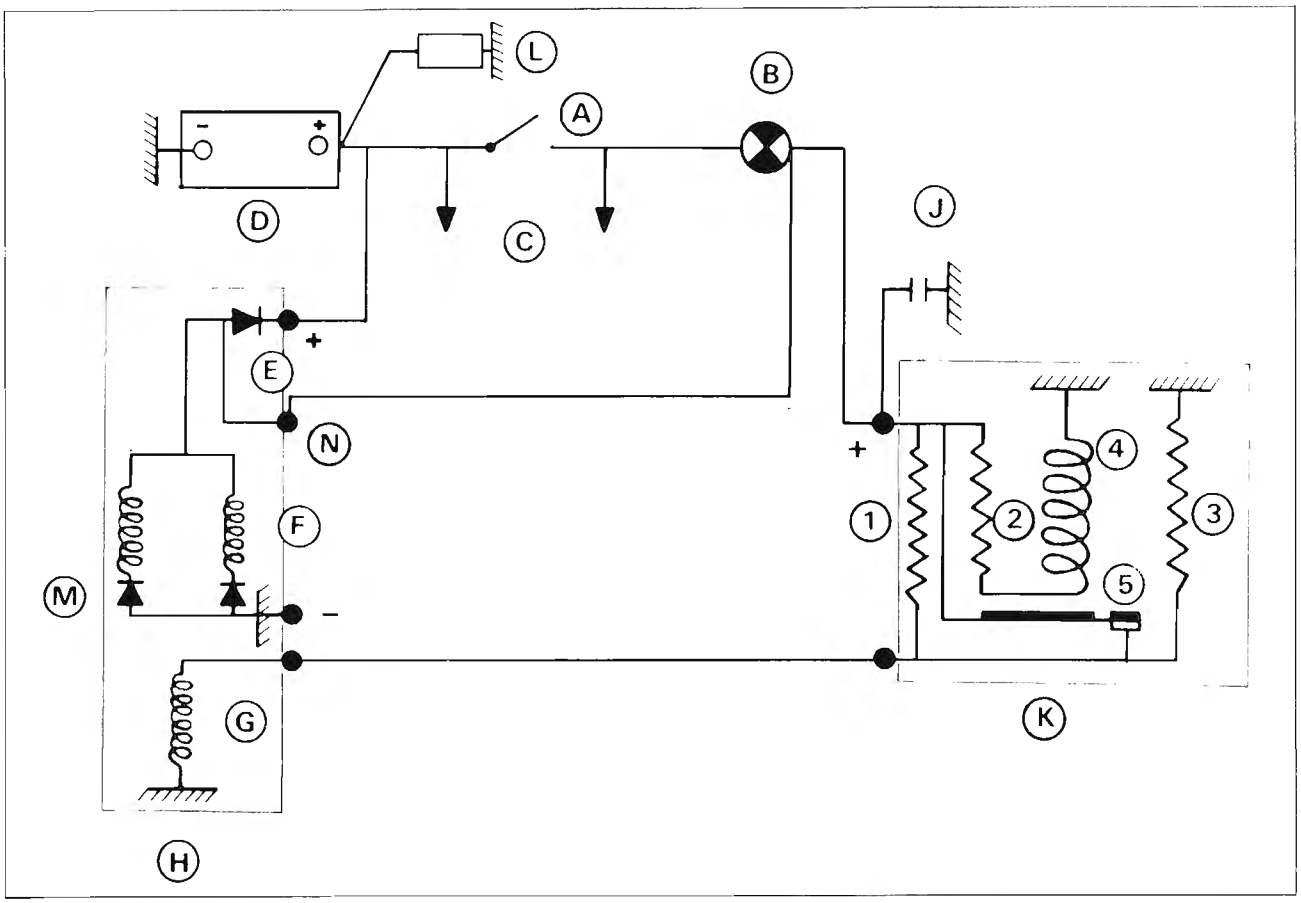


Fig. 1

Z 1266

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REGULATOR

The only function of the regulator is to limit the alternator output available at its + terminal.

This regulating function is achieved by controlling the current admitted in the rotor excitation circuit.

The regulator is fitted on the excitation circuit between the auxiliary terminal and the alternator excitation terminal. One of the regulator terminals is identified by a + ref. mark, and the other by the EXC. ref. mark.

The regulator + terminal is connected to the battery through the ignition and indicator lamp contactor, so that the excitation circuit is closed only when ignition is switched on.

The regulator has a 2 position "closed" and "open", relay.

In the first position, when the regulator coil terminal voltage is comparatively low, there is not enough current for the relay contacts to open. In this case, the excitation circuit is fed directly, and the primary field is at its maximum level.

When coil terminal is sufficient to open the contact, supply is achieved through the regulating resistor.

The current of excitation is then reduced, as well as the primary field, and the alternator output falls sharply.

In effect, the regulator is a vibrating relay, and the absorption resistor, arranged between earth and the excitation circuit, is designed to reduce the arc at the contacts of this relay.

Also, the operation of the relay is stabilized by means of a thermal compensation resistor connected in series with its winding.

Furthermore, a 470 microfarad condenser, fitted between the regulator + terminal and earth, protects the charge indicator lamp.

CHARGE INDICATOR LAMP

Alternator energizing excitation

The indicator lamp allows a low current to be admitted initially in the field magnet, and this allows energizing to be achieved at a lower rating.

Charge indicator lamp

Initially, when ignition is switched on, the indicator lamp, fed by the battery, lights up, return to earth being achieved by the regulator and field magnet windings.

When the engine speed increases as soon as the alternator + terminal voltage increases, it has the effect, through the wire connected to the auxiliary terminal, of balancing the lamp terminal voltage, and the lamp is gradually switched off.

Note: if the lamp does not switch off, before concluding that the alternator does not produce any current, make sure that there is no cut in the wire running from the alternator auxiliary terminal to the charge indicator lamp: when ignition is switched on, the auxiliary terminal must be live. Use a voltmeter to check this.

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ADJUSTING BELT TENSION

On loosened belt, use grease paint stick to mark two reference lines at 100 mm from one another.

Tighten belt until this distance becomes 102 mm.

Then lock adjuster bolt to prescribed torque on circular segment, and also lock alternator fastening screw to cylinder block.

CHECKING THE CHARGING SYSTEM ON THE VEHICLE

Preliminary precautions

- Fit fender covers to protect paintwork.
- Check tension of alternator driving belt.
- Check battery and its connections.
- As the alternator + terminal is always live, never earth it, whether the engine is running or not; otherwise, battery would be short-circuited.
- When ignition is switched on, never run alternator without its + terminal being connected to the battery.
- Polarizing an alternator is unnecessary, since excitation is achieved directly by the battery.
- Energizing is not dependent on remanent magnetism as in the case of generators. The presence of the indicator lamp, however, facilitates energizing.
- Disconnect battery before removing alternator or regulator.
- Take care not to allow any oil or liquid in cooling air intakes. The liquid could reach the slip rings, and the alternator would no longer be energized.
- Before connecting a charger to the battery, disconnect the battery + cable.
- Never carry out any arc-welding operation on a vehicle fitted with an alternator, unless the alternator wires have been previously disconnected.

CHECKING PROCEDURES

Before undertaking any charge system checking operation, it is extremely important that the temperature of the components of this system should be stabilized.

This stabilization can be achieved:

1. by using the car normally, on the road, for a period of at least 30 minutes;
2. in the workshop, by idling the engine for approximately 20 minutes, this being followed by a period of 10 minutes at a slightly accelerated speed (1200 r.p.m.) after short-circuiting the regulator + and EXC terminals.

CAUTION: do not exceed the engine speed prescribed for this last stage.

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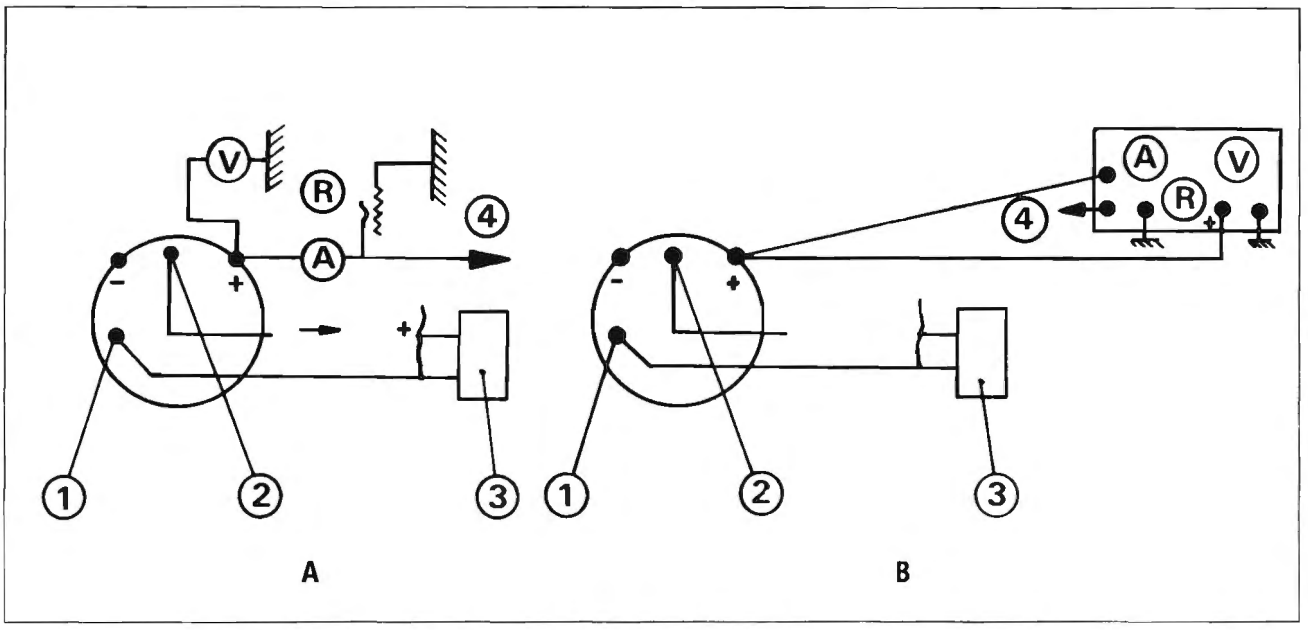


Fig. 1 A : WITH SEPARATE UNITS

B : WITH COMBINED INSTRUMENT.

1 : Excitation.
2 : Auxiliary.
3 : Regulator
4 : To battery +

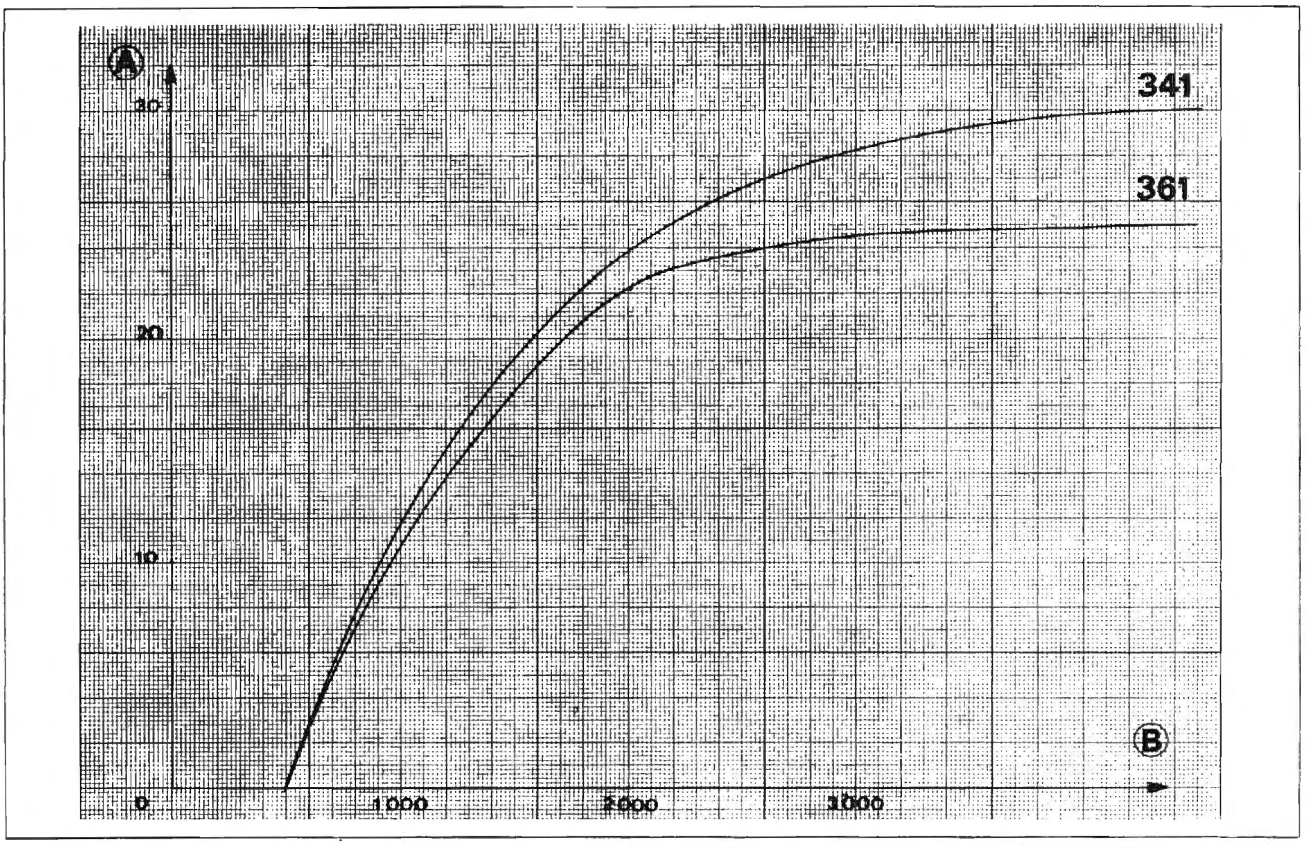
A : Ammeter.
R : Rheostat.
V : Voltmeter.

Z 1215 - Z 1216

Fig. 2 Alternator current curve.

A : Amps.
B : Engine r.p.m.'s.

G.036



1. - CHECKING ALTERNATOR OUTPUT

Check to be carried out after temperature of charging system units has been stabilized.

- Stop engine.
- Disconnect alternator + wire.

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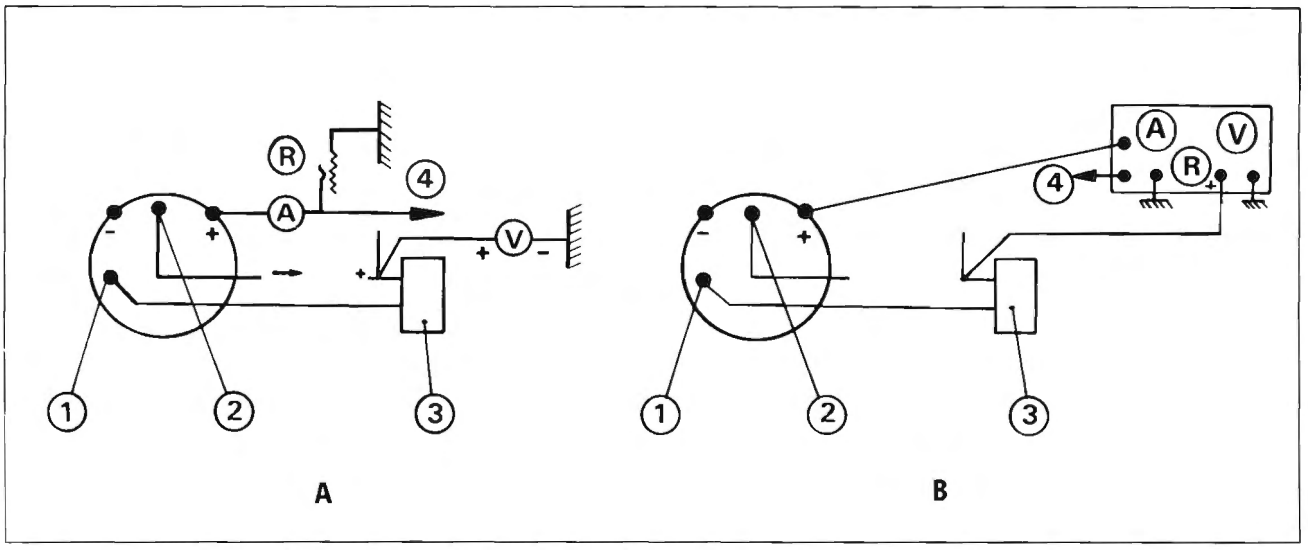


Fig. 3

Z 1217 - Z 1218

A : WITH SEPARATE INSTRUMENTS.
B : WITH COMBINED INSTRUMENT.
1 : Excitation.
2 : Auxiliary
3 : Regulator
4 : To battery +
A : Ammeter
R : Rheostat
V : Voltmeter

- Connect checking instruments as follows:

  with separate instruments (A) (Fig. 1),
  with combined instrument (B) (Fig. 1).

- Keep regulator + and EXC terminal short-circuiting wire fitted for temperature stabilization. If this wire is not present, fit one (case of stabilization on the road).

- Start engine, and note current outputs at alternator + pole, under a voltage level kept constant at 14 V, using the variable resistor.

These outputs must be as follows (Fig. 2)

Engine speed	Current output under 14 V	
	341 Engine	361 Engine
1000 r.p.m.	11 A	10 A
2000 r.p.m.	23 A	21 A
3000 r.p.m.	27 A	24 A

2. - CHECKING THE OPERATION OF THE REGULATOR

Undertake this test only after the temperature of the charging system units has been stabilized.

- Stop engine.
- Remove regulator + and EXC terminal short circuiting wire.
- Connect testing instruments as follows:

  with separate instruments (A) (Fig. 3),
  with combined instrument (B) (Fig. 3).

Checking the regulator calibration

- Start engine, and accelerate it to 2 750 r.p.m.
- Use variable resistor to set alternator output to:

  20 A for 341 engine,
  15 A for 361 engine.

> The voltage reading on the voltmeter must then be between 14.6 and 15.1 V.

Checking influence of engine speed

- Progressively bring engine speed to maximum whilst keeping current at 20 A level for 341 engine, 15 A level for 361 engine, using the variable resistor.

> The regulated voltage must remain constant with an accuracy of .2 V.

Checking influence of output

- Slow engine speed down to 2 750 r.p.m., vary alternator current output to 25 A for 341 engine, 20 A for 361 engine, using the variable resistor.

> The voltage reading on the voltmeter must be between 14.6 and 15.1 V.

When tests are completed, switch ignition off, and remove instruments.

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INTERPRETING THE RESULTS

RESULTS OBTAINED	PROBABLE CAUSES	REMEDIES
Output check		
Current lower than required levels	Loose or broken belt.	Tighten or replace
	Outer circuit cut.	Check circuit continuity (see operation No. 1).
	Field magnet (rotor) cut or shorted.	Check and replace if necessary (see operation No. 2).
	Armature (stator) cut or shorted.	Check and replace if necessary (see operation No. 3).
	Defective diodes.	Check and replace if necessary (see operation No. 4).
Regulator check		
Voltage falls outside of given limits	Defective regulator.	Replace.

OPERATION No. 1

Checking circuit continuity on vehicle

- Set car on lifting ramp, disconnect coil supply.
- Switch ignition, check that supply to all consuming units is indeed cut, and close doors.
- Note potential difference at battery terminals.
- Raise lifting ramp.
- Note potential difference between alternator + and - terminals.

  This must be identical with the reading obtained at battery terminals.

  This operation is designed to make sure that the alternator + terminal is connected to the battery, and that earthing is correct.
- Lower ramp, switch ignition off, re-connect coil supply.

OPERATION No. 2

Field magnet check (rotor)

Required tooling

1 Metrix ohmmeter (A) (Fig. 4) (do not use magneto ohmmeter or HV instruments) or 1 "electric bell" made up of 1 - 15 W/12 V bulb supplied by battery.

Procedure

- With ohmmeter
- Remove alternator.
- Measure field magnet resistance between EXC terminal and brush-holder earth.

  This resistance must be:

  7 approx. for 361 engine,
  5.5 approx. for 341 engine.

  If resistance reading is:

  . lower than this value, there is a short-circuit.

  Replace the field magnet.

  . much higher, the brushes are bearing poorly or not bearing at all on the slip-rings, or the field magnet is cut. Remove the brush-holders.

  Repeat test on slip-rings; if result is the same, the field magnet is cut: replace it.

Note: do not forget to calibrate the ohmmeter before use by bringing the pointer to zero when both ends of ohmmeter cables are in short-circuit.

- With electric bell
- Connect electric bell made up of a 15 W - 12 V bulb supplied by a battery between EXC terminal and brush holder earth (Fig. 5 - Paris - Rhone alternator) (Fig. 6 - Ducellier alternator).

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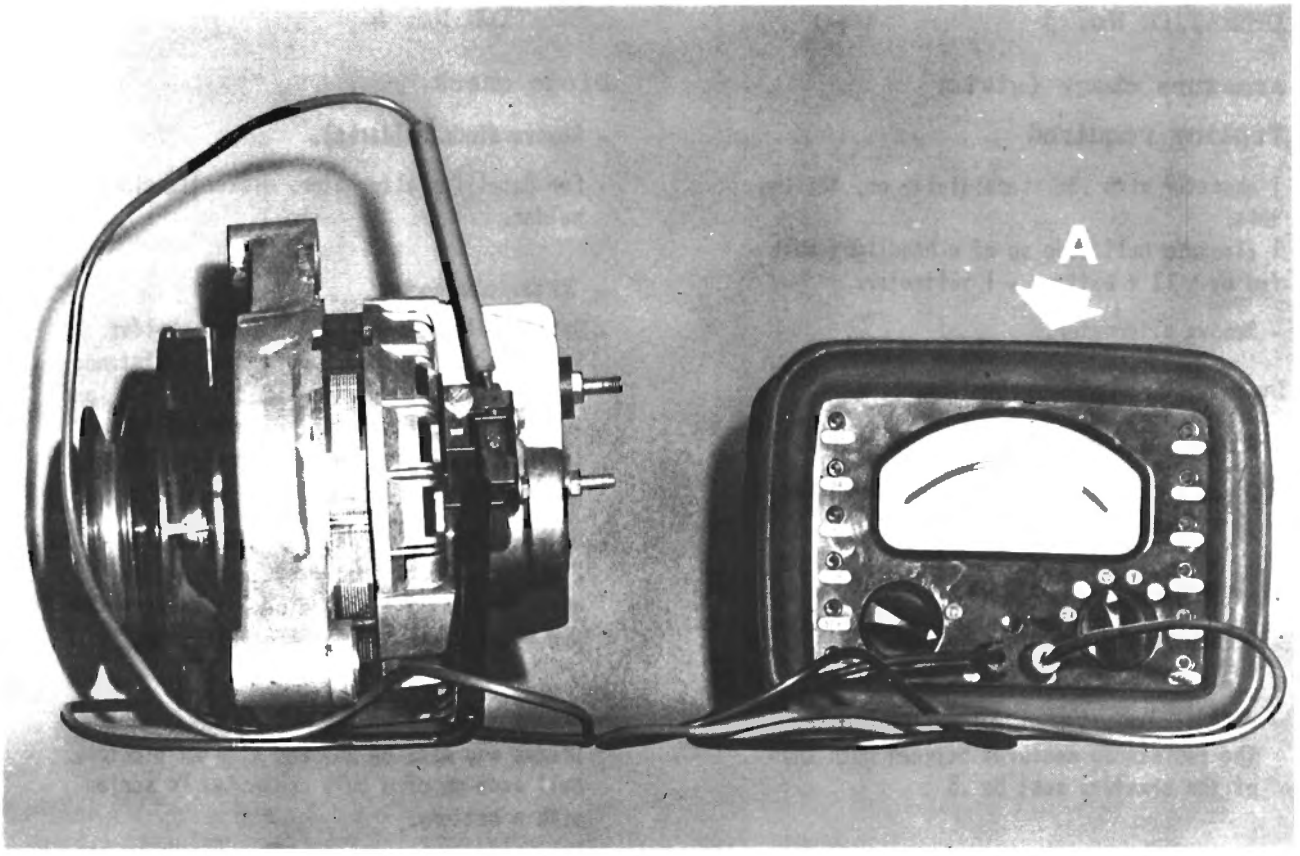


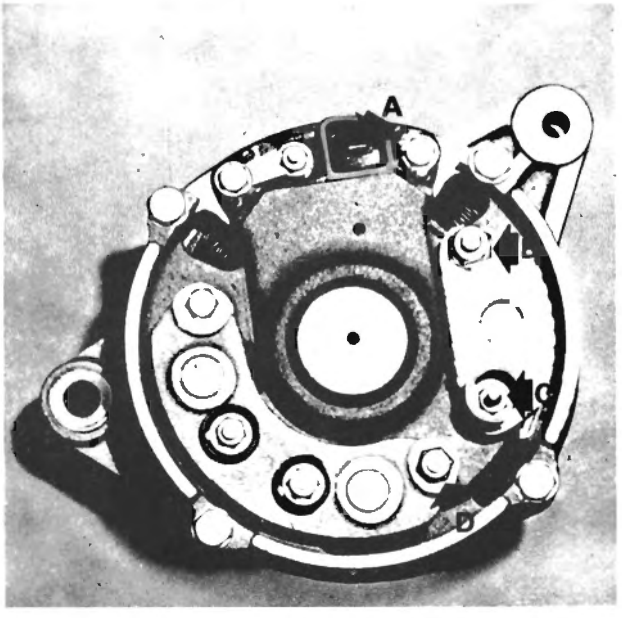
Fig. 4 2895

The bulb must be lit at half-brilliance level:

. if bulb is fully lit, there is a short in the field magnet : replace it.
. if bulb remains unlit, the field magnet is cut: replace it.

Note: the bulb may also remain unlit if the brushes are bearing poorly or not at all. Check this by removing the brush-holder.

Fig. 5 2896



Legend for Figs. 5 and 6:

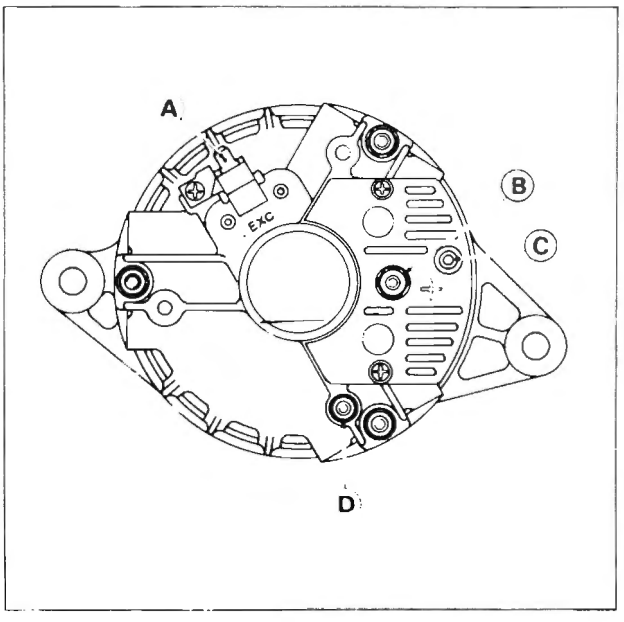
A - EXC terminal

B - + terminal

C - Auxiliary terminal

D - Earth

Fig. 6 G.037



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OPERATION No. 3

Armature check (stator)

Tooling required

1 ohmmeter with .5 sensitivity or, failing this,
1 electric bell made up of a headlight bulb fed by a 12 V battery + 1 voltmeter.

- Remove alternator.

Ducellier alternator

- Remove diode-holder plastic protection.
- Unsolder armature wires from diode-holder terminals.

Paris-Rhone alternator

- Remove rectifying diode-holder.

- With ohmmeter
The resistance measured between both ends of the armature must be .5

- With electric bell
The electric bell is connected between both ends of the armature. The potential difference then read between these two ends must be of approximately 2 V.

OPERATION No. 4

Diode check

- Remove diode-holder(s).
- For Ducellier alternator, dismantle diode-holder.

- With ohmmeter
- On insulating diode-holder (diode-holder with a single diode), check that resistance in one direction is from 15 to 30 ; and 400 k in the opposite direction (as an indication, on the Metrix ohmmeter, the pointer shows).
- On rectifying diode-holder (diode-holder with 2 diodes), check that resistance in one direction is, for each diode, from 15 to 30 and 400 k in the opposite direction.

- With electric bell
Diodes may also be checked with an electric bell made up of a bulb connected in series with a battery.

The bulb must light up when the current flows in one direction, and it must remain unlit in the opposite direction.

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REMOVAL PROCEDURE

- Disconnect battery.
- Remove bolt fastening alternator to circular segment (Fig. 1).
- Disconnect alternator wires.
- Loosen screw fastening alternator to cylinder block (Fig. 2).
- Loosen 2 screws fastening alternator to timing gear cover, remove driving belt.
- Remove alternator from underneath vehicle

RE-FITTING

- Proceed in reverse order from removal procedure.

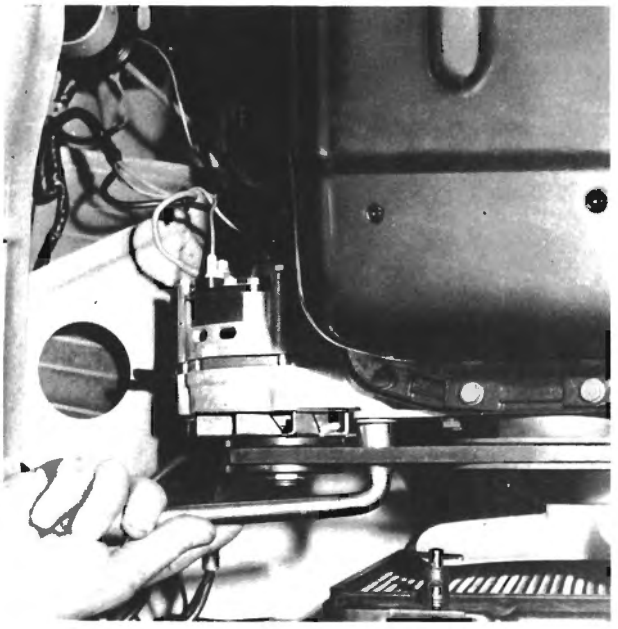
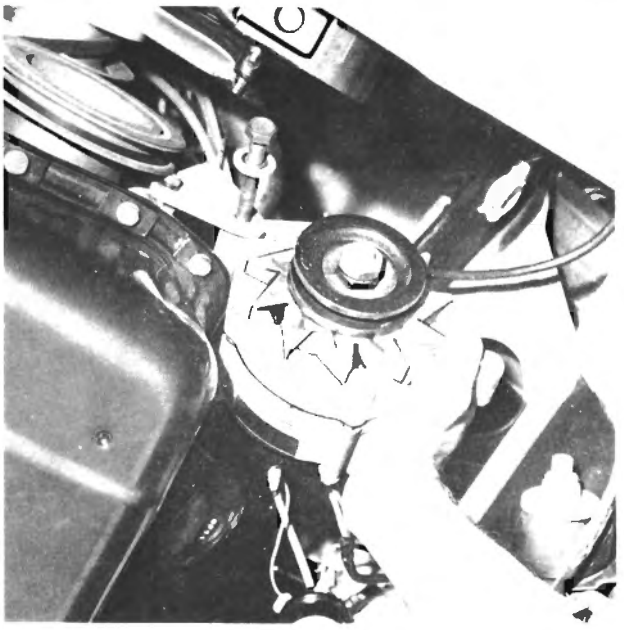


Fig. 2 4057

Fig. 1 4056



Fig. 3 4058



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REMOVING THE BRUSHES

- Remove each brush setscrew.

REMOVING THE INSULATING DIODE HOLDER

- Remove 2 plastic protection setscrews.
- Loosen and remove diode-holder retaining nut.
- Unsolder 2 rectifying diode supply wires.
- Clear both wires, clear small insulating plate by melting the solder down and using a small screw-driver as a lever.
- Remove metal washer and insulating washer.
- Unsolder both supply wires on small metal plate.
- Remove insulating diode-holder.

DISMANTLING THE ALTERNATOR

- Hold turbine in a vice fitted with claws.
- Remove 24 mm nut, and successively remove pulley, turbine, washer, key and bearing retaining washer.
- Use a centre-punch to mark the 3 components (2 half-housings + stator).
- Remove alternator assembly bolts.
- Remove brushes.
- Remove insulating diode-holder.
- Remove barrel and insulating washer under insulating diode-holder.
- Separate alternator components.
- On front housing, remove 3 bearing retaining plate setscrews, and remove bearing.
- To remove rear bearing, use fork Ref. 20895 L and a Dia. 11.8 pin (Fig. 1).

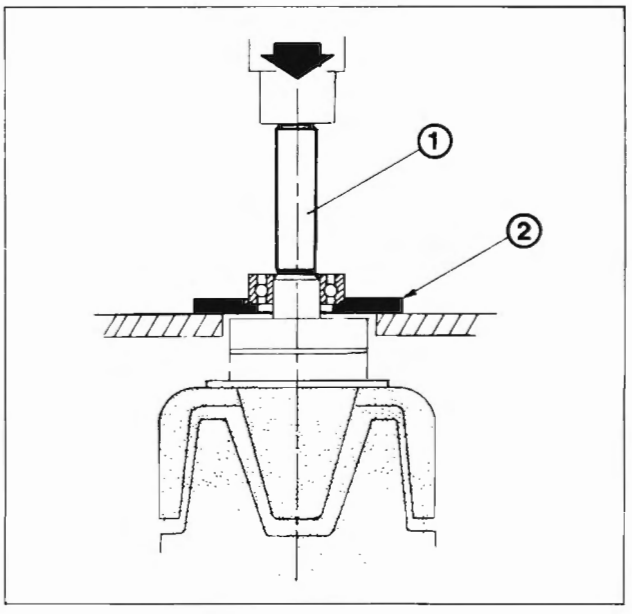
RE-ASSEMBLING THE ALTERNATOR

- To re-assemble the alternator, proceed in reverse order from dismantling procedure.

Very important note: for operations requiring the use of a soldering iron in the vicinity of the diodes, take the greatest care and proceed very quickly in order not to overheat the diodes; the latter resist a maximum temperature of 80° C.

Fig. 1 ① = 11.8 Dia. pin.
② = Fork Ref. 20895 L

A 600



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REMOVING THE DIODE-HOLDERS

- Insulating diode-holder

- Remove diode-holder fastening nuts (A) (Fig. 2).

  Note: the terminal, which is sunk in the plastic insulation is the auxiliary terminal.

- Rectifying diode-holder

- Remove fastening nuts and screws (B) (Fig. 2).

REMOVING THE BRUSH-HOLDER

- Remove setscrews (C) (Fig. 2).

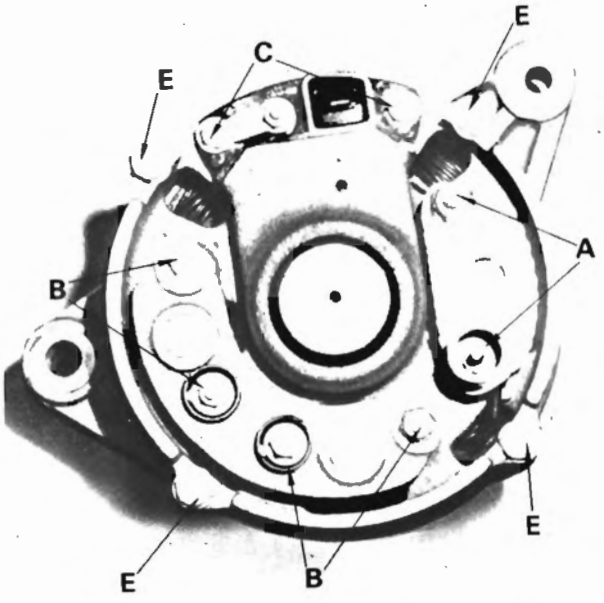
DISMANTLING THE ALTERNATOR

- Use centre-punch to mark 3 alternator components (front and rear housings, and stator).
- On front housing, disconnect field-magnet and armature wires.
- Use a vice fitted with claws to hold the alternator turbine, and loosen the pulley (24 mm wrench).
- Remove nut, washer, pulley, turbine and driving pin.
- Remove front bearing retaining plate 4 assembly screws (7 mm wrench).
- Remove 4 alternator assembly tie-rods (E) (Fig. 2).
- Separate alternator components, striking end of rotor shaft slightly with a wooden mallet.
- Separate rotor from rear housing, striking housing periphery lightly with the wooden mallet.
- Use fork Ref. 20895 L and a Dia. 11.8 pin to extract bearing remaining on rotor (Fig. 1).

RE-ASSEMBLING THE ALTERNATOR

- To re-assemble alternator, proceed in reverse order from dismantling procedure.

Fig. 2 2896



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GENERAL SPECIFICATIONS

Ignition distributor

Centrifugal advance and vacuum correction type.

Controlled by gear and screw on camshaft.

Ignition distributor setting

Presetting of contact studs: .4 mm.

Contact pressure: 450 g ± 50.

Cam angle (saturation): $56^{0} \pm 1^{0}$

Initial timing adjustment (crankshaft degrees: 10^{0}.

Coil

Voltage: 12 V.

Spark plugs

Champion N 6 Y.

Spark plug electrode gap: .6 mm.

Condenser

Capacity: .2 to .3 MF.

ADVANCE CURVES

Note: curves are plotted with the ignition distributor set at 0^{0}.

CENTRIFUGAL ADVANCE CURVES

For 341 and 361 engines

A : Ignition distributor degrees

B : Ignition distributor r.p.m.'s.

(1) : Applicable to new distributor.

(2) : Applicable to distributor after running-in.

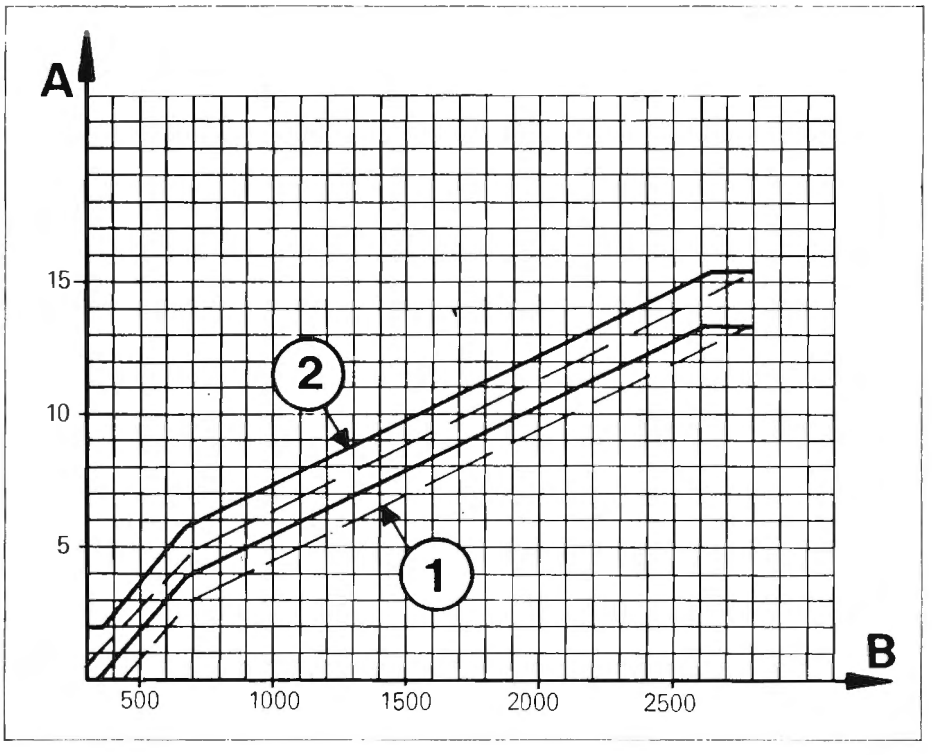


Fig. 1

G.038

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VACUUM CORRECTOR ADVANCE CURVES

For 341 engine

A : Distributor degrees

B : Vacuum in mm of Hg.

C : Vacuum in g/cm^2

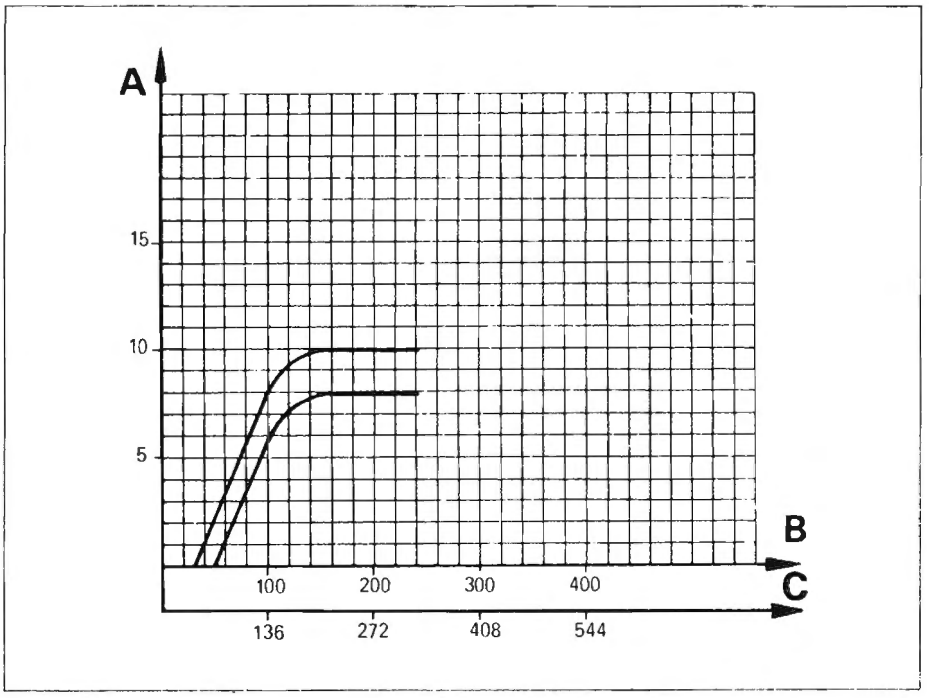


Fig. 2 G.039

VACUUM CORRECTOR ADVANCE CURVES.

For 361 engine

A : Distributor degrees

B : Vacuum in mm of Hg.

C : Vacuum in g/cm^2

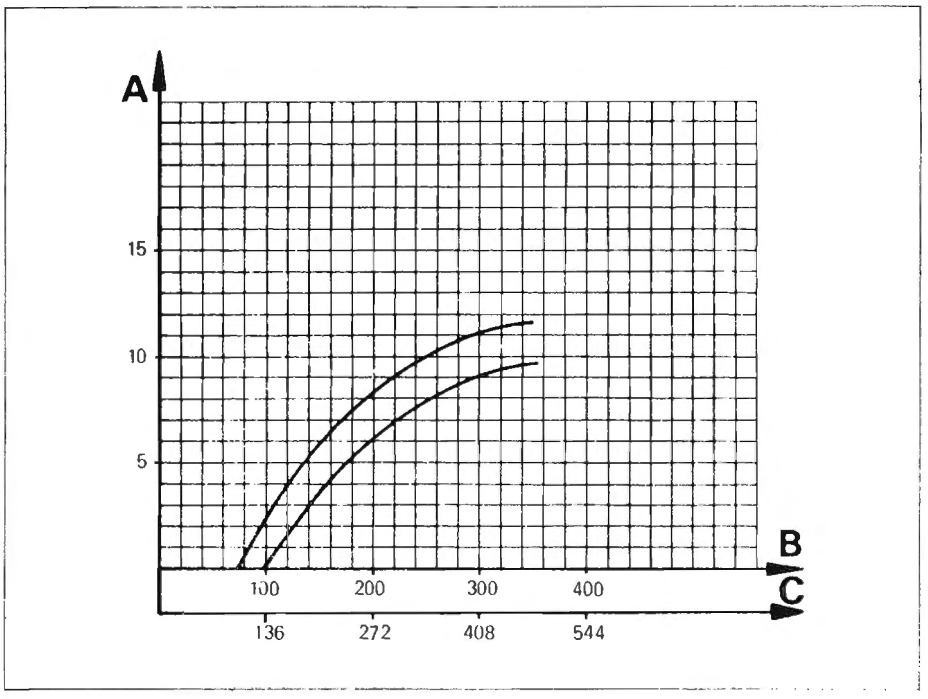


Fig. 3 G.040

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F1 - CLUTCH

F1/I - General specifications

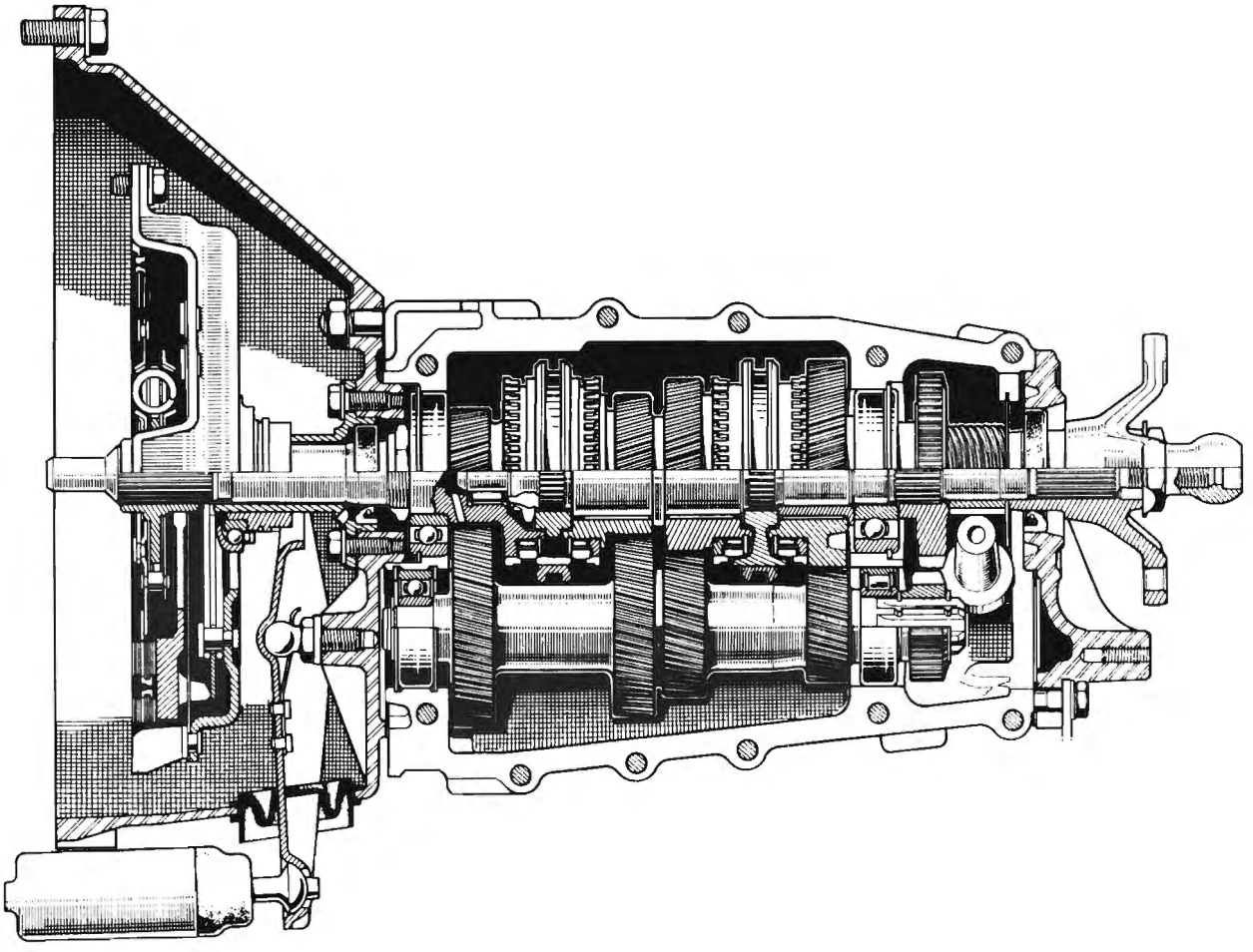
F1/I - Tightening torque values

F1/I - Specific tooling

F1/I - Description of diaphragm clutch

F1/V - Removing and re-fitting the clutch plate and mechanism

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W.1320

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GENERAL SPECIFICATIONS (Fig. 1)

The clutch is of the dry single plate diaphragm type.

The clutch plate is fitted with a torque damper made of tangential springs ensuring a progressive engagement.

The clutch is hydraulically controlled.

The master-cylinder, controlled by the clutch pedal, directs oil under pressure to the receiver cylinder, which is fastened to the clutch housing.

The receiver cylinder transfers the thrust to the clutch fork through a non-adjustable push rod.

The clutch fork, which is articulated on a knuckle fastened to the clutch housing, transfers the thrust to the clutch ball thrust bearing.

The ball thrust bearing slides on a supporting sleeve fastened to the clutch housing.

In the engaged position, the ball thrust bearing and the clutch mechanism slide face are in permanent contact under low pressure (zero clearance).

This is achieved by the effect of the spring in the clutch receiver cylinder.

The clutch system receives its Lockheed 55 oil supply from the compensating tank fastened to the brake master-cylinder.

Specifications of clutch mechanism for 361 engine

. Diaphragm type: Dia. 200.

. Outer dia. : 253 mm.

. Total thickness: 44 mm.

. Transmissible torque, at least equal to 13 m da N.

. Outer dia. of clutch plate: 200 mm.

. Inner dia. of friction: 130 mm.

. Thickness of plate: 8.1 ± .3 mm under 375 da N load.

Specifications of clutch mechanism for 341 engine

. Diaphragm type: Dia. 215.

. Outer dia. : 274 mm.

. Total thickness: 46 mm.

. Transmissible torque, at least equal to 16.5 m da N.

. Outer dia. of clutch plate: 215 mm.

. Inner dia. of friction: 145 mm.

. Thickness of plate: 7.7 mm $\pm \frac{.15}{.30}$ under 430 da N load.

Specifications of clutch master-cylinder

. Bore: 22 mm.

. Plunger stroke: 25 mm ± .5

Specifications of receiver cylinder

. Bore: 28.575 mm.

. Plunger stroke: 18.5 mm maximum.

Clutch pedal ratio

. 5.9 to 1 approximately.

TIGHTENING TORQUE VALUES

	m da N
Clutch housing to gear box	4.75
Clutch housing and starting motor to cylinder block	4.75
Receiver cylinder to clutch housing	2.2
Master-cylinder to underframe	1.6
Thrust bearing sleeve to clutch housing	1.45
Clutch mechanism to engine flywheel	2.2
Clutch fork knuckle, fastening	2.2

SPECIFIC TOOLING

Dummy input shaft to locate clutch plate or pilot	21620 Y

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DESCRIPTION OF DIAPHRAGM CLUTCH

With this type of clutch, the engagement pressure is provided by a perfectly balanced flexible diaphragm. This type of clutch is particularly recommended for engines with a high rotational speed.

As compared with the conventional type of clutch, the helical springs providing the engagement pressure are replaced by the flexible diaphragm, and the declutching levers are cancelled.

The special diaphragm spring plays the parts of both pressure springs and levers.

This arrangement gives the diaphragm clutch the following characteristics:

- virtually total elimination of internal friction;
- improved balance;
- reduced size;
- reduced declutching pressure;
- reduced sensitivity to the effects of centrifugal force;
- possibility of use of a flat flywheel.

The diaphragm is a tapered spring plate, made of special steel, which is fitted between a pressed sheet metal cover and a special friction cast-iron pressure plate.

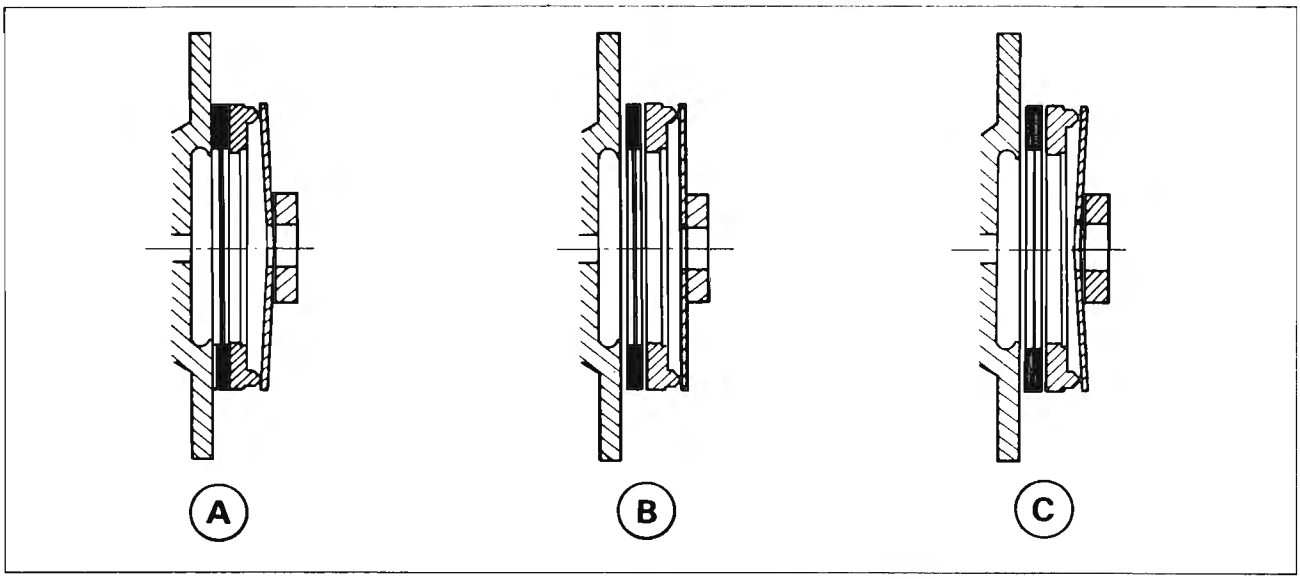
The pressure plate is driven by 3 flexible steel tabs connected to the cast-iron cover.

With this type of clutch, it is extremely important not to reach the point of no return for the spring plate or tapered diaphragm when the shape of the latter is modified during the declutching operations (Fig. 2: A - Engaged position; B - Released position; C - excessively released position, point of no return exceeded). This is why the releasing stroke is limited, in the receiving cylinder, to 18.5 mm, which corresponds to a releasing stroke at the thrust bearing of 12.4 mm.

Fig. 2

A : Engaged position.
B : Released position.
C : Excessively released position.
Point of no return exceeded.
The diaphragm cannot return to its initial position.

Z.1274



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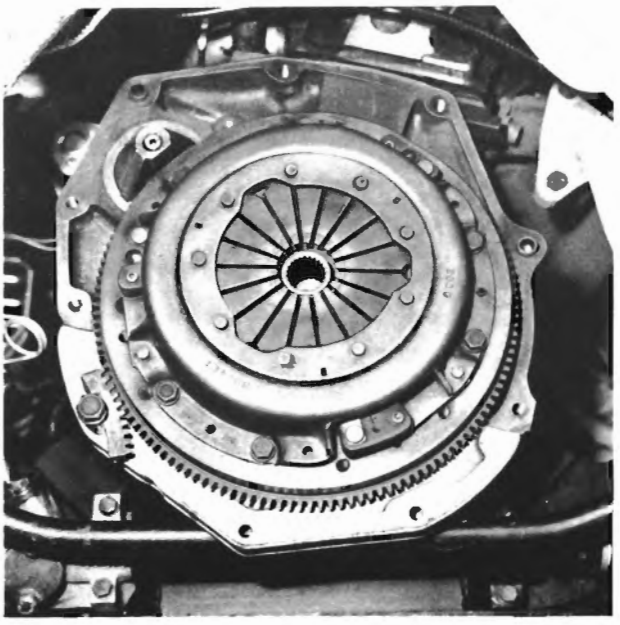


Fig. 1 4023

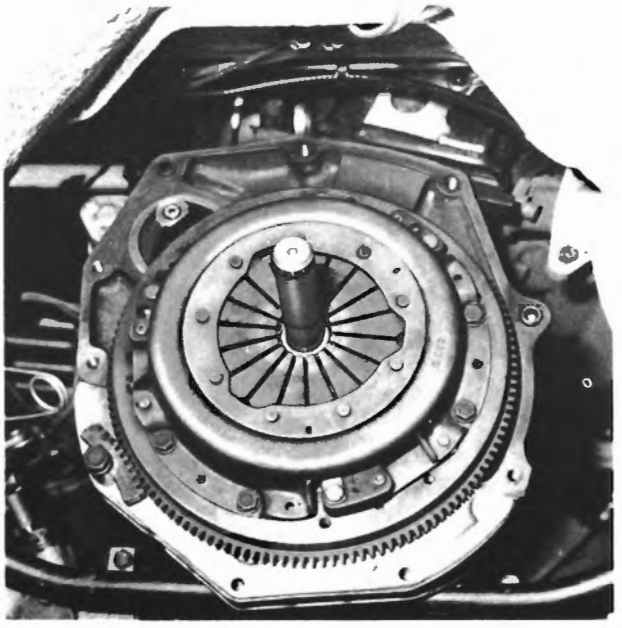


Fig. 3 4025

REMOVAL PROCEDURE

- Remove gear box.
- Fit starting motor crown-wheel rotation locking tool in position (Fig. 1).
- Remove screws fastening mechanism to fly wheel, loosening them gradually.
- Remove clutch mechanism and plate.

Fig. 2 4024



RE-FITTING OPERATIONS

- Fit plate (hub offset towards rear) and mechanism in position.

  Note: Balancing Ref. marks (paint marks) must face one another (Fig. 2). Taking fixing points into consideration, these marks may be offset by a maximum of $\pm$ 60°.
- Locate plate in position with pilot tool Ref. 21620 Y (Fig. 3).
- With mechanism fitted on Mecanindus pins, progressively tighten screws.
- Remove starting motor crown-wheel locking tool.
- Re-fit gear box.

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F3 - GEAR BOX

F3/I - General Specifications

F3/I - Description of gear box

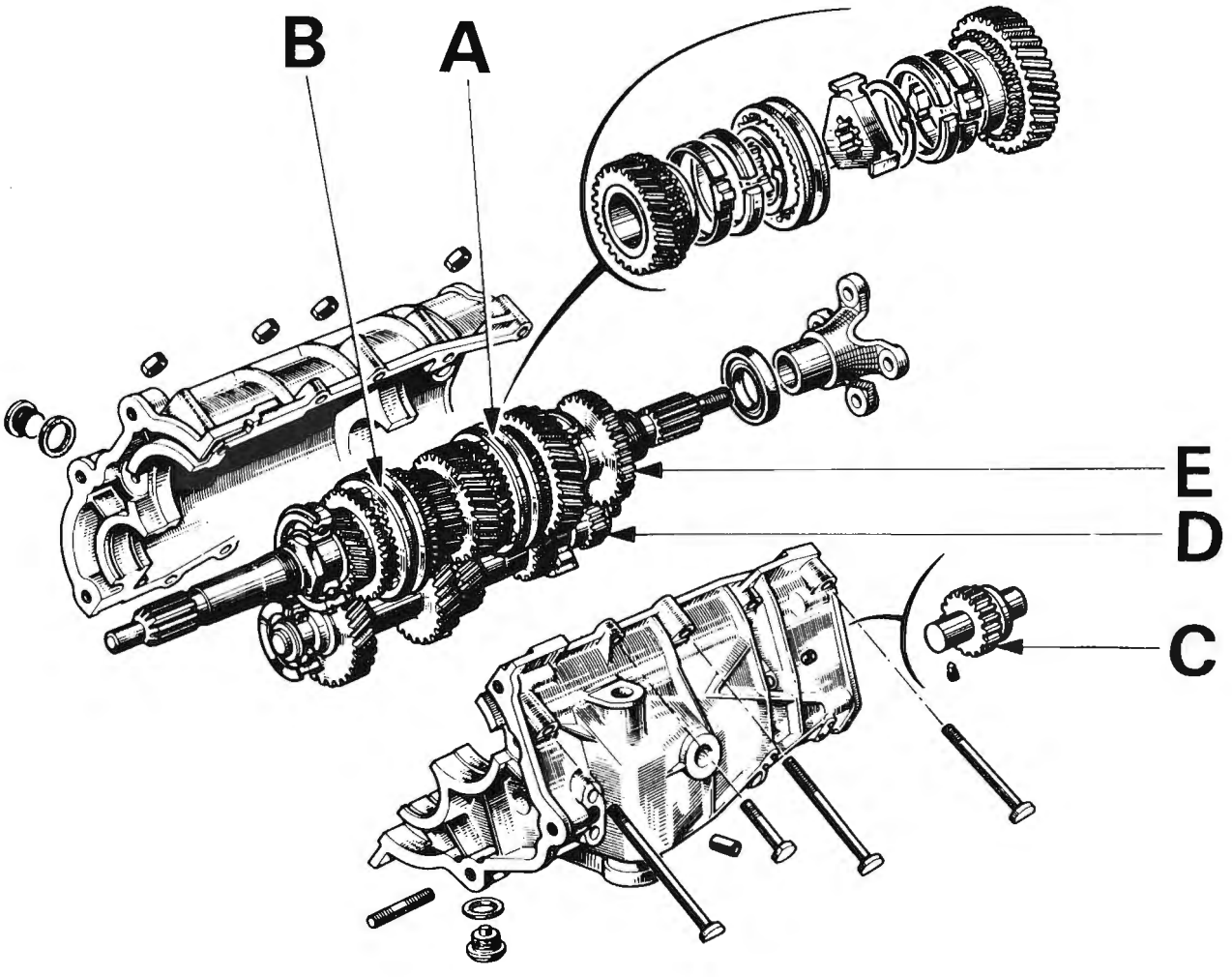
F3/II - Tightening torque values

F3/III - Specific tooling

F3/V - Removing and re-fitting the gear box on the vehicle

F3/VII - Overhaul of gear box

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G.059

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GENERAL SPECIFICATIONS

The gear box, which is common to the 160 and 180 models, gives 4 forward ratios, which are all synchronized.

The aluminium housing is in two parts, the joint planes running on the centre-line of the fixed gear and input and output shafts.

The draining and filling holes are closed by plugs with fibre seals.

The gear ratios are as follows:

1st gear	17/28	x	13/28	=	.282
2nd gear	17/28	x	20/26	=	.467
3rd gear	17/28	x	25/21	=	.723
4th gear	17/28	x	28/17	=	1
Reverse	17/28	x	16/32	=	.303

Note: for speeds at 1,000 r.p.m., see section F 6.

The tachometric ratios are as follows (Fig. 1):

A - For vehicles fitted with 361 engine

W = 5 threads
X = 15 teeth
Y/Z = 9/10.

B - For vehicles fitted with 341 engine

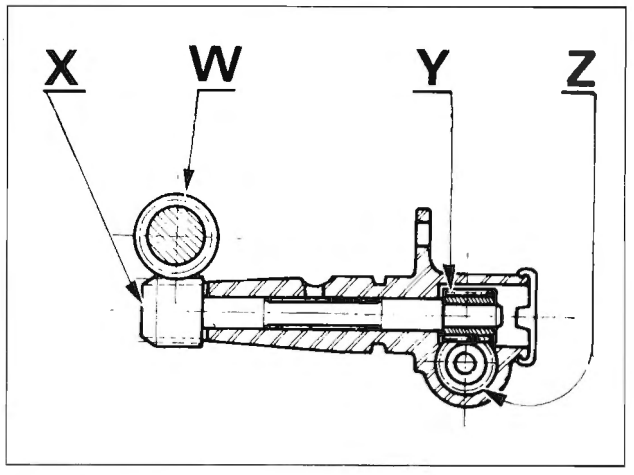
W = 5 threads
X = 14 teeth
Y/Z = 7/8.

Gear box oil capacity

(Shell Spirax 90 EP)

Initial filling: 1.5 litre.
Oil change : 1.35 litre.

Fig. 1 A 475



DESCRIPTION

The engine drive is directly transmitted to the input shaft through the clutch.

The input shaft gear is in constant mesh with a gear which is integral with the intermediate shaft. This shaft is in constant mesh with the 2nd and 3rd gears. The 1st gear is engaged by the synchronizing ring (A - Fig. 2) moving towards the rear, which has the effect of interlocking the 1st gear in rotation with the output shaft.

The forward displacement of this synchronizing ring (A) has the effect of interlocking the 2nd gear in rotation with the output shaft.

The 3rd gear is engaged by synchronizing ring (B) being displaced towards the rear, which has the effect of interlocking the 3rd gear in rotation with the output shaft.

The 4th gear, or direct gear, is engaged when the input shaft is directly interlocked with the output shaft through the effect of synchronizing ring (B) being moved forward.

Reverse is engaged by the displacement of reversing gear (C), which has the effect of meshing gear (D), on the fixed gear set, with gear (E) on the output shaft.

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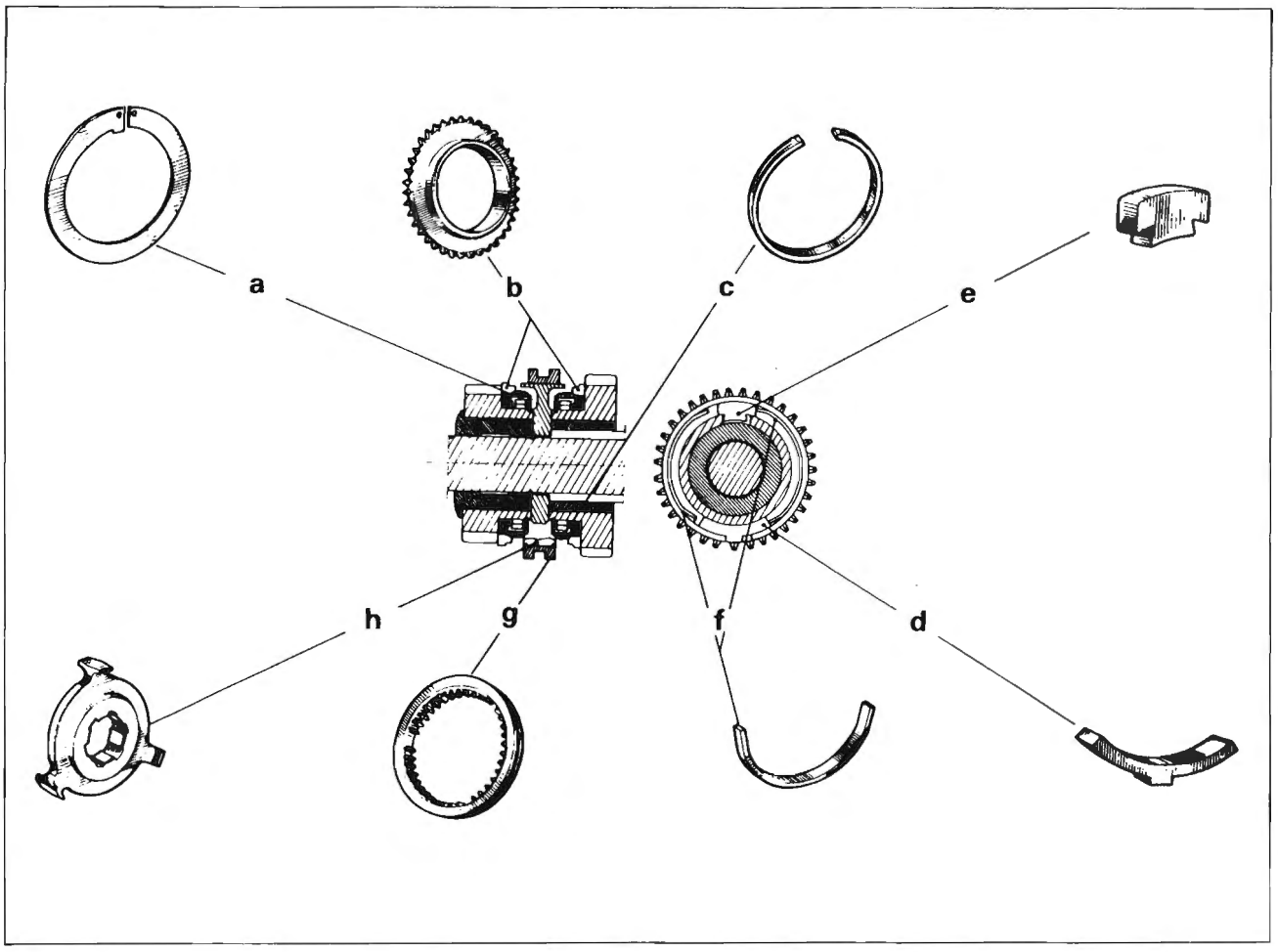


Fig. 3 Y913

SYNCHRONIZING SYSTEM

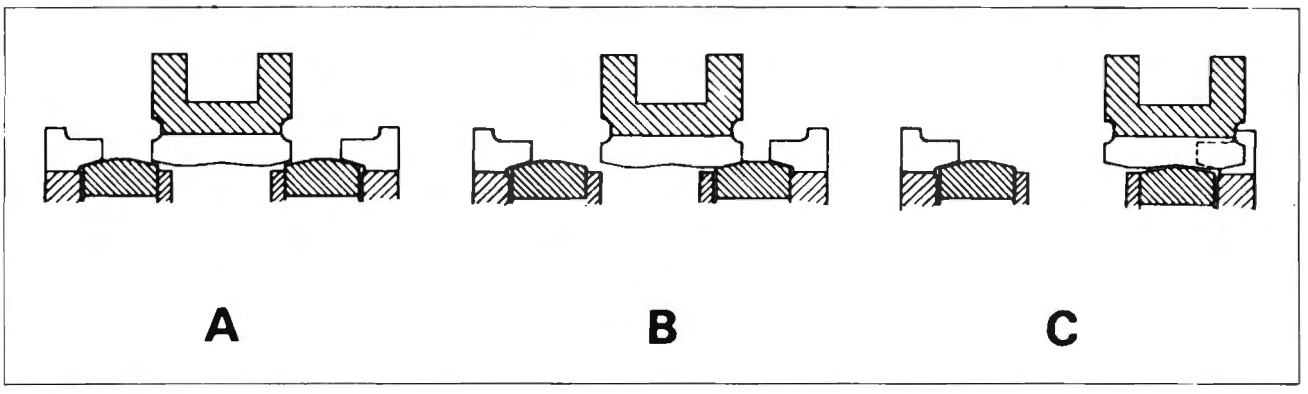
Operators will remember that the function of the synchronizing system is to equalize the speed of the gear concerned with the speed of the sliding sleeve so that smooth engagement can be achieved.

Fig. 3 shows that each one of the gears, which are fitted loose on the secondary shaft, can be interlocked with the shaft through the effect of sliding sleeve (g) sliding on a driving hub (h).

The sliding sleeve incorporates inner teeth designed to be meshed with synchronizing crown (b), with outer teeth, brazed on the internal face of idler gears.

A synchronizing snap-ring (c) fitted inside a recess machined under the crown wheel teeth ensures progressive speed equalization as the sleeve traverse motion proceeds.

Fig. 4 A : Neutral position B : Synchronization period C : Gear engaged Y 1041



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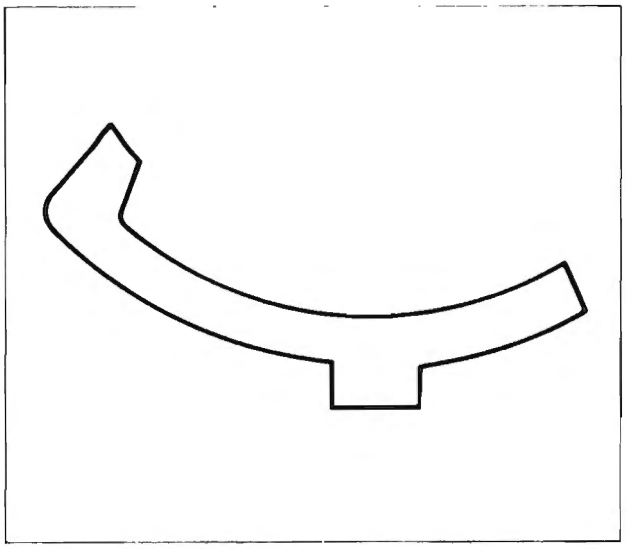


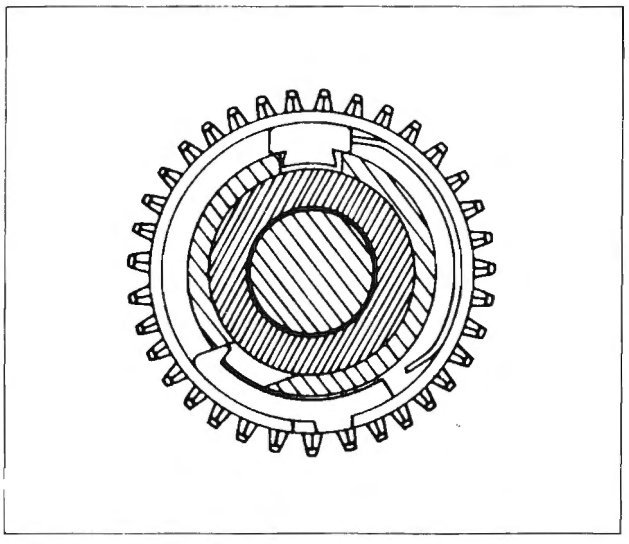
Fig. 5 Z 1270

Snap ring (c) is subjected to a circumferential thrust leading one of its ends to bear against stop (d); the driving spring is compressed against stop (e) and deformed against the snap-ring. This spring (f), compressed inside the snap-ring, increases the effect of friction applied by the latter against the slider.

In this manner, these frictional forces, which, initially, resulted only from the tension of the snap-ring itself, are gradually increased by the effect of driving spring (f), which, through being deformed, applies radial pressure.

This effect persists until there is no longer any difference between the speeds of the slider and driven gear. Then, the effect of spring (f) ceases, and the synchronizing snap-ring returns to a closer condition. The slider can thus be made to slide, for a limited effort, until smooth meshing is achieved with the crown-wheel

Fig. 6 Z 1271



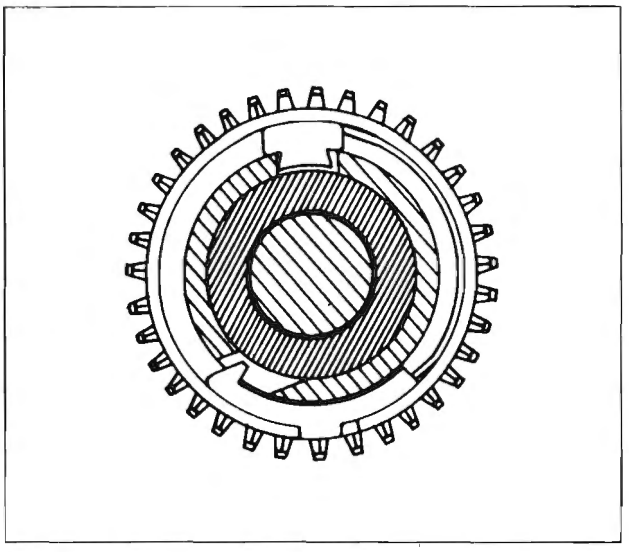


Fig. 7 Z 1271

interlocked with the gear (C - Fig. 4).

The synchronizing snap-ring expands in a circular groove machined on the protrusions of the slider inner teeth. It thus locks the selected gear in position.

Synchronization is achieved effortlessly by using the forces converted by the system itself.

The displacement of stop (d) is limited to prevent any self-locking effect.

Notes on 1st gear synchronization

The illustrated system (Fig. 3) is identical for the 2nd, 3rd, and 4th gears; the arrangement is, however, different, for the 1st gear.

As the 1st gear is used for starting, special precautions were taken, so that selecting this gear, with the vehicle stopped, could be achieved with a minimum effort. In this purpose, a single driving spring is used, and the locking system carries an internal spigot (Fig. 5).

When starting, the engine is running at low r.p.m.'s, and counteracting the inertia of the clutch plate is sufficient.

The end of the synchronizing ring comes to bear against the locking piece, the inner spigot of which is pressed against the synchronizing crown (Fig. 6). Owing to the shape of its spigot, the locking-piece is lifted, and thus increases the radial thrust applied by the snap-ring against the crown during the synchronizing period.

When changing down from 2nd gear to 1st gear (Fig.7), the synchronizing process is achieved as in the case of the 4th - 3rd ratios, which has been explained earlier.

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GEAR SELECTION

The gear selection system is accommodated in the left hand half-shell of the gear box, which also carries the shafts and gear change control forks.

Each fork:

- . 1 for 1st and 2nd gears
- . 1 for 3rd and 4th gears
- . 1 for reverse gear

is interlocked with its own shaft.

Shafts (A), (B), and (C) (Fig. 8) slide in the machined bores inside the cover, and incorporate a mortise, which, when a gear is engaged, accommodates a tenon controlling their forward or rearward displacement.

This tenon is integral with a sliding tumbler (D), which slides on grooves on the shaft of gear control lever (E) on the gear box.

The side movement of the sliding tumbler is controlled by a selector finger (F), interlocked with a small rod (G), the displacement and position of which are controlled through a linkage connected with the gear control system.

Consequently, the selector sliding tumbler controlled by the gear control lever is subjected to two forms of displacement:

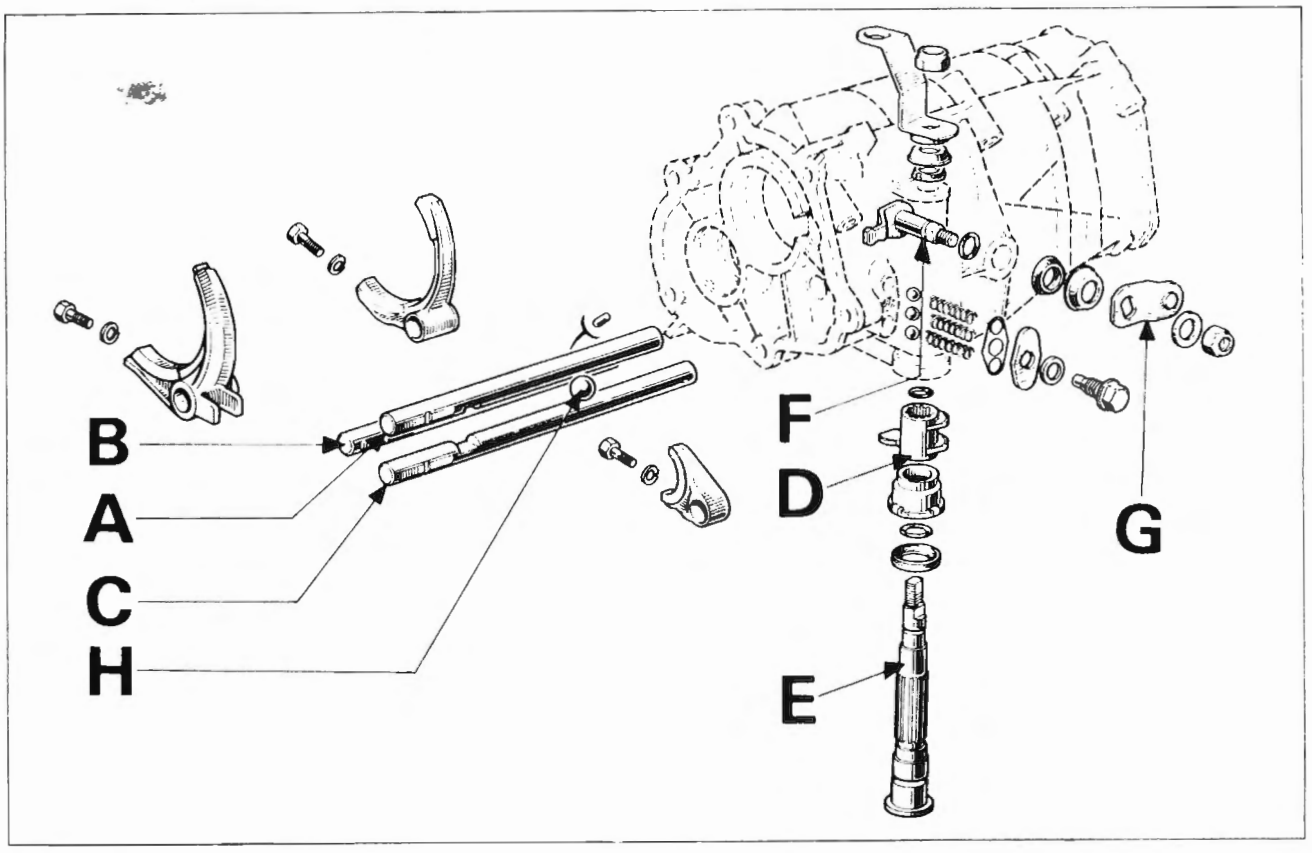
1 - a traverse motion,
2 - a fraction of a turn rotary motion.

The traverse motion controls the 1st stage of the selection process in the 1st 2nd, or 3rd 4th, or reverse ranges.

Fig. 8 Selection system

A, B, C - gear shafts
D - Selector sliding tumbler
E - Gear control lever shaft
F - Selector finger
G - Small rod
H - Interlock ball

G.027



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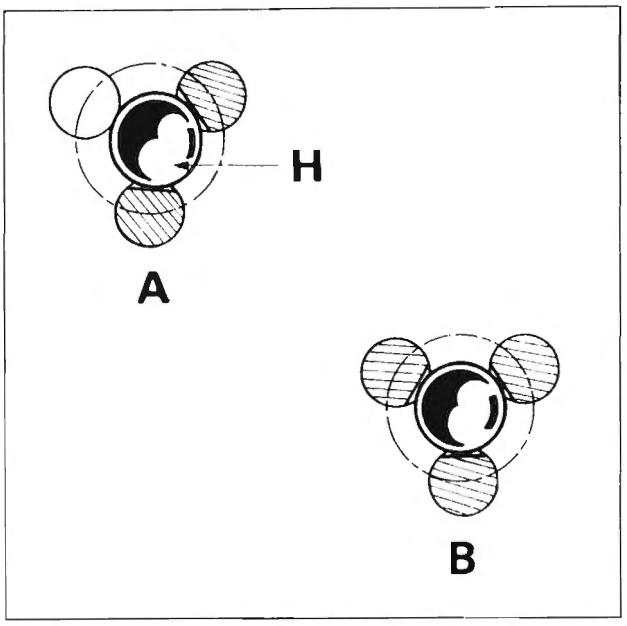


Fig. 9 A - Engaged gear position B - Neutral position H - Interlocking ball X386

The rotary motion controls meshing of the previously selected range gear.

Each shaft incorporates a notch receiving a ball controlled by a spring.

This arrangement prevents the shafts from sliding freely in the neutral position.

On the other hand, a locking system, fitted in the gear box L.H. housing prevents several shafts from being displaced at the same time.

This safety locking system consists of a ball (H) fitted between the three shafts (Fig. 9) opposite notches of an appropriate shape.

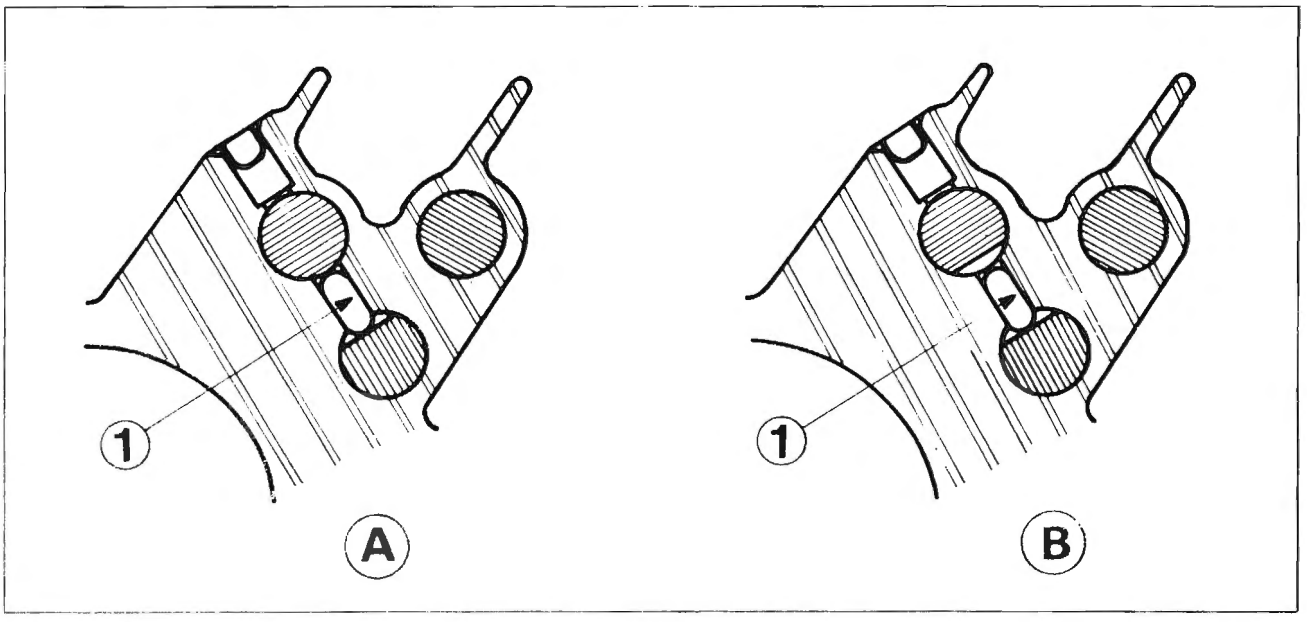
The size and position of these notches on the shafts are such that, when a gear is engaged, ball (H) enters the notches of both unselected gear control shafts, thus preventing them from moving.

An additional locking system prevents the 1st 2nd shaft and the 3rd 4th shaft from moving simultaneously.

This safety locking system is controlled by an interlocking roller fitted in the housing, opposite notches of an appropriate shape on the 1st 2nd shaft, and on the 3rd 4th shaft (Fig. 10).

The length of the interlocking roller is such that, when a gear is engaged, the roller is engaged in the notch on the other shaft, and prevents it from moving.

Fig. 10 A - Engaged gear position B - Neutral position 1 - Interlocking Roller G.028



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GEAR BOX CONTROL

The gear change control system is floor mounted (Fig. 11). It is fastened by means of 2 screws for assembly of the rear cover to the gear box, through a sheet metal support bracket (A) welded on tubular sleeve (B). Two silent-blocs, fitted on the sheet metal support bracket, filter the vibrations and sounds which could emanate from the engine-drive unit.

Operation

The manual gear control lever (C), which is articulated on yoke (D) is subjected to two forms of motion.

A - Traverse motion

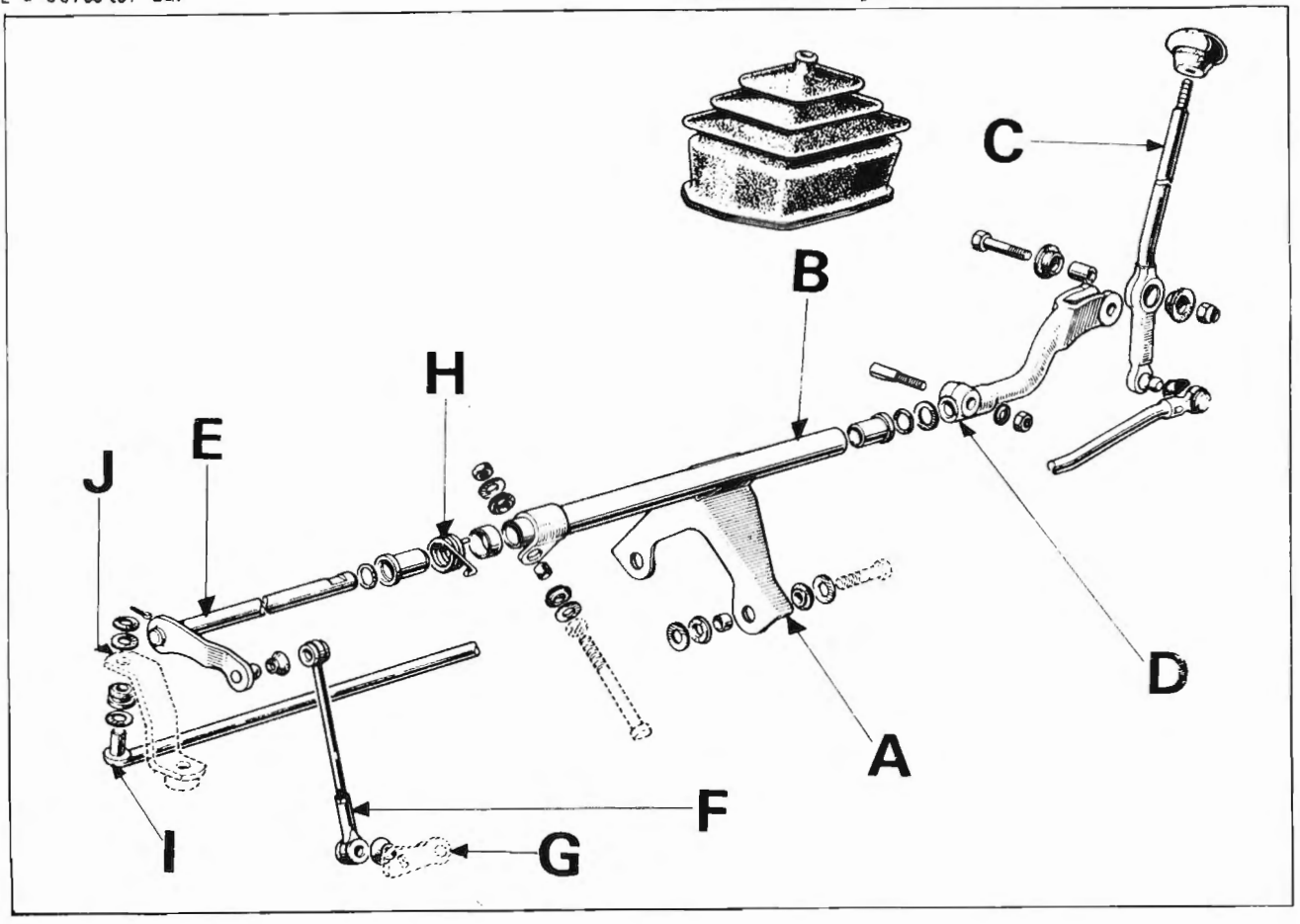
Manual lever (C), when actuated transversely, causes the pivoting motion of yoke (D) to which selector bar (E) is keyed. At the end of this bar, a selector rod (F), which is adjustable in length, transfers this movement to selector lever (G) on the gear box.

This movement selects the 1st - 2nd range, 3rd - 4th range, or reverse gear. A return spring (H), fitted at the end of the selector bar, returns the manual lever, in neutral, opposite the 3rd - 4th range.

Fig. 11 Gear change control

A - Sheet metal support bracket
B - Tubular sleeve
C - Manual gear control lever
D - Yoke
E - Selector bar
F - Selector rod
G - Selector lever
H - Return spring
I - Gear control rod
J - Gear shifting lever

C.029



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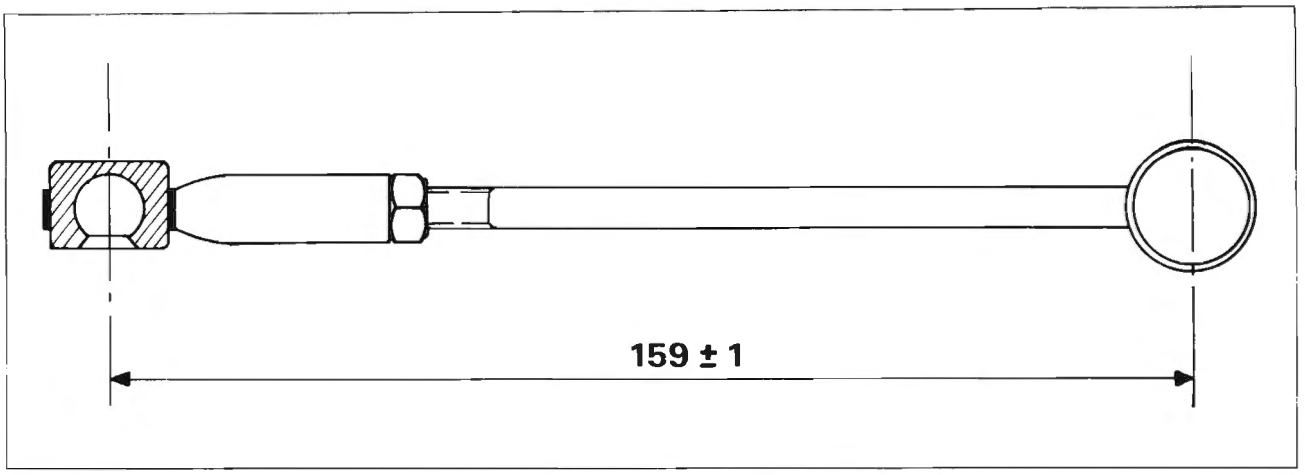


Fig. 12 G.030

B - Longitudinal movement

Manual lever (C), actuated longitudinally, moves non adjustable gear control rod (I) forward or rearward.

This rod transfers the motion to gear shifting lever (J) on the gear box.

This movement achieves gear engagement in the previously selected range.

ADJUSTMENT

A - Selection

- Modify the length of selector rod (F). Before assembly, the latter must be brought to the pre-adjustment length of 159 ± 1 mm. (Fig. 12).
- The adjustment must not exceed ± 5 mm, so as to leave a minimum of 6 mm of thread in mesh between the swivel case and the rod.

B - Gear shifting system

- No adjustment. As gear control rod (I) is not adjustable, its length is such that, when gear shifting lever (J) on the gear box, is in neutral, manual lever (C) is vertical.

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TIGHTENING TORQUE VALUES

	m da N
3rd - 4th gear sliding hub stop on output shaft	15
Assembly of gear box half-housings	2.2
Filling and draining plug	3.5
Transmission flange to output shaft	8
Clutch housing to gear box	4.75
Starting motor and clutch housing to cylinder block	4.75
Reverse light contactor or plug	2
Rear cover to gear box	1.6
Forks to their shafts	1.25
Gear control lever to shaft	1.6
Selector lever to shaft	1.1
Front and rear bearing retaining plates to input and output shafts	2.2
Retainer plate for 3 neutral locking balls.	2
Speedometer tapping	1.25
Gear control support bracket to gear box	1.6
Exhaust support bracket to gear box	2.2

SPECIFIC TOOLING FOR OPERATIONS ON GEAR BOX

Desvil stand Ref. 149.

32 long bush	20814 J
Output shaft locking lever	21618 S
Intermediate shaft locking claws	20803 Y
Intermediate shaft bearing extractor	8604 R
Input shaft bearing extractor	15933 G
Wrench for output shaft nut	20818 W
Output shaft bearing extractor	15525 F
Fitting tool for gear control shaft lip seal	20882 P
Sleeve for lip seal fitting tool	15522 C
Fitting tool for clutch housing lip seal.	21619 T
Fitting tool for gear box rear cover lip seal	20875 X
Draining wrench	7302 H

Circlip grip B.E.M. Muller Ref. 595 T or O.T.C. No. 715.

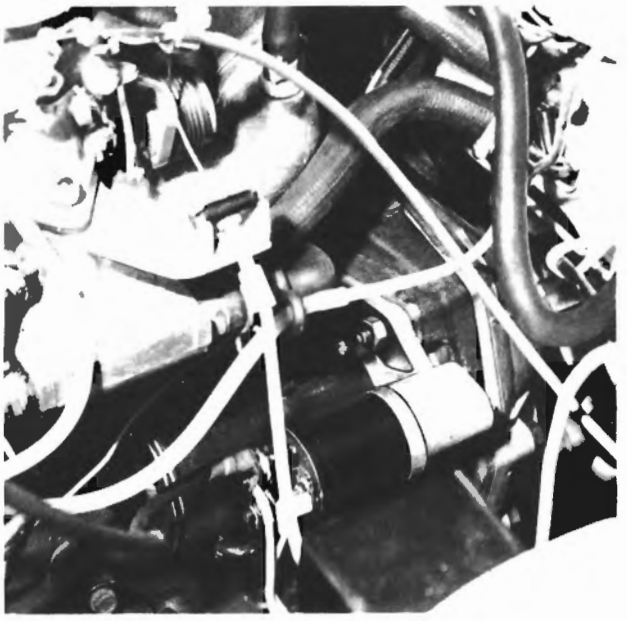


Fig. 1 4026

Fig. 2 4027



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REMOVAL PROCEDURE

- Disconnect battery.
- From inside engine compartment, remove bolt fastening the starting motor and clutch housing to the cylinder block (Fig. 1).
- Remove manual gear control lever knob (to enable manual lever to slide through bellows when gear box is being removed).
- Remove clutch receiving cylinder without disconnecting its pipe. Allowing it to hang at the end of the pipe is to be avoided.

  Important note: the receiver cylinder internal spring tends to push the plunger out of the bore. Before removal operations are undertaken, therefore, the plunger must be held in its cylinder (Fig. 2).
- Remove rear suspension cross-member from engine-drive unit : 4 fastening points on body, 2 points on gear box (Fig. 3).
- Disconnect both wires on reversing light contactor.



Fig. 4 4029

- Disconnect propeller shaft, on gear box flange. The "flector" remains on the propeller shaft.
- Remove both exhaust pipe hanging straps from supporting cross-member (Fig. 4).
- Remove exhaust pipe supporting cross-member (Fig. 5).

Fig. 3 4028

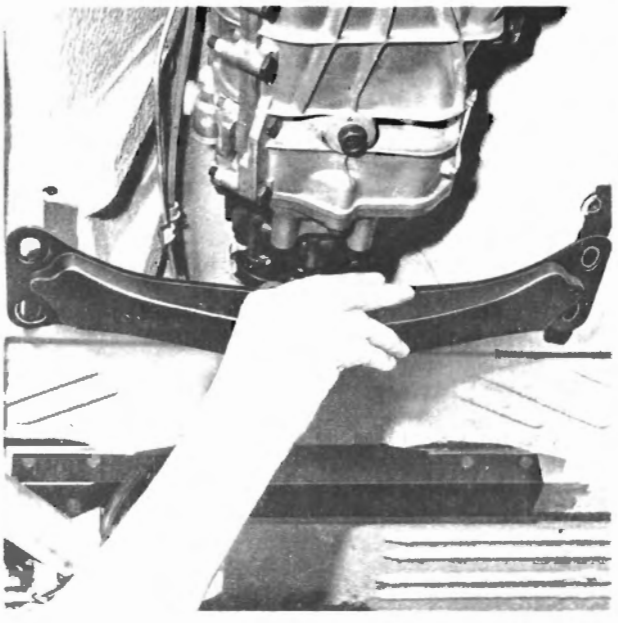


Fig. 5 4030



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REMOVING AND RE-FITTING THE GEAR BOX ON THE VEHICLE



Fig. 6 4031

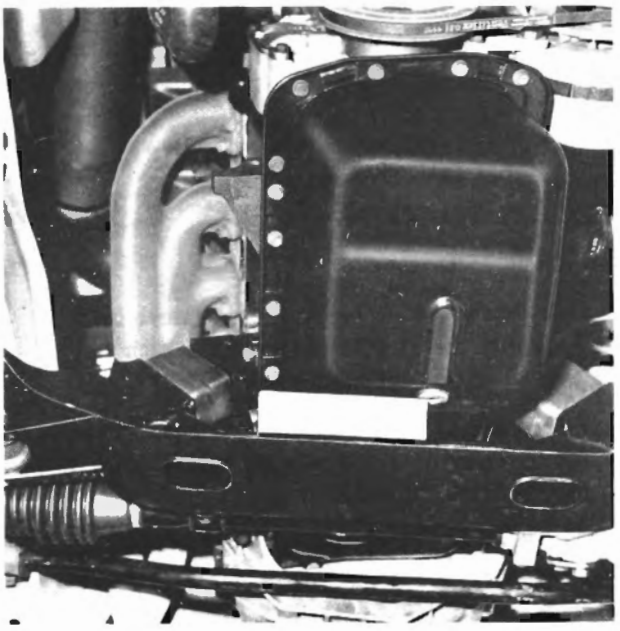


Fig. 7 4032

- Use rubber extensible spring to hold propeller shaft to the side (Fig. 6).
- Disconnect speedometer cable from tachometer tapping on gear box.
- Clear gear shifting small rod from manual lever knuckle. This enables the manual lever to be swivelled freely when removing and re-fitting the gear box.
- Fit a 35 mm thick wooden spacer between the front suspension cross-member and the oil sump to tilt the engine unit towards the rear (Fig. 7). This enables the gear box to be cleared from the tunnel for removing and re-fitting operations.
- Remove screws fastening clutch housing surround to cylinder block.
- Remove gear box, with its integral control, pulling towards the rear.

RE-FITTING OPERATIONS

- Engage a gear.
- With the wooden spacer still inserted between the front suspension cross-member and the oil sump, locate gear box in position manually, take care correctly to mesh the input shaft with the clutch plate grooves until clutch housing comes into contact with cylinder block.

Note: Before undertaking the re-fitting operations, it is advisable to check the condition of the input shaft grooves and, if necessary, to apply some Molykote aerosol to enable the clutch plate to slide more easily.

- Fit screws fastening the clutch housing surround to the cylinder block.
- Remove wooden spacers.
- Connect gear shifting small rod with manual lever knuckle.
- Connect speedometer cable.
- Couple propeller shaft with gear box flange.
- Fit engine unit rear suspension cross-member.
- Re-connect both wires to reversing light contactor.
- Fit exhaust pipe supporting cross-member.
- Fit both exhaust pipe suspension straps in position.
- Fasten receiver cylinder to clutch housing.
- Fasten starting motor and clutch housing assembly bolt.
- Re-connect battery.
- Fit knob in position on manual gear control lever.
- Check that all gears can be engaged correctly.

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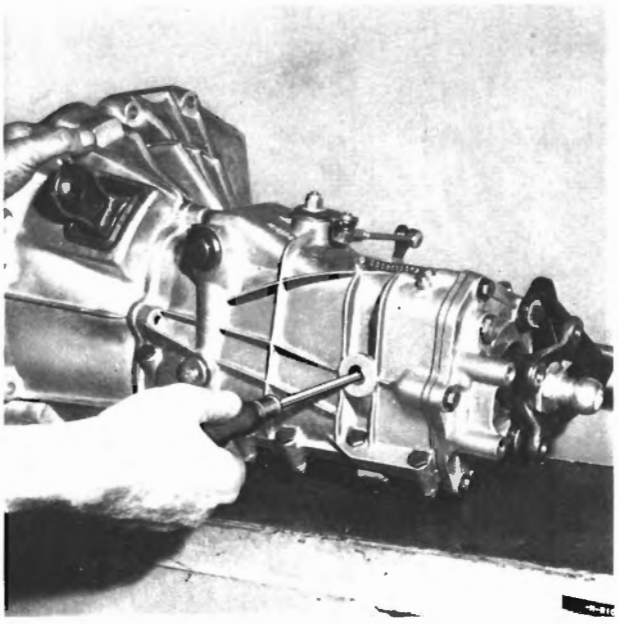


Fig. 1 4383

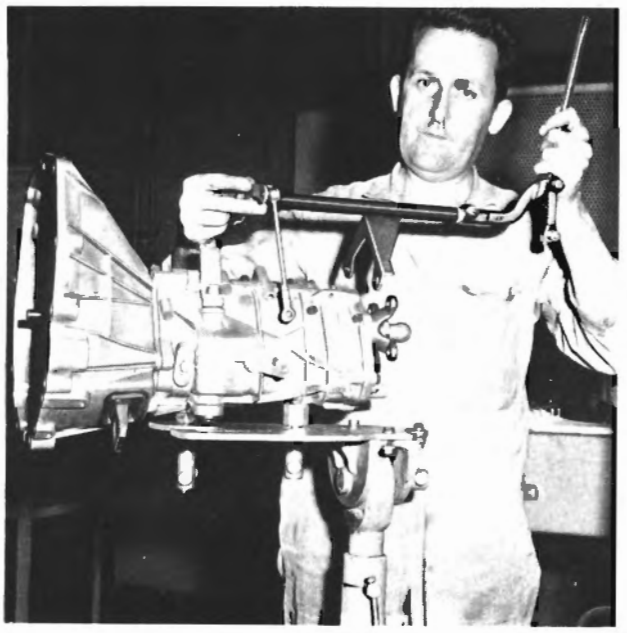


Fig. 3 4385

Dismantling the gear box

- Remove screw (Fig. 1) locking the shaft of the reverse control gear.
- Fasten gear box to Desvil stand Ref. 149 (Fig.2), using the following as attachment points:
  . drain plug hole;
  . reverse shaft locking screw hole.
- Remove gear shifting bar, then remove gear control assembly (Fig. 3). Recover flat and plastic washers, and spacers.
- Remove clutch housing, with fork, clutch bearing, and sleeve assembled on same.
- Unlock transmission flange fastening swivel nut on the output shaft.
- Loosen swivel nut using a 32 long bush Ref. 20814 J, and immobilizing the flange with a special lever Ref. 21618 S (Fig. 4).
- Remove transmission flange.
- Remove tachometer tapping.

Fig. 2 4384

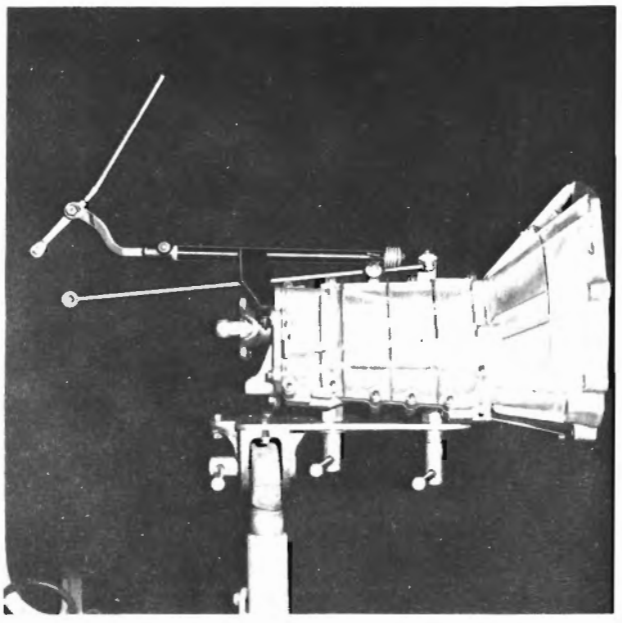
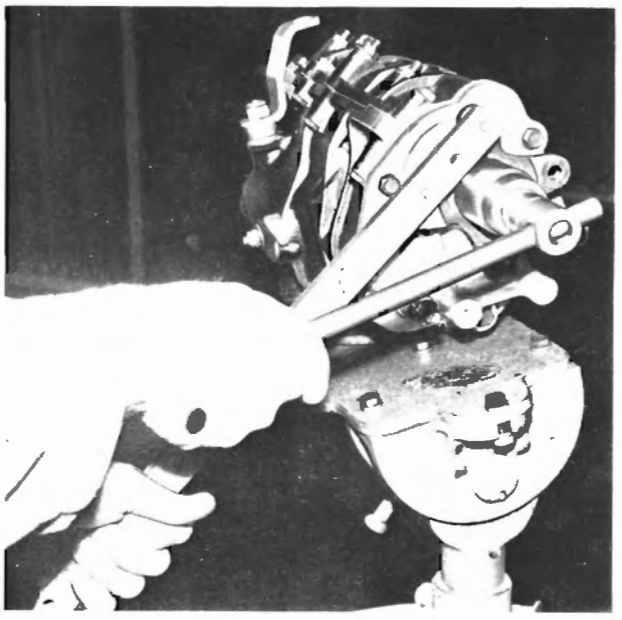


Fig. 4 4386



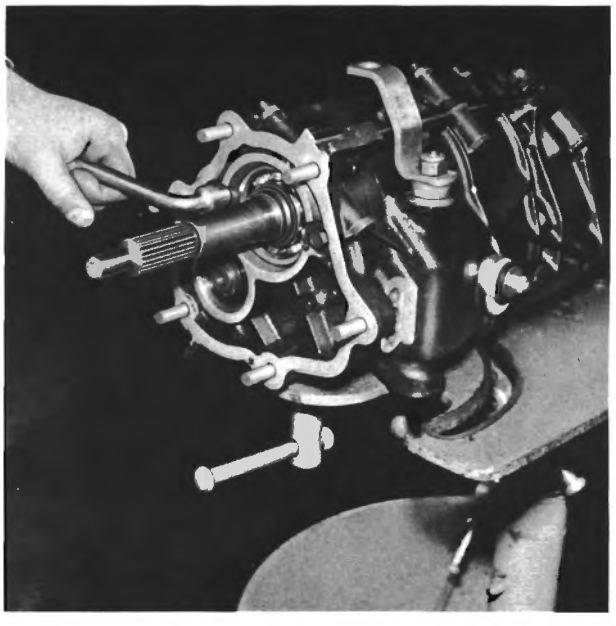
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Fig. 5 4387

- Remove gear box rear cover (Fig. 5), then remove
  . deflector washer,
  . tachometer screw,
  . reverse gear.
- Unlock input shaft bearing retaining plate on upper half-housing, but do not remove it (Fig. 6).

Fig. 6 4388



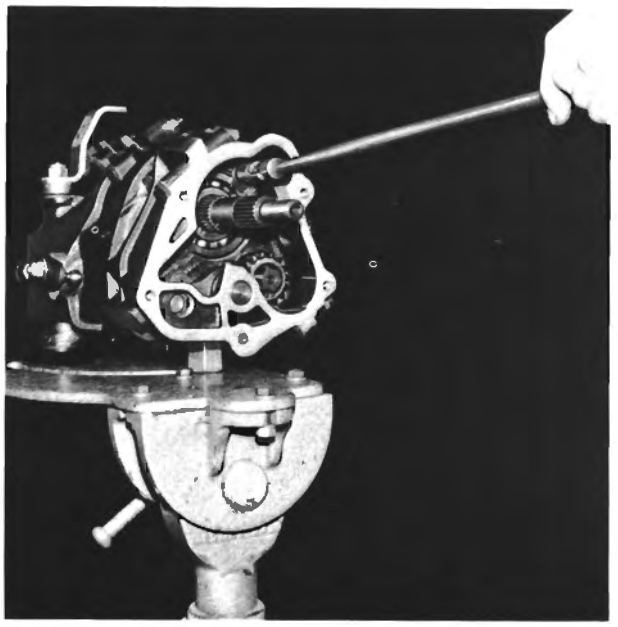


Fig. 7 4389

- Unlock output shaft bearing retaining plate on upper half-housing, but do not remove it (Fig. 7).
- Remove upper half-housing.
- Unlock both bearing retaining plates on lower half-housing, but do not remove them.

Fig. 8 4390



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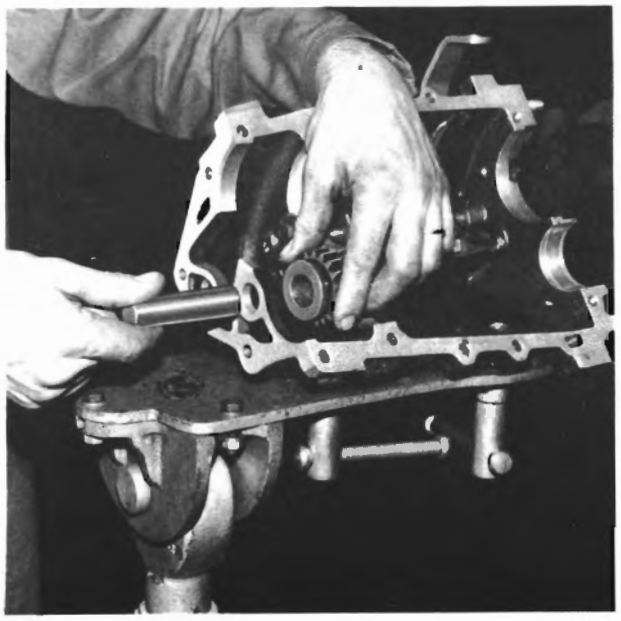
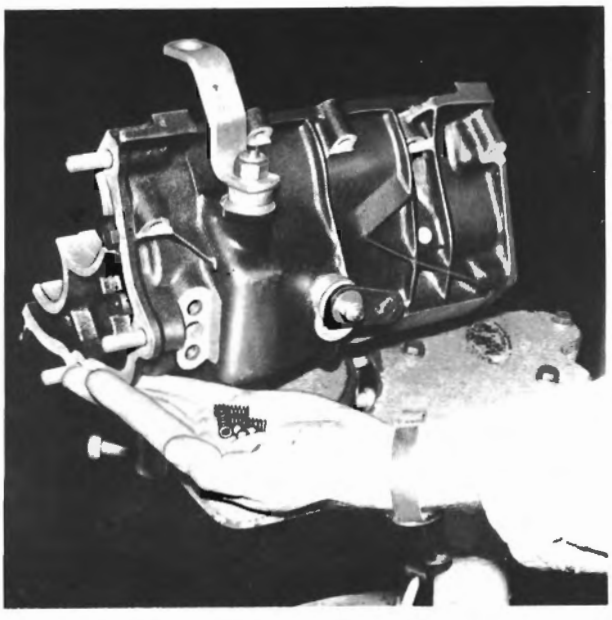


Fig. 9 4391

- Remove input shaft and output shaft assembly (Fig. 8)
- Remove intermediate shaft.
- Remove reversing gear and shaft (Fig. 9).

Fig. 10 4392



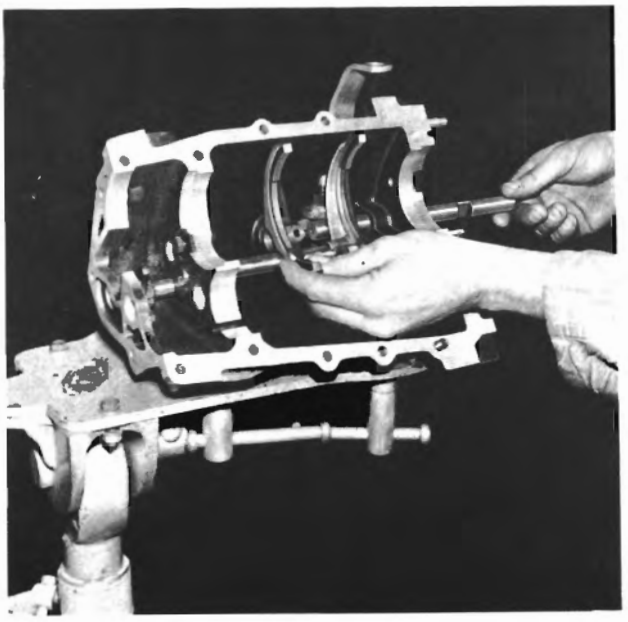
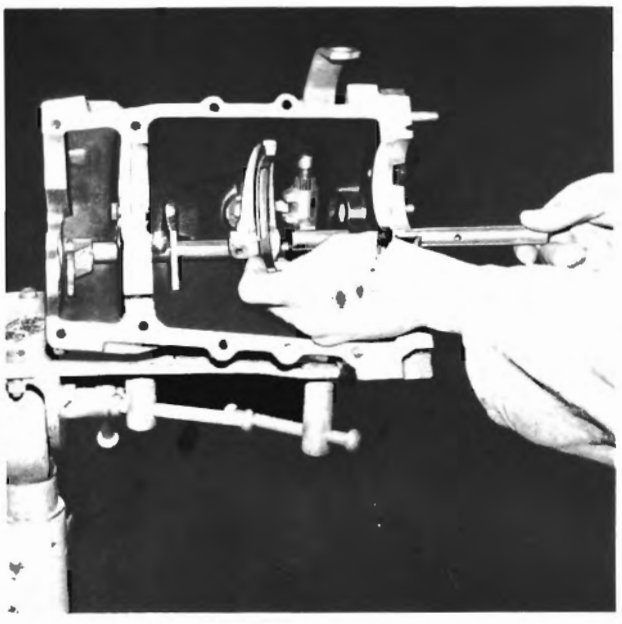


Fig. 11 4393

Dismantling the gear control system

- Remove locking ball retaining plate, recover 3 springs and 3 balls (Fig. 10).
- Remove 1st - 2nd gear shaft and fork (Fig. 11).
- Remove 3rd - 4th gear shaft and fork (Fig. 12). Recover interlocking roller and ball.

