

SPECIAL REMARKS

Workshop Manuals - concerning the mechanical part - are divided into several Sections. Each Section is characterised by a number and its content is shown on the general index to be found at the beginning of each workshop manual.

Each section deals generally with one of the main Assemblies (engine, transmission, etc.)

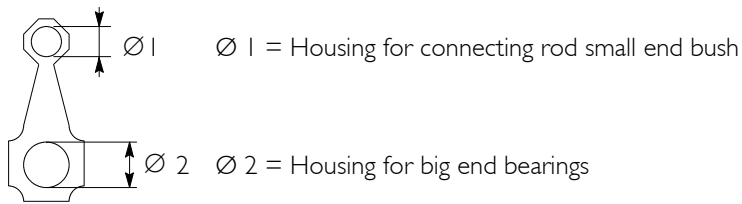
Each section deals with the following topics:

Specifications and technical data, Tightening torques, Special tools, Troubleshooting (fault diagnosis), Component removal/refitting, Repair operations.

To facilitate manual consultation, the different subjects are generally dealt with (where possible), following the same sequence.

This manual also provides graphs and symbols instead of description of parts, operations or operating procedures (see next page), to give a more immediate and friendly reference.

Example:



Tighten to torque + angle value

Furthermore, within each section, every heading or sub-heading concerning the operations to be carried out is preceded by a six digit number. This number is the **Product Code** that is to be found in the repair operation described in the FLAT RATE MANUALS and in the FAILURE CODES publication.

For quick reference the indication for reading this code is described below (see also the Flat Rate Manuals).



The first two figures identify the PRODUCT within the vehicle.

Example :

Product 50 = Frame;

Product 52 = Axles;

Product 53 = Gearbox, etc.

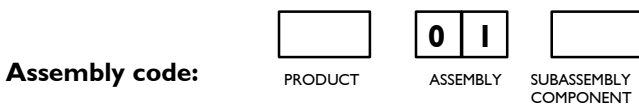


Figure three and four identify the ASSEMBLY within the PRODUCT

Example :

Product 50 = Frame;

Assembly 01 = Chassis;

Assembly 02 = Bumpers-Under run-bars, etc.

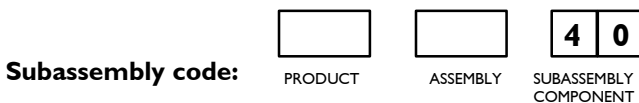


Figure five and six identify exactly the SUB-ASSEMBLY and the Assembly Component within the PRODUCT



















Example :
















Product 50 = Frame;

Assembly 01 = Chassis;

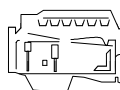



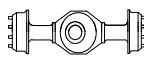
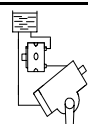


Subassembly 40 = Chassis cross members, etc.

Graph and symbols

	Removal Disconnection
	Refitting Connection
	Removal Disassembly
	Fitting in place Assembly
	Tighten to torque
	Tighten to torque + angle value
	Press or caulk
	Regulation Adjustment
	Warning Note
	Visual inspection Fitting position check
	Measurement Value to find Check
	Equipment
	Surface for machining Machine finish
	Interference Strained assembly
	Thickness Clearance
	Lubrication Damp Grease
	Sealant Adhesive
	Air bleeding

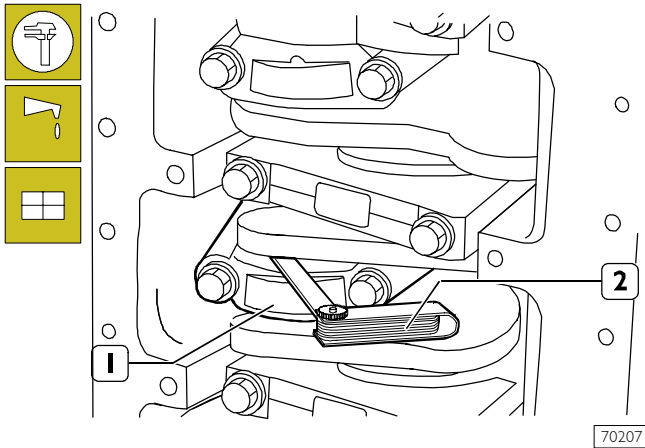
	Intake
	Exhaust
	Operation
ϱ	Compression ratio
	Tolerance Weight difference
	Rolling torque
	Replacement Original spare parts
	Rotation
	Angle Angular value
	Preload
	Number of revolutions
	Temperature
	Pressure
$>$	Oversized Higher than.... Maximum, peak
$<$	Undersized Less than.... Minimum
	Selection Classes Oversizing
	Temperature < 0 °C Cold Winter
	Temperature > 0 °C Hot Summer

**GENERAL SPECIFICATIONS
COMPOSITION OF THE MODELS**

UNITS	MODELS 4 X 2	MLI10EL17	MLI10EL17/P	MLI10EL17R	MLI10EL17R/P	MLI10EL21	MLI10EL21/P	MLI10EL21R	MLI10EL21R/P	MLI20EL17	MLI20EL17/P	MLI20EL17R	MLI20EL17R/P	MLI20EL21	MLI20EL21/P	MLI20EL21R	MLI20EL21R/P	MLI20E18	MLI20E18/P
			F4AE048IA (170 HP)	•	•	•	•					•	•	•	•				
	F4AE068IE (180 HP)																	•	•
	F4AE068ID (210 HP)					•	•	•	•					•	•	•	•		
	F4AE068IB (240 HP)																		
	F4AE068IA (275 HP)																		
	Single plate																		
	13"	•	•	•	•					•	•	•	•						
	14"					•	•	•	•					•	•	•	•	•	•
	13"/14"																	•	•
	15"/16"																		
	2855.6	•	•							•	•							•	•
	2865.6					•	•							•	•				
	2870.9	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	2895.9																		
	FSO 5206B																		
	MD 3060P																		
	5845	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	5842/5																	•	•
	5851/5																		
	5871/5																		
	MS08-125	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	MS10-144																	•	•
	MS10-164																		
	MS13-165																		
	SPI45E																		
	ZF 8095																	•	•
	ZF 8098																		
	TRW-TAS 55	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Mechanical front	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Mechanical rear	•		•		•		•		•		•		•		•		•	
	Pneumatic front																		
	Pneumatic rear		•		•		•		•		•		•		•		•		•
	Disk front	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Disk rear	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Drum rear																		

K = Dump body; R = Trailing vehicle; T = Tractor; P = Vehicles with pneumatic suspension on rear axle; FP = Vehicles with front and rear pneumatic suspension; D = Double cabin (6 + 1); RS* = Road Sweeper

Figure 99



If a different clearance value is found, replace the half bearings and repeat the check.

Once the specified clearance has been obtained, lubricate the main half bearings and fit them by tightening the connecting rod cap fastening screws to the specified torque.

