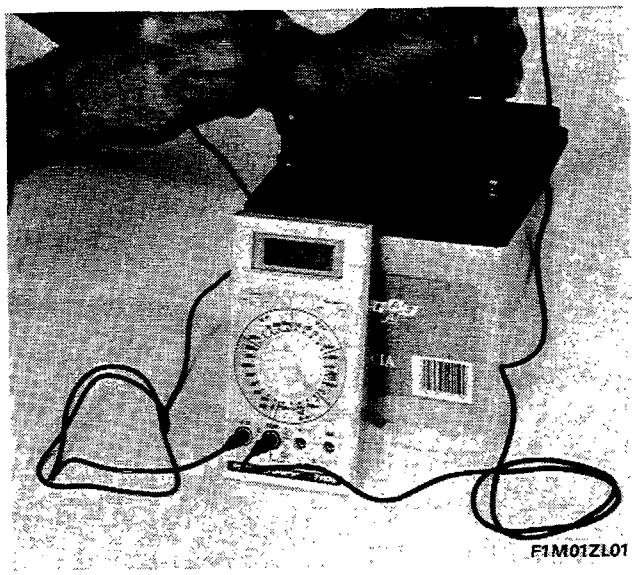
# 55.

## BATTERY

All batteries fitted to Prisma versions are ES (Energy Sealed) and do not require maintenance.
This type of battery offers the following advantages over conventional batteries:

- negligible consumption of electrolyte due to the use of a new type of alloy for grille and plate construction;
- negligible standing charge loss that allows efficient starting for a period of 7 months and is thus suitable for extended storage (at temperatures below 28°C);
- reduction in the volume of gas produced during charging that is normally responsible for corrosion and consequent bad contact of terminal poles.




If the battery appears to be flat, **leave the battery disconnected for at least two hours**, measure the no-load voltage by connecting a digital voltmeter over its terminals: if this is less than 12.3 V it holds 50% charge, if it reaches 12.48 V it is 75% charged and if it reaches 12.66 V it is 100% charged.

*If the electrolyte level drops below the minimum level marked on the plastic container in one or more cells, open the cover sealing the plugs and add distilled, deionised water (as used to top up ordinary batteries).*

**NOTE** *Do not subject the battery to rapid recharging at voltages over 15.5 V or at high currents and recharging ampage.*

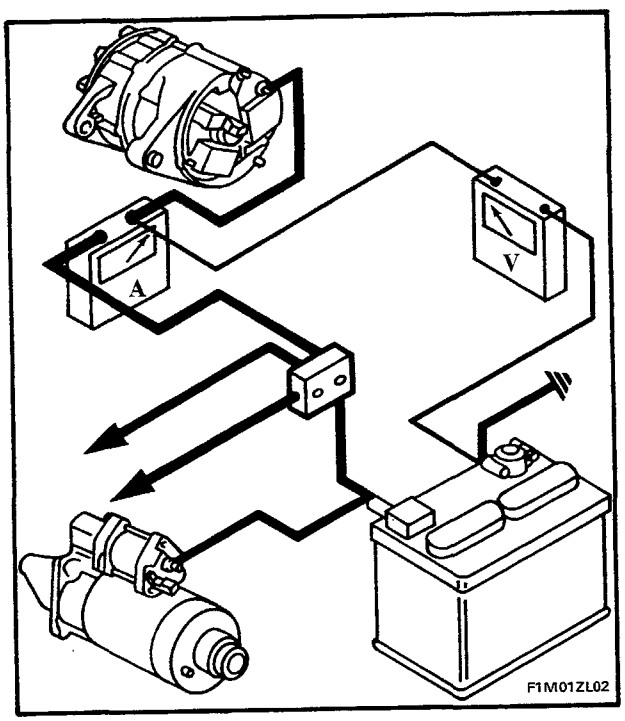
## ALTERNATOR

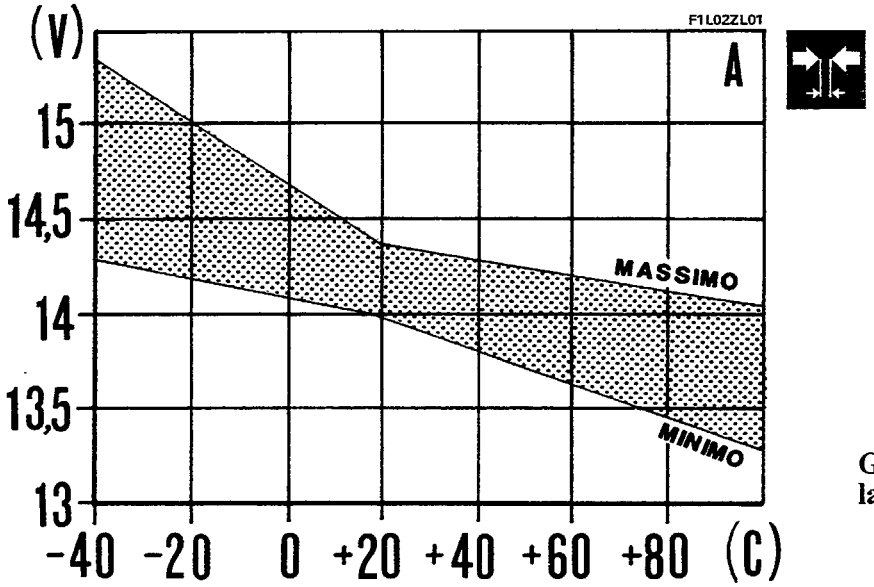
**Checking maximum charge rate on car produced by alternator with built-in electronic regulator:**

Carry out the following operations:

- release the cable connected to the alternator from the junction box;
- connect an ammeter across the above cable and the junction or the battery positive terminal;
- connect a voltmeter across the negative pole of the battery and the cable connected to the alternator and ammeter (see diagram);
- start the engine and run it at a speed of 3000 - 4000 rpm;
- connect all available connections one by one;
- measure the maximum current when the voltage read off the voltmeter falls below 13.5 V.

If the current reading is over 5A below specified levels, overhaul the alternator.






**Graph of regulated voltages -regulator ambient temperature**

**Checking voltage regulator on car**

Maintain previous connections and engine speed and then disconnect some connectors until an absorption of about **half maximum load** is reached.
Under these conditions the voltage should fall between the maximum and minimum values given in the diagram alongside, depending on the ambient temperature of the electronic regulator (alternator).
Diagram A refers to electronic regulator RTT 119 A incorporated in Marelli alternators

**Checking stability of electronic regulator**

Maintaining the same electrical contacts and engine speed, connect a few connectors until the current load is about 2/3 of the alternator current rating.
Under these conditions the voltage should drop by over 0.4 V.

Then disconnect connections to obtain a current load of about 5A. The voltage previously recorded for about half load should not alter by more than ± 0.2 V.
If the voltage change does not fall within specified limits, the electronic voltage regulator must be replaced since it is faulty.

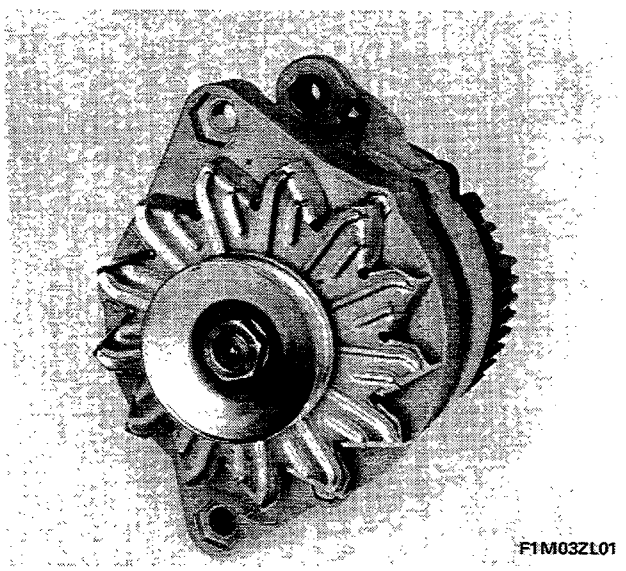
## ADJUSTING TENSION OF ALTERNATOR, WATER PUMP AND POWER STEERING DRIVE BELT

Fit the new belt (Poli-V) type, ensuring that it slides through the grooves in the pulleys. Adjust belt tensioner screw to obtain a load of 50-100 daN as measured with tool 1895760000.
**Belt tension need not be readjusted for this belt type**

NOTE *Always adjust belt tension when the engine is cold.*

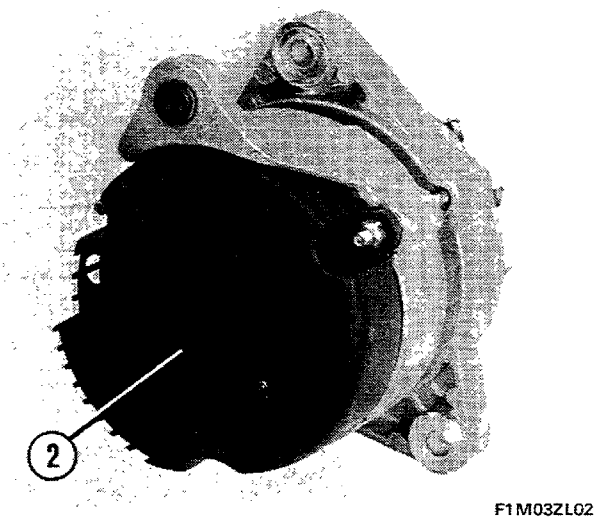
## OVERHAULING M. MARELLI ALTERNATOR

*Never run the engine with temporary or slack recharging circuit electrical connections since this could damage the alternator diodes. Never carry out diagnostic checks on the electronic regulator using test lights since this could cause damage.*




**M. Marelli AA125R-14V-65A alternator**

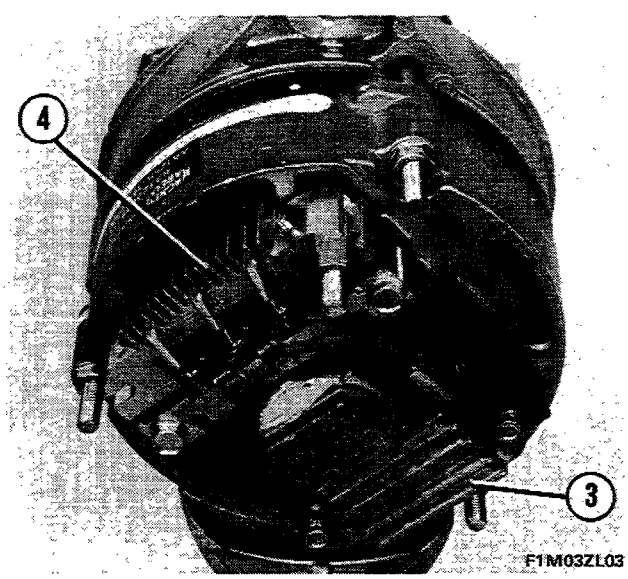
**NOTE** *All M. Marelli alternators are manufactured to practically identical specification. Follow the instructions and illustrations in the following pages for all models.*




**Rear view of alternator**

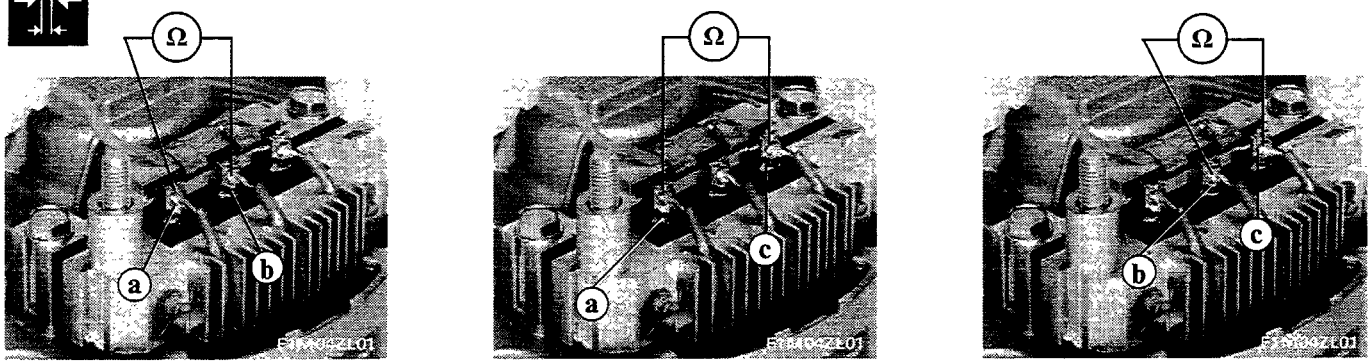
Remove guard (2) after removing nuts retaining it to the alternator.

Before completely disassembling the alternator, carry out the operations and checks described in the following pages.




**Rear view of alternator without guard**

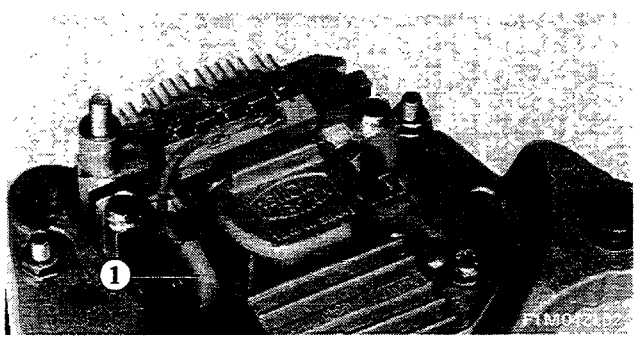
3. RTT 119A electronic voltage regulator.
4. 9 diode rectifier bridge.




**Checking continuity of 3 stator windings**

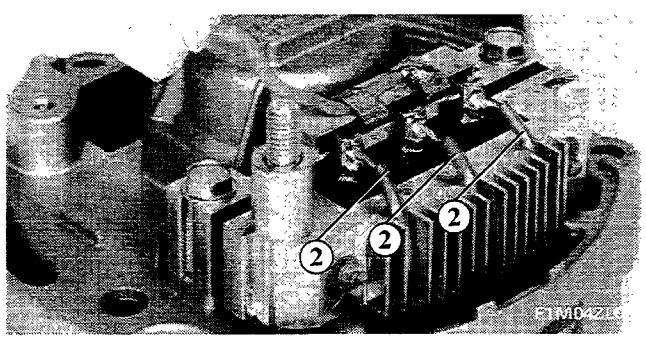
Connect the terminals of an ohmmeter (adjusted to a scale of × 1) to the ends of the stator windings (a-b-c) in the three possible ways as shown.
For each measurement, the instrument should show a certain resistance value that is equal for all measurements.

*If the instrument needle does not move (infinite resistance ) or fully deflects (resistance nil), the winding in question is broken or short-circuited and the stator must be replaced.*

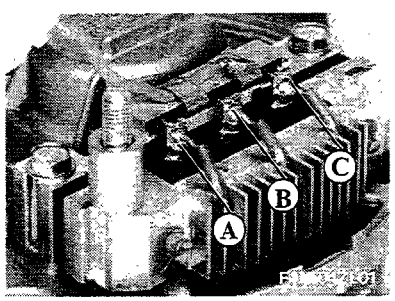


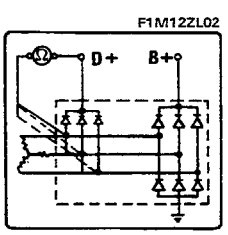

## CHECKING DIODES

Disconnect connector (1) of the terminal lead of the flat pin exciter diodes connected to the positive brush.




Disconnect terminals (2) of the stator windings from the rectifier bridge.



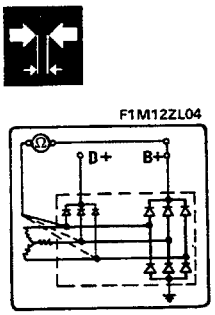



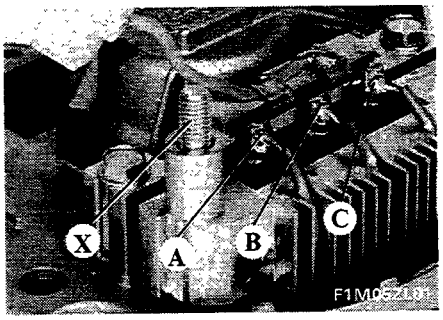

**Checking excitation diodes**

Insert the terminal of an ohmmeter in connector (1) above.
The second instrument terminal must be placed into contact with each of the three terminals (A-B-C) in turn.
Repeat the three measurements after reversing the terminal connection on the instrument.

### Checking positive diodes

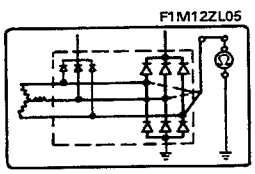
Connect one ohmmeter probe to the alternator positive terminal (X) and the other to each of the three terminals (A-B-C) in turn.
Repeat the three measurements after reversing the connections of the probes on the instrument.

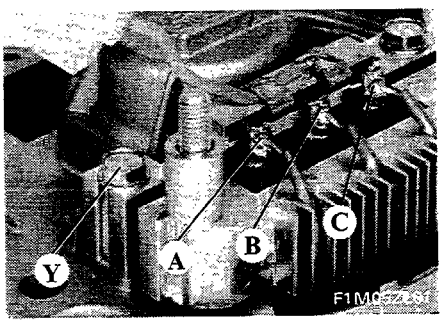



### Checking negative diodes

Connect one ohmmeter probe to the negative diode plate (Y) and the other probe with each of the three terminals (A-B-C) in turn.
Repeat the three measurements after reversing the probe connection order.



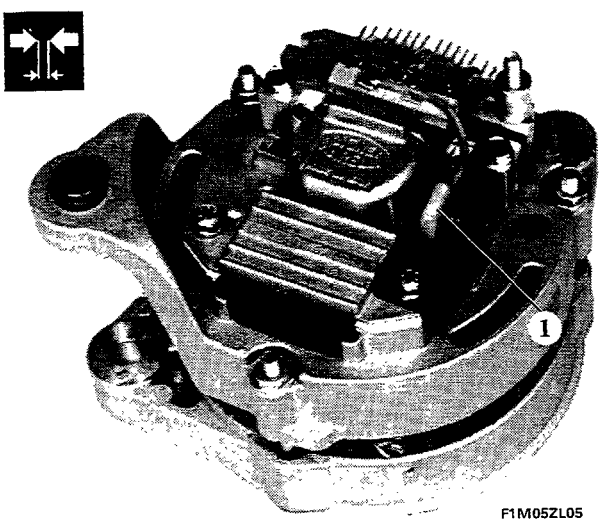



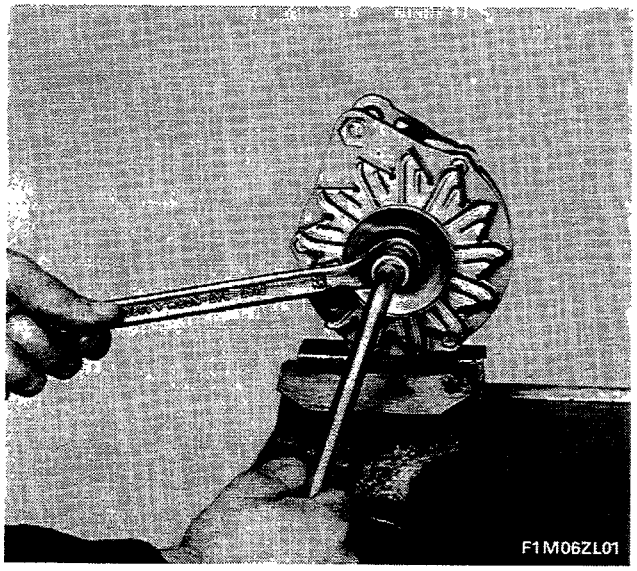

For each of the three checks described previously, a resistance value should be measured for each instrument terminal (A-B-C).
When the connection of the two probes on the instrument is reversed, the needle should not move. If the needle moves for both connections (diode short-circuited), or never moves (diode interrupted) the rectifier bridge assembly must be replaced.

## ROTOR

### Check rotor winding resistance measured across the brush connectors

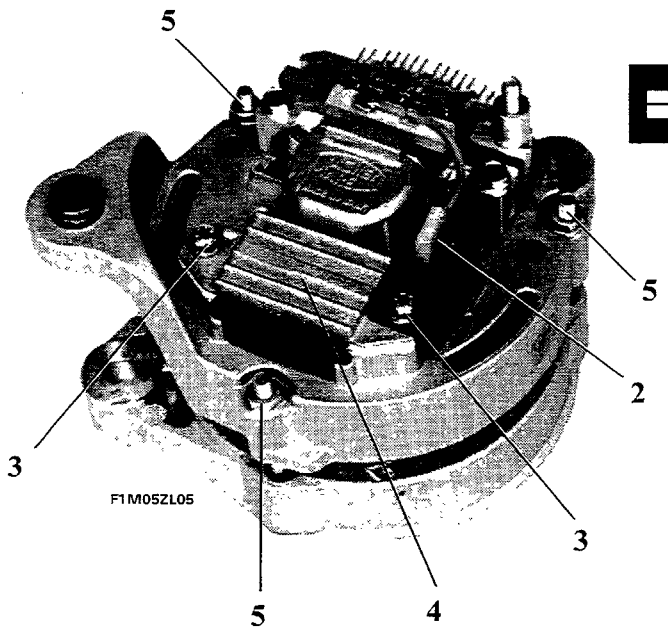
Disconnect connector (1) of exciter diode terminal cable from the blade connected to the positive brush.
Connect the ohmmeter probes (set to a scale of Ω x 1) with the two blades of the brush carrier - voltage regulator support.
If the resistance reading is not as specified or infinite (interrupted circuit), the rotor must be checked and replaced if necessary.



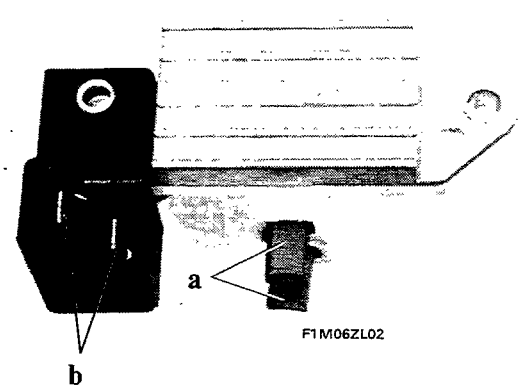



**Disassembly**

Insert a socket wrench in the hexagonal hole on the alternator shaft to hold the alternator shaft still and use another wrench to back off the nut retaining the fan and pulley to the rotor.
Withdraw the above components with their spacers and washers from the alternator shaft.




Disconnect connector (2) of the exciter diode terminal cable from the blade connected to the positive brush.
Back off bolts (3) retaining the electronic voltage regulator (4) complete with brushes to the rear alternator support plate.
Back off bolts (5) and withdraw bolts that join the main outer parts of the alternator.

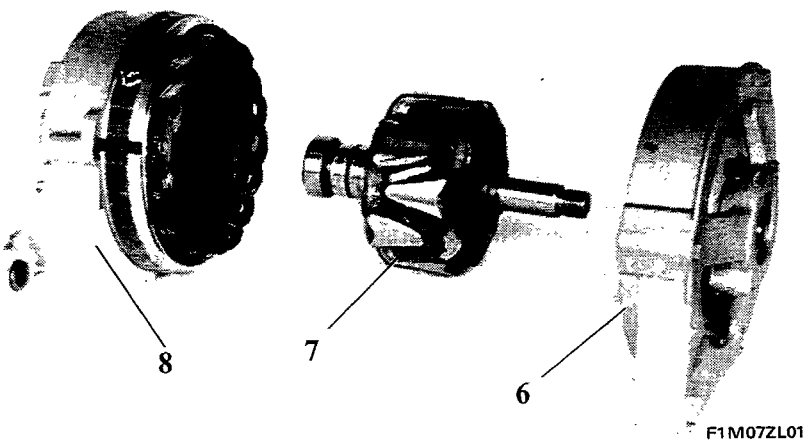



**Electronic voltage regulator**

a. Brushes
b. Blades

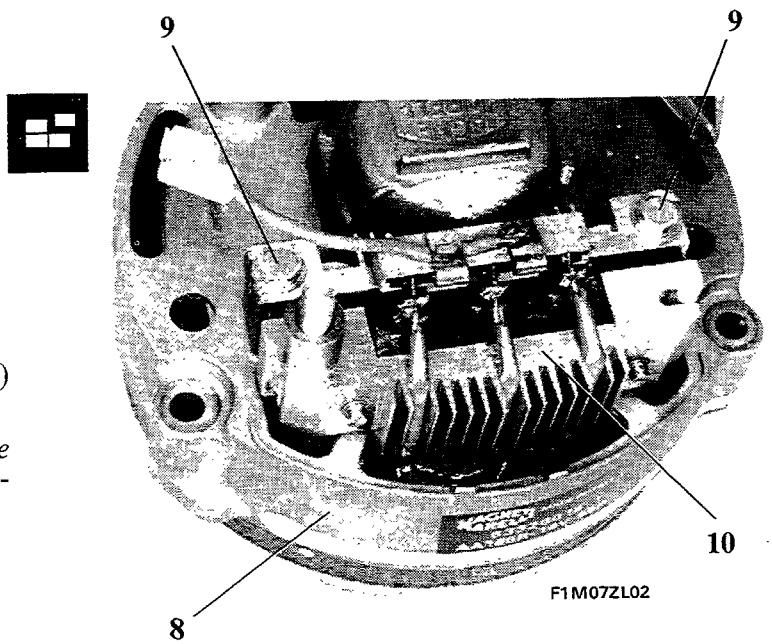
Disassemble the various components (as shown), remembering that pressure must be exerted on the rotor shaft in order to release it from the suppport plate.

**NOTE** *If a press is not available, use a brass driver to avoid damaging the thread.*

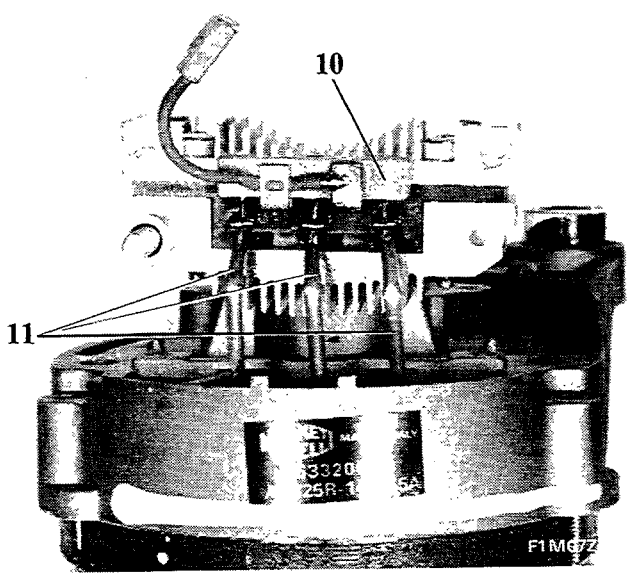



Back off bolts (9) retaining rectifier bridge (10) to the rear support plate (8).

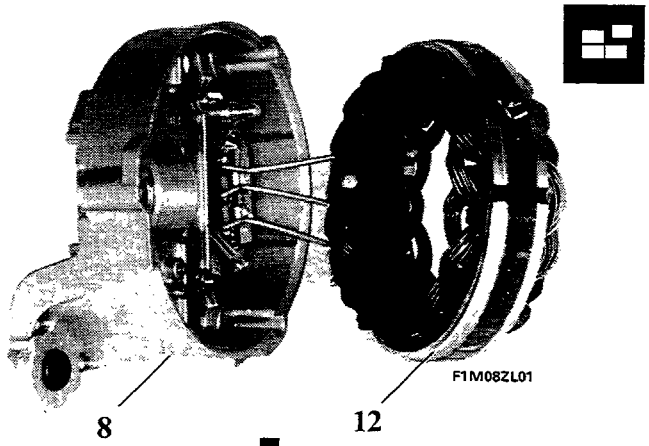
*The rectifier bridge should not be disassembled; this is supplied as a complete spare.*



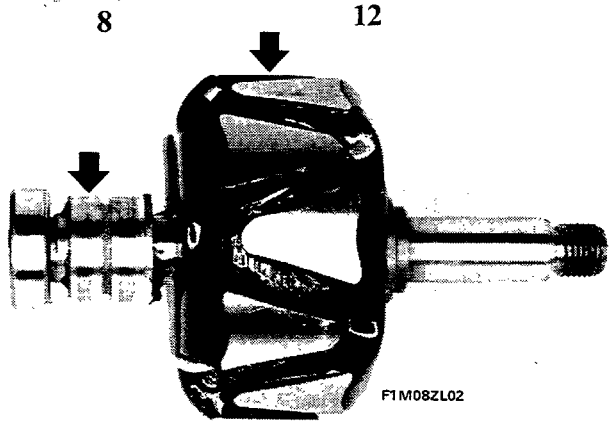

Move rectifier bridge (10) away from the support plate and unsolder terminals (11) of the stator winding.



55.

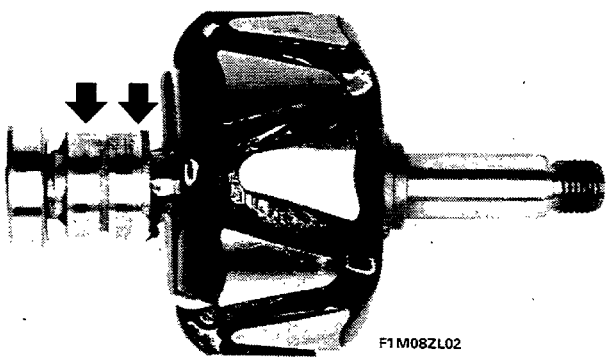



Remove stator (12) with its terminals (11) from rear support plate (8).




**Check inductor winding insulation**

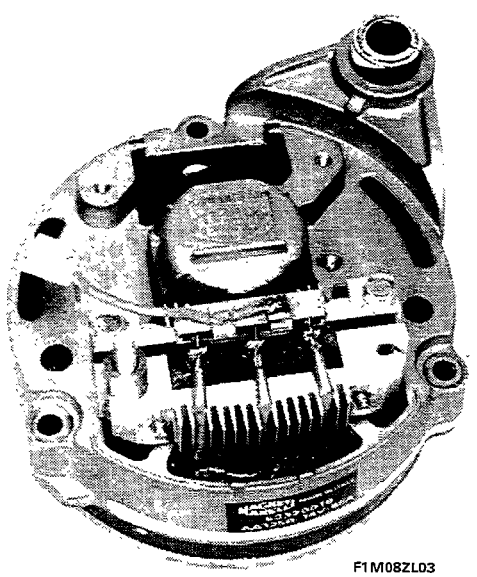
Connect the two probes of an ohmmeter (set to a scale of Ω × 1) to a slip ring and the rotor case (see arrows).
The instrument should give an infinite resistance reading, otherwise replace the rotor.




**Checking resistance of inductor winding (rotor) on slip rings**

Connect the two probes of an ohmmeter (set to a scale of Ω × 1) to the rotor slip rings (see arrows):the instrument should show a certain resistance reading.

If the resistance reading is not as specified or infinite (circuit interrupted), the rotor must be replaced.



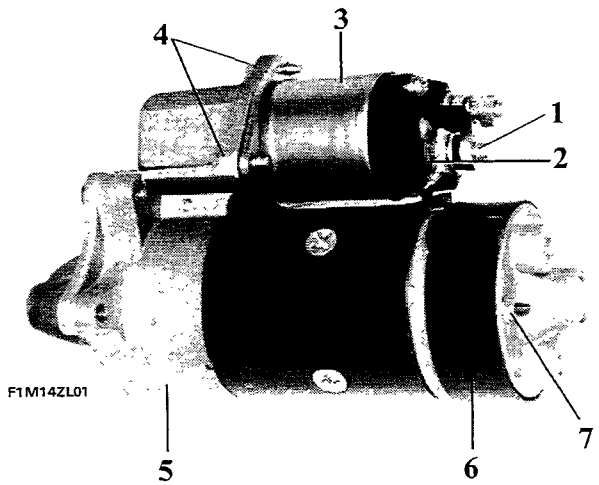

*Check that the bearing turns freely without binding or noise.*
*Check that the slip rings have not be grooved by the brushes, otherwise replace the rotor assembly.*

**Reassembly**

Carry out disassembly instructions in reverse order for assembly.

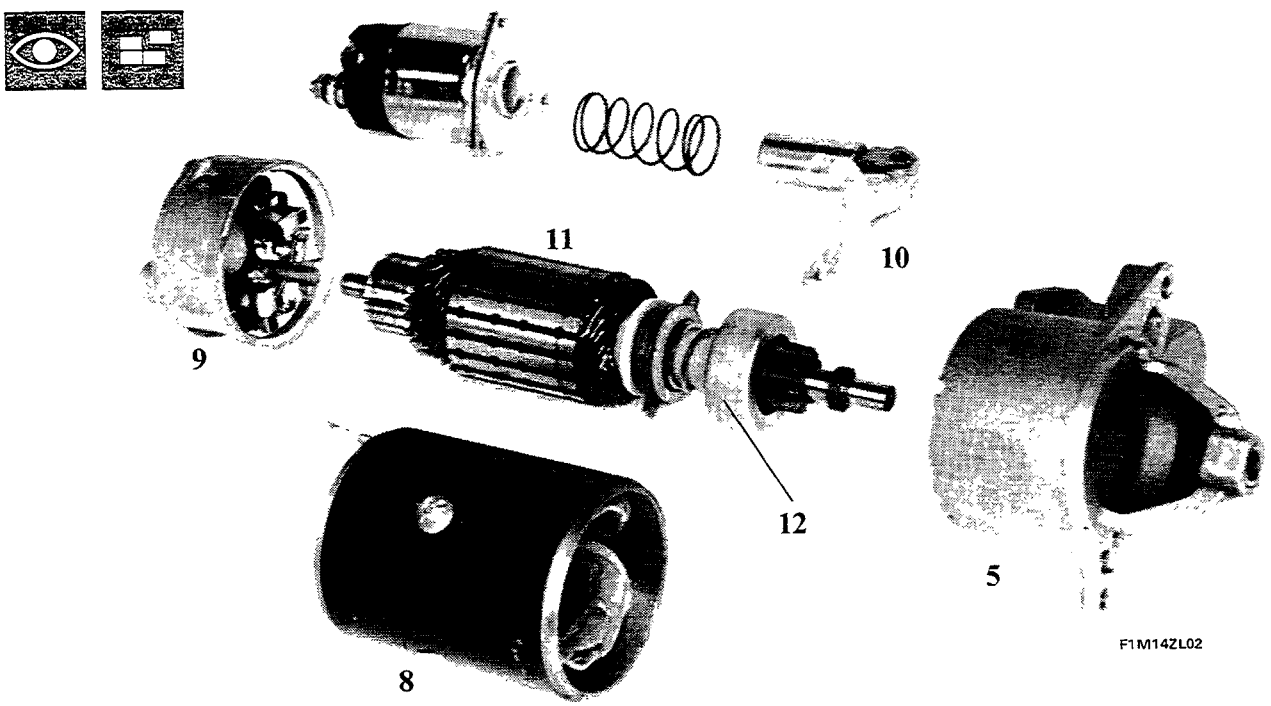
## OVERHAULING M. MARELLLI STARTER MOTOR

*Before overhauling the starter motor, check that the cause of the insufficient starting torque is not due to a flat battery.*




### Removal

To remove the starter motor first disconnect the supply leads and then back off the bolts retaining the unit to the gearbox.




