Repair Instructions

9HP48X
Repair stage 3
Automatic transmission
Passenger Cars

1 Preface

This documentation was developed for specialized staff trained in the operation of ZF products by ZF Friedrichshafen AG (hereinafter referred to as ZF).

The work may only be performed by authorized, trained and instructed staff. The user company is responsible for training the authorized, specialized staff and providing required documents.

The technical information depends on the parts list [BoM]. Due to technical further developments of the ZF product, deviating work steps and Technical Data might be necessary during repair. Therefore, information on technical requirements must be obtained before carrying out the repair. Technical information is available from the ZF-ServiceLine or the ZF Service Data Management

The figures illustrate the workflow and may deviate from the ZF product. The figures are not binding.

ZF Friedrichshafen AG

1.1 Specialized staff

The work may only be performed by trained and instructed specialized staff. As a result of specialized training and practical experience, the specialized staff must be capable of detecting risks and avoiding possible dangers which may be caused by the operation, maintenance and repair of the product.

To avoid injury to personnel and damage to the product, all safety regulations and legal requirements must be adhered to.

Country-specific safety, accident prevention and environmental regulations apply irrespective of the instructions provided in this document.

Wear safety-relevant workwear for all work.

1.2 Technical information

The transmission is filled with a lifetime oil.

Depending on the driving mode, changing the transmission oil is required after a mileage of 100,000 km or after 8 years.

The transmission shall only be delivered with the oil quantity and oil grade specified in the corresponding parts list (refer to Service Data Management).

2 Safety Instructions

⚠ WARNING

Risk of injury due to falling parts.
Death or serious injury possible.
⇨ Secure parts against falling down.
⇨ Do not stand beneath a suspended load.
⇨ Do not work on a suspended load.

⚠ WARNING

Risk of injury due to rotating parts.
Death or serious injury possible.
⇨ Wear tight-fitting clothing.
⇨ Wear a hair net.
⇨ Wear protective clothing.
⇨ Wear safety boots.

⚠ WARNING

Risk of injury due to caustic liquid or irritant gas.
Acid burn of skin possible.
Irritation of the airways and the lungs possible.
⇨ Wear protective gloves.
⇨ Wear protective goggles.
⇨ Wear a respirator.

⚠ CAUTION

Risk of injury due to sharp edges.
Slight to moderate injury possible.
⇨ Attach safety device.

⚠ CAUTION

Risk of injury due to machine-cutting works.
Slight to moderate injury possible.
⇨ Wear protective goggles.

NOTICE

Property damage due to electrostatic discharge (ESD) possible.

⇨ Observe ESD protection.
⇨ Do not touch contacts.
⇨ Wear conductive workwear.
⇨ Use ESD transport protection.
⇨ Use ESD protective packaging.

NOTICE

Environmental risk as a result of oil getting into the soil, groundwater and sewage system.

⇨ Collect oil in a suitably large container.
⇨ Dispose of used operating supplies, cleaning agents and filters in accordance with local applicable regulations.
⇨ Request the material safety data sheets for the respective products from the responsible environmental protection agency and observe them.

2.1 Signal words and symbols

This document contains particularly highlighted safety instructions which are marked with one of the following signal words depending on the severity of the danger.

⚠ DANGER

DANGER
The signal word DANGER indicates a dangerous situation that, if not prevented, will lead to a severe injury or death.

⇨ Information as to how the danger can be prevented.

⚠ WARNING

WARNING
The signal word WARNING indicates a dangerous situation that, if not prevented, can lead to a severe injury or death.

⇨ Information as to how the danger can be prevented.

⚠ CAUTION

CAUTION
The signal word CAUTION indicates a dangerous situation that, if not prevented, can lead to a slight or moderate injury.

⇨ Information as to how the danger can be prevented.

NOTICE
The signal word NOTICE indicates a situation that, if not prevented, can lead to property damage. ⇨ Information as to how the property damage can be prevented.

The following symbols are additionally used:

This symbol refers to additional, safety-relevant information.

This symbol indicates information concerning special workflows, methods, application of aids, etc.

2.2 General safety instructions

Read all safety instructions and information. Failure to comply with safety instructions and information may lead to property damage, serious injuries or death.

Intended use

The ZF product is exclusively intended for the application as defined in the contract and as agreed on the time of delivery. Any other or extended form of use does not comply with this definition of intended use. The intended use includes compliance with this documentation and other applicable documents, in order to avoid malfunctions and damage in operation.

The ZF product is designed and produced in line with state-of-the-art technology. The ZF product in its delivery status is safe to operate. However, the ZF product may pose dangers if improperly used by unauthorized, untrained and uninstructed staff or if not used according to its intended use.

Figures might deviate from the ZF product and are not drawn to scale. No conclusions can be drawn with regard to size and weight.

Installation, commissioning, maintenance and repair

Perform assembly, commissioning, maintenance and repair work exclusively according to this documentation and other applicable documents.

Observe the following points:

- Employ authorized, trained and instructed staff.
- Observe technical provisions.
- Only use genuine ZF spare parts.
- Only use genuine ZF accessories.
- Only use genuine ZF special tools.
- Unauthorized changes and modifications lead to the expiry of the operator's license, warranty or guarantee.

In case of damage, contact ZF and have the following information on the product ready:

- Type
- Parts list [BoM] number
- Serial number
- Operating hours
- Description of damage

Observe safety instructions, valid safety regulations and legal conditions to prevent malfunctions and damage.

The country-specific safety regulations, accident prevention regulations and environmental protection provisions apply additionally.

Wear safety-relevant workwear for all work. Depending on the work, also wear personal protective equipment.

After completing the work, check correct function and functional security.

Handling of ZF product

Unauthorized changes and modifications might impair functional security. Changes, modifications and applications are only permissible upon written approval by ZF Friedrichshafen AG.

Observe the following when working on the ZF product:

- Secure workspace.
- Only carry out work at the unit when in a voltage-free state.
- Protect unit against being started accidentally. Attach instruction plate where it is clearly visible.
- Perform work when engine is switched off.
- Protect engine against being started accidentally. Attach instruction plate where it is clearly visible.
- Do not stand beneath a suspended load.
- Do not work on a suspended load.
- Only use permitted means of transport and lifting devices with sufficient load-bearing capacity.
- Close open tubings and hoses and avoid damage.
- Observe tightening torques.
- Protect cables against mechanical damage.

Noise

Noise might cause irreversible damage to hearing.

The perception of acoustic signals, warning calls or sounds warning of impending danger is impaired by noise.

Observe the following when working on the ZF product:

- Avoid noise.
- Wear ear protection.

Operating supplies and aids

Operating supplies and aids might cause permanent damage to health and environmental damage.

Observe the following when selecting operating supplies and aids:

- Health risks
- Environmental compatibility
- Material safety data sheets

Observe the following when handling operating supplies and aids:

- Store operating supplies and aids in suitable and correctly labeled containers.
- Seek medical help in case of injuries due to hot, cold or caustic operating supplies or aids.

Observe the following to protect the environment:

- Collect leaking operating supplies and aids in sufficiently large containers.
- Observe disposal regulations.
- Observe material safety data sheets.

3 Repair Instructions

3.1 Cleanliness instructions

Observe provisions for the repair process and the workshop equipment:

- Use separate cleaning processes for outer transmission parts and for parts of the hydraulic system.
- Parts made of Fe metals must be demagnetized.
- Only use cleaning cloths which do not fray.
- Only apply lubricant using a high-quality and wear-resistant brush whose bristles do not fall out.
- Cover operating supplies and auxiliary materials before and after use.
- Store and transport ready-to-install components and assembly groups when properly covered.

Observe specifications for the workshop equipment:

- Design support surfaces for material and tools in such a way that no deposits may occur (e.g. grate, perforated sheet metal).
- Work surfaces must be abrasion-proof and easy to clean.
- Workshop equipment (cabins, racks, workbenches, etc.) and its respective arrangement in the room should always be designed in such a way that proper cleaning of the room and floor is possible.
- It must be possible to clean the floor (e.g. through abrasion-proof sealing).

3.2 Dismantling

- To avoid mixing up parts, uniquely assign parts to the disassembled ZF product. In particular, this applies to gear parts, reusable spacer washers or shims, electronic components, etc.
- Assemblies which must not be disassembled or are only available as spare parts assembly are described accordingly. Please observe the spare parts catalog for the ZF product.
- Inspect the parts during disassembly in order to find a potential cause of damage.

3.3 Cleaning parts

Thoroughly clean the product with an appropriate cleaning agent prior to repair or assembly works.
Thoroughly clean the angles and recesses of housing and cover.

- Remove all reusable components after disassembly.
- Remove sealing compound residue on sealing faces or retaining agent residue, e.g. in tapped holes.
- Clean contact surfaces and check for damage.
- Wash out blind holes and blind hole threads and remove contamination.
- Lubricating bores, oil bores, oil ducts, bores for oil press fits and lubricating grooves must be free from dirt, preservative and foreign matter. If possible, blow through with compressed air. Check for perfect passage.
- Hose assemblies, oil tubes and joining elements must be free from dirt, oil and chafe marks. Thoroughly clean dirty or oily components; if necessary, blow through with compressed air. Replace damaged parts.
- Clean cavities and reliefs.
- Thoroughly remove burrs or other similar rough surfaces using a grindstone. Replace the component in case of more severe damage.
- Thoroughly remove preservative from new parts (e.g. on bearings).

3.4 Reusing parts

Authorized, specialized staff assess whether parts can be reused. The list of replacement parts can be downloaded from the ServiceLine.

- Replace parts if they are damaged.
- Replace parts if they are worn, e.g., rolling bearings, multidisks, thrust washers, etc.
- Replace parts if they have been overheated during operation or during disassembly.

Renew every time:

- Bolts with reduced shank, aluminum screws, seals, etc., and parts that are intended for single use only
- Sealing rings
- Shaft sealing rings
- Rectangular rings
- Snap and securing rings

Replace parts with genuine ZF parts. Please observe the spare parts catalog for the ZF product.

3.4.1 O-rings, shaft sealing rings, rectangular rings, seals

- After having removed the seals, check the contact surfaces at the transmission housing for damage.
- For installation, coat O-rings, rectangular rings and other sealing rings with white petroleum jelly and shaft sealing rings with oil.
- Fit rectangular rings with suitable assembly sleeve.
- In case of damage to the vulcanized sealing rings, replace the complete unit.
- Replace vulcanized components after a certain mileage. The information is available for download from the ServiceLine.

3.4.2 Screws, nuts

- Unfasten screws in reverse tightening sequence.
- Tighten screws according to specified tightening sequence.
- Unfasten and tighten screws without tightening sequence crosswise and in steps.

3.4.3 Snap rings and securing rings

- Snap and securing rings must fit tightly at the groove base.

3.4.4 Bearings, adjustment plates

- Only install bearings when oiled.
- In case of damage to pressed-in needle roller bearings or drawn cup needle roller bearings, replace the complete unit. Exceptions are possible.
- Measure adjustment plates at several spots using a micrometer.

3.4.5 Gearings

- Check gearings for damage.
- For some gear drives, the gears air paired. In this case, replace all meshing parts in combination.

3.4.6 Multidisks

- Check lined clutch disks and steel multidisks for damage or overheating and replace them, if necessary.

3.4.7 Mechatronic/Control unit

- The Mechatronic or the control unit are considered as a complete unit in these instructions.
- In case of damage, replace Mechatronic or control unit completely.

4 Description

4.1 Product information

4.1.1 Transmission illustration

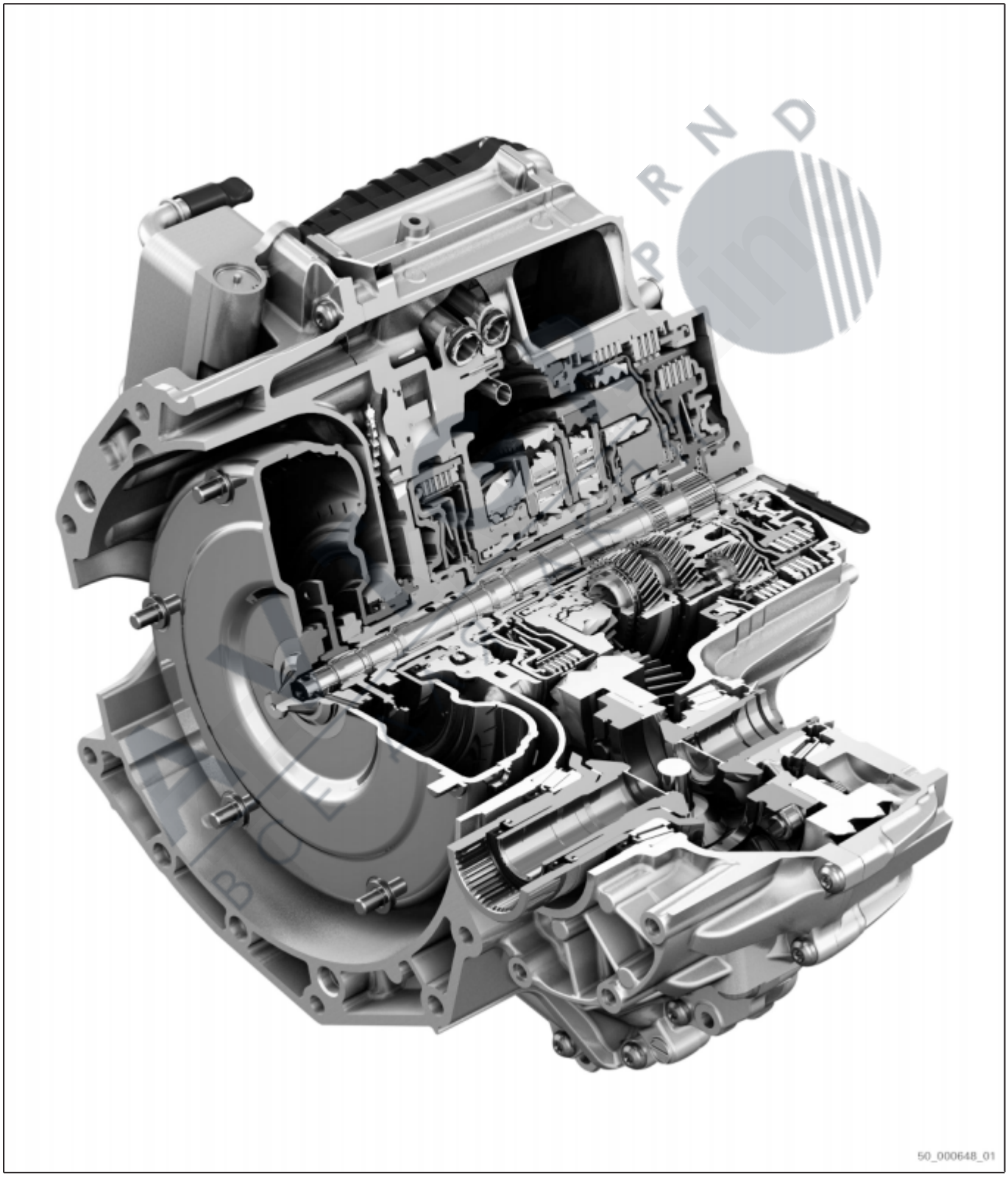


Fig. 1 9HP48X transmission image

4.1.2 Oil circuit plan

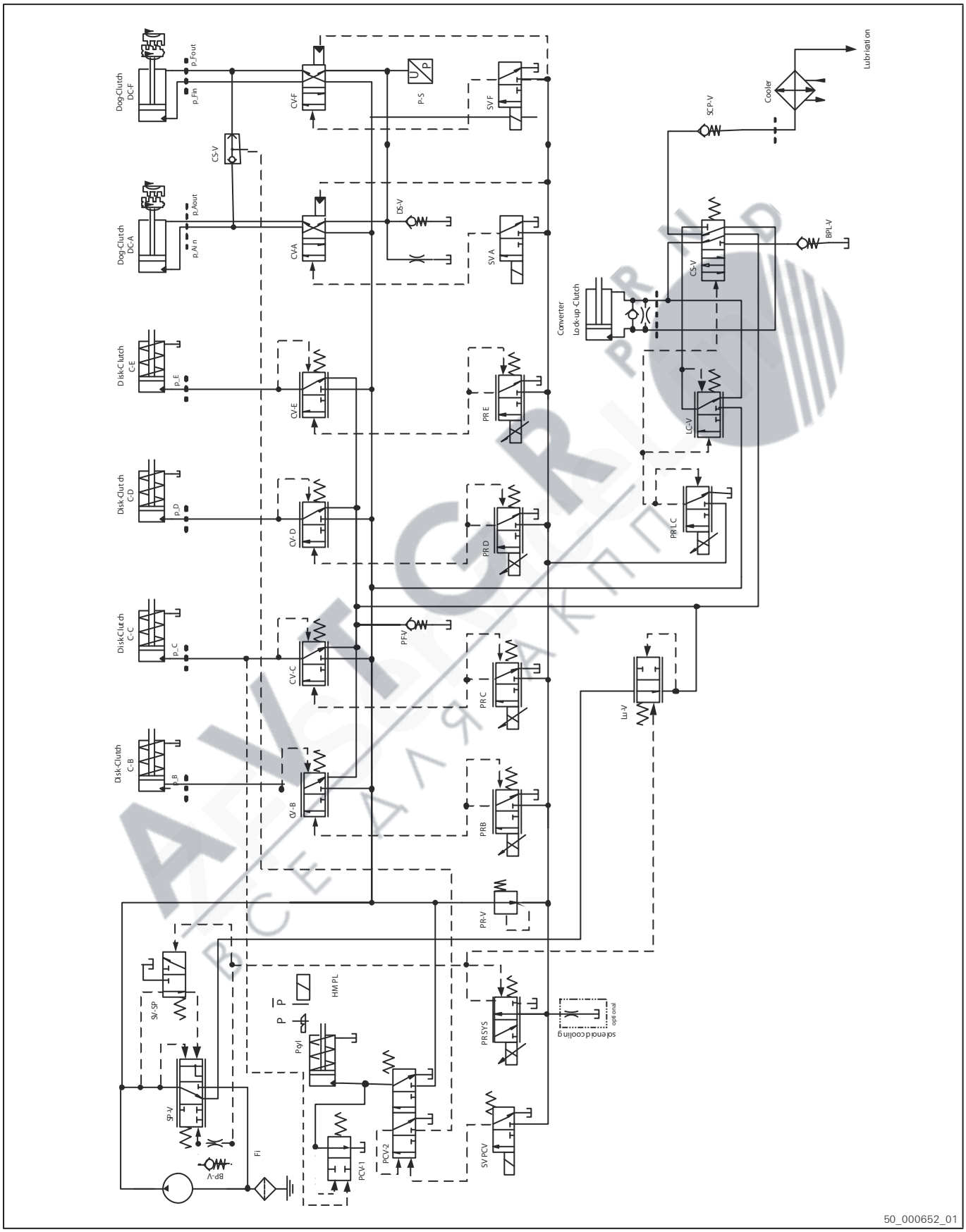


Fig. 2 DIN schematic E28/4 – electromechanical shift system

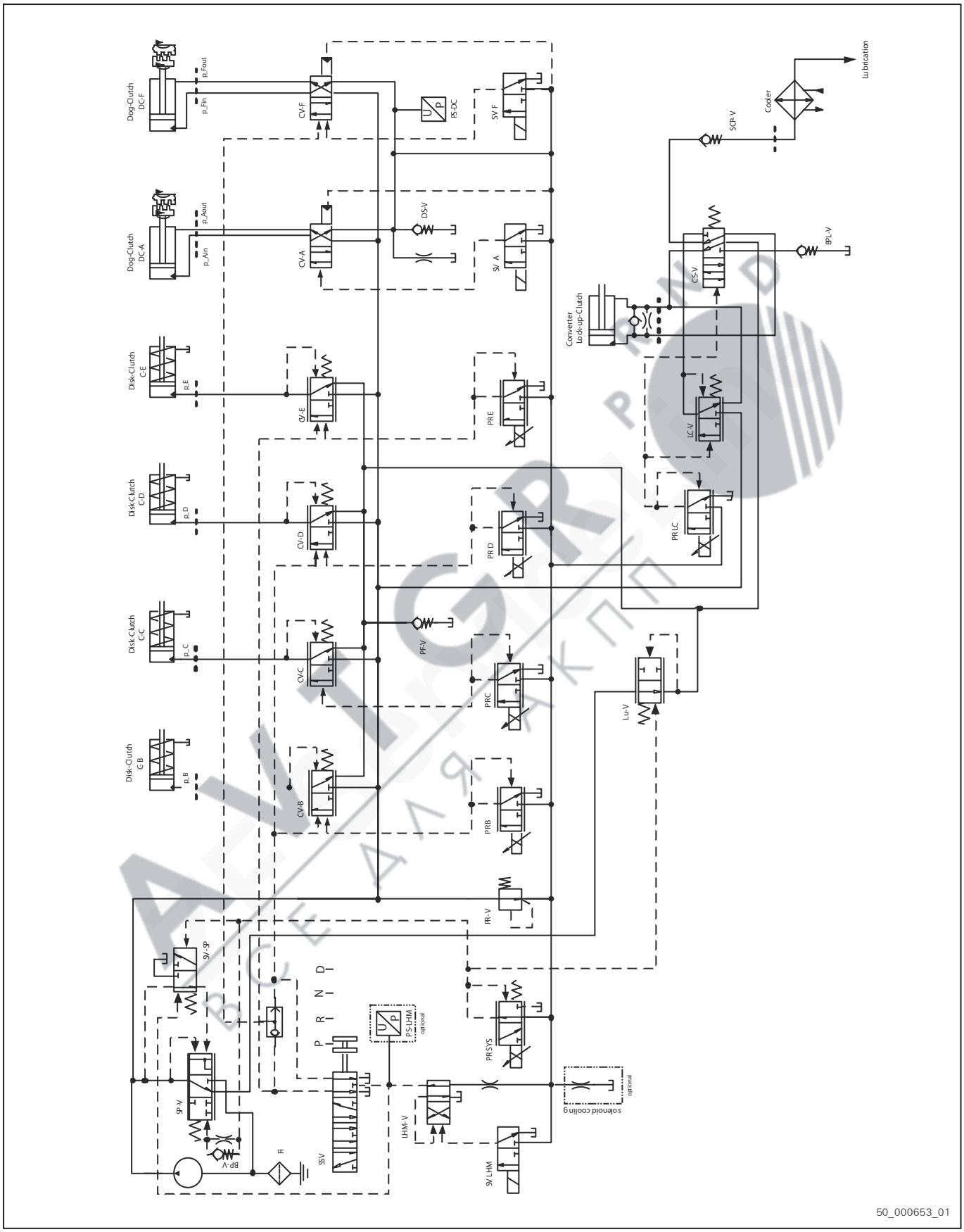


Fig. 3 DIN schematic E28/5 – eclectronic shift system

5 Settings

Designation	Dimensions	Measuring instrument	Comment Chapter/Section
Tolerance range of chain wheel axial clearance	0.15 mm - 0.30 mm	Dial gage	• Setting axial clearance of chain wheel, page 102
Running clearance tolerance range of clutch B	1.28 mm - 1.77 mm	Dial gage	Set running clearance with end disk (02.040/140) • Setting running clearance of clutch B, page 104
Running clearance tolerance range of clutch E	1.26 mm - 1.79 mm	Dial gage	Set running clearance with snap ring (71.200) • Setting running clearance of clutch E, page 107
Running clearance tolerance range of clutch C	0.76 mm - 1.15 mm	Dial gage	Set running clearance with snap ring (75.160) • Setting running clearance of clutch C, page 111
Running clearance tolerance range of clutch D	1.01 mm - 1.50 mm	Dial gage	Set running clearance with end disk (73.010) • Setting running clearance of clutch D, page 114
Backlash tolerance range	0.07 - 0.32 mm	Dial gage	• Setting backlash, page 117
Tolerance range of bearing setting for intermediate shaft	-0.03 to 0.03 mm	Dial gage	• Setting axial clearance at intermediate shaft, page 125
Tolerance range of bearing setting for differential	-0.26 to -0.19 mm	Dial gage	• Setting axial clearance of differential, page 131