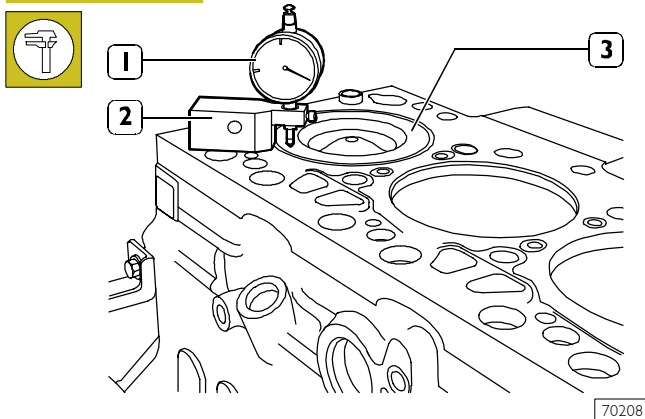


Before the final fitting of the connecting rod cap fastening screws, check that their diameter measured at the centre of the thread length is not < 0.1 mm than the diameter measured at approx. 10 mm from screw end.

Check manually that the connecting rods (1) are sliding axially on the output shaft pins and that their end float, measured with feeler gauge (2) is 0.10 – 0.33 mm..

Checking piston protrusion

Figure 100

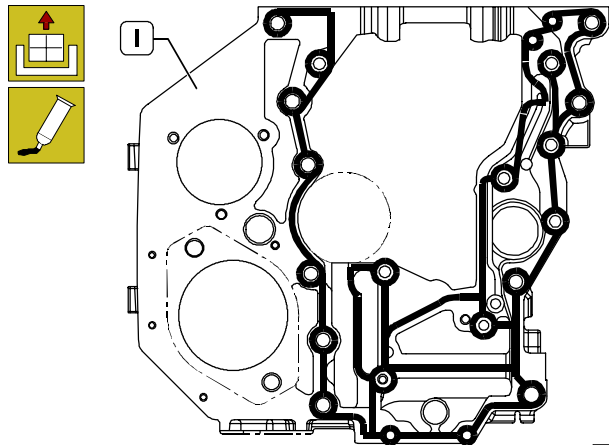


Once connecting rod-piston assemblies refitting is over, use dial gauge 99395603 (1) fitted with base 99370415 (2) to check piston (3) protrusion at T.D.C. with respect to the top of the engine block.

Protrusion shall be 0.28 – 0.52 mm.

Timing gear case

Figure 101



IVECO N. 2992545 SEALANT APPLICATION AREAS

Clean accurately the timing gear case (1) and the engine block.

Perfect seal is only obtained by cleaning accurately the surface to seal.

Smear the case with IVECO N. 2992545 to obtain a bead of few mm diameter.

It shall be uniform (no clots), without air bubbles, thin areas or discontinuities.

Any imperfection shall be corrected as soon as possible.

Avoid to use excess material to seal the joint.

Excessive sealant could come out from joint sides and cause lubricant passage clogging.

After applying the sealant, the joint shall be assembled immediately (10 – 20 minutes).

Figure 102

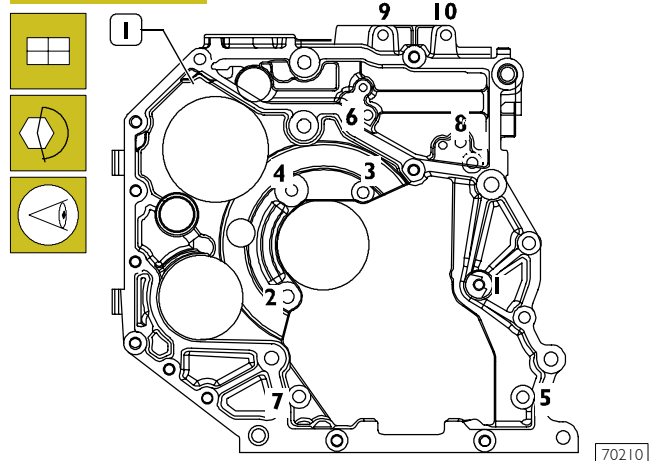


DIAGRAM FOR TIGHTENING THE REAR TIMING GEAR CASE FASTENING SCREWS

Refit the case (1) to the engine block.

Screw the fastening screws in the same position found at removal and tighten them to the following torque values in the sequence shown in the figure:

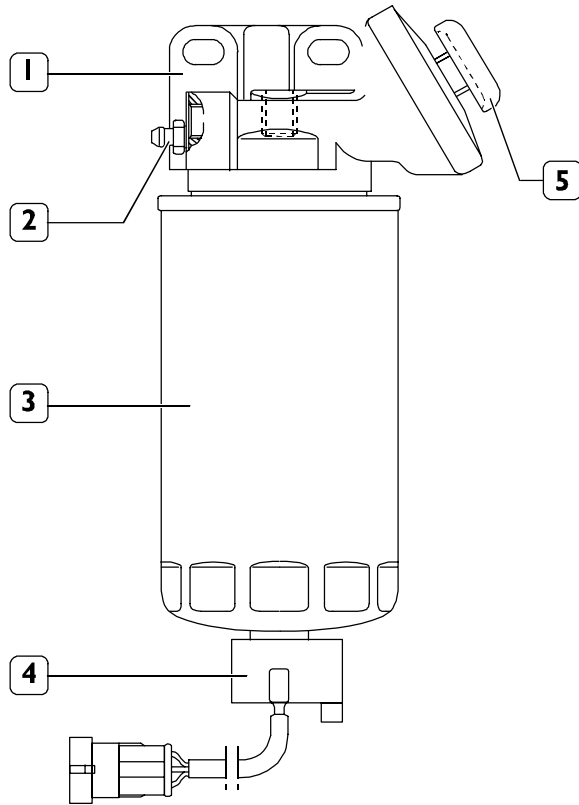
Screws M12 65 - 89 Nm

Screws M8 20 - 28 Nm

Screws M10 42 - 52 Nm

FUEL PREFILTER

Figure 205



70494

The fuel filter is of the high water separation type, is assembled on the right side of the vehicle chassis, and has the sensor (4) for detecting water in fuel placed on the cartridge (3) base.

Manual priming pump (5) and air bleeding screw (2) from system are placed on filter support.

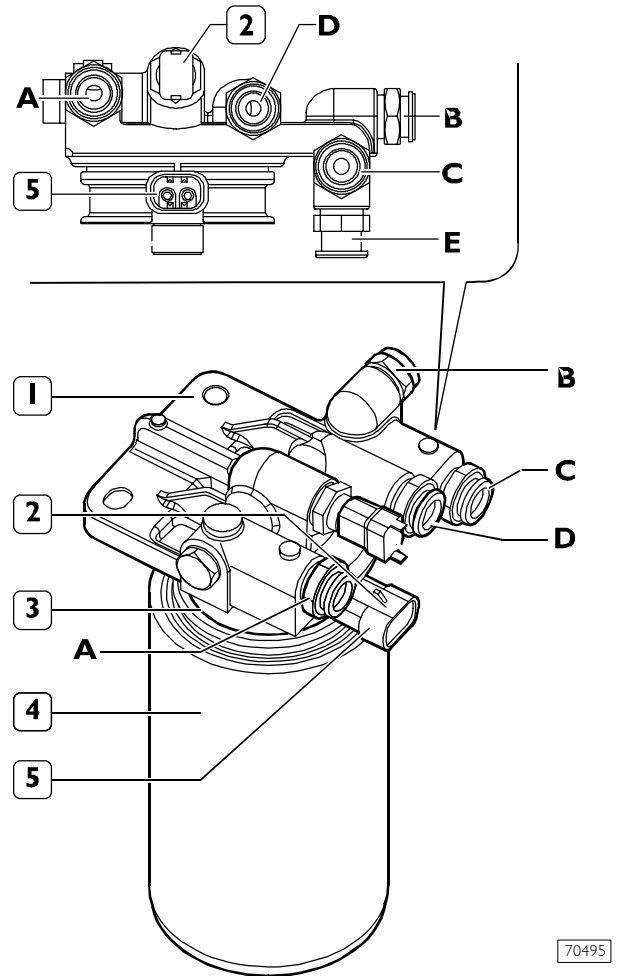
The presence of condensate into filter is signalled by sensor (4) when a warning light on the instrument panel is lit.