### Disassembly

Proceed as follows to disassemble the starter motor:

- back off nut (1) and release cable (2) from solenoid (3);
- back off bolts (4) retaining solenoid (3) to front support (5);
- remove brush protective band (6);
- back off nuts (7) and withdraw bolts that join front support (5) to the central part (8) and brush carrier support (9);
- disassemble the parts and release fork (10) from front support (5) and rotor (11).

### Checks

Carry out the following checks on motor components:

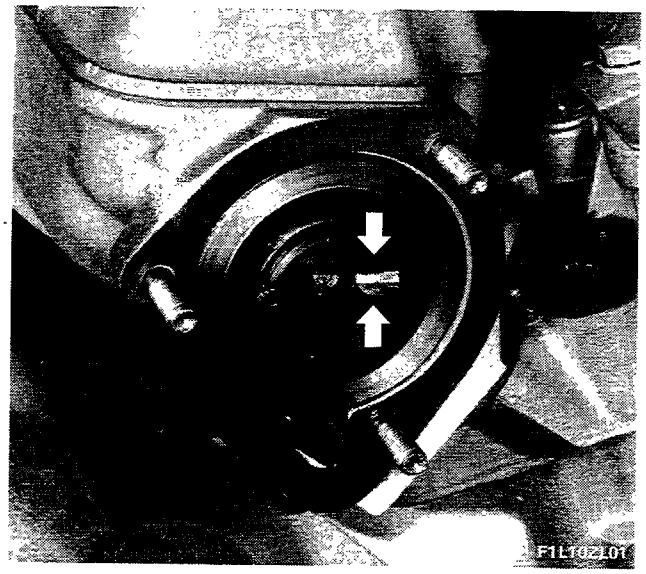
**rotor:** check continuity, short-circuit and earth insulation

**stator:** check continuity and earth insulation

**brush carrier:** earth insulation

**solenoid:** check continuity and earth insulation

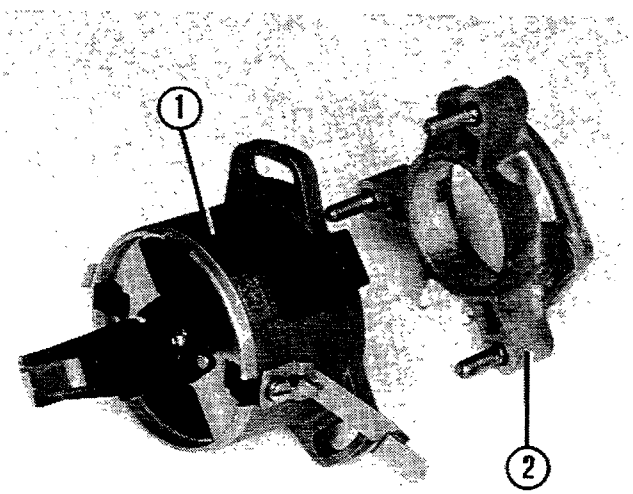
*Free wheel (12) must be replaced whenever the starter motor makes a noise upon starting.*




## I.A.W. IGNITION-INJECTION SYSTEM

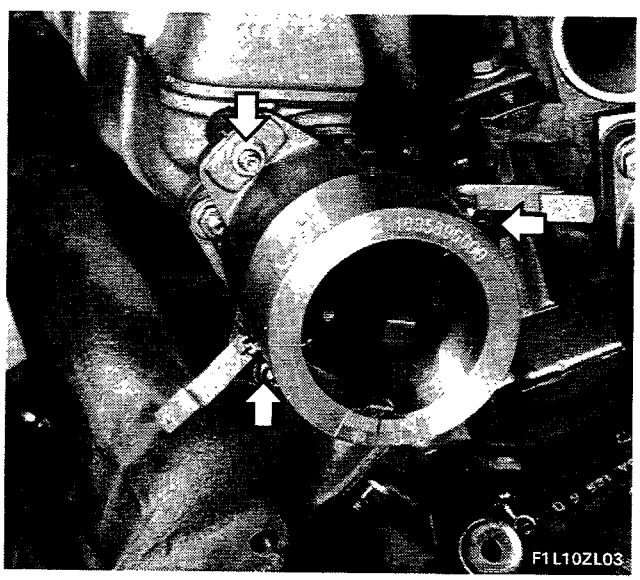
*The WEBER-MARELLI integrated electronic intermittent, multipoint, low pressure ignition-injection system adopted on the DELTA HF 4WD and PRISMA HF 4WD is described in detail on section 10 in the Fuel System section.*

**Asymmetrically milled end (→) of timing shaft**



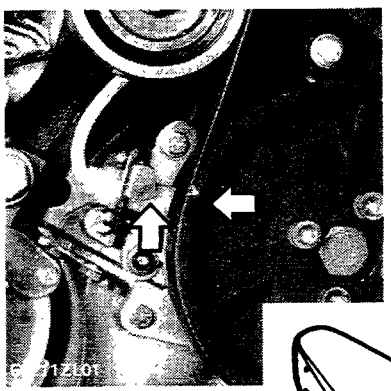

F1L10ZL02

**High tension distributor (1) with incorporated phase sensor and support (2) for attachment to cylinder head**




**Timing adjustment**

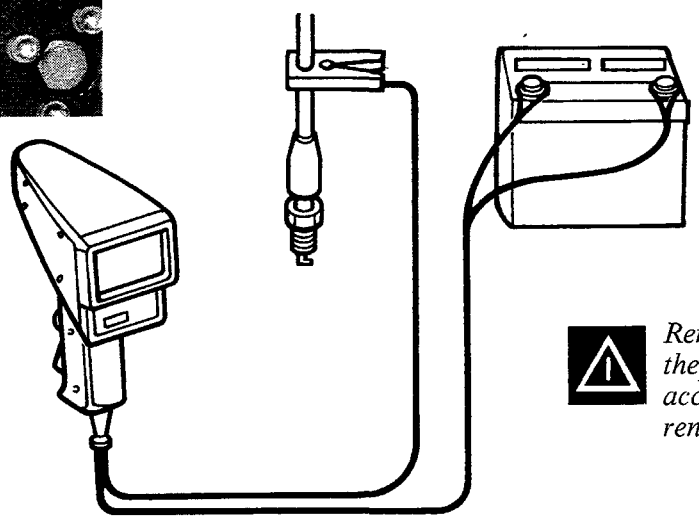
- Pistons 1 and 4 at T.D.C.
- Tool 1895896000 fitted to distributor: the rotary brush centre line must align with the central zero on the gauge. Otherwise turn the distributor in its seat until the reading is zero, then fully tighten the retaining bolts (→).



**Checking ignition advance angles using stroboscopic lamp**

PRISMA 4WD - Idle speed: 8080-850 rpm
Advance: 18° ± 2°

DELTA HF 4WD - Idle speed: 800 - 850 rpm
Advance: 15° ± 2°

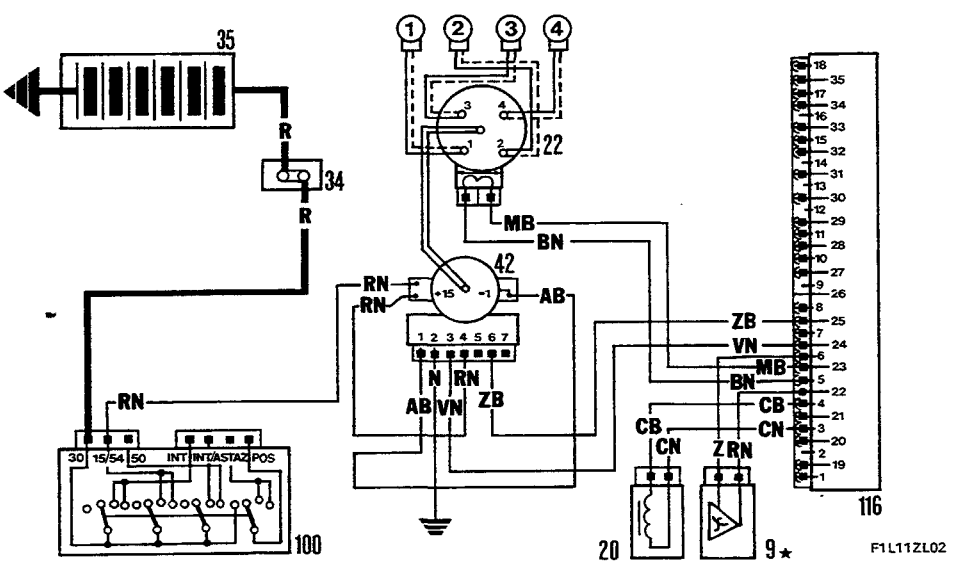


F1M19ZL03

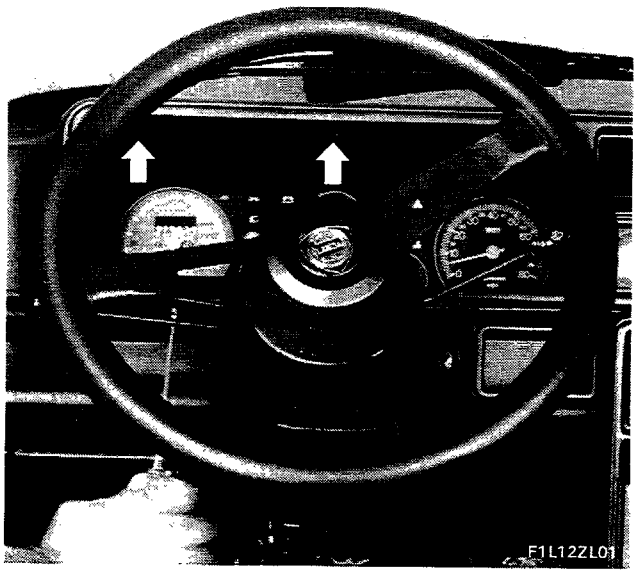
*Remove the plastic guard under the right front wheel arch to gain access to the engine advance reference marks.*

**NOTE** *The first cars manufactured had fixed references on the timing belt cover that cannot be seen through the relevant opening. On these cars it is therefore necessary to remove the bulkhead separataing the engine compartment from the front right wheel arch in order to check the ignition advance.*

## DIAGRAM SHOWING I.A.W. IGNITION SYSTEM COMPONENTS




9. Anti-knock sensor (only on DELTA HF 4WD)
20. Rpm and T.D.C. sensor
22. Ignition distributor with built-in phase sensor
34. Joint
35. Battery
42. Ignition coil
100. Ignition commutator
116. Electronic ignition injection control unit



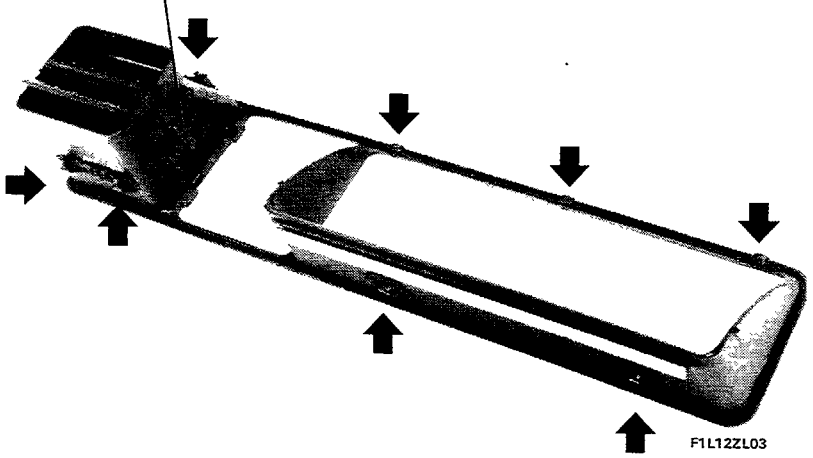

## REMOVAL-REFITTING (DELTA HF 4WD)

**Removing-refitting control panel frame**

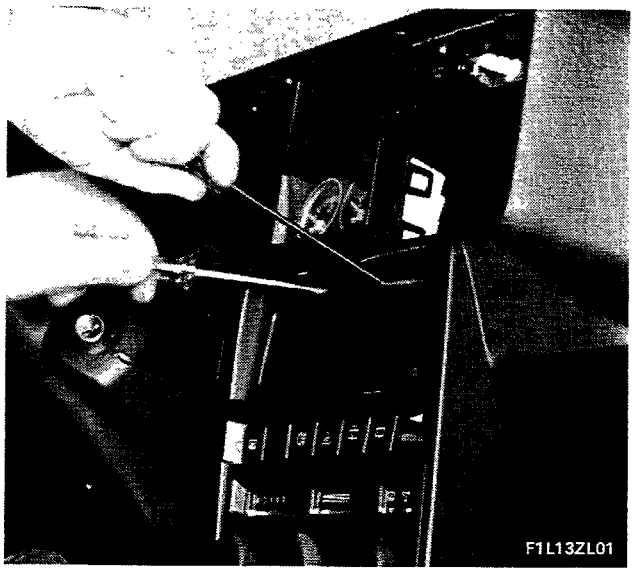
- Bolts retaining (→) frame to facia.


**Removing frame from facia**

- The frame is secured by flexible tabs (→), see photo below, to the facia.




**Rear of protective control panel frame**

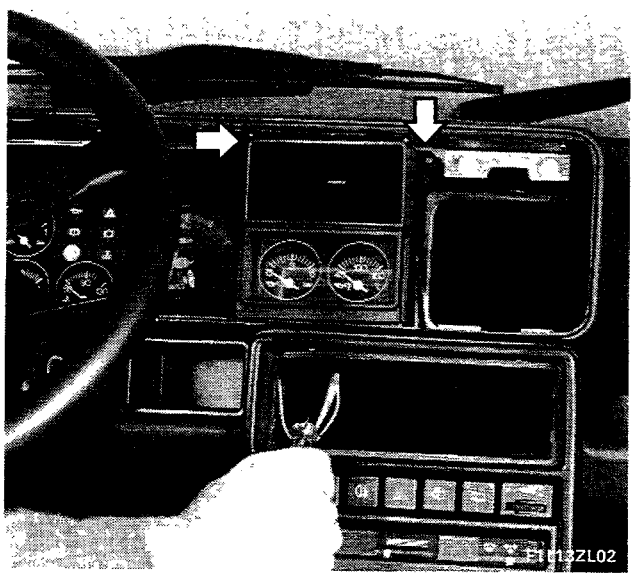


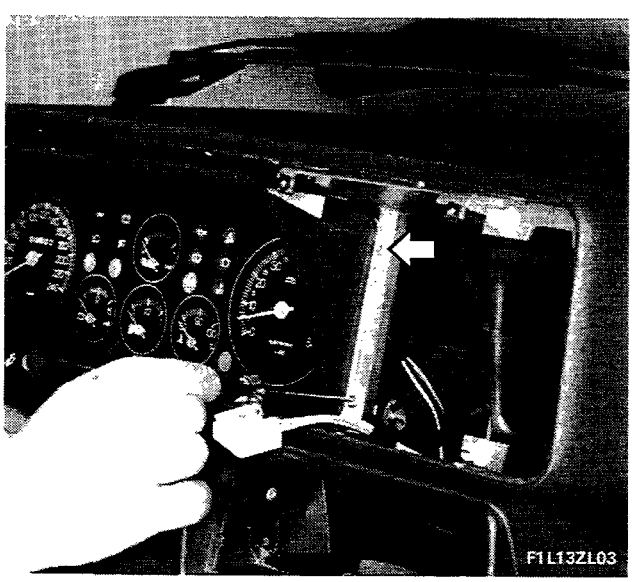

**Removing radio compartment grille**

**Removing-refitting auxiliary control panel**

(→) Bolts retaining auxiliary panel to facia.

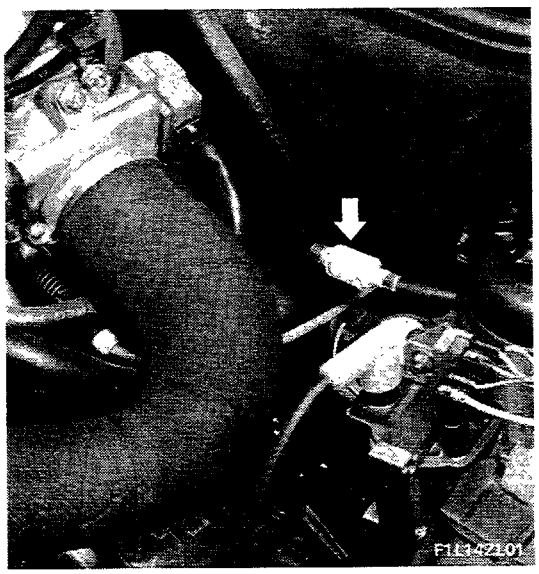
- Disconnect electrical connections and extract panel from its compartment.

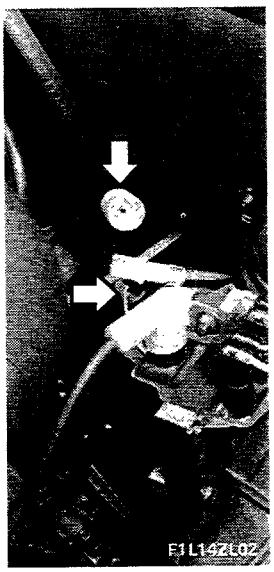


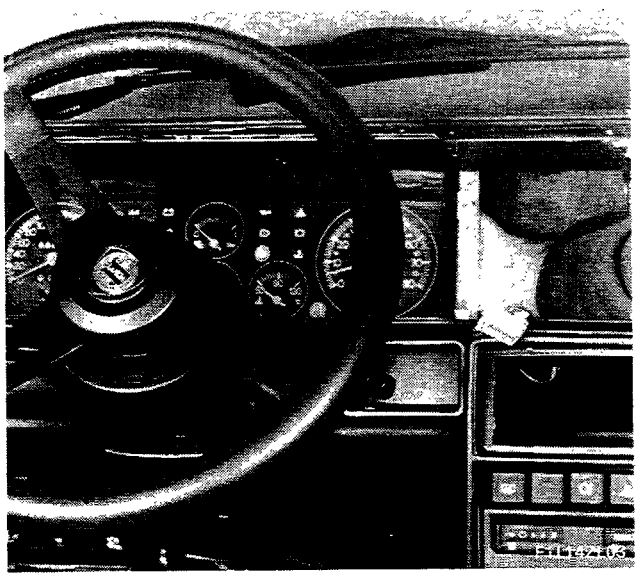

**Removing-refitting control panel from facia**

(→) Bolts retaining auxiliary panel to bodyshell



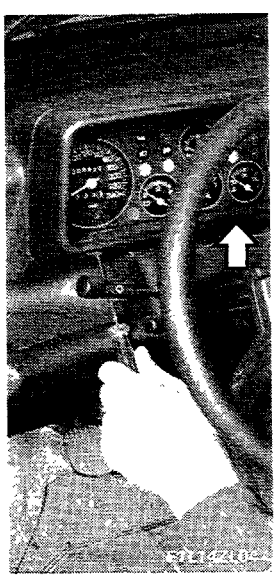




**Disconnecting milometer cable in engine compartment** (to facilitate removal of control panel from facia compartment)



**Removing control panel from facia**

- Disconnect milometer control cable (press-fit) from panel.
- Disconnect all electrical connections from panel.

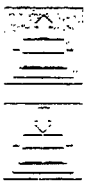


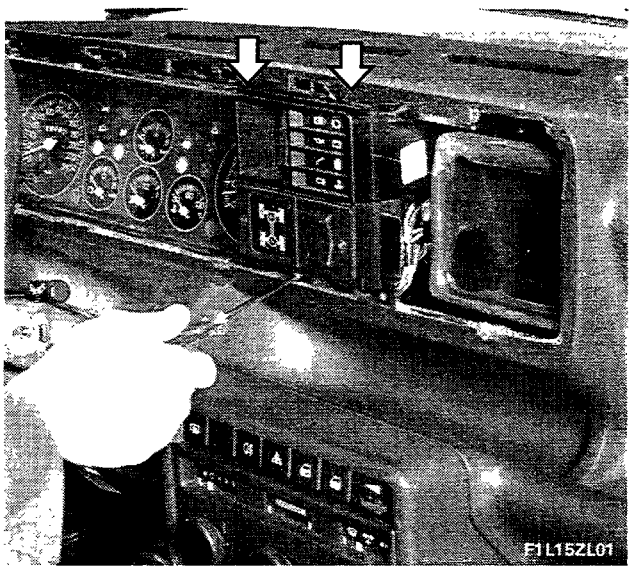

**REMOVAL-REFITTING (PRISMA 4WD)**

**Removing frame from facia**

- Back off bolts retaining (→Φbottom end of frame to facia.

NOTE *The top side of the frame is secured with flexible tabs.*





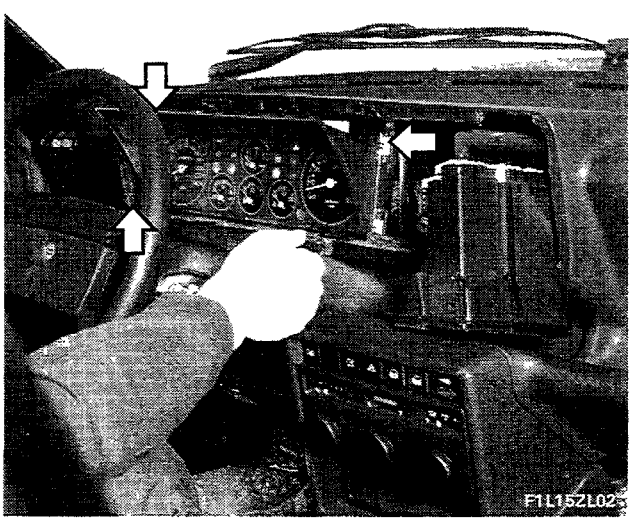

**Removing-refitting control module - Check system display and rear differential lock**

(→) Bolts retaining panel to facia.

- Disconnect electrical connectors from module.

**NOTE** *Connectors can only be fitted one way round.*

- Disconnect milometer control cable in engine compartment (see previous page, top illustration).



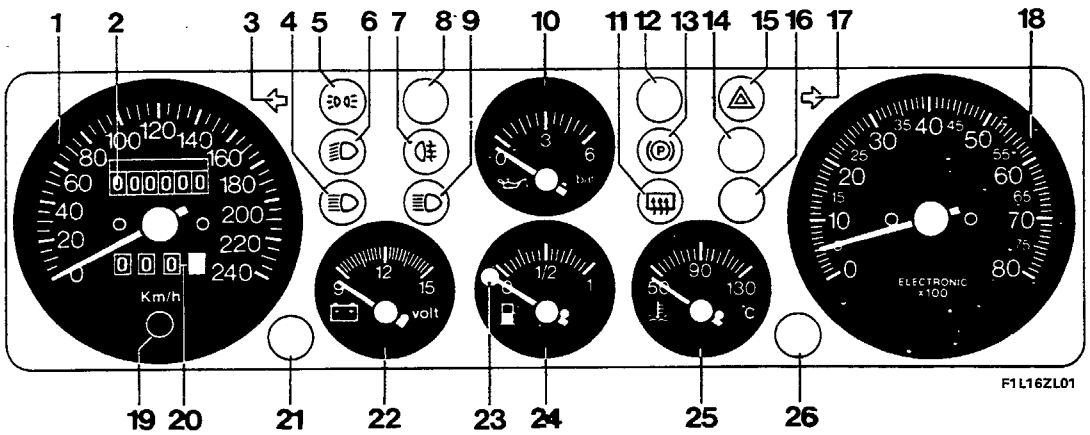

**Removing-refitting control panel from facia**

(→) Bolts retaining panel to facia.

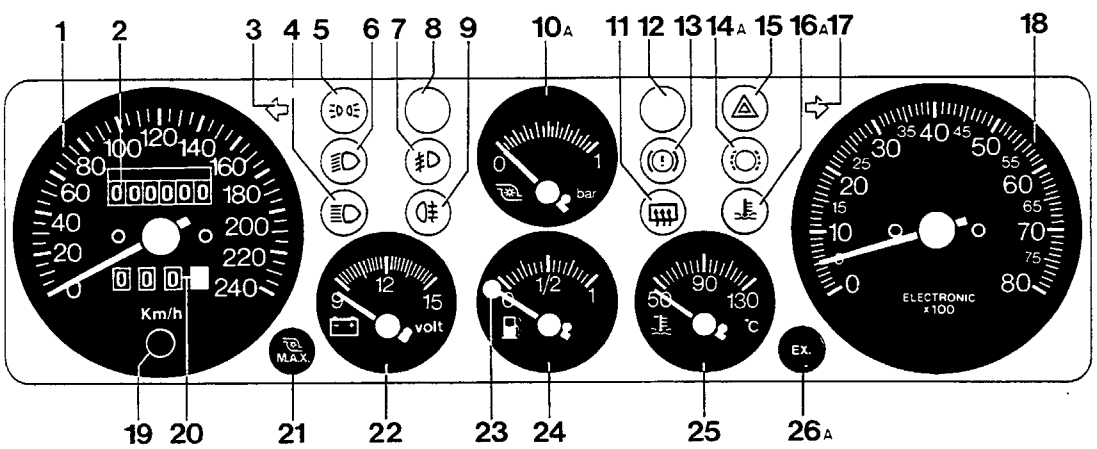

- Disconnect press-fit milometer control cable and electrical connectors from control panel.

**Removing control panel from facia compartment**

**Control panel PRISMA 4WD**




**Control panel DELTA HF 4WD**




**Key**

1. Speedometer
2. Milometer
3. Left turn signal
4. Main beam warning light
5. Lights on warning light
6. Dipped beam warning light
7. Fog lamp warning light
8. Check panel monitor light upon car start-up
9. Rear fog lamp warning light
10. Oil pressure gauge (PRISMA 4WD)

10A. Turbo boost gauge (DELTA HF 4WD)

11. Heated rear window warning light
12. Main Check Panel warning liglht
13. Parking brake warning light
14. Spare (PRISMA 4WD)

14A. Brake pad wear warning light (DELTA HF 4WD)

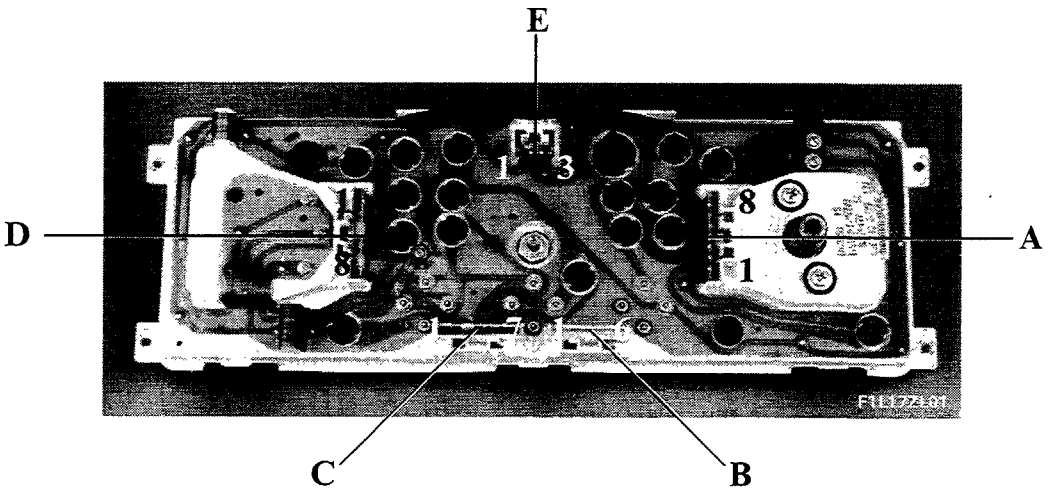
15. Hazard warning flasher warning light
16. Spare (PRISMA 4WD)

16A. Excessive coolant temperature warning light (DELTA HF 4WD)

17. Right turn signal
18. Rev counter
19. Trip counter reset button
20. Trip counter
21. Maximum catalytic converter temperature warning light (certain markets)
22. Voltmeter
23. Low fuel level warning light
24. Fuel level gauge
25. Coolant temperature gauge
26. Spare (PRISMA 4WD)

26A. Overboost warning light (DELTA HF 4WD)

**Rear control panel terminals for connection of car electrical system connectors**




**NOTE** *The blades and terminals are identified using the same numbers and letters adopted in the WIRING DIAGRAMS.*

| CONNECTOR A | | |
|---|---|---|
| cable colour | N° | PARTS CONNECTED |
| N | 1 | General instrument earth to FRONT RIGHT body shell section |
| GN | 2 | Control panel lighting from UT terminal of dimmer |
| HR | 3 | Rear fog lamp warning light from blade 1 H of control box |
| MB | 4 | Fog lamp warning light from terminal 87 of control relay |
| VB | 5 | Main beam warning light from blade 7 I of control box (fuse 7) |
| HN | 6 | Dipped beam warning light from blade 2 C of control box (fuse 5) |
| G | 7 | Side light warning light from blade 2 of control box connector M (fuse 4) |
| AN | 8 | Right turn signal warning lights from connector A on steering column switch unit |

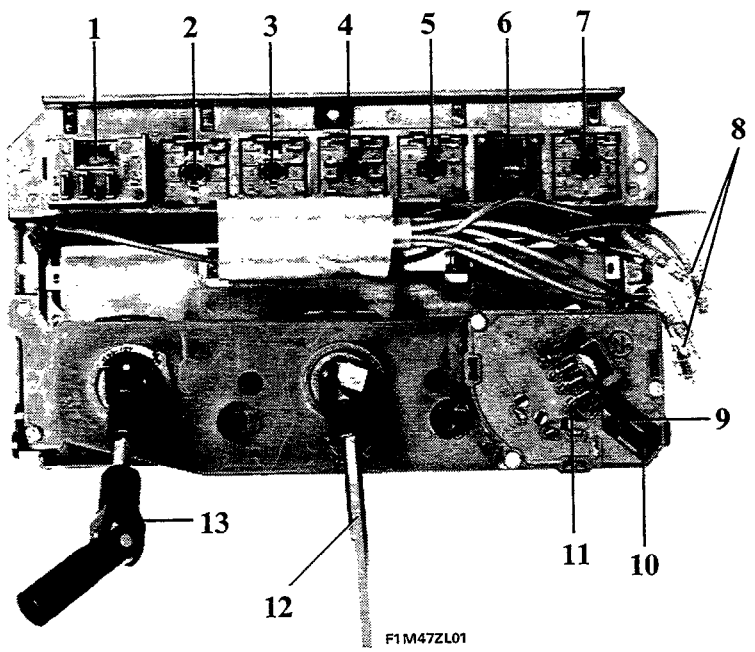
| CONNECTOR B | | |
|---|---|---|
| cable colour | N° | PARTS CONNECTED |
| MB | 1 | Low fuel level warning light to terminal 1 connector E of Check panel control module |
| HR | 2 | Maximum coolant temperature warning light from terminal 2 of Check Panel control module connector E |
| V | 3 | Green start-up monitor warning light from terminal 3 of Check Panel connector E through check socket |
| RV | 4 | + green and red Check Panel warning lights from terminal 4 connector E of Check Panel control module through the check socket |
| RN | 5 | Red Check Panel warning light from terminal 5 connector E of Check Panel control module through the check socket |
| G | 6 | Check panel lighting supply outlet (to terminal 6, connector E of Check Panel module) |

| CONNECTOR C | | |
|---|---|---|
| cable colours | N° | PARTS CONNECTED |
| | 1 | Spare (PRISMA 4WD) |
| HN | | Over-boost warning light: from block no. 62 (over-boost solenoid) (DELTA HF 4WD) |
| AR | 2 | From coolant temperature sending unit |
| | 3 | Spare |
| BN | 4 | Heated rear window warning light from blade 9 connector I of control box (fuse 11) |
| R | 5 | + instrument supply from blade 10 connector I of control box (fuse 1) |
| V | 6 | Fuel level warning light from sending unit via control box (2I and 2L) |
| M | 7 | Low fuel level warning light from sending unit via control box (3I and 3L) |

| CONNECTOR D | | |
|---|---|---|
| cable colour | No. | PARTS CONNECTED |
| AB | 1 | Right turn signal warning light from blade 4 of connector C of control box |
| AR | 2 | Hazard warning flasher warning light from terminal L of hazard warning switch unit |
| | 3 | Spare |
| | 4 | Spare |
| HN | 5 | Excessive coolant temperature warning light from sending unit on engine |
| BR | 6 | Handbrake warning light from terminal L of control flasher |
| | 7 | Spare |
| AN | 8 | Rev counter signal from terminal 1 of igntion coil |

| CONNECTOR E: ALL THREE SPARE |
|---|

# 55.




**Rear view of auxiliary control console (PRISMA 4WD)**

1-7. Auxiliary device control buttons.
8. Button symbol lighting bulbs.
9-10. Vacuum connection pipes to external air flap control.
11. Motor speed variation connector for fan and outside air intake flap opening actuator cam.
12. Shaft with two universal joints for control of blender flaps and coolant intake cock
13. Shaft with two universal joints for control of distribution flaps.

**Removing-refitting pushbutton**

Remove the pushbutton by inserting a screwdriver between the button and its seat on the console.