Fig. 12 4394



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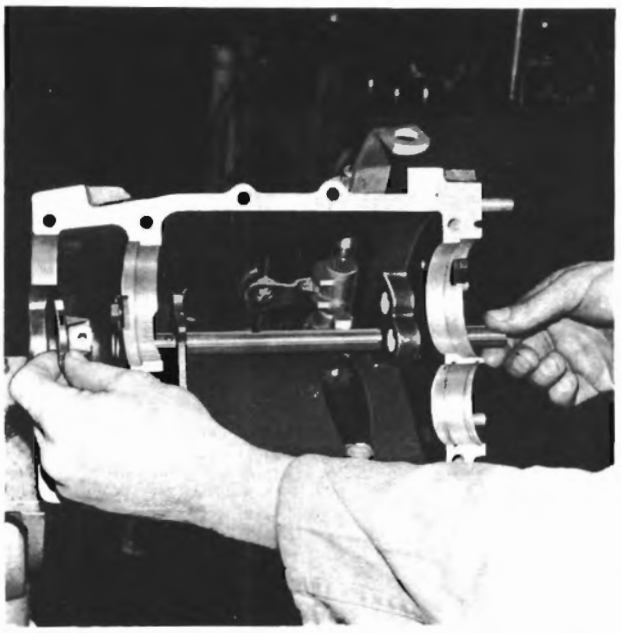


Fig. 13 4395

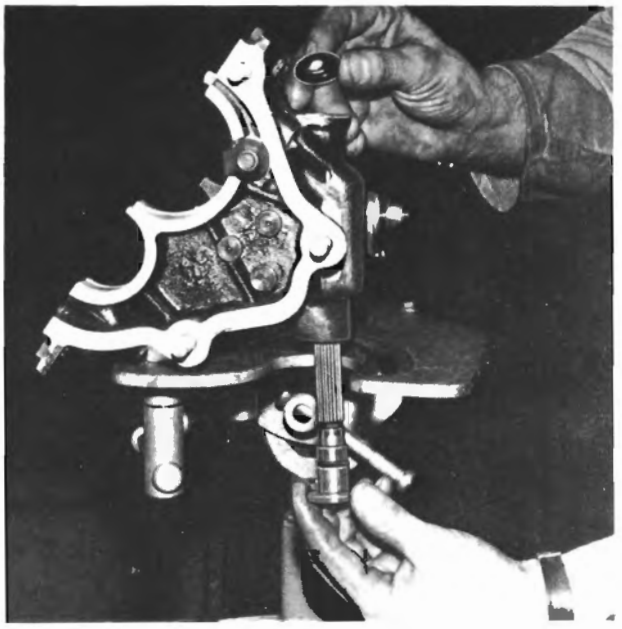


Fig. 15 4397

- Remove reverse gear shaft and fork (Fig. 13).
- Remove selector lever.
- Remove selection control finger (Fig. 14). Recover seal and its metal cup.
- Remove gear shifting lever.
- From underneath, remove gear control shaft (Fig. 15). Recover seal and its metal cup.
- Remove gear selection and control sliding tumbler, and reverse "tight spot" spring (Fig.16).

Overhaul of intermediate shaft

- Hold intermediate shaft in vice with both claws Ref. 20803 Y.
- Extract circlip, then remove reverse gear (Fig. 17).

Fig. 14 4396

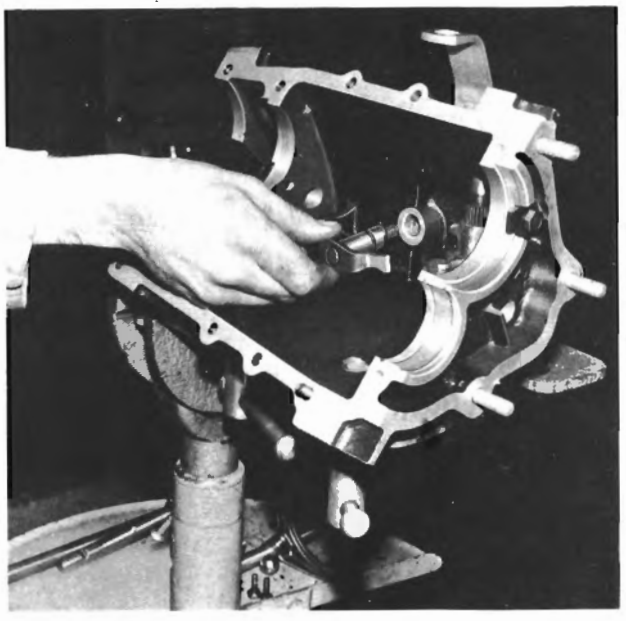
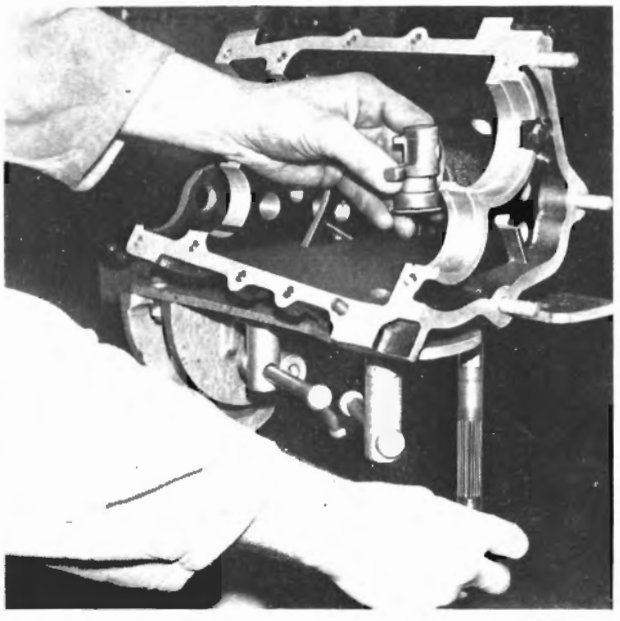


Fig. 16 4398



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Fig. 17 4399

- Remove circlip, then remove reverse bearing, using extractor Ref. 8604 R (Fig. 18).
- Turn intermediate shaft over in vice.
- Extract circlip, then remove front bearing, using extractor Ref. 8604 R (Fig. 19). Recover bearing retaining washer.



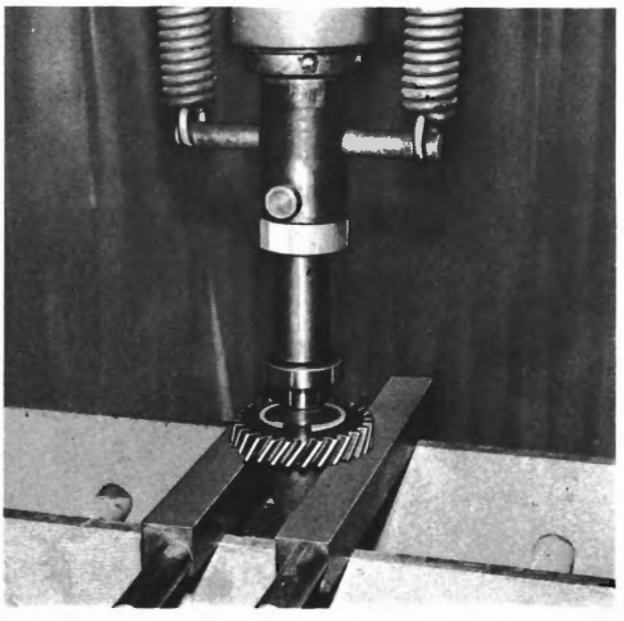
Fig. 19 4401

- Before re-fitting the front bearing, remember to fit its inner retaining snap-ring on the shaft.
- Fit front bearing in position, using a 24 x 34 tube (Fig. 20).
- Fit bearing retaining washer in position (if it is difficult to fit it manually, use 24 x 34 tube), then fit circlip.

Fig. 18 4400



Fig. 20 4402



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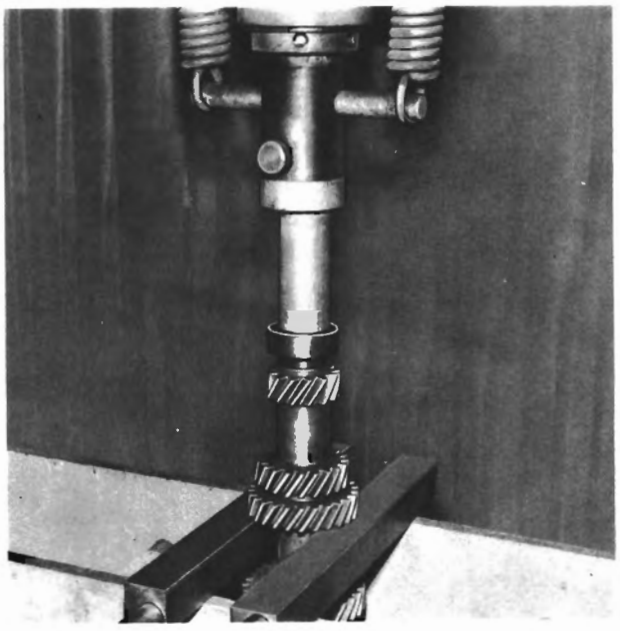


Fig. 21 4403

- Fit rear (roller) bearing, using a 27 x 36 tube (already used on Simca 1000 differential/gear box unit) (Fig. 21).
- Fit:
  . rear bearing retaining circlip;
  . reverse gear ("input" side of teeth opposed to bearing);
  . reverse gear retaining circlip.

Overhaul of input and output shafts

- Use a transmission flange fastened to a stand, or on a workbench, to hold input and output shafts vertically. The operator may use the 3 leg flange already used for the overhaul of Simca 1301 - 1501 gear boxes (grooves are identical).
- Engage 4th gear, then use special wrench Ref. 20818 W (Fig. 22) to loosen input shaft bearing retaining nut.
- Remove input shaft, and recover pilot bearing.
- Remove nut on output shaft front end, using special wrench Ref. 20818 W (Fig. 23).
- Remove 3rd - 4th slider and hub assembly, then remove 3rd gear.

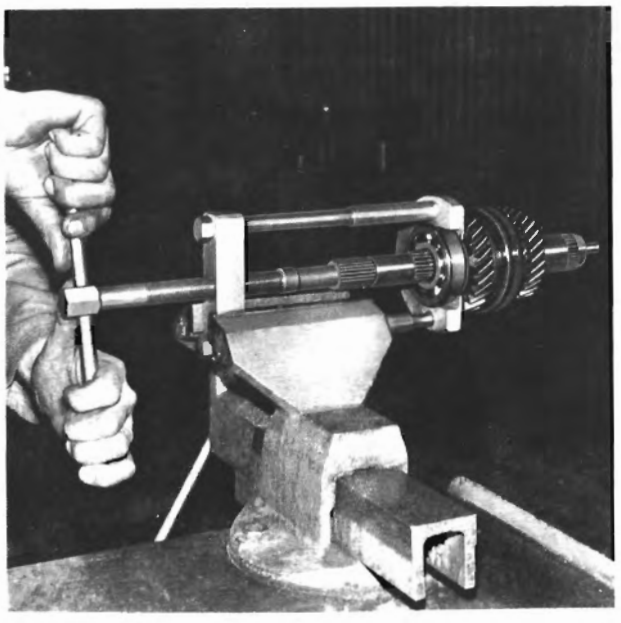
Fig. 22 4404





Fig. 23 4405

Fig. 24 4406



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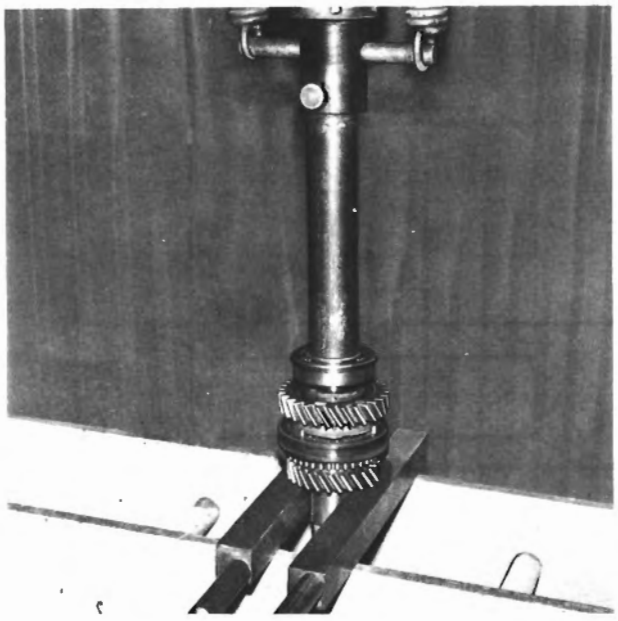


Fig. 25 4407

- Use extractor Ref. 15525 F (Fig. 24) to remove output shaft bearing.
- Remove:
  - . 1st gear and its bushing;
  - . 1st - 2nd slider and hub assembly;
  - . 2nd gear.
- After replacing the defective parts, fit the following on the output shaft, in this order:
  - . 2nd gear;
  - . 1st - 2nd slider and hub assembly;
  - . 1st gear and its bushing, with the bushing shoulder opposed to the synchronizer.

Fig. 26 4408

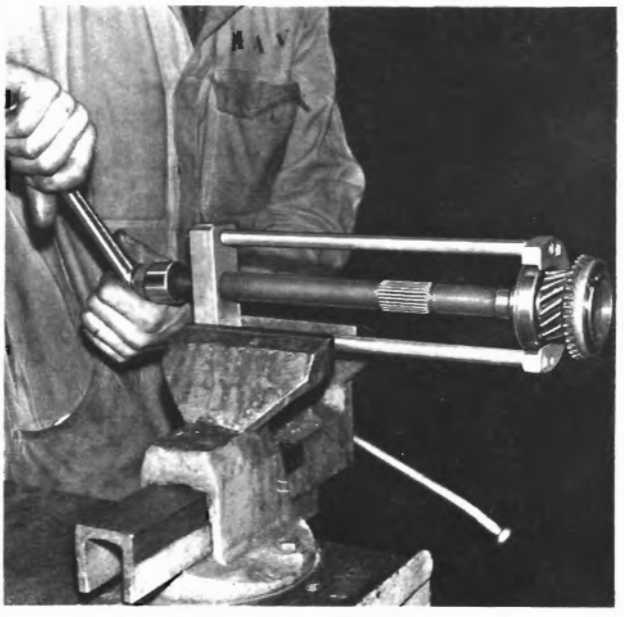




Fig. 27 4409

- Fit bearing on output shaft, using a 36 x 45 tube, 210 mm in length (already used for gear box overhaul on Simca 1000 and 1100); the snap ring on the bearing outer race must face opposite side to 1st gear (Fig. 25).
- Fit 3rd gear, then 3rd - 4th slider and hub assembly.
- Fit a new nut on the front end of the output shaft, and use special wrench Ref. 20818 W to tighten it. Tightening torque is 15 m da N (Fig. 26).
- Lock the nut in position by forcing the metal into both output shaft notches (Fig. 27).

Fig. 28 4410



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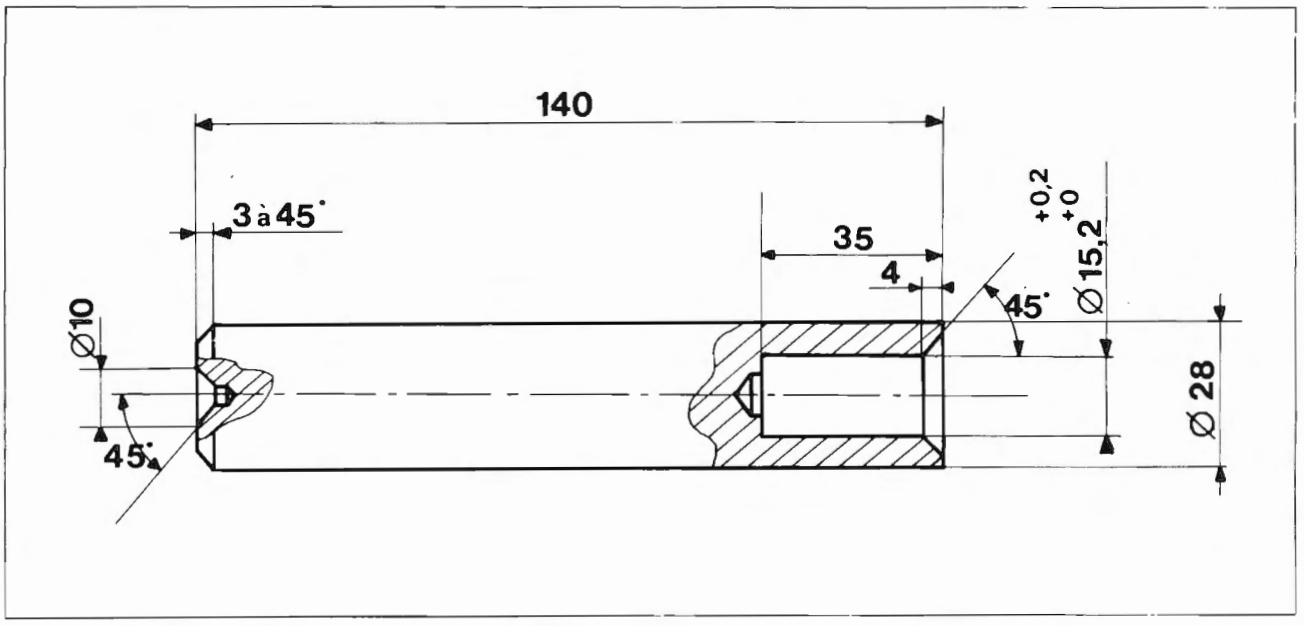


Fig. 29 G.056

On input shaft:

- Remove bearing (Fig. 28), using extractor Ref. 15933 G fitted with a retaining spacer to be made in the workshop with the dimensions shown on Fig. 29. Fitting the extractor in position requires the removal of the snap ring, on the bearing outer race, with a circlip grip (B.E.M. - Muller Ref. 595 T or O.T.C. No. 715) (already used for Borg-Warner automatic transmission overhaul).
- Fit bearing on input shaft, using the 210 mm long 36 x 45 tube, with the snap ring on the outer bearing race facing opposite side to gear (Fig. 30).
- Fit pilot bearing in position on output shaft.
- Fit input shaft on output shaft.
- Engage 4th gear.
- Fit a new nut on the input shaft, and lock it in position, using special wrench Ref. 20818 W. Tightening torque is 15 m da N (Fig. 31).
- Lock the nut in position by forcing metal into both input shaft notches.
- Release 4th gear

Fig. 30 4411

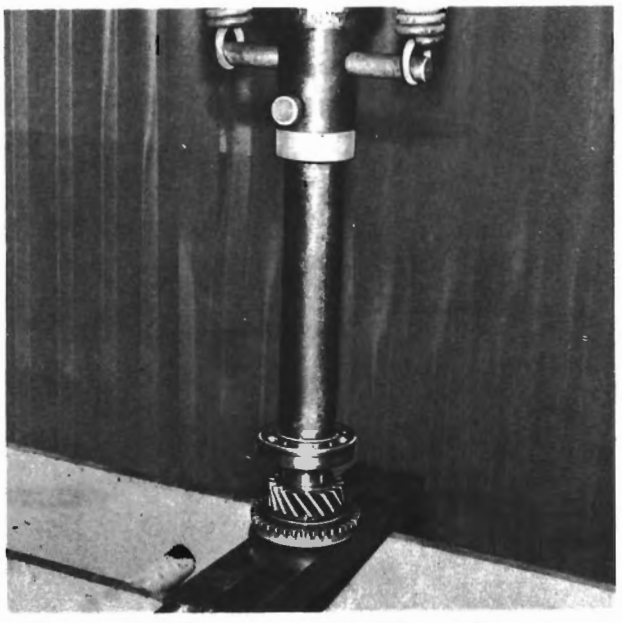


Fig. 31 4412



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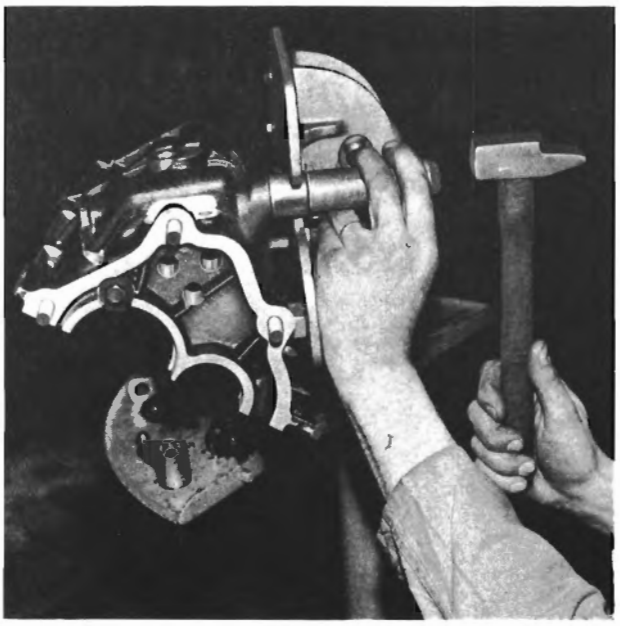


Fig. 32 4413

Re-fitting the gear control system

- Prior to re-fitting the gear control system, check:
  - . condition of gear change control shaft lip seal. Replace it, if necessary, using fitting tool Ref. 20882 P fitted with sleeve Ref. 15522 C (Fig. 32);
  - . condition of 'O' ring on gear change control shaft;
  - . condition of 'O' rings on selector finger spindle.
- Re-fit:
  - . gear change control shaft (A) (Fig. 33);
  - . reverse "tight spot" spring (B);
  - . gear control and selection sliding tumbler (with finger (C) facing side of reverse "tight spot" spring (B));
    gear control lever (D) on shaft (remember to fit seal and its metal cup between lever and half-housing). Tightening torque: 1.750 m da N.

In neutral, finger (C) and gear control lever (D) must be in the same plane, i.e. a plane perpendicular to the gear box longitudinal centre-line (Fig. 33).

- Fit selector finger in position (Fig. 14).
- Fasten selector lever on its shaft (remember to fit seal and its metal cup between lever and half-housing). Tightening torque 1.25 m da N.
- Fit reverse shaft and fork (Fig. 13). Tighten to 1.25 m da N torque.
- Fit interlocking ball on reverse shaft.

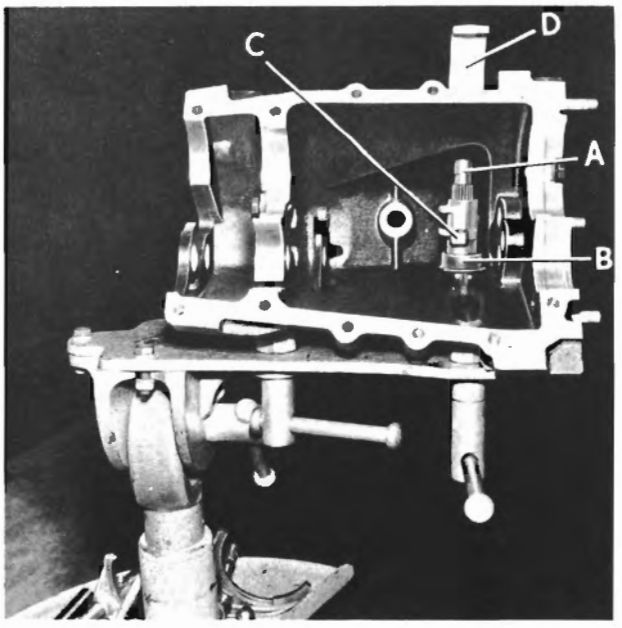
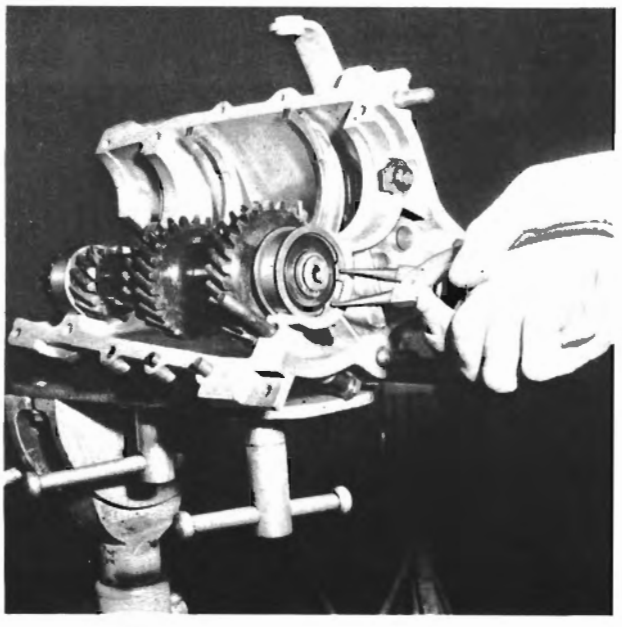


Fig. 33 4414

- Make sure that the catch used for locking 1st - 2nd and 3rd - 4th shafts is correctly in position and slides freely in its housing.
- Fit 3rd - 4th shaft and fork (Fig. 12). Tighten to 1.25 m da N torque.
- Fit 1st - 2nd shaft and fork. Tighten to 1.25 m da N torque.
- Fit reversing gear and shaft (Fig. 9).
- Fit 3 neutral locking balls, then 3 springs, and fasten retaining plate fitted with a new paper gasket.

Fig. 34 4415



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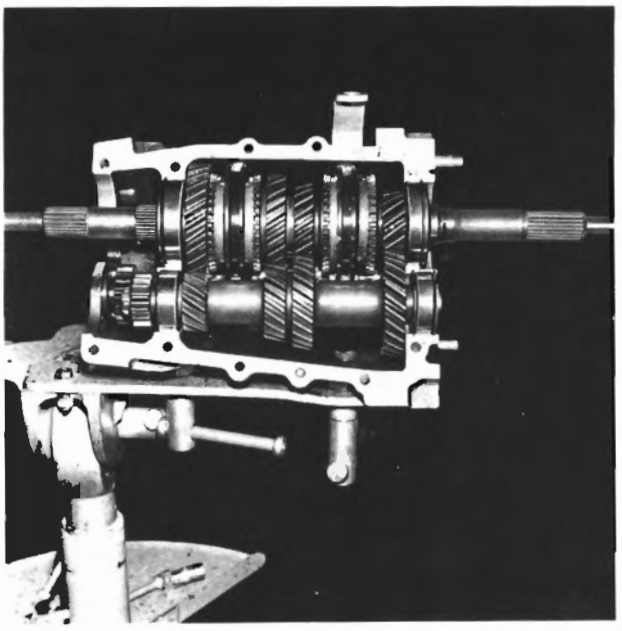


Fig. 35 4416

Re-fitting the gear box

- Locate intermediate shaft in lower half-housing. Make sure both side retaining circlips fit correctly in the half-housing with their gap turned towards inside (Fig. 34).
- Place input shaft - output shaft assembly in position in half-housing. Both side retaining snap-rings on front and rear bearings must bear against half-housing (Fig. 35).
- Fit upper half-housing (make sure joint plane is clean and in good condition).

  Make sure that both intermediate shaft retaining circlips are correctly fitted in their respective grooves.
- Tighten gear box housing screws and nuts to 2.25 m da N torque.

Fig. 36 4417





Fig. 37 4418

- Fasten front bearing stop plates, then rear bearing stop plates to 2.25 m da N torque.
- In the following order, fit:
  . reverse gear (input side of teeth facing outwards);
  . tachometer screw;
  . deflector washer.
- Fit gear box rear cover with a new paper gasket. Check condition of lip seal; replace it, if necessary, with fitting tool Ref.20875 X fitted with sleeve Ref. 15522 C (Fig. 36). Tighten screws to 1.75 m da N. torque.
- Fit transmission flange with a new sheet metal lock on the output shaft. Tighten it to 8 m da N torque.
- Lock swivel nut.
- Fit tachometer tapping. Check condition of 'O' ring; replace it, if necessary.
- Fit clutch housing with a new paper gasket. Check condition of lip seal; replace it, if necessary, using fitting tool Ref. 21619 T fitted with sleeve Ref. 15522 C (Fig. 37). Tighten nuts to 5 m da N torque.
- Fit gear control assembly (remember to fit plastic and flat washers, and spacers), and fit gear shifting bar.
- Remove gear box from its stand, and fit reversing gear locking screw (Fig. 1).
- Fit drain plug.

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F4 - AUTOMATIC TRANSMISSION

F4/I - General

F4/II - Tightening torque values

F4/IV - Adjustment and maintenance of automatic transmission

F4/V - Removing and re-fitting the automatic transmission

F4/VII - Replacement of automatic transmission components

F4/VII - Removing and re-fitting the tachometer tapping

F4/VII - Removing and re-fitting the extension

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SPECIFICATIONS

Type: 3 gears, automatic gear change, with torque converter.

Dia. of converter: 9 inches.

Capacities:

- gear box : 4.6 litres
- converter : 3.1 litres
- cooling circuit : .3 litres
- total capacity : 8.1 litres

Recommended fluid:

- Shell Dexron Automatic Fluid Ref.B 10378 or B 10494 B 10709.

Cooling system: water cooled exchanger.

Lubrication: rotor type pump.

Clutches:

- Front clutch - Number of plates : 3
  Number of discs : 3
- Rear clutch - Number of plates : 2
  Number of discs : 3

Reduction ratio:

- 1st : 2.45/1 or .408
- 2nd : 1.45/1 or .689
- 3rd : 1/1 direct gear
- Reverse : 2.2 /1 or .454

Tachometer tapping:

- 41 T. gear for 160 GT and 180
- 43 T. gear for 160
- Screw on output shaft : 13 threads

Normal operating temperature:

- From 65° to 95° C.

Brake engine speed:

- Brakes applied, selector on D, engine warm.
- Press fully on accelerator pedal, and note engine speed; this must be between 1900 and 2200 r.p.m.; this operation must not exceed 5 seconds.

GENERAL AND OPERATION

The A-904 automatic transmission provides three forward ratios, and a reverse ratio.

There is no clutch pedal on vehicles fitted with this transmission, and they can be driven in the three forward ratios, with the driver using only the accelerator pedal.

On automatic drive, gear changes must be obtained quickly and smoothly without any noticeable and sudden engine acceleration, both when changing up and when changing down.

For town driving, it is not recommended to allow the transmission to operate when idling with a ratio engaged and the car stopped for long periods. In cases of traffic congestion, drivers are advised to switch to neutral (position "N").

11) Transmission control

111) Manual control:

The A-904 automatic transmission is controlled by a manual selector, which provides the following combinations:

P (Parking)

This position allows the vehicle to be immobilized by locking the gear box output shaft mechanically.

- Never select position P until the vehicle is at a standstill.
- When parking the vehicle, always use the hand brake at the same time as position P is selected.

R (Reverse)

Switching into reverse.

D (Drive) normal drive

With this combination, the three forward gears are engaged automatically depending on driving conditions, i.e. depending on the vehicle speed, on the one hand, and, on the other hand, on the load as depending on the position of the accelerator.

At a point corresponding to approximately three quarters of the accelerator control stroke, a hard spot is felt.

Beyond this limit, and for the whole last quarter of the stroke, the "kick down" valve is in a position of forced gearing down.

Over the first three quarters of the accelerator stroke, however, it is possible to obtain gearing down from 3rd to 2nd with carburettor butterfly valves partly opened. This feature, the limits of which are illustrated further, results in a very flexible and very pleasant drive.

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2) Second ratio

The selection of position 2 only allows the first two ratios to be used; the 3rd ratio (or direct drive) cannot be engaged, whatever the speed of the vehicle.

In this position, therefore, it is possible:

- to hold the second ratio beyond the normal speed level, which ensures automatic switching to the 3rd ratio;
- to gear down manually into second gear under special driving conditions (for mountain driving, for instance).

1) First ratio

Selecting this combination enables the driver to engage the first ratio manually.

However, a safety system prevents direct shifting into first gear if this range is selected at a speed higher than 45 km/h approximately. This safety system prevents the occurrence of excessive engine speeds and even of the dangerous sudden "braking effect" which would otherwise result from selecting the wrong ratio. In such cases, it is the second ratio which is engaged, the first ratio being engaged in its turn only below 45 km/h.

As soon as the first ratio is engaged, it remains engaged, even if the driver accelerates beyond the maximum prescribed engine speed.

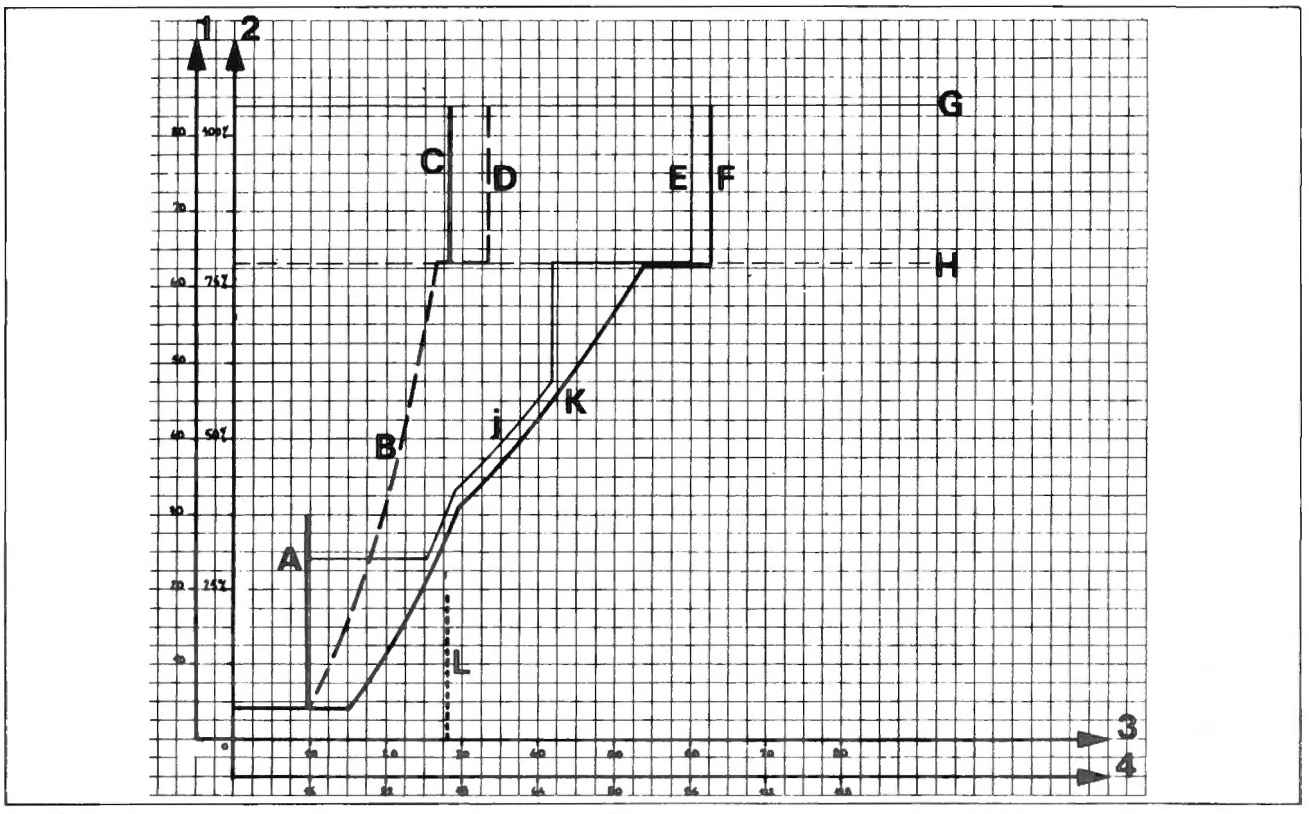
112) Automatic interlock

Automatic transmission interlocking is controlled by an hydraulic system, with which shifting into the three forward ratios is dependent on:

- the load, as represented by the position of the accelerator pedal, which is linked with the kick-down valve.
- the speed, as represented by the speed of the output shaft, which is interlocked with a centrifugal regulator.

The chart (Fig. 1) shows the various limits for automatic shifting as dependent on the speed of the vehicle, and on the angle or percentage of opening of the carburettor butterfly valves.

Fig. 1 G.055



A = 3-1 gearing down
B = 1-2 shifting
C = 3-1 Kick-down
D = 1-2 kick-down shifting
E = 3-2 kick-down
F = 2-3 Kick-down shifting.
G = Fully opened butterfly
H = Tight spot area on control.
J = 3-2 gearing down for partly opened butterfly
K = 2-3 shifting
L = Limit for manually controlled shifting into 1st.
1 = Angle of butterfly valve opening
2 = % of butterfly opening
3 = speed in miles
4 = " in km.

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Examples:

a) With a 40° opening of the carburettor butterfly valve(s), which represents 50% of the stroke, shifting from 1st ratio to 2nd ratio takes place at a speed of 22 MPH or 35.4 km/h (speeds given as a guide):

- shifting from 2nd ratio to 3rd ratio takes place at a speed of 38.5 MPH or 62 km/h approximately;
- when speed is reduced, with butterfly valve still at 40° (when reaching a hill, for instance) shifting down from 3rd ratio to 2nd ratio takes place at a speed of 35 MPH or 56 km/h approximately.

b) With a 15° opening of the carburettor butterfly valve(s), shifting from 1st ratio to 2nd ratio takes place at 15 MPH or 24 km/h approximately; shifting from 2nd ratio to third ratio at 22 MPH or 35.2 km/h approximately; and shifting down from 3rd ratio to first ratio (skipping the 2nd ratio owing to the narrow opening of the butterfly valve) takes place at 10 MPH or 16.6 km/h approximately.

c) In kick down position, with a 63 to 80° butterfly valve opening, i.e. beyond three quarters of the stroke, shifting from 1st ratio to 2nd ratio takes place at 33 MPH or 52.8 km/h approximately; shifting from 2nd ratio to 3rd ratio takes place at 62.5 MPH or 100 km/h approximately, and gearing down (e.g. when reaching a hill without changing the position of the accelerator) from 3rd ratio to 2nd ratio takes place at 60 MPH or 96 km/h approximately, and from 2nd ratio to 1st ratio at 28 MPH or 45 km/h approximately.

12) Starting

The engine can be started only when the selector lever is in position P (parking) or N (neutral).

1. When starting the engine with selector lever in position N (neutral) it is advisable to press on the brake pedal.
2. Turn ignition key fully to the right to "Start" position. When engine runs, release key, which will then return into normal ignition position.

Vehicles fitted with the automatic transmission cannot be started by pushing or towing.

13) Mountain driving

For mountain driving, when the vehicle is heavily loaded or towing a caravan, the driver should select position 2 (second ratio) or position 1 (1st low ratio), when the gradients require driving with the accelerator pedal fully down for 1 km or more.

This precautionary measure reduces gear box and converter overheating, which could otherwise result from such conditions.

14) Towing the vehicle

If gear box has broken down:

Lift rear of vehicle for touring, or remove propeller shaft.

If gear box operates normally

The vehicle may be towed, with the selector lever in position N (neutral), with the rear wheels in contact with the road, at a speed not exceeding 45 km/h, and over a distance of no more than 100 km.

If the vehicle is to be towed over a greater distance, operators are advised to lift the rear of the vehicle, or to remove the propeller shaft.

As the transmission is only lubricated when the engine is running, it is good practice always to tow a broken-down vehicle with the rear end lifted off the road, or with the propeller shaft removed.

15) Maintenance

151) Lubrication

The gear box oil and the filter are meant to provide satisfactory lubrication and protection for the automatic transmission, and it is not advisable to change the oil on vehicles used under normal conditions.

Periodical oil changes and filter replacements, therefore, are not necessary, except when the vehicle is used under severe conditions.

If, for some reason, the oil initially used must be replaced, this operation must be carried out every 3 years, or every 40,000 km, when the vehicle is used normally.

152) Checking the oil level

Check oil level every 6 months, with engine and gear box at normal operating temperature.

153) Prescribed oil grade

Only use the prescribed oil, i.e. : Shell Dexron Automatic Fluid.

OPERATION OF A-904 AUTOMATIC TRANSMISSION

The A-904 automatic transmission is comprised of two epicyclic gear trains associated to the engine through an hydraulic torque converter. Interlocking the component units of these two gear trains, which allows the various combinations to be obtained is through two clutches, two band brakes, and a free wheel.

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21) Torque converter

212) Description:

The converter has a 9 inch diameter (229 mm); this dimension indicating the outside diameter for the fluid circuit. It is a single stage system with three units (Fig. 2):

- the pump, with virtually radial blades, driven by the front section of the converter, is connected with the crankshaft by means of a diaphragm;
- the turbine, with short blades, which is integral with the gear box input shaft;
- the reactor fitted on a free-wheel assembled on a sleeve made integral with the gear box housing. The free-wheel prevents the reactor from turning in the opposite direction to the engine.
- the converter is cooled by circulating the oil under pressure in a heat exchanger fitted in the lower part of the engine water radiator.

213) Operation:

The pump, driven by the crankshaft, converts the engine power into hydrokinetic energy. Under the effect of the centrifugal force, the fluid flows from the pump blades to the turbine blades to return to the pump through the reactor blades.

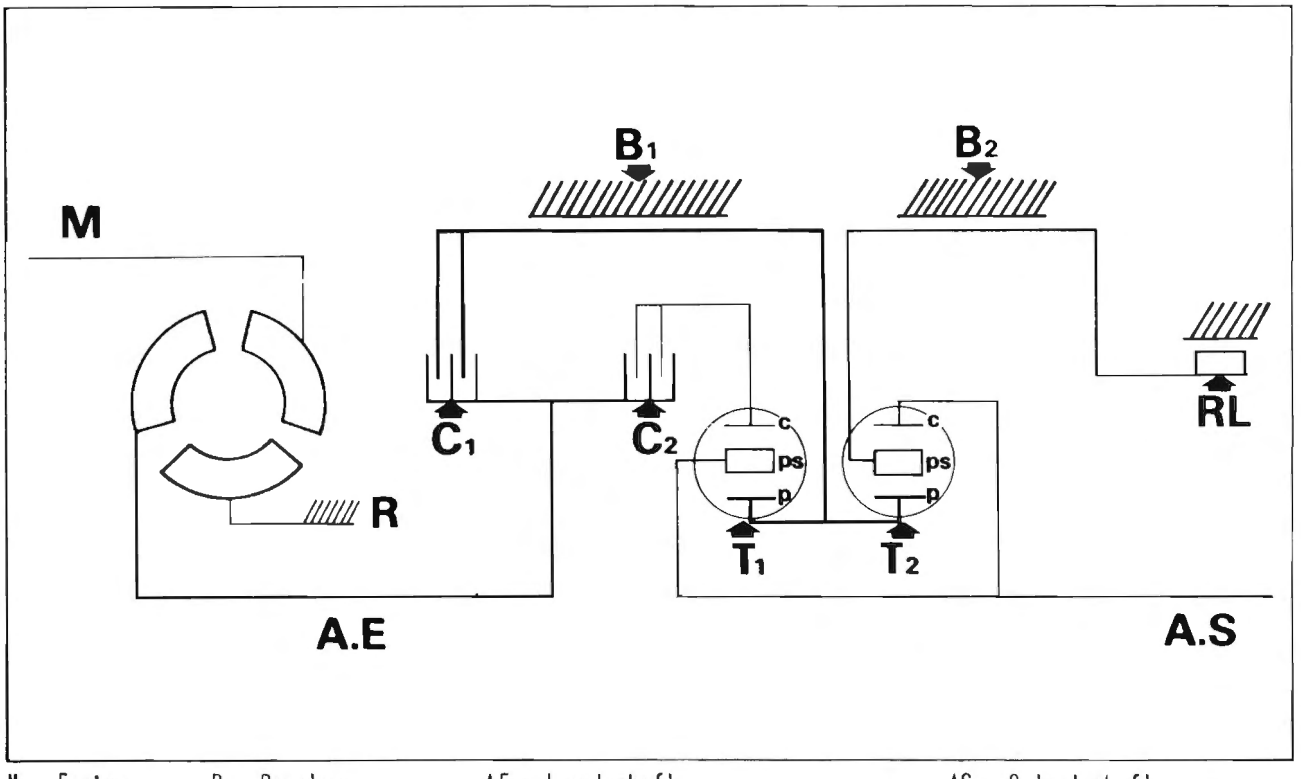
The curvature of the blades is such that, when the pump and turbine speeds differ, the fluid flow returning from the turbine is altered by the reactor blades and exerts a pressure on the reverse side of the pump blades.

The fluid driven from the reactor, therefore, participates in controlling the driving pump. Under these conditions, the torque is stepped-up from 2.1/1 when the turbine is motionless (i.e. when, with manual selector lever in positions R, 1 , 2 or D, the vehicle is stopped with the engine running at full speed) to 1/1 when the turbine reaches a speed of approximately 90% of the pump speed.

The various reduction ratios are obtained through the various components of epicyclic gear sets T1 and T2 interlocked with the engine through clutches C1 and C2, or locked by band brakes B1 and B2 or free wheel RL (see Fig. 2).

- The planet gears of both sets T1 and T2 are interlocked with one another, and may be driven through clutch C1 or immobilized by brake B1.
- The outer crown wheel of gear set T1 can be driven through clutch C2.
- Planet gear carrier T1 is made integral with outer crown wheel T2 and output shaft.
- Planet-gear carrier T2 can be immobilized by brake B2 or free wheel RL.

Fig. 2 G.057



M - Engine R - Reactor AE - Input shaft AS - Output shaft
T1 - Front epicyclic gear set T2 - Rear epicyclic gear set C - Crown wheel
PS - Planet-gear carriers P - Planet gear

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222) Mechanical operation

The following table shows the various units (marked by a cross), which are brought into play for each of the ratios applied

Selector position	Ratio	C1	C2	B1	B2	RL	Output shaft reduction ratio
1	1st		x		x		.408
2	1st		x		x		.408
	2nd		x	x			.689
D	1st		x			x	.408
	2nd		x	x			.689
	3rd	x	x				1
R	Reverse	x			x		.454

First ratio

Through C2, the input shaft drives the crown-wheel of set T1 which, in its turn, tends to drive planet gear carrier T1 and crown-wheel T2 (interlocked). Crown-wheel T2 bears against planet-gear carrier T2 immobilized by brake B2 or by free-wheel RL. The output shaft reduction ratio is .408.

Second ratio

Through C2, the input shaft drives the crown-wheel of set T1, which tends to drive planet-gear carrier T1 and crown-wheel T2 (interlocked). Planet-gear carrier T1 bears against planetary gear set T1 immobilized by brake B1. The output shaft reduction ratio is .689.

Third ratio

Simultaneously through clutches C1 and C2, the input shaft drives crown-wheel T1 and planetary gear sets T1 and T2. Planet-gear carrier T1, integral with the output shaft, is locked between the crown-wheel and planetary gear set T1, and these three units are, therefore, running at the same speed. The output shaft ratio, therefore, is 1.

Reverse

Through clutch C1, the input shaft drives planetary gear sets T1 and T2. Planet-gear carrier T2, immobilized by brake B2, drives crown-wheel T2, interlocked with the output shaft, in the opposite direction to planetary gear sets T1 and T2, interlocked with the input shaft. The direction of rotation is, therefore, reversed, and the output shaft ratio is .454.

223) Hydraulic operation

Both clutches and both servo systems controlling the band brakes are actuated by hydraulic pressure.

This pressure originates in the oil pump driven by the engine and, after filtering, it is regulated and distributed through an hydraulic block with four main component units, as follows:

1° the pressure regulating units;

2° the pressure distribution units;

3° the outer interlocking or system control units, allowing the required pressure variations to be obtained in the various systems;

4° the accessory operating units.

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2231) Pressure regulating units

Pressure is regulated by a delivery valve, a main pressure regulating valve, and a pressure regulating valve for the oil which is directed towards the lubricating points for the gear box mechanical units, and towards the converter (see Fig. 3).

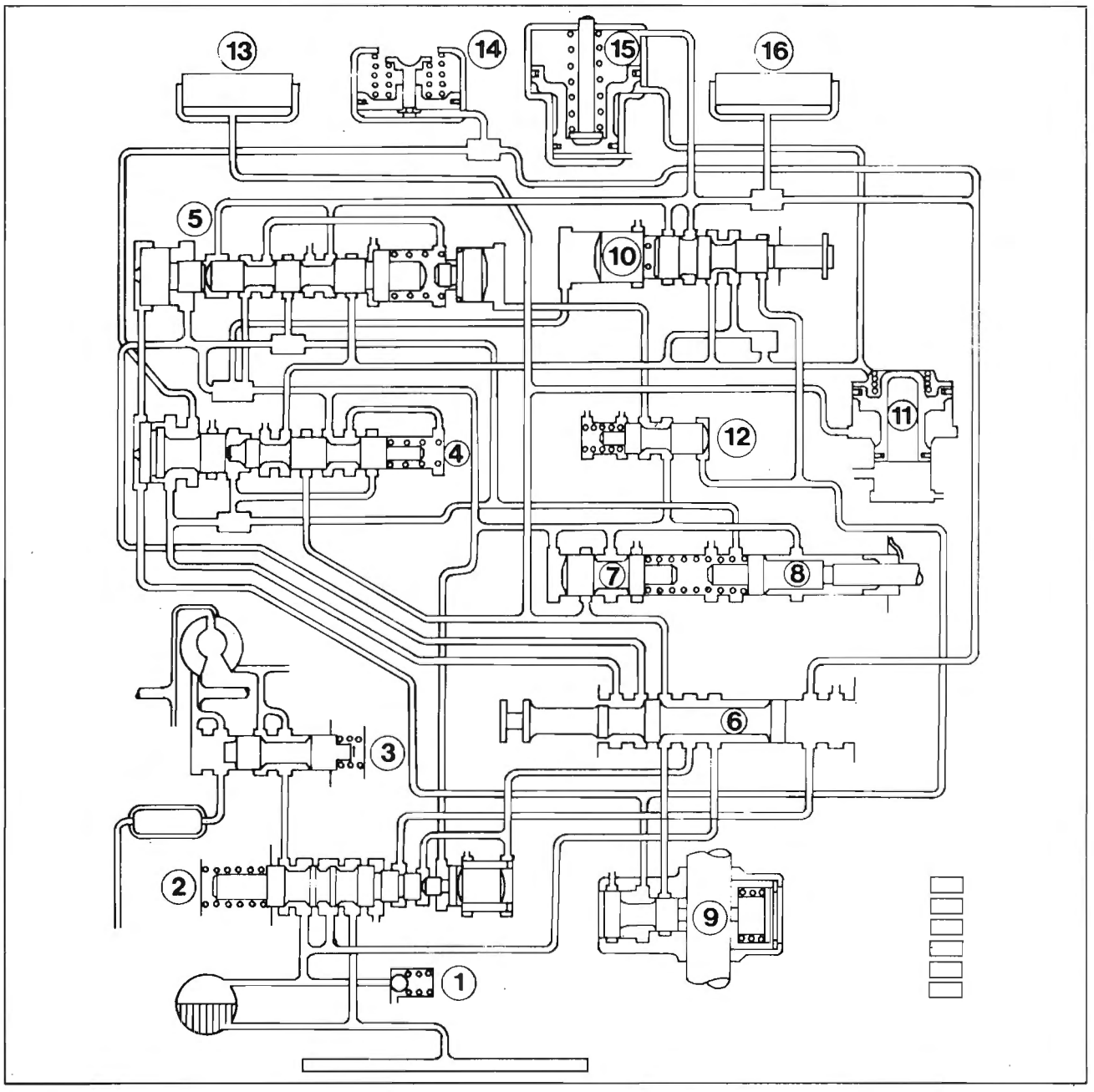
Main pressure is regulated to a level, which is indirectly dependent on the position of the accelerator pedal.

2232) Pressure distribution units

Automatic pressure distribution towards the control units (clutches and servo-systems) is by means of 1-2 and 2-3 valves, which, depending on their respective positions, open or close the supply systems for these units (see Fig. 3).

Fig. 3

G.058



1 - Delivery valve
2 - Main pressure regulating valve.
3 - Lubricating pressure regulating valve.
4 - 1-2 shift valve.
5 - 2-3 shift valve.
6 - Manual valve.
7 - Throttle valve.
8 - Gear-down valve.
9 - Centrifugal governor.
10 - Shuttle valve
11 - Time delay system.
12 - Limiting valve.
13 - Rear clutch.
14 - R. Servo
15 - K.D. Servo.
16 - Front clutch.

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2233) Control or outer circuit interlocking units

The units which allow the pressure applied in the various systems of the hydraulic pack to be accurately controlled, are as follows:

. the manual valve:
which is designed to direct the appropriate pressure to the selected systems;

the throttle and gear-down valve, which is designed:

- to modify the main pressure level depending on the driving conditions;
- to delay the action of 1-2 and 2-3 shift valves, and therefore to delay shifting into top gear, when shifting gears up, depending upon driving conditions.
- to actuate 1-2 and 2-3 shift valves when gearing down;

. the centrifugal governor:
which is designed to convert the main pressure into a gradually increasing pressure dependent on the increase in engine speed.

It is this pressure, dependent on the speed of the vehicle, which tends to actuate 1-2 and 2-3 shift valves to shift into the corresponding ratios.

2234) Accessory units for better operation

These units have been incorporated to avoid certain secondary operational effects, which would otherwise be likely to produce unpleasant driving reactions.

These units are:

. the shuttle valve:
designed principally to avoid jerking effects for 2-3 and 3-2 kick down shifting;

. the accumulator or time delay system:
essentially designed to avoid jerking effects for 1-2 shifting;

. the limiting valve:
designed to prevent gearing down into first ratio from occurring at a speed greater than 45 km/h.

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	m da N
Diaphragm to crankshaft	8
Diaphragm to converter	5
Automatic gear box to cylinder block	5
Kick down lever setscrew	1
Selector control lever setscrew	1
Tachometer tapping setscrew to gear box	1.2
Extension to gear box setscrew	3.3
Oil sump to gear box setscrew	1.7
Neutral contactor to gear box	3.3
Front band adjustment screw lock-nut	4
Rear band adjustment screw lock-nut	4.8
Screw fastening extension support cross-member to extension	2.5
Screw fastening extension support cross-member to body	2.5
Screw fastening filter to valve box	0.4

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ADJUSTMENTS

Adjusting the gear selection control

- Set and lock manual control lever on position "P" (Parking), which is the most forward position.
- Place selector lever, on gear box, in parking position (rearmost position).
- Fit rod linking manual selector lever to gear box lever.

  This must be a free uncramped fit.
- Fit bolt fastening link rod to lever.
- Check that, for each selector lever position, locking of the same position on the gear box lever is obtained (ball seating noise in gear box).
- Check that it is possible to actuate the starting motor in positions "P" and "N", and impossible to actuate it in the other positions.
- Check that reverse lights can be switched on in position "R".
- Manipulating the selector lever, check that:
  - . gear box is released in positions "N" and "P";
  - . it is engaged in the other positions;
  - . also check action of parking brake in position "P".

Kick down control adjustment

Adjusting the kick down control must be carried out after the accelerator control has been adjusted as per engine specifications.

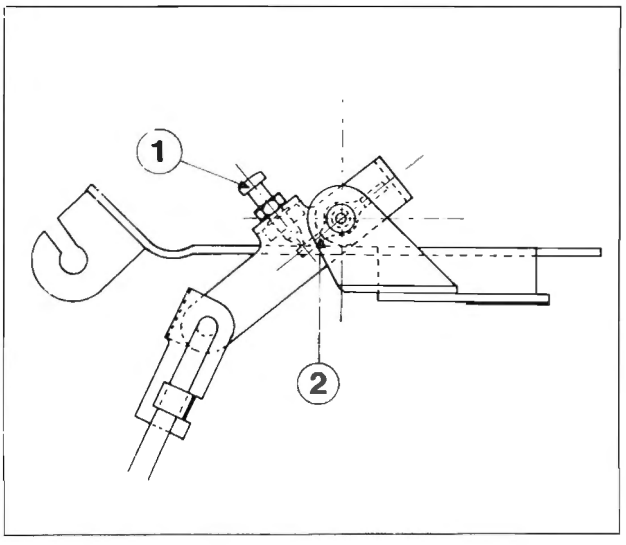
- With the butterfly valve closed, make sure that kick down lever, on gear box, is butting in forward position, with the return spring into place (the kick down stop is inside the gear box).
- Adjust play between screw (1) and driving sheet metal component (2), making sure that kick down lever on gear box is not displaced (Fig. 1).

Play : .05 to .3 mm

- Tighten lock-nut after adjustment.
- Actuate control three times from accelerator pedal.
- Checking: check that, with butterfly valve closed (accelerator pedal released), kick down lever on gear box returns properly to its stop, and that play between screw (1) and driving sheet metal component (2) correctly remains within the above mentioned figures.

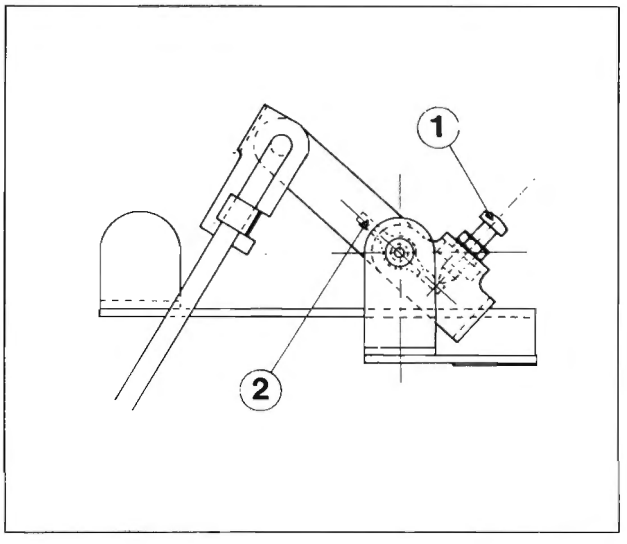
1800 Assembly, except Sweden

Fig. 1 G.052



1600 + 1800 Assembly, Sweden

Fig. 2 G.052



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Adjustment of bands

Adjustment of rear band:

- Set vehicle on a lifting ramp, and place a vessel with a wide opening under the oil sump.
- Loosen oil sump screws, open sump slightly at one of the corners to allow the oil to run out.
- Remove oil sump.
- Loosen nut locking the adjustment screw, then unscrew the nut about 5 turns.
- Check that adjustment screw turns freely in lever.
- Tighten adjustment screw to .8 m da N (Fig. 2).
- Loosen adjustment screw again by 3¼ turns.
- Hold screw in this position and tighten lock-nut.
- Re-fit oil sump, using a new gasket.
- Re-fill transmission.

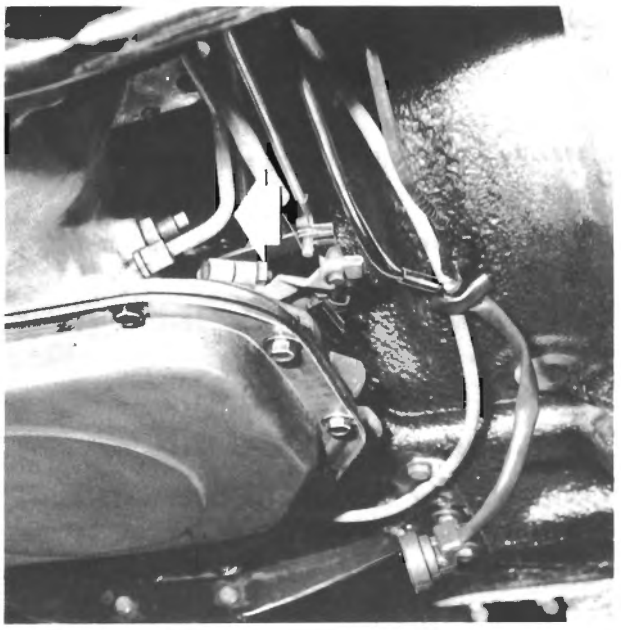


Fig. 3 4278

Adjustment of front band:

The front band adjustment screw is on the left-hand side of the transmission housing.

- Remove pipe taking oil from gear box towards cooler (Fig. 3).
- Loosen adjustment screw lock-nut, then unscrew nut about 5 turns.
- Check that adjustment screw turns freely in housing.
- Tighten adjustment screw to .8 m da N (Fig. 4).
- Loosen adjustment screw again by 3 turns.
- Hold screw in this position, and tighten lock-nut.
- Re-fit oil pipe.
- Top up with oil if necessary.

Fig. 2 4277

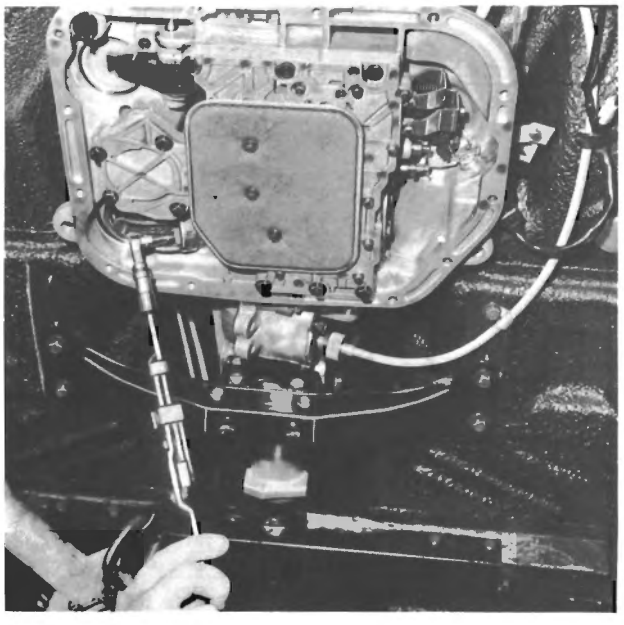


Fig. 4 4279



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DRAINING AND FILLING THE AUTOMATIC TRANSMISSION

- Set car on a lifting ramp; place a wide opening vessel under oil sump.
- Loosen oil sump screws, open sump slightly at one corner to allow oil to run out, then remove sump.
- If necessary, fit a new filter, in lower section of valve box, and tighten setscrews.
- If necessary, adjust reverse band.
- Clean sump, and re-fit it, using a new gasket.
- Pour Dexron Automatic Fluid in filter tube.
- Start engine, and allow it to idle for at least 2 minutes; then, with hand-brake applied, move manual selector lever momentarily towards each position to finish with the neutral position.
- Top up oil level.
- Check level again when transmission is at normal operating temperature.

DIAGNOSIS

As no repair operation is,at present, allowed on the automatic transmission, with the exception of the operations indicated under chapter F4/VII, operators must distinguish between the faults resulting from:

. a poor adjustment,

. the torque converter,

. the automatic gear box.

Checking the brake engine speed provides a prompt diagnosis of those faults which are attributable either to the torque converter or to the gear box.

Prior to removing the gear box-converter assembly, it is essential that the following should be checked:

. gear box oil level,

. engine setting,

. kick down linkage adjustment,

. adjustment of selection system,

. adjustment of bands,

. brake engine speed.

Brake engine speed

Caution: during this test, there should be no one in front of the car.

The brake test consists in finding out the engine speed as obtained in D position with throttle wide open. This test is designed to check the correct operation of the converter reactor, and of the gear box clutches.

Before this test, check oil level, and bring engine to its normal operating temperature.

Apply vehicle brakes.

Do not pursue test beyond time required to obtain the result, nor, in any case, beyond 5 seconds per test.

If the test must be repeated, run engine for 20 seconds at 1000 r.p.m. in neutral, to cool transmission down.

If engine speed exceeds the maximum limit, release accelerator immediately, for the clutches are slipping.

The acceptable brake engine speed is between 1900 and 2200 r.p.m.

Brake speed higher than standard

If brake engine speed is higher than the standard speed by more than 200 r.p.m., the clutches are slipping. This fault calls for the replacement of the transmission assembly (converter + gear box).

Brake speed lower than standard

With a correctly set engine, a brake engine speed lower than the standard speed indicates that the reactor free wheel is at fault. A road test is, then, necessary, to trace the exact cause.

If the brake engine speed is lower than the standard speed by 250 to 300 r.p.m., and if the vehicle runs normally on the road, but with weak acceleration, this shows the reactor free wheel is slipping.

Brake engine speed between 1900 and 2200 r.p.m.

If speed and acceleration are normal, but car speed is limited to approximately 110 km/h, the reactor free wheel is seizing.

Both faults call for the replacement of the torque converter.

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Noise

A siren type of noise may be heard on the occasion of the brake engine speed test with some converters; however, dull metallic sounds resulting from shocks or loosened components, indicate that the torque converter is defective.

To make sure that the noise comes from the torque converter, set the vehicle on a lifting ramp, and run the engine under low acceleration in positions D and N, and listen for noise under the torque converter housing.

Summary

Faults	Repair operations
Incorrect adjustment	Adjust correctly
Defective converter	Replace converter
Defective gear box	Replace gear box and converter

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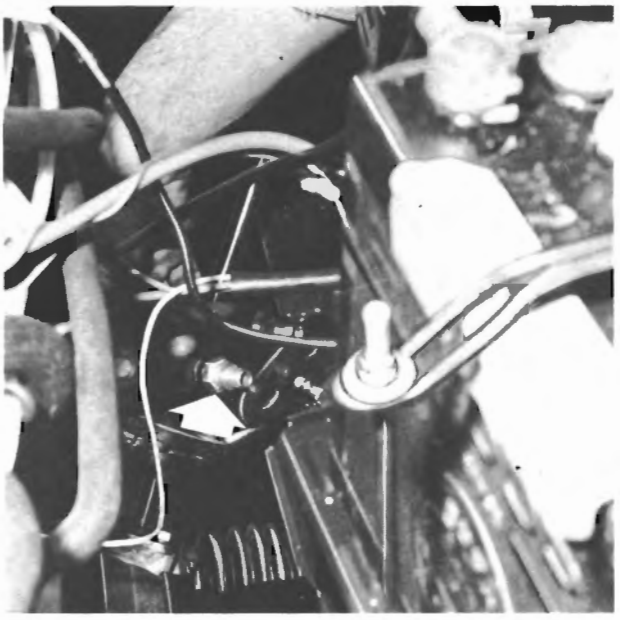


Fig. 1 4300

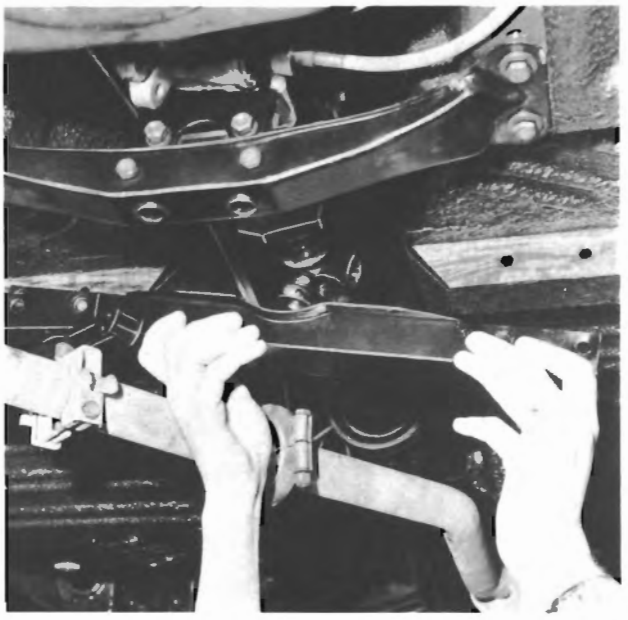


Fig. 3 4302

REMOVAL PROCEDURE

In engine compartment

- Disconnect battery.
- Disconnect oil cooling pipes from supporting angle bracket on side-member (Fig. 1).
- Remove bolt fastening starting motor to cylinder block.

From under vehicle

- Clear both rubber holders used to attach exhaust system to cross-member (Fig. 2).
- Remove 4 bolts fastening cross member to body (Fig. 3).
- Unlock and remove 4 bolts fastening propeller shaft to differential nose.
- Remove 2 screws fastening transmission relay unit to body.
- Proceed slowly to clear propeller shaft from extension, and remove it.
- Disconnect speedometer cable (Fig. 4).

Fig. 2 4301

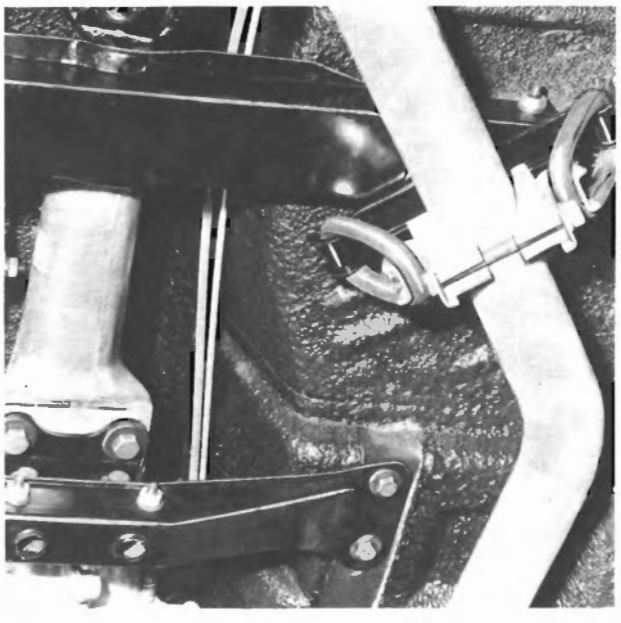
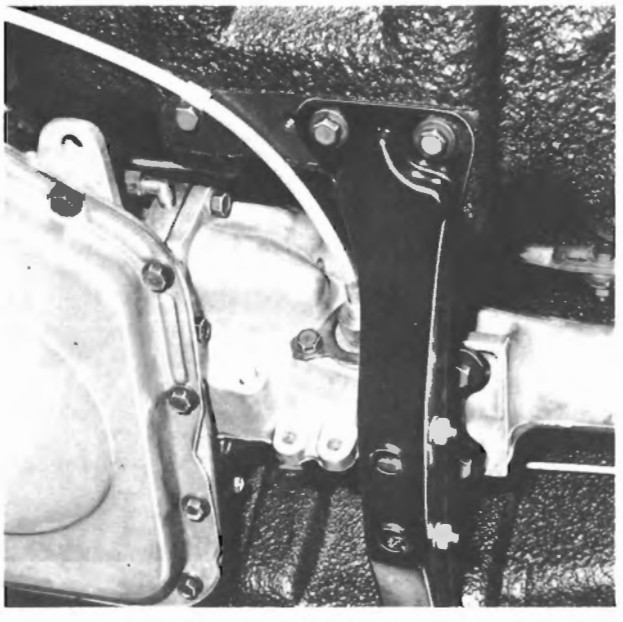


Fig. 4 4303



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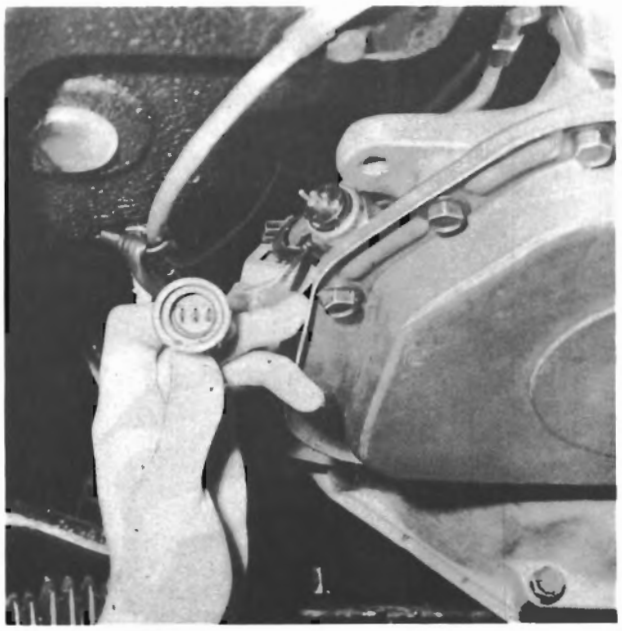


Fig. 5 4304

- Disconnect reverse light and neutral contactor supply wires (Fig. 5).
- Disconnect selector rod on gear box.
- Disconnect kick down rod on gear box.
- Remove 4 screws fastening stabilizer rod to side-members (Fig. 6).
- Remove 4 screws fastening lower reinforcement to cylinder block (Fig. 7).
- Remove 3 screws fastening lower reinforcement to gear box (Fig. 8), and remove reinforcement.
- Remove 3 screws fastening the diaphragm to the torque converter, using a 32 end-piece fitted at end of pulley to rotate the crankshaft.
- Mark diaphragm/converter relative position.

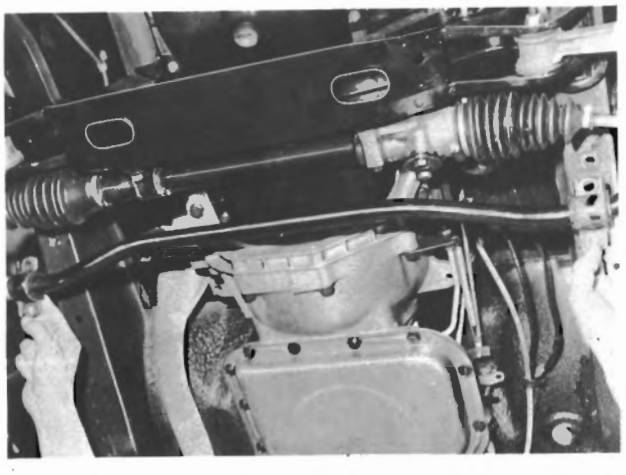


Fig. 6 4305

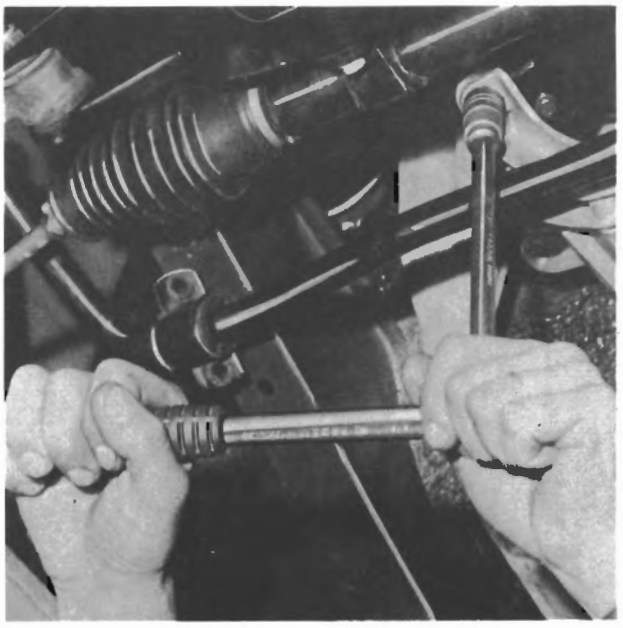


Fig. 7 4306

- Remove 4 screws fastening gear box cross-member to body after placing a vessel under the gear box in order to recover the oil running from the extension when the engine/drive unit is tilted rearwards.
- Remove 2 screws fastening cross-member to gear box, and remove cross-member.
- Place a wooden spacer (35 mm thick) between the front suspension cross-member and the oil sump to enable the engine/drive unit to be tilted rearwards.



Fig. 8 4307

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- Place an hydraulic jack under the automatic gear box.
- Remove gear box setscrews, push converter fully in its gear box housing.
- Progressively clear gear box towards rear, and remove gear box.

Note: When removing the gear box take the greatest care not to foul the starting motor nose with the torque converter housing.

When transmission has been cleared, do not tilt it forward, to prevent the converter from falling out.

RE-FITTING OPERATIONS

- Locate gear box in position on cylinder block.
- Fasten gear box setscrews.
- Connect diaphragm to converter, using ref. marks made when dismantling this assembly.

Note: When changing a diaphragm or a converter, proceed as follows:

. the heavy point of the diaphragm is marked with green paint;

. the light point of the converter is marked with blue paint.

Bring those two ref. marks face to face (with an accuracy of $\pm 60^0$) and connect converter to diaphragm.

For the remainder of re-fitting operations, proceed in reverse order from removal procedure, but remember to:

. check oil level;

. check selection system adjustment;

. check adjustment of kick down linkage.

REPLACING THE CONVERTER

- Remove automatic gear box.
- Remove converter, pulling gently towards outside of housing.
- Place new converter in its housing; turn it slightly, pushing it towards the pump until driving studs are meshed in the front pump.
- Re-fit automatic gear box.

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REVERSE LIGHT AND NEUTRAL CONTACTOR

Replacement and testing

The neutral contact is the central terminal of the 3 terminal switch.

Its function is to earth the starting motor solenoid circuit when the selector lever cam is in position "P" or "N" only.

- To test this contact, remove the wire connected to the central terminal, and check the continuity of the circuit from the central terminal to the housing when the control is in position "P" or "N" only.
- Check the adjustment of the selection system before replacing the contact when test results are unsatisfactory.
- Unscrew contact, allowing the oil to flow in a vessel. Move selector lever to "P", then to "N", and check that the lever contact straps controlling the switch are correctly located in the contactor holder on the housing.
- Screw contact and new seal in housing, and tighten to torque. Test contact again with an electric bell.
- Add oil to transmission to correct level.
- Reverse light contact is through both outer terminals of 3 terminal switch.
- To check contact, remove wires from switch, and check continuity between the outer terminals.
- Circuit continuity should only be present when control is in position "R".
- There must be no continuity between any of these two terminals and the housing.

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REMOVING AND RE-FITTING THE TACHOMETER TAPPING

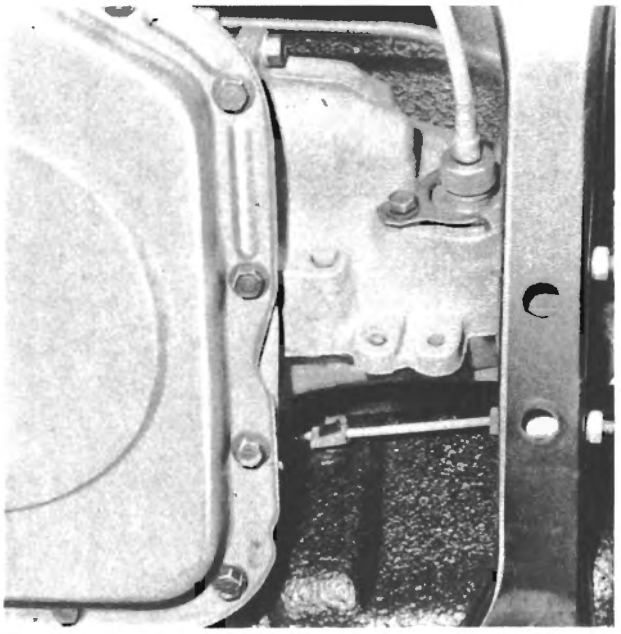


Fig. 1 4308

Removal procedure

- Remove screw and strap retaining tachometer tapping on extension housing (Fig. 1).
- Pull on cable sheath connected with tachometer tapping in order gently to extract the adapter and the pinion from the extension housing.
- Disconnect speedometer cable from tachometer tapping.
- Remove tachometer tapping assembly (adapter and pinion).

Re-fitting operations

Before re-fitting the adapter/pinion assembly, make sure that bearing faces on the adapter and extension housing are clean. Impurities may cause some misalignment and may, therefore, produce noise in the tachometer tapping.

Also check that there is no oil in the speedometer cable sheath.

- Place pinion in position in adapter.
- Rotate "adapter-pinion" assembly so that the numerical reference shown on the adapter (39-45), which corresponds to the number of teeth on the pinion (41 teeth for 160 GT and 180, 43 teeth for 160 model), faces the extension housing reference mark (Fig. 2) when the assembly is fitted.

  Note: this reference mark (A) is in the 6 o'clock position on the extension housing.
- Re-fit screw and retaining strap so that the tongues fit in correct position in adapter grooves; use a mallet to fit the adapter in its housing.
- Re-connect speedometer cable.

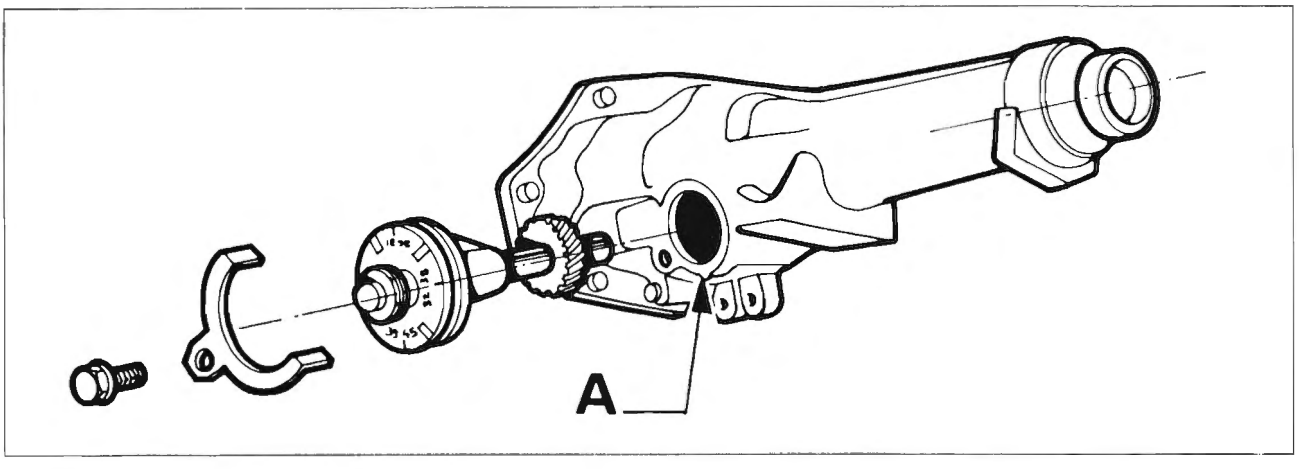


Fig. 2 G.053

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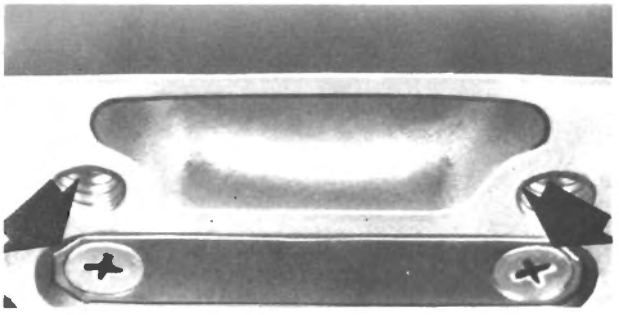


Fig. 3 4309

Removing the extension

- When removing or re-fitting the extension, the selector lever must be in position "L1". This sets the parking brake control shaft towards the rear, so that it can be released from the parking brake pawl or re-engaged.
- Remove tachometer tapping assembly (adapter and pinion); recover the oil, which may flow out during this operation.
- Unlock and remove the 4 nuts fastening the propeller shaft to the differential nose; remove transmission relay setscrews, and gently clear propeller shaft from extension.
- Remove 4 screws used to fasten extension supporting cross-member to gear box.
- Remove 2 screws used to fasten cross-member to extension.
- Remove exhaust supporting cross-member.
- Remove the 2 screws, the plate, and the gasket from the bottom of the extension housing bearing face against the support (Fig. 3).
- Remove screws fastening extension to housing.
- Widely open the circlip, which is visible through the extension opening, and pull extension gently from output shaft bearing (Fig. 4).
- Pull extension gently towards rear to bring parking brake control shaft butt beyond pawl, then remove extension.
- Remove pawl retaining spindle.
- Remove pawl and its spring.
- Remove pawl stop retaining circlip, and pull upwards to remove stop.

Note: the last three operations are only necessary if the extension is being replaced.

Replacement of output shaft bearing

From removed extension:

- Remove rear bearing retaining circlip (Fig. 5).
- Remove bearing.
- Fit a new bearing on the shaft, with the groove on the outer bearing race facing forward, then fit rear circlip.

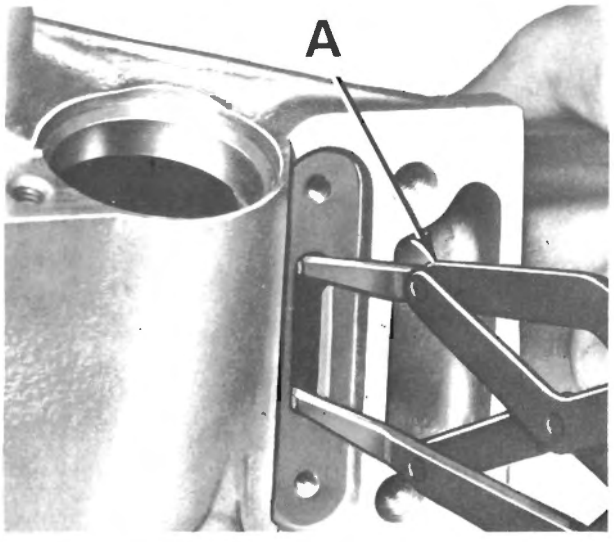


Fig. 4 4310

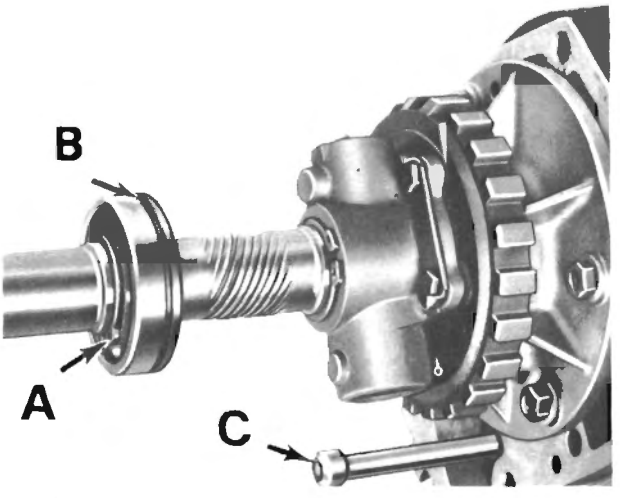


Fig. 5 4311

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Re-fitting the extension

- Fit a new extension housing gasket on the gear box housing. Place output shaft bearing retaining circlip in extension housing.
- Slide housing over output shaft, guiding the parking brake control shaft butt beyond the pawl.
- Widely open housing circlip, and fit housing gently in position.
- Release circlip, making sure it is correctly seated in rear bearing groove.
- Fit screws fastening extension housing.
- Place gasket, plate, and 2 screws on bottom section of transmission housing bearing face against support.
- Re-fit exhaust supporting cross-member.
- Re-fit extension supporting cross-member.
- Re-fit propeller shaft.
- Re-fit tachometer tapping assembly.
- Top up with oil to appropriate level in gear box.

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F5 - PROPELLER SHAFT

F5/I - General specifications

F5/II - Tightening torque values

F5/III - Specific tooling

F5/V - Removing and re-fitting the propeller shaft

F5/VI - Overhaul of propeller shaft

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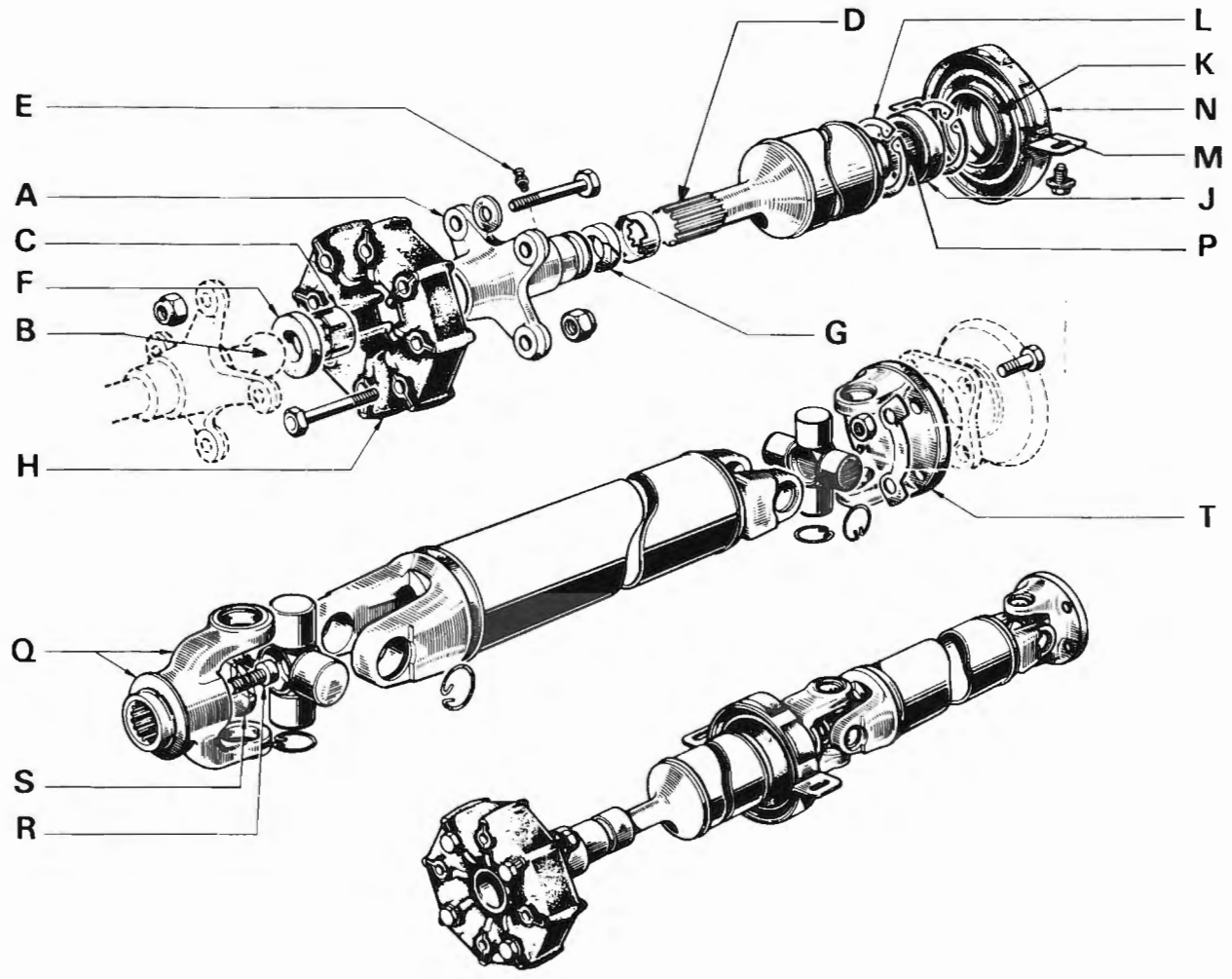


Fig. 1

G.031

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GENERAL SPECIFICATIONS

Motion transmission is by means of a shaft, which consists of:
. a front half-shaft,
. a rear half-shaft.

Front half propeller shaft

This half-shaft has a flange (A - Fig. 1) with a front end bore fitting on swivel nut (B), which is made integral with the gear box output shaft.

A plastic cap (C), filled with Shell Retinax A grease (7 g to be evenly distributed on assembly), lubricates the swivel-joint.

The rear end of the flange has a grooved bore; a grooved sleeve (D), welded on the half-shaft front end, slides in this bore.

Flange (A) is fitted with a lubricator (E). The flange is sealed:
. at the front end, by a foam rubber ring (F);
. at the rear end, by a cork lining (G) held in a clinched sheet-metal retainer.

A flexible "SAGA" type joint (H) binds the gear box output shaft flange and propeller shaft flange (A).

The half propeller shaft is supported, at the rear end, by a flexible relay system comprised of:
. a sealed ball bearing (J) in which the propeller shaft runs. The outer race is held laterally in bush (K) by 2 inner circlips (L);
. a bush (K) connected to relay system support (N) by means of a flexible roughened rubber ring (M). (The lip of this ring must always be turned towards the front of the vehicle.
. a sheet metal bracket (N) fastened in two points to the underframe.

The rear end of the half shaft has a grooved spindle (P) designed to receive the fixed jaw (Q) of the universal joint used for linking with the rear half-shaft.

Rear half shaft

Fixed jaw (Q) of the front universal joint is coupled with grooved spindle (P) of the front half-shaft by means of a central screw (R) and a bearing washer (S).

This coupling also enables inner bearing race (J) to be locked laterally.

Rear universal joint jaw (T) is coupled with the differential flange by means of screws and locked nuts.

Important note:

The complete transmission assembly (inclusive of the flexible joint) is originally balanced dynamically at 3,000 r.p.m. The permissible want of balance is 15 g/cm.

A balancing ref. mark is shown on the following components (Fig. 2):

. flexible joint .....) These 3 Ref.
. front half-shaft flange ...) Marks must face
. front ½ shaft (front end)..) one another

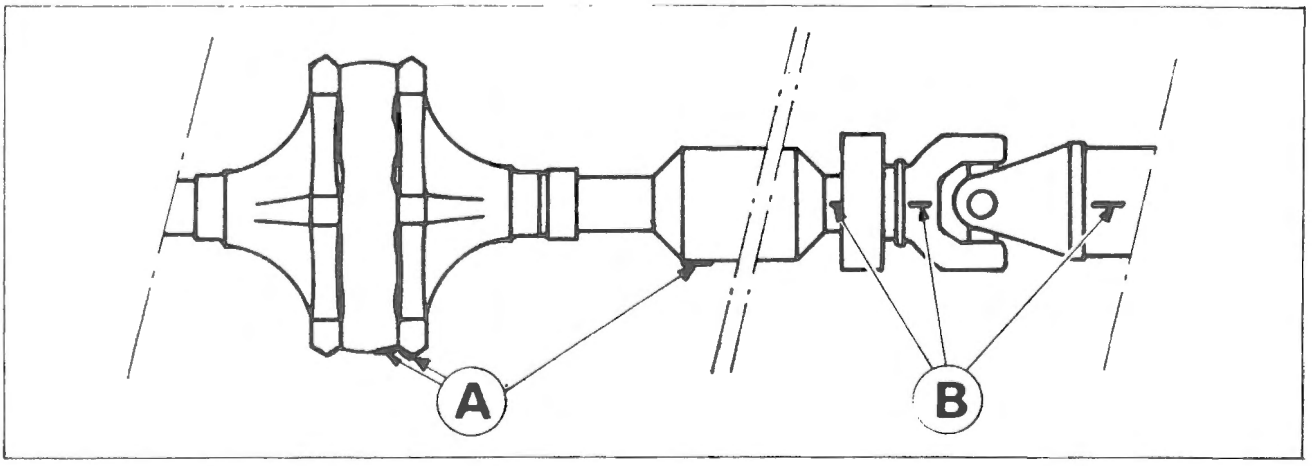
. front ½ shaft (rear end) ..) These 3 Ref.
. intermediate cardan jaw ...) Marks must face
. rear ½ shaft (front end) ..) one another

Consequently, when re-fitting a propeller shaft, the balancing reference marks must face one another.

If these reference marks are difficult to see (rust, dirt, etc.), mark the above parts before undertaking the dismantling operations.

Fig. 2 A - 3 Ref. marks in line, any position in relation to relay reference marks
B - 3 Ref. marks in line.

G.032



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TIGHTENING TORQUE VALUES
SPECIFIC TOOLING

TIGHTENING TORQUE VALUES

	m da N
Transmission rear flange to differential flange	2.2
Coupling between front half shaft and rear half shaft	5.25
(SAGA) flexible joint to propeller shaft front flange	5.25
(SAGA) flexible joint to gear box output shaft flange	5.25
Transmission relay to underframe	2.2

SPECIFIC TOOLING

Tool	20893 C
Stand	20938 W
Bearing ring	20939 X
Washer	20940 C
Bearing fork	20941 Z

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REMOVAL PROCEDURE

- Disconnect propeller shaft from gear box flange. The flexible joint remains on the propeller shaft.
- Remove both exhaust pipe suspension rings from supporting cross-member (Fig. 1).
- Remove exhaust pipe supporting cross-member (Fig. 2).
- Disconnect propeller shaft from differential flange.
- Remove screws fastening transmission relay to body (Fig. 3).
- Remove propeller shaft.

RE-FITTING OPERATIONS

- Fasten transmission relay to body.
- Couple propeller shaft to differential flange.
- Fit new sheet metal retainers.
- Couple propeller shaft to gear box flange.
- Fit exhaust pipe supporting cross-member.
- Fit both exhaust pipe suspension rings into place.



Fig. 2 4030

Fig. 1 4029

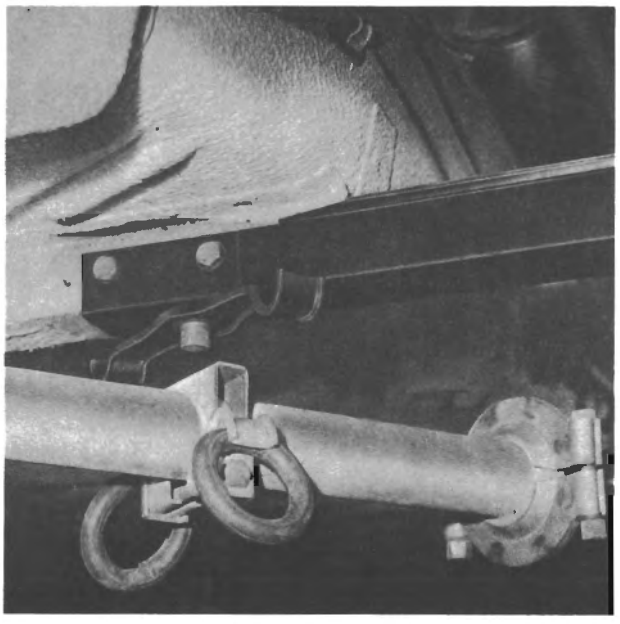
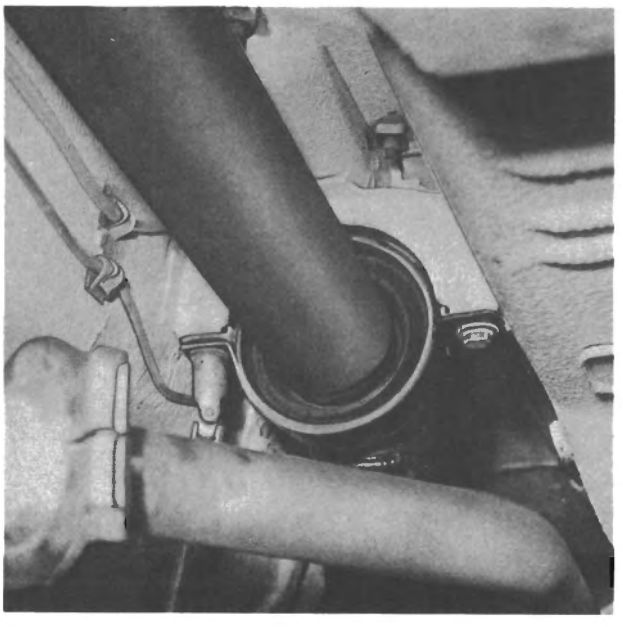


Fig. 3 4033



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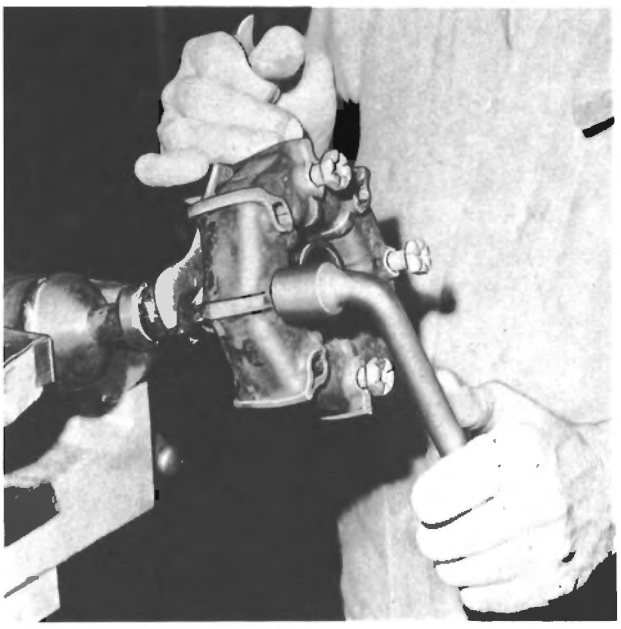


Fig. 1 4034

DISMANTLING PROCEDURE

Prior to any dismantling operations, and if the original balancing reference marks are difficult to see, reference marks must be shown on the following parts:

. flexible joint (flector).....) These 3 Ref.
. front ½ shaft flange .....) marks must face
. front ½ shaft (front end) ....) one another

. front ½ shaft (rear end) .....)
. intermediate cardan joint) These 3 Ref.
fixed jaw .....) marks must face
. rear ½ shaft (front end) .....) one another

Note: the rear half shaft is delivered assembled from the suppliers, and is coupled afterwards with the front half shaft in production. Consequently, the rear end of the rear half shaft, and the rear universal joint jaw do not carry initial reference marks.

If the rear universal joint, therefore, is to be dismantled, operators must show these two reference marks.

- Remove transmission flexible joint (Fig. 1).
- Loosen the flange sealing cork lining sheet metal retainer (Fig. 2).
- Remove flange (Fig. 3). Do not re-use the cork lining or sheet metal retainer.
- Uncouple half shafts, removing the central coupling screw with an 8 mm Allen wrench (Figs. 4 and 5).

Fig. 2 4035

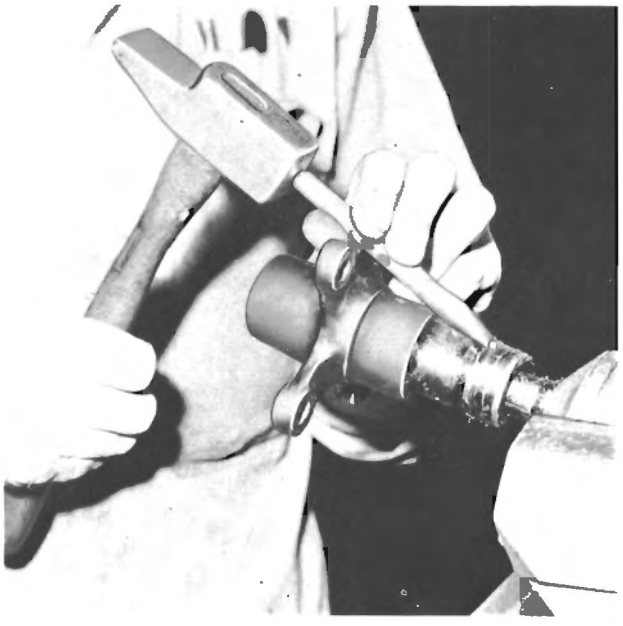




Fig. 3 4036

Fig. 4 4037



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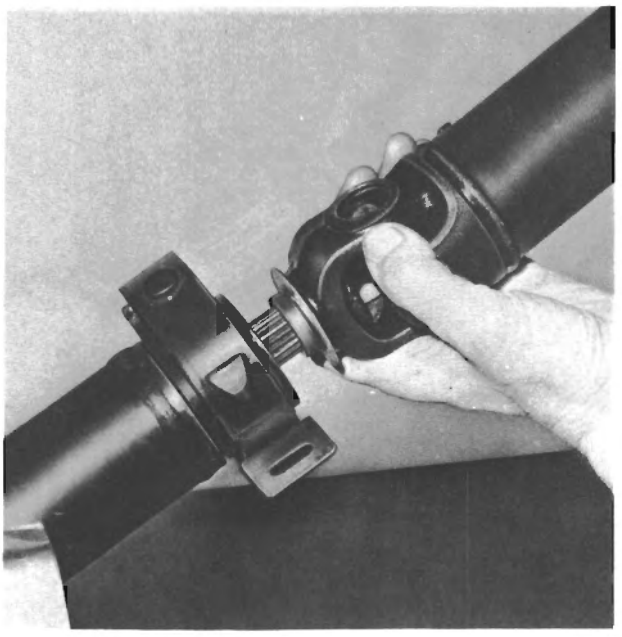


Fig. 5 4038

- Remove 4 intermediate universal joint bearing snap-rings.
- Set rear half shaft on fork Ref. 20941 Z, resting on fixed jaw.
- Use small bronze hammer to strike on rear half shaft until hollow cross-pin comes to stop against the rear half shaft jaw flange (Fig. 6).
- Turn half shaft over, and repeat operation on opposite bearing.

Fig. 6 4039



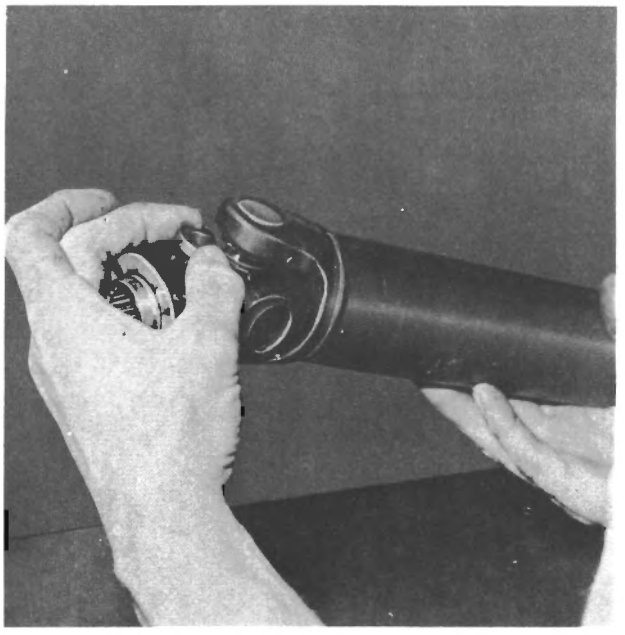


Fig. 7 4040

- Push cross-pin to one side, and insert washer Ref. 20940 C between cross-pin and bearing (with washer chamfer on side of cross-pin recess) (Fig. 7).
- Strike until bearing is fully extracted.
- Repeat same operation on opposite bearing.
- Clear fixed jaw with hollow cross-pin from rear half shaft jaw (Fig. 8).
- Place fixed jaw cross-pin on supporting fork Ref. 20941 Z.

Fig. 8 4041



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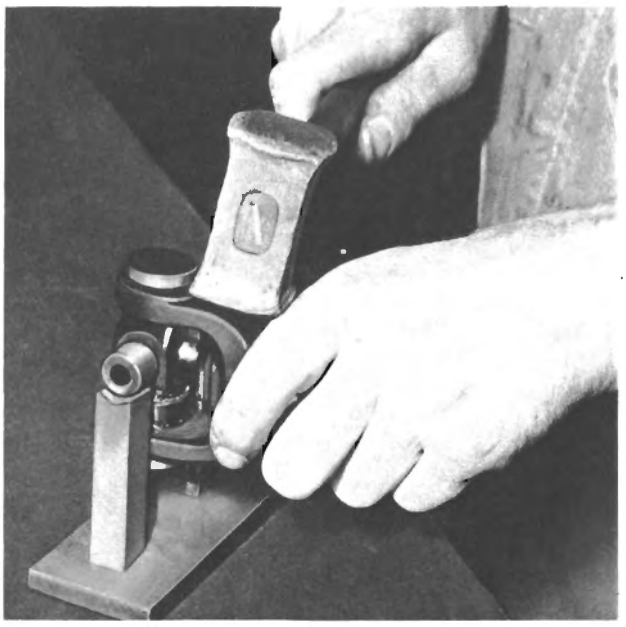
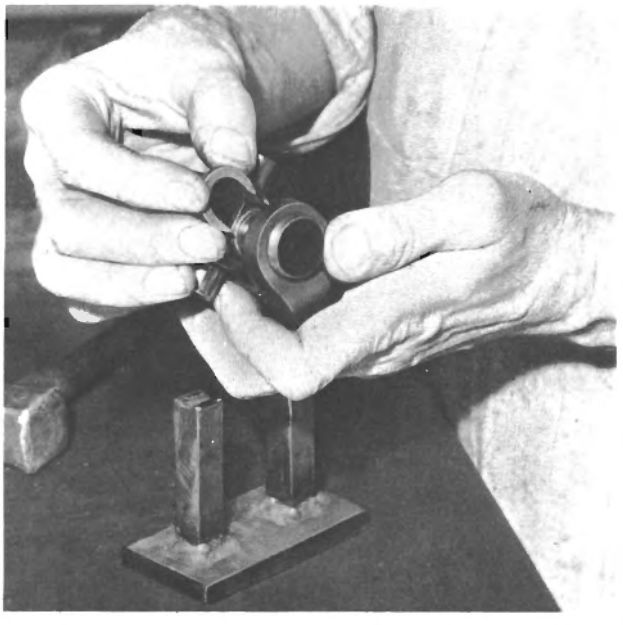


Fig. 9 4042

- Strike on fixed jaw until hollow cross-pin comes to stop against jaw flange (Fig. 9).
- Turn fixed jaw over, and repeat operation on opposite bearing.
- Push cross-pin to one side, and insert washer Ref. 20940 C between cross-pin and bearing (with washer chamfer on side of cross-pin recess (Fig. 10).
- Strike until bearing is fully extracted.

Fig. 10 4043



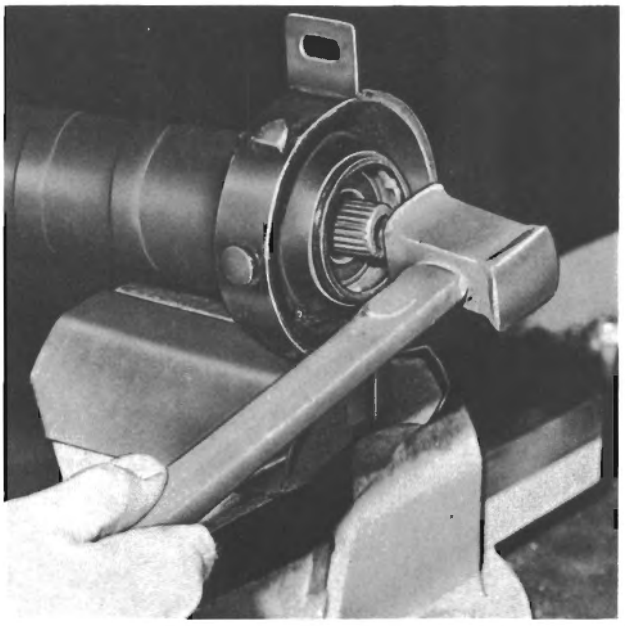
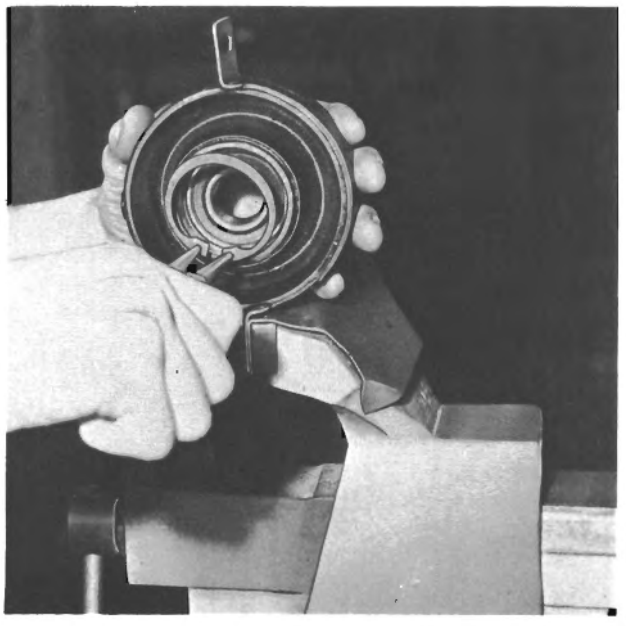


Fig. 11 4044

- Repeat same operation on opposite bearing.
- To dismantle rear universal joint, proceed likewise.
- Extract flexible relay from front half shaft by striking on half shaft with a small bronze hammer (Fig. 11).
- Extract both circlips used to retain the ball bearing (Fig. 12).

Fig. 12 4045



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Fig. 13 4046

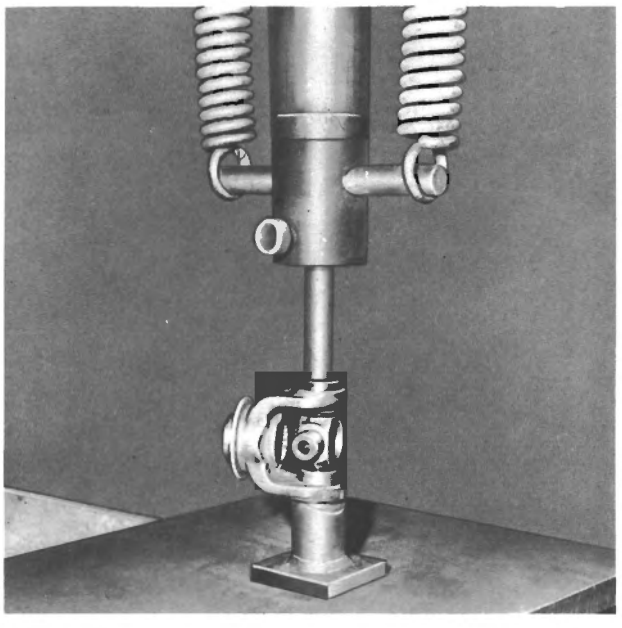
- Extract bearing from flexible relay, using tool Ref. 20893 C and taking the outer bearing race as a bearing point (Fig. 13).

INSPECTION

- Carefully clean dismantled parts, except the following components, which must be systematically replaced when dismantling is required:

  . front flange sealing cork lining;
  . cork lining sheet metal retainer;
  . bearings and cross-pins;
  . bearing seals;
  . bearing snap-rings;
  . relay bearing retaining circlips.