If the warning light is on, it is necessary to immediately operate to remove its cause; the common rail system components are quickly damaged by the presence of water or impurities in the fuel.

FUEL FILTER

Figure 206



70495

1. Fuel filter support - 2. Fuel temperature sensor - 3. Electric fuel heater - 4. Fuel filter - 5. Heater connector.

It is placed on engine block in the circuit between supply pump and high-pressure pump (CP3).

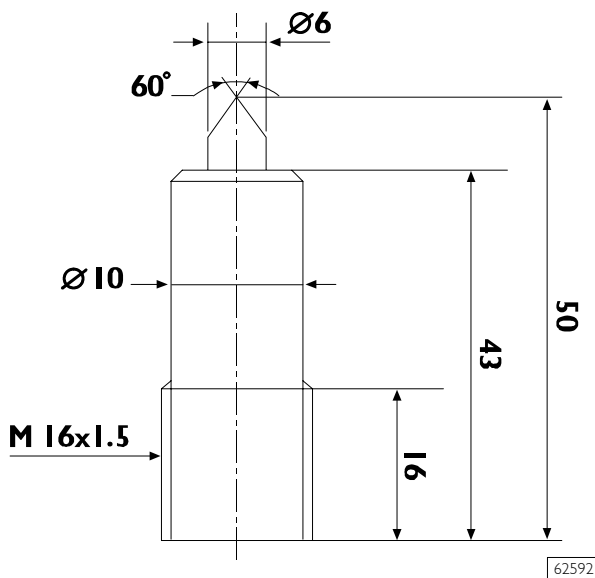
Cartridge filtering degree: 4 microns, Pressure delta 2 bars.

The following are placed on the support: fuel temperature sensor and heater resistances.

Fuel temperature, signalled by the related sensor to EDC7 control unit, allows a very accurate computation of the fuel flow-rate to be injected into the cylinders.

The electric heater is activated when fuel temperature is below 5 °C.

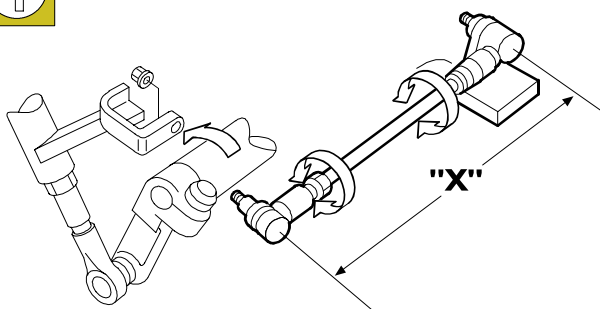
Figure 3



62592

- It is necessary that the gearbox remains in such a condition for the whole operation. In order to be sure of that, in place of the Idle-R.M. switch, a screw can be applied with equal sizes (M 16x1.5 mm) with its bit chamfered at 60° that, completely screwed, blocks any transverse rod movement for gearboxes 2855.6 and 2865.6 and the internal controls for gear boxes 2870.9 and 2895.9; it is anyhow sufficient to check whether the neutral condition remains during the different stages (avoiding any forcing on the lever);

Figure 4

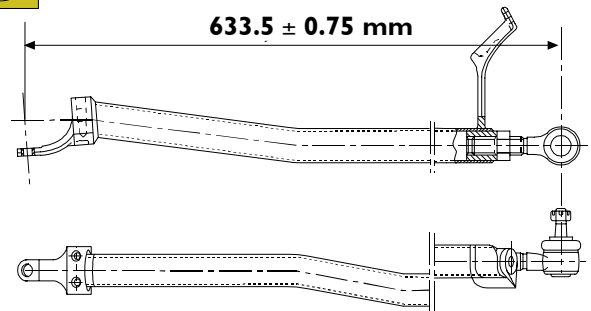


62593

- position the reaction plate on gears control and screw the securing screws without completely tightening them;
- check/adjust the length (X) of the gearbox control reaction tie-rod that must be 329 mm;

- verify/adjust the fixed adjustable tie-rod length complying with the shown dimensions (see Figures 5, 6, 7 and 8) with a ± 0.75 mm tolerance (corresponding to 1/2 threading turns).

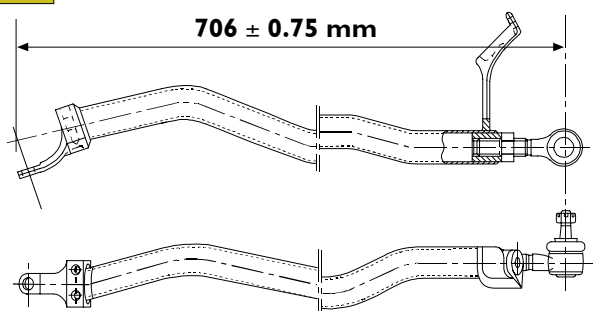
Figure 5



70992

MODELS 120EL17

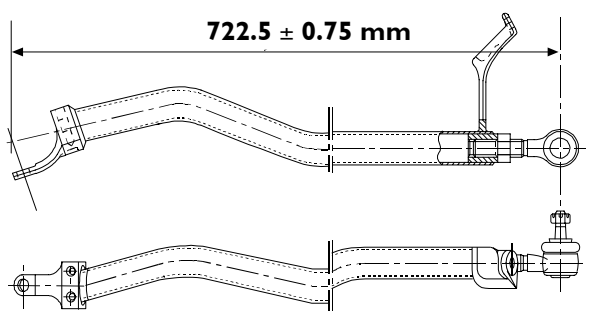
Figure 6



70993

MODELS 120EL21

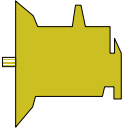
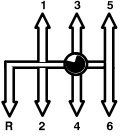


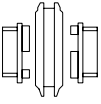



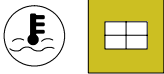
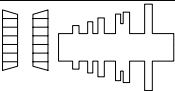
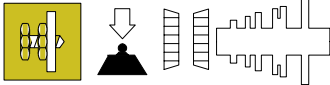

