Gearbox
EuroTronic 12 AS 2301 D.D./O.D.

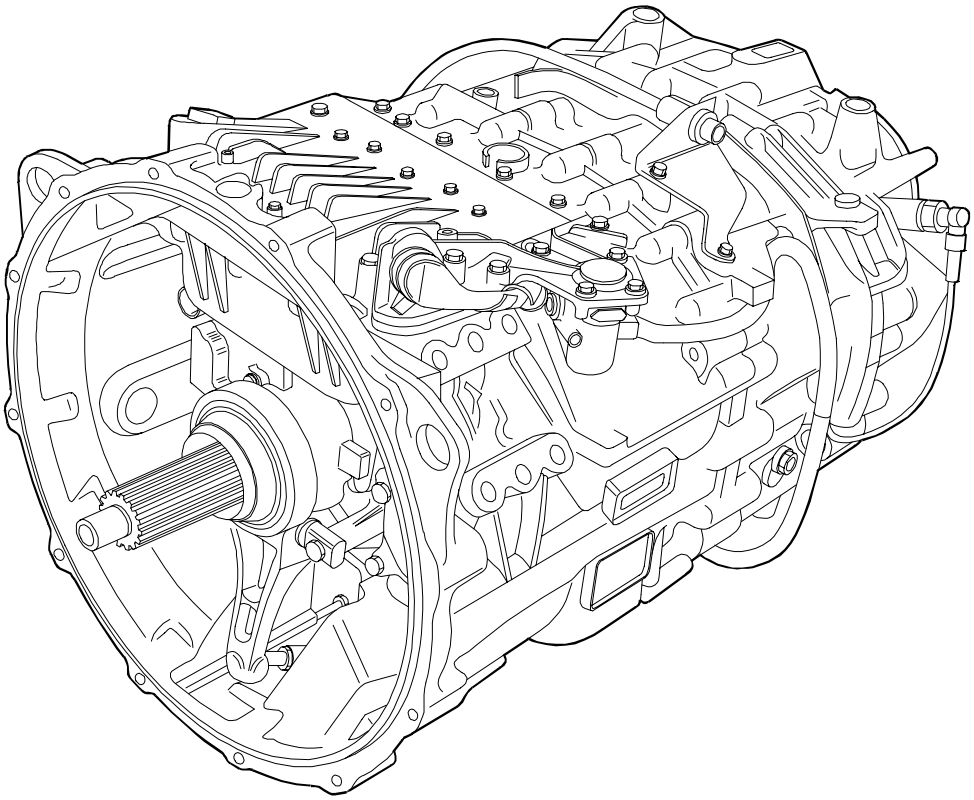
Page

DESCRIPTION

The EuroTronic gearbox 12 AS 2301 D.D./O.D. is mechanical with electro-pneumatic control.
The driver can choose whether to program gear selection/engagement manually or automatically. The shafts and gears have helical toothing that reduces operating noise.
The main shaft gear coupling is obtained with sleeves with front toothing.
The splitter and epicyclic reduction gear unit engagement is synchronized.
The speeds are selected with finely staggered ratios and can be engaged in succession with the coupling of the epicyclic reduction gear unit "ERG" and the "Splitter" slow or fast speed unit.
On engaging the "ERG", the speeds of the main shaft are doubled. The ratios obtained in this way are further doubled with the engagement of the "Splitter". Each single ratio is thus divided into a fast or slow ratio.

D.D. = Direct drive
O.D. = Over Drive (Multiplied)

Figure 1



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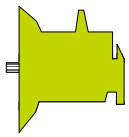
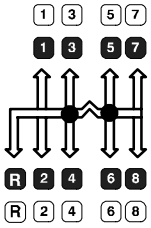
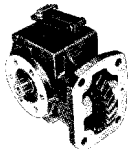
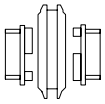
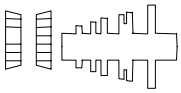
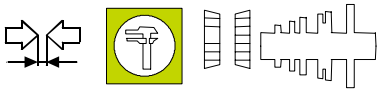
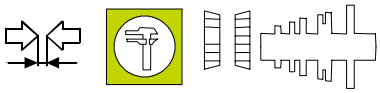
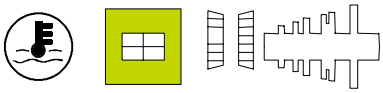
SPECIFICATIONS AND DATA

	GEARBOXES	EuroTronic Automated	
		12 AS 2301 D.D.	12 AS 2301 O.D.
	Type	Mechanical	
	Torque activated Nm	1900	2500
	Forward gears Reverse gears	12 2	
	Type of running control	electronically-operated semi-automatic	
	Rear power takeoff	optional	
	Gear engagement: E.R.U.* and splitter engagement	by front engagement sleeves free ring synchroniser	
	Gears	constantly engaged straight toothed	
	Gear ratios		
	1ª	15.85	12.33
	2ª	12.32	9.59
	3ª	9.56	7.44
	4ª	7.43	5.78
	5ª	5.87	4.57
	6ª	4.56	3.55
	7ª	3.47	2.70
	8ª	2.70	2.10
	9ª	2.09	1.63
	10ª	1.62	1.27
	11ª	1.28	1.00
	12ª	1.00	0.78
	1ª RM	14.68	11.41
	2ª RM	11.41	8.88

ERG* = Epicyclic Reduction Gearing
D.D. = Direct drive
O.D. = Over Drive (Multiplied)

SPECIFICATIONS AND DATA

		EuroTronic Automated 12 AS 2301 D.D./O.D.
	Bearings - drive input shaft - ERG* shaft - transmission shafts	 with balls with cylindrical rollers with tapered rollers
	Bearing end float: - drive input shaft - ERG* planet shaft - transmission shafts	 0 ÷ 0.1 mm 0 ÷ 0.1 mm - 0.05 ÷ + 0.05 mm
	End float: - main shaft - drive input shaft split ring	 0.2 mm 0 ÷ 0.1 mm
	Temperature for fitting bearings or bearing seats on the boxes	120 °C
	Forced lubrication with positive displacement pump flow rate (with 12th speed engaged and oil at a temperature of 80°C) pressure with 12th speed engaged at 2400 rpm and oil at a temperature of: 40°C 80°C Oil type litres kg	50 dm^3/min 1.7 bar 1.2 bar Tutela Truck Fe-Gear Tutela ZC 90 12 11

ERG* = Epicyclic Reduction Gearing
D.D. = Direct drive
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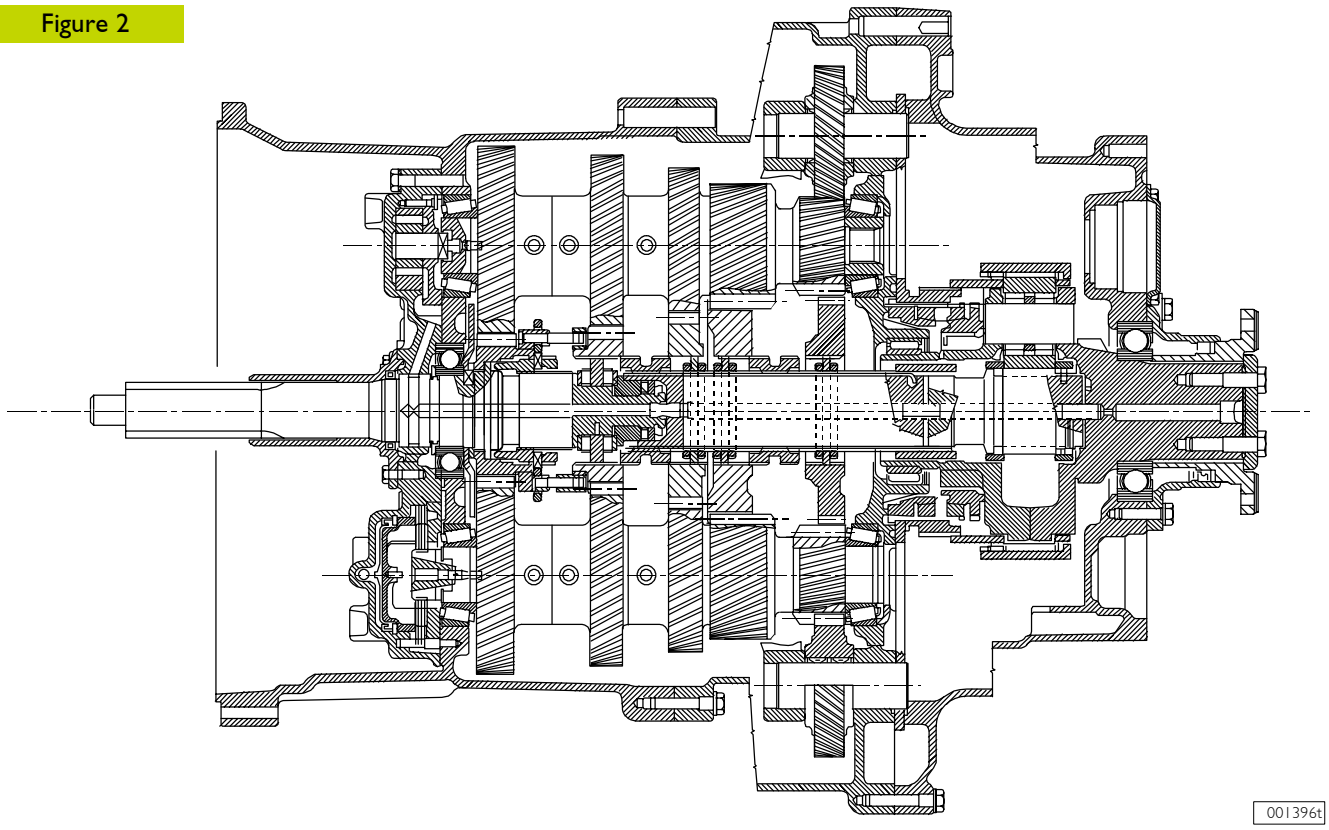
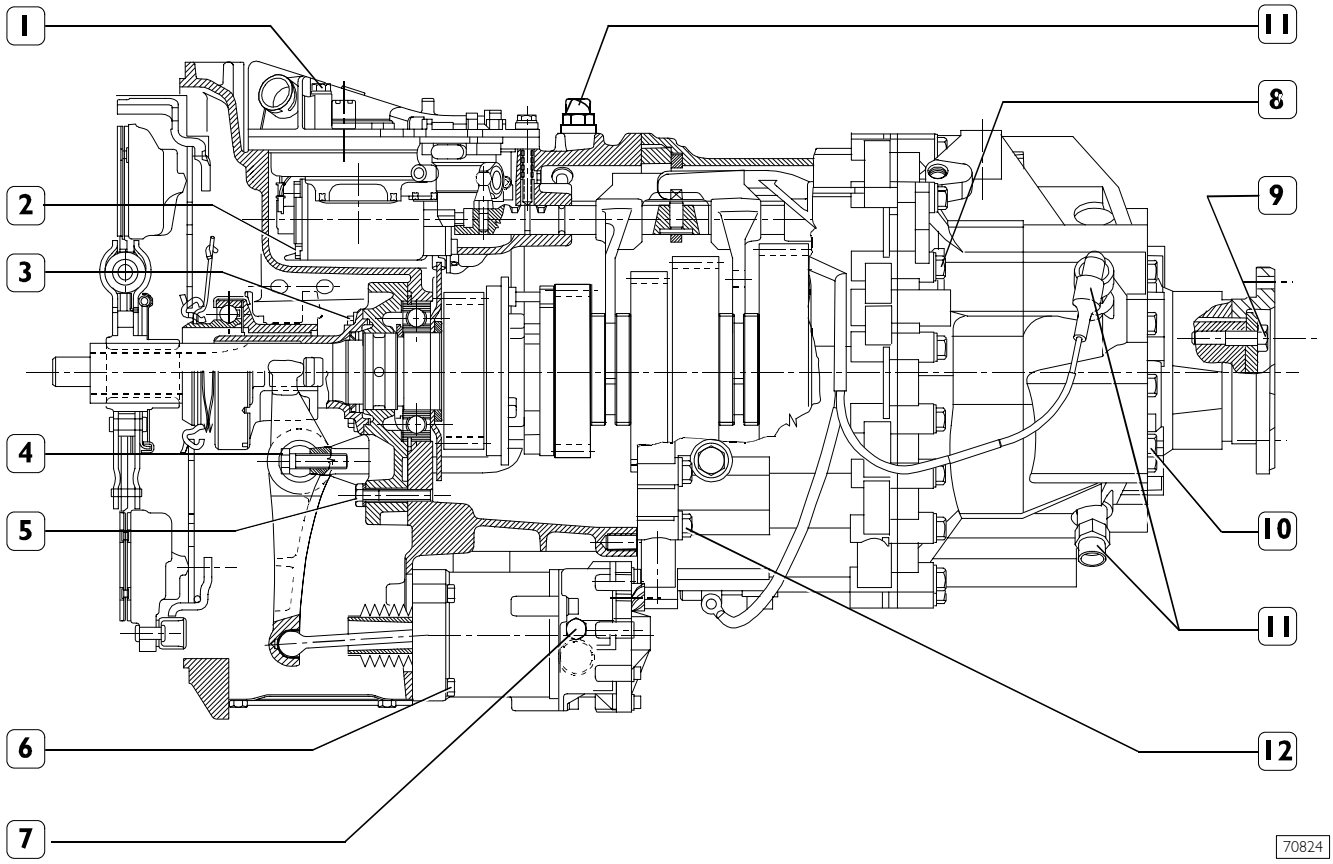
Figure 2



LONGITUDINAL CROSS-SECTION OF EUROTRONIC 12AS 2301 GEARBOX

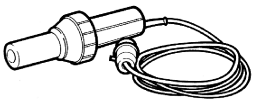
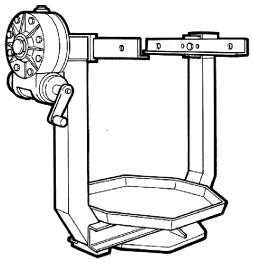
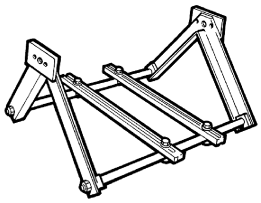
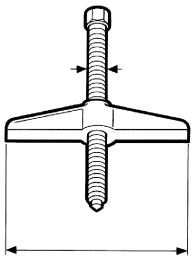
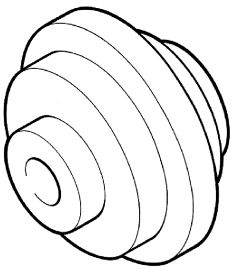
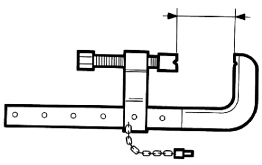
TIGHTENING TORQUES

Figure 3

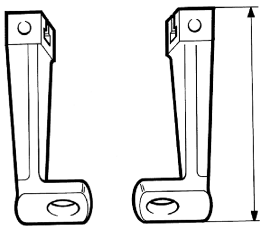
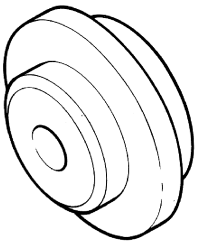
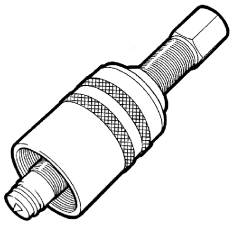
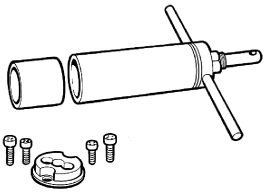
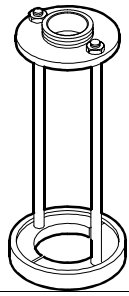
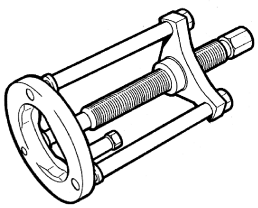


	DESCRIPTION	TORQUE	
		Nm	kgm
1	Screws fixing gearbox actuator	23	2.3
2	Screw fixing oil pump	10	1
3	Screws fixing drive input shaft cover	23	2.3
4	Screw fixing clutch uncoupling lever control pin: - M 12 8.8 - M 12 10.9	 79 115	 7.9 11.5
5	Screws fixing cover (spread LOCTITE 241 on the thread)	79	7.9
6	Screws fixing clutch actuator	23	2.3
7	Screw cap to discharge air from clutch actuator	22	2.2
8	Screws fixing rear box to middle box	46	4.6
9	Screws fixing flange retaining plate	120	12
10	Screws fixing rear cover	5	4.6
11	Speed sensor	45	4.5
12	Screws fixing middle box to front box	50	5
	Pin on rod (spread LOCTITE 262 on the thread)	23	2.3
	Oil vapour vent	10	1
	Screw plug M 10x1 on rear box	15	1.5
	Screw plug M 24x1 on rear box	60	6
	Screw M12 fixing power take-off bay cover	79	7.9
	Screw plug M 24x1.5 on middle box	60	6
	Screw fixing plates retaining fork joint pins on rear box	23	2.3

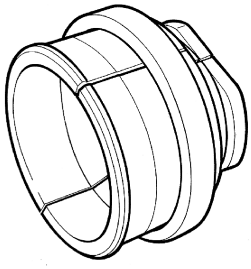
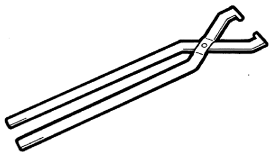
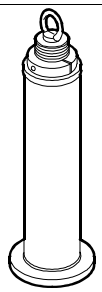
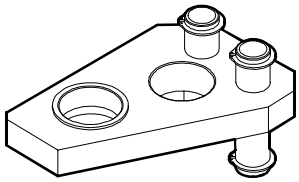
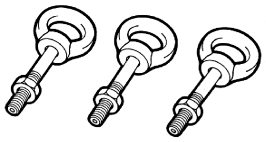
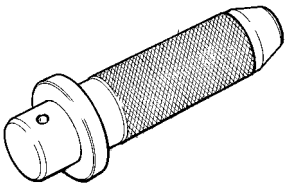
TOOLS

TOOL NO.	DESCRIPTION	
99305121		Hot air device
99322205		Rotary stand for overhauling assemblies
99322225		Mount to support assemblies (to fit onto stand 99322205)
99341003		Single-acting bridge
99341013		Reaction block
99341015		Clamp

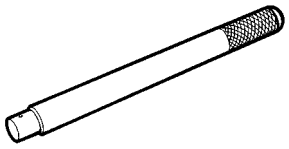
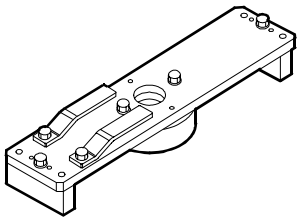
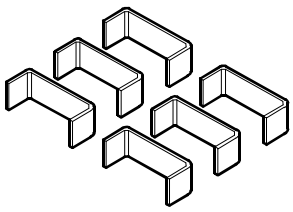
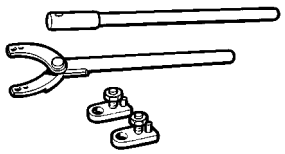
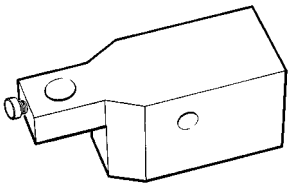
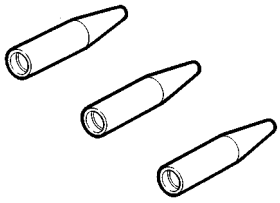
TOOLS

TOOL NO.	DESCRIPTION	
99341018		Pair of brackets with hole
99345057		Extractor reaction block
99345078		Extractor to remove drive input shaft bearing (use with 99345105)
993450998		Inserter to fit bearing on main shaft, rear side and to insert rear flange of gearbox
99345105		Extractor for gearbox drive input shaft bearing (use with 99345078)
99347100		Small extractor (use with specific rings with 99347132)

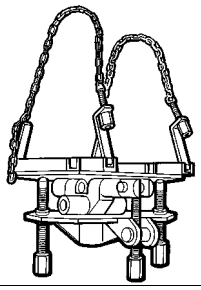
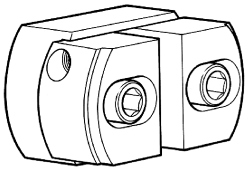
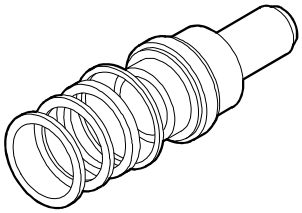
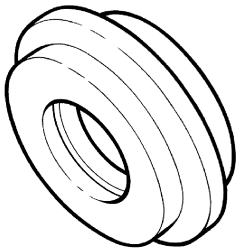
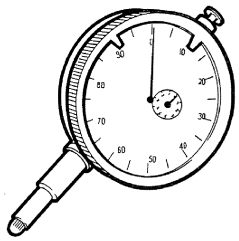
TOOLS

TOOL NO.	DESCRIPTION	
99347132		Ring grips to extract gearbox transmission shaft bearings (use with 99345057 - 99347100)
99360323		Tool to turn drive input shaft when refitting the gearbox to the engine
99360526		Tool to extract and insert main shaft (use with 99360527) and to drive in gearbox drive input shaft bearing (use with 99345098)
99360527		Tool retaining gearbox main shaft forks (use with 99360526)
99366811		Set of M10 eyebolts (3) to remove and refit gearboxes
99370006		Grip for interchangeable drifts

TOOLS

TOOL NO.	DESCRIPTION	
99370007		Grip for interchangeable drifts
99370153		Tool for positioning main shaft when removing the transmission shafts and for retaining gearbox reverse gear pins
99370172		Tools (6) to mount gearbox epicyclic reduction gear train synchronizer rings
99370317		Reaction lever with extension to fasten drive output flange
99370415		Dial gauge base to adjust transmission shaft bearings (use with 99395604)
99370499		Guides (no. 3) to mount Splitter synchronizing device assembly

TOOLS

TOOL NO.	DESCRIPTION	
99370629		Mount to support gearbox when removing and fitting it back on the vehicle
99374092		Drift to mount outer races of bearings (69 ÷ 91) (use with 99370007)
99374221		Driver to mount seals on back cover
99374336		Driver to fit seals on the front cover of the gearbox (use with 99370006)
99395604		Dial gauge (0 - 10 mm)

530210 OVERHAULING THE GEARBOX

Wash the assembly thoroughly before overhauling.

The specific and/or general tools must be used in the way for which they were designed.

To facilitate assembly, put the removed parts away on the specific tray in their order of removal.

Upon assembly, the following must always be replaced with new parts: the gaskets and seals, spring pins, safety plates and springs. Nuts and screws must be tightened to the prescribed torque with their thread dry and degreased.

Keep to the specific regulations when disposing of lubricant and detergents.

Checks

The gears, synchronizer rings, coupling bodies and sliding couplings must show no sign of failure or excessive toothing wear.

The main shaft must have no indentation, especially on the sliding surfaces of the gear rotation and coupling sleeves.

The reverse idle gear shafts must have a polished surface free from scoring.
The gearboxes must show no sign of cracking and the bearing seats must be neither damaged nor worn, so as to prevent the outer rings of the bearings from turning in their seats.

Check the shoulder spacers are neither worn nor damaged.

The gear coupling forks must show no sign of cracking and the relevant control rods must slide freely, but without any appreciable play, in their guide seats.

Check that the shoes of the drive forks are fully efficient.

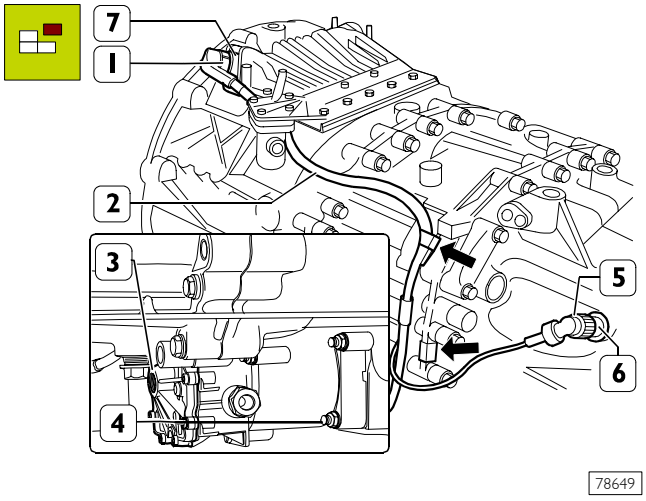
Check that the holes, grooves and lubrication pipes are not obstructed by grease or foreign bodies.

Check the bearings are not worn, damaged or overheated.

The following described and illustrated overhaul operations regard transmission 16 A6 2601 and, save different indications, are valid also for transmission 12 AS 2301.

530520 Gearbox actuator Removal

Figure 4

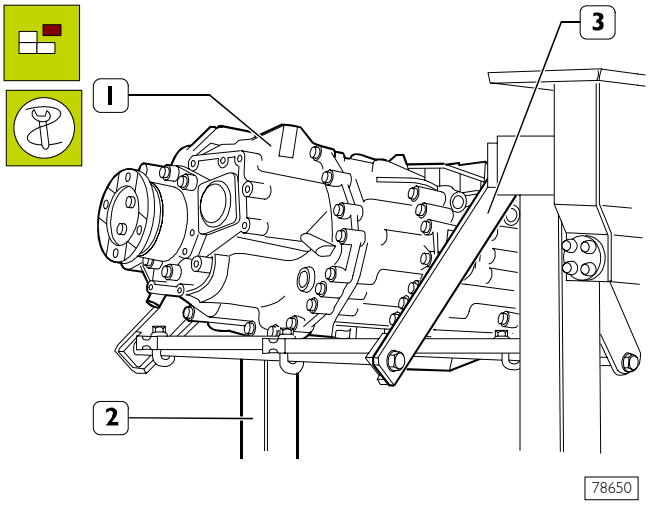


Unscrew the ring nut (1 and 5) and disconnect the electric wiring (2) from the speed sensor (6 and 7).

Detach the wiring (2) from the clips (→) securing it to the middle box.

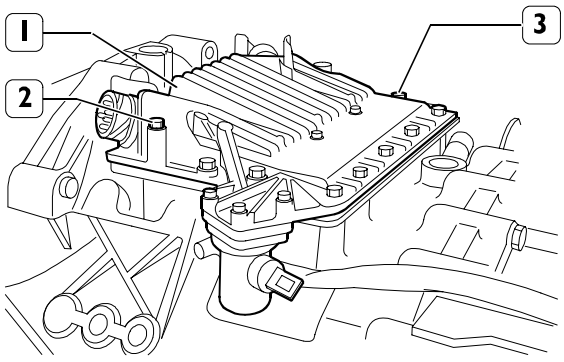
Remove the nuts (4) and detach the actuator (3) from the front box.

Figure 5



Fasten the gearbox (1) to brackets 99322225 (3) on the rotating stand 99322205 (2).
Remove the plug and bleed the lubrication oil.

Figure 6



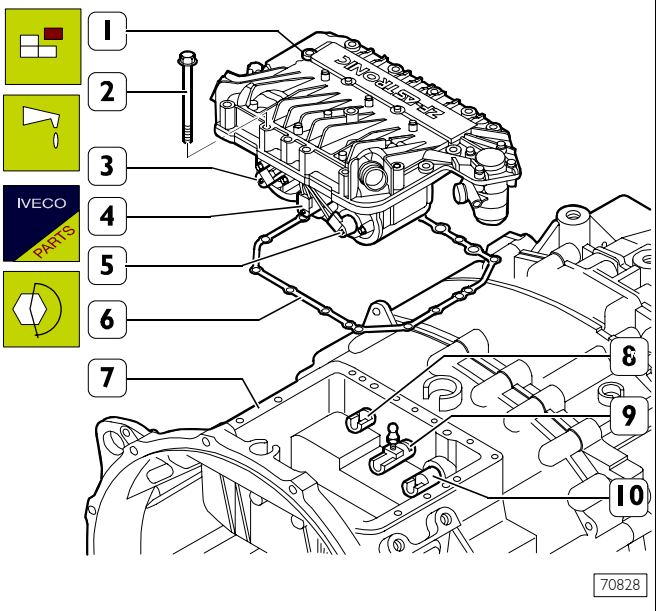
Take out the screws (2) and detach the actuator (1) with its gasket.

The electronic control unit is integrated in the actuator and these cannot be overhauled. See under the diagnosis heading for the check.

Check that the oil vapour vent (3) is not clogged; if it is, clean it.

Refitting

Figure 7

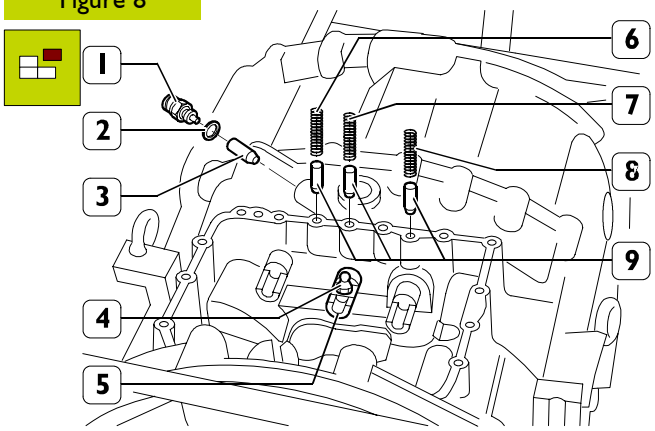


Set a new gasket (6) on the front case (7).

Lubricate the stems of the solenoid valves (3-4-5) with silicone grease and put them into a neutral position. Put the rods (8-9-10) into a neutral position. Fit the actuator (1) on the front box (7) verifying that the end of the stems of the solenoid valves is correctly positioned in the seats of the rods (8-9-10). Tighten the fixing screws (2) to the prescribed torque. After removing the gearbox from the stand used for overhaul, refit the clutch actuator (3, Figure 4) and make sure the wiring (2, Figure 4) is not damaged.

Removing the rear box

Figure 8



Disconnect speed actuators (1) as described in the relevant chapter.

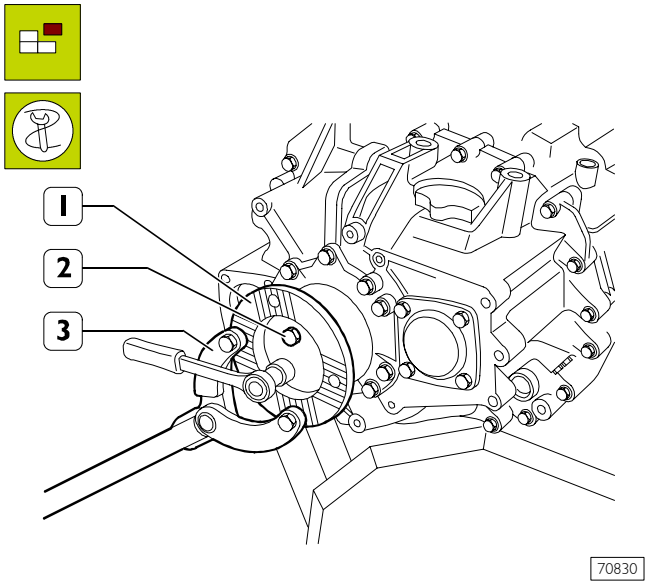
Extract the springs (6-7-8) and the pawls (6).

The springs (7 and 8) are of equal length, the spring (6) is larger.

Remove the pin (4) from the rod (5).

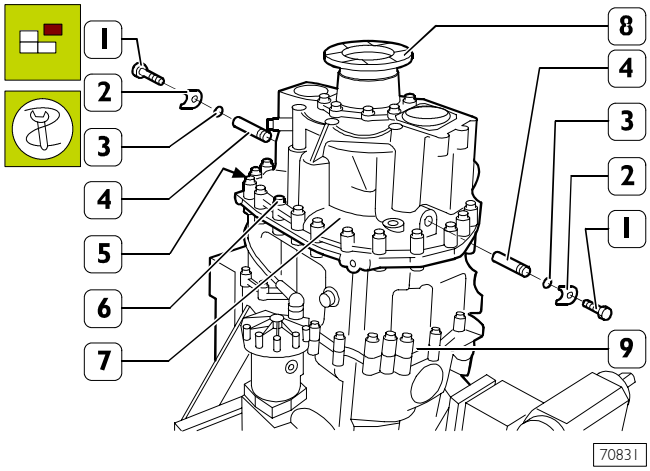
Remove the switch (1) together with the gasket (2) and extract the cap (3).

Figure 9



Block rotation of the sleeve (1) by applying the lever 99370317 (3) and slightly loosen the screws (2).