Fig. 14 4047



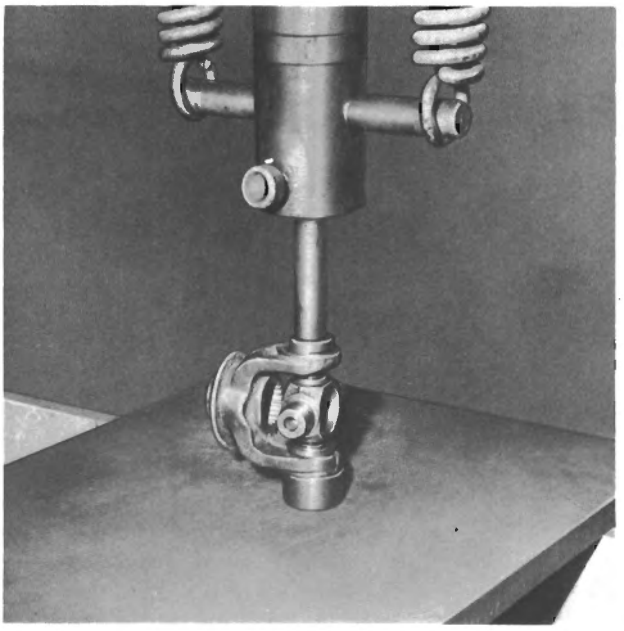
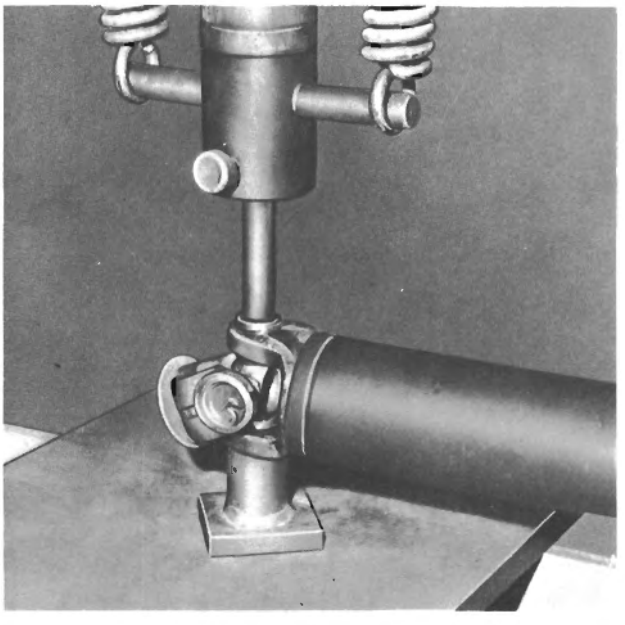


Fig. 15 4048

- Make sure that universal joint jaws are neither badly distorted nor cracked.
- If one of the half shafts shows a fault requiring its replacement, the propeller shaft complete must be replaced. These half shafts, indeed, are not supplied separately, since they are dynamically balanced once assembled.
- Make sure that the relay rubber ring does not show marks of ageing or other faults (cuts, loosening, etc.).
- The bearing must be perfectly sealed, and must run noiselessly without any "tight spot".

Fig. 16 4049



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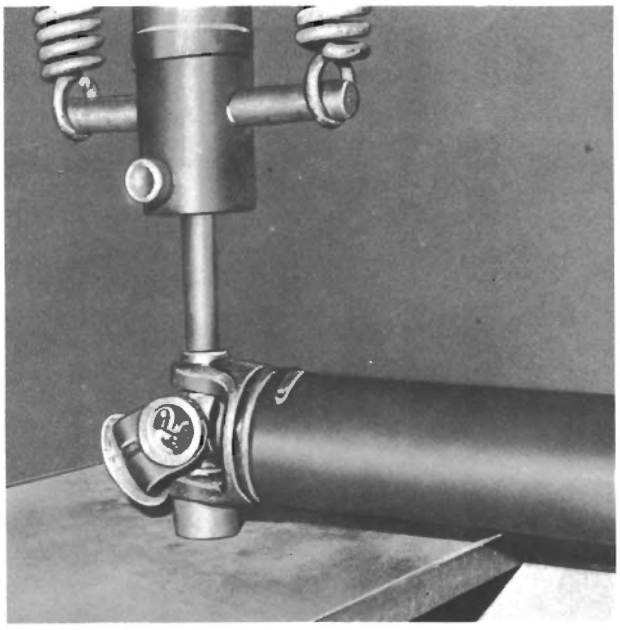


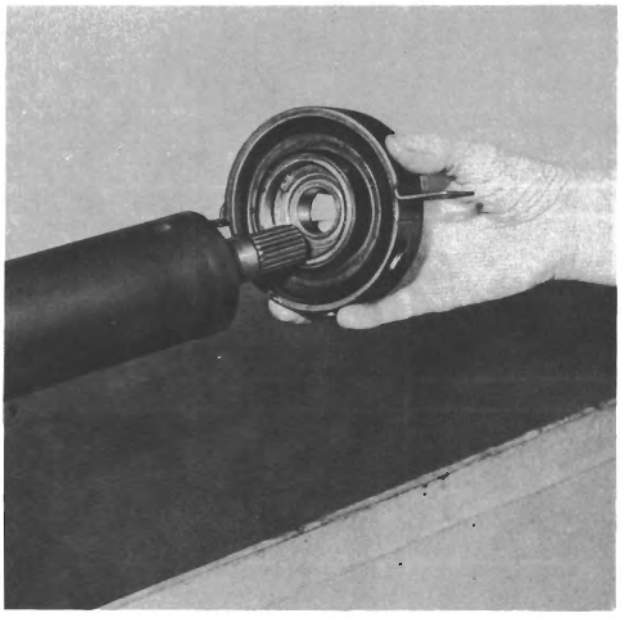
Fig. 17 4050

RE-ASSEMBLY

- Generously pack Shell Alvania EP 2 grease in the 4 holes of each cross-pin.
- Insert hollow cross-pin in fixed jaw flanges.

  Fit a seal on hollow cross-pin spindle (nylon cup facing outside).
- Place fixed jaw and cross-pin on stand Ref.20938 W.
- Use press to fit a bearing (Fig. 14), then fit a retaining snap-ring in its groove.
- Turn fixed jaw over, place it on bearing ring Ref. 20939 X, then repeat operation on opposite side (Fig. 15).

Fig. 18 4051



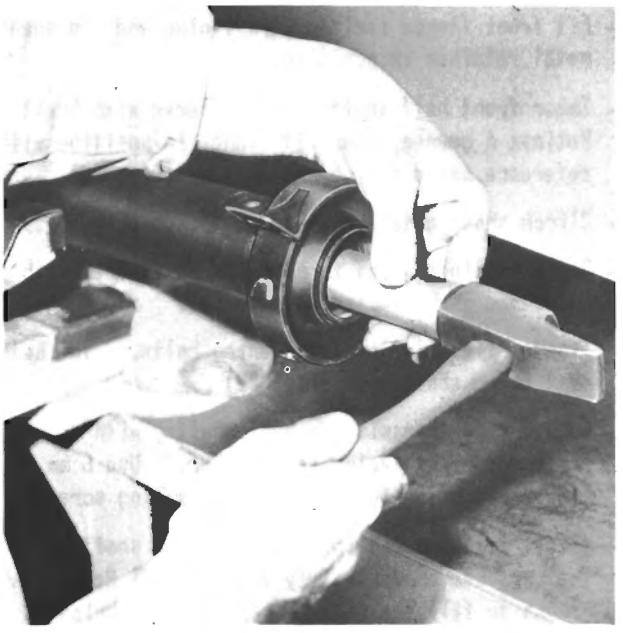


Fig. 19 4052

- Insert hollow cross-pin in rear half shaft front jaw flanges, with both jaw reference marks facing one another.
- Place rear half shaft jaw on stand Ref. 20938 W.
- Fit a seal on hollow cross-pin spindle (nylon cup facing outside).
- Use press to fit a bearing (Fig. 16), then fit a retaining snap-ring in its groove.
- Turn rear half shaft jaw over, place it on bearing ring Ref. 20939 X, then repeat operation on opposite side (Fig. 17).
- Manually check that universal joint operates correctly. These must be no tight spot.
- Proceed likewise to re-assemble rear universal joint.
- Fit a circlip in position in its groove on the transmission relay.
- Taking outer bearing race as a bearing point, use tool Ref. 20893 C to fit relay bearing in position.
- Fit 2nd circlip in position.
- Taking inner bearing race as a bearing point, use a tube with a 26 inner dia. and a 34 outer dia. (Figs. 18 and 19) to fit flexible relay on front half shaft, with flexible ring lip facing the front.

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- Fit front flange sealing cork lining and its sheet metal retainer in position.
- Smear front half shaft grooved sleeve with Shell Retinax A grease, then fit flange in position with reference marks facing one another (Fig. 20).
- Clinch sheet metal retainer on flange (Fig. 21).
- Place flexible joint in position on flange, with reference marks facing one another.
- Tighten flexible joint fastening bolts. The nuts must be on shaft side (Fig. 22).
- Couple both transmission half shafts, with reference marks facing one another. Use 8 mm Allen wrench to tighten central coupling screw.

Note: prior to fitting the propeller shaft on the car, use approximately 7 g of Shell Retinax A grease to fill the plastic cap, which lubricates the gear box flange fastening swivel nut.

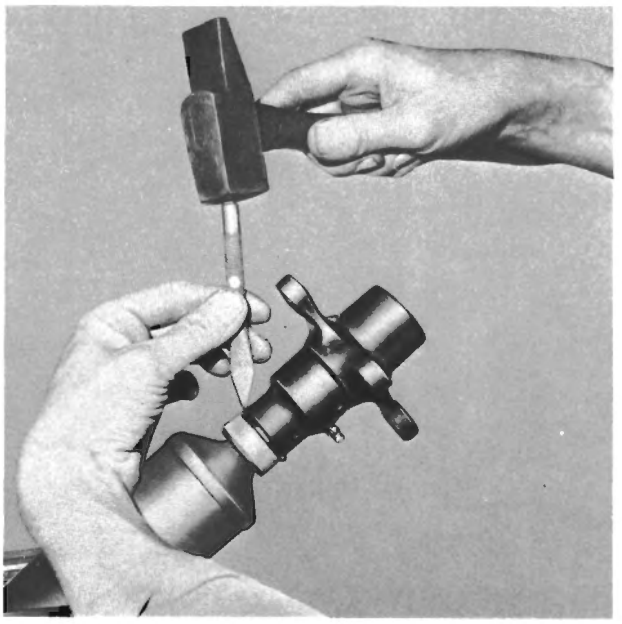


Fig. 21 4054

Fig. 20 4053

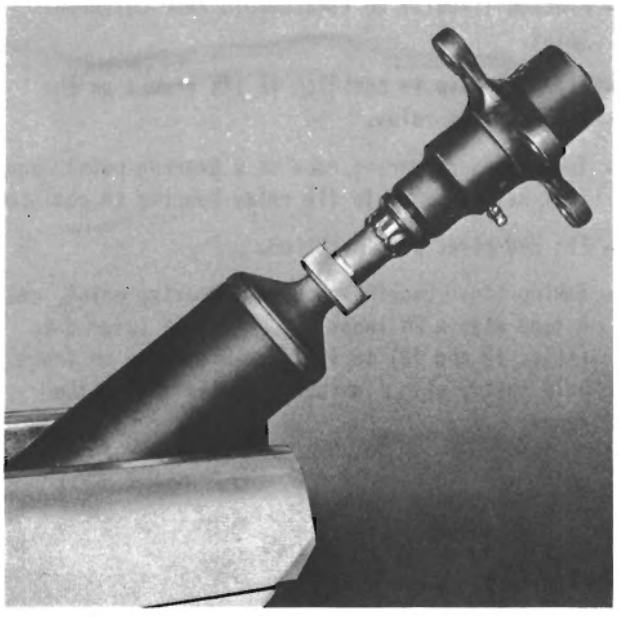
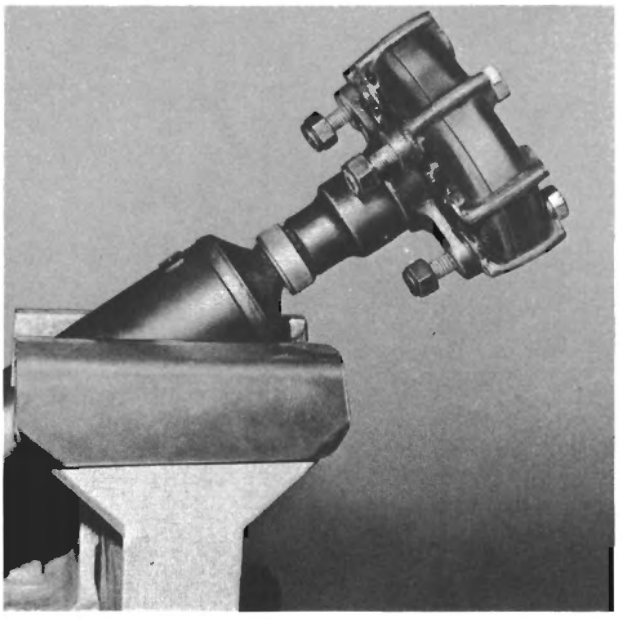


Fig. 22 4055



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F6 - DIFFERENTIAL

F6/I - General specifications

F6/I - Reduction ratios and speeds per 1,000 r.p.m.

F6/II - Tightening torque values

F6/III - Specific tooling

F6/V - Removing and re-fitting the differential

F6/VI - Overhaul of the differential

F6 - WHEEL SHAFTS

F6/I - General specifications

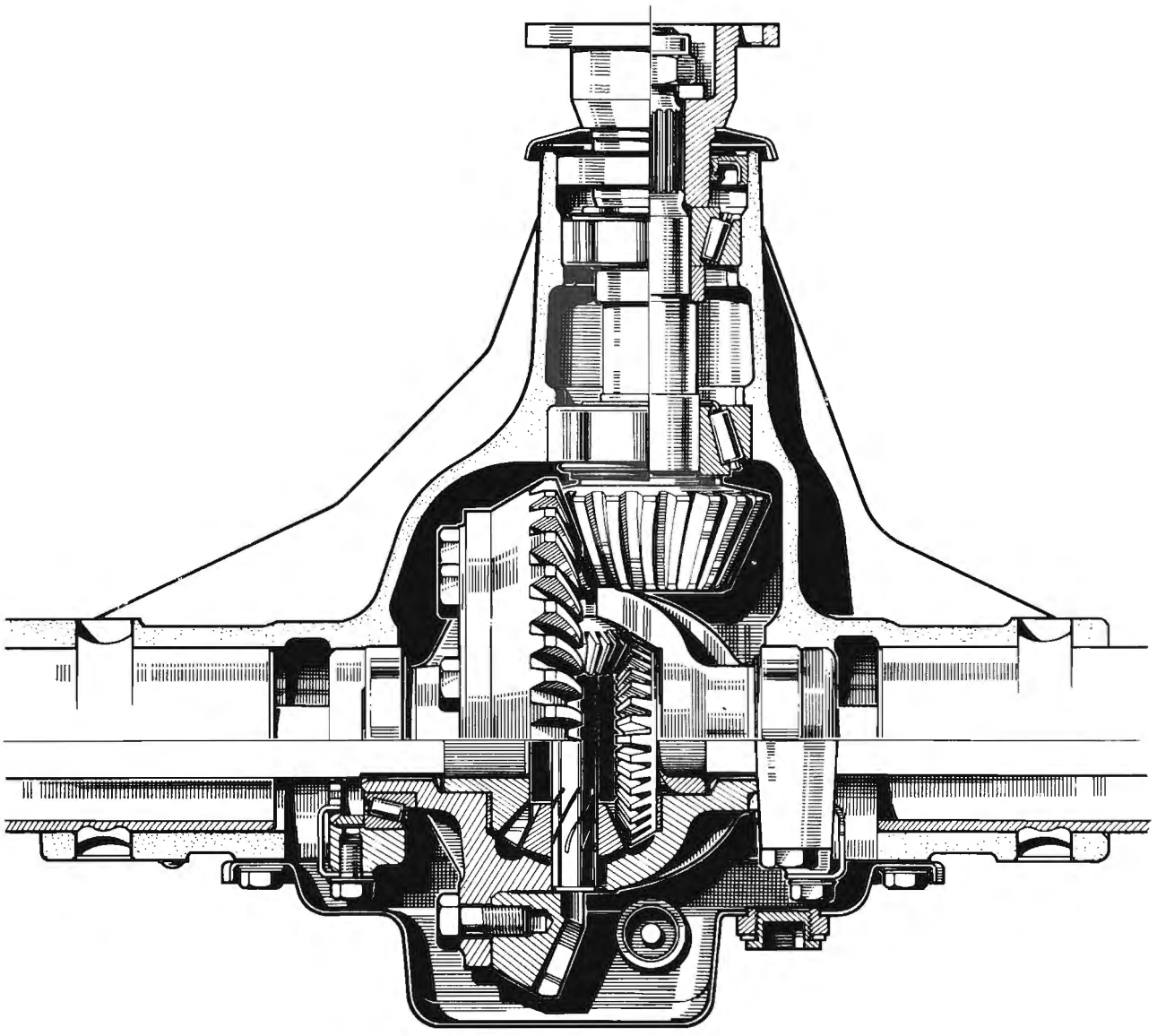
F6/II - Tightening torque values

F6/III - Specific tooling

F6/V - Removing and re-fitting a wheel shaft

F6/VI - Replacing a wheel shaft bearing

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W.1321

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GENERAL SPECIFICATIONS (Fig. 1)

The differential is of the semi-floating type.

It is fitted with a banjo housing.

A removable rear cover provides access to the differential and bevel gears for repairs and adjustments.

The bevel gears are of the hypoid type.

Oil capacity (Shell Spirax 90 EP) of differential: 1.4 litre.

REDUCTION RATIOS AND SPEEDS AT 1000 r.p.m.

	Selected gears	Gear Box ratios	Differential ratio		Total ratios		Speeds at 1000 r.p.m. for a theoretical tyre rolling circumference of 1.8 m.	
			160	160 GT.180	160	160 GT. 180	160	160 GT. 180
Manual Gear Box	1	0.282			0.0719	0.0752	7.8 km/h	8.15 km/h
	2	0.467			0.119	0.122	12.8 km/h	13.5 km/h
	3	0.723			0.184	0.190	19.9 km/h	21.5 km/h
	4	1	11/43	11/41	0.255	0.263	27.5 km/h	28.9 km/h
	reverse	0.303	or	or	0.077	0.0797	8.3 km/h	8.75 km/h
Automatic Gear Box			0.256	0.268				
	1	0.408			0.104	0.107	11.2 km/h	11.8 km/h
	2	0.689			0.175	0.181	18.9 km/h	19.9 km/h
	3	1			0.255	0.263	27.5 km/h	28.9 km/h
	reverse	0.454			0.116	0.119	12.5 km/h	13.1 km/h

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TIGHTENING TORQUE VALUES

	m da N
Draining and filling plugs	4
Differential flange	27.5
Crown-wheel to differential case	8
Rear axle cover	2
Differential, fastening of nut retainers	2
Differential, fastening of bearing caps	7.5

SPECIFIC TOOLING

Desvil stand	21626 J
Spanners for differential nuts	21635 K
Torque bar and spring-balance	21630 S
Mandrel + rear bearing race extractor assembly	7306 D
Front bearing race extractor	21632 Q
Extractor for rear bearing on differential pinion	15525 F
Fork for rear bearing extraction	21634 J
Bearing bush for rear bearing extraction	20833 M
Extractor for differential bearings and rear axle flange	15526 G
Tool for fitting front and rear bearing races in rear axle housing	15524 E
Fitting bush for rear bearing race	20808 D
Fitting bush for front bearing race	21633 R
Dummy pinion	21627 K
Comparator with fitting rods	14773 W
Dummy differential	21628 U
Dummy differential removable washers	21629 Y
Fitting tool for differential bearings	20893 J
Claws for rear axle flange extractor	20891 Q
Dummy flange	21643 T
Fitting tool for rear axle flange	21644 U
Lauravia torque wrench	S 108.20
Extension for Lauravia torque wrench	C 108.40
End-piece for Lauravia torque wrench	C 155 S

Facom U 41 inertia extractor.

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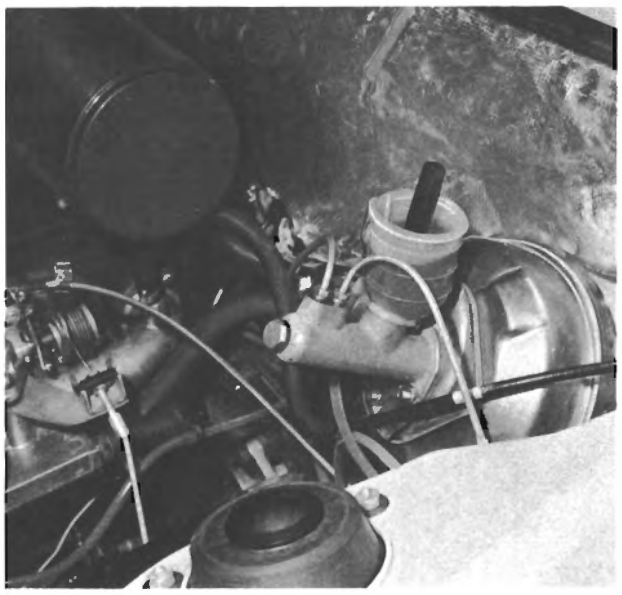


Fig. 1 4059

REMOVAL PROCEDURE

- From inside, use a tapered punch or a tapering piece of wood to plug lower hole of compensating tank (Fig. 1).
- Drain rear axle.
- Disconnect propeller shaft from rear axle flange. Use a rubber extensible spring to hold it to one side.
- On body, disconnect hand brake cable retaining fasteners (160 model).
- Uncouple 2 rear shock-absorbers, in their lower section, from differential housing.
- Remove rear suspension cross bar (Fig. 2).

Fig. 2 4060





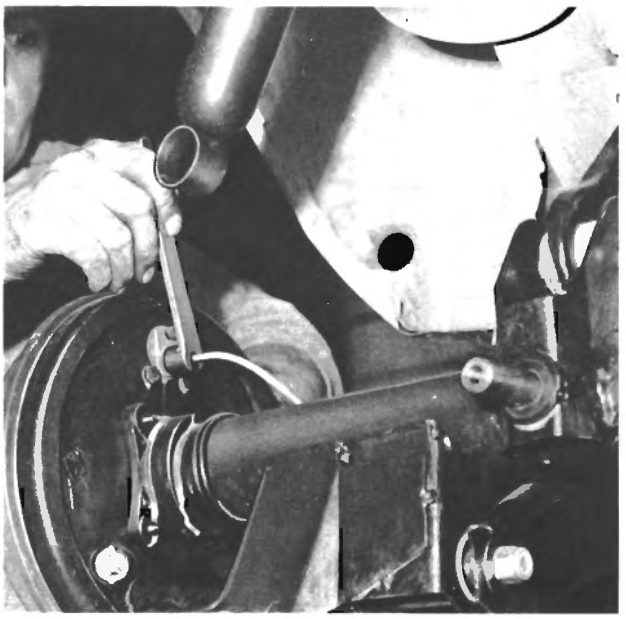
Fig. 3 4061

- Loosen lower and upper suspension arm linkage spindles on differential housing, but do not remove them.
- Slacken hand brake cable on equalizer (160 model).
- Unlock both rear wheels.
- Set rear of vehicle on pins, then remove wheels after marking their position.
- Remove rear springs and flexible crowns (Fig. 3).

On 160 model

- Disconnect brake pipes from rear wheel cylinders (Fig. 4), use drain screw caps to plug these pipes.

Fig. 4 4062



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REMOVING AND RE-FITTING THE DIFFERENTIAL

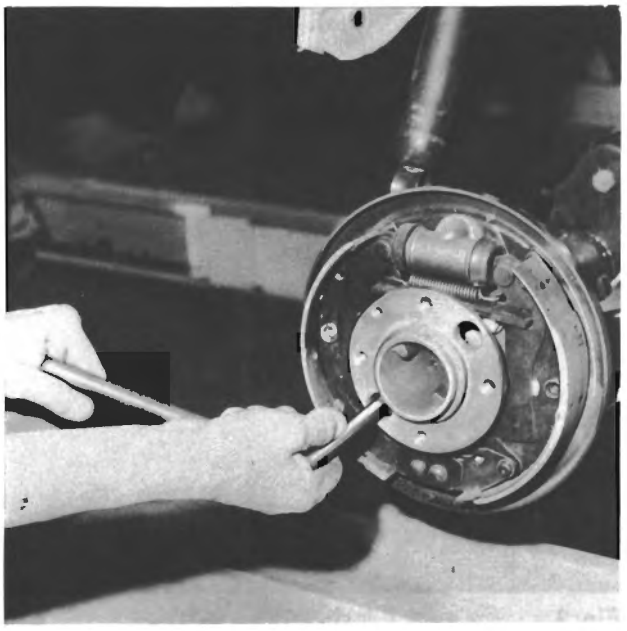


Fig. 5 4063



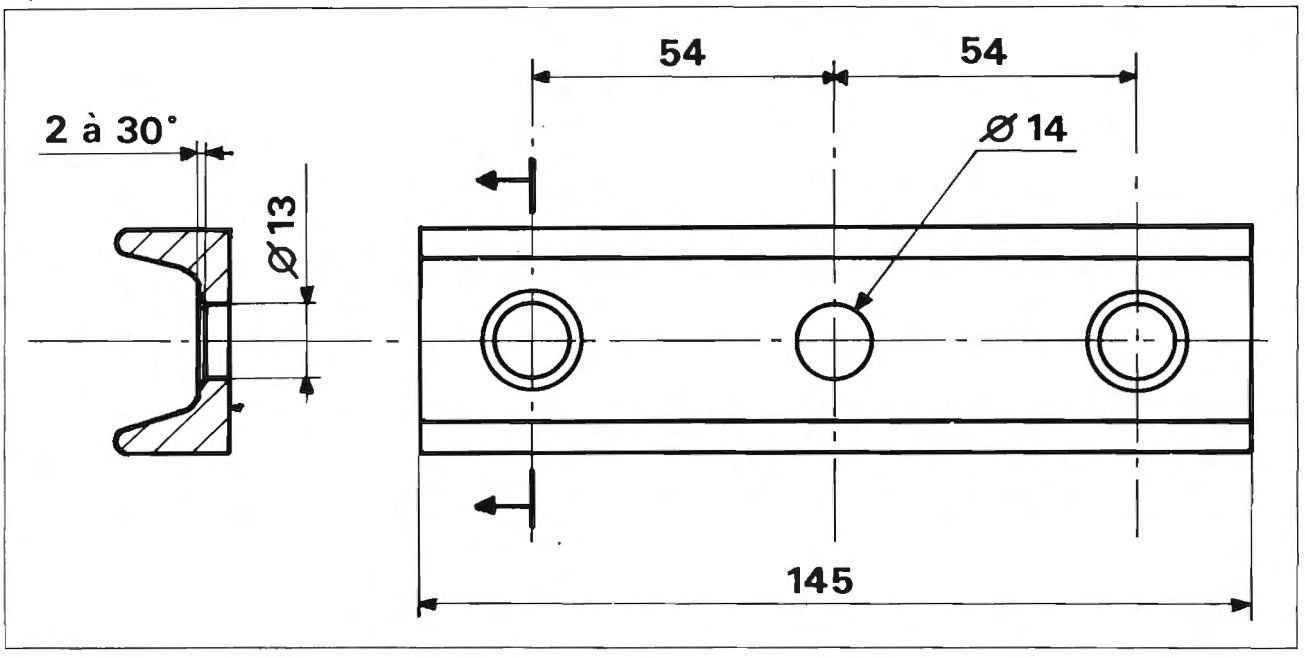
Fig. 6 4064

- Remove brake drums
- Remove 4 screws used for fastening each brake anchor plate to banjo (Fig. 5).
- Remove wheel shafts (Fig. 6) using a Facom U 41 inertia extractor fitted with a plate to be made by the operator to the dimensions shown on Fig. 7.
- Remove brake anchor plates without disconnecting hand brake cable from same.

On 160 GT and 180 models

- Disconnect brake tubes from rear disc brake yoke flexible pipes. Plug tubes and flexible pipes with drain screw caps.
- Remove flexible pipe retaining fasteners.
- Unlock and remove screws fastening brake yokes to banjo.
- Remove brake yokes, but do not disconnect hand brake cable from same (Fig. 8).

Fig. 7 G.041



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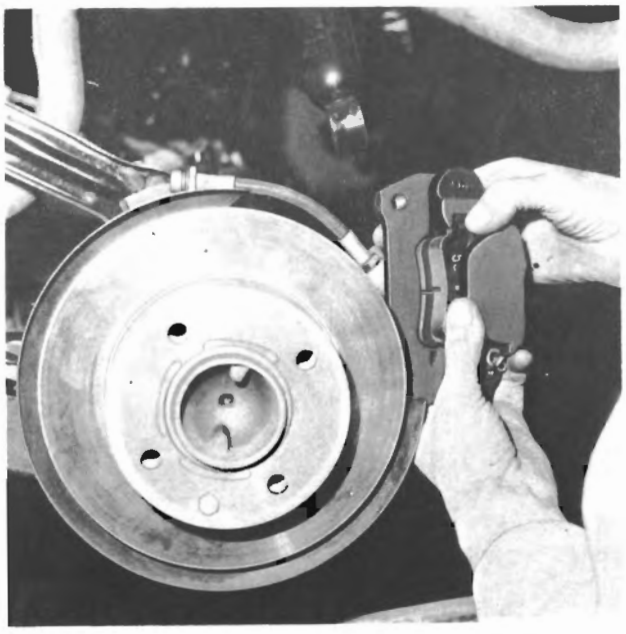


Fig. 8 4065

- Remove brake discs.
- Remove 4 screws fastening each brake deflector to banjo (Fig. 9).
- Remove wheel shafts (Fig. 10), using a Facom U 41 inertia extractor fitted with a plate to be made by the operator to the dimensions shown on Fig. 7.
- Remove brake deflectors.

Fig. 9 4066



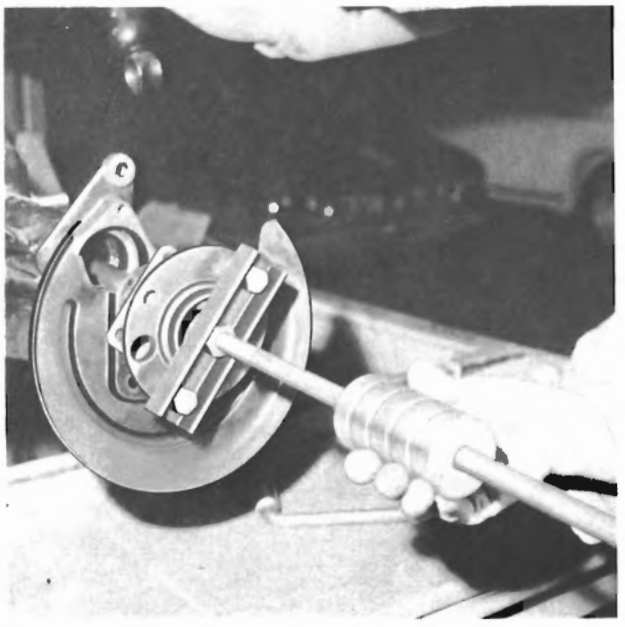
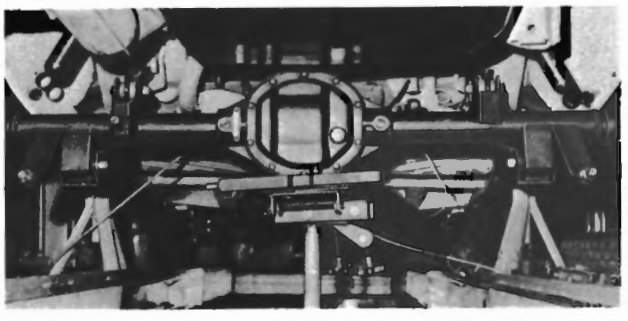


Fig. 10 4067

The following operations are common to 160 - 160 GT and 180 models

- Disconnect 2 brake tubes from banjo three-way connection.
- Remove these 2 brake tubes.
- Extract fastener retaining 3-way connection, and leave connection attached to flexible pipe.
- Place an hydraulic jack bearing against differential housing (Fig. 11).

Fig. 11 4068



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REMOVING AND RE-FITTING THE DIFFERENTIAL

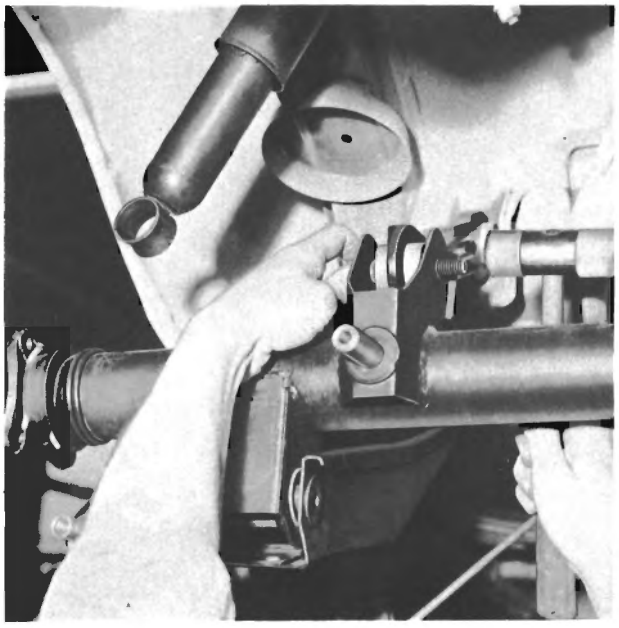


Fig. 12 4069

- Remove linkage spindles from suspension lower arms, then from suspension upper arms, or differential housing (Fig. 12).
- Remove differential assembly (Fig. 13).

RE-FITTING OPERATIONS

- Set differential on an hydraulic jack.
- Place differential in a position, which will allow the lower suspension arms to be located on their differential housing linkage supports.

Fig. 13 4070

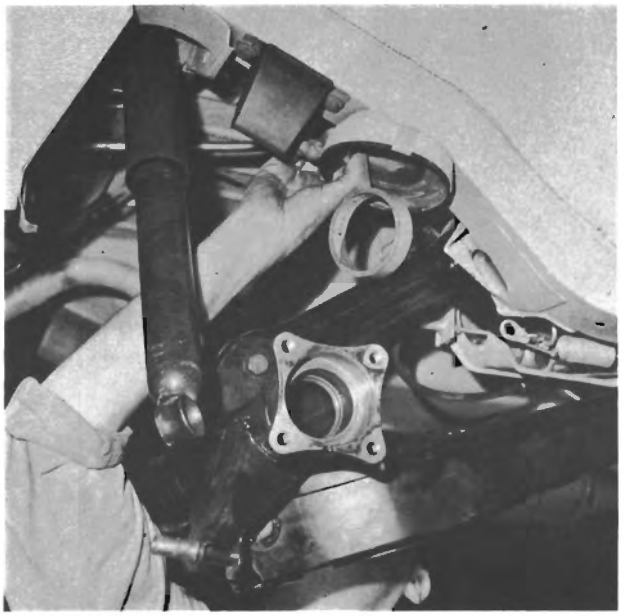




Fig. 14 4071

- Fit lower arm linkage spindles in position (nuts facing outside). Do not lock these spindles in position.
- Locate upper arms in position on differential housing, then fit linkage spindles into place (nuts facing inside), but do not lock them in position (Fig. 14).
- Use adhesive tape to retain spring flexible crowns in position in upper cups on body (Fig. 15).

Fig. 15 4072



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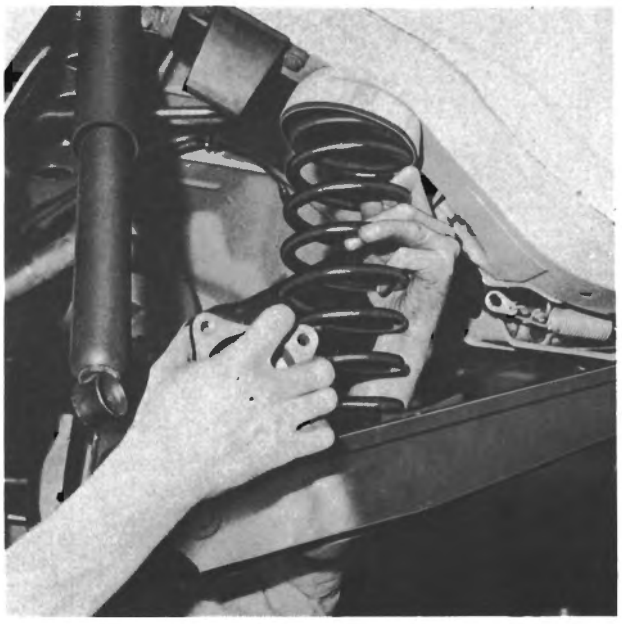
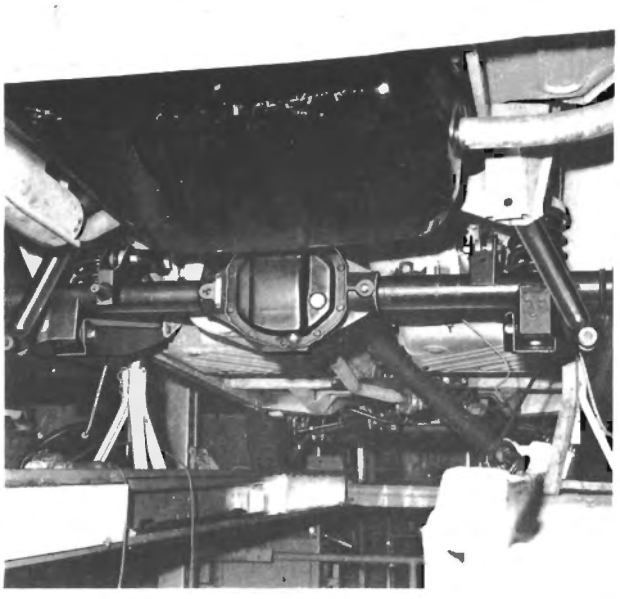


Fig. 16 4073

- Fit springs (any direction for fitting is suitable) (Fig. 16).
- Using the hydraulic jack, still fitted under the differential housing, compress both springs, checking that they are correctly seated, together with the flexible crowns.
- Fasten shock-absorbers to differential housing, then remove hydraulic jack (Fig. 17).

Fig. 17 4074



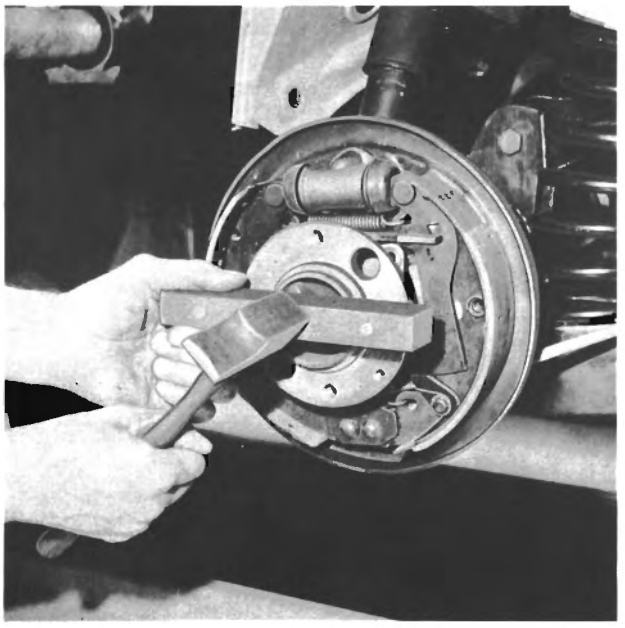
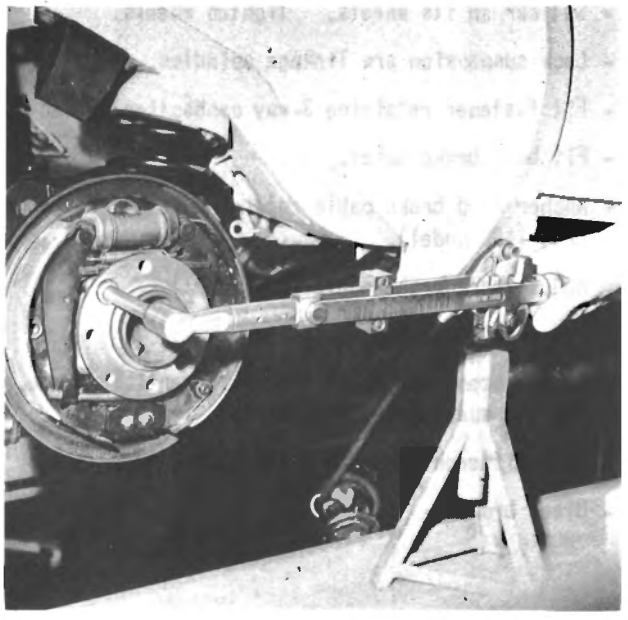


Fig. 18 4075

On 160 model

- Place brake anchor plates in position on banjo trumpet tubes after replacing the paper seals, then fit wheel shafts in trumpet tubes (Fig. 18).
- Fasten brake anchor plates and sheet metal flanges to trumpet tubes (Fig. 19). Tightening torque 5 m da N.
- Fit drums.

Fig. 19 4076



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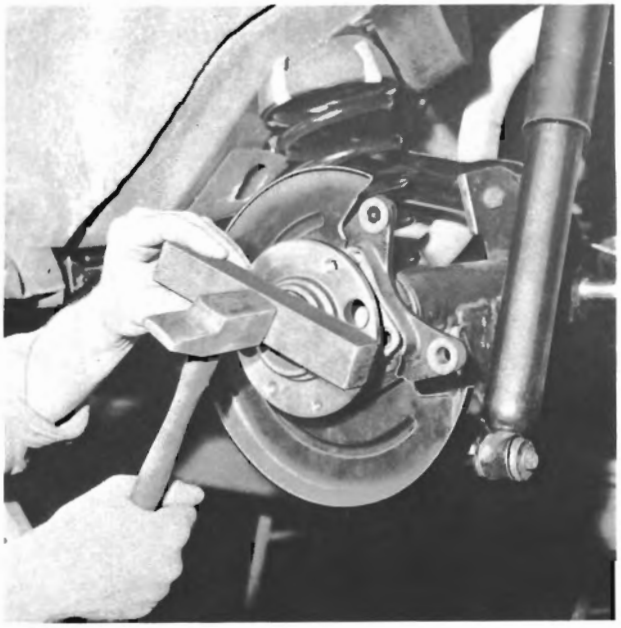


Fig. 20 4077



Fig. 21 4078

On 160 GT and 180 models

- Locate brake deflectors in position on banjo trumpet tubes, then fit wheel shafts in trumpet tubes (Fig. 20).
- Fasten brake deflectors and sheet metal flanges on trumpet tubes (Fig. 21). Tightening torque 5 m da N.
- Fit discs.
- Fasten brake yokes on trumpet tubes. Tightening torque 6.5 m da N.
  Replace sheet metal retainers.

The following operations are common to 160 - 160 GT, and 180 models

- Set car on its wheels. Tighten wheels.
- Lock suspension arm linkage spindles.
- Fit fastener retaining 3-way connection to banjo.
- Fit both brake tubes.
- Anchor hand brake cable retaining fasteners to car body (160 model).
- Adjust hand brake cable (160 model).
- Fit rear suspension cross-bar.
- Couple propeller shaft with differential flange.
  Replace sheet metal retainers.
- Fill differential with Shell Spirax 90 EP oil.
- Bleed brakes.

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Fig. 1 4079



Fig. 3 4081

DISMANTLING OPERATIONS

With differential removed from vehicle and drained:

- Fasten differential on Desvil stand Ref. 21626 J (Fig. 1).
- Remove closing cover and its seal.
- Remove differential adjustment nut retainers.
- Unlock both differential adjustment nuts, using spanner 21635 K (Fig. 2).
- Remove differential bearing caps. Check if there is a reference mark on one of the bearing caps, and on the differential housing.
  If necessary, make punch marks.
- Remove differential case as assembled (Fig. 3) (if differential bearings are to be kept for re-assembly, take appropriate steps to avoid mixing outer bearing races).
- Unlock flange nut, immobilizing flange with torque bar Ref. 21630 S (Fig. 4).

Fig. 2 4080

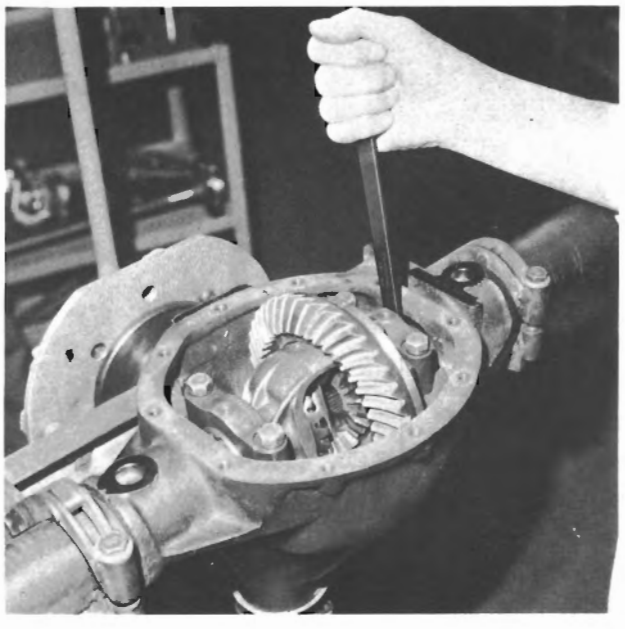
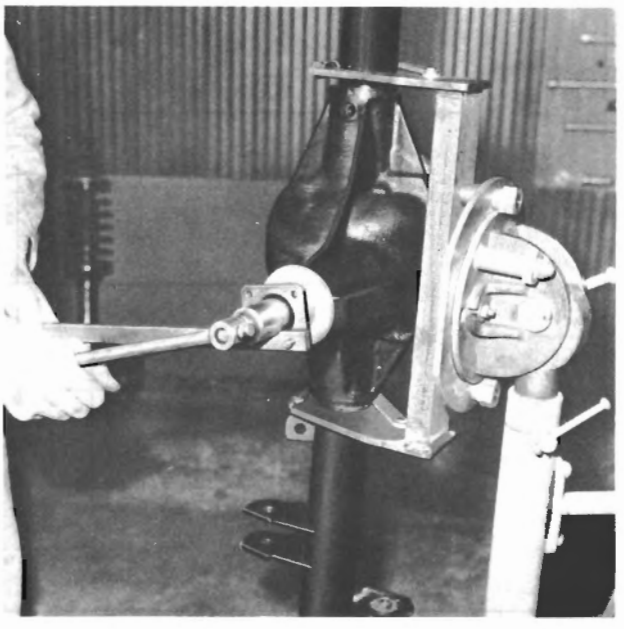


Fig. 4 4082



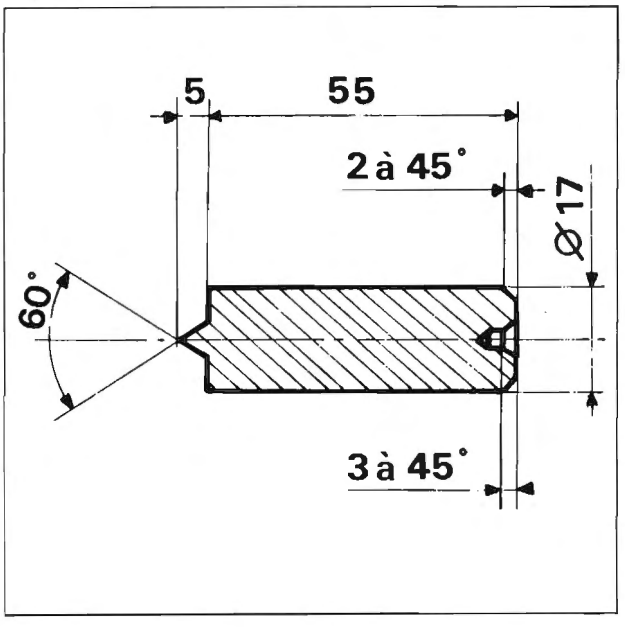
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Fig. 5 4083

- Use extractor Ref. 15526 G fitted with two claws Ref. 20891 Q (Fig. 5) to remove flange. Between the extractor and the end of the differential pinion, insert a spacer to be made by the operator to the dimensions shown on the sketch (Fig. 6). Use torque bar Ref. 21630 S to hold flange.
- Drive differential pinion out (Fig. 7); recover spacer and adjustment spacers.
- From inside differential housing, drive front bearing out, as well as double lip seal, using mandrel Ref. 7306 D fitted with extractor Ref. 21632 Q (Fig. 8).
- Drive rear bearing race out with mandrel + extractor Ref. 7306 D.

Fig. 6 G.042



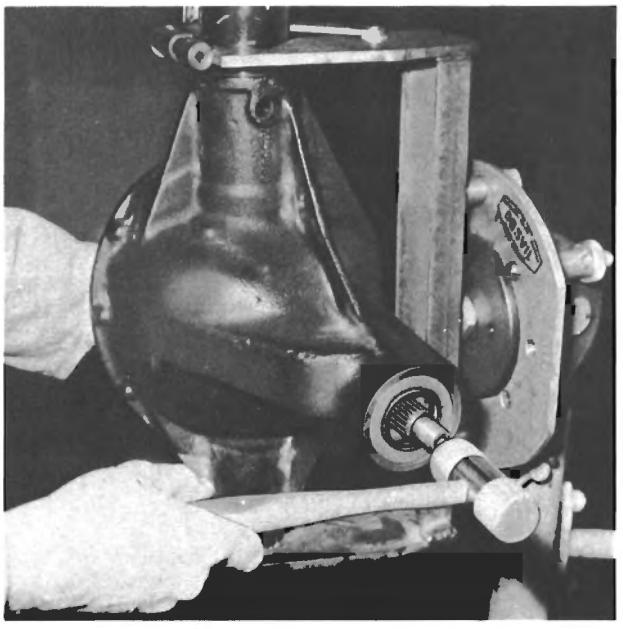


Fig. 7 4084

- Use extractor Ref. 15525 F fitted with fork Ref. 21634 J to extract rear bearing on differential pinion. Take the precaution of inserting the bearing bush, which is part of set Ref. 20833 M, between the extractor screw and the differential pinion (Fig. 9).
- Recover adjustment spacers on differential pinion.
- Unlock crown-wheel fastening screws (L.H. thread), and remove crown-wheel. If crown-wheel is to be used for re-assembly, mark its position in relation to differential case.

Fig. 8 4085



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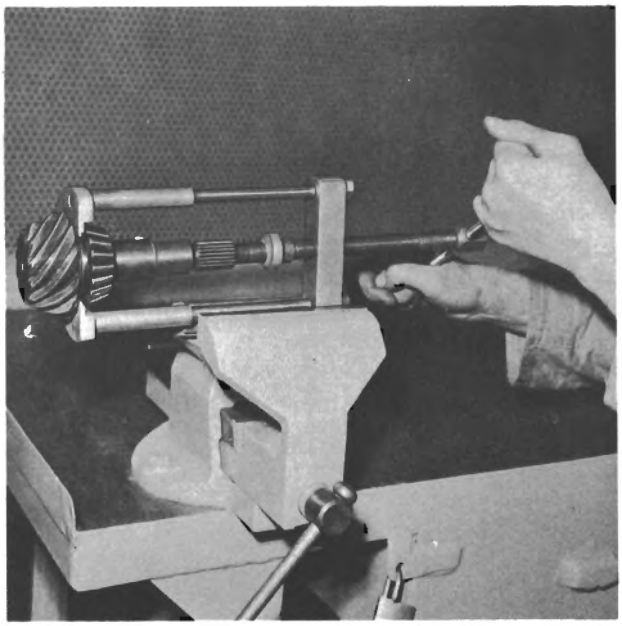


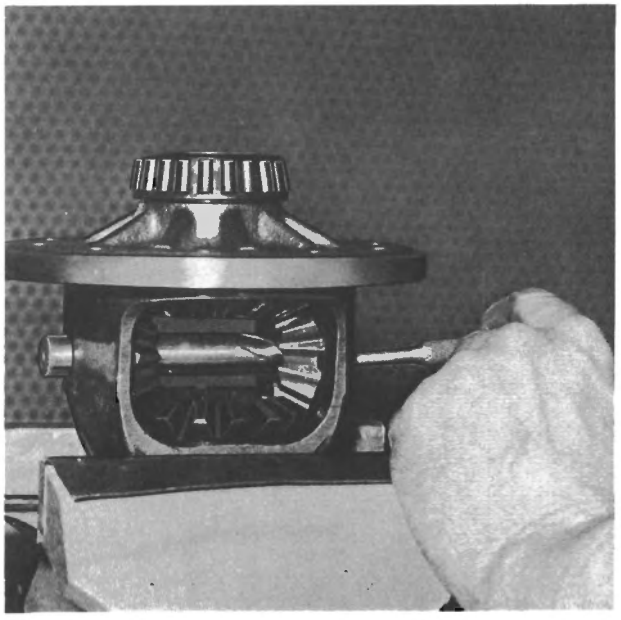
Fig. 9 4086

- Drive differential pinion shaft out (Fig. 10).
- Remove differential pinions, differential side gears, and side gear washers.
- Use extractor Ref. 15526 G with its bearing bush to extract 2 bearings on differential case (Fig. 11).

RE-ASSEMBLY

Re-assembling the differential requires three different adjustments of fundamental importance to ensure a noiseless operation and a long life for moving parts.

Fig. 10 4087



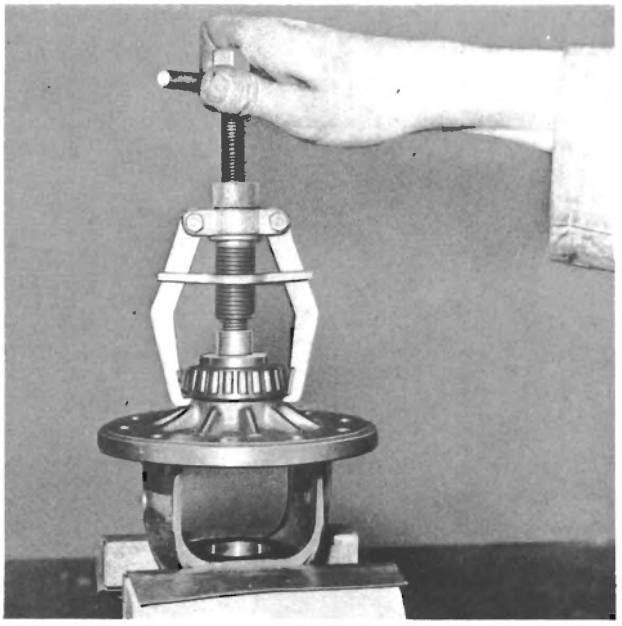
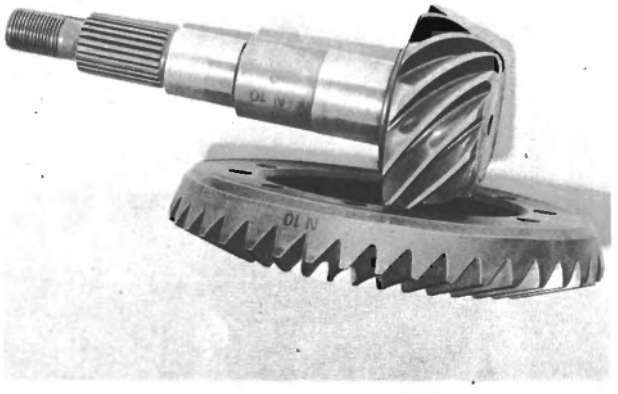


Fig. 11 4088

1. Adjustment of differential pinion position in relation to crown-wheel.
2. Adjustment of differential pinion taper bearing pre-load.
3. Adjustment of differential taper bearing pre-load and bevel gear set tooth play.

Note: prior to undertaking any adjustment operation, make sure that differential pinion and crown-wheel are correctly matched (Fig. 12).

Fig. 12 4089



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Fig. 13 4090

1. Adjustment of differential pinion position in relation to crown-wheel

This adjustment is carried out by inserting spacers between the rear bearing and the differential pinion. This must be done in all cases where one of the following parts is to be replaced:

. differential housing,
. bevel gear set,
. differential pinion rear bearing.

If none of these parts is replaced when the differential is being overhauled, use initial spacers.

Fig. 14 4091



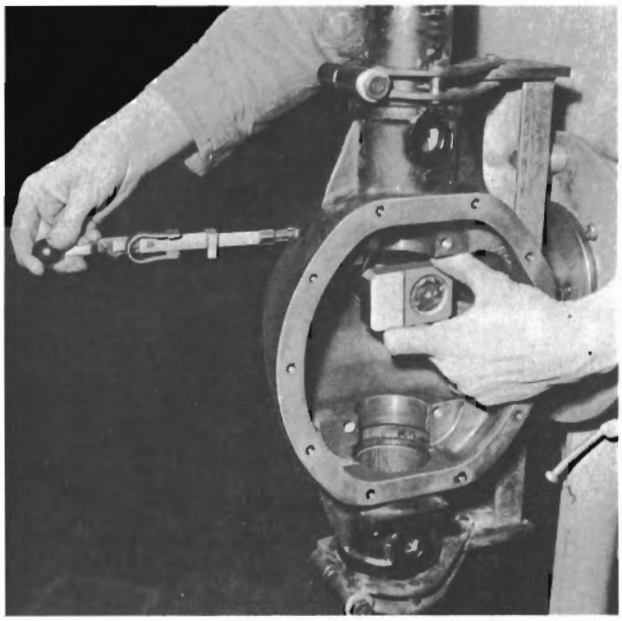
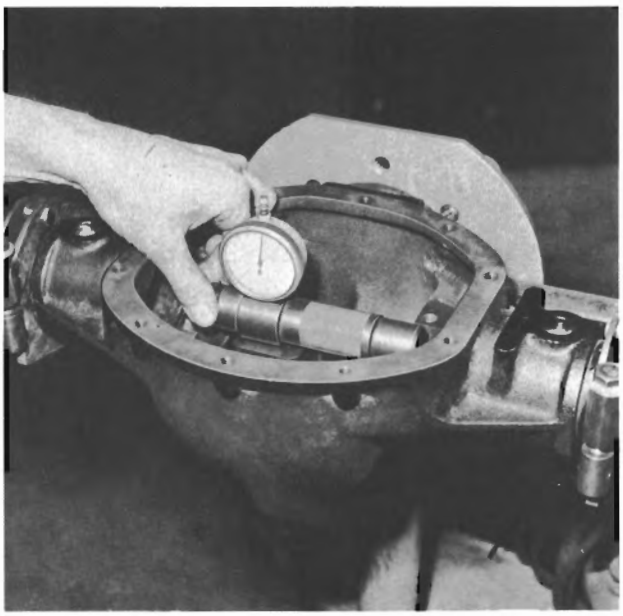


Fig. 15 4092

The thickness of adjustment spacers is calculated as follows:

- Fit differential pinion rear bearing race in position in differential housing, using tool Ref. 15524 E and fitting bush Ref. 20808 D (Fig. 13).
- Proceed likewise to fit front bearing race in position, using fitting bush Ref. 21633 R (Fig.14).
- Make sure that bearing races are correctly in contact with the differential housing shoulders.
- Fit dummy pinion Ref. 21627 K, with correct final rear bearing.

Fig. 16 4093



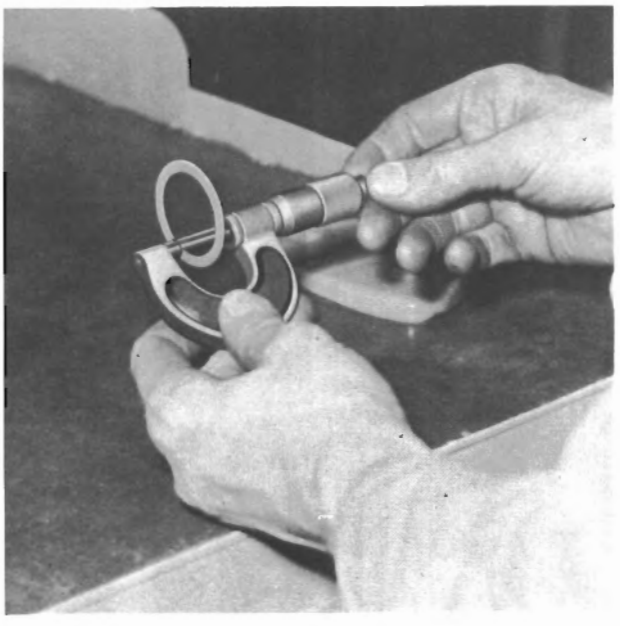
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Fig. 17 4094

- Fit front bearing on dummy pinion; the bearing is located in position by tightening the dummy pinion nut Remember to insert the bearing washer.
- Tighten nut to torque .7 m da N (Fig. 15).
- Rotate dummy pinion by hand several times, with the best possible clearance to fit assembly correctly in position.
- Tighten nut again to .7 m da N.
- Rotate dummy pinion again.
- Fit comparator Ref. 14773 on dummy differential Ref. 21628 U.

Fig. 18 4095



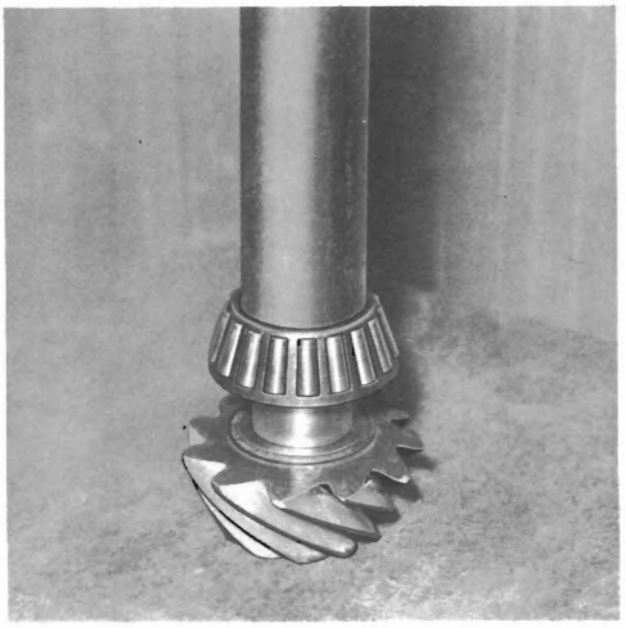


Fig. 19 4096

- Set comparator pointer to 0, using the dummy pinion reference face (Fig. 16).
- Place dummy differential, with its 2 removable washers Ref. 21629 Y on 2 differential bearings (with removable washer flats in vertical position).
- Fit differential bearing caps, taking their reference marks into account. Tighten screws to torque: 4 m da N.
- Swivel dummy differential from front to rear in order to take note of the minimum reading on the comparator (Fig. 17).
- The final thickness of required spacers is equal to the minimum reading shown on the comparator (red figures) plus or minus the positive or negative gear cutting correction factor shown at the end of the differential pinion. The gear cutting correction factor must always be read in 1/100 of a mm.
- Prepare spacer stack, measure spacers one by one with a micrometer screw gauge, taking tolerance limits into consideration, and select those spacers, which will allow the exact final stacking thickness to be obtained (Fig. 18).

  Thickness of available spacers: .07 - .10 - .12 - .15 - .30 - .50.
- Place final stack of spacers on differential pinion.
- Remove dummy differential with its removable washers, and remove dummy pinion.
- Fit final rear bearing on differential pinion, using a 210 mm long 36 x 45 tube (already used for overhaul of S 1000 and S 1100 gear boxes (Fig. 19).

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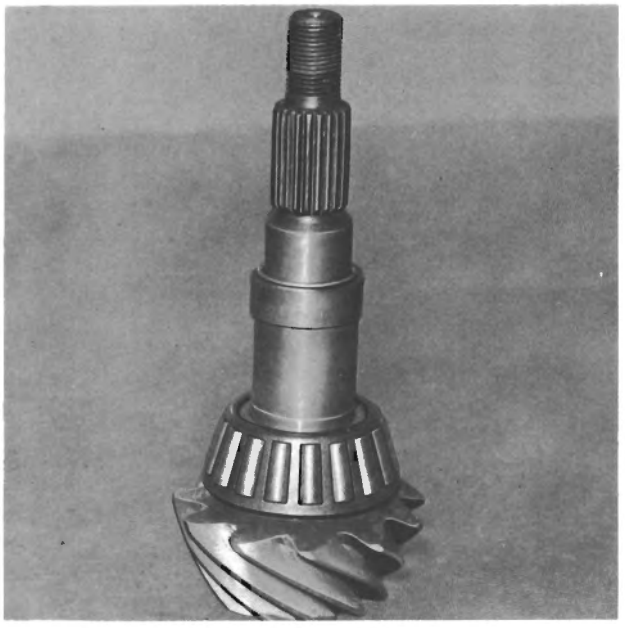


Fig. 20 4097

2. Adjustment of differential taper bearing pre-load

This adjustment is achieved by inserting spacers between the differential pinion front bearing, and the distance piece. It must be carried out whenever one of the following components is being replaced:

. differential housing,

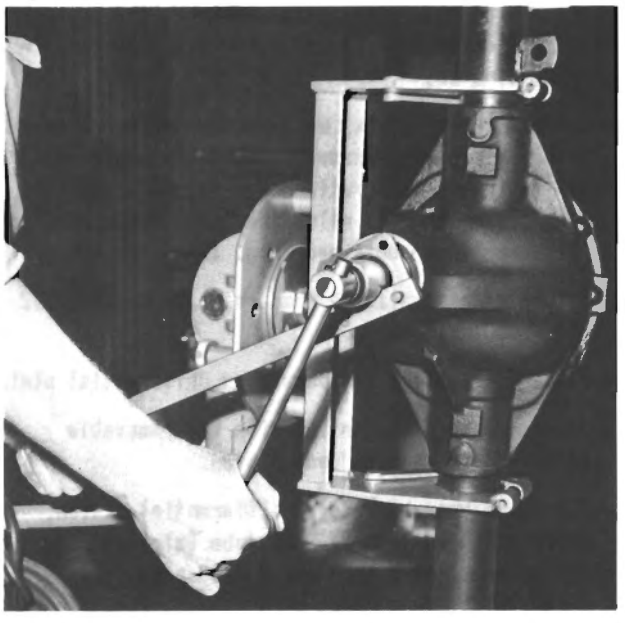
. bevel gears

. differential pinion front bearing,

. differential pinion rear bearing,

. distance-piece.

Fig. 21 4098



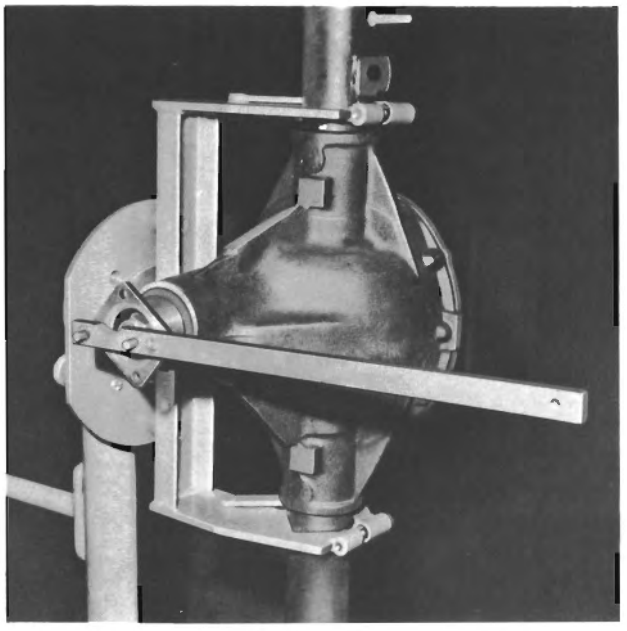


Fig. 22 4099

If none of these components is to be replaced when the differential is being overhauled, retain the initial spacer stack.

The thickness of required adjustment spacers is calculated as follows:

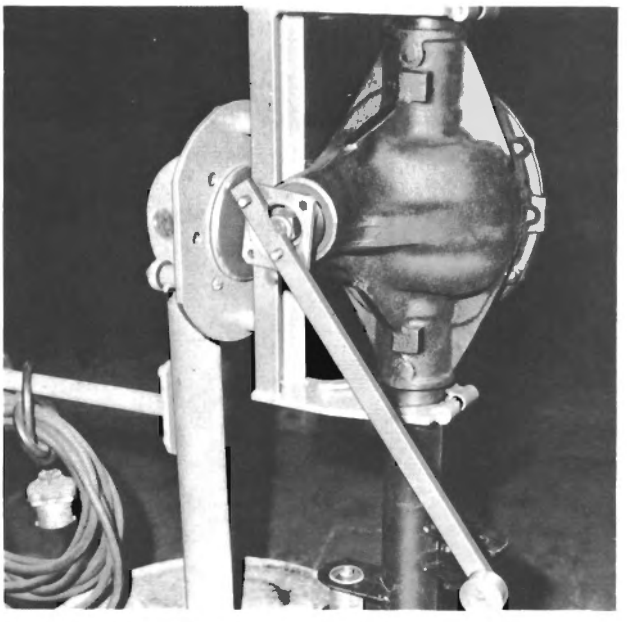
- On differential pinion, with distance-piece in position, fit a length of 1.5 mm dia. soldering wire in place of adjustment spacers (Fig. 20).

  Important: do not use any other type of wire.

- Fit differential pinion with distance-piece and soldering wire in differential housing.

- Fit front bearing on differential pinion.

Fig. 23 4100



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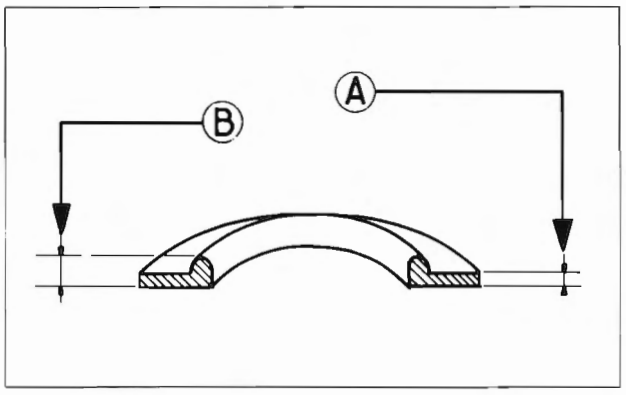


Fig. 24 A - Correct measurement X142
B - Wrong measurement

- Fit dummy flange Ref. 21643 T in position on differential pinion grooves, with the flat washer and nylstop nut used initially.
- Tighten nut until front bearing is fitted fully with differential pinion.
- Tighten nut gradually to apply pre-load on differential pinion bearings (Fig. 21). When the pre-load is applied, the differential pinion driving torque (without a seal) must be between .115 and .185 m da N.

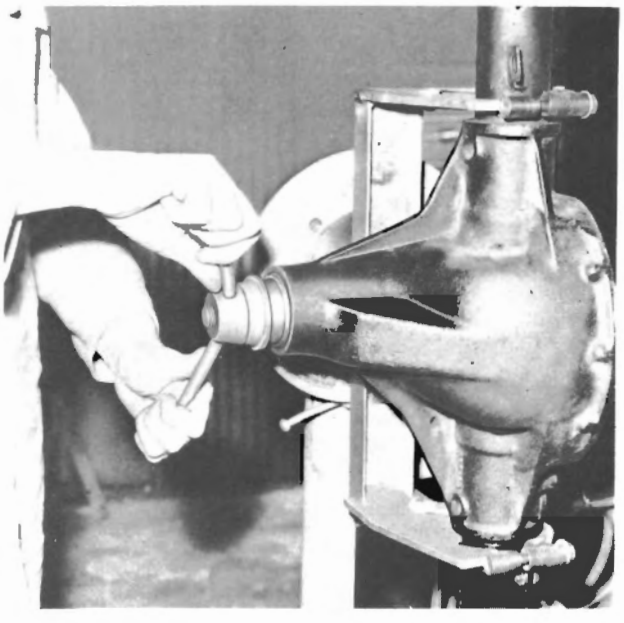
  This driving torque is controllable as follows:

  . Place torque bar Ref. 21630 S on differential pinion dummy flange;

  . The bare bar (without spring balance) must stay horizontal (Fig. 22);

  . When its weight is increased by means of the spring-balance, the bar must fall (Fig. 23).

Fig. 25 4101



Note: every time the nylstop nut has been tightened, and before every check of the driving torque, the differential pinion must be rotated several times for the assembly to be fitted correctly into place.

- Use great care to remove differential pinion, and recover crushed soldering wire.
- With a micrometer screw-gauge, measure thickness of crushed wire in 3 points (Fig. 24). Average these 3 measurements to obtain the final thickness of required spacers.
- Stack up required spacers, measure spacers one by one with micrometer screw-gauge, taking tolerance limits into consideration, select those spacers which will produce the exact final stack thickness required.

  Thickness of available spacers: .07 - .10 - .12 - .15 - .30 - .50.

- Proceed with test assembly operations, i.e. :

  . fit differential pinion, with distance-piece and spacer stack;

  . tighten dummy flange nut (already used) to 30 m da N torque. Use Lauravia S 108.20 torque wrench, Lauravia extension C 108.40 and Lauravia C 155 S end-piece, set torque wrench sliding gauge to half the prescribed torque, or 15 m da N;

  . check driving torque with bar and spring-balance as previously;

  . if driving torque is too high, add spacers;

  . if driving torque is too low, remove spacers.

- Remove differential pinion, distance-piece and adjustment spacers; leave front bearing in differential housing.
- Fit a new double lip seal, using tool Ref.15524 E and front bearing fitting bush Ref. 21633 R, which will be turned over (Fig. 25).

  The seal must not sit flush with the edge of the housing, it must be pushed 1 mm inwards.

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Fig. 26 4102

- Fill space between 2 lips of seal with Shell Alvania EP 2 or Retinax A grease.
- Place final differential flange in position on differential pinion end, then push it on the grooves, using tool Ref. 21644 U, which is to be screwed onto differential pinion (Fig. 26).
- Remove this tool when it becomes harder to screw on, and finish flange fitting operation with a new nylstop nut and the flat washer. Tighten to 25 to 30 m da N final torque (Fig. 27). Use Lauravia S 108.20 torque wrench, Lauravia C 108.40 extension, and Lauravia C 155 S end-piece. Set torque wrench sliding-gauge to half the prescribed torque value.

Fig. 27 4103



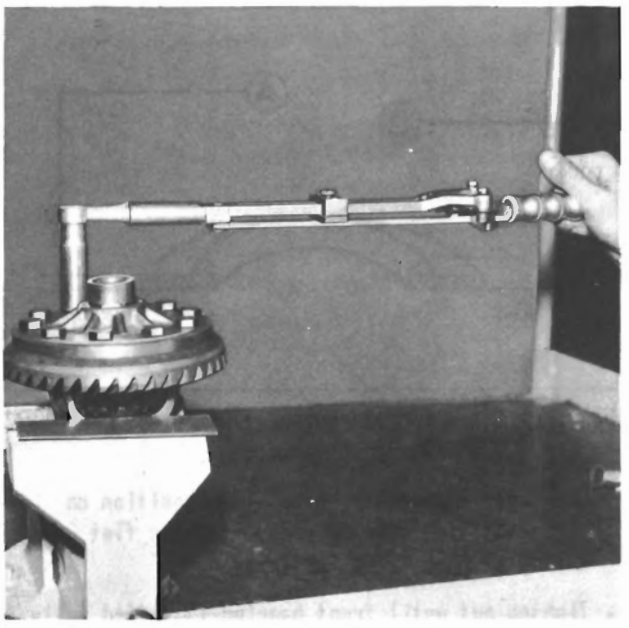


Fig. 28 4104

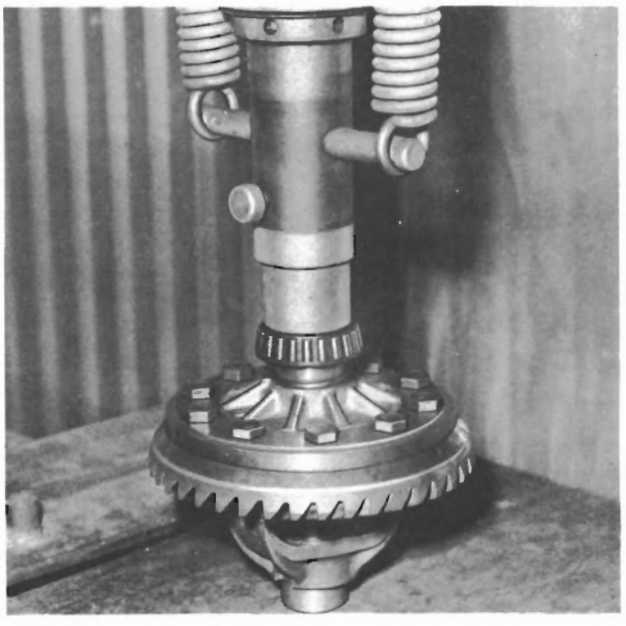
3. Adjustment of differential taper bearing pre-load and bevel gear tooth play

This adjustment is achieved by modifying the shape of both differential bearing caps.

It must be carried out whenever a new differential bearing is fitted.

If the initial bearings are retained, the original adjustment must be retained as the pre-load. If necessary, tooth play can be adjusted without deforming the bearings.

Fig. 29 4105



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Fig. 30 4106

Proceed as follows:

- Place friction washers on differential side gears (with recesses on side of side-gear bearing face).
- Fit side gear and differential pinions in position in differential case.
- Fit differential pinion shaft in position.
- Tooth play between differential pinions and side gears must not exceed .25 mm.

  Otherwise, fit two washers of the next greater thickness.

  Thickness of available spacers: 1.35 ± .05 - 1.45 ± .05 - 1.55 ± .05.

Fig. 31 4107



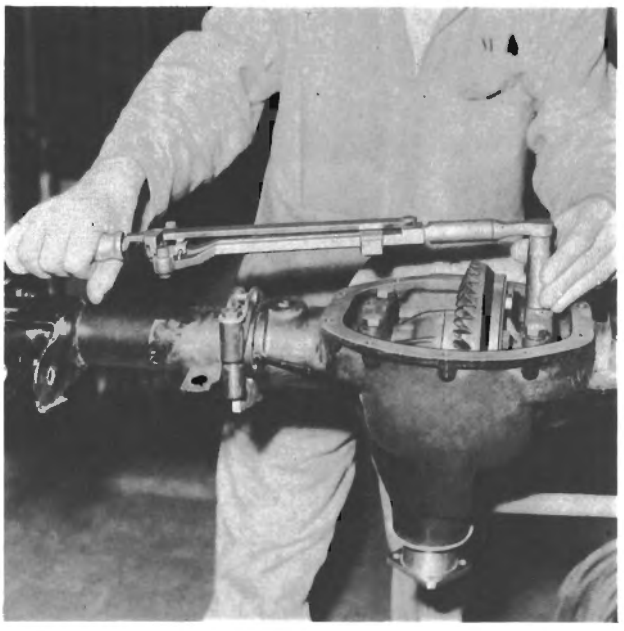


Fig. 32 4108

- Fasten crown-wheel to differential case. Tightening torque for screws: 8 m da N (L.H. thread) (Fig. 28).
- Fit bearings on differential case, using fitting tool Ref. 20893 J (Fig. 29).
- Lightly oil differential bearing races for easier sliding in differential bearings, and fit them on their respective bearings.
- Fit differential case in position in differential housing, then fit both differential adjustment nuts (Fig. 30).
- Fit bearing caps, in accordance with their reference marks. Tighten screws manually.
- Use wrench Ref. 21635 K to screw both differential adjustment nuts in position. Allow a slight amount of tooth play to be present (Fig. 31).
- Tighten bearing cap screws to 3 m da N (Fig. 32).
- Loosen the nut on crown-wheel tooth side by one turn.
- Tighten nut on opposite side to teeth until bevel gear set play is 0.
- Fit comparator support Ref. 14773 W in a securing hole of the differential cover.
- Place comparator Ref. 14773 W in perpendicular position in relation to bearing cap on opposite side to teeth. Use on adjustment nut retainer fitted wrong side up for easier assembly and reading (Fig. 33).
- Set comparator to 0.

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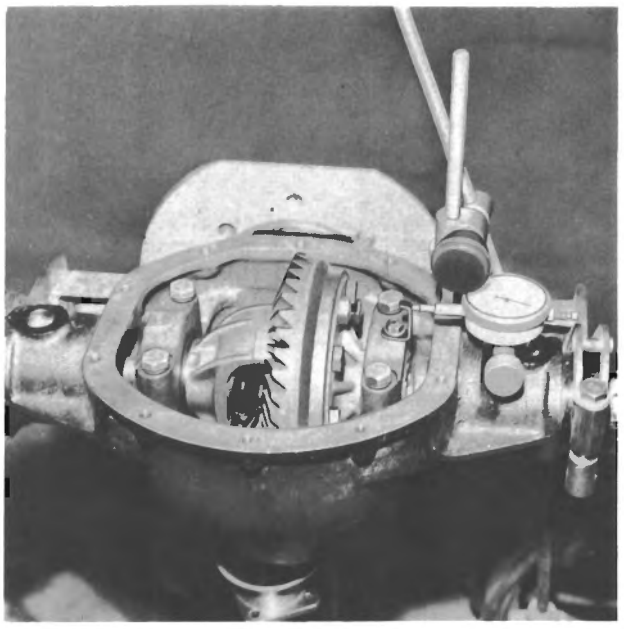


Fig. 33 4109

- Apply pre-load by tightening nut on tooth side until a .02 to .085 mm deformation of the bearing cap is obtained (Fig. 34). If the operator controls the deformation of both bearing caps at the same time, this deformation must be multiplied by 2, to become .04 to .17 mm.

- Check bevel gear set tooth play in 3 points at 120^{0} on the outer diameter of the crown-wheel. This must be comprised between .07 and .12 mm. The difference between the 3 measurements must not exceed .06 mm (Fig. 35).

- If the play obtained is too low, mark position of adjustment nuts in relation to bearing caps. Loosen the nut on the opposite side to the crown-wheel teeth, and retighten the nut on the side of

Fig. 34 4110

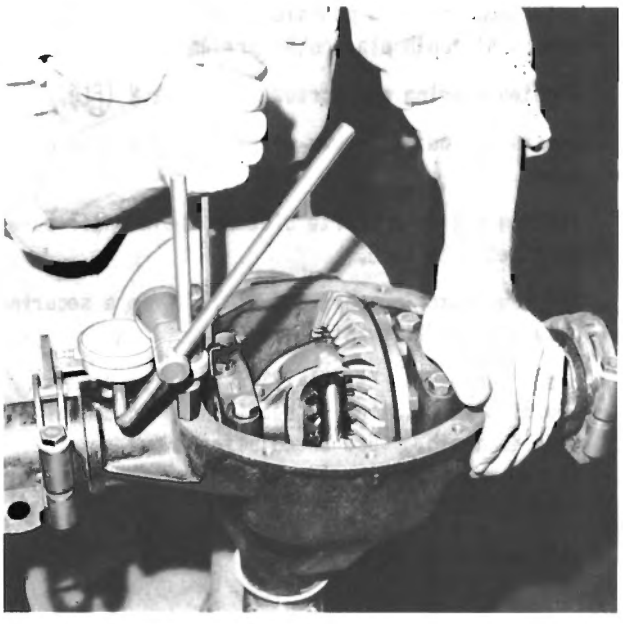




Fig. 35 4111

the crown-wheel teeth by the same amount.

Check tooth play again.

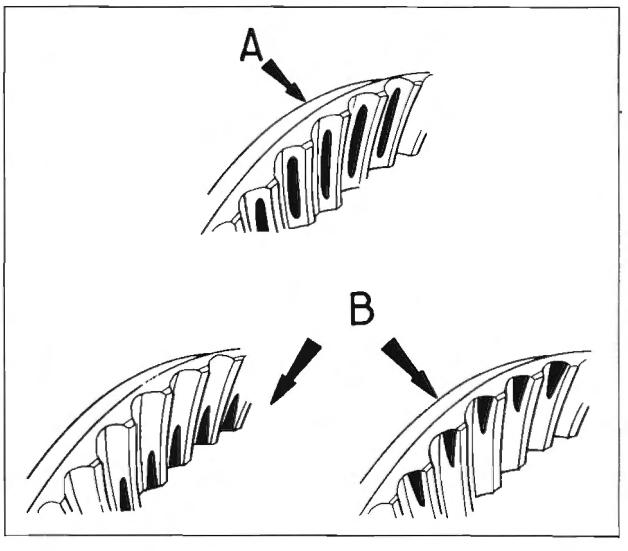
- If play obtained is excessive, proceed in opposite manner.
- Tighten bearing cap screws to final tightening torque of 7.5 m da N.

- Use sheet metal retainers to lock adjustment nuts in position.
- Check bearing area of teeth on the crown-wheel, using red chalk or Prussian blue (Fig. 36).

- Fit differential cover, with a new seal. Tighten screws to torque of 2 m da N.

- Remove differential from Desvil stand Ref.21626 J.

Fig. 36 A - Correct bearing area X224
B - Incorrect bearing areas



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GENERAL SPECIFICATIONS

Power is transferred to the rear wheels via two (L.H. and R.H.) wheel shafts, accommodated inside the differential trumpet tubes.

With each wheel shaft:

The inner end is interlocked with the grooved inner bore of one of the two differential side gears.

It runs on a sealed ball bearing forced in position on the wheel shaft, and held by a band also forced in position on the latter. The outer bearing race is held in a recess in the differential trumpet tube by means of a sheet metal web screwed on the trumpet tube.

The brake drum, or brake disc, and the wheel are fastened at the outer end.

TIGHTENING TORQUE

	m da N
Brake anchor plate and bearing retaining webs	4.75

SPECIFIC TOOLING

Facom U 41 inertia extractor.

Wheelshaft bearing extractor	20840 G
Fork for wheel shaft bearing extractor ...	20841 V
Wheel shaft bearing extractor fork setscrew	25158 Z

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REMOVING AND RE-FITTING A WHEEL SHAFT

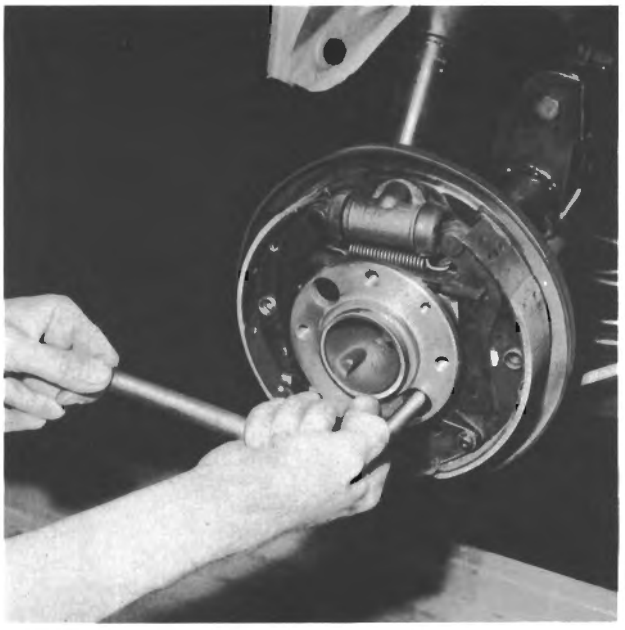


Fig. 1 4112



Fig. 2 4113

160 MODEL

REMOVAL PROCEDURE

- Unlock rear wheel.
- Set rear of vehicle on pins, then remove wheel after marking its position.
- Remove brake drum.
- Remove 4 screws fastening brake anchor plate to banjo (Fig. 1).
- Remove wheel shaft whilst holding brake anchor plate to avoid damaging the brake tube, which has not been disconnected (Fig. 2).

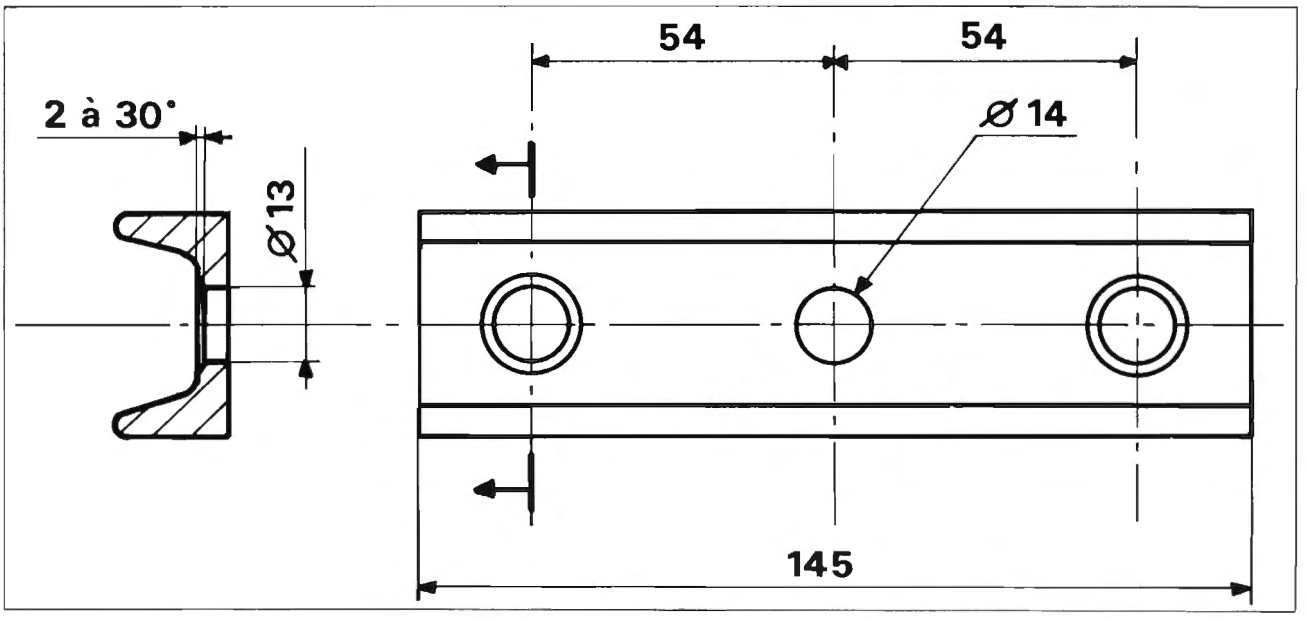
Use a Facom U 41 inertia extractor fitted with a plate to be made by the operator to the dimensions shown on Fig. 3.

- Once wheel shaft is removed, hold brake anchor plate to banjo trumpet tube by means of 2 screws.

RE-FITTING OPERATIONS

- Fit a new paper seal on brake anchor plate.
- Insert wheel shaft in trumpet tube, then remove both screws used to hold the brake anchor plate.

Fig. 3 G.041



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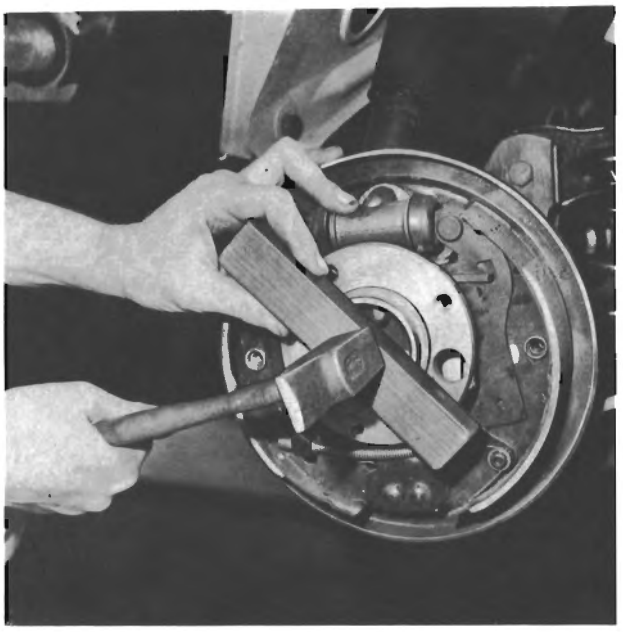


Fig. 4 4114

- Fit wheel shaft bearing in its housing on trumpet tube (Fig. 4).
- Fasten brake anchor plate and sheet metal web to trumpet tube (Fig. 5). Tightening torque 5 m da N.
- Fit drum.
- Set vehicle on its wheels. Tighten wheel.

Fig. 5 4115





Fig. 6 4116

160 GT - 180 MODELS

REMOVAL PROCEDURE

- Unlock rear wheel.
- Set rear of vehicle on pins; then remove wheel after marking its position.
- Disconnect hand brake cable from yoke.
- Unlock and remove screws fastening yoke to banjo (Fig. 6).
- Remove yoke, without disconnecting pipe from same (Fig. 7). Do not allow yoke to hang from end of flexible pipe.

Fig. 7 4117



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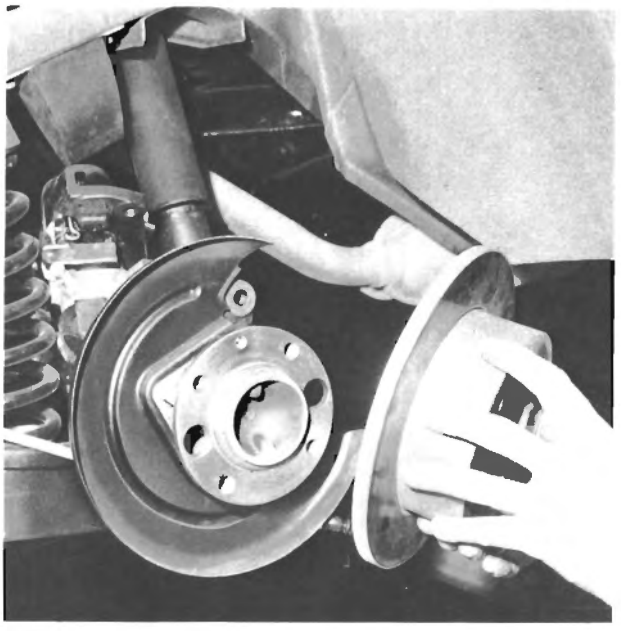


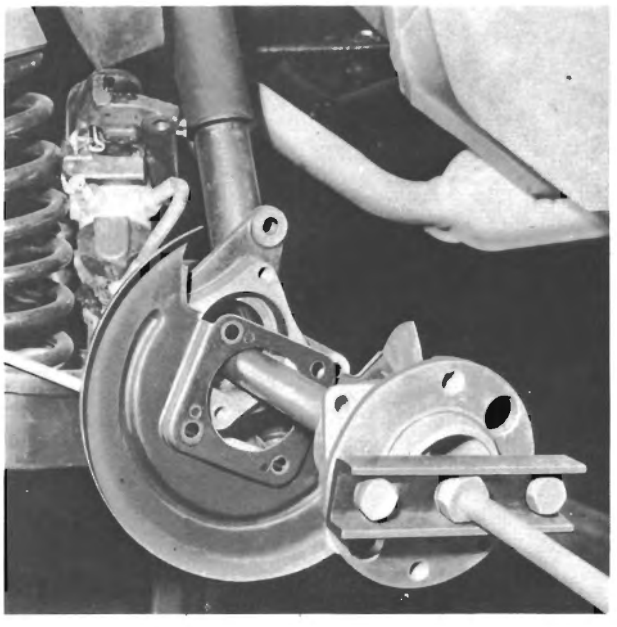
Fig. 8 4118

- Remove brake disc (Fig. 8).
- Remove 4 screws fastening brake deflector to banjo.
- Remove wheel shaft (Fig. 9), using a Facom U 41 inertia extractor fitted with a plate to be made by the operator to the dimensions shown on Fig. 3.
- Recover brake deflector.

RE-FITTING OPERATIONS

- Place brake deflector in position on banjo trumpet tube; then fit wheel shaft in trumpet tube (Fig.10).

Fig. 9 4119



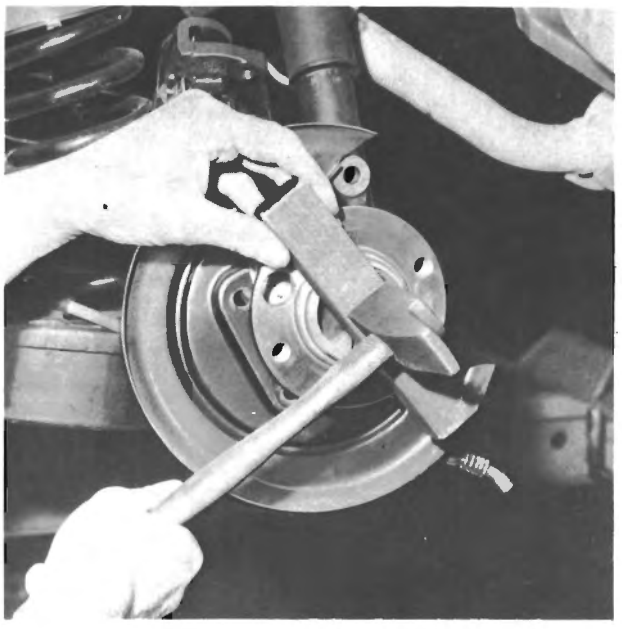


Fig. 10 4120

- Fasten brake deflector and sheet metal web to trumpet tube (Fig. 11). Tightening torque: 5 m da N.
- Fit disc.
- Fasten brake yoke to trumpet tube. Tightening torque: 6.5 m da N. Repiace sheet metal retainers.
- Re-connect hand brake cable.
- Set vehicle on its wheels. Tighten wheel.

Fig. 11 4121



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CHANGING A WHEEL SHAFT BEARING

The wheel shaft being removed.

- On work bench, use a chisel to break the band used to retain the bearing (Fig. 1).
- Use tool Ref. 20840 G, and fork Ref. 20841 V to extract bearing.

  Make fork integral with tool by means of 4 - 100 mm long HM 8 x 1.25 screws, Ref. 25158 Z (Fig. 2).
- Use press to fit new bearing and band on wheel shaft, also using a 45 mm long tube with an outer dia. of 42 mm, and an inner dia. of 33 mm, bearing on the band (Fig. 3).
- Place sheet metal web in position between bearing and shaft outer end, with collar facing end of shaft.
- Place shoulder of bearing inner race in position on shaft recess side.
- Band: may be fitted either way.

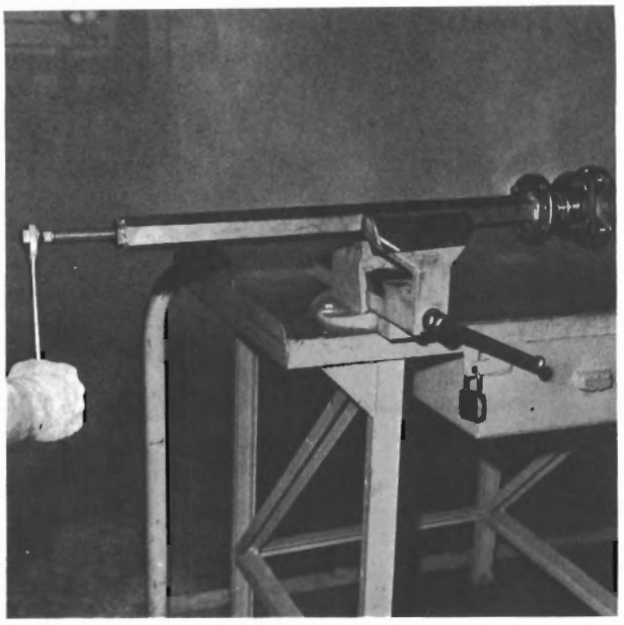


Fig. 2 4123

Fig. 1 4122

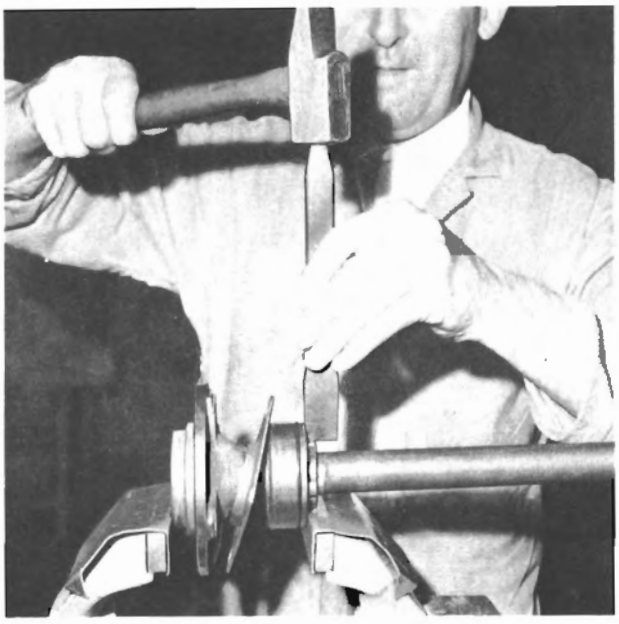
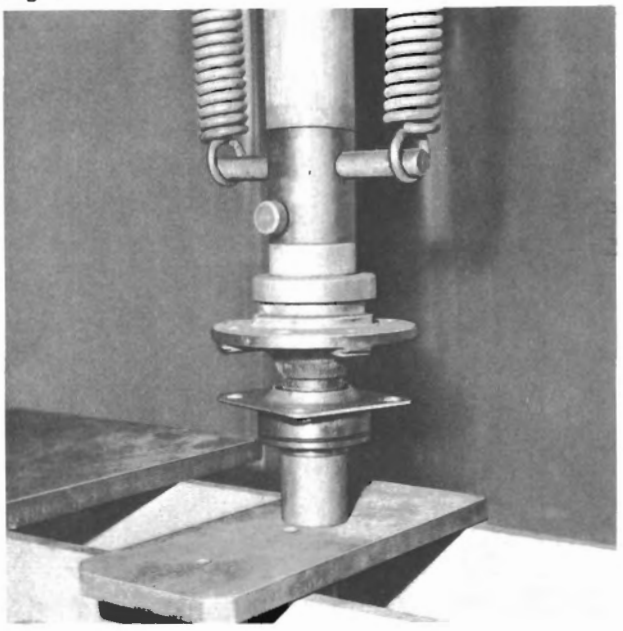


Fig. 3 4124



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G1 - FRONT SUSPENSION

G1/I - Description of suspension

G1/II - Tightening torque values

G1/III - Specific tooling

G1/V - Removing and re-fitting the steering and front suspension assembly

G1/V - Removing and re-fitting a front suspension unit

G1/V - Removing and re-fitting a stub axle

G1/V - Removing and re-fitting a front suspension spring

G1/V - Removing and re-fitting assembled ball thrust bearing and spring support

G1/V - Removing and re-fitting a front suspension shock-absorber

G1/V - Removing and re-fitting a front suspension lower ball joint

G1/V - Removing and re-fitting a front suspension lower arm

G1/V - Removing and re-fitting a wheel-play tie-rod

G1/V - Removing and re-fitting the front suspension cross-member

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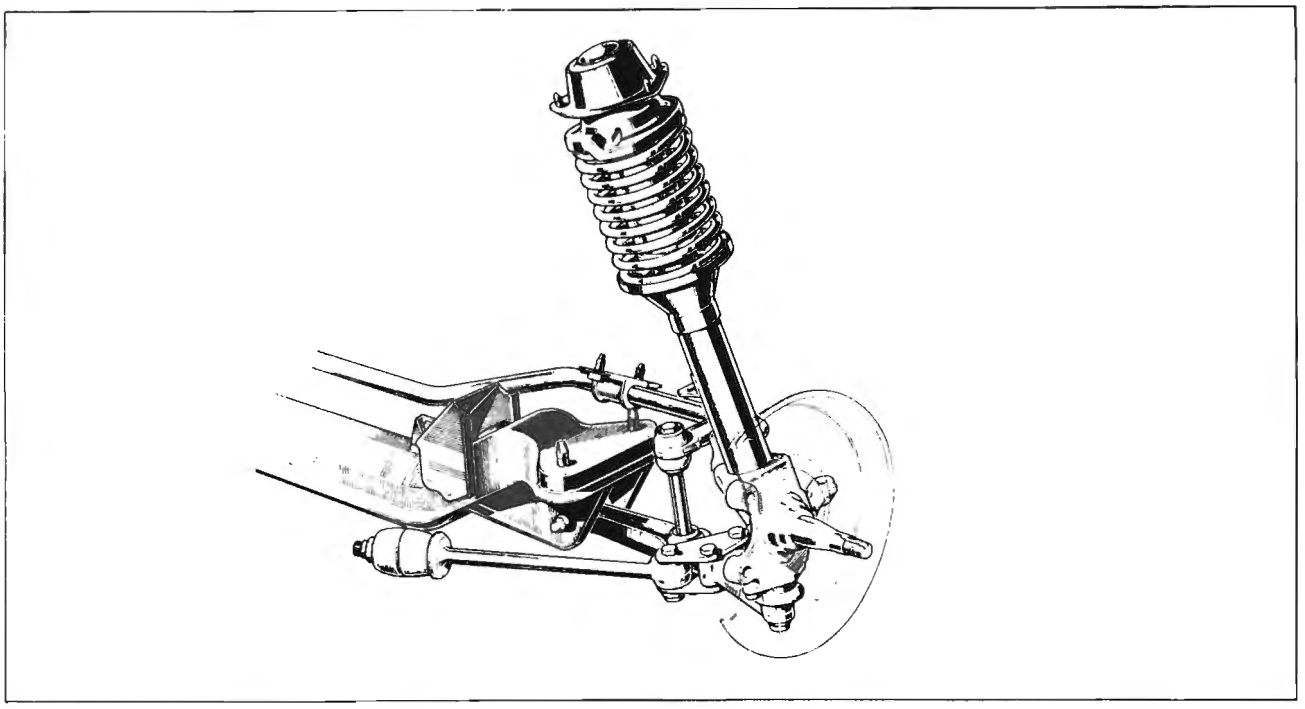
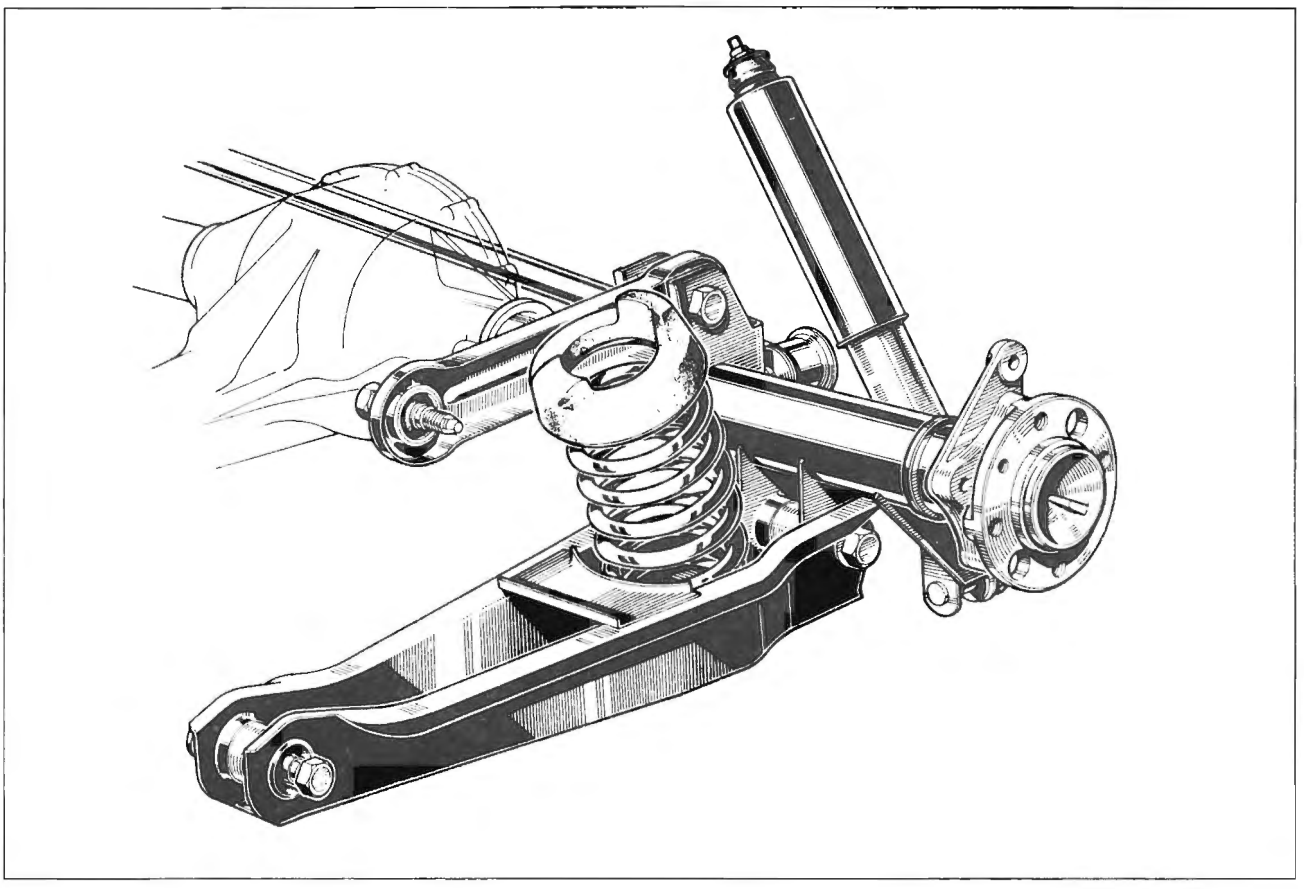


Fig. 1 W.1315

GENERAL

Independent front suspension, and rigid rear axle with coil springs, differential double action telescopic shock-absorbers, stabilizer rod at front, cross-bar for lateral stability at rear.

Fig. 2 W.1316



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DESCRIPTION (Fig. 1)

The front suspension assembly is comprised of:

. a sheet metal cross-member attached to both front side-members;

. two stamped R.H. and L.H. steel control arms each swivelling on a cross-member spring joint, and made integral, at their outer end, with the steering knuckle tie-rod end;

. two R.H. and L.H. units, each comprised of 3 main components:

  . a coil spring,
  . a shock-absorber,
  . a stub-axle separable from the shock-absorber.

The shock-absorber is fastened rigidly to the king pin. A lug, welded to the shock-absorber body, enables the shock-absorber to be located correctly in relation to the stub-axle, and prevents any displacement.

The spring is fitted between a base, which is welded to the shock-absorber body, and a base held, in the upper section, between the shock-absorber rod and the ball thrust bearing.

The suspension unit, which is removed as an assembly, swivels in its upper section on the ball thrust bearing, and on the steering knuckle tie-rod end in its lower section.

The ball thrust bearing is held by a spring support rigidly fastened to the fender flange.

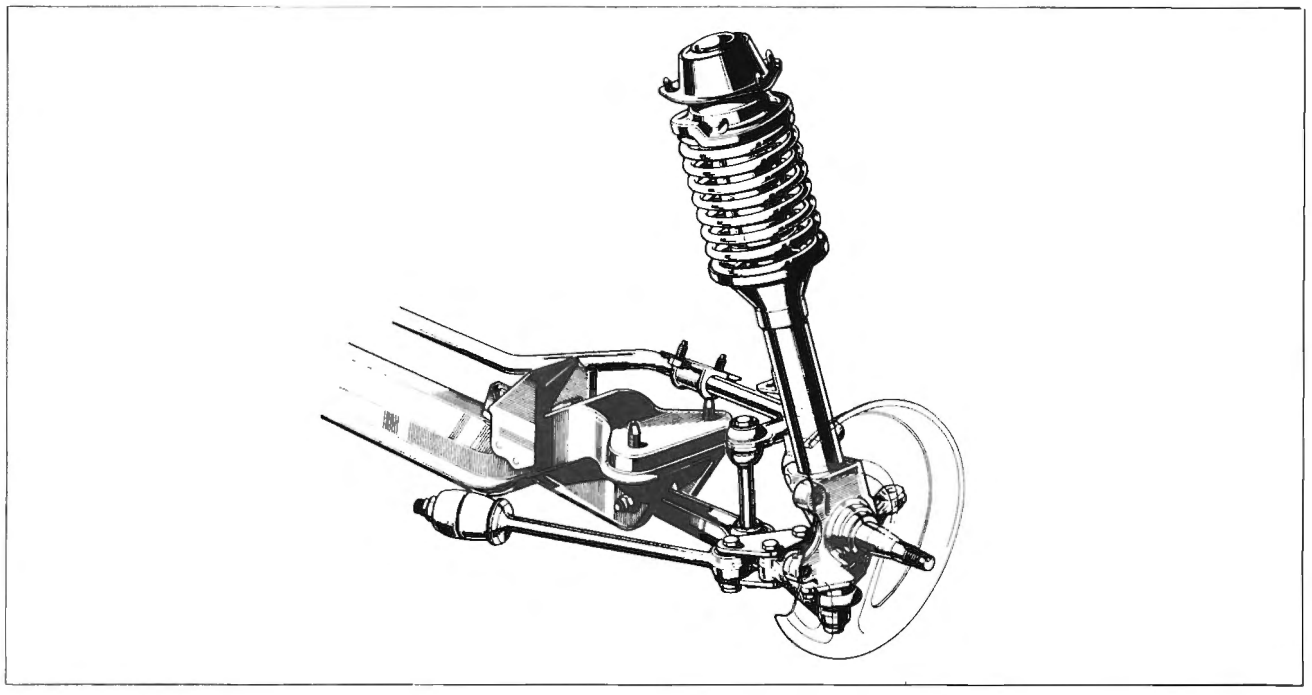
- A stabilizer rod fitted behind the cross-member, and pivoting on two bearings fastened to the side-members, connects both suspension arms through 2 vertical floating tie-rods.

- Two R.H. and L.H. reaction tie-rods, which are not adjustable in length, and which are made integral with the body through a spring linkage, connect the suspension arms.

TIGHTENING TORQUE VALUES

	m da N
Cross-member to side-member	6 to 8
Arm to cross-member	4 to 5
Reaction tie-rod to body	6 to 8
Reaction tie-rod to small link-plate ..	6 to 8
Small link-plate to arm	4 to 5
Knuckle to arm	5.5 to 7
Knuckle to king pin	1.8 to 2.6
Stabilizer rod to side-member	4 to 5
Stabilizer rod to vertical rie-rods ...	1.5 to 2
Vertical tie-rod to arms	1.5 to 2
Shock-absorbers to king pin	11 to 14.5
Shock-absorber rod to ball thrust bearing	5.5 to 7
Spring support to fender flange	1.5 to 2

Fig. 1 W.1315



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SPECIFIC TOOLING

Knuckle extractor	15532 E
Hub cap extractor	4025 K
Spring compressor	21617 R
Special grip for extraction of shock-absorber	21625 R
Compressor for fitting shock-absorber ...	39973 N

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REMOVAL PROCEDURE

- Set front of vehicle on pins.
- From inside, plug lower hole of compensating tank, using a tapered punch or a tapering piece of wood (Fig. 1).
- Disconnect battery.
- Remove nuts fastening both engine mounting brackets to suspension cross-member (Fig. 2)
- Set engine holding support (see section A0/III - Specific tooling - Fig. 2) to bear against fender flanges (Fig. 3). Take the precaution of removing the ignition distributor cap.
- Run a rope under the crankshaft pulley, and fasten it to the holding support.