**Connectors for connection between central console pushbuttons and devices (terminals are indicated from left to right and top to bottom)**

**1. Instrument light dimmer (white connector)**

- Yellow-black cable to control panel (terminal 2 connector A)
- Yellow cable to a box lamp:
  yellow cable from control box (terminal 6 connector I)

  Supply from INT terminal of ignition commutator (under fuse 4)
- Black cable from earth carrier, under right side of facia

  black cable from door release control

**2. Door release control (green connector)**

- Black cable, to earth loom, under right side of facia via instrument light dimmer
- white-dark blue cable to terminal 2 of door lock control unit through a multiple connector and branch of the door lock system

**3. Door lock control button (dark blue connector)**

- Black cable to box light switch
- Dark blue-white cable to terminal 3 of door lock control unit passing through a multiple connector and a branch of the door lock system

**4. Hazard warning light switch (white connector)**

- Spare
- B. Red cable from control box (terminal 7 connector M). Direct emergency supply (fuse 13)
- C. Red-black cable to + terminal of flasher unit (hazard warning)
- D. red-green cable from control box (3-M). Turn signal supply (fuse 1) below key
- E. Light blue-white cable to turn signal via control box: input (4-C); output (7-A), (2-A). Hazard warning light on control panel (1a-d) also comes from 4-C.
- F. White cable to steering column switch unit connector (turn signal stalk)
- H. Light blue-black cable to turn signal via control box: enters (3-C); exits (3-F). (6-A). Turn signal warning light of control panel (8-A) also comes from 3-C

**5. Rear fog lamp switch (red connector)**

- Grey-red cable to control box: enters (1-C); exits (1-I) for warning light of control panel (3-A) and (9-D) for Check Panel module. Goes from inside the module to the lights via the control unit
- Grey-black cable from control box (2-C). Supply under fuse no. 5

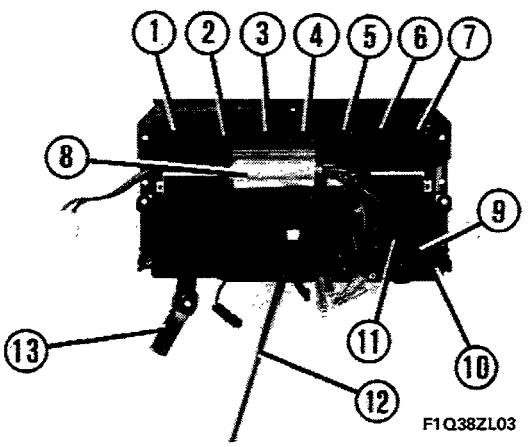
| 6. Provision for fog lamps |
|---|
| - Black cable for connection to earth loom under right side of facia (via turn signal - hazard warning flasher terminal)<br>- White-red cable to terminal 86 of fog lamp relay for relay activation |

| 7. Heated rear screen pushbutton |
|---|
| - Black cable to earth loom under right side of facia<br>- Black-purple cable to control box (6-H). Activation of control unit heated rear screen relay |

| 11. Interior fan speed control switch |
|---|
| - Black cable to earth loom under right side of facia<br>- Grey cable from fan resistor (1st speed)<br>- Red cable from fan resistor (2nd speed)<br>- Brown cable from fan resistor |

**NOTE** *Behind the console there is a 3-way connector for checking Check Panel efficiency at the end of the production line (not used during service).*

## MODEL DELTA HF 4WD VARIANTS



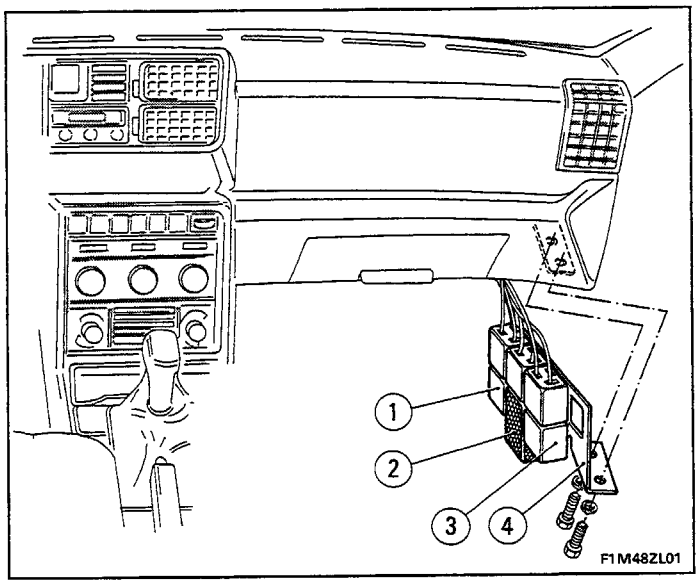

1. Instrument light dimmer
2. Rear wiper switch
3. Rear wash/wipe intermittent switch
4.....13 As for mod. PRISMA 4WD

| 1. Instrument light dimmer |
|---|
| - Black cable to earth loom under facia on right hand side<br>- Yellow supply cable from ignition cable INT across steering column side light control (protected by fuse 4) and blade 6 of connector I of control box: supply to box lamp (yellow cable)<br>- Yellow-black supply cable regulated in intensity at control panel from terminal 2, connector A of control box |

| 2. Rear wiper switch |
|---|
| - Yellow-black cable supply from fuse no. 2 under INT/A key from blade 2, connector G of control box<br>- Connection (green cable) to windscreen wiper motor for normal operation via multiple connector<br>- To rear wash/wipe intermittent switch via a red-green cable |

| 3. Rear window wash/wipe intermittent switch |
|---|
| E - Red cable: to rear wiper motor via a multiple connector<br>F - Red-green cable: to rear washer pump motor via multiple connector<br>B - Red cable for supply of electric motors from control box (5.H) protected by fuse no. 2 (under key)<br>C - Red-green cable: to rear wiper switch (switch supply)<br>D - Grey-black cable: to rear wiper motor via multiple connector |

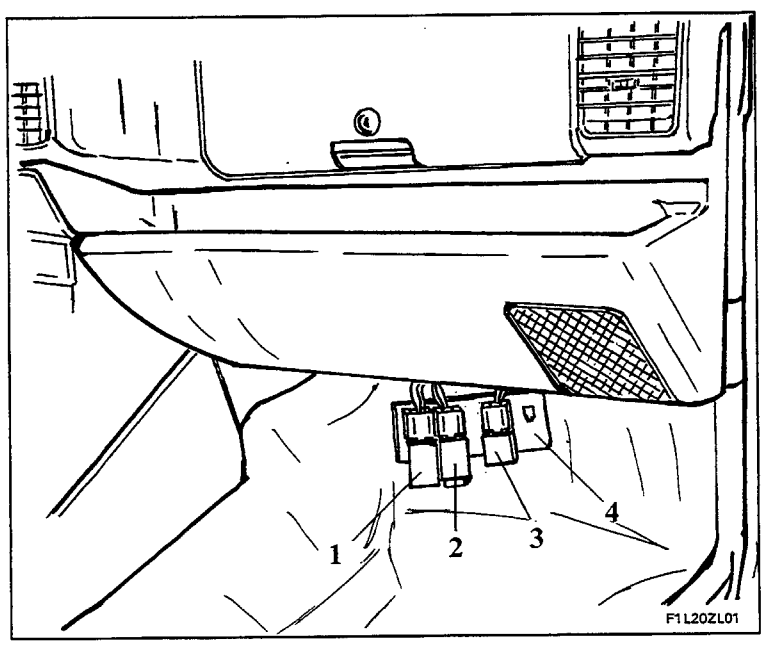
## 55.




### LOCATION OF AUXILIARY DEVICES (PRISMA 4WD)

**Key**

1. Hot wire device for igntion switch slot light delay
2. Turn signal-hazard warning light flasher unit
3. Supplementary high beam relay
4. Bracket



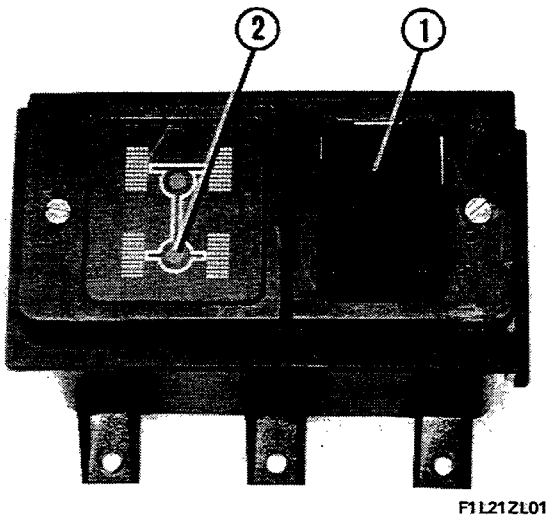

### LOCATION OF AUXILIARY DEVICES (DELTA HF 4WD)

**Key**

1. Turn signal-hazard warning flasher unit
2. Fog lamp relay
3. Main beam relay
4. Device carrier plate

## REAR DIFFERENTIAL VACUUM LOCK

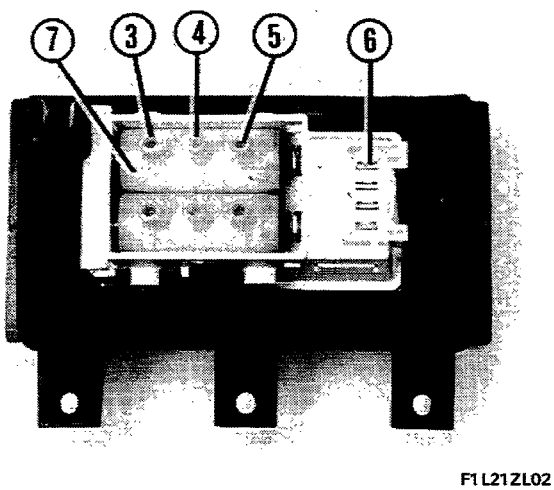
NOTE *This device cuts out the rear differential so that the two rear wheels are integral. This is used only in certain critical driving conditions when the ground is very slippery or bumpy.*




**Front view of differential lock controls and warning light**

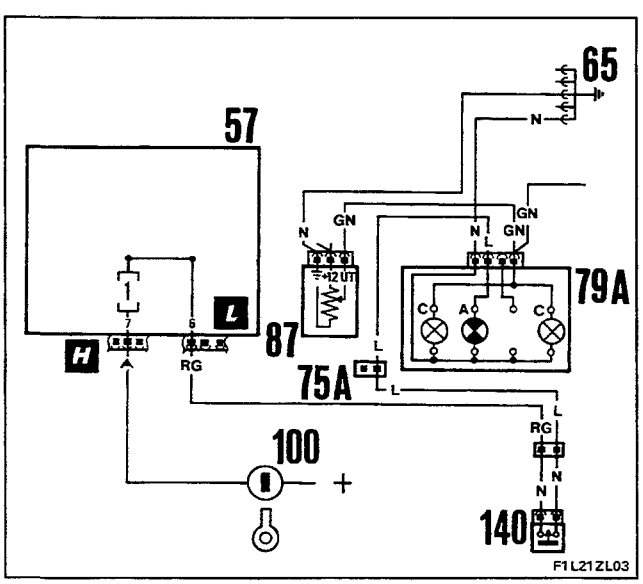
1. Rear differential lock control button
2. Rear differential lock sleeve engagement warning light

**Rear view of rear differential lock control and warning light**




3. Piping (yellow) connected to one end of pneumatic differential lock actuator
4. Piping (red) connected to vacuum tank
5. Piping (yellow) connected to other side of actuator
6. Warning light and symbol illumination connection
7. Distributor casing (atmospheric pressure and vacuum)

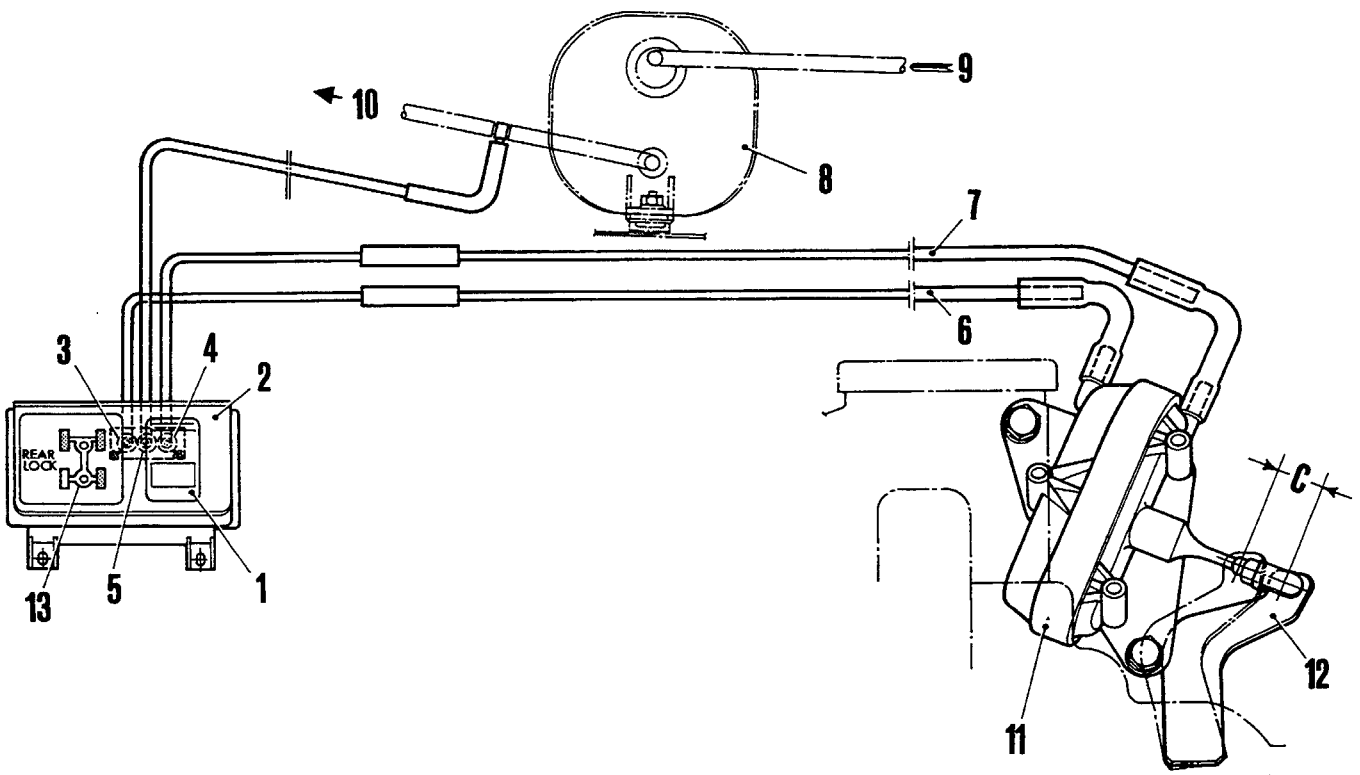
**Rear differential lock symbol and warning light electrical lighting circuit**




57. Control box and fuse holder
65. Earth loom under facia on right hand side
75A. Connection
79A. Control instruments and rear differential engaged warning light
87. Control panel lighting warning light
100. Ignition control switch
140. Rear differential lock switch (on rear differential)

# 55.

## REAR DIFFERENTIAL LOCK CONTROL AND WARNING LIGHT




1. Control button
2. Instrument
3. Socket for connection of distributor to actuator
4. Socket for connection of distributor to actuator
5. Socket for connection of distributor to inlet manifold
6. Actuator connection pipe
7. Actuator connection pipe
8. Vacuum tank
9. From inlet manifold
10. To interior air intake flap
11. Actuator and rear differential lock engagement diaphragm
12. Rear differential lock sleeve control lever

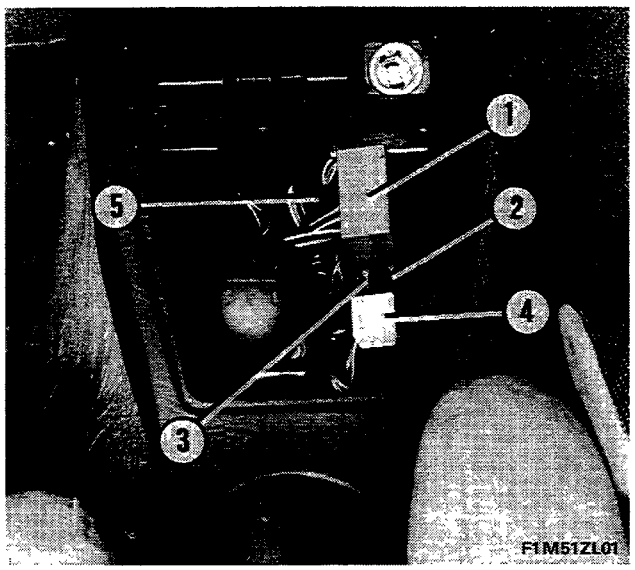
### OPERATION

When device button (1) is pressed, a distribution system within the instrument (2) moves to open up communication with passage (5) - connected permanently to engine intake manifold vacuum - alternatively passages (3) or (4) and, at the same time, to bring the passage cut off by the connection into contact with the atmosphere.
Two connection pipes (6) and (7) between passages (3) and (4) of the distributor and the two opposite sides of a diaphragm actuator - located in the rear differential - are used to transmit the vacuum to one side of the diaphragm and atmospheric pressure to the other. The force set up due to the different pressures acting on the diaphragm pushes the diaphragm, lever and toothed differential lock engagement sleeve (12) until engagement takes place.
When the differential is engaged, a switch on the differential closes. This causes the differential lock warning light (13) to come on.

*The differential lock should never be engaged on tarmac roads or at high speed because it does not allow the car to corner.*

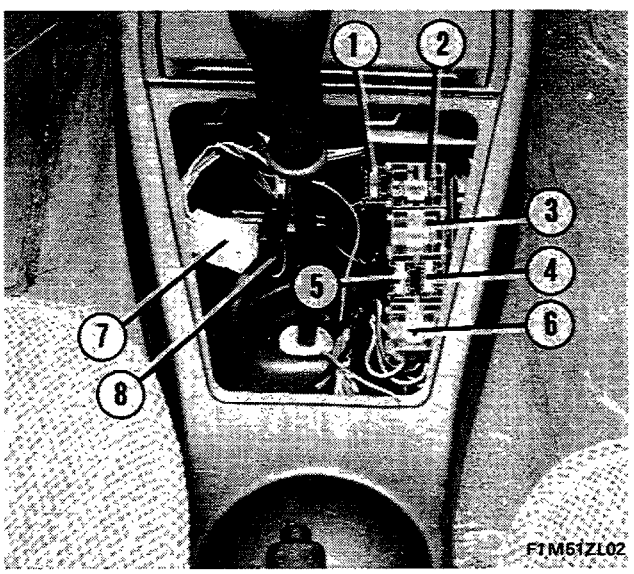
## LOCATION OF POWER WINDOW AND DOOR LOCK CONTROL AND FUSES (PRISMA 4WD)

1. Door lock control unit
2. Rear power window reduction unit fuse
3. Front power window reduction unit fuse
4. Power window motor relay
5. Connector




**The unlocked power supply** reaches the + terminal of the door lock control unit (3) directly from the battery through the junction and fuse (1).

**Locked power** reaches the relay of power windows (6), terminal 86 pink lead, from INT/A terminal of ignition switch.

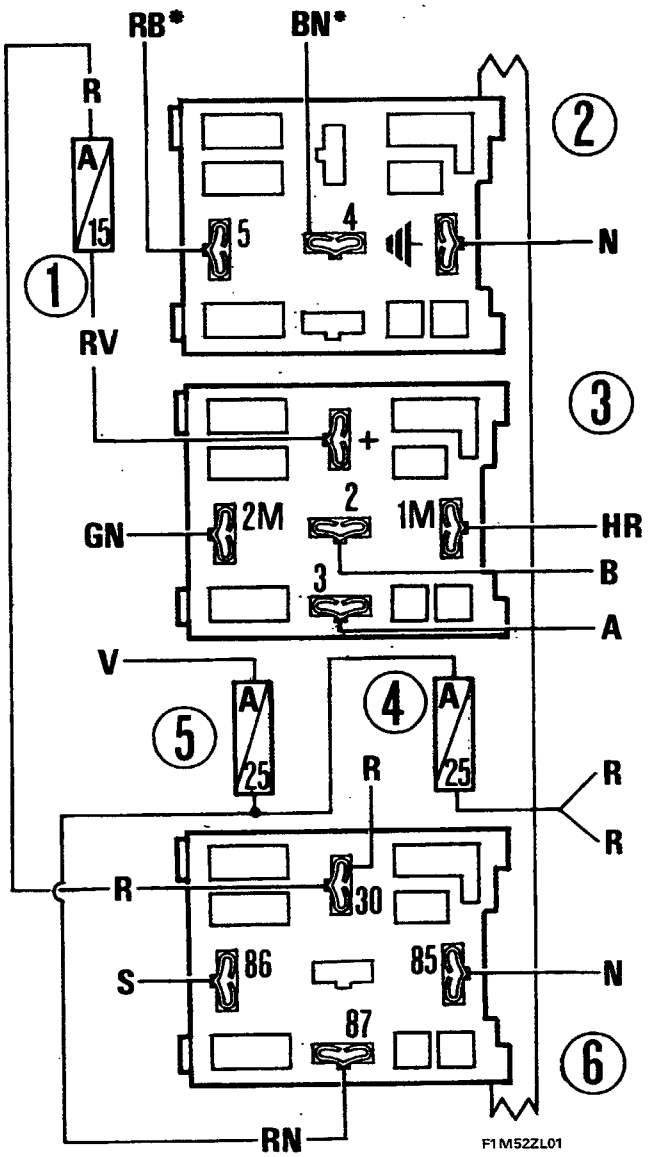



**Location of control unit mount, relay and fuses**

**Key (last photo)**

1. Electric door lock control unit fuse
2. Green mount for door lock control unit
3. Red mount for door lock control unit
4. Rear power window reduction unit fuse
5. Front power window reduction unit fuse
6. Red mount for power window motor relay

7-8. Multiple connectors




**Vehicle electrical system socket cable connection**

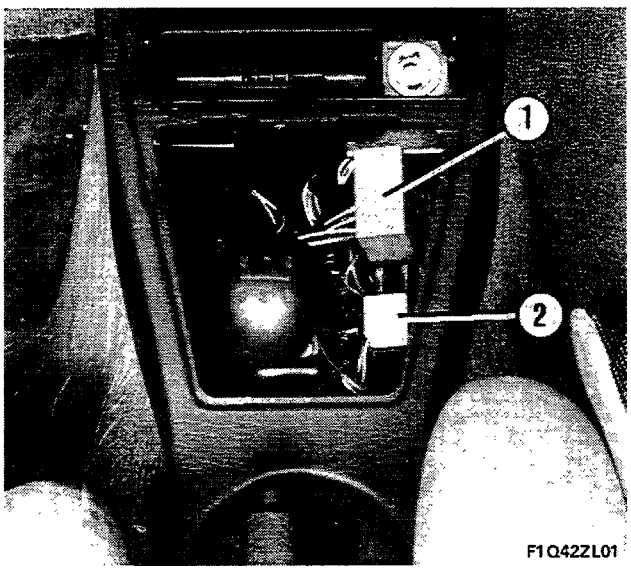
Key - see bottom photo on previdus page (PRISMA 4WD)

| Socket n° 2 - (green) - for central locking control unit | | |
|---|---|---|
| N° | Cable color | CABLE CONNECTION |
| 5 | RB | Wiring for boot lid geosed motor |
| 4 | BN | Wiring for fuel filler flap geased motor |
| | N | To the right side under dashboard earth cable loom |

| Socket n° 2 - (green) - for central locking control unit | | |
|---|---|---|
| N° | Cable color | CABLE CONNECTION |
| + | RV | Central locking supply (via connector block) through socket (6) and fase (1) |
| 1M | HR | To the front and rear door geared motors for rotation in clockwise direction (through a multiple fastening for the various terminals located nearby. |
| 2M | GN | To the front and rear door geared motor for rotation in an anti-clockwise direction (via a multiple fastering for the various terminals located nearby. |
| 2 | B | To the end of travel microswitches for the electric front window geared motors for maintenance without rotating the motors |
| 3 | A | To the end of travel microswitches for the electric front windows for reversal without rotating the motors |

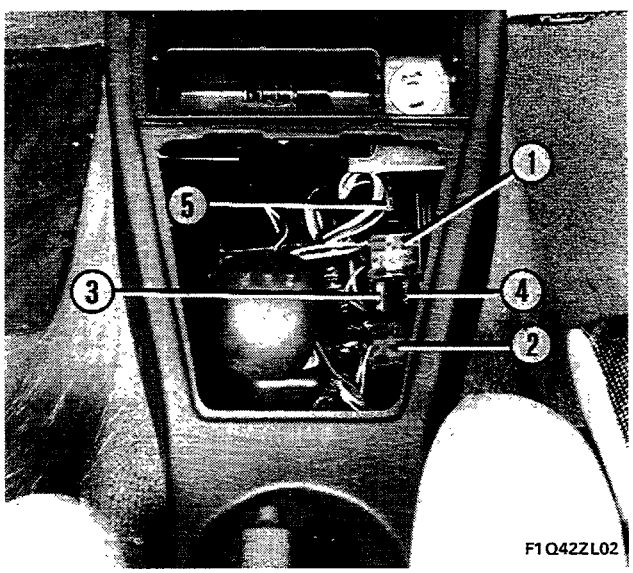
| Socket n° 6 - (red) - for electric windows relay | | |
|---|---|---|
| N° | Cable color | CABLE CONNECTION |
| 30 | R | Supply from electrical system connector block |
| | R | Central locking control unit direct supply via fuse (1) |
| 87 | RN | Supply for electric front window motor, via protective fuse (5) and for rear windows via fuse (4) |
| 85 | N | To earth |
| 86 | S | INT/A terminal of ignition switch.upply. Coming from |

## LOCATION OF POWER WINDOW AND DOOR LOCK CONTROL UNIT AND FUSES (DELTA HF 4WD)



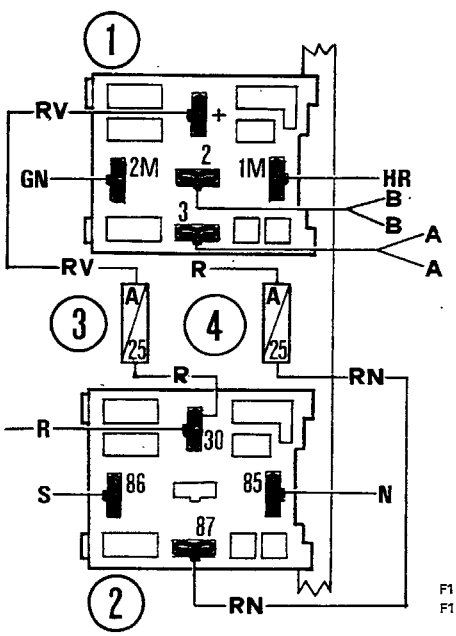

F1Q42ZL01

1. Door lock control unit
2. Front power window supply relay




F1Q42ZL02

1. Door lock control unit mount
2. Front power window relay mount
3. Door lock control unit supply fuse
4. Front power window reduction unit fuse
5. Door lock control unit earth lead




F1Q42ZL03
F1Q42ZL04

**Relay and door lock control unit mounts with fuses**

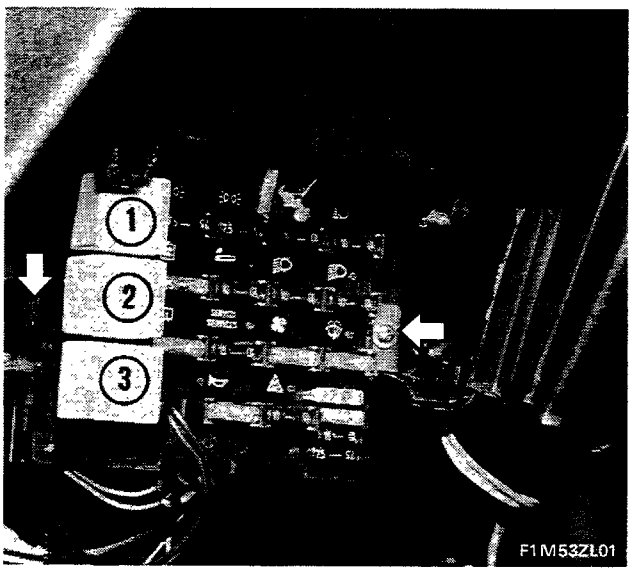
# 55.

## Connection of mount cables to car electrical system (DELTA HF 4WD)

| Mount no. 1 for door lock control unit | | |
|---|---|---|
| **Terminal no.** | **Cable colour** | **DESCRIPTION** |
| + | RV | Door lock control unit supply from fuse (3) through terminal 30 of power window supply relay |
| 1M | HR | To front and rear door lock reduction units by clockwise rotation (via multiple clips) |
| 2M | GN | To front and rear door lock reduction units by anticlockwise rotation (via multiple clips) |
| 2 | B | To front door reduction unit end stop microswitches to maintain motor rotation direction |
| 3 | A | To front door reduction unit end stop microswitches to reverse motor rotation direction |

| Mount no. 2 for front power window relay | | |
|---|---|---|
| **Terminal no.** | **Cable colour** | **DESCRIPTION** |
| 30 | R | Direct supply cable from battery junction |
| | R | Door lock control unit supply |
| 87 | RN | Supply for front power window motors via fuse (4) and power window switches |
| 85 | N | Earth cable |
| 86 | S | Power window relay excitation supply from INT/A terminal of ignition switch |

## CONTROL BOX




1. Horn control relay
2. Heated rear window relay
3. Car interior fan relay

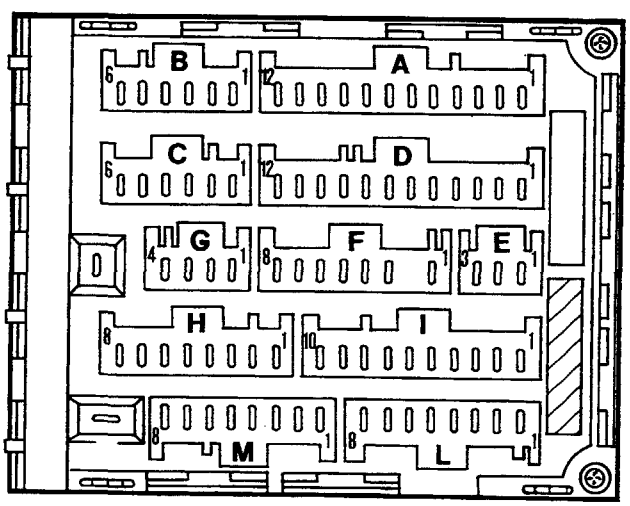
**Removing-refitting control box from facia**

- Back off bolts retaining (→) unit to facia.

**Rear view of control unit with shape of terminals for connection to car electrical system**

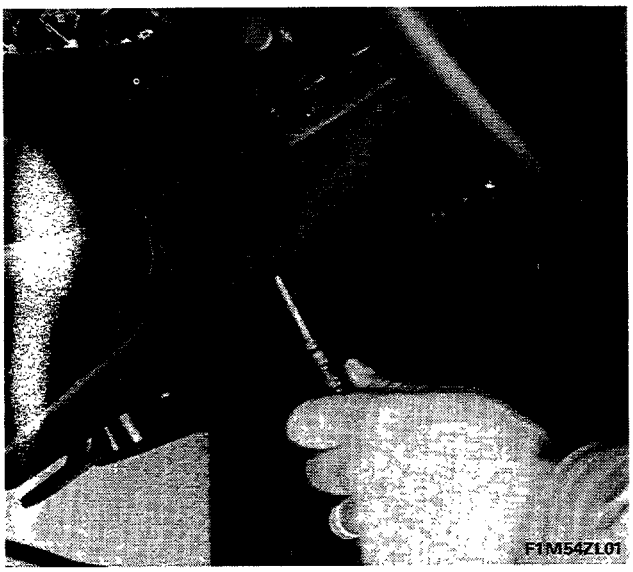
The control box contains all electrical system fuses, with symbols showing main function protected.
It is also equipped with connections for insertion of some relays.
Internally it consists of a flexible support for connection of the various wires.

*It is impossible to mistake one connector for another as they all have their own special shape.*
*Connector identification letters are as adopted in the wiring diagrams.*




**Classification of connection unit connectors with cable colours**

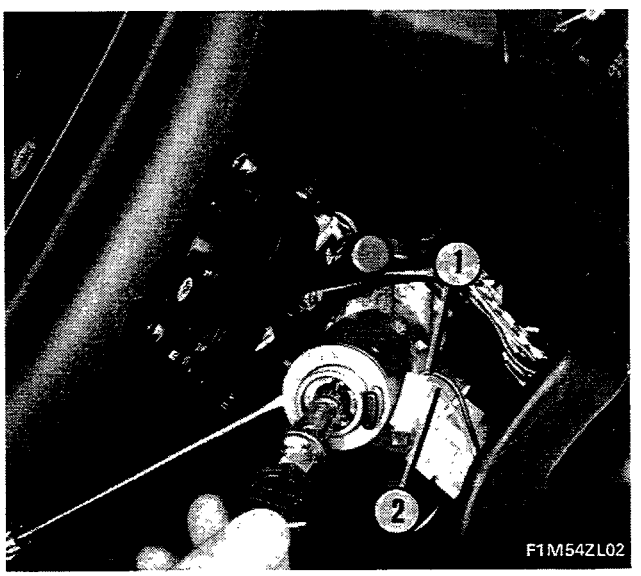
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | GV | HR | VN | GR | RV | AN | AB | RN | GN | SN | MB | G |
| **B** | H | AB | Z | A | - | V | | | | | | |
| **C** | HR | HN-HN | AN-AN | AB-AB | G | BN | | | | | | |
| **D** | RV | RN | V | - | A | - | HR | MB | H | HG | VG | - |
| **E** | BR | GR | GR | | | | | | | | | |
| **F** | GN | - | AN-AN | - | HN | R | - | VN | | | | |
| **G** | - | GN-GN | V | H | | | | | | | | |
| **H** | RA | M | RV | - | R-S | NZ | A | C | | | | |
| **I** | HR | V | M | R | - | G-G | VB | RN | BN | R-R | | |
| **L** | - | V | M | R | - | - | SN | N | | | | |
| **M** | - | G | RN | H-H | - | GN | R | S | | | | |
| **Q** | R | | | | | | | | | | | |




## IGNITION SWITCH

### Removing-refitting top steering control shaft guards

Back off the five bolts fastening the bottom of the guard to the steering column.

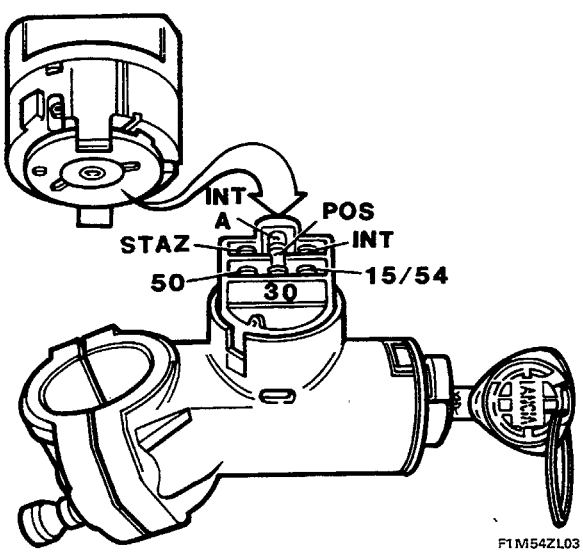



### Ignition switch bulb supply cable

1. Black cable to earth loom under facia on right side, via radio connector
2. Red-green supply cable to ignition switch light from ignition switch light delay

### Replacement of block with ignition key

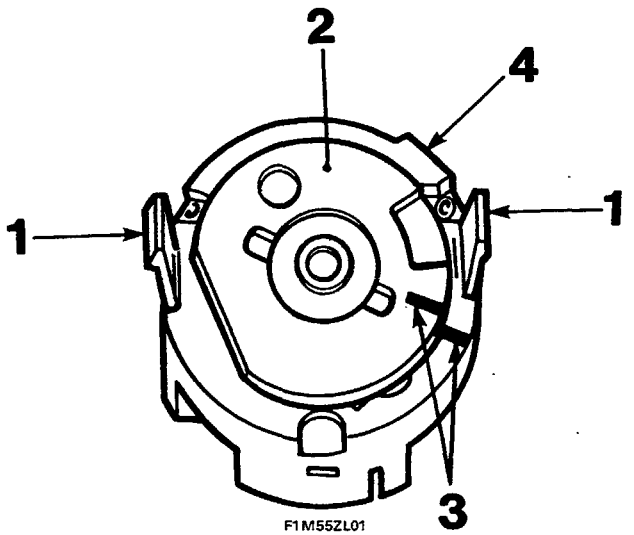
Turn key to running position. Press relevant groove with screwdriver and simultaneously extract key and block.




### Replacement of ignition switch electrical contacts

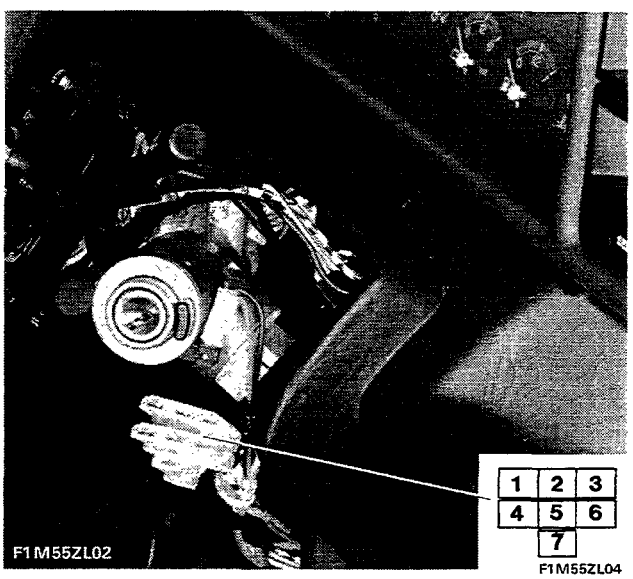
With key in "STOP" position, withdraw the two switch connectors.
Turn the key to "MAR" position.
Using a screwdriver, push fins (1) inward and simultaneously withdraw switch from housing (see following illustration).
Position cam (2) of new switch so that reference notches (3) are aligned.