Figure 10



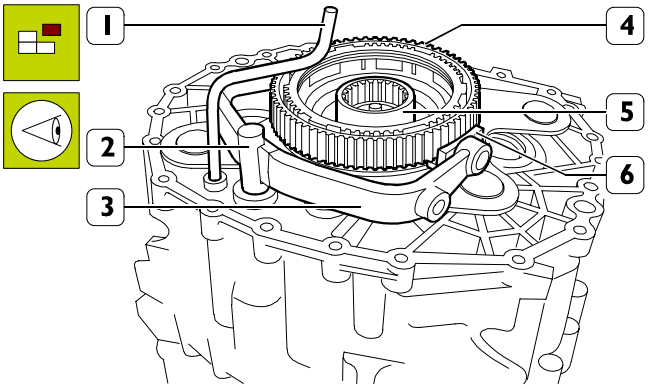
70831

Remove the screws (1) fixing the plates (2) fastening the pins (4) and extract these together with the seal (3) from the rear box (7).

Extract the two centring pins (5). Remove the screws (6).

Fit the eyebolt 99366811 to the sleeve (8) and, using special ropes and lifter, detach the rear box (7) from the middle one (9).

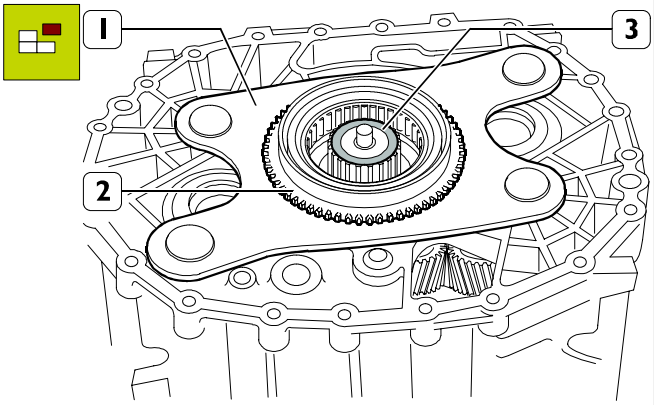
Figure 11



70832

Remove the oil pipe (1). Note down the assembly position of the fork (3) and plugs (6) and remove them. Remove: the rod (2), synchronizing device assembly (4) and connecting sleeve (5).

Figure 12

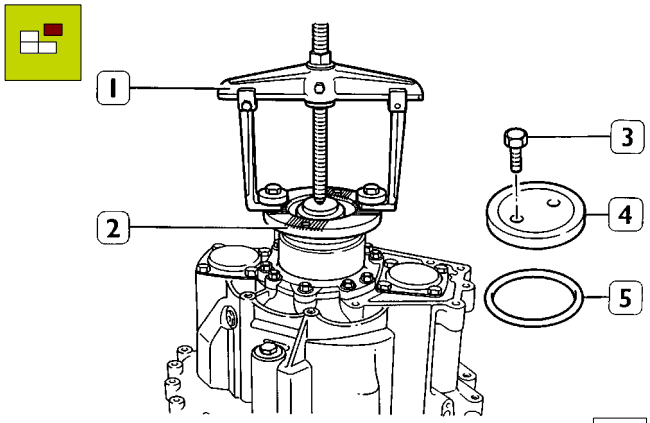


70833

Remove the adjustment ring (3) and the plate (1) together with the coupling body (2).

Removing the rear box

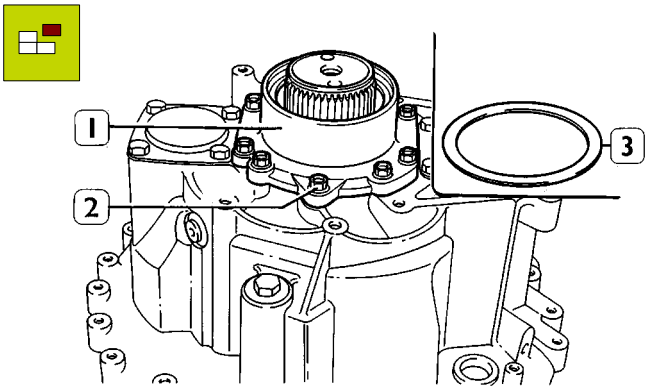
Figure 13



70834

Remove the screws (3), disc (4) and seal (5) and extract the sleeve (2) from the spider shaft. Should extraction prove difficult, use an extractor (1) applied as illustrated in the figure.

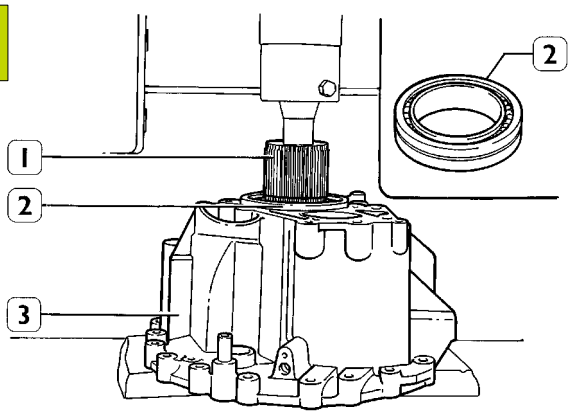
Figure 14



70835

Remove the screws (2) and take off the cover (1). Remove the spider shaft bearing end float adjustment ring (3).

Figure 15

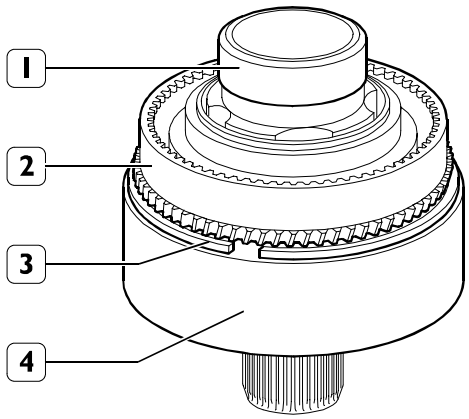


45946

Using a press, extract the spider shaft (1) from the supporting roller bearing (2). Turn the rear box (3) upside-down and extract the roller bearing (2).

Removing the epicyclic reduction gear train (E.R.G.)

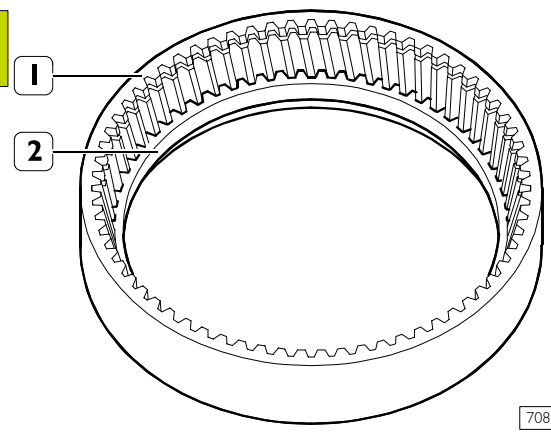
Figure 16



70836

Using a screwdriver, remove the circlip (3) fastening the ring gear with internal toothing (4) to the ring gear with external toothing (2) and remove them from the E.R.G. (1).

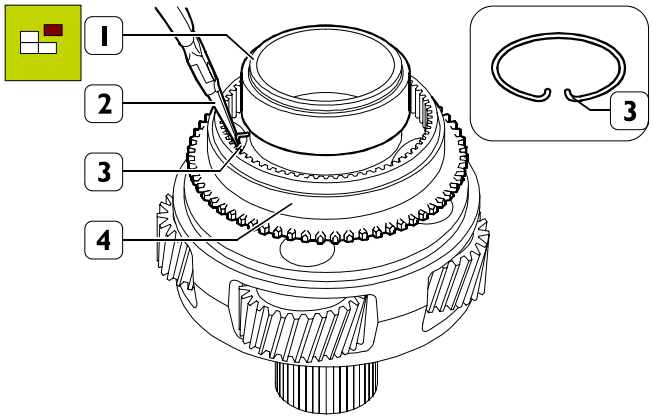
Figure 17



70837

Extract the toothed ring (2) from the ring gear with internal toothing (1).

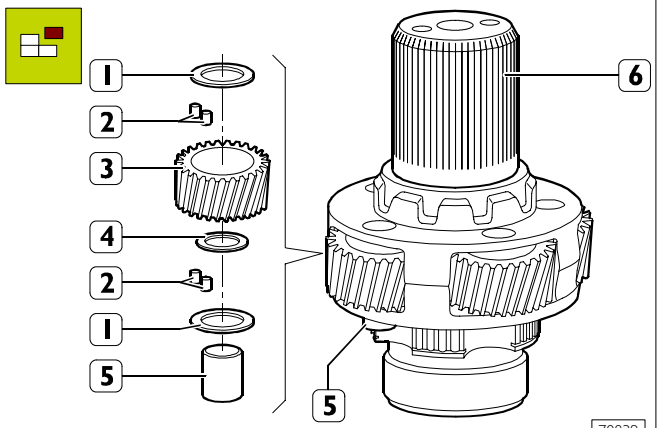
Figure 18



70838

Using pliers (2), tighten the ends of the circlip (3) and remove the coupling body (4) from the E.R.G. shaft (1).

Figure 19

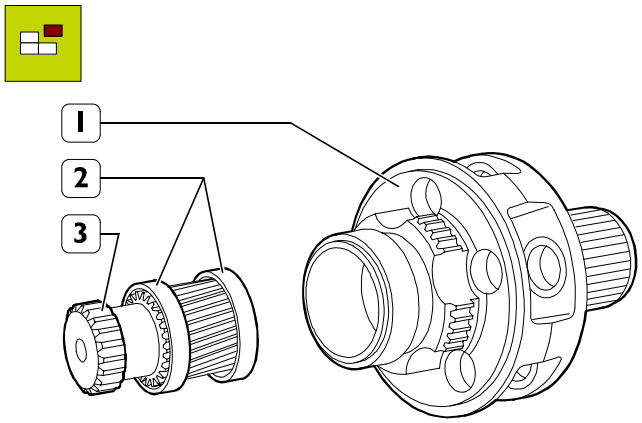


70839

Using a punch, extract the pins (5) from the spider shaft (6).

Remove the planetary gears (3) from the spider shaft (6), together with the rollers (2) and shim adjustment rings (1 and 4).

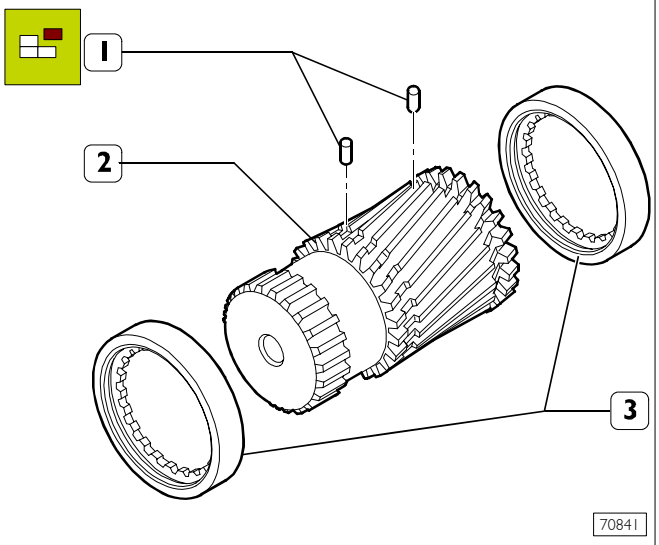
Figure 20



70840

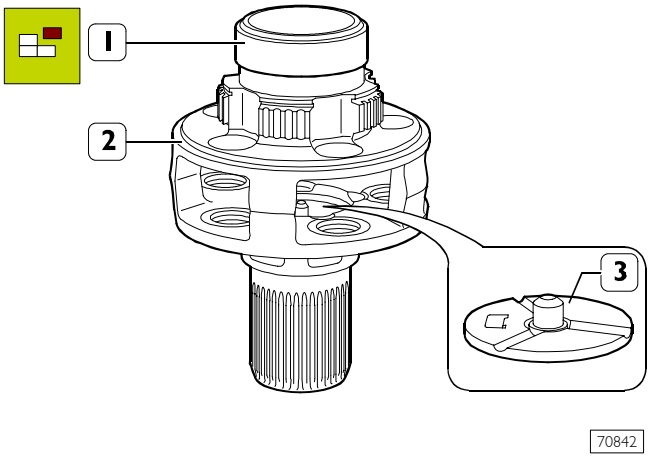
Extract the toothed shaft (3) from the spider shaft (1) together with the rings (2).

Figure 21



Extract one of the pins (1) from the toothed shaft (2) and extract the rings (3) from this.

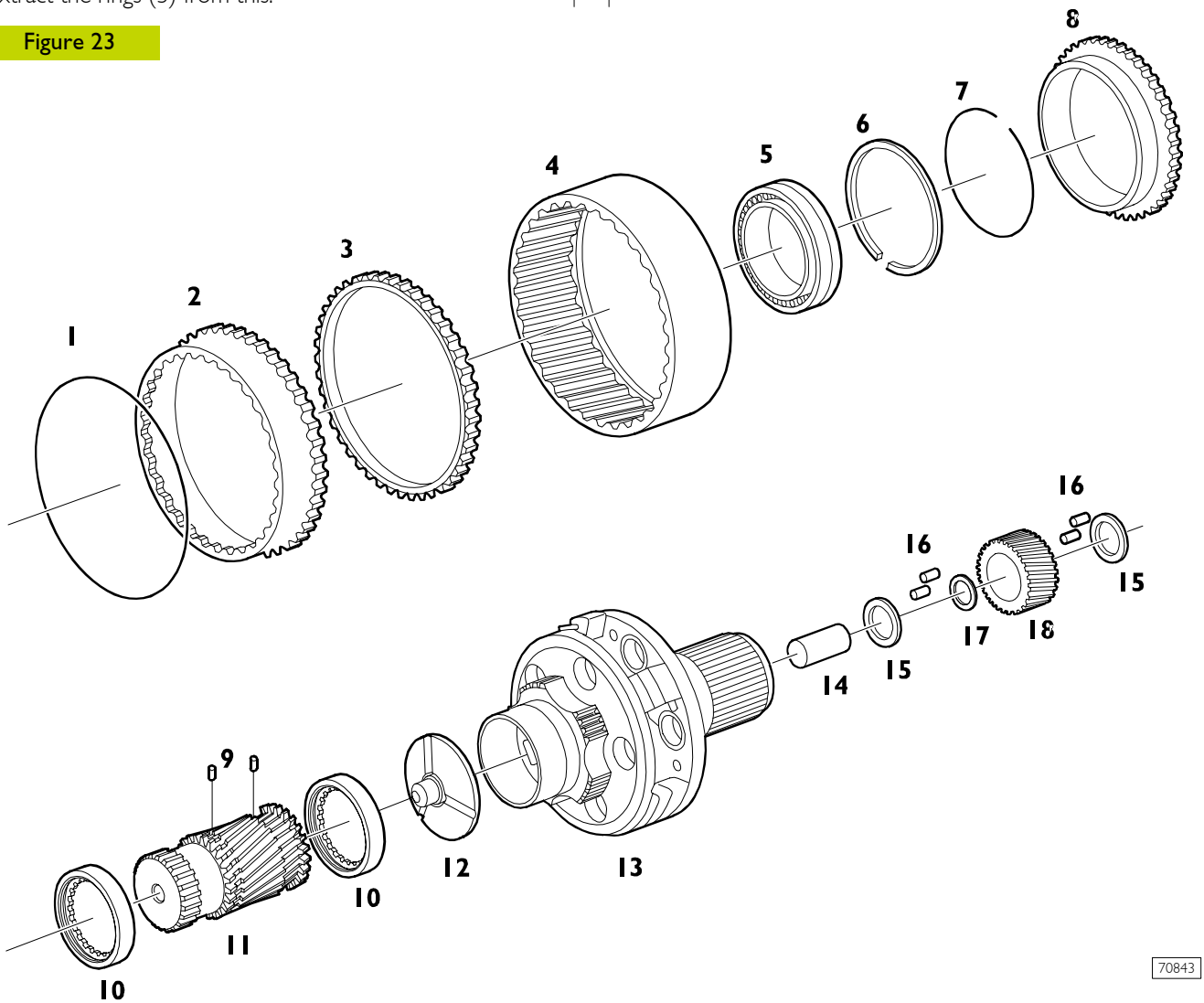
Figure 22



Using a suitable extractor, remove the roller bearing ring (1) from the spider shaft (2).

Using a punch, extract the disc (3) from the inside of the spider shaft (2).

Figure 23

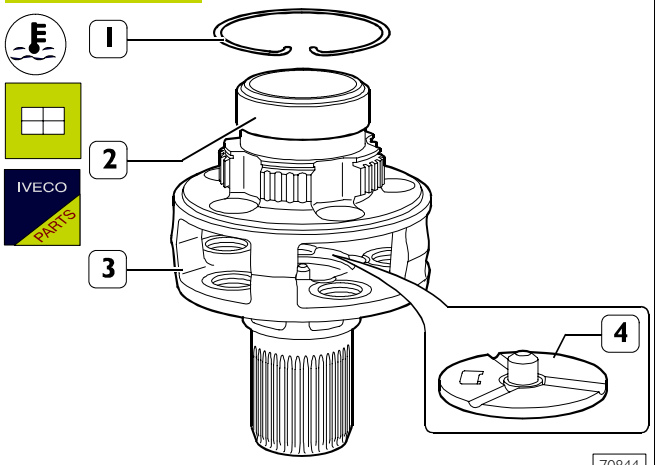


PARTS COMPRISING THE E.R.G.

1. Circlip - 2. Ring gear with external toothing - 3. Toothed ring - 4. Ring gear with internal toothing - 5. Bearing - 6. Circlip - 7. Circlip - 8. Coupling body - 9. Pins - 10. Ring - 11. Toothed spindle - 12. Disc - 13. Spider shaft - 14. Pin - 15. Shim adjustment ring - 16. Rollers - 17. Shim adjustment ring - 18. Planetary gear.

Fitting the epicyclic reduction gear train (E.R.G.)

Figure 24

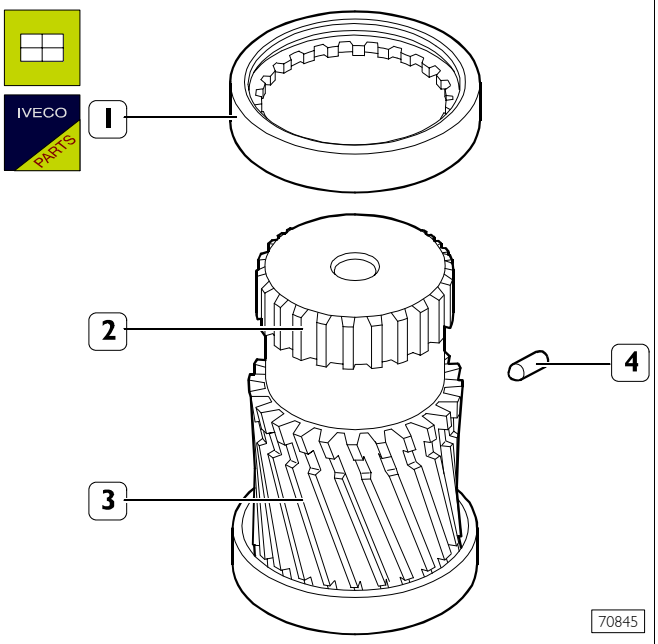


70844

Heat the inside ring (2) of the roller bearing to 120°C and fit it on the spider shaft (3).

Fit on the circlip (1). Fit on the disc (4).

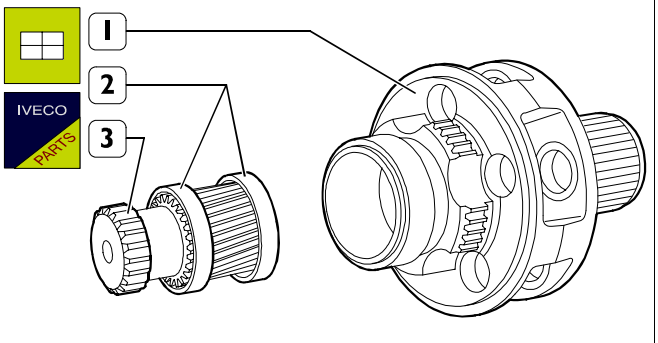
Figure 25



70845

Drive the rings (1 and 3) onto the toothed spindle (2) and fit on the pin (4).

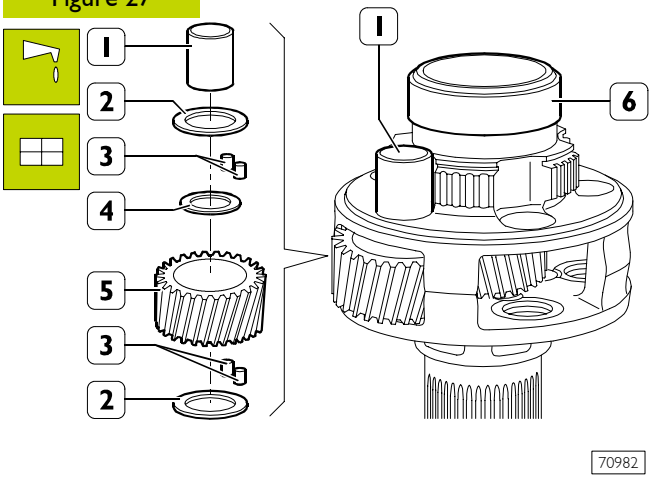
Figure 26



70840

Insert the spindle (3) together with the rings (2) onto the spider shaft (1).

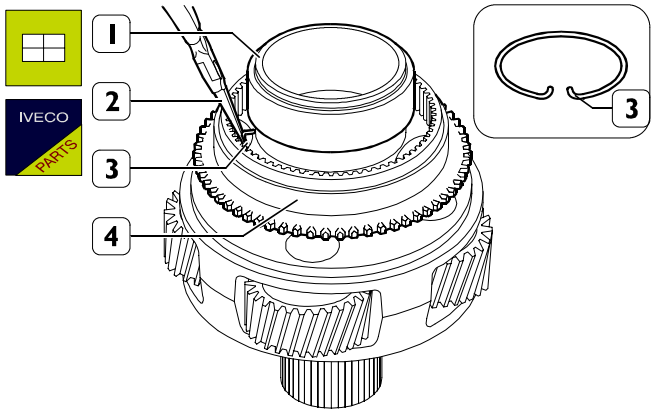
Figure 27



70982

Smear grease into the hole of the planetary gear (5) and insert the rollers (3) with the associated shim adjustment rings (2 and 4). Fit the planetary gears (5) onto the spider shaft (6), fastening them to it with the pins (1).

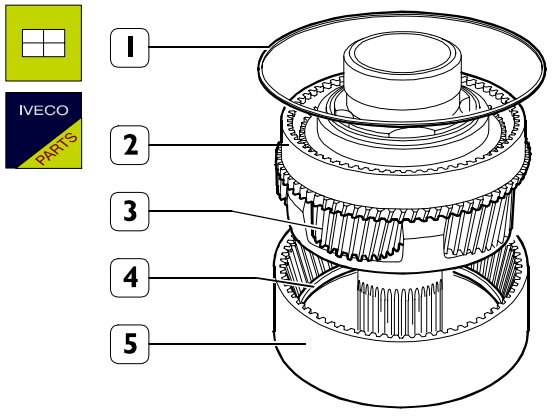
Figure 28



70838

Using pliers (2), tighten the ends of the circlip (3) and fit the coupling body (4) onto the E.R.G. shaft (1).

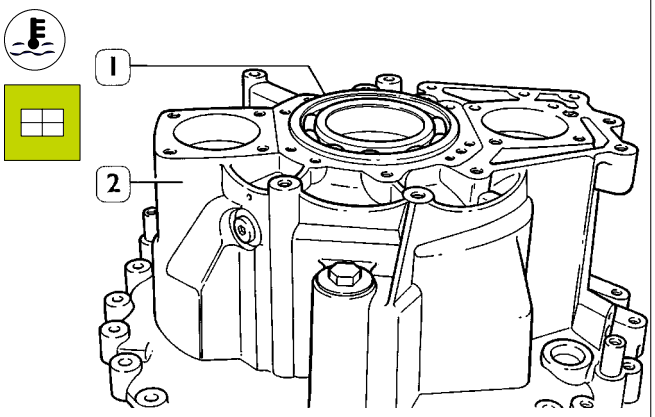
Figure 29



70983

Fit the ring gear with internal toothing (5) onto the spider shaft (3) together with the toothed ring (4), and the ring gear with external toothing (2) and fasten the two ring gears with the circlip (1).

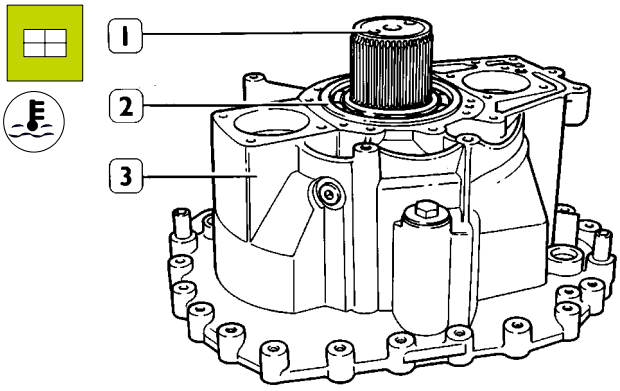
Figure 30



45951

Heat the seat of the bearing (1) of the rear box (2) to 120°C and mount the bearing (1).

Figure 31



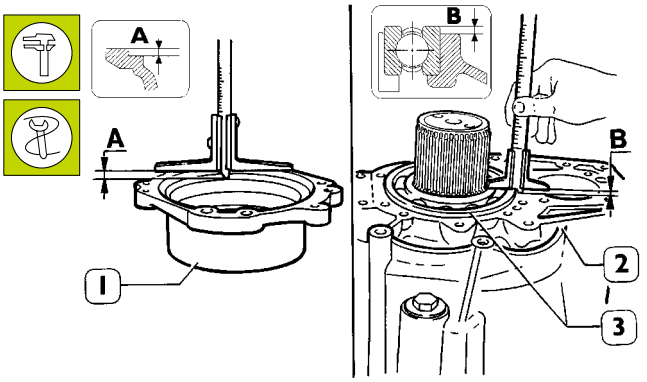
45943

Rest the spider shaft (1) on an appropriate spacer.

Heat the inside ring of the bearing (2) to 120°C and drive it together with the rear box (3) onto the spider shaft (1).

Adjusting epicyclic reduction gear train bearing end float

Figure 32



70847

Determine the ball bearing end float adjustment thickness (3) by proceeding as follows:

- ❑ measure the depth of the seat on the cover (1) of the bearing (3), distance **A**;
- ❑ measure the protrusion of the bearing (3) from the surface of the rear box (2), distance **B**.

The thickness S of the adjustment ring is determined by the following equation:

$$S = (A - B) - C$$

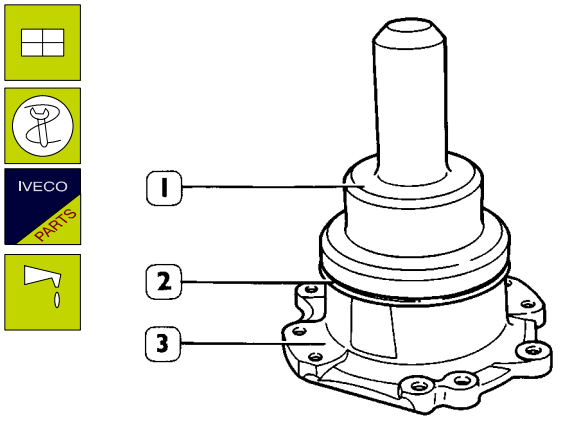
Where:

A and **B**	=	measurements
C	=	end float 0÷0.1 mm

For example:

A	=	5.4 mm
B	=	5 mm
C	=	0÷0.1 mm
S	=	(5.4 - 5) - (0÷0.1 mm) = 0.3 ÷ 0.4 mm

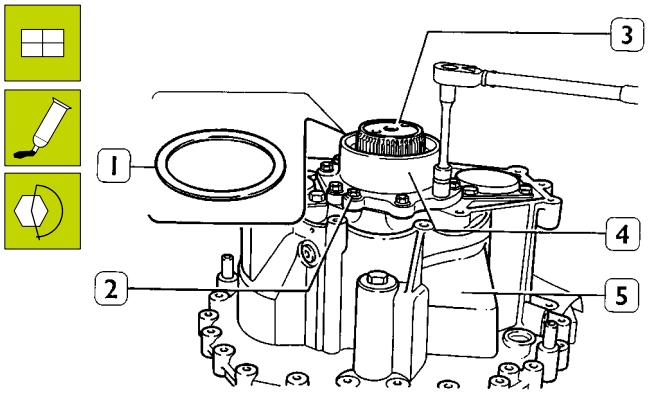
Figure 33



45954

Using the driver 99374221 (1), fit the seal (2) in the cover (3).

Figure 34

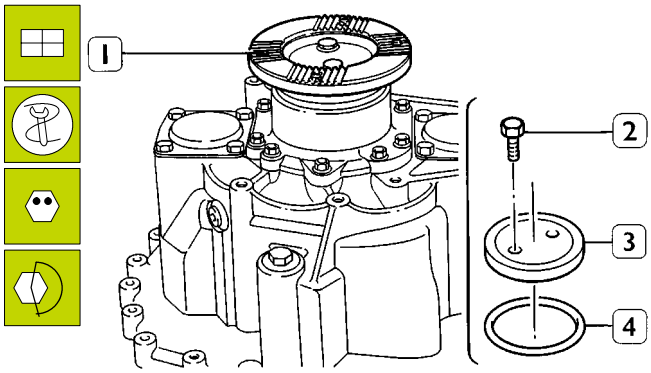


70848

Mount the adjustment ring (1), of the thickness determined in the preceding measurement, on the bearing (2, Figure 31) of the spider shaft (3).

Spread IVECO sealant 1905685 on the mating surface of the cover (4) with the box (5) and fit it onto the box, tightening the screws (2) to the prescribed torque.

Figure 35

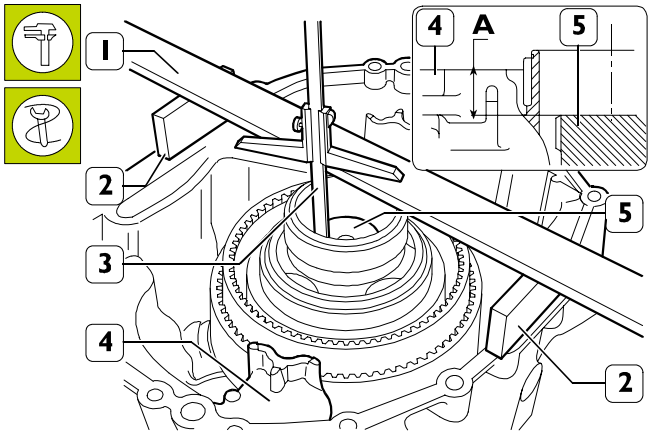


70849

Heat the sleeve (1) to 90°C and fit it onto the spider shaft (1). Fit on a new seal (4), the disc (3) and screws (2) and tighten them to the prescribed torque.

Adjusting main shaft end float

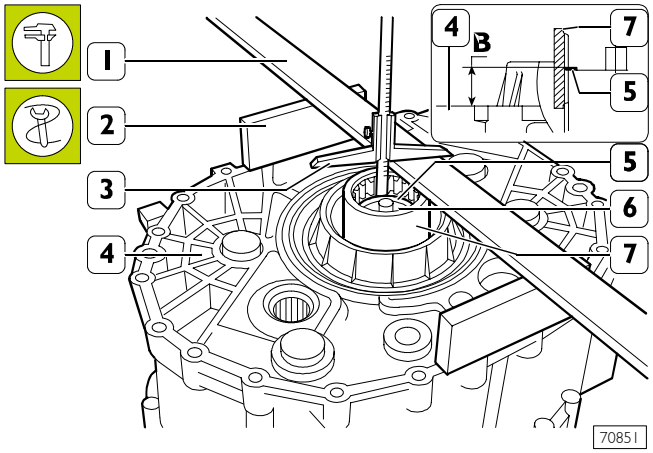
Figure 36



70850

Position two calibrated blocks (2) on the rear box (4). Place a calibrated rule (1) on them and, using a depth gauge (3), measure the distance between the top side of the rule and the end of the spider shaft (5), distance **A**.