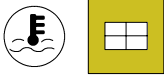
Figure 7



70994

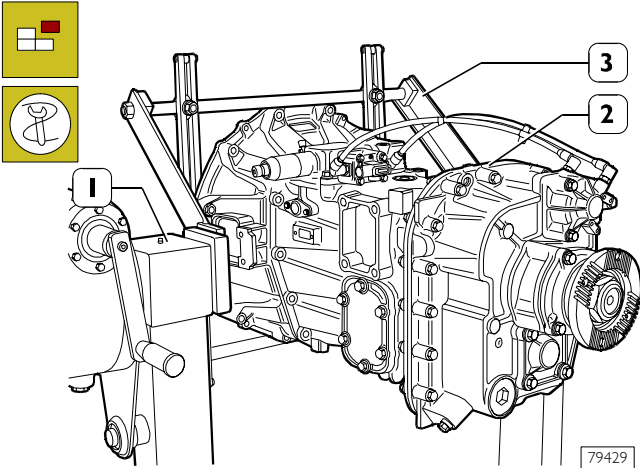
MODELS 130E18 - 150E21 - 180E21

SPECIFICATIONS AND DATA

	GEARBOX	2865.6
	Type	Mechanical
	Gears	6 forward gears and reverse gear
	Gears engagement control	Mechanical
	Power takeoff	Upon request
	Gears engagement: 1 st – 2 nd 3 rd – 4 th – 5 th – 6 th Reverse gear Gears anti-disengagement	Double-cone synchronizer Free-ring synchronizer Quick-connection type Sliding sleeve holding through rollers and springs.
	Gears	With helical teeth
	Gear ratio First Second Third Fourth Fifth Sixth Reverse gear	 1 : 9.007 1 : 5.015 1 : 3.206 1 : 2.066 1 : 1.370 1 : 1.000 1 : 8.170
	Oil type Amount	TUTELA ZC 90 8.1 Kg. (9 lt)
	Fixed hubs assembly temperature	100°C to 130°C
	Secondary shaft bearings	With tapered rollers
	Secondary shaft bearings pre-loading adjustment	By means of rings
	Secondary shaft pre-loading adjustment rings thickness mm	4.0-4.1-4.2-4.3-4.4-4.5-4.6 4.7-4.8-4.9-5.0-5.1-5.2-5.3 Supplied in a kit
	Secondary shaft bearings assembly temperature	85°C

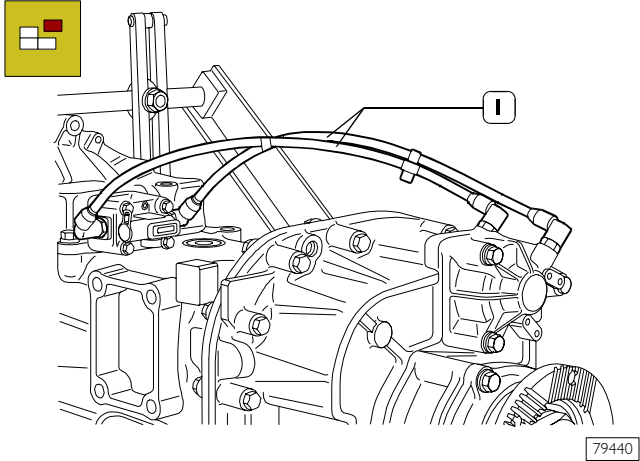
GEARBOX DISASSEMBLY

Figure 4



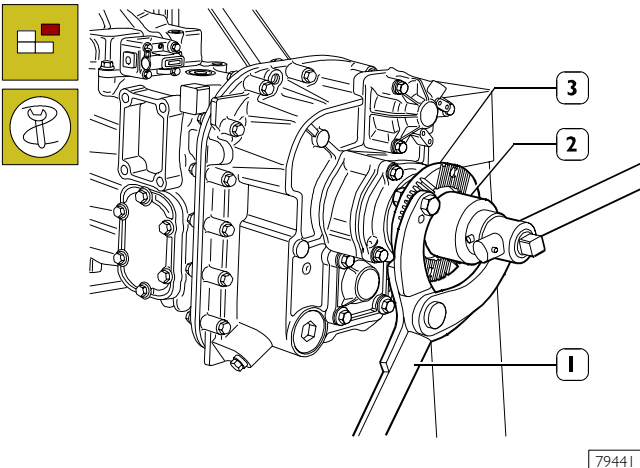
Place gearbox (2) on rotating stand 99322205 (1) equipped with brackets 99322225 (3) and discharge lubricating oil.

Figure 5



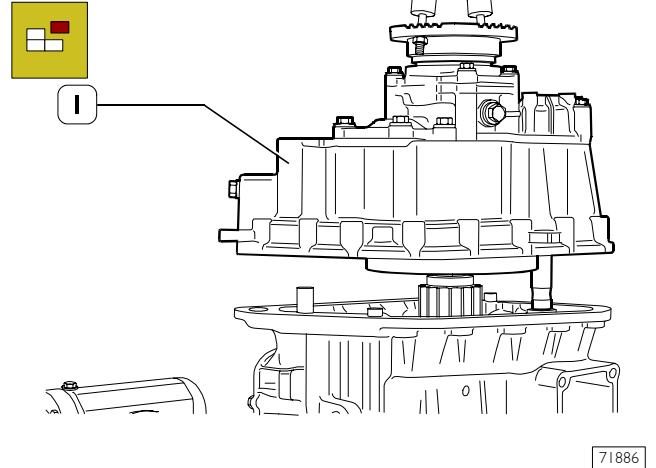
Disconnect pneumatic pipings (1) of epicyclic reduction gear. Unscrew the two screws securing clutch disengagement lever support and remove lever from gearbox.

Figure 6



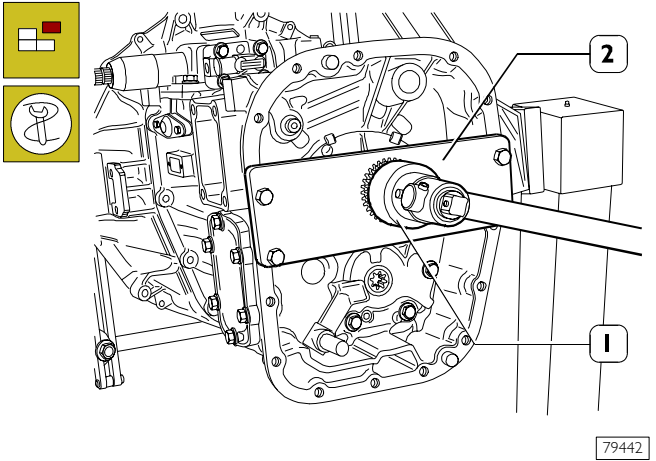
Apply reaction lever 99370317 (1) and with key 99355081 (2) loosen nut securing motion outlet flange (3).

Figure 7



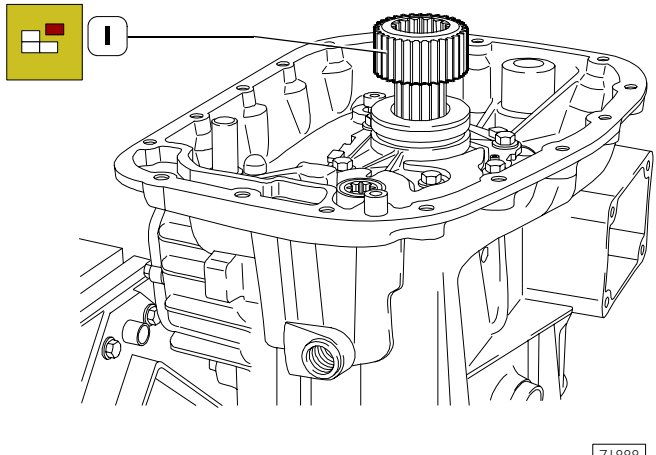
Unscrew securing screws and with the help of a lifting device, remove epicyclic reduction gear assembly (1).