6 Tightening Torques

Designation	Tightening torque	Measuring instrument	Comment Chapter/Section
(01.010/010/160) M6x15 torx screw	**10 Nm (±1.0 Nm)**	Torque wrench	• Fitting cover and oil tube, page 147
(01.010/010/130) M6x20 torx screw	**10 Nm (±1.0 Nm)**	Torque wrench	• Fitting cover and oil tube, page 147
(01.110) M18x1.5 torx screw	**35 Nm (±3.5 Nm)**	Torque wrench	• Fitting cover and oil tube, page 147
(01.120) M18x1.5 torx screw	**35 Nm (±3.5 Nm)**	Torque wrench	• Fitting cover and oil tube, page 147
(01.090) M6x42 torx screw	**12.5 Nm (±1.25 Nm)**	Torque wrench	• Completing transmission housing, page 150
(22.450) M14x1.5 screw plug	**23 Nm (±2.3 Nm)**	Torque wrench	• Assembling torque converter bell housing, page 154
(22.440) M10x1 screw plug	**12 Nm (±1.2 Nm)**	Torque wrench	• Assembling torque converter bell housing, page 154
(22.420) M18x1.5 screw plug	**35 Nm (±3.5 Nm)**	Torque wrench	• Assembling torque converter bell housing, page 154
(01.530) M8x1 screw plug	**8 Nm (±0.8 Nm)**	Torque wrench	• Assembling torque converter bell housing, page 154
(22.360) M6x17 torx screw	**10 Nm (±1.0 Nm)**	Torque wrench	• Assembling intermediate plate, page 158
(22.120) M6x22 torx screw	**7.5 Nm (±0.75 Nm)**	Torque wrench	• Assembling intermediate plate, page 158
(22.030) M6x22 torx screw	**10 Nm (±1.0 Nm)**	Torque wrench	• Assembling intermediate plate, page 158
(77.080) groove nut	**60 Nm (±3.0 Nm)**	Torque wrench	• Assembling bearing support, page 176
(22.370) M8x71 torx screw with Usit ring	**25 Nm (±2.5 Nm)**	Torque wrench	• Fitting torque converter bell housing, page 207
(22.370) M8x33 torx screw	**25 Nm (±2.5 Nm)**	Torque wrench	• Fitting torque converter bell housing, page 207
(97.030) M10x8 hexagon nut	**15 Nm (±2.25 Nm)**	Torque wrench	• Fitting torque converter bell housing, page 207
(97.020) M10x30 hexagon screw	**15 Nm (±2.25 Nm)**	Torque wrench	• Fitting torque converter bell housing, page 207
(28.690) M5x12 torx screw	**5.7 Nm (±0.57 Nm)**	Torque wrench	• Fitting control unit, page 212
(28.640) M5x14 torx screw	**5.5 Nm (±0.55 Nm)**	Torque wrench	• Fitting control unit, page 212
(28.570) M6x62 torx screw	**8 Nm (±0.8 Nm)**	Torque wrench	• Fitting control unit, page 212
(20.350) torx screws oil pan	**9.5 Nm (±0.47 Nm)**	Torque wrench	Torx screws are fixed to oil pan • Fitting oil pan and transmission control module, page 219
(20.050) torx screws	**10 Nm (±1.0 Nm)**	Torque wrench	• Fitting oil pan and transmission control module, page 219

Designation	Tightening torque	Measuring instrument	Comment Chapter/Section
(26.050) torx screws	**24 Nm (±2,4 Nm)**	Torque wrench	• Fitting oil pan and transmission control module, page 219

7 Workshop Equipment

7.1 Special tools

The required quantity is listed. Please inquire as to packaging unit before ordering.

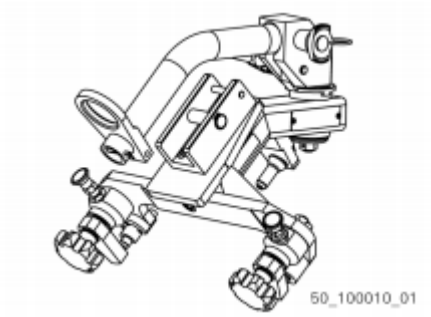
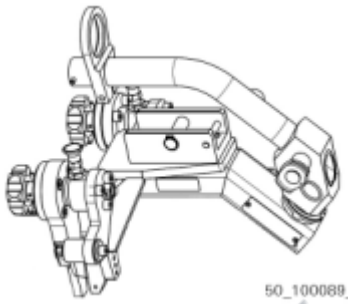
Figure	Order no. Designation Chapter/Section	Qty.	Comment
	**AA00.835.196** **Assembly bracket** • Loading transmission, page 41	1	with orbital rotation axis for JLR, Chrysler, Honda
	**AA01.081.813** **Assembly bracket** • Loading transmission, page 41	1	with orbital rotation axis for Honda
	**AA01.221.521** **Disassembly device** • Removing torque converter, page 43 • Fitting torque converter bell housing, page 207	1	torque converter extracting handles for JLR and Chrysler
	**AA01.221.533** **Disassembly device** • Removing torque converter, page 43 • Fitting torque converter bell housing, page 207	1	torque converter extracting handles for Honda

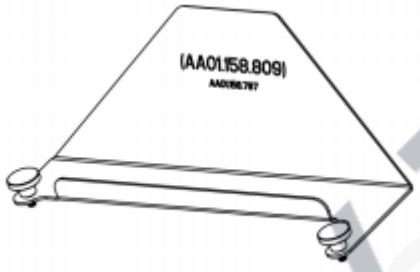
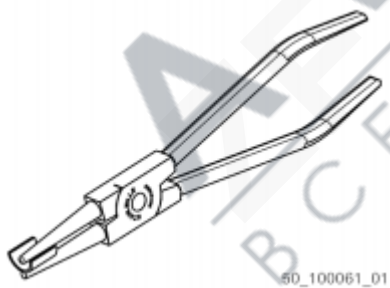
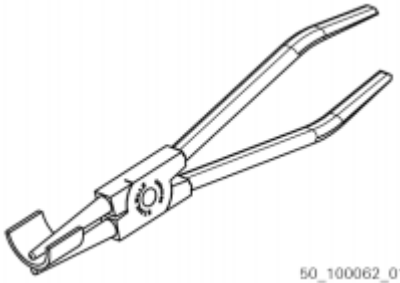
Figure	Order no. Designation Chapter/Section	Qty.	Comment
 50_000275_01	**AA00.361.629** **Disassembly device** • Removing torque converter, page 43	1	
 50_100024_01	**AA01.233.276** **Holding device** • Removing control unit, page 46 • Fitting control unit, page 212	1	for selector shaft (E switch) Chrysler, JLR, Honda
 50_100014_01	**AA01.158.809** **Retaining plate** • Removing control unit, page 46 • Fitting control unit, page 212	1	for control unit
 50_100061_01	**AA01.349.327** **Pliers** • Removing control unit, page 46	1	for removal of oil tubes (A, E, F, LuC)
 50_100062_01	**AA02.031.913** **Pliers** • Removing control unit, page 46	1	for removal of tubes (suction tubes and pressure tube)

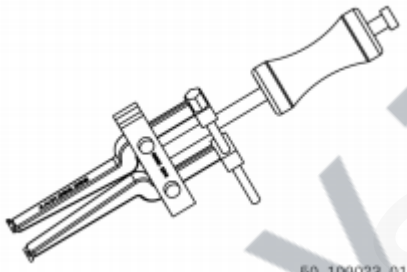
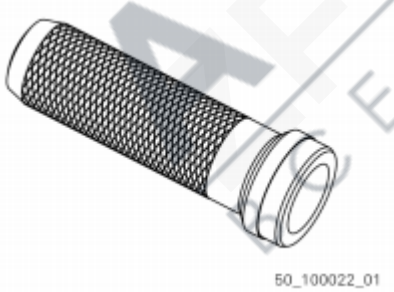
Figure	Order no. Designation Chapter/Section	Qty.	Comment
 50_000278_01	**AA01.217.244** **Disassembly device** • Removing torque converter bell housing, page 54	1	to loosen torque converter bell housing
 50_100015_01	**AA01.233.211** **Bracket** • Removing torque converter bell housing, page 54 • Dismantling torque converter bell housing, page 57 • Assembling torque converter bell housing, page 154 • Assembling intermediate plate, page 158	1	backing torque converter bell housing
 50_100023_01	**AA01.266.268** **Extracting device** • Dismantling torque converter bell housing, page 57 • Dismantling differential, page 66	1	for bearing cups of tapered roller bearings at intermediate shaft and differential
 50_100022_01	**AA01.267.287** **Disassembly device** • Dismantling torque converter bell housing, page 57	1	for torque converter bell housing's needle roller bearing

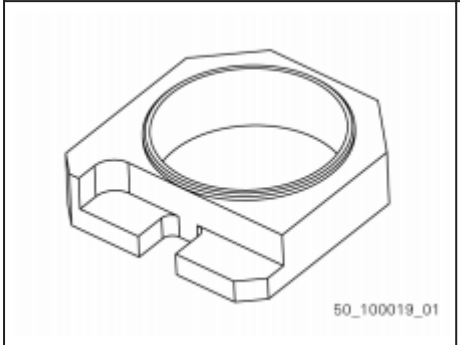
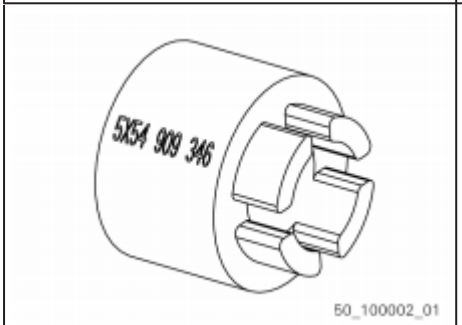
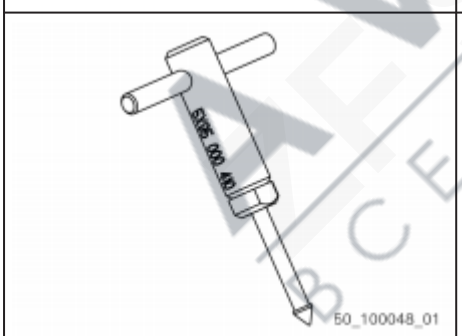
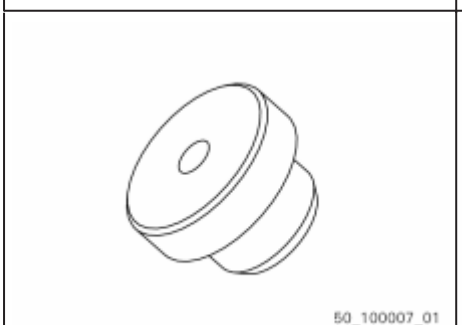
Figure	Order no. Designation Chapter/Section	Qty.	Comment
	**AA01.386.036** **Workpiece support** • Dismantling intermediate plate, page 63 • Assembling intermediate plate, page 158	1	for intermediate plate
	**5X54.909.346** **Press-in device** • Dismantling intermediate plate, page 63 • Assembling intermediate plate, page 158	1	for pump
	**AA00.566.429** **Disassembly device** • Dismantling intermediate plate, page 63	1	to loosen pump from intermediate plate
	**5X95.000.410** **Extracting handle** • Removing differential, page 65	1	
	**5X46.000.165** **Extracting device** • Dismantling differential, page 66 • Disassembling intermediate shaft, page 97	1	

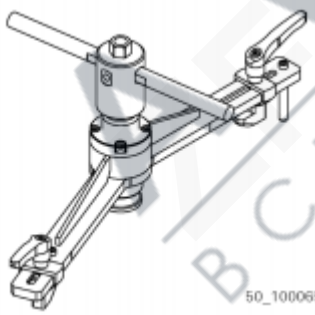
Figure	Order no. Designation Chapter/Section	Qty.	Comment
 50_100078_01	**1X56.122.306/AA01.263.260** **Disassembly device** • Dismantling differential, page 66 • Removing clutch D, page 74	1	for differential tapered roller bearing (basic device with extracting device)
 50_1000075_01	**5X46.002.000** **Disassembly tool** • Dismantling differential, page 66	1	
 50_1000023_01	**AA00.861.844** **Downholder** • Removing clutch D, page 74 • Fitting input shaft, clutch C and clutch D, page 195	1	for clutch D
 50_100065_01	**AA00.861.830** **Counter support** • Removing clutch D, page 74 • Removing clutch C, page 78 • Fitting input shaft, clutch C and clutch D, page 195	1	for downholder of clutch C and D
 50_100080_01	**AA01.357.687** **Center punch** • Removing clutch D, page 74	1	self-punching

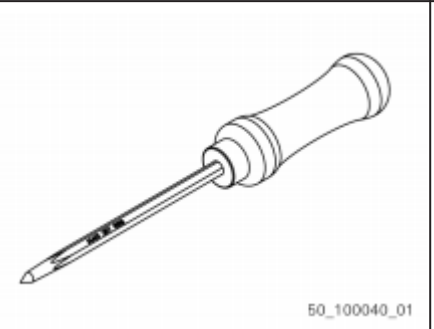
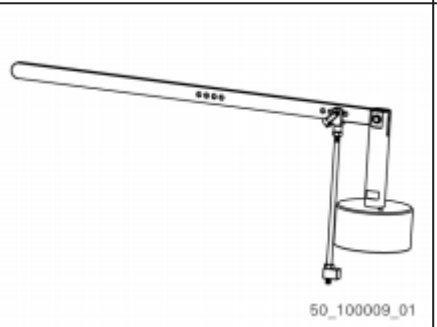
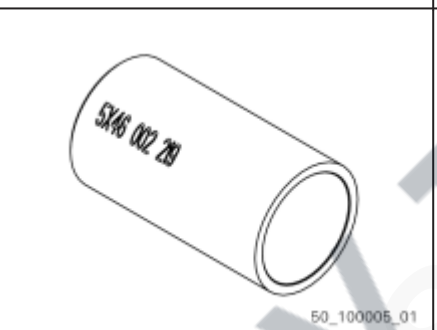
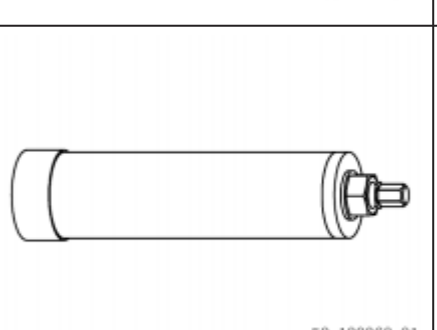
Figure	Order no. Designation Chapter/Section	Qty.	Comment
	**AA01.357.658** **Disassembly device** • Removing clutch D, page 74	1	for snap ring of clutch D
	**AA01.006.327** **Disassembly device** • Removing clutch D, page 74	1	for clutch D
	**5X46.002.219** **Press-in mandrel** • Removing clutch D, page 74	1	
	**AA00.861.841** **Downholder** • Removing clutch C, page 78 • Fitting input shaft, clutch C and clutch D, page 195	1	for disk spring and snap ring of clutch C
	**AA01.349.312** **Extracting device** • Removing oil feed bush, page 81	1	oil feed bush

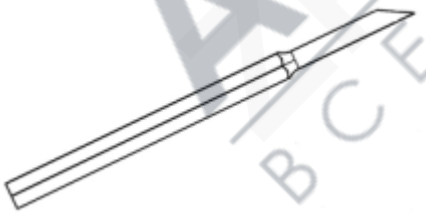
Figure	Order no. Designation Chapter/Section	Qty.	Comment
 50_100012_01	**AA01.211.988** **Supporting fixture** • Dismantling ring gear 2, sun gear 1 and multidisk carrier B/C/D, page 83 • Dismantling input shaft, page 85 • Assembling clutch B and input shaft, page 164 • Assembling ring gear 2/multidisk carrier B/C/D, page 168	1	for tower/input shaft
 50_100003_01	**5X46.030.167** **Assembly aid** • Dismantling clutch B, page 87	1	for clutch B
 50_100001_01	**5X46.909.841** **Holder** • Disassembling bearing support, page 92 • Assembling bearing support, page 176	1	for tightening groove nut and staking safety plate.
 50_100090_01	**5X46.004.168** **Disassembly device** • Disassembling bearing support, page 92	1	to loosen staking of nut

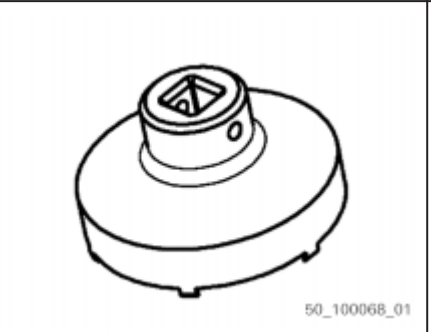
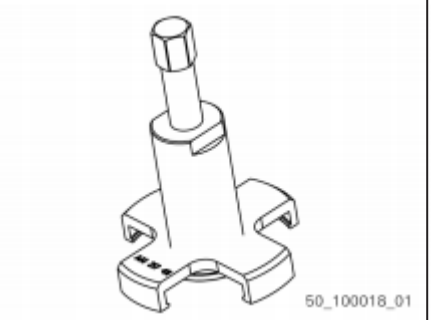
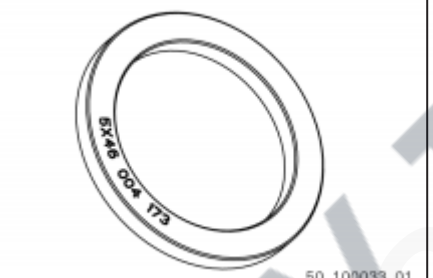
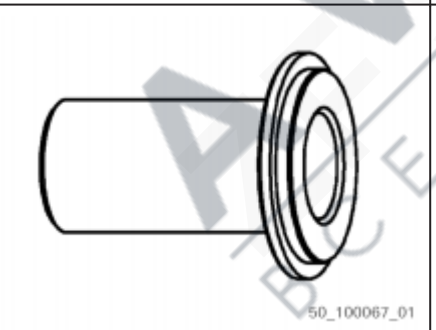
Figure	Order no. Designation Chapter/Section	Qty.	Comment
	**AA01.215.336** **Socket wrench** • Disassembling bearing support, page 92 • Assembling bearing support, page 176	1	
	**AA01.217.411** **Disassembly device** • Disassembling bearing support, page 92	1	for input gear of bearing support
	**5X46.004.173** **Centering ring** • Disassembling bearing support, page 92 • Assembling bearing support, page 176	1	for press-in device for angular ball bearing of input gear
	**AA01.357.282** **Disassembly device** • Disassembling bearing support, page 92	1	ball bearing from input gear
	**AA01.202.461** **Extracting device** • Disassembling bearing support, page 92	1	to remove dog F from bearing support

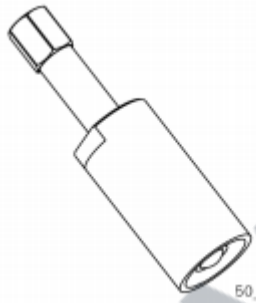
Figure	Order no. Designation Chapter/Section	Qty.	Comment
 50_100088_01	**AA01.215.202** **Extracting device** • Disassembling bearing support, page 92	1	Facom U.49AM
 50_1000077_01	**5X46.300.849** **Disassembly device** • Disassembling intermediate shaft, page 97	1	for small tapered roller bearing of intermediate shaft, outside (Rollex)
 50_100004_01	**5X46.010.011** **Disassembly device** • Disassembling intermediate shaft, page 97	1	for small tapered roller bearing of intermediate shaft, outside (Rollex basic device)
 50_000277_01	**AA00.611.954** **Safety device** • Disassembling intermediate shaft, page 97	1	
 50_100079_01	**AA01.222.595/AA01.222.627** **Extracting device** • Disassembling intermediate shaft, page 97	1	for large tapered roller bearing of intermediate shaft, inside

Figure	Order no. Designation Chapter/Section	Qty.	Comment
 50_000207_01	**5X46.001.502** **Assembly fixture** • Dismantling clutch E, page 98	1	for disk spring of clutch A
 50_100013_01	**AA01.180.034** **Test device** • Setting axial clearance of chain wheel, page 102	1	chain wheel setting
 50_000384_01	**5P01.001.330** **Measuring device** • Setting running clearance of clutch B, page 104 • Setting running clearance of clutch E, page 107 • Setting running clearance of clutch C, page 111 • Setting running clearance of clutch D, page 114	1	Part 1 of 3
 50_000383_01	**5P01.001.458** **Test device** • Setting running clearance of clutch B, page 104 • Setting running clearance of clutch E, page 107 • Setting running clearance of clutch C, page 111 • Setting running clearance of clutch D, page 114	1	Part 2 of 3

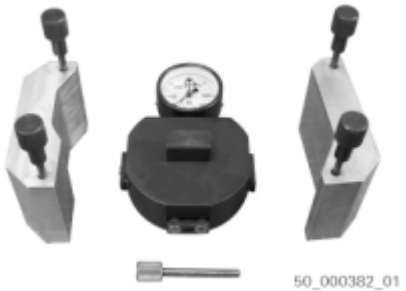
Figure	Order no. Designation Chapter/Section	Qty.	Comment
	**5P01.000.329** **Test device** • Setting running clearance of clutch B, page 104 • Setting running clearance of clutch E, page 107 • Setting running clearance of clutch C, page 111 • Setting running clearance of clutch D, page 114	1	Part 3 of 3
	**5P70.000.130** **Height measuring device** • Setting running clearance of clutch B, page 104 • Setting running clearance of clutch D, page 114	1	Only use together with a measuring plate.
	**5P33.000.009 / 5P74.001.051** **Measuring bar with dial gage** • Setting running clearance of clutch E, page 107 • Setting running clearance of clutch C, page 111	1	Only use together. Measuring tool for clutch running clearance
	**5P70.000.122** **Depth gage** • Setting backlash, page 117 • Setting axial clearance at intermediate shaft, page 125 • Setting axial clearance of differential, page 131	1	

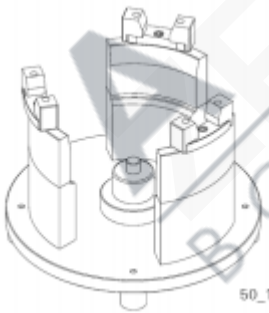
Figure	Order no. Designation Chapter/Section	Qty.	Comment
 50_100026_01	**AA01.175.522** **Measuring support** • Setting backlash, page 117	1	for bearing support – measuring input clearance dimension D together with depth gage
 50_100071_01	**AA01.183.838** **Test device** • Setting backlash, page 117	1	for input clearance, tower, dimension E, take over values from device
 50_100056_01	**AA01.183.841** **Setting master MIN** • Setting backlash, page 117	1	for input clearance, tower, dimension E
 50_100066_01	**AA01.183.839** **Depot plate** • Setting backlash, page 117	1	for measuring device, input clearance, tower, dimension E
 50_100059_01	**AA01.183.843** **Setting master MAX** • Setting backlash, page 117	1	for input clearance, tower, dimension E