Figure 37



Fit the connecting sleeve (7) together with the circlip (5) on the main shaft (6).

Position two calibrated blocks (2) on the middle box (4) and place a calibrated rule (1) on them.

The calibrated blocks and rule must be the same ones used in the preceding measurement.

Using a depth gauge (3), measure the distance between the top end of the circlip (5) and the top side of the calibrated rule (1), distance **B**.

The thickness **S** of the main shaft end float adjustment ring is determined by the following equation:

$$S = (A - B) - 2$$

For your information (see Figure 39), subtracting the thickness of the calibrated blocks and rule:

- from the distance **A** gives the distance **X** corresponding to the distance between the end of the spider shaft (2) from the mating surface of the rear box (1).
- from the distance **B** gives the distance **Y** corresponding to the distance between the circlip (4) and the mating surface of the middle box (3).

Figure 38

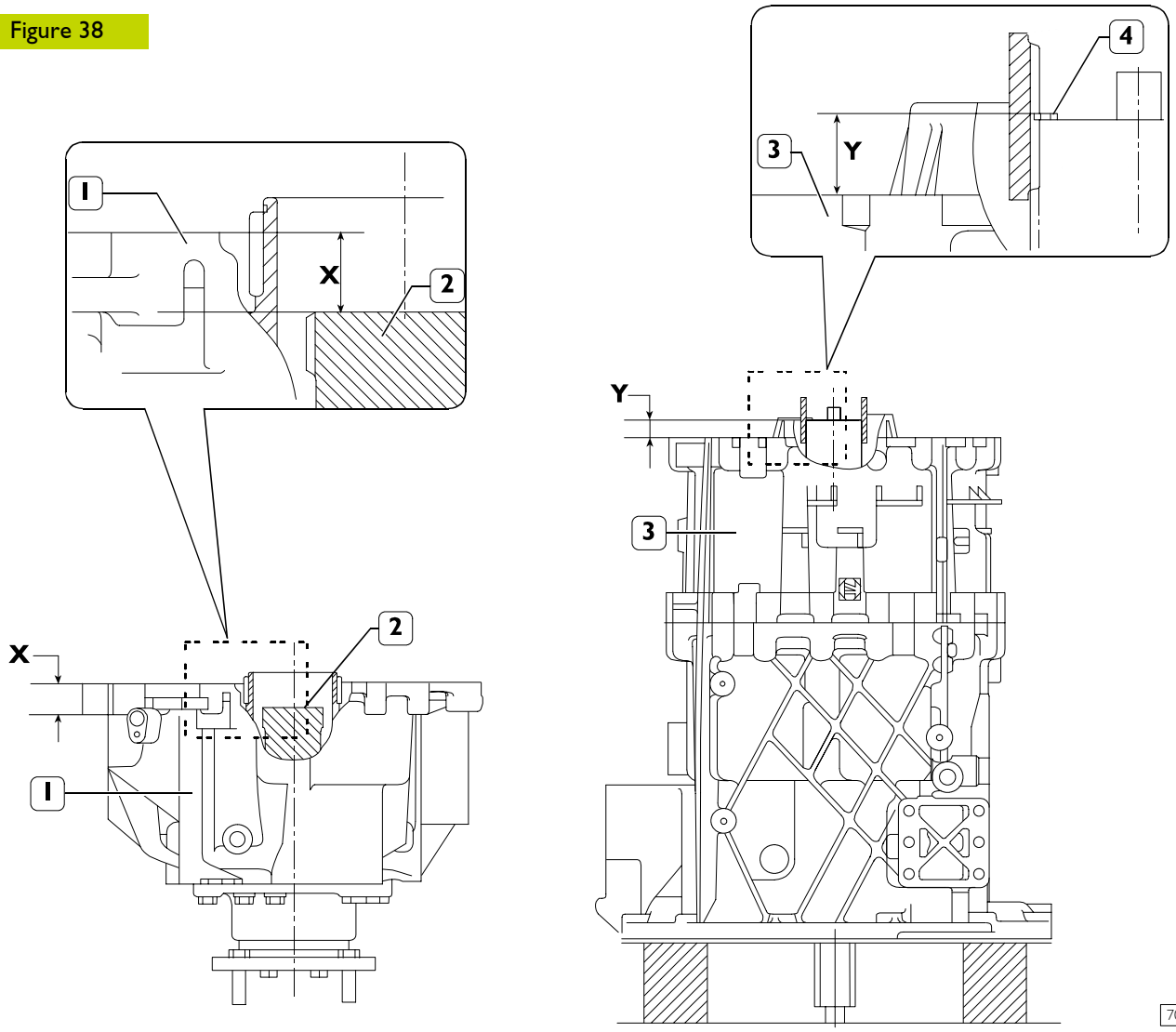
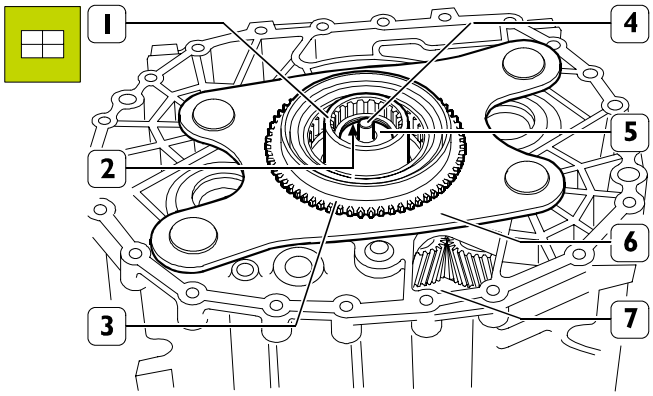


Figure 39



70853

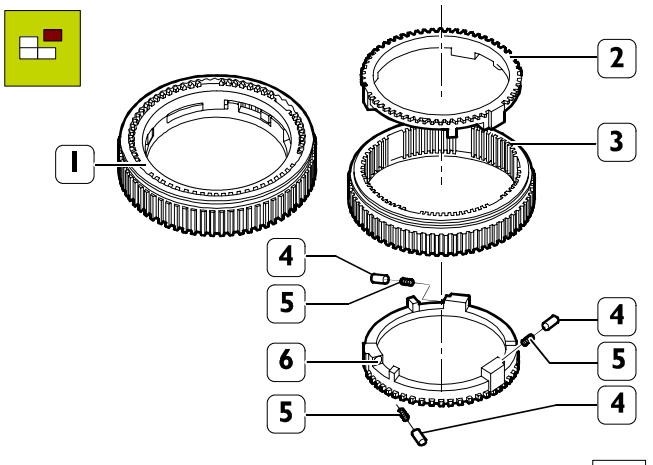
Position the adjustment ring (2) (of the thickness determined in the preceding measurements) on the main shaft (5). Mount the connecting sleeve (1) and the tube (4).

Mount the plate (6) together with the coupling body (3).

Synchronizing device assembly for engaging normal or reduced gears

Removal

Figure 40



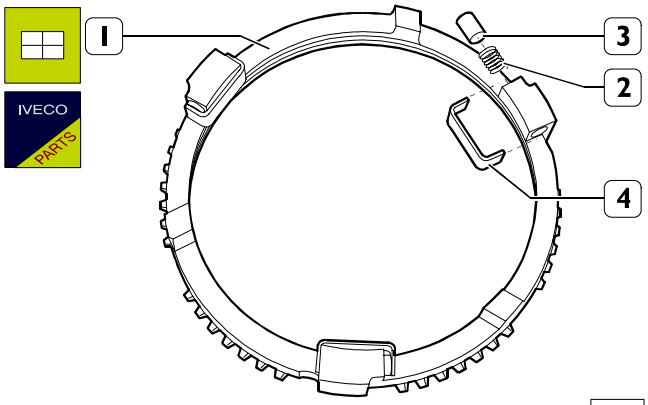
70854

1. Synchronizing device assembly - 2. Synchronizing device ring - 3. Sliding sleeve - 4. Pawl - 5. Spring - 6. Synchronizing device ring.

Put a cloth on the synchronizing device assembly (1) so that, when dismantling it, the springs (5) and pawls (4) are held back as they come out of their seats.

Fitting

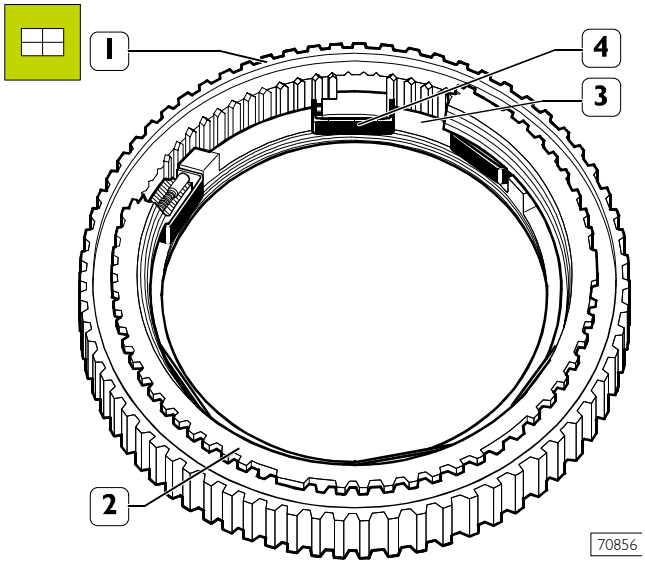
Figure 41



70855

Put the springs (2) and pawls (3) into the seats of the synchronizing device rings (1) and fasten them with the tools 99370172 (4).

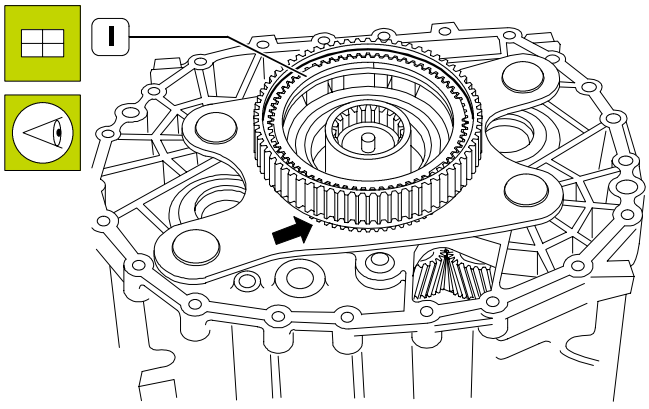
Figure 42



70856

Position the synchronizing device ring (2) on the synchronizing device ring (3) so that it is possible to fit the sliding sleeve (1) onto them. On completing assembly, remove the tools 99370172 (4).

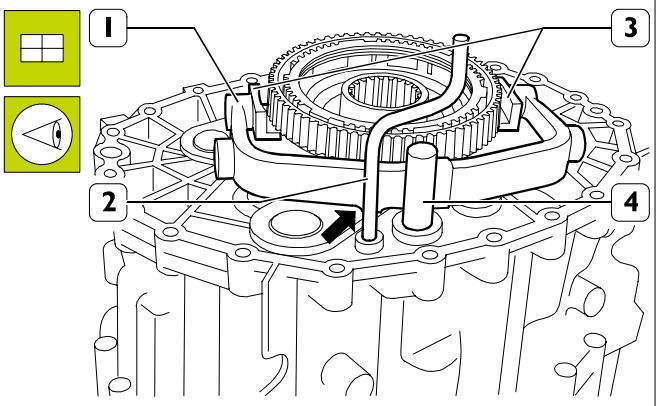
Figure 43



70857

Fit the synchronizing device assembly (1) on the coupling body (3, Figure 39) with the ring groove (→) facing downwards.

Figure 44

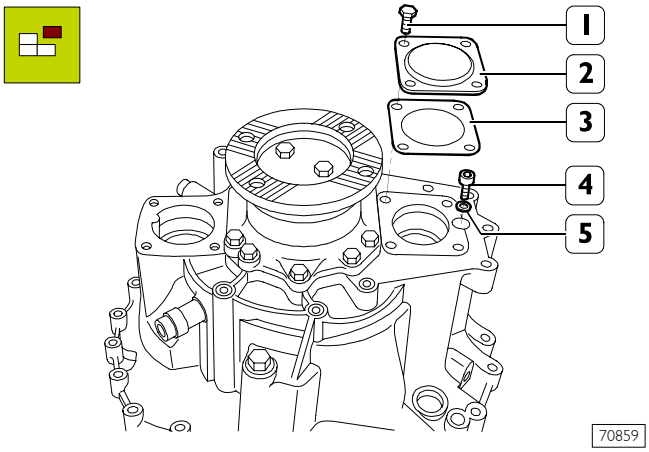


70858

Position the fork (1) with the plugs (3) and the reliefs (◗) facing as illustrated in the figure.

Fit on the rod (4) and connect it to the fork (1). Fit on the oil pipe (2).

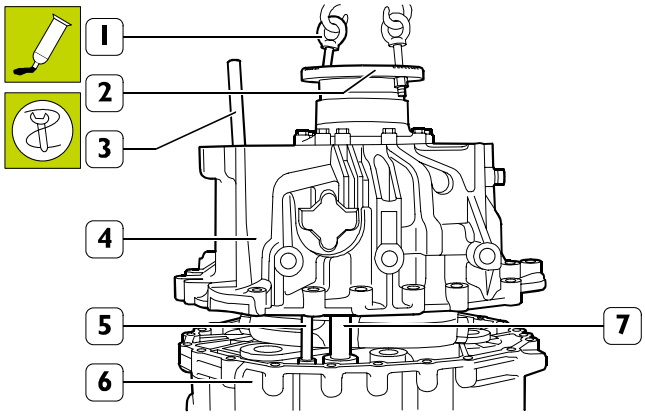
Figure 45



70859

Take out the screws (1) and remove the cover (2) with its seal (3). Remove the screw (4) with the washer (5).

Figure 46

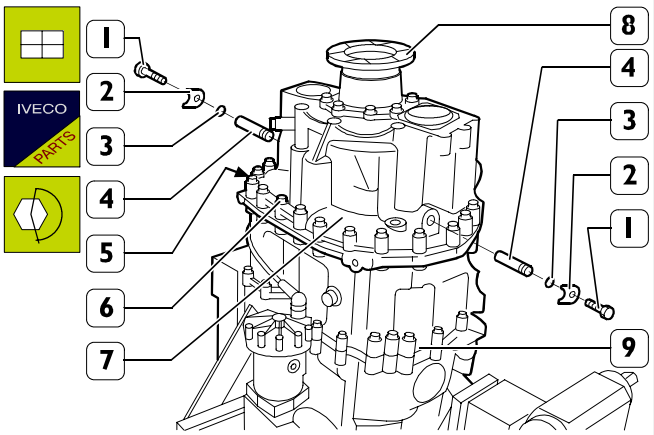


70860

Spread IVECO sealant 1905685 onto the mating surface of the middle box (6). Fit the eyebolts 99368811 (1) to the sleeve (2). Using ropes and a lifter, position the rear box (4) coaxially to the middle one (6).

Insert the rod (3) of appropriate diameter in the hole for the screw (4, Figure 45) and in the oil pipe (5) to guide this into its seat, while lowering the rear box (4). Lower the rear box (4), paying attention that the spider shaft, oil pipe (5) and rod (7) go into their seat correctly.

Figure 47

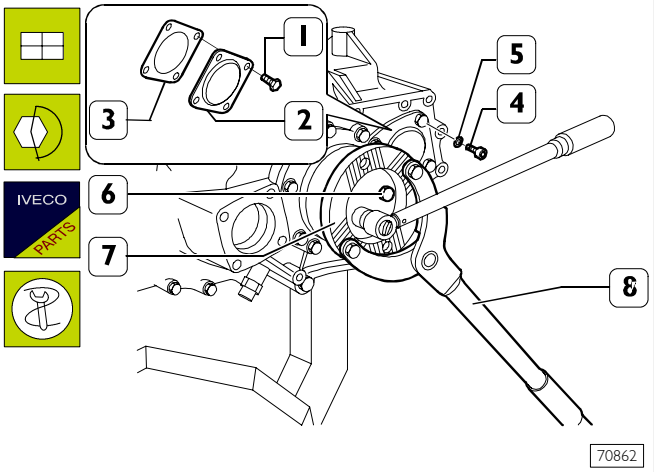


70831

Screw down the screws (6) without tightening them; insert the centring pins (5) and tighten the screws (6) to the prescribed torque.

Fit the fork joint pins (4) with fresh seals (3) and tighten the screws (1) fixing the fastening plates (2) to the prescribed torque.

Figure 48



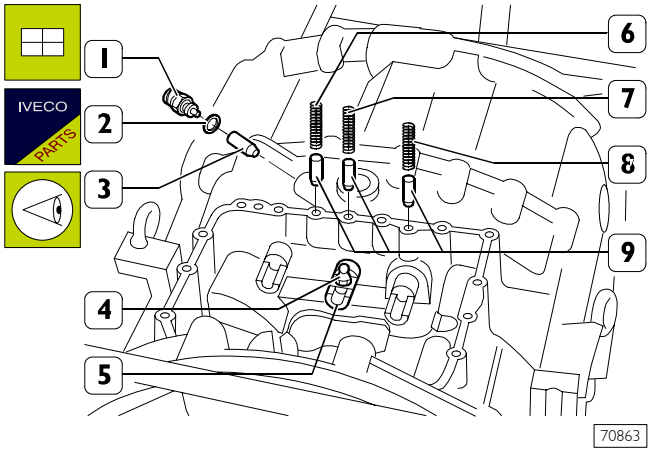
70862

Fit: the screw (4) with a new washer (5) and tighten it to the prescribed torque.

Fit the cover (2) with a fresh seal (3) and tighten the fixing screws (1) to the prescribed torque.

Block rotation of the sleeve (7) by applying the lever 99370317 (8) and tighten the fixing screws (6) to the prescribed torque.

Figure 49

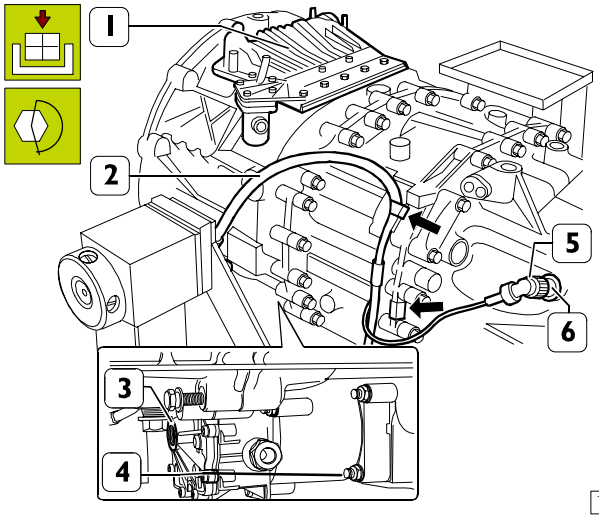


Fit the cap (3) and the switch (1) with a new gasket (2). Spread LOCTITE 262 onto the thread of the pin (4), screw it onto the rod (5) and tighten them to the prescribed torque.

Fit the pawls (9) and the springs (6-7-8).

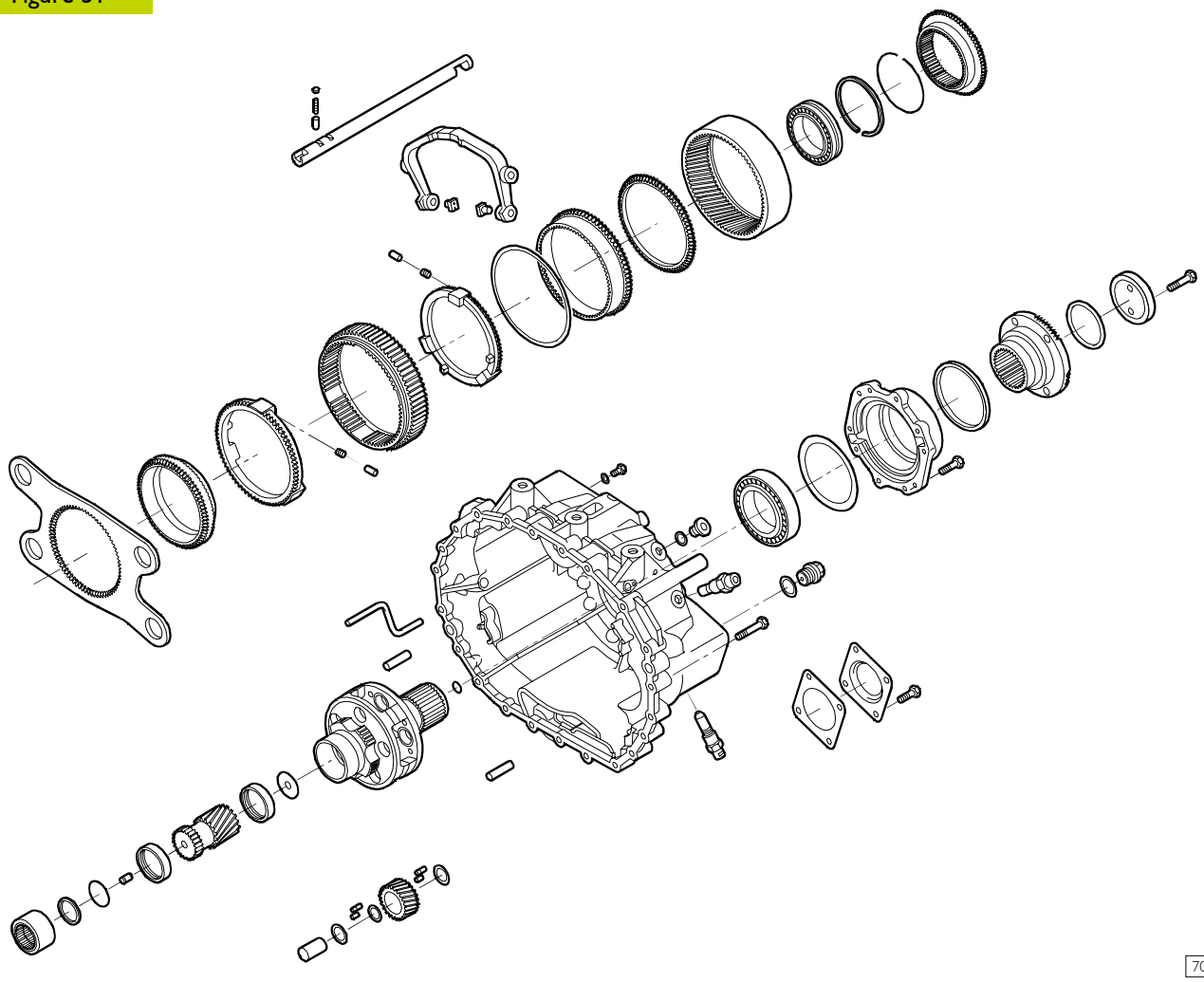
The springs (7 - 8) are of equal length, the spring (6) is larger.

Figure 50



Refit the gear actuator (1) as described under the relevant heading.
Connect the electric wiring (2) to the speed sensor (6), tighten the fixing ring nut (5) and secure the wiring (2) to the box by inserting it in the clips (→).
Remove the transmission from the rotating stand.
Refit the clutch actuator (3) and tighten the nuts (4) to the prescribed torque.

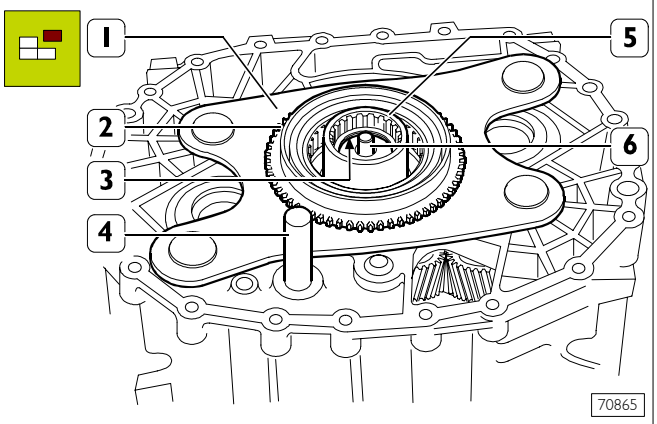
Figure 51



COMPONENT PARTS OF THE REAR BOX OF THE EPICYCLIC REDUCTION GEAR TRAIN

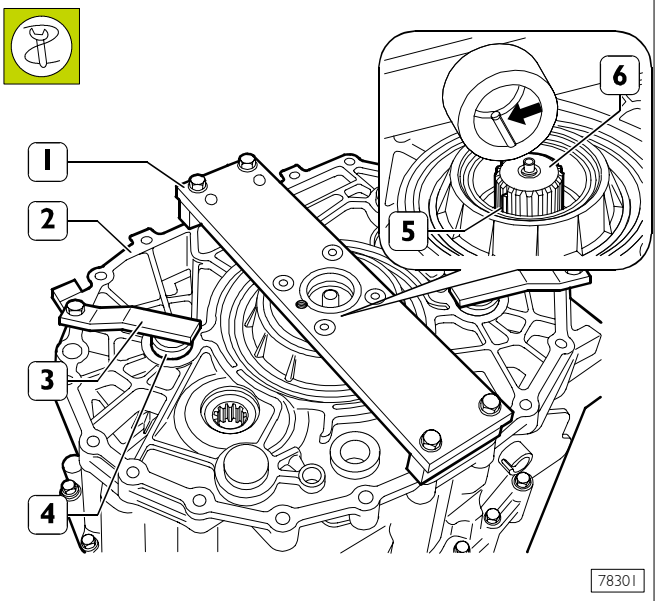
Removing the middle box

Figure 52



Detach the gear actuator and the rear box as described under the relevant headings. Remove the E.R.G. drive rod (4), connecting sleeve (5), adjustment ring (3) and the plate (1) together with the coupling body (2).

Figure 53

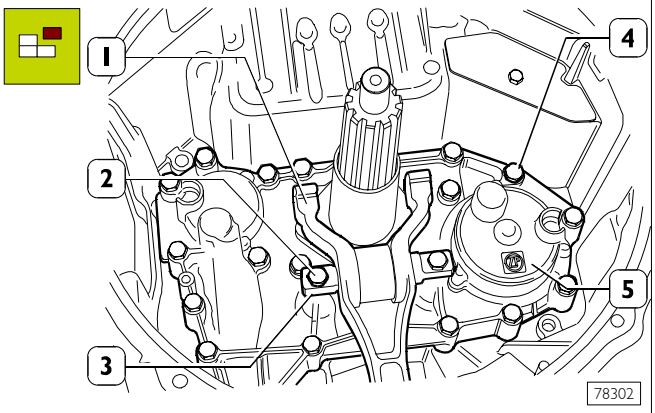


Fit the plate 99370153 (1) to the middle box (2) so that the groove inside the plate coincides with the key (5) of the main shaft (6).

Fasten the pins (4) by fitting the brackets (3) of the plate 99370153 to the middle box (2).

Turn the gearbox through 180°.

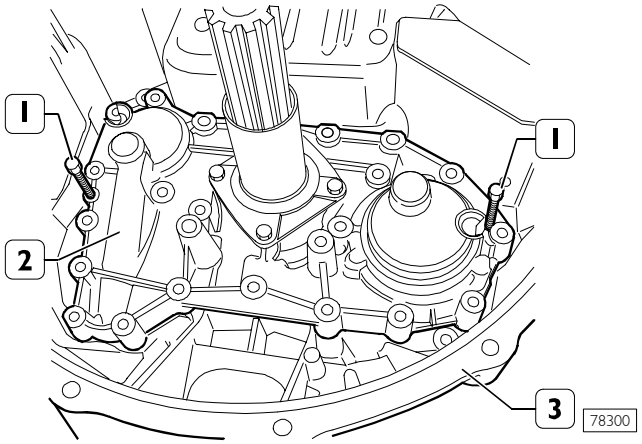
Figure 54



Take out the screws (2) and remove the pin (3) in the joint of the clutch uncoupling lever (1) with this lever.

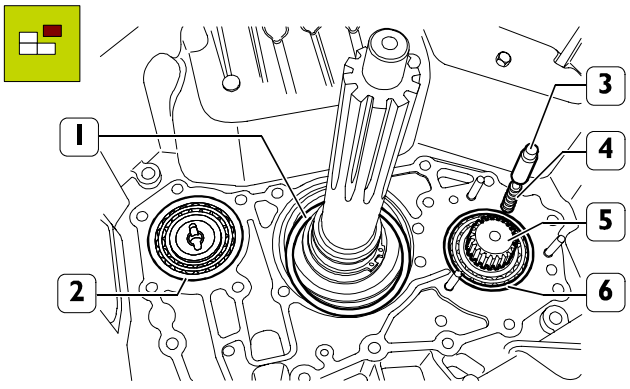
Remove the screws (4) fixing the front cover (5) to the front box.

Figure 55



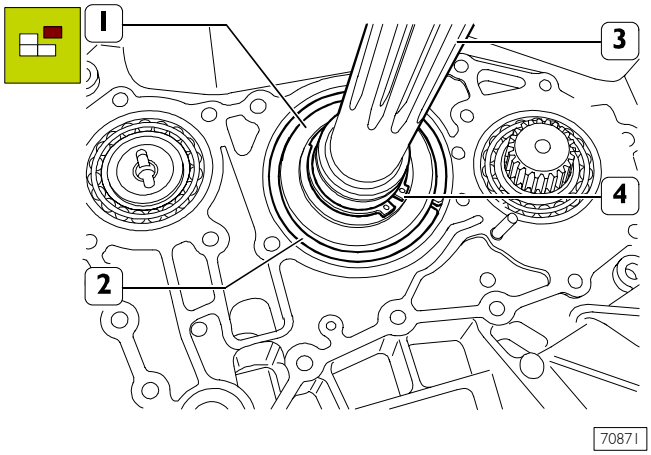
Screw down two screws (1) into the front cover (2) and detach this from the front box (3).

Figure 56



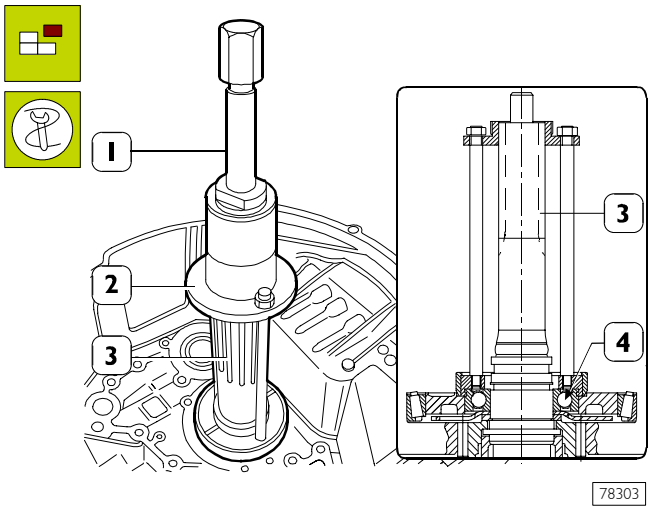
Remove the cap (3), the spring (4) from the transmission shaft (5) and the adjustment rings (1-2-6).

Figure 57



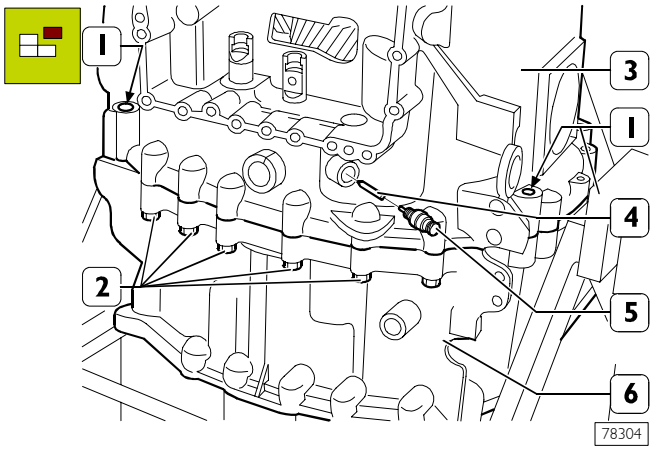
Remove the circlip (4) fastening the bearing (1) to the drive input shaft (3). Remove the circlip (2) from the bearing (1).

Figure 58



Using the extractors 99345078 (1) and 99345105 (2), extract the ball bearing (4) from the drive input shaft (3).