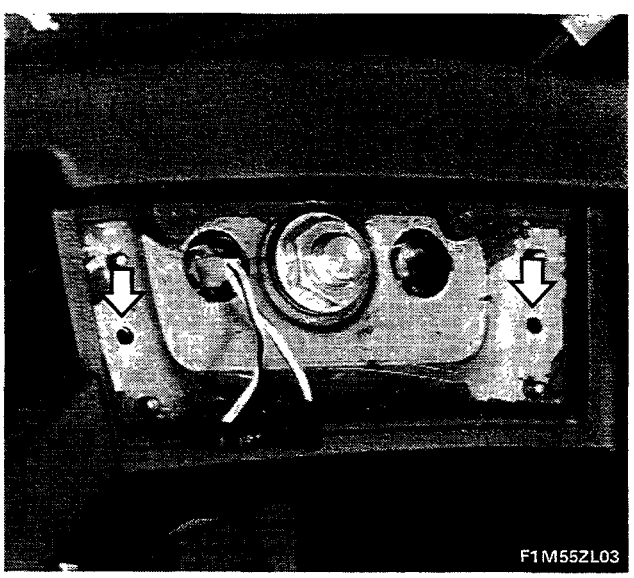
Insert switch into seat on steering lock until fins lock in grooves. Reference tooth (4) will ensure correct positioning.
Turn key to "STOP" position and connect the two connectors previously removed.




**Cables connecting ignition switch to car electrical system**

| Term. | No. | Cable colour | CABLE CONNECTION |
|---|---|---|---|
| 15/54 | 1 | RN | To terminal +15 of ignition coil |
| | | RN | To cut-off control module (1300) |
| 30 | 2 | | |
| | | R | To terminal 50 of starter motor |
| INT | 4 | A | To steering column connector for main-dipped beam switch |
| POS | 5 | GN | To control box (terminal 6 - connector M) supplying fuses nos. 3-4 |
| STAZ | 6 | G | To side light switch steering column connector |
| INT/A | 7 | S | To control box (connector M - terminal 8) for car interior fan relay, screen wipers, headlamp wipers, heated rear screen (switch discharge) |
| | | SN | To amendment 04 device fuse |
| | | S | To connector for power windows, door lock and air conditioner |

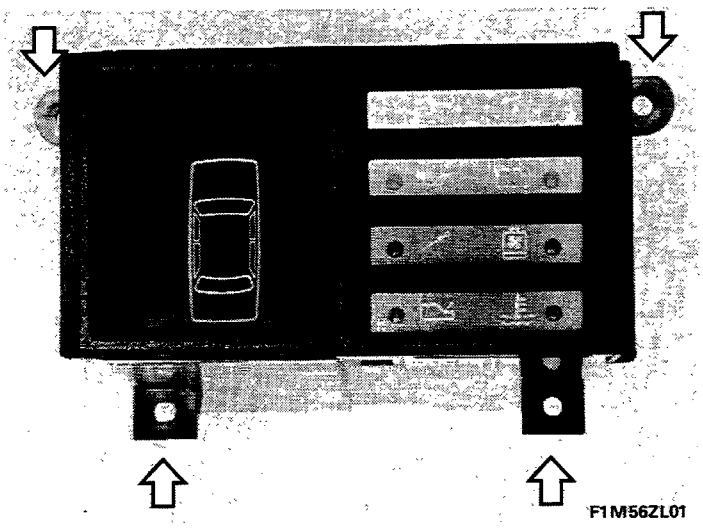



**Removing-refitting steering wheel**

Back off the 2 steering wheel cover retaining bolts from below (→).
Back off the steering wheel retaining nut and pull this off the steering column.

## 55.

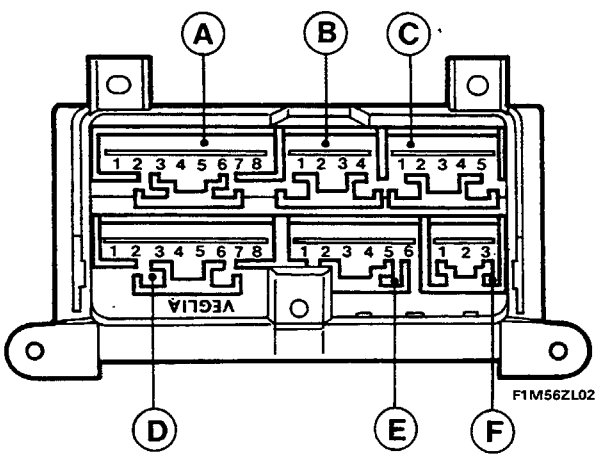



### CAR OPERATION MONITORING DEVICE (CHECK PANEL)

**Car operation monitoring check and display unit (Check Panel)**

See page 41 for removal-refitting operations.

(→) Bolts retaining Check Panel module to facia




A-B-C-D-E-F. Terminals for connection to various functions monitored.

**Back of Check Panel with connection terminals**

| TERMINAL BLOCK A | | |
|---|---|---|
| Cable colour | No. | CABLE CONNECTION |
| HR | 1 | To left fog lamp bulb via control box 7D-2A |
| MB | 2 | To right fog lamp bulb via control box 8D-11A |
| RN | 3 | To left stop light bulb via control box 2D-8A |
| RV | 4 | To right stop light bulb via control box 1D-5A (may be exchanged for 3) |
| AR | 5 | From stop light switch working contacts |
| H | 6 | To rear fog lamp light switch and control panel warning light via control box 9D-1C-1I |
| VG | 7 | Supply of side lights from fuse no. 3 (under POS ignition switch) from 11-D on control box (also number plate and cigarette lighter light) |
| HG | 8 | Supply of side lights from fuse no. 4 (under POS) from 10-D of control box (also digital clock display, dimmer, luggage compartment light and control panel lighting) |

| TERMINAL BLOCK B | | |
|---|---|---|
| Cable colour | No. | CABLE CONNECTION |
| BR | 1 | To right front side light |
| V | 2 | To left rear side light via control unit 3D-4A (may be exchanged with no. 4) |
| GN | 3 | To left front side light |
| A | 4 | To right rear side light via control unit 5D-9A (may be exchanged with no. 2) |

| TERMINAL BLOCK C | | |
|---|---|---|
| Cable colour | No. | CABLE CONNECTION |
| R | 1 | From switch resting contacts |
| BN | 2 | To right front door button (via front door transverse cable connectors) |
| BR | 3 | To left rear door button (via door lock connector) |
| VB | 4 | To left front door button (via front door transverse cable connector) |
| CB | 5 | To right rear door button (via power window connector, door lock) |

| TERMINAL BLOCK D Various devices | | |
|---|---|---|
| Cable colour | No. | CABLE CONNECTION |
| N | 1 | To right front earth loom |
| | 2 | Spare |
| VN | 3 | To coolant level sensor located in expansion tank |
| BN | 4 | Battery charge warning light from +D generator |
| HV | 5 | Low oil pressure warning light from associated switch |
| R | 6 | + from INT terminal of ignition switch via fuse no. 1 of control box &h-6F for battery charging warning light |
| HG | 7 | To engine oil level sensor |
| HR | 8 | To engine oil level sensor |

| TERMINAL BLOCK E | | |
|---|---|---|
| Cable colour | No. | CABLE CONNECTION |
| MB | 1 | Low fuel level warning light from blade 1. terminal B of control panel |
| HR | 2 | Maximum coolant temperature warning light from blade 2, terminal B of control panel |
| V | 3 | To check socket, then to blade 3, terminal B of panel for general Check Panel start-up signal |
| RV | 4 | To Check Panel check socket, then to blade 4, terminal B of panel for supply of GREEN and RED Check Panel warning lights |
| RN | 5 | To Check Panel check socket, then to blade 5, terminal B of Check Panel general FAILURE warning light |
| G | 2 | To blade 6, terminal D of panel for lighting |

| TERMINAL BLOCK F To sensors | | |
|---|---|---|
| Cable colour | N° | CABLE CONNECTION |
| S | 1 | To brake fluid level sensor |
| SN | 2 | To left front brake lining wear sensor |
| VG | 3 | To right front brake lining wear sensor |

| MULTIPLE SUPPLY CABLES | | |
|---|---|---|
| Cable colour | No. | CABLE CONNECTION |
| RN | 1 | Supply from fuse 12, not locked, via blade 8, of connector I of control box and courtesy light transverse cable bundle connector |
| G | 2 | Supply from fuse 4 (locked, POS terminal) from blade 6, of connector I of control box |
| N | 3 | General earth to left front earth loom |
| | 4 | Supply from fuse 1 (locked, INT terminal) via blade 4, of connector M of control box |

## Composition

This system for checking the operation of several important electrical circuits and various car functions (oil level, brake fluid etc.) comprises:

- An electronic CONTROL UNIT incorporating a light circuit check module and a check monitor that memorises and displays faults;
- A general GREEN warning light and a RED light located in a prominent position on the control panel;
- a system of connecting cables joining car circuits to be checked and the control unit;
- some N.C. sensors **i.e. with contacts normally closed during correct operation of monitored service and other N.O. sensors, i.e. normally open, with contacts normally open during correct operation of monitored service.**

## Characteristics of check panel

This multifunctional electronic device checks the functions listed below as follows:

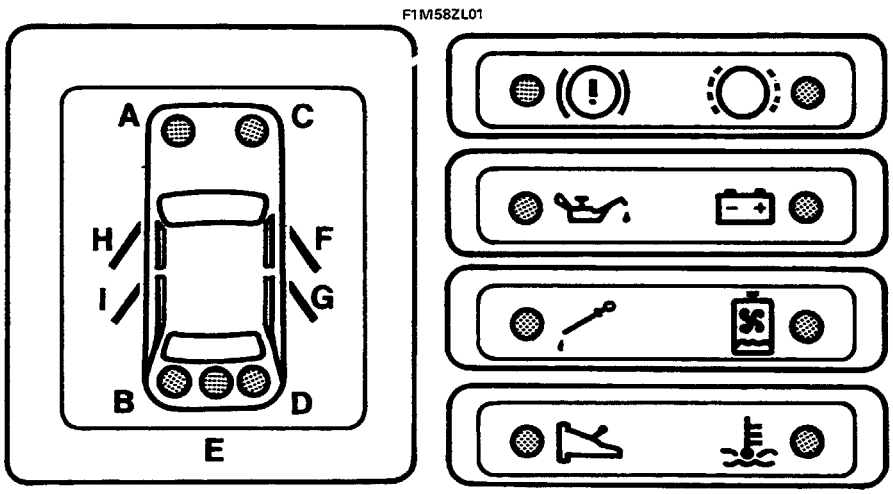
**Checks with engine off (ignition key in MARCIA position)**

- low oil level. If the level is too low, the fault is memorised so that it can be displayed when the engine is started up;
- low coolant level. If the level is too low, the fault is memorised so that it can be displayed when the engine is started up.

- low oil pressure;
- alternator is not providing sufficient current (failure).

**Checks run with engine off and running:**
- brake fluid level;
- excessive coolant temperature;
- excessive automatic transmission fluid temperature (for cars with this feature);
- wear (maximum) of front brake linings.

The device also checks the following services if activated (with ignition key in MARCIA position or with engine running):
- side lights (side light switch on);
- rear fog lamps (dipped beam and fog lamp switches on);
- stop lights (brake pedal depressed);
- brake lining wear signal (initial) (brake pedal depressed).




**Symbols**(from left to right - from top to bottom)

Low brake fluid level, front brake linings excessively worn, low oil pressure, alternator defective, low oil level, low coolant level, excessive automatic transmission fluid level, excessive oil temperature.

**Check Panel display**

A-C. Front side lights
B-D. Rear side lights
E. Rear fog lamps
H-F. Incomplete front door closure
I-G. Incomplete rear door closure

All device functions are first monitored as described, then DISPLAYED. Display only takes place a few seconds after the engine has been started up however. At this point any defects (or open doors) are identified by the lighting of the corresponding LED and the general RED Check Panel warning light on the control panel.

NOTE *If oil or coolant levels drop below specified limits, this information is memorised. Once the engine has been started up, the red LED corresponding to the fault and the general RED warning light will both come on for the time that the ignition key is in MARCIA position.*
***To turn the lights off you must not only top up the levels but also turn the ignition key to STOP position in order to delete the previously memorised information.***

In order to be sure that one of the leds (light emitting diodes), the low fuel level warning light or the general failure warning light (RED) have not failed and have not therefore indicated a fault, all red LEDs and above warning lights should come until the general signal (GREEN) lights up to indicate the car is ready to start when the ignition key is turned to MARCIA position.

NOTE *The low oil pressure and battery charge checks are carried out only when the engine is running.*

**Operation**

With engine OFF

When the ignition key is turned to MARCIA position, the following warning lights come on:
all red LEDs on the display, the low fuel level warning light, excessive coolant temperature warning light and the general RED warning light on the control panel.
After about 2 seconds, the oil level check will be over. If this is satisfactory the general signal (GREEN) will come on. Otherwise this will go off and the general failure warning light (RED) will come on. If the GREEN warning light comes on all the components and services monitored are working properly and the engine may be turned on. If the engine is not started, the general GREEN signal will start to flash.

With engine RUNNING

As soon as the engine has been running for a sufficient length of time for the oil pressure and battery charge lights to go off, a time switch comes into operation that causes the general GREEN signal to go off after a few seconds if all services monitored are working properly.

When the car is running or the engine is on, the electronic device monitors the following services continually:

- generator and circuit;
- engine oil pressure;
- brake fluid level;
- excessive coolant temperature;
- external lighting;
- excessive transmission fluid temperature;
- front brake lining wear;
- incomplete door closure.

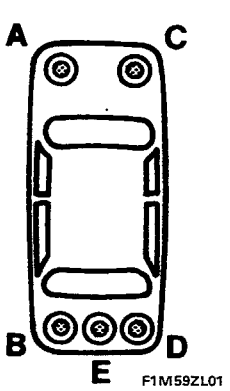
When one or more of the above services fails, the relevant red LED comes on immediately together with the red general warning light.

## LIGHT CIRCUITS MONITORED

**Side lights and number plate lights**

One or more LEDs on the display come on to indicate:
- individual or simultaneous failure of two bulbs in a diagonal (ignition of corresponding LED: A-C-B-D);
- Fuse failure brings about ignition of the LEDs situated diagonally (A + D come on for fuse 3 or C + B for fuse 4).

NOTE *Simultaneous failure of the two fuses 3 and 4 is not indicated on the DISPLAY.*



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**Rear fog lamps**

The display indicates:
- Individual or simultaneous failure of the two bulbs (LED E comes on).
  Fuse failure is not indicated.

NOTE *The rear fog lamp must be turned on in order to carry out this check.*

**Stop lights**

The display indicates:
- failure of a single bulb (LED B or D comes on);
- interruption of working contacts of switch below brake pedal (LEDs B and D come on);

NOTE *Operate the brake pedal in order to carry out these checks.*

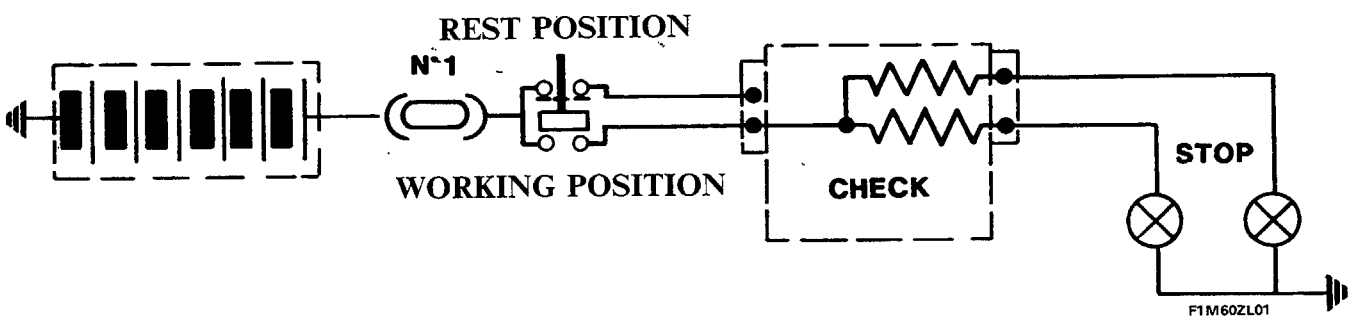
- simultaneous failure of both bulbs (LEDs B and D come on);
- failure of fuse 1 (LEDs B and D come on);
- inefficiency of resting contacts of switch under brake pedal (LEDs B and D come on).

NOTE *These defects are also indicated even if the service is not on.*

To conclude, note how the two following services are checked:

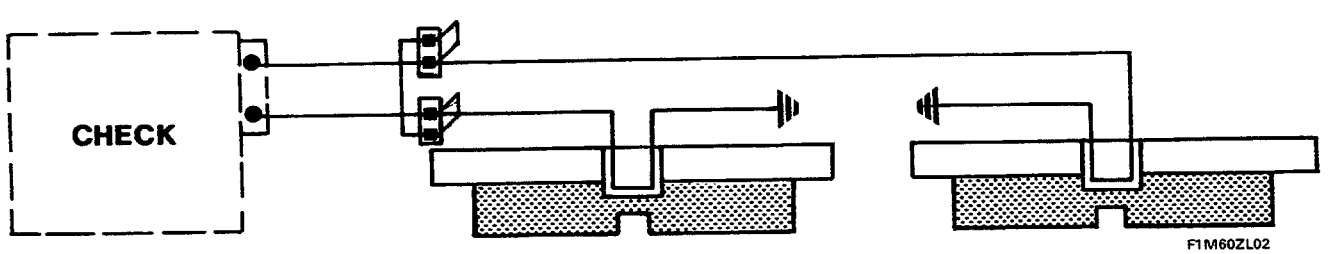
**Stop lights**

The circuit fuse (no. 1) and resting contacts of switch under brake pedal are checked even when the brake pedal is not depressed. The two bulbs or working contacts of the switch under the brake pedal are monitored only WHEN THE BRAKE PEDAL IS OPERATED.



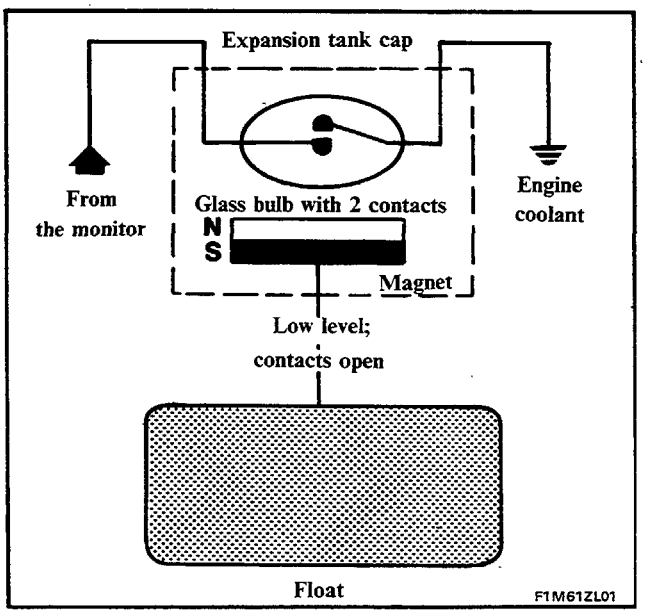

**Front brake lining wear**

When the brake lining insert wire is earthed due to being brought into contact with the brake disc while braking the check system indicates the defect.
When the pedal is released, the defect is no longer displayed.
When linings become so worn that the insert wire is cut, the defect is indicated CONTINUALLY and not only at the time of braking.



## CONSTITUTION AND OPERATION OF MAIN SENSORS

*Check system sensors include normal switches adopted on cars not fitted with Check Panels, such as an excessive coolant temperature switch, excessive brake pad wear inserts etc.*




### Coolant level sensor

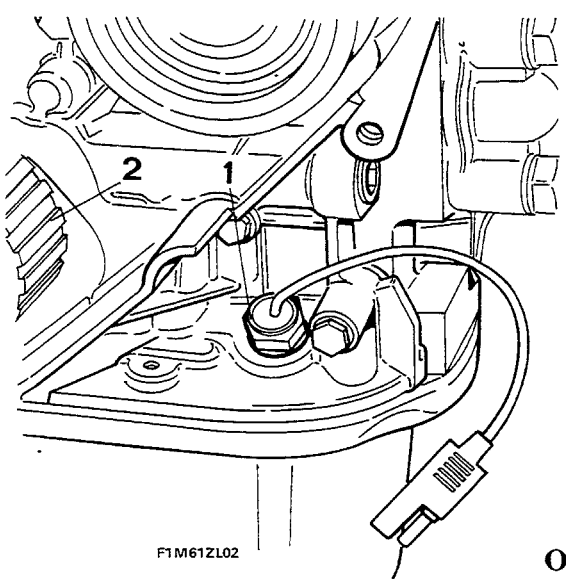
This consists of a pair of electrical contacts (Reed) enclosed in a glass bulb located in the coolant expansion tank and a control magnet located on the end of a float immersed in the tank fluid. When the hydrostatic thrust exercised by the fluid (at normal level) against the float moves the magnet closer to the contacts, the strong magnetic flux generated in the bulb closes them.

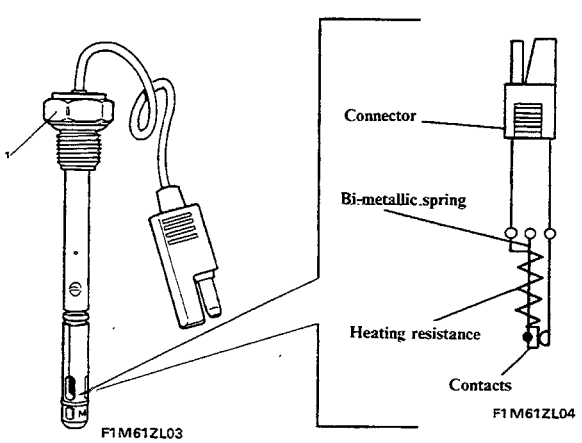
When fluid is lost from the coolant circuit and the level drops excessively, the contacts open because the magnet moves away, thus depriving them of the magnetic flux necessary to stay open. The warning light therefore comes on.

**NOTE** *If the cable is disconnected, the warning light comes on.*

### Engine oil level sensor

This is located on the end of a rod immersed in the sump oil. It consists of a pair of electrical contacts located at the end of a bimetallic strip heated by an electrical resistance.
Part of the heat produced by the current passing through the sensor resistance is dissipated by the engine oil (even if this is hotter than 100°C). The bimetallic strip therefore fails to bend sufficiently and the sensor contacts stay closed.
When the oil level drops below a certain limit, heat dissipation no longer takes place with the same intensity. The contacts therefore open as a result of the curving of the bimetallic strip and the warning light on the monitor display comes on.




**Oil level sensor location**
1. Sensor socket screw
2. Crankshaft pulley

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## CHECKS IN CASE OF DEFECTIVE DEVICE OPERATION

If the DISPLAY indicates faults that do not exist in the circuit monitored, proceed as follows:
**Check the connections to the various sensors, light circuits and electronic control unit**
If a conductor is broken or a connector disconnected (or its terminals oxidised) this is indicated by the device as a DEFECT in the relevant service if the sensor is N.C. type.
On the other hand **failure or disconnection of a connector fitted with a N.O. connector would prevent indication of a defect.**

## CHECKING SENSORS

If the previous check does not reveal any defects, check the sensors associated with the defective service as follows:

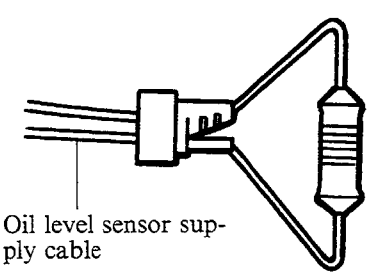
**Brake fluid level sensor**
- Check that level is correct;
- turn ignition switch to "MARCIA" position;
- press brake reservoir cap where sensor is located in order to close the contacts: if the warning light does not go off on the display **the sensor is working properly.**Otherwise it is defective and must be replaced.

**Coolant level sensor (N.C. type)**
- Check that expansion tank level is correct.
  If so, remove the sensor from its seat and use an ordinary ohmmeter to check electrical continuity between the two pins of the connector by putting the float in completely raised and completely lowered positions. If continuity or lack of continuity is noted in both cases, replace the sensor since it is defective.

**Incomplete door closure sensor**
- Check that sensor contacts are not oxidised.

**Oil level sensor (N.C.)**
- Check oil level when car is on a flat surface. Check that oil level in sump is at least 2 mm above minimum mark.
- Disconnect and connect the oil level sensor supply cable several times in order to remove any oxidation on the contacts.
- Start engine **after leaving engine off for at least 10 mins.** (to allow the oil pumped through the engine ducts to fall back into the oil sump).

***If the check panel level warning light goes out after the waiting time, the sensor is working properly and need not be replaced.***



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Otherwise, detach the sensor and fit a 12Ω resistance in its place, as shown in the diagram, then turn the ignition key to MARCIA position:
if the check panel warning light does not go off after the waiting period, the check panel module is defective and must be replaced.

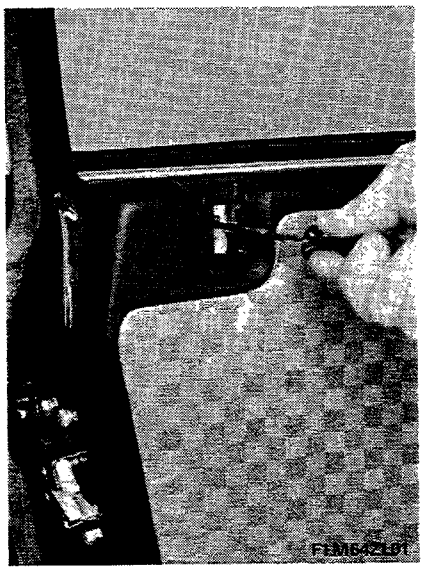
NOTE ***Inform customers that the low oil level warning light may come on if the engine is restarted immediately after stalling. In this case the level is recorded when the oil ducts have not completely emptied and the oil has not all returned to the sump.***

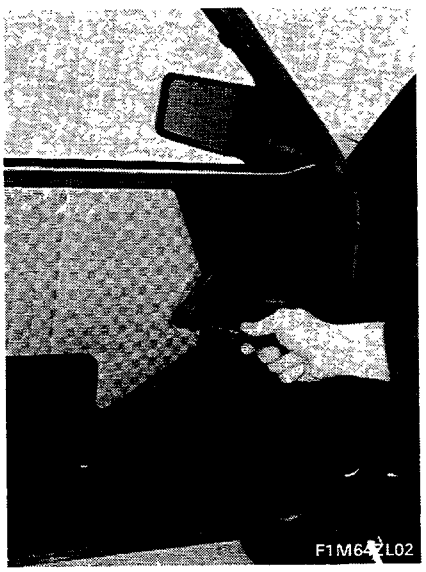
⚠ *Never short-circuit the supply cables of this sensor since this would irreparably damage the control unit. If the defect is due to low oil level, top up and then turn the ignition switch to STOP position to delete the previous MEMORY before reading the display again.*

SUMMARY TABLE OF OPERATION AND DIAGNOSIS

| Services | Conditions for carrying out check | Possible check system defects | Repair | Notes |
|---|---|---|---|---|
| Side lights and fuses 3 and 4 | Engine on or off<br>Side light switch on | Conductor joining lights to control unit broken or with oxidised terminals<br>Power module of defective control unit | Reset, connect or clean<br>Replace the electronic control unit | |
| Car stop lights and fuse no. 1<br>Car stop light switch resting contacts (under brake pedal) * | Engine on or off<br>Brake pedal activated<br>Engine on or off | Control unit defective<br>Conductor connecting lights to control unit broken or with oxidised terminal<br>Cable connecting switch or control unit broken or disconnected<br>Control unit defective | Replace, connect, clean or reset<br>Connect or reset<br>Replace electronic control unit | |
| Rear fog lamps | Engine on or off, but with dipped beams and fog lamp on | Conductor connecting light to control unit broken or failed<br>Control unit power module defective | Connect or reset<br>Replace electronic control unit | |
| Engine coolant level | Only with engine off (signal MEMORISED) | Sensor defective<br>Cable connecting disconnected or broken sensor<br>Defective control unit | Replace, connect or reset<br>Replace electronic control unit | |
| Engine oil level | Only with engine off (signal MEMORISED) | Sensor defective<br>Control unit sensor cable disconnected or interrupted<br>Defective control unit | Replace, connect or reset<br>Replace electronic control unit | If a sensor connection cable is earthed, the electronic control unit would be irreparably damaged |
| Low engine oil pressure | Only with engine on | Sensor defective<br>Control unit defective | Replace<br>Replace | If a sensor connection cable is disconnected, any fault will not be indicated |
| Low battery charge | Only with engine on | Generator cable disconnected<br>Control unit cables broken | Connect<br>Connect | |
| Initial front brake lining wear<br>Maximum front brake lining wear | Engine running or off, operating brake<br>Engine running or off | Control unit connection cables broken, disconnected or terminals oxidised<br>Control unit sensor connection cables interrupted, disconnected or terminals oxidised | Connect, reset or clean<br>Connect, reset or clean | If a cable is disconnected, the display indicates a DEFECT |

**NOTE** *Defects are displayed only if the engine is running.*



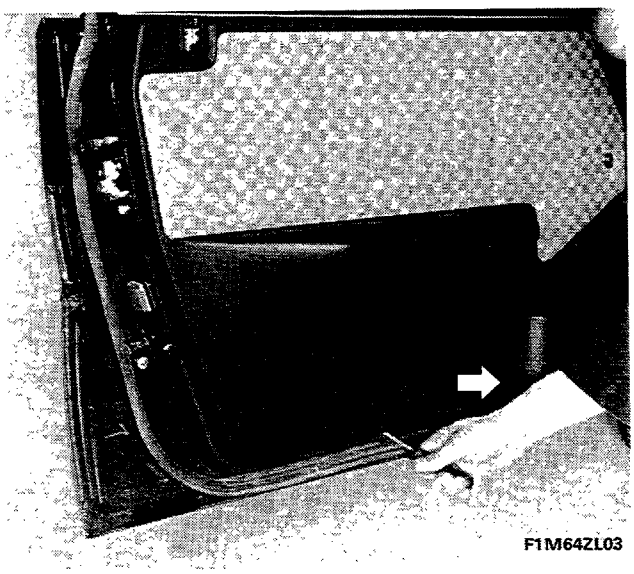


## POWER WINDOWS

The power windows are controlled by a switch in door. The driver side door has a dual switch to control both windows.

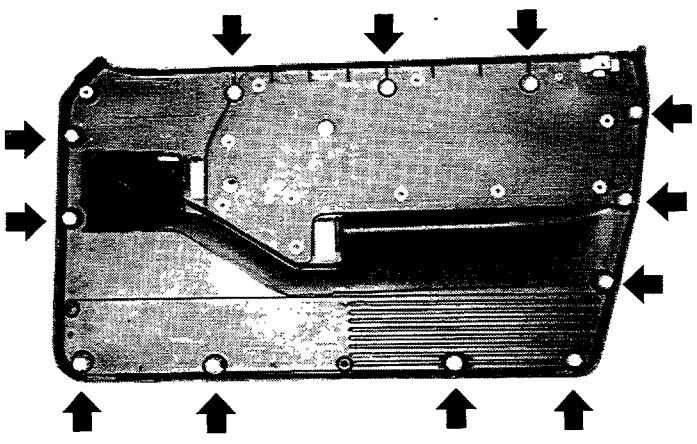
- Back off the two bolts retaining the arm rest.

**Remove inner safety catch and door opening handles**



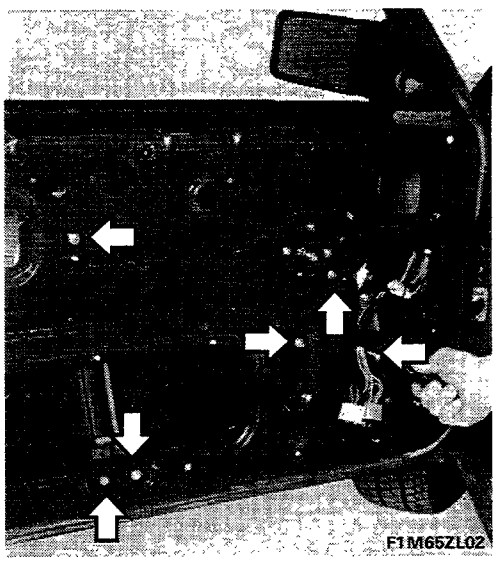
- Disconnect the power window electric switches from the door panel by pressing in the retaining tabs with a screwdriver;
- back off bolts retaining the panel to the door frame;
- insert a screwdriver near each flexible panel retaining button.

**Removing door panel from door frame (levering flexible retaining buttons)**



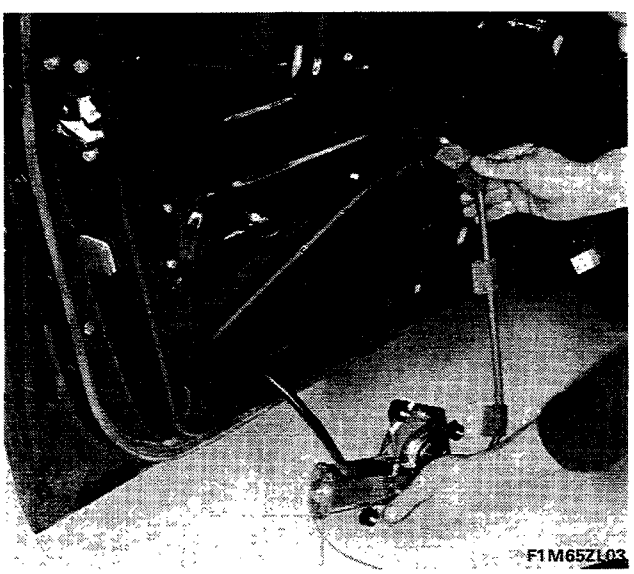
**Rear view of door panel**

All flexible buttons retaining panel to door frame can be seen.


**Removing window support retaining bolts (→) and bolts retaining power window assembly to door frame (→)**

- Turn power window assembly to extract from door frame, as shown in diagram.

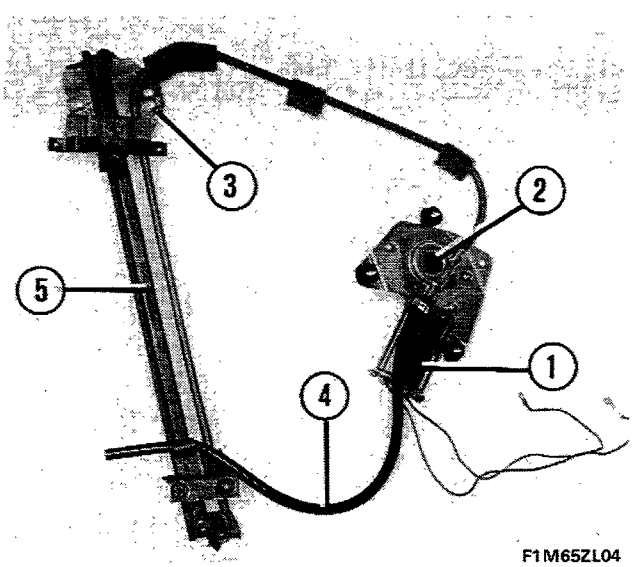



**Removing power window assembly from door**

NOTE *After fitting the assembly, adjust the window support in the lift support slots (3) after applying tension to the system to ensure that the window slides smoothly.*

**Constitution and operation**

Motor (1) operates a worm screw and wheel mechanism (2).
This controls a coaxial pinion that engages the control cable coils.
The coil is fixed to power window support (3), which slides in a vertical guide (5).
The door window is secured to the support with a special bracket.
A plastic pipe (4) houses the free section of the control cable that slides within a moulded tube.
The motor may turn clockwise or anticlockwise to move the control cable in rack-like fashion.
The motor is fitted with a circuit breaker that consists of 2 contacts and a bimetallic strip.