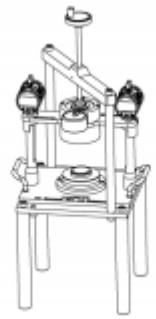
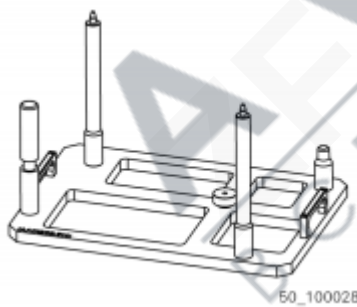
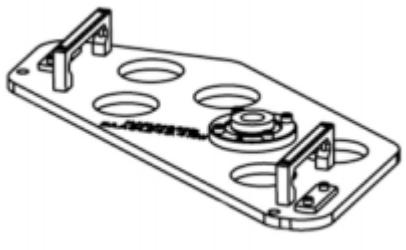
Figure	Order no. Designation Chapter/Section	Qty.	Comment
 50_100044_01	**AA01.257.418** **Test device** • Setting axial clearance at intermediate shaft, page 125 • Setting axial clearance of differential, page 131	1	for differential and intermediate shaft
 50_100046_01	**AA01.259.174** **Setting master MIN** • Setting axial clearance at intermediate shaft, page 125 • Setting axial clearance of differential, page 131	1	for measuring device AA01.257.418
 50_100042_01	**AA01.259.176** **Setting master MAX** • Setting axial clearance at intermediate shaft, page 125 • Setting axial clearance of differential, page 131	1	for measuring device AA01.257.418
 50_100028_01	**AA01.239.914** **Supporting fixture** • Fitting oil feed bush, page 144	1	to assemble oil feed bush
 50_100043_01	**AA01.249.419** **Assembly fixture** • Fitting oil feed bush, page 144	1	for oil feed bush

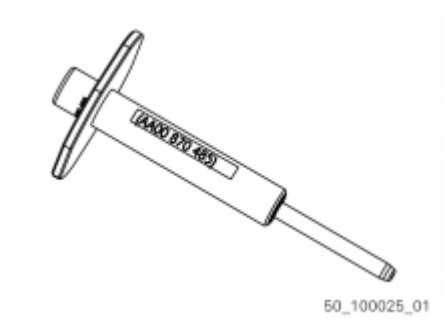
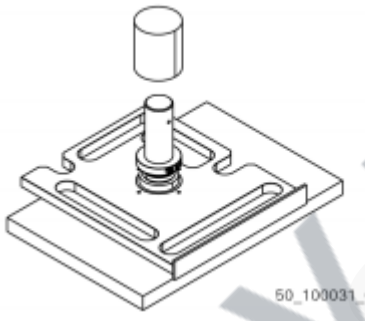
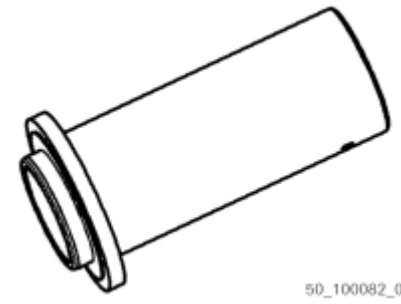
Figure	Order no. Designation Chapter/Section	Qty.	Comment
	**AA00.870.485** **Assembly fixture** • Completing transmission housing, page 150	1	for shaft sealing ring of selector shaft
	**5X46.001.368** **Press-in device** • Completing transmission housing, page 150	1	for clamping sleeve
	**AA00.343.868** **Assembly fixture** • Assembling torque converter bell housing, page 154	1	for torque converter bell housing
	**AA00.347.308** **Assembly fixture** • Assembling torque converter bell housing, page 154	1	for drawn cup needle roller bearing
	**AA01.158.209** **Press-in mandrel** • Assembling torque converter bell housing, page 154	1	for shaft sealing ring of torque converter

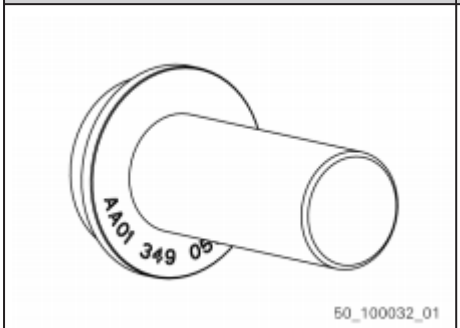
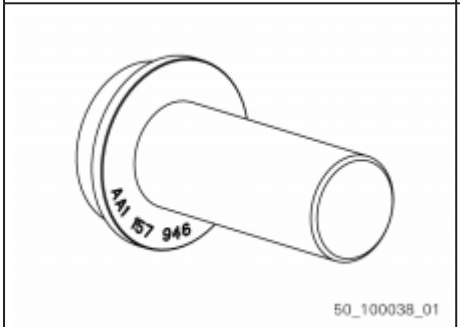
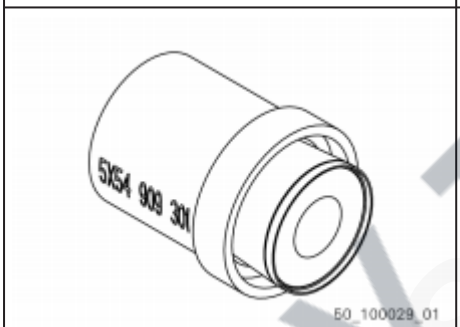
Figure	Order no. Designation Chapter/Section	Qty.	Comment
 50_100032_01	**AA01.349.059** **Press-in mandrel** • Assembling intermediate plate, page 158 • Assembling intermediate shaft and differential, page 192	1	bearing cup into intermediate shaft
 50_100038_01	**AA01.157.946** **Press-in mandrel** • Assembling intermediate plate, page 158 • Fitting input shaft, clutch C and clutch D, page 195	1	for differential bearing cup into transmission housing and torque converter bell housing
 50_100029_01	**5X54.909.301** **Assembly fixture** • Assembling clutch B and input shaft, page 164	1	for snap ring of piston B
 50_100051_01	**5X54.909.311** **Press-in device** • Assembling clutch B and input shaft, page 164	1	for snap ring of clutch B on input shaft
 50_100052_01	**5X54.909.312** **Press-in device** • Assembling ring gear 2/multidisk carrier B/C/D, page 168	1	for snap ring of sun gear

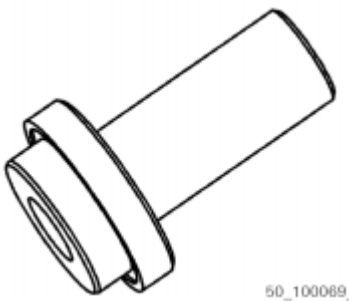
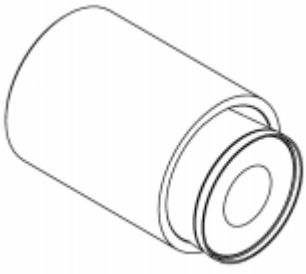
Figure	Order no. Designation Chapter/Section	Qty.	Comment
	**AA00.622.346** **Assembly sleeve** • Assembling bearing support, page 176	1	
	**AA01.216.173** **Press-in mandrel** • Assembling bearing support, page 176	1	for angular ball bearing into input gear
	**5X46.909.843** **Assembly sleeve** • Assembling bearing support, page 176	1	for input gear on bearing support
	**AA01.216.392** **Staking device** • Assembling bearing support, page 176	1	for safety plate
	**5X54.909.307** **Assembly fixture** • Assembling clutch E, page 182	1	for snap ring of clutch E

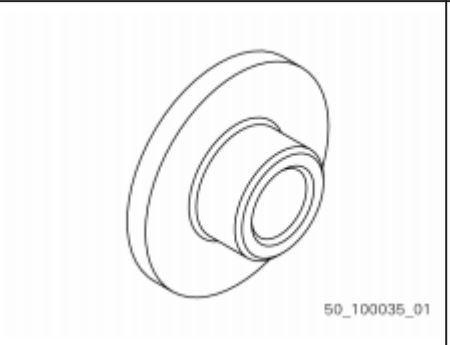
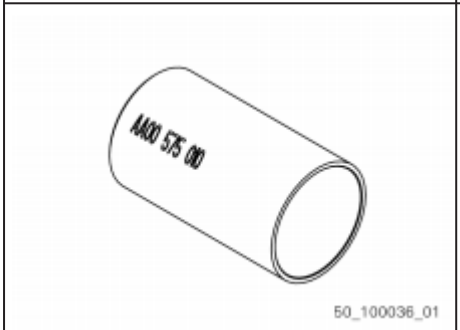
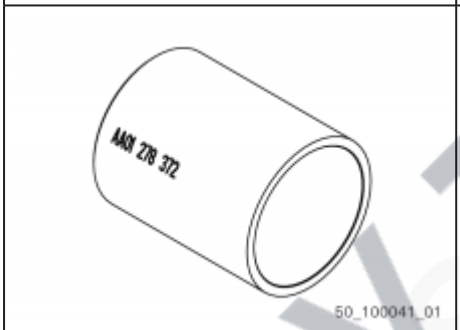
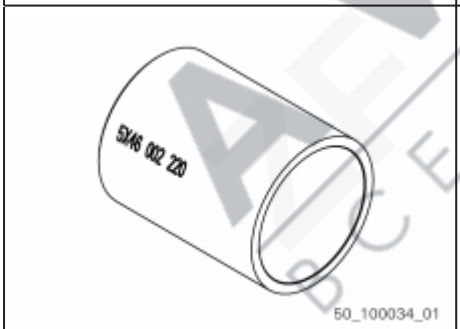
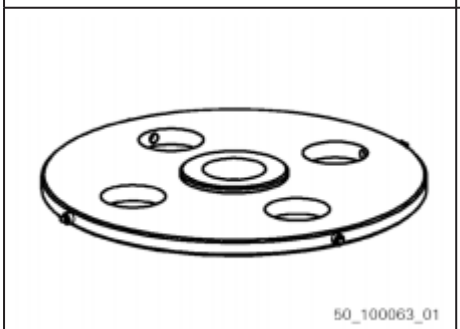
Figure	Order no. Designation Chapter/Section	Qty.	Comment
	**5X46.909.896** **Supporting fixture** • Assembling tower, page 188 • Fitting input shaft, clutch C and clutch D, page 195	1	
	**AA00.575.010** **Press-on fixture** • Assembling intermediate shaft and differential, page 192	1	for tapered roller bearing onto intermediate shaft
	**AA01.278.372** **Assembly sleeve** • Assembling intermediate shaft and differential, page 192	1	for tapered roller bearing on differential
	**5X46.002.220** **Press-in mandrel** • Fitting input shaft, clutch C and clutch D, page 195	1	for tapered roller bearing on differential
	**5X46.909.932** **Centering plate** • Fitting input shaft, clutch C and clutch D, page 195	1	for disk spring C

Figure	Order no. Designation Chapter/Section	Qty.	Comment
 50_100070_01	**AA00.805.056** **Press-in device** • Fitting torque converter bell housing, page 207	1	for torque converter bell housing's shaft sealing ring JLR and Chrysler
 50_100053_01	**AA00.396.351** **Press-in device** • Fitting torque converter bell housing, page 207	1	for shaft sealing ring into hollow shaft JLR and Chrysler
 50_100049_01	**AA00.396.745** **Assembly fixture** • Fitting torque converter bell housing, page 207	1	for shaft sealing ring JLR
 50_100064_01	**AA00.396.739** **Assembly fixture** • Fitting torque converter bell housing, page 207	1	for shaft sealing ring Chrysler
 50_100037_01	**AA00.851.606** **Assembly fixture** • Fitting control unit, page 212	1	for adapter

Figure	Order no. Designation Chapter/Section	Qty.	Comment
	**AA01.216.098** **Test device** • Fitting control unit, page 212	1	sealing plate for leak test of clutches

8 Preparatory Activities

8.1 Loading transmission

Special tools:

- AA00.835.196 Assembly bracket
- AA01.081.813 Assembly bracket

⚠ WARNING

Risk of injury due to falling parts.
Death or serious injury possible.

⇨ Secure parts against falling down.
⇨ Do not stand beneath a suspended load.
⇨ Do not work on a suspended load.

Removing transmission control module

1. Unscrew four screws from EGS.
2. Take out EGS.

Fig. 4

3. Attach AA00.835.196 [Assembly bracket] or AA01.081.813 [Assembly bracket] in the three securing points at the transmission.
4. Attach transport tube at assembly bracket.
5. Turn transmission.

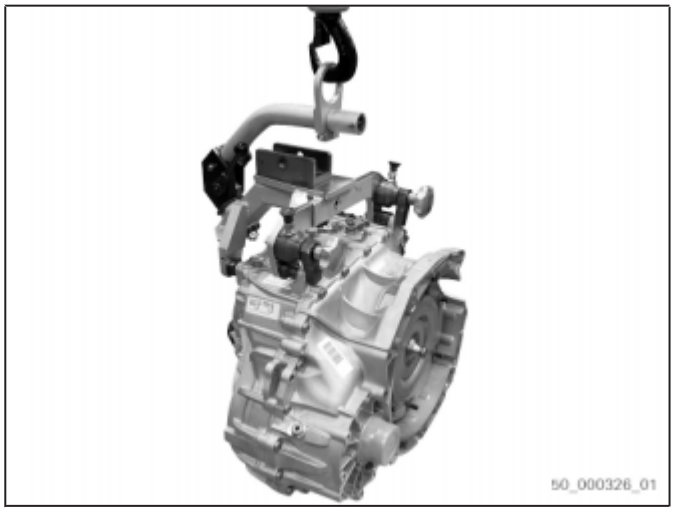


Fig. 5

6. Hook transmission into assembly trolley.

7. Remove retaining pin from transport tube and remove transport tube.

8. Read out error memory with diagnostic tester.

9. Remove transport protection from transmission.

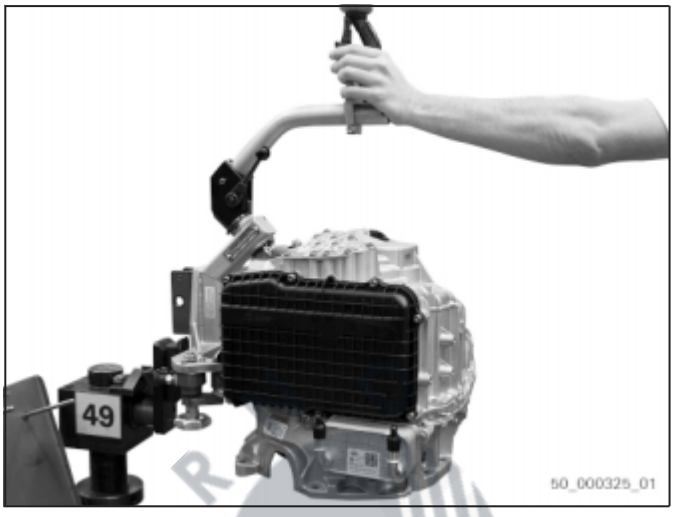


Fig. 6

8.2 Draining transmission oil

Requirements:

- Suitable container to collect oil

Unscrew screw plugs

1. Put container beneath screw plug.

2. Unscrew screw plug.

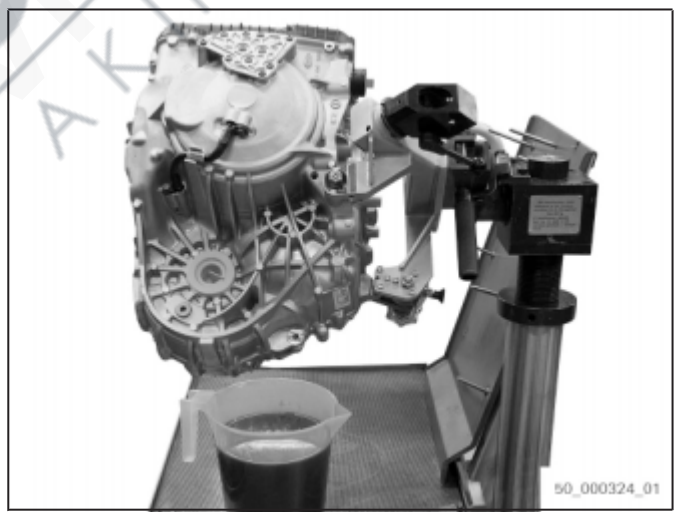


Fig. 7

→ Once the transmission oil has been completely drained, unscrew **all** other screw plugs.

9 Dismantling

9.1 Removing torque converter

Special tools:

- AA01.221.521 Disassembly device
- AA01.221.533 Disassembly device
- AA00.361.629 Disassembly device

⚠ WARNING

Risk of injury due to falling parts.
Death or serious injury possible.

⇨ Secure parts against falling down.
⇨ Do not stand beneath a suspended load.
⇨ Do not work on a suspended load.

1. Place transmission with torque converter end facing upwards.

2. Unscrew hexalobular driving screw and nut WAF 17 from torque converter retaining brackets.

3. Remove torque converter retaining brackets.

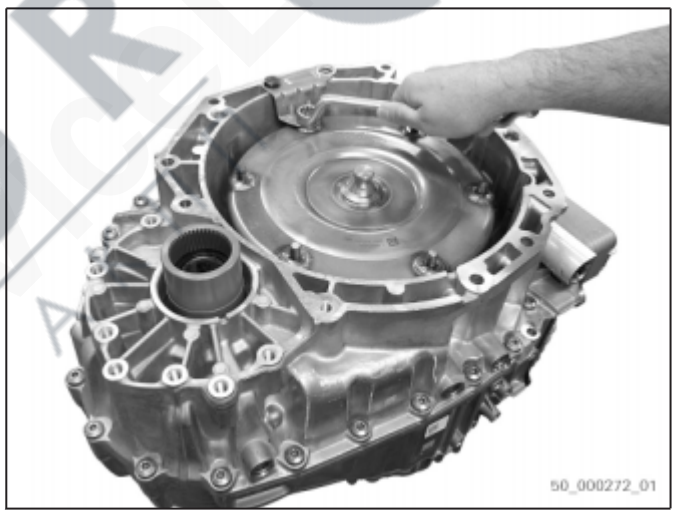


Fig. 8

4. Screw in AA01.221.521 [Disassembly device] or AA01.221.533 [Disassembly device] into torque converter.

5. Remove torque converter from transmission housing.

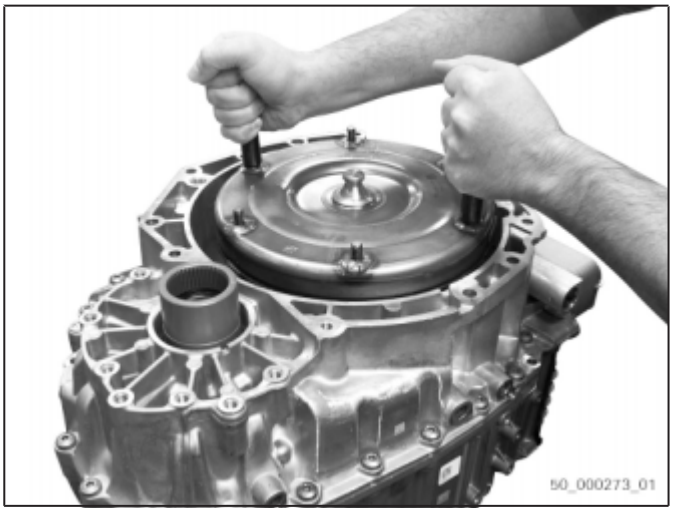


Fig. 9

Only JLR

6. Insert AA00.361.629 [Disassembly device] into hollow shaft and spread.

7. Remove hollow shaft.

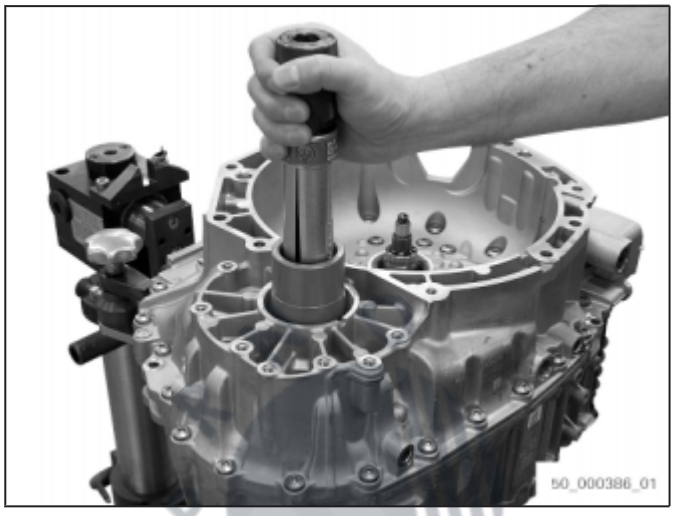


Fig. 10

8.

NOTICE

Damage due to leakage possible. Do not damage sealing face.

⇨ Carefully remove sealing element.

Remove shaft sealing ring from hollow shaft.

Fig. 11

9.2 Removing oil cooler, oil pan and control unit

9.2.1 Removing oil cooler

Depending on the customer application, the number of screws might vary.

1. Place transmission with oil pan end facing upwards.
2. Unscrew three TX 30 torx screws from oil cooler.
3. Remove oil cooler.

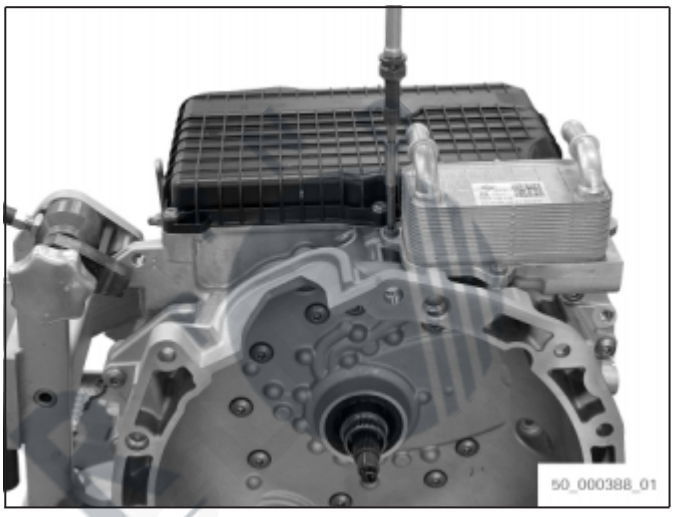


Fig. 12

4.

NOTICE

Damage due to leakage possible. Do not damage sealing face.

⇨ Carefully remove sealing element.

Carefully remove two sealing rings form oil cooler lines.

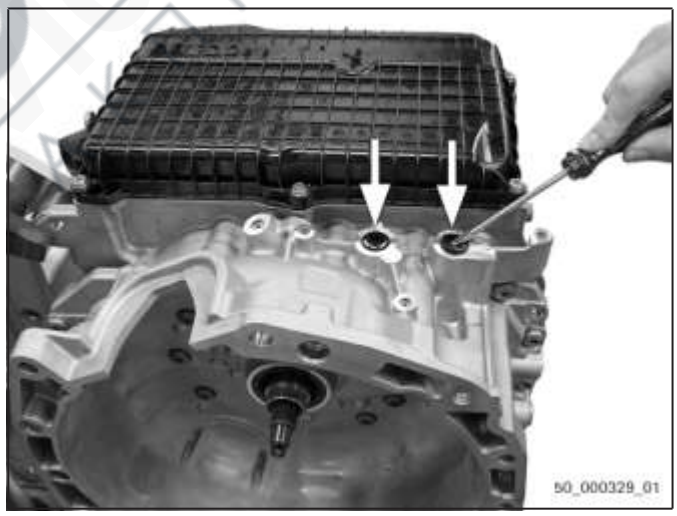


Fig. 13

9.2.2 Removing oil pan

1. Seal is integrated into oil pan. Torx screws of oil pan are protected against loss.

   Loosen torx screws form oil pan in two steps since otherwise the threaded sleeve comes loose.