Figure 8



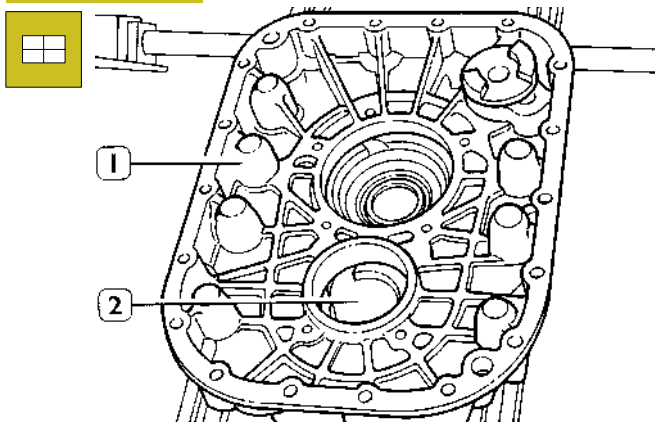
Apply tool 99370130 (2) and, through wrench 99355131 (1), unscrew sun gear check nut.

Figure 9



Remove the sun gear (1).

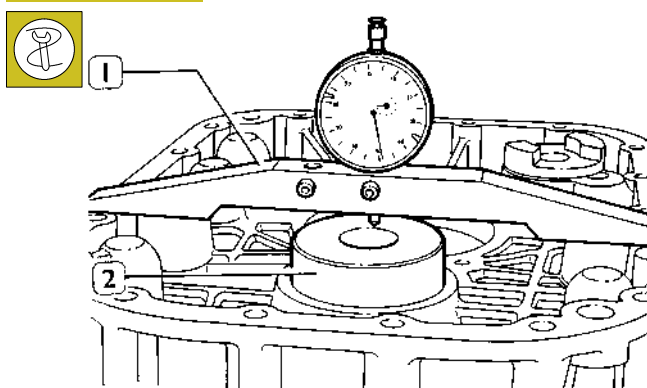
Figure 27



35459

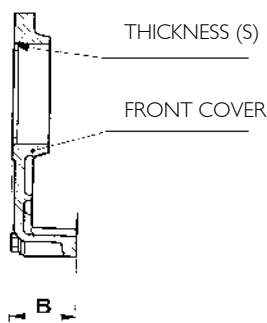
Fit temporarily cover (2) on front cover (1).

Figure 28



35460

Figure 29



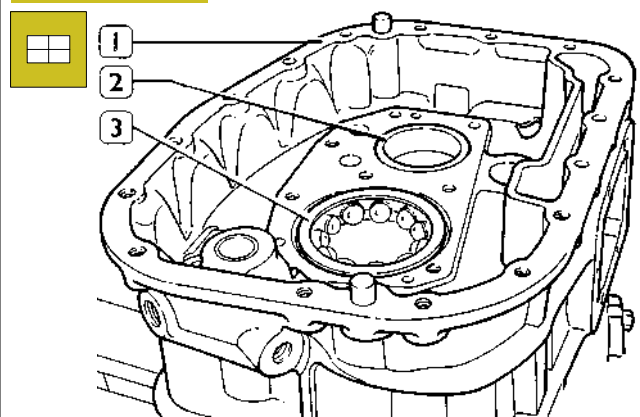
35461

Place gauged ring 99396032 (2) in the tapered roller bearing seat, without adjustment ring on front cover; place base 99370466 with gauge (1) previously set to zero as shown in Figure 25.

First method – Take note of the value read on the gauge (Example: 2.43 mm).

Second method – Take note of the value read on the gauge and add it to the gauged ring thickness [Example: 2.43 + 50.5 = 52.93 mm (Dimension **B**)].

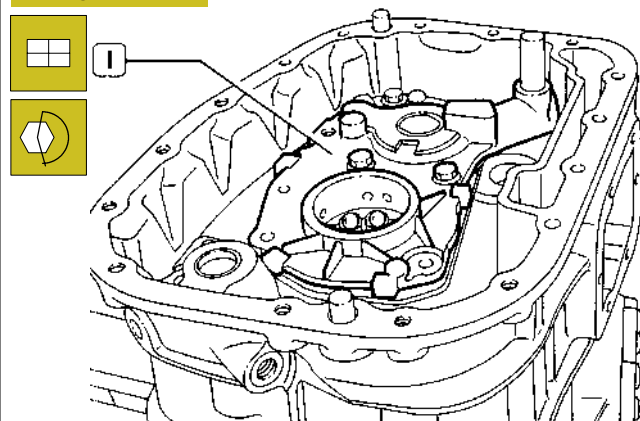
Figure 30



35462

Fit transmission shaft bearing outer ring (2) and main shaft ball bearing (3) on the intermediate box (1).

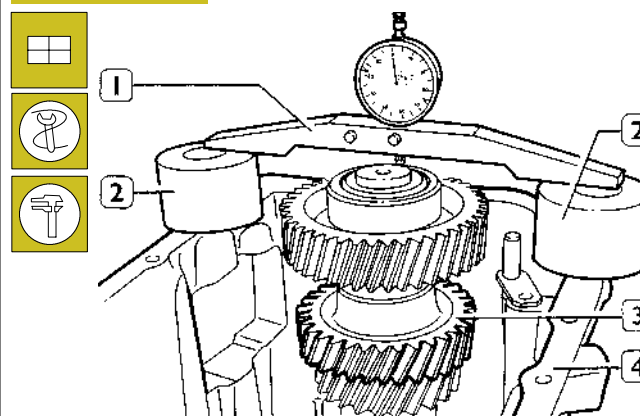
Figure 31



35463

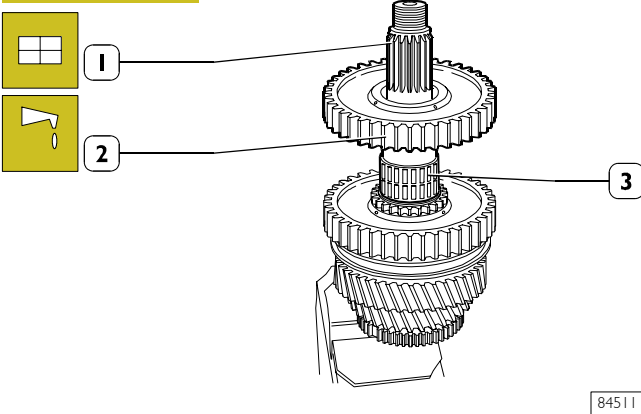
Fit the oil pump (1) and tighten the screws to the specified torque, rotate the intermediate box.

Figure 32



35464

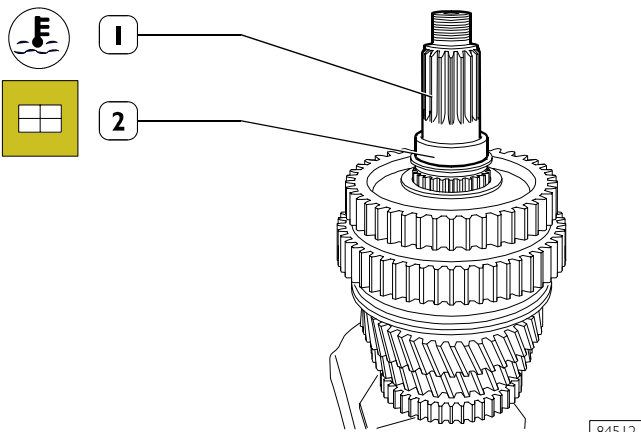
Figure 61



84511

Lubricate roller cage (3), then fit it onto output shaft (1) and mount reverse gear (2).