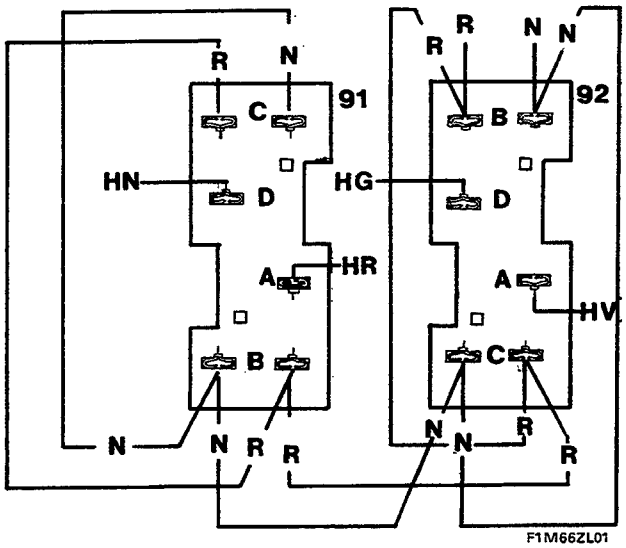
# 55.

**Power window switch mount (driver side window)**

91. White left door power window switch mounting
92. Red right door power window switch mounting

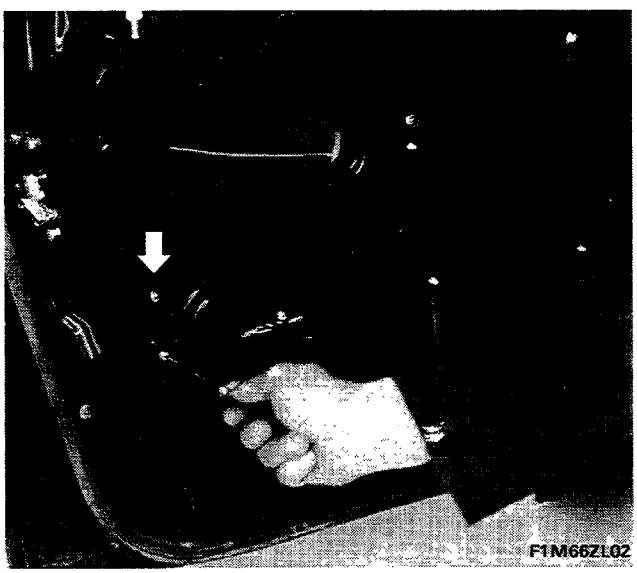
A-D. Connection cables to the two front power window motors (clockwise and anticlockwise)

C-D. Connection cables to the two front power window motors: black cable to earth, red cable to auxilary fuses (25 Amps).



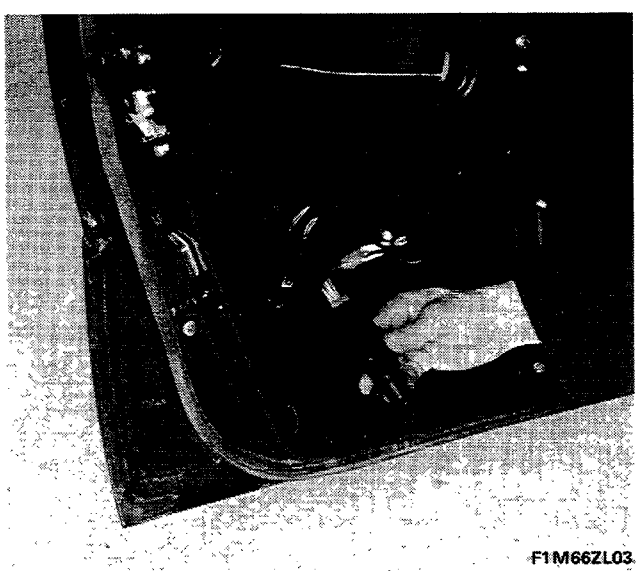

## ELECTRIC DOOR LOCK

- Remove the door panel and inside safety catch handle as described on the previous pages.




**Removing-refitting reduction unit and door lock from door frame**

The reduction unit consists of an electric motor that operates a rack via a pinion. The front reduction unit is also fitted with an end stop microswitch.




**Extracting door lock reduction unit from door frame**

- Disconnect electrical connector.

## REPAIR OPERATION IN CASE OF POWER WINDOW FAILURE

If power windows fail, follow the following instructions

1. - Turn the ignition switch to "MARCIA" position.
2. - Check that the fuses 113 (only PRISMA 4WD) - 114 located near power window control switch have not blown.

**For front power window failure (Mod. DELTA-PRISMA 4WD)**

3. - Remove power window control button/s and disconnect from mounting/s
   - Check positive and negative power supply to button mounting (using check light or multimeter);
     **- red supply cables**
     **- negative supply cables (continuity for return to earth): black (only driver door)**
   (*) If positive supply is lacking, the failure should be sought in the following components:
   - Ignition switch failed (INT/A **terminal** no voltage)
   - Power window relay failed or with excitation circuit inoperative due to defective earth
   - Driver or passenger side under facia connection blocks, defective.

**NOTE** *If there is no connection to earth (negative supply) check the earth loom contact under the facia.*

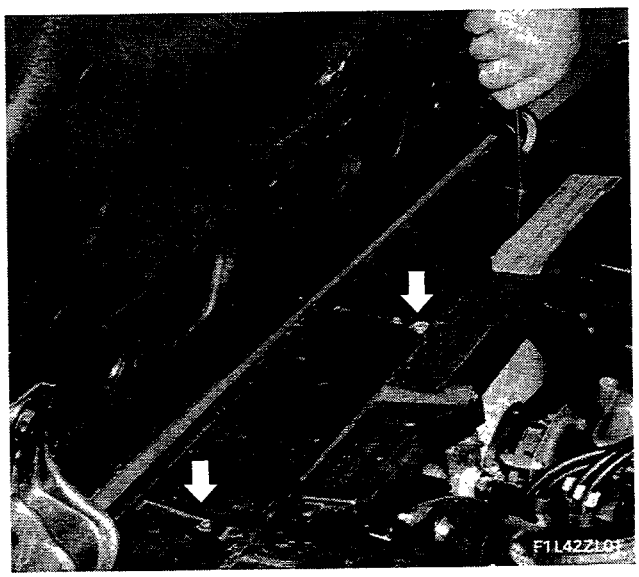
If positive and negative supply are present, refit the power window control button and move on to point 6.

**For failed rear power windows (only for PRISMA 4WD)**

4. - Remove the rear power window inhibition button located on the drive side tunnel and defective rear button/s located at end of tunnel and disconnect from mounts.
   - Check positive power supply to rear power window operation inhibition switch (green cable) on tunnel.
   - Refit this switch and check operation, making sure that th e power supply reaches the red cable.
     If no power reaches the green cable, the causes are the same described at point (*) previously
     If power does not reach the red cable, replace the inhibitor switch since it is defective.
   - Refit the control buttons to tunnel.
5. - Check positive and negative power supplies to rear power window button mountings located in the rear of the tunnel:
   **- positive power supply: red cable**
   **- negative power supply: black cable**
   If no voltage is present, the defect lies in the following:
   - 2 way connector block defective or earth contact loose
   - red cable from rear window inhibition switch to control switches broken
   - Refit control buttons.
6. - Disconnect the defective window door panel, disconnect the 2-way window motor supply connector and check that this is supplied by both cables when the control button on the tunnel is pressed (both ways). If no voltage is obtained, replace the control button since it is defective. If voltage is obtained, replace the window motor since this is defective.

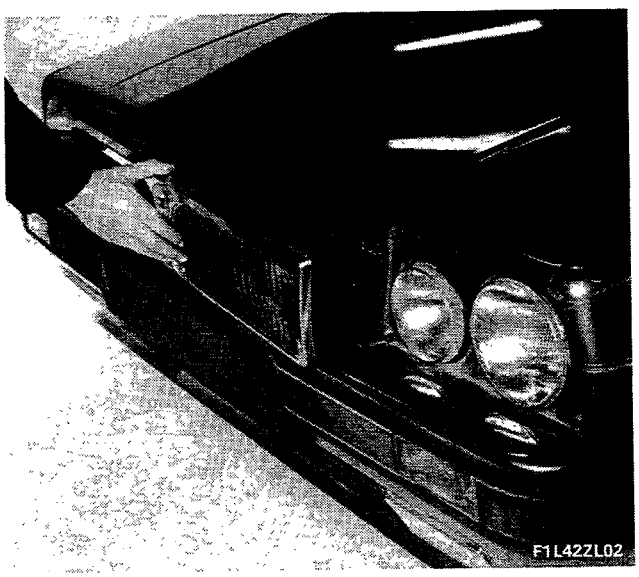
**NOTE** *Also search for faults or binding of mechanical glass guide assembly by supplying the window motor directly (with 25A fuse) with buffers at top and bottom.*

*Repeat the test without the glass.*
*Ensure that the ducts do not slow down the glass.*




## REMOVING-REFITTING FRONT LIGHT CLUSTER

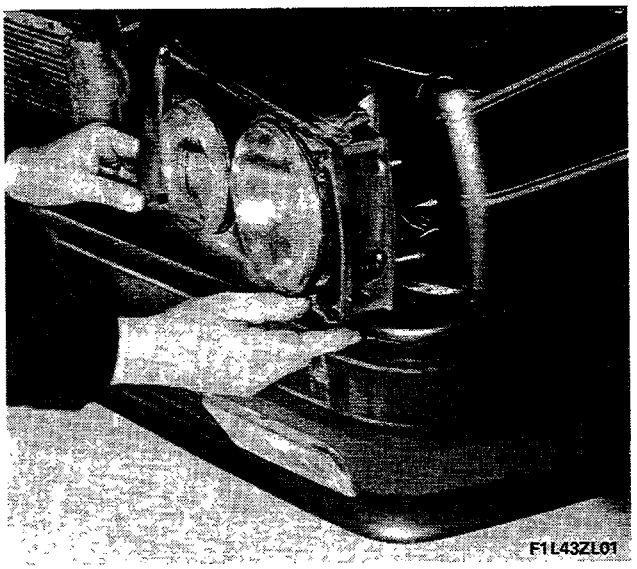
**Removing-refitting radiator grille assembly**




**Removing radiator grille assembly from housing**


**Removing-refitting bolts retaining light cluster to body**

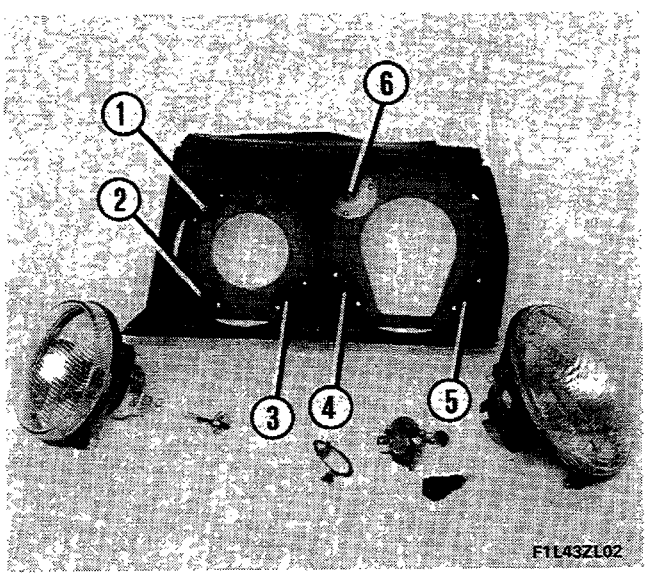
- Disconnect bulb connectors




**Removing light cluster from seat**

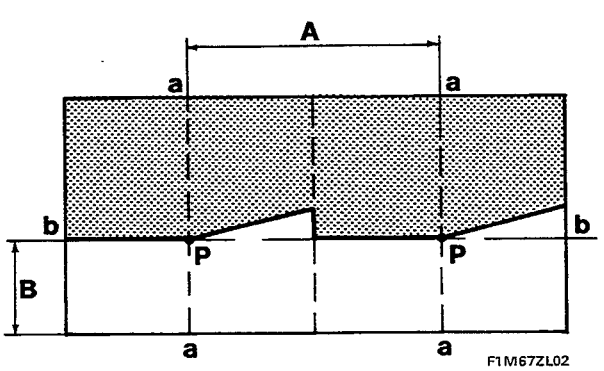
**Components of front light cluster**

1. Vertical supplementary beam adjustment screw
2-3. Horizontal supplementary beam adjustment screw
4-5. Horizontal main-dipped beam adjustment screw
6. Vertical main-dipped beam adjustment screw




## HEADLAMP ALIGNMENT

On a screen located 10 m away, the demarcation line between the dark area and area lit by the dipped beam (b-b) must be 12 cm lower than height B when the car is new, 10cm when the car has been run in.

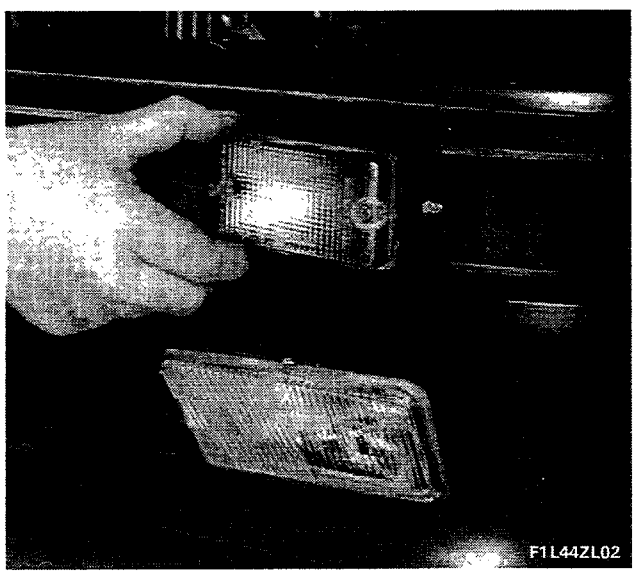



**Headlamp alignment diagram**

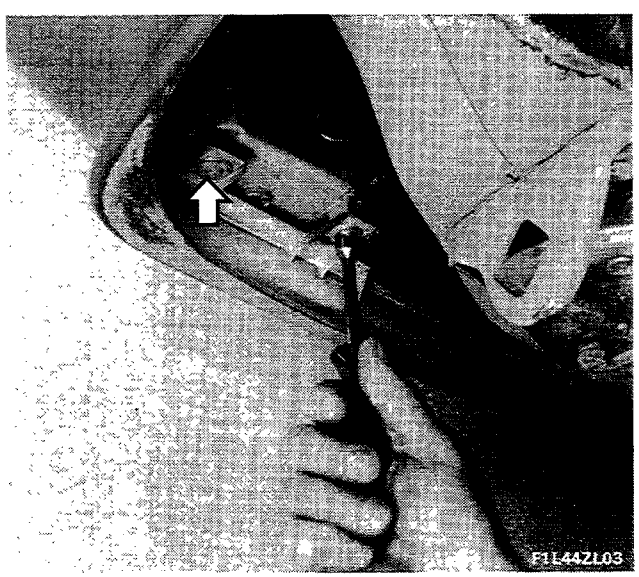
A. Line connecting headlamp centre lines
B. Height of headlamp centre from ground during alignment

## 55.

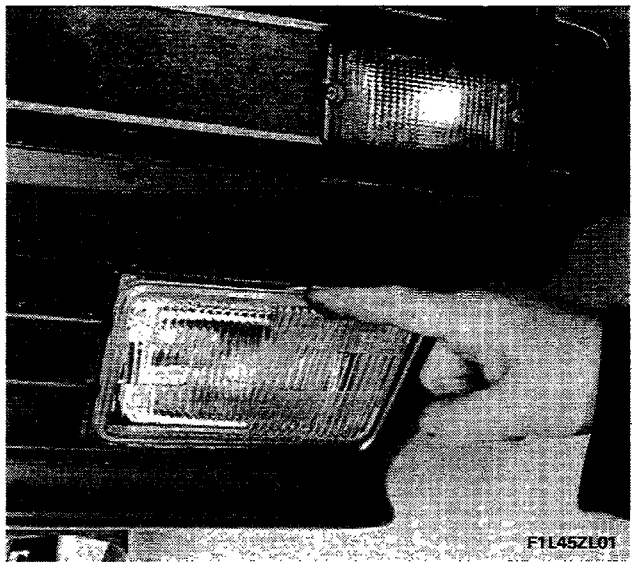

Removing-refitting bolts retaining side lights to body shell (with car raised)



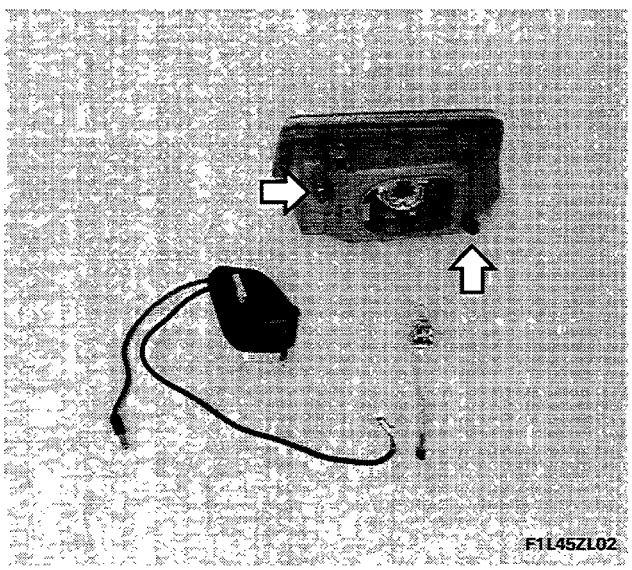

Removing side lights from body shell




Removing-refitting bolts retaining fog lamps to body shell (with car raised)

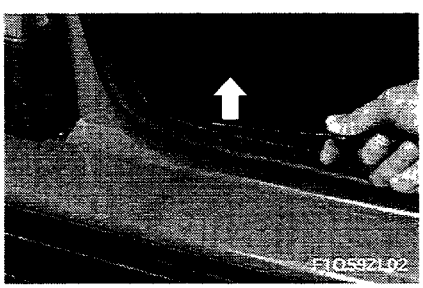


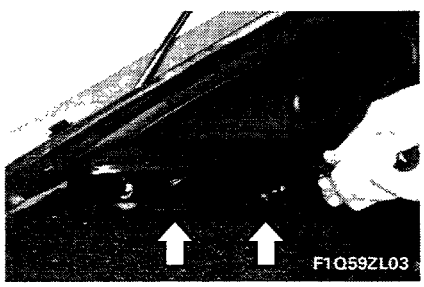

**Operation of fog lamp locking device in order to remove device from the body shell**




**Components of fog lamp**

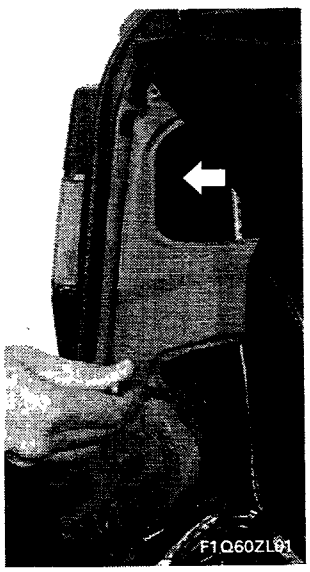
(→) Bolts retaining lamp to body shell.

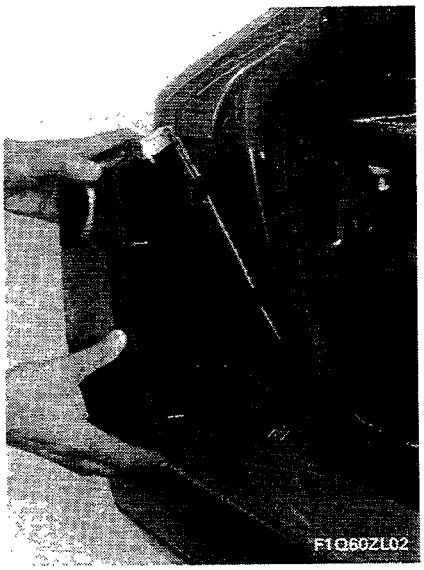




**Removing-refitting rear light from body shell**

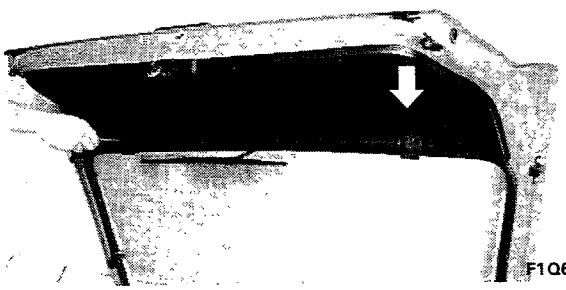
- Remove cover to gain access to the bolts.



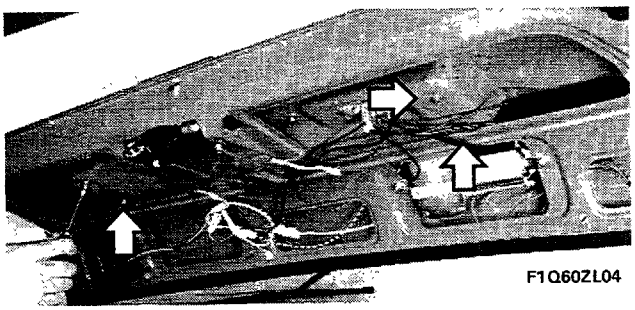

**Removing rear light**

- Back off nuts retaining light to body shell.

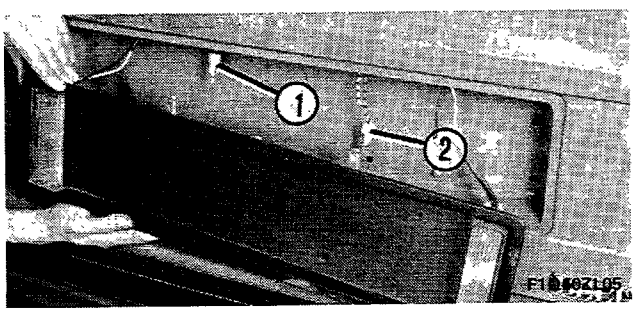



**REMOVING-REFITTING NUMBER PLATE HOLDER WITH ASSOCIATED BULB HOLDERS AND REVERSING LIGHTS**

**Removing tailgate interior trim**

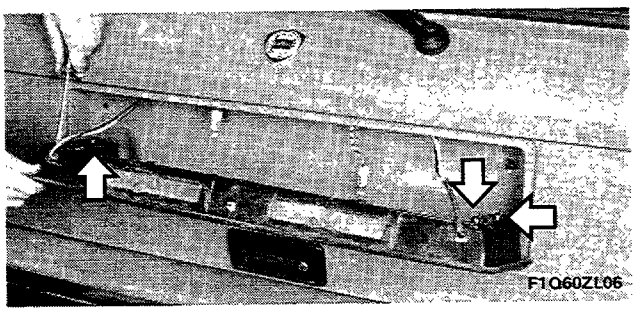



**Removing nuts retaining plate holder to tailgate**



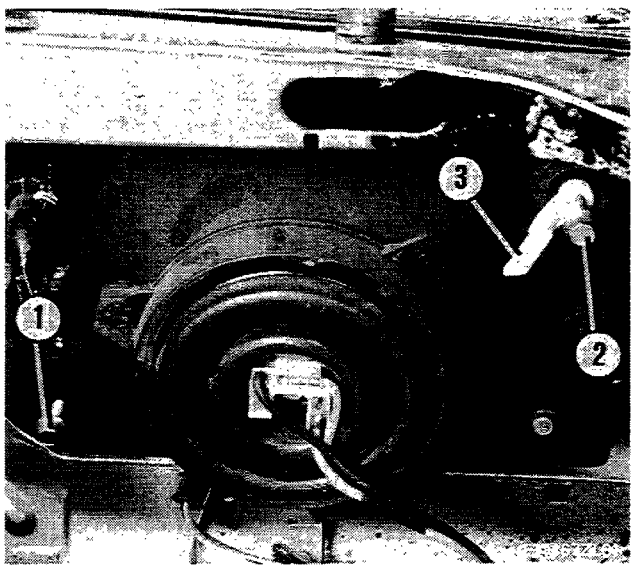

**Removing plate holder from seat**

1-2. Number plate light bulb



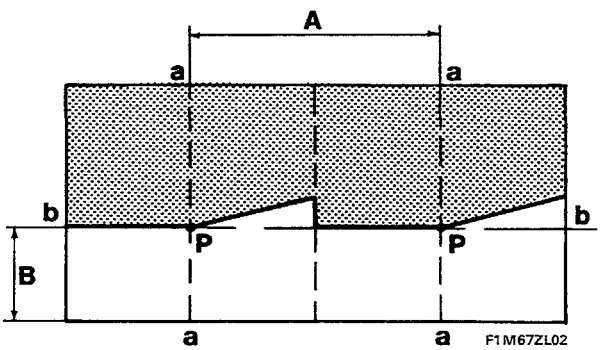

**Removing reversing lights**

1. Horizontal headlamp adjustment screw
2. Vertical headlamp adjustment screw
3. Manual dipped-main beam alignment correction device



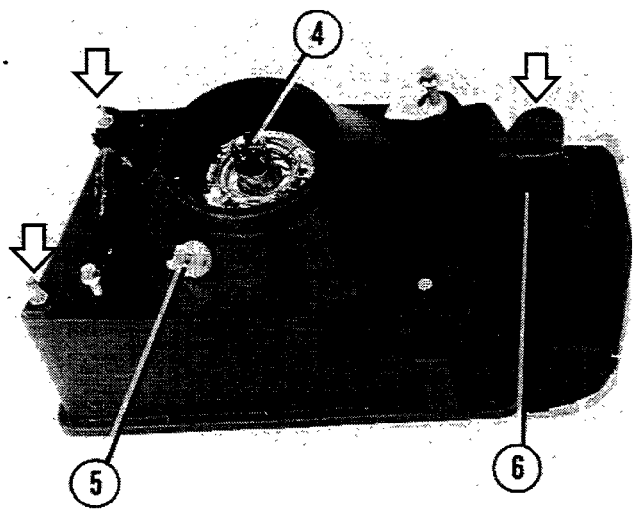

## HEADLAMP ALIGNMENT

On a screen located 10m away the demarcation line between the dark area and the area lit by the main beam (b-b) should be 12cm lower than height B when the car is new, 10cm when the car has been run in.



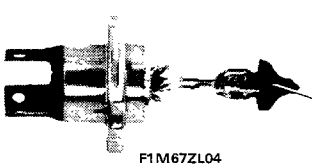

**Headlamp alignment diagram**

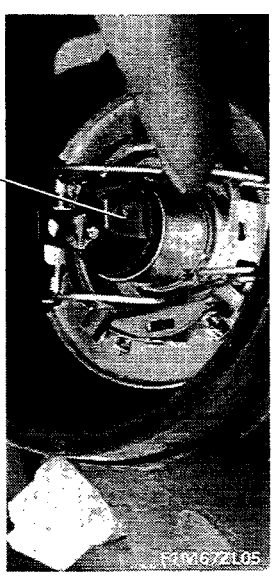
A. Line joining headlamp centre lines
B. Height of headlamp centre from ground, measured upon alignment

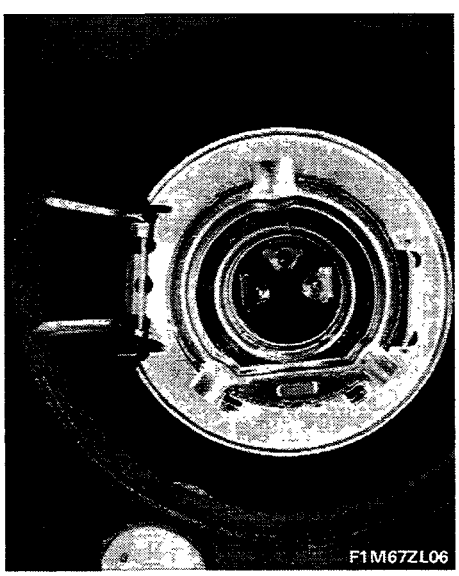



4. Headlamp bulb connection plug
5. Side light bulb connection plug

6. Side turn signal connector housing (→) pins retaining lights to body shell.



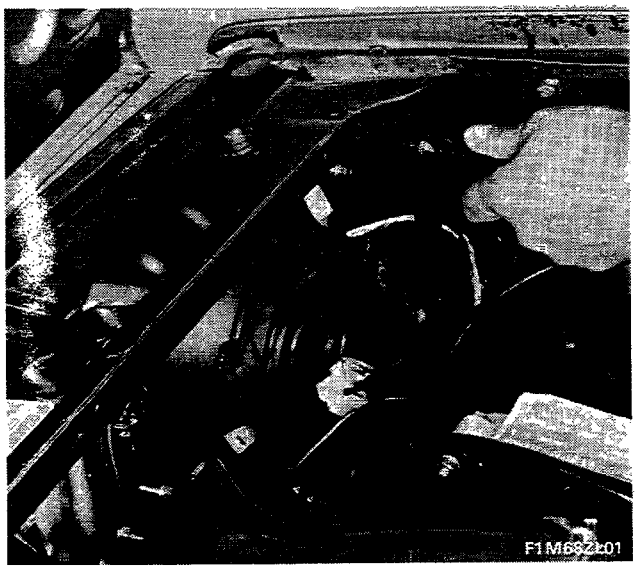




- withdraw the rubber protective boot;
- extract connection plug;
- press and turn the spring to release from the light cluster cup and remove the bulb.

### Replacing dipped-main beam bulb

NOTE *Since the bulb is halogen type its brightness will be lost if it is touched with the hands.*

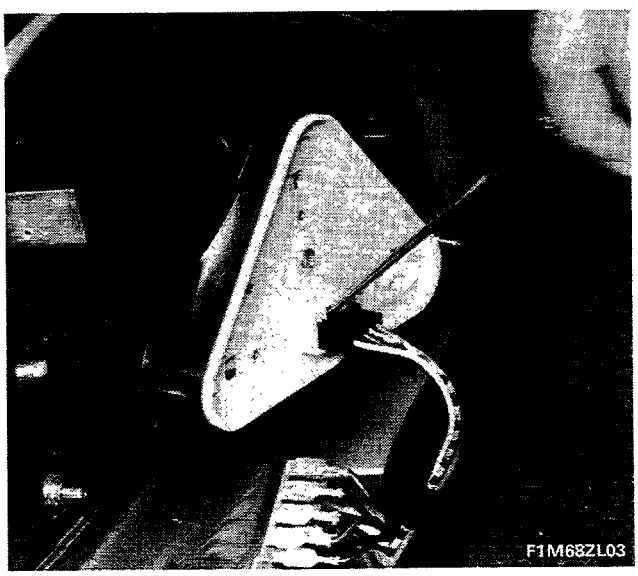
## 55.