   Loosen seven TX 30 torx screws from oil pan in two steps.

2. Take off oil pan.

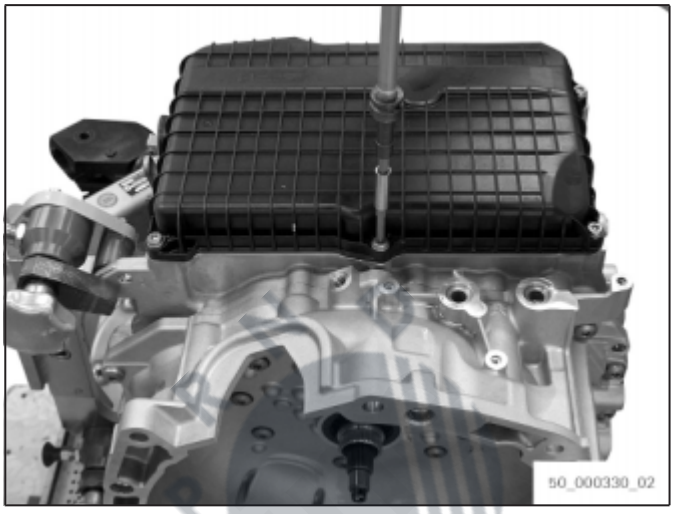


Fig. 14

9.2.3 Removing control unit

Special tools:

- AA01.233.276 Holding device
- AA01.158.809 Retaining plate
- AA01.349.327 Pliers
- AA02.031.913 Pliers

1. Position AA01.233.276 [Holding device] on selector shaft.

2. Prestress selector shaft using AA01.233.276 [Holding device] and insert into blind hole.

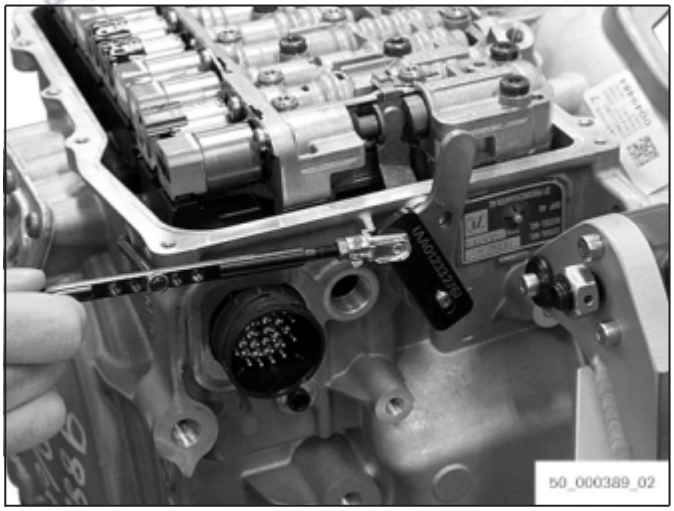


Fig. 15

3. Attach AA01.158.809 [Retaining plate] at transmission housing.

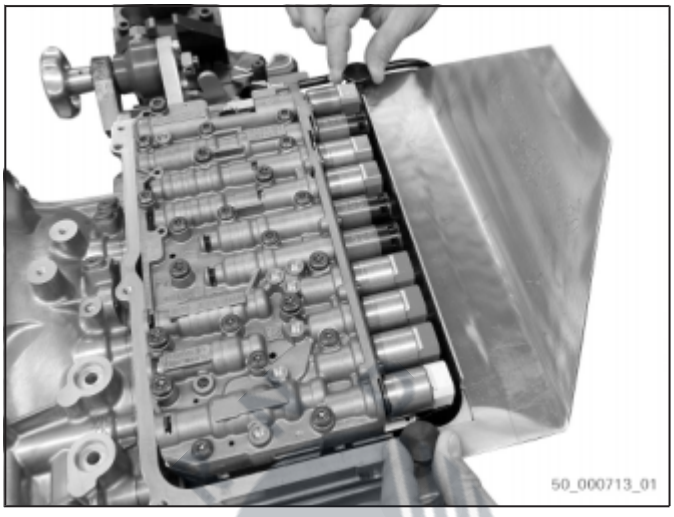


Fig. 16

4. Unscrew ten TX 40 torx screws from control unit.

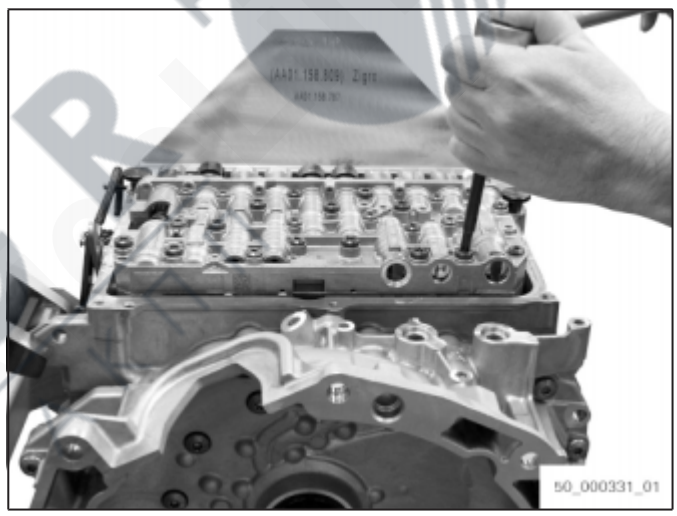


Fig. 17

5. Control unit might be jammed.

Carefully pry out control unit at several spots.

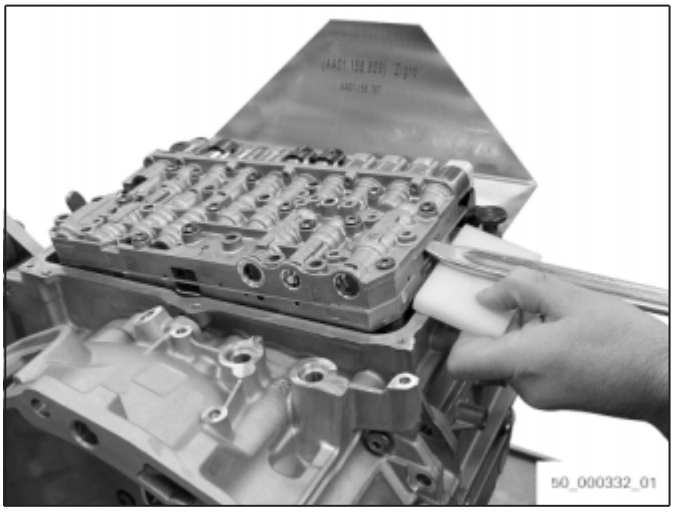


Fig. 18

6. Put control unit on AA01.158.809 [Retaining plate].

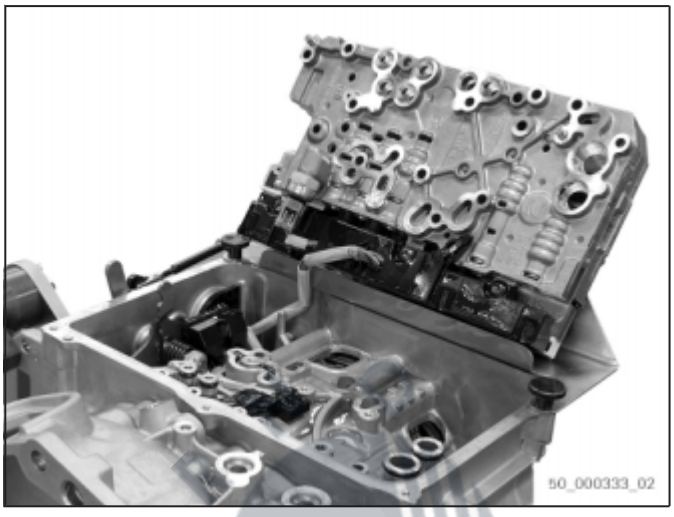


Fig. 19

7. Unscrew TX 30 torx screw at speed sensor.

8. Take out input speed sensor and output speed sensor from bore.

Fig. 20

9. Torx screw remains in position sensor.

   Loosen TX 27 torx screw at position sensor.

10. Take out position sensor from bore.

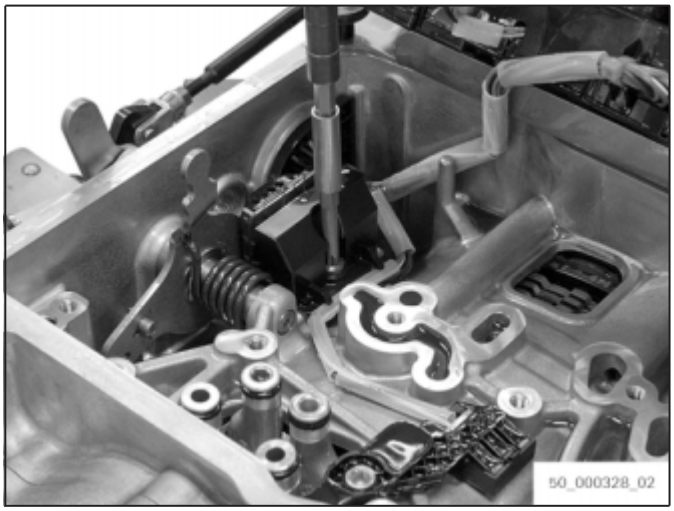


Fig. 21

11. Loosen retaining clamp of electronic unit connector.

12. Press ECU connector into transmission housing.

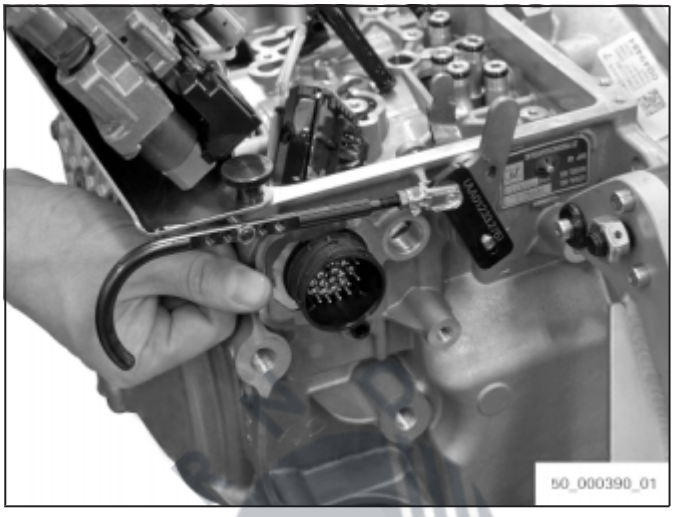


Fig. 22

13. Take out control unit with sensor unit.

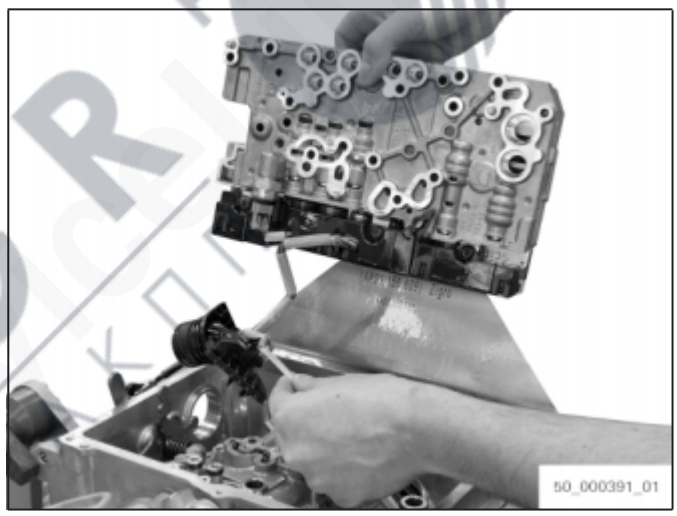


Fig. 23

14. Remove AA01.233.276 [Holding device].

15. Remove AA01.158.809 [Retaining plate].

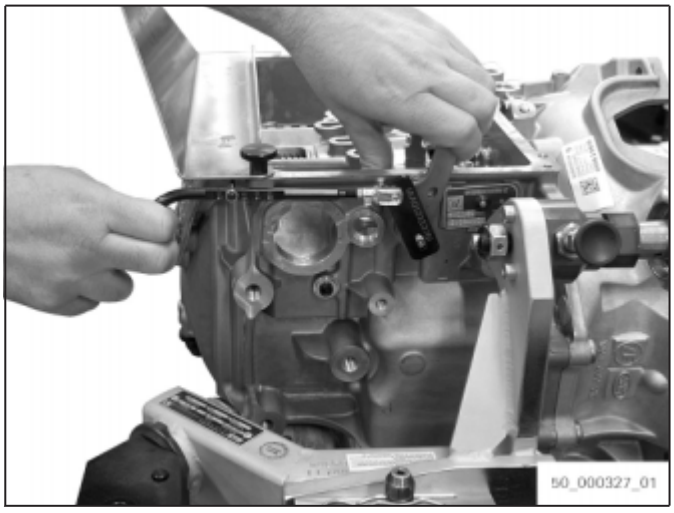


Fig. 24

16. Socket, adapter and tubes might remain in transmission housing or control unit.

    Remove six adapters from transmission housing using AA01.349.327 [Pliers].

17. Remove two tubes from transmission housing using AA02.031.913 [Pliers].

18. Pull off two O-rings each from adapters and tubes.

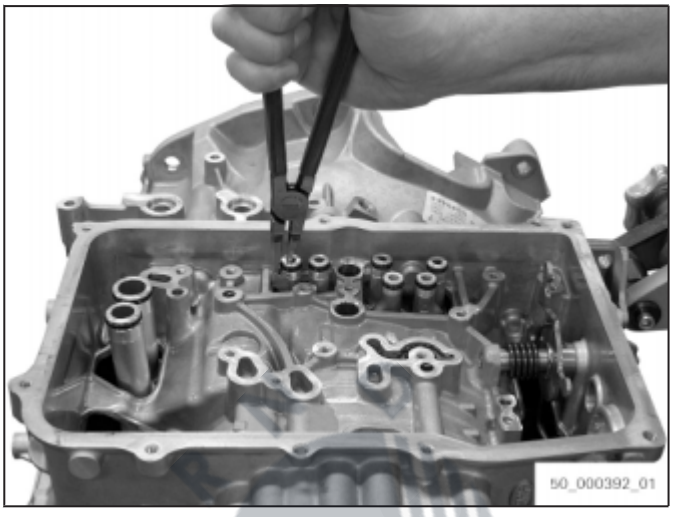


Fig. 25

9.2.4 Dismantling control unit

1. Unscrew three torx screws from sensor unit.

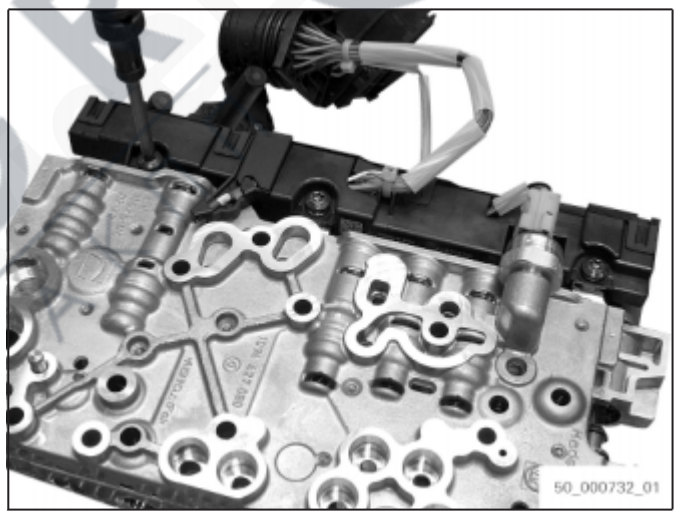


Fig. 26

2. Carefully remove plug from pressure sensor.

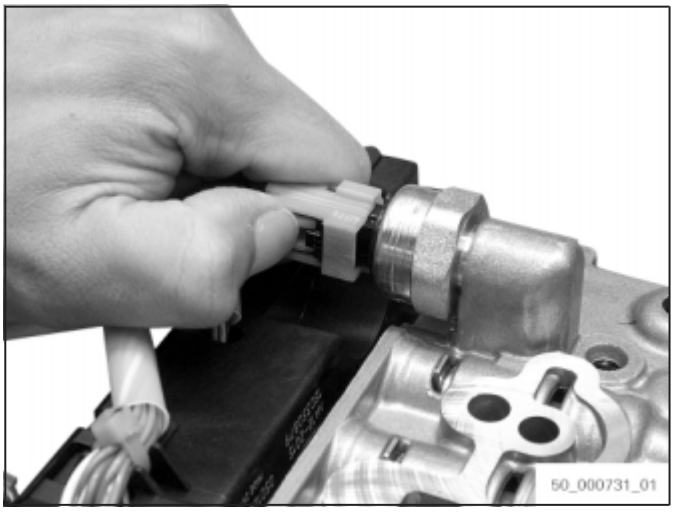


Fig. 27

3. Carefully remove sensor unit.

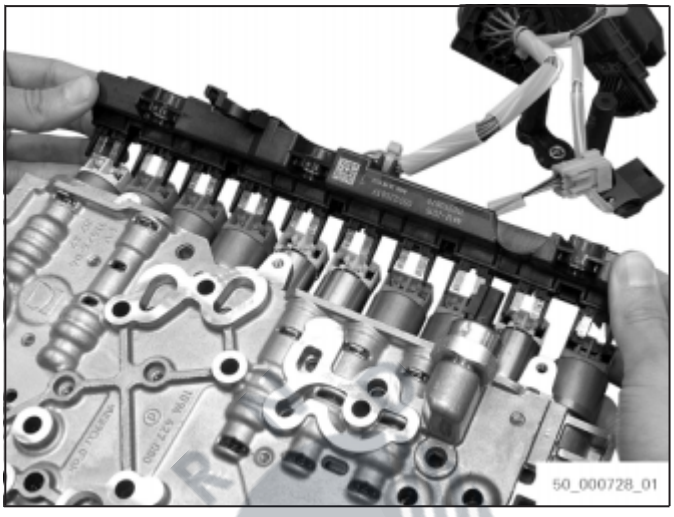


Fig. 28

9.3 Removing spiral spring and parking disk

1. Pry out spiral spring from parking disk using a screwdriver.

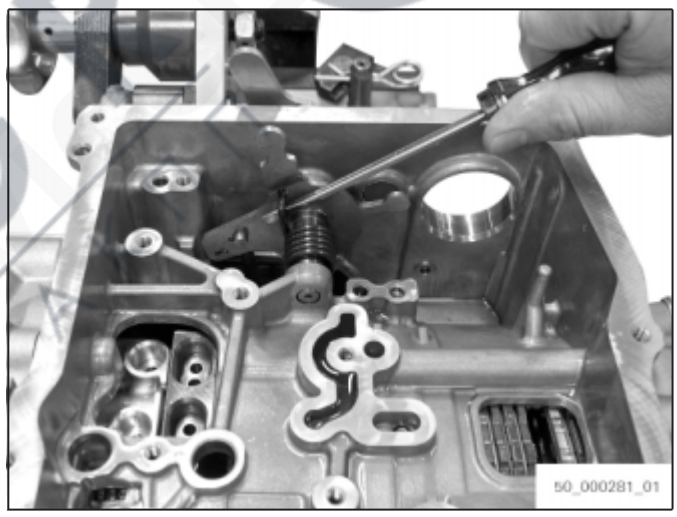


Fig. 29

2. Clamping sleeve might fall into transmission. Secure clamping sleeve with bar magnet.

Drive out clamping sleeve 5 mm using impact mandrel.

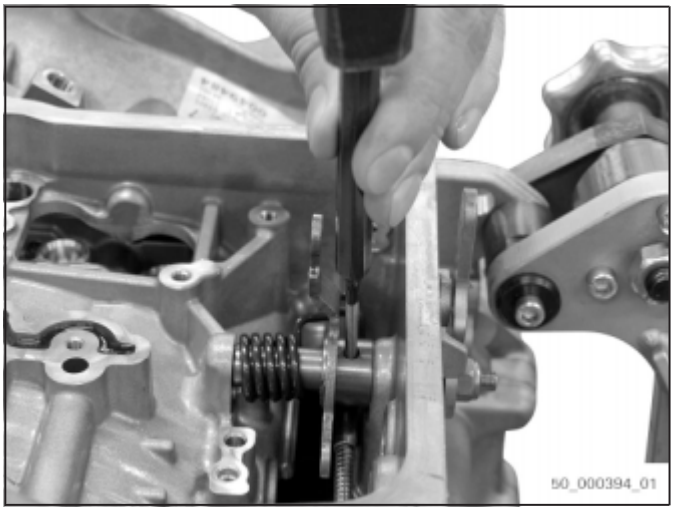


Fig. 30

3. Remove shift selector lever, nut and selector shaft.

4. Take out parking disk with connecting rod and spiral spring.

5. Take out connecting rod and spring from parking disk.

6. Dismantle shift selector lever, nut and selector shaft.

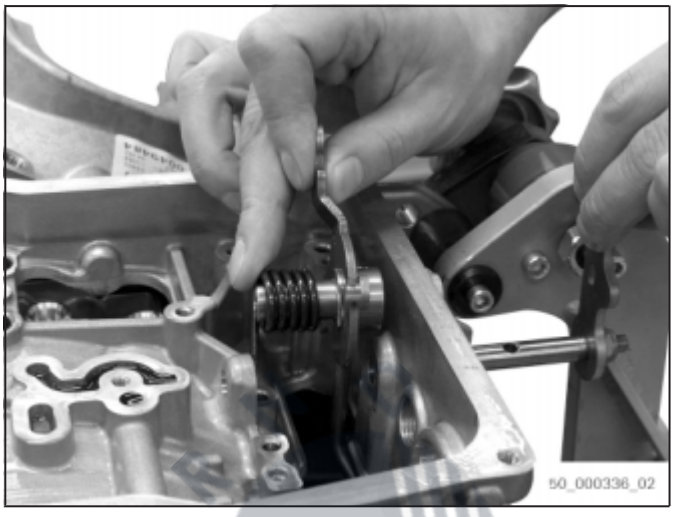


Fig. 31

7. **NOTICE**

Damage due to leakage possible. Do not damage sealing face.

⇨ Carefully remove sealing element.

Remove shaft sealing ring of selector shaft.