Fig. 2 4312

Fig. 1 4059



Fig. 3 4313



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REMOVING AND RE-FITTING THE STEERING AND FRONT SUSPENSION ASSEMBLY

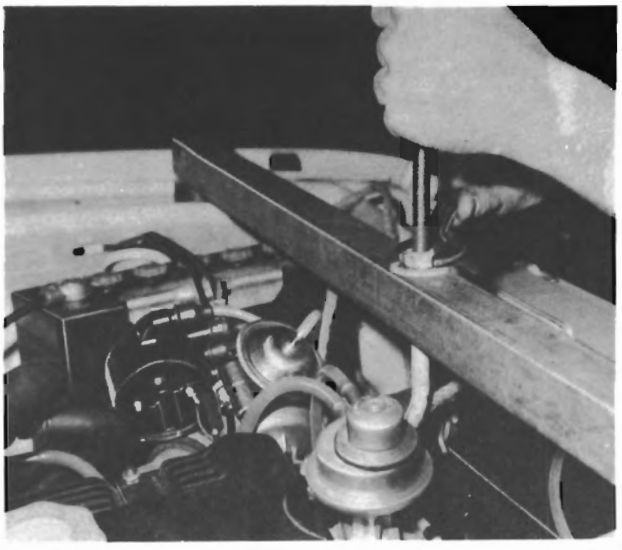


Fig. 4 4239

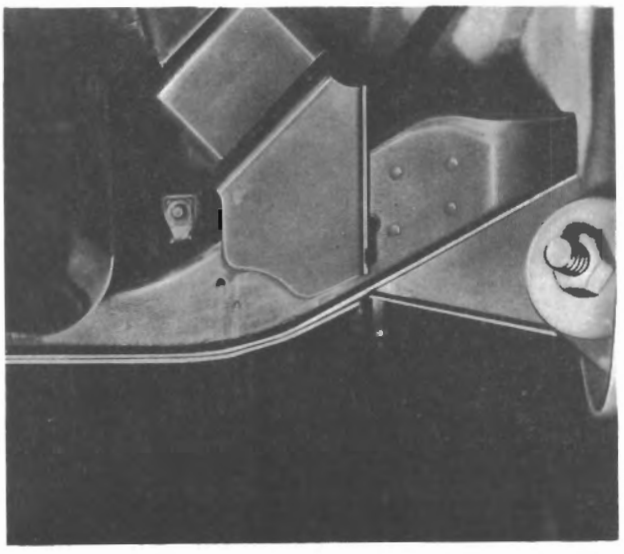
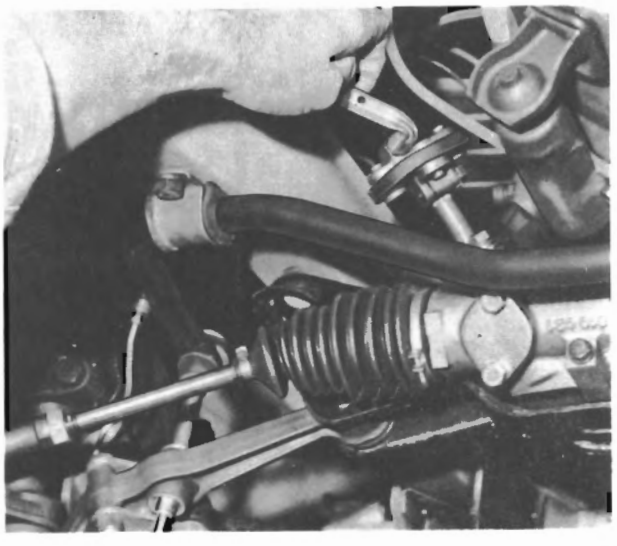


Fig. 5 4314

Fig. 6 4315



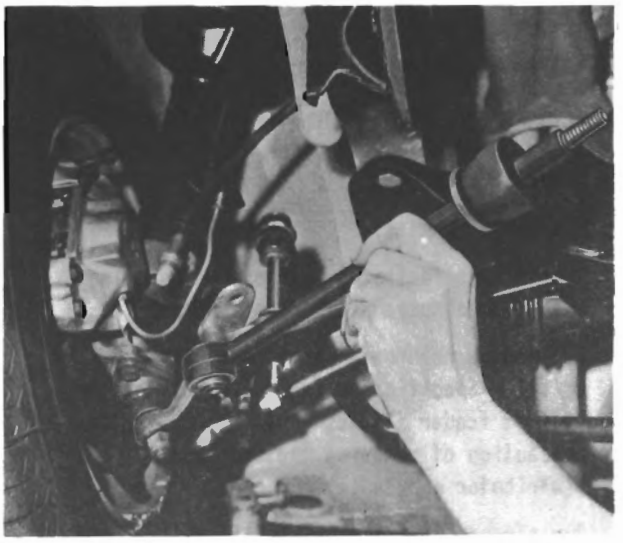
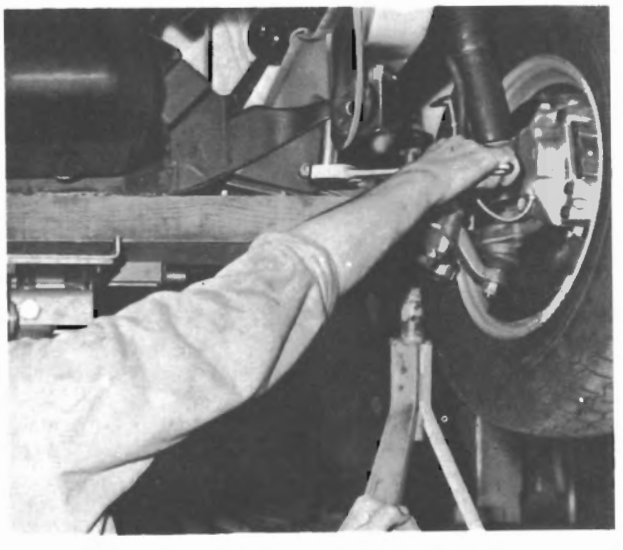


Fig. 7 4316

- Screw hook nut (Fig. 4) in to raise engine until both engine mounting brackets clear the cross-member by a few millimetres (Fig. 5).
- Remove key used to assemble steering flexible joint to shaft (Fig. 6).
- Remove screws fastening stabilizer rod bearings to side-members. Recover bearing rubber parts and supports.
- Disconnect brake tubes from flexible pipes.
- Extract flexible pipe retaining fasteners.
- Remove wheel-play tie-rods (Fig. 7).
- Set an hydraulic jack to bear under the suspension cross-member, then remove 4 screws fastening the cross-member to the side-members (Fig. 8).
- Hold each suspension unit with a wire anchored, on the one hand, to the spring and, on the other hand, to the cross-member.

Fig. 8 4317



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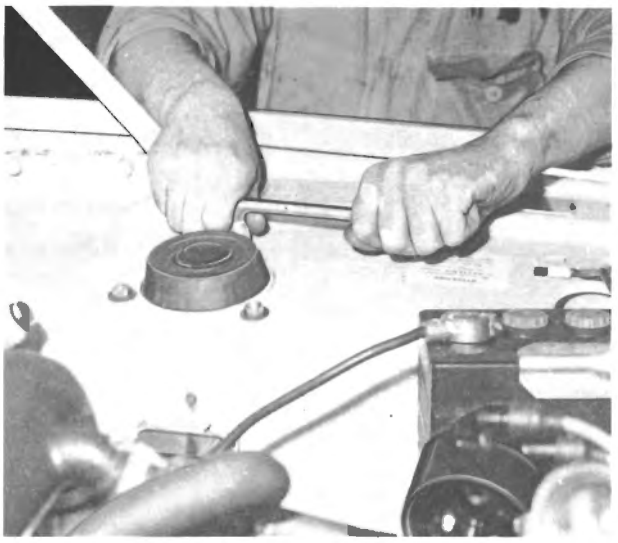


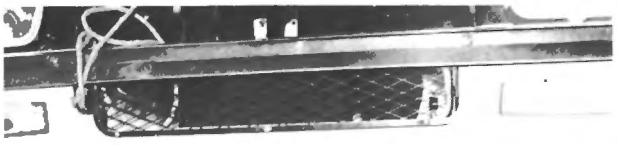
Fig. 9 4318

- Remove upper fastening nuts of each suspension unit to fender flange (Fig. 9).
- Slowly lower hydraulic jack, and clear steering and suspension assembly from car (Fig. 10).
- Extract steering and front suspension assembly (Fig. 11).

RE-FITTING THE STEERING AND FRONT SUSPENSION ASSEMBLY

- Place assembly in position under car (Fig. 12).
- Place assembly on an hydraulic jack bearing against the suspension cross-member.
- Fit assembly in position with great care, and fit steering flexible joint to shaft.
- Fit cross-member fastening screws, but do not lock them.

Fig. 10 4319





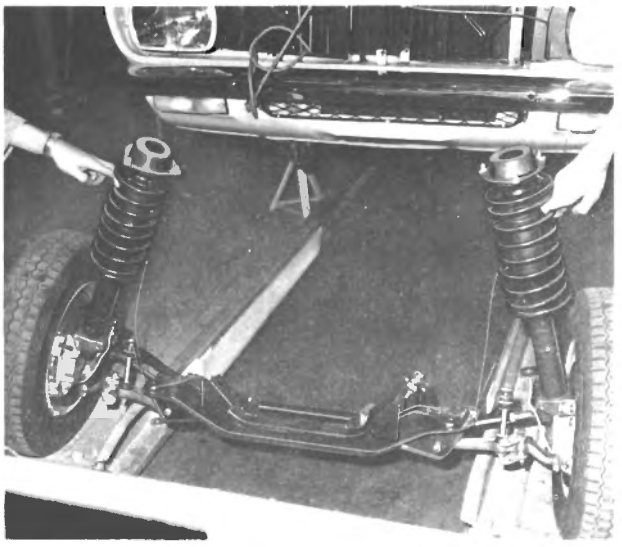
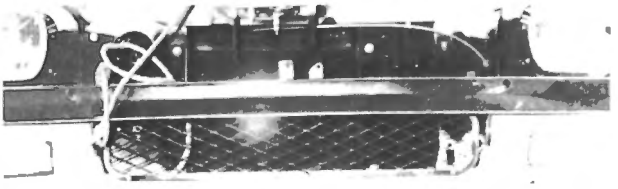


Fig. 11 4320



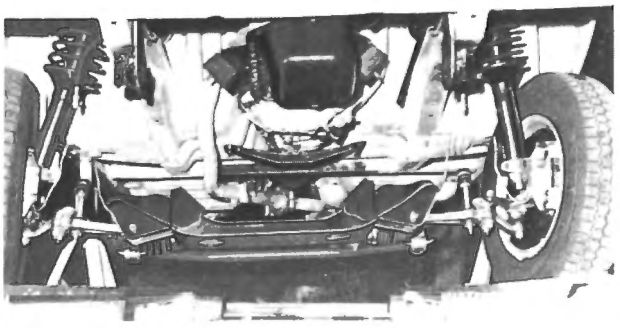


Fig. 12 4321

Fig. 13 4322



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REMOVING AND RE-FITTING THE STEERING AND FRONT SUSPENSION ASSEMBLY



Fig. 14 4323

- Remove hydraulic jack.
- Tighten cross-member screws to 7 m da N torque (Fig. 14).
- Use parallel articulated jack to raise each suspension unit, and locate flexible support in position on fender flange (Fig. 15).
- Fasten each flexible support to fender flange. Nut tightening torque is 1.75 m da N. Remove metal wires.
- Fit brake flexible pipe retaining fasteners.
- Connect brake tubes to flexible pipes.
- Fit wheel-play tie-rods.
- Fasten stabilizer rod to side-member.

Fig. 15 4324

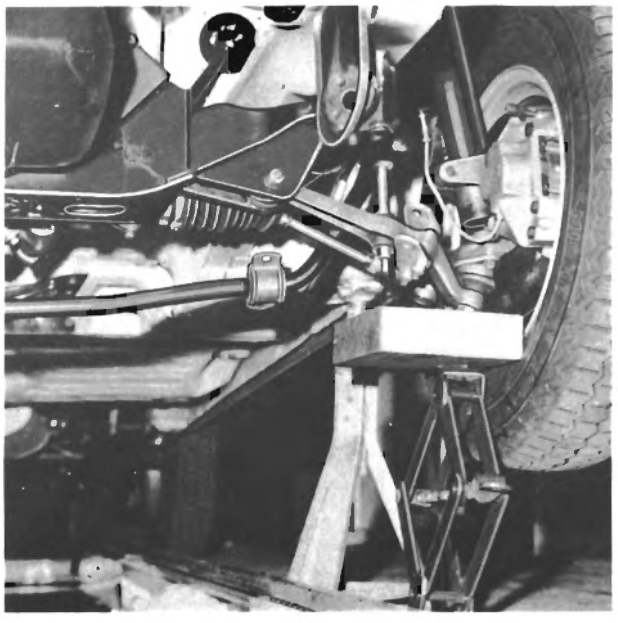




Fig. 16 4325

- Fit key used for assembly of flexible joint with steering shaft.
- Allow engine to bear on suspension cross-member by unscrewing lock nut (Fig. 16).
- Remove engine holding support and rope.
- Fit ignition distributor cap.
- Connect battery.
- Set car on its wheels.
- Tighten nuts of both engine mounting brackets to 2.5 m da N torque (Fig. 17).
- Bleed brakes.

Fig. 17 4326



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Fig. 18 4327

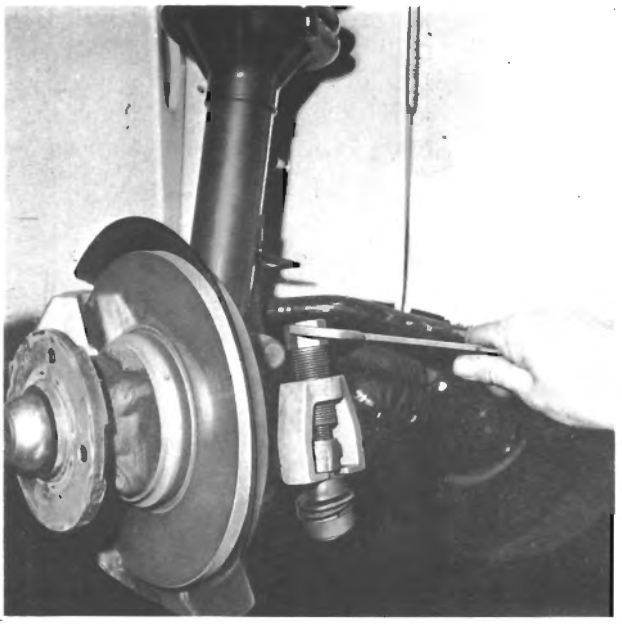


Fig. 20 4329

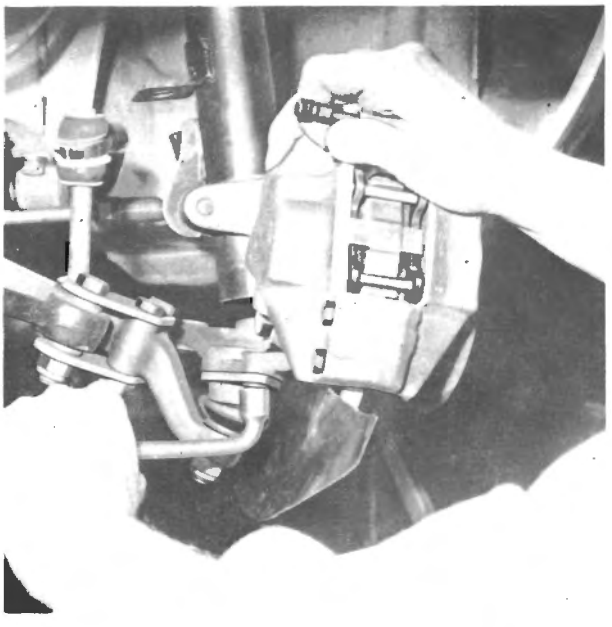
REMOVAL PROCEDURE

- From inside, use a tapered punch or a tapering piece of wood to plug lower hole of compensating tank (Fig. 1).
- Remove central cap, then unlock (but do not remove) the shock-absorber rod-to-spring support ball thrust bearing upper fastening nut (Fig. 18) (this is to be done only if the spring or shock absorber are to be replaced).
- Remove 3 suspension unit-to-fender flange upper fastening nuts (Fig. 19).
- Unlock front wheel.
- Set front of car on pins, then remove wheel after previously marking its position.
- Disconnect brake tube from flexible tube and yoke.
- Extract flexible pipe retaining fastener.
- Use extractor Ref. 15532 E (Fig. 20) to uncouple the steering knuckle.
- Remove 2 screws fastening the knuckle to the stub axle (Fig. 21).

Fig. 19 4328



Fig. 21 4330



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REMOVING AND RE-FITTING A FRONT SUSPENSION UNIT

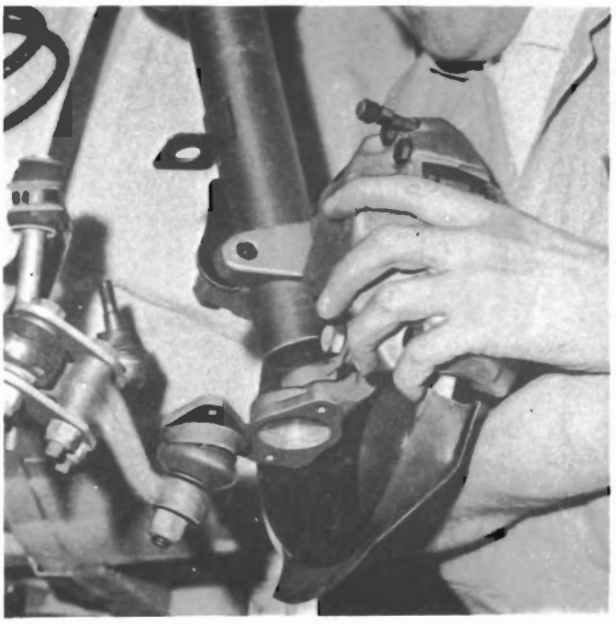


Fig. 22 4331

- Extract knuckle from stub axle by lowering lower suspension arm (Fig. 22), then remove suspension unit.

RE-FITTING OPERATIONS

- Locate suspension unit in position on car. Fasten its upper section to fender flange. Nut tightening torque: 1.5 to 2 m da N.
- Insert knuckle in its housing on stub axle. Tighten both knuckle fastening screws to 1.8 to 2.6 m da N torque.

Fig. 23 4332

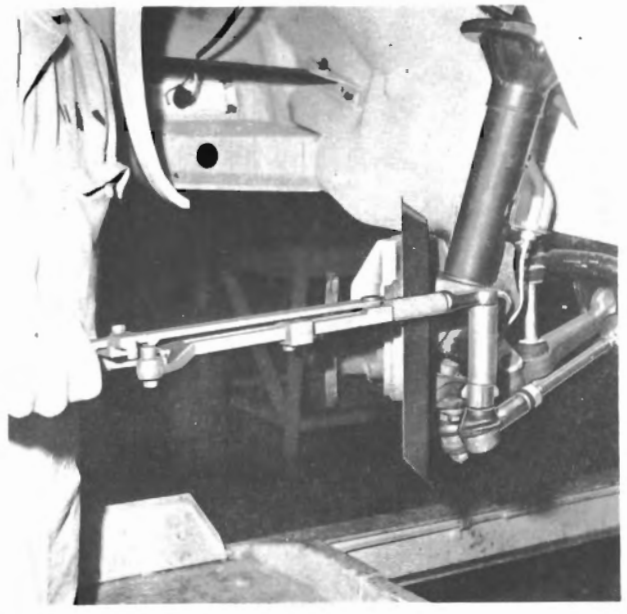




Fig. 24 4333

- Fit flexible pipe retaining fastener.
- Connect brake tube to flexible pipe and yoke.
- Couple steering knuckle. Tightening torque: 7 m da N (Fig. 23).
- Tighten shock-absorber rod upper fastening nut to 5.5 to 7 m da N torque (Fig. 24).
- Fit central cap in position (Fig. 25).
- Bleed brakes.
- Set car on its wheels. Tighten wheel.

Fig. 25 4334



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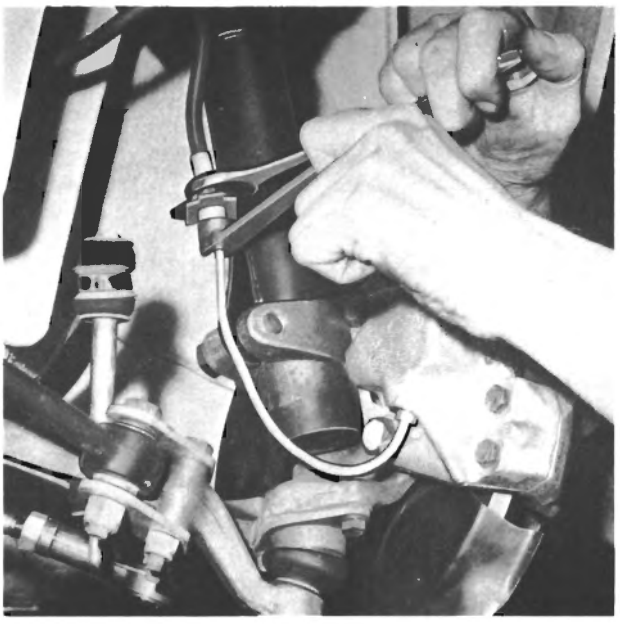


Fig. 26 4250



Fig. 28 4262

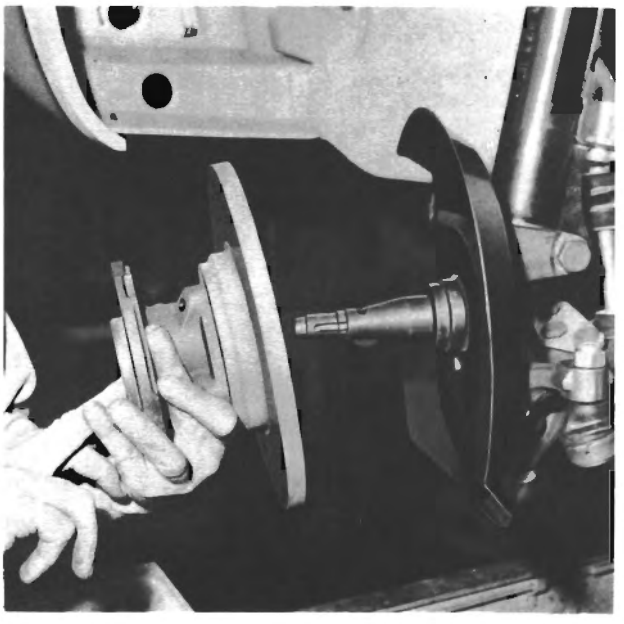
REMOVAL PROCEDURE

- From inside, use a tapered punch or a tapering piece of wood to plug compensating tank lower hole (Fig. 1).
- Remove 3 nuts fastening upper section of suspension unit to fender flange (Fig. 19).
- Unlock front wheel.
- Set front of vehicle on pins, then remove wheel after marking its position.
- Disconnect brake tube from flexible pipe (Fig. 26).
- Extract flexible pipe retaining fastener.
- Unlock, and remove the screws fastening the yoke to the stub axle.
- Remove the brake yoke, without disconnecting the tube from the yoke (Fig. 27).
- Remove hub cap, using tool Ref. 4025 K (Fig. 2
- Remove hub nut, then remove hub and disc as assembled (Fig. 29).

Fig. 27 4261



Fig. 29 4263



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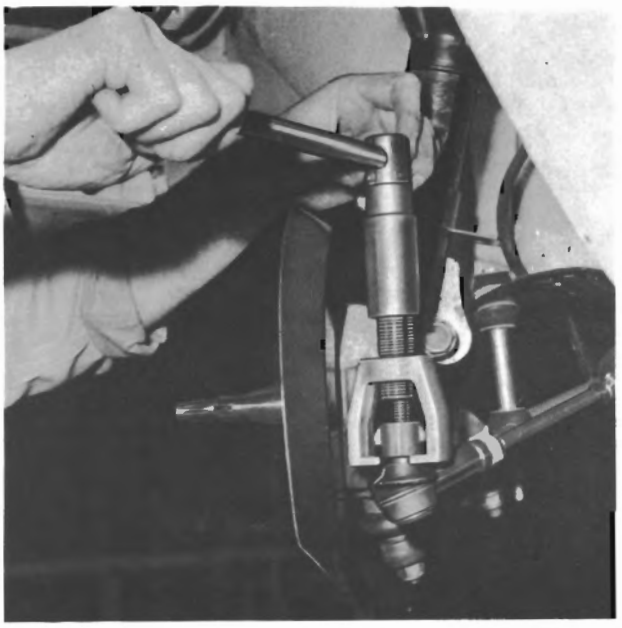


Fig. 30 4335

- Uncouple steering knuckle, using extractor Ref. 15532 E (Fig. 30).
- Remove the 2 screws fastening the knuckle to the stub axle.
- Extract knuckle from stub axle, lowering the lower suspension arm (Fig. 31), then remove suspension unit.
- On work-bench, place suspension unit on spring compressor Ref. 21617 R, from which both screws and the claw will have been removed.
- Remove screw fastening shock-absorber to stub axle (Fig. 32).
- Clean end of shock-absorber, and eliminate the mud and traces of oxidation, which may be present.

Fig. 31 4336



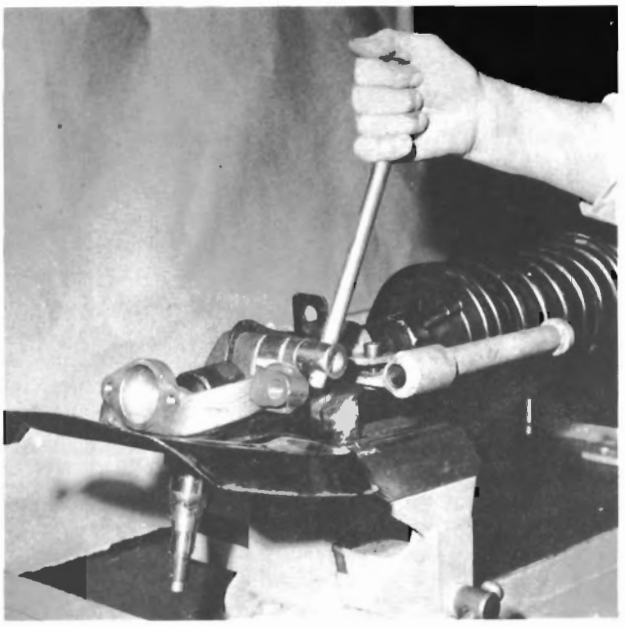


Fig. 32 4337

- Use grip Ref. 21625 R to loosen stub axle from shock-absorber (Fig. 33).
- Proceed as follows to finish extracting the stub axle:
  - . place a 5 mm thickness gauge in stub axle slot;
  - . place a 10 mm long, 10 mm dia. distance piece in stub axle threaded hole;
  - . fit screw in threaded hole, and tighten it, but not excessively, to open slot up (Fig. 34).
  - . remove stub axle (Fig. 35).

Fig. 33 4338



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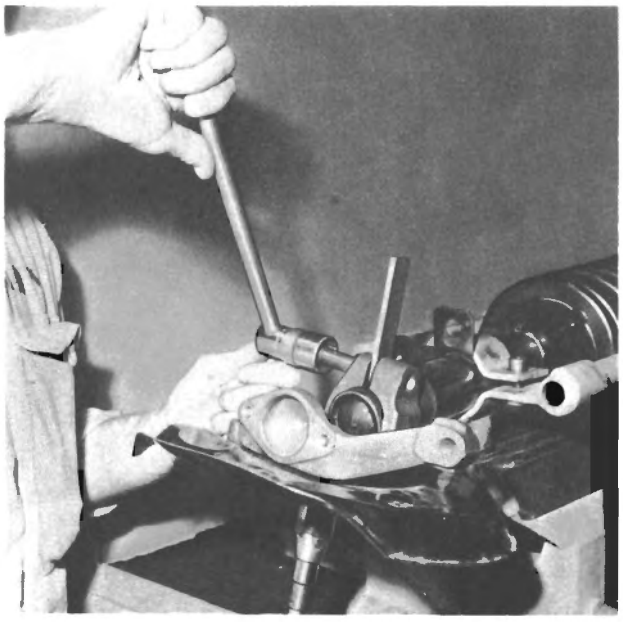


Fig. 34 4339

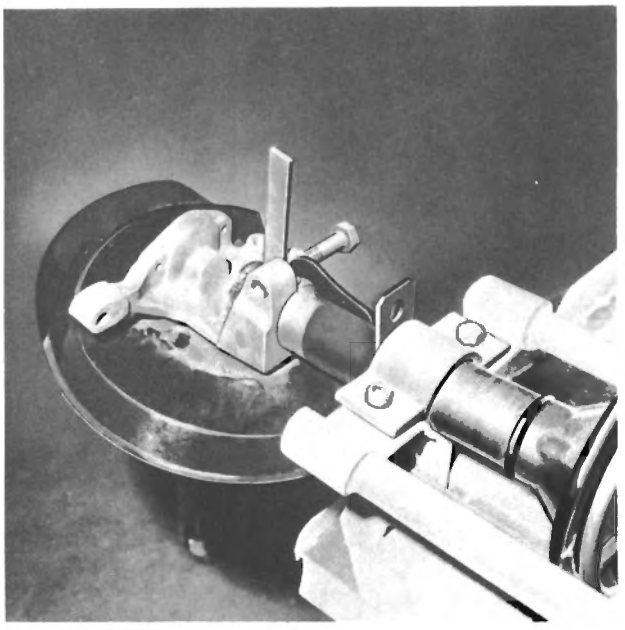


Fig. 36 4341

RE-FITTING OPERATIONS

- If the area of the shock-absorber body, where the stub axle is to be fitted, is rusted, eliminate these traces of rust with emery cloth, and lightly smear this area with grease for easier fitting of the stub axle.
- With the stub axle slot spread open, fit stub axle on shock-absorber until the lug welded on the shock-absorber comes to stop against the 5 mm thickness gauge (Fig. 36).
- Remove thickness gauge, screw, and distance-piece.
- Finish fitting king pin, using tool Ref. 39973 N fastened to the spring compressor, and bearing against end of stub axle (Fig. 37).
- Fit screw fastening shock absorber to stub axle. Tighten screw to 11 to 14.5 m da N torque.
- Remove suspension unit from spring compressor.
- Locate suspension unit in position on car. Fasten its upper section to the fender flange. Nut tightening torque is 1.5 to 2 m da N.

Fig. 35 4340

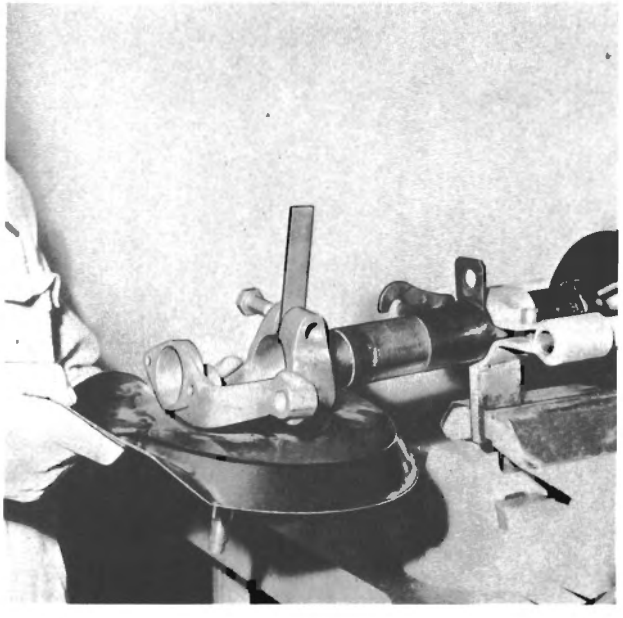
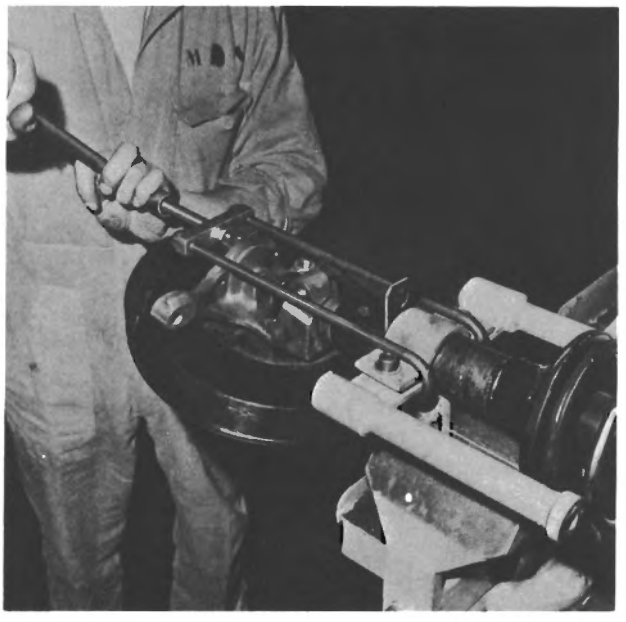


Fig. 37 4342



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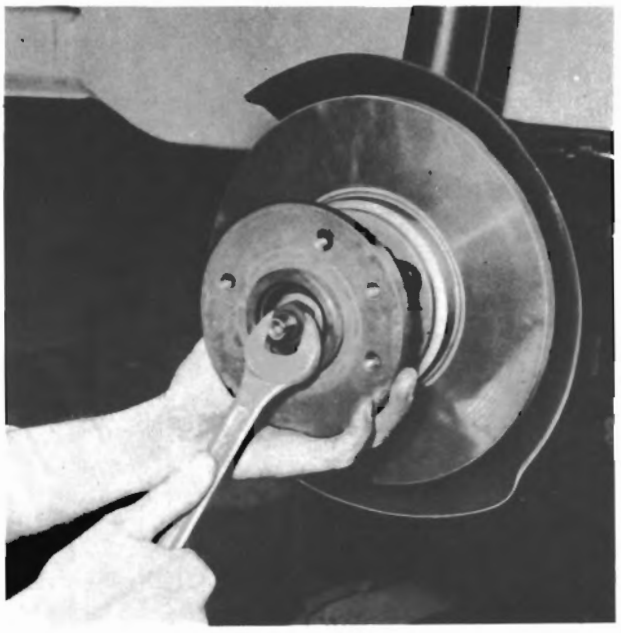


Fig. 38 4267



Fig. 40 4269

- Fit knuckle in its housing on stub axle. Tighten both knuckle fastening screws to 1.8 to 2.6 m da N torque.
- Fit hub and disc as assembled.
- Fit a new hub skirt nut. Adjust hub play (Fig.38).
- Lock skirt nut (Fig. 39).
- Fit hub cap.

Fig. 39 4268



- Fasten brake yoke to stub axle. Replace sheet metal retainer. Tightening torque from 6 to 8.5 m da N (Fig. 40).
- Fit flexible pipe retaining fastener.
- Connect brake tube to flexible pipe.
- Couple steering knuckle. Tightening torque; 7 m da N (Fig. 23).
- Bleed brakes.
- Set car on its wheels. Tighten wheel.

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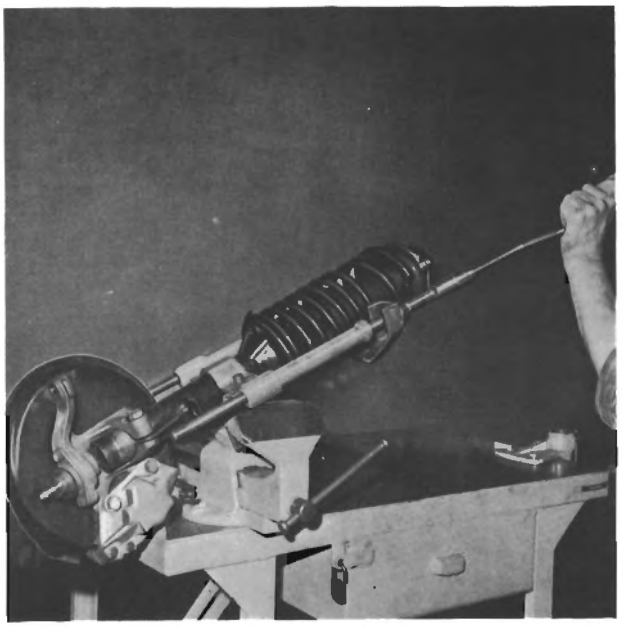


Fig. 41 4343

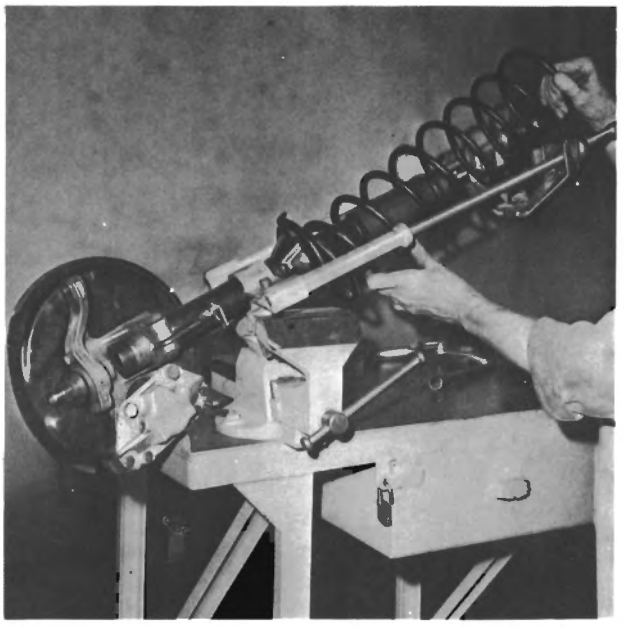


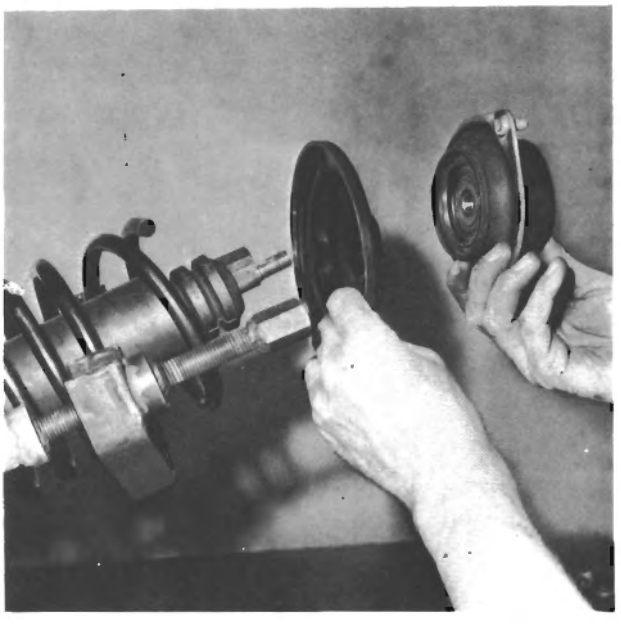
Fig. 43 4345

REMOVAL PROCEDURE

- Remove front suspension unit.
- On work-bench, place suspension unit on spring compressor Ref. 21617 R.

  Place 3 claw legs to bear against 2nd upper turn of spring.
- Grease tool screw-knuckles and screws.
- Compress spring, tightening each screw alternately (Fig. 41), until the upper turn of the spring is no longer bearing against its cup.
- Remove nut on shock absorber rod, then remove spring support and upper cup (Fig. 42).
- Relieve spring, and remove it (Fig. 43).

Fig. 42 4344



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REMOVING AND RE-FITTING A FRONT SUSPENSION SPRING

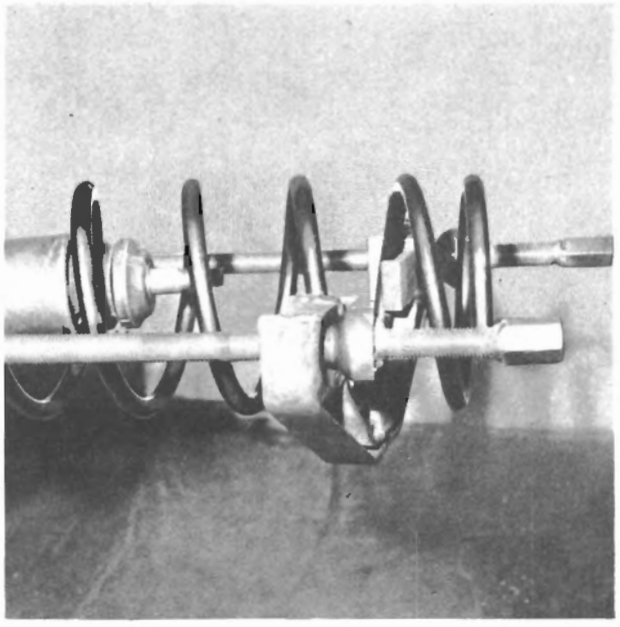


Fig. 44 4346

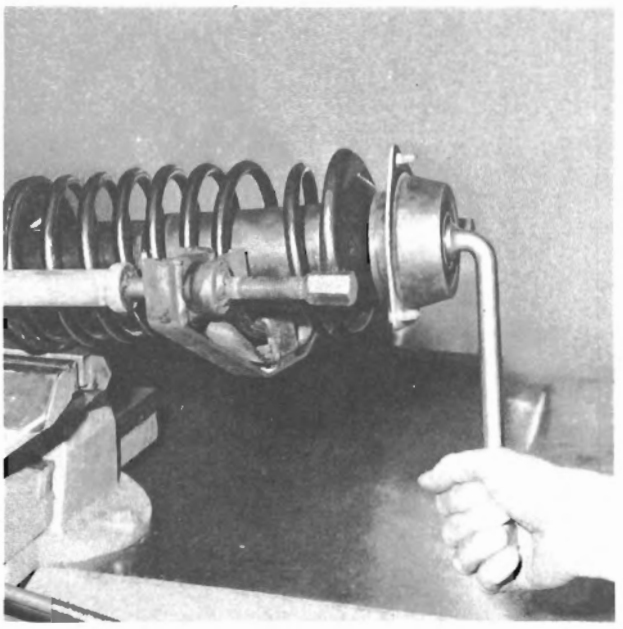


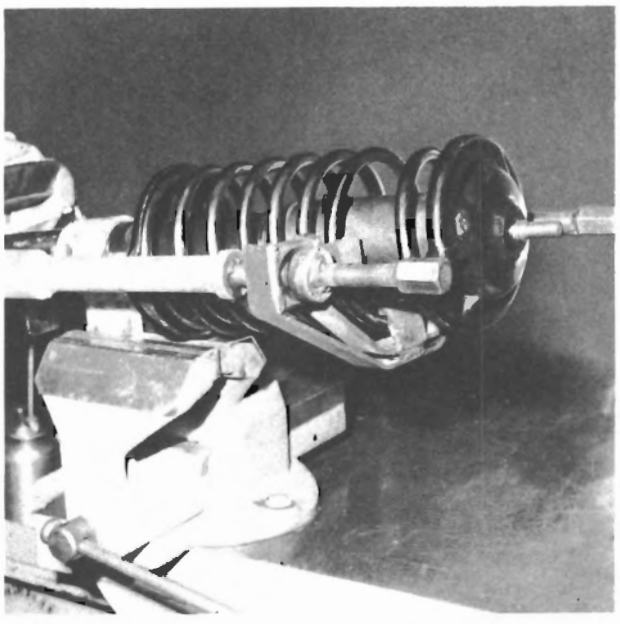
Fig. 46 4348

RE-FITTING OPERATIONS

The shock absorber being fastened to the spring compressor:

- Locate spring (either direction is suitable) in lower cup, then place 3 claw legs on 2nd upper turn of spring (Fig. 44). The claw thus placed sits askew as a result of the helix pitch.
- Grease tool screw-knuckles and screws.
- Compress spring, screwing in each screw alternately.
- When spring is sufficiently compressed, place upper cup on spring (Fig. 45). To set it in correct directional position, turn shock-absorber rod.
- Fit spring support in position. Fit nut, but do not lock it (Fig. 46).
- Relieve spring.
- Extract suspension unit from spring compressor, by turning it around its own axis to clear claw from spring turns.
- Re-fit suspension unit on car.

Fig. 45 4347



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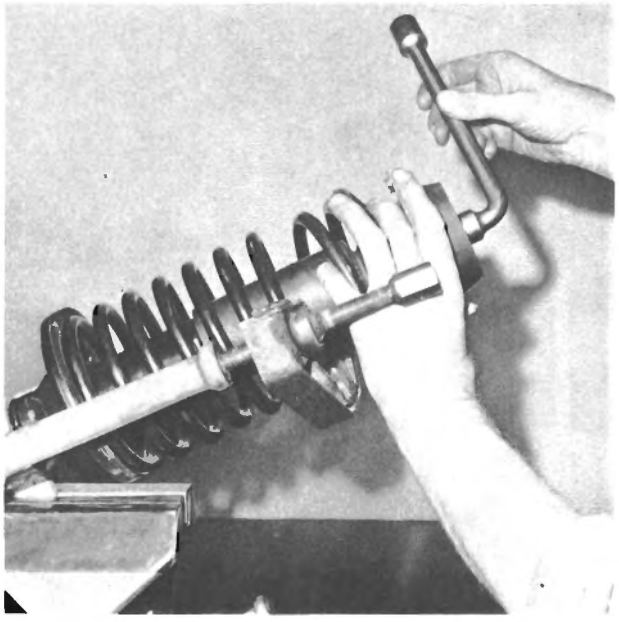


Fig. 47 4349

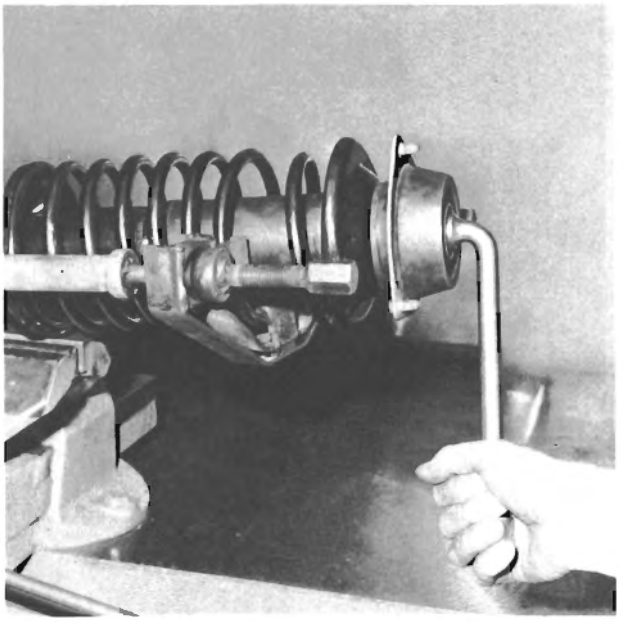


Fig. 48 4348

REMOVAL PROCEDURE

- Remove front suspension unit.
- On work-bench, place suspension unit on spring compressor Ref. 21617 R.

  Position 3 claw legs to bear against 2nd upper spring turn.
- Grease tool screw knuckles and screws.
- Compress spring, screwing in each screw alternatively (Fig. 41), until upper turn is no longer bearing against its cup.
- Remove nut on shock-absorber rod, then remove spring support (Fig. 47).

RE-FITTING OPERATIONS

- Fit spring support in position on shock absorber rod, then fit nut, but do not tighten it (Fig. 48).
- Relieve spring. Make sure upper cup is set in correct directional position.
- Extract suspension unit from spring compressor, by turning it around its own axis to clear claw from spring turns.
- Re-fit suspension unit on car.

Fig. 49 4351

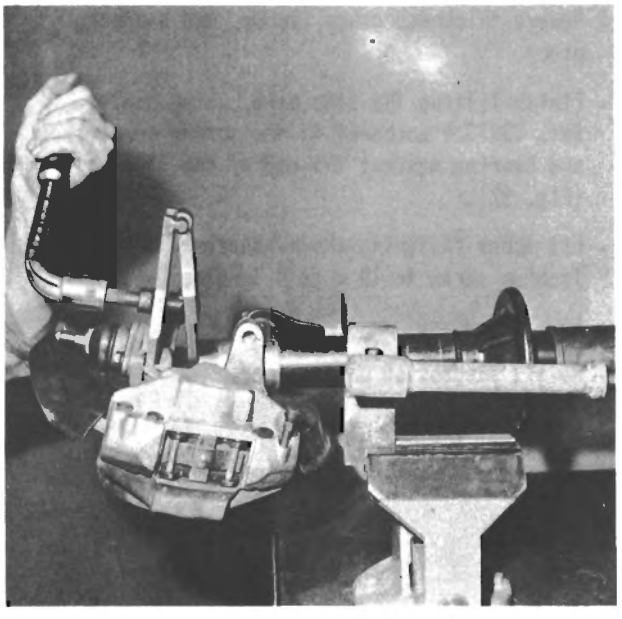
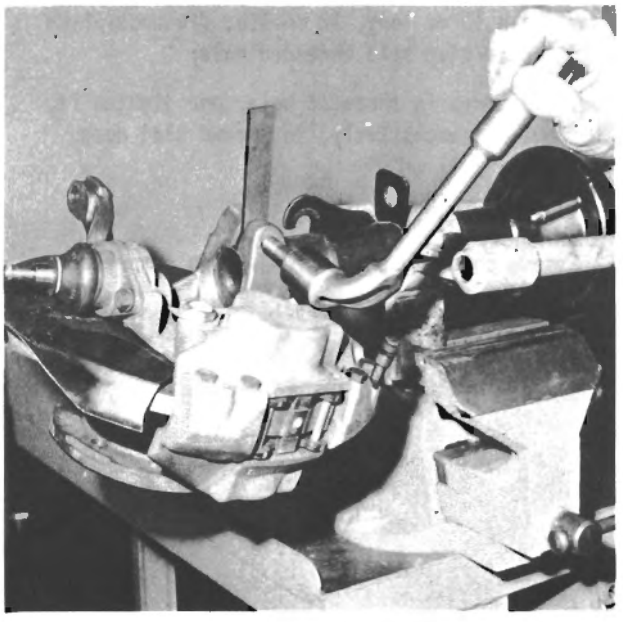


Fig. 50 4352



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REMOVING AND RE-FITTING A FRONT SUSPENSION SHOCK-ABSORBER

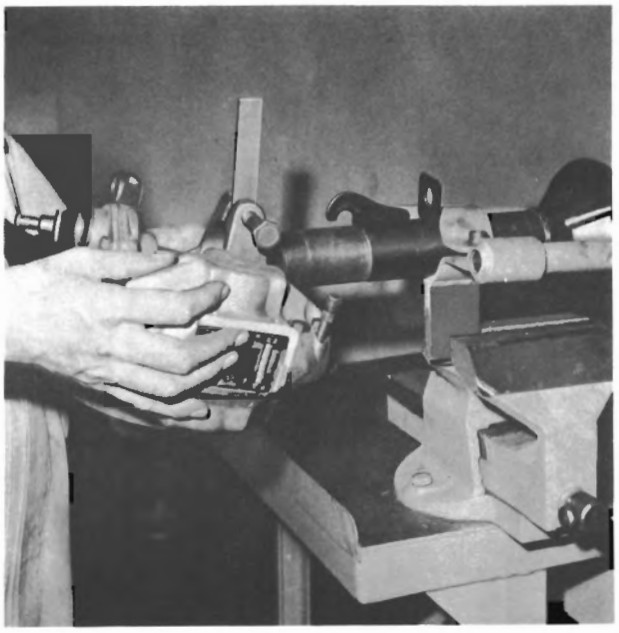


Fig. 51 4353

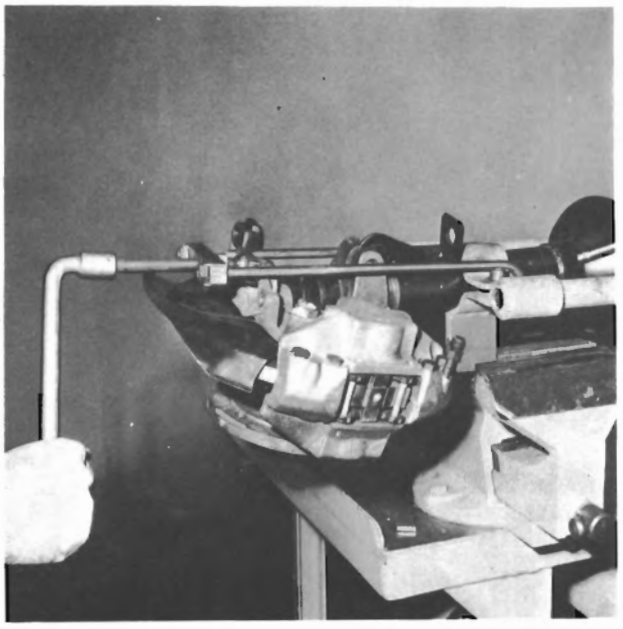


Fig. 52 4354

REMOVAL PROCEDURE

- Remove suspension unit.
- Remove front suspension spring.

The shock-absorber being fastened to spring compressor Ref. 21617 R:

- Remove screw fastening shock-absorber to stub axle.

  Use grip Ref. 21625 R to loosen stub axle from shock absorber body (Fig. 49).

- Proceed as follows to complete extraction of stub axle:
  - . fit a 5 mm thickness gauge in stub axle slot;
  - . fit a 10 mm long, 10 mm dia. distance-piece inside stub axle threaded hole;
  - . fit screw in threaded hole, and tighten it, but not excessively, to spread slot open (Fig. 50);
  - . remove stub axle (Fig. 51).
- Remove shock-absorber from spring compressor.

RE-FITTING OPERATIONS

- Fasten shock-absorber on spring compressor, with tool base bearing against brake flexible pipe tab.
- If the area of the shock-absorber body where the stub axle is to be fitted, is rusted or covered with dirt (dirty paint or grease, etc.), eliminate these with an emery cloth, and lightly smear this area with grease for easier fitting of the stub axle.
- The stub axle slot being spread open, fit it on the shock-absorber until the lug welded on the shock-absorber comes to stop against the 5 mm thickness gauge.
- Remove thickness gauge, screw, and distance-piece.
- Finish fitting the stub axle, using tool Ref. 39973 N anchored to the spring compressor, and bearing against the end of the stub axle (Fig. 52).
- Fit screw fastening shock-absorber to stub-axle. Tighten screw to 13 m da N torque.
- Re-fit spring.
- Re-fit suspension unit on car.

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Fig. 53 4355

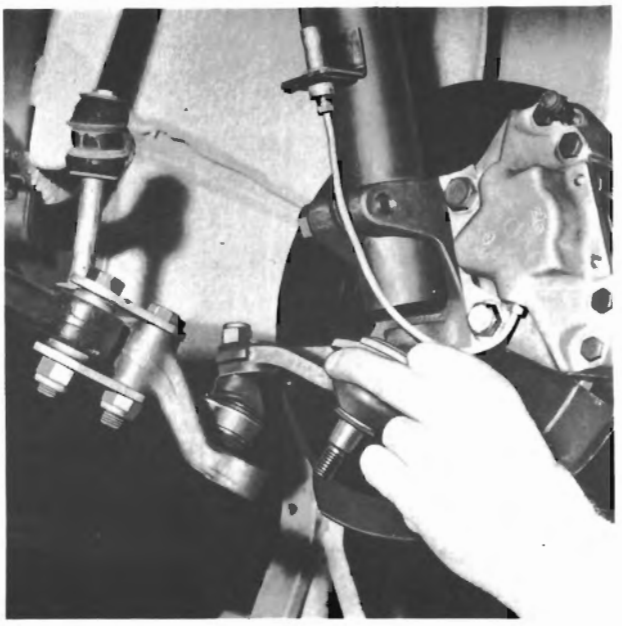


Fig. 55 4357

REMOVAL PROCEDURE

- Unlock front wheel.
- Set front of vehicle on pins, then remove wheel after marking its position.
- Uncouple knuckle from lower suspension arm, using extractor Ref. 15532 E (Fig. 53).
- Remove both screws fastening knuckle to stub-axle, then separate knuckle from stub-axle (Fig. 54).
- Remove knuckle (Fig. 55).

RE-FITTING OPERATIONS

- Place knuckle cone on suspension arm.
- Insert knuckle in its housing on stub-axle.

  Tighten both knuckle fastening screws to torque of 1.8 to 2.6 m da N.
- Tighten nut fastening knuckle to suspension arm to torque of 5.5 to 7 m da N (Fig. 56).
- Set car on its wheels. Tighten the wheel.

Fig. 54 4356

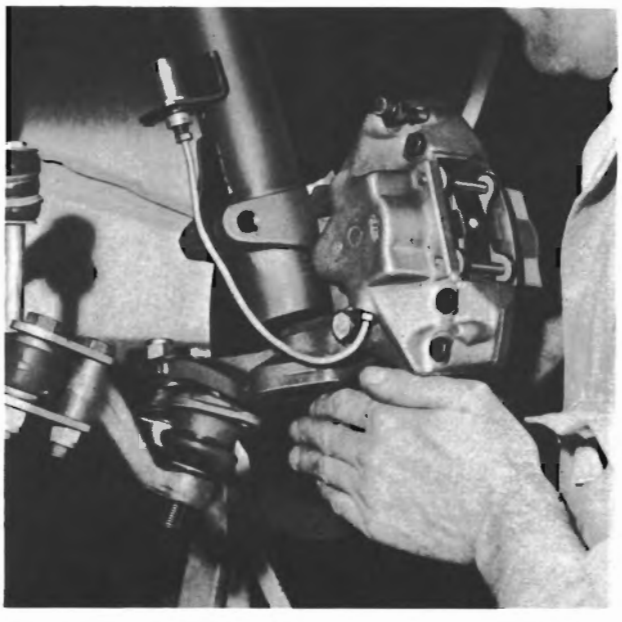
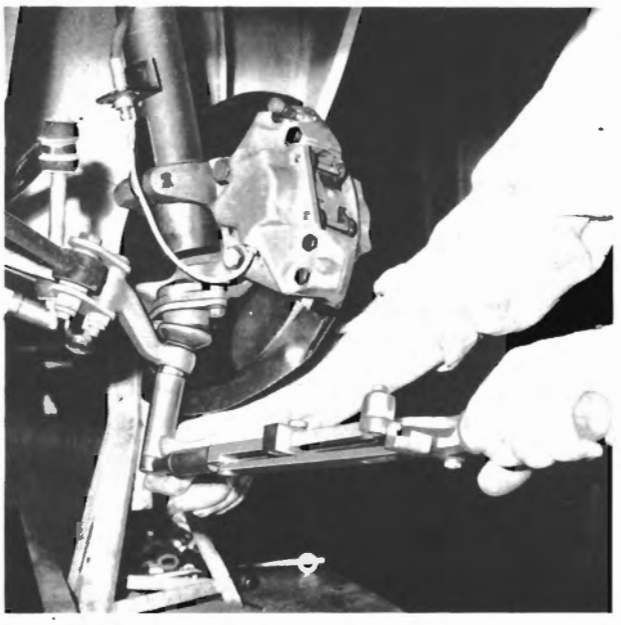


Fig. 56 4358



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REMOVING AND RE-FITTING A FRONT SUSPENSION LOWER ARM

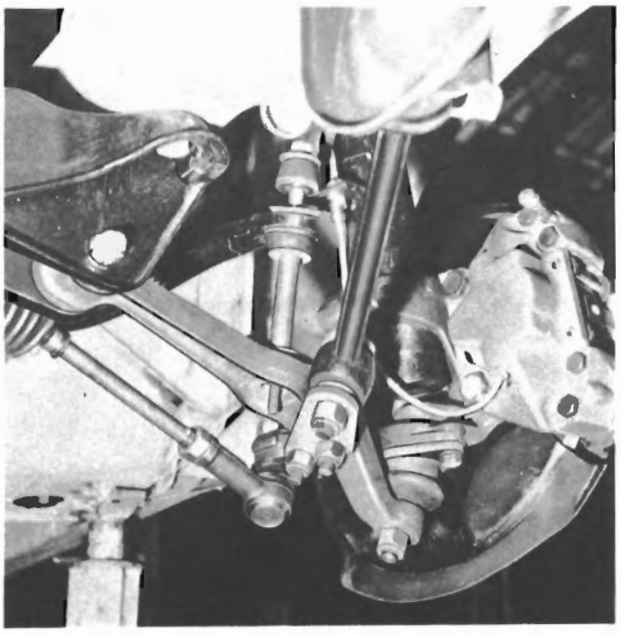


Fig. 57 4359

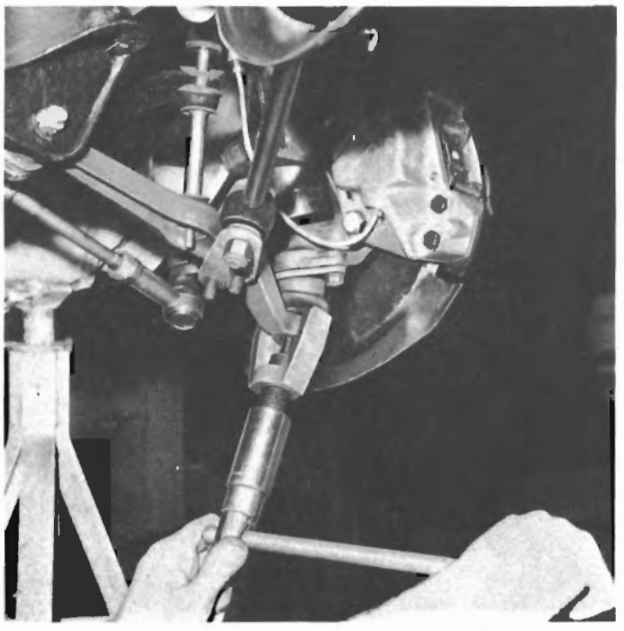


Fig. 58 4360

REMOVAL PROCEDURE

- Unlock front wheel.
- Set front of vehicle on pins, then remove wheel after marking its position.
- Remove stabilizer rod tie-bar fastening nut. Recover lower flexible ring and its 2 cups. Clear tie-bar spindle upwards (Fig. 57), but do not remove it.
- Loosen wheel-play tie-rod linkage spindle, but do not remove it.
- Remove nuts used for fastening both wheel-play tie-rod linkage plates to the suspension arm.
- Uncouple knuckle from lower suspension arm, using extractor Ref. 15532 E (Fig. 58).
- Remove both screws fastening both small plates to the arm.
- Swivel lower small plate to enable arm to be cleared downwards (Fig. 59).
- Lower the arm to clear it from the lower knuckle and stabilizer rod tie-bar.

  Fit a nut on the stabilizer rod tie-bar in order to retain the stacking of flexible rings and cups.
- Remove arm linkage spindle on cross-member. Place rack to bear against its body to avoid damaging its bellows with the spindle.
- Remove suspension arm (Fig. 60).

Fig. 59 4361



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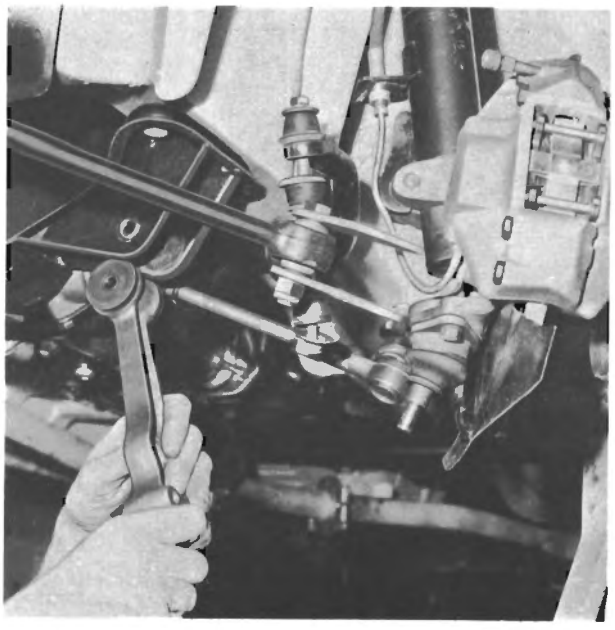


Fig. 60 4362

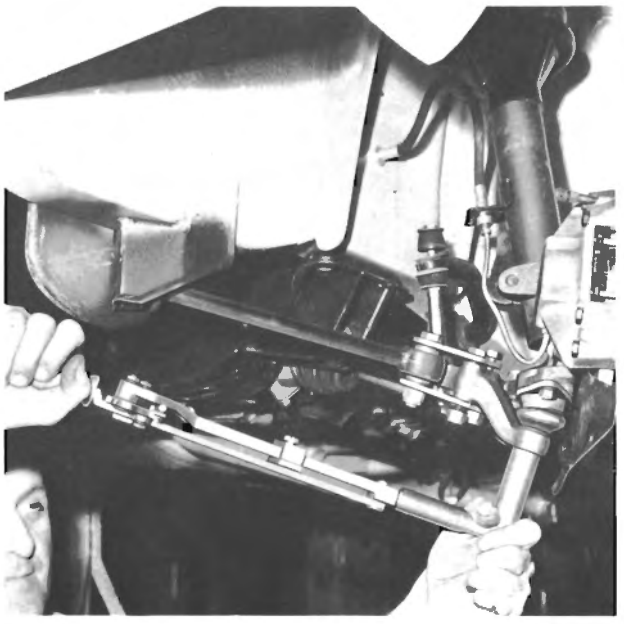


Fig. 62 4364

RE-FITTING OPERATIONS

- If necessary, replace suspension arm silentblocs (Fig. 61).

  Locate arm in position on cross-member, then fit linkage spindle in position (with screw head facing rear), but do not lock it.

- Insert lower knuckle cone in the arm, then insert stabilizer rod tie-bar spindle in its housing on the arm.

- Place both small plates in position on the arm, then fit its 2 fastening bolts, but do not lock them.

- Tighten lower knuckle fastening nut to torque of 5.5 to 7 m da N (Fig. 62).

- Set car on its wheels. Tighten the wheel.

- Tighten both bolts used to fasten both linkage plates to torque of 4 to 5 m da N.

- Tighten wheel-play tie-rod linkage spindle to torque of 6 to 8 m da N.

- Re-connect the stabilizer rod tie-bar to the arm. Make sure flexible rings and cups are correctly set into position.

- Tighten suspension arm linkage spindle with cross-member to torque of 4 to 5 m da N.

Fig. 61 4363



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REMOVING AND RE-FITTING A WHEEL-PLAY TIE-ROD

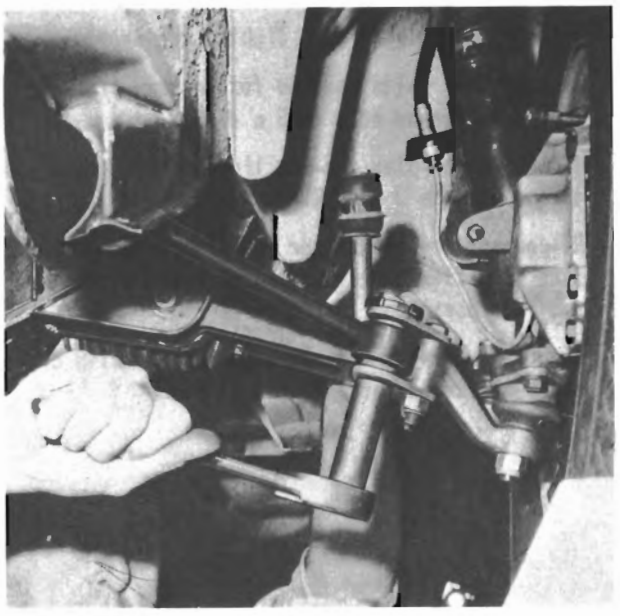


Fig. 63 4365

REMOVAL PROCEDURE

- Remove nut fastening wheel-play tie-rod to body (Fig. 63). Recover front silentbloc.
- Remove wheel-play tie-rod to suspension arm linkage spindle (Fig. 64).
- Loosen both bolts fastening the small linkage plates, but do not remove them.
- Remove wheel-play tie-rod with rear silentbloc (Fig. 65).

Fig. 64 4366



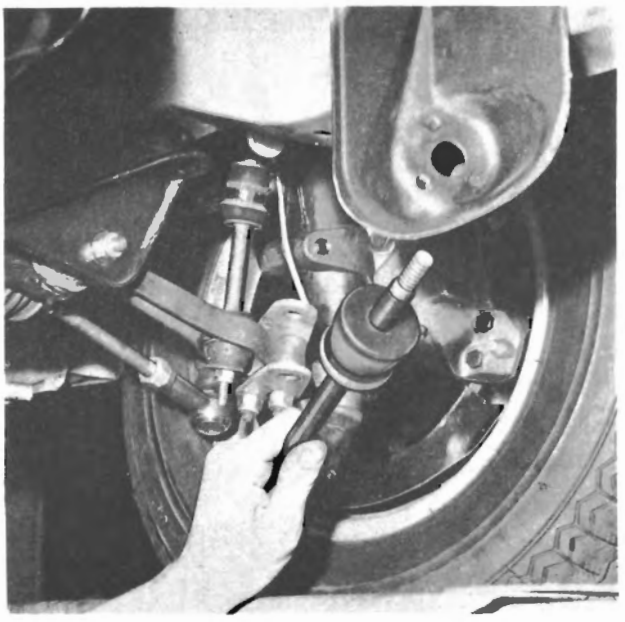
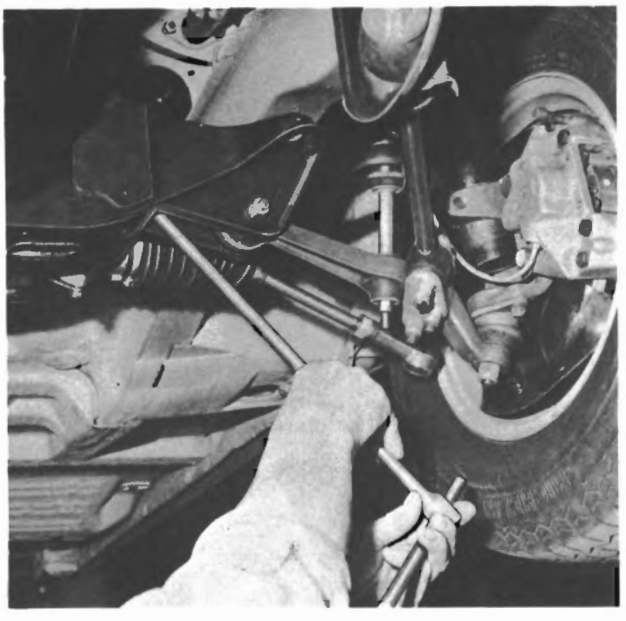


Fig. 65 4367

RE-FITTING OPERATION

- If necessary, replace wheel-play tie-rod silentblocs.
- Locate tie-rod in position with its silentblocs.
- Tighten nut fastening wheel-play tie-rod to body to torque of 6 to 8 m da N.
- Fit wheel-play tie-rod-to-suspension arm linkage spindle.
- Tighten both bolts fastening the 2 linkage small plates to torque of 4 to 5 m da N.
- Tighten wheel-play tie-rod linkage spindle to torque of 6 to 8 m da N.

Fig. 66 4312



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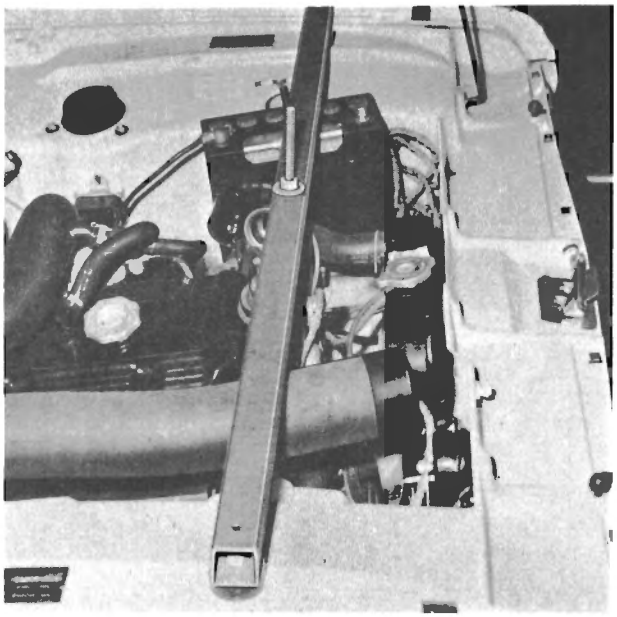


Fig. 67 4313

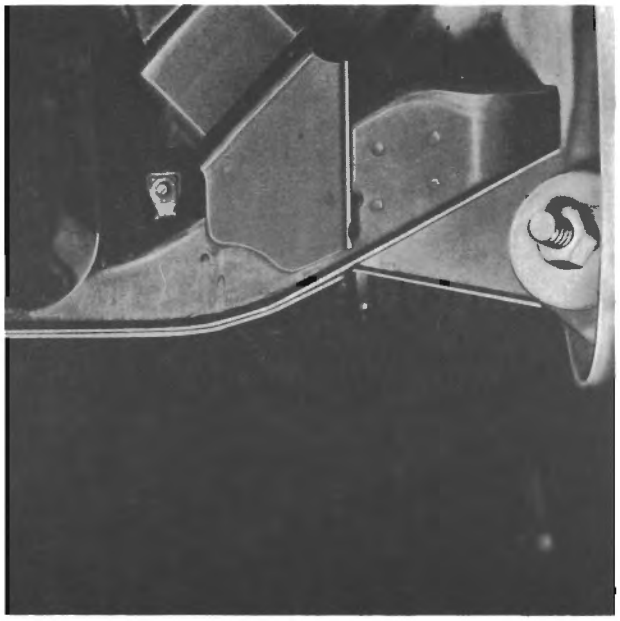


Fig. 69 4314

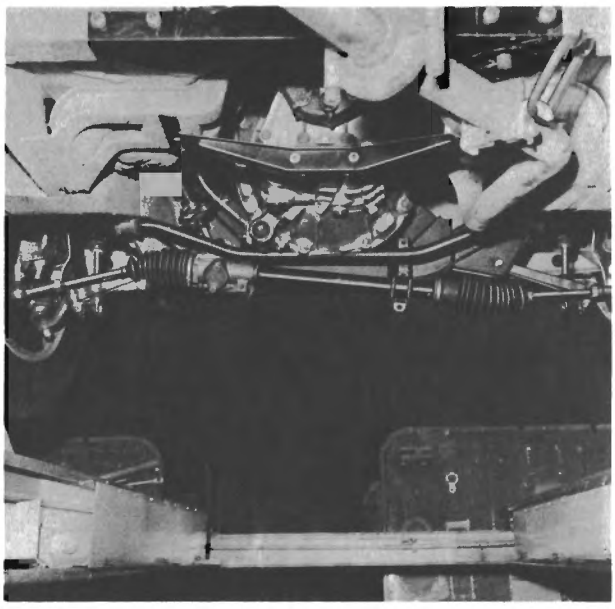
REMOVAL PROCEDURE

- Set front of vehicle on pins.
- Disconnect battery.
- Remove nuts used for engine mounting brackets on suspension cross-member (Fig. 66).
- Fit engine holding support in position, bearing against fender flanges (see section A0/III - Specific Tooling - Fig. 2) (Fig. 67). Remember to remove ignition distributor cap.
- Run a rope under the crankshaft pulley, and anchor it to the support.
- Raise the engine by tightening the hook nut (Fig. 68) until both engine mounting brackets clear the cross-member by a few millimetres (Fig. 69).
- Separate rack body from cross-member, but disconnect neither the knuckles, nor the flexible joint (Fig. 70).

Fig. 68 4239



Fig. 70 4368



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REMOVING AND RE-FITTING THE FRONT SUSPENSION CROSS-MEMBER



Fig. 71 4369

- Disconnect wheel-play tie-rods on suspension arms.
- Remove arms-to-cross-member linkage spindles.
- Extract suspension arms from cross-member, and place them to the side (Fig. 71).
- Loosen screws fastening the cross-member to side-members, then remove suspension cross-member (Fig. 72).

Fig. 72 4370

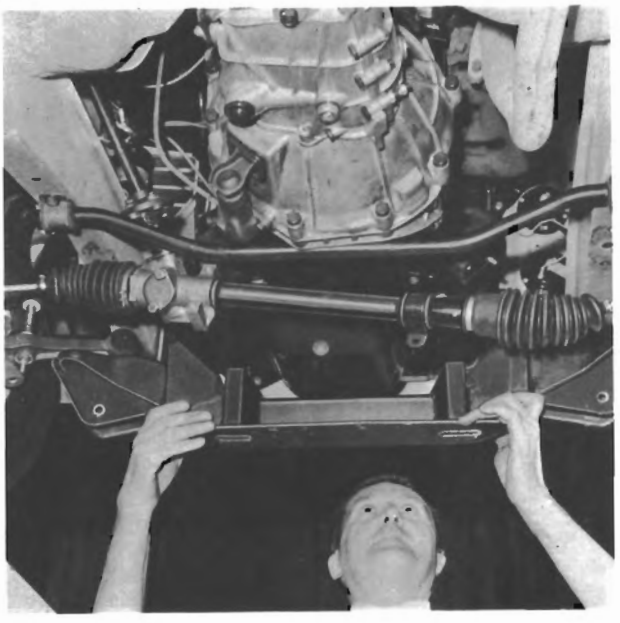




Fig. 73 4326

RE-FITTING OPERATIONS

- Place cross-member in position on side-members, but do not tighten the fastening screws.
- Set suspension arms in position on cross-member.
- Fit arm-to-cross-member linkage spindles in position (with screw head facing rear), but do not lock same.
- Tighten cross-member fastening screws to torque of 7 m da N.
- Re-connect wheel-play tie-rods to suspension arm.
- Fasten rack to cross-member.
- Allow engine to sit on suspension cross-member, by loosening hook nut.
- Remove engine holding support and rope.
- Re-fit ignition distributor cap.
- Connect battery.
- Set car on its wheels.
- Tighten arm-to-cross-member linkage spindles to torque of 4.5 m da N.
- Tighten nuts for both engine mounting brackets on cross-member to torque of 2.5 m da N (Fig. 73).

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G2 - REAR SUSPENSION

G2/I - General specifications

G2/II - Tightening torque values

G2/V - Removing and re-fitting a rear suspension spring

G2/V - Removing and re-fitting a rear suspension lower arm

G2/V - Removing and re-fitting a rear suspension upper arm

G2/V - Removing and re-fitting the rear axle and rear suspension assembly

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GENERAL SPECIFICATIONS (Fig. 1)

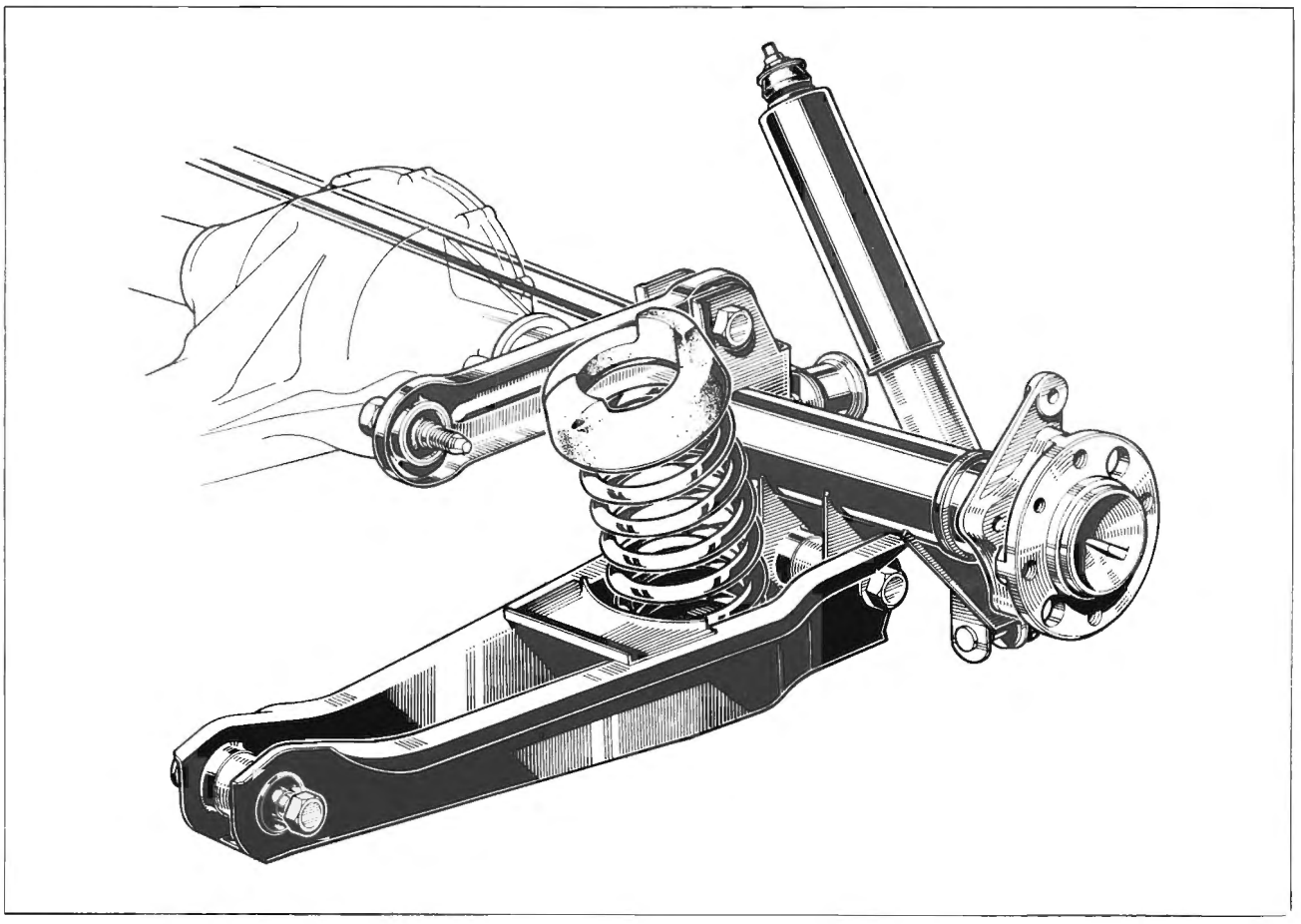
The rear suspension assembly is comprised of:

- a rigid axle (rear axle assembly) articulated to the underframe by means of 2 lower longitudinal arms and 2 upper link rods composing a deformable parallelogram. The articulations for the 2 longitudinal arms and 2 link rods are mounted on silentblocs, on the one hand on the rear axle and, on the other hand on the underframe;
- 2 coil springs fitted between the lower arms and the underframe;
- 2 differential double-action telescopic shock-absorbers fastened, in their upper section, to the underframe and, in their lower section, to the differential housing;
- 2 R.H. and L.H. thrust bearings coming into contact with the differential "trumpet" tubes when bumping takes place;
- a cross-bar fastened, on the one hand, to the rear axle, and, on the other hand, to a bracket made integral with the underframe, and limiting the transverse displacements of the body, and providing the required stability when cornering.

TIGHTENING TORQUE VALUES

	m da N
Shock-absorber, lower fastening joint	2.2
Shock-absorber, upper fastening joint	1.25
Lower arm linkage to body and rear axle ...	6.5
Upper arm linkage to body and rear axle ...	6.5
Cross-bar to rear axle	3.75
Cross-bar to underframe	6.5

Fig. 1 W 1316



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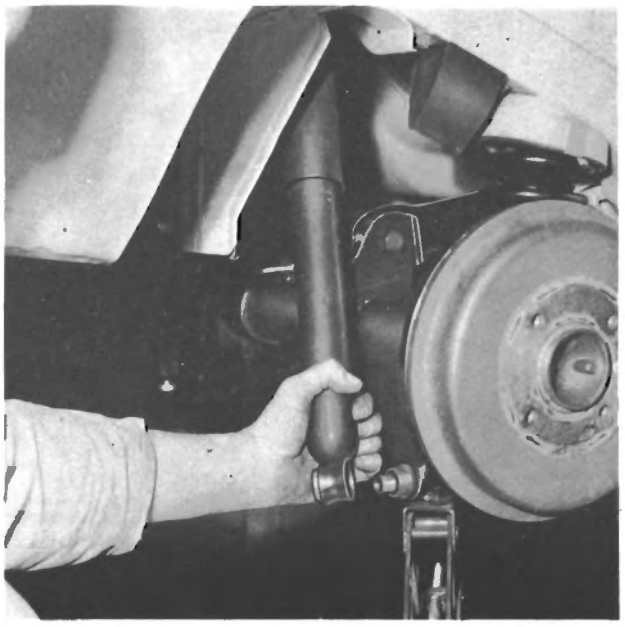
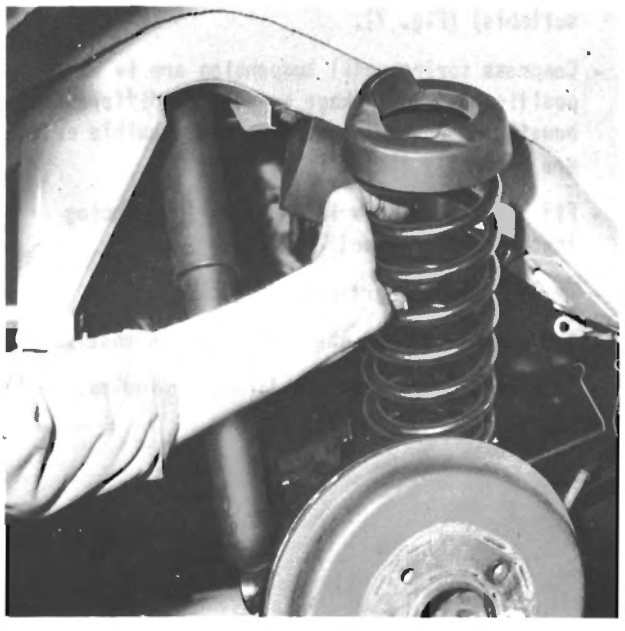


Fig. 1 3947

REMOVAL PROCEDURE

- Unlock rear wheel.
- Set rear of vehicle on pins; then remove rear wheel after marking its position.
- From body, disconnect hand brake cable retaining fasteners (on 160 model).
- Fit parallel articulated jack to bear against underside of differential housing, compress spring, then disconnect shock-absorber in its lower section (Fig. 1).
- Release spring, then remove it, together with its flexible crown (Fig. 2).

Fig. 2 3948



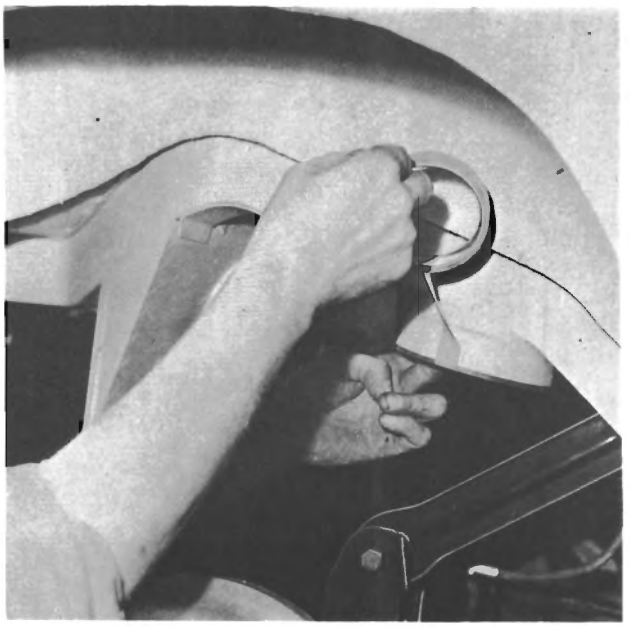


Fig. 3 3949

RE-FITTING OPERATIONS

- Use adhesive tape to hold spring flexible crown in position in upper cup on body (Fig. 3).
- Fit spring (either directional setting is suitable).
- With the parallel articulated jack bearing against underside of differential housing, compress spring, checking that it is fitted in correct position, as well as the flexible crown.
- Fasten shock-absorber to differential housing, then remove jack.
- Set car on its wheels. Tighten wheel.

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REMOVING AND RE-FITTING A REAR SUSPENSION LOWER ARM

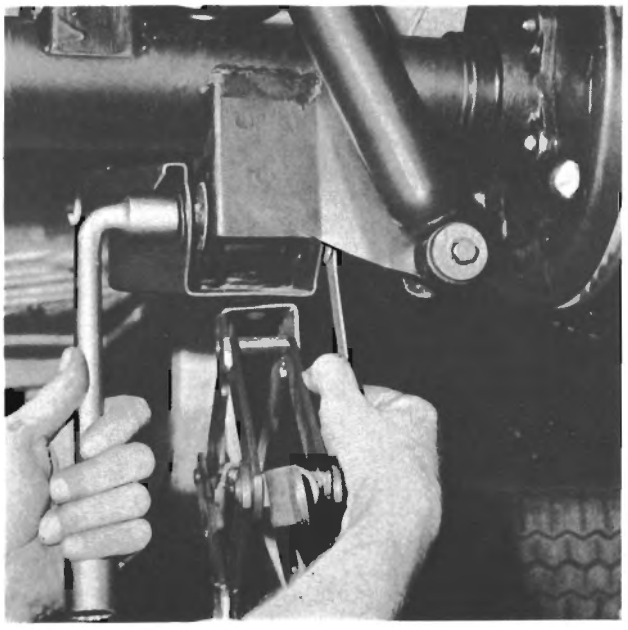


Fig. 4 3950

REMOVAL PROCEDURE

- Unlock rear wheel.
- Set rear of car on pins, then remove wheel after marking its position.
- Fit parallel articulated jack to bear against underside of lower arm end, then compress spring slightly.
- Unlock, then remove lower arm-to-differential housing linkage spindle (Fig. 4).
- Release spring, and remove it together with its flexible crown.

Fig. 5 3951

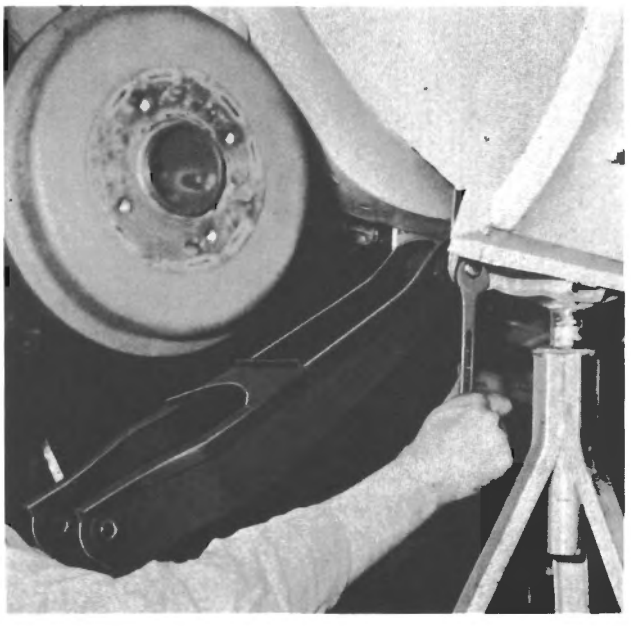




Fig. 6 3952

- Unlock, then remove lower arm-to-body linkage spindle (Fig. 5).
- Remove suspension arm (Fig. 6).

RE-FITTING OPERATIONS

- Fit arm-to-body linkage spindle in position (nut facing outwards), but do not lock it.
- Set parallel articulated jack to bear against underside of lower arm end.
- Use adhesive tape to hold spring flexible crown in position in upper cup on body.
- Fit spring (either directional setting is suitable) (Fig. 7).
- Compress spring until suspension arm is in position on its linkage support on differential housing. Check that spring and flexible crown are correctly fitted in position.
- Fit linkage spindle in position (nut facing inwards), but do not lock it.
- Remove parallel articulated jack.
- Set vehicle on its wheels. Tighten wheel.
- Lock both suspension arm linkage spindles.

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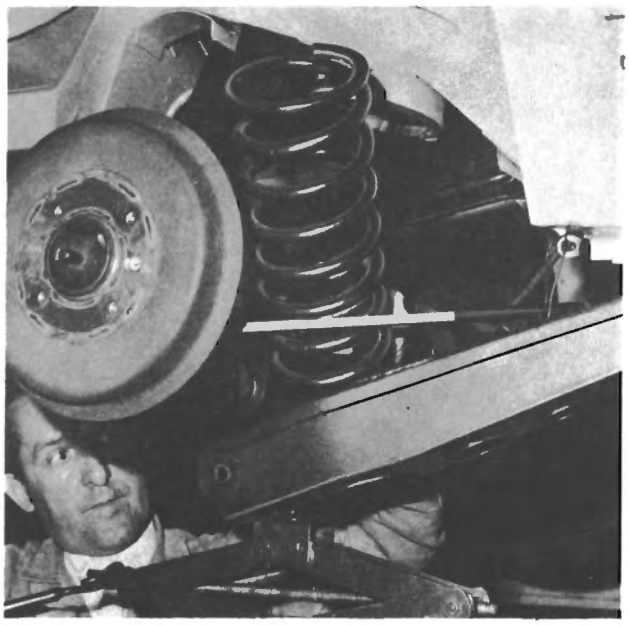


Fig. 7 3953

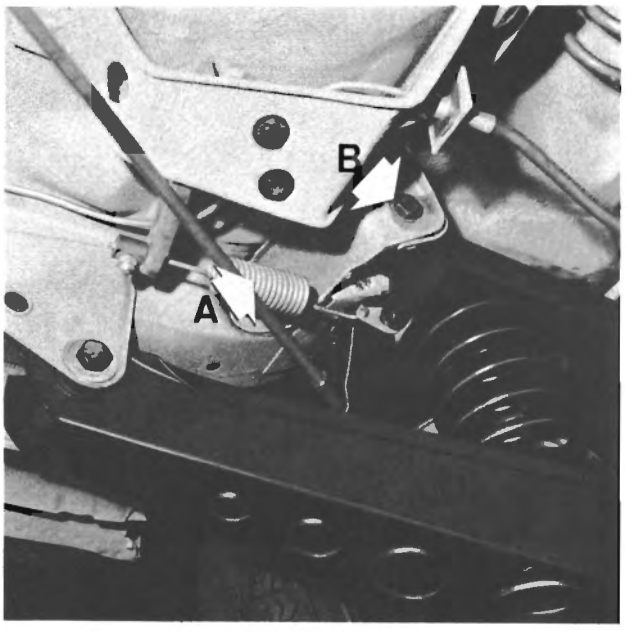


Fig. 8 3954

REMOVAL PROCEDURE

- Uncouple brake equalizer spring (A) (Fig. 8) from suspension arm (for R.H. rear arm only).
- Loosen, then remove linkage spindles (B) and (C) from suspension arm.
- Remove suspension arm.

RE-FITTING OPERATIONS

- Locate suspension arm in position (equalizer spring lever towards rear for R.H. rear arm).
- Fit both linkage spindles in position (nut towards inside for linkage on differential housing - nut towards outside for linkage on body).
- Lock both linkage spindles.
- Anchor the brake equalizer spring.

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Fig. 9 4371

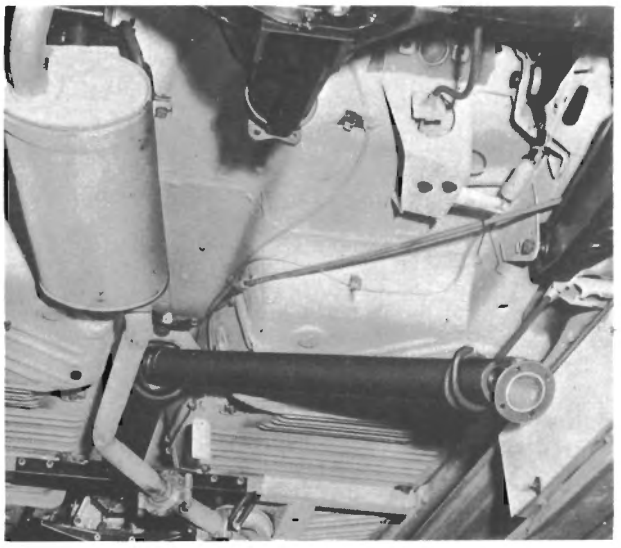


Fig. 11 4373

REMOVAL PROCEDURE

- Remove trim from luggage trunk floor.
- Remove shock absorber caps from luggage trunk floor (Fig. 9).
- Remove shock absorber upper fastening nuts. Recover flexible brackets and washers.
- Remove cross-bar from its bracket on body.
- Loosen spindles on lower and upper arm linkages with body, but do not remove spindles (Fig. 10).
- Uncouple propeller shaft from differential flange. Use a rubber extensible spring to hold it to one side (Fig. 11).
- Disconnect hand brake cable from its adjustment rod.
- Extract each sheath from both brackets on body.
- Set rear of vehicle on pins, sufficiently high to allow the wheels to clear the fenders when the operation is completed.
- Remove rear springs and flexible crowns (Fig.12).
- Place an hydraulic jack to bear against the differential housing.
- Disconnect brake tube from differential flexible pipe. Use a bleed screw cap to plug tube (Fig. 13).
- Remove fastener holding flexible pipe to body.
- Disconnect brake equalizer spring from suspension upper arms.

Fig. 10 4372

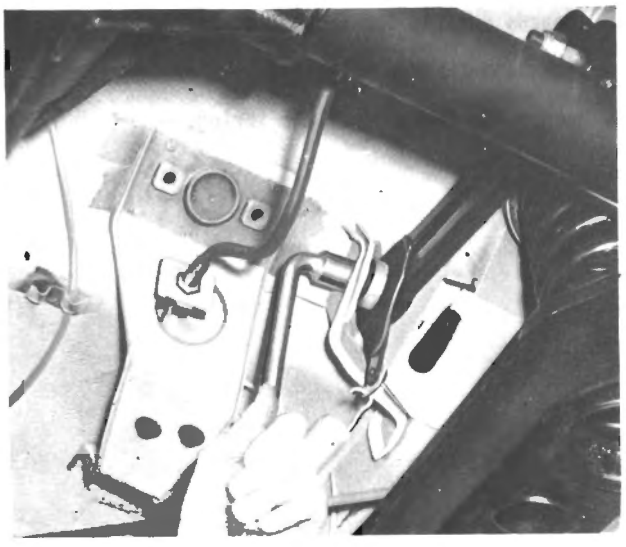


Fig. 12 4374



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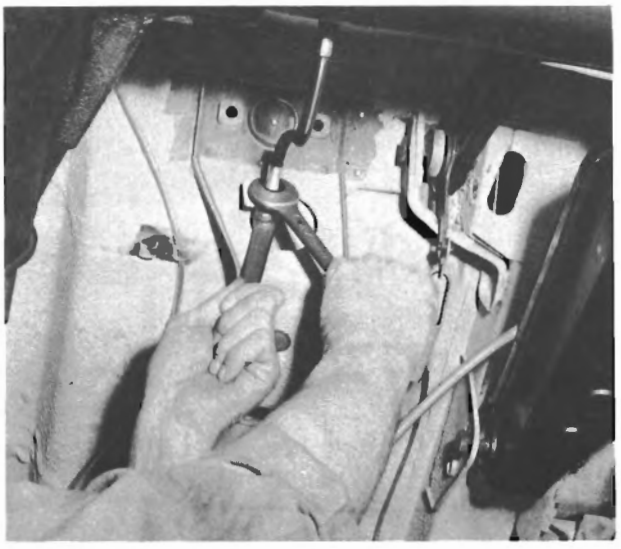


Fig. 13 4375

- Remove upper arm-to-body linkage spindles (Fig.14).
- Remove lower arm-to-body linkage spindles, holding assembly on hydraulic jack.
- Lower hydraulic jack, then allow rear suspension assembly to rest on lifting ramp (Fig. 15).
- Extract both exhaust silencer retaining rings, on bracket (Fig. 16), then remove screw fastening rear exhaust strap to body (Fig. 17); this will give free passage for the hand brake cable.
- Remove rear axle and rear suspension assembly, by rolling it over the rear wheels.

RE-FITTING OPERATIONS

- Place assembly under car, running the hand-brake cable over the exhaust (Fig. 18).
- Fasten exhaust strap.
- Fit both exhaust silencer holding rings.
- Place an hydraulic jack to bear against underside of differential housing.
- Raise assembly, with great care, then place upper suspension arms in position on body.
- Fit linkage spindles in position, but do not lock them (Fig. 19).
- Locate lower arms into place, then fit linkage spindles (nuts towards outside), but do not lock them.

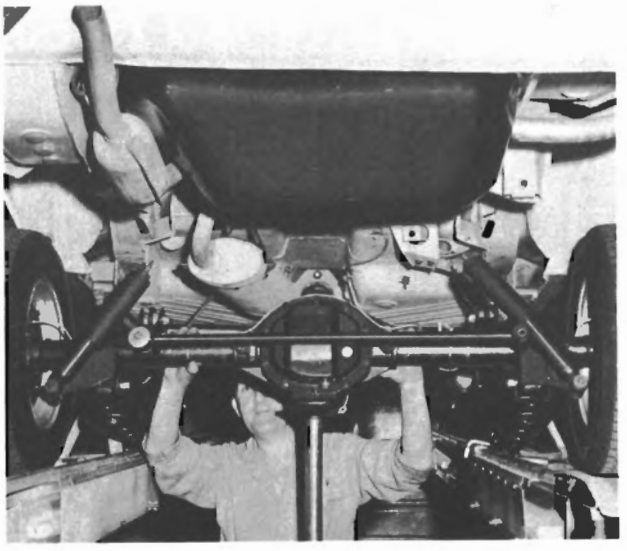


Fig. 15 4377

Fig. 14 4376

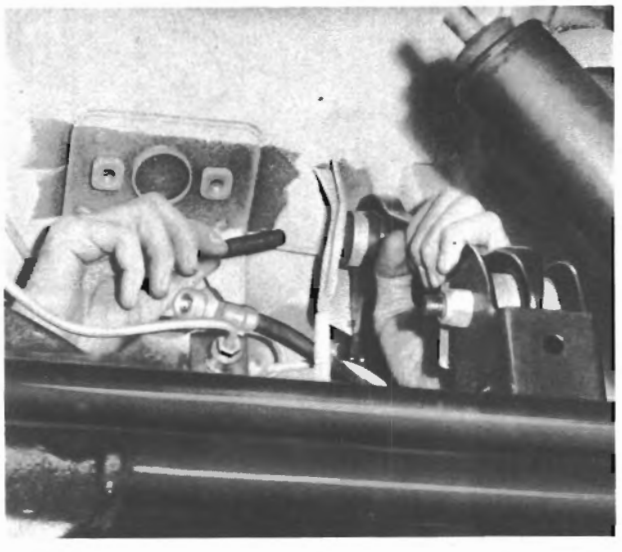
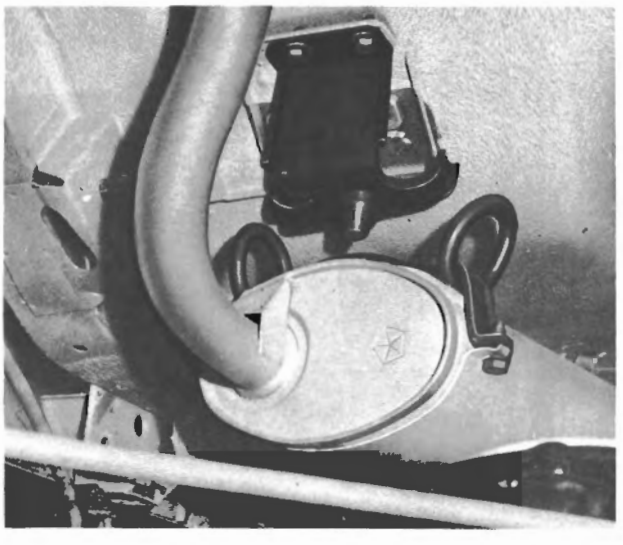


Fig 16 4378



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REMOVING AND RE-FITTING THE REAR AXLE AND REAR SUSPENSION ASSEMBLY

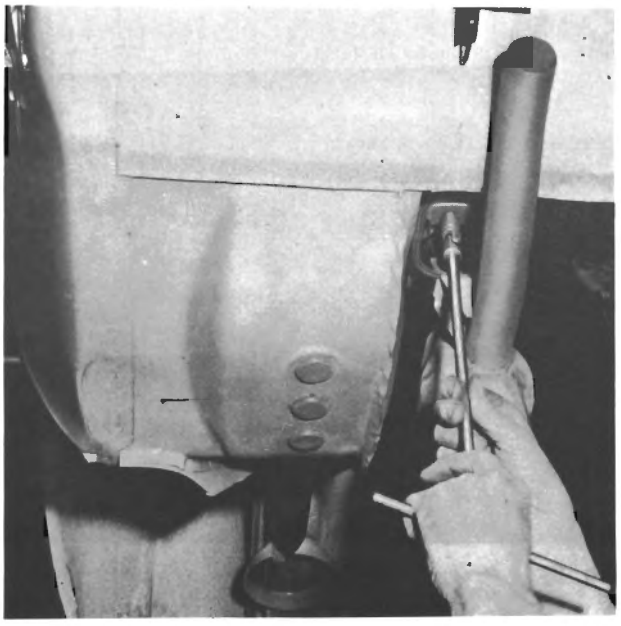


Fig. 17 4379

- Anchor equalizer spring to upper arm.
- Use adhesive tape to hold spring flexible crowns in position in upper cups on body (Fig. 20).
- Fit springs into place (either directional setting is suitable).
- Using the hydraulic jack, still in position under the differential housing, compress both springs, checking that they are correctly fitted into position, as well as the flexible crowns.
- Set car on its wheels.
- Fasten cross-bar to body (nut towards rear).



Fig. 19 4381

- Lock suspension arm-to-body linkage spindles.
- Fit fastener retaining flexible pipe to body.
- Connect brake tube to flexible pipe.
- Connect hand brake cable. Adjust it.
- Connect propeller shaft to differential flange. Replace sheet metal retainers.
- Fasten shock-absorbers to luggage trunk floor.
- Fit shock-absorber caps in position on luggage trunk floor.
- Re-fit luggage trunk floor trim.
- Bleed brakes.

Fig. 18 4380

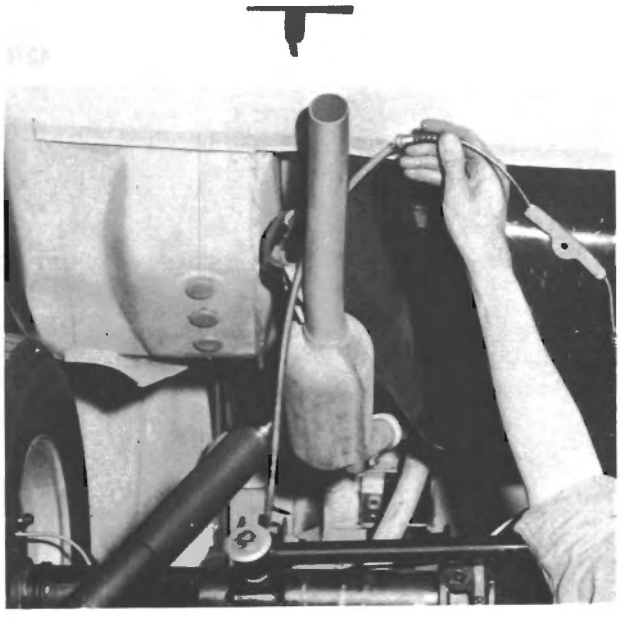
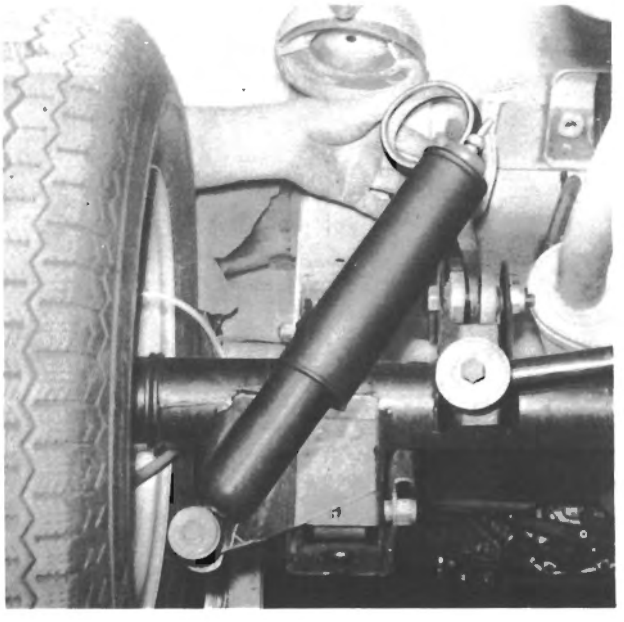


Fig. 20 4382



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H1 - STEERING

H1/I - General specifications

H1/II - Tightening torque values

H1/III - Specific tooling

H1/IV - Filling the rack system

H1/V - Removing and re-fitting the rack assembly with the flexible joint

H1/V - Dismantling and re-assembling the steering column

H1/V - Removing and re-fitting a flexible joint or a steering universal joint

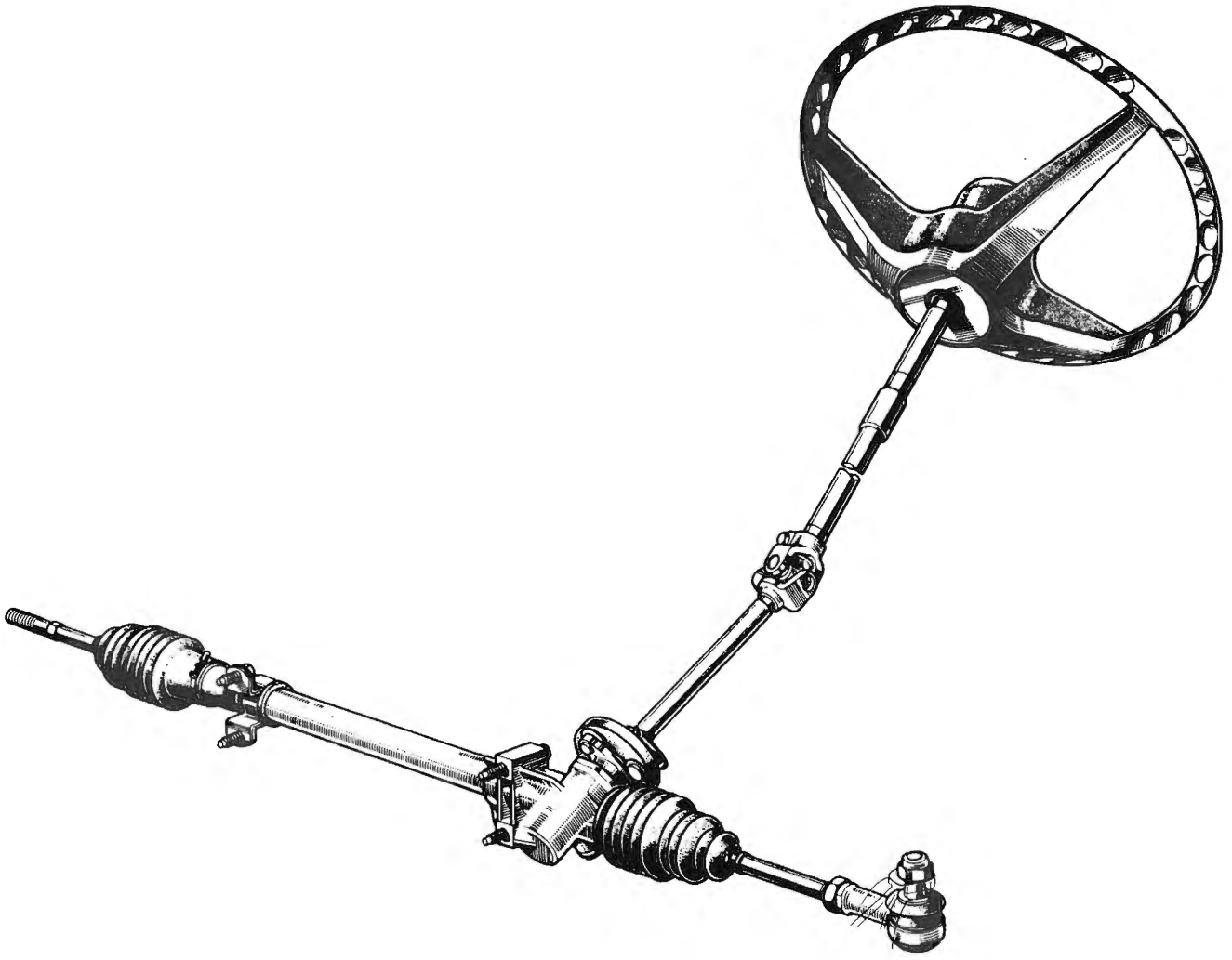
H1/V - Removing and re-fitting a steering rack bellows

H3 - ADJUSTMENT OF CAR BALANCE
ADJUSTMENT OF FRONT WHEEL SET GEOMETRY

H3/I - Checking the front wheel set geometry

H3/IV - Adjustment of toe-in

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W.1322

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SPECIFICATIONS

Rack steering assembly controlled by a cardan joint steering shaft:

- number of steering wheel turns from stop to stop: 4.25;
- turning radius:

  wheels: 5 m.

  overall: 5.50 m.
- steering rack oil capacity: 142 to 157 cm^3 of SAE 90 Hypoid oil.

STEERING RACK ASSEMBLY

The steering rack assembly is fastened in four points to two brackets welded to the suspension cross-member.

- at left, the steering rack is fastened directly to the bracket;
- at right, the steering rack is fastened to the bracket through two half-yokes.

Rubber bellows protect the steering rack output ends against the projection of mud.

The steering rack ends are linked with the king pins by means of knuckles.

The steering drag rods are mounted on knuckles inside the steering rack system. Toe-in adjustment is by screwing or unscrewing steering drag rods in the knuckle housings on the king pin side.

RACK PINION

The rack pinion is connected to the lower section of the steering shaft by means of a flexible joint.

STEERING SHAFT

The steering shaft, in two parts connected by means of a needle cardan joint, is housed in a sheet metal sleeve fastened in its upper section, by means of two screws, to the steering column support, and, in its lower section, by means of a shell fastened in four points to the toe-board.

STEERING WHEEL

Three-spoke steering wheel fastened to the steering shaft by means of a steering wheel nut.

TIGHTENING TORQUE VALUES

	m da N
Cardan fork end to upper steering shaft	1.5
Steering rack to front suspension cross-member	2.5
Flexible joint to rack pinion	2
Flexible joint to lower steering shaft	1
Steering knuckle to drag rod	12
Steering knuckle to king pin	7
Steering wheel to steering shaft	5

SPECIFIC TOOLING

Light projection instrument for adjustment of front wheel set geometry.

Knuckle extractor Ref. 15532 E.

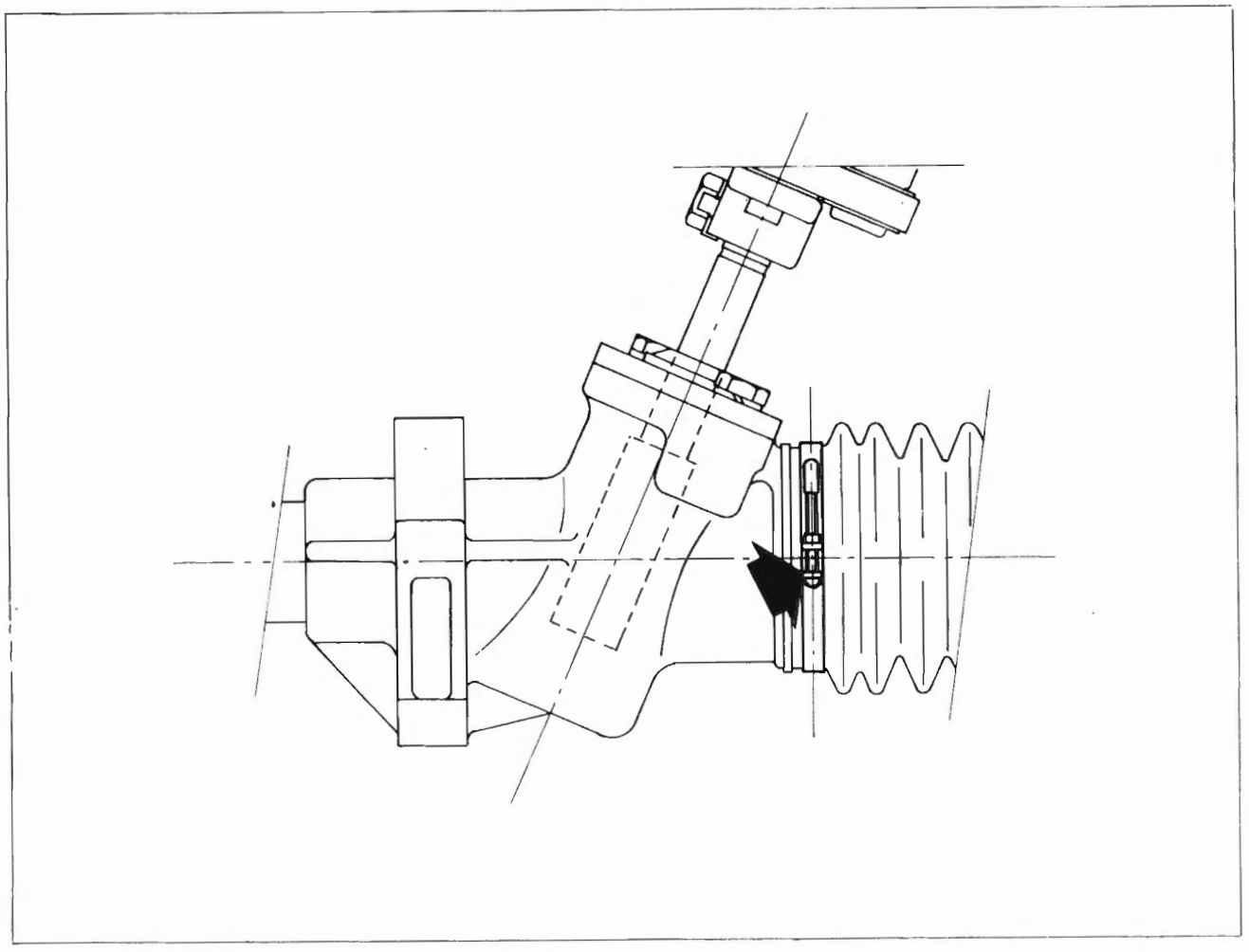
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FILLING THE STEERING RACK

- Remove steering rack.
- Clear fastening collar from one of the bellows, on steering rack body side.
- Fill rack body with a quantity of oil equivalent to 150 cm^3, through opening cleared by bellows.
- Re-fit steering rack bellows, and fasten it, with collars in correct directional setting (Fig. 1).
- Re-fit rack.