Figure 59

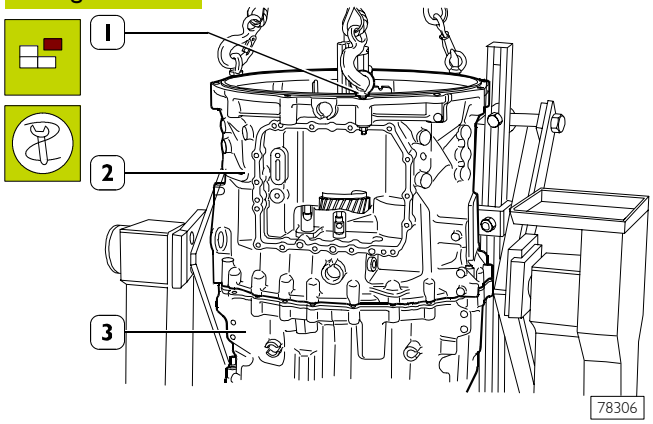


Remove the speed sensor (5) and the cap (4) beneath.

Take out the four centring pins (1).

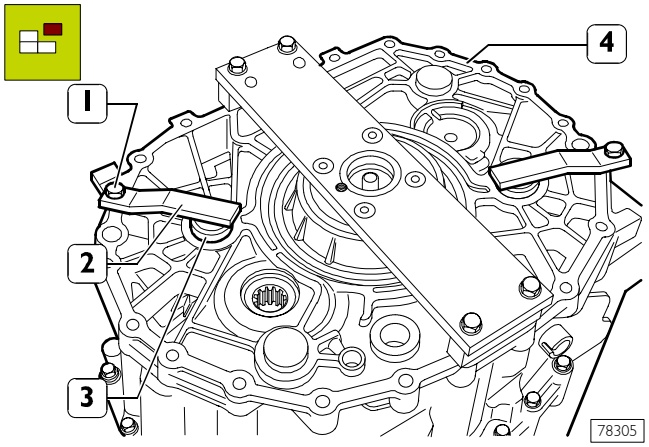
Remove the screws (2) fixing the middle box (6) to the front box (3).

Figure 60



Fit the eyebolt 99366811 (1) onto the front box (2). Using special ropes and a hoist, detach the front box (2) from the middle one (3).

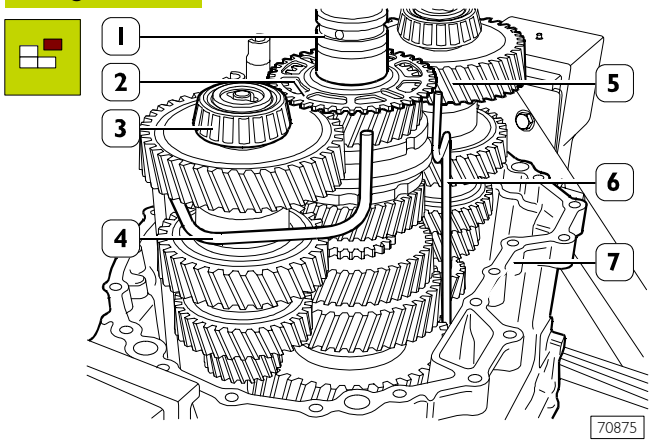
Figure 61



To perform the following operations, the gearbox must be positioned as shown in Figure 62 in order to avoid any chance of the transmission shafts falling.

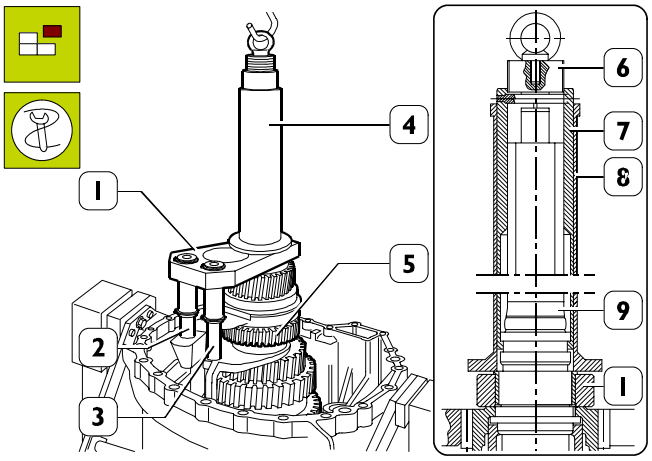
Take out the screws (1) and remove the brackets (2) of the plate 99370153. Extract the reverse gear pins (3) from the middle box (4).

Figure 62



Remove the phonic wheel (2) from the drive input shaft (1). Extract the oil pipes (4-6) from the middle box (7).
Spread apart the transmission shafts (3-5) and remove them from the middle box (7).

Figure 63

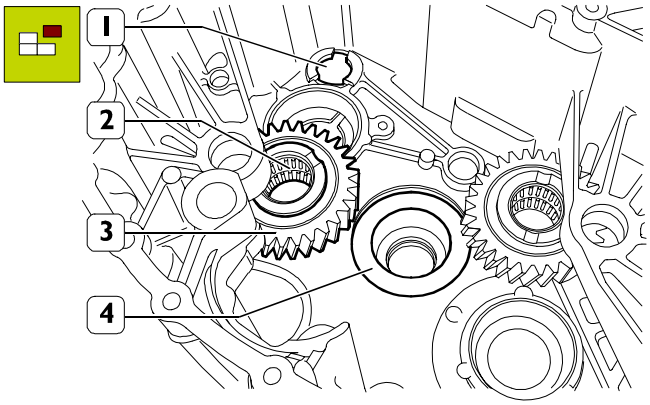


70876

Fit tool 99360527 (1) onto the drive input shaft (9) and the rods (2 and 3); fit parts (6-7 and 8) of tool 99360526 (4) onto the drive input shaft (9).

Hook tool 899360526 (4) onto the lifter and extract the main shaft (5) together with the drive input shaft (9) and rods (2 and 3) from the supporting bearing.

Figure 64



70877

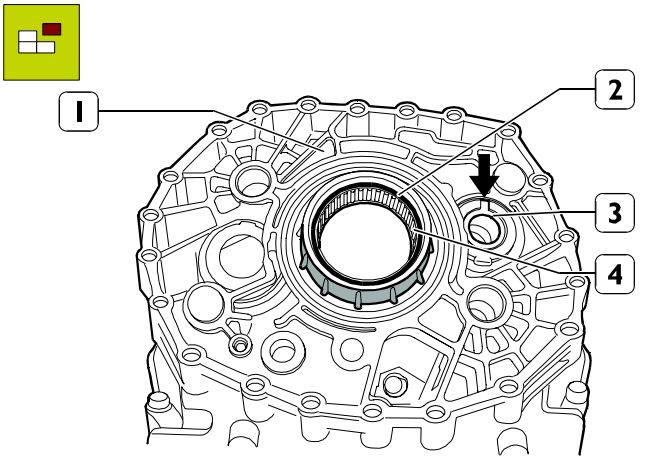
Remove the reverse gears (3) together with the roller bearings (2).

Remove the plate 99370153 (4).

If replacement is necessary, remove the centring pins (1).

Before removing the pins (1) heat the seats of the box to ~ 90°C.

Figure 65



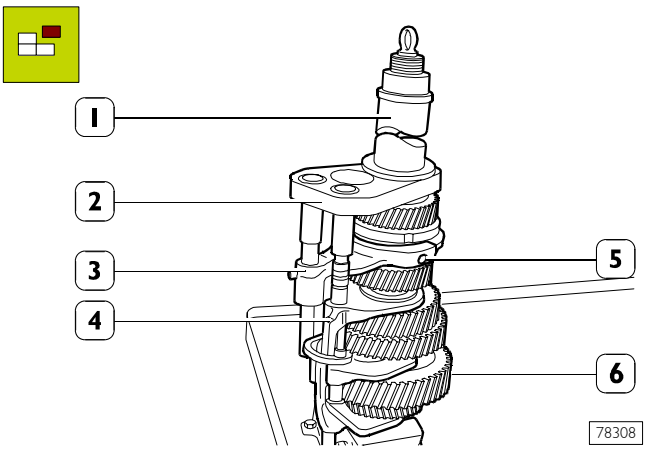
78307

Turn the middle box (1) upside-down, remove the circlip (2) and, working from inside the box, remove the roller bearing (4).

Using a punch, and operating through the openings (→) of the middle box (1), remove the external rings (3) of the tapered roller bearings for transmission shafts.

Removing the main shaft

Figure 66



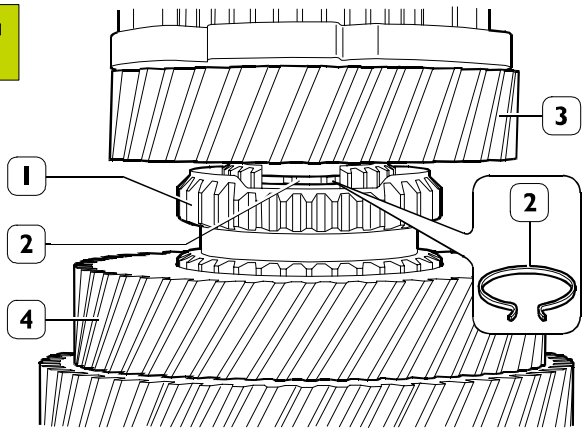
78308

Clamp the main shaft (6) in a vice and remove tool 99360526 (1) and 99360527 (2).

Remove the rods (3 and 4) with the relevant forks.

To remove the fork (5), the ring of the synchronizing device has to be in the middle position.

Figure 67



Through the bay of the coupling sleeve (1), using suitable pliers, tighten the ends of the circlip (2) and remove the drive input shaft (3) from the main shaft (4), **see Figure 68**.

Remove the coupling sleeve (1) and the tube (2) from the main shaft (4).

Turn the main shaft (3) upside-down and remove the coupling sleeve (4) from it; remove the key (5) from the hole (→) in the shaft (3) and extract it.

To extract the shoulder spacers (6 - 8 * - 9 * - 11 - 13 - 15 - 16 - 18) it is necessary to turn them so that their toothing is with the grooves of the shaft (3).

Extract:

- ❑ spacer (6);
- ❑ reverse gear (7);
- ❑ spacers (8 and 9) *;
- ❑ gear (10) *;
- ❑ spacer (11);
- ❑ coupling sleeve (12);
- ❑ spacer (13);
- ❑ 2nd gear (14);
- ❑ spacers (15 and 16);
- ❑ gear (17);
- ❑ spacer (18);
- ❑ tube (19).

* **16 AS 2601 only**

Figure 68

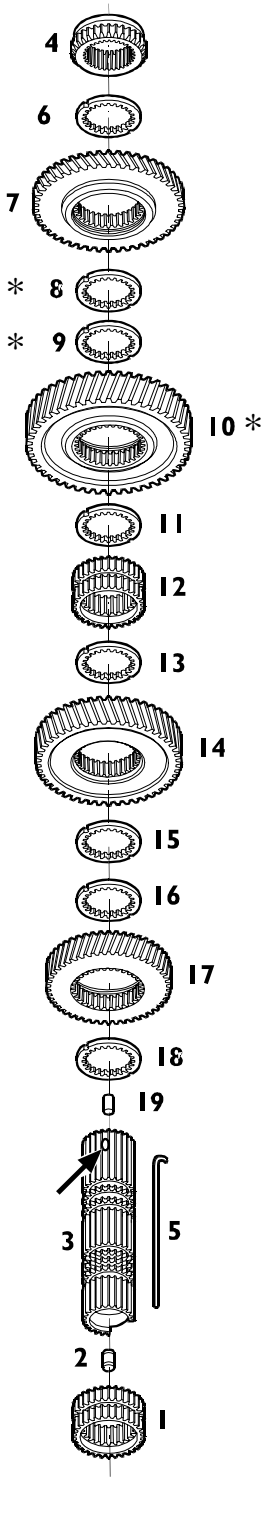
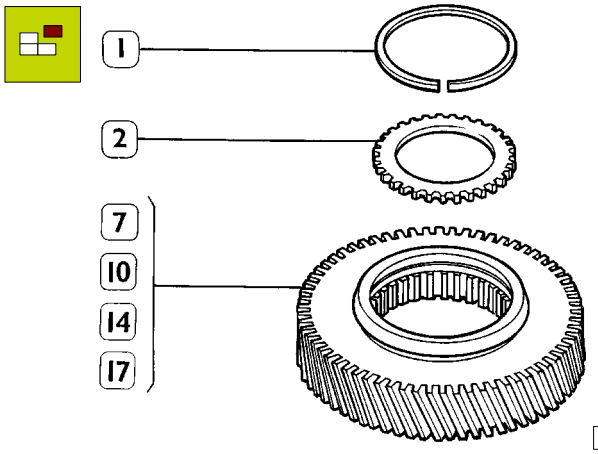


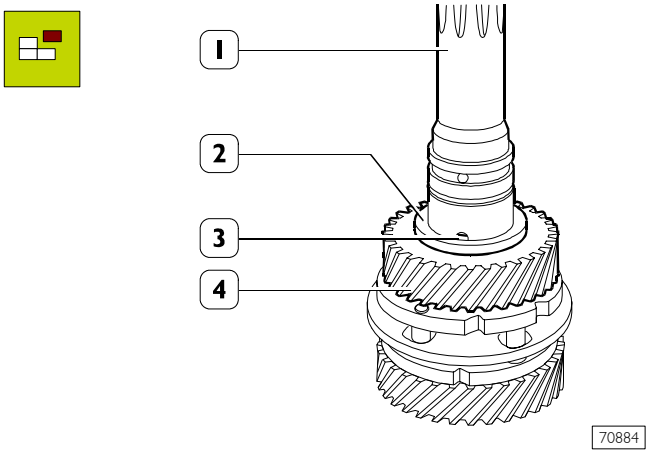
Figure 69



If necessary, remove the circlips (1) from the gears (7 - 10 - 14 - 17, Figure 68) and extract the toothed ring (2).

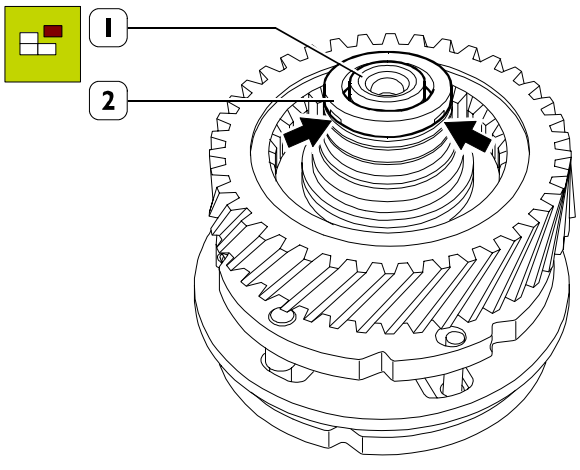
Removing the drive input shaft

Figure 70



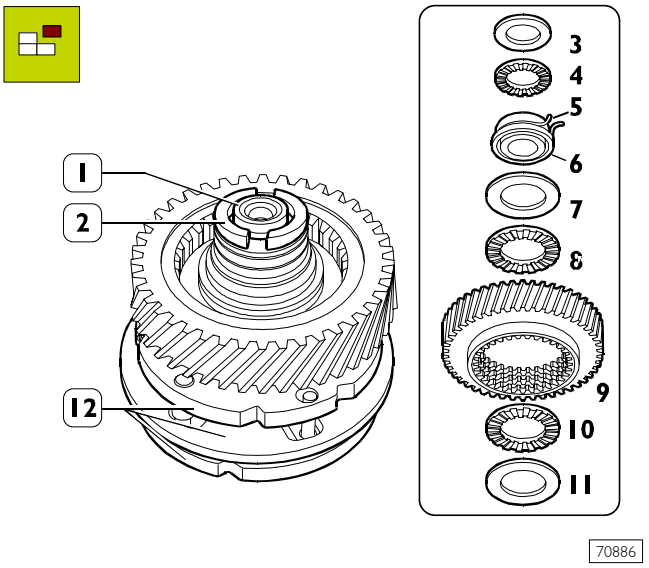
Extract the ring (2), key (3) and gear (4) from the drive input shaft (1).

Figure 71



Turn the drive input shaft (1) upside-down, lift the notches (→) of the safety cover (2) and take it off.

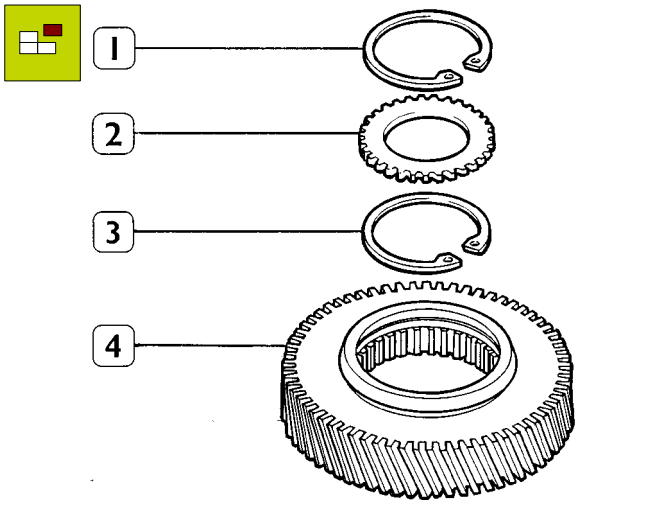
Figure 72



Remove the half rings (2) from the drive input shaft (1) and extract from it:

- ❑ thrust washer (3);
- ❑ thrust bearing (4);
- ❑ bushing (6) together with circlip (5);
- ❑ thrust washer (7);
- ❑ thrust bearing (8);
- ❑ gear (9);
- ❑ thrust bearing (10);
- ❑ thrust washer (11);
- ❑ synchronizing device assembly (12).

Figure 73

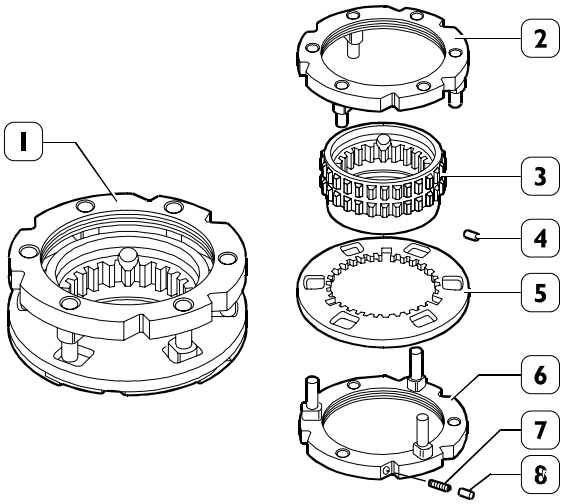


70887

If necessary, remove the circlips (1-3) from the gear (4) and extract the toothed ring (2).

Removing the splitter synchronizing device

Figure 75



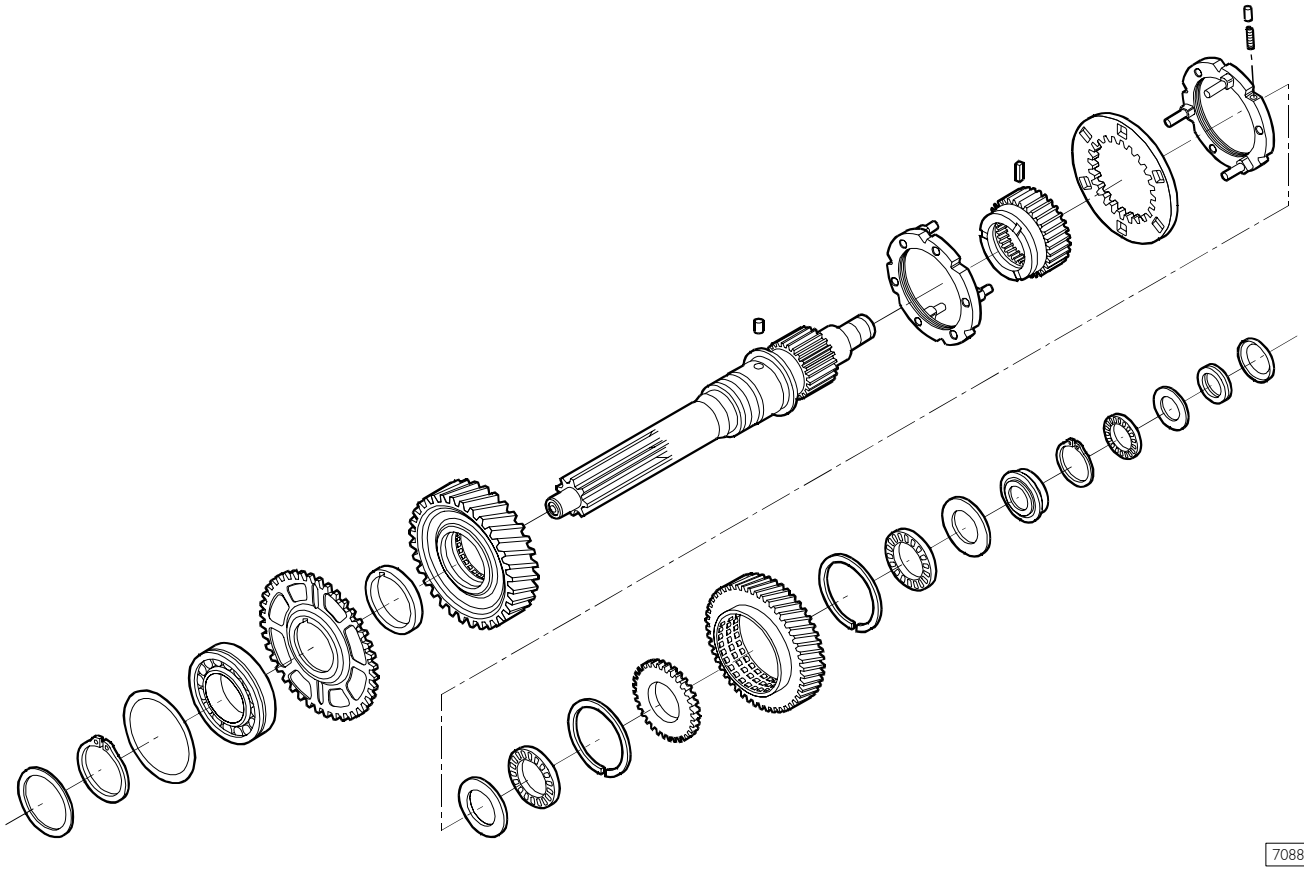
70889

Put the synchronizing device assembly (1) on the workbench, cover it with a cloth to prevent the pins (8) and springs (7) getting lost during subsequent dismantling.

Holding back the synchronizing device ring (6), lift the synchronizing device ring (2); these will get freed: toothed ring (5), three clips (7) and three pins (8).

Remove the key (4) and extract the toothed sleeve (3) from the toothed ring (5).

Figure 74



70888

COMPONENT PARTS OF THE DRIVE INPUT SHAFT

Fitting the splitter synchronizing device

Insert the three springs (7) and three pins (8) in the synchronizing device ring (1) and keep them in their seat with the centring pins 99370499 (2).

Position the toothed ring (4) on the synchronizing device ring (6). Fit the synchronizing device ring (1) in the toothed ring (4) and on the synchronizing device ring (6) so that the centring pins 99370499 (2) drive onto the pins (5) of the synchronizing device ring (6). Press on the synchronizing device ring (1) uniformly so that the components of the assembly fit together correctly. Take out the centring pins (2).

Figure 77

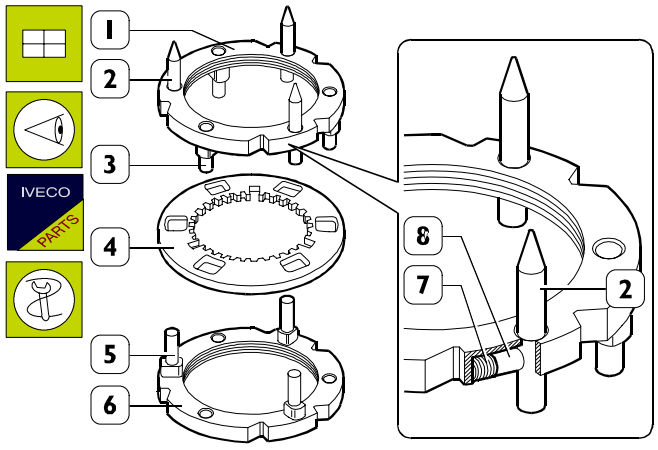
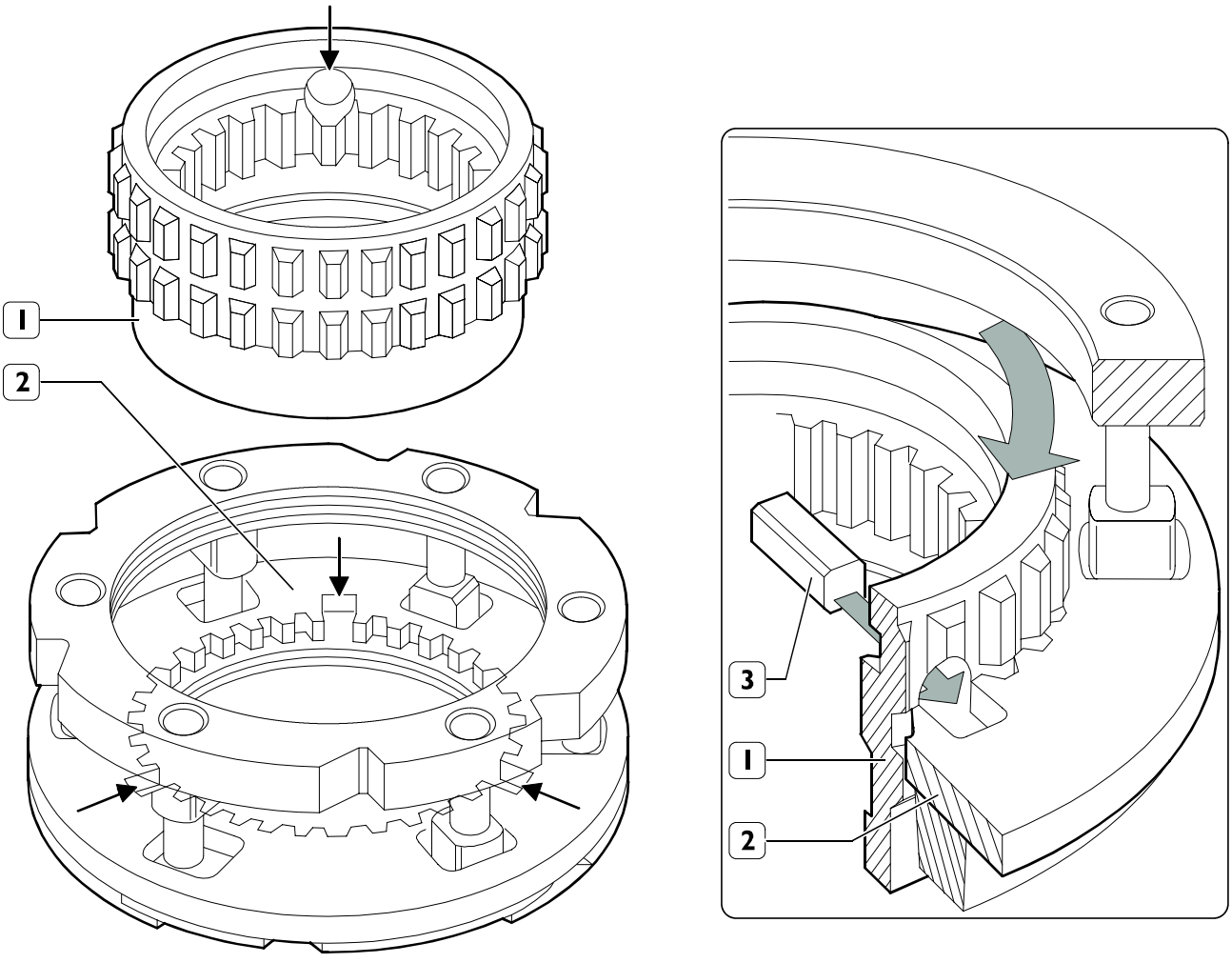


Figure 76



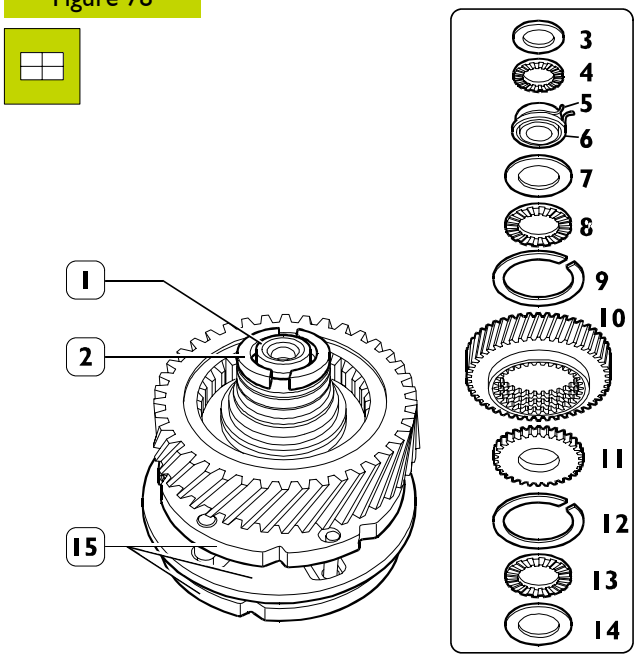
Insert the toothed sleeve (1) in the toothed ring (2) so that the race between the two toothings corresponds to the inside toothing of the ring (2) and allows it to rotate.

Turn the sleeve (1) so that the hole in it coincides with one of the three bays (→) of the toothed ring (1).

Then insert the key (3) as shown in the figure.

Fitting the main shaft

Figure 78

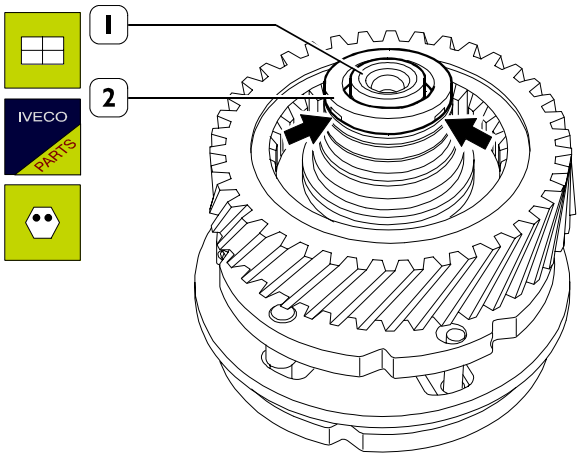


70892

On the drive input shaft (1), fit:

- ❑ synchronizing device assembly (15);
- ❑ thrust washer (14);
- ❑ thrust bearing (13);
- ❑ gear (10) together with circlips (9 and 12) and toothed ring (11);
- ❑ thrust bearing (8);
- ❑ thrust washer (7);
- ❑ bushing (6) with circlip (5);
- ❑ thrust bearing (4);
- ❑ thrust washer (3);
- ❑ half rings (2).

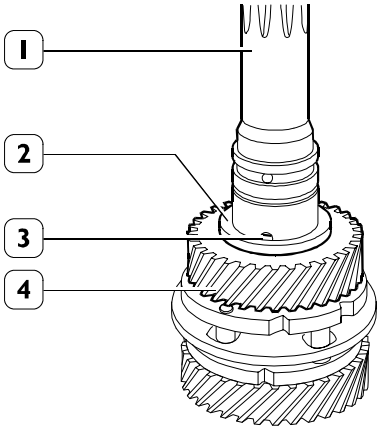
Figure 79



70885

Fit on a new safety cover (2) and notch it (→) at three/four equidistant points. Turn over the drive input shaft (1).

Figure 80

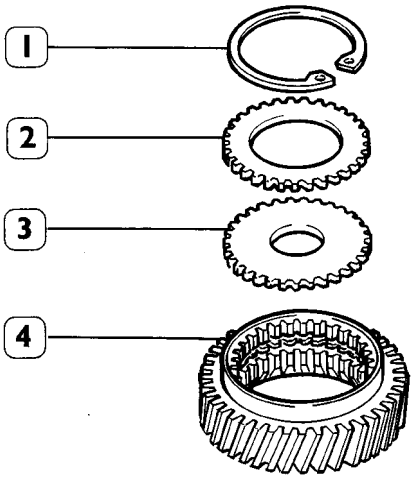


70884

On the drive input shaft (1), fit: gear (4), key (3) and thrust washer (2).