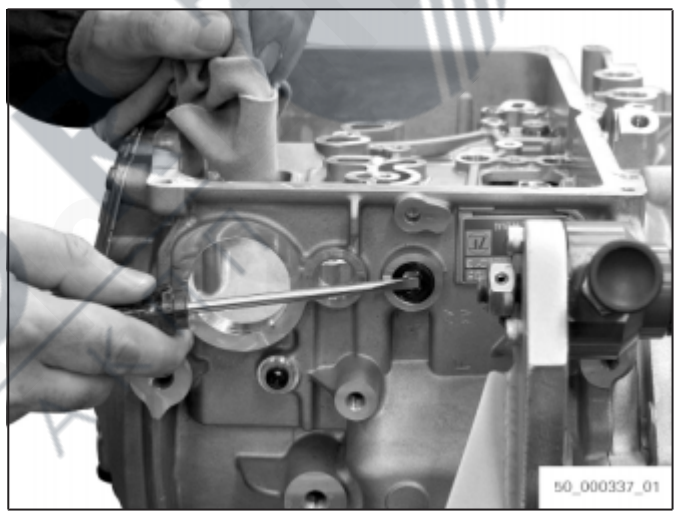


Fig. 32

8. Drive out breather tube 4 mm towards the outside using impact mandrel.

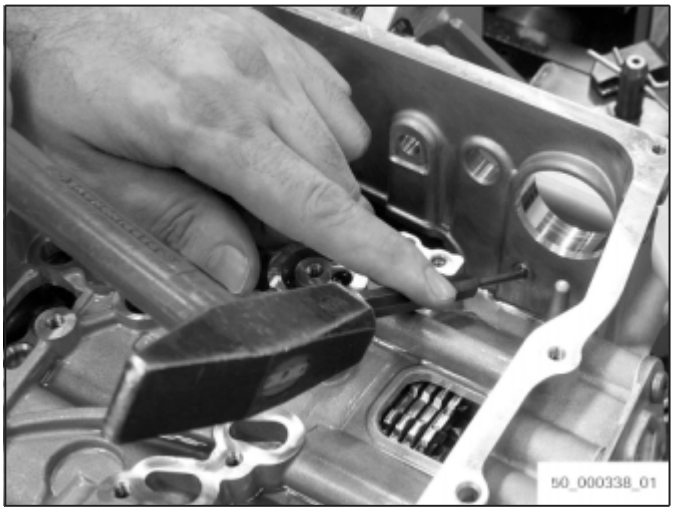


Fig. 33

9.4 Removing oil tube and cover

1. Place transmission with torque converter end facing downwards.

2. Loosen two TX 30 torx screws at tube.

3. Take off tube.

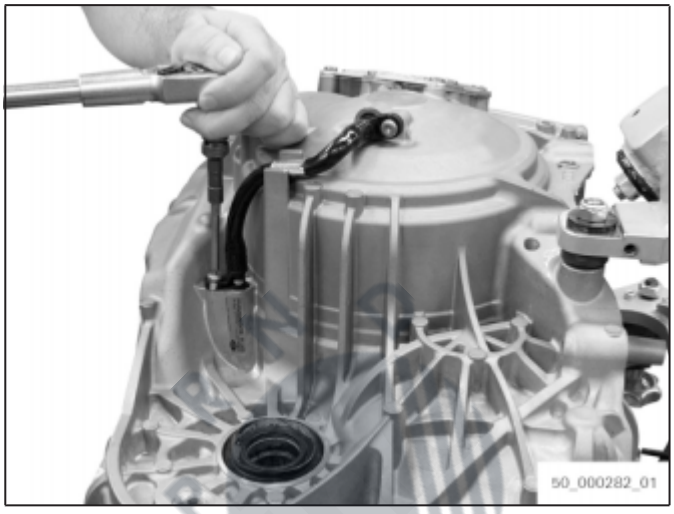


Fig. 34

4. Sealing rings might remain in transmission housing.

   Pull off two O-rings from tube or remove from transmission housing.

Fig. 35

5. Unscrew eleven TX 30 torx screws from cover.

6. Take off cover and seal.

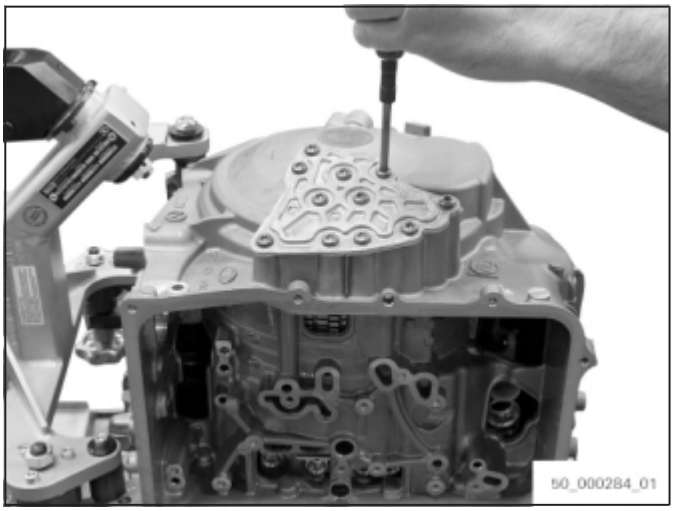


Fig. 36

9.5 Removing and dismantling torque converter bell housing

9.5.1 Removing torque converter bell housing

Special tools:

- AA01.217.244 Disassembly device
- AA01.233.211 Bracket

1. Place transmission with torque converter end facing upwards.

2. Unscrew nine TX 40 torx screws with Usit ring from torque converter bell housing.

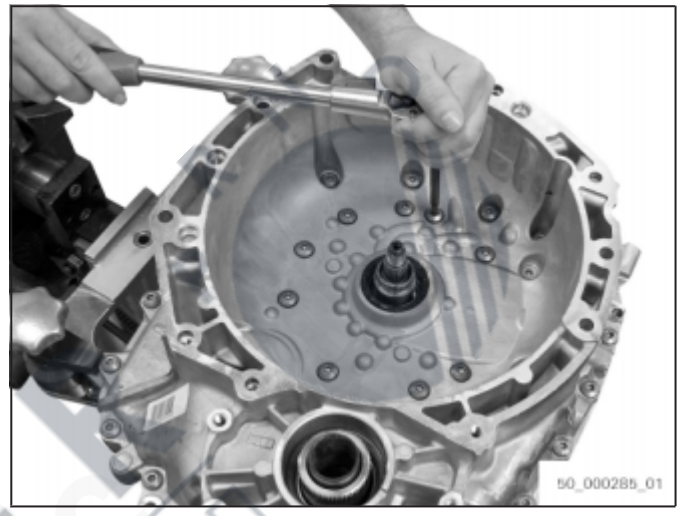


Fig. 37

3. Unscrew four TX 40 torx screws from torque converter bell housing.

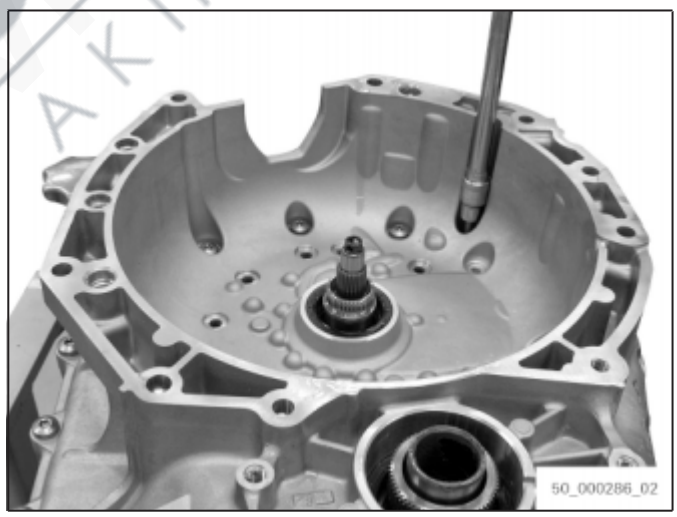


Fig. 38

4. Unscrew 17 TX 40 torx screws from torque converter bell housing and transmission housing parting point.

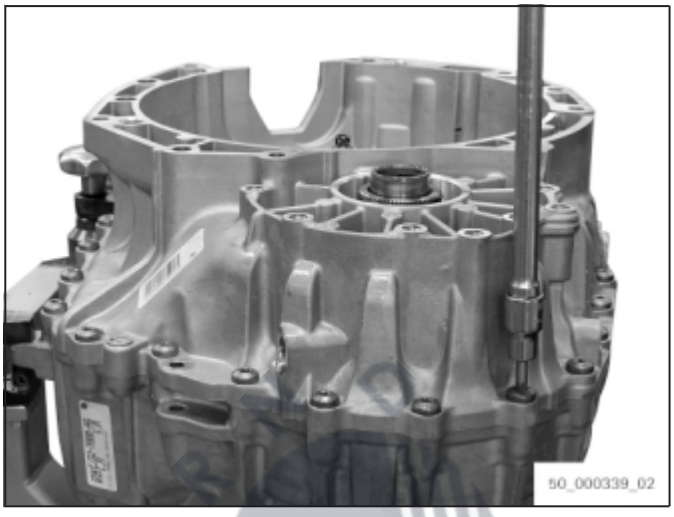


Fig. 39

5. Apply AA01.217.244 [Disassembly device] at opposed recess clearances in turns. Carefully separate torque converter bell housing from transmission housing.

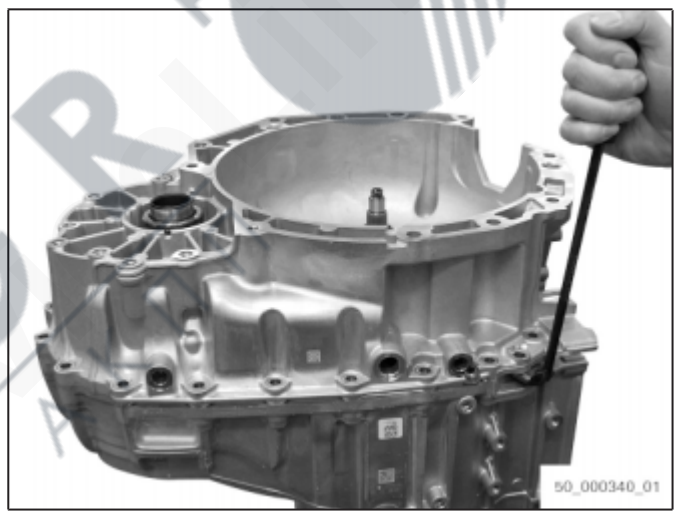


Fig. 40

6. Take off torque converter bell housing from transmission housing and put on workbench.

Fig. 41

7. Screw in AA01.233.211 [Bracket] into torque converter bell housing.

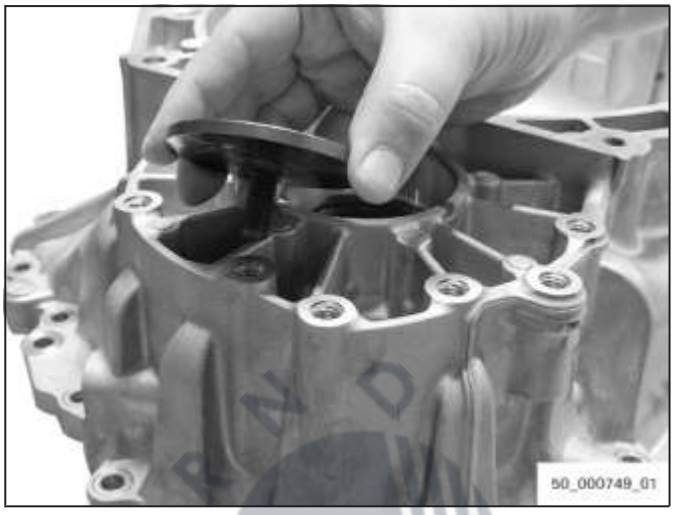


Fig. 42

8. Turn around torque converter bell housing.

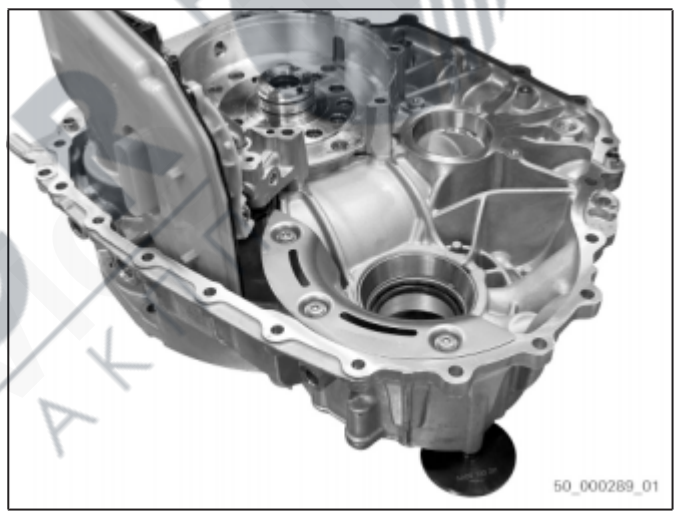


Fig. 43

9.5.2 Dismantling torque converter bell housing

Special tools:

- AA01.266.268 Extracting device
- AA01.267.287 Disassembly device
- AA01.233.211 Bracket

1. Unscrew TX 30 torx screw from oil filter.

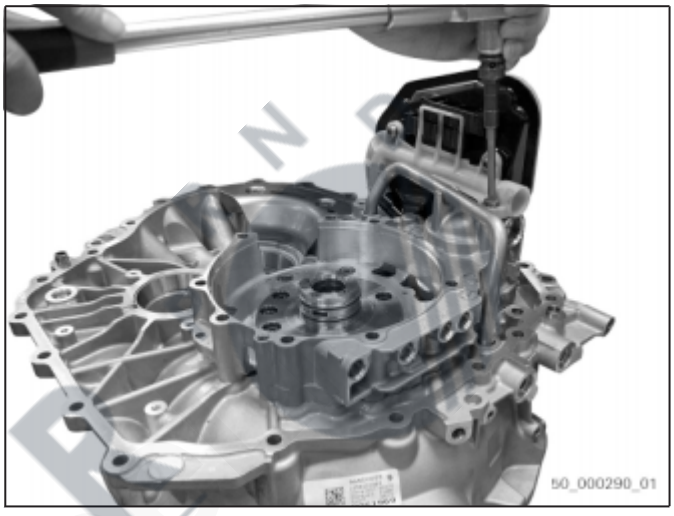


Fig. 44

2. Remove oil filter from pump's suction side.

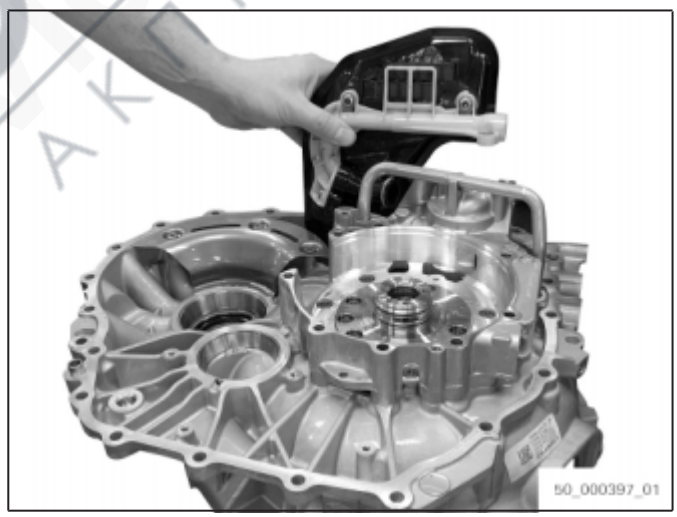


Fig. 45

3. Remove oil tube.

4. Sealing rings might remain in transmission housing.

   Pull off two O-rings from oil tube or remove from transmission housing.

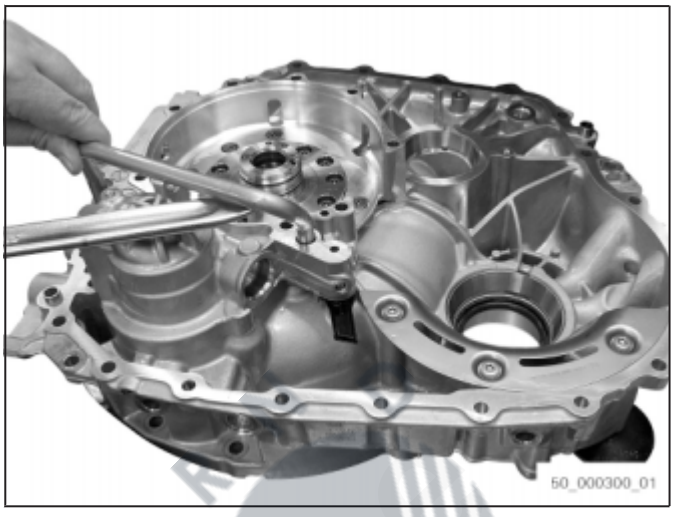


Fig. 46

5. Unscrew three TX 30 torx screws from oil baffle plate.

6. Take out torx screws and oil baffle plate.

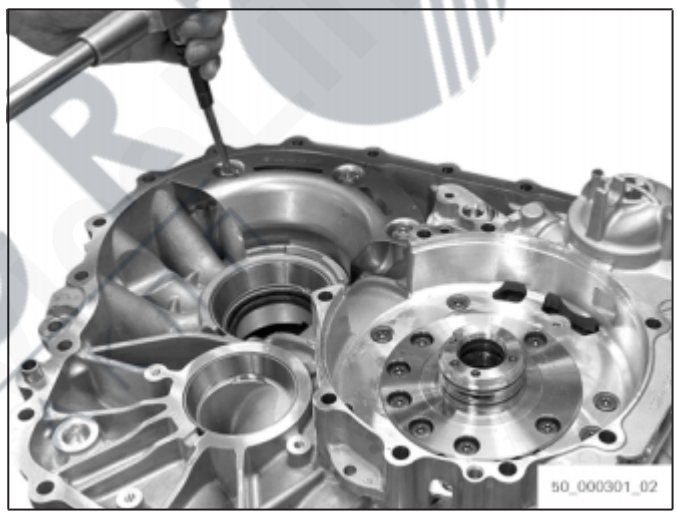


Fig. 47

7. Do not mix up bearing cups.

   Insert AA01.266.268 [Extracting device] into recess clearance of differential bearing cup.

8. Remove bearing cup from torque converter bell housing using AA01.266.268 [Extracting device].

9. Take off bearing cup from AA01.266.268 [Extracting device].

Fig. 48

10.

NOTICE

Damage due to leakage possible. Do not damage sealing face.

⇨ Carefully remove sealing element.

Carefully remove differential shaft sealing ring using a screwdriver.

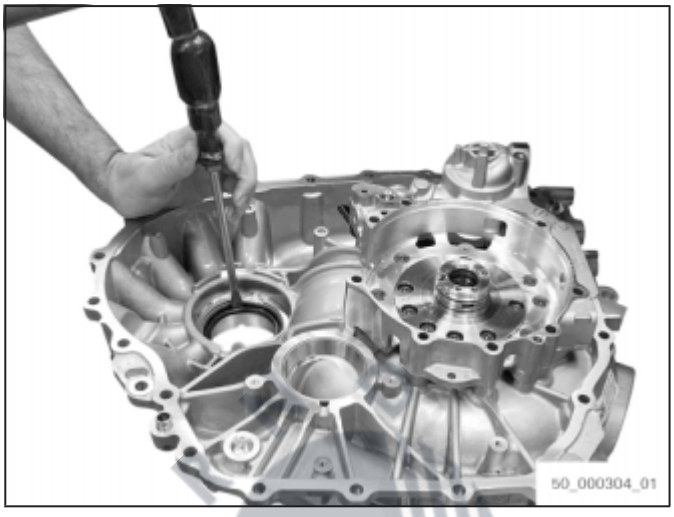


Fig. 49

11. Insert AA01.266.268 [Extracting device] into recess clearance of intermediate shaft bearing cup.

12. Remove bearing cup from torque converter bell housing using AA01.266.268 [Extracting device].

13. Take off bearing cup from AA01.266.268 [Extracting device].

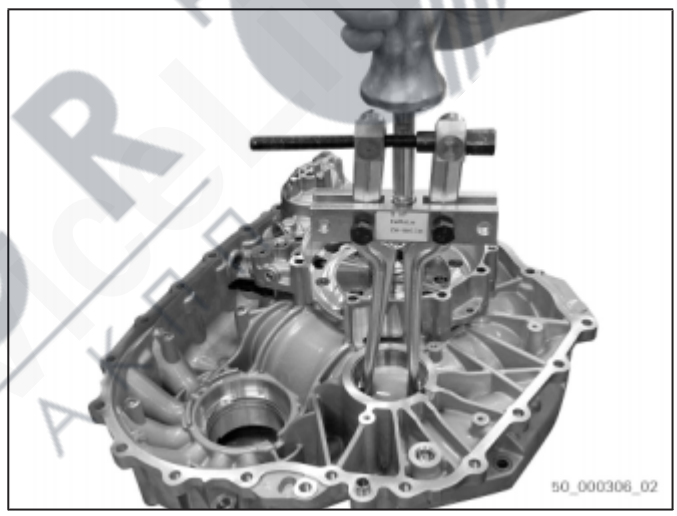


Fig. 50

14. Unscrew seven TX 30 torx screws from stator shaft.

Fig. 51

15. Take out stator shaft from intermediate plate.

16. Remove two rectangular rings above the stator shaft screw flange.

17. Remove one rectangular ring below the stator shaft screw flange.

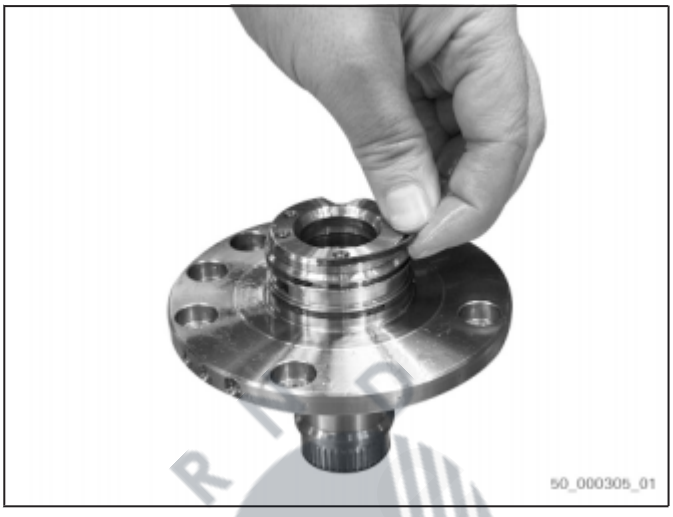


Fig. 52

18. Unscrew six TX 30 torx screws from intermediate plate.

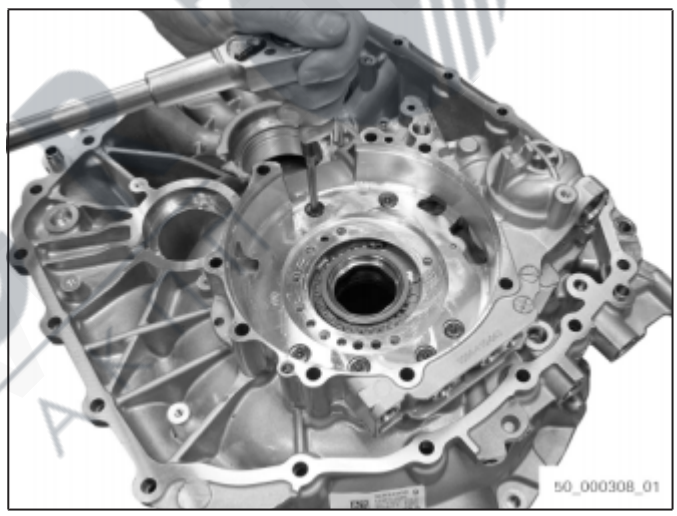


Fig. 53

19. Take out adjustment plate of chain wheel.

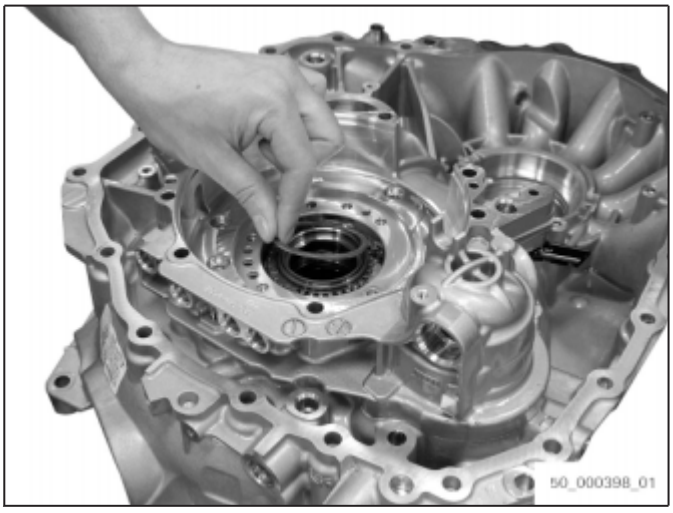


Fig. 54

20.