### REMOVING-REFITTING LIGHT CLUSTERS

**Removing-refitting bolts retaining lights to body shell**


**Removing front light assembly (including turn signal)**

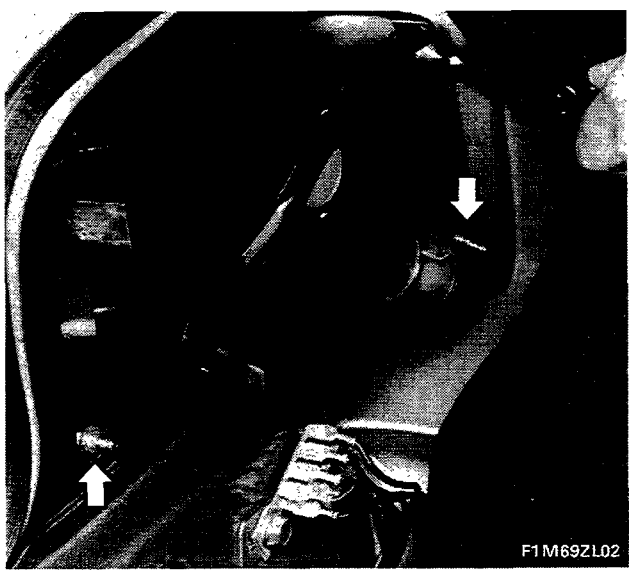



### REMOVING-REFITTING REAR LIGHTS AND BULBS

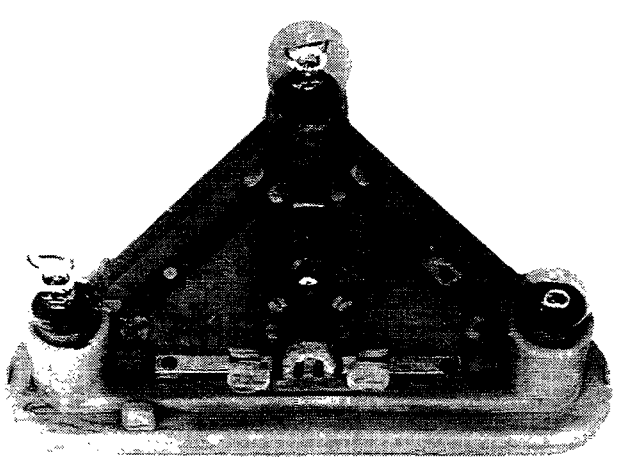
**Removing rear light connector**

NOTE *Remove locking device using a screwdriver.*

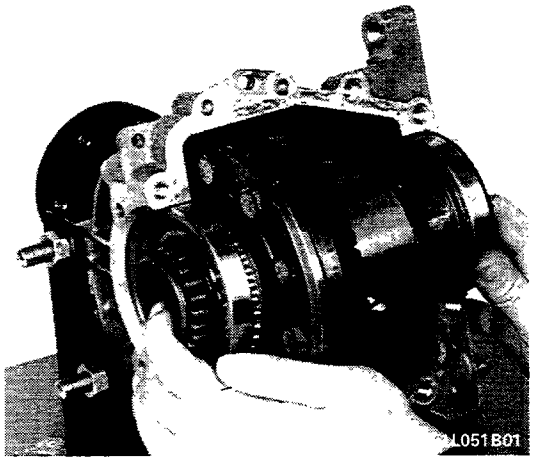

**Removing-refitting rear side light, turn signal and stop light bulb holders**

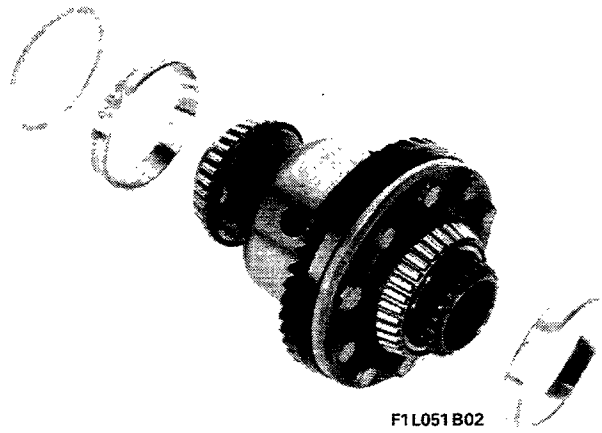



**Removing-refitting rear side light, turn signal and stop light cluster (→) from body shell**




**Rear bulb holder for side lights, turn signal and stop light**

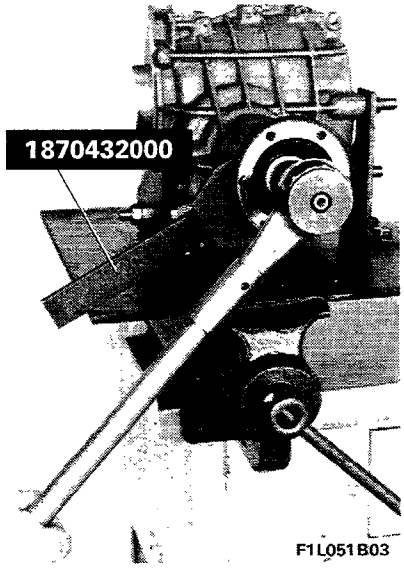


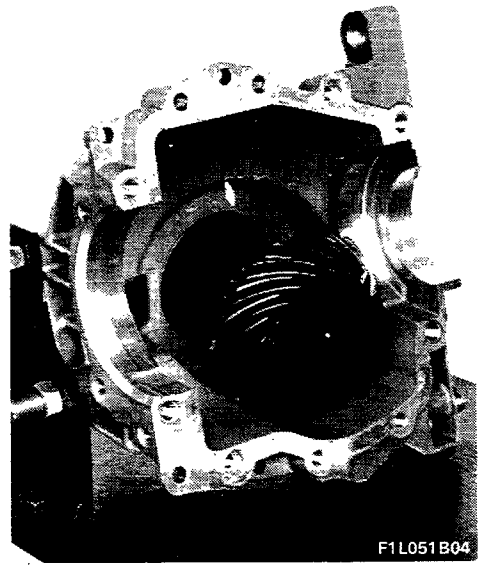



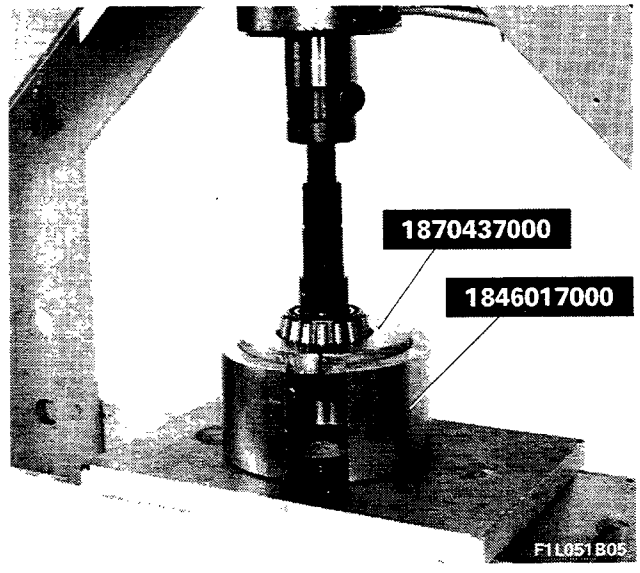

**Removing front transmission unit from housing**

**Removing bevel pinion retaining nut and extracting pinion complete with bearings and flange**

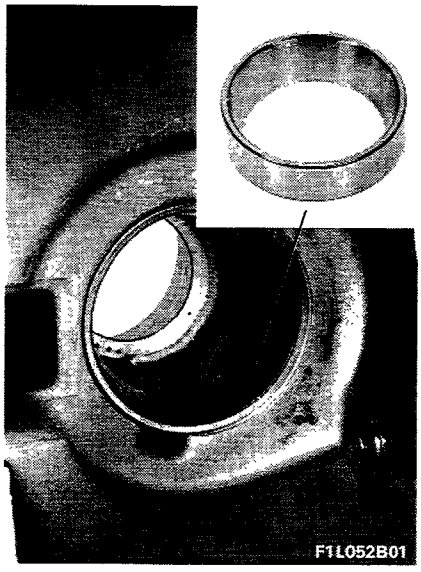
NOTE *When removing the pinion retaining nut, prevent the flange from rotating using tool 1870432000, as shown in the diagram.*

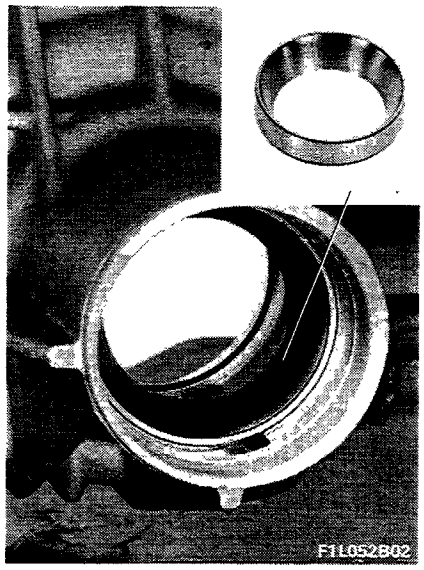


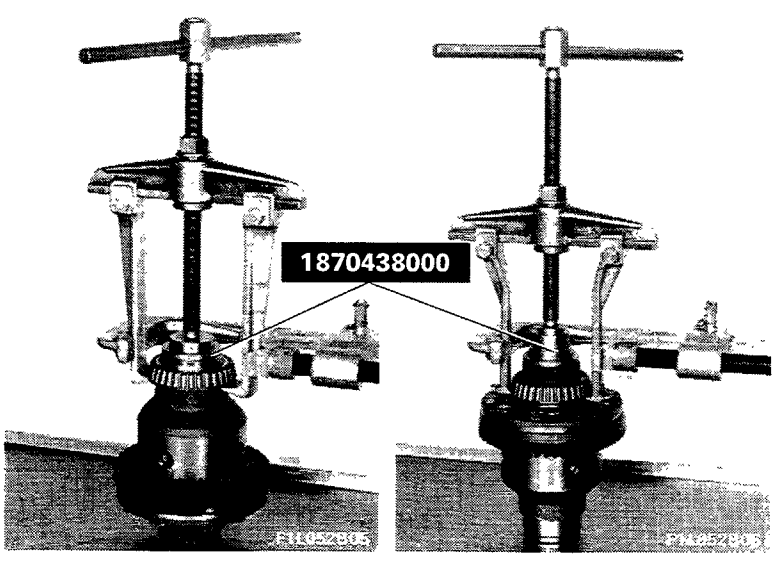

**Removing inner race of rear bevel pinion bearing using hydraulic press**



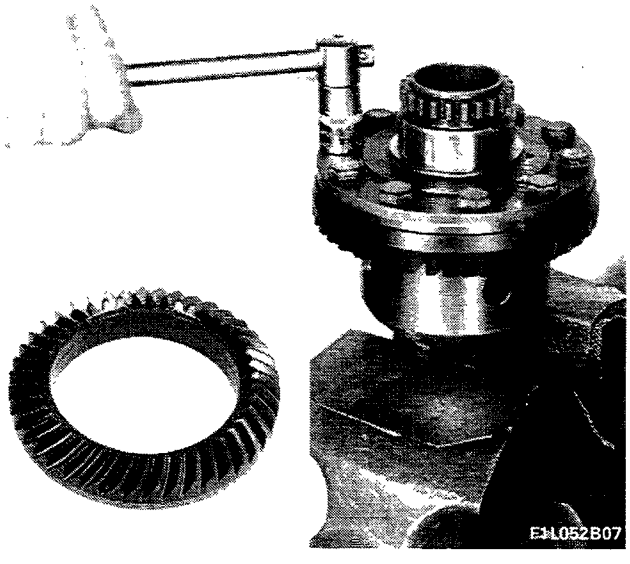




**Removing outer races of bevel pinion roller bearings**

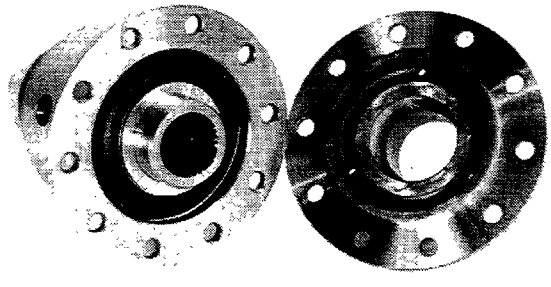
Remove outer races using a steel driver.

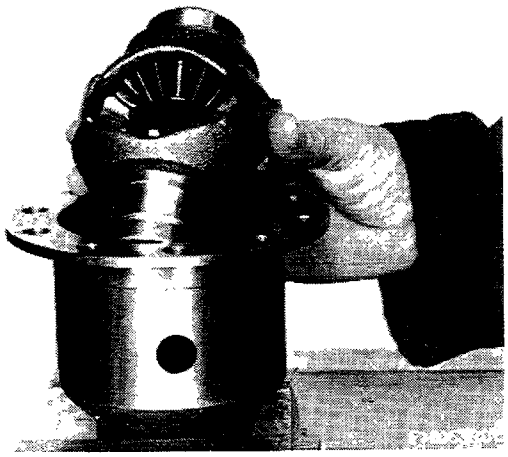



**Removing roller bearings from differential unit**

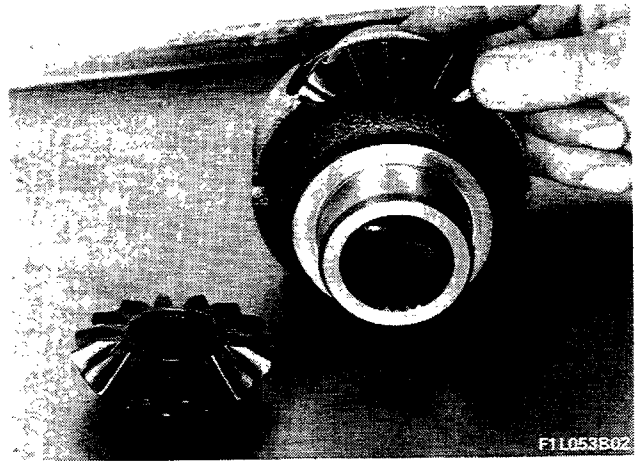



**Removing ring gear from differential unit and disassembly of differential halves**



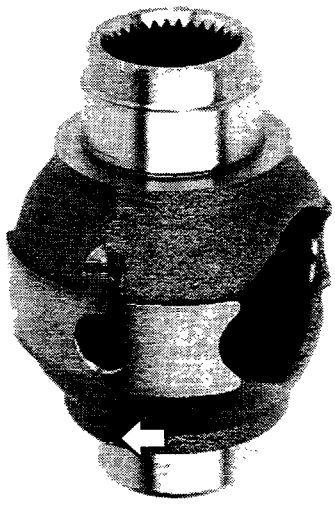


Removing front differential from differential half

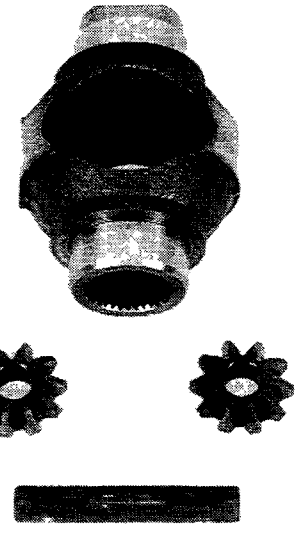



**Removing planet wheels from housing**

NOTE *Planet wheels are fitted in differential housing without shims. It is not therefore possible to adjust clearance between satellite and planet gears.*

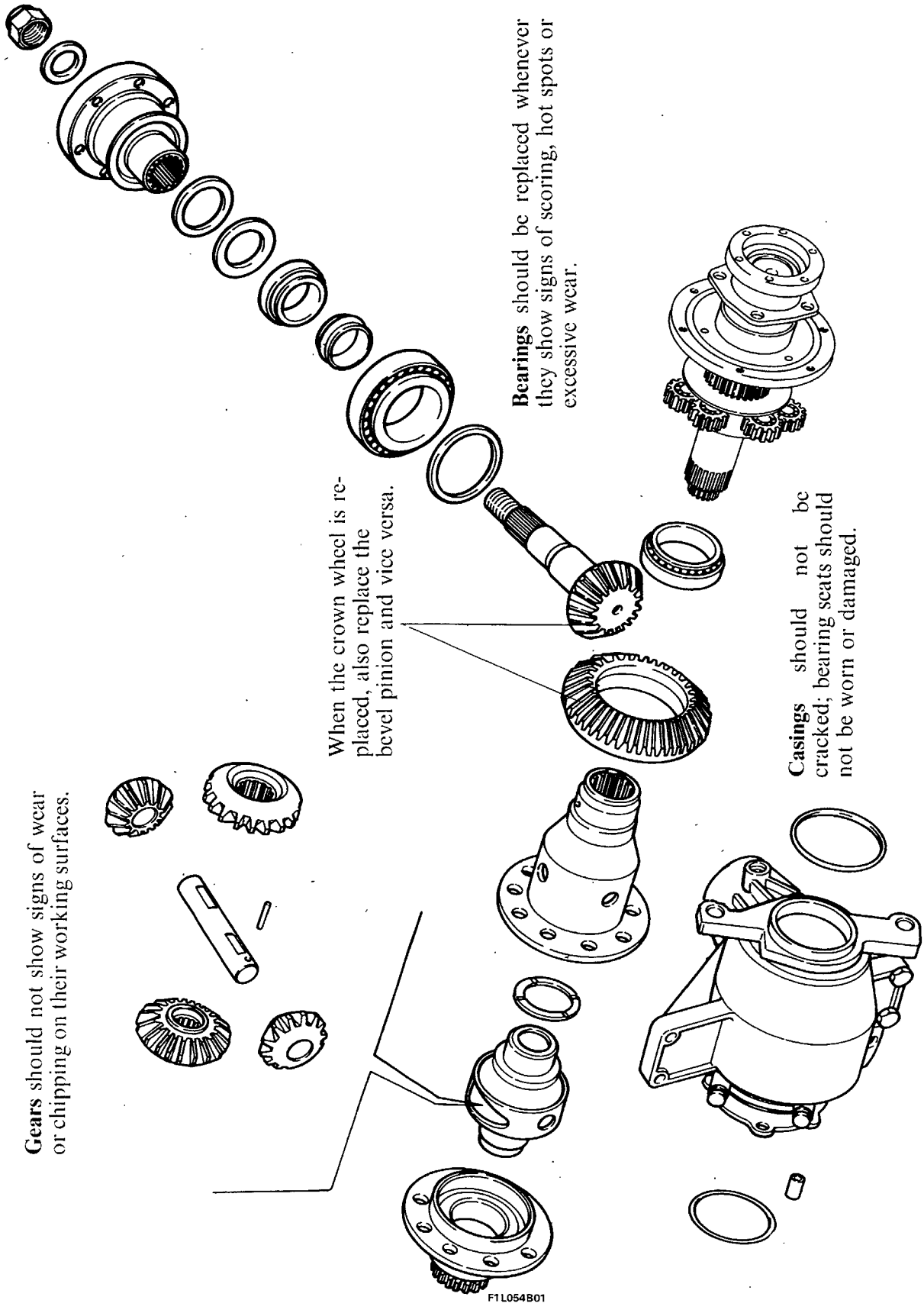



**Extraction of retaining pin and removal of satellite carrier shaft**



**Removing satellites from housing**

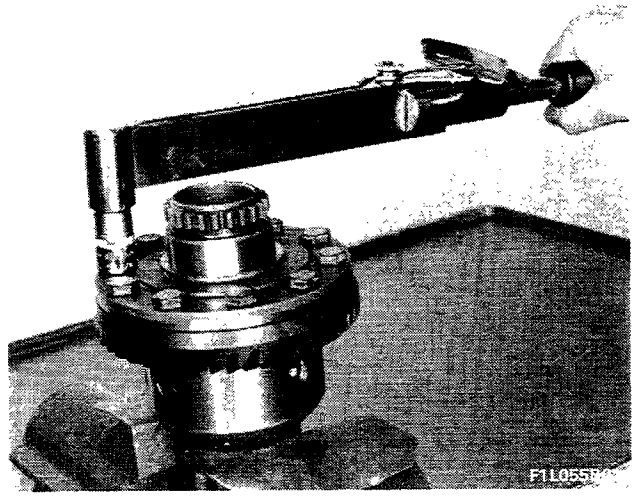
NOTE *Install satellite and planet gears in housing by carrying out removal operations in reverse order.*



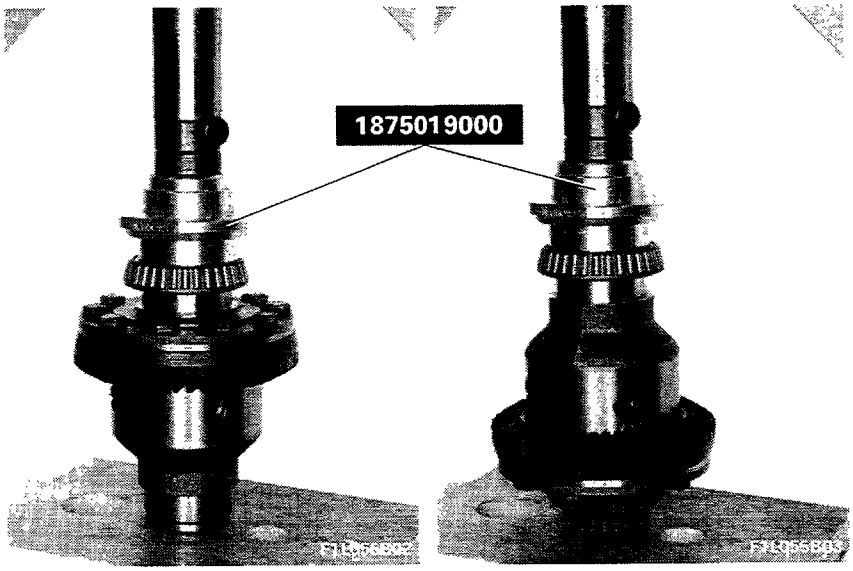

**Components of front differential - transmission unit**

## FITTING AND ADJUSTMENT

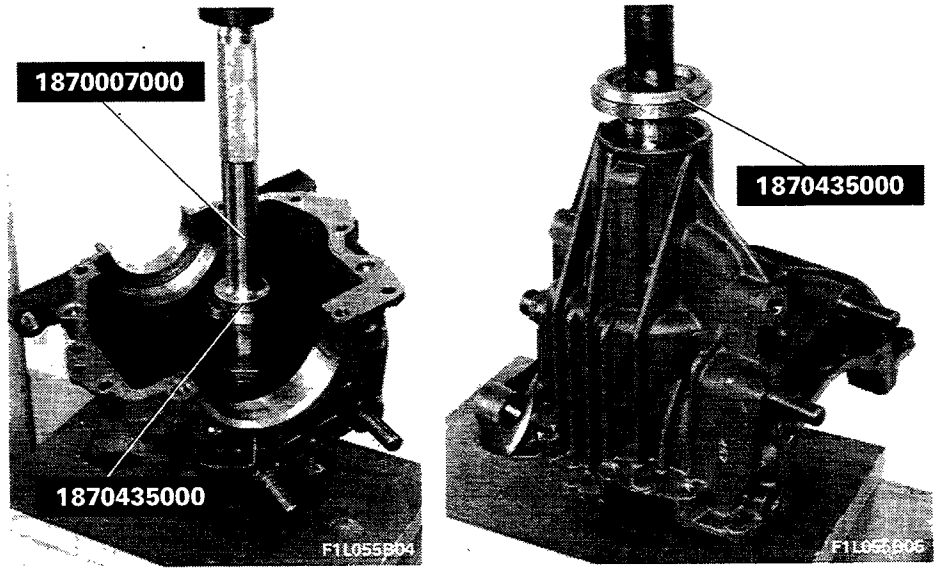
8,8 daNm



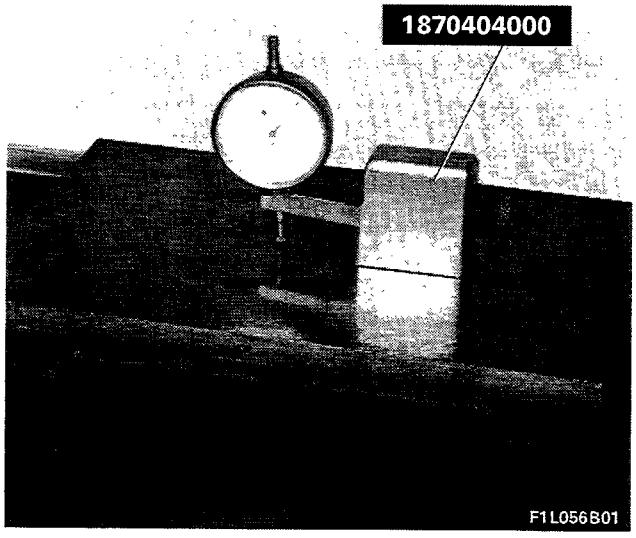
Fitting and torque closure of ring gear and differential halves



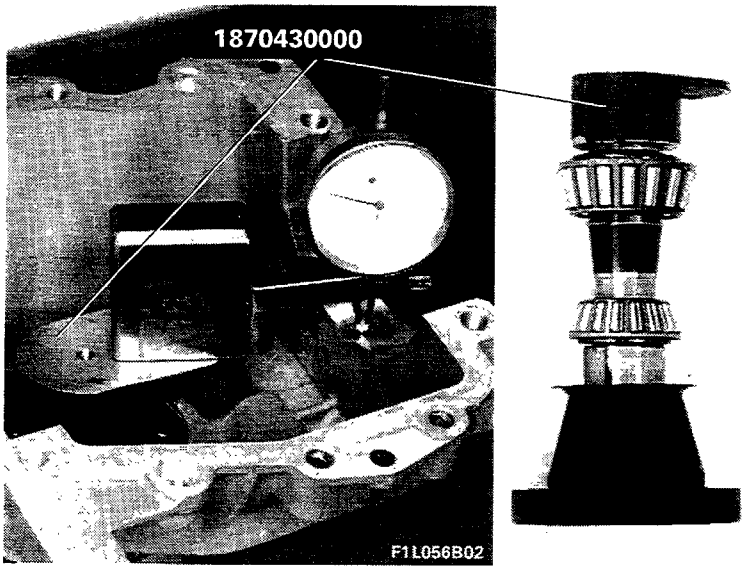

Fitting roller bearings in seats on differential halves




Fitting outer races on bevel pinion roller bearings

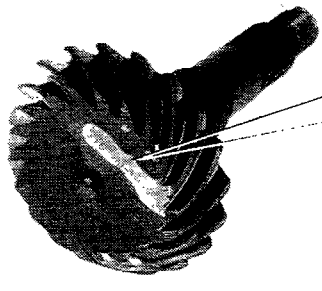



**Zeroing centesimal gauge installed on stand 1870404000 using surface plate**




**Calculating thickness of thrust ring for rear bevel pinion bearing**

To fit dummy pinion 187043000, proceed as for installation of bevel pinion but leave out the rubber spacer between front and rear bearings.
Tighten nut and flat washer to secure tool. Adjust bearings and tighten fully.



**Bevel pinion**

1st case - centesimal value of difference between actual and nominal installation gaps.
(e.g.: -2, 0, +3)

2nd case - Actual installation gap in millimetres.
(e.g.: 80.45 - 80.5 - 80.52).
Always obtain value expressed as in first case by subtracting 80.50 mm front this measurement.
(e.g.: 80.45 - 80.50 = - 0.05 mm = -5 hundredths)
(80.52 - 80.50 = + 0.02 mm = + 2 hundredths).

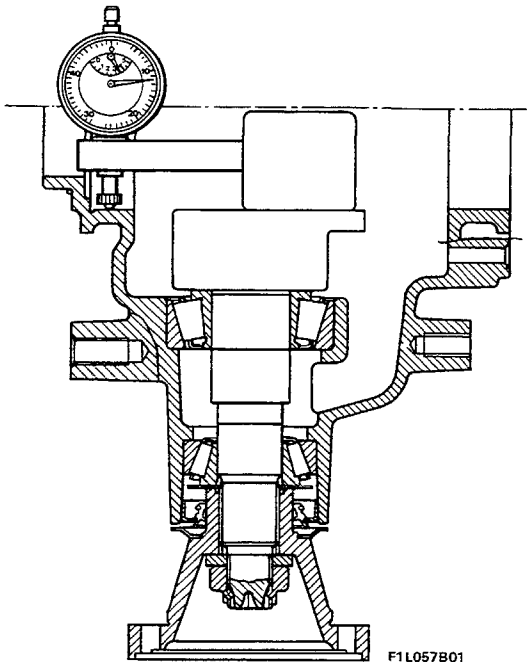
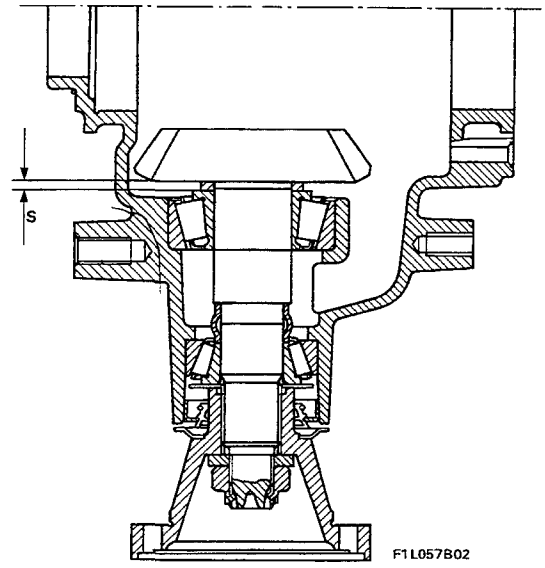



**Diagram showing application of dummy pinion 1870430000 and gauge for calculation of thickness S of thrust ring for rear bevel pinion bearing**




**Bevel pinion installation diagram**

Thrust rings for rear bevel pinion roller bearings are supplied in the following sizes: 2.55 - 3.35 mm in steps of 0.02 mm.

## CALCULATION OF THICKNESS OF THRUST RING FOR REAR BEVEL PINION BEARING

If "**a**" is the reading on the gauge and "**b**" the value stamped on the bevel pinion at the factory, thickness "**S**" of thrust ring to be fitted is given by the following equation:

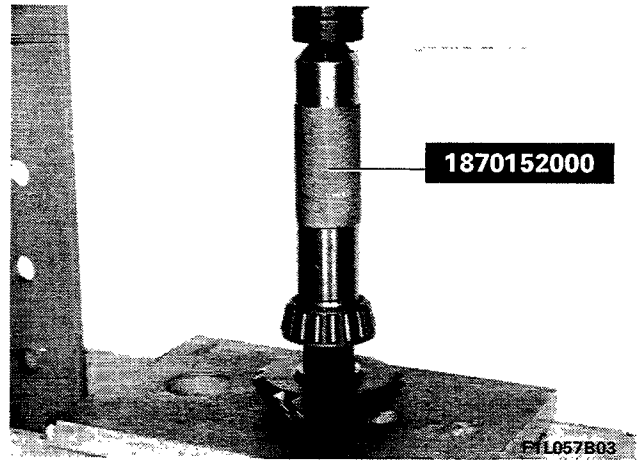
$$S = a - (+ b) = a - b$$
$$S = a - (- b) = a + b$$

in other words:
- if the number stamped on the pinion is preceded by a (+) thrust ring thickness is obtained by subtracting this number from the reading on the gauge;
- if the number marked on the pinion is preceded by a (-) ring thickness is obtained by adding the number to the gauge reading.

Example: let **a** = 2.90 (gauge reading);
and let **b** = - 5 (number written on pinion);
then: **S = a - (- b);**
**S = 2.90 - (- 0.05);**
**S = 2.90 + 0.05:**
**S = 2.95**

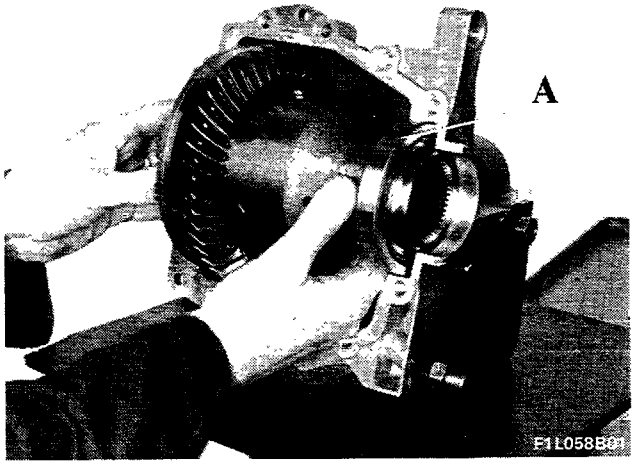
In this case, we need to fit a thrust ring of 2.95 mm thickness.

*If the calculated value does not correspond to the one of the spare thrust rings, fit the next size up.*



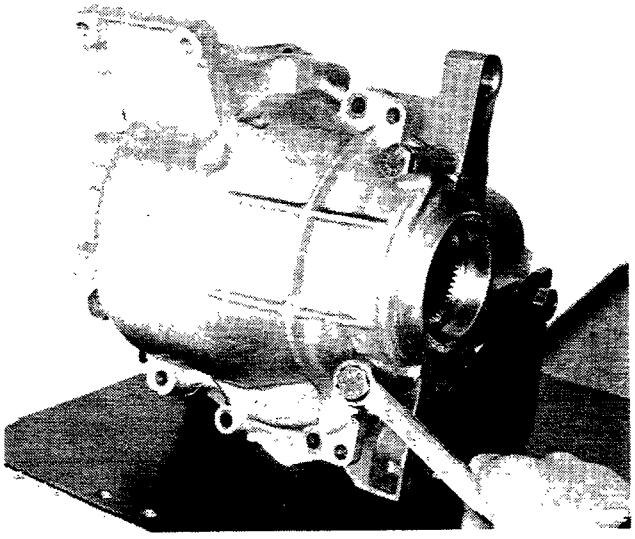

**Fitting rear roller bearing inner race to bevel pinion.**

## BEVEL PINION ROLLING TORQUE

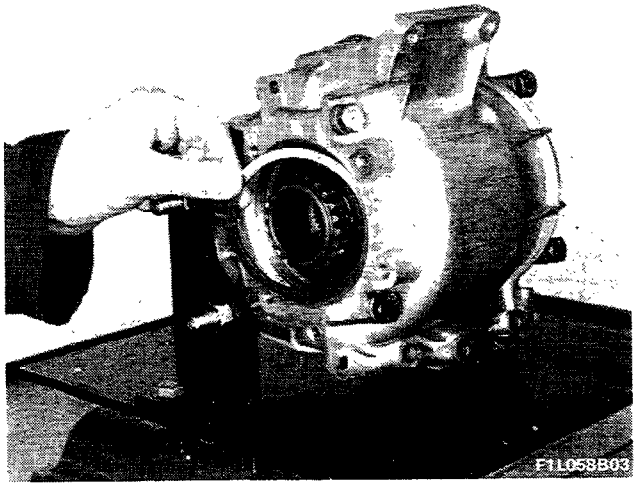



**Fitting differential unit complete with ring gear in bell housing**

Position shim (A) of known thickness between bell housing and bearing.

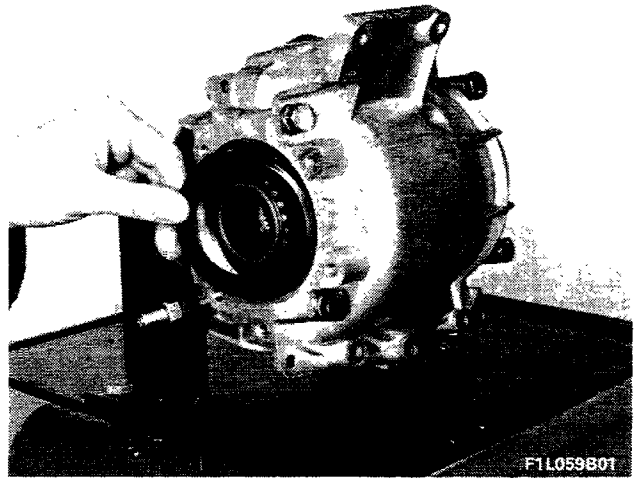


**Fitting cover for differential unit bell housing and**

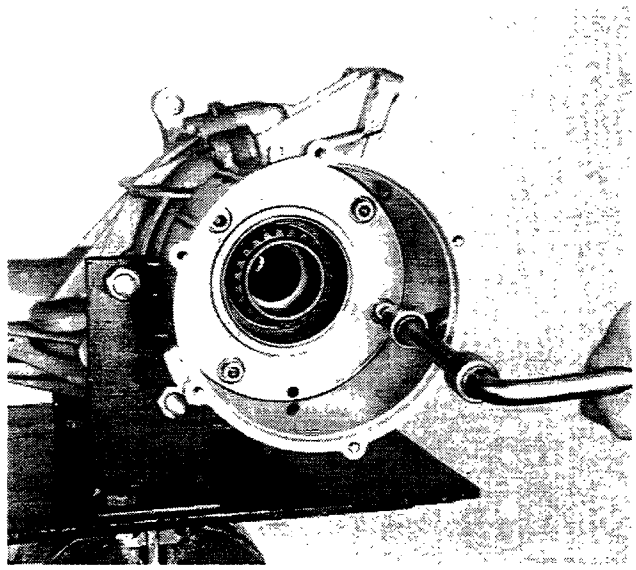



**Fitting shim**

Position shim of known thickness between bearing and "Ferguson" housing.

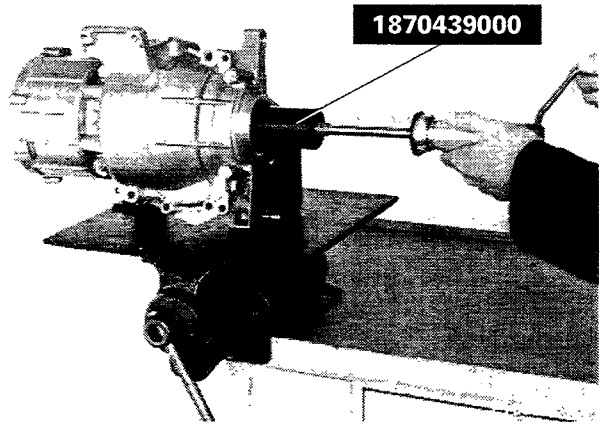



Fitting cup



Fitting "Ferguson" housing

0,12÷0,15 daNm




**Ring gear rolling torque**

If the rolling torque is too high, reduce shim thickness. Otherwise increase thickness.
Then remove differential unit.