Fig. 1

G.017



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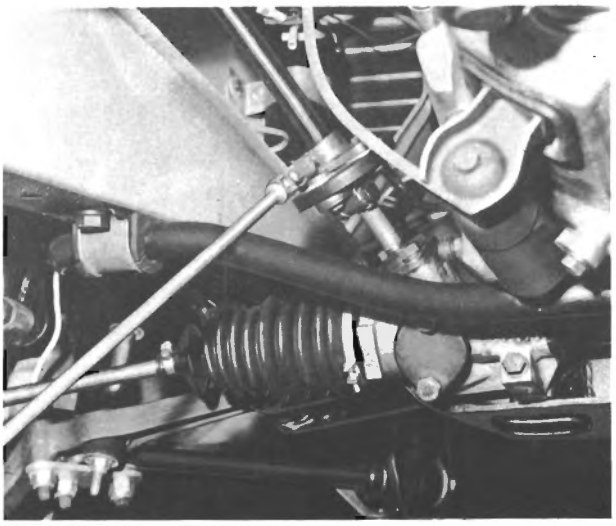


Fig. 1 3955

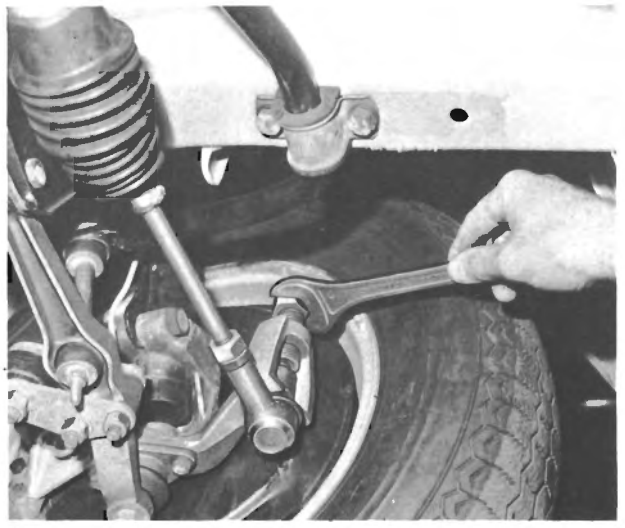


Fig. 2 3956

REMOVAL PROCEDURE

- Place car on a lifting ramp, and raise lifting ramp.
- Remove key fastening flexible joint to lower steering shaft (Fig. 1).
- Use extractor Ref. 15532 E (Fig. 2) to disconnect steering knuckles from king pins.
- Remove 4 screws fastening steering rack to its supporting brackets (recover both half-yokes on right hand side).
- Remove steering rack from under vehicle.
- Unlock and remove flexible joint fastening screw.
- Remove flexible joint.

RE-FITTING OPERATIONS

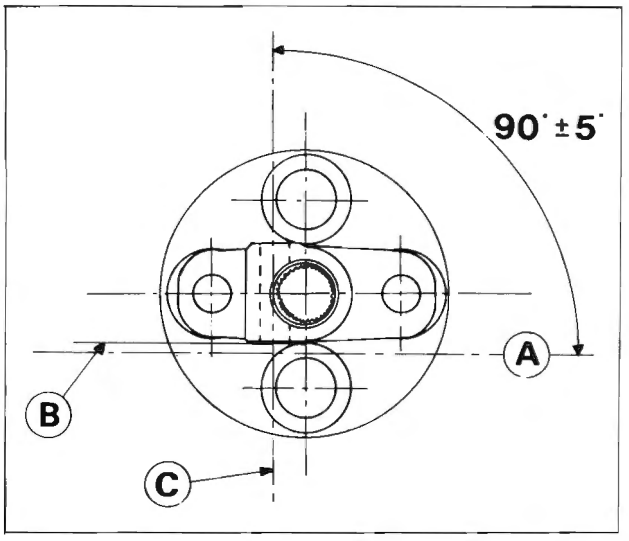
- Fit flexible joint to end of steering rack pinion.
- Use flexible joint to rotate pinion in order to bring rack against stop on one side.
- Turn it by 2 $\frac{1}{8}$ turns in the other direction to bring rack to central point.
- Remove flexible joint, taking care not to alter the position of the rack, and re-fit it in the position shown on Fig. 3, i.e. with the upper flexible joint cross-pin parallel with the steering rack centre-line.
- Place both half-yokes in position on steering rack.
- Place steering rack in position, tighten the 4 fastening screws.
- Connect steering knuckles.
- Fit key used to fasten steering flexible joint to lower half-shaft.
- Adjust toe-in.

  Note: after this operation, check play between steering wheel and combined switch.

  Play must be between 2 and 3.5 mm and, if necessary, adjust it, proceeding as follows:

  - loosen collar fastening steering column tube to lower shell;
  - loosen both screws fastening steering column tube to dash panel;
  - displace tube until correct play is achieved between steering wheel and combined switch;
  - lock screws fastening steering column tube to dash panel and lower shell.

A - Rack centre-line B - Machined face
Fig. 3 C - Key hole Centre-line G.018



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Fig. 4 3957

REMOVING THE STEERING WHEEL

- Remove steering wheel central cover (Fig. 4).
- Remove steering wheel central fastening nut (Fig. 5).
- Mark relative position of steering wheel and steering shaft.
- Remove steering wheel.

REMOVING THE COMBINED SWITCH

- Disconnect battery.
- Remove steering wheel.

Fig. 5 3958



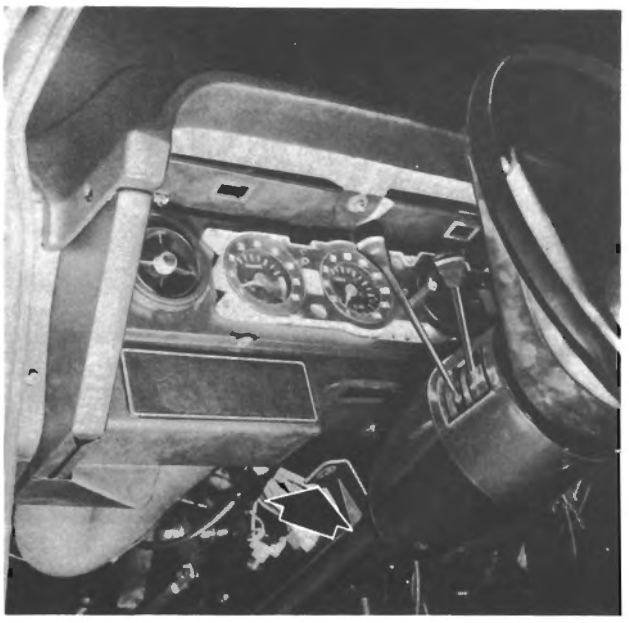
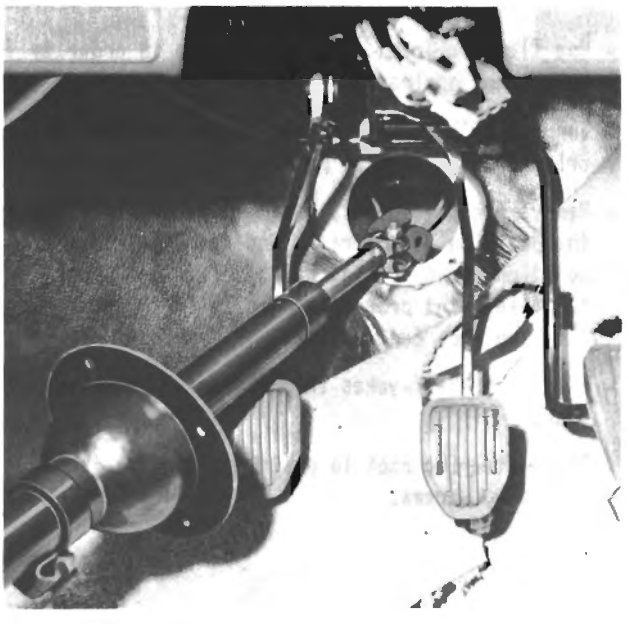


Fig. 6 3959

- Loosen both screws used to fasten steering column tube to dash panel, and lower the steering column (Fig. 6).
- Remove 4 screws fastening the combined switch shells.
- Remove shells.
- Remove combined switch 3 setscrews.
- Disconnect junction boxes used for electric connections with main harness.
- Clear combined switch harness from its retaining tab on steering column tube.
- Remove combined switch.

Fig. 7 3960



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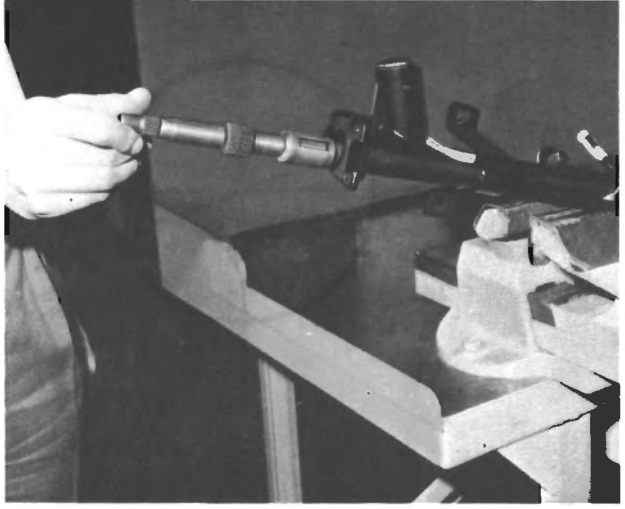


Fig. 8 3961

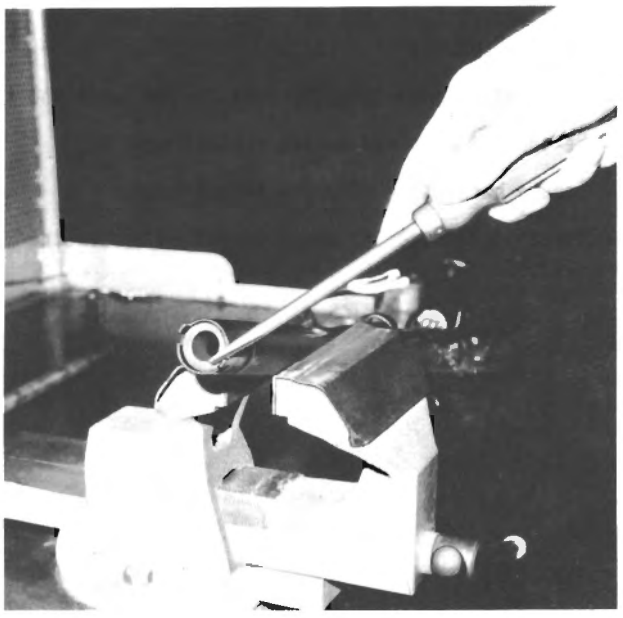


Fig. 10 3963

REMOVING THE TUBE

- Remove steering wheel.
- Remove combined switch.
- Loosen screw fastening collar to lower shell.
- Clear mat from toe board.
- Remove screws fastening lower shell to toe board.
- Slide lower shell up along tube (Fig. 7).
- Punch mark the relative position between cardan joint and upper steering shaft.

Fig. 9 3962



- Remove screw fastening cardan joint to upper steering shaft.
- Remove both screws fastening the steering column tube supporting bracket to the dash panel, and remove tube.

REMOVING THE UPPER STEERING SHAFT (from removed tube)

- Turn ignition key to ignition position.
- Extract upper flexible ring, using the steering shaft as an extractor (Fig. 8).
- Remove upper steering shaft.

REMOVING THE LOWER FLEXIBLE RING (From removed tube)

Unclinch lower flexible ring (two tabs folded down to an angle of approximately 30°) (Fig. 9).

- Extract lower flexible ring, using the steering shaft as an extractor (Fig. 10).

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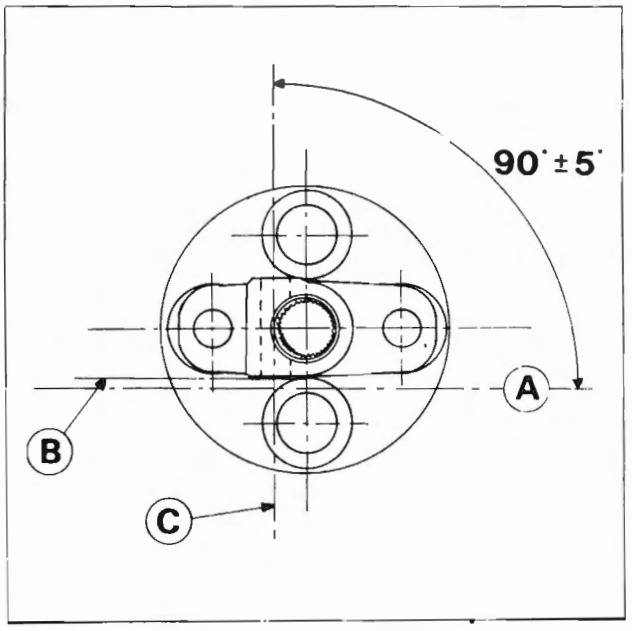


Fig. 11 A - Rack centre-line
B - Machined face
C - Key hole centre-line
G.018

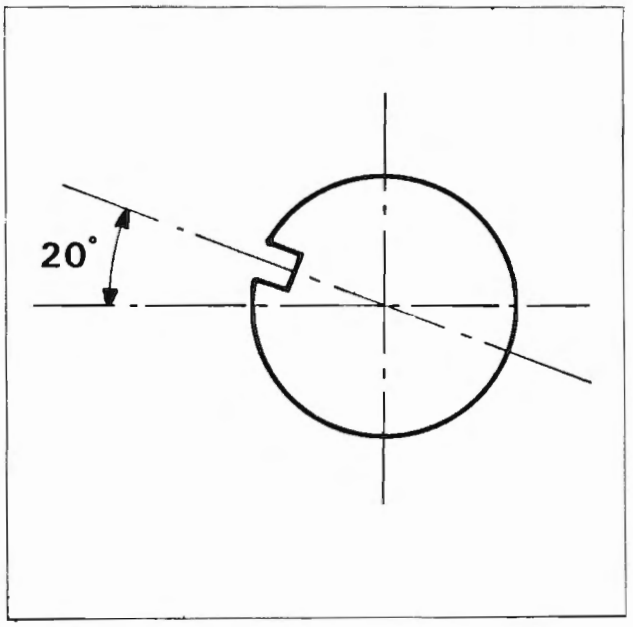


Fig. 12 G.019

- Fit lower flexible ring in position, and fold both tabs down.
- Fit upper steering shaft in position in steering column tube.
- Fit upper flexible ring.
- Locate upper steering shaft in position in cardan joint, following the reference marks made at the removal stage.
- Tighten fastening nut.

  Note: if the upper steering shaft is being replaced, the reference marks made at the removal stage cannot be taken into consideration; it will then be necessary to:

  - set rack in central position, i.e. to set the flexible joint upper cross-pin parallel with the steering rack centre-line (Fig. 11);
  - set upper steering shaft in such a position that the notch used for the automatic return of the traffic indicator control is inclined at an angle of 20^0 to the horizontal (Fig. 12), as seen from driver's position.
- Fasten shell to toe board.
- Fit combined switch and its shells in position; fasten same.
- Fit and fasten steering wheel; fit steering wheel central cover.
- Locate screws fastening the steering column tube to the dash panel, in position.
- Adjust play between steering column and combined switch (from 2 to 3.5 mm); to achieve this, displace tube longitudinally.
- Lock screws fastening the steering column tube to the dash panel.
- Lock collar fastening the tube to the lower shell.
- Re-connect combined switch connections.
- Secure harness to steering column tube.
- Re-connect battery; check operation of combined switch.

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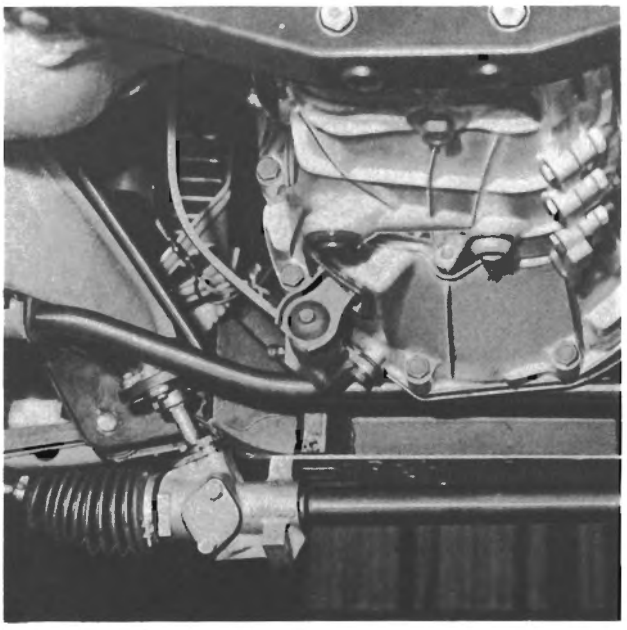


Fig. 13 3964

FLEXIBLE JOINT

REMOVAL PROCEDURE

- Remove key fastening flexible joint to lower steering shaft.
- Remove 4 screws fastening steering rack to its support brackets, and lower the rack in order to separate the flexible joint from the lower steering shaft (Fig. 13).
- Unlock and remove the screw fastening the flexible joint to the steering rack pinion.
- Mark the position of the flexible joint in relation to the steering rack, and remove it.

RE-FITTING OPERATIONS

- Re-fit new flexible joint to pinion in the same position as the discarded worn flexible joint.
- Re-fit the screw fastening the flexible joint to the pinion.
- Re-fasten steering rack to its support brackets.
- Re-fit key fastening flexible joint to lower steering shaft.
- Check play between steering wheel and combined switch (from 2 to 3.5 mm).

STEERING UNIVERSAL JOINT

REMOVAL PROCEDURE

- Remove key fastening flexible joint to lower steering shaft.
- Remove 4 screws fastening steering rack to its support brackets, and lower the rack in order to separate the flexible joint from the lower steering shaft (Fig. 13).
- Remove steering wheel central cover.
- Remove steering wheel.
- Pull on lower steering shaft to gain access to the universal joint fastening to the upper steering shaft.
- Mark position of universal joint in relation to upper steering shaft.
- Remove universal joint.

RE-FITTING OPERATIONS

- Place new universal joint on upper steering shaft in position previously occupied by the worn universal joint.
- Re-fit nut fastening universal joint to upper steering shaft.
- Place lower steering shaft in position in flexible joint, and re-fit steering rack on its support brackets.
- Re-fit key fastening the flexible joint to the lower steering shaft.
- Re-fit steering wheel, and turn it so that the trafficator control stud locates itself in the upper steering shaft notch.
- Check operation of traffic indicator automatic return control.
- Re-fit steering wheel central cover.
- Check play between steering wheel and combined switch (from 2 to 3.5 mm).

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REMOVING AND RE-FITTING A STEERING RACK BELLOWS

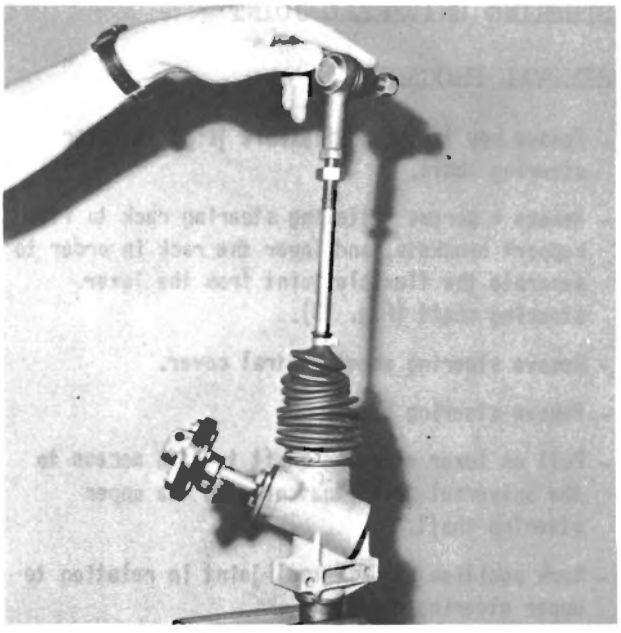


Fig. 14 3965

- Remove steering rack.
- Remove knuckle, and lock-nut on king pin side (Fig. 14).
- Remove worn bellows (Fig. 15).
- Drain steering rack.
- Wrap adhesive tape around threaded end of steering drag rod, to avoid damaging new bellows when fitting same in position.

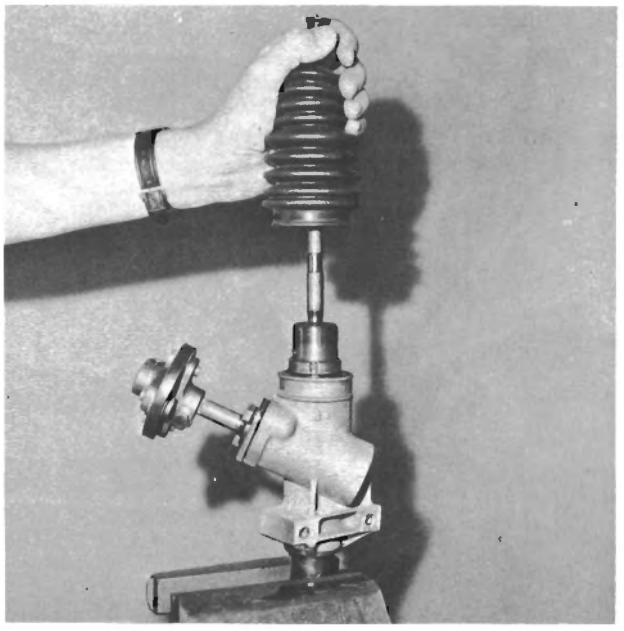
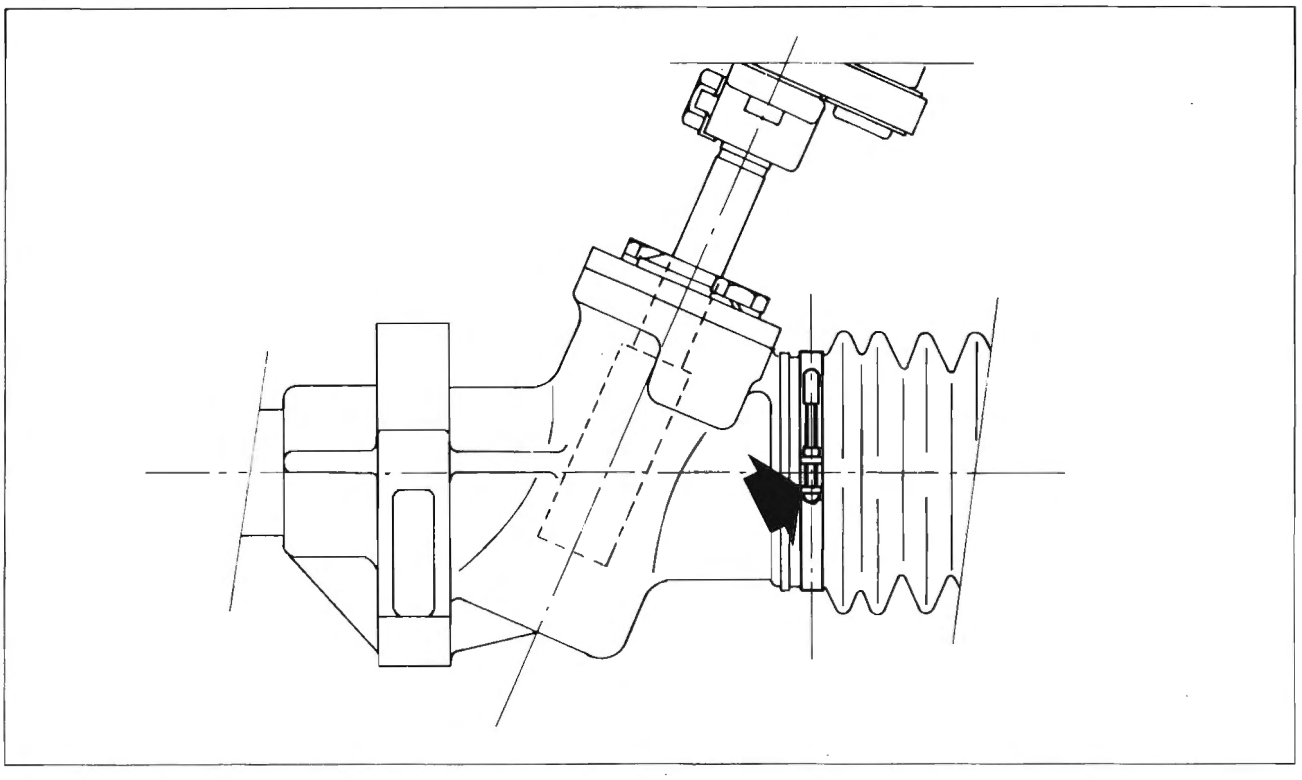


Fig. 15 3966

- Fill steering rack body, which will be placed vertically, with a quantity of oil equivalent to 150 cm^3, through the opening cleared by the bellows.
- Fit new bellows in position, and fasten it, fitting the collars (Fig. 16) in the correct directional setting.
- Re-fit knuckle and lock-nut.
- Re-fit steering rack.
- Adjust toe-in.

Fig. 16 G.017



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The toe-in only is adjustable.

Toe-in adjustment (unloaded)

- 2 mm ± 2

Wheel set adjustment (unloaded)

- wheel play: $2^{0}\ 30 \pm 0^{0}\ 30'$
- wheel camber: $+ 1^{0}\ 30' \pm 0^{0}\ 30'$

TOE-IN ADJUSTMENT

Prior to any adjustment:

- make sure front wheel set linkage systems operate without strain or play;
- inflate tyres to required pressure;
- set car on platforms arranged on flat area;
- investigate wheel warping, proceeding as follows:
  - . set projectors to wheel centre-line;
  - . raise car wheels;
  - . place a scale ahead of wheel centre-line, at the appropriate distance;
  - . bring light beam indicator to coincide with a figure reference on the scale;
  - . turn wheel slowly, keeping the projector in the reading position on the scale;
  - . the displacement of the indicator shows the magnitude of the warping effect, each division of the scale representing 1 mm;
  - . when the indicator has reached the limit of its displacement towards the outside of the car, make a chalk mark on the tyre at the outer end of the light beam; this mark represents the high point of the warping effect;
  - . if the warping effect exceeds 1.5 mm, replace rim;
  - . turn wheel so that the chalk mark is on a vertical line running through the wheel centre-line;
  - . allow wheel to rest on platform;
  - . remove projector stands, and reset them vertically;
- align front wheel set, i.e. set upper flexible joint cross-pin parallel with steering rack centre-line.
- toe-in is adjusted by altering the length of steering drag rods.
- To modify toe-in, proceed as follows:
  - . loosen steering rack bellows retaining collars on king pin side;
  - . use a 22 mm spanner to hold knuckle, and loosen lock-nut used to lock knuckle to drag link;
  - . use a multiple-hold grip to adjust toe-in, acting upon R.H. and L.H. drag links;
  - . after adjustment is completed, re-tighten the lock-nuts, taking care not to alter the adjustment;
  - . re-tighten the steering rack bellows retaining collars.

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GENERAL

The braking system is comprised of:

- **A main system as described hereunder**

  Control of single circuit master-cylinder (or dual circuit for vehicles exported to certain countries) by means of suspended pedal and servo-brake system (Master-vac).

  Braking power transferred hydraulically to the 4 wheels.

  Determination of hydraulic pressure or braking power applied to rear wheels, by means of a brake equalizer made dependent on the load carried by the rear suspension.

  . **For vehicles with 1600 c.c. engine**
  Mixed system. Discs at front. Drums at rear.

  . **For vehicles with 1800 c.c. engine**
  4 disc brakes.

- **An emergency brake or hand-brake** with mechanical control (lever and cables) acting on both rear wheels.

TIGHTENING TORQUE VALUES

	m da N
Front brake calliper to king pin	7.5
Splash shield to king pin	.75
Rear brake calliper flange to banjo	7
Brake disc to front wheel hub	5.5
Drum or disc to rear wheel shaft	1.5
Master-cylinder to servo-brake	1
Servo-brake to pedal set	1
Pedal set to body	1
3-way connection to body	1.75
Piping to connections and flexible pipes	1.25
Flexible pipe to brakes	2
Leak indicator to fender flange	1.75
Hand-brake rod to equalizer	1
Hand-brake to body	2.25
Holding flange for wheel shaft bearing and rear brake anchor plate	5

SPECIFIC TOOLING

Pliers to push Teves calliper pistons	20837 R
Gauge for directional setting of Teves calliper pistons	21640 C
Pliers for directional setting of Teves calliper pistons	20839 T
Hub cap extractor	4025 K
Mandrel for hub bearing fitted tools	15522 C
Mandrel for hub bearing extractors	7306 D
Large hub bearing extractor	21621 M
Small hub bearing extractor	21622 N
Fitting tool for large hub bearing and lip seal	21623 P
Small hub bearing fitting tool	21624 Q
Pliers for drum brakes	7331 V
Pliers to push D.B.A. calliper pistons	21645 V
Tool for spreading D.B.A. calliper support	21641 Z

Facom U 41 inertia extractor.

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J2 - FRONT BRAKES (Discs)

J2/I - General specifications and description
J2/V - Changing the front brake shoes
J2/V - Removing and re-fitting a front brake calliper
J2/V - Removing and re-fitting a front brake disc and hub
J2/V - Changing the front hub bearings
J2/V - Changing a front disc splash-shield
J2/VII - Reconditioning a brake calliper

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SPECIFICATIONS

Disc brakes: Teves.

Type: Fixed calliper with 2 coaxial pistons.

Dia. of pistons: 48 mm.

Disc

Material: Cast iron

Outer diameter: 249 mm.

Thickness: 12.75 mm.

Minimum acceptable thickness after grinding: 11.75 mm.

Brake shoe

Lining grade: Ferodo 556.

Total thickness of lining + metal backing: 15 mm.

Thickness of lining alone: 10 mm.

Minimum acceptable thickness before replacement: 7 mm, inclusive of backing.

Effective friction surface: 38 cm^2 per lining.

Front hub

Material: cast iron.

Hub grease capacity (Shell Alvania EP 2): 39 to 46 g.

DESCRIPTION (Fig. 1)

The brake assembly is comprised of:

- a disc made integral with the wheel hub;
- a sheet metal splash shield fastened to the stub axle, and protecting the face of the disc opposed to the wheel against projections whilst providing ventilation;
- a calliper fastened to the stub axle.

The wheel hub is fitted on 2 taper roller bearings, being retained laterally by a skirted nut.

The calliper is comprised of two half-callipers, each being comprised of:

- a moving piston sliding in the bore;
- a ring seal fitted in a groove in the bore;
- a dust cover held by a metal snap ring;
- a brake shoe, with its lining moulded on a metal backing.

Both half-callipers are made integral by means of 4 screws and nuts. Both bores are connected by means of 2 internal channels.

Sealing for the joint face between half-callipers is by means of two 'O' rings fitted where both internal channels are connected.

Both shoes are held in position by means of two assembly rods held on the calliper by means of two extensible retainers.

A cross-shaped spring controls the return of the shoes, and prevents the occurrence of any noise or vibrations when they are not in use.

On the other hand, the width of this spring is such that the risks of damage to the disc, through contact with the brake shoe backing, are practically eliminated, for the backing plates come into contact with the spring when the linings have reached a minimum thickness, which corresponds to the maximum acceptable wear.

The driver becomes aware of this maximum wear through a substantial increase of the pressure required on the pedal and a simultaneous reduction in braking efficiency.

OPERATION

When the brake pedal is being pressed, the hydraulic pressure generated in the system is such that the pistons in coaxial alignment apply, through the brake shoes, an equal and opposed pressure against the disc, this pressure being proportional with the pressure applied on the brake pedal.

When pressure on the brake pedal is released, the resultant pressure is cancelled, and each ring seal, which had been modified in shape by the displacement of the pistons during braking, returns to its initial shape, bringing each piston back, over approximately .15 mm. Under the effect of the cross-shaped spring, the brake shoes are cleared from the disc to the same extent, which corresponds to the functional clearance between disc and shoes.

This system also constitutes an automatic take-up system, which compensates for lining wear.

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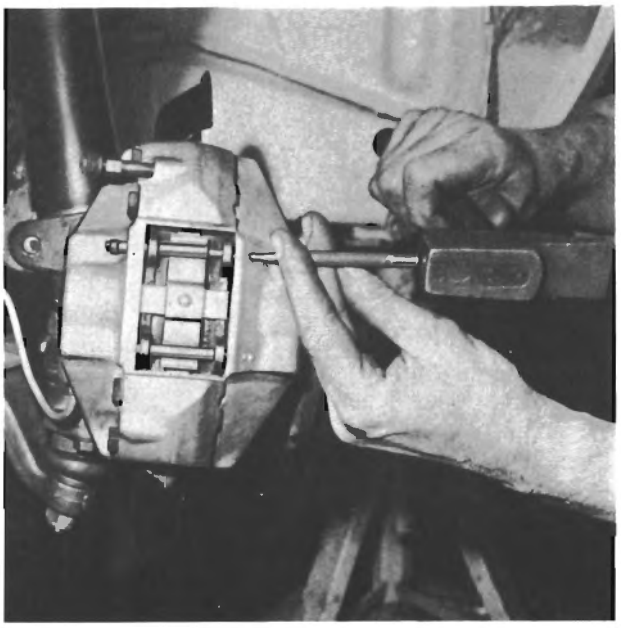


Fig. 1 4246

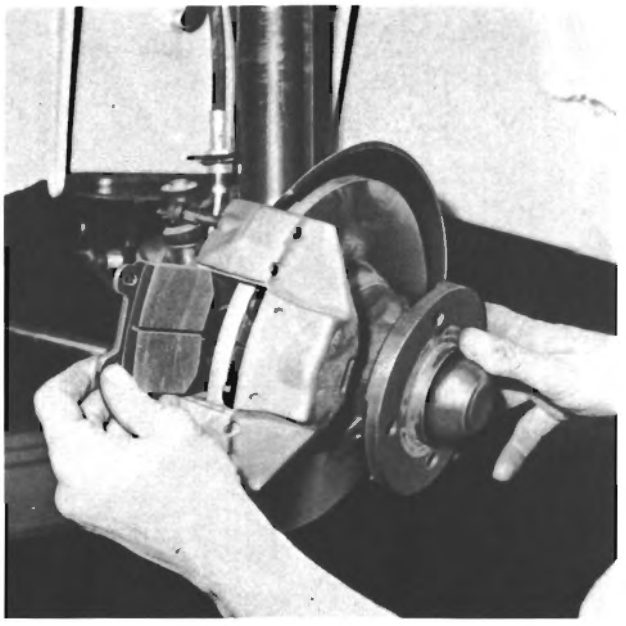


Fig. 2 4247

Changing brake shoes is imperative when the total thickness of the backing + lining assembly is reduced to 7 mm at its thinnest section.

For this replacement, use the "lining reconditioning kit" available from the Spare Part Department.

This kit contains:

. 4 brake shoes,

. 2 cross-shaped springs.

Operational procedure

- Unlock both front wheels.
- Set front of vehicle on pins, then remove wheels after marking their position.

For each side:

- Remove sheet metal splash shield from calliper.
- Extract both brake shoe retaining pins, using a pin-drift (Fig. 1), then extract cross-shaped spring.
- Remove brake shoes (Fig. 2).

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CHANGING THE FRONT BRAKE SHOES

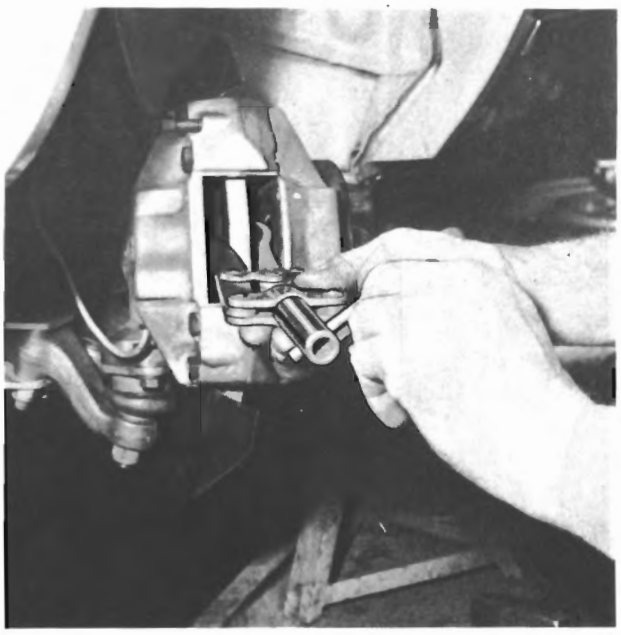


Fig. 3 4248

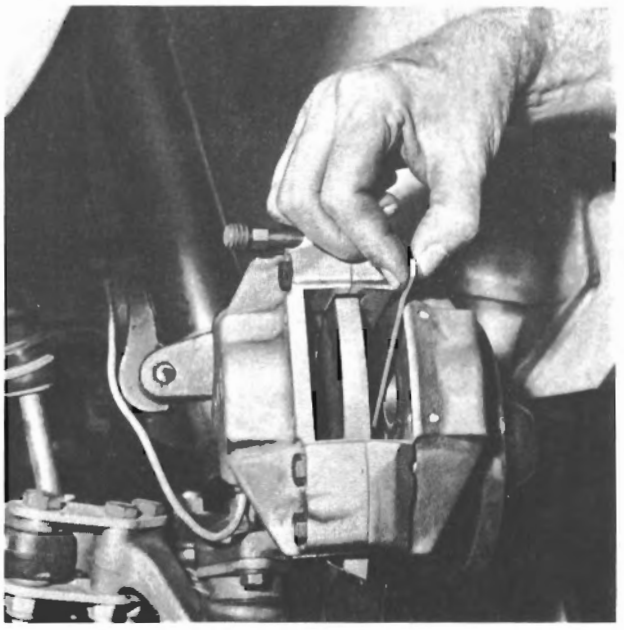


Fig. 4 4249

- Use tool Ref. 20837 R (Fig. 3) to push each piston to the bottom of its bore.
- Use template Ref. 21640 C (Fig. 4) to check directional setting of each piston.
- If necessary, use pliers Ref. 20839 T to set pistons in correct directional position.
- Fit new brake shoes in position.
- Insert brake shoe upper retaining pin, then place one end of the cross-shaped spring in position under this pin.
- Press on other end of cross-shaped spring, then insert lower pin.
- Fit calliper sheet metal splash shield.
- Set vehicle on its wheels. Tighten wheels.
- Press several times on brake pedal to bring shoes closer to disc until play is reduced to functional clearance value.

Important notes: for the replacement of brake shoes, operators, if justified by the degree of wear, are advised to replace all brake shoe assemblies.

In any case, if only front wheel or rear wheel brake shoes are being replaced, it is imperative that the brake shoes of a complete axle should be replaced, and this always with linings of the same type.

On the other hand, new brake shoes reach their full efficiency only after running-in (between 150 and 250 km). It will be found useless to brake violently and repeatedly to reduce this running-in period; on the contrary, this process is likely to impair efficiency as a result of abnormal overheating.

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Fig. 5 4059

REMOVAL PROCEDURE

- From inside, use a taper punch or a tapering piece of wood (Fig. 5) to plug lower hole of equalizer tank.
- Unlock wheel.
- Set front of vehicle on pins, then remove wheels after marking their position.
- Remove brake shoes.
- Disconnect brake tube from flexible pipe (Fig. 6), then from calliper.
- Loosen and remove screws fastening calliper to stub axle.

Fig. 6 4250

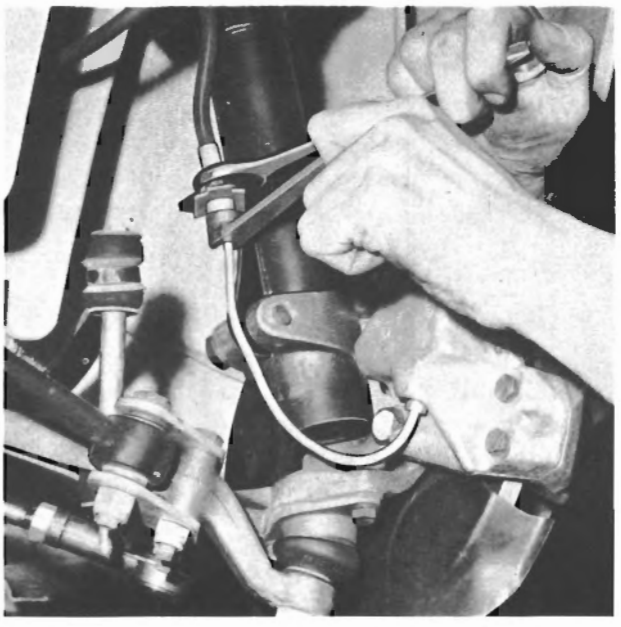




Fig. 7 4251

- Remove calliper (Fig. 7).

RE-FITTING OPERATIONS

- Fasten calliper to stub axle. Replace sheet metal retainer. Tightening torque 7,5 m da N (Fig. 8).
- Re-connect brake tube to flexible pipe and calliper.
- Fit brake shoes.
- Bleed brakes.
- Press several times on brake pedal to bring brake shoes closer to disc until play is reduced to functional clearance value.
- Set car on its wheels. Tighten wheel.

Fig. 8 4252



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REMOVING AND RE-FITTING A FRONT DISC AND HUB

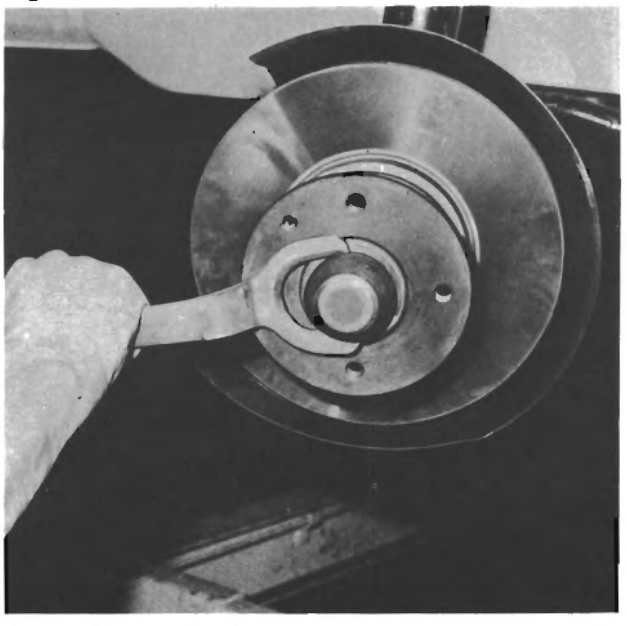


Fig. 9 4261

REMOVAL PROCEDURE

- From inside, use a taper punch or a tapering piece of wood (see Fig. 5) to plug lower hole of equalizer tank.
- Unlock front wheel.
- Set front of vehicle on pins, then remove wheel after marking its position.
- Disconnect brake tube from flexible pipe (see Fig 6).
- Unlock and loosen screws fastening calliper to stub axle.
- Remove brake calliper, but do not disconnect its tube (Fig. 9).

Fig. 10 4262



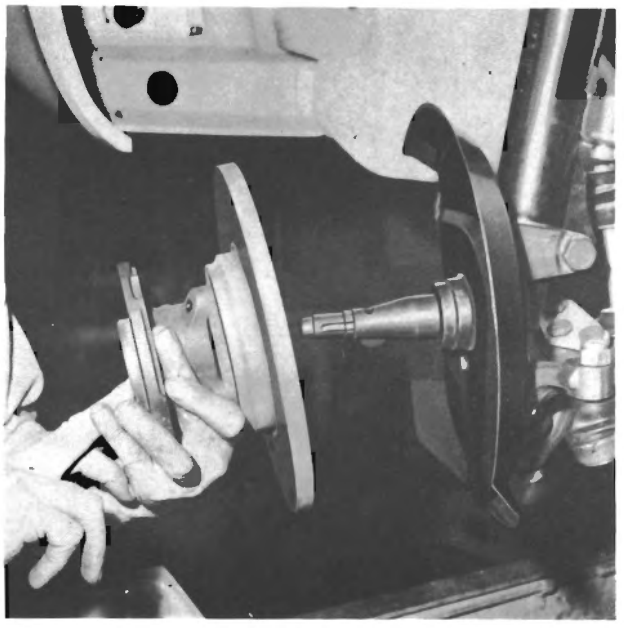


Fig. 11 4263

- Remove hub cap, using tool Ref. 4025 K (Fig. 10).
- Remove hub nut, then remove hub and disc as assembled (Fig. 11). Recover small bearing washer.
- Remove hub and disc assembly screws (Fig. 12).
- Separate hub from disc (Fig. 13).

CHECKING THE DISC

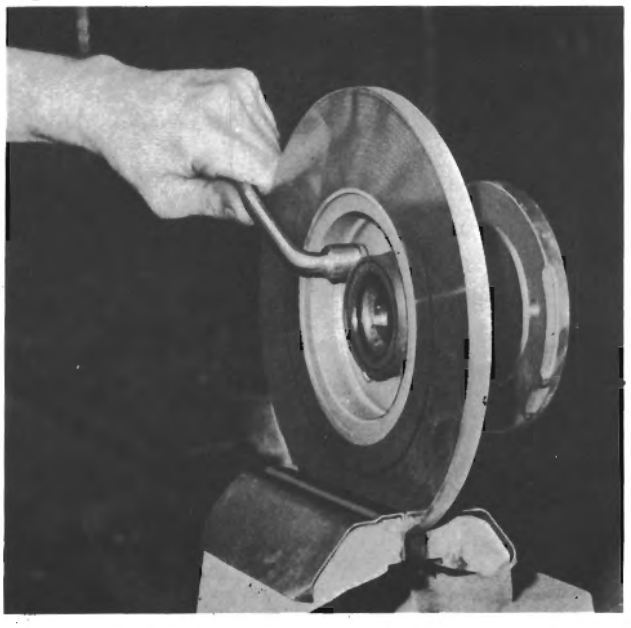
Criteria for acceptance of a disc

. Maximum warp for each friction face:

1 mm on grinding machine,

2 mm on car.

Fig. 12 4264



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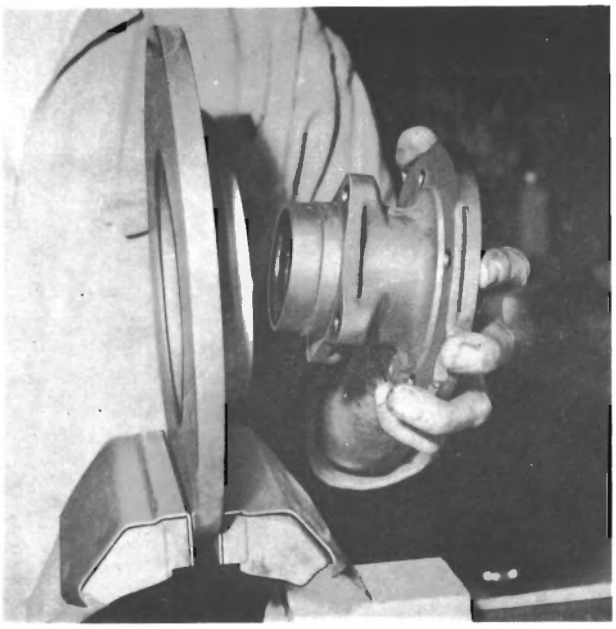


Fig. 13 4265

. Radial variation of thickness between friction faces:

.05 maximum.

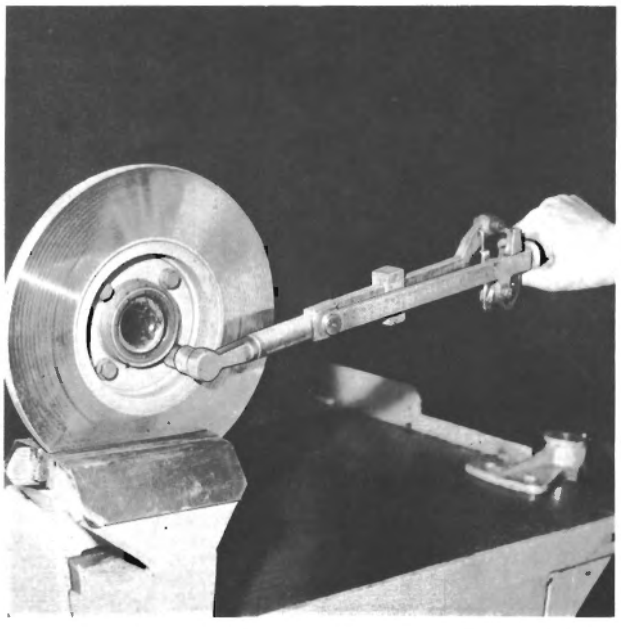
. Minimum thickness of disc:

11.75 mm.

If the disc does not meet these requirements, it may be trued up, providing its thickness is more than 11.75 mm.

If the disc, after re-surfacing, and though it may meet the 11.75 mm minimum thickness requirement, still shows grooving marks, or does not meet acceptance requirements, it must be replaced.

Fig. 14 4266



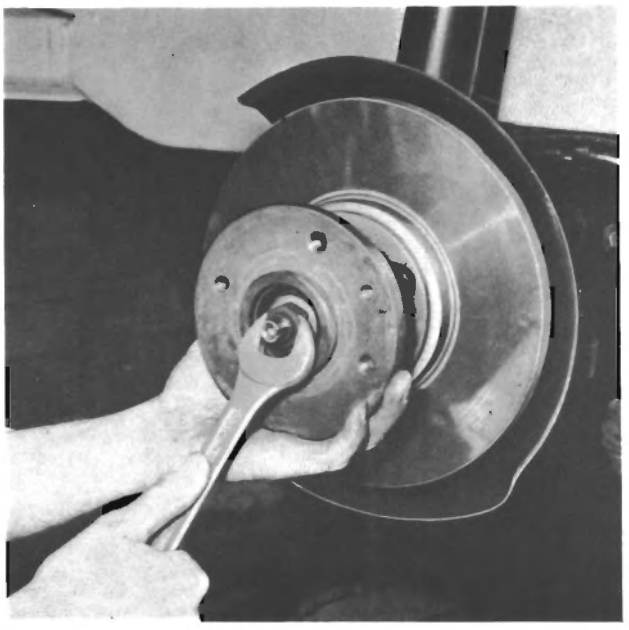


Fig. 15 4267

RE-FITTING OPERATIONS

- Assemble the hub with the disc. Tighten screws to 5.5 m da N. torque (Fig. 14).
- Fit disc and hub as assembled to stub axle.
- Fit a new hub skirted nut. Adjust hub play (Fig. 15).
- Lock skirted nut (Fig. 16).
- Fit hub cap.
- Fit calliper and brake shoe assembly to stub axle. Tighten screws to 7.5 m da N torque (Fig. 17). Replace sheet metal retainer.

  Note: when substituting a new disc for a disc which, for instance, was worn, it may happen that, owing to its greater thickness, fitting the calliper and brake shoe assembly is impossible.

  In this case, the operator must push the pistons back as indicated in the procedure for the "replacement of brake shoes".
- Connect brake tube to flexible pipe.
- Bleed brakes.
- Set car on its wheels. Tighten wheel.

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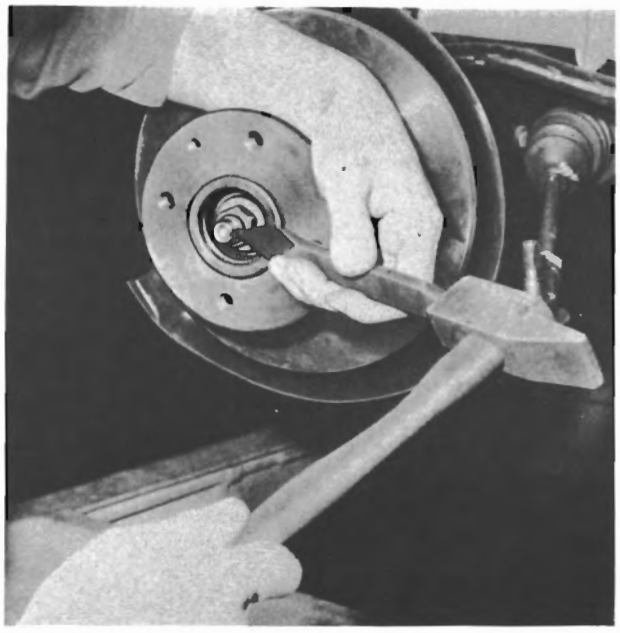


Fig. 16 4268



Fig. 17 4269

- Remove hub.
- Remove small bearing inner race.
- From inside hub, use mandrel Ref. 7306 D fitted with extractor Ref. 21621 M (Fig. 18) to drive large bearing and lip seal out.
- Use mandrel and extractor Ref. 21622 N (Fig. 19) to drive small bearing outer race out.
- Carefully clean hub, then pack it with approximately 40 to 45 g of Shell Alvania EP 2 grease.
- Fit large bearing outer race in position, using sleeve Ref. 15522 C with fitting tool Ref. 21623 P (Fig. 20).
- Fit large bearing inner race, then insert a new lip seal, using the sleeve and fitting tool previously used, but turned over for this application (Fig. 21).
- Fit small bearing outer race using sleeve Ref. 15522 C with fitting tool Ref. 21624 P (Fig. 22).
- Fit small bearing inner race.
- Re-fit hub.

Fig. 18 4270



Fig. 19 4271



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CHANGING A FRONT DISC SPLASH-SHIELD

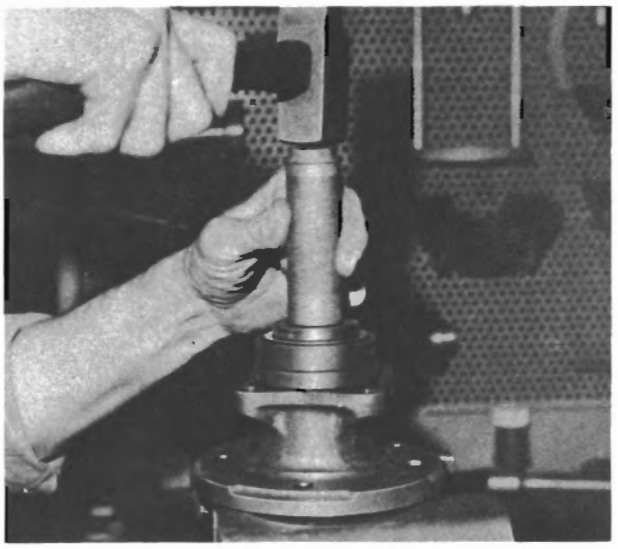


Fig. 20 4272

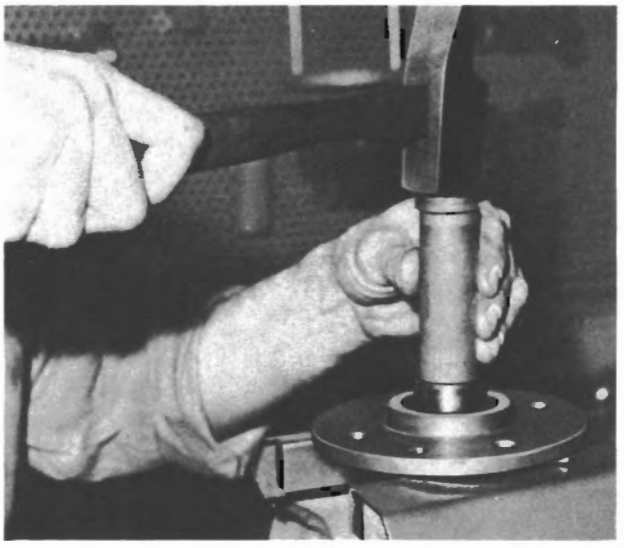


Fig. 22 4274

- Remove front disc and hub as assembled.
- Remove screw fastening splash shield to stub axle.
- Use a chisel to unclinch the splash shield from the stub axle, then remove it.
- Fit new splash shield in position on stub axle, using a tube with an inner diameter of 54, and an outer diameter of 60, after rounding off the edge of the tube bearing against the splash shield (Fig. 23).
- Set splash shield in correct directional position, then hold it with the screw fastening it to the stub axle.
- Clinch splash shield to stub axle in three points at 120° to one another (Fig. 24).
- Re-fit disc and hub as assembled.

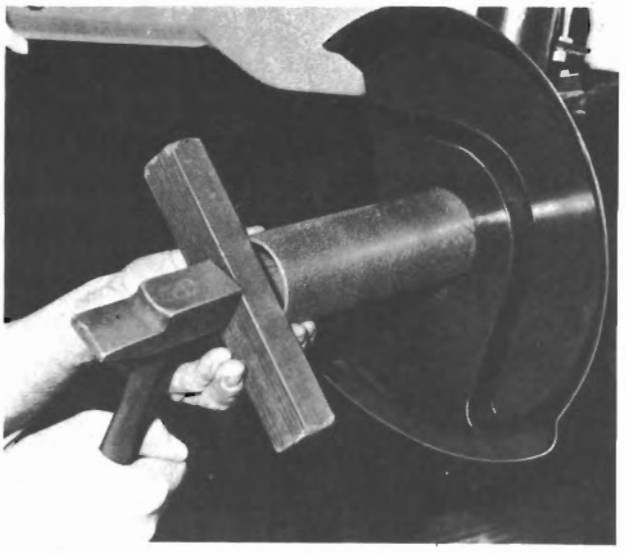
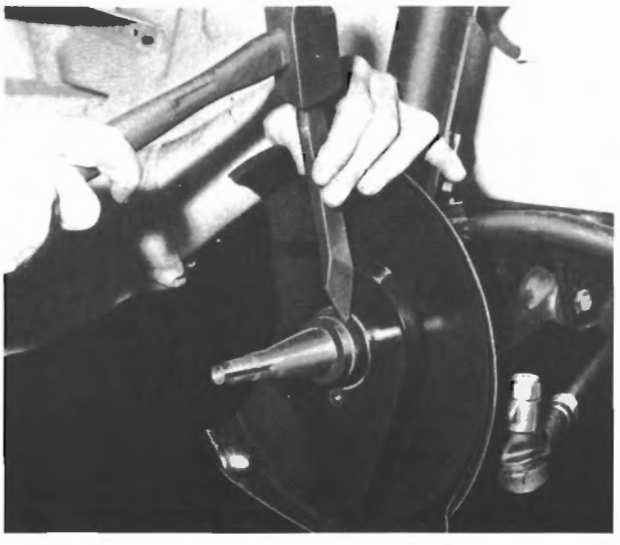


Fig. 23 4275

Fig. 21 4273



Fig. 24 4276



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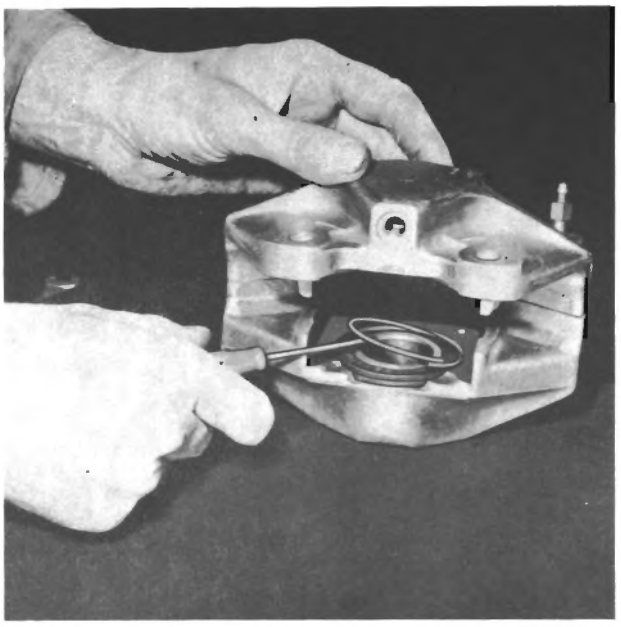


Fig. 1 4253



Fig. 3 4255

Dismantling procedure

- Clean outside of calliper.

Important: never separate the half-callipers, to avoid damaging the internal seals and experiencing the leaks which might, afterwards, ensue.

If there is a leak from the joint plane of the half-callipers, replace the calliper complete.

Fig. 2 4254



- Use a small screw driver to remove the dust cover retaining snap-rings (Fig. 1).
- Remove both dust covers.
- Use tool Ref. 20837 R to hold piston in half-calliper bore, on the side of the holes used for fastening to the stub axle, then remove opposite piston by injecting compressed air through the feeding hole (bleed screw closed), proceeding gradually to prevent it from escaping brutally (Fig. 2).
- Remove tool Ref. 20837 R.
- Remove other piston by injecting compressed air through feeding hole (bleed screw closed).

  Insert a flat piece of metal between the half-callipers to avoid damaging the opening of the opposite bore (Fig. 3).

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Fig. 4 4256



Fig. 6 4258

Note: if some difficulty is experienced for the extraction of the second piston (pistons seized on ring seals, for instance), proceed as follows:

. Use a blade with a rounded-off tip to extract the first removed piston ring seal. Take care not to scratch bore (Fig. 4).

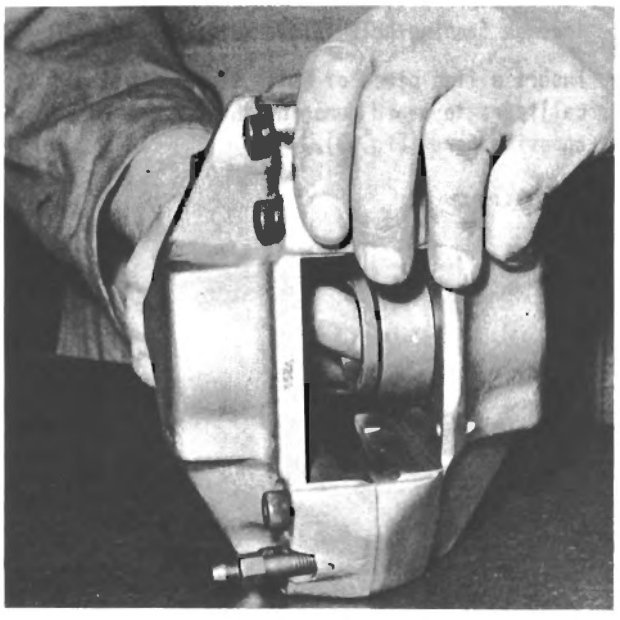
. Set first piston opposite in its bore (it should slide freely, by hand, since its ring seal has been removed) (Fig. 5).

. Hold this piston in its bore, using tool Ref. 20837 R, then remove second piston by gradually injecting compressed air through the feeding hole (bleed screw closed) (Fig. 6).

. Remove tool, then remove piston (inserted without its seal), which can be extracted easily by hand.

- Use a blade with a rounded-off tip to remove ring seals. Take care not to scratch bores (Fig. 4).

Fig. 5 4257



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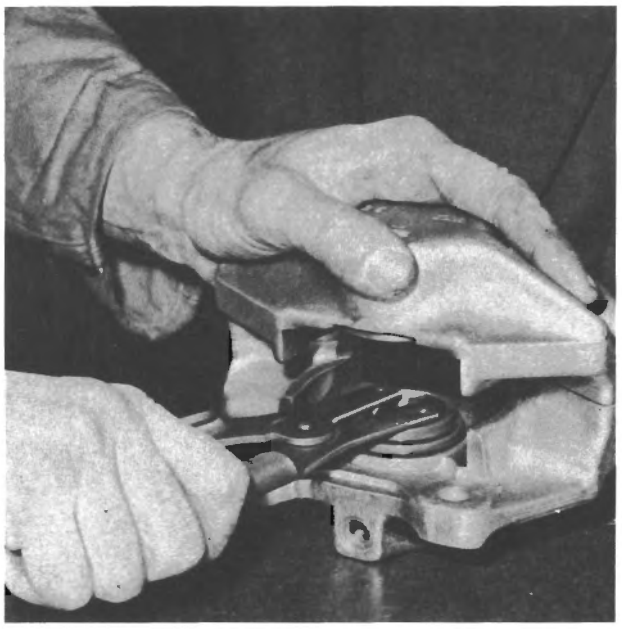


Fig. 7 4259



Fig. 8 4260

Checking procedure

- Carefully clean components with methylated spirit.
- Visually check the surface condition of pistons and bores:
  - . piston: any trace of seizing, scratches, or rough area, calls for its replacement;
  - . bore: any trace of seizing, or deep scratches, calls for the replacement of the calliper complete.
- The following components, available from the repair kit, must be replaced systematically:
  - . dust covers,
  - . dust cover retaining snap-ring,
  - . ring seals,
  - . cross-shaped spring.

Re-assembly operations

- Use anti-corrosion grease Ref. 28533 L lightly to smear calliper bores and pistons (remember ring seal grooves).
- Fit a new ring seal, also lubricated, in each calliper groove.
- Manually insert each piston in its appropriate bore. Make sure not to fit it askew.
- Use pliers Ref. 20839 T to push each piston in, turning piston slightly in order not to damage the ring seal (Fig. 7).
- Use 20^{0} template Ref. 21640 C to set each piston in correct directional position (Fig. 8).
- Use a small screw driver to fit each new dust cover and new retaining snap-ring in position.

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J3 - REAR BRAKES (drum brakes)

J3/I - General specifications

J3/V - Removing and re-fitting a brake drum

J3/V - Changing the brake shoes

J3/V - Removing and re-fitting a wheel cylinder

J3/V - Removing and re-fitting a brake anchor plate

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SPECIFICATIONS

Drum brakes: D.B.A.

Type: Simplex (with one wheel cylinder) with floating and self-locating brake shoes automatically adjusted by means of toothed segments.

Brake anchor plate

Outer diameter: 262 mm.

Sheet metal thickness: 2.5 mm.

Wheel cylinder

Inner diameter: 22 mm.

Brake linings

Grade: DON JM 16

Developed length: 189 mm.

Useful length: 165 mm.

Width: 40 mm.

Thickness: 5 mm.

Effective friction area: 66 cm^2 per lining.

Fastened by means of 8 rivets.

Drum

Type: single circular rib.

Material: cast iron.

Outer diameter: 270.5 mm.

Inner diameter: 228.6 mm.

Maximum acceptable inner diameter after refacing: 229.6 mm.

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Fig. 1 4280

REMOVAL PROCEDURE

- Unlock rear wheel.
- Set rear of vehicle on pins; remove wheel after marking its position.
- Remove drum (Fig. 1).

REFACING THE BRAKE DRUMS

If brake drums are moderately scratched or ovalized, they may be refaced providing the inner diameter does not exceed a maximum of 229.6 mm, which means a refacing operation of 1 mm over the diameter in relation to the nominal diameter.

If the drum, after refacing, and although it may meet the maximum permissible diameter of 229.6 mm, still shows scratches, or is still out-of-round by more than .1 mm, it must be replaced.

Also, to keep rear brakes in correct balance condition, the opposite drum must be refaced to the same dimension.

RE-FITTING OPERATIONS

- Fit drum, and fasten it to wheel shaft.
- Set car on its wheels. Tighten wheel.

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CHANGING THE BRAKE SHOES

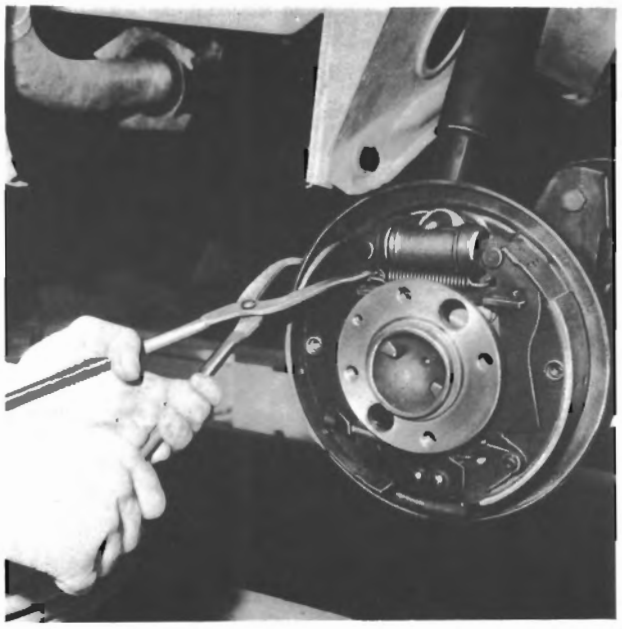


Fig. 2 4281



Fig. 4 4283

Removal procedure

For each side:

- Remove brake drum.
- Use pliers Ref. 7331 V to disconnect the upper return spring.

  In order not to damage the lining, place a piece of emery cloth, for instance, between the lining and the arm of the tool (Fig. 2).
- Disconnect hand brake cable (Fig. 3).
- Use pliers Ref. 7331 V to disconnect the lower return spring.
- Remove both springs retaining the brake shoes to the anchor plate. Use a screw driver to compress same, and apply swivelling effect to release them (Fig. 4).
- Remove brake shoes (Fig. 5).
- Hold wheel cylinder pistons to prevent them from falling out (Fig. 6).

Fig. 3 4282



Fig. 5 4284



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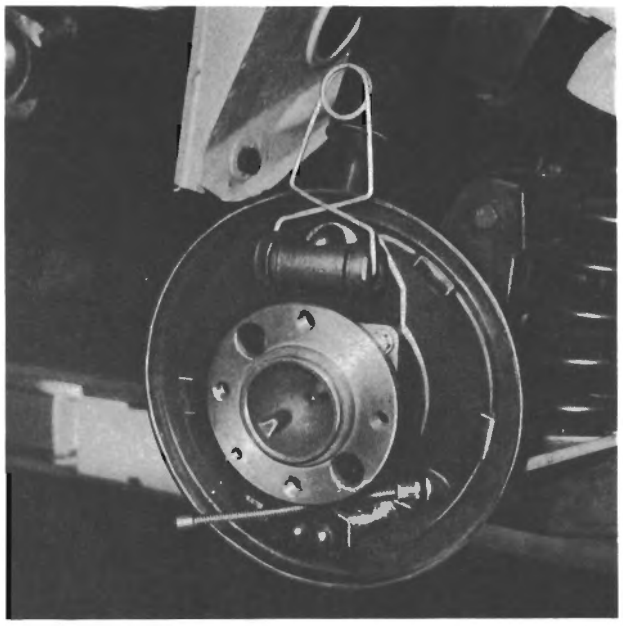


Fig. 6 4285

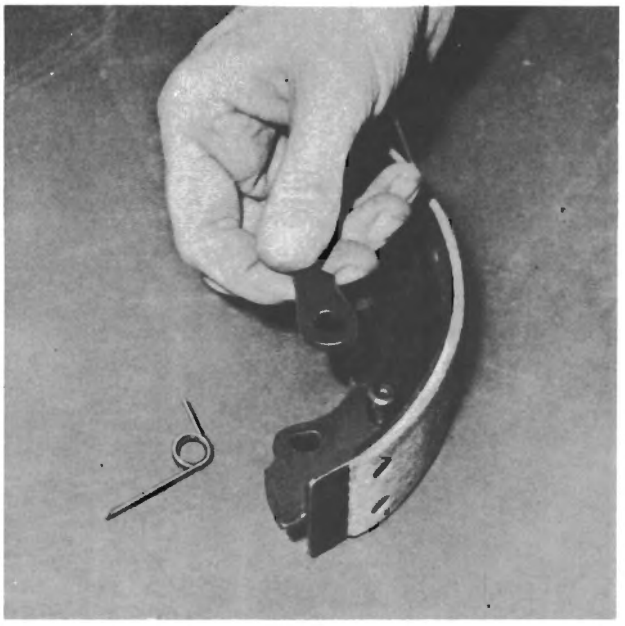


Fig. 8 4287

Dismantling the brake shoes

Primary shoe:

- Remove toothed segment lever after extracting its fastener (Fig. 7).
- Remove clip spring, and pawl (Fig. 8).

Secondary shoe

- Remove shoe linkage bar after extracting its retaining spring (Fig. 9).
- Remove hand brake lever, after extracting its fastener.

Re-assembling the brake shoes

All springs, clips, and fastener must be replaced.

Fig. 7 4286

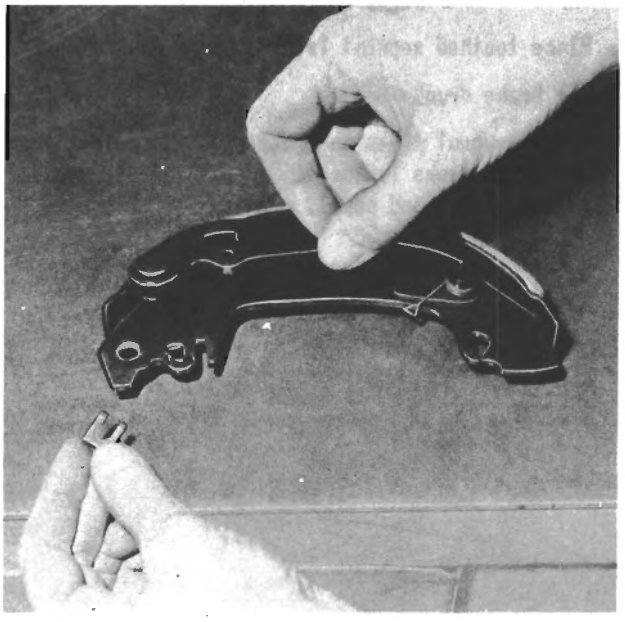
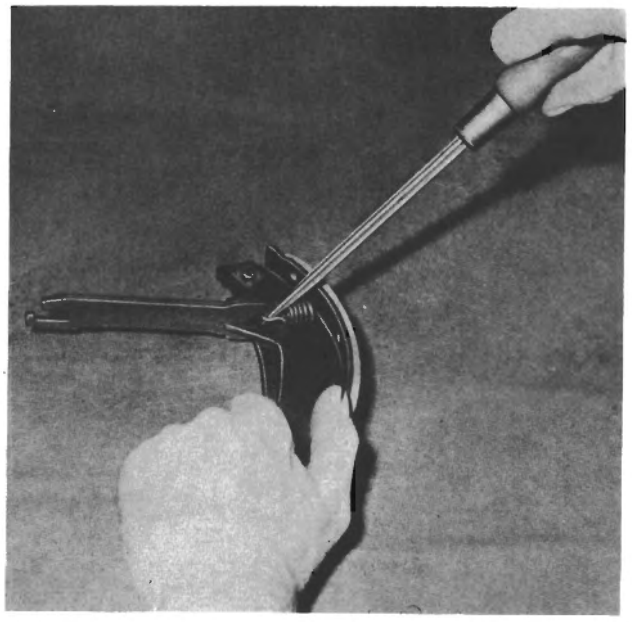


Fig. 9 4288



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Fig. 10 4289

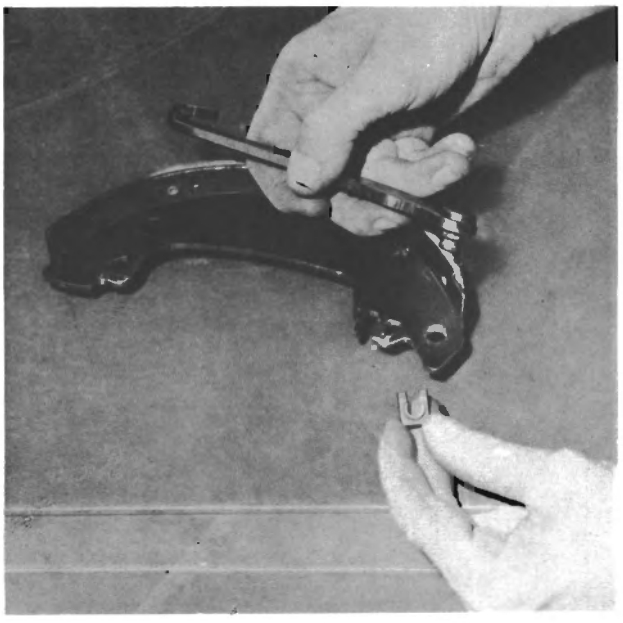
Primary shoe

- Place pawl and spring in position, then use a small tube to fit the clip (Fig. 9).
- Place toothed segment lever in position, then retain it with its fastener.

Secondary shoe

- Fit hand-brake lever, then retain it with its fastener (Fig. 10).
- Anchor spring to shoe, then to linkage bar. Press on linkage bar to engage it in its notch (Fig. 11).

Fig. 11 4290



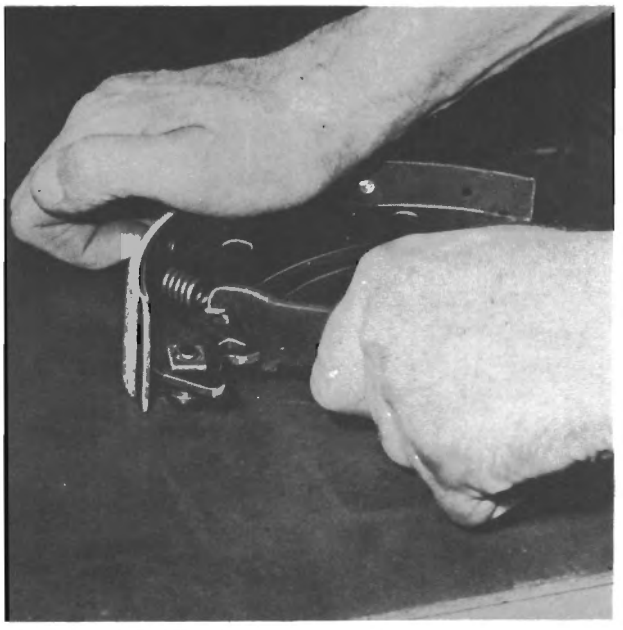


Fig. 12 4291

Re-fitting operations

All springs must be replaced. For each side:

- Place secondary shoe in position on brake anchor plate.
- Fit spring used to retain it to anchor plate. Use a screw driver to press on spring and turn it to lock it in position (Fig. 12).
- Fit primary shoe in position on brake anchor plate. Fit linkage bar into place in notch of toothed segment lever.
- Fit spring used to retain it to anchor plate.
- Fit lower shoe return spring (Fig. 13), then fit upper return spring.
- Place toothed segment lever closest to lining.
- Fit brake drum.

Press several times on brake pedal to bring linings closer to drums (automatic adjustment via toothed segment lever and pawl).

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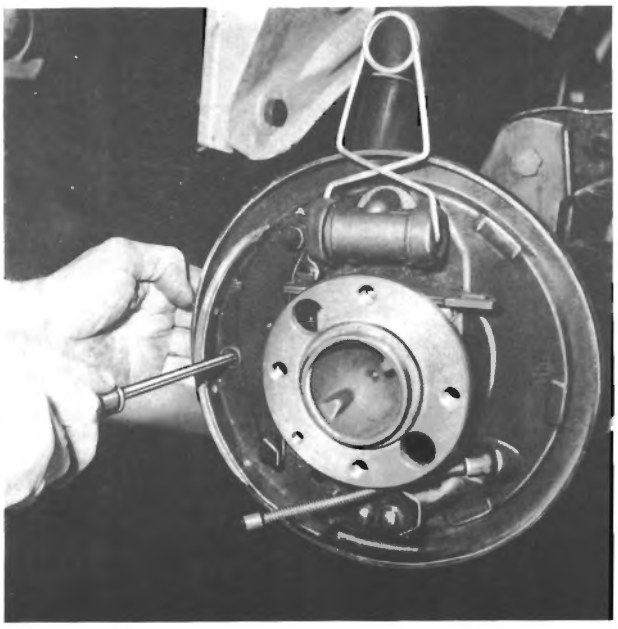


Fig. 13 4292

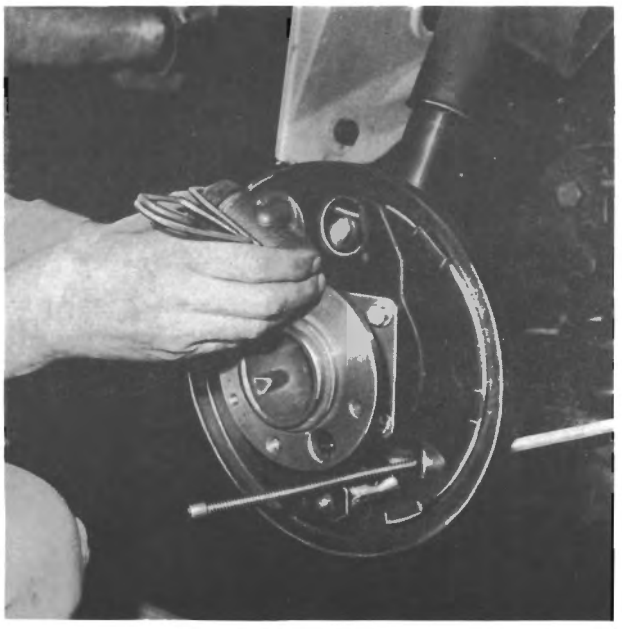


Fig. 15 4294

REMOVAL PROCEDURE

- Remove brake shoes.
- Disconnect brake tube from wheel cylinder. Use a bleed screw cap to plug it.
- Remove screws retaining the wheel cylinder to the anchor plate.
- Remove wheel cylinder (Fig. 15).

RE-FITTING OPERATIONS

- Fasten wheel cylinder to anchor plate.
- Connect brake tube to wheel cylinder.
- Re-fit brake shoes.
- Bleed brakes.

Fig. 14 4293



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REMOVING AND RE-FITTING A BRAKE ANCHOR PLATE

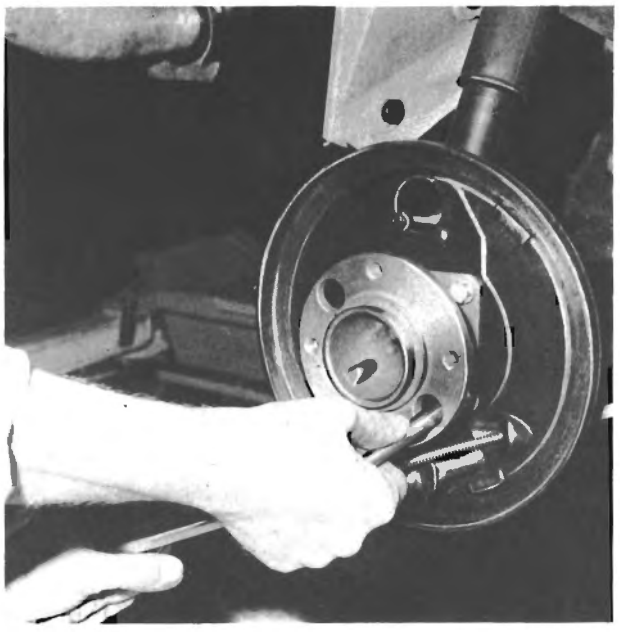


Fig. 16 4295

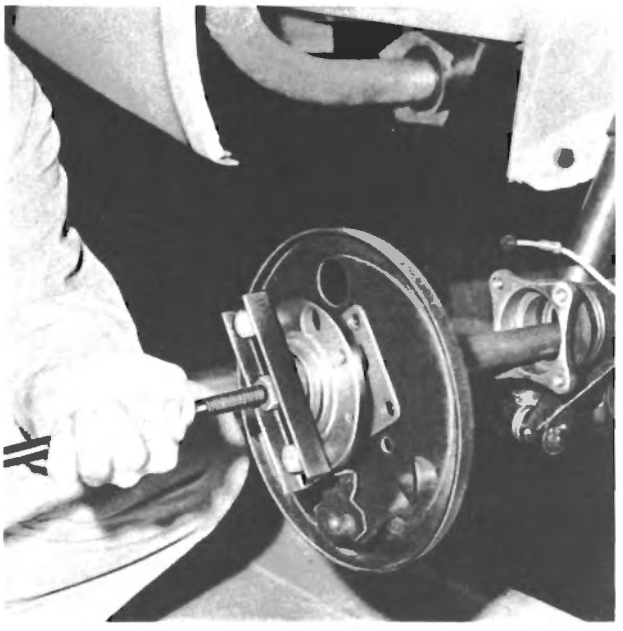
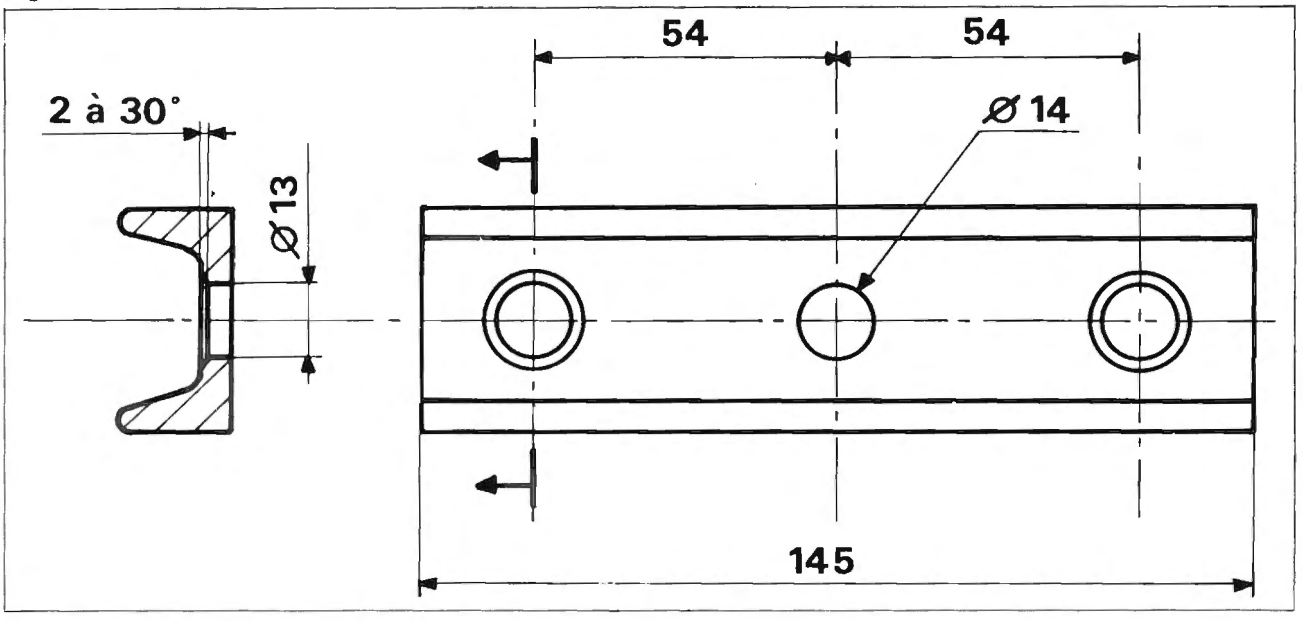


Fig. 17 4296

REMOVAL PROCEDURE

- Remove wheel cylinder.
- Extract hand brake cable sheath from anchor plate.
- Remove 4 screws fastening brake plate to banjo (Fig. 16).
- Extract wheel shaft, using Facom U 41 inertia extractor (Fig. 17) fitted with a plate made by the operator to the dimensions shown on Fig. 18.
- Remove brake plate (Fig. 19).

Fig. 18 G.041



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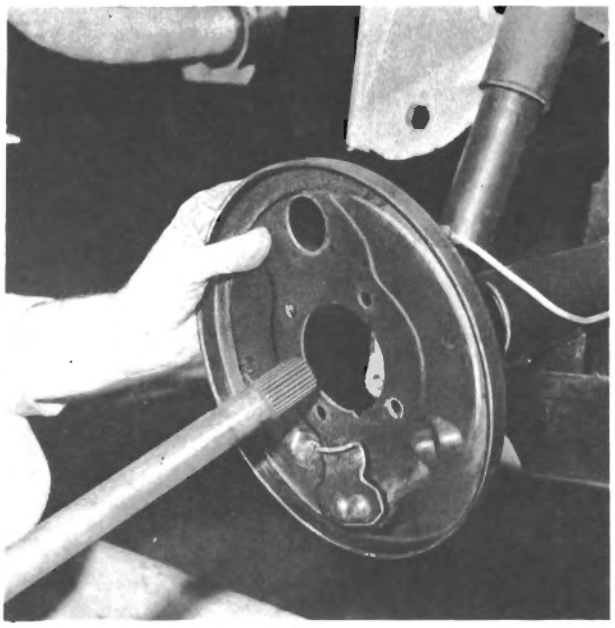


Fig. 19 4297



Fig. 21 4299

RE-FITTING OPERATIONS

- Fit a new paper seal on the brake plate.
- Locate brake plate in position on trumpet tube, then fit wheel shaft.
- Fit wheel shaft bearing in its housing on trumpet tube (Fig. 20)

Fig. 20 4298



Fasten brake plate and sheet metal backing plate to trumpet tube (Fig. 21). Tightening torque 5 m da N.

- Fit hand brake sheath in position on brake plate.
- Fit wheel cylinder.

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J4 - REAR BRAKES (Discs)

J4/I - General specifications and description

J4/IV - Changing the rear brake shoes

J4/V - Removing and re-fitting a rear brake hydraulic cylinder

J4/V - Removing and re-fitting a rear brake disc

J4/V - Removing and re-fitting a rear brake yoke

J4/V - Removing and re-fitting a rear brake splash shield

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Specifications

Disc brakes: D.B.A. composite

Type: sliding calliper assembly with one hydraulic cylinder.

Diameter of hydraulic cylinder: 38 mm.

Disc

Material: cast iron.

Outer diameter: 228.5 mm minimum.

Thickness: 10 mm.

Minimum permissible thickness after refacing: 9 mm.

Brake shoe

Lining grade: Ferodo 556.

Total thickness lining + metal backing: 15 mm.

Thickness of lining alone: 10 mm.

Minimum permissible thickness before replacement: 7 mm, inclusive of backing.

Effective friction area: 26 cm^2. per lining.

DESCRIPTION

The rear brake assembly is comprised of:

- A disc made integral with the wheel shaft.
- A sheet metal splash shield, fastened to the rear axle banjo and protecting the face of the disc opposed to the wheel against projections while securing the required ventilation.
- A cast iron yoke fastened to the rear axle banjo.
- A sliding calliper assembly, held to the yoke by means of 2 keys, each being retained by 2 safety fasteners and 2 springs. These 2 springs have the function of keeping the sliding calliper assembly under tension on the yoke, and of preventing any vibration or noise, which might otherwise ensue.

The sliding calliper assembly is comprised of:

. A cast iron support.

. A light alloy hydraulic cylinder mounted on 2 slots on the support, and retained by a stud and a locking spring.

This is comprised of:

- a mechanical control (for hand brake);
- a moving piston fitted with a mechanical device for the automatic adjustment of the mechanical control clearance.
- a ring seal fitted in a groove in the bore;
- a dust cover protecting the piston;
- a cap protecting the mechanical control.

. Two brake shoes, with their lining moulded on a metal backing. A flat spring fitted between the yoke and each brake shoe prevents any brake shoe vibration or noise from occurring when it is not being used.

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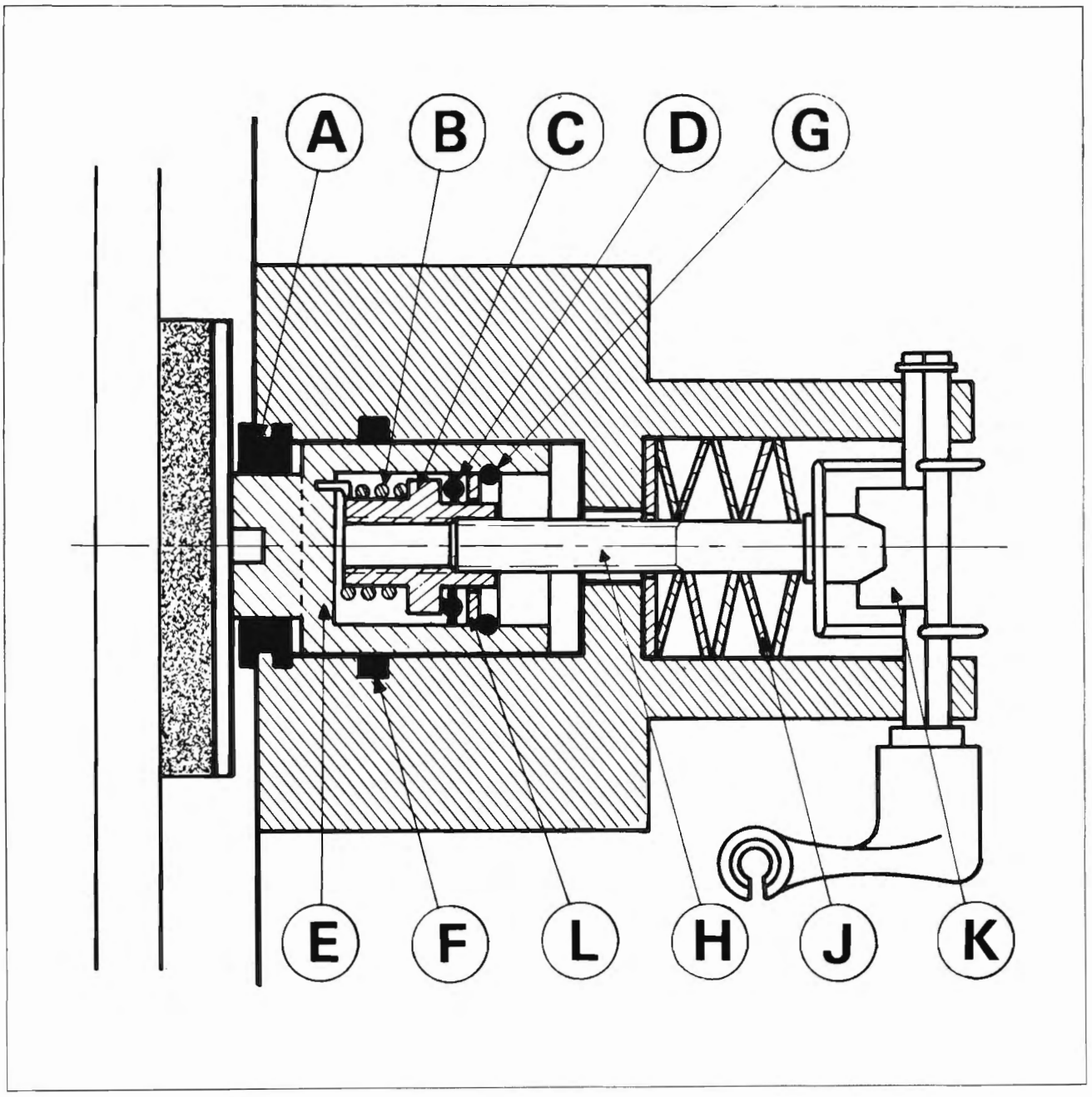


Fig. 1 G.072

OPERATION (Fig. 1)

When the driver presses on the brake pedal, the hydraulic pressure generated in the system simultaneously initiates an action on the piston and a reaction on the sliding calliper assembly, and applies equal and opposite pressure forces against the disc, through the brake shoes, these forces being directly proportional to the pressure applied on the brake pedal.

When the brake pedal is released, this pressure is cancelled, and the ring seal, which had been modified in shape by the displacement of the piston during the braking operation, returns to its normal shape, and pushes the piston back, leaving a functional clearance between the disc and brake shoes. This also constitutes an automatic take-up system, which compensates for lining wear.

When the hand brake is being used, push-rod (K), actuated by the lever, which is interlocked with the cable, displaces the threaded head (C) and adjustment screw (H) assembly inside the hydraulic cylinder until contact is achieved at the bottom of the piston (this displacement constitutes the hand

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brake clearance), and it pushes the latter, which applies the brake shoes against the disc.

When the hand brake is released, Belleville washers (J) return the threaded head (C) and adjustment screw (H) assembly to its initial position.

Piston (E) returns to its position under the effect of sealing ring (F).

On the other hand, to compensate for the play resulting from lining wear, a mechanism provides an automatic adjustment system for the hand brake mechanical control inside the hydraulic cylinder.

Principle:

The amount of play existing between bearing washer (L) and ball thrust bearing (D) corresponds to the functional clearance between the disc and brake shoes (the bearing washer is held in a piston groove, and retained by snap-ring (G).

When hydraulic pressure is applied:

- If this play is equal to the displacement of the piston, or greater, nothing happens.
- If this play is less than the displacement of the piston, bearing washer (L) pushes ball thrust bearing (D). The latter, by friction, loosens threaded head (C) on adjustment screw (H) until the piston displacement is discontinued.

When hydraulic pressure is cancelled, piston (E) returns to its position under the effect of ring seal (F), and drives bearing washer (L) over a distance corresponding to the functional clearance between the disc and shoe brakes.

Threaded head (C), which cannot turn in the opposite direction to the loosening effect owing to the effect of helical spring (B) retained in a recess in the piston, remains in the same position.

Owing to the function of this system, as lining wear is increasing with the piston moving out of the bore over a progressively greater distance, the threaded head is automatically unscrewed to increase the length of the threaded head (C) and adjustment screw (H) assembly, and this prevents the hand brake mechanical control inside the hydraulic cylinder from being put out of order.

Note:

The hand brake mechanical control inside the hydraulic cylinder can only operate if:

- the play between shoe brakes and disc is reduced to the functional clearance. To make sure of this, before using the hand brake, actuate the brake pedal so that, under the effect of hydraulic pressure, the automatic adjustment mechanism can fulfil its function.

  This applies when brake shoes are being replaced;

- when operations have been carried out on one or several hydraulic cylinders, the system must first be bled to enable the automatic adjustment mechanism to operate under the effect of hydraulic pressure.

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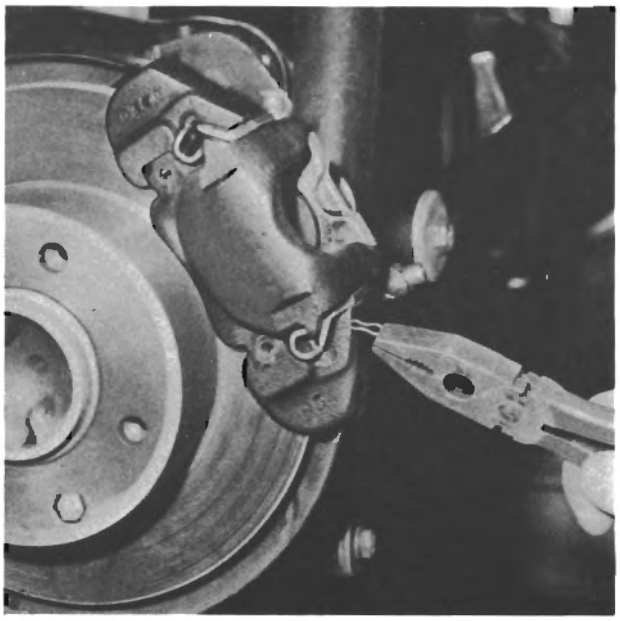


Fig. 1 4425

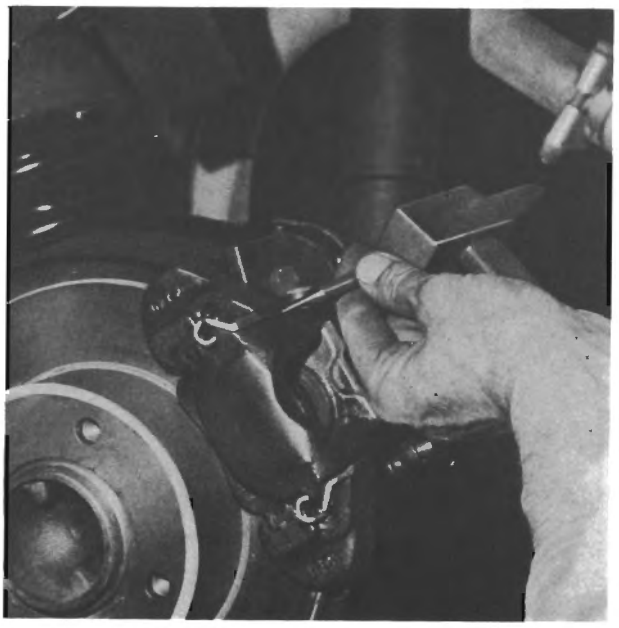


Fig. 2 4426

Changing brake shoes is imperative when the total thickness of the backing + lining assembly is reduced to 7 mm in its thinnest section.

For this replacement operation, use the "lining reconditioning kit", which is available from the Spare Part Department.

This kit contains:

. 4 brake shoes,

. 4 sound-deadening springs,

. 2 spring pins,

. 8 fasteners.

Operational procedure

- Unlock both rear wheels.
- Set rear of vehicle on pins, then remove rear wheels after marking their position.
- Slacken hand brake cable on equalizer.
- Disconnect hand brake cable from callipers.
- Extract the 4 pins from retaining keys on each calliper (Fig. 1).
- With a pin drift, remove both calliper retaining keys (Fig. 2).
- Press downwards on calliper, then remove it from yoke without disconnecting the flexible pipe (Fig. 3). Do not allow calliper to hang at end of flexible pipe.

Fig. 3 4427



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CHANGING THE REAR BRAKE SHOES

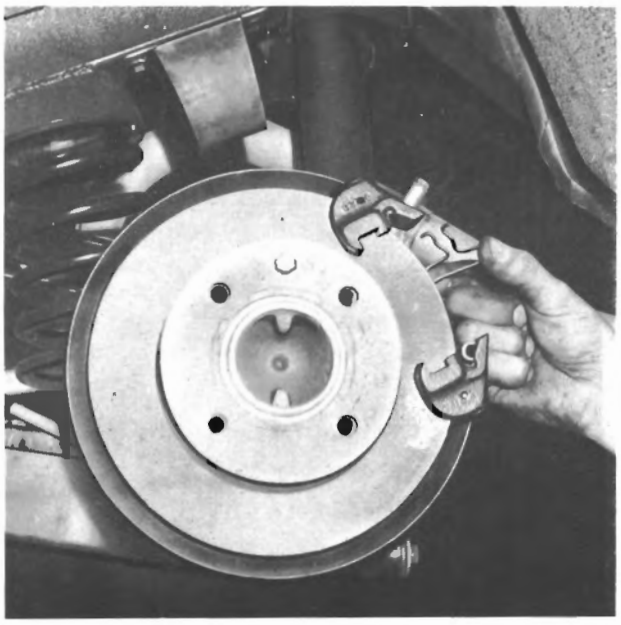


Fig. 4 4428

- Remove worn brake shoes with their anti-noise springs.
- Replace spring pins (Fig. 4).
- Fit new brake shoes in position (Fig. 5). Locate each shoe in position in lower yoke groove, compress anti-noise spring, then engage shoe in upper groove.
- Push each piston to bottom of hydraulic cylinders. To achieve this, screw piston in, using tool Ref. 21645 Y (Fig. 6).

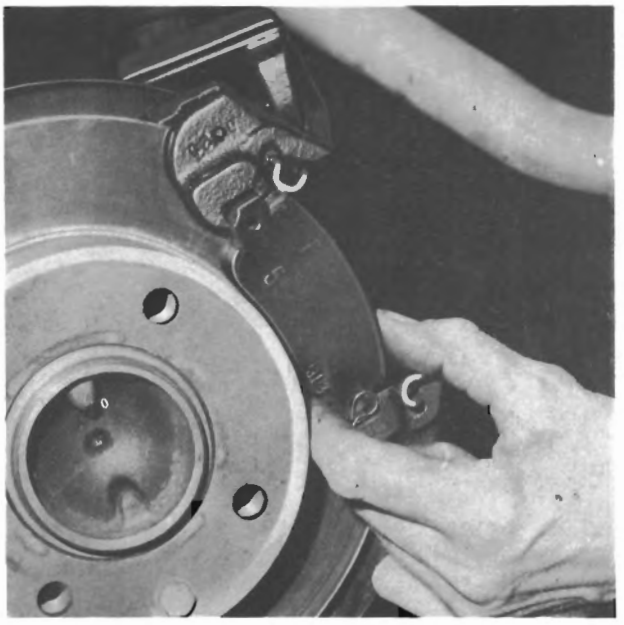


Fig. 5 4429

The piston groove must be facing side of bleed screw, and must be parallel with the arms of the hydraulic cylinder. This requirement must be met if subsequent complete bleeding is to be achieved.

- Engage one side of calliper between spring pin and key area.
- Engage other side of calliper in position, compressing both spring pins.
- Engage lower key retaining calliper to yoke in position.

Fig. 6 4430



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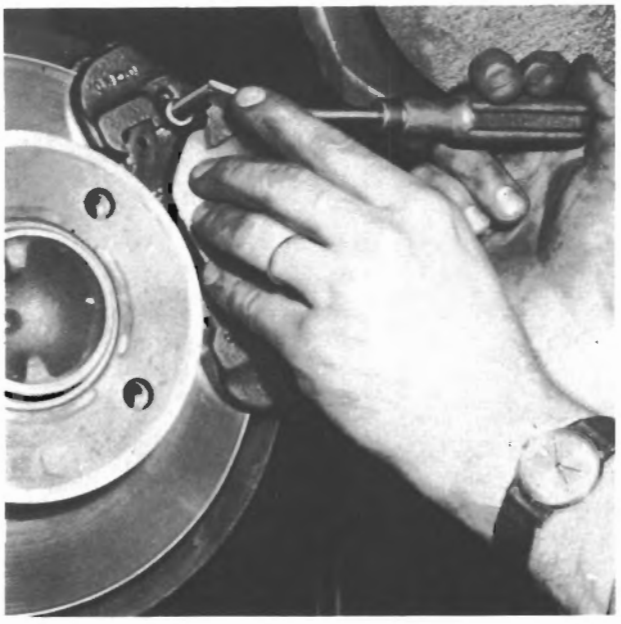


Fig. 7 4431

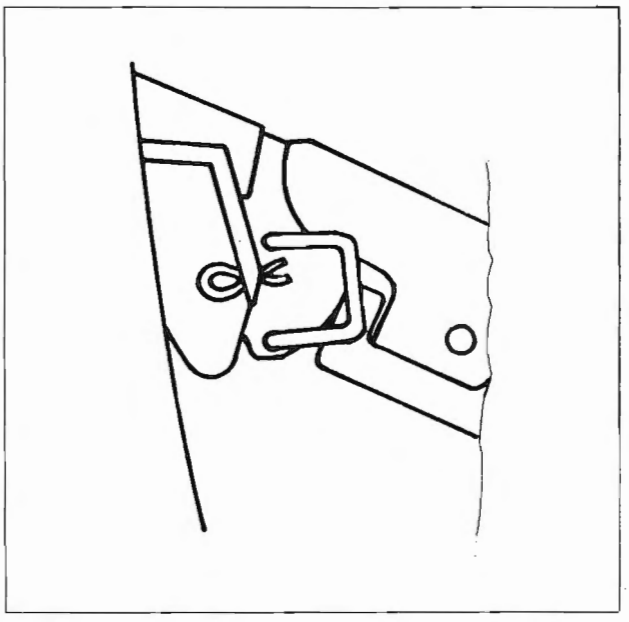


Fig. 9 4432

- Engage upper key in position (Fig. 7). Use a screw driver as a lever to push calliper.
- Check position of spring pins.

  Figure 8 illustrates the correct fitting, which is an absolute requirement.
- Fit 2 fasteners to each calliper retaining key (Fig. 9).
- Re-connect hand brake cable.
- Press several times on brake pedal to bring shoes closer to disc, until play is reduced to functional clearance value.
- Set car on its wheels. Tighten wheels.
- Adjust hand brake cable.

Fig. 8 G.073



Important notes

When replacing brake shoes, if the amount of wear justifies it, it is advisable to replace all shoe assemblies.

If only front wheel brake shoes or rear wheel brake shoes are being replaced, it is imperative, in any case, that all shoes of the same axle should be replaced, and this always with linings of the same type.

On the other hand, the full efficiency of new brake shoes is only ahcieved after running-in (between 150 and 250 km). It is useless to apply the brakes sharply and repeatedly in an attempt to reduce the running-in period; on the contrary, this procedure might impair efficiency owing to the abnormal overheating which ensues.

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Fig. 1 4059

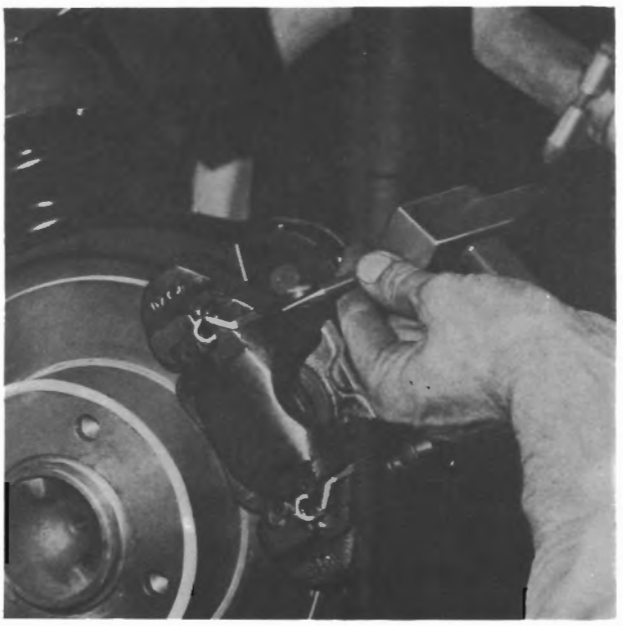


Fig. 3 4426

REMOVAL PROCEDURE

- From inside, use a taper punch or a tapering piece of wood to plug the lower hole of the equalizer tank (Fig. 1).
- Unlock rear wheel.
- Set rear of vehicle on pins, then remove rear wheel after marking its position.
- Slacken hand brake cable on equalizer.
- Disconnect hand brake cable from calliper.
- Unlock flexible pipe on calliper, but do not unscrew it.
- Extract 4 fasteners on calliper retaining keys (Fig. 2).
- Use a pin drift to remove both calliper retaining keys (Fig. 3).
- Clear calliper from yoke, pressing on calliper downwards, then remove it, unscrewing it from flexible pipe (Fig. 4). Use a bleed screw cap to plug end of flexible pipe.

Fig. 2 4425

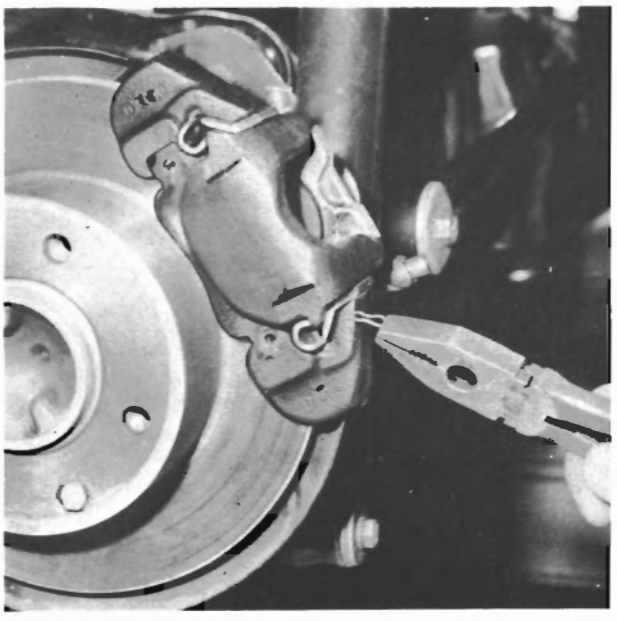
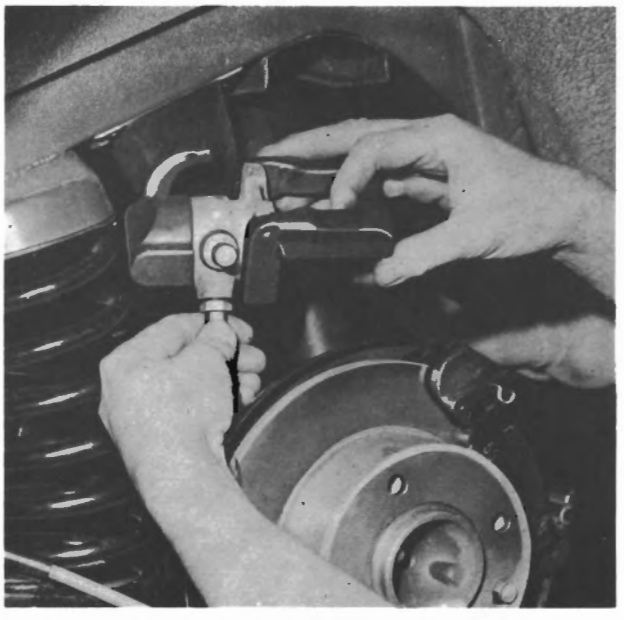


Fig. 4 4433



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REMOVING AND RE-FITTING A REAR BRAKE HYDRAULIC CYLINDER

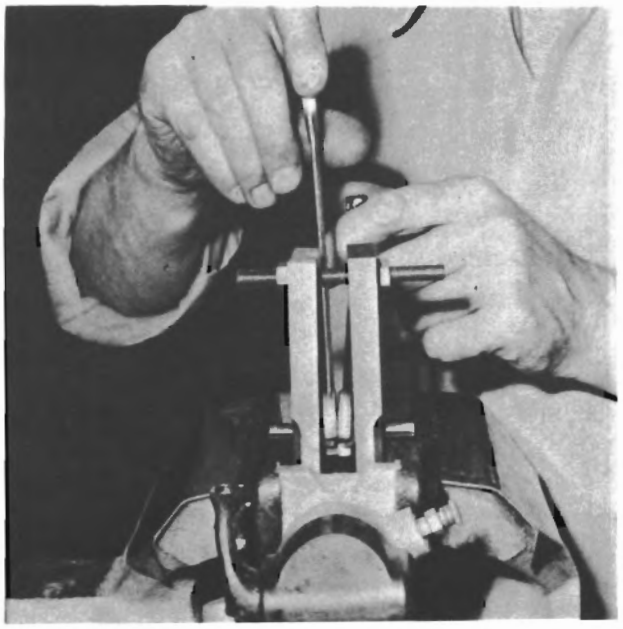


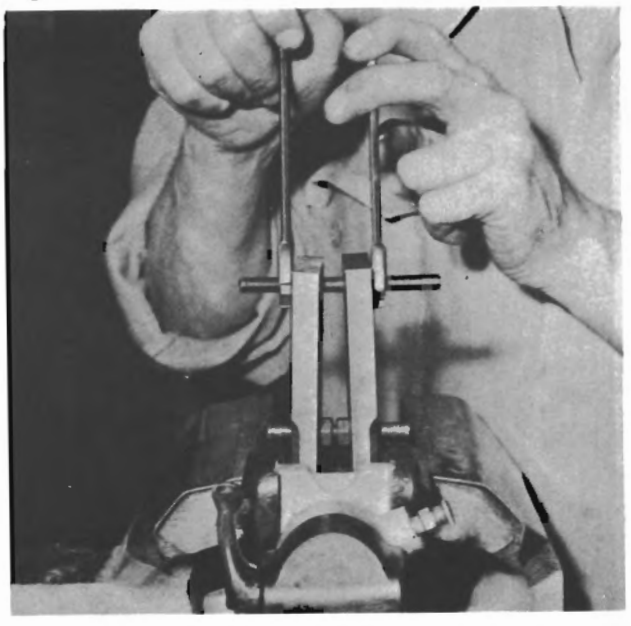
Fig. 5 4434

Separate hydraulic cylinder from bracket.