NOTICE

Damage due to leakage possible.

⇨ Do not damage sealing face.

Carefully separate intermediate plate from torque converter bell housing.

Fig. 55

21. Hold chain wheel tight during removal.

Remove intermediate plate with chain and chain wheel.

Fig. 56

22. Pull off O-ring from chain wheel.

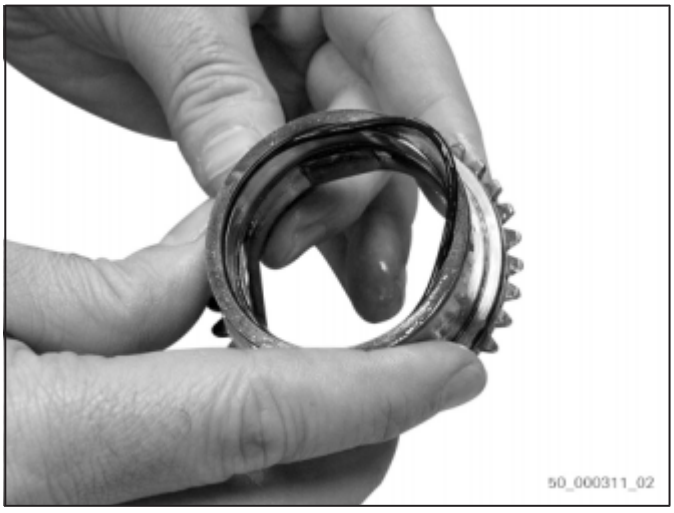


Fig. 57

23.

NOTICE

Damage due to leakage possible. Do not damage sealing face.

⇨ Carefully remove sealing element.

Carefully remove shaft sealing ring in torque converter impeller hub using a screwdriver.

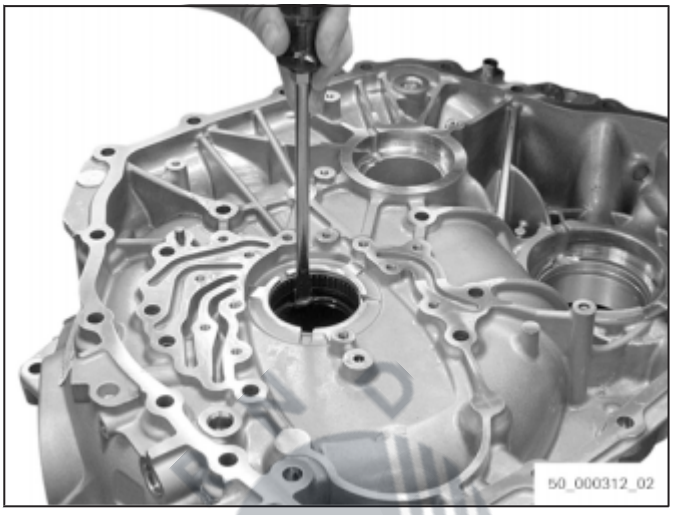


Fig. 58

24. Turn around torque converter bell housing.

25.

NOTICE

Damage due to leakage possible. Do not damage sealing face.

⇨ Carefully remove snap ring.

Remove snap ring of drawn cup needle roller bearing.

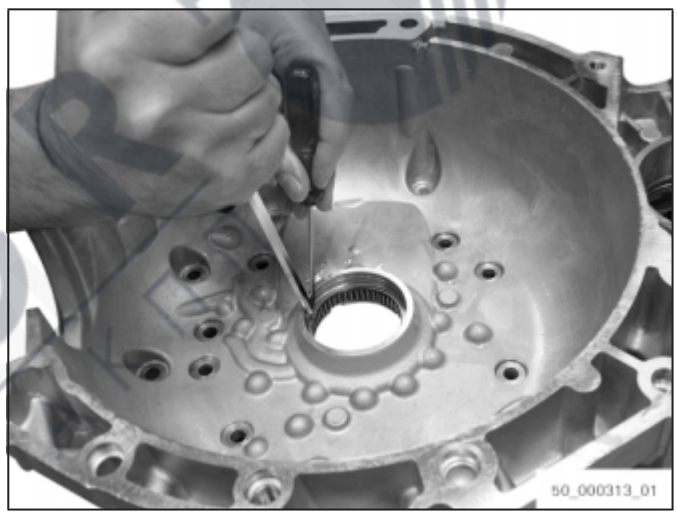


Fig. 59

26. Turn around torque converter bell housing.

27. Remove drawn cup needle roller bearing of torque converter impeller hub using AA01.267.287 [Disassembly device].

28. Remove AA01.233.211 [Bracket].

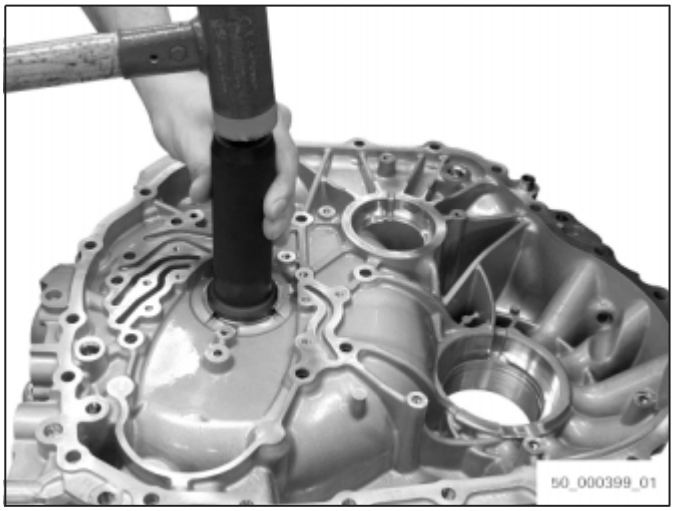


Fig. 60

9.6 Dismantling intermediate plate

Special tools:

- AA01.386.036 Workpiece support
- 5X54.909.346 Press-in device
- AA00.566.429 Disassembly device

1. Position intermediate plate on AA01.386.036 [Workpiece support].

2. Ensure plane positioning.

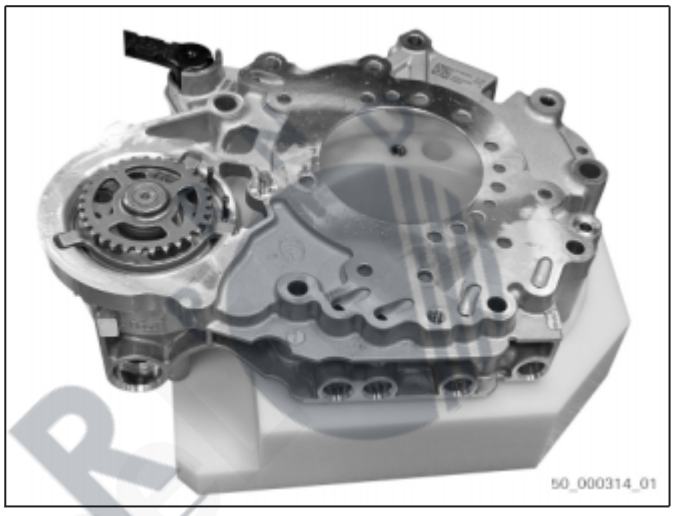


Fig. 61

3. Position intermediate plate with supporting plate in arbor press.

4. Put 5X54.909.346 [Press-in device] on pump.

5. **NOTICE**

   Positioning dog points at pump might break off.

   ⇨ Prestress pump with light pressure.

   Prestress downholder with light pressure to remove snap ring.

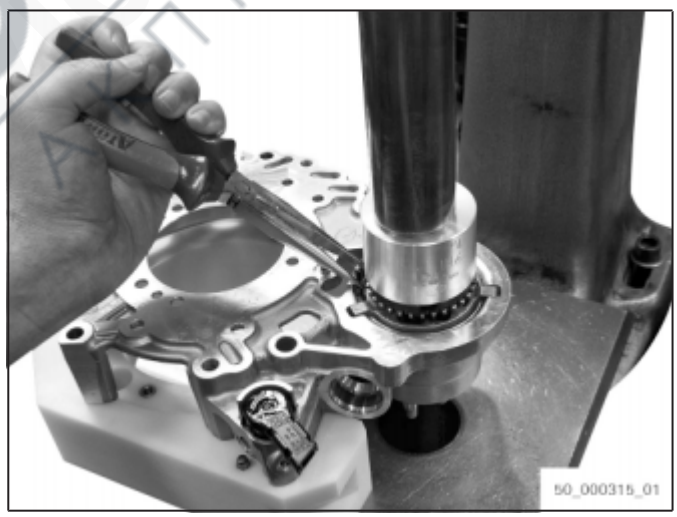


Fig. 62

6. Remove intermediate plate from arbor press.

7. Put AA00.566.429 [Disassembly device] on pump.

8. Remove pump using AA00.566.429 [Disassembly device].

Fig. 63

9. Remove valve.

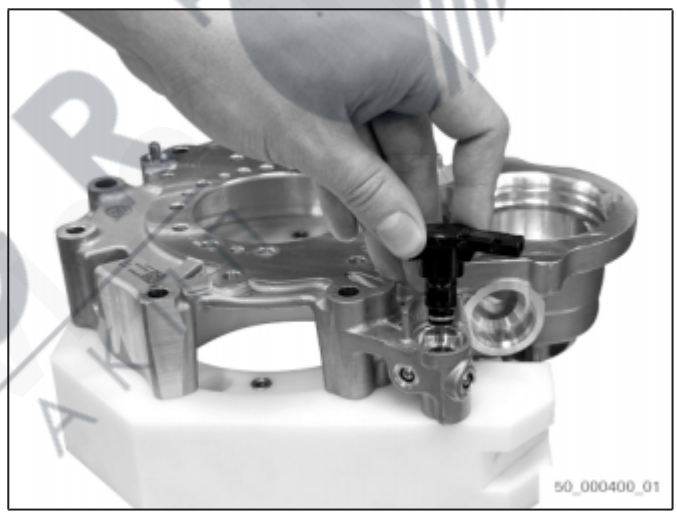


Fig. 64

9.7 Removing differential, intermediate shaft and tower

9.7.1 Removing differential

Special tools:

- 5X95.000.410 Extracting handle

1. Remove sealing sleeve from transmission housing using 5X95.000.410 [Extracting handle].

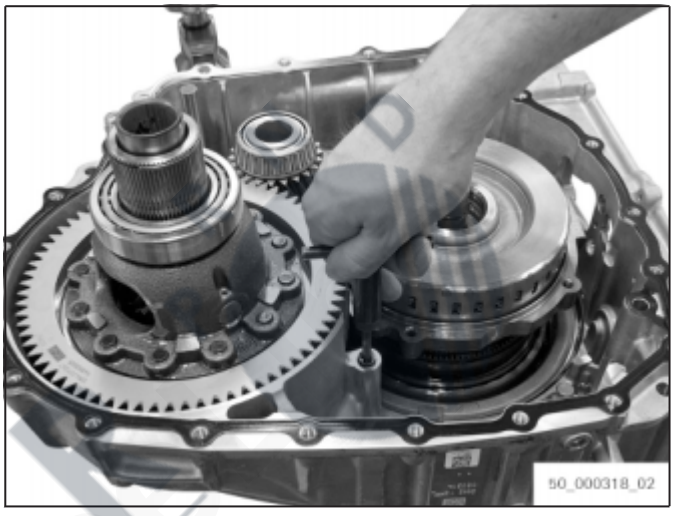


Fig. 65

2. Remove differential from transmission housing.

Fig. 66

9.7.2 Dismantling differential

Special tools:

- 5X46.000.165 Extracting device
- 1X56.122.306/AA01.263.260 Disassembly device
- 5X46.002.000 Disassembly tool
- AA01.266.268 Extracting device

1.

NOTICE

Damage due to leakage possible. Do not damage sealing face.

⇨ Carefully remove snap ring.

Pry out snap ring using screwdriver and remove.

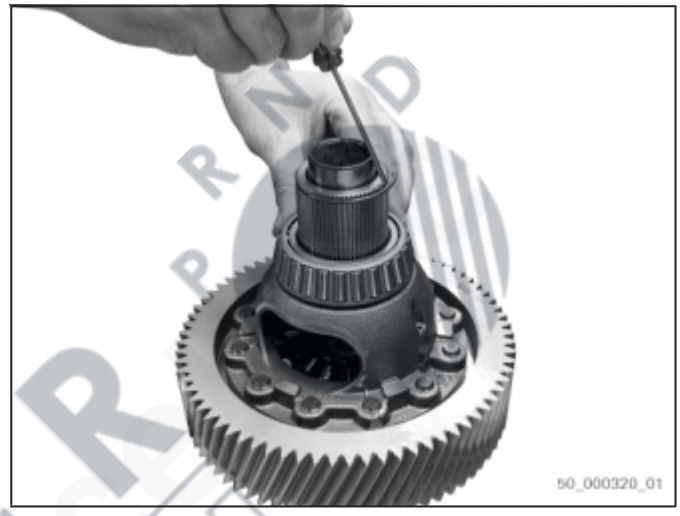


Fig. 67

2. Insert 5X46.000.165 [Extracting device] into differential.

3. Put 1X56.122.306/ AA01.263.260 [Disassembly device] on tapered roller bearing on hollow shaft end.

4. Remove tapered roller bearing using 1X56.122.306/AA01.263.260 [Disassembly device], open end wrenches WAF 41 and WAF 50.

Fig. 68

5. Turn around differential.

6. Remove O-ring from differential.

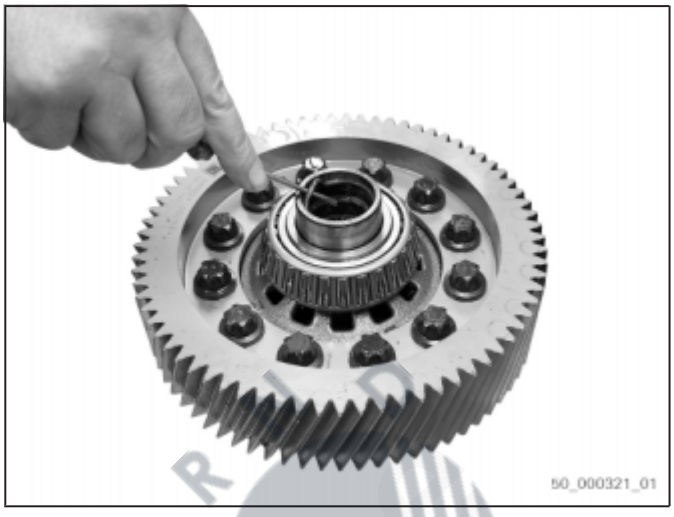


Fig. 69

7. Insert 5X46.002.000 [Disassembly tool] into differential.

8. Put 1X56.122.306/ AA01.263.260 [Disassembly device] on tapered roller bearing.

9. Remove tapered roller bearing using 1X56.122.306/AA01.263.260 [Disassembly device], open end wrenches WAF 41 and WAF 50.

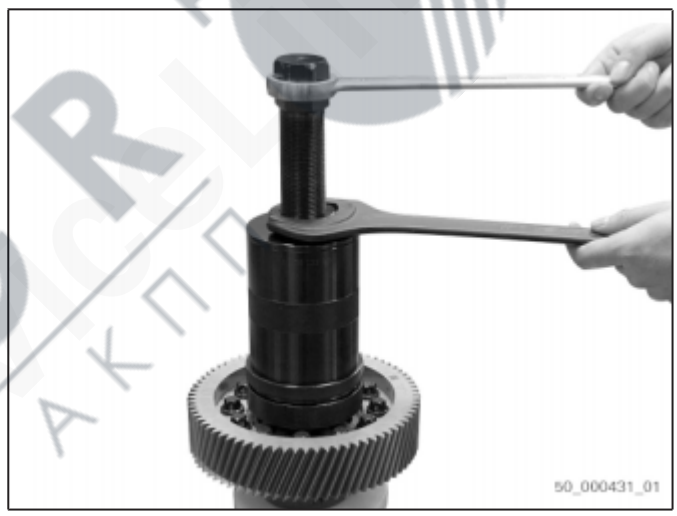


Fig. 70

10. Insert AA01.266.268 [Extracting device] into recess clearance.

11. Remove differential bearing cup using AA01.266.268 [Extracting device].

12. Do not mix up bearing cups.

Remove bearing cup using AA01.266.268 [Extracting device].

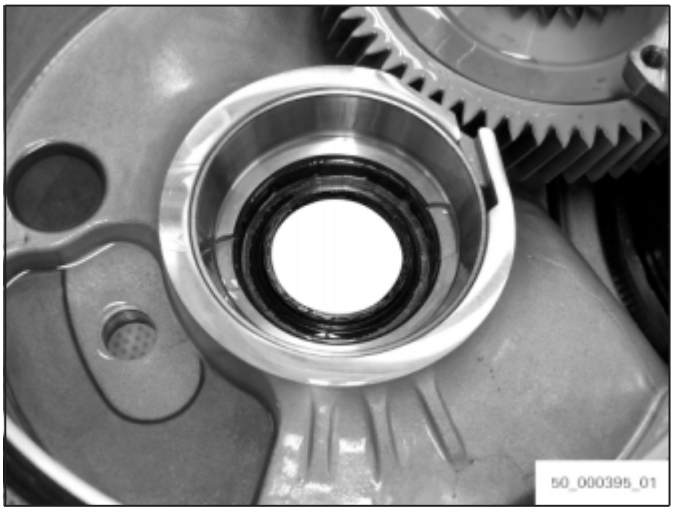


Fig. 71

13. Take out bearing cup and adjustment plate.

Fig. 72

14.

NOTICE

Damage due to leakage possible. Do not damage sealing face.

⇨ Carefully remove sealing element.

Remove differential shaft sealing ring using a screwdriver.

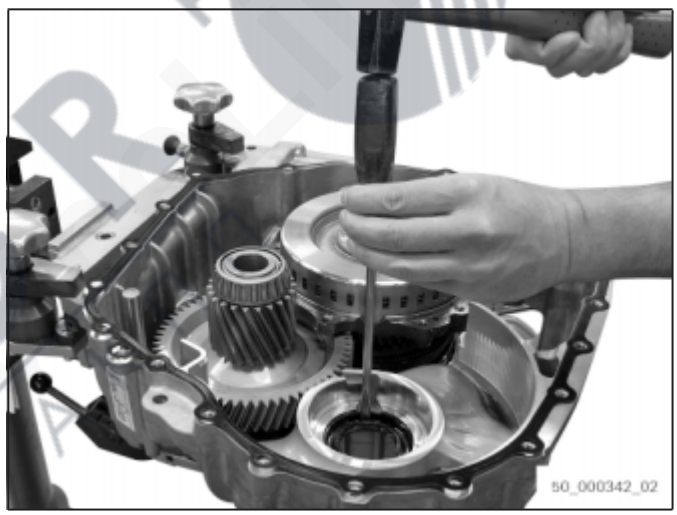


Fig. 73

9.7.3 Removing clutch E

Ensure to remove axial needle bearing. The axial needle bearing is installed in clutch E/spider shaft.

1. Take out clutch E from transmission housing.

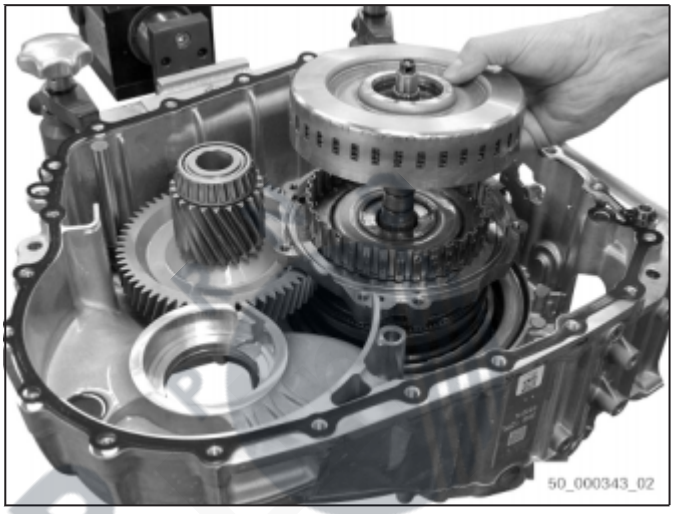


Fig. 74

2. Take out spider shaft.

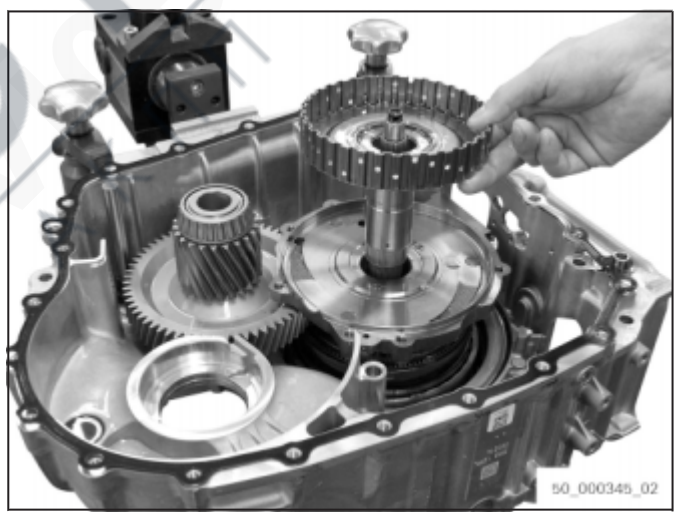


Fig. 75

3. Take out bearing support.

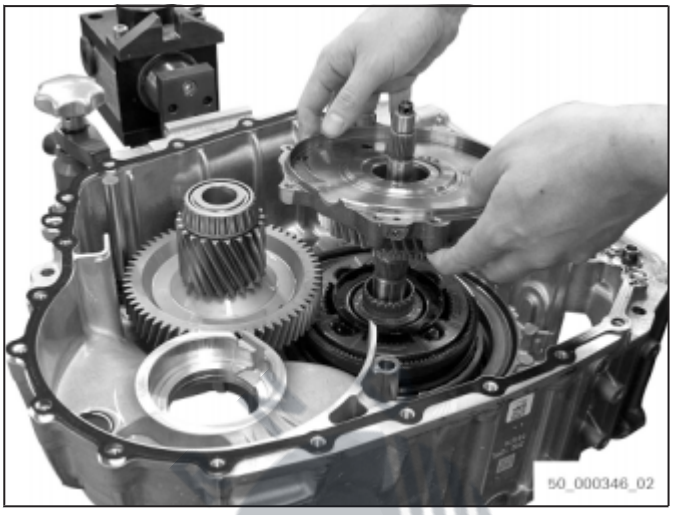


Fig. 76

4. Take out intermediate shaft.

Fig. 77

9.7.4 Removing planetary gearsets

1. Take out sun gear 3/4 with spline of dog F from planetary gearset 3/4.

2. Take out axial needle bearing from sun gear 3/4.

Fig. 78

3. Take out planet carrier 4 from ring gear 4.

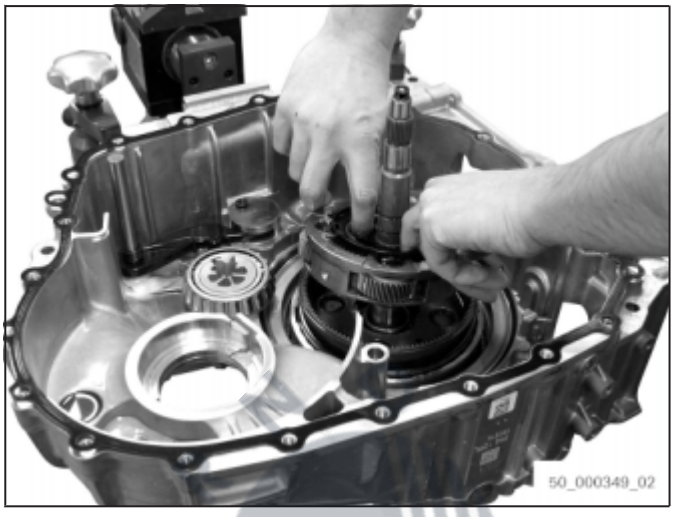


Fig. 79

4.