Fitting the drive input shaft

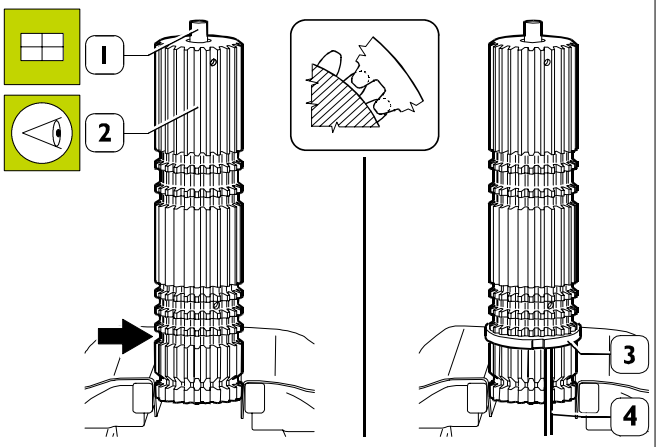
Figure 81



70893

In the gears (4), fit: Reverse – 1st – 2nd – 3rd gears and toothed rings (2) and fasten them to the gears with the circlips (1 and 3).

Figure 82

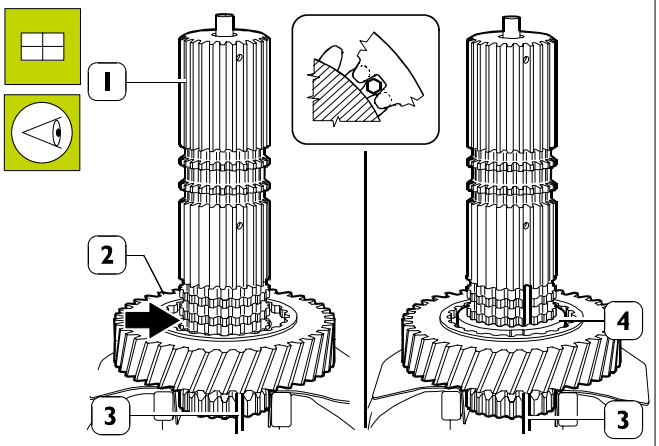


78309

Clamp the main shaft (2) in a vice. Fit on the tube (1). Put the shoulder spacer (3) in the ring groove (→). Turn the spacer (3) so that its internal toothing rests on that of the main shaft (2).

Insert the key (4) in the spacer (3) so as to prevent rotation and keep it in position.

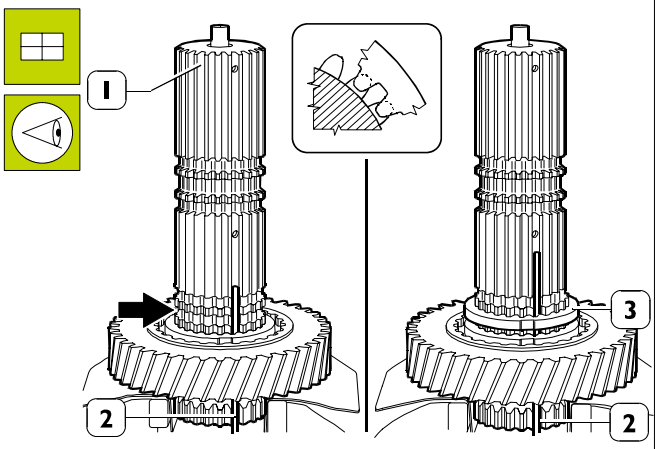
Figure 83



78310

Mount the 3rd speed gear (2), put the spacer (4) in the ring groove (→). Turn the spacer (4) so that its internal toothing rests on that of the main shaft (1). Insert the key (3) in the spacer (4) and keep it in position.

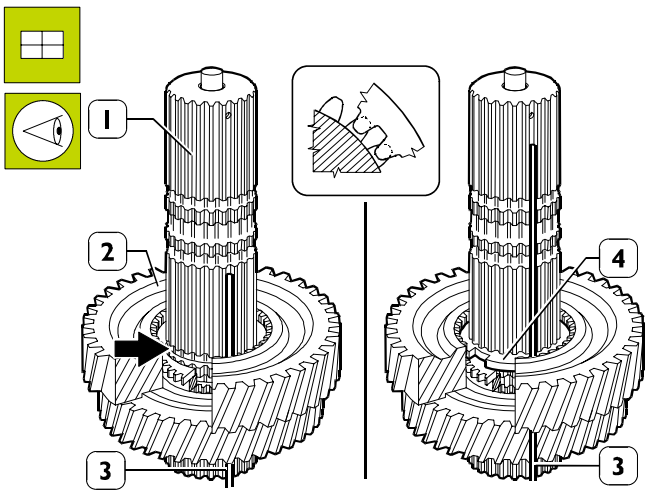
Figure 84



78311

Put the spacer (3) in the ring groove (→). Turn the spacer (3) so that its internal toothing rests on that of the main shaft (1). Insert the key (2) in the spacer and keep it in position.

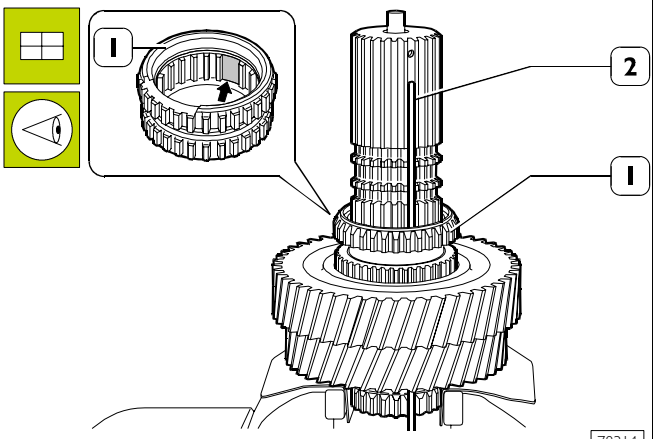
Figure 85



78312

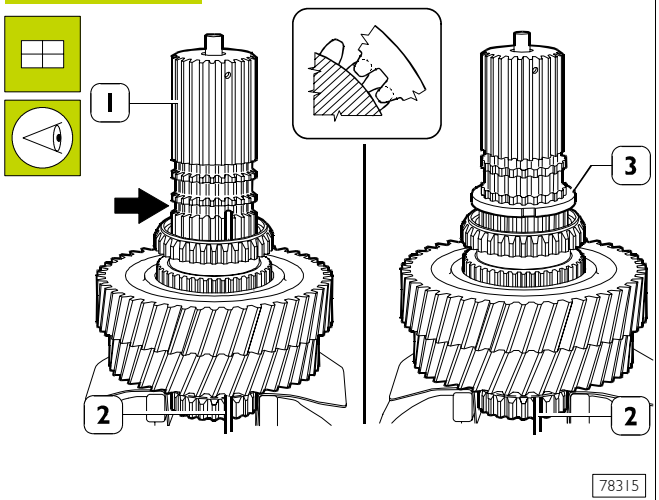
Mount the 2nd speed gear (2), put the spacer (4) in the ring groove (→). Turn the spacer (4) so that its internal toothing rests on that of the main shaft (1). Insert the key (3) in the spacer (4) and keep it in position.

Figure 86



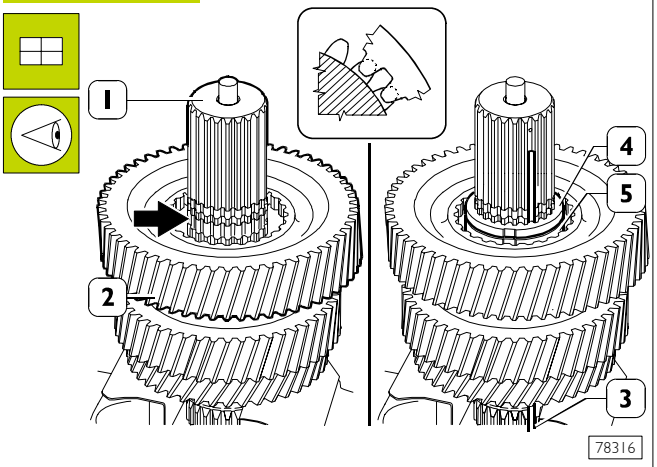
Fit on the 1st/2nd gear coupling sleeve (1) with the larger internal groove (→) turned to the side of the key (2).

Figure 87



Put the spacer (3) in the ring groove (→). Turn the spacer (3) so that its internal toothing rests on that of the main shaft (1). Insert the key (2) in the spacer (3) and keep it in position.

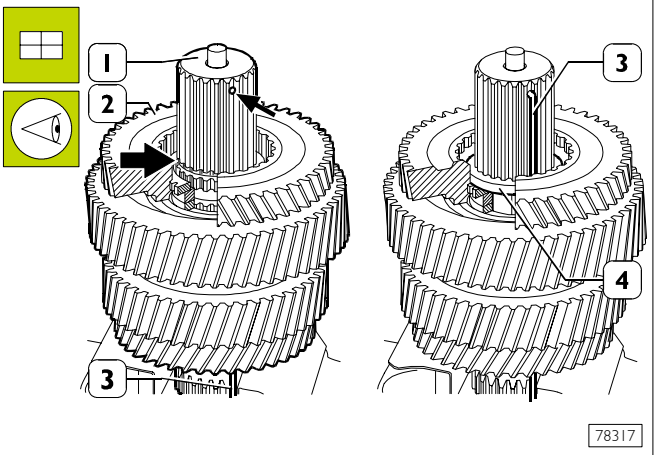
Figure 88



For 16 AS 2061 gearboxes only, fit on the gear (2). Put the spacer (5) in the ring groove (→) so that its internal toothing rests on that of the main shaft (1). Put the spacer (4) in the ring groove (→) so that its internal toothing rests on that of the main shaft (1).

Insert the key (3) in the spacers (4 and 5) and keep it in position.

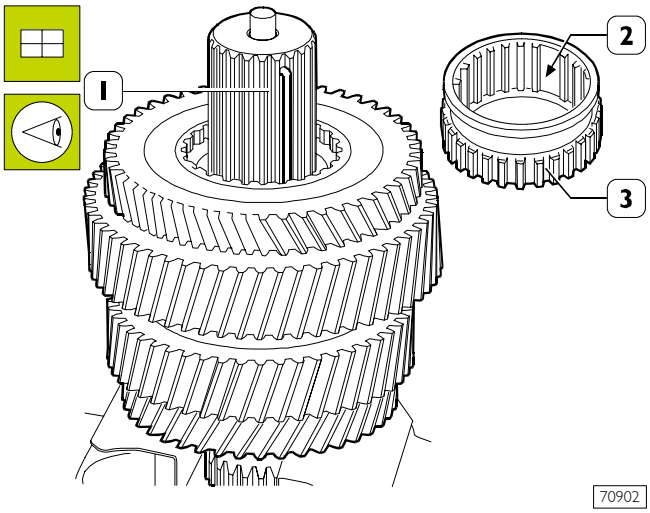
Figure 89



For all gearboxes, fit on the reverse gear (2). Put the spacer (4) in the ring groove (→) so that its internal toothing rests on that of the main shaft (1).

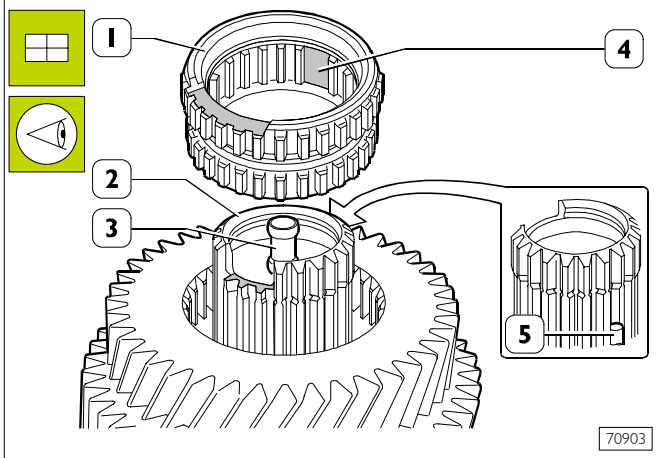
Extract the key (3) and insert it from the top side of the shaft (1) in the groove on this and in all the spacers, so that its bent portion goes into the hole (→) of the shaft (1).

Figure 90



Fit on the reverse gear coupling sleeve (3) with the bay (2) coinciding with the key (1).

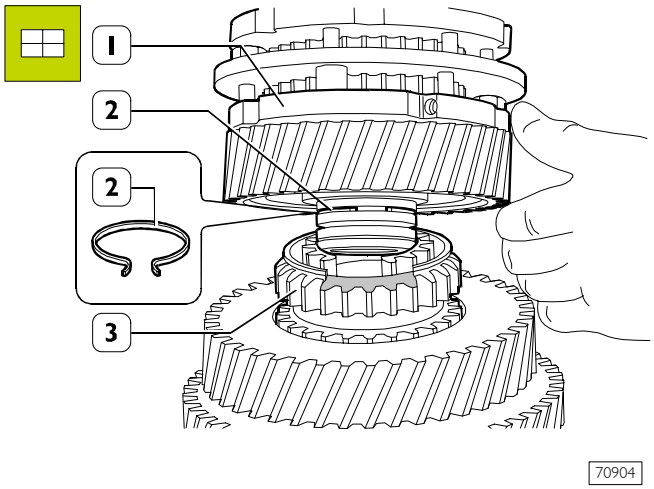
Figure 91



Turn over the main shaft (2) and fit on the sleeve (1) with the bay (4) coinciding with the key (5).

Fit on the tube (3).

Figure 92



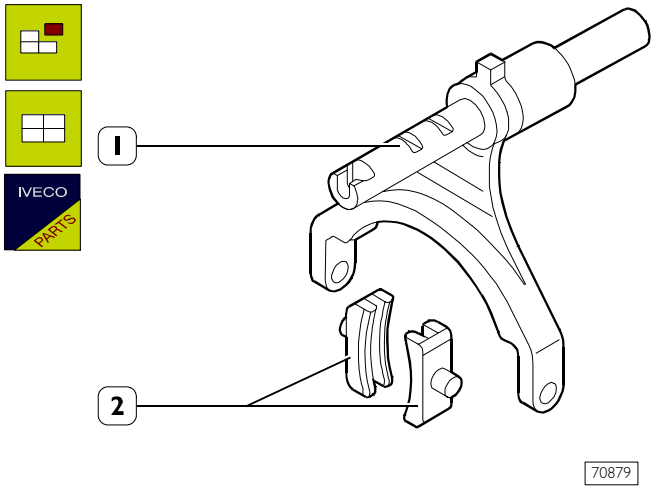
Using suitable pliers, tighten the ends of the circlip (2) and fit the drive input shaft (1) onto the main shaft (3).

Make sure that the circlip (2) gets correctly positioned in the seat of the main shaft (3).

Splitter control fork

Disassembly - Assembly

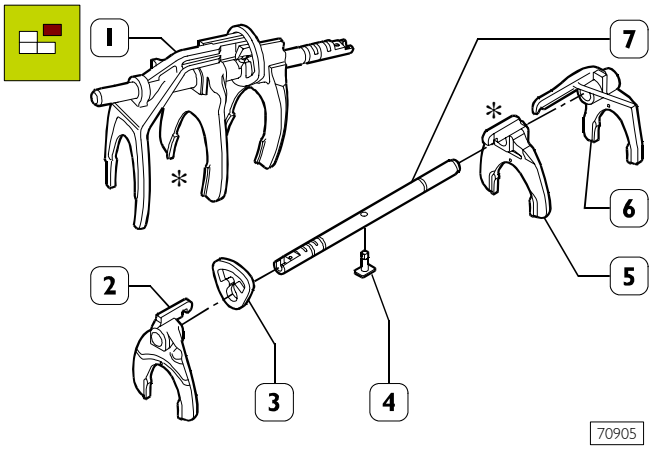
Figure 93



Extract the plugs (2) from the splitter synchronizing device coupling fork (1) and fit on the new plugs.

Gear control forks
Removal

Figure 94

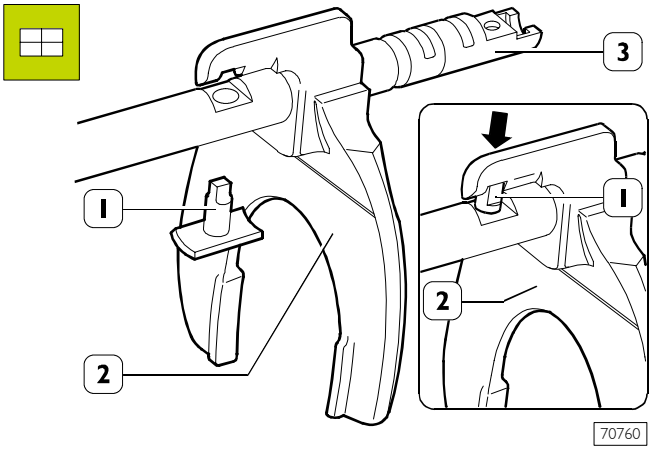


Dismantle the gear control fork assembly (1), suitably adjusting the ring (3) to prevent the gears simultaneously coupling and extracting from the rod (7): the coupling fork (6)*, pin (7), coupling fork (5), fork (2) and ring (3).

* 16 AS 2601 gearbox only

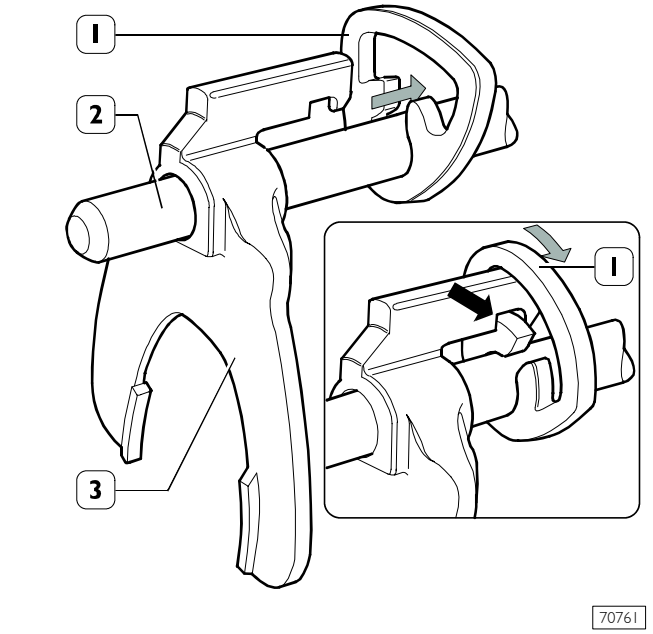
Fitting

Figure 95



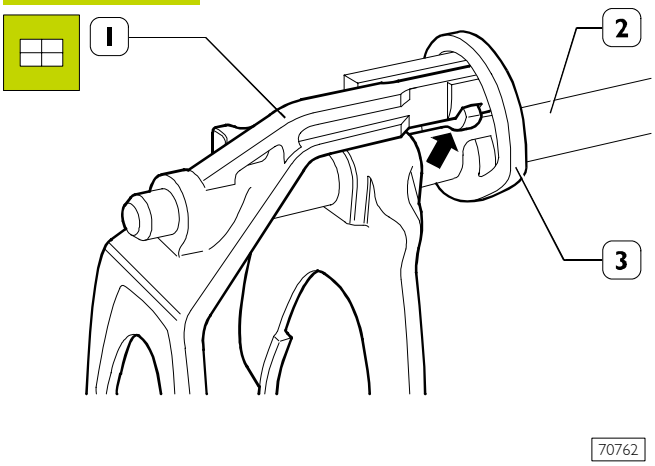
Insert the pin (1) in the seat on the rod (3). Drive the reverse gear coupling fork (2) onto the rod (3), adjusting it so that the pin (1) gets positioned in the bay (→) of the fork (2).

Figure 96



Drive the ring (1) and the 1st/2nd gear coupling fork (3) onto the rod (2). Position the fork (3) in the ring (1) so that on turning it the bay (→) of the fork (3) is inserted in the ring (1).

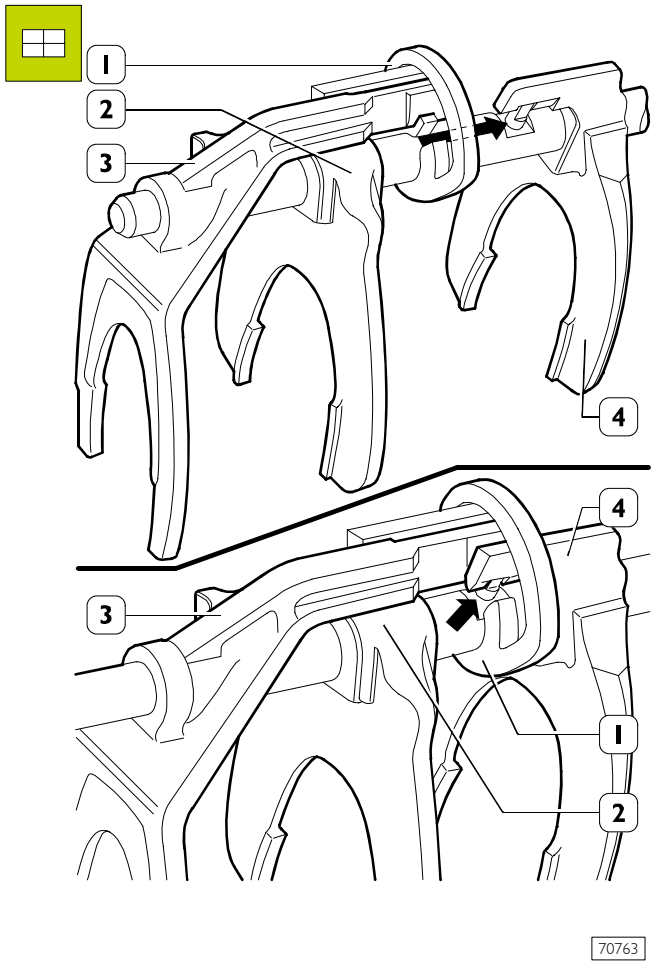
Figure 97



16 AS 2601 gearbox only, drive the 3rd/4th gear coupling fork (1) onto the rod (2).

Position the fork (1) in the ring (3) so that on turning it the bay (→) of the fork (1) is inserted in the ring (3).

Figure 98

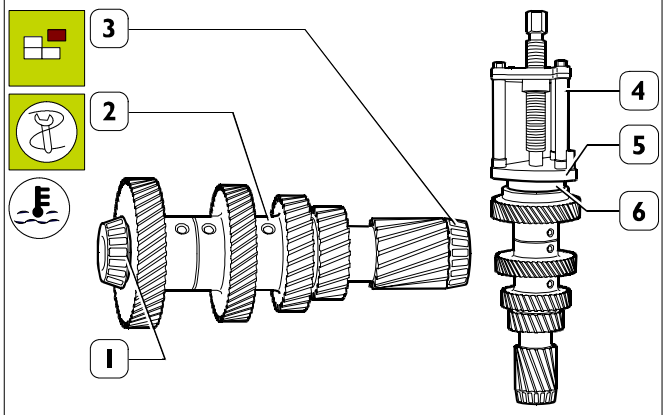


Position the fork assembly (2*-3) and the ring (1) assembled in this way so that the bay (→) of the reverse gear coupling fork (4) is inserted in the ring (1).

* **16 AS 2601 gearbox only**

Transmission shafts Disassembly - Assembly

Figure 99



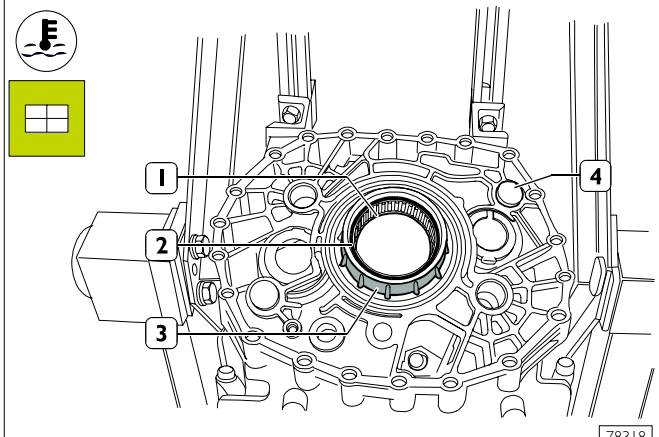
70906

Remove the inside rings (1-3) of the roller bearings from the transmission shaft (2), using the extractor 99347100 (4), grips 993471132 (6) and plug 99345057 (5).

To fit the rings (1 - 3) on the shaft (2) it is necessary to first heat them to 120°C.

Fitting the middle box

Figure 100

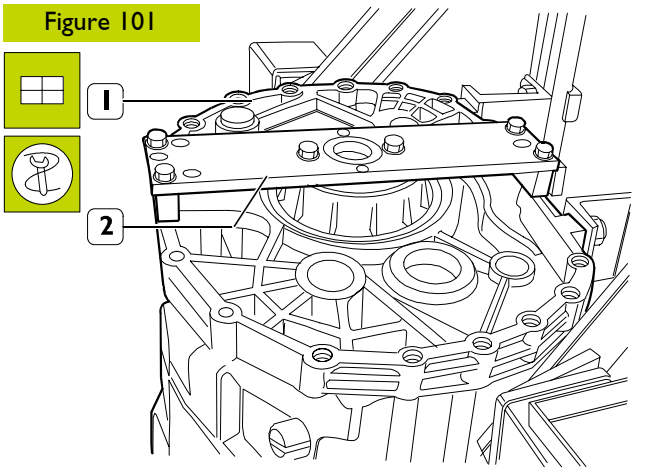


78318

Heat the seat (3) of the cylindrical roller bearing (1) to ~ 90°C, fit this and fasten it to the middle box with the circlip (2).

If removed, refit the centring pins (4) after heating the seats of the box to ~ 90°C.

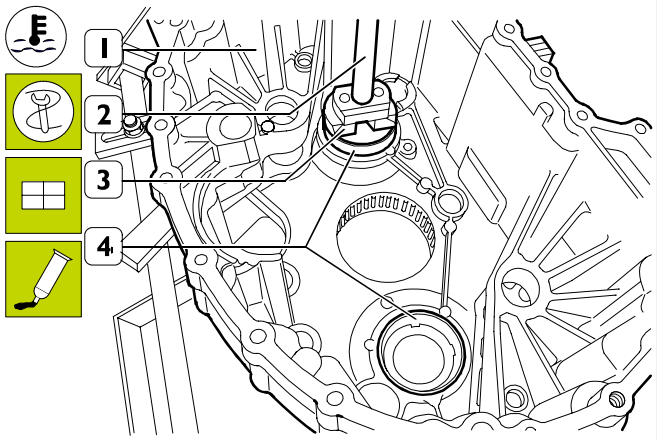
Figure 101



78319

Fit the plate 99370153 (2) onto the middle box (1).

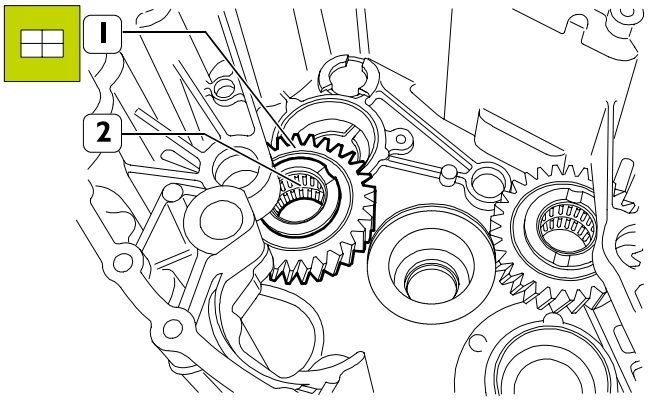
Figure 102



70909

From inside the box (1), heat the seats of the rings (4) to ~ 90°C, transmission shaft bearings. Fit on the rings (4) with driver 99370092 (3) and grip 99370007 (2).

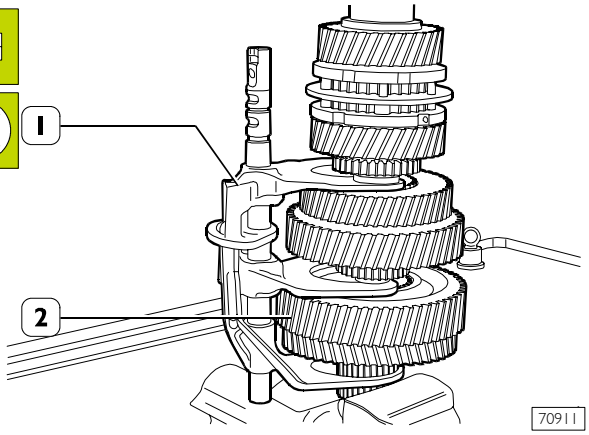
Figure 103



70910

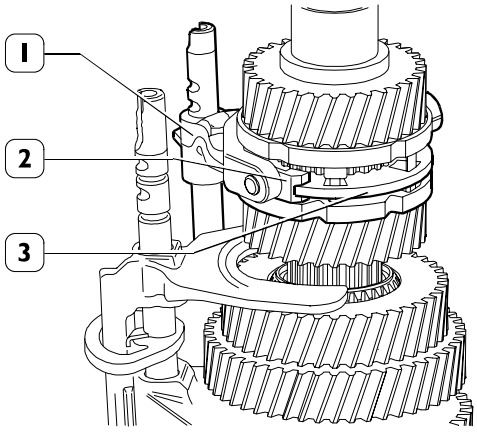
Place the reverse gears (1) together with the roller bearings (2) in the middle box.

Figure 104



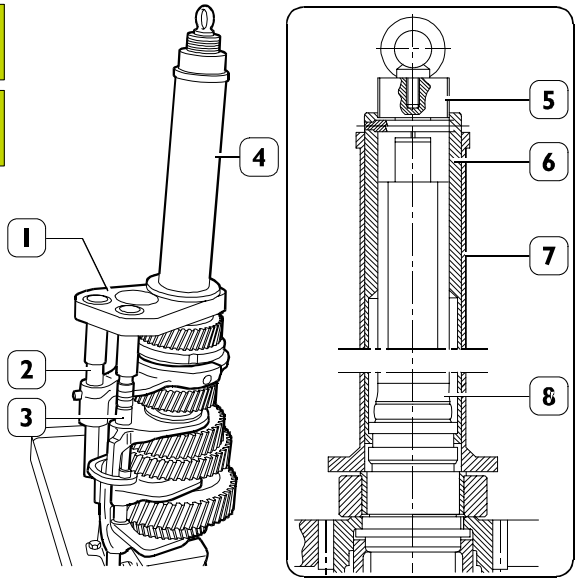
Fit the fork assembly (1) onto the main shaft (2), verifying that the forks are correctly positioned on their respective coupling sleeves.

Figure 105



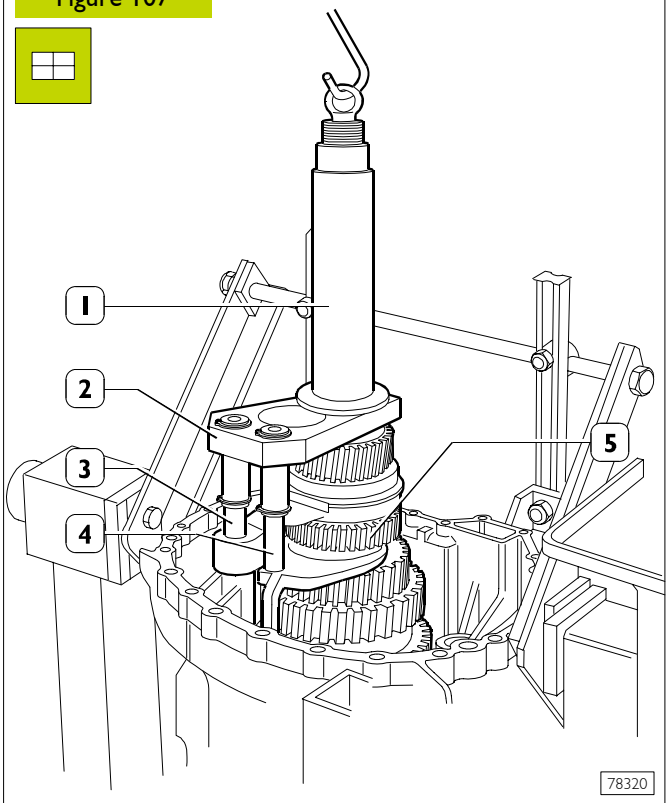
Mount the splitter coupling fork (1) positioning the plugs (2) on the toothed coupling ring (3).

Figure 106



Fit tool 99360527 (1) onto the drive input shaft (8) and the rods (2 and 3). Fit parts (5-6-7) of tool 99360526 (4) onto the drive input shaft (8).