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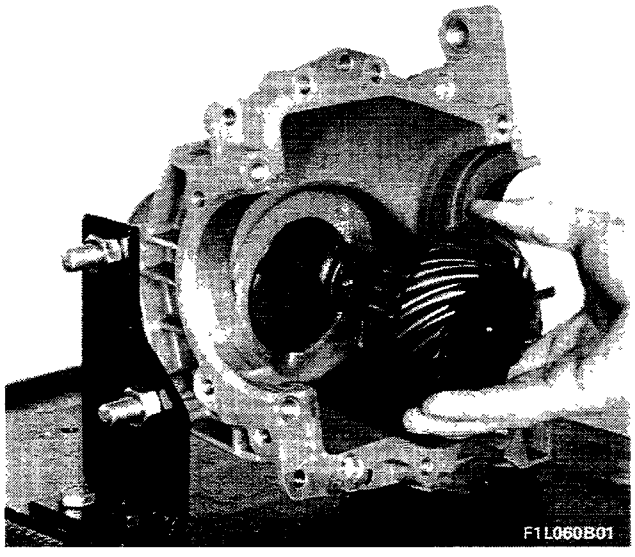
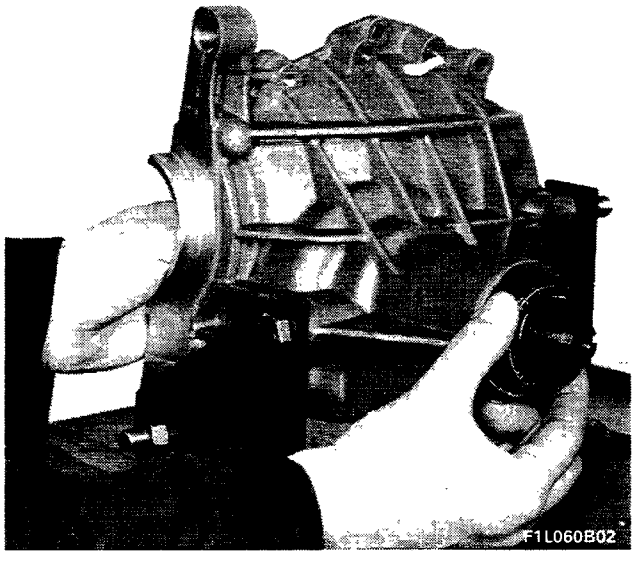
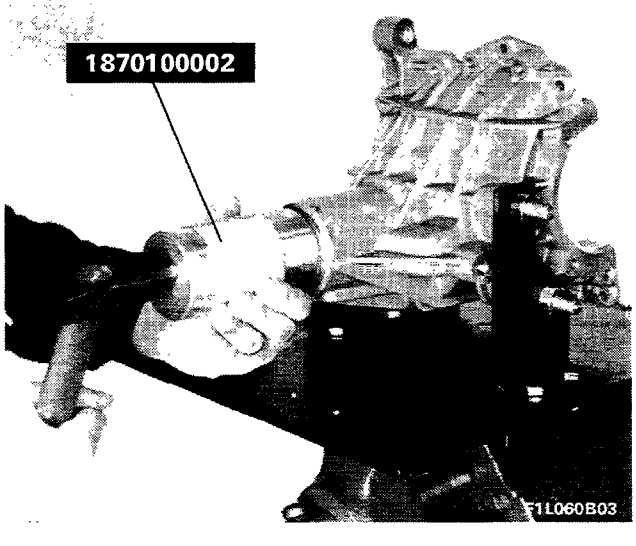



BEVEL PINION ROLLING TORQUE

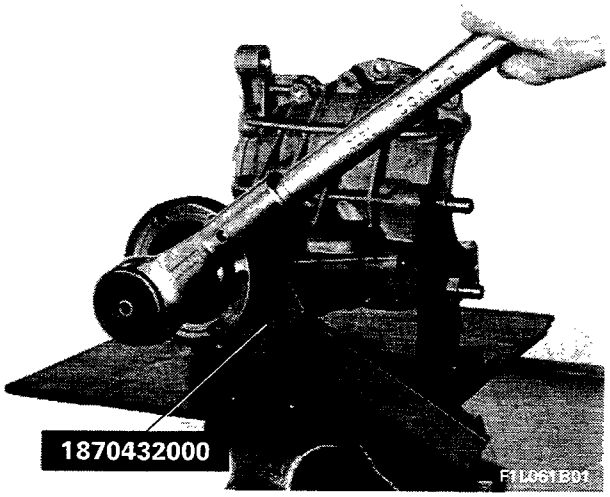



Fitting bevel pinion complete with rubber spacer



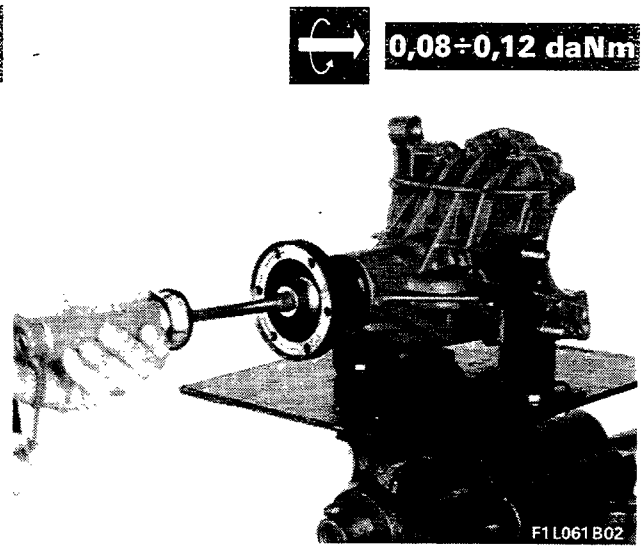

Fitting roller bearing inner race, sleeve side

Fitting bevel pinion gasket




**Tightening nut retaining sleeve to bevel pinion**

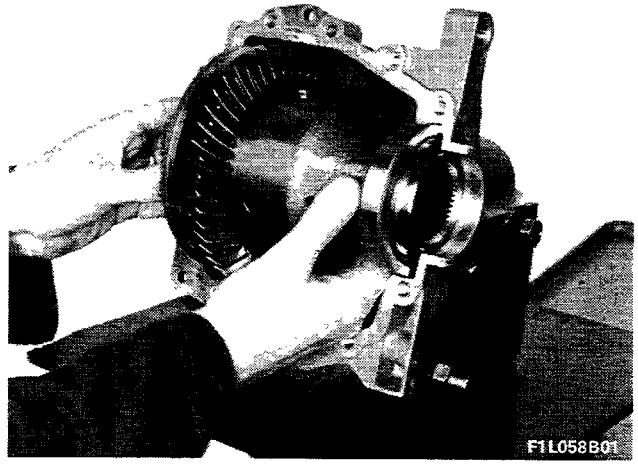
Tighten nut to a torque of 17-28 daNm to produce a rolling torque of 0.08-0.12 daNm at pinion. Since this type of differential is fitted with a rubber spacer, remember when installing that bevel pinion retaining nut must never be slackened, otherwise the rubber spacer must be replaced.



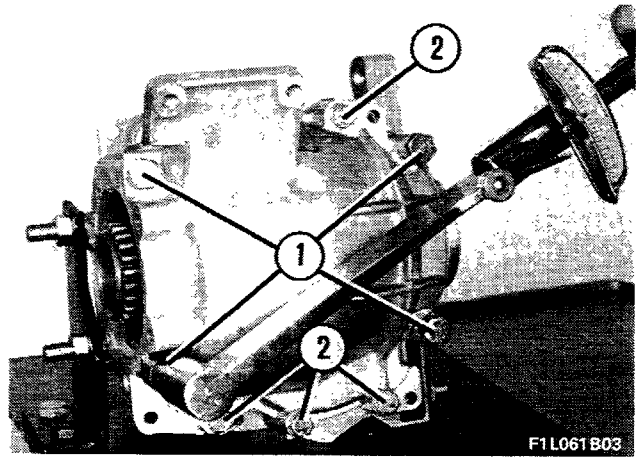

**Checking bevel pinion rolling torque**

If maximum bevel pinion rolling torque is exceeded during preloading, installation and checks must be repeated using a new rubber spacer.

## CHECKING PINION-CROWN WHEEL BACKLASH

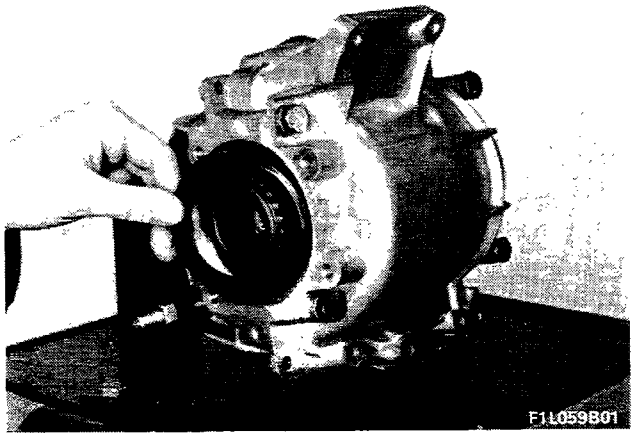



**Fitting differential unit and shim**

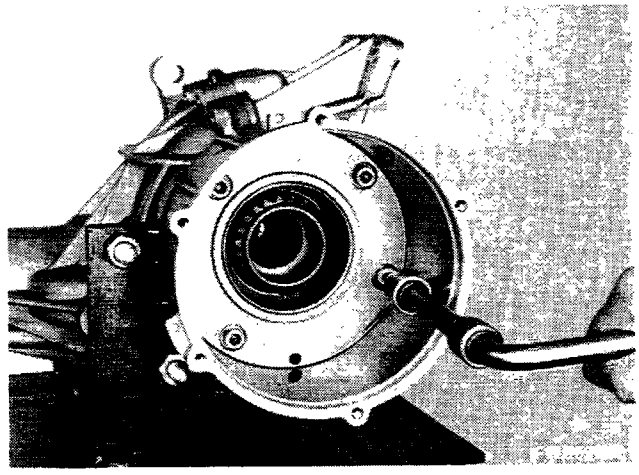




**Fitting differential bell housing and shim**

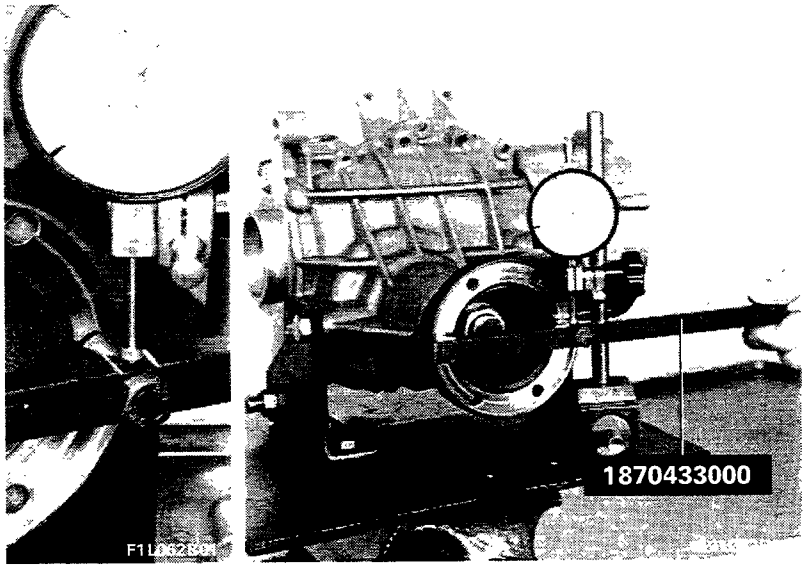
NOTE *Shim thickness must be as calculated previously.*




Fitting cup



Fitting "Ferguson" housing

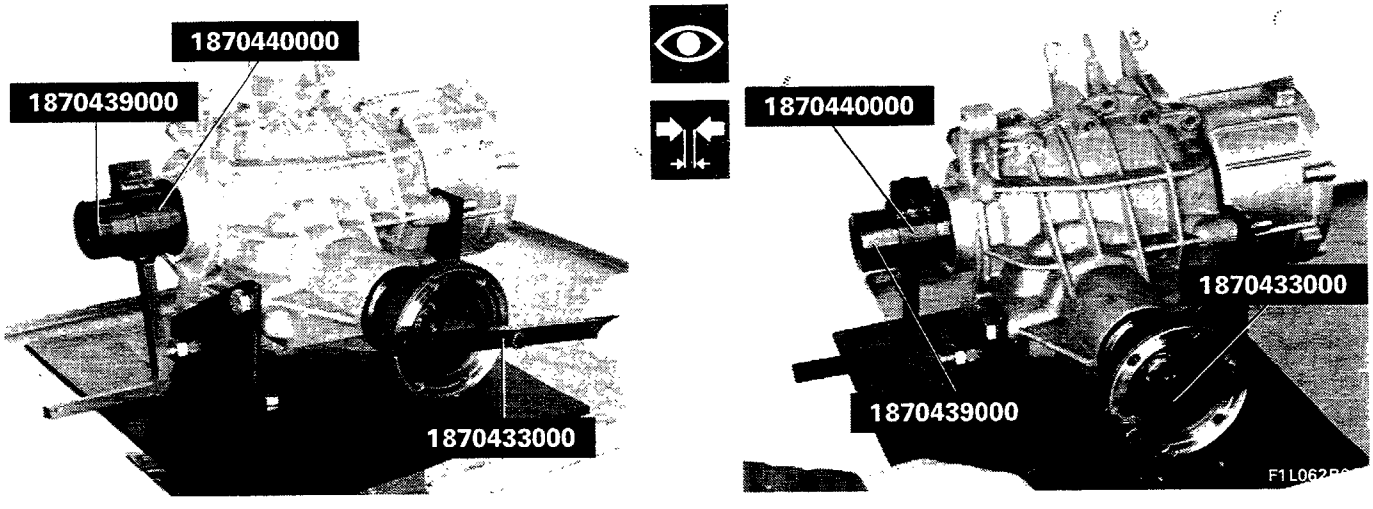



0,08 ÷ 0,15

**Checking and adjusting pinion-crown wheel backlash**

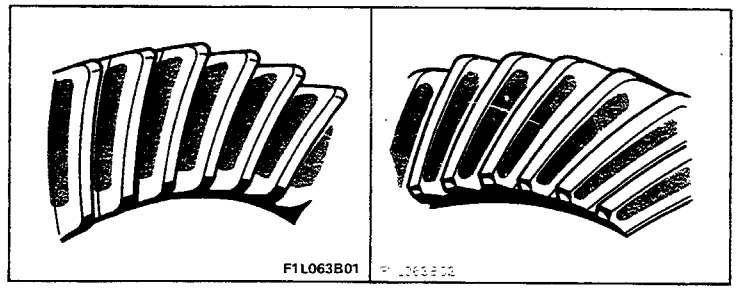
If backlash is lower or higher than specified value, gap between crown wheel and pinion must be altered by fitting shims of different thickness. Take care to keep overall value as calculated during adjustment of crown wheel rolling torque.

## CHECKING AND ADJUSTING BEVEL PINION AND CROWN WHEEL TOOTH CONTACT PATTERN



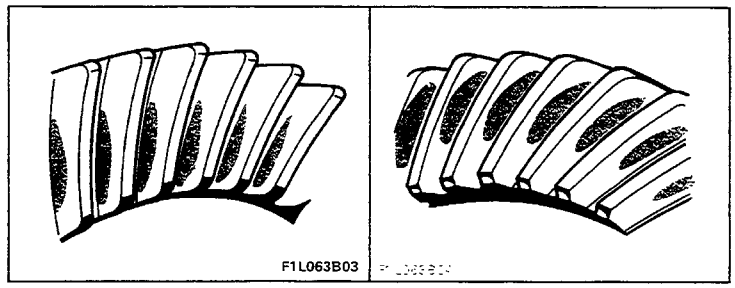

Checking bevel pinion-crown wheel tooth contact pattern on drive and coast surfaces

DRIVE SIDE COAST SIDE



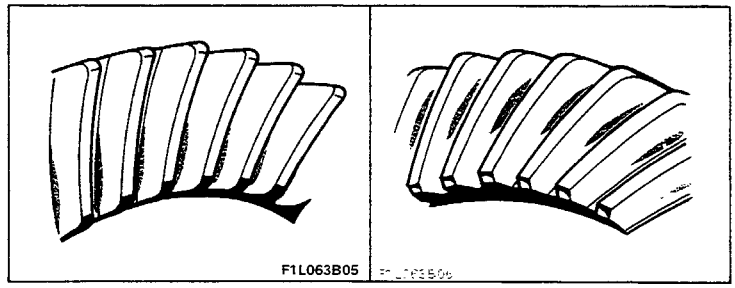

**Exact mesh**

The contact pattern should be evenly spread over both faces of the tooth. i.e. the drive and coast sides.



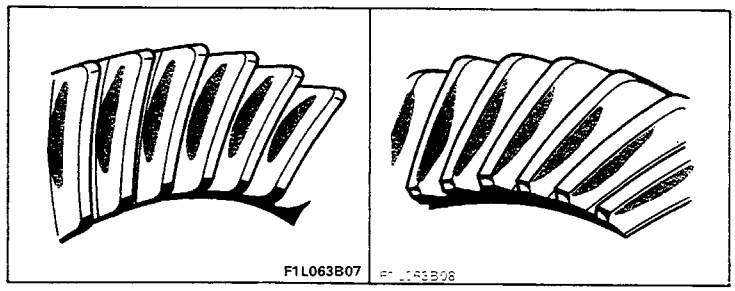

**Inexact mesh**

**Drive side:** contact on the tooth tip and towards the middle area.
**Coast side:** contact on tooth heel and towards the middle area.
Move the pinion further from the crown wheel by decreasing thrust ring thickness



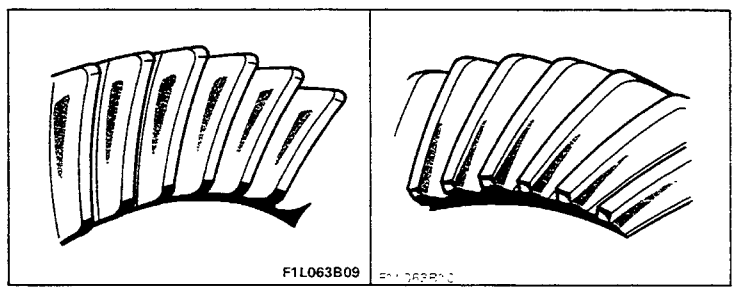

**Inexact mesh**

**Drive side:** contact on top, localised on side of tooth at bottom.
**Coast side:** contact on heel, localised on side of tooth at bottom.
Move the pinion further from the crown wheel by decreasing thrust ring thickness.




**Inexact mesh**

**Drive side:** contact on heel and towards middle of tooth.
**Coast side:** contact on tip and towards middle of tooth.
Move pinion closer to crown wheel by increasing thrust ring thickness.



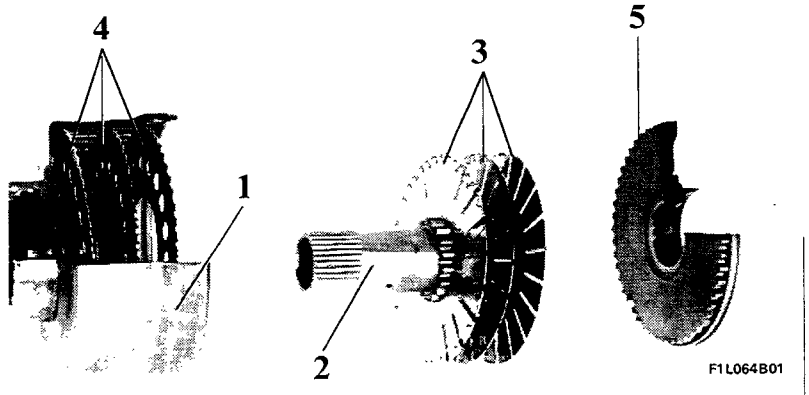

**Inexact mesh**

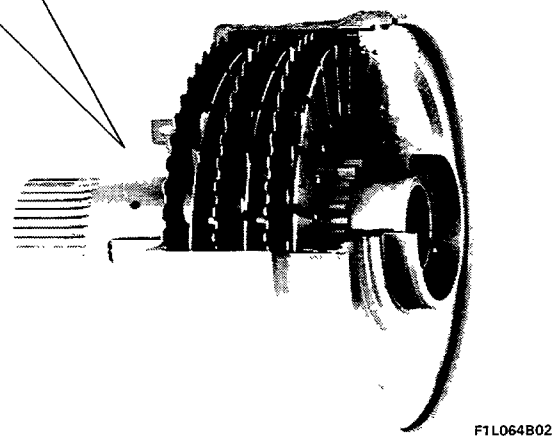
**Drive side:** contact on heel, localised on crest of tooth.
**Coast side:** contact on tip, localised on crest of tooth.
Move pinion closer to crown wheel by increasing thrust washer thickness.

*The unit must be removed again in all the above cases. The pinion-crown wheel backlash must be readjusted when the unitis fitted again.*

# 21-27.

## "FERGUSON" VISCOUS COUPLING



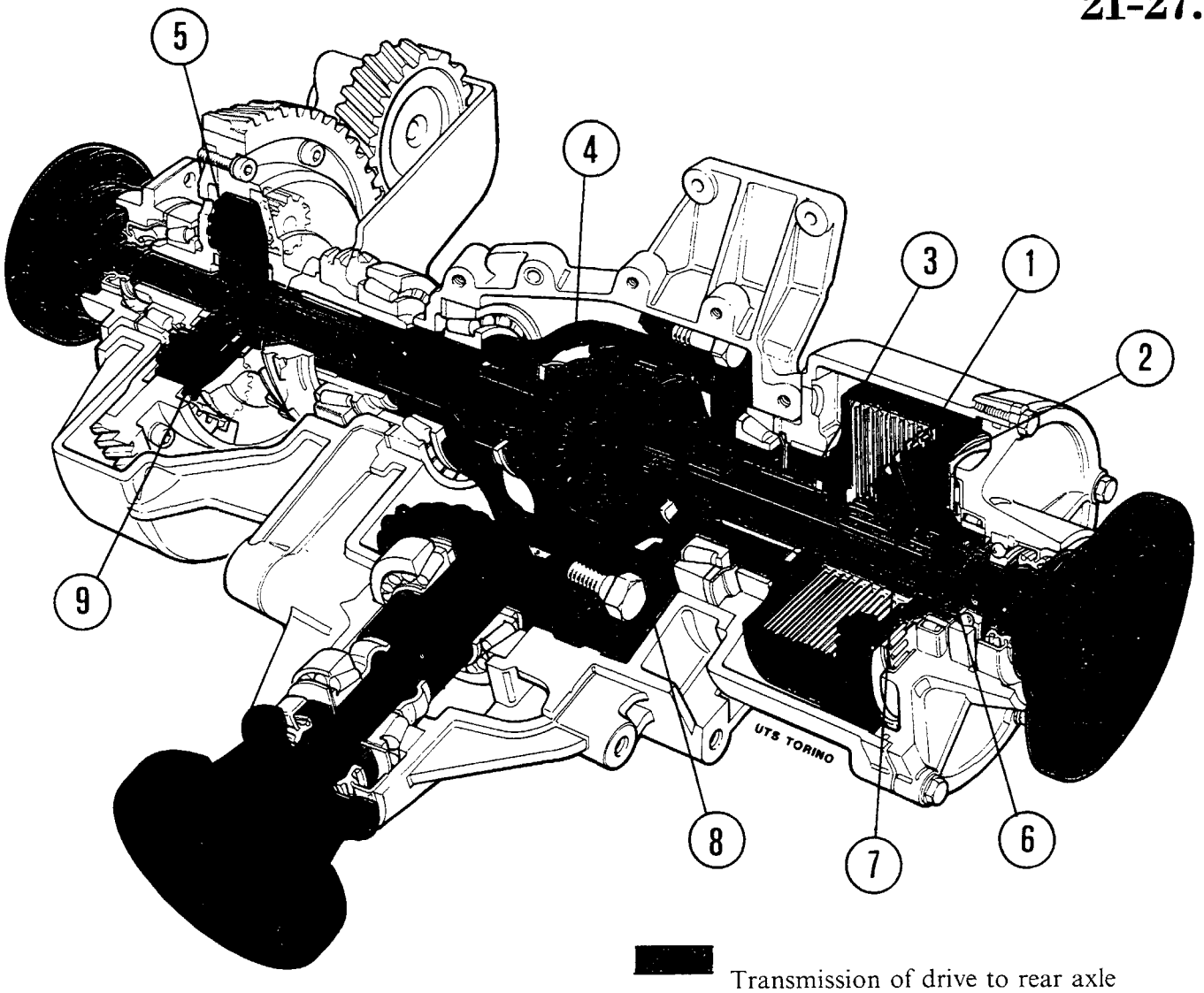

### General remarks

The "Ferguson" viscous coupling applied to the central differential restricts front axle slide in relation to the rear axle and vice versa by transferring part of the torque from front to rear axle when slide occurs.
Loss of grip by one of the axles is prevented or at least restricted in this way and optimal torque distribution over front and rear axles is obtained despite the loss of grip even in poor driving conditions.
The viscous coupling offers the advantage of permanent operation, without manual intervention, and of not transmitting anomalous signals to the various transmission components.

**This coupling is maintenance free and cannot be overhauled. It must therefore be replaced if found to be defective**

The "Ferguson" viscous coupling consists of:
1. Outer casing
2. Inner hub
3. Series of plates integral with hub
4. Series of plates integral with outer casing
5. External housing cover

The coupling is filled with a special ultra-high viscosity, silicone-based fluid.




Transmission of drive to rear axle

Transmission of drive to front axle

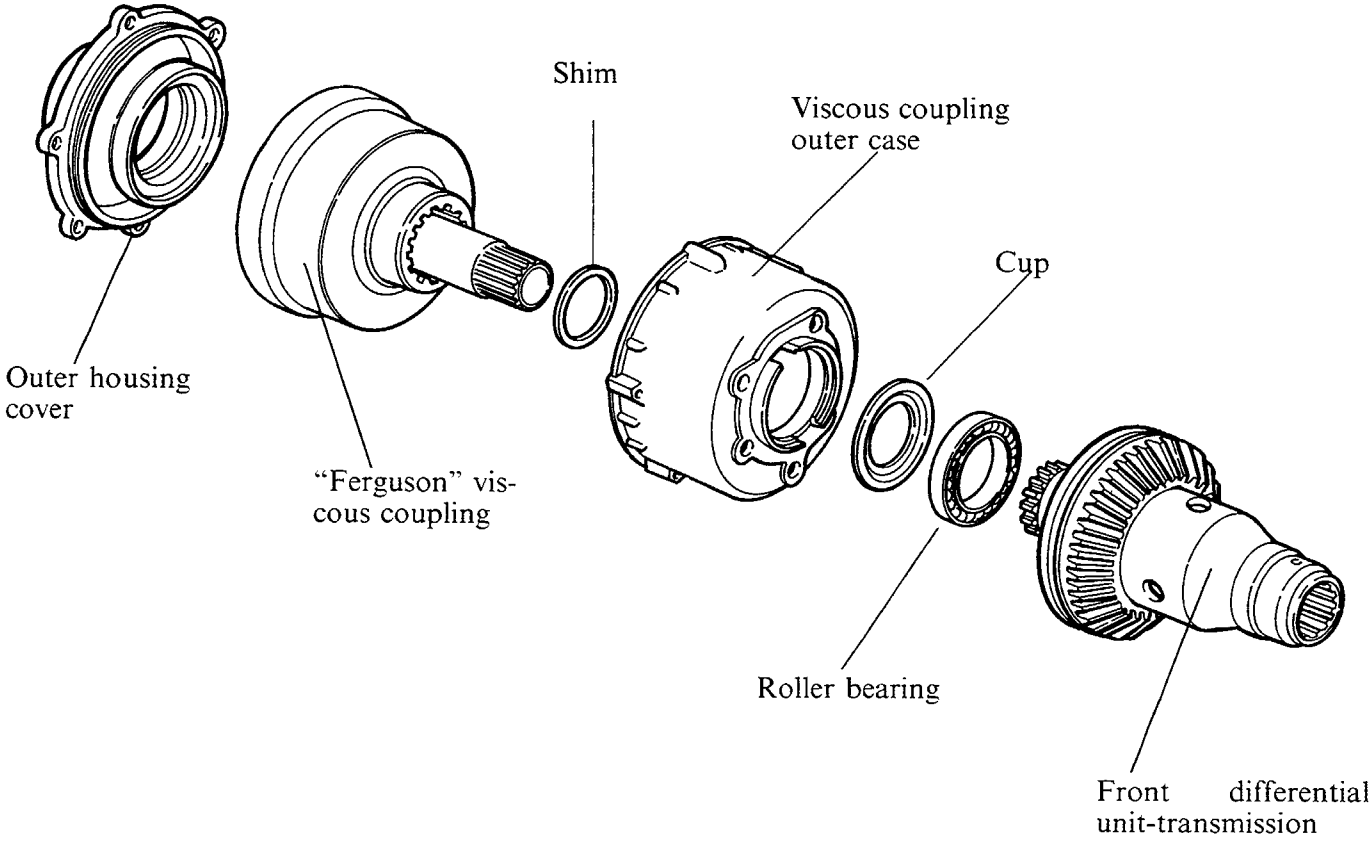
**Operation**

The outer casing (1) and integral plates (2) receive the drive via a spur toothed fitting (3), from the transmission cover (4), connected to the satellite carrier housing (5) (rear axle) of the central differential or torque distributor.
The hub (6) and integral plates (7) receive drive via differential casing (8), from pinion (9) (front axle) of central differential.
When front and rear axles are turning at the same speed, all parts of the viscous coupling turn at the same speed. When the axles start to turn at different speeds (cornering, bumpy road, slippery road) the two sets of plates (2 and 7) also tend to move at different speeds but are slowed by the viscous fluid thus restricting slide between the axles. As a result of the difference between the speeds of plates (2 and 7), the viscous fluid is "cut", i.e. subjected to a cutting force. This force increases with increasing speed difference.
The cutting force acting on the opposing plates leads to a considerable increase in torque on the axle that tends to turn at a lower speed (normally the axle with the best grip) with benefits in terms of traction and stability.
Even during small skids, the torque crossing the viscous coupling (i.e. the torque that the viscous coupling takes from the faster axle and yields to the slower axle) is high.

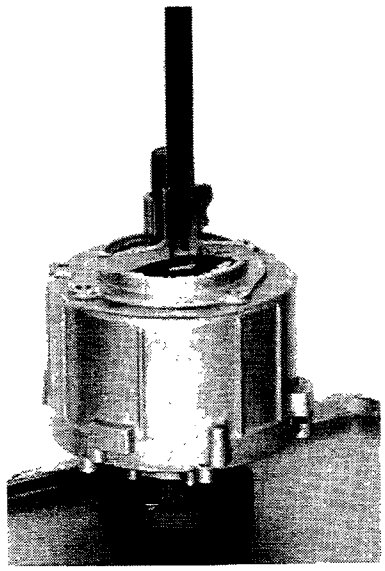
All else being equal, it is possible to increase or decrease torque transfer by varying plate number and size and/or fluid viscosity.
The viscous coupling may lock, i.e. transmit very high torques with no slide. In other words, a very high torque may cross the viscous coupling that has been taken from the faster axle and yielded to the slower axle even when there is no slide.
This happens when the unit runs for a long time with high slide and the heat produced raises the temperature of the viscous fluid (150° - 200°C).
The air present inside the viscous coupling forms an emulsion with the fluid to bring about an increase in pressure (about 90 bar). This brings about an abrupt change in the properties of the viscous coupling and makes slide between the plates impossible.
The viscous coupling is designed to stand up to the above conditions for short periods. If subjected to such conditions for long periods as a result of high stress or defective operation (such as disconnecting the rear transmission and driving the car as if it only had two drive wheels) the viscous coupling could become damaged.

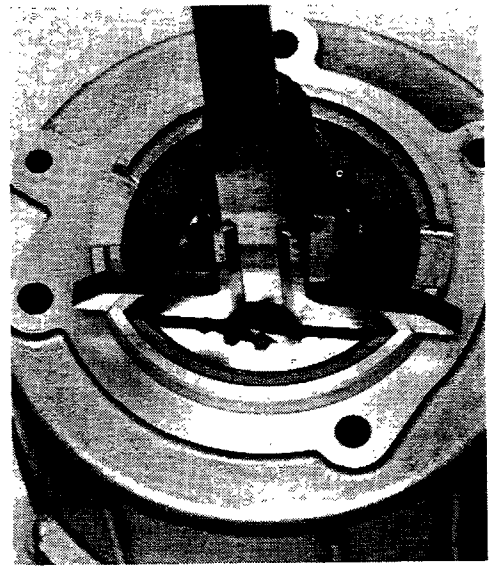
*In the case of breakdown or accident, the car must be towed using a bar so that the wheels can turn or loaded onto a breakdown truck.*

**Components of "Ferguson" viscous coupling**



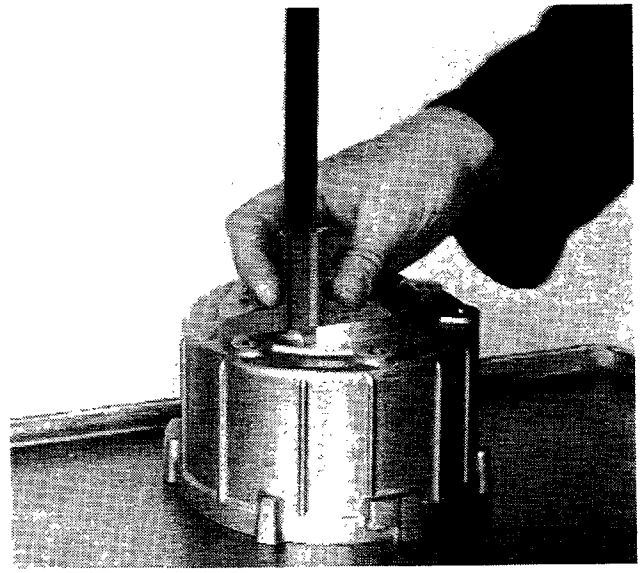
## ADJUSTMENT



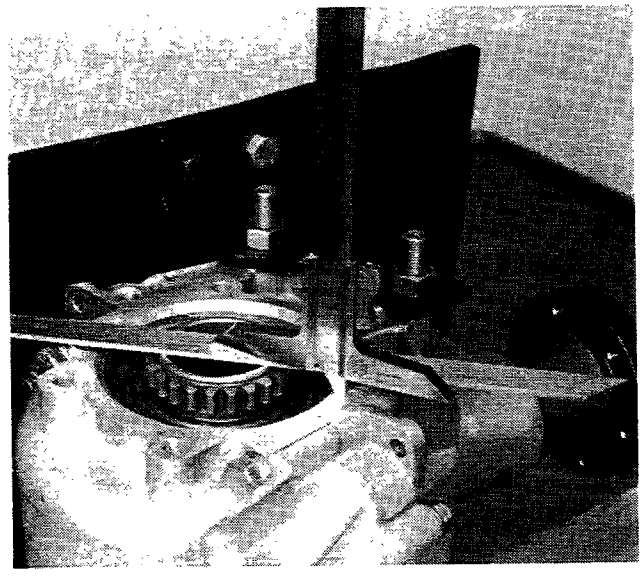


### Calculating shim thickness "S"

Fit the viscous coupling and cover on the housing and use a depth gauge to measure the gap between the outer edge of the housing and the rest plane of the shim on the viscous coupling.
You will therefore obtain dimension "**X**".



Measure the gap between the outer edge of the viscous coupling housing and the rest surface on the differential unit support housing.
You will therefore obtain dimension "**Y**".



Measure the gap between the meshed gear and rest plane on differential unit bell housing.
You will obtain dimension "**Z**".