NOTICE

Locking dog point and oil feed dog point at the oil drip pan might break off.

⇨ To pry out, place screwdriver at several spots.

Pry out oil drip pan from planet carrier 4 using a screwdriver.

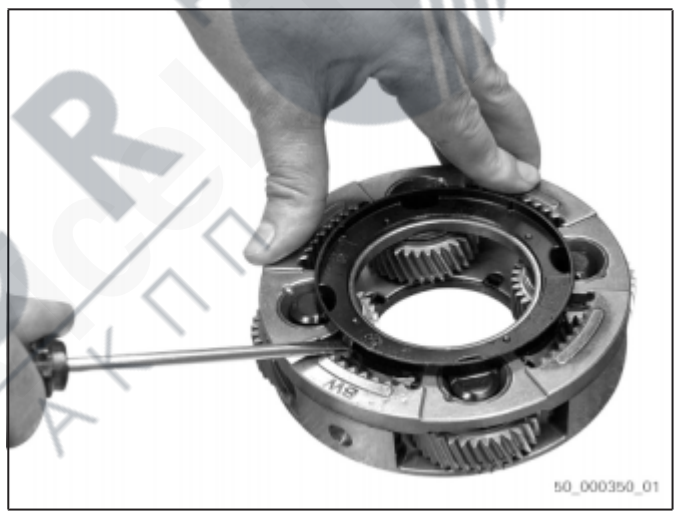


Fig. 80

5. Turn around planet carrier 4.

6. Pry out axial plain bearing from planet carrier 4 using a screwdriver.

Fig. 81

7. Take out planet carrier 3 with ring gear 4 from ring gear 3.

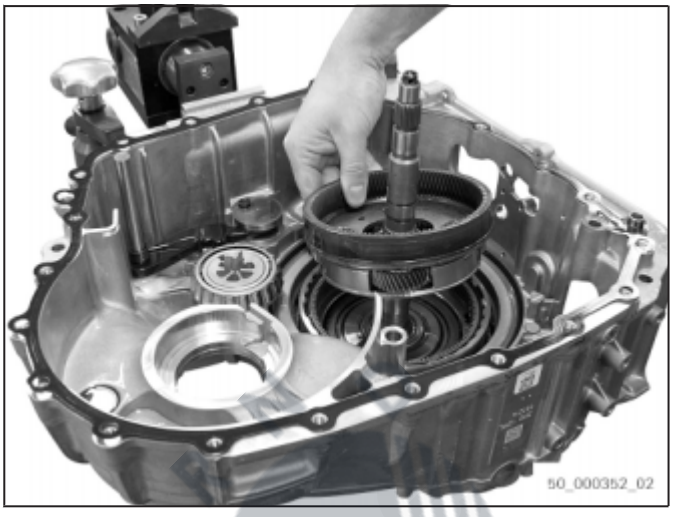


Fig. 82

8. Take out axial needle bearing from ring gear carrier/planetary gearset 1.

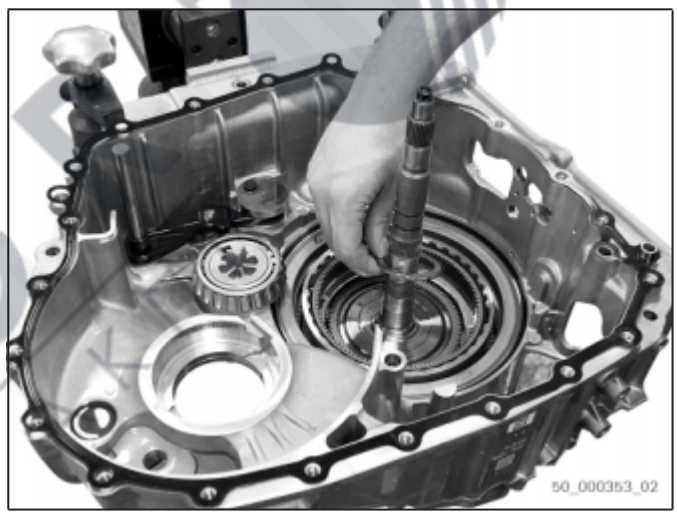


Fig. 83

9. Take out planet carrier 1/2 including ring gear 1/sun gear 2 from ring gear 2.

Fig. 84

9.7.5 Removing parking lock

1. Hook out spiral spring using a screwdriver.
2. Take out spiral spring, bolt and ratchet.

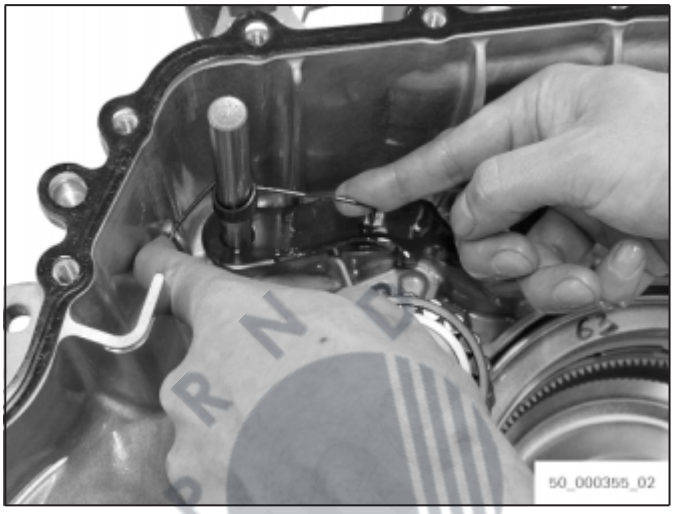


Fig. 85

3. Unscrew TX 30 torx screw from guide bush.
4. Take out guide bush.

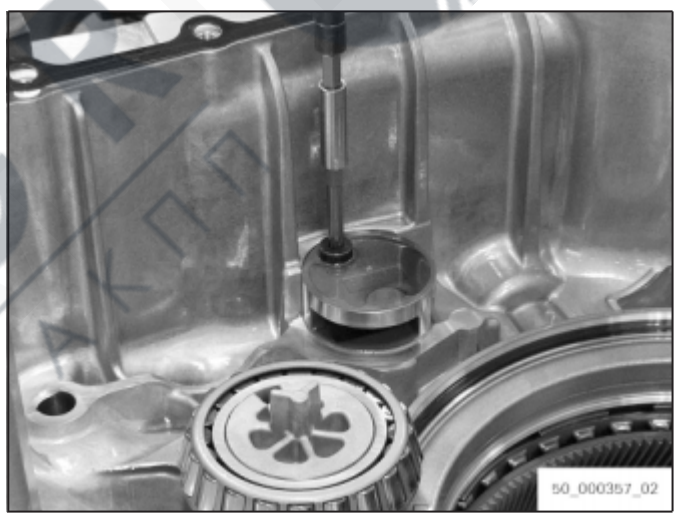


Fig. 86

9.7.6 Removing clutch D

Special tools:

- AA00.861.844 Downholder
- AA00.861.830 Counter support
- AA01.357.687 Center punch
- AA01.357.658 Disassembly device
- AA01.006.327 Disassembly device
- 1X56.122.306/AA01.263.260 Disassembly device
- 5X46.002.219 Press-in mandrel

⚠ CAUTION

Risk of injury due to sharp edges.
Slight to moderate injury possible.
⇨ Attach safety device.

1. Put AA00.861.844 [Downholder] on piston D.
2. Position AA00.861.830 [Counter support] on downholder.
3. Fix locating pins of counter support in bores of assembly bracket and transmission housing.
4. Turn spindle to prestress disk spring D.

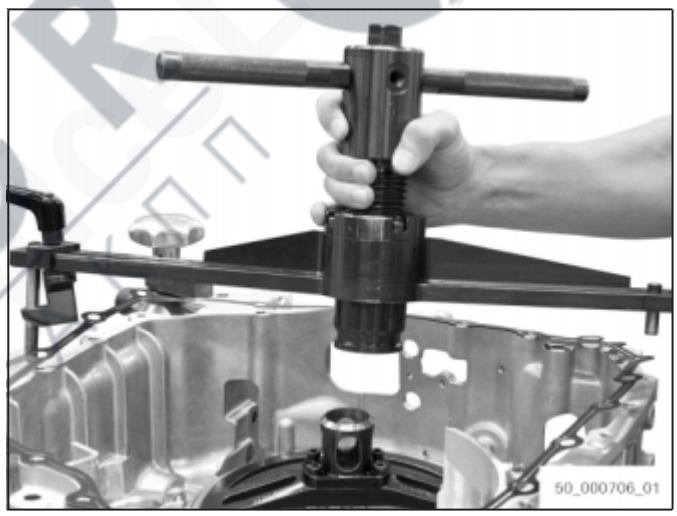


Fig. 87

5. ***NOTICE***

   Damage due to leakage possible. Do not damage sealing face.
   ⇨ Carefully remove snap ring.

   Punch mark snap ring of piston D using AA01.357.687 [Center punch].

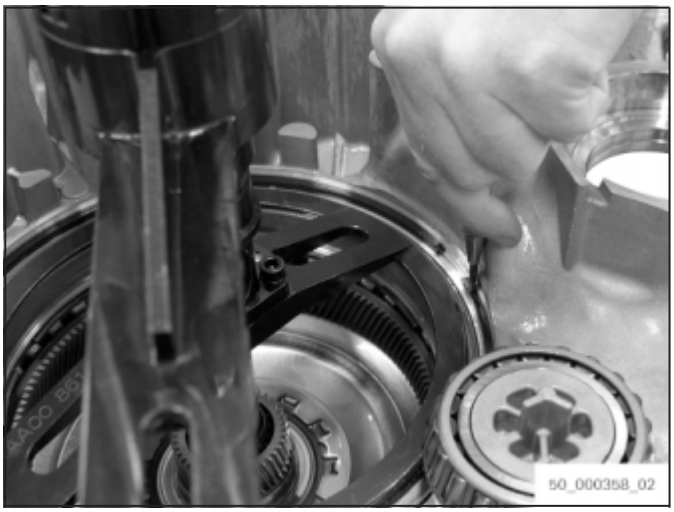


Fig. 88

6. Remove snap ring using AA01.357.658 [Disassembly device] and a screwdriver.

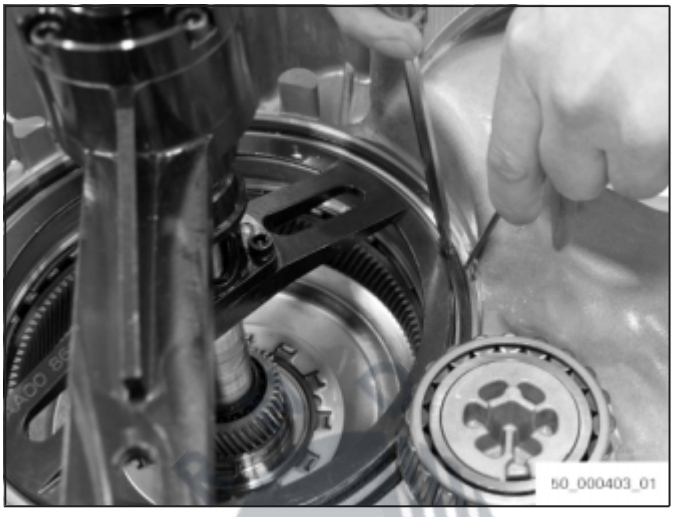


Fig. 89

7. Take out snap ring.

8. Remove AA00.861.830 [Counter support] and AA00.861.844 [Downholder] from transmission housing.

Fig. 90

9. Put AA01.006.327 [Disassembly device] on tapered roller bearing of intermediate shaft.

10. **NOTICE**

Component might get jammed during removal.

⇨ Apply tool at several spots to avoid jamming.

Remove piston D and cylinder D using AA01.006.327 [Disassembly device].

Fig. 91

11. Take out cylinder, piston and disk spring D from transmission housing.

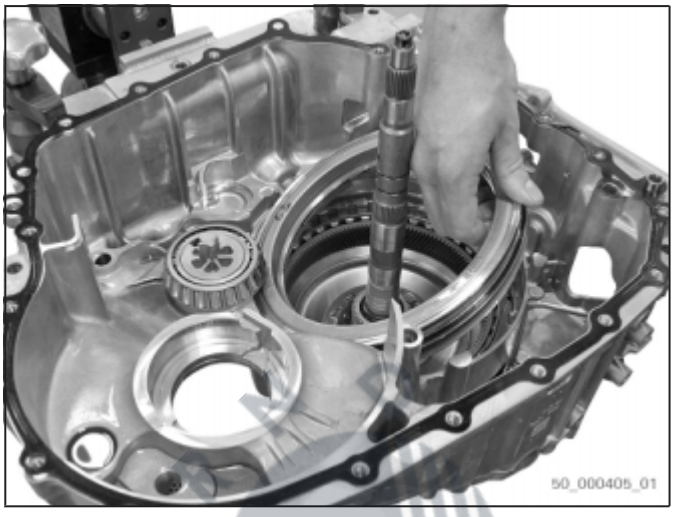


Fig. 92

12. Take out disk spring from piston D.

13. Pull off two lipped seal rings from piston D.

14. Pull off O-ring from cylinder.

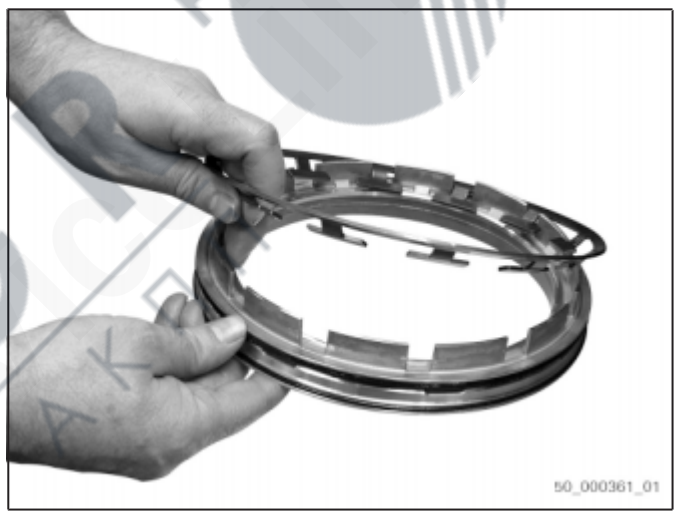


Fig. 93

15. Put 1X56.122.306/ AA01.263.260 [Disassembly device] and 5X46.002.219 [Press-in mandrel] on tapered roller bearing of intermediate shaft.

16. Remove tapered roller bearing with 1X56.122.306/AA01.263.260 [Disassembly device] and 5X46.002.219 [Press-in mandrel].

17. Take out tapered roller bearing from 1X56.122.306/AA01.263.260 [Disassembly device].

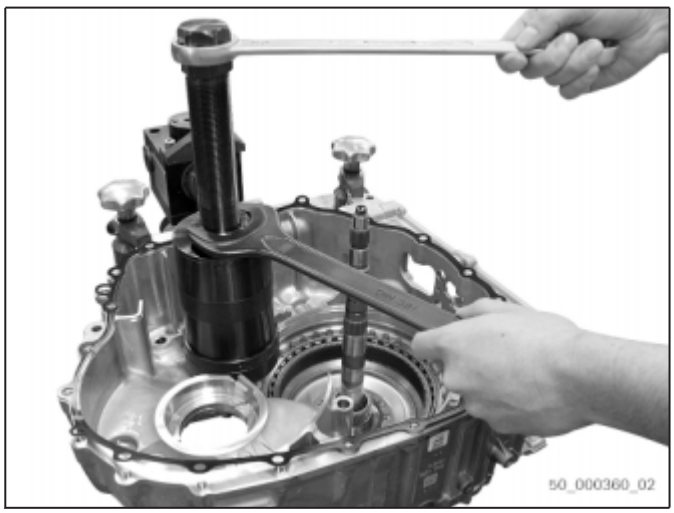


Fig. 94

18. Take out adjustment plate.

Fig. 95

19. Axial needle bearing might get caught in clutch B or on oil feed bush.

Remove input shaft with multidisk carrier D/C and clutch B from transmission housing.

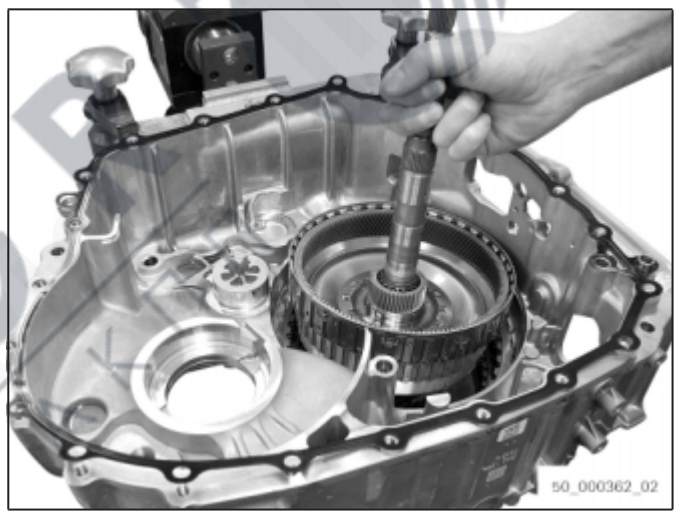


Fig. 96

20. Take out multidisk package of clutch D from transmission housing.

Fig. 97

21. Take out adjustment plate for transmission axial clearance from transmission housing.

Fig. 98

9.7.7 Removing clutch C

Special tools:

- AA00.861.841 Downholder
- AA00.861.830 Counter support

1. Pry out snap ring of multidisk package C using a screwdriver.

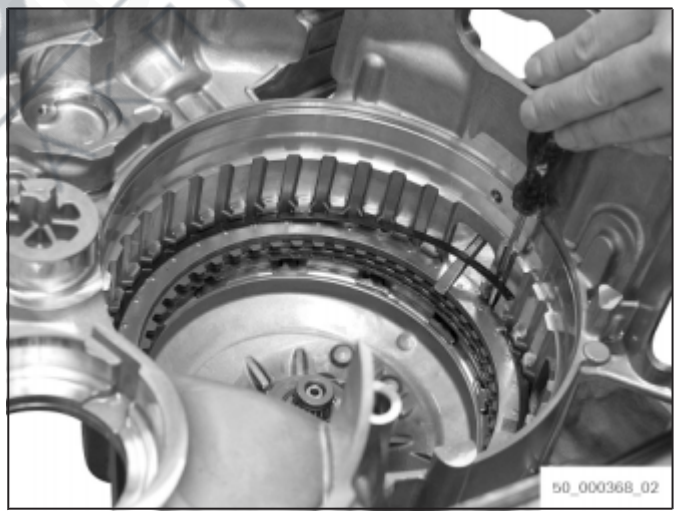


Fig. 99

2. Take out multidisk package C from transmission housing.

Fig. 100

3.

NOTICE

Damage due to damaged sealing face possible.

⇨ Do not damage sealing face in transmission housing, seat of cylinder D, to avoid leaks.

Put AA00.861.841 [Downholder] on disk spring C.

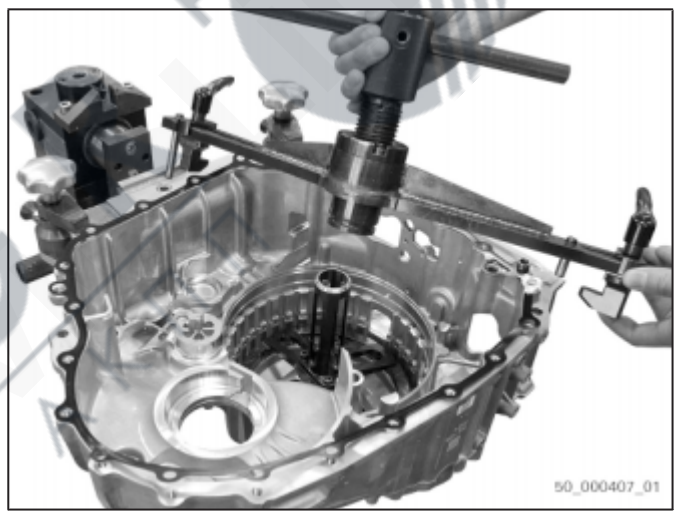


Fig. 101

4. Position AA00.861.830 [Counter support] on downholder.

5. Fix locating pins of counter support in bores of assembly bracket and transmission housing.

6. Turn spindle to prestress disk spring C.

7. Remove snap ring using a screwdriver.

8. Remove AA00.861.830 [Counter support] and AA00.861.841 [Downholder] from transmission housing.

Fig. 102

9. Take out disk spring C from transmission housing.

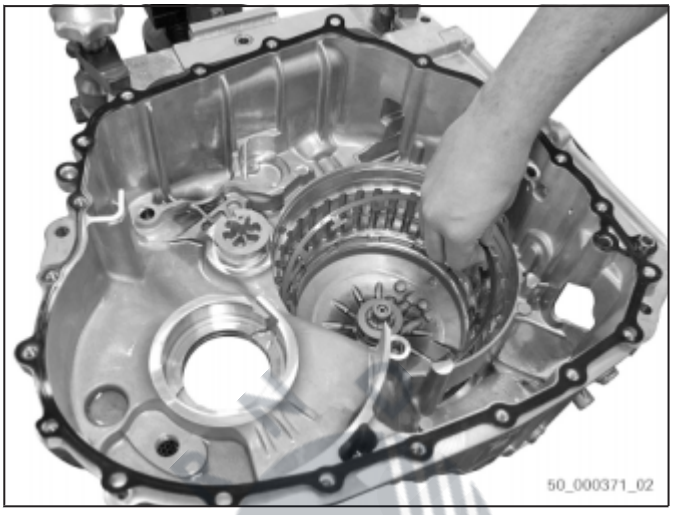


Fig. 103

10. Loosen piston C using pointed pliers and take it out.

11. Remove inner lipped seal ring and outer lipped seal ring from piston C.

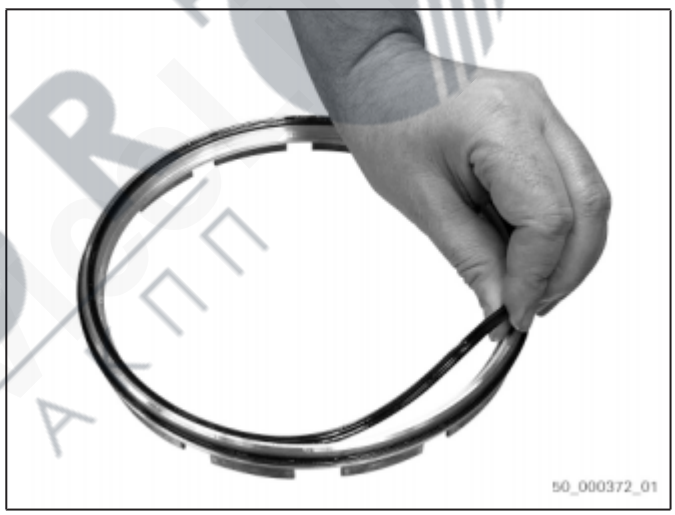


Fig. 104

9.8 Removing oil feed bush

Special tools:

- AA01.349.312 Extracting device

1. Put AA01.349.312 [Extracting device] around oil feed bush.

Fig. 105

2. Put sleeve over spindle and tool tray.

3. Pull off oil feed bush using wrenches WAF 16 and WAF 30.

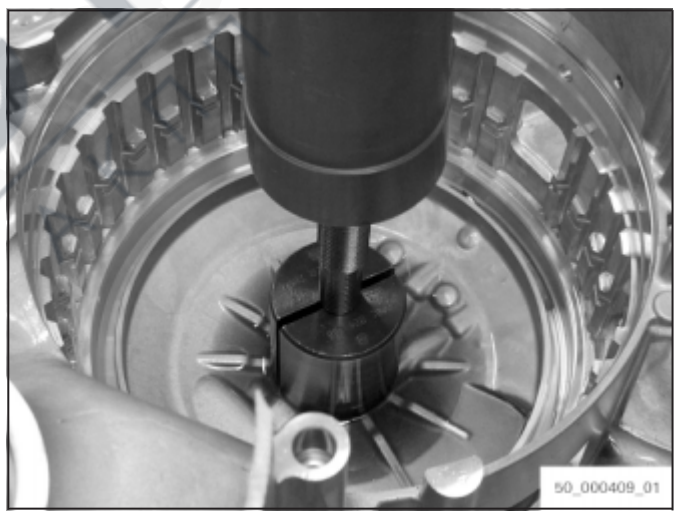


Fig. 106

9.9 Dismantling oil feed bush

1. Remove opened needle ring (needle roller and cage assemblies) from oil feed bush.

Fig. 107

2. Remove two large rectangular rings and one small rectangular ring from oil feed bush.

Fig. 108

3. **NOTICE**

Damage due to leakage possible. Do not damage sealing face.