It is imperative that this operation should be carried out as follows:

- Position tool Ref. 21641 Z with both arms bearing against supporting bracket wings.
- Use bottom nuts to adjust parallelism of arms (Fig. 5).
- Progressively tighten upper nuts (Fig. 6) until hydraulic cylinder is no longer held tight by the supporting bracket wings. Do not alter shape of wings excessively.
- Use a 3 mm dia. spindle (Fig. 7) to push stop stud in, then remove hydraulic cylinder, sliding it downwards.

Fig. 6 4435



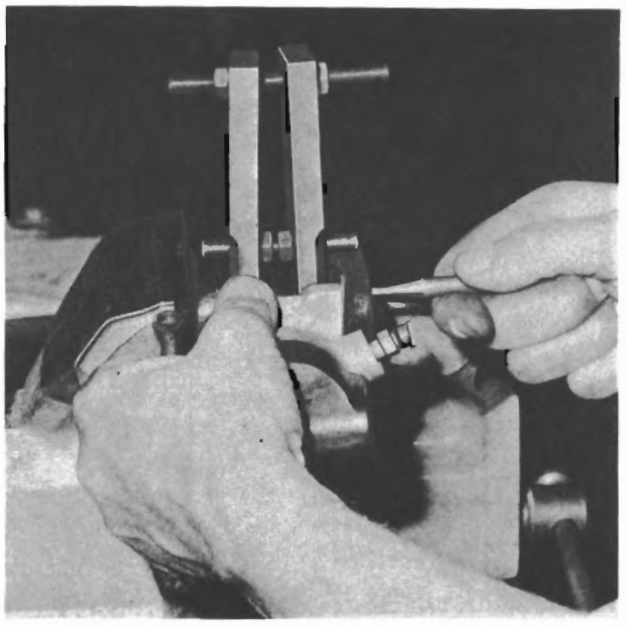


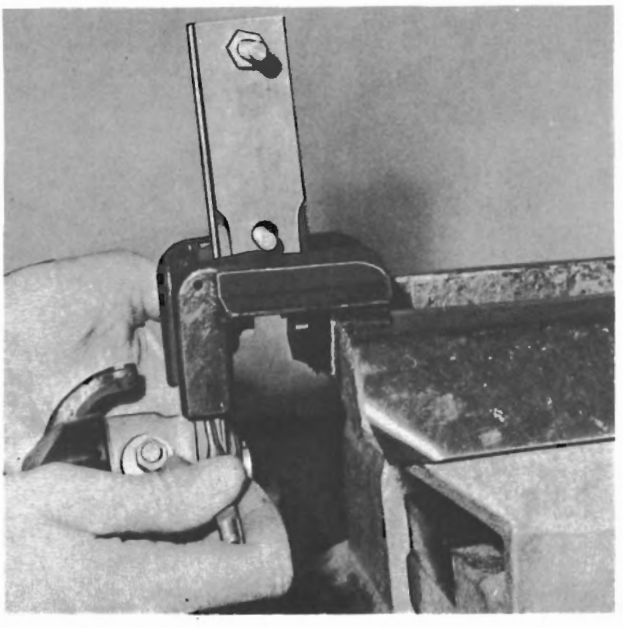
Fig. 7 4436

Note: Never remove hydraulic cylinder without opening wings of supporting bracket.

RE-FITTING OPERATIONS

- With the supporting bracket wings opened up, engage hydraulic cylinder on supporting bracket slides, holding the stop stud and its spring in position (Fig. 8). (See (Fig. 9) for direction of assembly for stop stud).
- Slide hydraulic cylinder upwards until stop stud is locked in its housing on supporting bracket.

Fig. 8 4437



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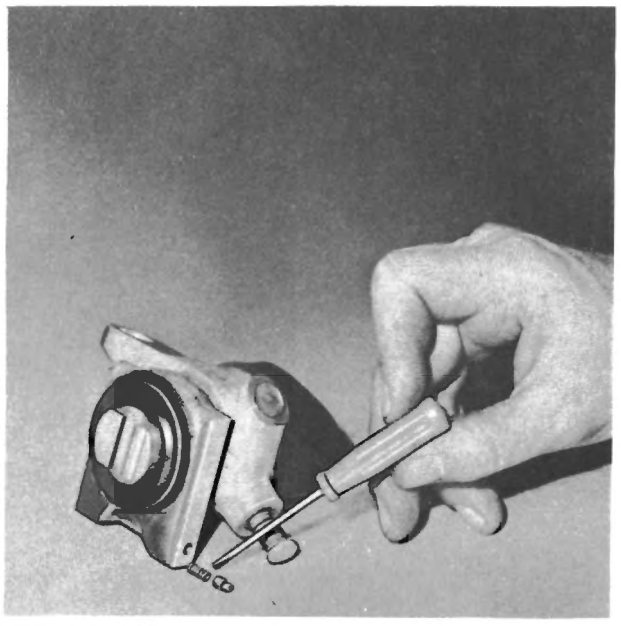


Fig. 9 4438

- Remove tool Ref. 21641 Z.

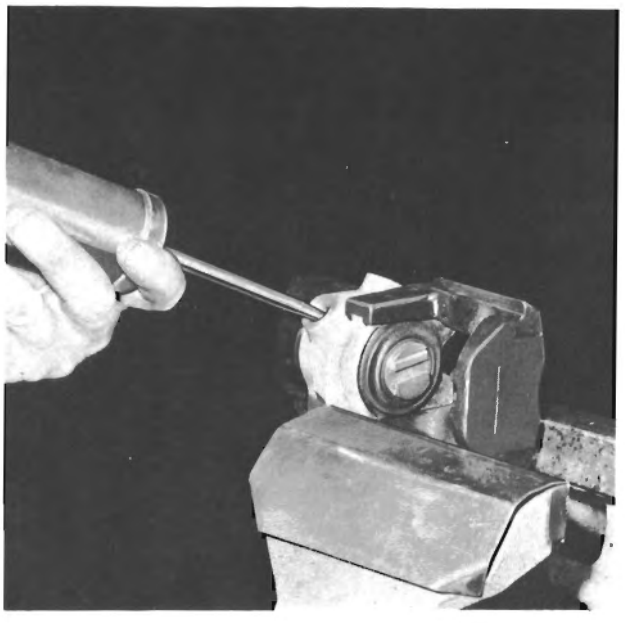
Important note: to enable the system to be bled at a later stage, it is imperative that the hydraulic cylinder should be pre-filled with brake fluid. Proceed as follows:

. remove bleed screw to enable air to escape.

. pour brake fluid through flexible pipe opening (Fig. 10);

. use pliers Ref. 21645 V to unscrew and screw piston several times by a ½ turn (Fig. 11); if necessary, actuate hand brake lever, and tap lightly on outside of cylinder until all the air has been evacuated.

Fig. 10 4439



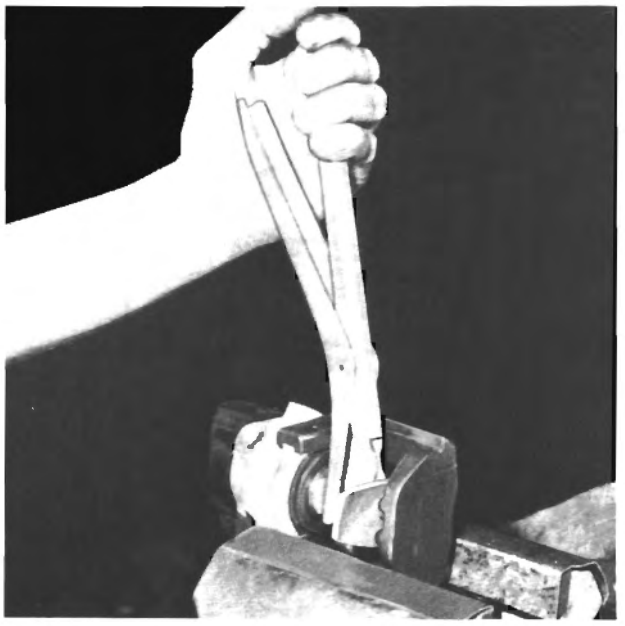


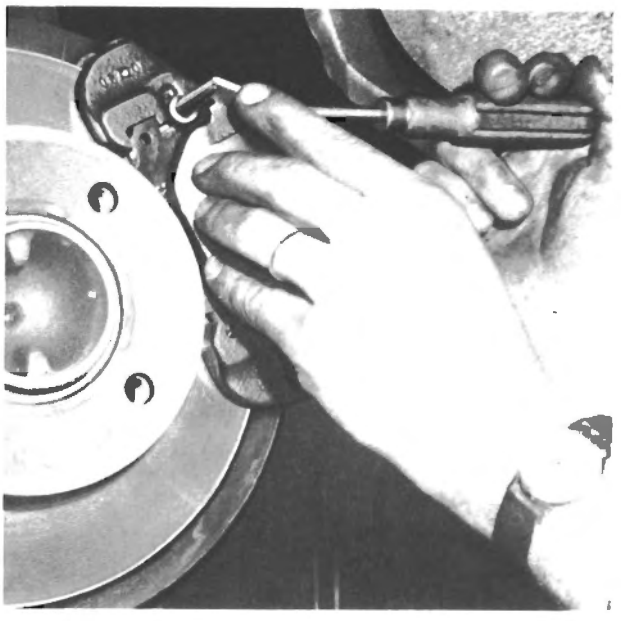
Fig. 11 4440

Remember to return piston to its original position, i.e. with the groove on bleed screw side and parallel with the wings of the supporting bracket;

. fit bleed screw.

- Screw calliper on flexible pipe, but do not lock it in position.
- Engage one side of the calliper between the spring pin and the key bearing area on the yoke.
- Engage other side of calliper, compressing both spring pins.
- Engage lower key retaining calliper to yoke.
- Engage upper key (Fig. 12). Use a screw driver as a lever to push calliper in position.

Fig. 12 4431



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REMOVING AND RE-FITTING A REAR BRAKE HYDRAULIC CYLINDER

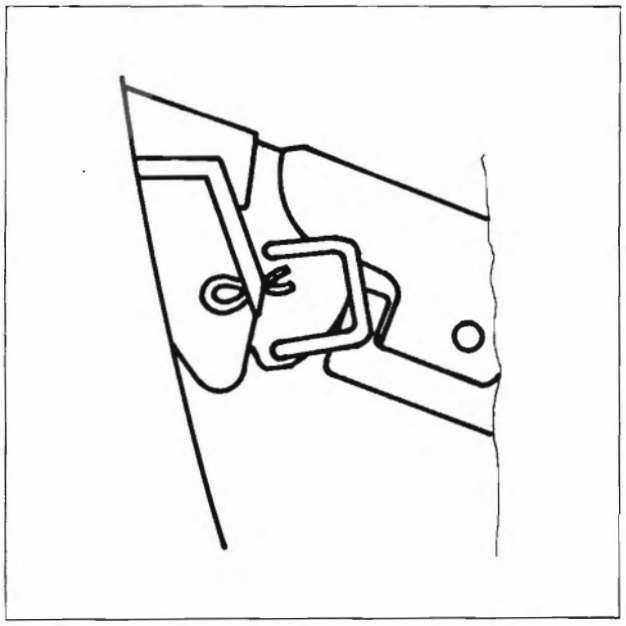


Fig. 13 G.073

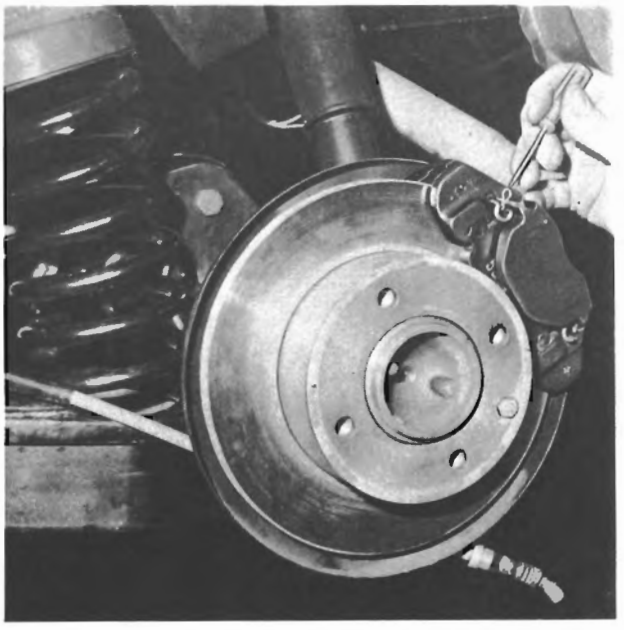


Fig. 14 4432

- Check position of spring pins.

  Fig.13 shows the correct way for fitting, which must be followed.

- Fit 4 new fasteners on the calliper retaining keys (Fig. 14).

- Re-connect hand brake cable.

- Lock flexible pipe to calliper.

- Bleed brake hydraulic system.

- Press several times on brake pedal to bring brake shoes closer to disc until play is reduced to functional clearance value.

- Set car on its wheels. Tighten wheels.

- Adjust hand brake cable.

Fig. 15 4116



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REMOVAL PROCEDURE

- Unlock rear wheel.
- Set rear of car on pins, then remove wheel after marking its position.
- Disconnect hand brake cable from calliper.
- Unlock and remove screw fastening the yoke to the banjo trumpet tube (Fig. 15).
- Remove yoke, calliper, and brake shoes as assembled, without disconnecting flexible pipe (Fig. 16).

  Do not allow this assembly to hang from the end of the flexible tube.
- Remove brake disc (Fig. 17).



Fig. 16 4117

Checking the disc

Criteria for disc acceptance:

. Maximum warp for each friction face:
  . 1 mm on refacing machine,
  . 2 mm on car.

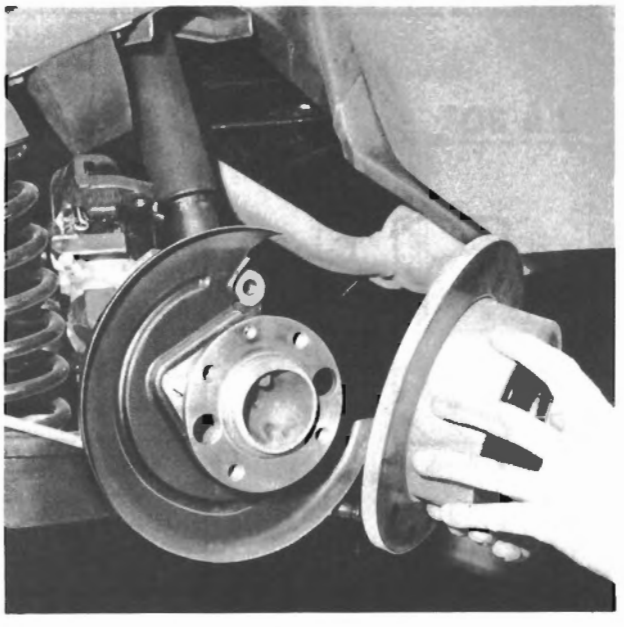
. Radial variation of thickness between friction faces: .05 maximum.

. Minimum disc thickness: 9 mm.

If the disc does not meet these requirements, it may be refaced, providing its thickness is greater than 9 mm.

If the disc, after refacing, and although it may meet the 9 mm minimum thickness requirement, still shows scratches or does not meet the acceptance criteria, it must be replaced.

Fig. 17 4118



RE-FITTING OPERATIONS

- Fasten disc to wheel shaft. Clean disc, if necessary.
- Fasten yoke, calliper, and brake shoes as assembled. Replace sheet metal retainer. Tightening torque 6.5 m da N.
- Re-connect hand brake cable.
- Set vehicle on its wheels. Tighten wheel.

  Note: If a disc (worn, for instance) is being replaced by a new disc, it may be that, owing to its greater thickness, fitting the yoke-calliper shoes assembly is found impossible. In this case, push piston back as indicated in the procedure for the "replacement of brake shoes".

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REMOVING AND RE-FITTING A REAR BRAKE YOKE

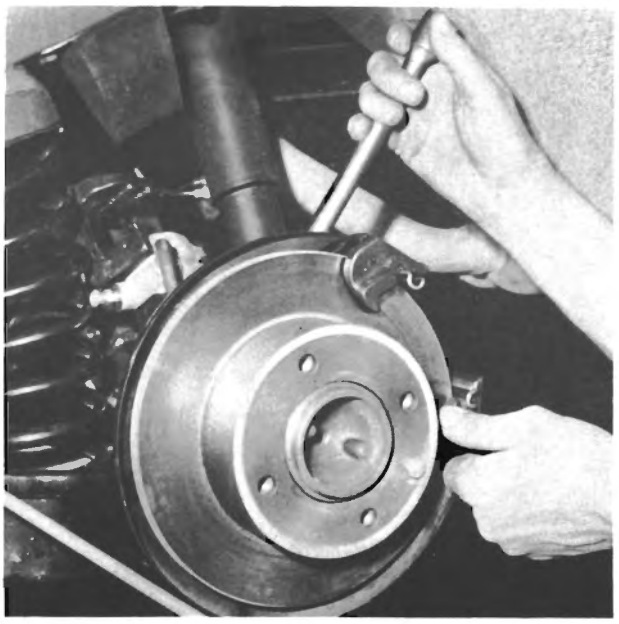


Fig. 18 4441

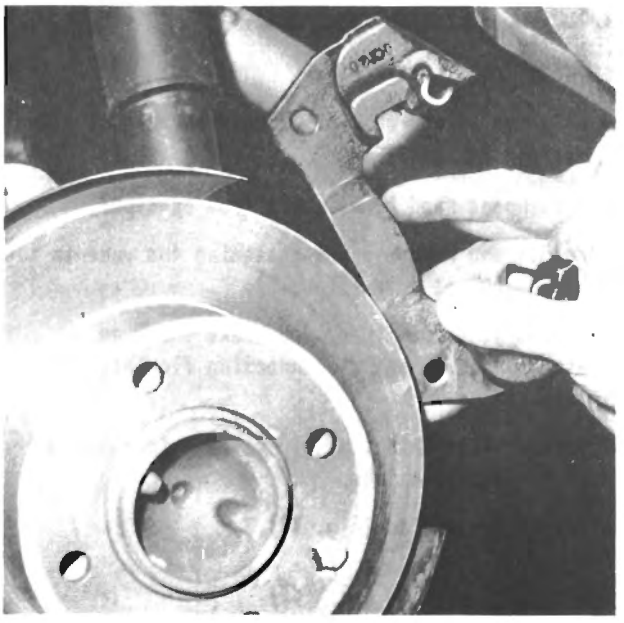


Fig. 19 4442

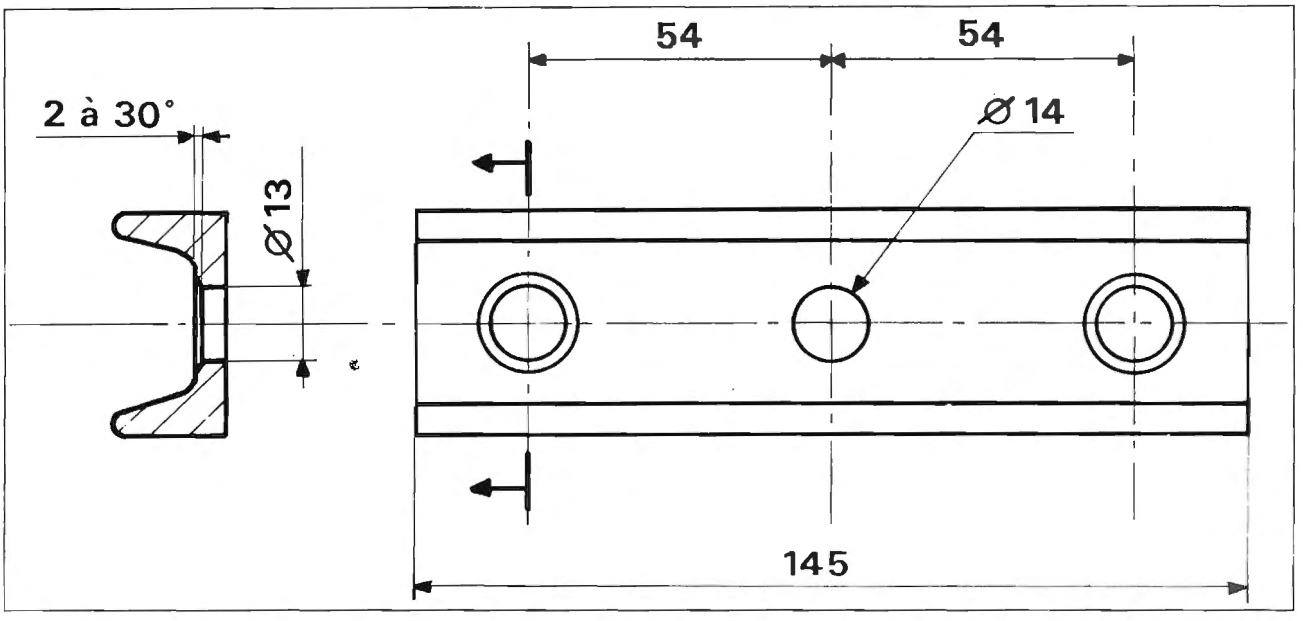
REMOVAL PROCEDURE

- Remove brake shoes. (See procedure for "Changing rear brake shoes").
- Unlock and remove screws fastening yoke to banjo trumpet tube (Fig. 18).
- Remove yoke (Fig. 19).

RE-FITTING OPERATIONS

- Fasten yoke to trumpet tube. Replace sheet metal retainer. Tightening torque 6.5 m da N.
- Lock the screws.
- Re-fit brake shoes. (See procedure for "Changing rear brake shoes").

Fig. 21 G.041



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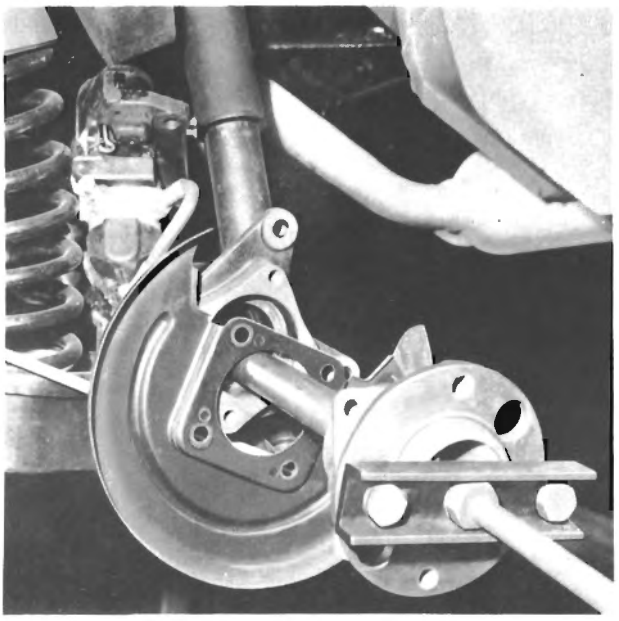


Fig. 20 4119

REMOVAL PROCEDURE

- Unlock rear wheel.
- Set rear of car on pins, then remove wheel after marking its position.
- Disconnect hand brake cable from calliper.
- Unlock and remove screws fastening the yoke to the banjo trumpet tube (Fig. 15).
- Remove yoke, calliper, and brake shoes as assembled, without disconnecting the flexible pipe (Fig. 16). Do not allow assembly to hang from end of flexible pipe.

Fig. 22 4120

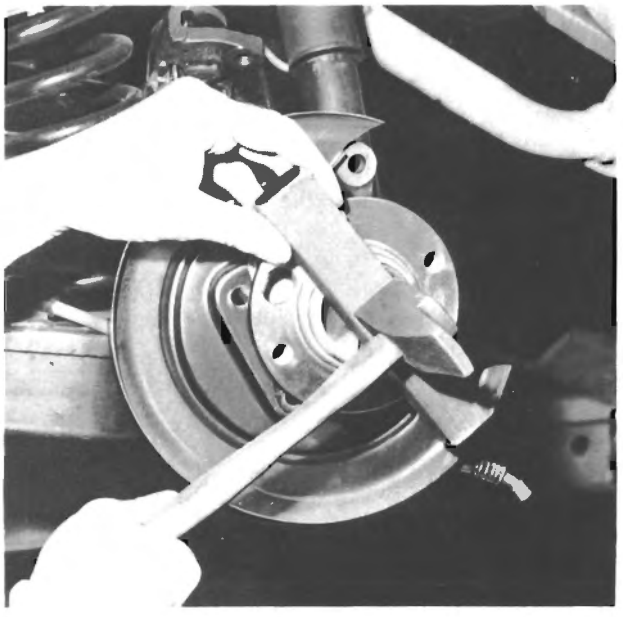




Fig. 23 4121

- Remove brake disc (Fig. 17).
- Remove 4 screws fastening splash shield to banjo.
- Remove wheel shaft (Fig. 10), using a Facom U 41 inertia extractor fitted with a plate made by the operator to the dimensions shown on Fig. 21.
- Remove brake splash shield.

RE-FITTING OPERATIONS

- Locate brake splash shield in position on banjo trumpet, then fit wheel shaft in trumpet (Fig. 22).
- Fasten brake splash shield and sheet metal flange to trumpet (Fig. 23). Tightening torque: 5 m da N.
- Fit disc.
- Fasten yoke, calliper, and brake shoes as assembled. Replace sheet metal retainer. Tightening torque 6.5 m da N.
- Re-connect hand brake cable.
- Set vehicle on its wheels. Tighten wheel.

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J5 - POWER BRAKE CONTROL

J5/I - Description of brake control

J5/I - Description of power brake (Master-Vac)

J5/I - Description of single circuit flap-valve master-cylinder

J5/I - Description of dual circuit master-cylinder

J5/I - Description of brake equalizer

J5/IV - Adjustment of brake equalizer

J5/V - Removing and re-fitting the single circuit master-cylinder

J5/V - Removing and re-fitting the power brake

J5/V - Removing and re-fitting the brake equalizer

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DESCRIPTION

Main control

The brake pedal which is suspended and articulated on the pedal set supporting bracket, actuates the power brake through an articulated control rod.

Pedal ratio: 3.8 to 1 approximately.

- The Bendix D.B.A. power brake (Master-Vac type), which is fastened to the pedal set supporting bracket inside the engine compartment, makes permanent use of the vacuum in the inlet manifold and of the atmospheric pressure in operation, and allows the pressure required on the pedal for deceleration to be reduced.
- The Lockheed D.B.A. master-cylinder:
  . of the single circuit type, dia. 19, stroke 31,
  . of the dual circuit type, dia. 20.6, stroke 30 (fitted on vehicles exported to certain countries),
  which is fastened to the power-brake and controlled by the latter, transfers the hydraulic pressure to the 4 wheels via "ARMCO" steel protected and flexible pipes.

  It is supplied in Lockheed H 55 fluid from a tank fitted directly on the master-cylinder body.
- The interlocked brake equalizer, which is connected to the R.H. upper suspension arm by means of an adjustable lever and a spring, allows the hydraulic pressure in the rear system to be distributed depending on the vehicle load and in proportion to each front system hydraulic pressure level.

Each braking system, i.e. :

. mixed discs and drums (for vehicles with 1600 c.c. engine), or

. 4 disc brakes (for vehicles with 1800 c.c. engine),

is fitted with a specific equalizer spring, the resilience of which is adapted to each case:

. spring for mixed system: no Ref. mark,

. spring for 4 disc brake system: coloured Ref. mark.

The adjustment dimension is identical for both systems: 202 mm.

Emergency or hand brake control

The hand brake system is comprised of:

- A manual lever articulated on the floor, and including:
  . a lever, a spring, and a brake latch,
  . a releasing push-button.
- A toothed segment allowing the lever to be locked in several positions by means of its latch.
- A rod, adjustable in length, which is interlocked at one end with the manual lever, and, at the other end, with the equalizer.
- A cable connecting the equalizer with both rear brakes.
- Two R.H. and L.H. sheaths, inside which the cable slides, each being fastened:
  . to the body, at front,
  . to the brake, at rear.

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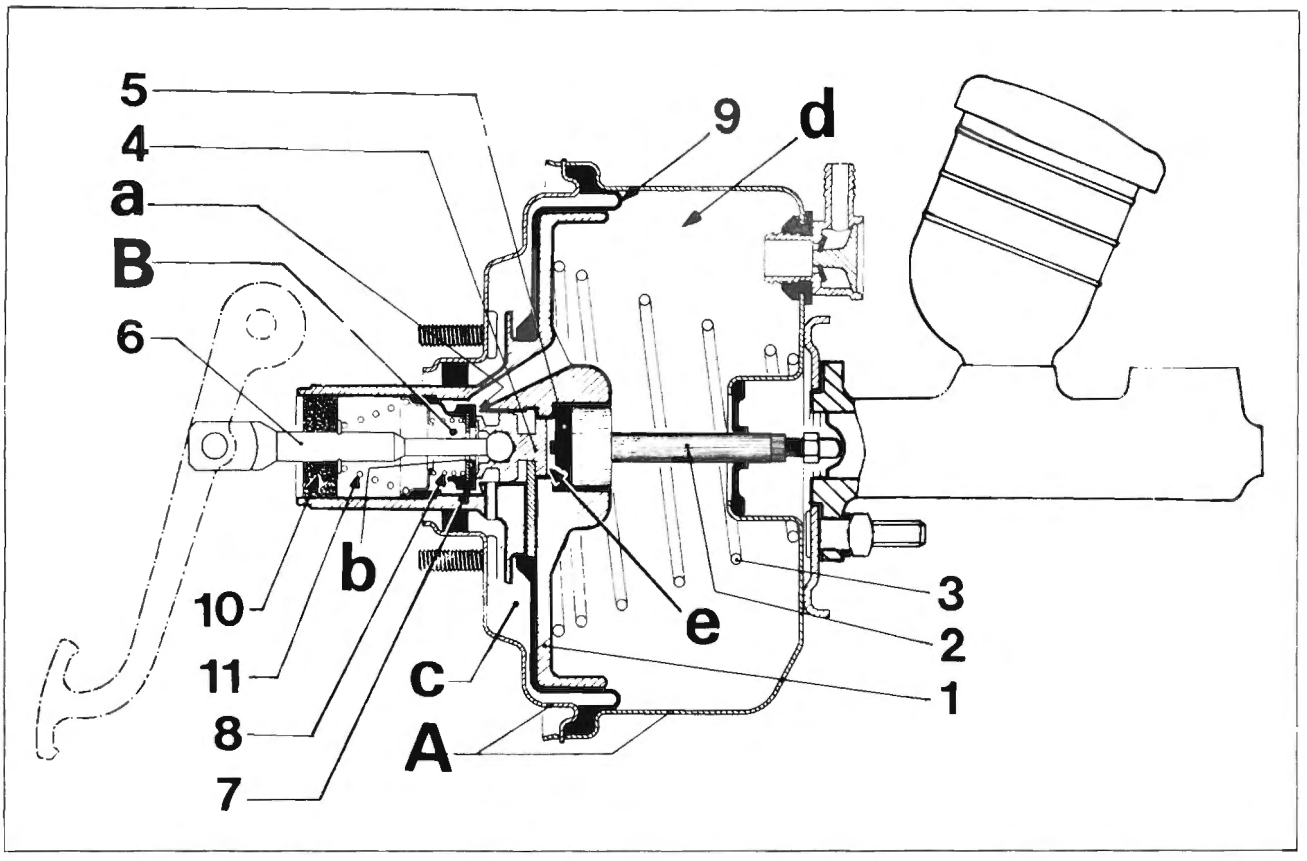


Fig. 1 G.060

Description (Fig. 1)

The power brake is comprised of two main units, as follows:

- A transmitter cylinder (A) comprised of:
  - . two half-shells,
  - . a driving piston (1),
  - . an hydraulic master-cylinder push-rod (2),
  - . a spring (3).
- A check valve (B) including:
  - . a plunger (4),
  - . a reaction plate (5),
  - . a vacuum hole (a),
  - . an opening to the atmosphere (b).

The check valve incorporated to the driving piston (1) is connected with the brake pedal by means of a control rod (6). This valve meters the degree of power-assistance or cancels it depending on the pressure applied on the brake pedal.

Operation

- Position of rest (Figs. 1 and 2)

When the vehicle is running, and the brakes are not being applied:

- . the opening to the atmosphere (b) is closed,
- . the vacuum hole (a) is open and allows the vacuum effect from the engine inlet manifold to be communicated between both chambers (d) and (c) on either side of diaphragm (9).

Diaphragm (9) of driving piston (1) is then balanced in a vacuum, and the latter is then held in the rest position by spring (3).

- Position of operation (Figs. 1 and 3)

When the driver presses on the brake pedal, control rod (6) pushes plunger (4), and the following occurs:

- . as a first stage, vacuum hole (a) is closed by flap valve (7) and its spring (8),
- . as a second stage, the opening to the atmosphere (b) is opened, which allows the air to enter chamber (c) through filter (10) and check valve (8).

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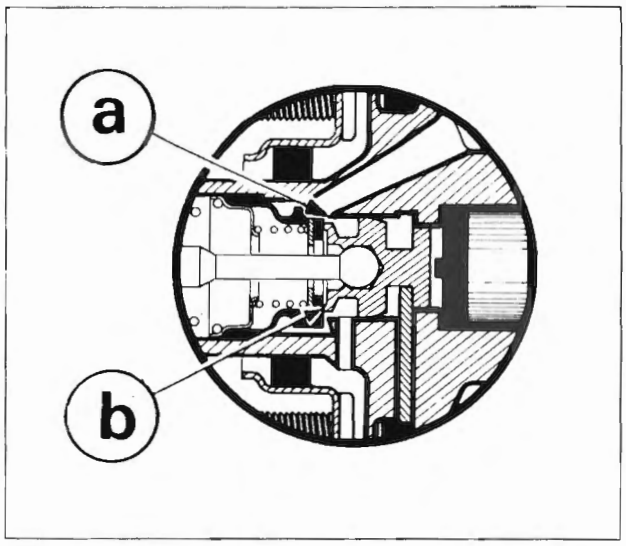


Fig. 2 G.061

The pressure differential, which is then established between both chambers (d and c), causes the displacement of driving piston (1) and push-rod (2), which actuates the hydraulic master-cylinder.

When hydraulic pressure is being applied by the master-cylinder, a force of reaction is applied against push-rod (2), then, through rubber reaction plate (5), against plunger (4), which tends to plug the opening to the atmosphere (b), and to open vacuum hole (a).

This force of reaction, which is opposed to the pressure applied by the driver on the brake pedal, allows the driver to control and evaluate the pressure he has to apply.

The force of reaction is in proportion to the hydraulic pressure present in the system.

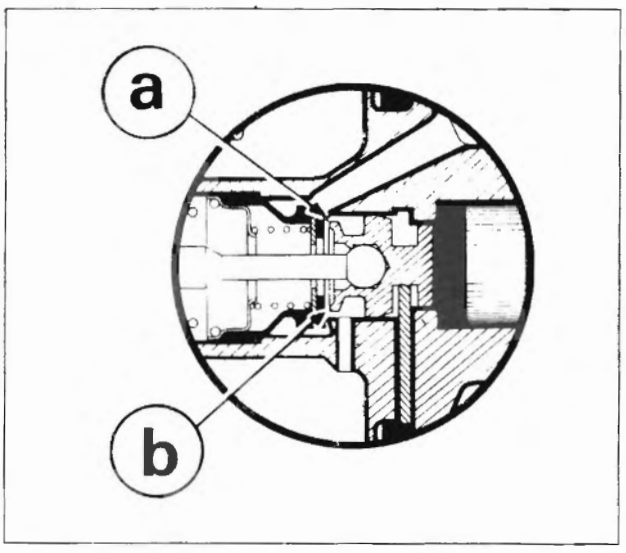


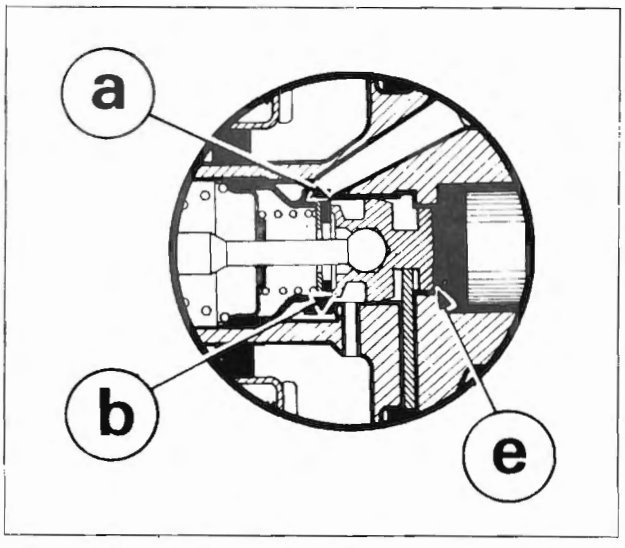
Fig. 3 G.062

- Holding position (Figs. 1 and 4)

During the braking operation, when the driver keeps the pressure constant on the brake pedal, the force of reaction compresses reaction plate (5), which changes shape, enters cavity (e), and pushes plunger (4) against flap valve (7).

When this displacement is achieved, both atmosphere and vacuum holes (a and b) are closed, and the power-brake is then said to be in the "holding position" or "balance position".

Fig. 4 G.063



- Return to rest position (Figs. 1 and 2)

When the brake pedal is released, control rod (6) driven back by its spring (11), drives also plunger (4), which then plugs opening to the atmosphere (b), and opens vacuum hole (a).

Then, both chambers (c and d) are again communicating, the vacuum effect is re-established on either side of driving piston (1) which, controlled by its spring (3), returns to its rest position.

Note: when the engine is not running, or in case of a break-down in the source of the vacuum, the master-cylinder is directly controlled through the combination of the control rod (6), plunger (4), reaction plate (5), and push-rod (2). It will be clear that braking, then, requires a greater pressure to be applied on the brake pedal.

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Description (Fig. 5)

The flap valve master-cylinder, also known as a central re-feeding master-cylinder, is comprised of:

- A cast iron body (A) including:
  . a bore,
  . a fastening flange,
  . a feeding boss (1), on which the equalizer tank is screwed, and which incorporates a fitted 4 mm dia. Mecanindus pin (2) providing a connection between the braking system and the equalizer tank,
  . a connection for the front brake system (3),
  . a connection for the rear brake system (4).
- A die-cast light alloy piston (B), comprised of:
  . a primary cup (5),
  . a secondary cup (6).

  A feature of this piston is that it incorporates a channel, which enables it to slide longitudinally over the Mecanindus pin, and a central drilling in its front section to accommodate flap valve (C).
- A flap valve (C) comprised of:
  . a bracket (7),
  . a spring (8).
- A piston return spring (D).
- An anti-emulsion valve (E) or residual pressure dummy valve.
  Note: this master-cylinder incorporates neither a snap-ring, nor a thrust washer. In the rest position, the piston bears against the Mecanindus pin.

Operation

When the driver presses on the brake pedal, piston (B) moves towards the bottom of the bore.

In so doing, it drives also primary cup (5) and flap valve bracket (7).

Flap valve (C), under the effect of its spring (8), remains stationary, and comes into contact with its seat (9).

During this first displacement, which is very short, there is no increase in pressure, and a small quantity of fluid is discharged through the piston central drilling, then via pin (2) towards the equalizer tank.

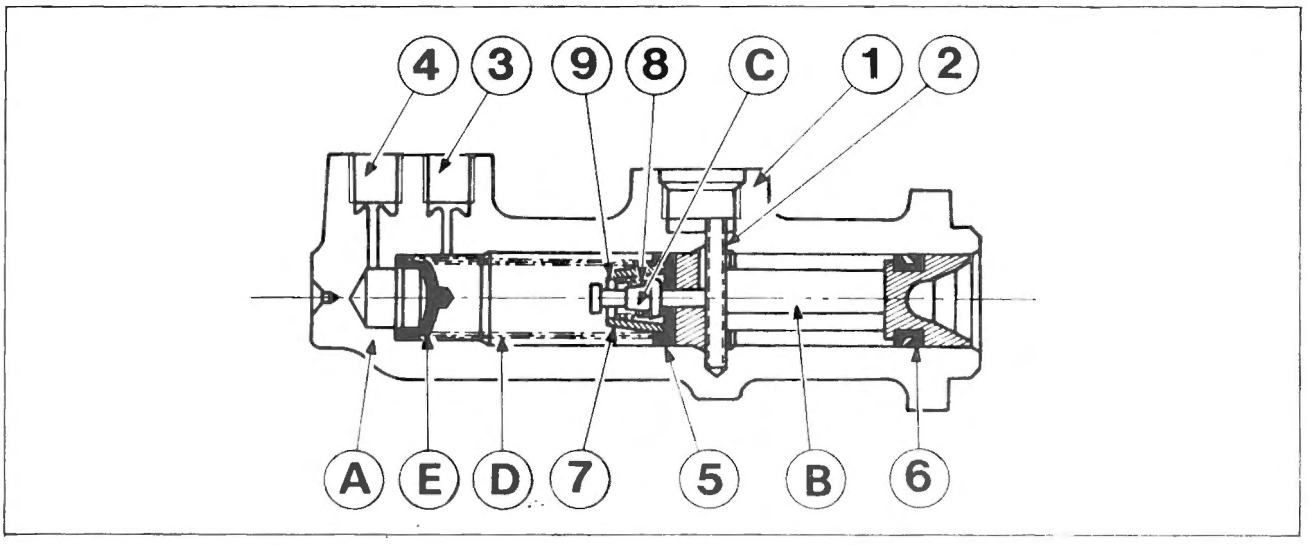
From that instant, the piston initiates a displacement of the column of fluid towards the receiver cylinders, and generates an increase in hydraulic pressure, which is in proportion to the pressure applied on the pedal.

When the brake is released, the hydraulic pressure is cancelled, the piston and flap valve return under the effect of return spring (D).

As a first stage, the vacuum, which is generated at that instant, opposes the force of flap valve spring (8); the flap valve, then, remains open, and the circuit is, therefore, made immediately complete: then, the piston reaches its rest position, the flap valve reaches its stop position, and provides a free communication between the supply system and the braking system.
Note: the flap-valve master-cylinder provides several improvements in relation to conventional master-cylinders.
It does not include an expansion hole, and the risk of scratches appearing on the primary cup is, therefore, eliminated.
As soon as the brake pedal is released, re-feeding takes place immediately through the flap valve opening, which reduces the vacuum considerably, and thus eliminates the risk of air penetrating in the system.

Fig. 5

G.064



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Description (Fig. 6)

This is comprised of two independent systems:

- (A) the primary system, controlling front brakes,
- (B) the secondary system, controlling rear brakes.

Each system includes a compression chamber, and a brake fluid supply system.

The dual feed type equalizer tank is fitted directly on the master-cylinder body. It includes an additional supply system, located on the front brake system vessel for the hydraulic control of the diaphragm clutch. The equalizer tank, which is fitted on automatic transmission vehicles, does not incorporate this additional supply system.

The master-cylinder rear system, which is fitted on vehicles with rear drum brakes only, includes a residual pressure valve.

Operation

When the driver presses on the brake pedal, piston (1) and cup (2) of the front system move towards the bottom of the bore. The head of fluid, present between front system piston (1) and rear system piston (3), also causes the latter to move towards the bottom of the bore.

The operation of these two systems is similar to the operation of a conventional single circuit master-cylinder.

Case of a fault in front system (a leak, for instance)

Pressure in the front system is nil; piston (1) therefore, moves, without any resultant hydraulic effect, until it comes into contact with sheet metal stop (4), which is interlocked with rear system piston (3).

Once this contact is established, rear system piston (3) moves, and initiates braking on the rear wheels in the usual manner. The rear system retains its full efficiency.

Case of a fault in rear system (e.g., a leak)

Pressure in the rear system is nil; both pistons move, without any resultant hydraulic effect, until rear system piston (3) comes into contact with bottom of bore. Once this contact is established, front system piston (1) continues to move, and initiates braking on the front wheels in the usual manner. The front system retains its full efficiency.

Note: Readers will remember that, in the case of a fault being present in one of these two systems, the "dead" stroke on the brake pedal is increased.

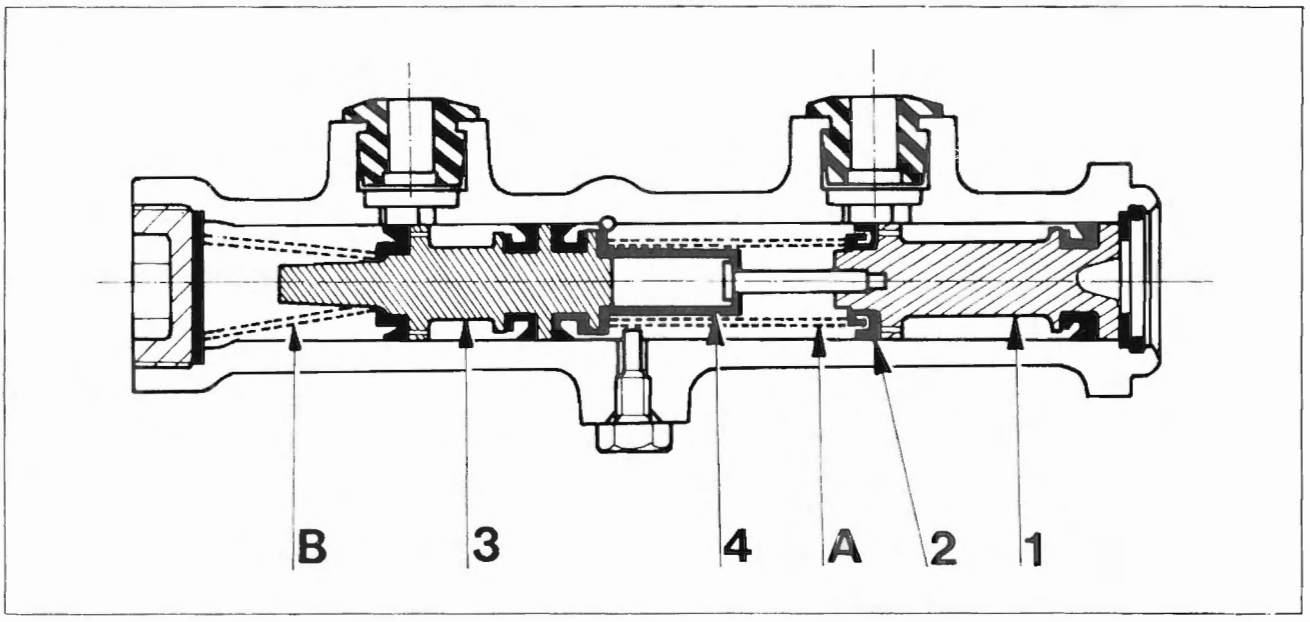
On the other hand, a "leak warning" device, which operates when there is a pressure differential between the front and rear systems, warns the driver of any abnormal pressure drop in one of the systems when braking.

This device includes a transmitter, fitted on the master-cylinder delivery pipes, and connected with a receiver fitted on the instrument panel, which incorporates an electric warning light.

The receiver includes a tumbler switch, which allows the proper operation of the electric bulb to be checked by direct earthing.

Fig. 6

G.065



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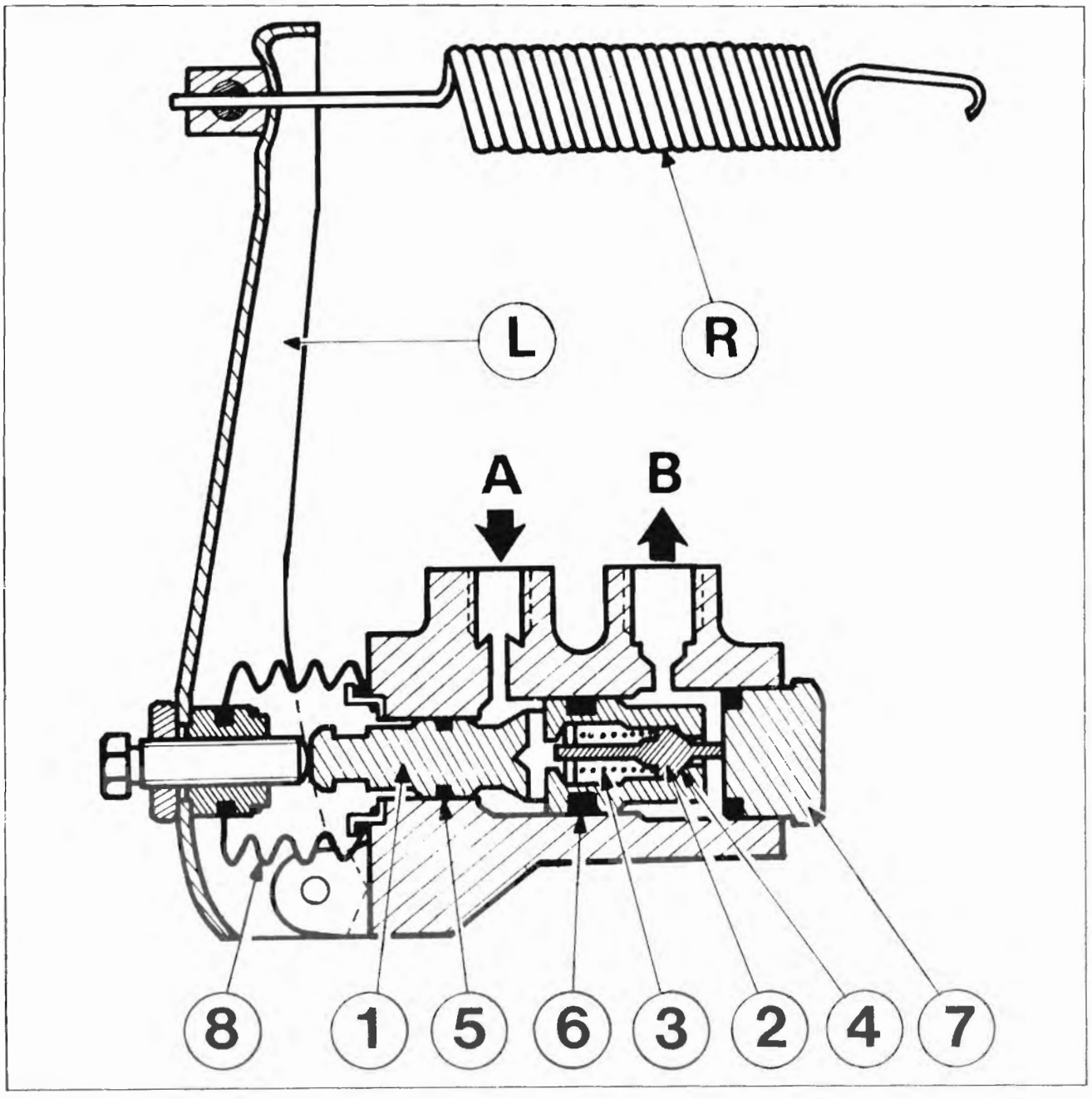


Fig. 7 G.066

Description (Fig. 7)

The interlocked equalizer includes:

- A body incorporating:
  . an inlet hole (A) from the master-cylinder,
  . an outlet hole (B) to the rear brakes

  A multiple stage piston (1) including a machined cavity to accommodate a flap valve (2) held by a spring (3) on a seat (4) made integral with the multiple stage piston.

- A ring seal (5) providing the required outer sealing between piston (1) and the body.
- A ring seal (6) providing the required inner sealing between the body and piston (1).
- A sealing cap (7).
- A dust cover (8)

The equalizer is connected with the R.H. rear suspension arm by means of a spring (R), and an adjustable lever (L).

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Operation

- Rest position:

Lever (L) actuates piston (1) through spring (R). It transmits a force F1, which is proportional to the load carried by the rear axle.

Flap valve (2) is then opened, and hydraulic communication is achieved between (A and B) (Fig.2).

- Braking:

I. - When the driver presses on the brake pedal, hydraulic pressure in the whole system is increased. As soon as the pressure from the master-cylinder applies against section S2 a force F2 sufficient to overcome force F1, piston (1) made integral with seat (4) moves in the direction of F2 (Fig. 8). As a result of this:

- . Flap valve (2) closes against its seat (4) (Fig. 9),
- . Hydraulic communication between (A and B) is interrupted,
- . A limited pressure is established in the rear system in accordance with the ratio between the sections of the multiple stage piston (1).

II. - At that instant, a new increase in hydraulic pressure causes a force F3 to be applied against annular section S - S3 - S2 of multiple stage piston (1) (Fig. 3). Multiple stage piston (1) slides in the direction of force F3.

Flap valve (2) then opens (Fig. 10) and re-opens the communication between (A and B), which allows a new hydraulic pressure increase to take place in the rear system.
However, instantaneously, force F4, resulting from the hydraulic pressure, applied against section S2, causes multiple stage piston (1) to slide again, which causes flap valve (2) to close. The piston is then in the same position (flap valve closed) as in paragraph I, but with the essential difference that pressure in the rear system has increased in relation to the first closing of flap-valve (2).

III. - Any new hydraulic pressure increase will cause a new displacement of piston (1) (flap-valve (2) opening) as described under paragraph II.
The increase of pressure in the rear system, until maximum deceleration is achieved, proceeds, therefore, following a certain number of cycles similar to the cycle described above.

- Return to rest position (Fig. 8)

When the brake pedal is released, hydraulic pressure decreases piston (1) returns to its position under the effect of force F1 applied by lever (L) and its spring (R). Flap-valve (2) opens, and hydraulic communication is achieved between (A and B).

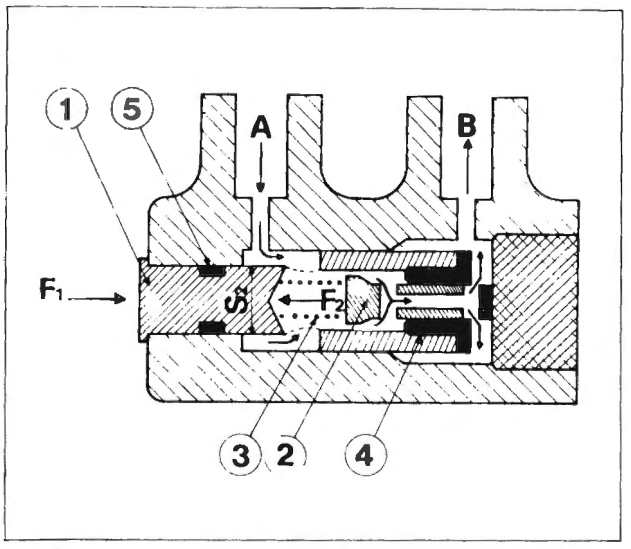


Fig. 8 G.067

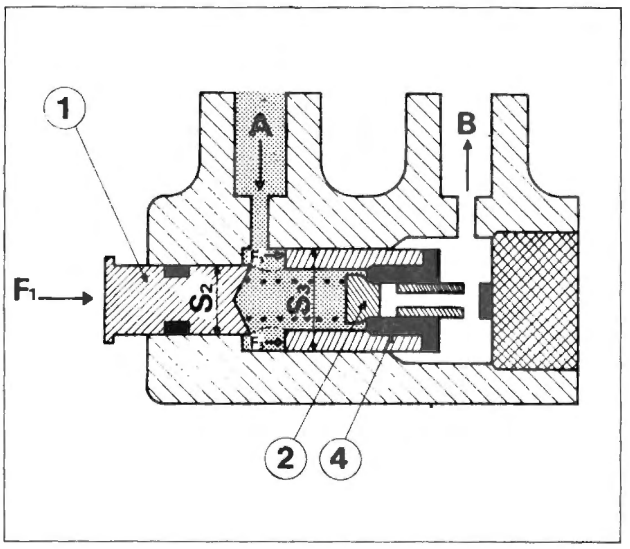
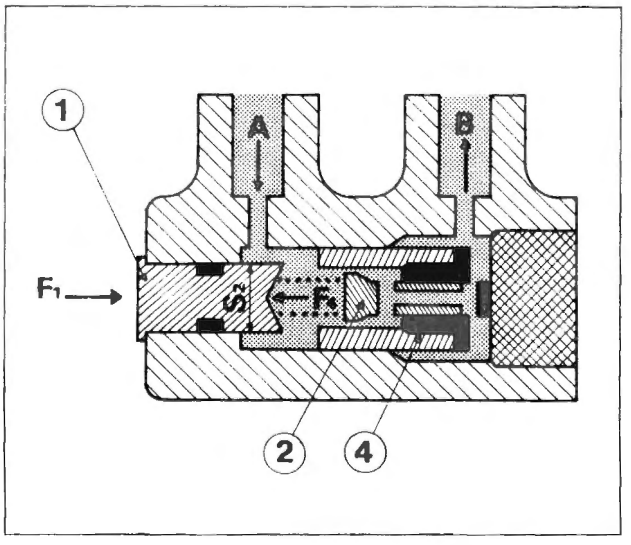


Fig. 9 G.068

Fig. 10 G.069



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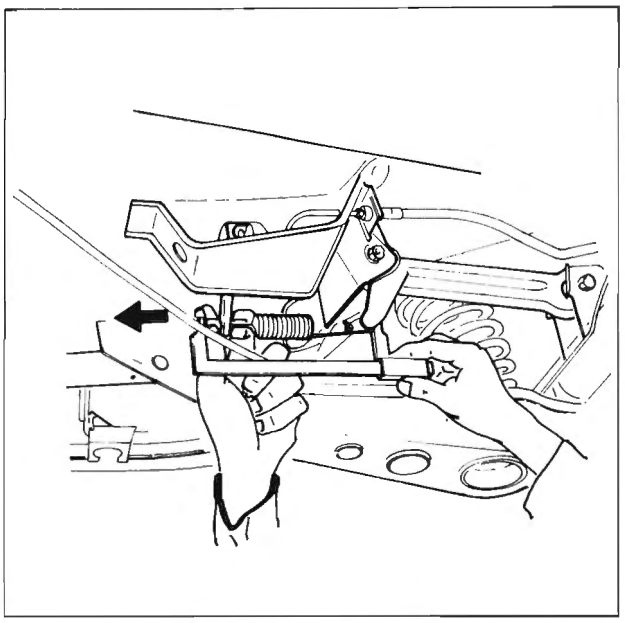


Fig. 1 G.070

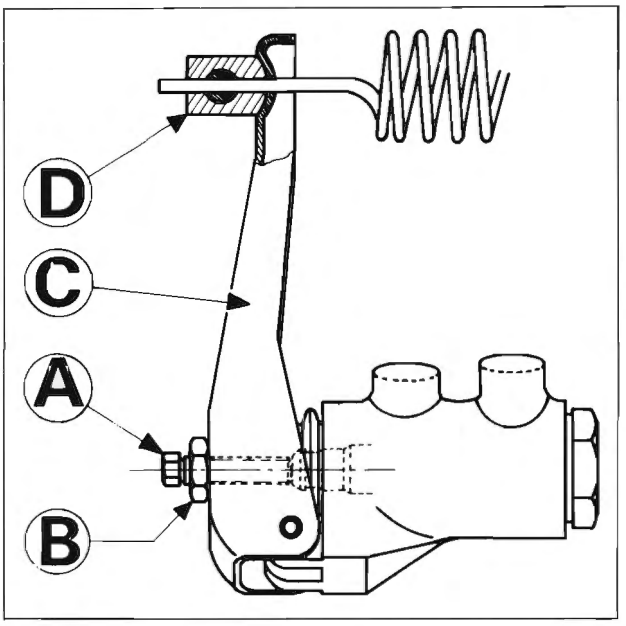


Fig. 2 G.071

Adjustment of brake equalizer

- This adjustment operation is required whenever any of the following components is being replaced:
  - . brake equalizer,
  - . equalizer spring,
  - . rear suspension R.H. upper arm.

Measuring the equalizer adjustment dimension must be carried out, with the vehicle unloaded, as follows:

- Use a slide square to measure the dimension as shown on Fig. 1. This dimension must be 202 mm; the spring linkage assembly must be in alignment, and, consequently, the contiguous turn spring must not be extended.

If the braking effect is predominantly applied on the rear wheels, the tension of the equalizer spring must be released by loosening adjustment screw (A) (Fig. 2).

If braking on the rear wheels lacks in efficiency, the equalizer spring tension must be increased by screwing in adjustment screw (A). After each adjustment operation, tighten lock-nut (B) whilst holding adjustment screw (A) in position.

Note: the reduction ratio of equalizer lever (C) is of approximately 6 to 1.

The adjustment screw has a diameter of 7 x 100. A turn of the adjustment screw, therefore, corresponds to a spring displacement of approximately 6 mm.

Never use spring fastening head (D) to adjust the equalizer.

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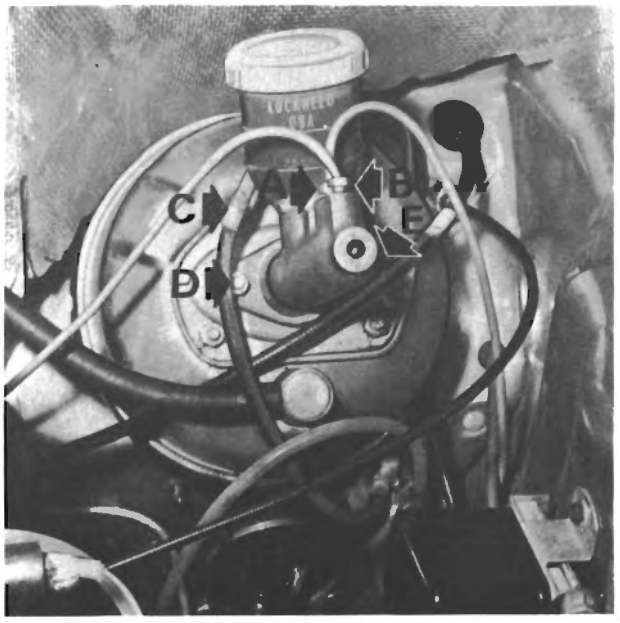


Fig. 1 4419

REMOVAL PROCEDURE

- Use a syringe to drain equalizer tank.
- Disconnect brake tubes from master-cylinder (A and B) (Fig. 1).
- Disconnect clutch release master-cylinder supply tube (C) from equalizer tank (except on automatic transmission model).
- Remove nuts (D and E) fastening master-cylinder to power-brake.
- Remove brake master-cylinder.
- Remove equalizer tank if master-cylinder is being replaced.

RE-FITTING OPERATIONS

- Fasten equalizer tank to master-cylinder. Tighten torque .7 m da N.
- Fasten master-cylinder to power brake.
- Connect clutch release master-cylinder supply tube to equalizer tank (except on automatic transmission model).
- Connect brake tubes to master-cylinder:
  - . tube (A) for rear brakes to front connection
  - . tube (B) for front brakes to rear connection
- Bleed brakes.

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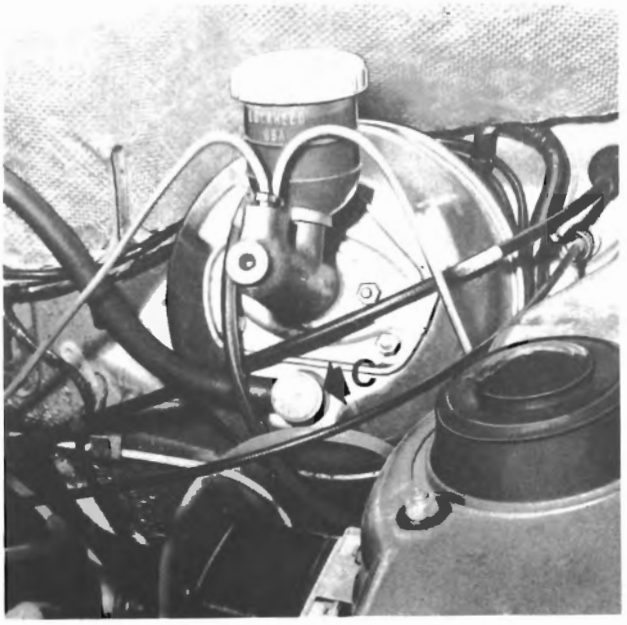


Fig. 2 4420

REMOVING THE POWER BRAKE

- Remove nuts fastening master-cylinder to power brake (Fig. 2).
- Extract master-cylinder from power brake, without disconnecting brake tubes.
- Disconnect vacuum pipe from power brake connection (C).
- Remove push rod spindle (D) from brake pedal (Fig. 3).
- Remove 4 nuts (E) fastening power brake to dash panel.

Fig. 3 4421

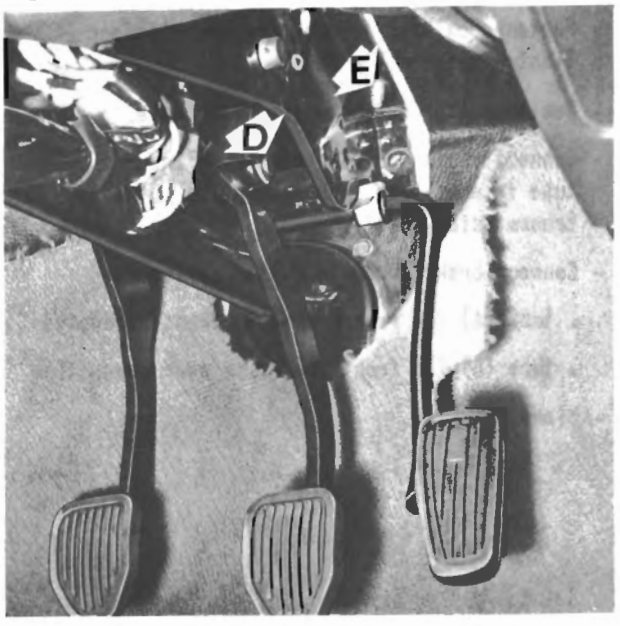




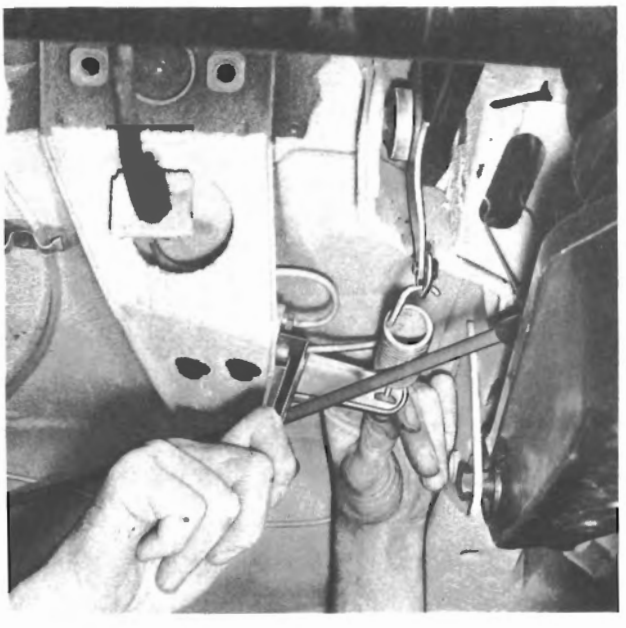
Fig. 4 4059

- Remove power brake, taking care not to damage brake master-cylinder tubes.

RE-FITTING THE POWER BRAKE

- Fasten power brake to dash panel.
- Connect push rod to brake pedal.
- Connect vacuum pipe to power brake.
- Fasten master-cylinder to power brake.

Fig. 5 4422



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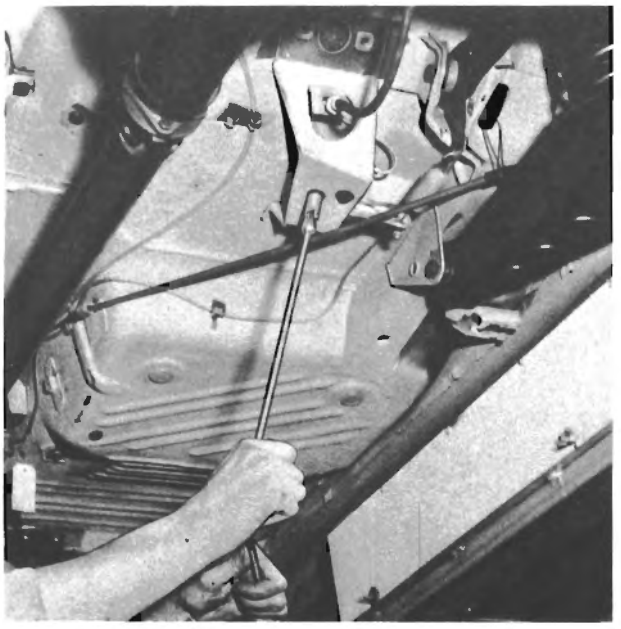


Fig. 6 4423

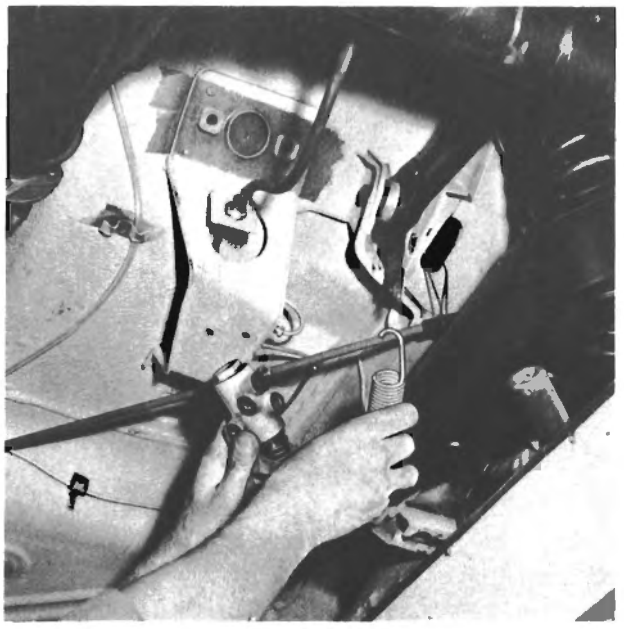


Fig. 7 4424

REMOVAL PROCEDURE

- From inside, use a taper punch or a tapering piece of wood (Fig. 4) to plug the equalizer tank lower hole.
- Disconnect brake tubes from equalizer.
- Extract fastener retaining the flexible pipe to allow the rear tube to be cleared from its opening on the equalizer, without bending it (Fig. 5).
- Remove screws fastening equalizer to bracket (Fig. 6).
- Remove equalizer with its spring (Fig. 7).

RE-FITTING OPERATIONS

- Locate equalizer in position on its bracket, and anchor spring to suspension arm.
- Fasten equalizer to its bracket.
- Re-connect brake tubes:
  . rear brake tube to equalizer rear opening,
  . master-cylinder supply tube to equalizer front opening (see Fig. 7 - section J5/1).
- Fit fastener holding flexible pipe to body.
- Bleed brakes.
- Adjust brake equalizer.

Note:

The equalizer lever spring must never be removed. The useful length of the spring is, indeed, preset by the suppliers.

Consequently, the equalizer, its lever, and its spring are supplied as a Spare Part assembly.

On the other hand, each braking system, whether mixed or with 4 disc brakes, is fitted with an equalizer assembly, which includes a spring with a resilience adapted to each type:

. spring for mixed system: no reference mark,

. spring for 4 disc brake system: coloured reference mark.

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K1 - WIRING DIAGRAM

K1/I - Basic wiring diagram 1971

K1/I - Partial wiring diagram 1971, specific for Automatic

K1/I - Partial wiring diagram 1971, specific for Germany

K1/I - Partial wiring diagram 1971, specific for Austria

K1/I - Partial wiring diagram 1971, specific for Denmark

K1/I - Partial wiring diagram 1971, specific for Italy

K1/I - Partial wiring diagram 1971, specific for Finland-Lebanon

K1/I - Partial wiring diagram 1971, specific for Norway

K1/I - Partial wiring diagram 1971, specific for Sweden

K1/I - Partial wiring diagram 1971, specific for Switzerland

K1/I - Partial wiring diagram 1971, specific for Czecho-slovakia

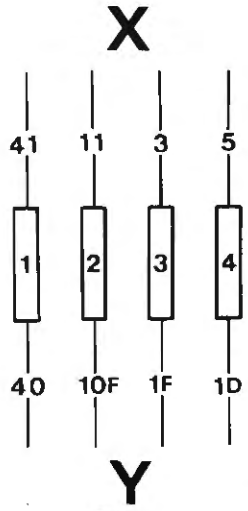
K1/V - Removing and re-fitting the harness

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Basic wiring diagram 1971

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ITEM	Qty.	LOCATION		POWER
		Car	Diagram	
Battery	1	in engine compartment, at left	(F)	12 V - 40 A/h
Dipped headlight	2	front face panel	(A)	40 W
Main beam	2	front face panel	(A)	45 W
Dipped signalling	2	front face panel	(A)	40 W
Front side light	2	under front bumper	(B)	5 W
Rear side light	2	back panel	(C)	5 W
Number plate light	1	back panel	(D)	5 W
Cluster light	1	cluster (X)	(XD)	3 W
Side light indicator light	1	cluster (X)	(XJ)	3 W
Front trafficator	2	under front bumper	(B)	21 W
Rear trafficator	2	back panel	(C)	21 W
Trafficator indicator light	1	cluster (X)	(XC)	3 W
Trafficator switch	1	L.H. 'A' post inner	(R)	42 W
Stop light	2	back panel	(C)	21 W
Reversing light 160, 160 GT, 180	2	back panel	(C)	15 W
Charge indicator light	1	cluster (X)	(XF)	3 W
Main beam indicator light	1	cluster (X)	(XE)	3 W
Oil pressure warning light	1	cluster (X)	(XB)	3 W
Minimum fuel warning light	1	cluster (X)	(XH)	3 W
Water temperature indicator	1	cluster (X)	(XA)	-
Fuel gauge	1	cluster (X)	(XG)	-
Electric clock 160, 180	1	cluster (X)	(YB)	-
B-C post roof light	1	B-C Post	(T)	4 W
Luggage trunk light 180	1	Luggage trunk	(TB)	4 W
Glove box light 160	1	glove box	(UE)	4 W
Air conditioner control light	2	on control plate	(XK) (XL)	1.2 W
Cigar lighter 180	1	near air-conditioner control	(MA)	-
Windscreen-wiper motor	1	under cowl panel	(P)	-
Air-conditioner motor	1	in conditioner unit under instr.panel	(Q)	-
W-washer electric pump	1	on L.H. front wheel-arch	(PA)	-
Fan electro-magnet) 160 GT	1	in fan	(EH)	-
Choking-coil on carburettor) and 180	1	on carburettor	(GA)	-
Starting motor	1	on clutch bearing	(H)	-
Starting safety relay	1	on L.H. front fender flange	(HB)	-
Alternator	1	in engine compartment	(HA)	-
Regulator	1	on L.H. front wheel-arch	(I)	-
HF horn 160, 160 GT	2	on radiator R.H. side panel	(ED)	-
Electro-magnetic horn 180	2	on radiator R.H. side panel	(ED)	-
Revolution indicator 160 GT, 180	1	in cluster	(YC)	-
OPTIONS				
- Heated backlight on 160 & 160 GT, standard on 180				
Heating grid	1	back light	(ZA)	110 W
Heated backlight relay	1	on R.H. 'A' Post inner	(EI)	-
Backlight indicator light	1	switch (VS)	in (VS)	2 W
- Iodized headlight on 160, 160 GT, 180				
Iodized headlight	2	main beam/dipped headlight	(AB)	55 W iodiz
Main beam	2	front face panel	(A)	45 W
Main beam and iodized headlight relay	1	L.H. front fender flange	(EG)	-



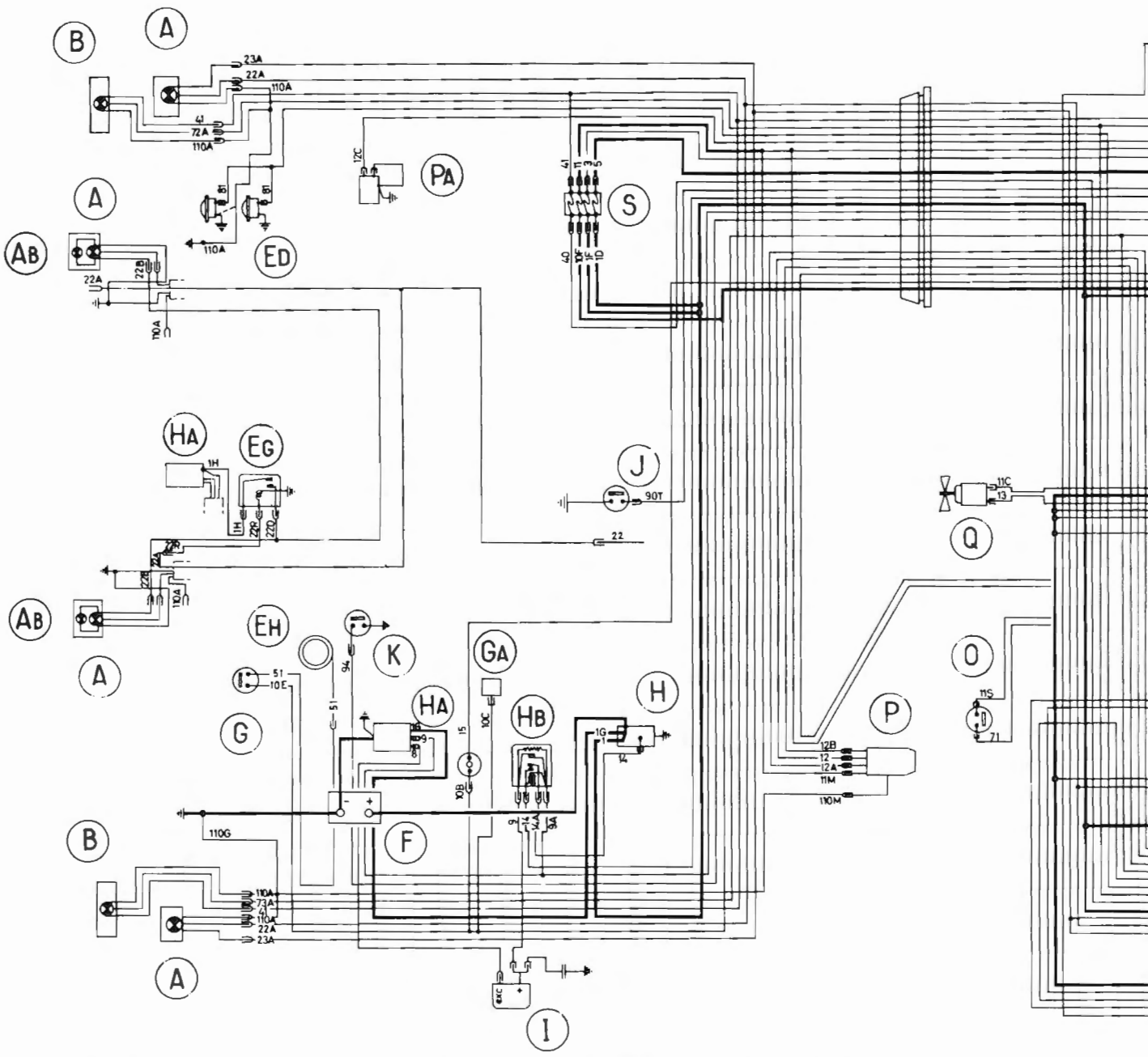
Fuse box
(item S on diagram)

X : before fuse box
Y : after fuse box
41 : green
40 : white - green
10F and 11 : grey
3 : white
1F : red - white
5 : white - red
1D : red

Light Colours	Wire Numbers	CONTROL	PROTECTION
yellow	23A, 110A	on combined switch under steering wheel	
yellow	22A, 110A	on combined switch under steering wheel	
yellow	23A, 110A	by lifting dipped/main beam control	
white	41, 110A	on combined switch under steering wheel)	fuse 1
red	41	on combined switch under steering wheel)simultan-	fuse 1
white	41	on combined switch under steering wheel) eous	fuse 1
white	60, 110B	on combined switch under steering wheel + rheostat(VJ))control	fuse 1
green	60, 110B	on combined switch under steering wheel + rheostat(VJ))	fuse 1
white	73A, 72A, 110A	lever on combined switch)	fuse 2
orange	73A, 72A	lever on combined switch) simultaneous	fuse 2
green	70T, 110B	lever on combined switch) control	fuse 2
-	11F, 70, 70T, 110	lever on combined switch)	fuse 2
red	71A	switch (O) on pedal set	fuse 2
orange	33A	switch (AD) on gear box	fuse 2
red	9T, 11B	common with alternator function (HA)	fuse 2
white	22T, 110B	common with main beam function	
red	90T, 11B	pressure switch (J) on engine	fuse 2
red	11B, 93T	gauge (Z) on tank	fuse 2
-	11B, 110B, 94	thermistor (K) on engine	fuse 2
-	11B, 92, 110B	gauge (Z) on tank	fuse 2
-	4, 110B	by + before ignition	fuse 3
white	3P, 132	manual switch or door switch (TD) (TE)	fuse 3
white	3P, 132	luggage trunk switch (TF)	fuse 3
white	3P	glove box switch (TG)	fuse 3
white	41, 110B	combined switch under steering wheel	fuse 1
-	110D, 5	push-button	fuse 4
-	11M, 12, 12A, 12B, 110M	control lever on combined switch (VB)	fuse 2
-	11C, 13	rheostat (QA) on control plate	fuse 2
-	12C	control lever on combined switch (VB)	fuse 2
-	51	thermo-switch (G) on radiator	
-	10C	by + after ignition	
-	1G, 1, 14	anti-joy ride contactor (W) starting position	
-	9, 9A, 14, 14A	charge circuit	
-	1G, 8, 9	engine	
-	8, 9	alternator voltage	
-	81, 110A	end of dipped/main beam lever	
-	81, 110A	end of dipped/main beam lever	
-	15, 110B	breaker in ignition distributor	
-	110B, 10L	switch with indic. light (VS) + relay (EI)	movable fuse 15A
-	1L, 10R, 10L	switch with indic. light (VS)	
red	101, 110H	switch with indic. light (VS)	
yellow(France)	22B	lever on combined switch + relay (EG)	
yellow(France)	22B	lever on combined switch + relay (EG)	
-	1H, 22R, 22D	lever on combined switch main beam position	

Basic wiring diagram 1971

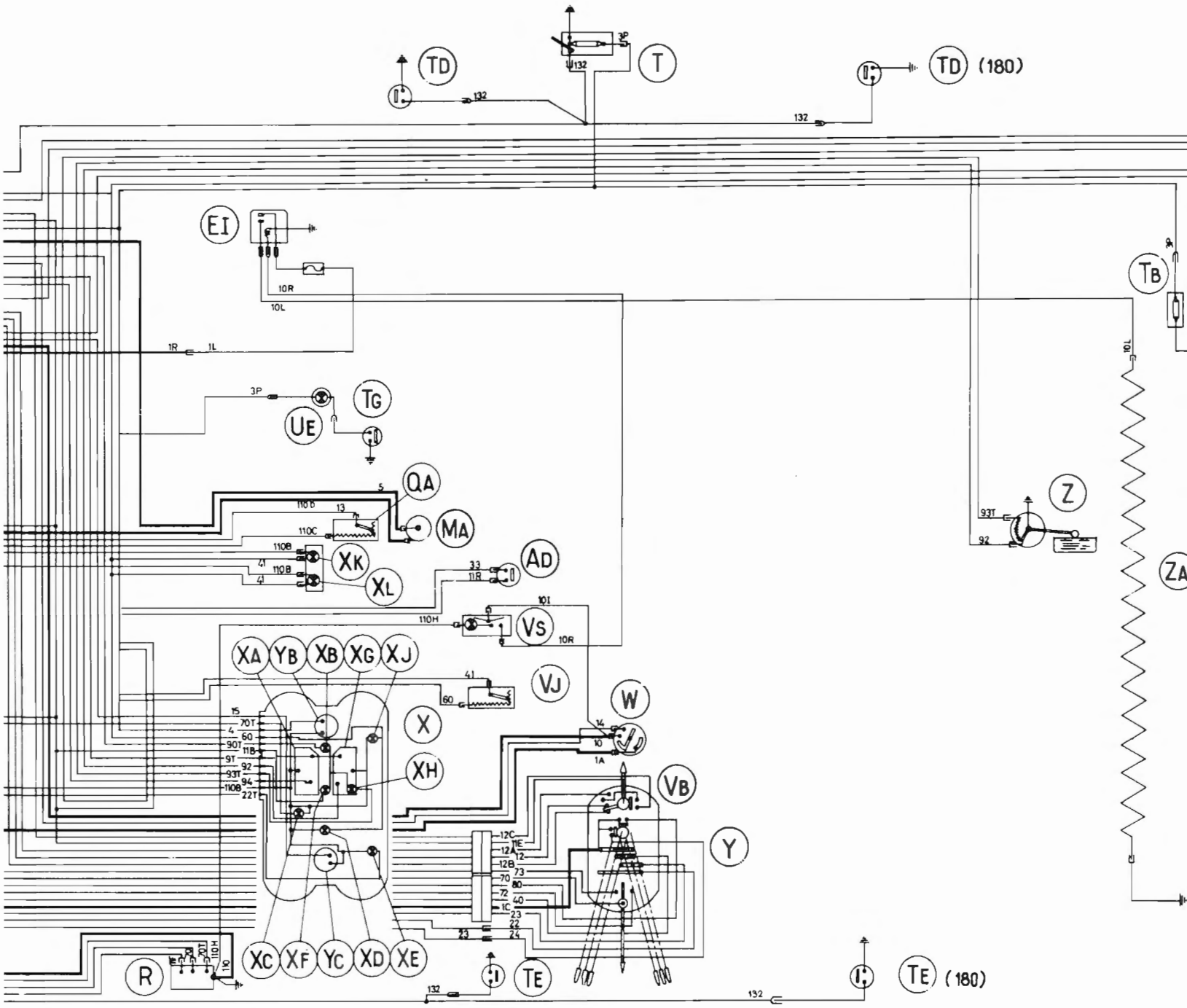
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Wire No.	COLOUR		Section in mm2
	Main	Secondary	
1	Red		7
1A	Red		3
1C	Red		3
1D	Red		1.4
1F	Red	White	2
1H	Red		3
1L	Red		3
1R	Red		3
3	White		0.6
3P	Red	White	0.6
4	White	Red	0.6
5	White	Red	1.4
8	Red	Yellow	1
9	Red	Blue	1
9A	Red	Green	1

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
9T	Red	Green	1
10	Grey		3
10B	Grey		1
10C	Grey		1
10E	Grey		1
10F	Grey		2
10I	Grey		0.6
10L	Grey	Blue	3
10R	Grey	Green	0.6
11	Grey		2
11B	Grey		0.6
11C	Grey		1
11E	Grey		1
11F	Grey		1
11M	Grey	Red	1

Wire No.	COLOUR	
	Main	Second
11R	Grey	
11S	Grey	
12	Grey	White
12A	Grey	Blue
12B	Black	Grey
12C	Grey	Yello
13	Grey	Yello
14	Grey	Black
14A	Grey	Grey
22B	Blue	
22D	Blue	
22	Blue	
22A	Blue	
22T	Blue	
22R	Blue	Green-r
		Blue-ha

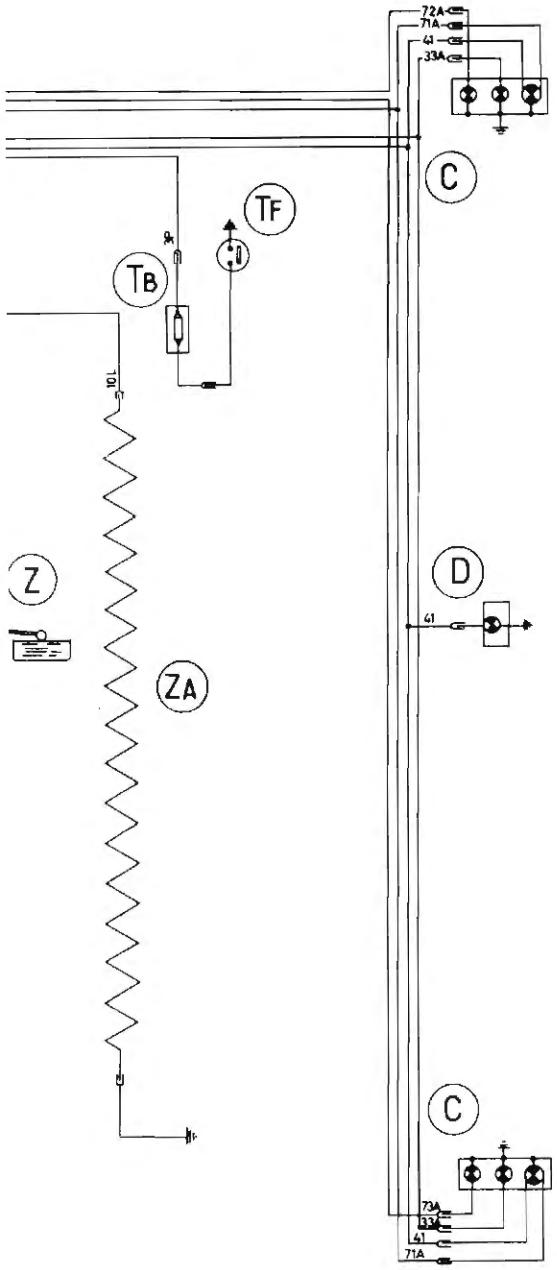


	Section in mm2
ondary	
	1
	1
ite	1
ue	1
ey	1
llow	1
llow	1
ack	2
ey	2
	2
	3
	?
	!
	0.6
relay side	0.6
arn. side	

Wire No.	COLOUR			Section in mm2
	Main	Secondary	Additional	
23	Blue	Yellow		2
23A	Blue	Yellow		1
24	Blue	Blue	Yellow	2
33	Blue	Grey		1
33A	Blue	Grey		0.6
40	White	Green		0.6
41	Green			0.6
51	Green	White		1
60	Brown			0.6
70	White	Brown		1.4
70T	White			0.6
71	White	Purple		1
71A	White	Purple		0.6
72	White	White	Green	1
72A	White			0.6

Wire No.	COLOUR			Section in mm2
	Main	Secondary	Additional	
73	White	White	Red	1
73A	White			0.6
80	White	Blue		2
81	White	Blue		1
90T	Yellow	Black		1
92	Yellow	Red		0.6
93T	Yellow			0.6
94	Yellow	White		1
				1.4 - 160
110	Black			160 GT
				3 - 180
110A	Black			1
110B	Black			0.6
110C	Black			1
110D	Black			1.4

Wire No.	C
	Main
110G	Black
110H	Black
110M	Black
132	Black



Wire No.	COLOUR			Section in mm2
	Main	Secondary		
110G	Black			2
110H	Black			0.6
110M	Black			1
132	Black			0.6

REMOVING THE HARNESS

In engine compartment

- Disconnect battery.
- Remove upper horn.
- Disconnect main beam, dipped headlight, side light, trafficator, and earthing wires.
- Disconnect windscreen-washer electric pump.
- Clear harness from R.H. front fender flange.
- Disconnect and remove fuse box
- Disconnect the following wires:
  - thermo-switch on radiator,
  - alternator and regulator,
  - starting motor locking relay,
  - oil pressure switch,
  - thermistor,
  - starting motor,
  - releasable fan.
- Clear harness from L.H. front fender flange.
- Disconnect windscreen-wiper motor.

From under the vehicle

- Disconnect fuel gauge and reversing light contactor wires.

In passenger compartment

- After clearing harness from dash panel, clear engine harness through grommet on R.H. side.
- Remove instrument panel (see L1 45 procedure).
- Remove cowl board and R.H. side door sill embellisher.
- Disconnect defrosting back light relay, and R.H. front door switch.
- Remove roof light, attach roof light supply wires to a length of approximately 2 m of metal wire, and extract wire through 'A' post lower inner panel, unfasten metal wire.
- Strip lower part of 'B-C' post, and disconnect R.H. rear door switch.
- Remove rear seat and rear seat back.
- Remove parcel tray, and strip R.H. three-quarter panel.
- Disconnect luggage trunk light.
- Remove defrosting nozzles.
- Disconnect combined switch, stop light contactor, trafficator main switch.
- Clear harness from air-conditioner.
- Remove L.H. door sill embellisher and cowl board.
- Strip lower part of 'B-C' post.
- Disconnect L.H. door switch wires.
- Clear harness from behind steering column.

In luggage trunk

- Disconnect rear lights; clear harness from back panel and R.H. rear fender.
- Clear seat back board on R.H. side.
- Clear harness at three-quarter panel level.
- Recover harness from luggage trunk, and pull it in passenger compartment.
- Remove harness.

RE-FITTING OPERATIONS

- To re-fit harness, proceed in reverse order from removal operations.

  Note: to remove harness from 160 and 160 GT models, it is necessary neither to remove the rear door sill embellishers, nor to strip the lower sections of R.H. and L.H. 'B-C' posts, since these vehicles are not fitted with rear door switches.

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Partial wiring diagram 1971 specific for "Automatic"

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ELECTRICAL EQUIPMENT

ITEM	Qty.	LOCATION		Power	Light Colours	Wire Numbers	CONTROL	PROTECTION
		Car	Diagram					
Starting motor relay	1	R.H. 'A' post inner	(EH)	-	-	1W, 14, 14B, 116	contactor (W) + contactor (WA) on gear box	
Starting motor	1	converter housing	(H)	-	-	14 and + battery	starting relay (EH)	
Reversing lights	2	back panel	(C)	15 W	orange	33A	contactor (WA) on gear box position R	fuse 2
Gear selection light	1	selector panel	(XI)	1.2 W	white	10V, 110V	+ after ignition	

COLOUR OF WIRES

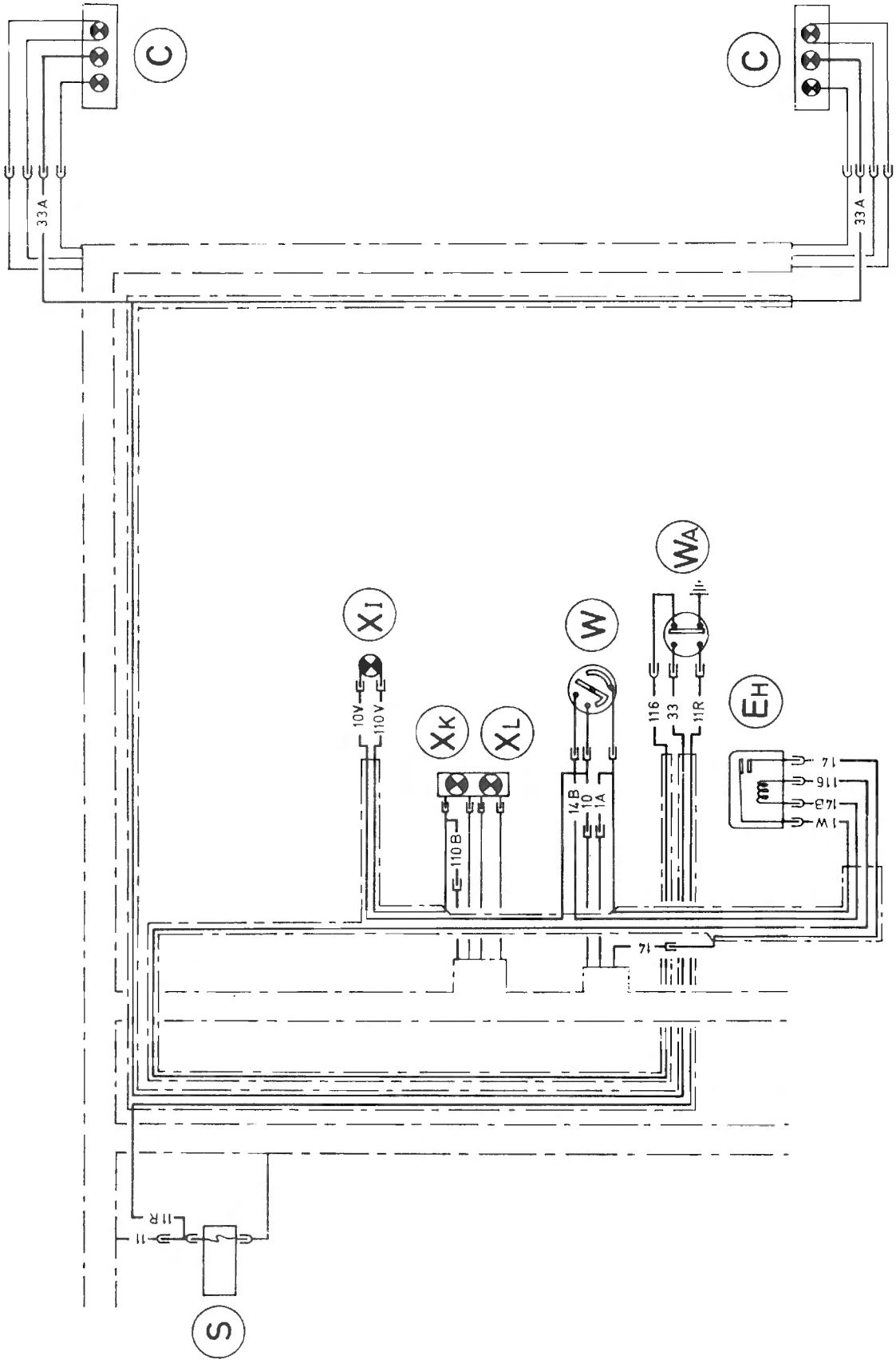
Wire No.	COLOUR		Section in mm2
	Main	Secondary	
1A	red		3
1W	red		2
10	grey		3
10V	grey		0.6
11	grey		2
11R	grey		1
14	grey	red on relay side black on harness side	2

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
14B	grey	black	0.6
33	blue	grey	1
33A	blue	grey	0.6
116	black		0.6
110B	black		0.6
110V	black		0.6

AUTOMATIC (1971)

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R.114



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Partial wiring diagram 1971 specific for Germany

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ELECTRICAL EQUIPMENT

ITEM	Qty.	LOCATION		Power	Light Colours	Wire Numbers	CONTROL	PROTECTION
		Car	Diagram					
Battery	1	engine compartment, at left	(F)	12 V 50 A/h				
Front side light	2	sealed beam unit	(B)	4 W	white	41, 110A	on combined switch under steering wheel	fuse 1
Dipped headlight	2	front face panel	(A)	40 W	white	23A, 110A	on combined switch under steering wheel	
Main beam	2	front face panel	(A)	45 W	white	22A, 110A	on combined switch under steering wheel	
Main beam signalling	2	front face panel	(A)	45 W	white	22A, 110A	by lifting dipped/main beam lever	
Rear side light	2	back panel	(C)	5 W	red	41	on combined switch under steering wheel	movable switch 5A
Front trafficator	2	under front bumper	(B)	21 W	orange	72A, 73A, 110A	lever on combined switch	fuse 3
Warning	4	same as trafficator	(B) and (C)	21 W	orange	72A, 73A, 110A	warning switch (VM) on instrument panel	fuse 3
Warning indicator light	1	warning switch	in (VM)	2 W	red	110T, 70	warning switch (VM)	fuse 3
HF horn, 160, 160 GT	1	R.H. radiator side panel	(ED)	-	-	81, 110A	end of dipped/main beam lever	
Reversing light 160GT,180	2	back panel	(C)	21 W	white	33A	(AD) switch on gear box	fuse 2
Trafficator switch	1	L.H. 'A' post inner	(R)	42-84 W	-	3C,70,70T,110	lever on combined switch	fuse 3
Electro-magnetic horn 180	1	R.H. radiator side panel	(ED)	-	-	81, 110A	end of dipped/main beam lever	

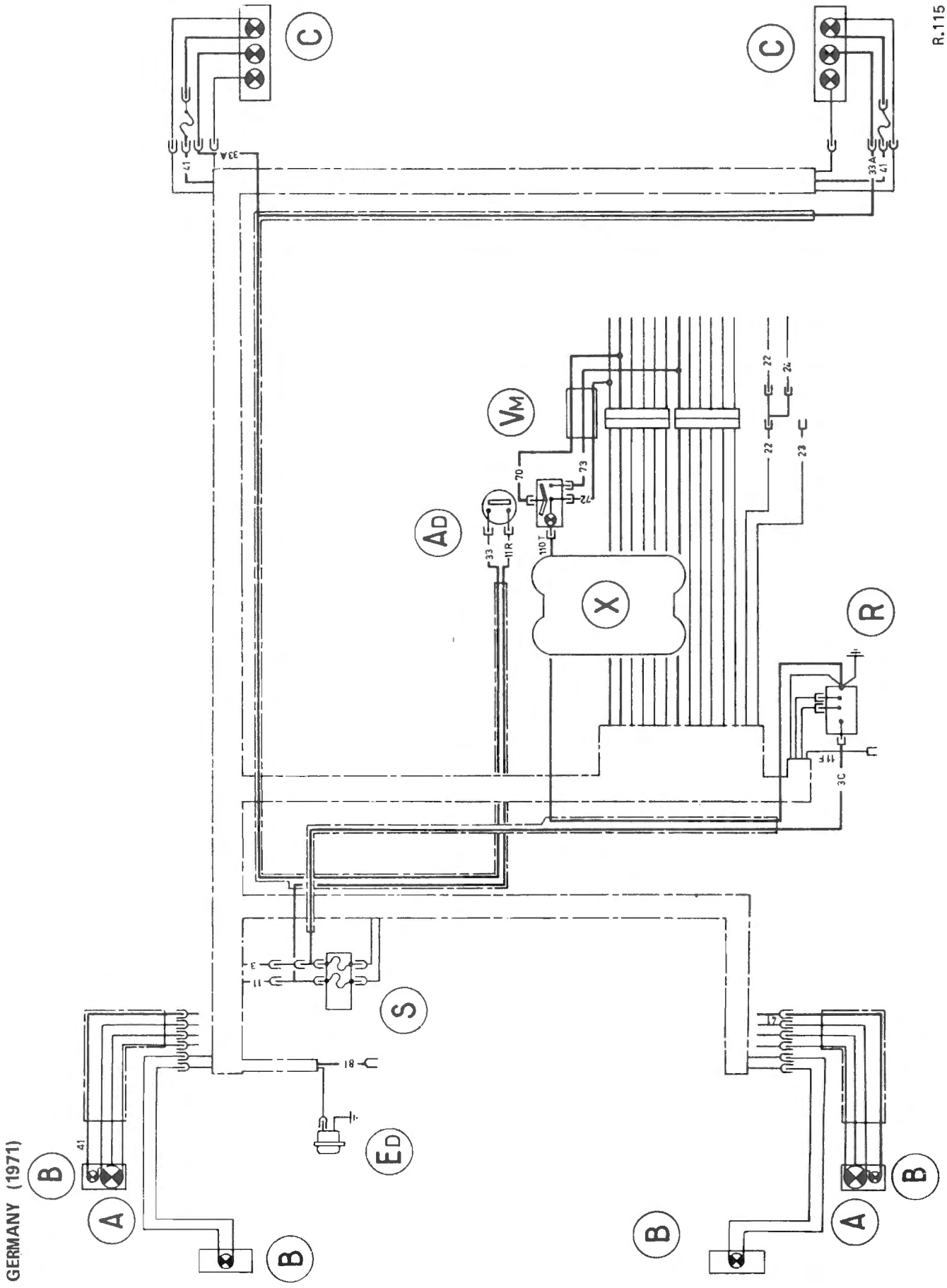
COLOUR OF WIRES

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
3	white		0.6
3C	white	red	1.4
11	grey		2
11F	grey		1
11R	grey		1
22	blue		2
23	blue	yellow	2
24	blue	blue-yellow	2

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
33	blue	grey	1
33A	blue	grey	0.6
41	green		0.6
70	white	brown	1.4
72	white	white-green	1
73	white	white-red	1
81	white	blue	1
110T	black		0.6

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R.115



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Partial wiring diagram 1971 specific for Austria

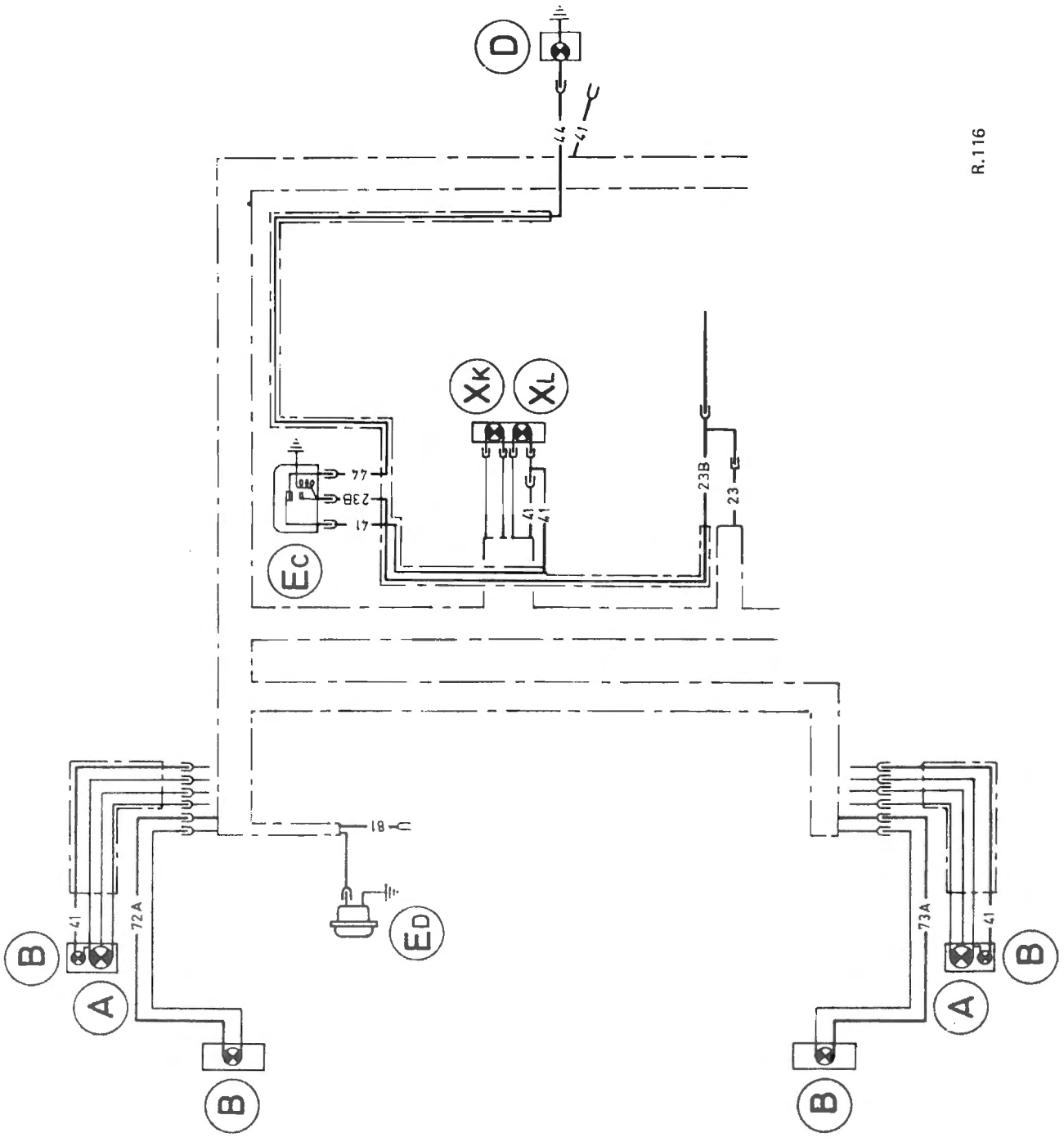
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ITEM	Qty.	LOCATION		Power	Light Colours	Wire Numbers	CONTROL	PROTECTION
		Car	Diagram					
Battery	1	engine compartment, at left	(F)	12 V 50 A/h				
Front side light	2	sealed beam unit	(B)	4 W	white	41, 110A	combined switch under steering wheel	fuse 1
Dipped headlight	2	front face panel	(A)	40 W	white	23A, 110A	combined switch under steering wheel	
Main beam	2	front face panel	(A)	45 W	white	22A, 110A	combined switch under steering wheel	
Number plate light	1	back panel	(D)	5 W	white	44	combined switch under steering wheel or relay (EC)	fuse 1
Number plate light relay	1	L.H. 'A' Post inner	(EC)	-	-	41,44,23B	lever dipped signalling	
HF horn 160, 160 GT.	1	R.H. radiator side panel	(ED)	-	-	81, 110A	end of dipped/main beam lever	
Front trafficator	2	under front bumper	(B)	21 W	orange	72A, 73A 100A	lever on combined switch	fuse 2
Reversing light 160 GT/180	2	back panel	(C)	21 W	white	33A	(AD) switch on gear box	fuse 2
Electro-magnetic horn 180	1	R.H. radiator side panel	(ED)	-	-	81, 110A	end of dipped/main beam lever	

COLOUR OF WIRES

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
23	blue	yellow	1.4
23B	blue	yellow	0.6
41	green		0.6
44	green	black	0.6
72A	white		0.6
73A	white		0.6
81	white	blue	1

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AUSTRIA (1971)

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Partial wiring diagram 1971 specific for Denmark

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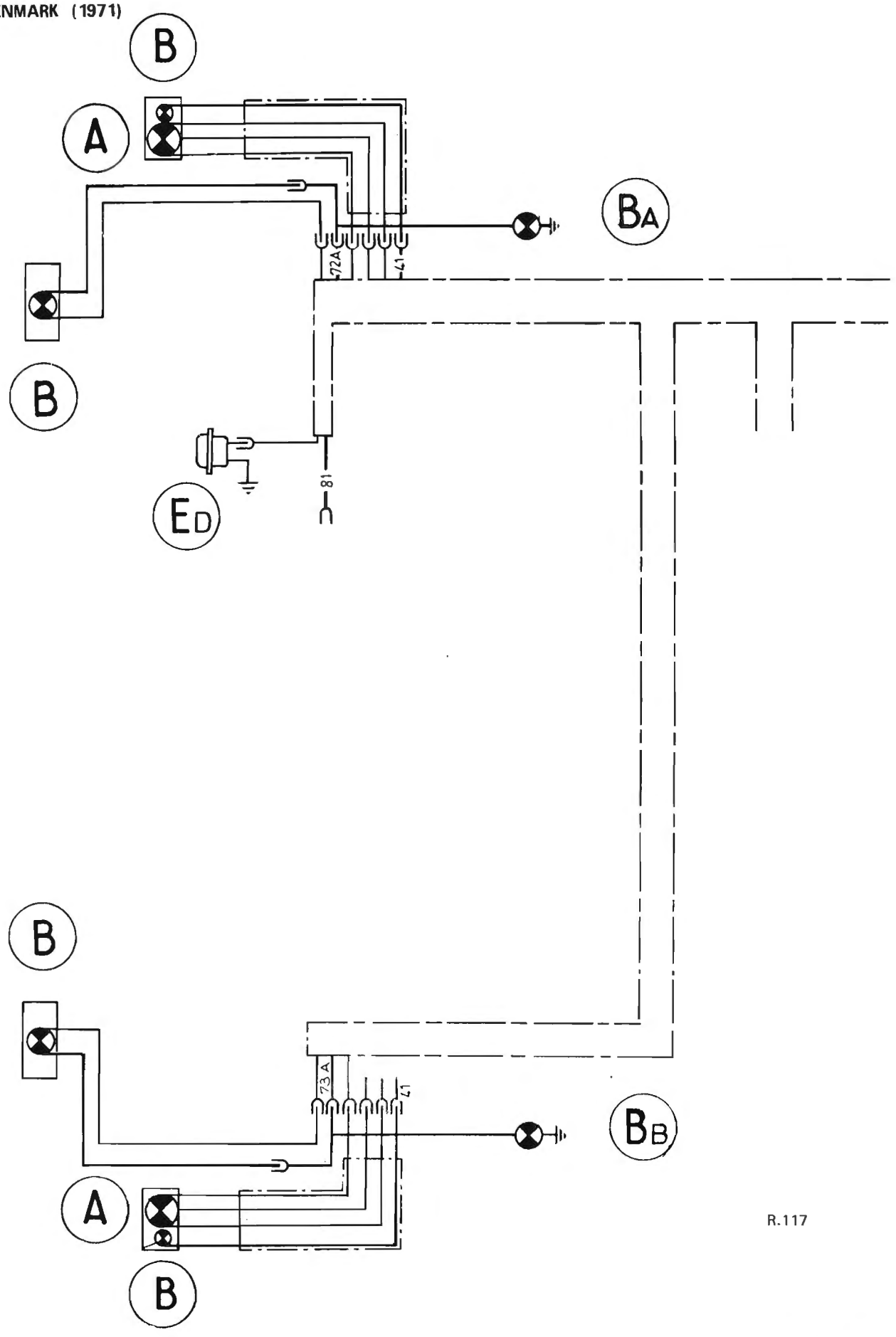
ITEM	Qty.	LOCATION		Power	Light Colours	Wire Numbers	CONTROL	PROTECTION
		Car	Diagram					
Battery	1	engine compartment, at left	(F)	12 V 50 A/h				
Front side light	2	in sealed beam unit	(B)	4 W	white	41, 110A	combined switch under steering wheel	fuse 1
Dipped headlight	2	front face panel	(A)	40 W	white	23A, 110A	combined switch under steering wheel	
Main beam	2	front face panel	(A)	45 W	white	22A, 110A	combined switch under steering wheel	
Trafficator side repeater	2	R.H.and L.H.front fenders	(BA)(BB)	3 W	orange	72A, 73A	common with trafficators	fuse 2
HF horn 160, 160 GT	1	radiator R.H. side panel	(ED)	-	-	81, 110A	end of dipped/main beam lever	
Electro-magnetic horn 180	1	radiator R.H. side panel	(ED)	-	-	81, 110A	end of dipped/main beam lever	
Reversing light	2	back panel	(C)	21 W	white	33A	(AD) switch on gear box	fuse 2
Front trafficator	2	under front bumper	(B)	21 W	orange	72A, 73A 110A	lever on combined switch	fuse 2

COLOUR OF WIRES

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
41	Green		0.6
72A	white		0.6
73A	white		0.6
81	white	blue	1

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DENMARK (1971)



R.117

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Partial wiring diagram 1971 specific for Italy