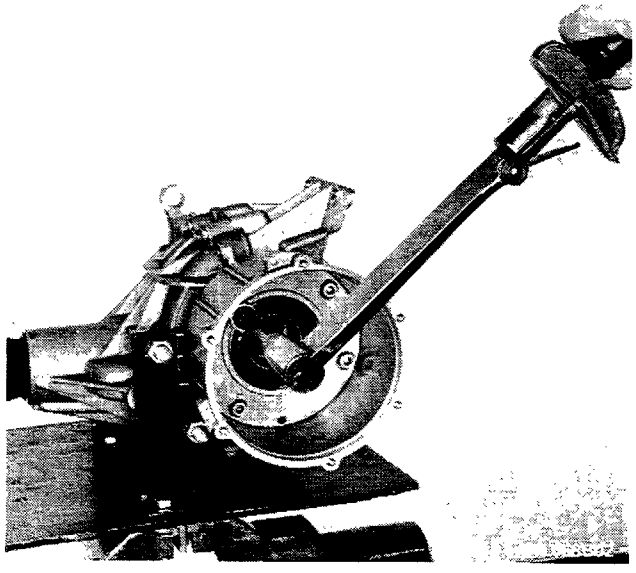
Thickness "**S**" of shim for adjustment of clearance between viscous coupling and gear is obtained using the following equation:

$$S = X - Y - Z - (0.13 - 0.25\ mm)$$

Where 0.13 - 0.25 mm is the clearance between viscous coupling and gear.

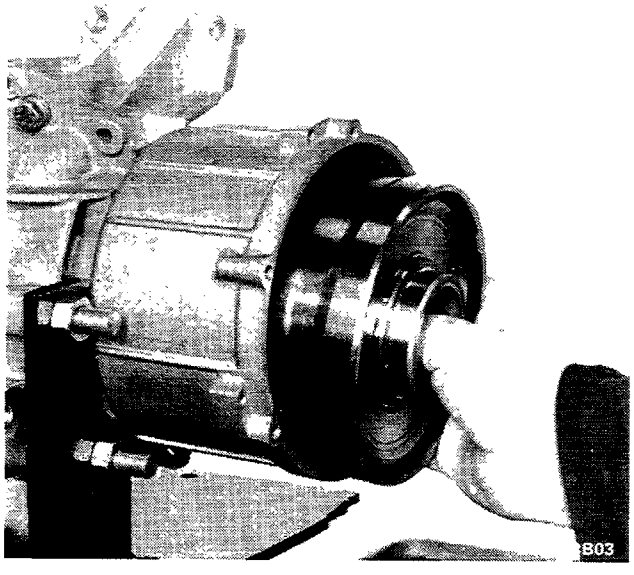

**Fitting shim to "Ferguson" viscous coupling**

Shims are supplied as spares in the following sizes:
2.45 - 3.05 mm in 0.05 mm steps.



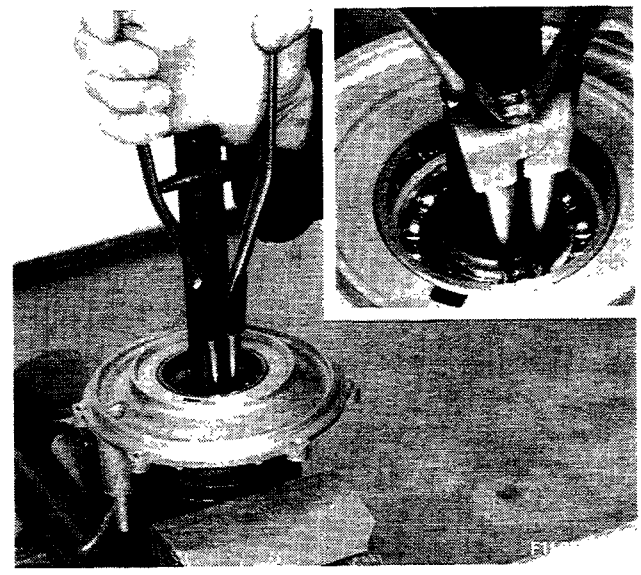
**2,5 daNm**

**Fitting and torque tightening of outer "Ferguson" coupling housing**

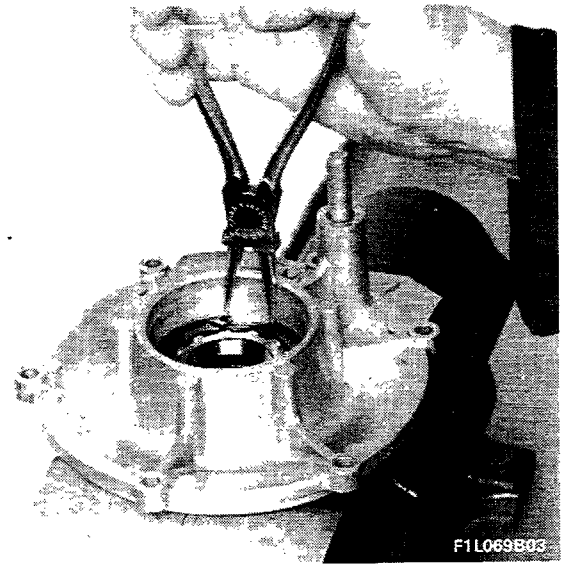



**Fitting "Ferguson" viscous coupling complete with shim**

## "FERGUSON" HOUSING COVER

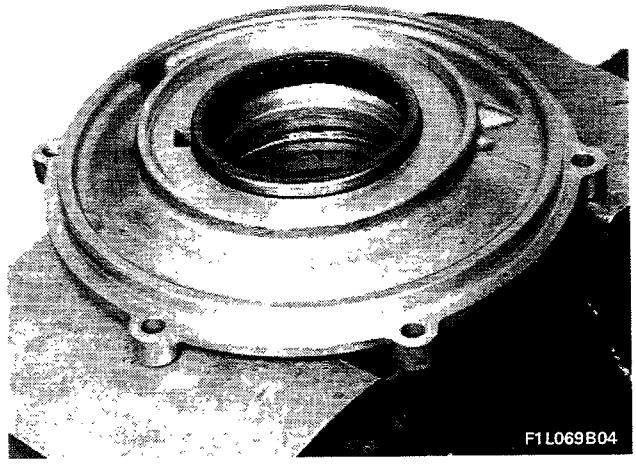


**Removing-fitting intermediate shaft retaining ring**

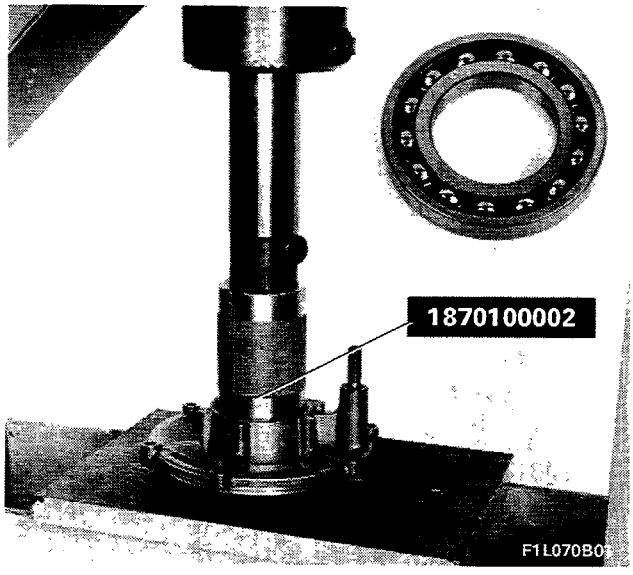



**Removing-fitting retaining ring for intermediate shaft mounting ball bearing**

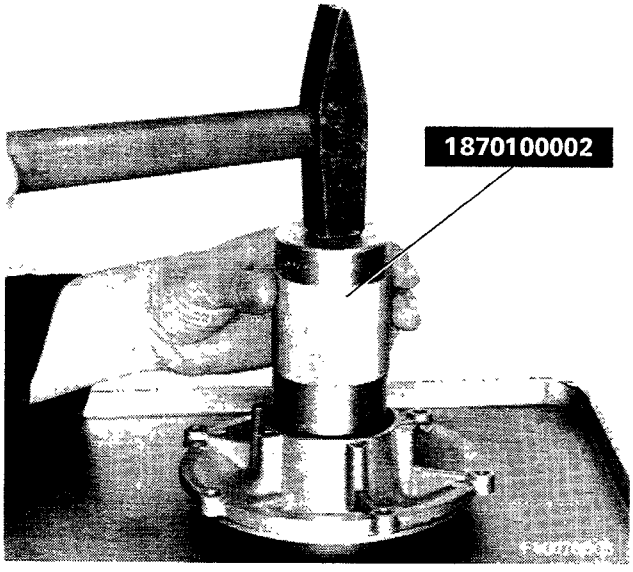
Remove the bearing using a driver.



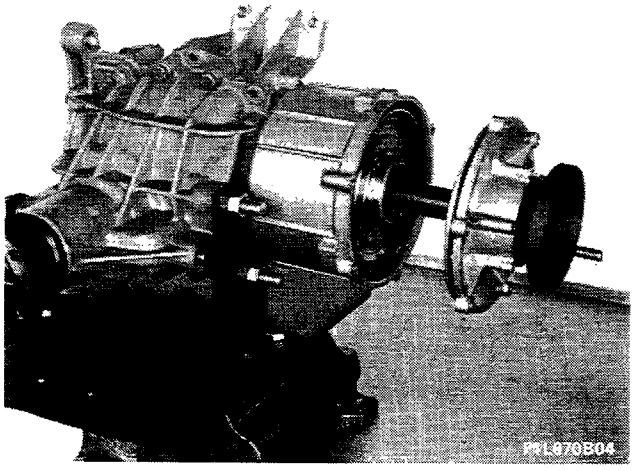

**Removing-fitting "Ferguson" coupling mounting roller bearing**




Fitting intermediate shaft mounting ball bearing using hydraulic press

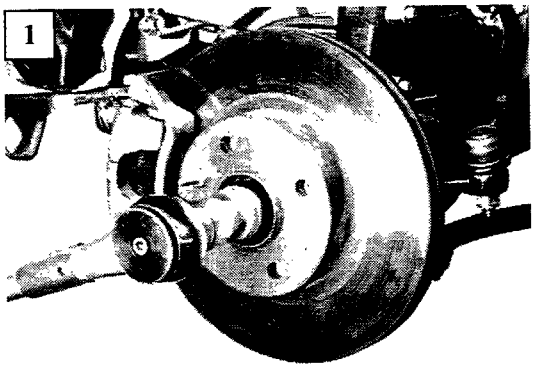



Fitting intermediate shaft seal




Fitting "Ferguson" housing cover complete with intermediate shaft

## REMOVAL - REFITTING

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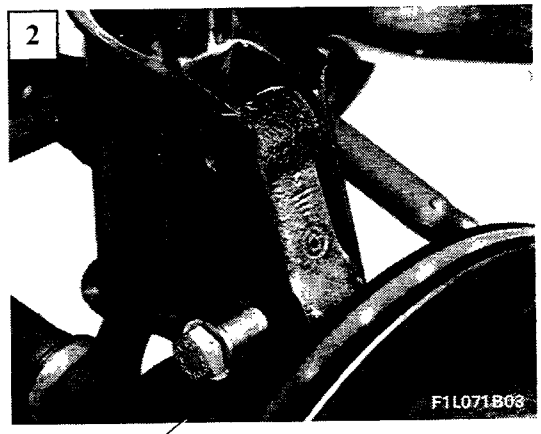


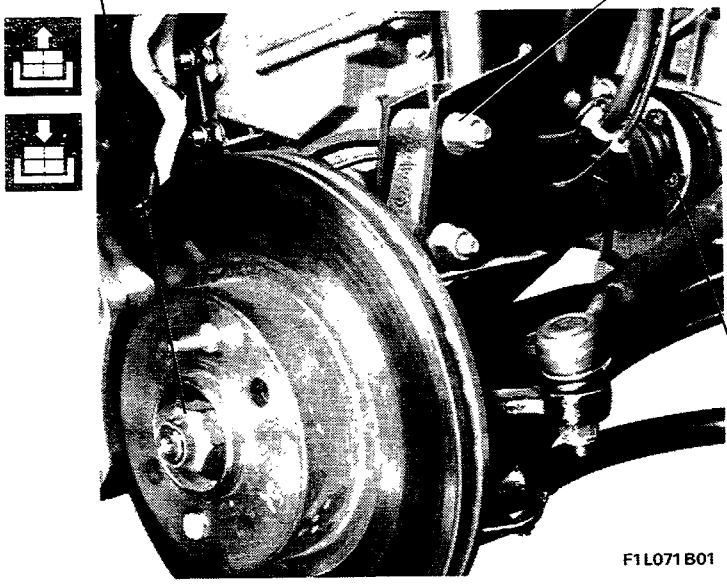

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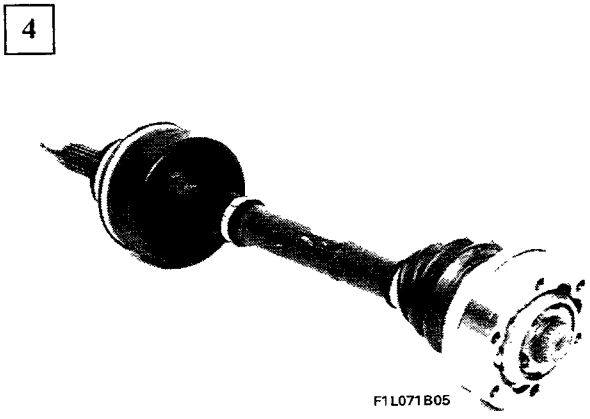
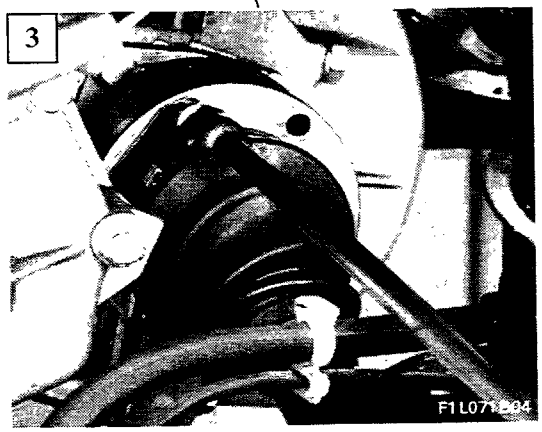
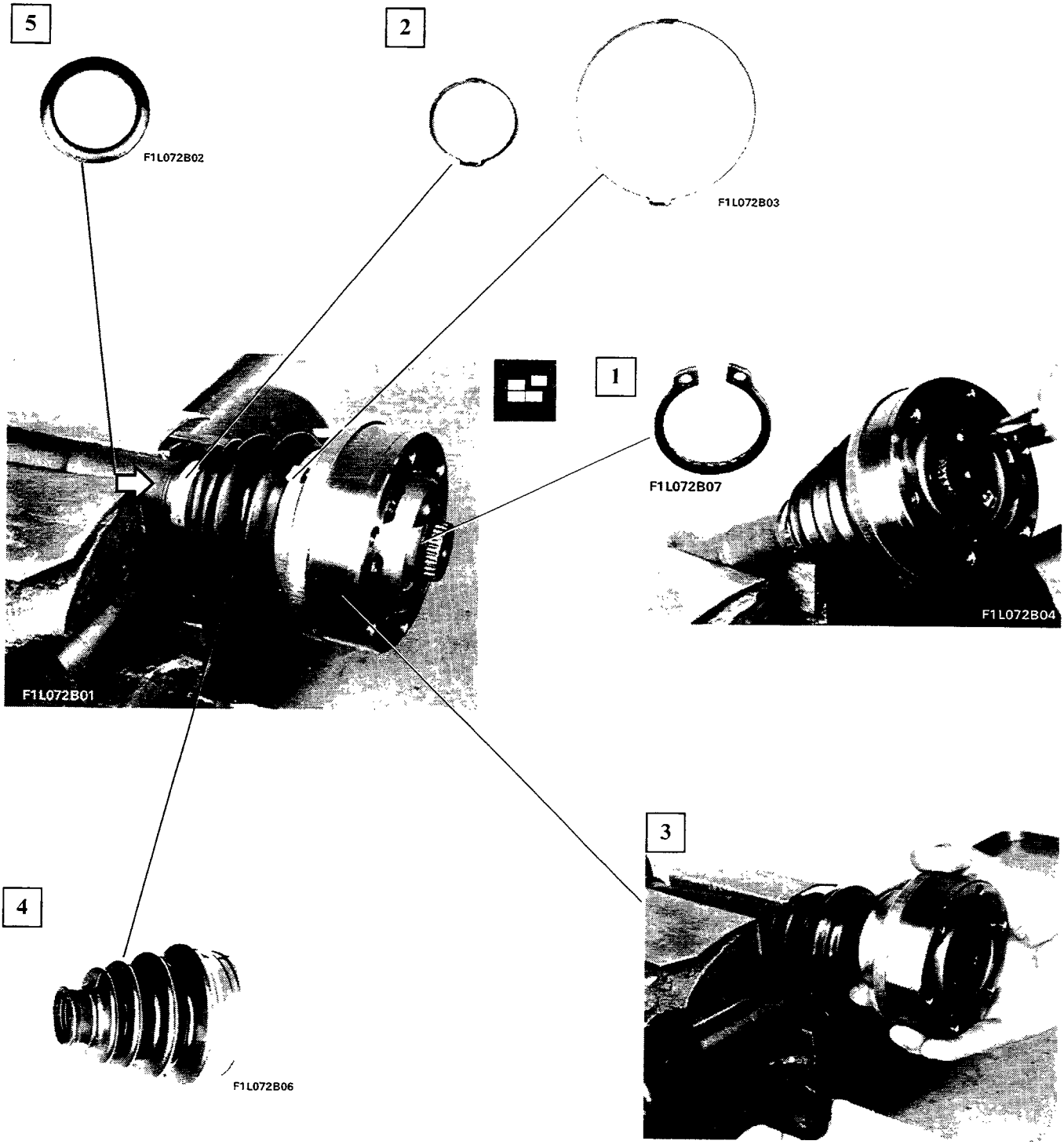



The numbers next to the illustrations indicate the order of operations.

## DISASSEMBLY AND CHECKS



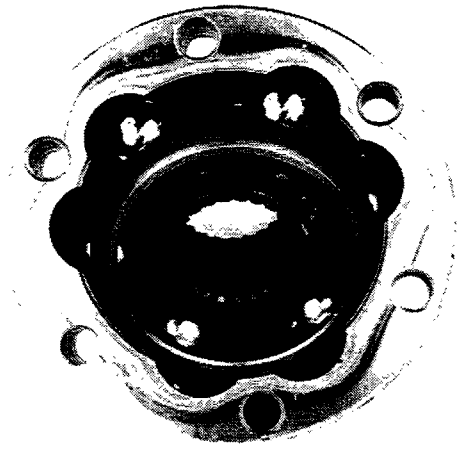

**Removing gearbox side constant velocity joint**

Removing constant velocity joint retaining ring [1] two boot retaining clips [2] constant velocity joint [3] protective boot [4] and lastly, withdraw the rubber washer (cup) [5].

### Gearbox side constant velocity joint

Thoroughly wash constant velocity joints with petrol or diesel and check that the balls and their seats are smooth and show no signs of binding or scoring.
Upon reassembly the gearbox side constant velocity joints must be fitted to the shaft as indicated in the table below.

| Shaft classification | | Joint classification | |
|---|---|---|---|
| Category | Colour | Category | Colour |
| A | Dark blue | A | Dark blue |
| C | Red | B | White |



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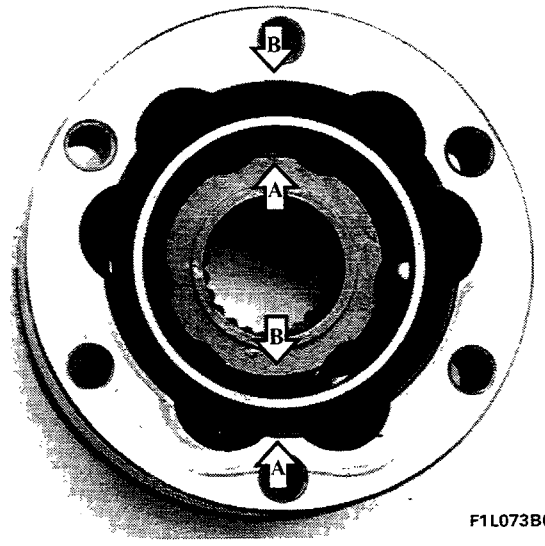
### Positioning gearbox side constant velocity joints

*If the balls come out of their seats when the joints are withdrawn, consult references shown in diagram to refit. The joint will lock otherwise.*

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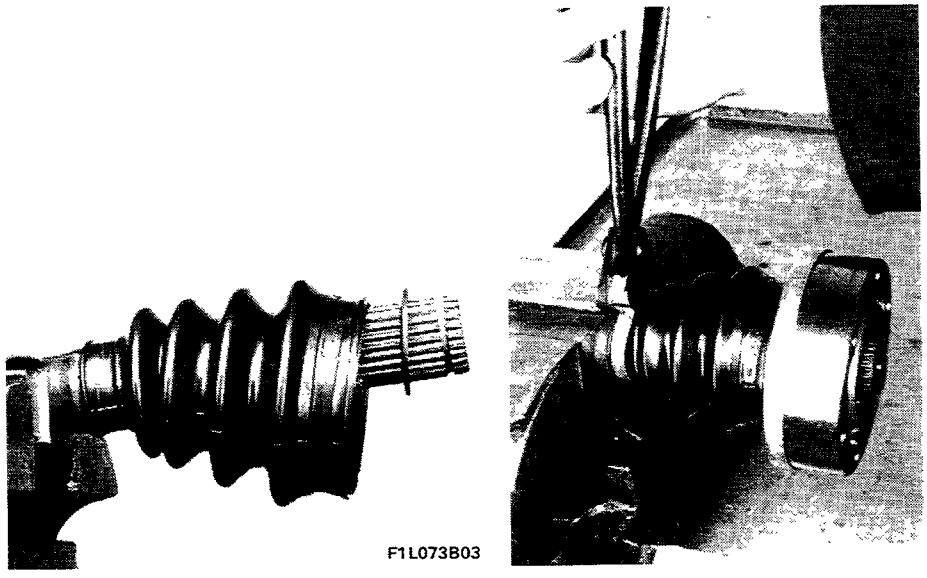
A. Smallest distance between ball seats
B. Greatest distance between ball seats

### Fitting protecting boot, rubber washer and closing retaining clips



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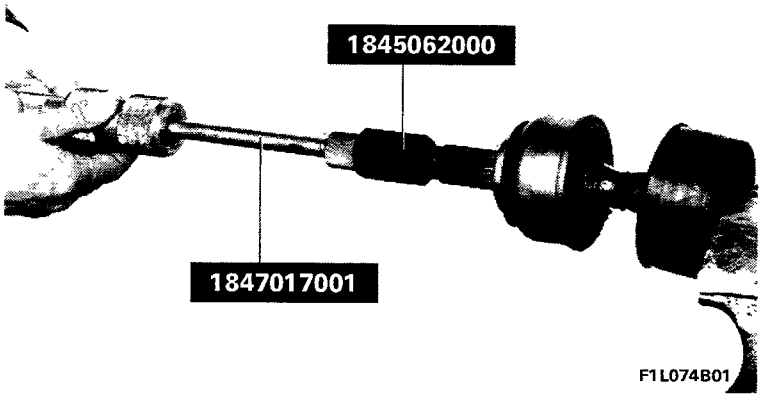
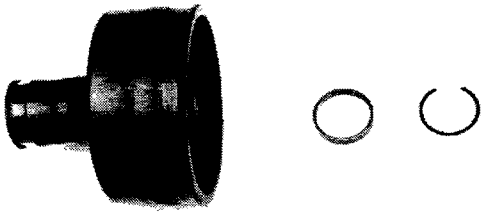



**Removing wheel side constant velocity joint**

Remove boot retaining clips before removing joint. This operation is destructive.



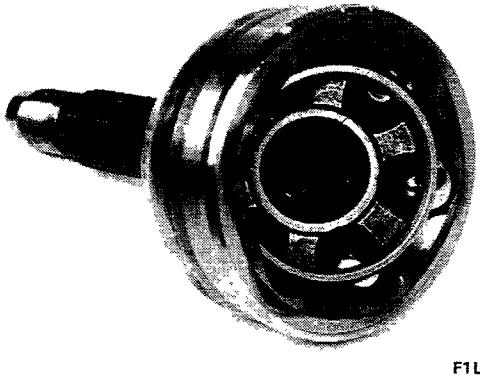

**Removing retaining ring, spacer and boot**

*It is advisable to renew the boot whenever it is removed.*
*Pack constant velocity joint and protective boot with TUTELA MRM2 grease.*

During assembly, use an adjustable clip to compress the constant velocity joint retaining ring.
Position the constant velocity joint on the half shaft and hammer into its seat.

**Wheel and drive shaft side constant velocity joint**

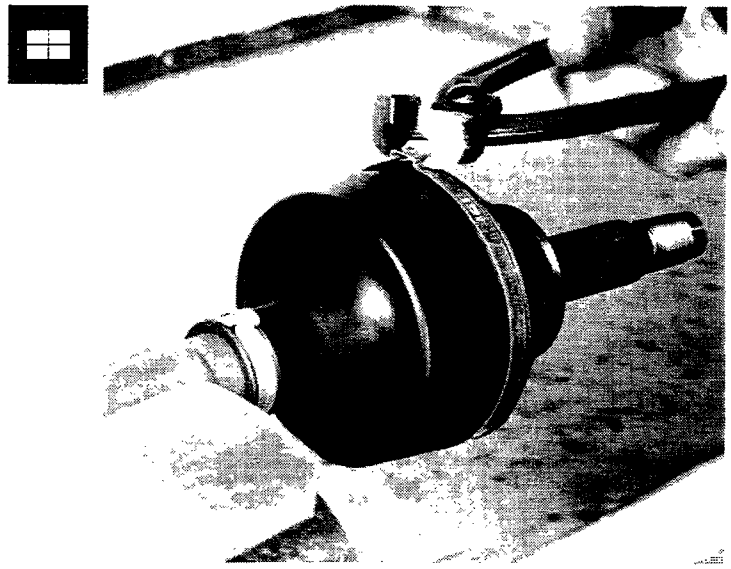
Carefully wash constant velocity joints with diesel or petrol and check that the balls and seats are perfectly smooth and free from binding or scoring.
When installing, fit wheel side constant velocity joints to shaft as indicated in the table below.





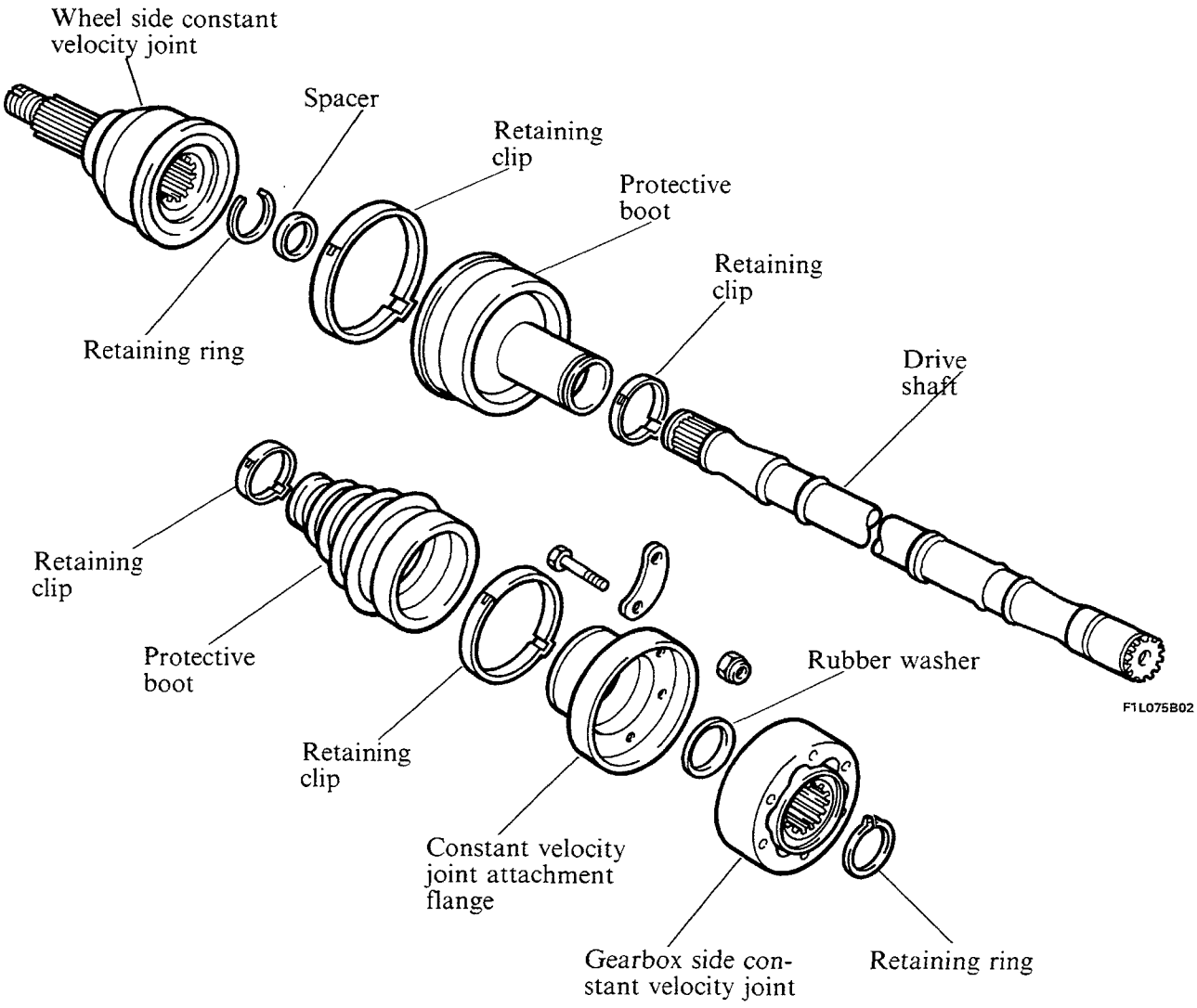
| Shaft classification | | Joint classification | |
|---|---|---|---|
| Category | Colour | Category | Colour |
| A | Dark blue | A | Dark blue |
| | | B | White |
| C | Red | C | Red |

Category B joints can be fitted to both drive shaft categories



**Fitting wheel side boot retaining clip**

*Fix drive shaft during power unit removal-installation in order to avoid damaging the boot.*




**Drive shaft assembly components**

| PART | Thread | Tightening torque |
|---|---|---|
| | | daNm |
| **MECHANICAL GEARBOX - DIFFERENTIAL** | | |
| Bolt retaining clutch release sleeve support cover | M 6 x 1 | 0.75 |
| Bolt retaining left side cover to housing | M 8 x 1.25 | 2.5 |
| Bolt retaining gear casing to support | M 8 x 1.25 | 2.5 |
| Bolts retaining rear cover to gear casing | M 8 x 1.25 | 2.5 |
| Bolt retaining differential cover to bell housing (length 55 mm) | M 8 x 1.25 | 2.5 |
| Bolt retaining differential cover to bell housing (length 80 mm) | M 10 x 1.25 | 5 |
| Bolt retaining gear rod spring | M 8 x 1.25 | 2.5 |
| Magnetic plug | M 22 x 1.5 | 4.6 |
| Main shaft gear lock collar | M 22 x 1.5 | 15 |
| Lay shaft gear lock collar | M 22 x 1.5 | 15 |
| Bolt retaining main rear bearing retaining plate | M 8 x 1.25 | 2.5 |
| Bolt retaining secondary rear bearing retaining plate | M 8 x 1.25 | 2.5 |
| Self-locking screw securing 1st and 2nd speed forks | M 8 x 1.25 | 2.5 |
| Self-locking screw securing 3rd and 4th speed dog | M 8 x 1.25 | 2.5 |
| Self-locking screw retaining 3rd and 4th speed fork | M 8 x 1.25 | 2.5 |
| Self-locking screw retaining 5th speed and reverse dog | M 8 x 1.25 | 2.5 |
| Bolt retaining reverse lever assembly | M 8 x 1.25 | 2.5 |
| Self-locking screw retaining 5th speed fork | M 8 x 1.25 | 2.5 |
| Bolt retaining gearbox shaft bushing on housing | M 6 x 1 | 0.75 |
| Self-locking nut retaining gear lever to inner shaft | M 8 x 1.25 | 2.5 |
| Bolt retaining outer shaft gear lever | M 8 x 1.25 | 2. |

| PART | Thread | Tightening torques daNm |
|---|---|---|
| Bolt retaining milometer support | M 6 x 1 | 1 |
| Socket screw retaining spur gear | M 8 x 1.25 | 3.5 |
| Reversing light switch bolt | M 12 x 1 | 3 |
| Socket screw retaining drive shaft joints to front differential | M 8 x 1.25 | 4.2 |

## MECHANICAL GEARBOX OUTER CONTROL

| | | |
|---|---|---|
| Bolt retaining rear gear engagement reaction rod rubber block | M 6 x 1 | 0.6 |
| Bolt retaining gear lever ball joint to rod | M 6 x 1 | 0.9 |
| Bolt retaining gear lever to floating support | M 6 x 1 | 0.6 |
| Bolt retaining rubber bushing to gear engagement rod (rubber coupling) | M 6 x 1 | 0.9 |
| Bolt retaining gear engagement rod ball joint to gear output shaft | M 6 x 1 | 0.9 |
| Bolt retaining end of gear engagement reaction rod to rubber bush | M 6 x 1 | 0.9 |
| Bolt retaining support bracket of rubber bushing anchoring reaction rod to gearbox | M 8 x 1.25 | 2 |
| Nut retaining support for rubber bushing joining reaction rod to gearbox bracket | M 8 x 1.25 | 1.3 |

## ENGINE-GEARBOX FASTENERS

| | | |
|---|---|---|
| Bolt for stud on support retaining gearbox assembly to engine | M 12 x 1.25 | 8.5 |
| Nut retaining bell housing to engine | M 12 x 1.25 | 8 |
| Bolt retaining bell housing to engine | M 12 x 1.25 | 8.5 |
| Bolt retaining flywheel cover to bell housing | M 6 x 1 | 0.8 |

| PART | Thread | Tightening torques daNm |
|---|---|---|
| Bolt retaining starter motor to bell housing | M 8 x 1.25 | 2.2 |
| Bolt retaining bell housing to engine | M 12 x 1.25 | 5.5 |

**FRONT DIFFERENTIAL: TRANSMISSION**

| | | |
|---|---|---|
| Bolt retaining viscous coupling support | M 8 x 1.25 | 2.5 |
| Bolt retaining viscous coupling support cover | M 6 x 1 | 0.75 |
| Bolt retaining cover for front differential-transmission support housing cover | M 8 x 1.25 | 2.5 |
| Bolt retaining cover for front differential-transmission support housing cover | M 10 x 1.25 | 5 |
| Staked nut for locking bevel pinion | M 20 x 1.5 | 17 - 28 ▲ |
| Ring gear retaining bolt | M 10 x 1.25 | 8.8 |

**FASTENERS RETAINING FRONT DIFFERENTIAL TO DISTRIBUTOR**

| | | |
|---|---|---|
| Union for adjustable fitting retaining oil delivery lines to bevel pinion support | M 16 x 1.5 | 3.5 |
| Fitting straight end section for retaining oil delivery line to bevel pinion support | M 16 x 1.5 | 3.5 |
| Nut retaining front differential link to sump | M 10 x 1.25 | 5.1 |
| Bolt retaining bevel pinion support to gearbox | M 12 x 1.25 | 8.8 |
| Bolt retaining bevel pinion support | M 8 x 1.25 | 2.5 |

▲ Tighten nut as indicated on page 61