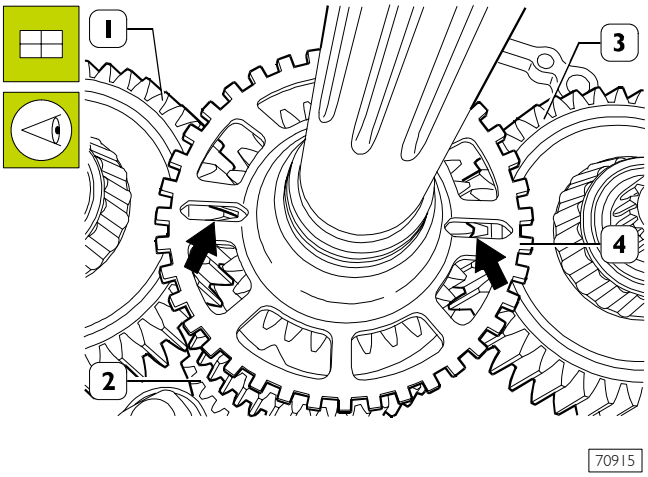
Figure 107



Hook the tool 99360526 (1) onto the lifter and fit the main shaft assembly (5) in the gearbox, verifying that the shaft (5) and the rods (3 and 4) get correctly inserted in their seats.

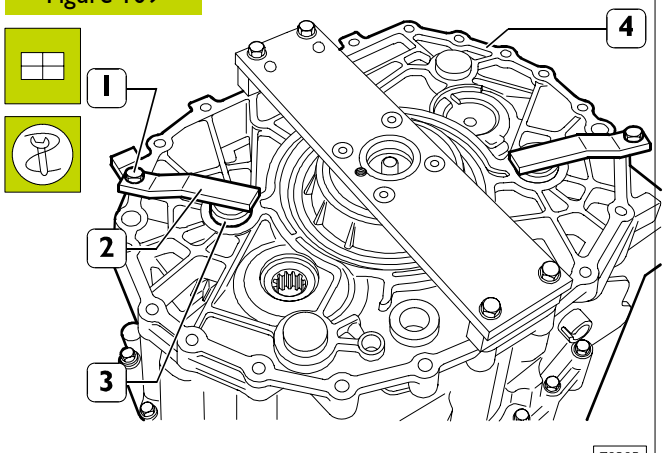
Remove the tools 99360526 (1) and 99360527 (2).

Figure 108



Mount the transmission shafts (1 and 3) so that on joining them to the main shaft (2) the marks stamped on them are aligned. Use the slots (→) of the phonic wheel (4) to check this.

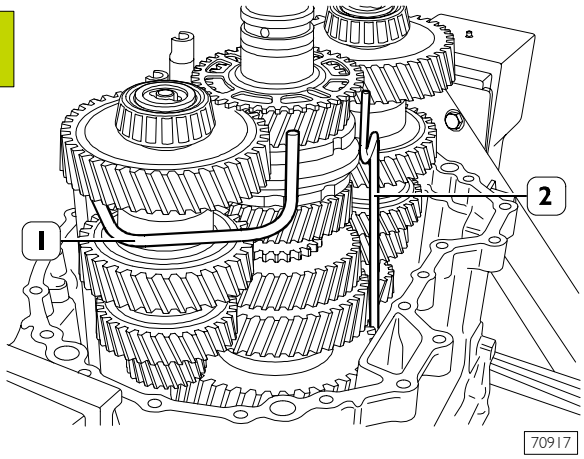
Figure 109



To perform the following operations, the gearbox must be positioned as shown in Figure 110 in order to avoid any chance of the reverse gears falling.

Insert the pins (3) in the middle box (4) and in the reverse gears (1, Figure 103), fastening them to the box (4) with the brackets (2) of plate 99370153 and the screws (1).

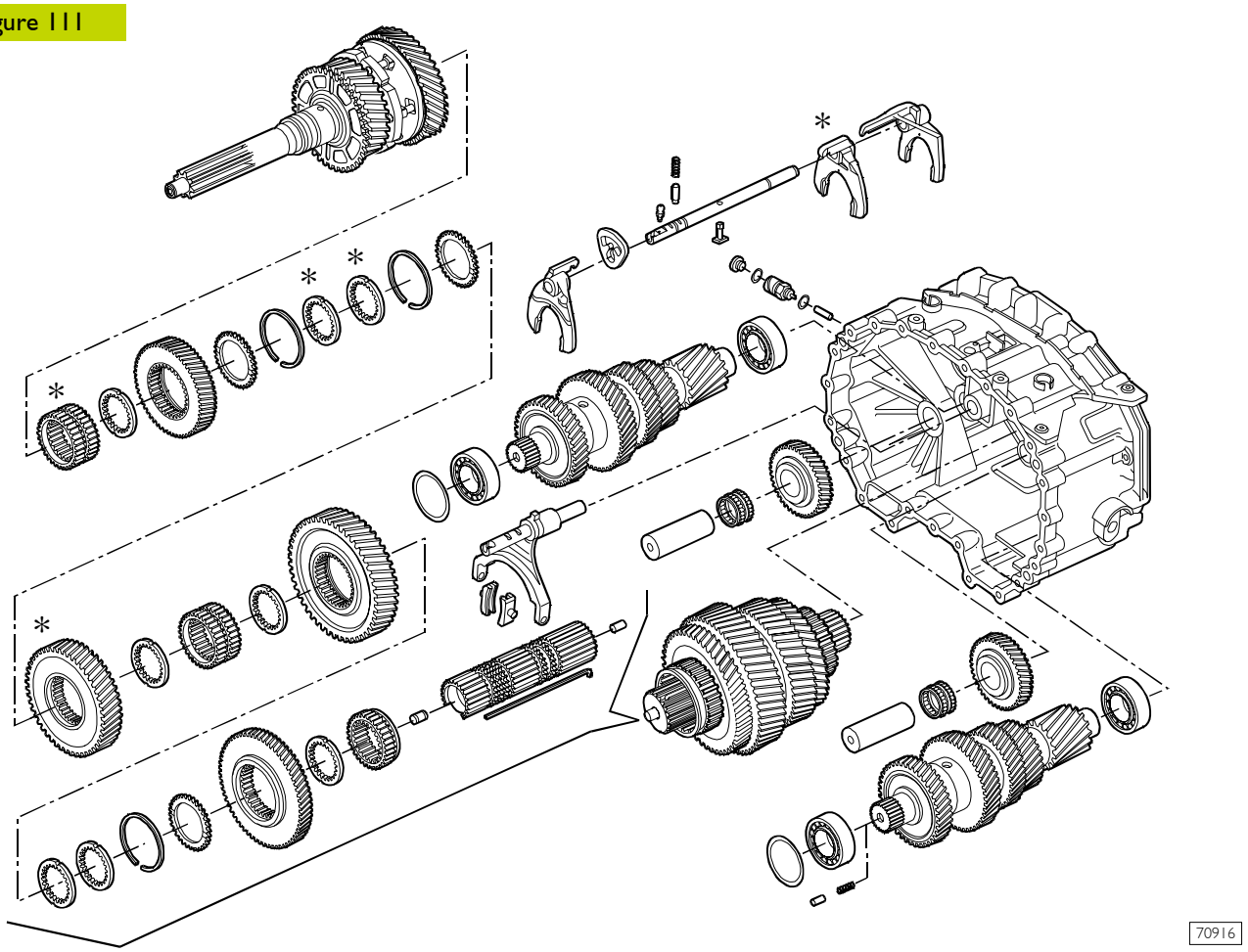
Figure 110



With no gears engaged, the shafts must turn freely, otherwise the alignment of the marks (see Figure 108) will not be correct.

Fit on the oil pipes (1 and 2).

Figure 111



COMPONENT PARTS OF THE MIDDLE BOX

* For the 16 AS 2601 gearbox only

Fitting the front box

Figure 112

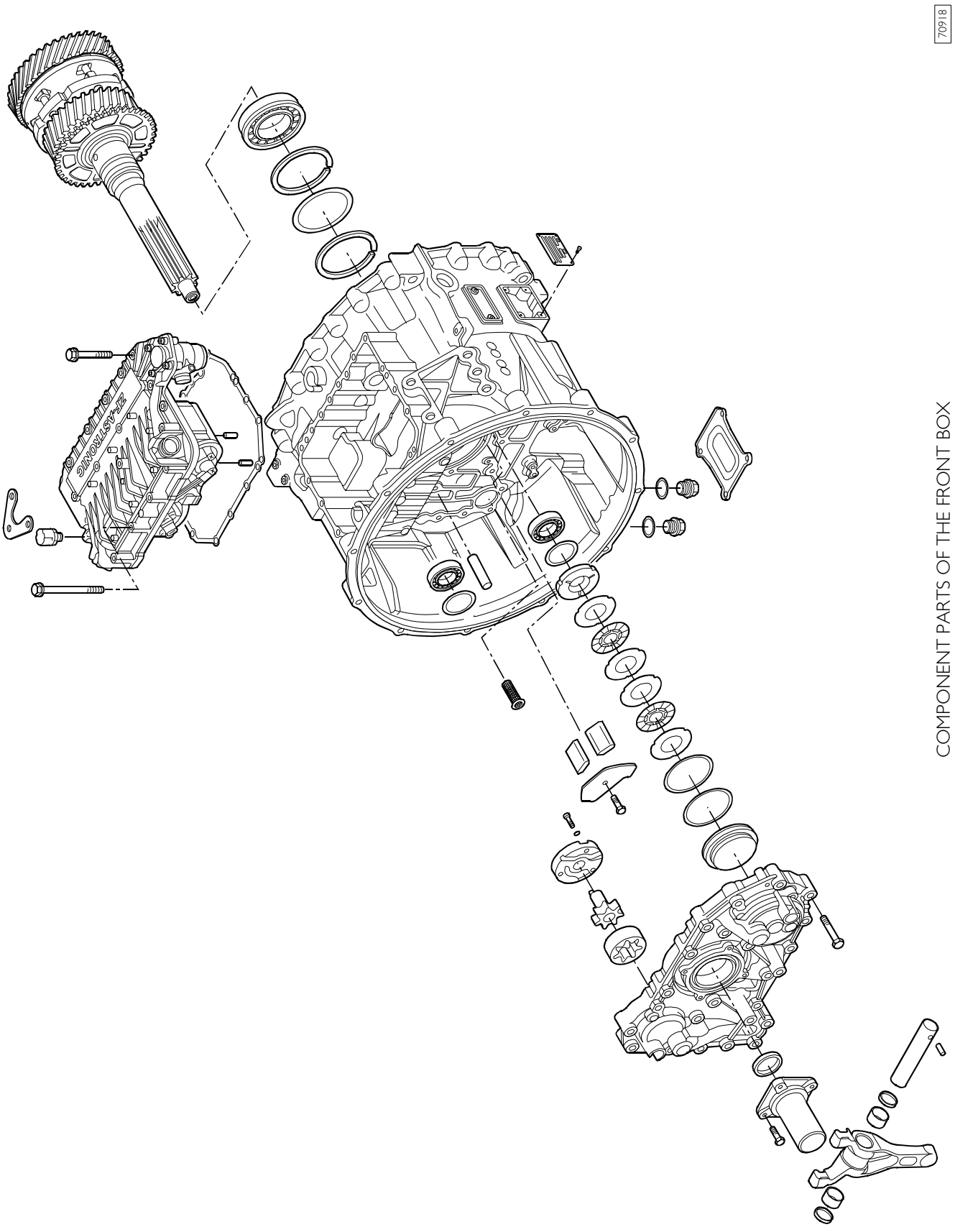
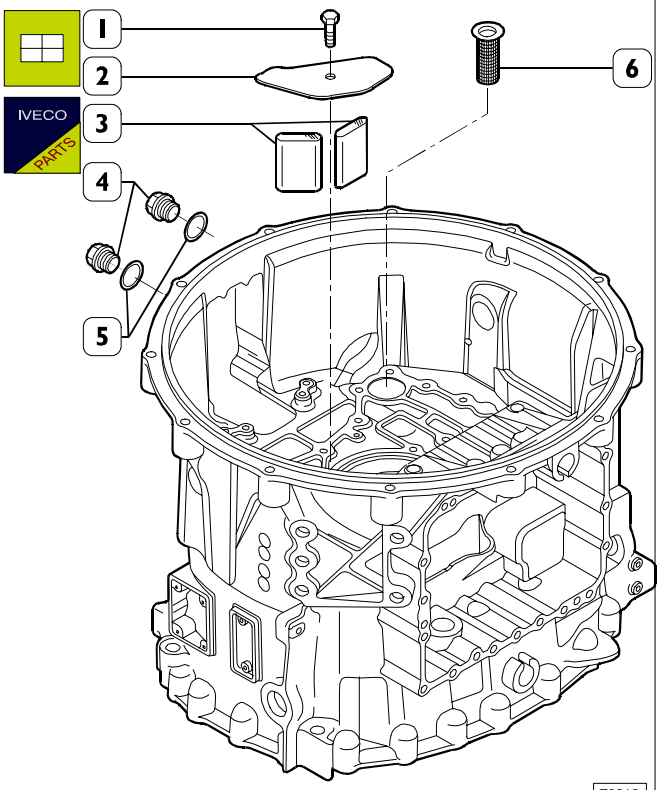


Figure 113



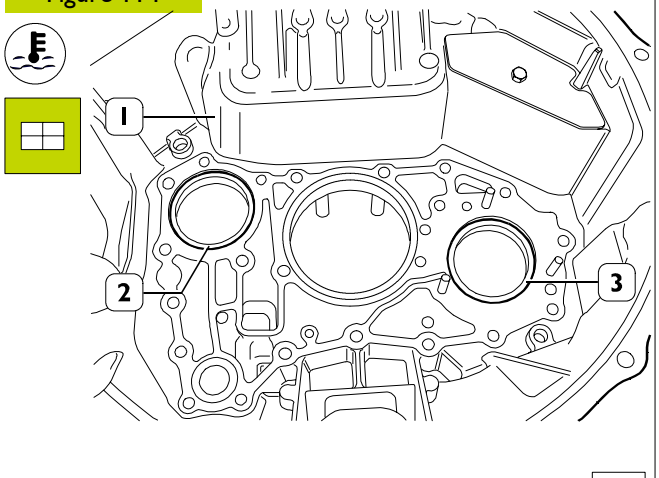
Remove the screw (1), lift the cover (2), remove the vents (3) and clean them or replace them.

Then reassemble the parts.

Carefully clean the oil filter (6) and fit it back in its seat.

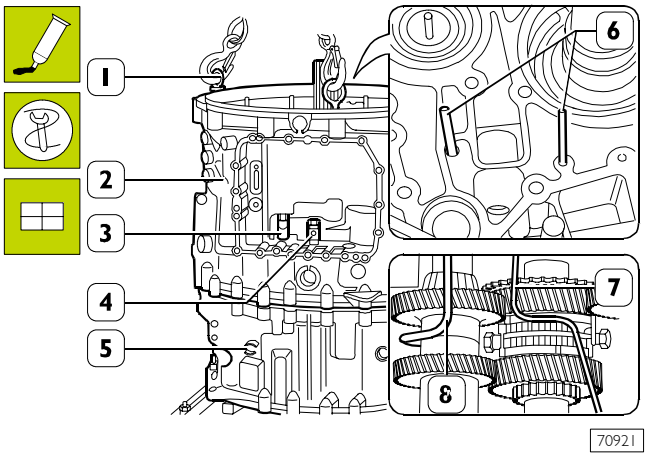
If the plugs (4) have been removed, it is necessary to fit them back on with new seals (5).

Figure 114



Heat the front box (1) to 90°C in correspondence with the seats for the external rings (2 and 3) of the tapered roller bearings and fit these on.

Figure 115



Spread IVECO sealant 1905685 onto the mating surface of the middle box (5).

Fit the eyebolt 99368811 (1) onto the front box (2).

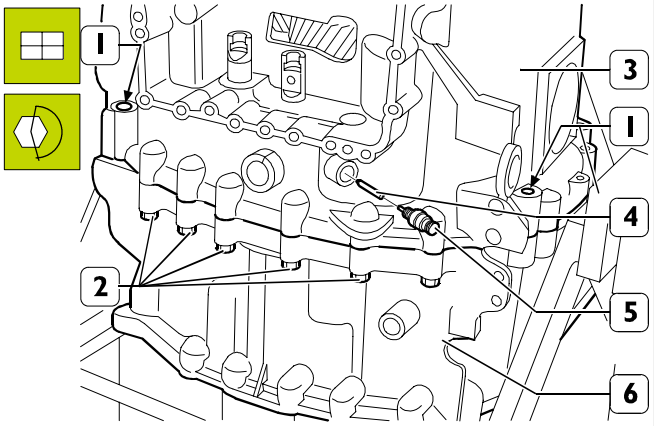
Using ropes and a hoist, lift the box (2) and position it coaxially to the middle box (5).

Insert the rods (6), of suitable diameter, into the seats in the front box (2) of the oil pipes (7 and 8) and into these too.

Lower the box (2) checking that the rods (3 and 4) and the oil pipes (7 and 8) are correctly inserted in their seat.

Remove the eyebolt (1) and the guide rods (6).

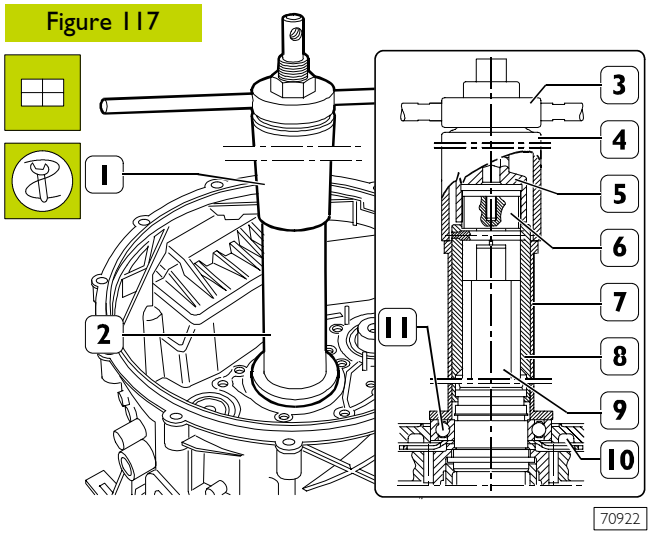
Figure 116



Screw down the screws (2) fixing the front box (3) to the middle box (6). Insert the centring pins (1) and tighten the screws (2) to the prescribed torque.

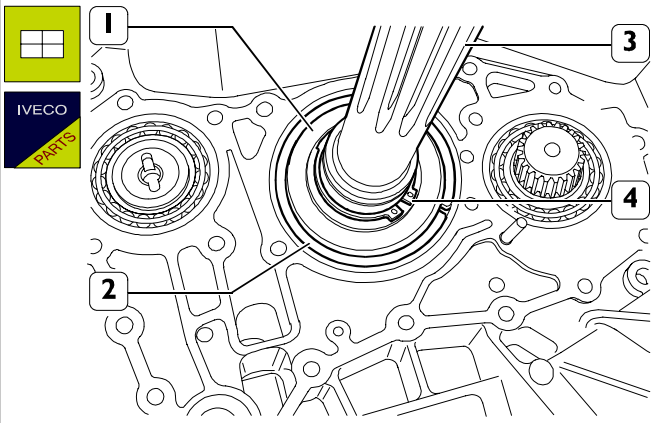
Mount the cap (4) and the speed sensor (5), tightening it to the prescribed torque.

Figure 117



Using the tools 99345098 (1) comprising parts (3-4 and 5) and 99360526 comprising parts (6-7 and 8), fit the ball bearing (11) on the drive input shaft (9) and in the front box (10).

Figure 118

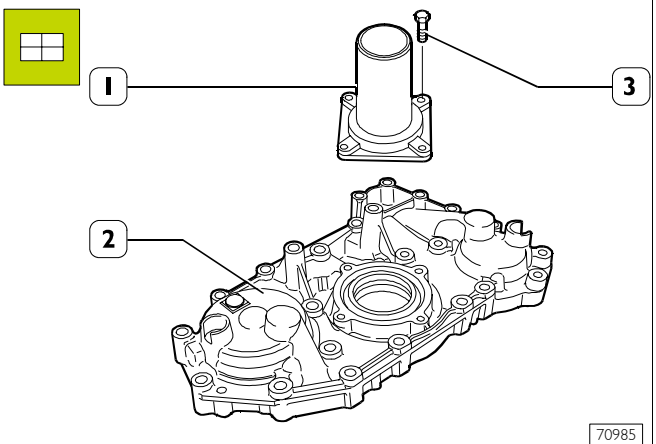


Fit the circlip (4) fastening the bearing (1) to the drive input shaft (3).

Fit the circlip (2) onto the bearing (1).

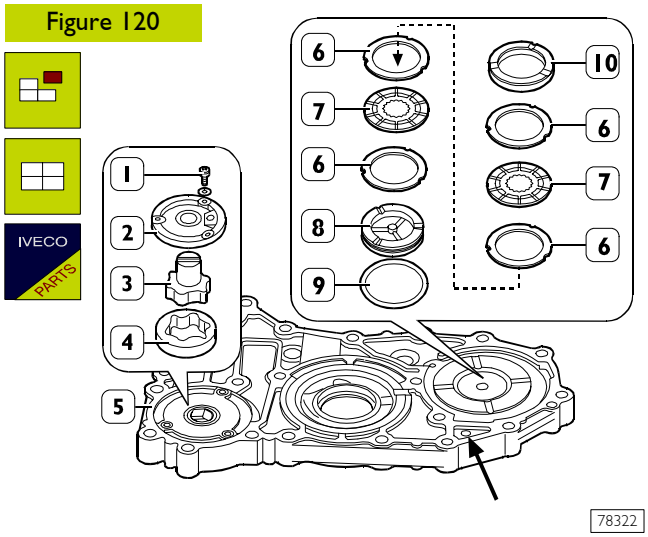
Front cover
Removal

Figure 119



Remove the screws (3) and take off the drive input shaft cover (1) from the front cover (2).

Figure 120



Take out the screws (1) and, through the front cover (5), take out the oil pump comprising: cover (2), rotor (3) and stator (4).

Introduce compressed air through the hole (→) and expel through the front cover (5): the overrun brake piston (8) comprehensive of gasket (9), clutch plates with external toothing (6), clutch plates with internal toothing (7) and supporting ring (10).

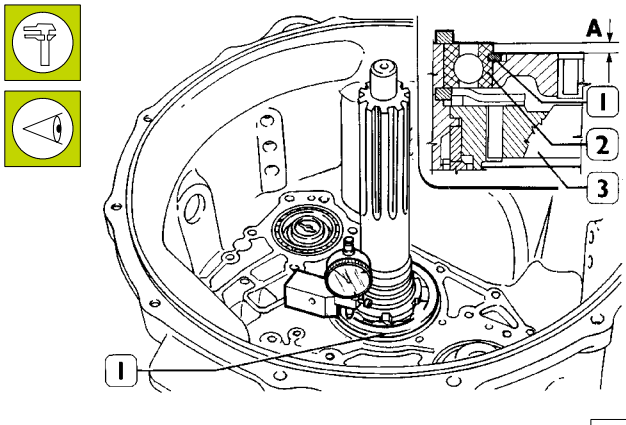
Fitting the front cover

Recompose the front cover (5) by reversing the operations described for removal, without parts (6 - 7 - 8).

The gasket (9) must always be replaced.

Adjusting drive input shaft bearing end float

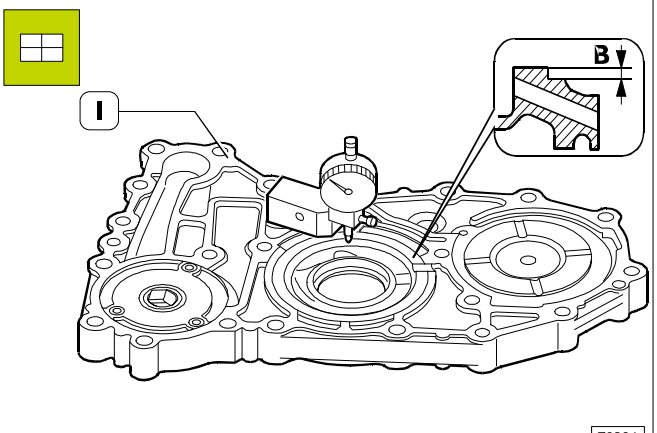
Figure 121



Determine the thickness **S** of the drive input shaft bearing adjustment ring by proceeding in the following way:

- ❑ check that the circlip (1) of the bearing (2) rests in its seat;
- ❑ measure the protrusion of the bearing (2) from the surface of the front box (3), distance **A**.

Figure 122



70986

❑ measure the depth of the seat on the front cover (1) of the bearing (2, Figure 121), distance **B**.

The thickness S of the adjustment ring is determined by the following equation:

$$S = (A - B) - C$$

Where:

A-B = measurements

C = end float 0 ÷ 0.1 mm

For example:

A = 5.50 mm

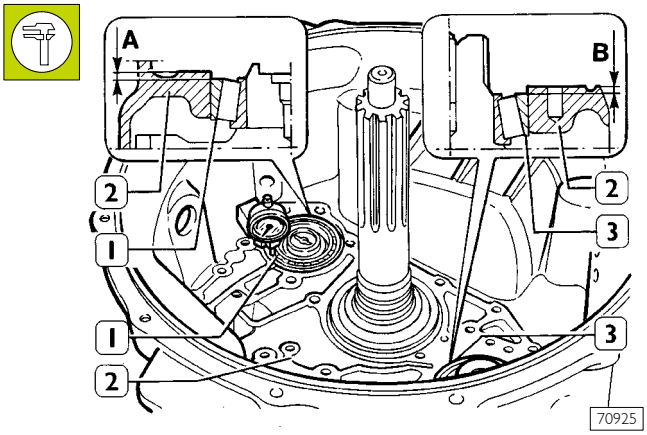
B = 3.90 mm

C = 0 ÷ 0.1 mm

S = (5.50 -3.90) - 0 ÷ 0.1=1.59 – 1.60 mm

Adjusting transmission shaft bearing end float

Figure 123



70925

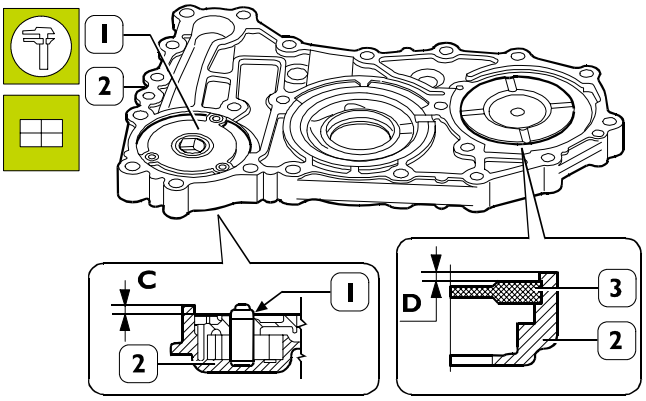
Determine the thickness **S** of the transmission shaft bearing end float adjustment rings by proceeding in the following way:

❑ turn the shafts and check that the external rings (1 -3) of the bearings rest with no play on the rollers of the bearings;

❑ measure the distance between the surface of the front box (2) and the external rings (1 - 3);

- external ring (1) pump side, distance A.
- external ring (3) overrun brake side, distance B

Figure 124



70926

❑ measure the distance between the surface of the front cover (2) and the oil pump (1), distance **C**;

❑ mount the overrun brake disc supporting ring (3) in the seat on the front cover (2) and measure the distance between this and the surface of the cover (2), distance **D**.

The thickness S of the adjustment rings is determined by the following equation:

- oil pump side **S = A + C + F**

A - C = measurements

F = end float ± 0.05

For example:

S = 2 + 0.05 (± 0.05) = 2 ÷ 2.1

- overrun brake side S = B + D + F

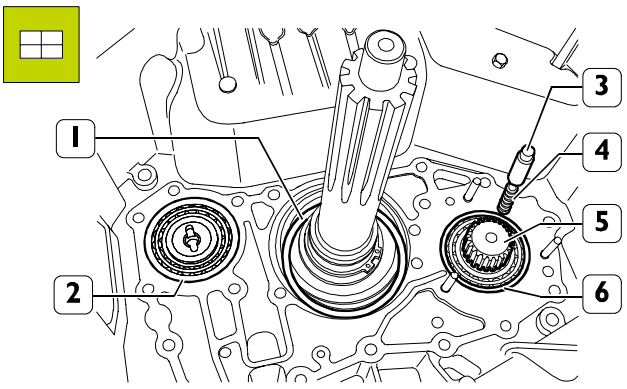
B - C = measurements

F = end float ± 0.05

For example:

S = 1.95 + 0.15 (± 0.05) = 2.05 ÷ 2.15

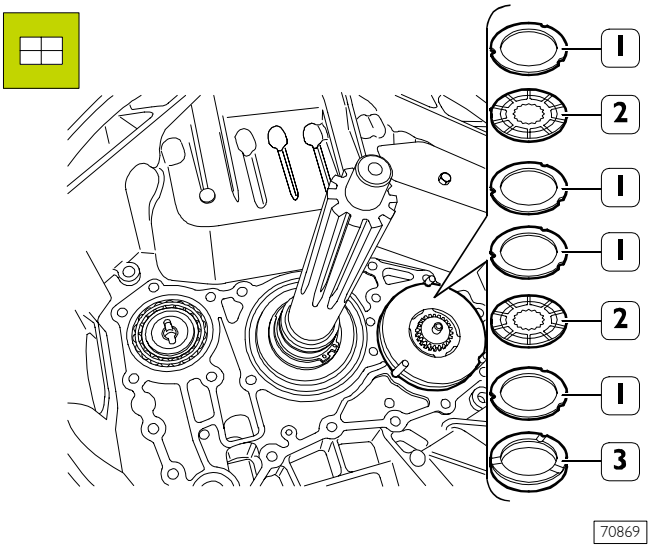
Figure 125



70870

On the external rings of the bearings supporting the drive input and transmission shafts, mount the end float adjustment rings (1 - 2 and 6) of the thickness determined in the preceding measurements. Insert the spring (4) and the cap (3) in the transmission shaft (5).

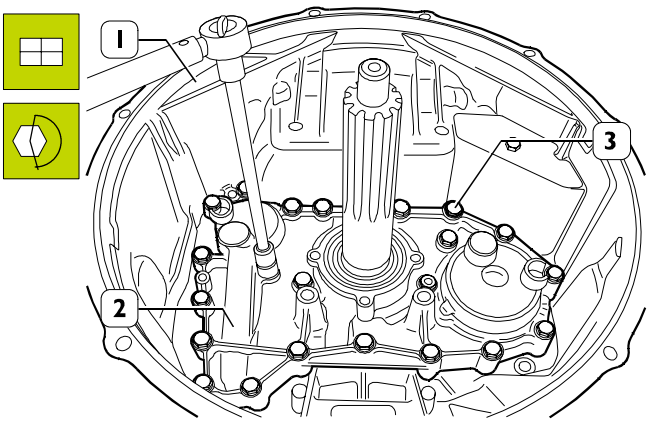
Figure 126



70869

In the sequence shown in the figure, position: the supporting ring (3), clutch plates with internal toothing (2) and clutch plates with external toothing (1).

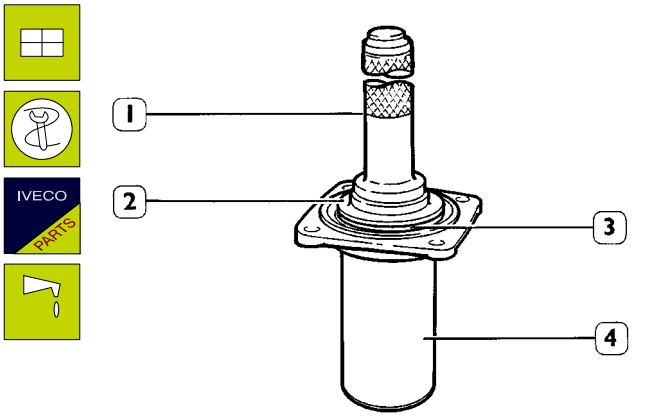
Figure 127



70927

Spread IVECO sealant 1905685 onto the surface of the front box (1) mating with the cover (2). Adjust the key of the oil pump shaft so that it coincides with the coupling milling of the transmission shaft. Fit on the cover (2) and tighten the screws (3) to the prescribed torque.