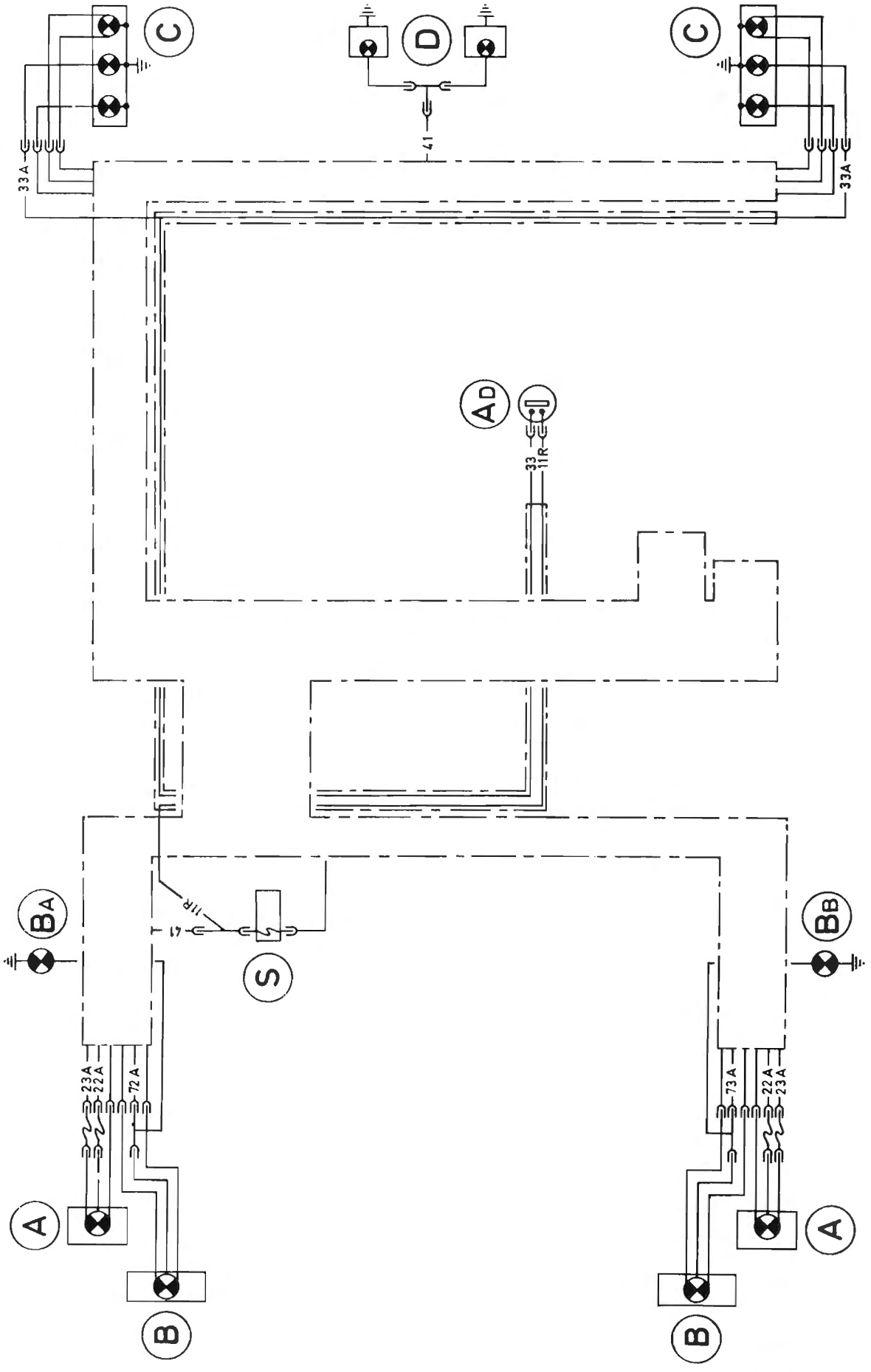
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ITEM	Qty.	LOCATION		Power	Light Colours	Wire Numbers	CONTROL	PROTECTION
		Car	Diagram					
Dipped headlight	2	front face panel	(A)	40 W	white	23A, 110A	combined switch under steering wheel	movable fuse 10A
Main beam	2	front face panel	(A)	45 W	white	22A, 110A	combined switch under steering wheel	movable fuse 10A
Reversing light 160 GT.180	2	back panel	(C)	21 W	white	33A	(AD) switch on gear box	fuse 1
Number plate light	2	rear bumper	(D)	5 W	white	41	combined switch under steering wheel	fuse 1
Trafficator side repeater	2	R.H.and L.H.front fenders	(BA)(BB)	3 W	orange	72A, 73A	common with trafficators	fuse 2

COLOUR OF WIRES

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
11R	Grey		1
22A	blue		1
23A	blue	yellow	1
33	blue	grey	1
33A	blue	grey	0.6
41	green		0.6
72A	white		0.6
73A	white		0.6

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R.118

ITALY (1971)

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Partial wiring diagram 1971 specific for Finland and Lebanon

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ELECTRICAL EQUIPMENT

ITEM	Qty.	LOCATION		Power	Light Colours	Wire Numbers	CONTROL	PROTECTION
		Car	Diagram					
Front side light	2	sealed beam unit	(B)	4 W	white	41, 110A	combined switch under steering wheel	fuse 1
Dipped headlight	2	front face panel	(A)	40 W	white	23A, 110A	combined switch under steering wheel	
Main beam	2	front face panel	(A)	45 W	white	22A, 110A	combined switch under steering wheel	
Front trafficator	2	under front bumper	(B)	21 W	orange	72A, 73A 110A	lever on combined switch	fuse 2
HF horn 160, 160 GT.	1	radiator R.H. side panel	(ED)	-	-	81, 110A	end of dipped/main beam lever	
Reversing light	2	back panel	(C)	21 W	white	33A	(AD) switch on gear box	fuse 2
Electro-magnetic horn 180	1	radiator R.H. side panel	(ED)	-		81, 110A	end of dipped/main beam lever	

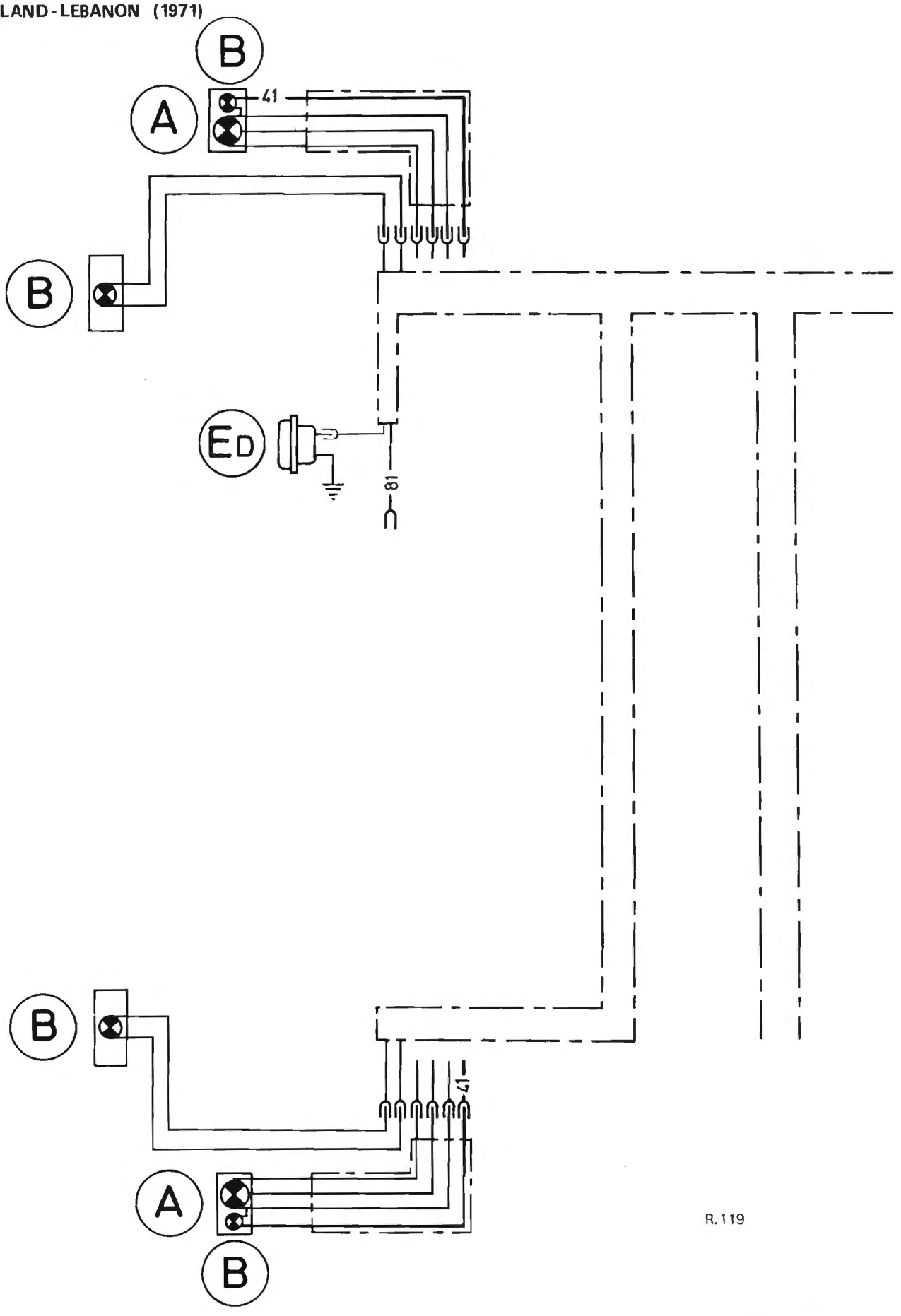
Vehicles for FINLAND are fitted with a 50 A/h battery

COLOUR OF WIRES

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
41	green		0.6
81	white	blue	1

FINLAND-LEBANON

FINLAND - LEBANON (1971)



R.119

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Partial wiring diagram 1971 specific for Norway

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ELECTRICAL EQUIPMENT

ITEM	Qty.	LOCATION		Power	Light Colours	Wire Numbers	CONTROL	PROTECTION
		Car	Diagram					
Battery	1	engine compartment, at left .	(F)	12 V 50 A/h				
Front side light	2	sealed beam unit	(B)	4 W	white	41, 110A	combined switch under steering wheel	fuse 1
Dipped headlight	2	front face panel	(A)	40 W	white	23A, 110A	combined switch under steering wheel	
Main beam	2	front face panel	(A)	45 W	white	22A, 110A	combined switch under steering wheel	
Front trafficator	2	under front bumper	(B)	21 W	orange	72A, 73A, 110A	lever on combined switch	fuse 3
HF horn 160, 160 GT	1	radiator R.H. side panel	(ED)	-	-	81, 110A	end of dipped/main beam lever	
Electro-magnetic horn, 180	1	radiator R.H. side panel	(ED)	-	-	81, 110A	end of dipped/main beam lever	
Reversing light	2	back panel	(C)	21 W	white	33A	(AD) switch on gear box	fuse 2
Trafficator side repeater	2	R.H.and L.H.front fenders	(BA&BB)	3 W	orange	72A, 73A	common with trafficators	fuse 3
Warning (lights)	4	as trafficator	(B)&(C)	21 W	orange	72A, 73A, 110A	(VM) switch on instrument panel	fuse 3
Warning indicator light	1	in (VM) switch	in (VM)	2 W	red	110T, 70	(VM) switch	fuse 3
Brake indicator light	1	on instrument panel	in (VN)	2 W	red	110T, 10T	(VN) brake switch or trans. (AE) switch	
Trafficator main switch	1	L.H. 'A' post inner	(R)	42-84 W	-	3C,70,70T,110	lever on combined switch	fuse 3
Main beam signalling	2	front face panel	(A)	45 W	white	22A, 110A	by lifting dipped/main beam control	

COLOUR OF WIRES

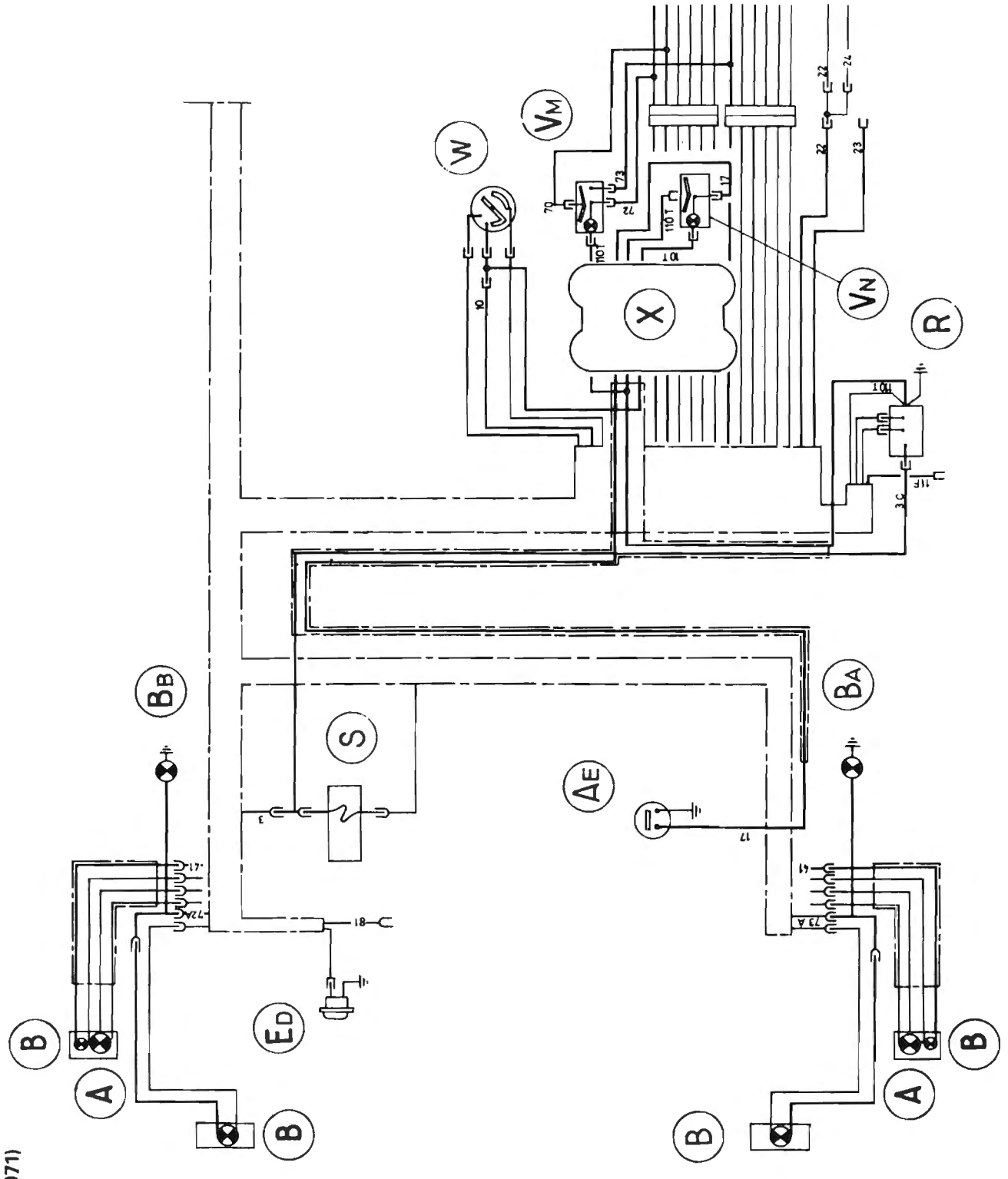
Wire No.	COLOUR		Section in mm2
	Main	Secondary	
3	white		0.6
3C	white	red	1.4
10	grey		3
10T	grey		0.6
11F	grey		1
17	black	green	0.6
22	blue		2
23	blue	yellow	2
24	blue	blue-yellow	2

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
41	green		0.6
70	white	brown	1.4
72	white	white-red	1
72A	white		0.6
73	white	white-green	1
73A	white		0.6
81	white	blue	1
110T	black		0.6

NORWAY (1971)

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R.120



NORWAY (1971)

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Partial wiring diagram 1971 specific for Sweden

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ELECTRICAL EQUIPMENT

ITEM	Qty.	LOCATION		Power	Light Colours	Wire Numbers	CONTROL	PROTECTION
		Car	Diagram					
Battery	1	engine compartment, at left	(F)	12 V 50 A/h				
Front side light	2	sealed beam unit	(B)	4 W	white	41, 110A	combined switch under steering wheel	fuse 1
Dipped headlight	2	front face panel	(A)	40 W	white	23A, 110A	combined switch under steering wheel	
Main beam	2	front face panel	(A)	45 W	white	22A, 110A	combined switch under steering wheel	
Main beam signalling	2	front face panel	(A)	45 W	white	22A, 110A	by lifting dipped/main beam lever	
Reversing light 160GT.,180	2	back panel	(C)	21 W	white	33A	(AD) warning switch on gear box	fuse 2
Warning (lights)	4	as trafficator	(B) & (C)	21 W	orange	72A, 73A 110A	(VM) warning switch on instrument panel	fuse 3
Warning indicator light	1	in warning switch	in (VM)	2 W	red	110T, 70	(VM) warning switch	fuse 3
Brake indicator light	1	on instrument panel	in (VN)	2 W	red	110T, 10T	(VN) brake switch or (AE) trans.switch	
HF horn 160, 160 GT	1	radiator R.H. side panel	(ED)	-	-	81, 110A	at end of dipped/main beam lever	
Front trafficator	2	under front bumper	(B)	21 W	orange	72A, 73A, 110A	lever on combined switch	fuse 3
Trafficator main switch	1	L.H. 'A' post inner	(R)	42-84 W	-	3C,70,70T,110	lever on combined switch	fuse 3
Electro-magnetic horn 180	1	radiator R.H. side panel	(ED)	-	-	81, 110A	at end of dipped/main beam lever	

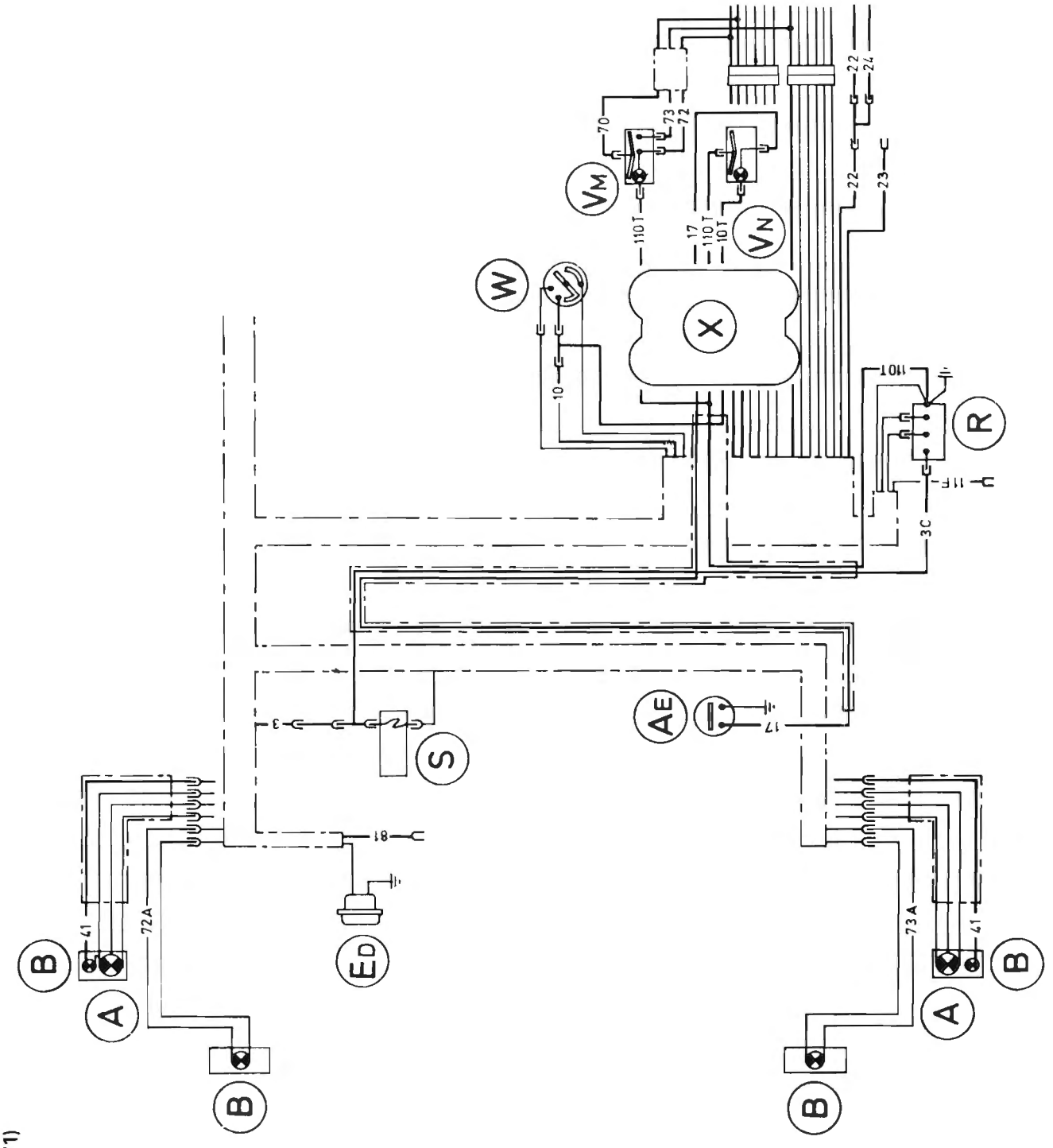
COLOUR OF WIRES

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
3	white		0.6
3C	white	red	1.4
10	grey		3
10T	grey		0.6
11F	grey		1
17	black	green	0.6
22	blue		2
23	blue	yellow	2

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
24	blue	blue-yellow	0.6
41	green		0.6
70	white	brown	1.4
72	white	white-green	1
73	white	white-red	1
81	white	blue	1
110T	black		0.6

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R.121



SWEDEN (1971)

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Partial wiring diagram 1971 specific for Switzerland

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ELECTRICAL EQUIPMENT

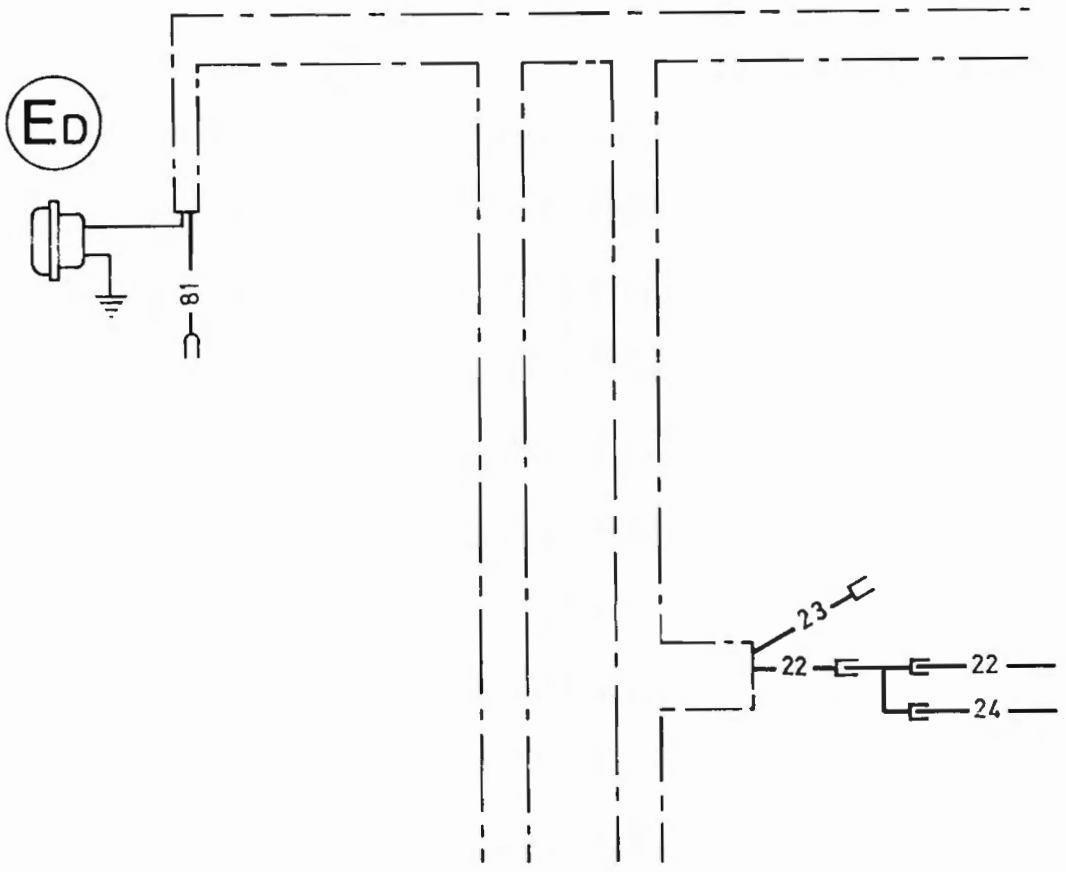
ITEM	Qty.	LOCATION		Power	Light Colours	Wire Numbers	CONTROL
		Car	Diagram				
Battery	1	engine compartment, at left	F	12 V 50 A/h			
HF horn 160, 160 GT	1	radiator R.H. side panel	ED	-	-	81, 110A	at end of dipped/main beam lever
Main beam signalling	2	front face panel	A	45 W	yellow	22A, 110A	by lifting dipped/main beam lever
Electro-magnetic horn 180	1	radiator R.H. side panel	ED	-	-	81, 110A	at end of dipped/main beam lever

COLOUR OF WIRES

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
22	blue		2
23	blue	yellow	2
24	blue	blue-yellow	2
81	white	blue	1

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SWITZERLAND (1971)



R.122

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Partial wiring diagram 1971 specific for Czecho-slovakia

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ELECTRICAL EQUIPMENT

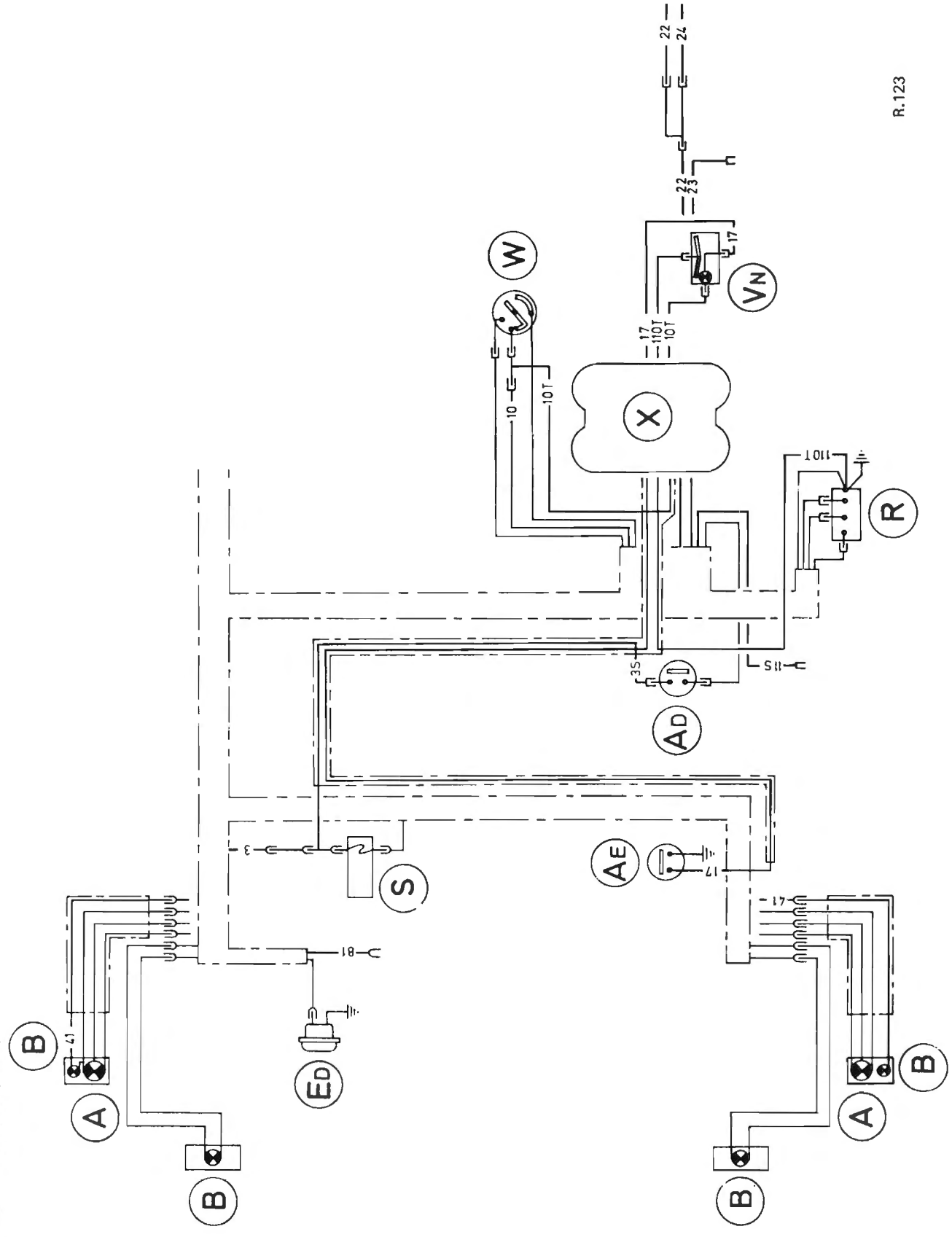
ITEM	Qty.	LOCATION		Power	Light Colours	Wire Numbers	CONTROL	PROTECTION
		Car	Diagram					
Front side light	2	sealed beam unit	(B)	4 W	white	41, 110A	combined switch under steering wheel	fuse 1
Dipped headlight	2	front face panel	(A)	40 W	white	23A, 110A	combined switch under steering wheel	
Main beam	2	front face panel	(A)	45 W	white	22A, 110A	combined switch under steering wheel	
Main beam signalling	2	front face panel	(A)	45 W	white	22A, 110A	by lifting dipped/main beam lever	
Reversing lights 160GT, 180	2	back panel	(C)	21 W	white	33A	(AD) switch on gear box	fuse 3
Front trafficator	2	under front bumper	(B)	21 W	orange	72A, 73A 110A	lever on combined switch	fuse 2
Back indicator light	1	instrument panel	in (VN)	2 W	red	10T, 110T	(VN) brake switch or (AE) trans.switch	
HF horn 160, 160 GT.	1	radiator R.H.side panel	(ED)	-	-	81, 110A	at end of dipped/main beam lever	
Electro-magnetic horn	1	radiator R.H.side panel	(ED)	-	-	81, 110A	at end of dipped/main beam lever	

COLOUR OF WIRES

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
3	white		0.6
3S	white		0.6
10	grey		3
10T	grey		0.6
11S	grey		1
17	black	green	0.6

Wire No.	COLOUR		Section in mm2
	Main	Secondary	
22	blue		2
23	blue	yellow	2
24	blue	blue-yellow	2
41	green		0.6
110T	black		0.6

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CZECHO - SLOVAKIA (1971)

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K2 - INSTRUMENTS

K2/I - Description of instruments

K2/V - Removing and re-fitting the instrument cluster, a clock, a revolution indicator, the combined switch

K2/VI - Dismantling and re-assembling the instrument cluster

K4 - WINDSCREEN WIPER

K4/I - Windscreen-wiper and windscreen-washer control

K4/V - Removing and re-fitting the windscreen-wiper motor

K6 - AIR CONDITIONING

K6/I - Specifications

K6/V - Removing and re-fitting the air-conditioner control plate

K6/V - Removing and re-fitting the air-conditioner

K6/V - Repair operations on air-conditioner

K6/VI - Dismantling and re-assembling the air-conditioner

K6/VI - Dismantling and re-assembling the air-conditioner motor

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DISMANTLING OPERATIONS

- Remove window held by plastic lugs.
- Remove embellisher.
- Remove mileage indicator resetting knurled screw.

Removing the revolution indicator

- Remove 3 screws and 3 nuts from back of revolution indicator.
- Spread revolution indicator retaining lugs open, and remove indicator.

Removing the speedometer

- Remove both speedometer setscrews.
- Remove speedometer.

Removing an indicator

(water temperature or fuel gauge)

- Remove 3 indicator setscrews.
- Remove indicator.

Removing the clock

- Disconnect both clock supply wires on printed circuit.
- Remove clock, spreading retaining lugs open.

Removing the printed circuit

- Remove indicators (water temperature and fuel gauge).
- On revolution indicator, remove both nuts fastening the contact strips.
- On printed circuit, remove both screws fastening the contact strips, then remove strips.
- Remove screw holding earthing wire to printed circuit.
- Disconnect both clock supply wires.
- Remove printed circuit.

RE-ASSEMBLY OPERATIONS

- To re-assemble the instrument cluster, proceed in reverse order from dismantling operations.

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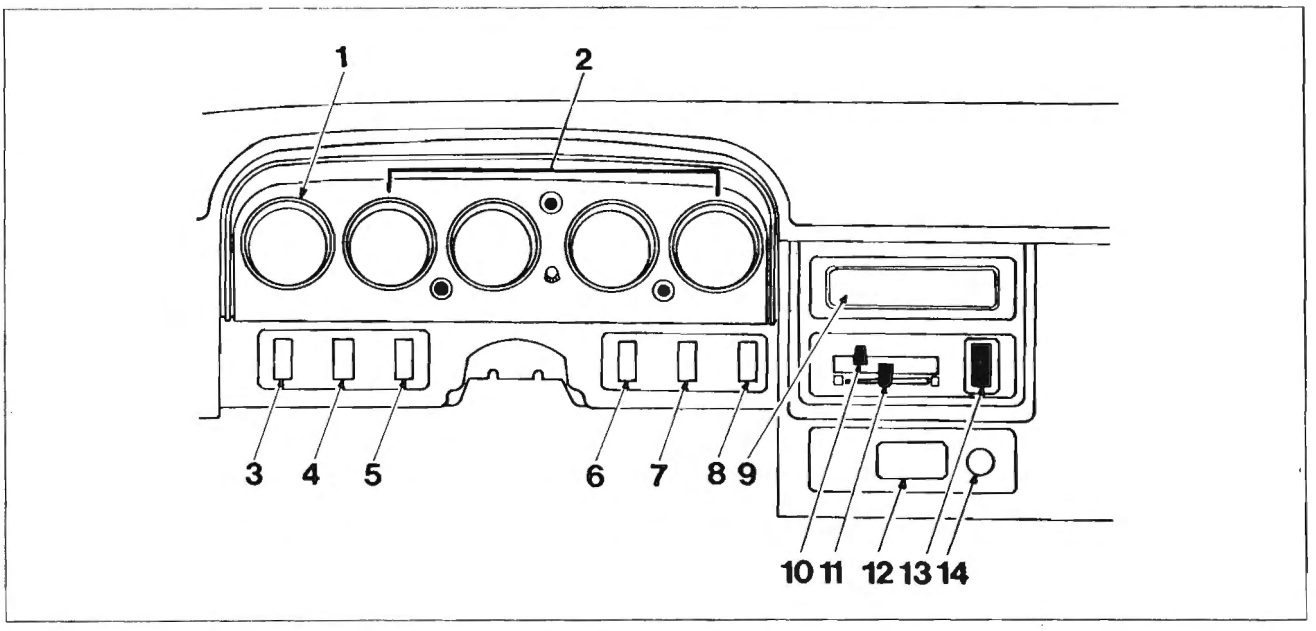


Fig. 1 G.022

INSTRUMENT PANEL AND CONTROLS (Fig. 1)

1 - Directionally adjustable ventilator.

2 - Instrument cluster.

3 - Light indicator switch for braking system control (on models fitted with dual circuit braking system).

4 - Choke (160 model).

5 - Dummy switch

6 - Warning switch (on cars supplied to Germany, Norway, and Sweden).

7 - Instrument panel lighting rheostat (on 180 model).

8 - Light indicator switch for back light defrosting (on 180 model, optional on 160 and 160 GT models).

9 - Location for radio.

10 - Conditioner air distributor.

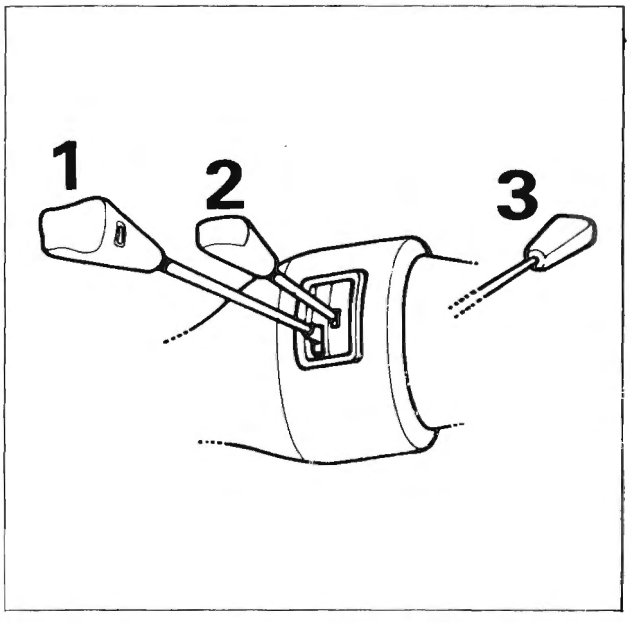
11 - Heating cock control.

12 - Ash-tray

12 - Air-conditioner blower rheostat.

14 - Cigar lighter (on 180 model)

Fig. 2 G.023



CONTROLS UNDER STEERING WHEEL (Fig. 2)

1 - Side light, dipped headlight, and main beam control.

2 - Traffic indicator control.

3 - Windscreen-wiper and windscreen-washer control.

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INSTRUMENT CLUSTER

On 1971 models (G Series), the instrument panel is fitted with 2 dial clusters (Fig. 3) or 4 dial clusters (Fig. 4) depending on the model concerned.

. 160 model:
- 2 dial cluster, single mileage indicator speedometer;
- electric clock fitted on a supporting bracket at right of cluster;

. 160 GT model:
- 2 dial cluster, single mileage indicator speedometer;
- revolution indicator fitted on a supporting bracket at right of cluster;

. 180 model:
- 4 dial cluster with dual mileage indicator speedometer, electric clock, and revolution indicator.

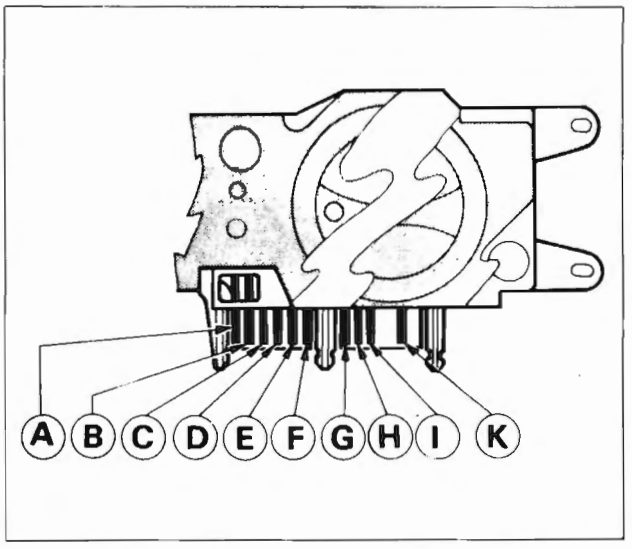
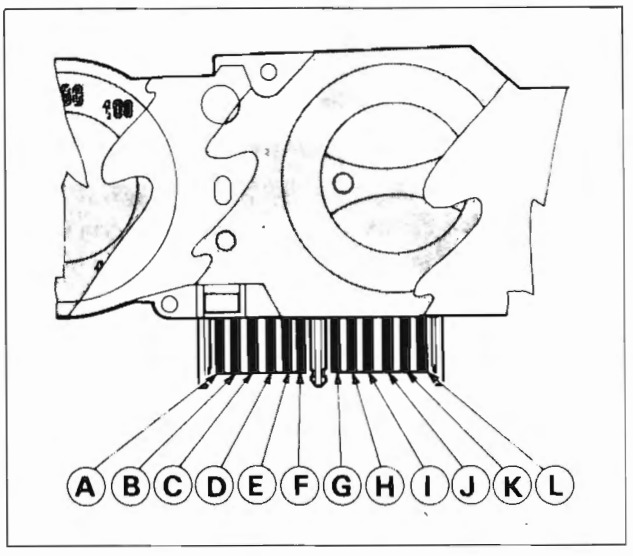


Fig. 3 Z.1749

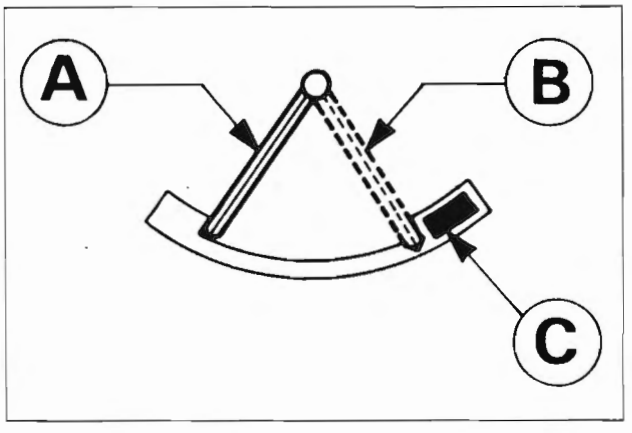
Fig. 4 Z.1750



Description of printed circuits:

	Cluster	
	2 dial	4 dial
Main beam indicator light	A	A
Earth	B	B
Thermometer	C	C
Minimum fuel	D	D
Fuel gauge	E	E
Charge	F	F
+ after ignition	G	G
Oil	H	H
Instrument panel lighting	I	I
Permanent +		J
Trafficators	K	K
Breaker (Rev. indicator)		L

Fig. 5 Z.1751



WATER TEMPERATURE INDICATOR (Fig. 5)

Water temperature at cylinder-head outlet:

A : 60°C.

B : 105°C.

C : red area (danger)

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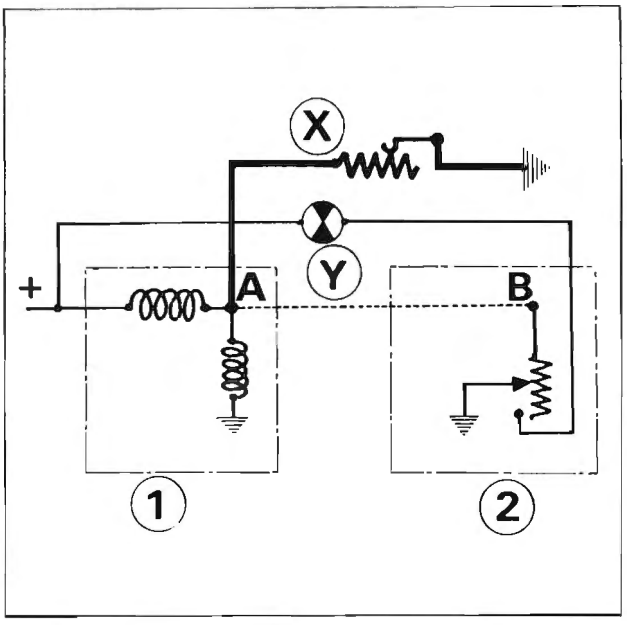


Fig. 6 Z.1751

FUEL GAUGE

Checking the fuel gauge:

- Disconnect A B wire.
- Place a variable resistor (X) (Fig. 6) on earth line at point (A) to replace original transmitter resistance. Value of variable resistor: 0 to 300

  Note: It is possible to replace the variable resistor by a new transmitter which will be considered as standard after checking resistance values with a Metrix instrument placed between transmitter earth and terminal (B) (Fig. 6).

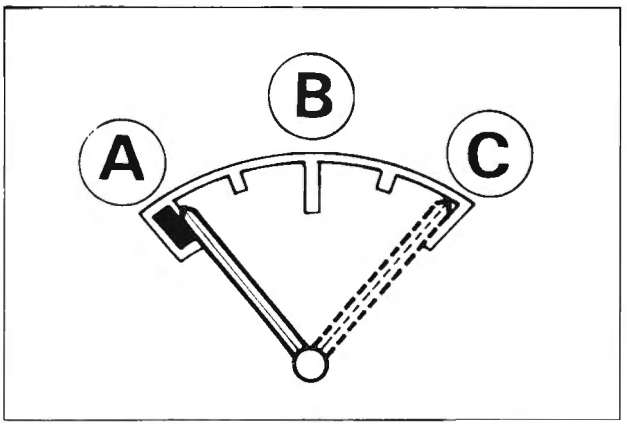
- Check pointer deviations corresponding to resistance values shown on Fig. 7.

A : 310 $\pm \begin{smallmatrix} 0 \\ 60 \end{smallmatrix}$

B : 97 $\pm$ 10

C : 0 to 15

Fig. 7 Z.1751



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REMOVING AND RE-FITTING THE INSTRUMENT CLUSTER, A CLOCK, A REVOLUTION INDICATOR, THE COMBINED SWITCH

REMOVING AND RE-FITTING THE INSTRUMENT CLUSTER

Removal procedure

- Disconnect battery.
- Remove 2 screws fastening the steering column supporting bracket to the dash panel.
- Lower the steering column.
- Remove fascia, which is held by 2 screws.
- Remove cluster (A) setscrews (Fig. 1)
- Disconnect cable from speedometer.
- Disconnect junction boxes for connection with printed circuit.
- Remove cluster.

Re-fitting operations

- For re-fitting operations, proceed in reverse order from removal operations.

REMOVING AND RE-FITTING A CLOCK (on 160 model) or a REVOLUTION INDICATOR (on 160 GT model)

Removal procedure

- Disconnect battery.
- Remove 2 screws fastening the steering column supporting bracket to the dash panel.
- Lower the steering column.
- Remove the fascia, which is held by 2 screws.
- Remove 2 screws fastening clock or revolution indicator (B) (Fig. 1).
- Clear clock or revolution indicator from housing.
- Disconnect supply wires from back of instrument.
- Remove instrument.

Re-fitting operations

- For re-fitting operations, proceed in reverse order from removal procedure.

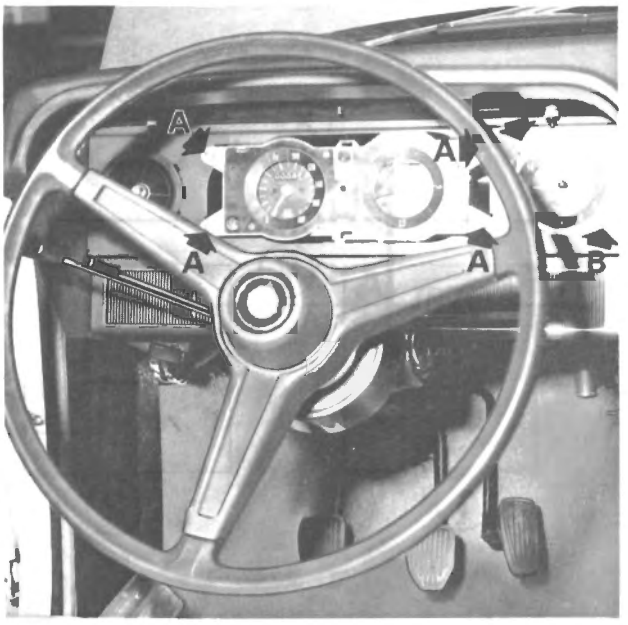


Fig. 1 4007

REMOVING AND RE-FITTING THE COMBINED SWITCH

Removal procedure

- Disconnect battery.
- Remove steering wheel central cover.
- Remove steering wheel central fastening nut.
- Mark relative position of steering wheel and steering shaft.
- Remove steering wheel.
- Loosen both screws fastening the steering column tube to the dash panel, and lower the steering column.
- Remove 4 combined switch shell screws, and remove shells.
- Remove 3 combined switch setscrews.
- Disconnect main harness junction boxes.
- Clear combined switch harness from its retaining tab on steering column tube.
- Remove combined switch.

Re-fitting operations

- For re-fitting operations, proceed in reverse order from removal procedure.

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REMOVING AND RE-FITTING THE WINDSCREEN-WIPER MOTOR

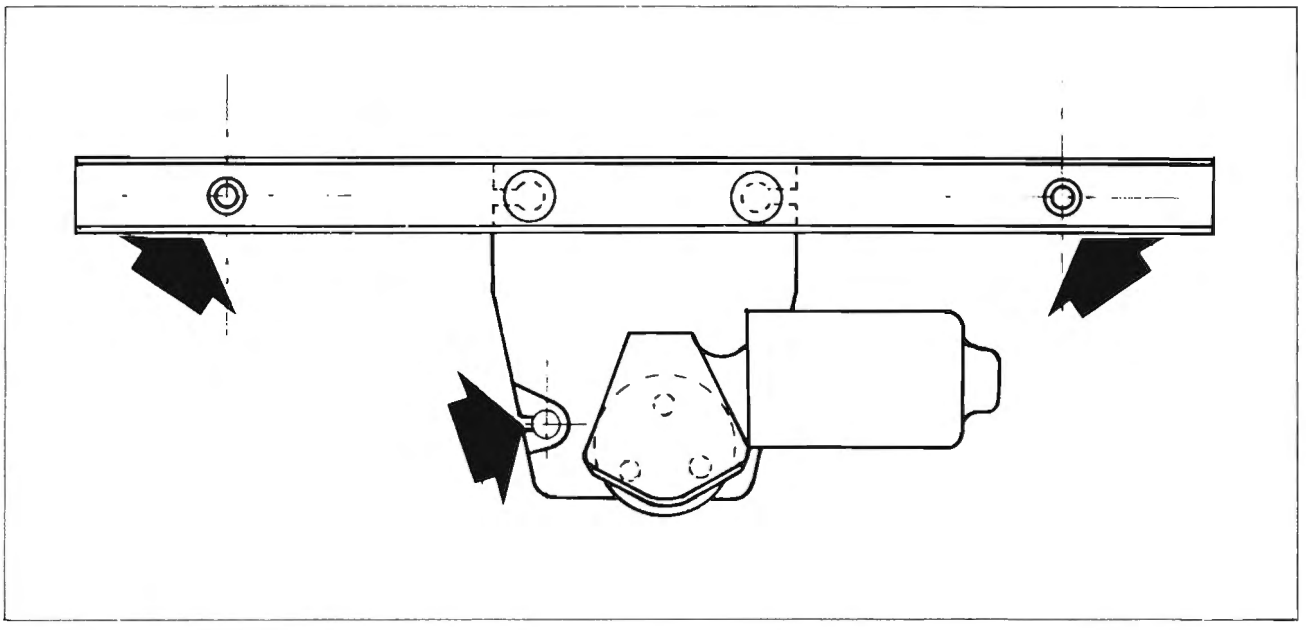
REMOVAL PROCEDURE

- Disconnect battery.
- Remove windscreen-wiper blades.
- Remove cowl upper panel.
- Remove 3 screws fastening the windscreen-wiper motor, plate, and linkage assembly.
- Disconnect windscreen-wiper motor supply wires.
- Remove assembly.
- Release linkage rod from motor.
- Remove 3 screws fastening the windscreen-wiper motor to the plate.
- Remove windscreen-wiper motor.

RE-FITTING OPERATIONS

- To re-fit motor, proceed in reverse order from removal operations.

Fig. 1 G.025



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WINDSCREEN-WIPER AND WINDSCREEN-WASHER CONTROL (Fig. 1)

Windscreen-wiper

0 - Stop.

1 - Normal operation.

2 - Fast operation.

Windscreen-washer

- Actuated by pulling knob towards steering wheel in positions (1) and (2).

Operation of windscreen-washer electric pump

- Electric windscreen-washer hydraulic diagram (Fig. 2).

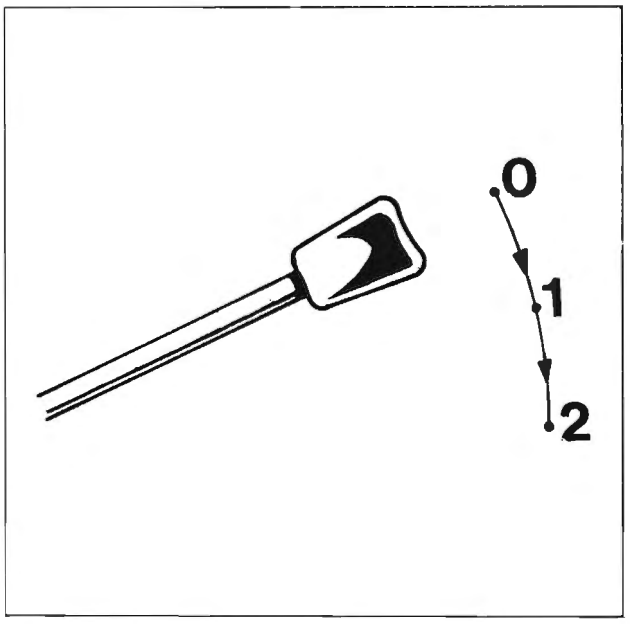
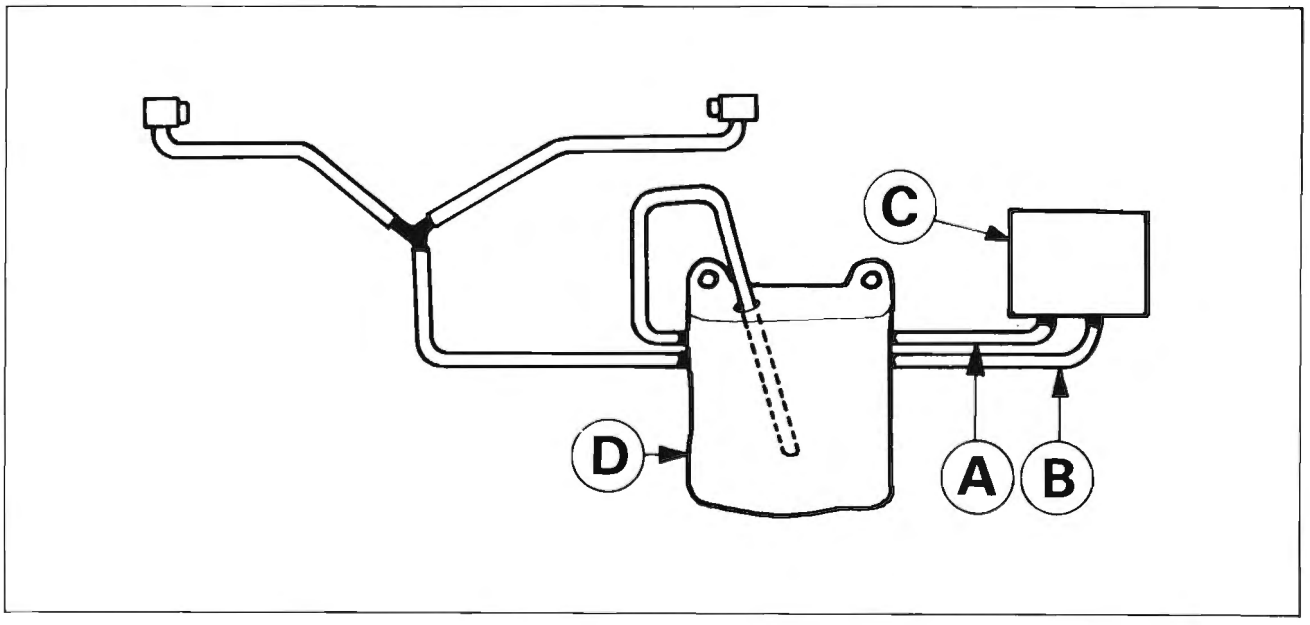


Fig. 1 G.024

Fig. 2 Hydraulic diagram for electrically controlled windscreen-washer

A : Suction system
B : Delivery system
C : Electric pump
D : Tank

Z.1752



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- The fluid is drawn via pipe (A) (Fig. 3), rollers (B) interlocked with driving shaft (D) squeeze the rubber pipe, and the fluid is delivered from pipe (C).
- Detail of a cycle (Fig. 4).

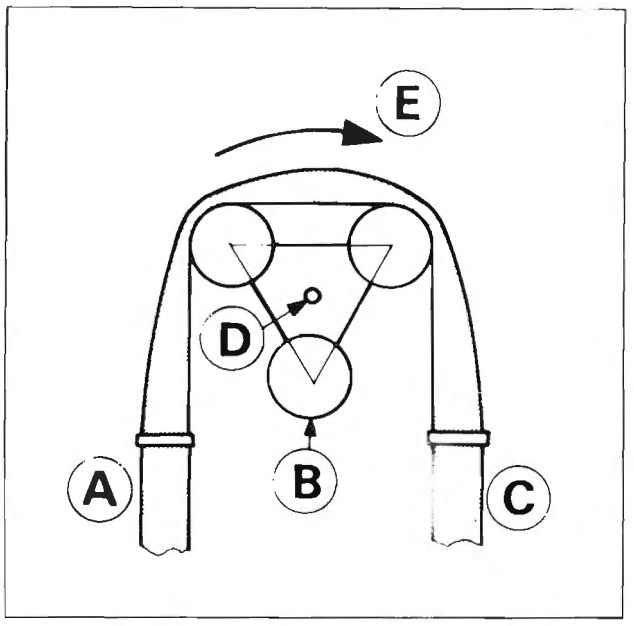
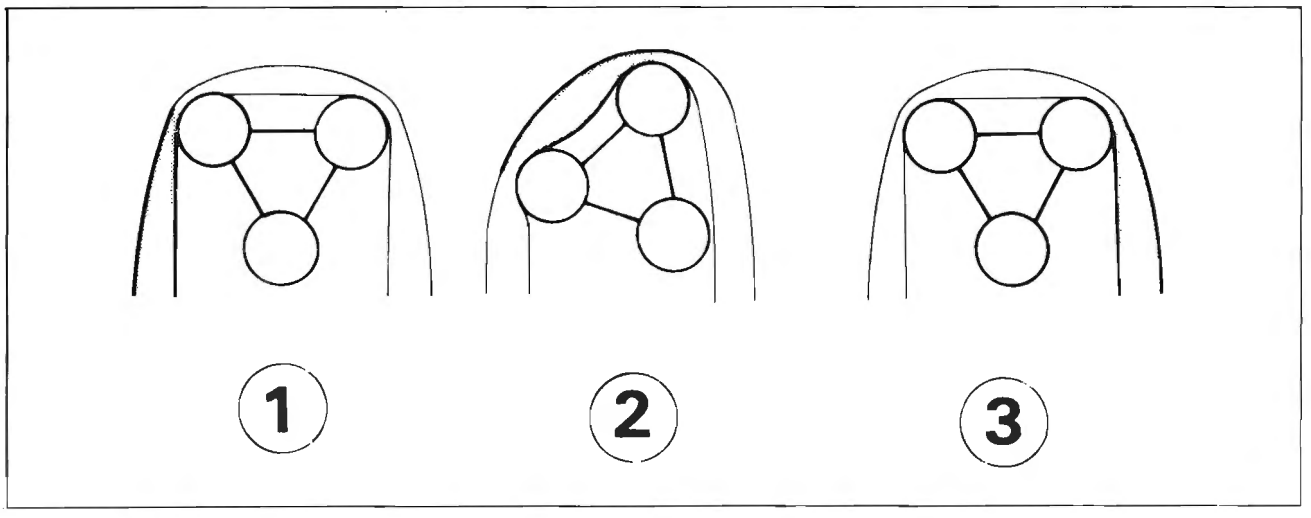


Fig. 3 E : Direction of rotation Z.1753

Fig. 4 Z.1754



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SPECIFICATIONS

Air from the outside is drawn into the cowl box. The fan, located in the centre of the device, delivers the air drawn in:

- through a radiator receiving its hot water from an engine cooling system by-pass;
- ahead of the radiator towards the instrument panel ventilators through two flexible pipes.

Downstream from the radiator, the air is then discharged in a flap distributor controlled by a lever (A) (Fig. 1), which can be moved horizontally.

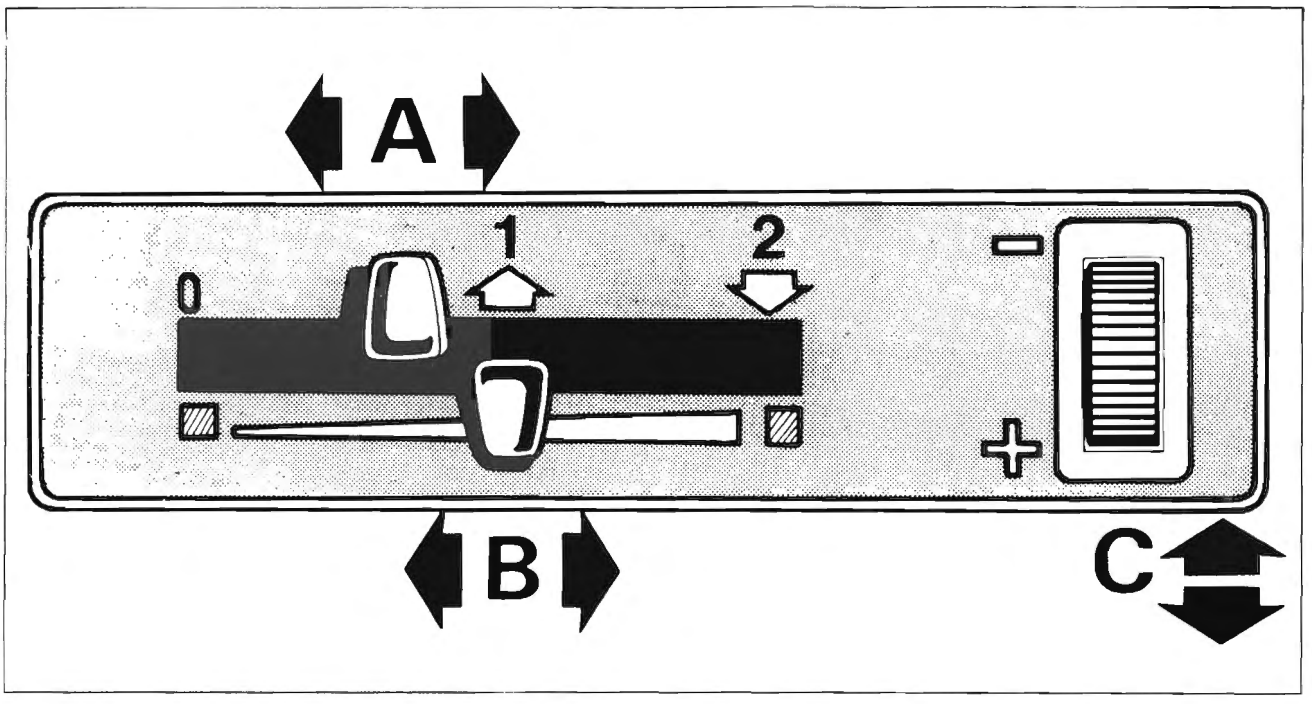
The distributor allows the air flow to be directed either towards the defrosting nozzles (1), or towards the floor (2), or again towards both at the same time (lever placed between (1) and (2).

The heating cock control (B) is a progressive action control.

The blower air output is adjustable by means of printed circuit rheostat control knurled knob (C).

Fig. 1

G.026



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REMOVING AND RE-FITTING THE AIR-CONDITIONER CONTROL PLATE



Fig. 1 3995



Fig. 3 4008

REMOVAL PROCEDURE

- Disconnect battery.
- Remove control lever knobs.
- Clear instrument panel central embellisher, which is held by 4 screws (Figs. 1 and 2).
- Disconnect lighting and blower control wires (Fig. 3).
- Remove central embellisher.
- Remove both screws fastening the air-conditioner control plate (Fig. 4).
- Remove both sheath retainer setscrews.
- Clear control cables (Fig. 5).
- Extract plate.

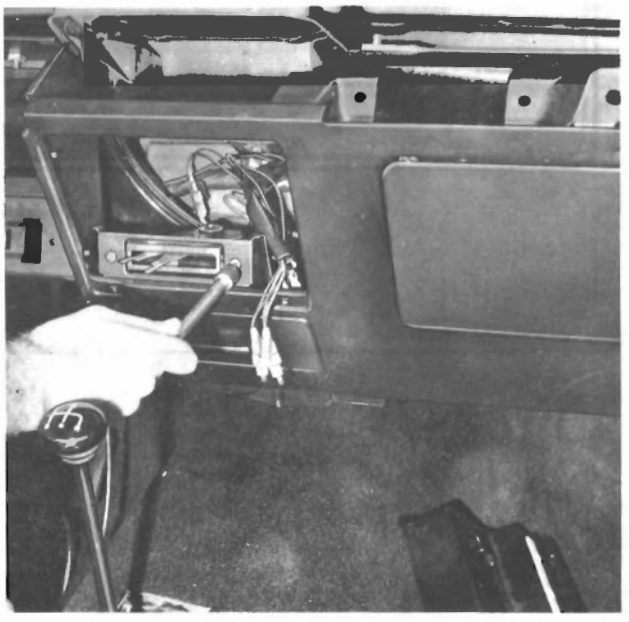
RE-FITTING OPERATIONS

- Proceed in reverse order from removal operations.

Fig. 2 3996



Fig. 4 4009



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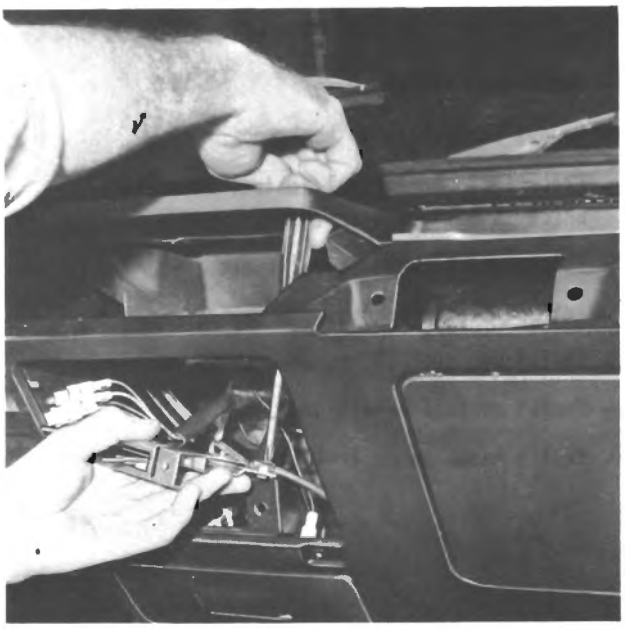


Fig. 5 4010

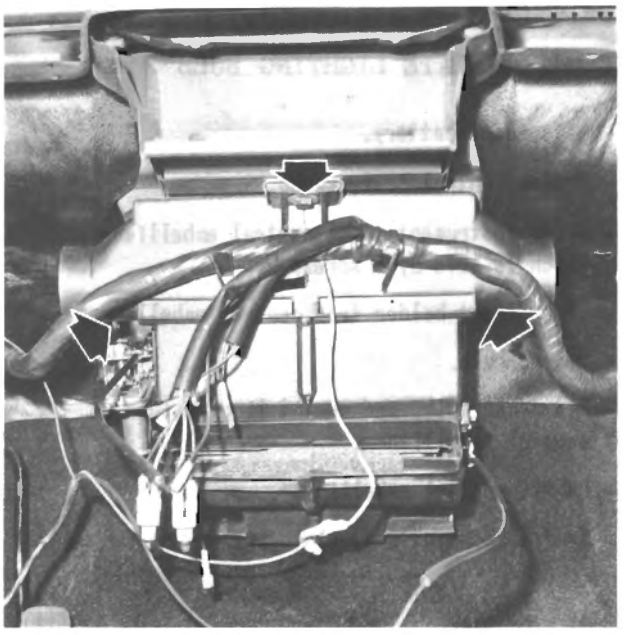
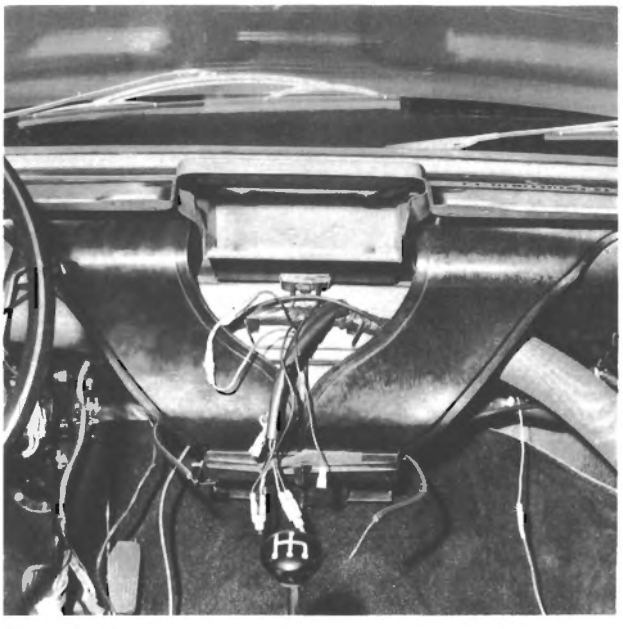


Fig. 7 4012

REMOVAL PROCEDURE

- Disconnect battery.
- Remove instrument panel and supporting bracket.
- Drain cooling system.
- Loosen both collars holding the air-conditioner water inlet and outlet hoses; disconnect these hoses.
- Remove 4 nuts fastening the defrosting nozzles (Fig. 6).

Fig. 6 4011



- Remove 3 screws fastening air-conditioner to dash panel; 2 side screws; 1 screw in upper area on car centre-line (Fig. 7).
- Remove side ventilator flexible supply pipes.
- Clear defrosting nozzles from bolts on dash panel.
- Remove nozzles; disconnect air-conditioner wires.
- Clear harness running in front of air-conditioner.
- Clear and remove air-conditioner.

RE-FITTING OPERATIONS

- Locate air-conditioner in position on car.
- Fit 3 air-conditioner setscrews in position.
- Re-fit both defrosting nozzles.
- Lock air-conditioner and nozzle setscrews.
- Re-connect wires, re-fasten harness in front of air-conditioner.
- Re-connect air-conditioner water inlet and outlet hoses.
- Fill cooling system.
- Re-fit instrument panel and bracket.

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REPLACING AN AIR-CONDITIONER CONTROL PLATE LIGHTING BULB

- Disconnect battery.
- Remove control lever knobs.
- Clear instrument panel central embellisher, which is held by 4 screws.
- Clear light-holder from central embellisher.
- Remove bulb.
- Fit a new bulb, and re-fit light-holder on central embellisher.
- Re-fit central embellisher.
- Re-fit knobs on control levers.

REPLACING THE BLOWER CONTROL

- Disconnect battery.
- Remove control lever knobs.
- Clear instrument panel central embellisher, which is held by 4 screws.
- Disconnect blower control wires.
- Extract blower control.
- Re-fit new control, re-connect wires.
- Re-fit central embellisher.
- Re-fit knobs on control levers.

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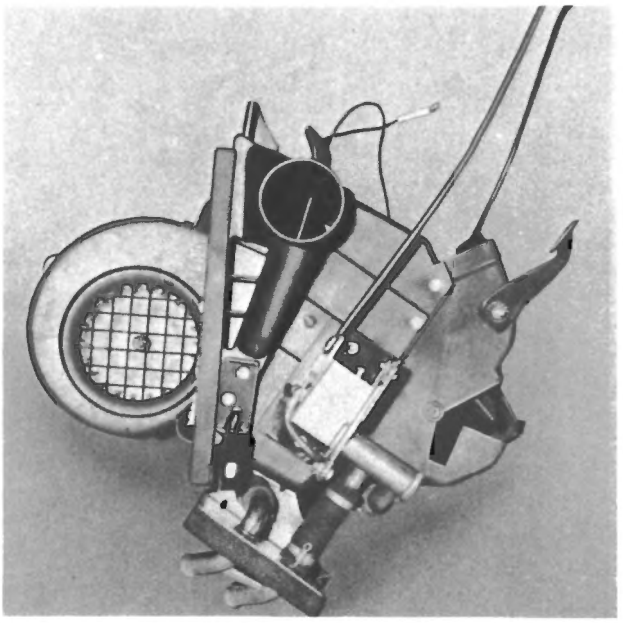


Fig. 1 4013

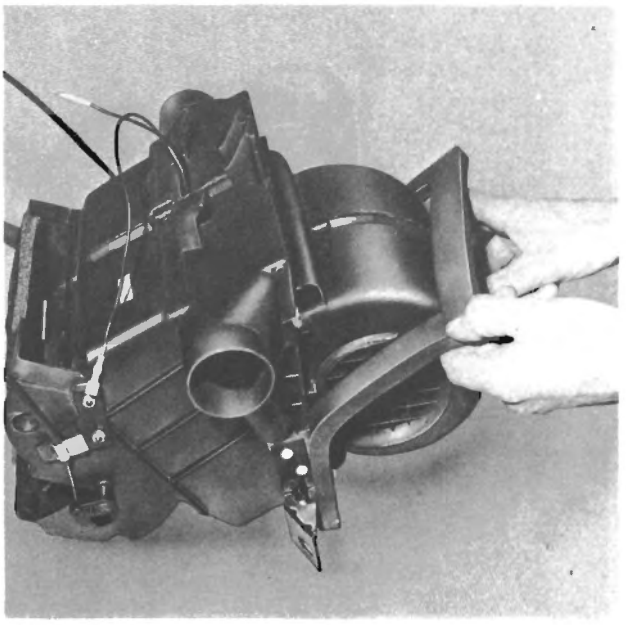


Fig. 3 4015

DISMANTLING PROCEDURE

- Disconnect battery.
- Remove instrument panel and bracket.
- Remove air-conditioner (Fig. 1).
- Remove half-housing retaining hooks.
- Clear air-conditioner upper fastening reinforcement (Fig. 2).
- Remove seal used against dash panel (Fig. 3).
- Remove both nuts retaining the flap control plate.
- Separate air-conditioner half-housings (Fig. 4).

Fig. 2 4014

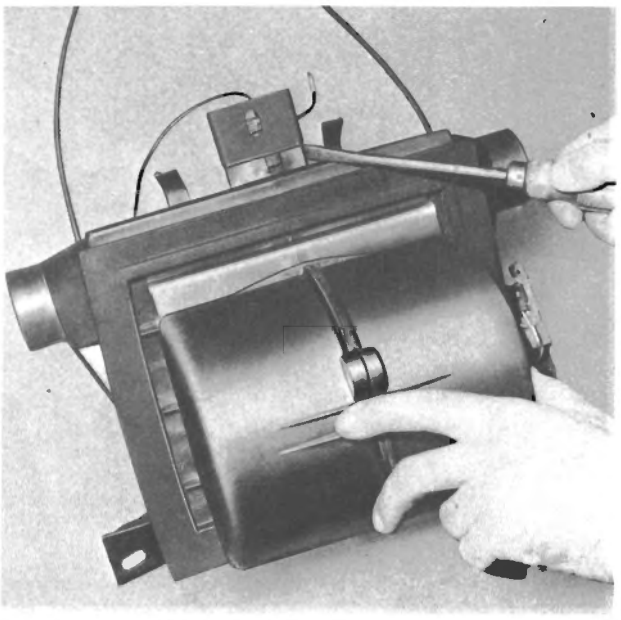
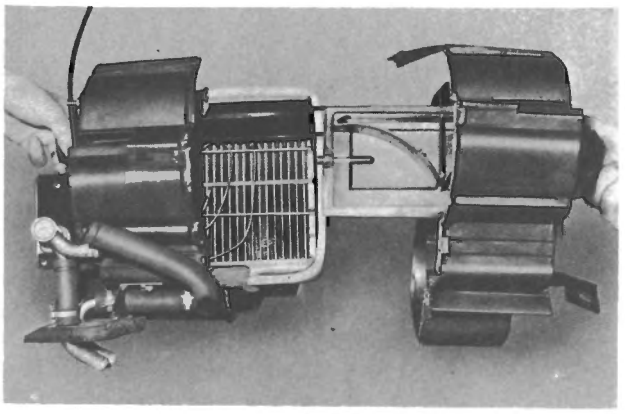


Fig. 4 4016



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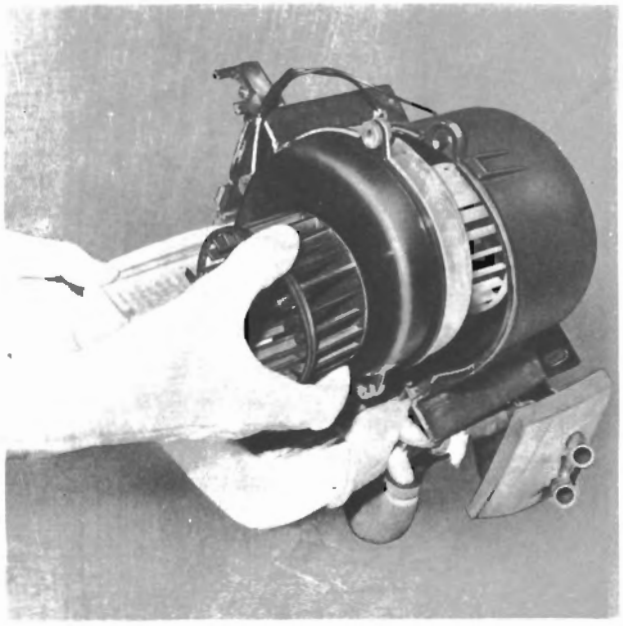


Fig. 5 4017

- Remove air-conditioner motor (Fig. 5).
- Remove rods retaining the thermostatic probe tubular set.
- Clear 2 water inlet and outlet hoses from cock.
- Remove both bolts holding cock to half-housing.
- Remove thermostatic cock (Fig. 6).
- Clear both water inlet and outlet hoses from radiator.
- Remove both nuts fastening the piping supporting plate (Fig. 7).
- Pull to remove radiator (Fig. 8).

Fig. 6 4018

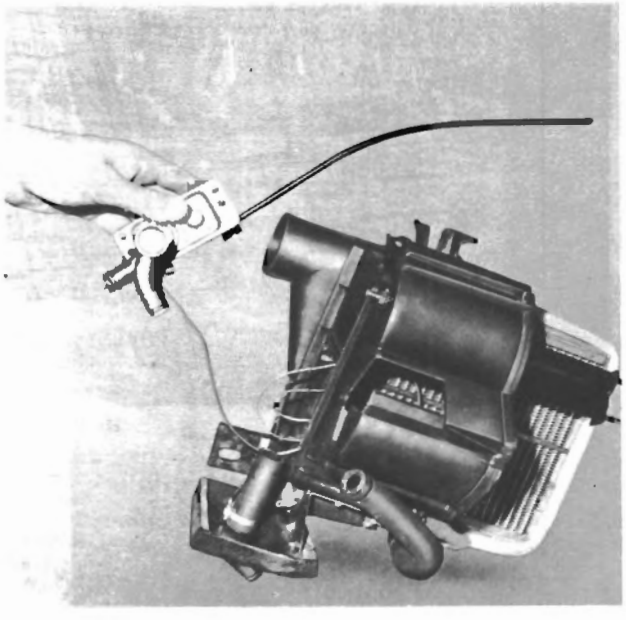




Fig. 7 4019

RE-ASSEMBLY OPERATIONS

- Locate radiator in position in air-conditioner half-housing.
- Re-fit piping supporting plate; re-fit radiator hoses.
- Re-fit thermostatic cock and its angle bracket.
- Re-fit rods retaining the thermostatic probe.
- Re-fit motor.
- Re-fit half-housing.
- Re-fit flap control plate.
- Re-fit seal.

Fig. 8 4020



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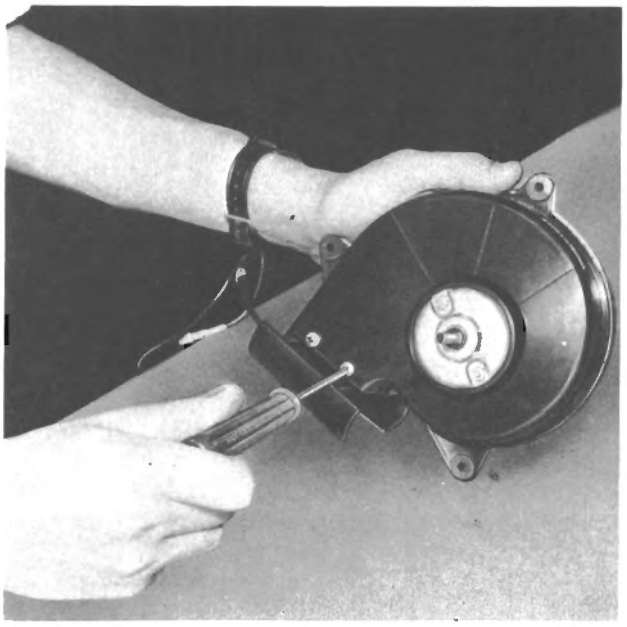


Fig. 9 4021

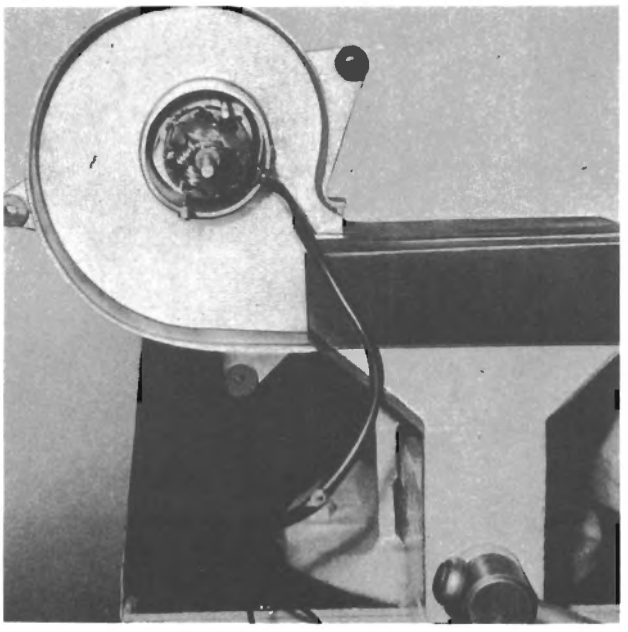


Fig. 10 4022

DISMANTLING PROCEDURE

- Mark a reference for the correct side of assembly of each turbine.
- Pull on turbines to clear them from motor shaft.
- Remove turbines.
- Remove 3 screws retaining the sheet metal reinforcement (Fig. 9).
- Remove both motor shielding half-housings, clearing the silentblocs through the plastic cover.
- Remove armature retaining clips; recover metal washer and fibre washer.
- Remove 4 nuts fastening the motor half-housings.
- Punch mark both half-housings, and separate them (Fig. 10).
- Remove armature.
- Remove brush-holder flange.

RE-ASSEMBLY OPERATIONS

- Locate armature in brush-holder.
- Locate assembly in position in half-housing.

  Fasten bolts.
- Locate the other half-housing in position in accordance with ref. marks punched at the dismantling stage.
- Assemble both motor half-housings.
- Assemble both outer half-shells retained by the 3 silentblocs.
- Re-fit sheet metal reinforcement held by 3 screws.

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L1 - FRONT END

L101 - Front bumper
L110 - Front grille
L145 - Instrument panel

L2 - CENTRAL SECTION

L201 - L209 - Front door
L210 - L219 - Rear door

L3 - REAR END

L301 - Rear bumper

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Front bumper

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REMOVAL PROCEDURE

BUMPER BAR

- Remove 1 + 1 bumper bar fastening screws with cross fittings (Fig. 1).
- Remove 1 + 1 fastening nuts with bumper longitudinal fittings (Fig. 2).
- Clear bumper bar.

BUMPER FITTINGS

Longitudinal fittings

- Remove stone-shield (Fig. 3).
- Remove 1 + 1 screws fastening fittings to front fender flange (Figs. 4 and 5)
- Clear fitting.

Cross fittings

- Remove 1 fastening screw to front fender flange bracket (Fig. 6).

RE-FITTING OPERATIONS

- Proceed in reverse order to removal procedure.

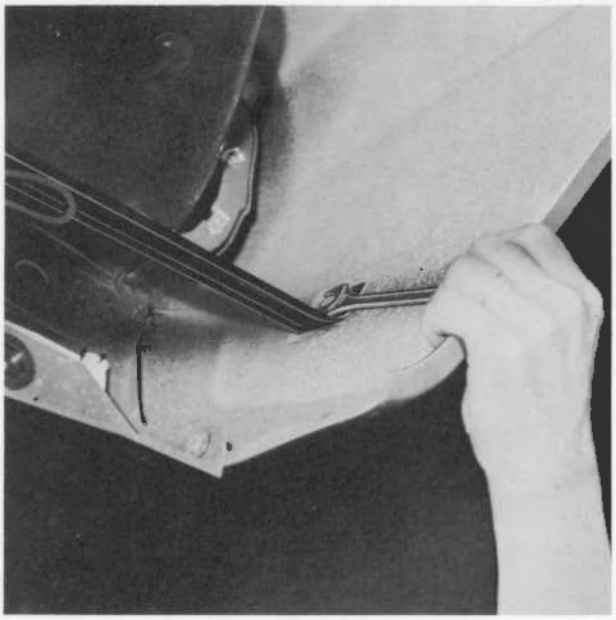


Fig. 1 3971



Fig. 2 3972



Fig. 3 3973



Fig. 4 3974



Fig. 5 3975

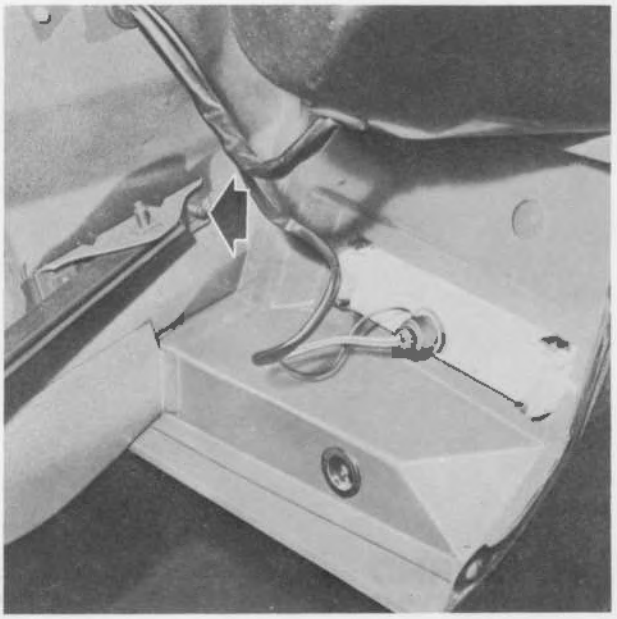


Fig. 6 3976

Front grille



Fig. 1 3977

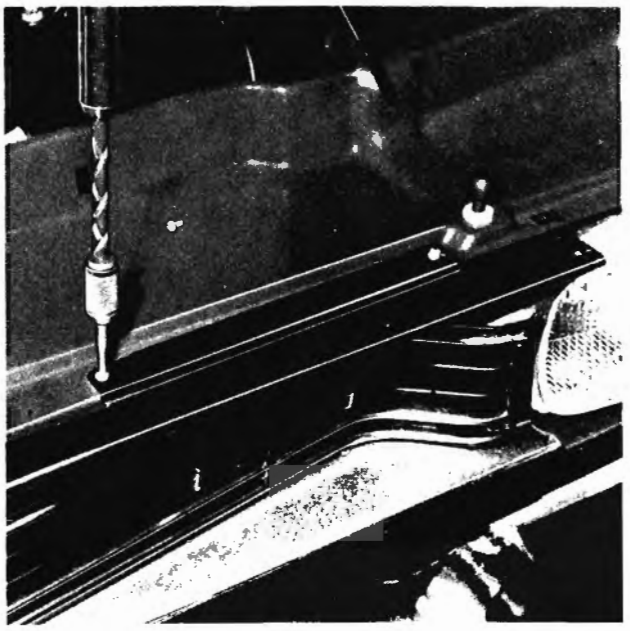


Fig. 3 3979

REMOVAL PROCEDURE

- Remove both setscrews from each headlight rim (Fig. 1).
- Clear headlight rims, by tilting upper section forward to clear them from their retaining fasteners in the lower section (Fig. 2).
- Remove 7 setscrews from front grille (4 in upper section, 3 in lower section) (Figs. 3 and 4).

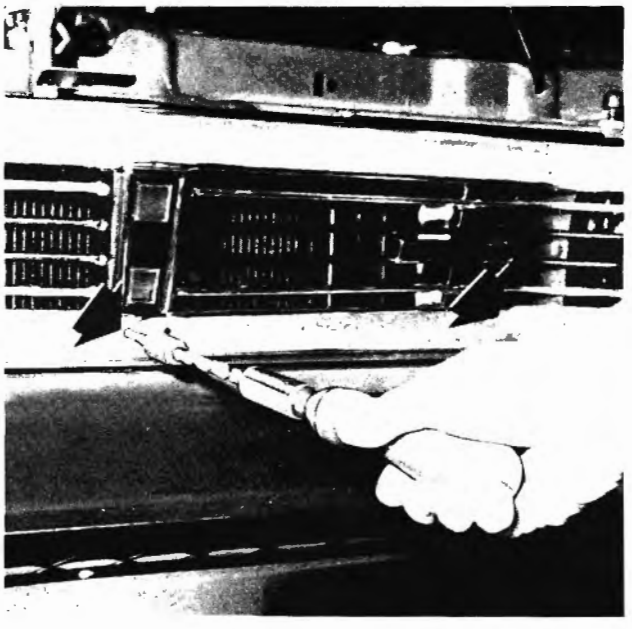
RE-FITTING OPERATIONS

- Check condition of fastening nuts.
- To re-fit, proceed in reverse order to removal operations.

Fig. 2 3978



Fig. 4 3980



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Instrument panel

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REPLACEMENT OF CLUSTER FASCIA

- Remove both steering column setscrews (Fig. 1).
- Remove both fascia setscrews (Fig. 2).
- Clear fascia towards rear of car (Fig. 3).
- Check positioning and condition of both rubber rings on instrument panel (Fig. 4).
- To re-fit, proceed in reverse order.

REPLACEMENT OF VENTILATOR ON CLUSTER SIDE

- Disconnect battery.
- Remove fascia.
- Clear cluster (5 screws) (Fig. 5).
- From cluster opening:
  - . disconnect air supply piping
  - . clear three plastic stops arranged on ventilator bracket surround (Fig. 6).
- Clear ventilator assembly towards rear of car.
- To re-fit same, proceed in reverse order.

REPLACEMENT OF VENTILATOR ON PASSENGER SIDE

- From inside of glove box:
  - . disconnect air supply duct;
  - . push ventilator towards rear of car, pressing on 4 fasteners (Fig. 7).
- To re-fit same, proceed in reverse order.

REPLACEMENT OF CRASH-PAD

- Remove:
  - . cluster fascia;
  - . 2 + 2 fastening screws on either side of instrument panel (Fig. 8);
  - . 2 loudspeaker screen setscrews (Fig. 9); clear and remove screen;
  - . 1 + 1 fastening nuts on instrument panel sheet metal frame: one on cluster side, one from inside of glove box (Figs. 10 and 11).
  - . both setscrews under loudspeaker screen (Fig. 12).
- Remove crash-pad assembly (Fig. 13)
- To re-fit same, proceed in reverse order.

REPLACEMENT OF CENTRAL EMBELLISHER

- Remove both air-conditioner control lever knobs.
- Remove 2 + 2 central embellisher setscrews (Figs. 14 and 15).
- Clear central embellisher, disconnect both supply wires, and remove both air-conditioner control lighting bulb-holders.
- Remove central embellisher.
- To re-fit same, proceed in reverse order.

REMOVAL OF ACCESSORIES

- Remove:
  - . floor bracket;
  - . fascia;
  - . cluster;
  - . central embellisher;
  - . instrument panel crash-pad;
  - . R.H. and L.H. ventilators;
  - . switches;
  - . air-conditioner control plate.
- Clear bonnet latch lever.
- Disconnect glove box lighting contactor.
- Clear glove box lighting bulb-holder.

COMPONENT REMOVAL

Sheet metal components, cluster side

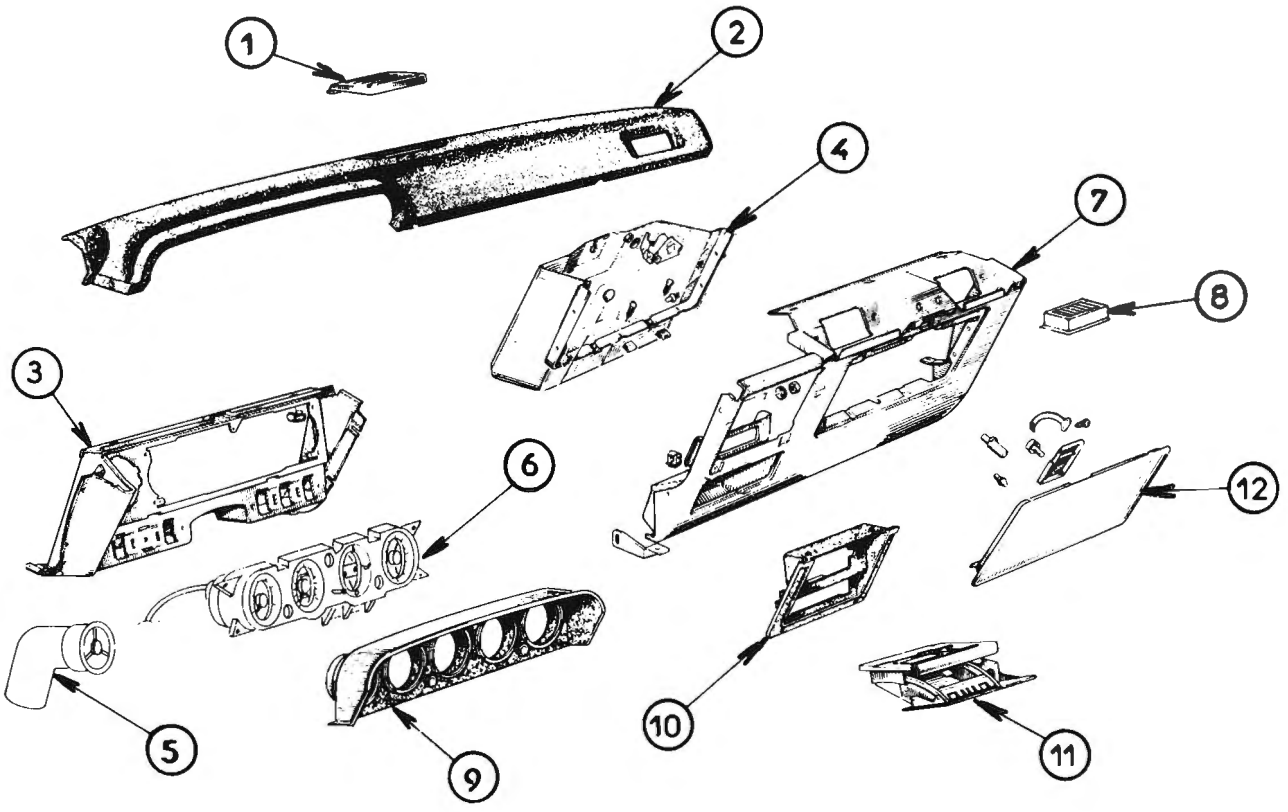
- Remove
  - . 2 screws for fastening to instrument panel side area (Fig. 16);
  - . 2 screws for fastening to instrument panel upper area (Fig. 17);
  - . 2 nuts + 1 screw for fastening to instrument panel on passenger side (Fig. 18);
  - . 1 screw for fastening to instrument panel side attachment bracket (Fig. 19).
- Clear instrument panel sheet metal unit on cluster side (Fig. 20).

Sheet metal components, glove box side

- Remove:
  - . 2 screws for fastening to instrument panel side area (Fig. 21);
  - . 3 screws for fastening to instrument panel upper area (Fig. 22);
  - . 1 screw for fastening to instrument panel side attachment bracket (Fig. 23);
  - . 1 screw for fastening to connecting tab with air-conditioner (Fig. 24).
- Clear instrument panel sheet metal unit on glove box side (Fig. 25).
- Remove:
  - . ash-trey plate;
  - . glove box bottom panel;
  - . glove box lid.

RE-FITTING

- To re-fit, proceed in reverse order.



G.054

(1) Radio screen
(2) Pad
(3) Sheet metal panel L.H.
(4) Glove box bottom panel
(5) Ventilator L.H.
(6) Instrument cluster
(7) Sheet metal panel R.H.
(8) Ventilator R.H.
(9) Fascia
(10) Central embellisher
(11) Ash tray
(12) Glove box lid

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Fig. 1 3983



Fig. 3 3985

Fig. 2 3984

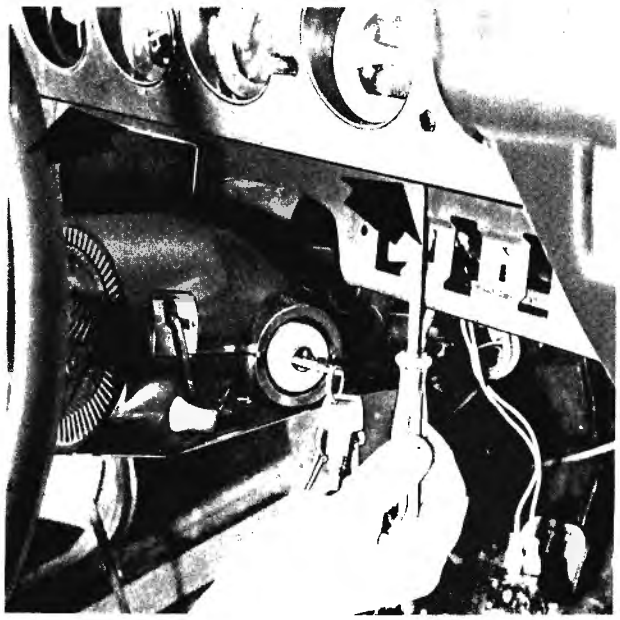


Fig. 4 3959



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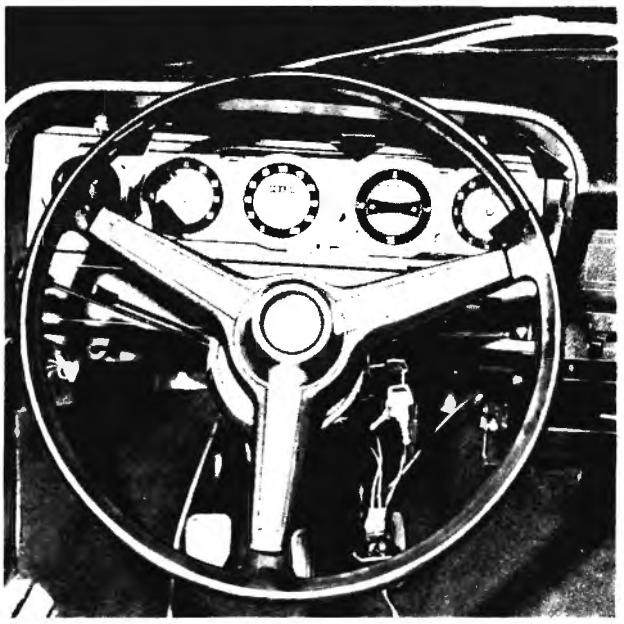


Fig. 5 3986



Fig. 7 3988

Fig. 6 3987

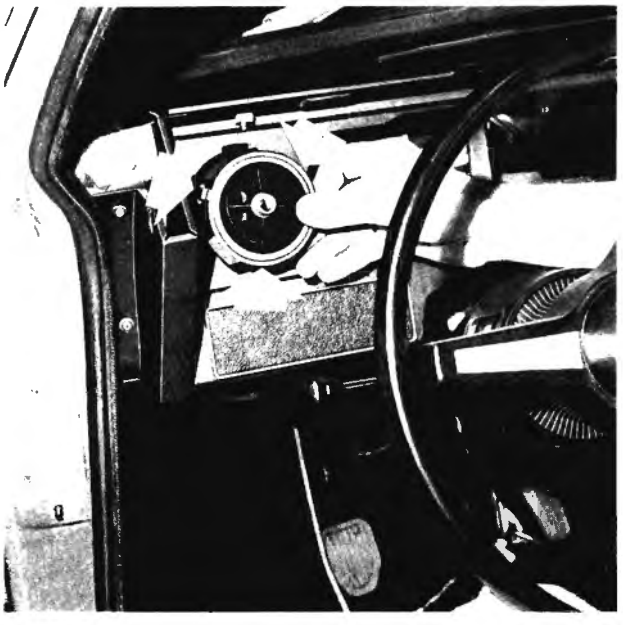


Fig. 8 3989



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Fig. 9 3990

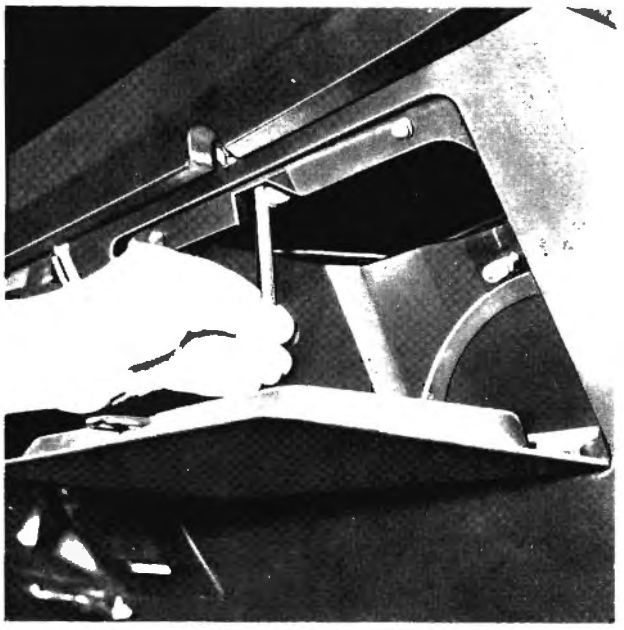


Fig. 11 3992

Fig. 10 3991

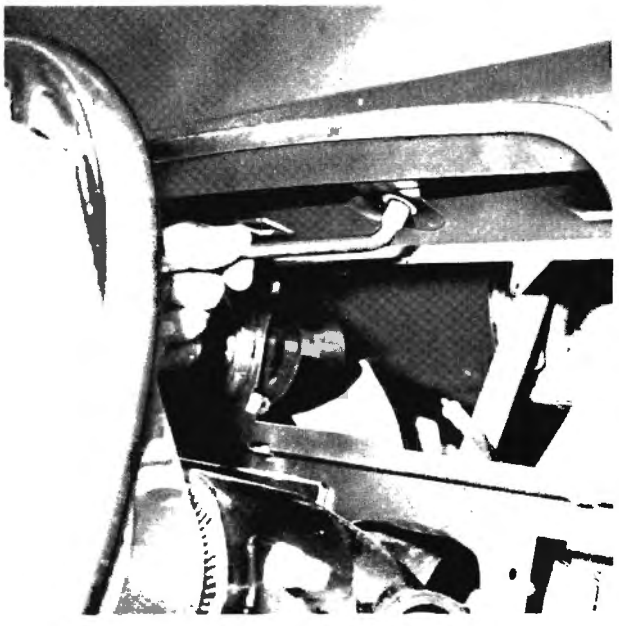


Fig. 12 3993



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Fig. 13 3994

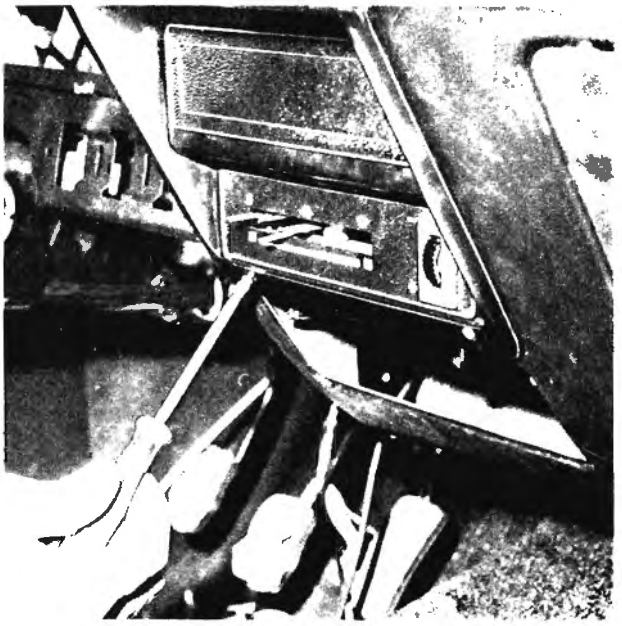


Fig. 15 3996

Fig. 14 3995

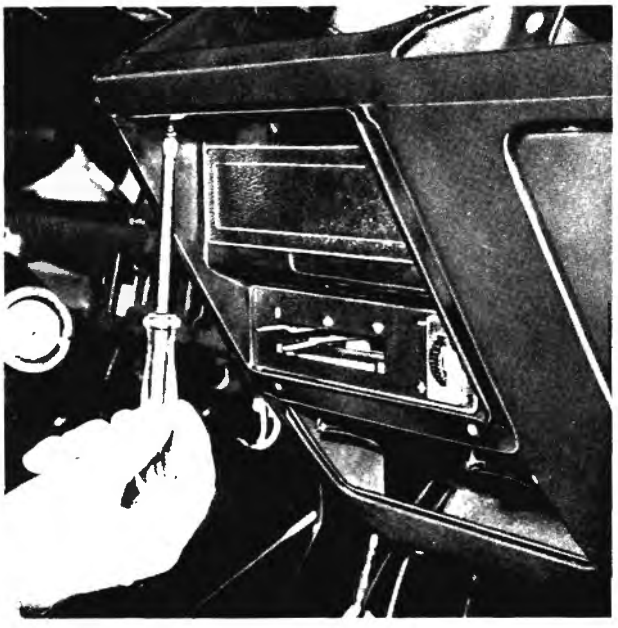
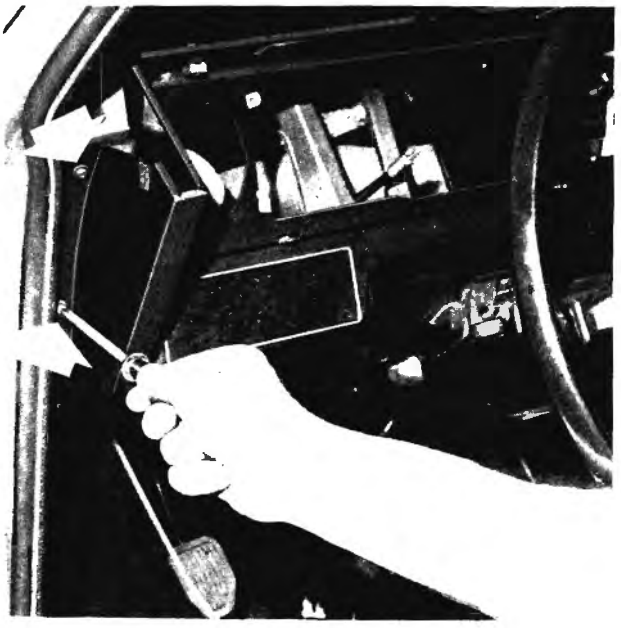


Fig. 16 3997



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Fig. 17 3998



Fig. 19 4000

Fig. 18 3999



Fig. 20 4001



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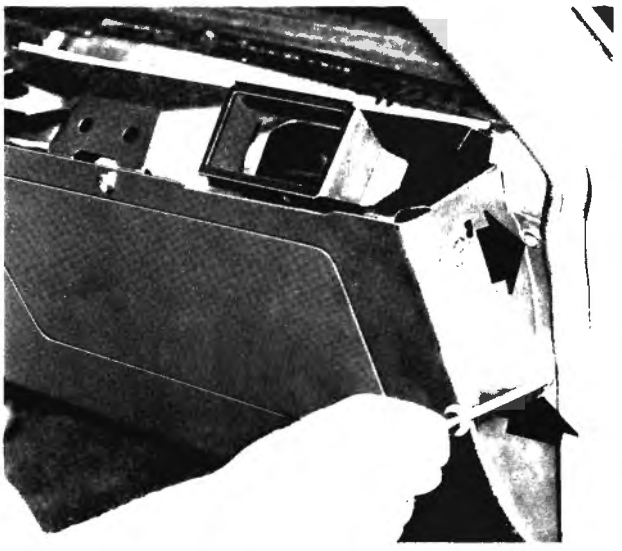


Fig. 21 4002

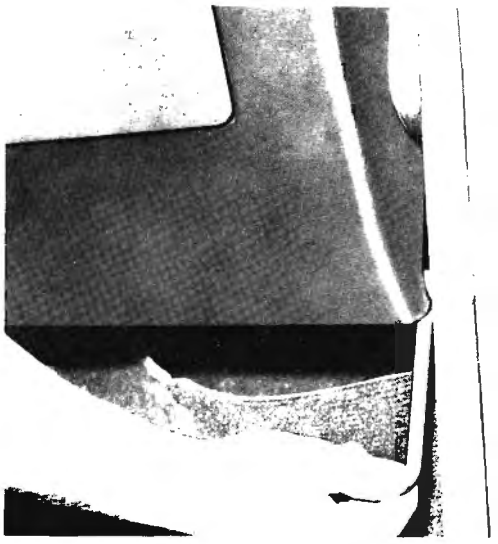


Fig. 23 4004

Fig. 22 4003



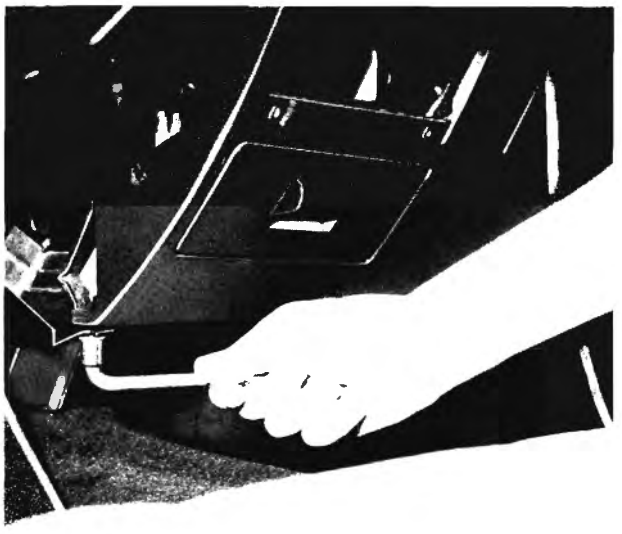


Fig. 24 4005

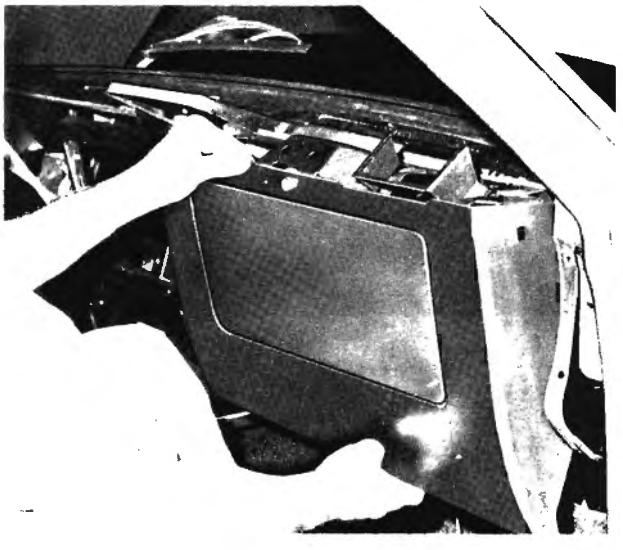


Fig. 25 4006

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Front door

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INTRODUCTION

With the exception of specific introductions, re-assembly operations should proceed in reverse order to the dismantling procedure.

At the end of each paragraph concerning a component, which is part of the door assembly, the reader will find the replacement procedure for this component on the front door not removed from the vehicle.

SPECIFIC TOOLING REQUIRED FOR DISMANTLING AND RE-ASSEMBLING A FRONT DOOR (Fig. 1)

. Dia. 10 socket wrench.
. Dia. 13 socket wrench.
. Dia. 13 spanner.
. 4 mm Allen wrench.
. Spatula.
. Cross-shaped screw driver.
. Pin
. Flat blade screw driver.
. Rubber mallet
. Tool for fastener Ref. 20842 W.
. Block (wooden).
. Rule.

LIST OF FRONT DOOR FITTINGS (Figs. 2 and 3)

Part Numbers:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
9 - Outer weatherstrip.
10 - Lower window regulator guide.
11 - Window regulator mechanism.
12 - Glass
13 - Glass lower assembly and seal
14 - Lower glass guide and seal.
15 - Glass channel.
16 - Rear glass channel bracket.
17 - Remote control lever.
18 - Remote control link.
19 - Remote control spring.
20 - Inner latch rod housing.
21 - Inner latch rod.
22 - Lock mechanism.
23 - Latch rod.
24 - Door latch.
25 - Latch bearing gasket.
26 - Latch fastening clips.
27 - Outer handle.
28 - Outer handle link.
29 - Outer handle fastening bracket.
30 - Outer handle seal.
31 - Outer handle fastening hole seal.

PREPARING THE NEW COMPONENT

Correct form setting

- Check aspect of outer panel.

Paint

- In accordance with nature of lacquer used.

DISMANTLING PROCEDURE

Preparatory operations

- Disconnect battery.
- Lower window.
- Remove door:
  . unscrew lower and upper hinge fastenings (Figs. 4 and 5).
- Take door to repair station.

Dismantling operations

- Remove:

rear view mirror (L.H. front door)

Part No. :

1 - Arm rest (Fig. 6).

2 - Window regulator handle insert (Fig. 7).

3 - Window regulator handle (Fig. 8).

4 - Remote control handle (Fig. 9).

5 - Remote control handle inner gasket.

6 - Trim panel assembly (Fig. 10).

7 - Inner weatherstrip (Fig. 11).

8 - Paper seal (Fig. 12).

9 - Outer weatherstrip (Fig. 13).

Note: the reference numbers are those shown on the "parts list" plate for fittings. If the components to be removed cannot be reached (in case of a deformation, for instance), use a chisel to cut the outer door panel (Fig. 14).