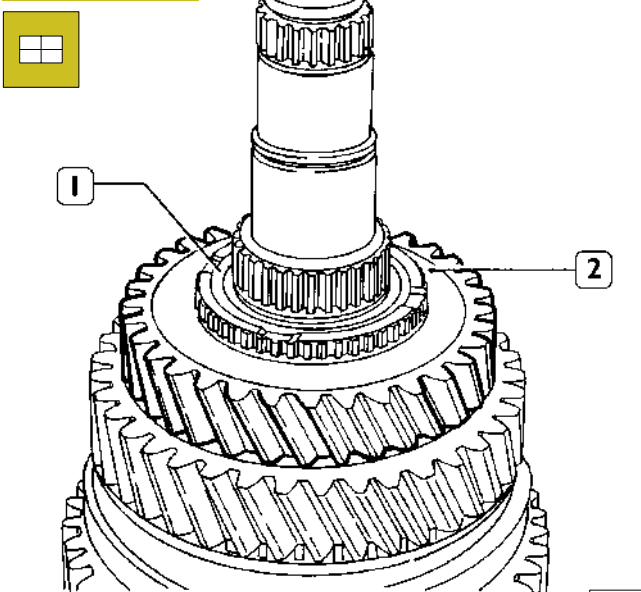
Figure 62



84512

Heat the rear roller bearing inner race (2) to ~ 85 °C, then fit it onto output shaft (1).

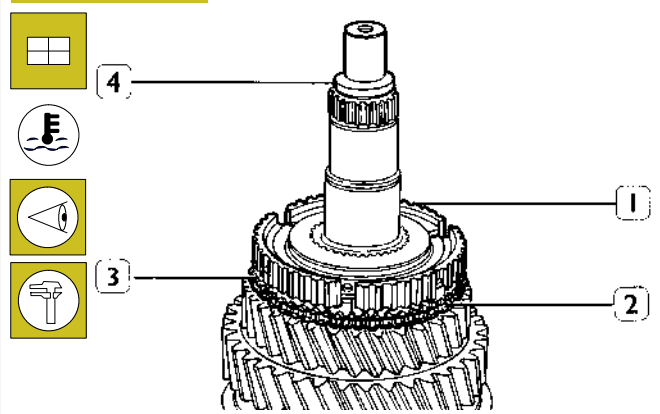
Figure 63



84513

Turn the shaft (placed in the vice) upside down, mount roller cage (1) and 3rd speed gear (2).

Figure 64

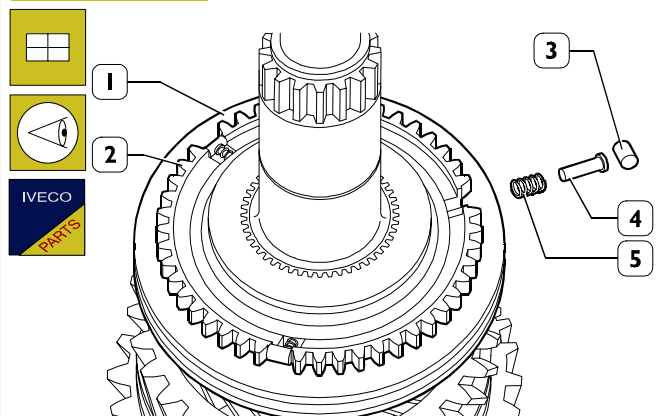


33639

Mount matching body (2) and synchronizing ring (3). Heat hub (1) to a temperature of 85°C, then fit it onto shaft (4), taking care that the synchronizing ring tangent stops are inserted into the respective seats of the hub.

Check axial play of 3rd speed gear, which must fall within the range of 0.35 ± 0.48 mm.

Figure 65



84514

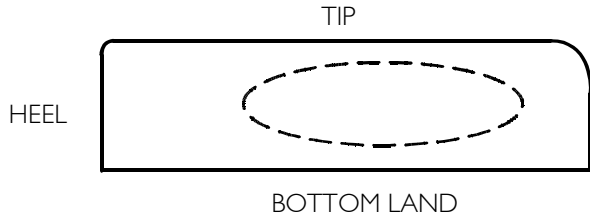
Mount springs (5) and small pins (4) on hub (2). Mount 3rd - 4th gear engagement sliding sleeve (1) on hub (2), then place the former so that it is slightly lifted compared to hub (2), then insert rollers (3) between small pins (4) and sliding sleeve (2).

CORRECTING THE CROWN WHEEL AND PINION CONTACTS (AFTER ASSEMBLY)

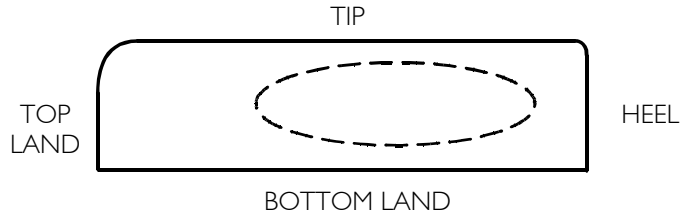
Figure 105

THEORETICAL CONTACTS

**PULLING
(CONVEX SIDE OF RING GEAR)**



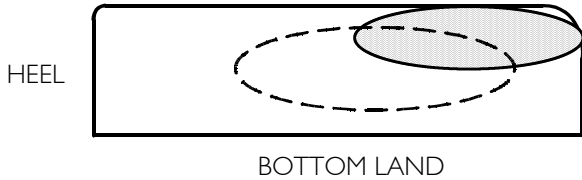
**RELEASE
(CONCAVE SIDE OF RING GEAR)**



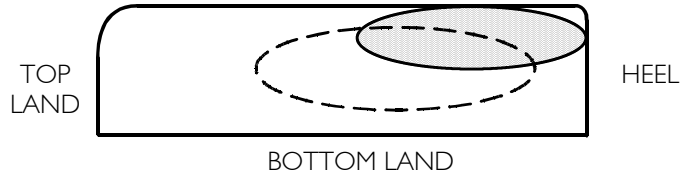
- PULLING : CENTRAL TENDING TOWARDS THE TOP LAND ON THE TOOTH FACE AND CENTRAL ON THE TOOTH PROFILE
- RELEASE : CENTRAL TENDING TOWARDS THE HEEL ON THE TOOTH FACE AND CENTRAL ON THE TOOTH PROFILE

CONDITION "A"

**PULLING
TIP**



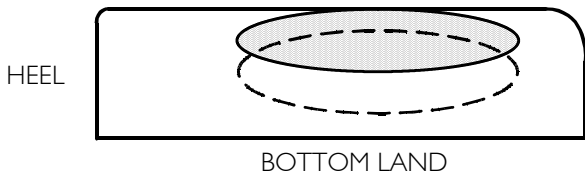
**RELEASE
TIP**



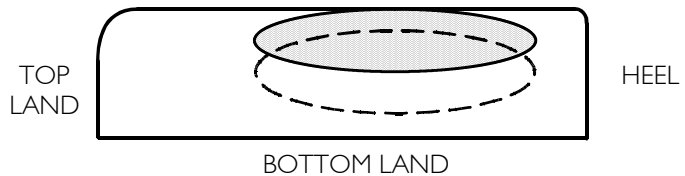
- PULLING RELEASE : CONTACTS TOO MUCH AT TIP
- PULLING : CONTACT TOO MUCH AT TOP LAND
- RELEASE : CONTACT TOO MUCH AT HEEL
- CORRECTIVE ACTION : REMOVE SHIMS AND INCREASE CLEARANCE TO MAXIMUM