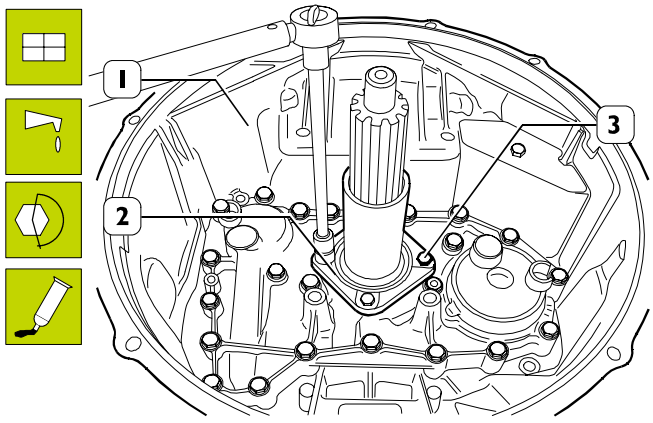
Figure 128



46007

Using the driver 99374336 (2) and grip 99370007 (1), fit the seal (3) in the drive input shaft cover (4).

Figure 129



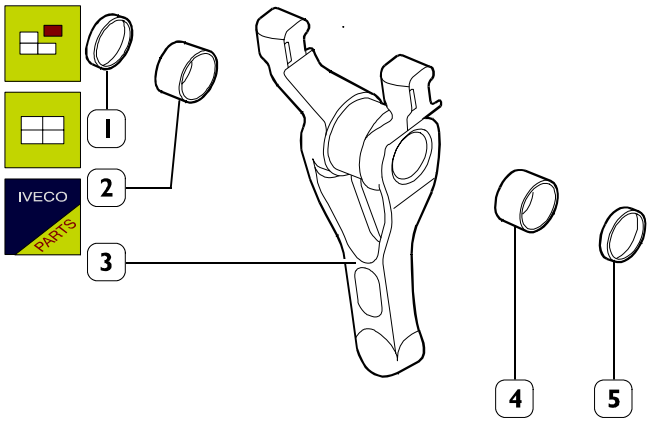
70928

Lubricate the sealing surface of the seal with Unisilikon.

Spread IVECO sealant 1905285 onto the surface of the front box (1) mating with the cover (2). Mount the cover (2). Spread LOCTITE 241 onto the thread of the screws (3) and tighten them to the prescribed torque.

Clutch release lever

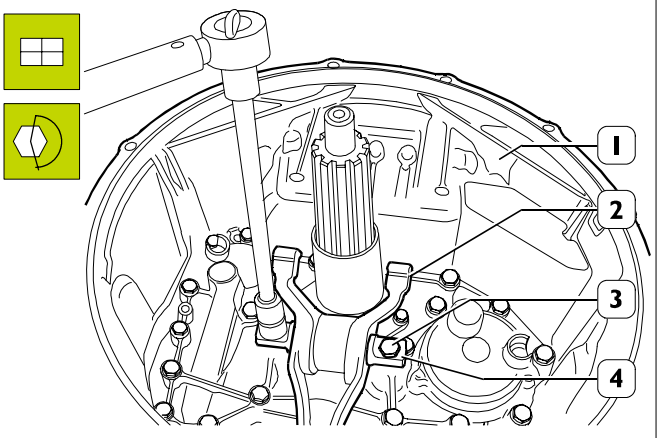
Figure 130



70929

The bushings (2 and 4) and seals (1 and 5) of the lever (3) are changed by using a suitable drift for removing – fitting new parts.

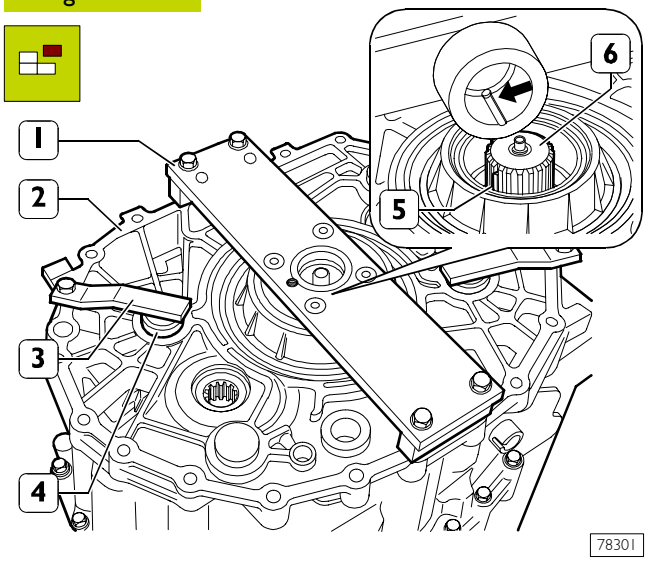
Figure 131



70930

Insert the joint pin (4) into the lever (2) and tighten the screws (3), fixing it to the front box (1), to the prescribed torque.

Figure 132

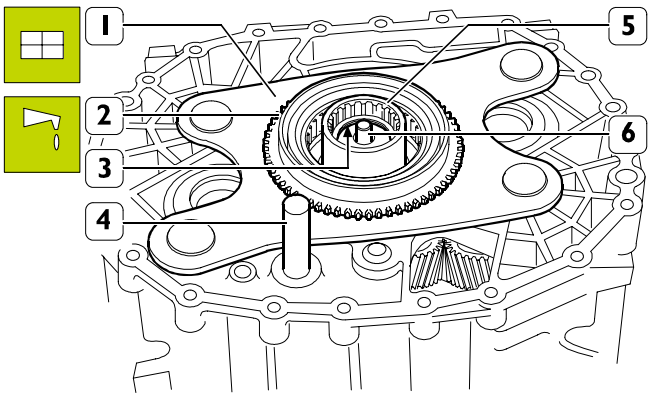


78301

Turn over the gearbox.

Remove the plate 99370153 (1) and the brackets (3) fastening the pins (4) from the middle box (2).

Figure 133



70865

Fit: the plate (1) together with the coupling body (2), adjustment ring (3), connecting sleeve (5) and rod (4).

Complete assembly of the gearbox by refitting the rear box and the speed actuator as described under the relevant headings.

On completing assembly, replenish the gearbox with the prescribed grade and quantity of lubricating oil.

Gearbox EuroTronic 12 AS 2301 D.D./O.D. with Intarder (IT)

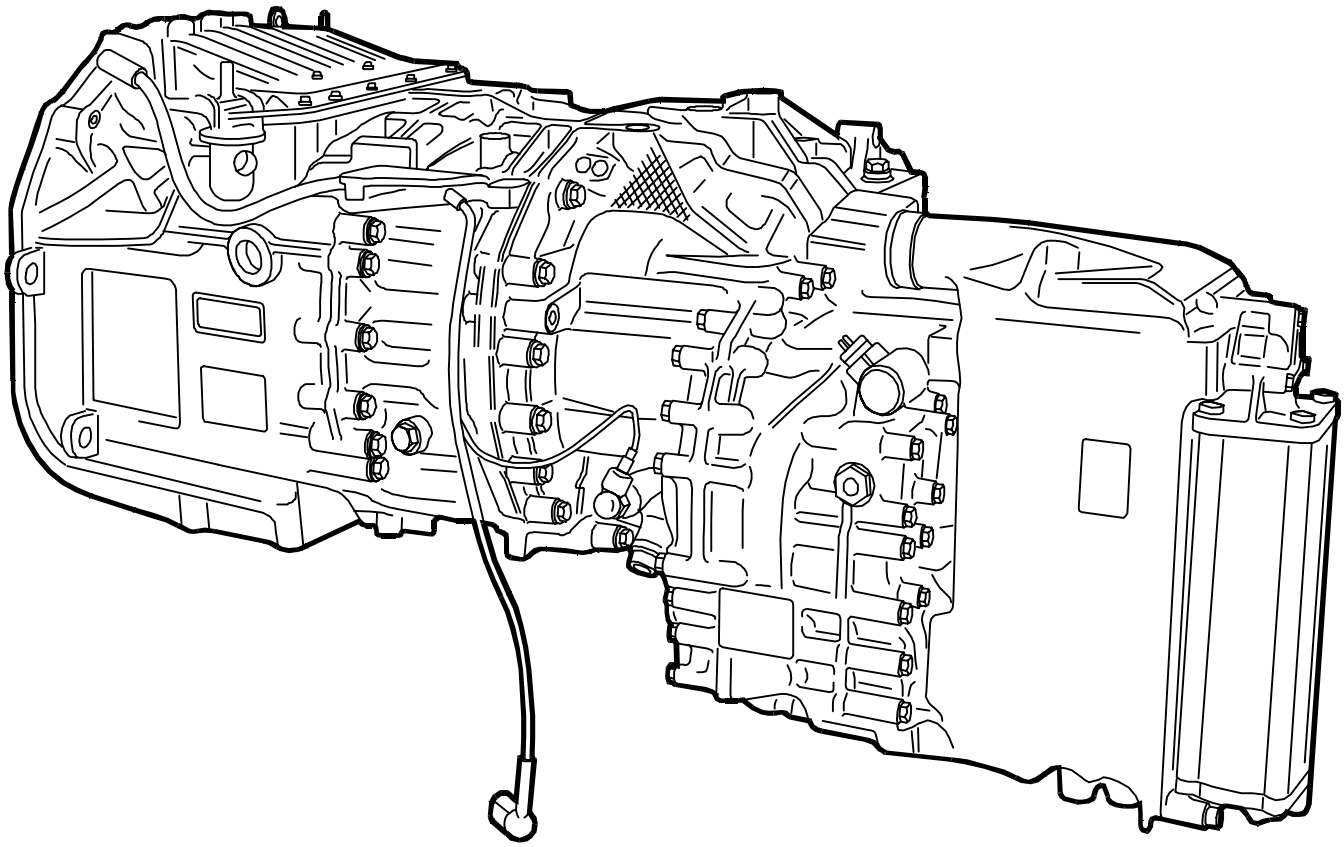
EuroTronic Automated 12 AS 2301 D.D./O.D. with intarder

This differs from the 12 AS 2301 D.D./O.D. gearbox in the following:

SPECIFICATIONS AND DATA

	GEARBOX Type	**EuroTronic Automated 12 AS 2301 D.D./O.D. with intarder**
	Maximum braking torque Nm	3000
	Braking capacity Kw	520
	Type of oil	Tutela Truck FE-Gear Tutela ZC 90
	Quantity after overhauling gearbox and retarder drained completely litres	21
	kg	19

Figure 1



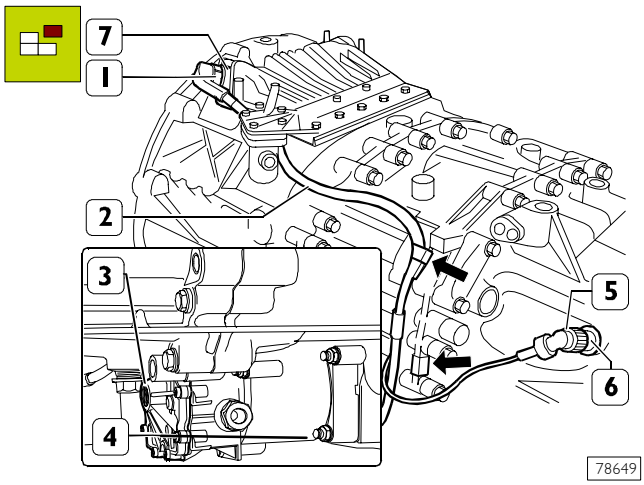
D.D. = Direct Drive
O.D. = Over Drive (Multiplied)

70831

530210 OVERHAULING THE GEARBOX

Removing the hydraulic retarder

Figure 2

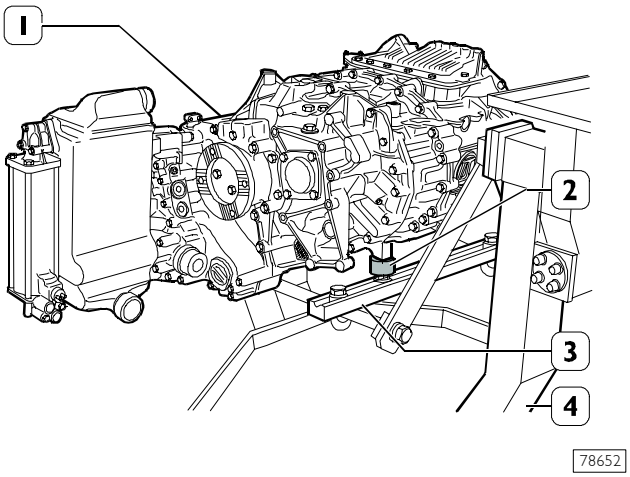


Unscrew the ring nut (1 and 5) and disconnect the electric wiring (2) from the speed sensor (6 and 7).

Detach the wiring (2) from the clips (→) securing it to the middle box.

Remove the nuts (4) and detach the actuator (3) from the front box.

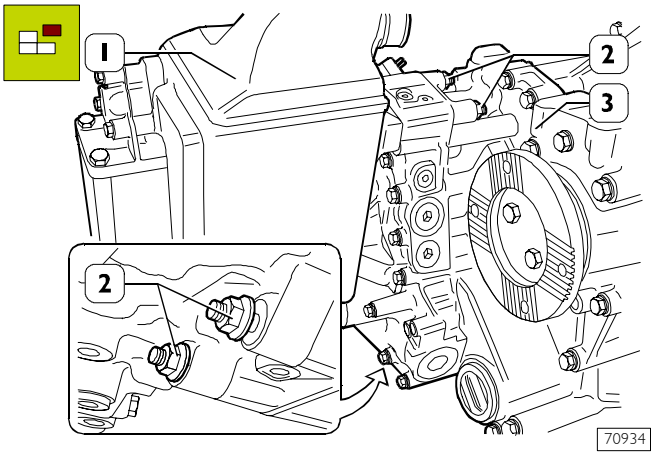
Figure 3



Fir spacers SP. 2396 (2) and fasten the gearbox (1) to brackets 99322225 (3) on the rotating stand 99322205 (4).

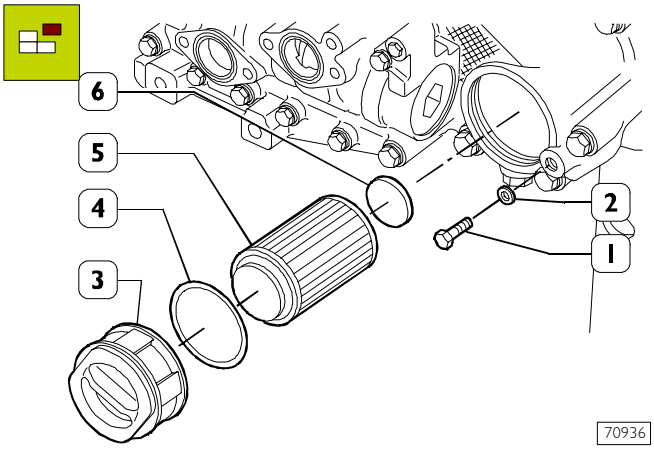
Drain off the lubricating oil by removing the plugs from the Intarder and from the gearbox.

Figure 4



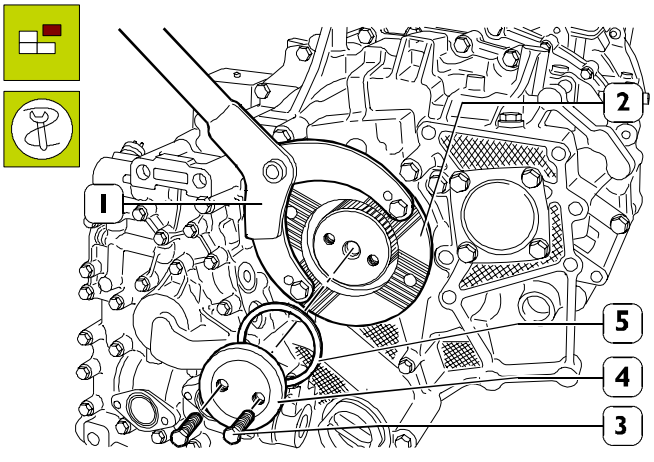
If applicable, remove the four nuts (2) fixing the heat exchanger (1) to the hydraulic retarder (3) and detach the heat exchanger (1).

Figure 5



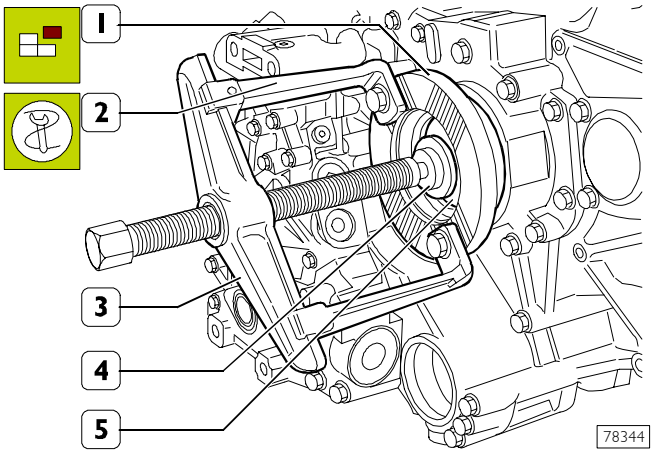
Remove the screw (1) and the washer (2) beneath. Extract the plug (3) with the seal (4), oil filter (5) and magnet (6).

Figure 6



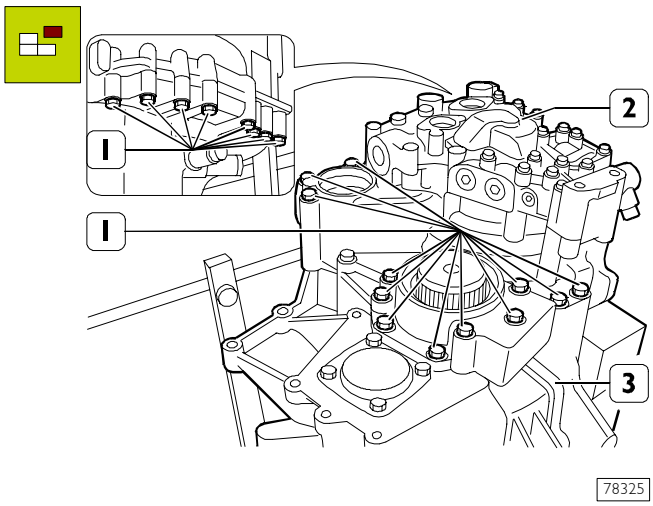
Block rotation of the sleeve (2) by applying the lever 99370317 (1) to it and remove the screws (3), disc (4) and underlying seal (5).

Figure 7



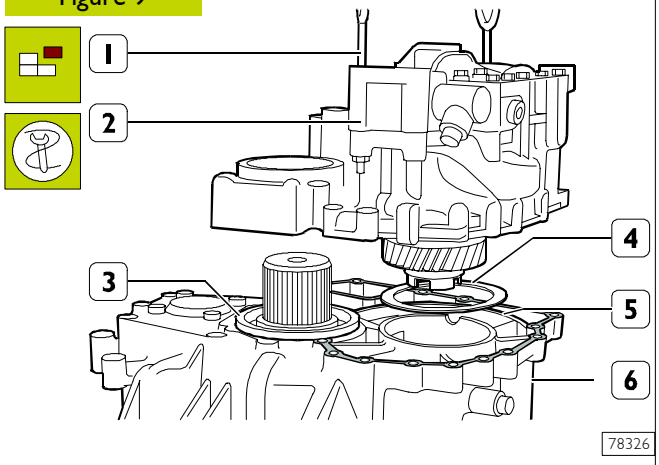
Using an extractor composed of the bridge 99341003 (3), brackets 99341018 (2) and reaction block 993410134 (4), remove the sleeve (1) from the shaft (5).

Figure 8



Remove the screws (1) fixing the hydraulic retarder (2) to the rear box (3).

Figure 9



Fit the eyebolt 99370565 (1) to the hydraulic retarder (2). With special ropes and lifter, detach the hydraulic retarder (2) from the rear box.

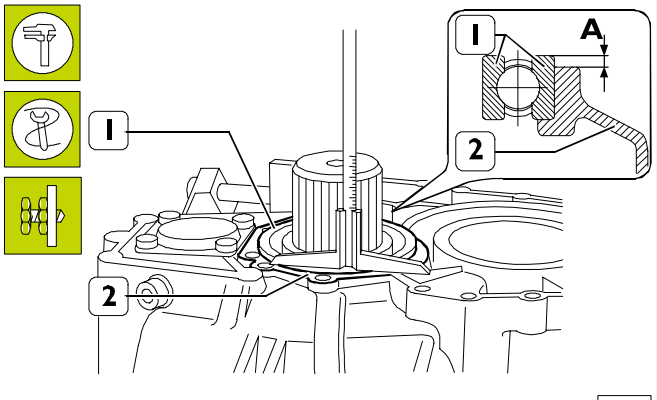
Remove the adjustment rings (3 and 4) and the gasket (6).

Refitting the hydraulic retarder

Before refitting, determine the thickness of the adjustment rings (3 and 4 Figure 9) as follows:

Adjusting epicyclic reduction gear train bearing end float

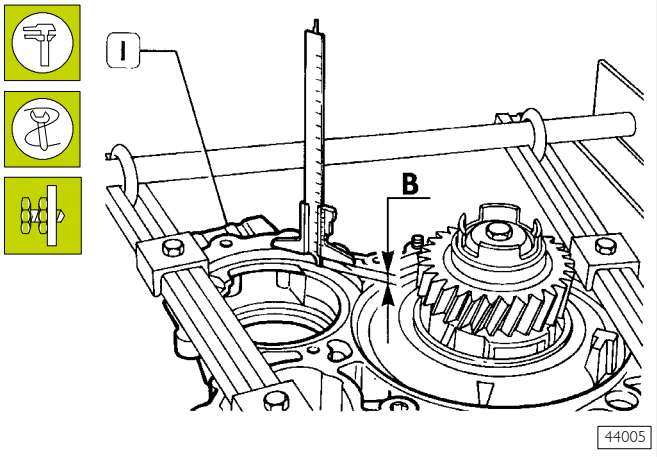
Figure 10



Determine the ball bearing end float adjustment thickness (1) by proceeding as follows:

- ❑ measure the protrusion of the bearing (1) from the surface of the rear box (2): distance **A;**

Figure 11



- ❑ measure the distance between the sealing surface (1) of the half box of the retarder and the supporting surface of the bearing (1, Figure 10): distance **B;**
- ❑ measure the thickness of the gasket between the retarder and gearbox: distance **C.**

The thickness S of the adjustment ring is given by the following equation:

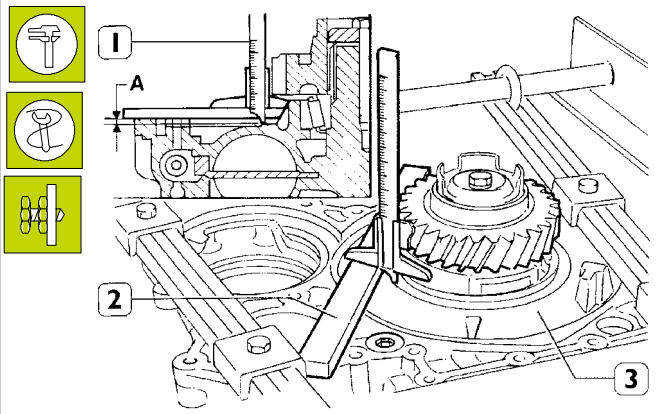
$$S = [B + C - A] - G$$

where:

- ❑ B - C - A = measurements
- ❑ G = 0.1 mm: end float of the ball bearing (1 Figure 10) (0 ÷ 0.1 mm)

Adjusting stator end float

Figure 12



70946

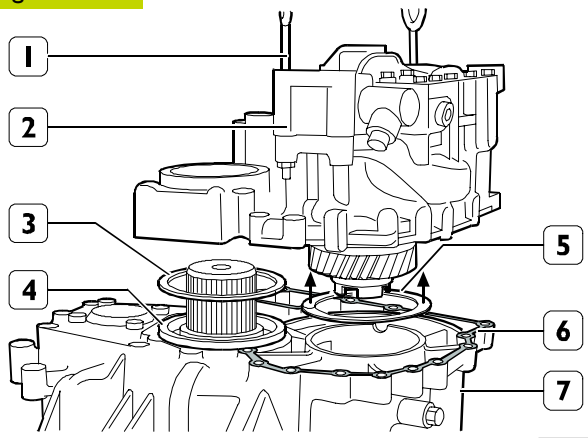
Determine the thickness **S** of the stator end float adjustment ring:

- using a depth gauge (1) and calibrated rule (2), measure the distance between the sealing surface of the half boxes and the supporting surface of the stator (3): distance **A**;
- measure the thickness of the gasket between the retarder and gearbox: distance **B**.

The thickness S of the stator end float adjustment ring is given by the following sum: **S = A+B+C**

- **A** and **B** = measurements
- **C** = 0.05 mm: stator end float adjustment ring pre-load. (- 0.05 ÷ 0.05 mm)

Figure 13



78327

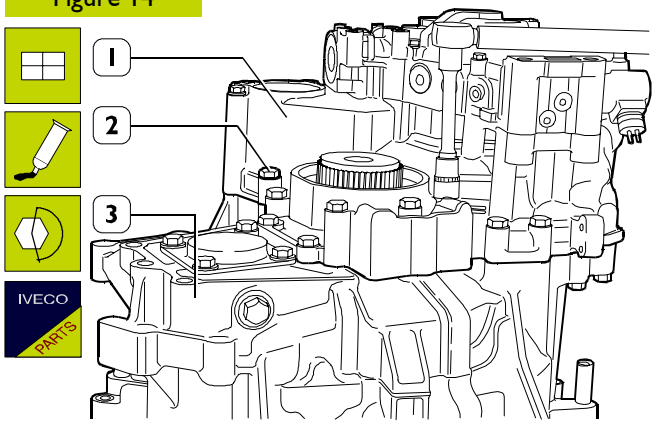
Fit the eyebolt 99370565 (1) to the hydraulic retarder (2) and lift it with a hoist.

Position the adjustment rings (3 and 5) of the thickness determined in the preceding measurements on the bearing (4) and on the seat (→) of the stator.

Fit a new gasket (6) on the rear box.

Mount the hydraulic retarder (2) on the rear box (7) making sure that the gasket (6) gets positioned correctly.

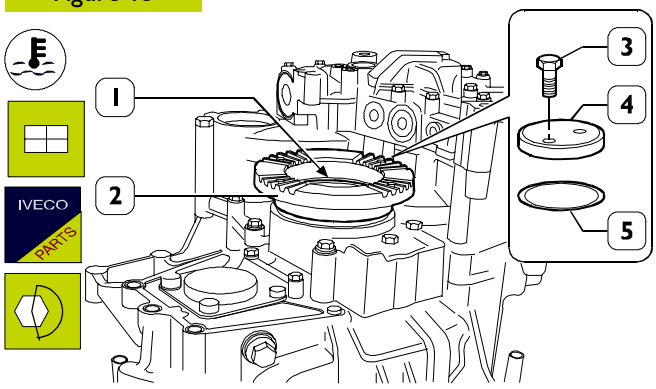
Figure 14



70948

Screw down the screws (2) fixing the hydraulic retarder (1) to the rear box (3) and tighten them to the prescribed torque.

Figure 15

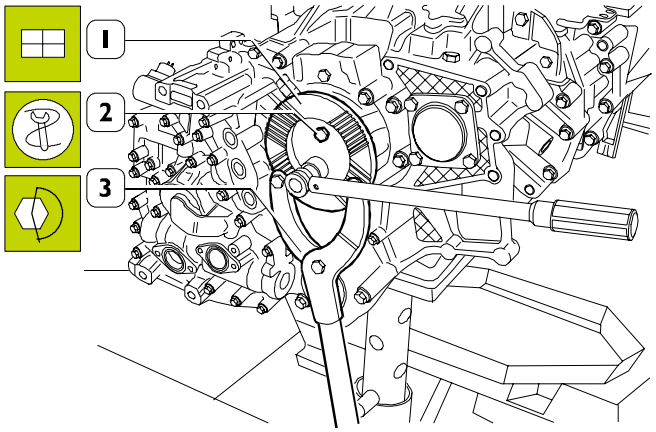


70949

Heat the flange (2) to approx. 80°C and fit it onto the spider shaft (1).

Fit on a new seal (5), the disc (4), screw down the screws (3) and tighten them to the prescribed torque.

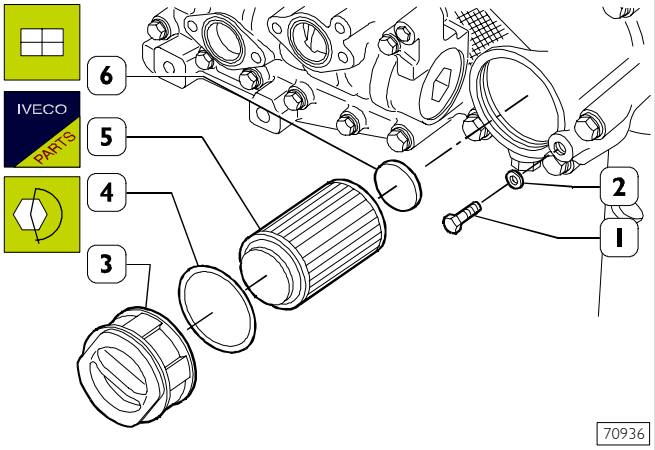
Figure 16



70954

Block rotation of the sleeve (1) by applying the lever 99370317 (3) and tighten the fixing screws (2) to the prescribed torque.

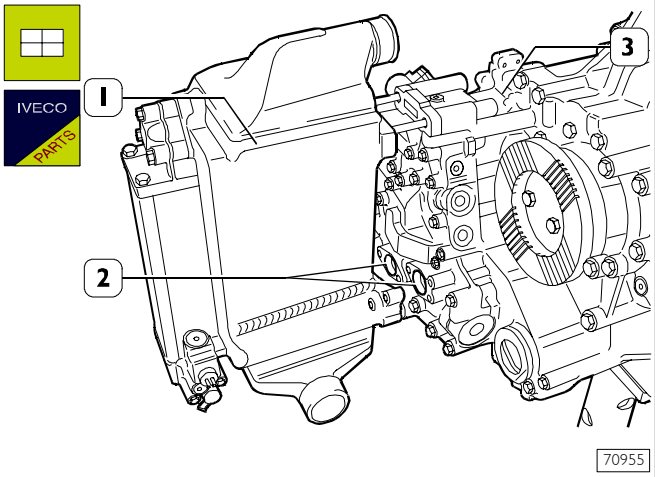
Figure 17



Position the magnet (6) on the filter (5) and insert this into the hydraulic retarder. Fit the plug (3) with a new seal (4).

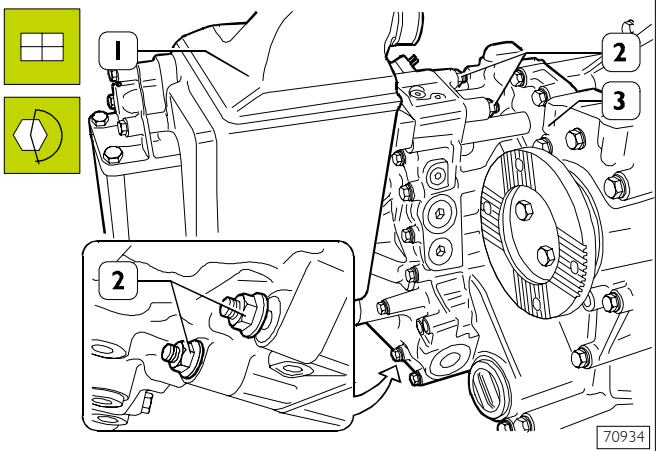
Screw down the fastening screw (1) with the washer (2).

Figure 18



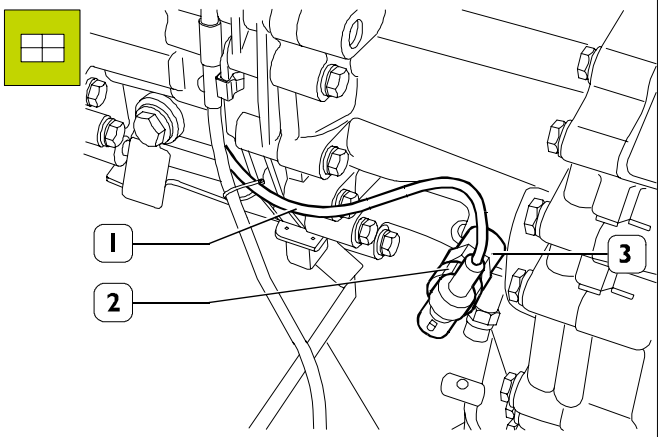
Fit two new seals (2) on the hydraulic retarder (3) and mount the heat exchanger (1) (if applicable).