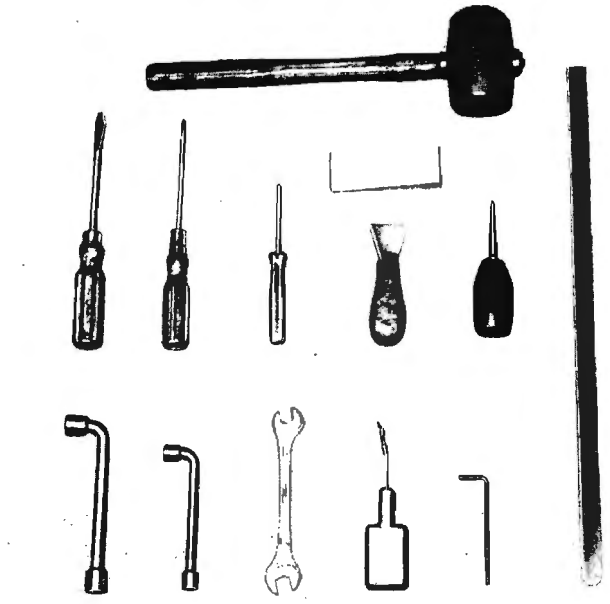


Fig. 1 4126

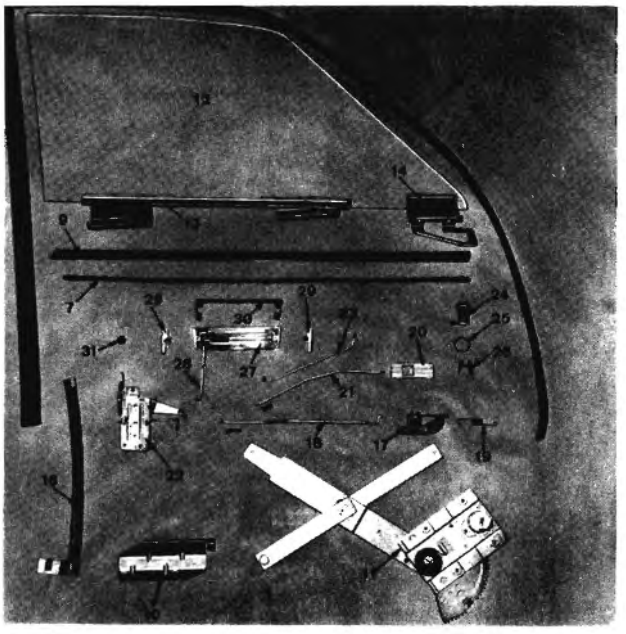


Fig. 3 4190

Fig. 2 4189

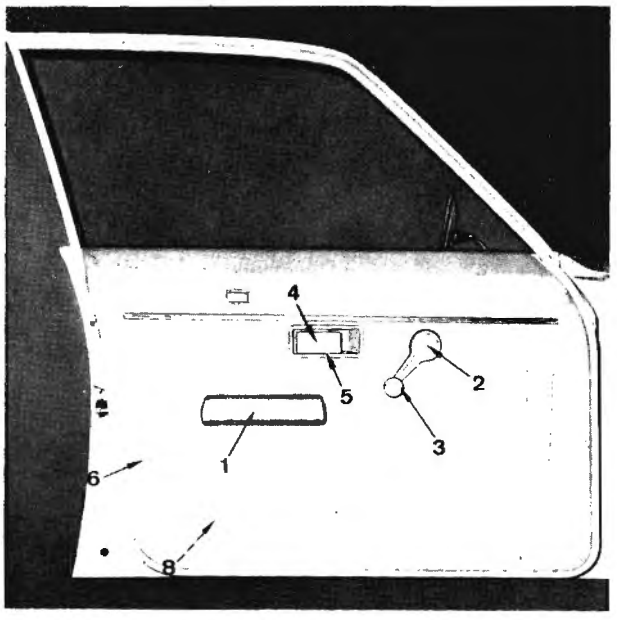


Fig. 4 4129



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Fig. 5 4191

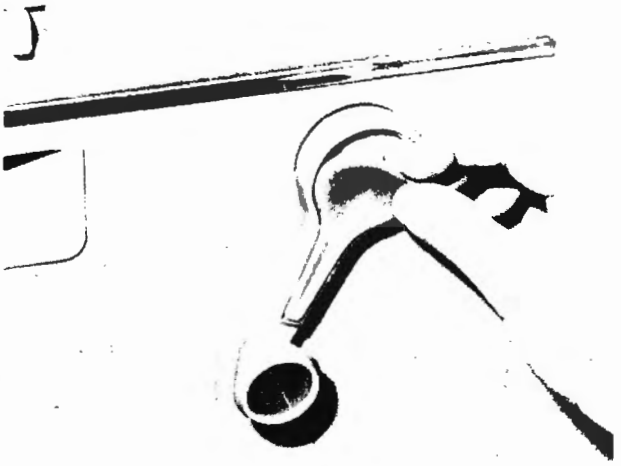


Fig. 7 4132

Fig. 6 4131

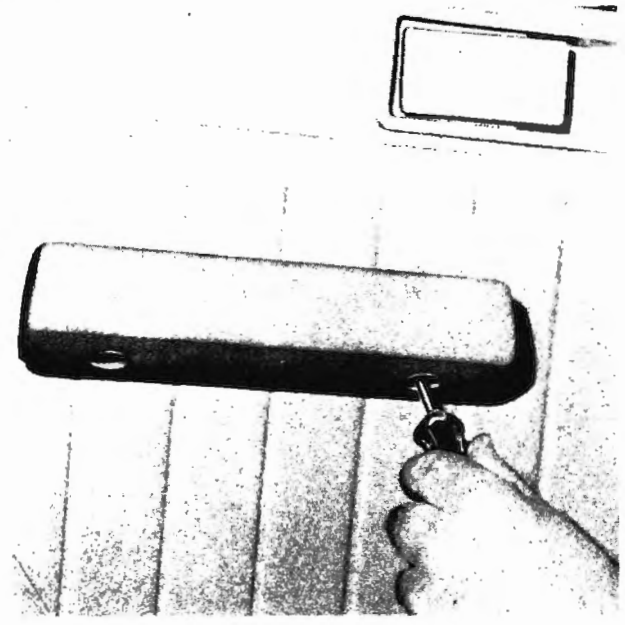
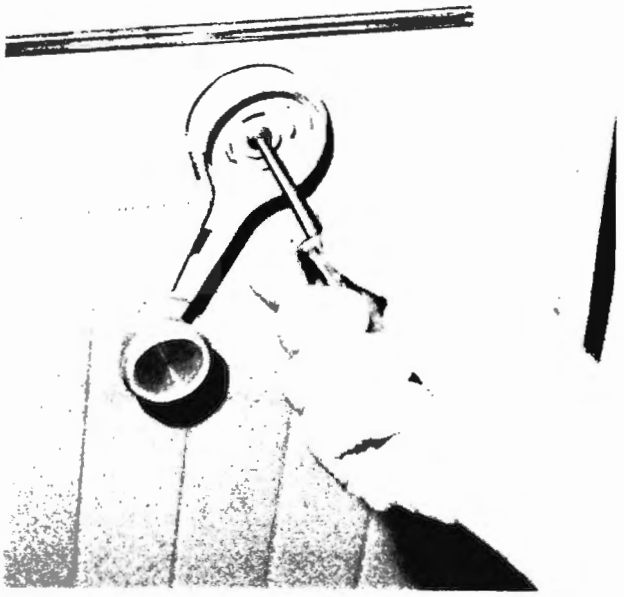


Fig. 8 4133



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Fig. 9 4134

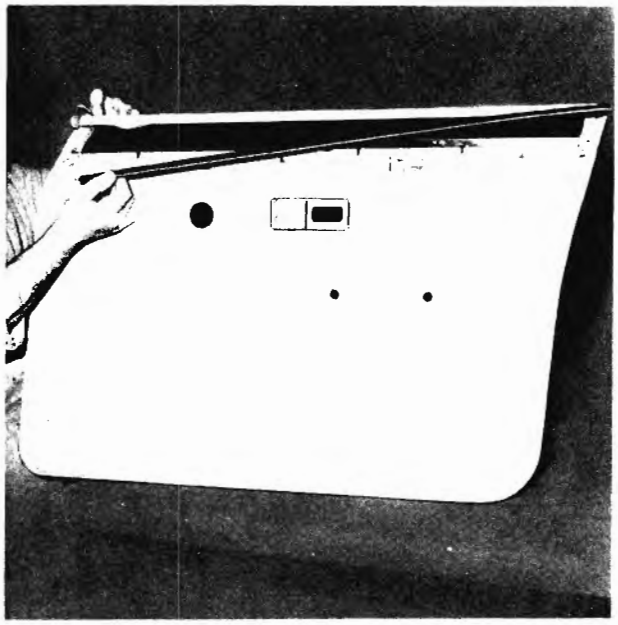


Fig. 11 4193

Fig. 10 4192

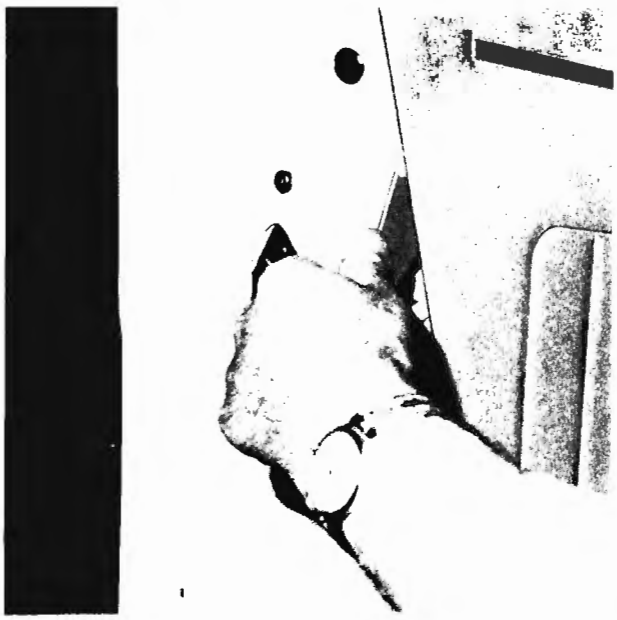
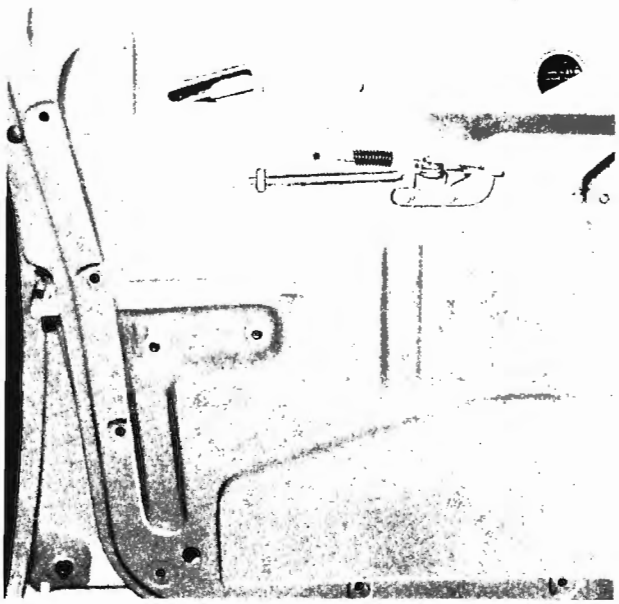


Fig. 12 4194



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Fig. 13 4195

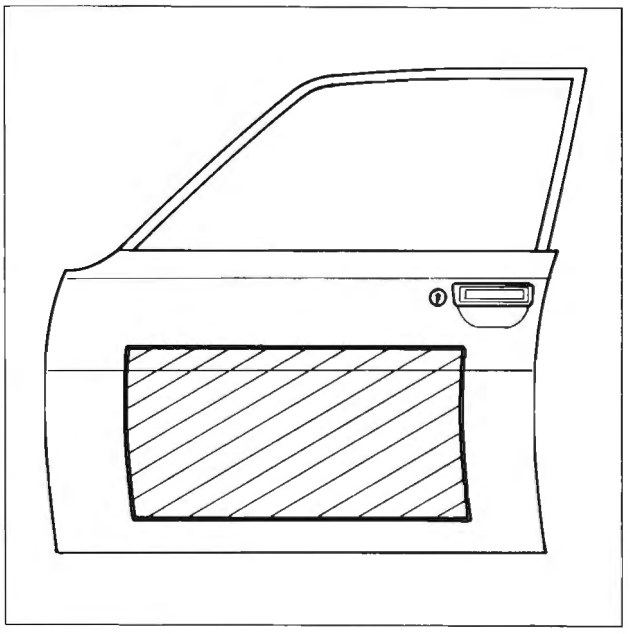


Fig. 14 G.048

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Front door

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REPLACEMENT OF LOWER WINDOW REGULATOR GUIDE (Ref. 10)

Removal procedure

- Lift window to top position.
- Unscrew lower window regulator guide fastening (Fig. 15).
- Slide window regulator guide rearwards (lock side) until window regulator roller is cleared.
- Extract window regulator lower guide (Fig. 16).

Fitting operations

- For fitting, proceed in reverse order.

Important: when fitting this component

- check that roller is engaged correctly in lower guide section;
- before locking fastening screws in position, manipulate window regulator mechanism, and make sure glass is fully engaged in channel; adjust by sliding lower guide in fastening slots (Fig. 15).

Replacement on door still retained on car

- With glass in top position, remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
10 - Lower window regulator guide.

REPLACEMENT OF WINDOW REGULATOR MECHANISM (Ref. 11)

Removal procedure

- Set glass in top position.
- Unscrew mechanism fastening, and clear it from its housing (Figs. 17 and 18).
- Slide mechanism rearwards (lock side) until roller is cleared from front lower glass section.
- Slide mechanism forwards (hinge side) until roller is cleared from rear lower glass section.
- Extract window regulator mechanism (Fig. 19).

Fitting operations

- For fitting, proceed in reverse order.

Important: check that rollers are correctly engaged in lower glass sections.

Replacement on door still retained on car

- Remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
10 - Lower window regulator guide.
11 - Window regulator mechanism.

Important: use two blocks to hold glass in its position when window regulator mechanism is being removed or fitted (Fig. 20).

REPLACEMENT OF GLASS (Ref. 12)

Removal procedure

- Unscrew lower glass guide shoe, and extract shoe (Fig. 23).
- Tilt glass downwards by 45^{0} from the rear (lock side) (Fig. 21).
- Extract glass in this position, on door outer side (Fig. 22).

Fitting operations

- For fitting, proceed in reverse order.

Important

- check proper fitting of glass:
  - . glass front end in relation to end of lower window section : dimension 233 (Fig. 24);
  - . glass front end in relation to rear end of glass guide : dimension 118 (Fig. 24).

Replacement on door still retained

- Remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
9 - Outer weatherstrip.
10 - Lower window regulator guide.
11 - Window regulator mechanism.

. Remove glass retaining blocks.

12 - Door glass.

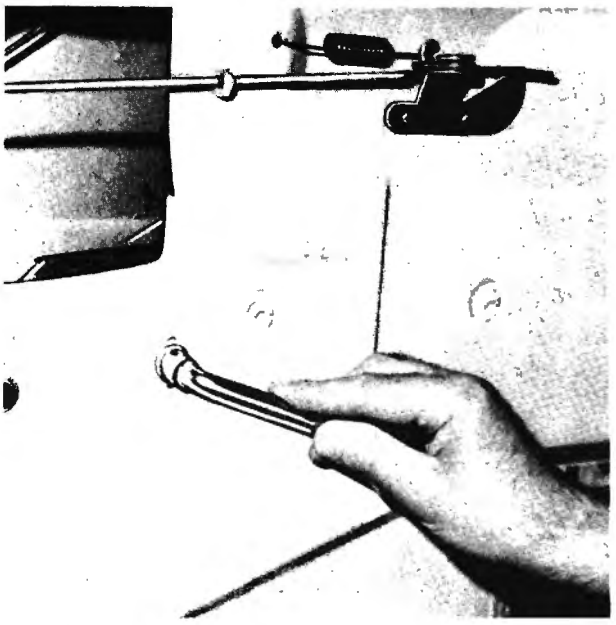


Fig. 15 4196

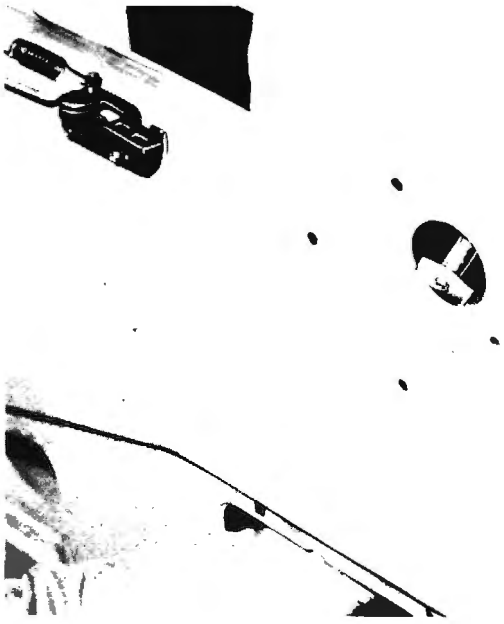


Fig. 17 4198

Fig. 16 4197



Fig. 18 4199



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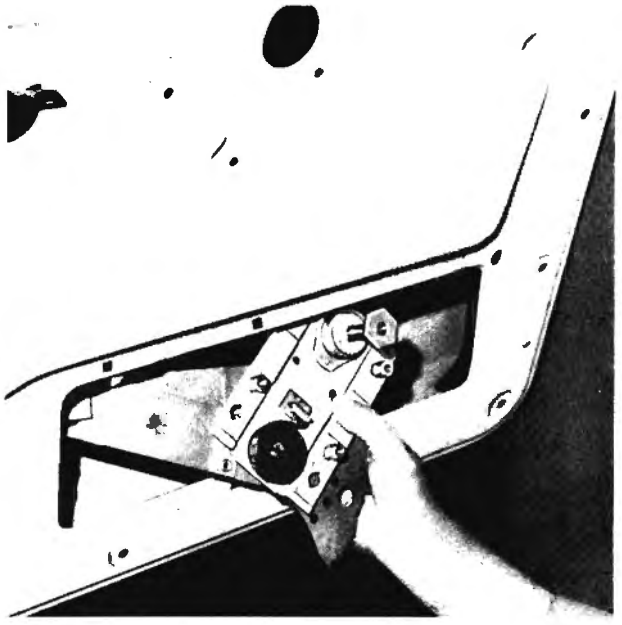


Fig. 19 4200



Fig. 21 4202

Fig. 20 4201



Fig. 22 4203



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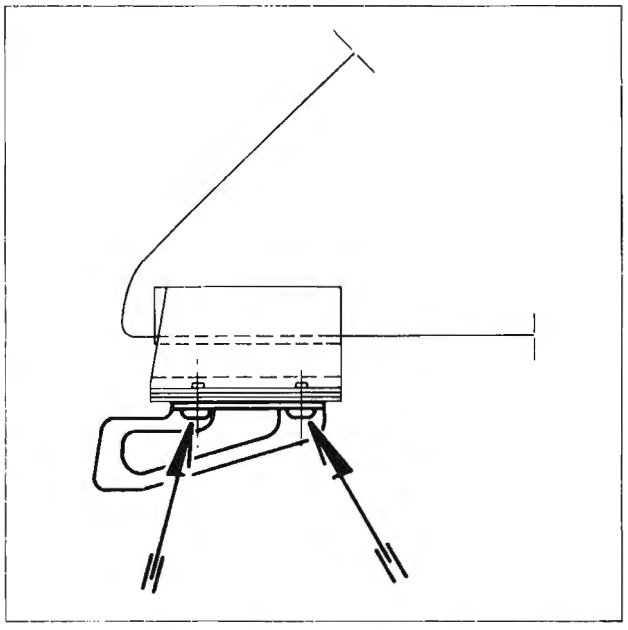
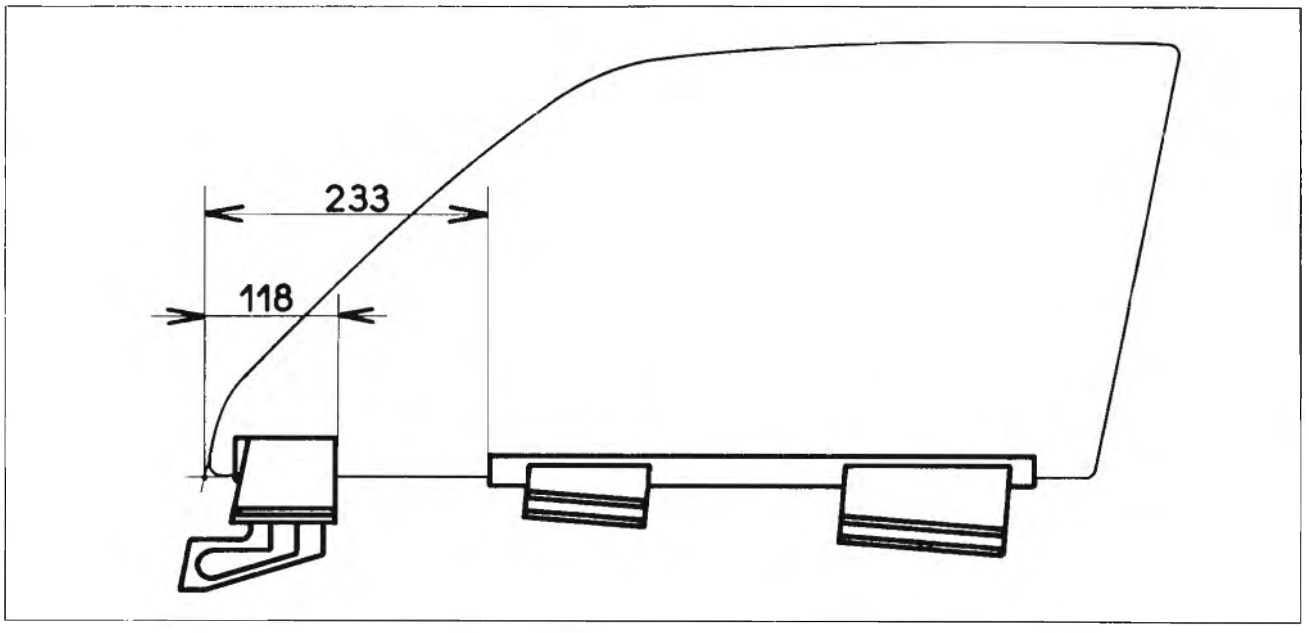


Fig. 23 G.049

Fig. 24 G.050



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Front door

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REPLACEMENT OF GLASS (continuation)

Glass fittings

- Lower glass section:
  - fit rubber seals to glass;
  - smear outer faces of sealing area with soapy water for easier fitting;
  - locate lower glass channel section in position in accordance with initial dimension (233) and, starting from that end, use a rubber mallet to fit lower glass on seal (Fig. 24).
- Lower glass guide:
  - fit rubber seal on glass;
  - smear outer faces of sealing area with soapy water for easier fitting;
  - locate glass guide channel section in position in accordance with initial dimension (118) and, starting from that end, use a rubber mallet to fit lower glass guide on seal (Fig. 24).

REPLACEMENT OF GLASS CHANNEL (Ref. 15)

Removal procedure

- Dislodge channel in lower area, on hinge side, and clear it upwards (Fig. 25).

Fitting operations

- Locate channel into place in corner (Ref. A) (Fig. 26), locate upper part in position, and fit side parts into place (Fig. 27).
- Press on channel to reach bottom of housing.

Replacement on door still retained on car

- Remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
9 - Outer weatherstrip.
10 - Lower window regulator guide.
11 - Window regulator mechanism.
12 - Glass.
15 - Glass channel.

REPLACEMENT OF REAR GLASS CHANNEL BRACKET (Ref. 16)

Removal procedure

- Unscrew channel bracket fastening (Fig. 28).
- Pull downwards to clear and extract glass channel bracket (Fig. 29).

Fitting operations

- Engage channel bracket in position (Fig. 30).
- Screw fastening in lower area.

Replacement on door still retained on car

- Remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal

. dislodge glass channel, on lock side (Fig. 31).

16 - Rear glass channel bracket

REPLACEMENT OF REMOTE CONTROL ASSEMBLY (Refs. 17, 18, 19)
INNER LATCHING SYSTEM (Refs. 20, 21)
LOCK MECHANISM (Ref. 22)

Removal procedure

- Remove remote control spring, Ref. 19 (Fig. 32).
- Unscrew remote control lever fastening (Fig. 33).
- Clear remote control link, Ref. 18, from retaining clip (Fig. 34).
- Clear inner latch rod, Ref. 21, from its housing, Ref. 20 (Fig. 35).
- Disconnect latch rod, Ref. 23, on lock side (Fig. 36).
- Disconnect outer handle rod, Ref. 28, on lock side (Fig. 37).
- Unscrew lock mechanism fastening (Figs. 38 and 39).
- Extract remote control, inner latching, and lock mechanism assemblies (Figs. 40 and 41).

Fitting operations

- For fitting, proceed in reverse order.

Important: check operation of removed components.

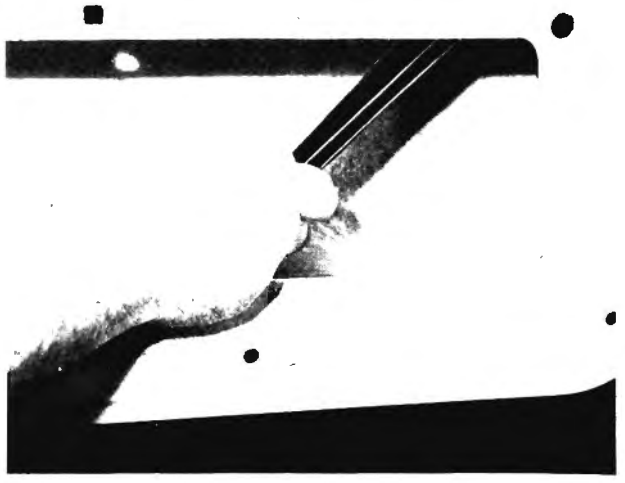


Fig. 25 4204



Fig. 27 4206

Fig. 26 4205



Fig. 28 4207



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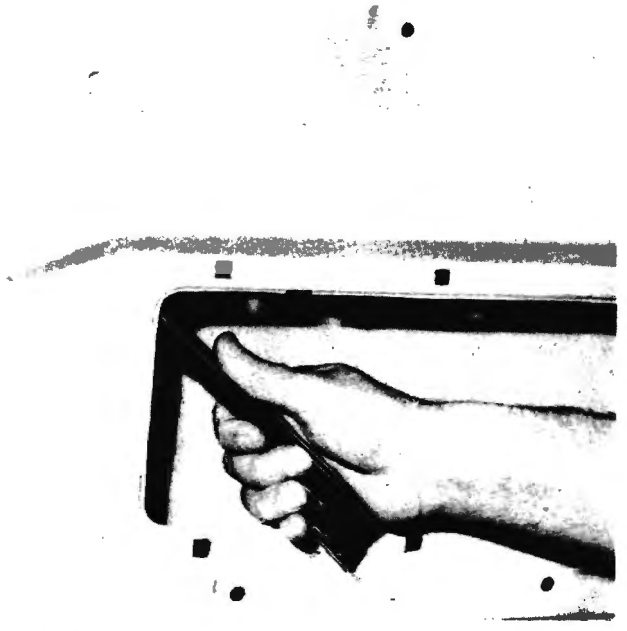


Fig. 29 4208

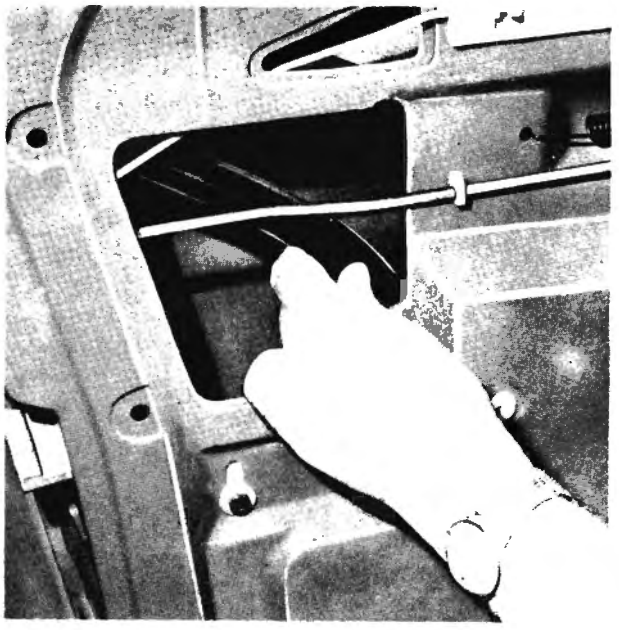


Fig. 31 4210

Fig. 30 4209

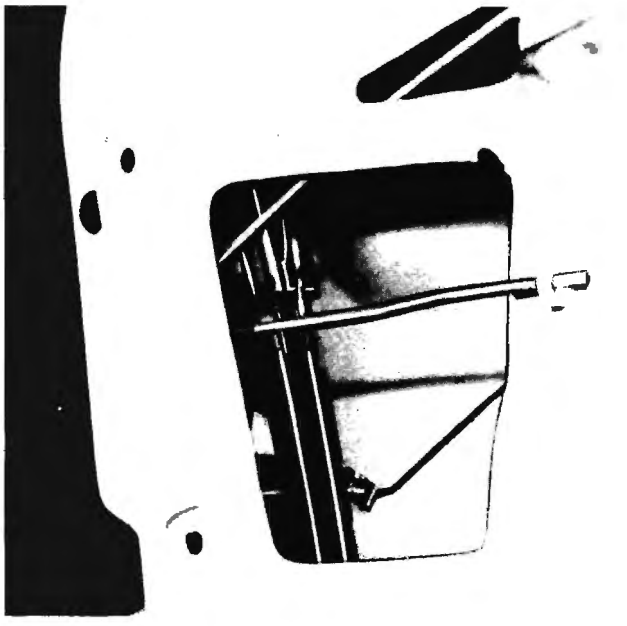
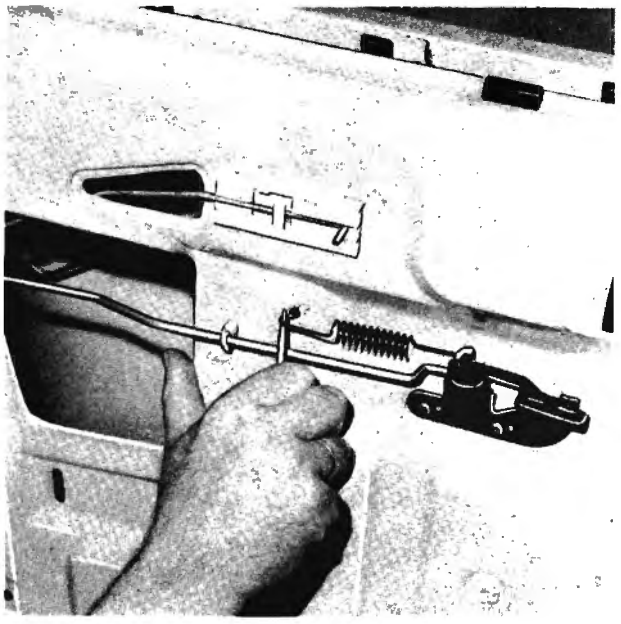


Fig. 32 4211



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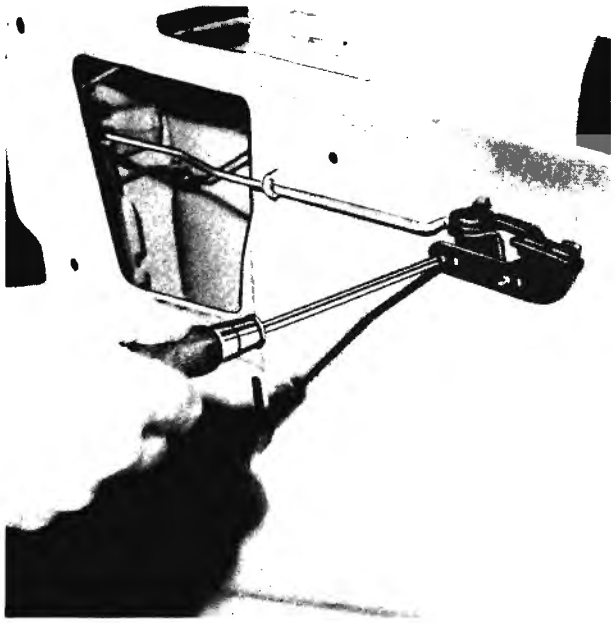


Fig. 33 4212



Fig. 35 4214

Fig. 34 4213

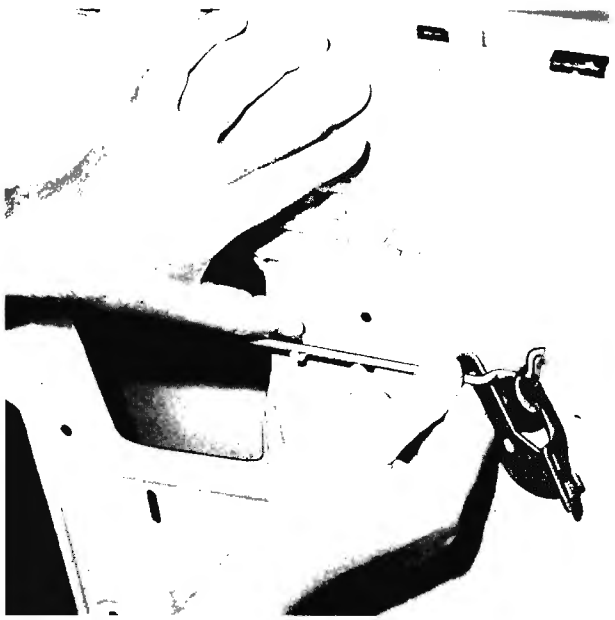


Fig. 36 4215

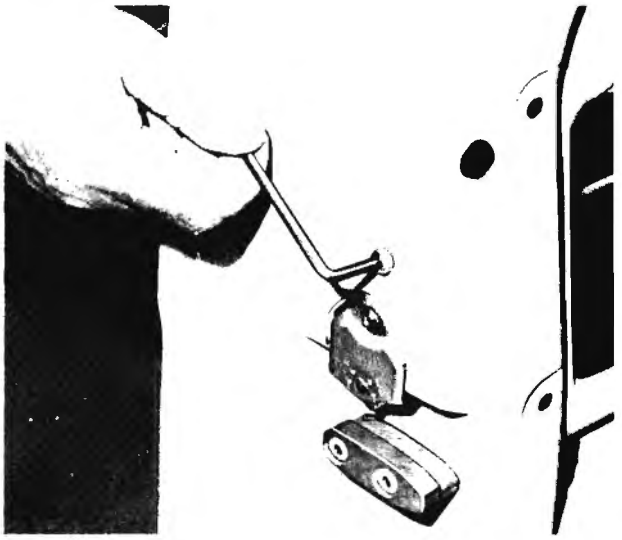


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Fig. 37 4216

Fig. 38 4217



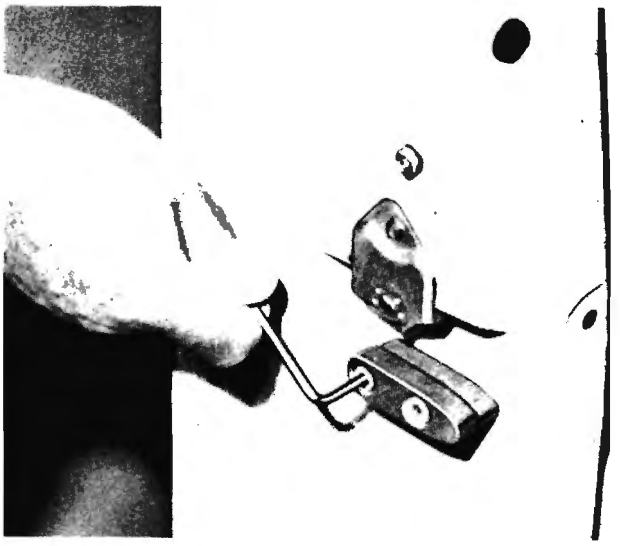


Fig. 39 4218

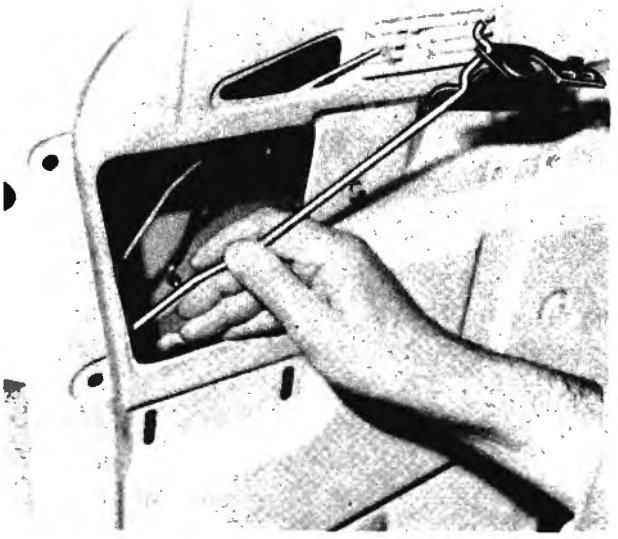


Fig. 40 4219

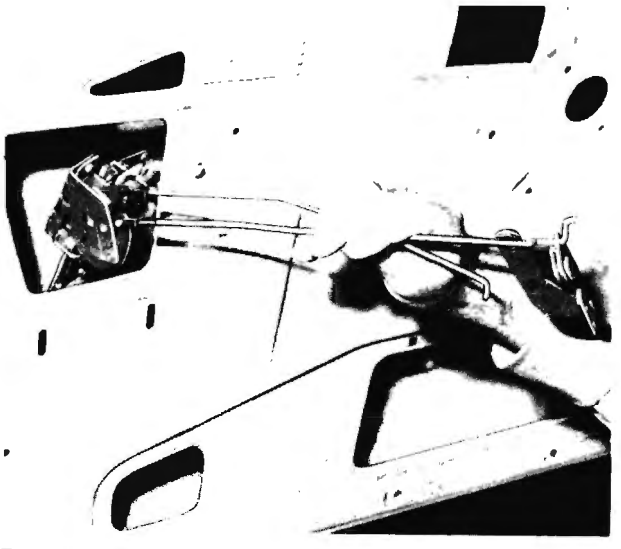


Fig. 41 4220

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Front door

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Replacement of remote control on door still retained on car

- Remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip
8 - Paper seal.
19 - Remote control spring.
17 - Remote control lever:

. clear remote control link from retaining clip;
. disconnect remote control link, on lever side (Fig. 42).

Fitting operations

- For fitting, proceed in reverse order.

Note: before re-assembly, check operation of remote control system.

Replacement of inner latching system on door still retained on car

- Remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
21 - Inner latch rod.

. clear latch from its housing;
. disconnect latch rod, on lock side (B) (Fig. 43).

Replacement of lock mechanism on door still retained on car

- With glass in top position, remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.

. dislodge glass channel, on lock side (Fig. 31).

16 - Rear glass channel bracket.
22 - Lock mechanism:

. disconnect:

- remote control link, Ref. 18, on lock side (C) (Fig. 43);
- inner latch rod, Ref. 21, on lock side (B) (Fig. 43);
- latch rod, Ref. 23 (D) (Fig. 43);
- outer handle link, Ref. 28;

. remove lock fastening screws.

Important:
- before reassembly: smear lock mechanical parts with grease;
- before re-fitting trim: check operation of removed components.

REPLACEMENT OF DOOR LATCH (Ref. 24)

Removal procedure

- Disconnect latch rod, Ref. 23, on latch side (Fig. 44).
- Clear latch fastening clip, Ref. 26 (Figs. 45 and 46).
- Extract latch and bearing gasket, Ref. 25 (Fig. 47).

Fitting operations

- Locate bearing gasket in position on latch.
- Fit clip in position on latch.
- Fit latch to correct positioning references.
- Press on latch to achieve clipping on door panel.
- Connect latch rod to latch.

Note: check operation of latch.

Replacement on door still retained on car

- With glass set in top position, remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
24 - Door latch:

. disconnect latch rod, ref. 23, on lock side and latch side.

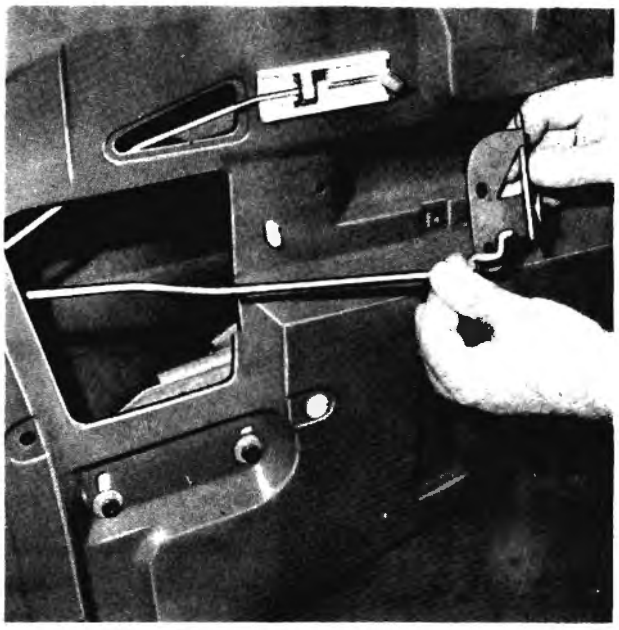


Fig. 42 4221

Fig. 43 4222

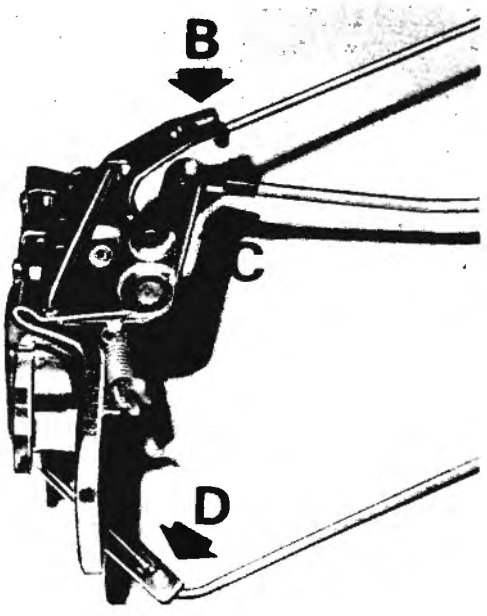
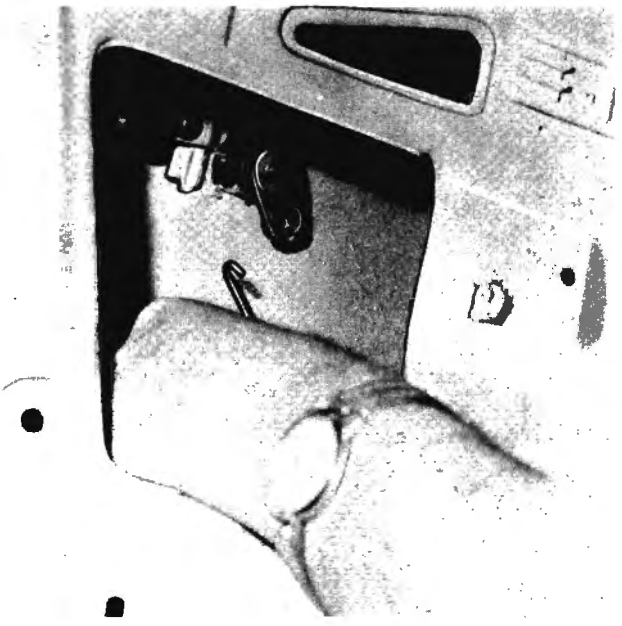


Fig. 44 4223



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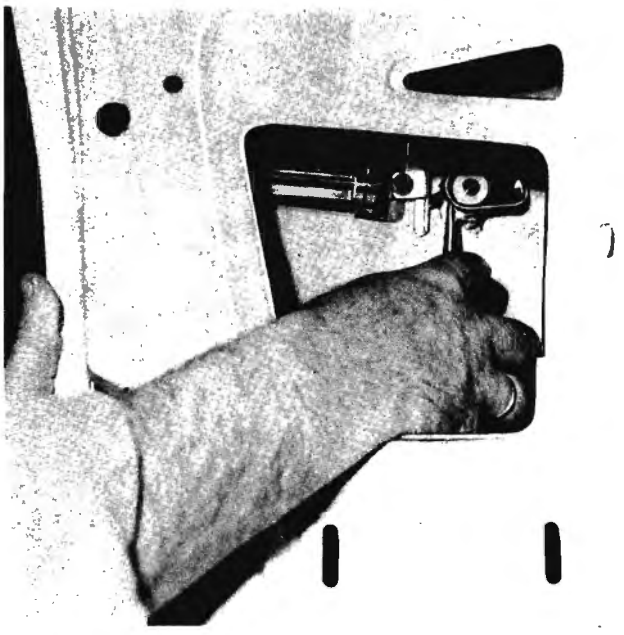


Fig. 45 4224

Fig. 46 4225

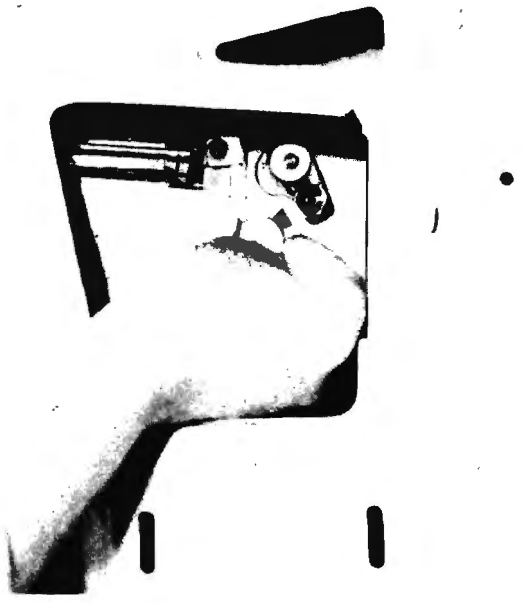
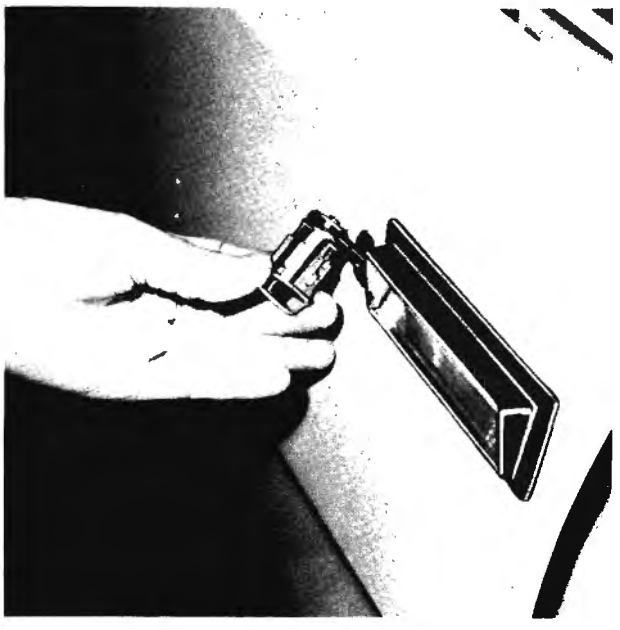


Fig. 47 4226



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Front door

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REPLACEMENT OF OUTER HANDLE (Ref. 27)

Removal procedure

- Remove seal, Ref. 31, on door inner panel (Ref. 48).
- Remove handle fastening screw (Figs. 49 and 50).
- Recover fastening brackets, Ref. 29, on door inner side, and seal, Ref. 30, on door outer side (Figs. 51 and 52).

Fitting operations

- For fitting, proceed in reverse order.

  Note: check position of seal before tightening.

Replacement on door still retained on car

- With glass set in top position, remove parts:
  1 - Arm rest
  2 - Window regulator handle insert.
  3 - Window regulator handle.
  4 - Remote control handle.
  5 - Remote control handle inner gasket.
  6 - Trim panel assembly.
  7 - Inner weatherstrip.
  8 - Paper seal.
  . dislodge glass channel, on lock side (Fig. 31).
  27 - Outer handle.
  . disconnect handle link, Ref. 28, on lock side (Fig. 37).

REPLACEMENT OF DOOR FRAME REAR AND UPPER EMBELLISHERS

Removal procedure

- Dislodge upper and rear embellisher from door frame (Fig. 53).

Fitting operations: for fitting, proceed in reverse order.

Miscellaneous

- For final stripping of door, on door as previously dismantled, removal or re-fitting of parts:

  32 - Spacer for trim panel (Fig. 54).
  33 - Lower stop (Fig. 54).
  34 - Remote control link sound-deadening retaining clip (Fig. 54).
  35 - Arm rest fastening nut (Fig. 54).
  36 - "Rapid" fastener, using tool Ref.20842 W (Figs. 55 and 56).



Fig. 48 4227

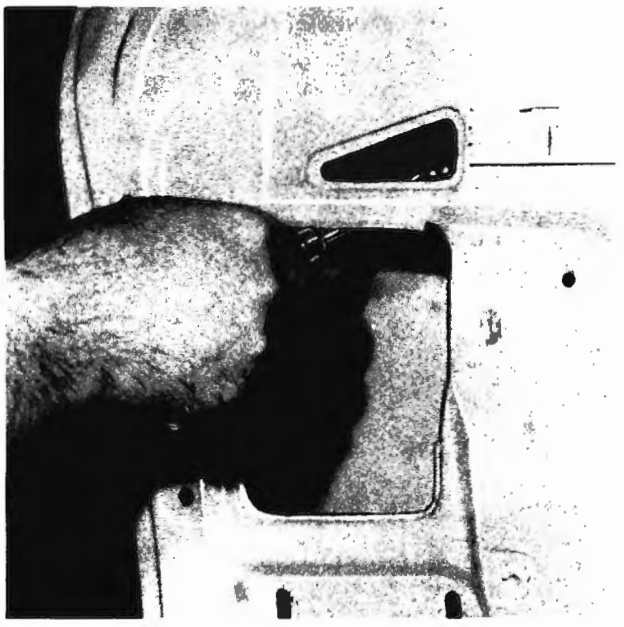


Fig. 50 4229

Fig. 49 4228

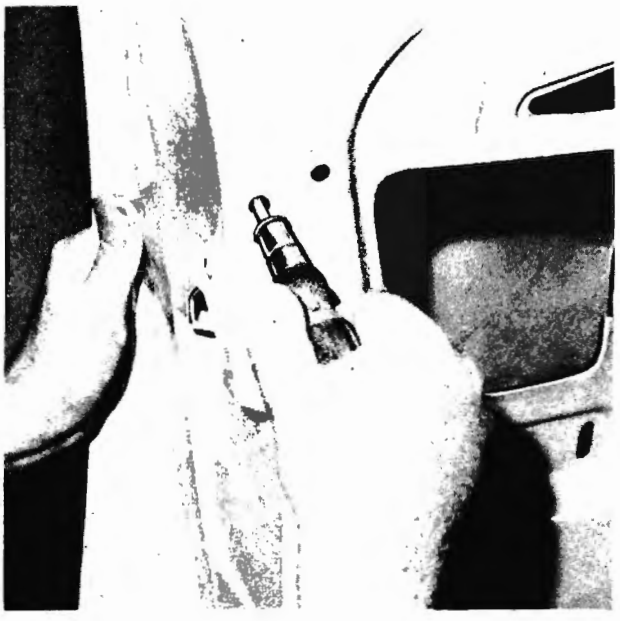
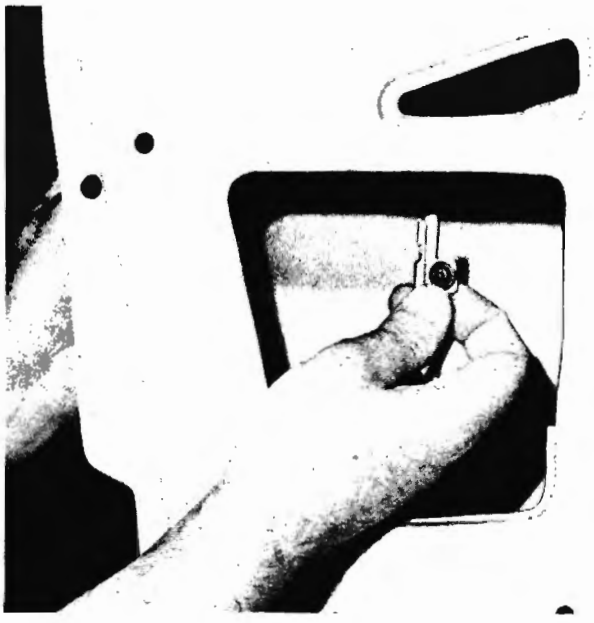


Fig. 51 4230



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Fig. 52 4231

Fig. 53 4232



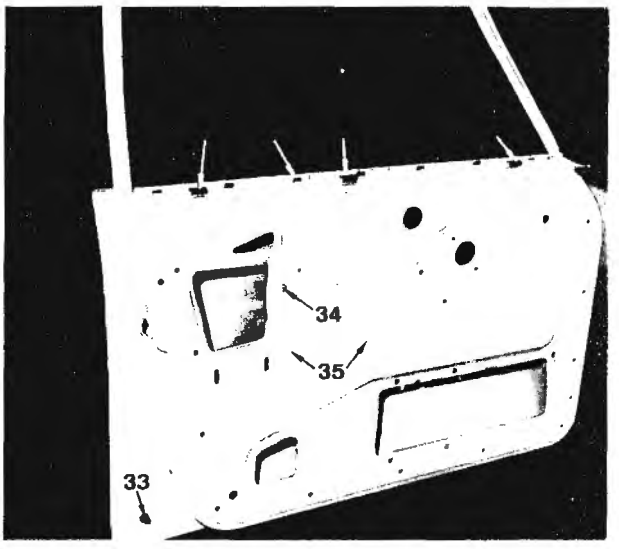


Fig. 54 4233



Fig. 55 4184

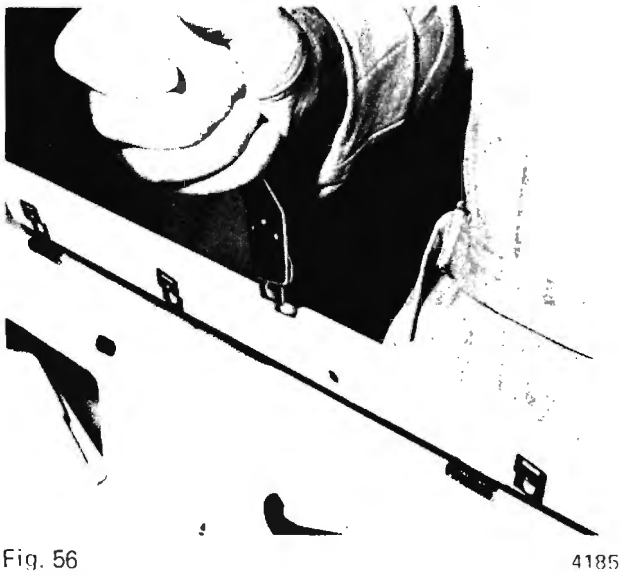


Fig. 56 4185

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Rear door

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INTRODUCTION

With the exception of specific instructions, re-assembly operations should proceed in reverse order to the dismantling procedure.

At the end of each paragraph concerning a component, which is part of the door assembly, the reader will find the replacement procedure for this component on the rear door not removed from the vehicle.

SPECIFIC TOOLING REQUIRED FOR DISMANTLING AND RE-ASSEMBLING A REAR DOOR (Fig. 1)

. Dia. 10 socket wrench.

. Dia. 13 socket wrench.

. Dia. 13 spanner.

. 4 mm Allen wrench.

. Spatula.

. Cross-shaped screw driver.

. Pin

. Flat blade screw driver.

. Rubber mallet.

. Tool for fastener Ref. 20842 W.

. Block (wooden).

. Rule.

LIST OF REAR DOOR FITTINGS (Figs. 2 and 3)

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
9 - Outer weatherstrip.
10 - Lower window regulator guide.
11 - Window regulator mechanism.
12 - Glass lowering guide.
13 - Rear glass channel bracket.
14 - Glass.
15 - Lower glass and seal assembly.
16 - Glass channels.
17 - Remote control lever.
18 - Remote control link.
19 - Remote control spring.
20 - Inner latch rod.
21 - Outer handle.
22 - Outer handle fastening bracket.
23 - Outer handle seal.
24 - Outer handle fastening hole seal.
25 - Handle linkage-to-lock fastening hole seal.
26 - Lock mechanism.
27 - Door block.
28 - Door frame rear bracket.

PREPARING THE NEW COMPONENT

Correct form setting

- Check aspect of outer panel.

Paint

- In accordance with nature of lacquer used.

DISMANTLING PROCEDURE

Preparatory operations

- Disconnect battery.
- Lower window.
- Remove door:
  . unscrew lower and upper hinge fastenings (Figs. 4 and 5).
- Take door to repair station.

Dismantling operations

- Remove parts:

1 - Arm rest (Fig. 6).
2 - Window regulator handle insert (Fig. 7).
3 - Window regulator handle (Fig. 8).
4 - Remote control handle (Fig. 9).
5 - Remote control handle inner gasket.
6 - Trim panel assembly (Fig. 10).
7 - Inner weatherstrip (Fig. 11).
8 - Paper seal (Fig. 12).
9 - Outer weatherstrip (Fig. 13).

Note: the reference numbers are those shown on the "parts list" plate for fittings. If the components to be removed cannot be reached (in case of a deformation, for instance), use a chisel to cut the outer door panel (Fig. 14).

REPLACEMENT OF LOWER WINDOW REGULATOR GUIDE (Ref. 10)

Removal procedure

- Set glass in top position.
- Unscrew window regulator lower guide fastening (Fig. 15).
- Slide window regulator guide forward (hinge side) until window regulator roller is cleared.
- Extract window regulator lower guide (Fig. 16).

Fitting operations

- For fitting, proceed in reverse order.

Important:

- check that roller is correctly engaged in lower guide section;
- before locking the fastening screws, manipulate the window regulator mechanism, and make sure glass fits fully in channel. Adjust by sliding lower guide in fastening slots (Fig. 16).

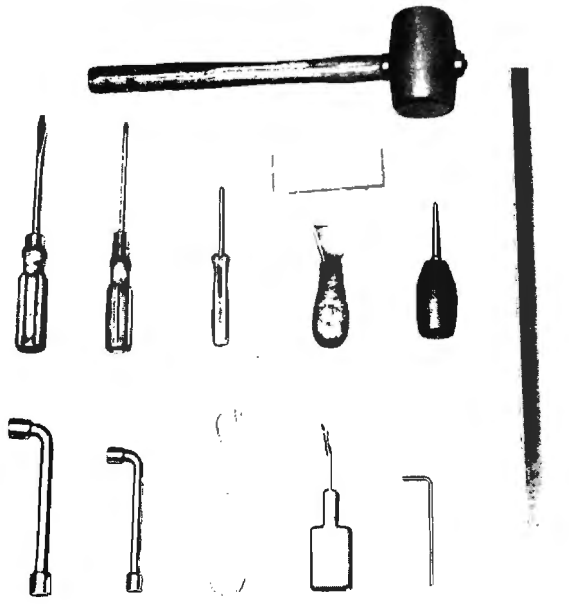


Fig. 1 4126

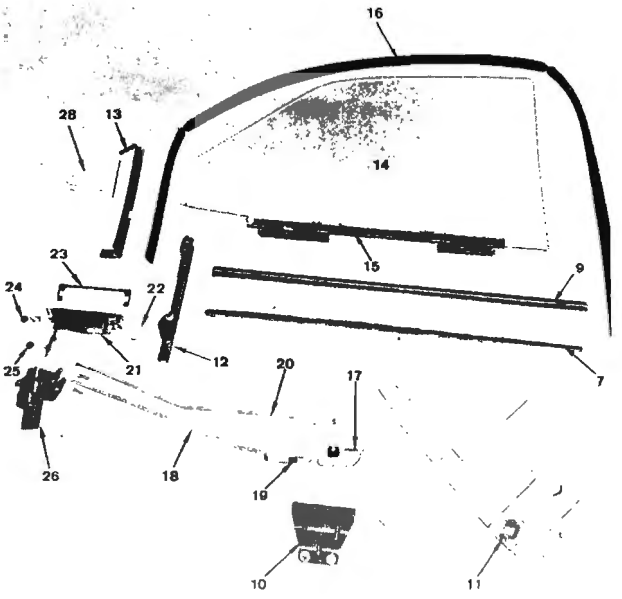


Fig. 3 4128

Fig. 2 4127

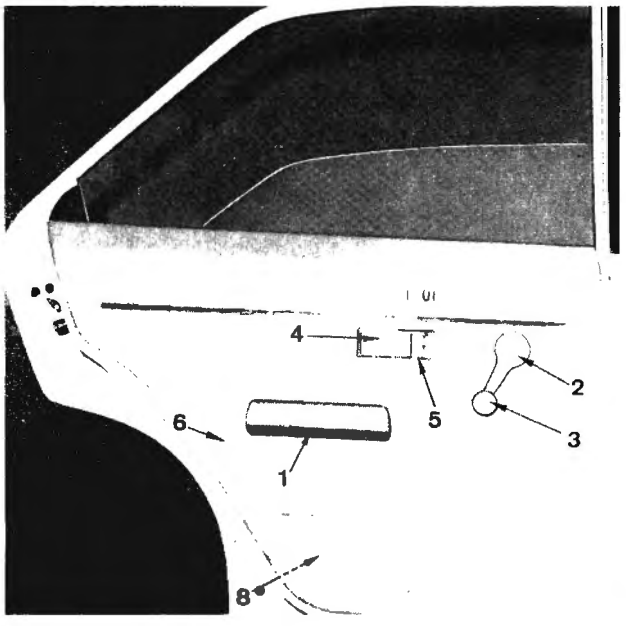


Fig. 4 4129



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Fig. 5 4130

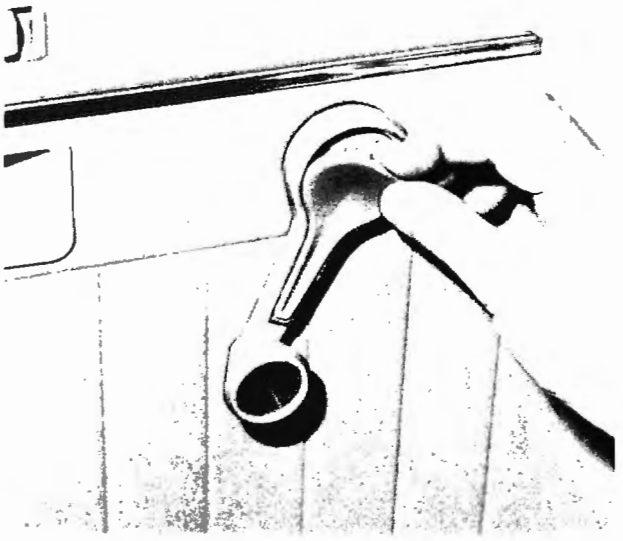


Fig. 7 4132

Fig. 6 4131

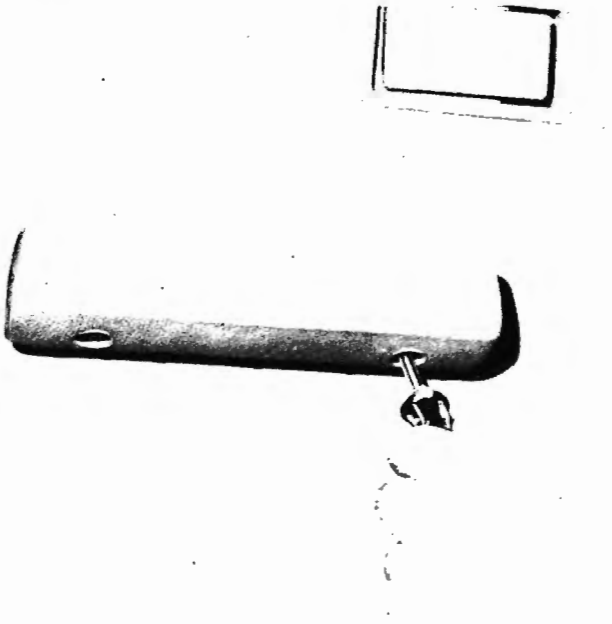
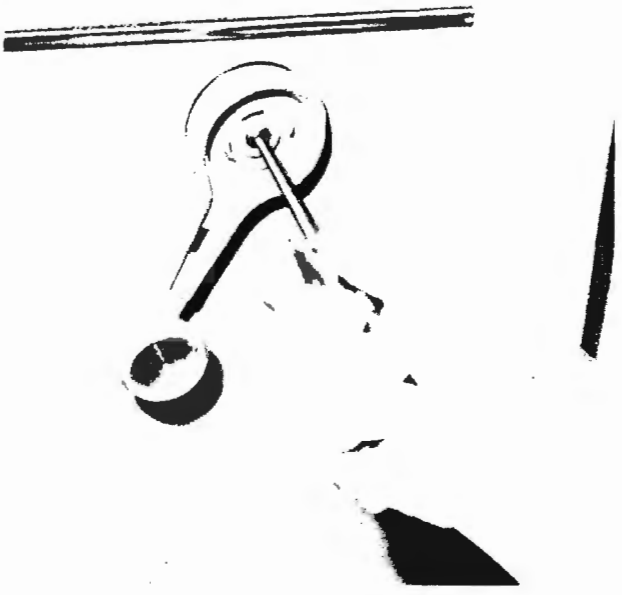


Fig. 8 4133



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Fig. 9 4134



Fig. 11 4136

Fig. 10 4135

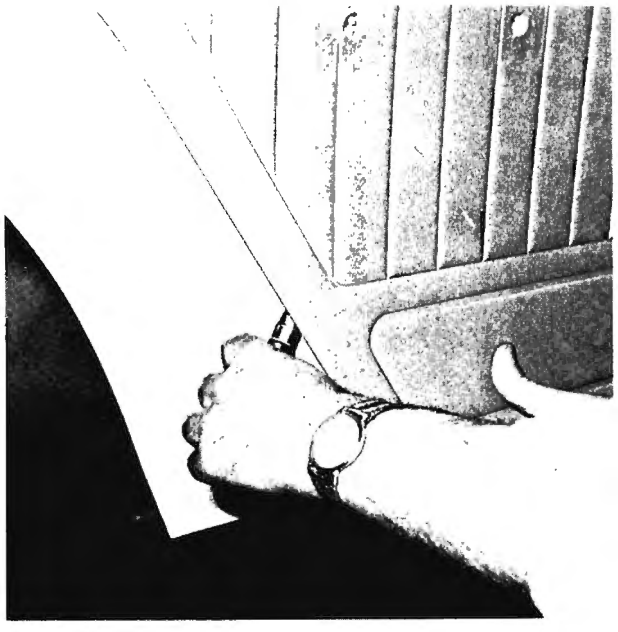
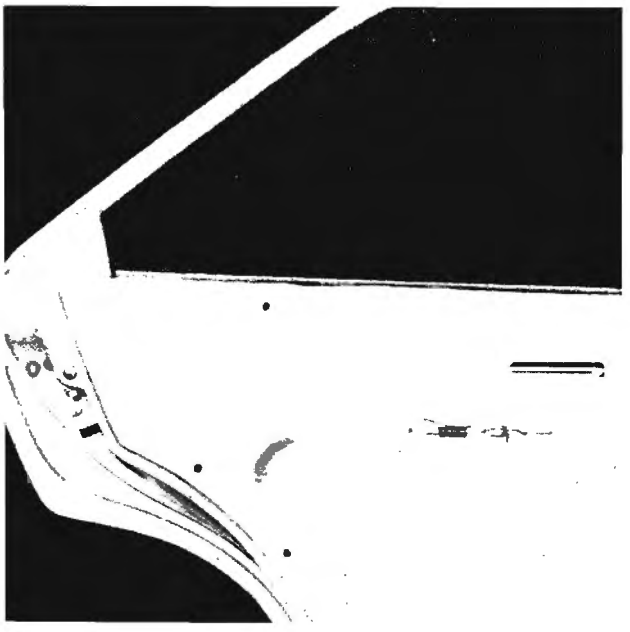


Fig. 12 4137



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Fig. 13 4138



Fig. 15 4139

Fig. 14 G.044

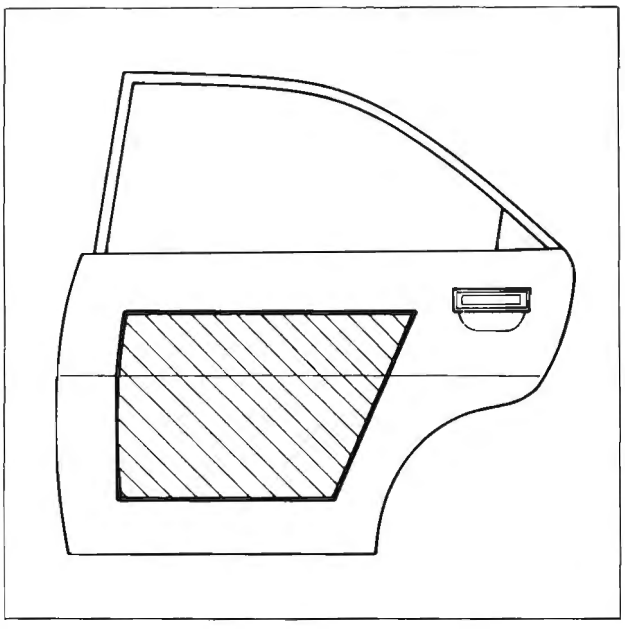
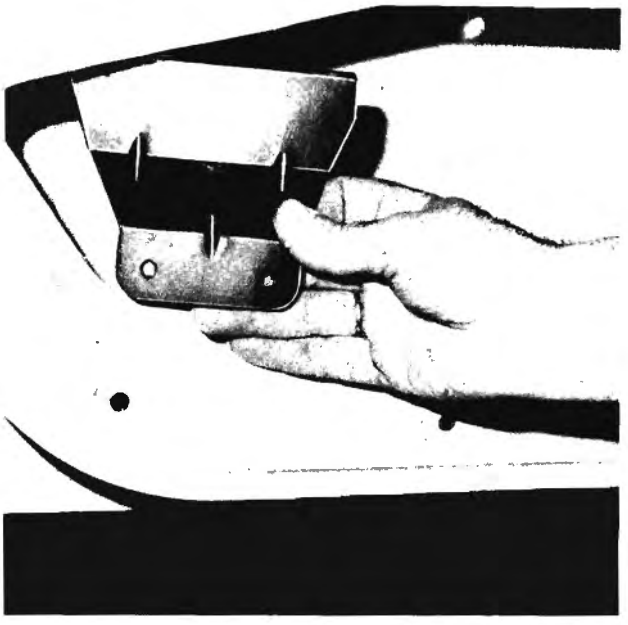


Fig. 16 4140



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Rear door

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REPLACEMENT OF LOWER WINDOW REGULATOR GUIDE (continuation)

Replacement on door still retained on car

- With glass set in top position, remove parts:

  1 - Arm rest.
  2 - Window regulator handle insert.
  3 - Window regulator handle.
  4 - Remote control handle.
  5 - Remote control handle inner gasket.
  6 - Trim panel assembly.
  7 - Inner weatherstrip.
  8 - Paper seal.
  10 - Lower window regulator guide.

REPLACEMENT OF WINDOW REGULATOR MECHANISM (Ref. 11)

Removal procedure

- Set glass in top position.
- Unscrew mechanism fastening, and clear it from its housing (Figs. 17 and 18).
- Slide mechanism forward (hinge side) until roller is cleared from rear lower glass section.
- Slide mechanism rearwards (lock side) until roller is cleared from front lower glass section.
- Extract window regulator mechanism (Fig. 19).

Fitting operations

- For fitting, proceed in reverse order.

  Important: check that rollers are engaged correctly in lower glass sections.

Replacement on door still retained on car

- Remove parts:

  1 - Arm rest.
  2 - Window regulator handle insert.
  3 - Window regulator handle.
  4 - Remote control handle.
  5 - Remote control handle inner gasket.
  6 - Trim panel assembly.
  7 - Inner weatherstrip.
  8 - Paper seal.
  10 - Lower window regulator guide.
  11 - Window regulator mechanism.

  Important: fit two blocks to hold glass in top position when removing or fitting the window regulator mechanism (Fig. 20).

REPLACEMENT OF GLASS LOWERING GUIDE (Ref. 12)

Removal procedure

- Unscrew glass lowering guide lower and upper fastenings (Figs. 21 and 22).
- Slide guide downwards until glass lower roller is cleared (Fig. 23).
- Extract glass lowering guide (Fig. 24).

Fitting operations

- For fitting, proceed in reverse order.

Important:

- check that glass lower roller is correctly engaged in glass lowering guide;

Replacement on door still retained

- check operation of window regulator.

- With glass set in top position, remove parts:

  1 - Arm rest.
  2 - Window regulator handle insert.
  3 - Window regulator handle.
  4 - Remote control handle.
  5 - Remote control handle inner gasket.
  6 - Trim panel assembly.
  7 - Inner weatherstrip.
  8 - Paper seal.
  12 - Glass lowering guide.

REPLACEMENT OF REAR GLASS CHANNEL BRACKET (Ref. 13)

Removal procedure

- Dislodge glass channel in lower area of channel bracket (Fig. 25).
- Unscrew channel bracket lower and upper fastening (Figs. 26 and 27).
- Pull downwards to clear and remove glass channel bracket (Fig. 28).

Fitting operations

- Locate bracket in position inside door (upper area at level of lower glass edge).
- Engage channel on bracket over approximately 2 cm in upper area only.
- Slide bracket towards upper fastening point, keeping the channel under tension.
- Screw the upper and lower fastenings in position.
- Engage remaining part of channel in position (Fig. 29).

Replacement on door still retained on car

- With glass set in top position, remove parts:

  1 - Arm rest.
  2 - Window regulator handle insert.
  3 - Window regulator handle.
  4 - Remote control handle.
  5 - Remote control handle inner gasket.
  6 - Trim panel assembly.
  7 - Inner weatherstrip.
  8 - Paper seal.
  13 - Rear glass channel bracket.



Fig. 17 4141

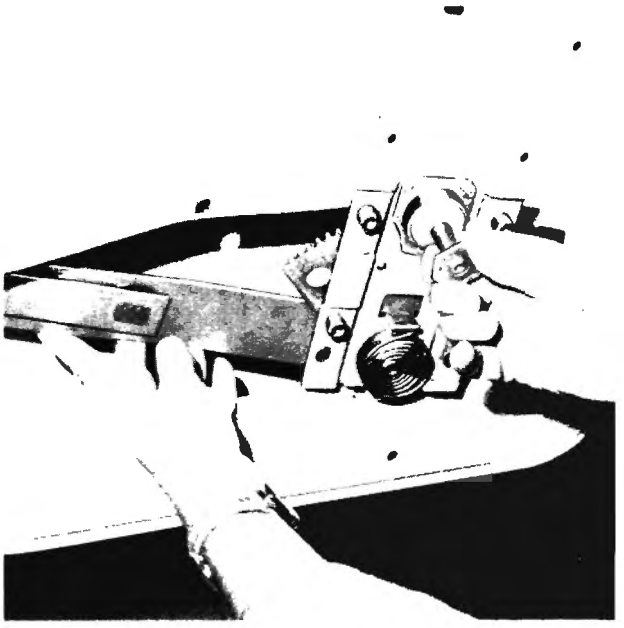


Fig. 19 4143

Fig. 18 4142

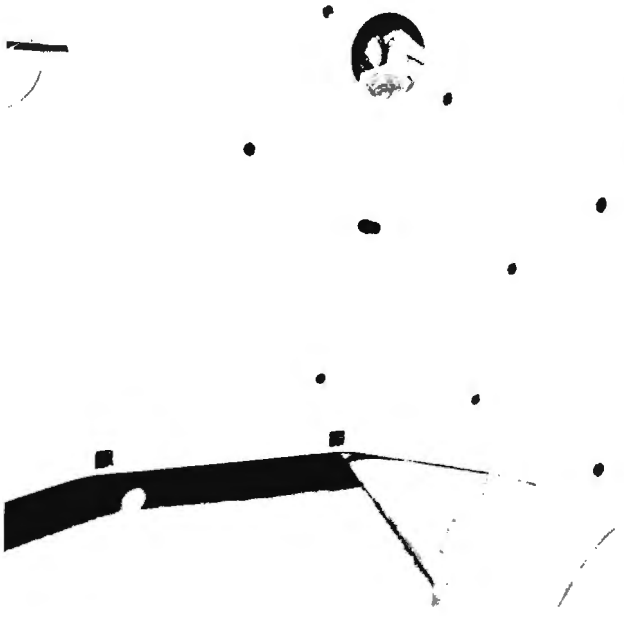


Fig. 20 4144



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Fig. 21 4145



Fig. 23 4147

Fig. 22 4146

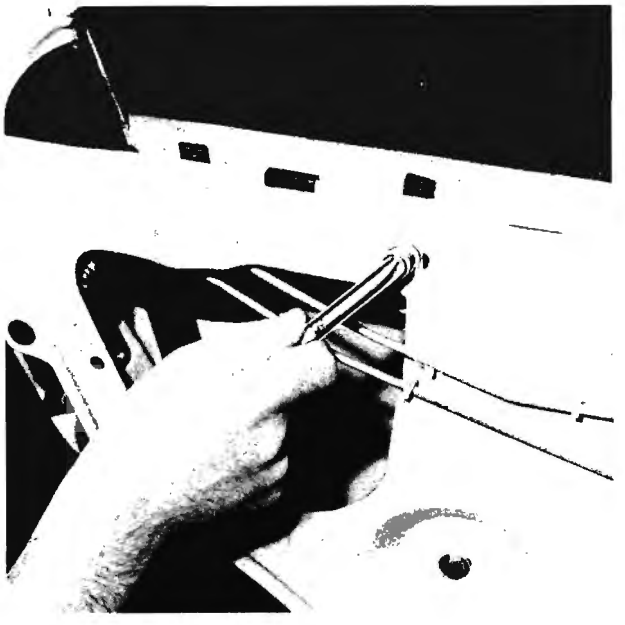


Fig. 24 4148



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Fig. 25 4149

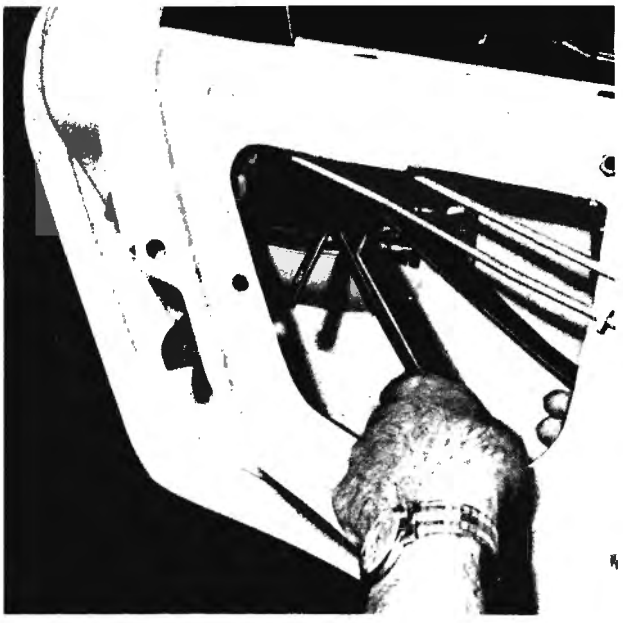


Fig. 27 4151

Fig. 26 4150



Fig. 28 4152



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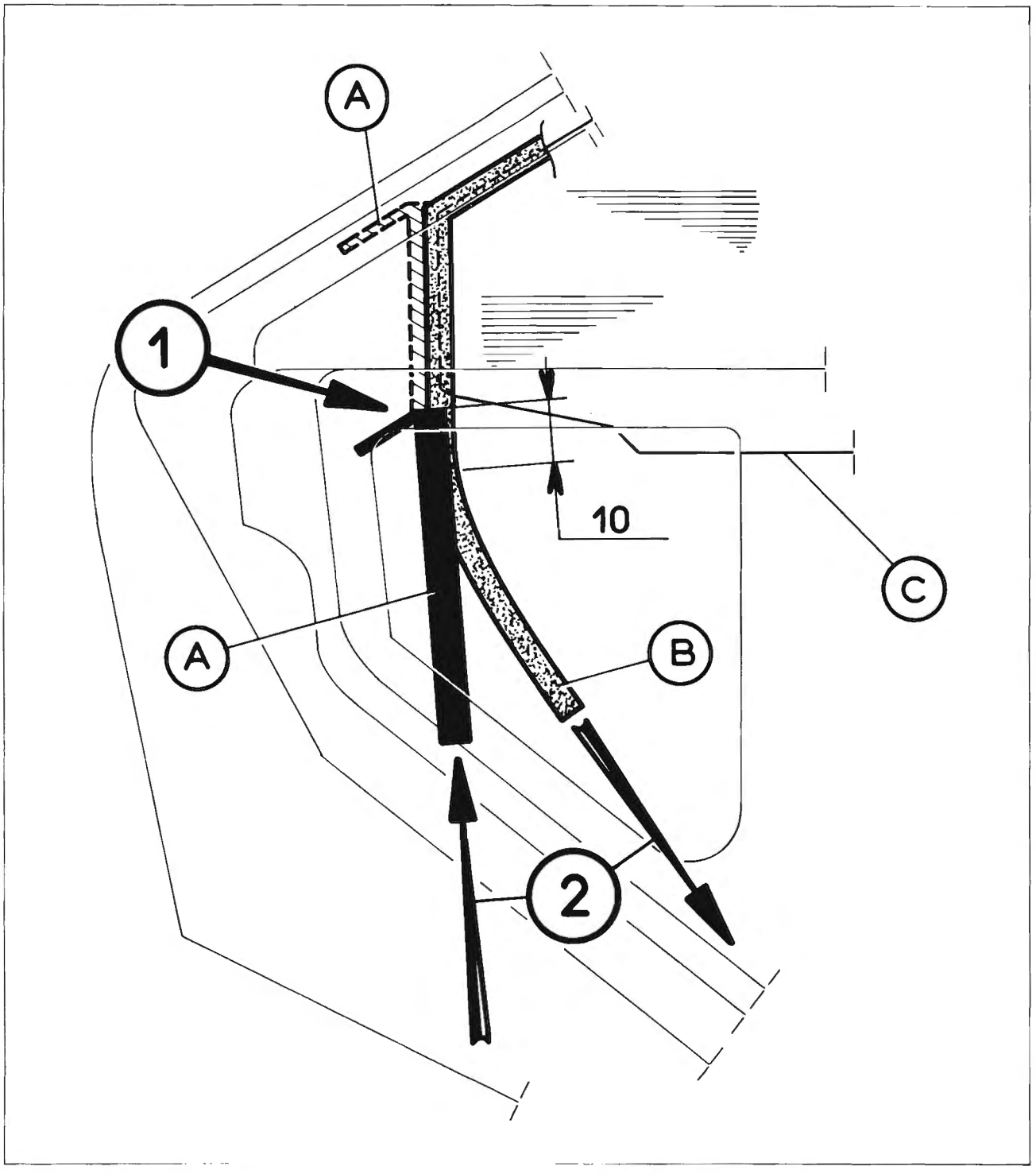


Fig. 29

A = Glass channel bracket

B = Glass channel

C = Glass lower edge

G.045

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Rear door

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REPLACEMENT OF GLASS (Ref. 14)

Removal procedure

- Tilt rear section of glass downwards (Fig. 30).
- Introduce glass lower roller in inner panel clearing counter-stamping, and extract glass in this position, on door outer side (Fig. 31).

Fitting operations

- For fitting, proceed in reverse order.

Important: check that door is correctly fitted; glass front end in relation to distance between centres of glass lower assembly roller: dimension 642 (Fig. 32).

Replacement on door still retained on car

- With glass set in top position, remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
10 - Lower window regulator guide.
11 - Window regulator mechanism.
12 - Glass lowering guide.
13 - Rear glass channel bracket:
. remove glass retaining blocks.
14 - Glass.

Fittings

- Fit rubber seals on glass.
- Use soapy water to smear outer seal faces for easier fitting.
- Locate glass lower channel in position in accordance with initial dimension (642) and, starting from this end, use a rubber mallet to fit glass lower area on seal (Fig. 32).

REPLACEMENT OF GLASS CHANNEL (Ref. 16)

Removal procedure

- Dislodge channel in lower area, on hinge side, and clear it upwards (Figs. 33 and 34).

Fitting operations

- Locate channel in position in corner (Ref. A), position upper part, and fit side parts into place.
- Press on channels to achieve full fitting (Fig. 35).

Replacement on door still retained on car

- With glass set in top position, remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
9 - Outer weatherstrip.
10 - Lower window regulator guide.
11 - Window regulator mechanism.
12 - Glass lowering guide.
13 - Rear glass channel bracket.
14 - Glass.
16 - Glass channels.

REPLACEMENT OF REMOTE CONTROL ASSEMBLY (Refs. 17 - 18 - 19)

Removal procedure

- Remove remote control spring, Ref. 19, (Fig. 36).
- Unscrew remote control lever fastening, Ref. 17 (Fig. 37).
- Disconnect remote control link, Ref. 18, on lever side (Fig. 38).
- Clear remote control link from retaining clips (Fig. 39).
- Disconnect remote control link, on lock side (Fig. 40).

Fitting operations

- For fitting, proceed in reverse order.

Important: check operation of removed components.

Replacement on door still retained on car

- Remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
17 - 18 - 19 - Remote control assembly.

Fitting operations

- For fitting, proceed in reverse order.

Note: before re-fitting, check operation of remote control assembly.



Fig. 30 4154

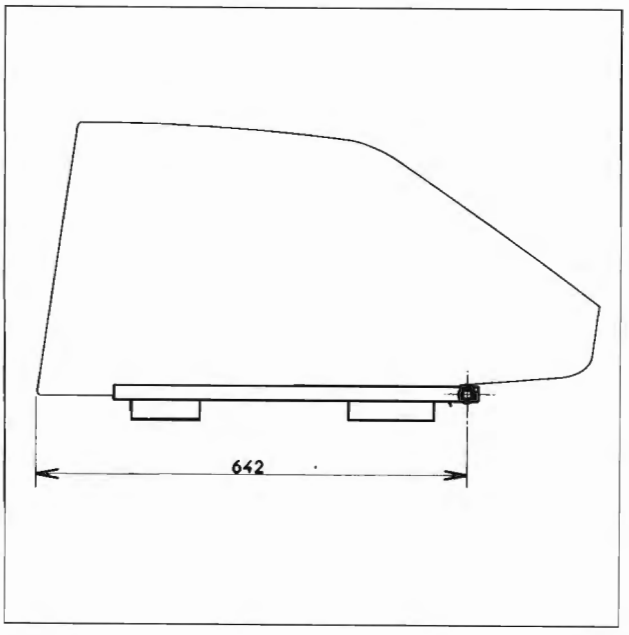


Fig. 32 G.046

Fig. 31 4155



Fig. 33 4156



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Fig. 34 4157

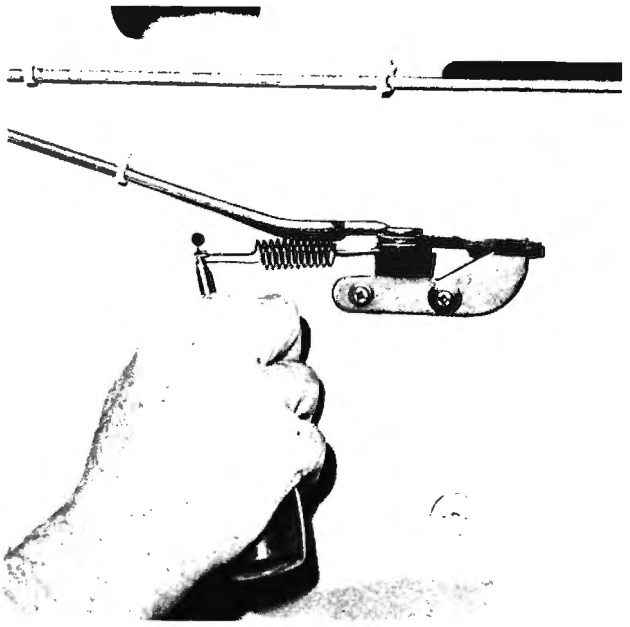
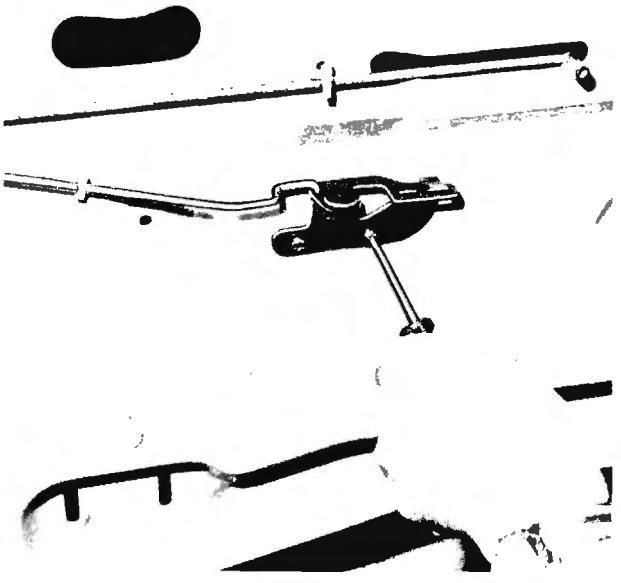


Fig. 36 4159

Fig. 35 4158



Fig. 37 4160



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Fig. 38 4161

Fig. 39 4162



Fig. 40 4163



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Rear door

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REPLACEMENT OF INNER LATCH ROD (Ref. 20)

Removal procedure

- Clear latch rod from retaining clips (Fig. 41).
- Disconnect latch rod, on lock side (Fig. 43).

Fitting operations

- For fitting, proceed in reverse order.

Replacement on door still retained on car

- Remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
20 - Inner latch rod.

REPLACEMENT OF OUTER HANDLE ASSEMBLY (Ref.21) LOCK MECHANISM (Ref. 26)

Removal procedure

- Remove seal (Ref. 24) on door inner panel (Fig. 43).
- Loosen screw on handle rear fastening bracket (Fig. 44).
- Loosen handle front bracket setscrew (Fig. 45).
- Recover outer handle front fastening bracket (Ref. 22) (Fig. 46).
- Unscrew lock mechanism fastening (Figs.47 and 48).
- Clear lock mechanism (Fig. 49).
- Extract lock and handle assembly from door outer panel opening (Figs. 50 and 51).

Fitting operations

- For fitting, proceed in reverse order.

Important:

- check position of handle gasket before tightening;
- check operation of lock and handle.

Replacement of outer handle or lock mechanism on door still retained on car

Removal procedure

- With glass in top position, remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal.
13 - Rear glass channel bracket.
21 - 26 - Lock mechanism and outer handle assembly:

. disconnect:

- remote control link (B) (Fig. 52);
- inner latch rod (C) (Fig. 52).

- The assembly being removed, loosen screw (D) coupling the handle with the lock (Fig. 53).
- Replace the defective part, and reconstitute the assembly.

Fitting operations

Important: as the outer handle and the lock mechanism are assembled at the preparatory stage, adjusting the assembly on the door will be required:

- Remove seal (Ref. 25) on inner panel (Fig. 54).
- Loosen screw (D) coupling the handle linkage with the lock (Figs. 53 and 55).
- Adjust coupling joint so that the lock bolt opens when the outer handle control is at end of stroke.
- Tighten coupling screw.

Note: before re-fitting, smear lock mechanical components with grease.



Fig. 41 4164



Fig. 43 4166

Fig. 42 4165

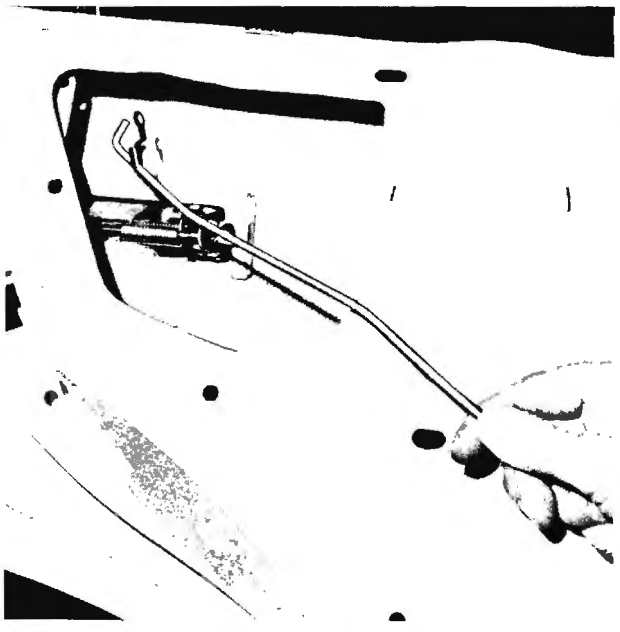
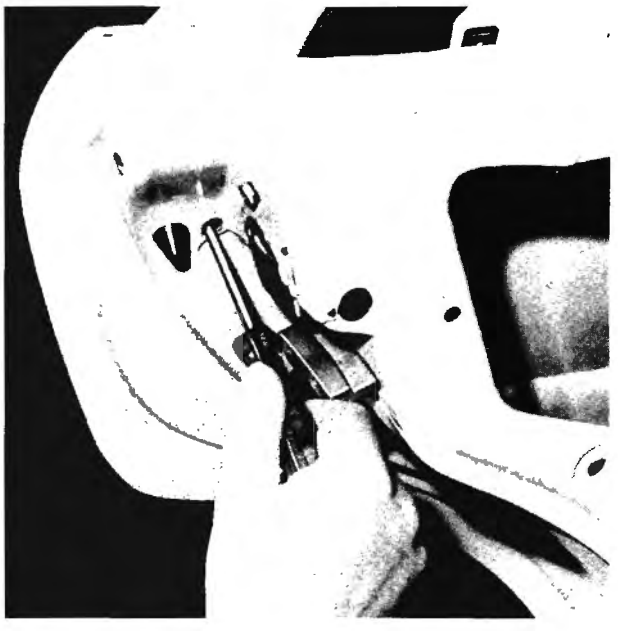


Fig. 44 4167



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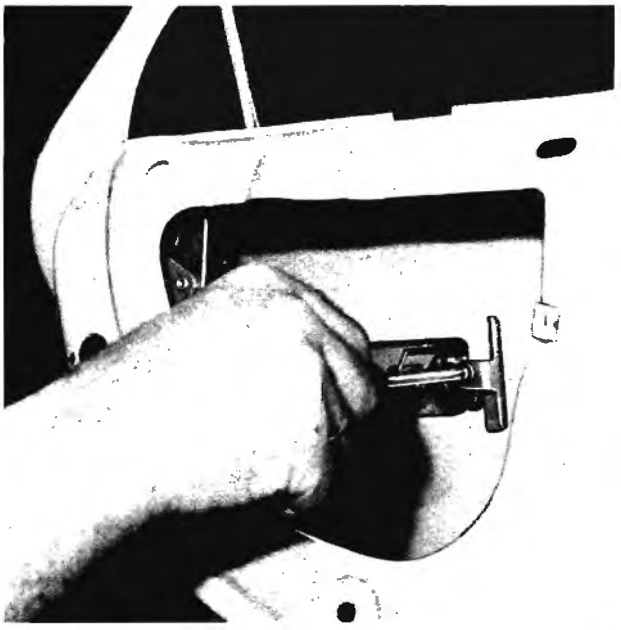


Fig. 45 4168

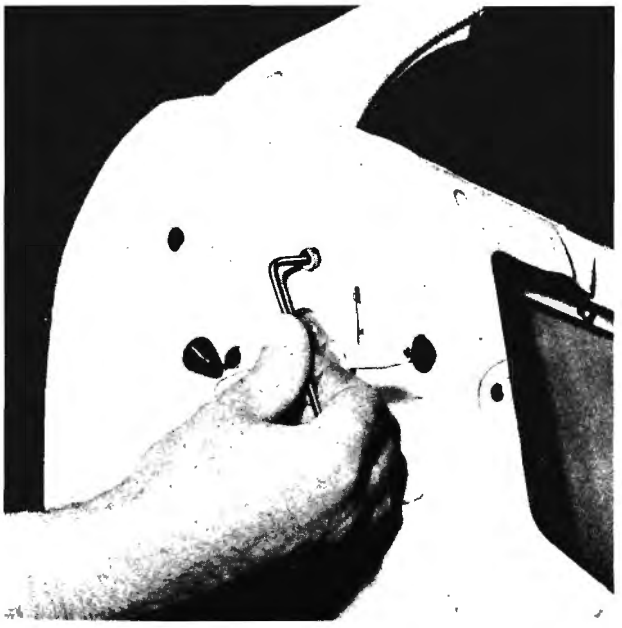


Fig. 47 4170

Fig. 46 4169

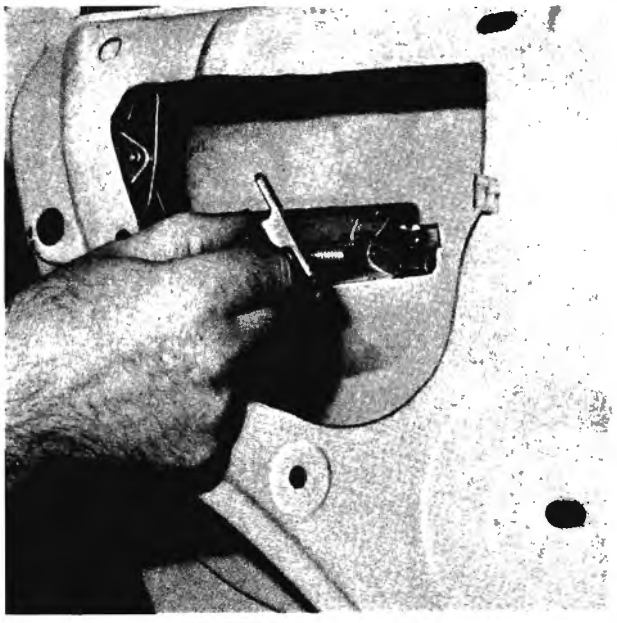
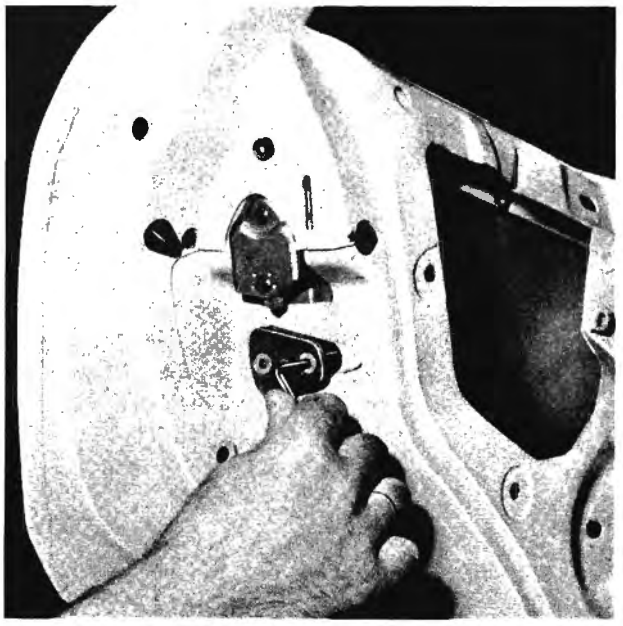


Fig. 48 4171



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Fig. 49 4172

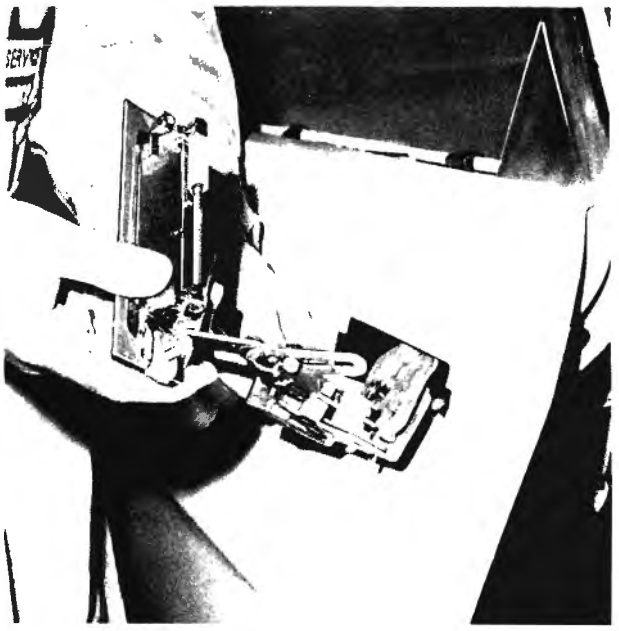
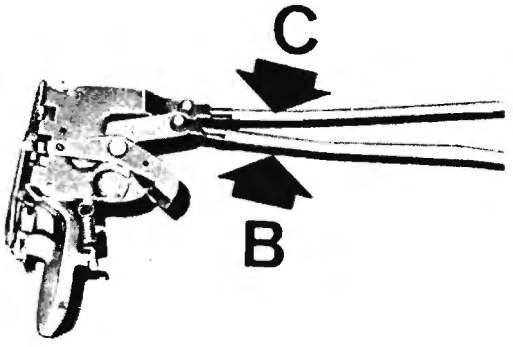


Fig. 51 4174

Fig. 50 4173



Fig. 52 4175



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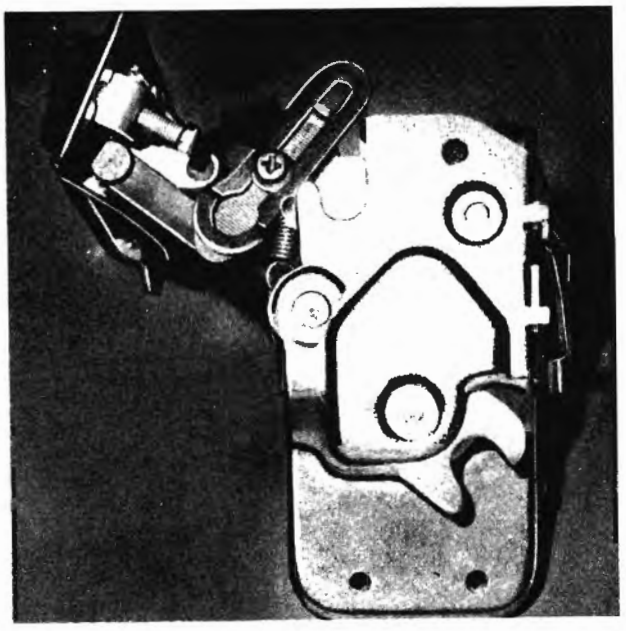


Fig. 53 4176

Fig. 54 4177



Fig. 55 4178



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Rear door

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REPLACEMENT OF DOOR FRAME REAR BRACKET (Ref. 28)

Removal procedure

- Unscrew fastening to door frame, and clear bracket (Figs. 56 and 57).

Fitting operations

- For fitting, proceed in reverse order to removal procedure.

Replacement on door still retained on car

- With glass in top position, remove parts:

1 - Arm rest.
2 - Window regulator handle insert.
3 - Window regulator handle.
4 - Remote control handle.
5 - Remote control handle inner gasket.
6 - Trim panel assembly.
7 - Inner weatherstrip.
8 - Paper seal
13 - Rear glass channel bracket.
28 - Door frame rear bracket.

REPLACEMENT OF DOOR FRAME FRONT AND UPPER EMBELLISHERS

Removal procedure

- Dislodge door frame front and upper embellishers (Fig. 58).

Fitting operations

- For fitting, proceed in reverse order.

Miscellaneous: for complete stripping of door

- On dismantled door, remove or fit parts:

29 - Door rear corner inner embellisher (Fig.59).
30 - Trim panel spacer (Fig. 60).
31 - Lower stop (Fig. 60).
32 - Upper stop (Fig. 60).
33 - Arm rest fastening nut (Fig. 60).
34 - Remote control link sound-deadening retaining clips (Fig. 60).
35 - Inner latch rod sound-deadening retaining clips (Fig. 60).
36 - "Rapid" fastener, with tool Ref. 20842 W (Figs. 61 and 62).



Fig. 56 4179

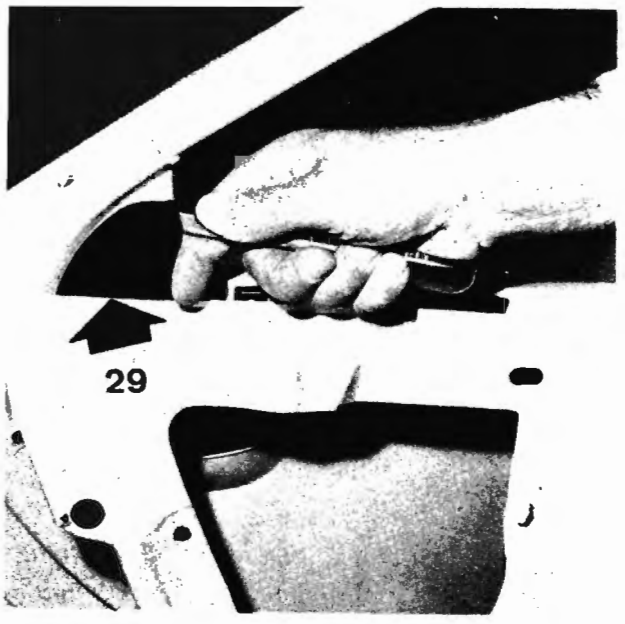


Fig. 58 4181

Fig. 57 4180



Fig. 59 4182



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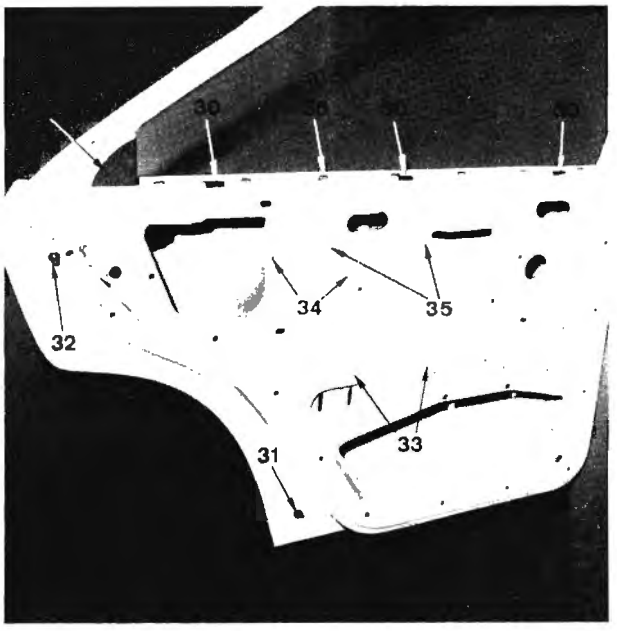


Fig. 60 4183

Fig. 61 4184



Fig. 62 4185



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Rear bumper

REMOVAL PROCEDURE

- Remove spare wheel.
- Remove 2 + 2 screws for fastening to back panel (Fig. 1).
- Remove 1 + 1 screws for fastening to rear fenders (Fig. 2).

RE-FITTING OPERATIONS

- Proceed in reverse order.



Fig. 1 3981

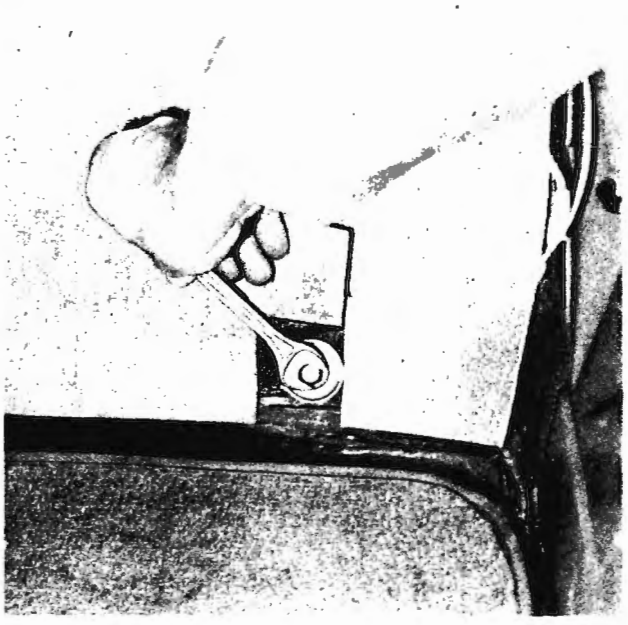


Fig. 2 3982

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N1 - AUTORADIO

N1/I - Description of component units

N1/V - Operations on radio

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DESCRIPTION OF COMPONENT UNITS

Autoradio set

The earthed negative, 5 W rating radio set is fastened in three points to the instrument panel: two fastening points behind the set control knobs, 1 fastening point on the set rear support bracket.

The set (+) supply is tapped from the main harness accessory output (red wire under instrument panel). The set is earthed through its rear fastening.

It is protected by a movable fuse (2 A) fitted in series on the line.

Loud-speakers

There are two loud-speakers, with an impedance of approximately 3.2 ohm, one attached at front to the instrument panel top, the other at right on the parcel tray.

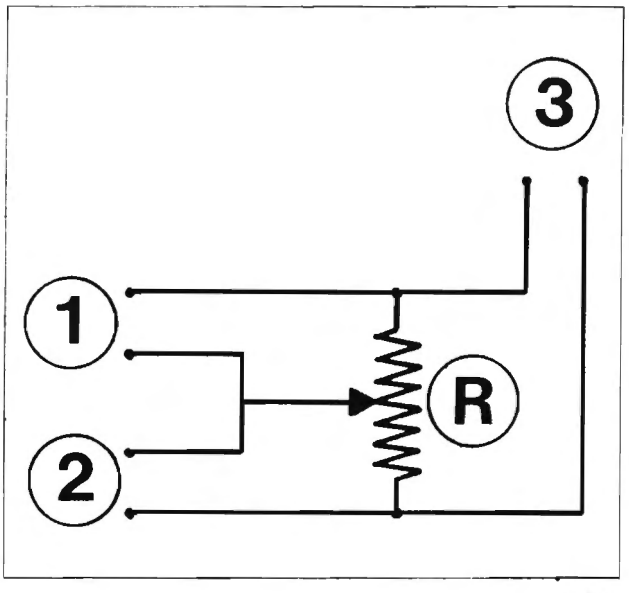
The distribution of sound between the two loud-speakers is achieved through a balance.

Arrangement of balance (Fig. 1)

Value of R, potentiometer-type resistor: 22 ohm approximately.

The radio balance is fitted under the instrument panel by means of 2 screws, which can be reached from underneath.

Fig. 1 1 Front loudspeaker - yellow reference
2 Rear loudspeaker - green reference
3 Radio set
R Potentiometer-type resistor, 22 ohm approximately.



G.020

Roof aerial

- Aerial rating: 12 pF.
- Aerial cable rating: 65 pF.

Coil interference protection capacitor

- Electrolytic capacitor: 12 V - 50 µF.
- Fastening common with coil: connection to coil (+) and harness by means of jumper connection.

Alternator interference protection capacitor

- Paper capacitor: 12 V - 3 µF.
- Connection: red wire to alternator (+), blue wire to earth terminal.

Ignition distributor interference protection suppressor

- Quantity: 5.
- Resistor elements of 7,000 ohm each.
- Fastened to ignition distributor head and receiving "spark plug" and "coil" distributor wires.

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Fig. 1 3967

REAR LOUDSPEAKER

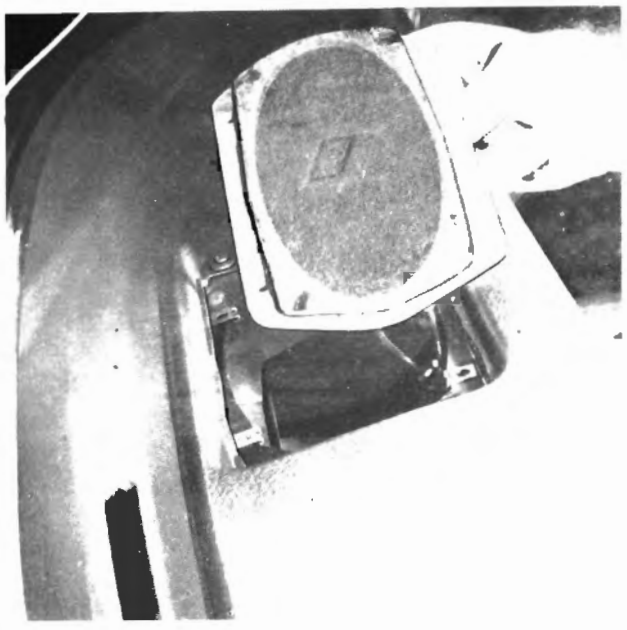
Removal procedure

- Remove rear seat back and parcel tray.
- Remove 4 screws fastening the loudspeaker (Fig. 1) to the R.H. seat back side bearing panel.
- Hold loudspeaker from inside rear luggage trunk to prevent it from falling.
- Disconnect and remove loudspeaker.

Re-fitting operations

- Proceed in reverse order.

Fig. 2 3968



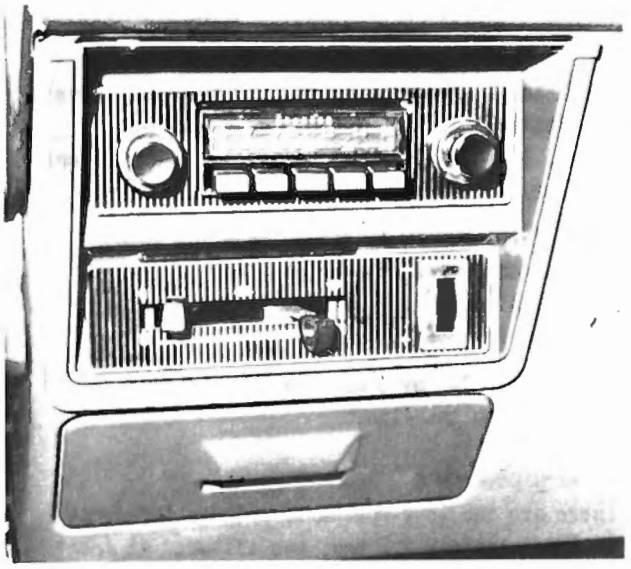


Fig. 3 3969

FRONT LOUDSPEAKER

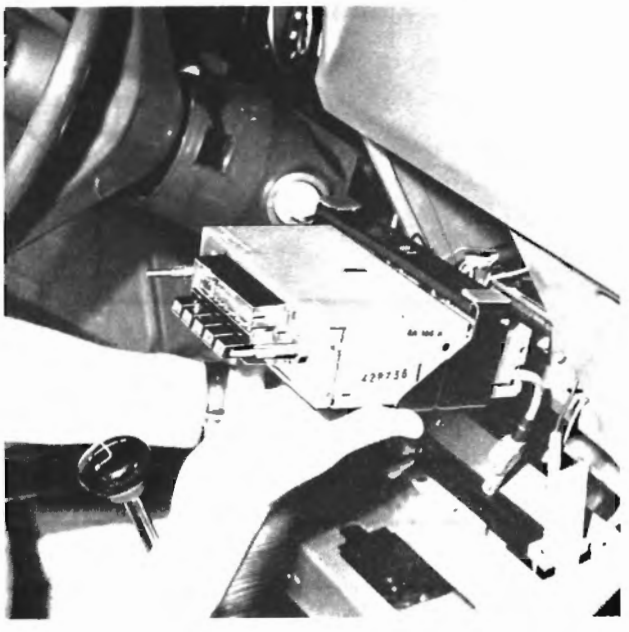
Removal procedure

- Remove loudspeaker screen held by 2 screws to instrument panel top.
- Remove loudspeaker setscrews.
- Clear and disconnect loudspeaker (Fig. 2).
- Remove loudspeaker.

Re-fitting operations

- Proceed in reverse order.

Fig. 4 3970



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AUTORADIO SET

Removal procedure

- Disconnect battery.
- Remove front loudspeaker.
- Remove radio control knobs (Fig. 3).
- Remove 2 nuts fastening radio set to fascia.
- Remove screw fastening the radio set rear support bracket, by using a screw driver through the front loudspeaker cut-out.
- Remove instrument panel central embellisher, which is held by 4 screws.
- Disconnect aerial cable and radio set supply wires.
- Remove radio set support bracket fastening nut, separate bracket and set (Fig. 4).

Re-fitting operations

- Proceed in reverse order.

AERIAL

Removal procedure

- Remove windscreen, rear-view mirror, and sun-visor.
- Partly strip front area of roof panel to have access to aerial fastening nut.
- Remove aerial fastening nut.
- Remove aerial.

Re-fitting operations

- Proceed in reverse order.

AERIAL CABLE

Removal procedure

- Remove aerial.
- Remove radio set.
- Unfasten cable from windscreen opening frame.
- Clear cable from underneath instrument panel.
- Gradually pull on cable aerial end, and remove cable.

Re-fitting operations

- Insert radio set end of aerial cable through cut-out in upper section of L.H. upper 'A' post.
- Run cable in upper 'A' post, turning it at the same time, and recover it under instrument panel from cut-out in lower 'A' post inner panel.
- Run cable under instrument panel, and connect it to radio set.
- Re-fit radio set.
- Fit cable in fastening clips in upper area of windscreen opening frame, and connect it to aerial.
- Re-fit aerial fastening nut.
- Re-fit roof panel trim.
- Re-fit sun-visor and rear-view mirror.
- Re-fit windscreen.

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