CONDITION "B"

TIP



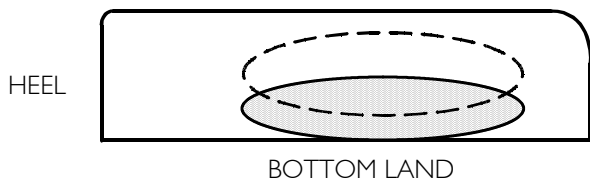
TIP



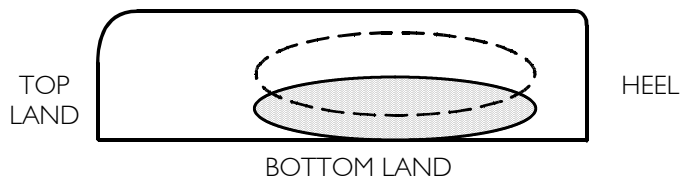
- PULLING - RELEASE : CONTACTS TOO MUCH AT TIP
- CORRECTIVE ACTION : MEASURE THE CLEARANCE AND RESTORE THE CLEARANCE

CONDITION "C"

TIP



TIP



- PULLING - RELEASE : CONTACTS TOO MUCH ON BOTTOM LAND
- CORRECTIVE ACTION : MEASURE THE CLEARANCE, ADD SHIMS AND RESTORE CLEARANCE

60676

FRONT WHEEL SET UP

Before checking, it is necessary to make a preliminary investigation of some vehicle elements which can affect set up. If any fault is detected, it is important to eliminate it in order to avoid wrong measurements.

The checks to be made are the following:

- tyre pressure;
- wheel hub bearing clearance;
- clearance between track rod pins and levers on steering knuckles;
- shock-absorber efficiency;
- wheel rims must not be dramatically distorted.

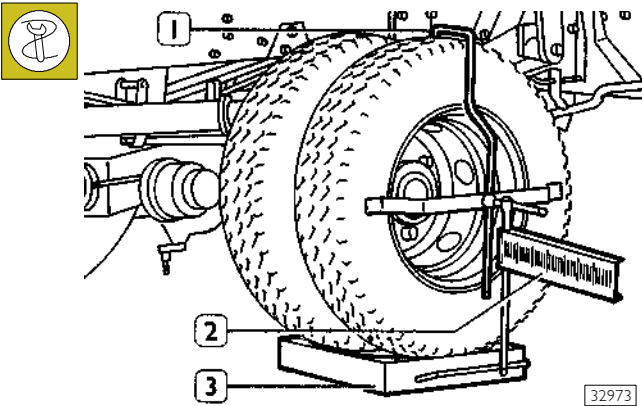
Make wheel set up check using equipment 99305354.



Checks and possible adjustments of wheel set up must be made with the vehicle having static load. By and then, check perfect calibration of optical units.

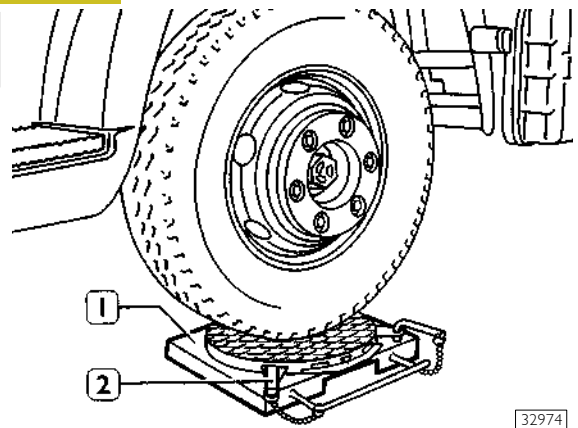
Setting of clips and headlights

Figure 14



Place the vehicle with the wheels in upright direction on a flat surface. Lift the vehicle's rear part and place the platforms under the wheels (3). Lower the vehicle, brake the rear wheels and set the hook (1) with the ruler (2).

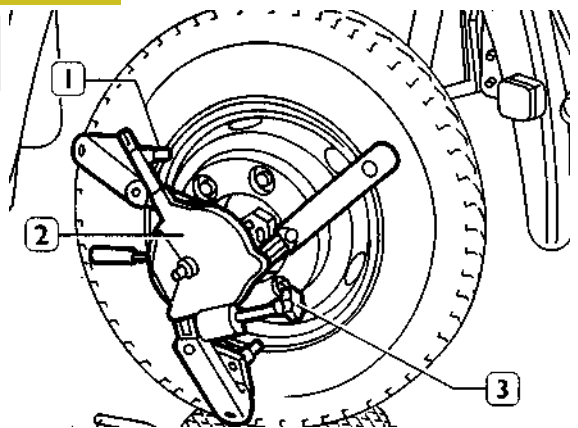
Figure 15



32974

Lift the vehicle's front part and place the swinging plates (1) under the wheels, clamping them with the appropriate locks (2).

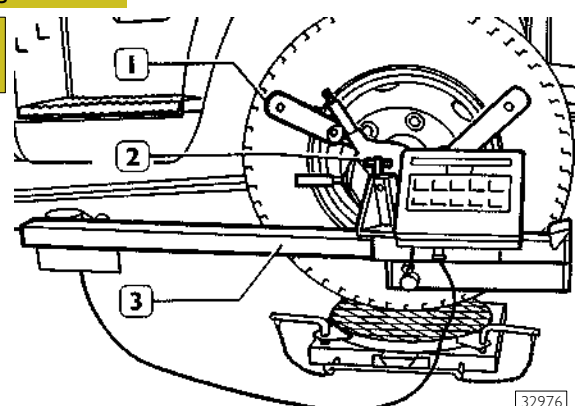
Figure 16



32975

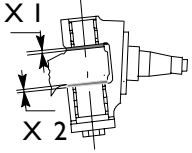
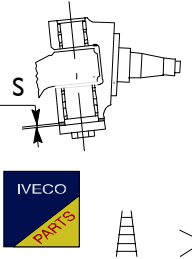


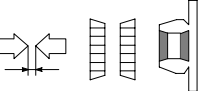
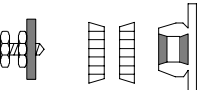
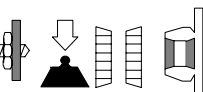


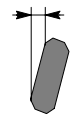
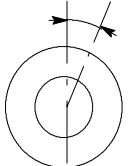
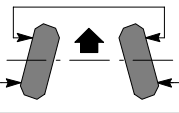
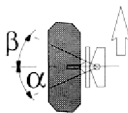
Place on the wheel rim the self-centring clip (2) fitted with the right lock pins (1). Use the handle (3) to clamp the clip on wheel, checking that the wheel itself is well fixed.