Figure 19



Screw down the four nuts (2) fixing the heat exchanger (1) to the hydraulic retarder (3) and tighten them to the prescribed torque.

Figure 20

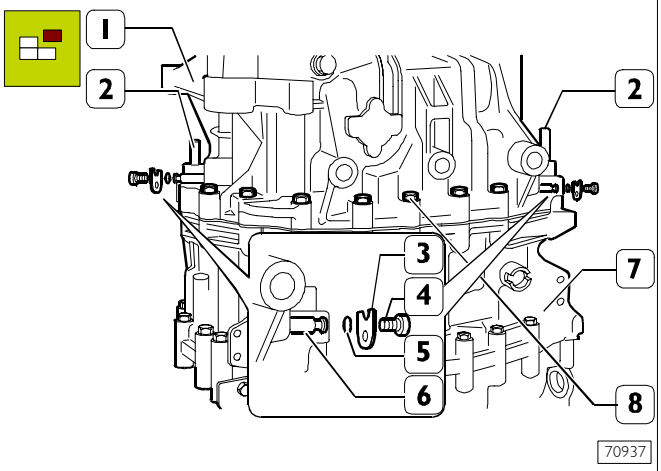


Connect the electric wiring (1) to the speed sensor (3) and tighten the ring nut (2).

Replenish the gearbox with the prescribed grade and quantity of lubricating oil.

Removing the rear box

Figure 21



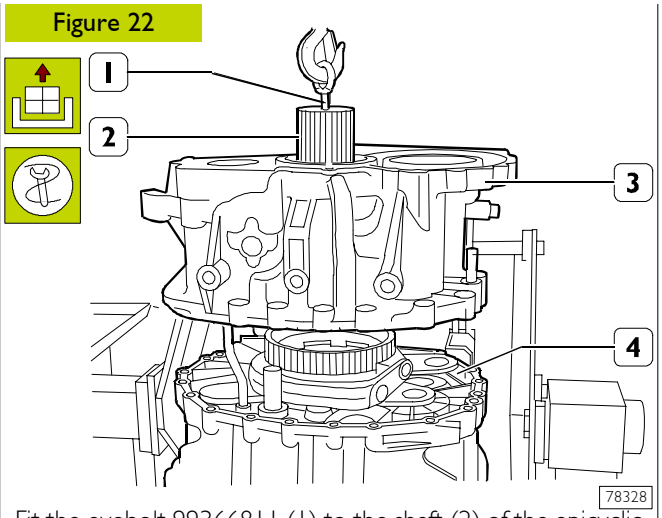
Disconnect the gear actuator, as described in the respective chapter.

Remove the hydraulic retarder as described under the relevant heading.

Remove the screws (4) fixing the plates (3) fastening the pins (6) and extract these together with the seals (5) from the central box (7).

Extract the two centring pins (2) and remove the screws (8) of fixing rear box (1).

Figure 22

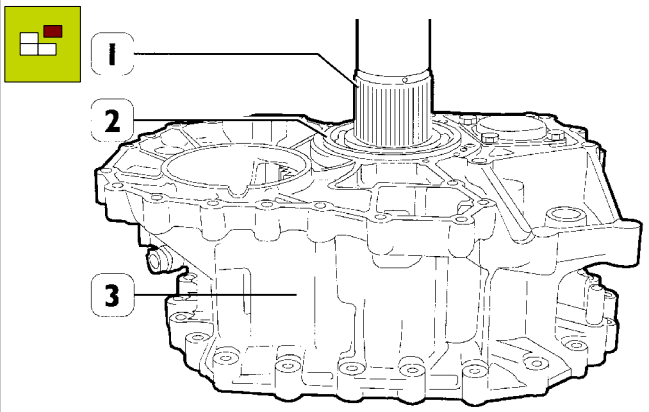


78328

Fit the eyebolt 99366811 (1) to the shaft (2) of the epicyclic reduction gear (2). Using special ropes and lifter, detach the rear box (3) from the middle box (4).

Removing the E.R.G.

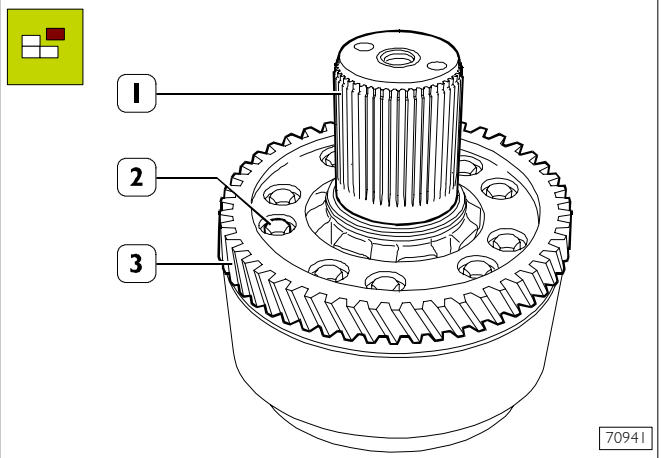
Figure 23



48941

Using a press, extract the E.R.G. spider shaft (1) from the supporting ball bearing (2). Turn the rear box (3) upside-down and extract the ball bearing (2).

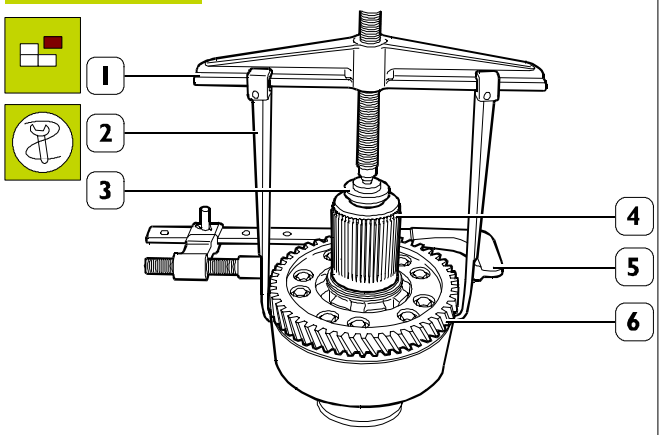
Figure 24



70941

Remove the screws (2) securing the gear (3) to the spider shaft (1).

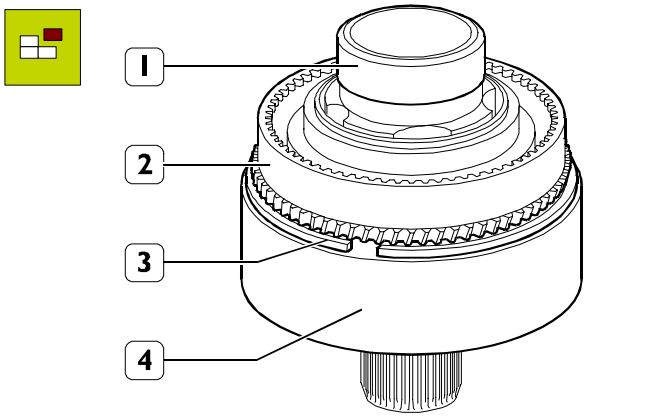
Figure 25



70942

Using an extractor composed of: bridge 99341004 (1), stays 99341012 (2), reaction block 99345056 (3) and clamp 99341015 (5), extract the gear (6) from the spider shaft (4).

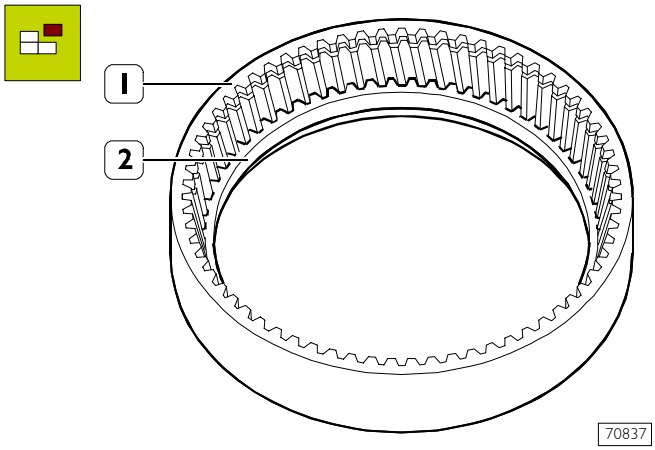
Figure 26



70836

Using a screwdriver, remove the circlip (3) fastening the ring gear with internal toothing (4) to the ring gear with external toothing (2) and remove them from the E.R.G. (1).

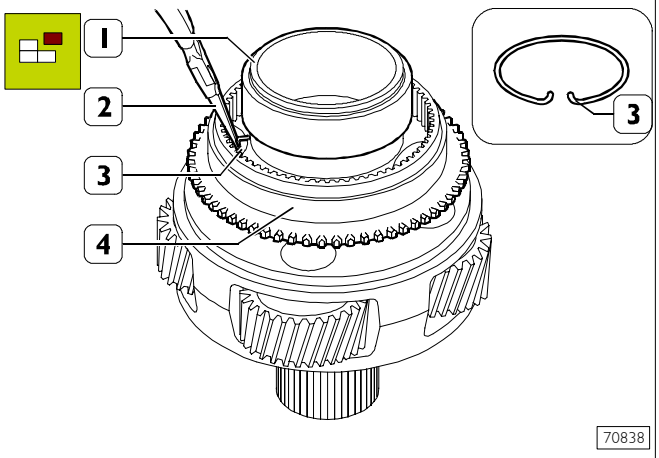
Figure 27



70837

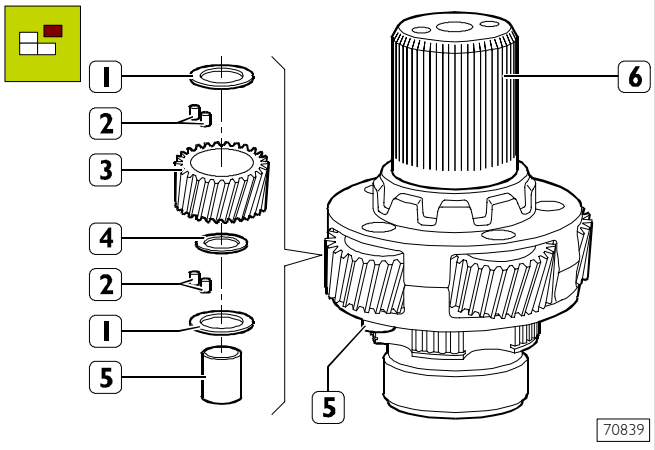
Extract the toothed ring (2) from the ring gear with internal toothing (1).

Figure 28



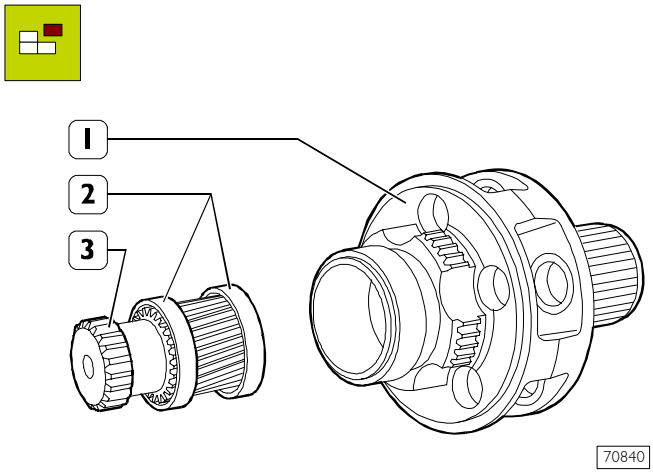
Using pliers (2), tighten the ends of the circlip (3) and remove the coupling body (4) from the E.R.G. shaft (1).

Figure 29



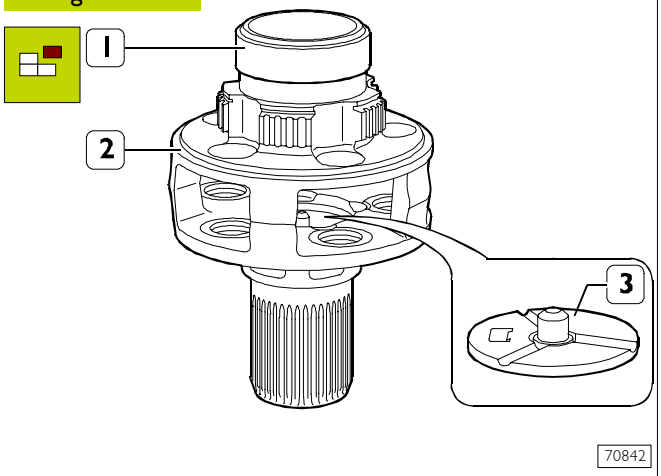
Using a punch, extract the pins (5) from the spider shaft (6). Remove the planetary gears (3) from the spider shaft (6), together with the rollers (2) and shim adjustment rings (1 and 4).

Figure 30



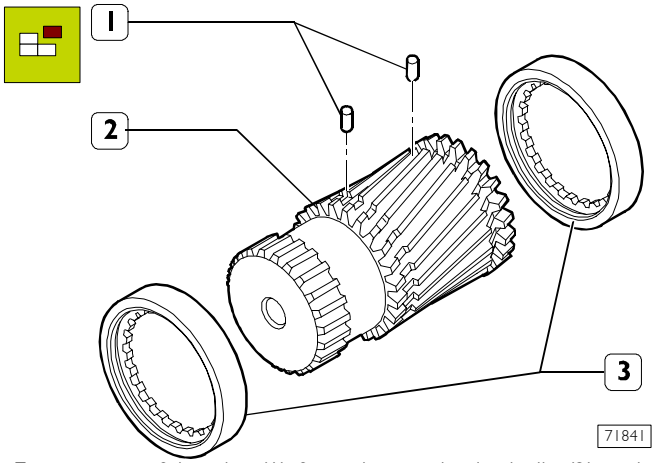
Extract the toothed spindle (3) from the spider shaft (1) together with the rings (2).

Figure 31



Using a suitable extractor, remove the roller bearing ring (1) from the spider shaft (2). Using a punch, extract the disc (3) from the inside of the spider shaft (2).

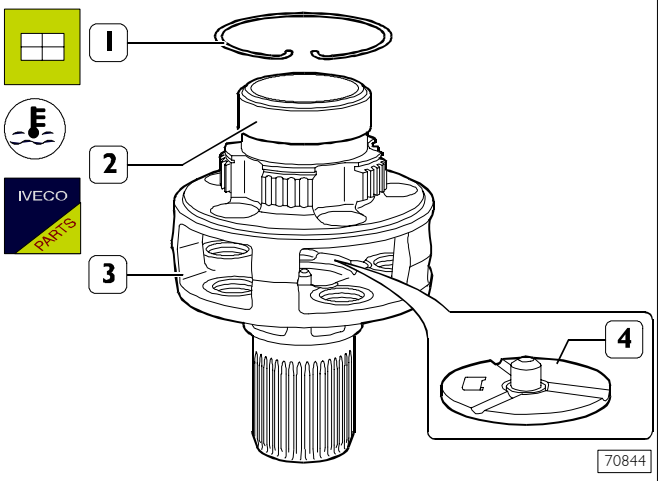
Figure 32



Extract one of the pins (1) from the toothed spindle (2) and extract the rings (3) from this.

Fitting the E.R.G.

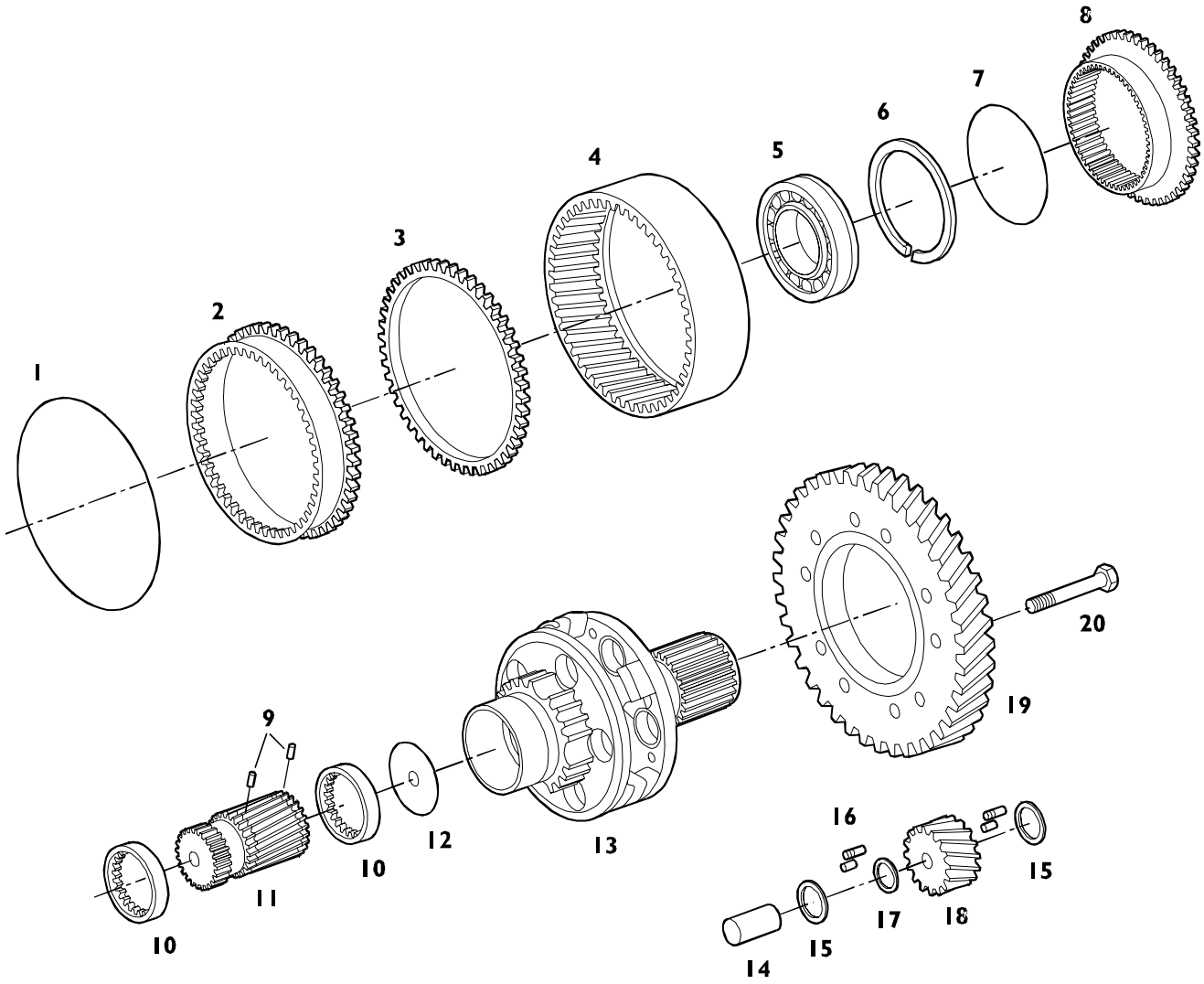
Figure 33



Heat the inside ring (2) of the roller bearing to and fit it on the spider shaft (3).

Fit on the circlip (1). Fit on the disc (4).

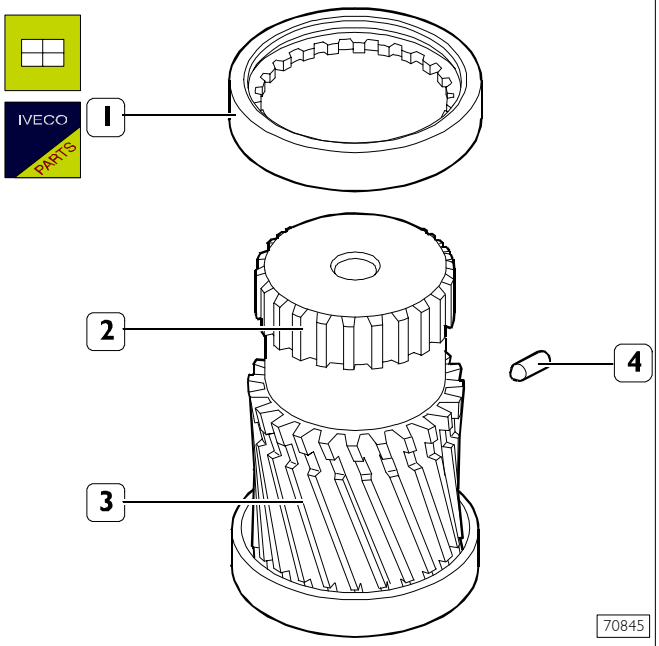
Figure 34



PARTS COMPRISING THE E.R.G.

1. Circlip - 2. Ring gear with external toothing - 3. Toothed ring - 4. Ring gear with internal toothing - 5. Bearing - 6. Circlip - 7. Circlip - 8. Coupling body - 9. Pins - 10. Ring - 11. Toothed spindle - 12. Disc - 13. Spider shaft - 14. Pin - 15. Shim adjustment ring - 16. Rollers - 17. Shim adjustment ring - 18. Planetary gear - 19. Gear - 20. Screw.

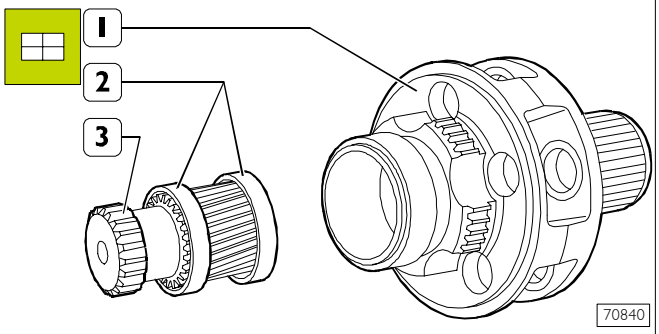
Figure 35



70845

Drive the rings (1 and 3) onto the toothed spindle (2) and fit on the pin (4).

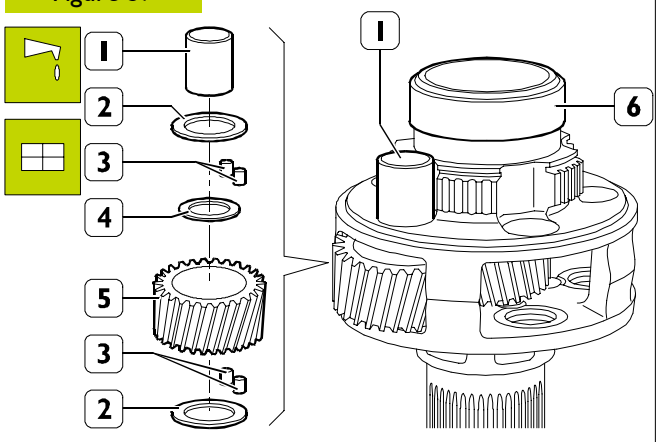
Figure 36



70840

Insert the spindle (3) together with the rings (2) onto the spider shaft (1).

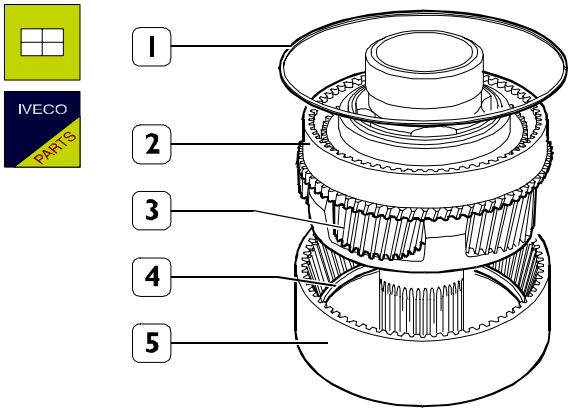
Figure 37



70982

Smear grease into the hole of the planetary gear (5) and insert the rollers (3) with the associated shim adjustment rings (2 and 4).
Fit the planetary gears (5) onto the spider shaft (6), fastening them to it with the pins (1).

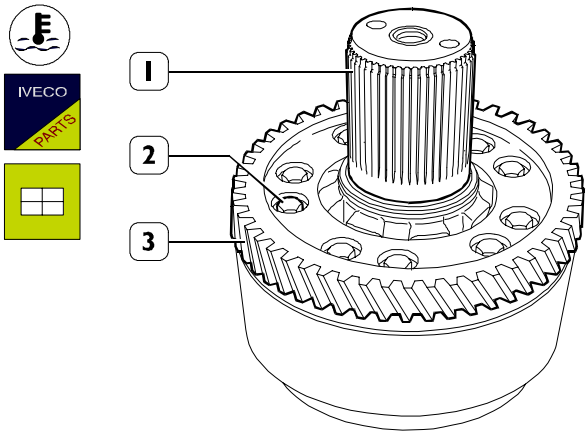
Figure 38



70983

On the spider shaft (3), fit: the ring gear with internal toothing (5) together with the toothed ring (4), and the ring gear with external toothing (2) and fasten the two ring gears with the circlip (1).

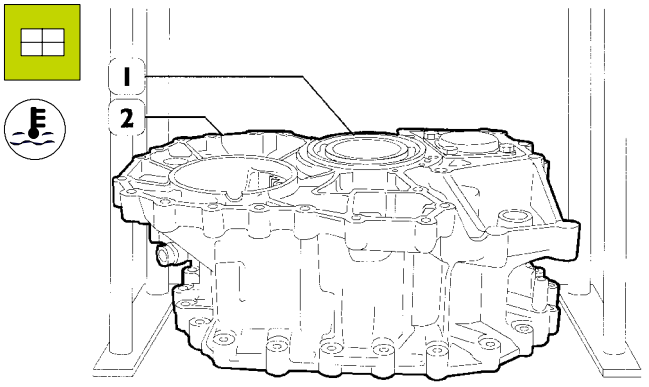
Figure 39



70941

Heat the gear (3) to 120°C ÷ 130°C and fit it onto the spider shaft (1). Screw down the fixing screws (2) and tighten them to the prescribed torque.

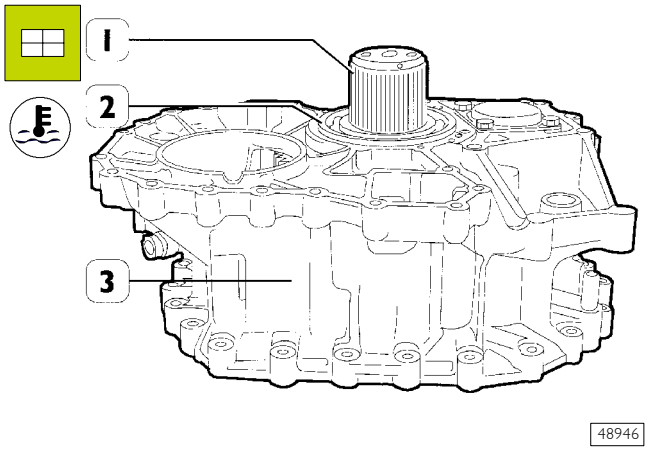
Figure 40



48944

Heat the seat of the bearing (1) of the rear box (2) to 90°C and mount the bearing (1).

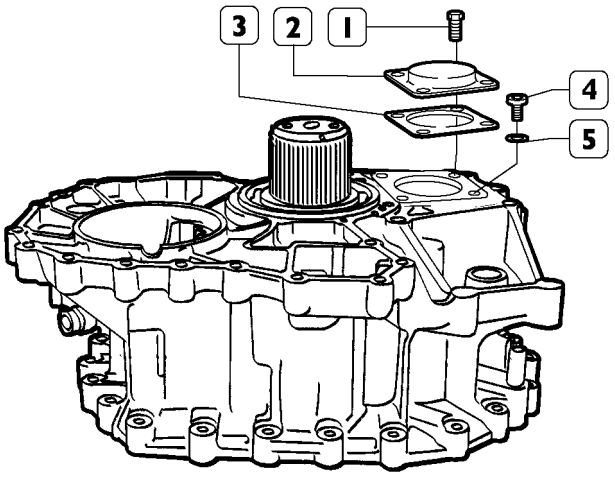
Figure 41



48946

Rest the spider shaft (1) on an appropriate spacer. Heat the inside ring of the bearing (2) to approx. 100°C and drive it together with the rear box (3) onto the spider shaft (1).

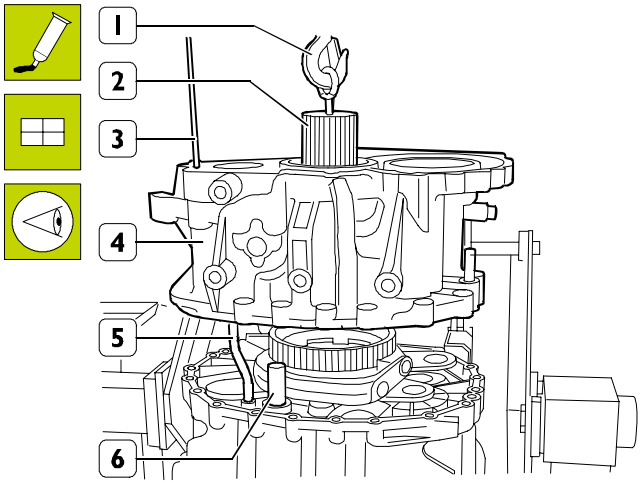
Figure 42



78364

Take out the screws (1) and remove the cover (2) with its seal (3). Remove the screw (4) with the washer (5).

Figure 43



78329

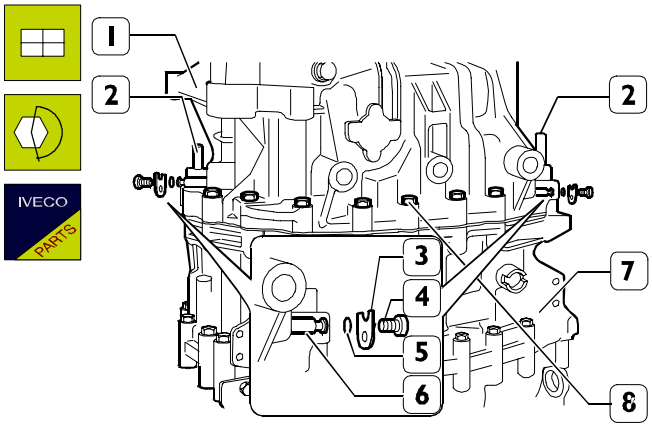
Spread IVECO sealant 1905685 onto the mating surface of the middle box (7). Fit the eyebolt 99366844 (1) onto the shaft (2).

Using ropes and a lifter, position the rear box (4) coaxially to the middle one (7).

Insert a rod (3) of appropriate diameter in the hole for the screw (4, Figure 42) and in the oil pipe (5) to guide this into its seat while lowering the rear box (4).

Lower the rear box (4), paying attention that the spider shaft, oil pipe (5) and rod (6) go into their seat correctly.

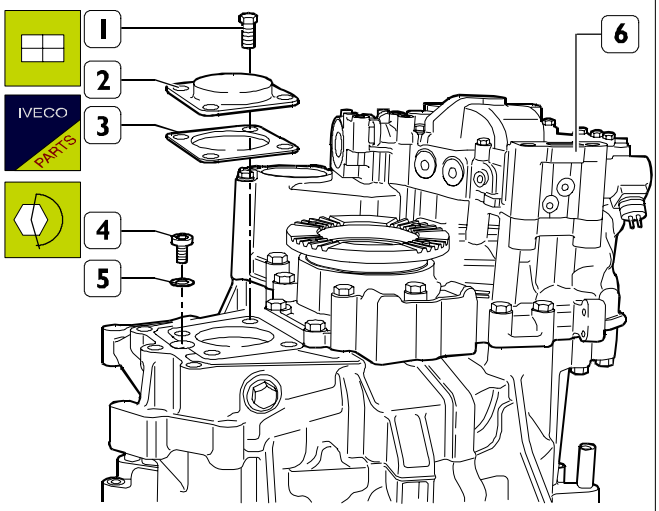
Figure 44



70937

Screw down the screws (8) without tightening them; insert the centring pins (2) and tighten the screws (8) to the prescribed torque.
Fit the fork joint pins (6) with fresh seals (5) and tighten the screws (4) fixing the fastening plates (3) to the prescribed torque.

Figure 45



Fit: the screw (4) with a new washer (5) and tighten it to the prescribed torque.

Fit the cover (2) with a fresh seal (3) and tighten the fixing screws (1) to the prescribed torque.

Then refit the hydraulic retarder (6) as described under the relevant heading.