Figure 17



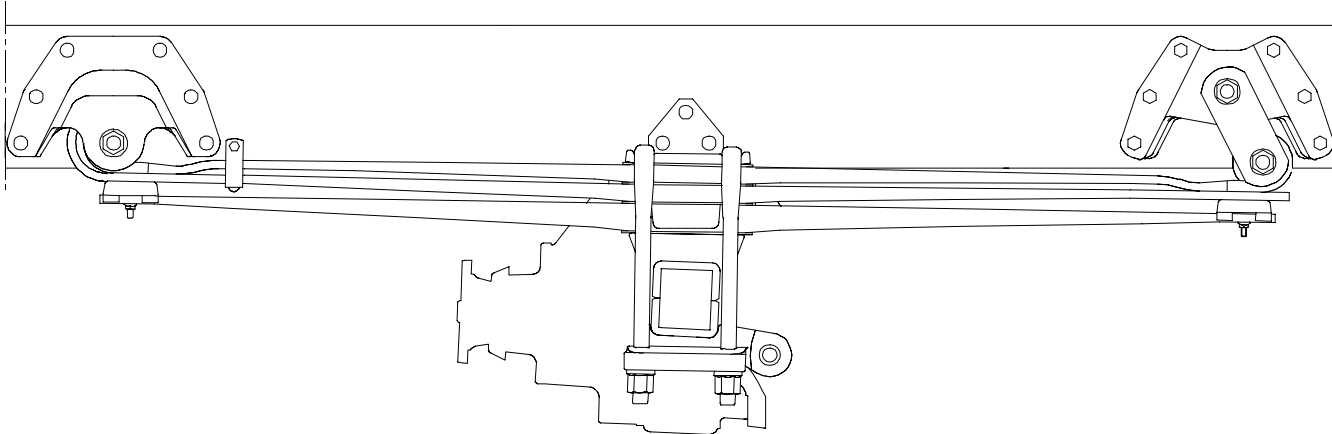
32976

Set the detecting system (3) on the clips (1) and clamp it with the screw (2). Repeat the same operations on the other wheel.

			5871/5
	<p>Clearance between axle and steering knuckle upper adjustment X1 mm</p> <p>Gap between axle and steering knuckle lower adjustment X2 mm</p>		<p>0.10 ÷ 0.35</p> <p>≥ 0.25</p>
	<p>Adjusting plates X1, X2</p> <p>0.25 mm S mm</p>		0.50 ÷ 1.75
	WHEEL HUBS		
	Wheel hub bearings		2 with taper rollers
	Hub bearing end play	mm	max 0.16
	Wheel hub clearance		not adjustable locking with lock nut torque
	Bearing preloading		daNm 0.50
	Oil for wheel hub bearings Amount per hub	Litres (kg)	Tutela W 140/M-DA 0.35 (0.32)
	WHEEL SET UP		
	Wheel inclination (vehicle with static load)		1°
	Wheel incidence (vehicle with static load)		1°, 24''
	Toe-in (vehicle with static load)	mm	0 ÷ 1
	Steering angle Inside α Outside β		52° 36°

REAR LEAF SPRINGS

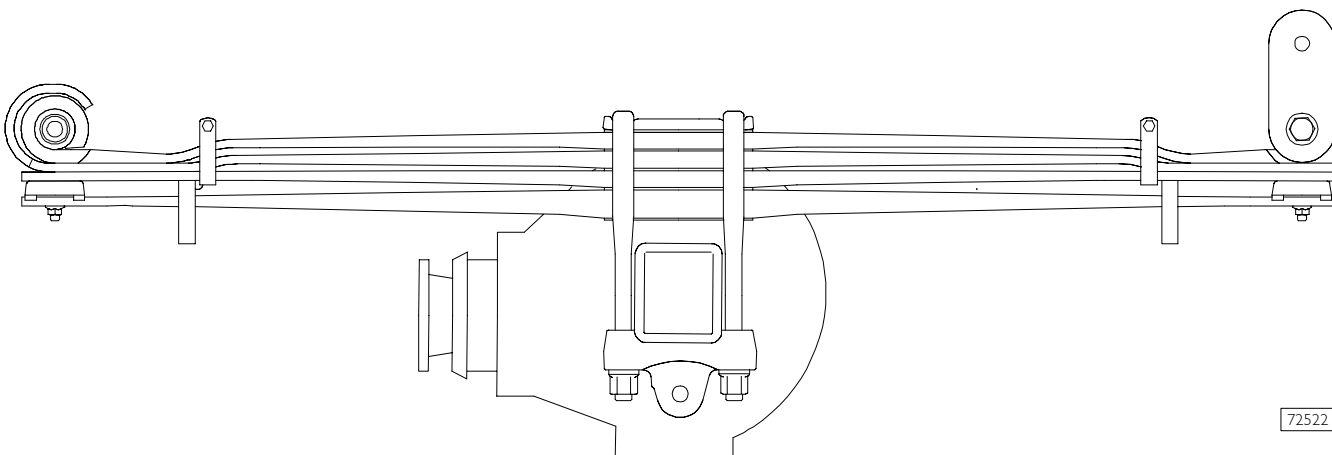
Figure 9



72520

REAR PARABOLIC LEAF SPRING ASSEMBLY
(Models: 110EL..-120EL..-120E..-130E..-130E..RS)

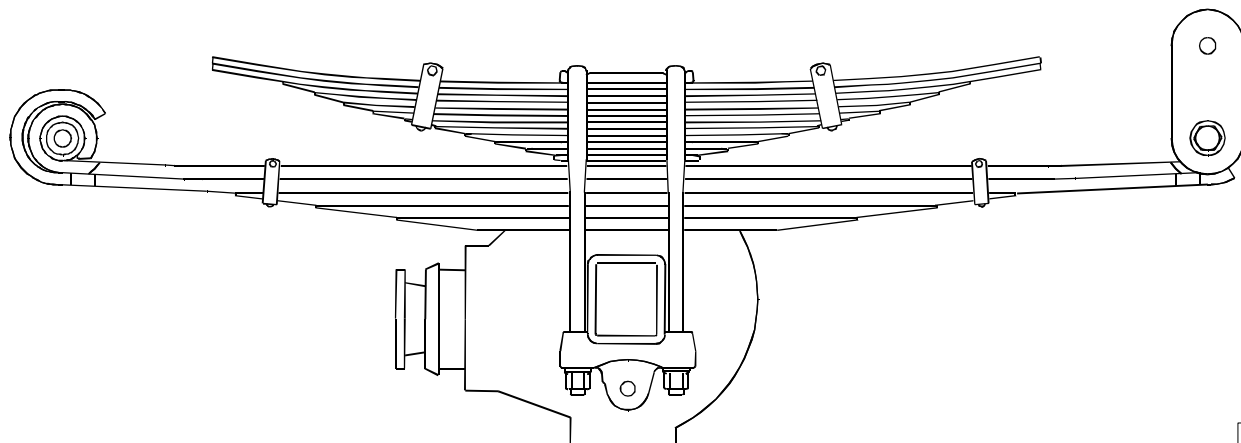
Figure 10



72522

REAR PARABOLIC LEAF SPRING ASSEMBLY
(Models: 120E..D-130E..D-150E..-150E..RS)

Figure 11



72697

REAR SEMI-ELLIPTICAL LEAF SPRING ASSEMBLY
(Models: 120E..-130E..)