⇨ Carefully remove sealing element.

Carefully remove O-ring from oil feed bush.

Fig. 109

9.10 Dismantling ring gear 2, sun gear 1 and multidisk carrier B/C/D

Special tools:

- AA01.211.988 Supporting fixture

1. Take out ring gear 2, sun gear 1 and multidisk carrier B/C/D from input shaft.

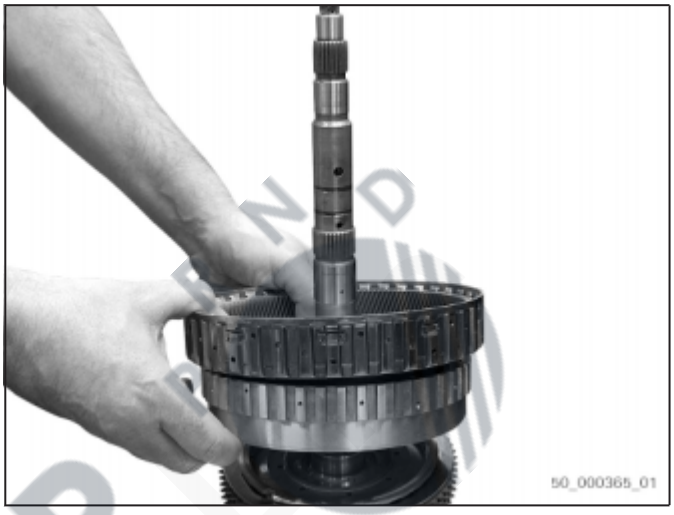


Fig. 110

2. Turn around ring gear 2, sun gear 1 and multidisk carrier B/C/D and put into AA01.211.988 [Supporting fixture].

Fig. 111

3. Take out axial needle bearing from multidisk carrier B/C.

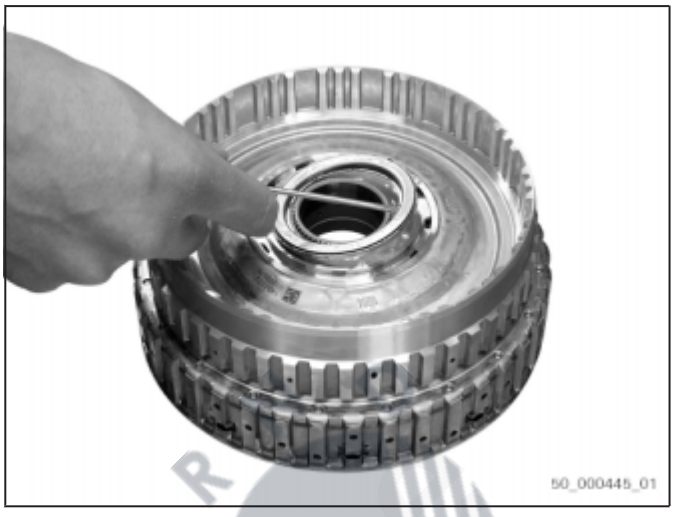


Fig. 112

4. Remove snap ring from sun gear 1.

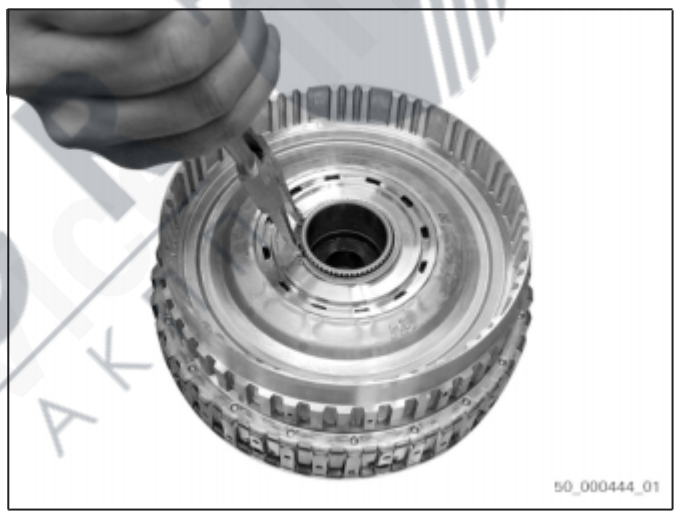


Fig. 113

5. Take out multidisk carrier B/C from spline of sun gear 1.

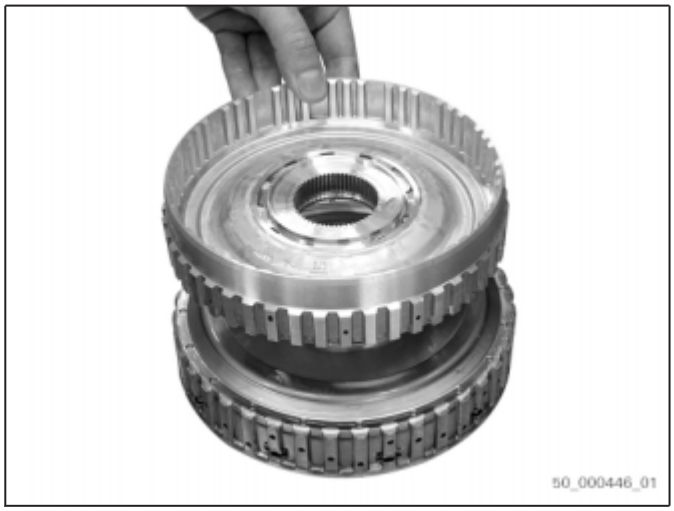


Fig. 114

6. Turn around multidisk carrier B/C.

7. Remove axial needle bearing.

8. Take off sun gear 1 and multidisk carrier D from AA01.211.988 [Supporting fixture].

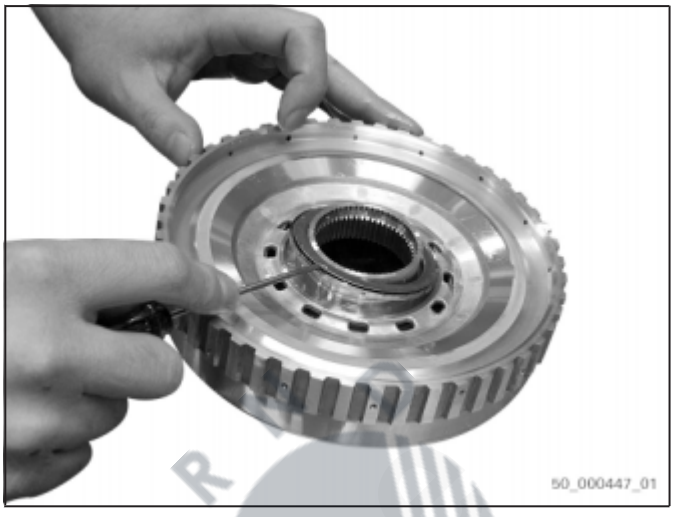


Fig. 115

9.11 Dismantling input shaft

Special tools:

- AA01.211.988 Supporting fixture

1. Axial needle bearing might get caught in clutch B or on oil feed bush.

   Put input shaft into AA01.211.988 [Supporting fixture].

2. Remove axial needle bearing from multidisk carrier B.

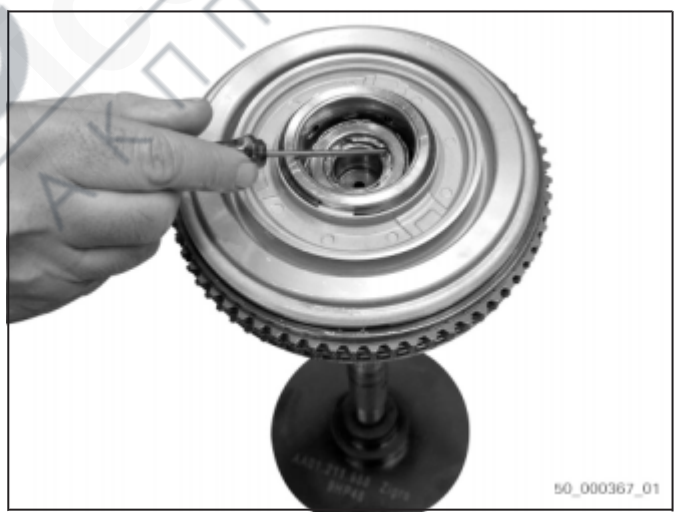


Fig. 116

3. Remove snap ring of clutch B using pliers.

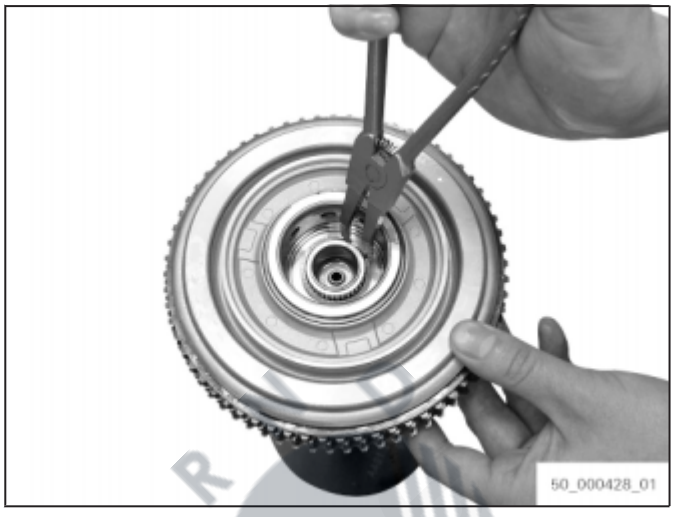


Fig. 117

4. Remove clutch B from input shaft.

Fig. 118

5. Pull off two rectangular rings from input shaft.

Fig. 119

9.12 Dismantling clutch B

Special tools:

- 5X46.030.167 Assembly aid

1. Set clutch B into arbor press.

2. Put 5X46.030.167 [Assembly aid] on clutch B and prestress disk spring.

3. Remove snap ring using snap ring pliers.

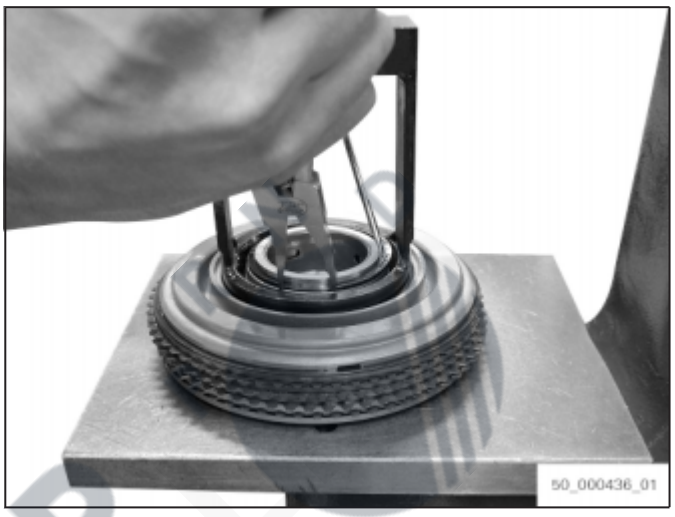


Fig. 120

4. Take off supporting ring and piston B from multidisk carrier B.

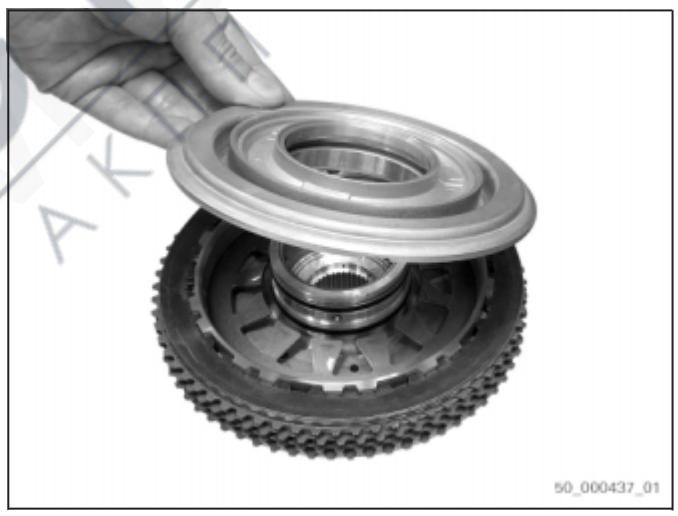


Fig. 121

5. Pull off outer profile sealing ring from supporting ring.

Fig. 122

6. Pull off O-ring from piston B.

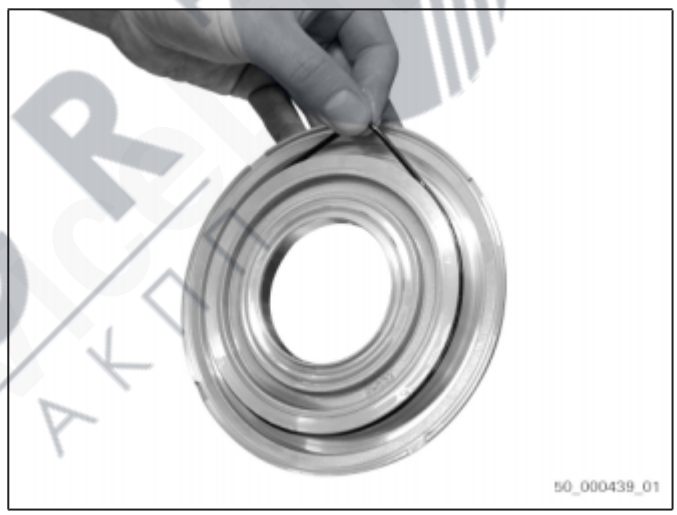


Fig. 123

7. Take out multidisk package from multidisk carrier B.

Fig. 124

8. Take out disk spring from multidisk carrier B.

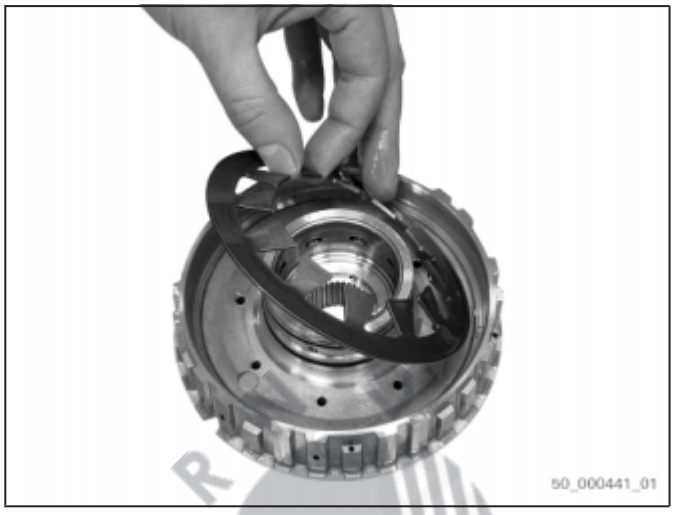


Fig. 125

9. Pull off two O-rings from multidisk carrier B.

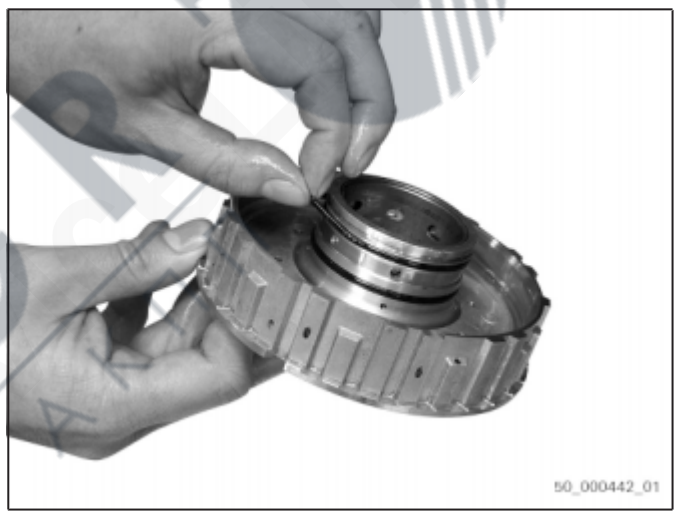


Fig. 126

9.13 Dismantling planetary gearset 1/2

1. Take out sun gear 2/ring gear 1 from planet carrier 1/2.

Fig. 127

2. Remove snap ring from sun gear 2/ring gear 1 and ring gear carrier.

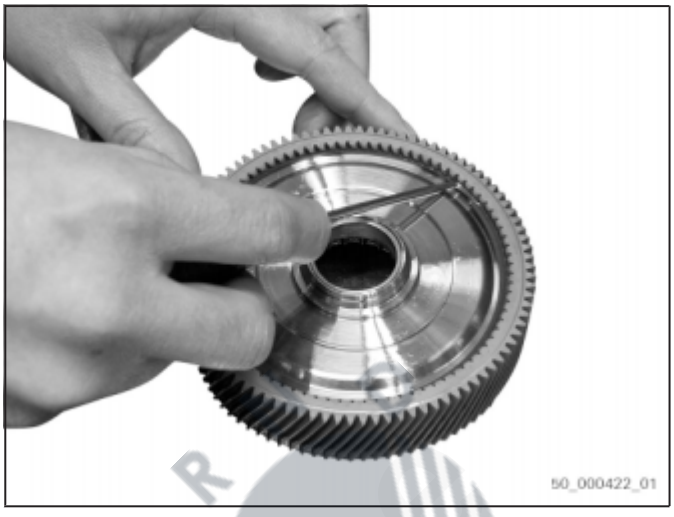


Fig. 128

3. Remove axial needle bearing from ring gear carrier using a screwdriver.

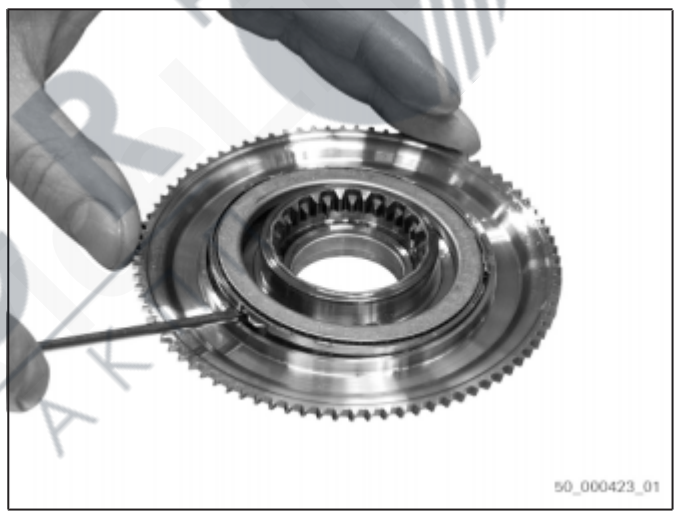


Fig. 129

4. Remove snap ring from planet carrier 1/2.

Fig. 130

5. Take out ring gear 3.

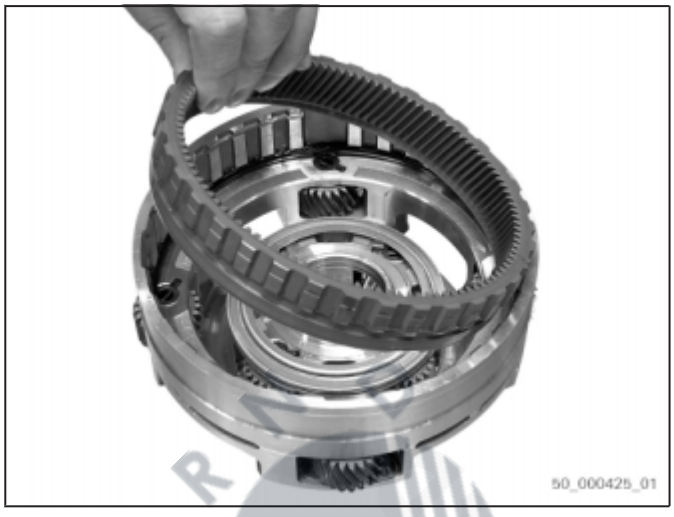


Fig. 131

6. Remove O-ring from planet carrier 1/2.

7. Turn around planet carrier 1/2.

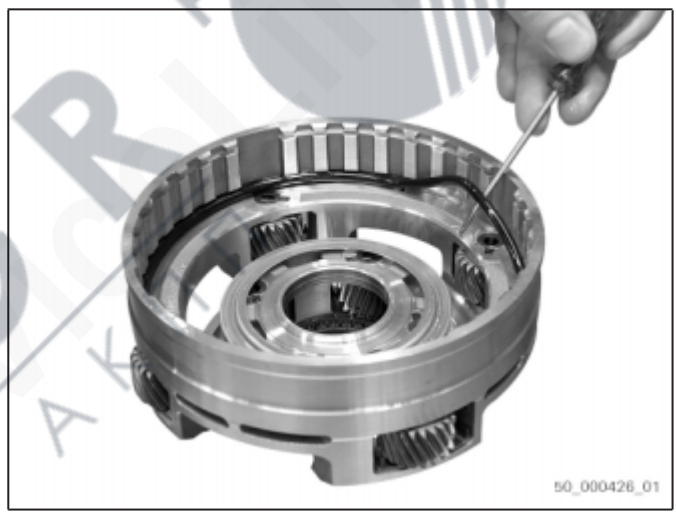


Fig. 132

8. Remove combination bearing of planet carrier 1/2 using a screwdriver.

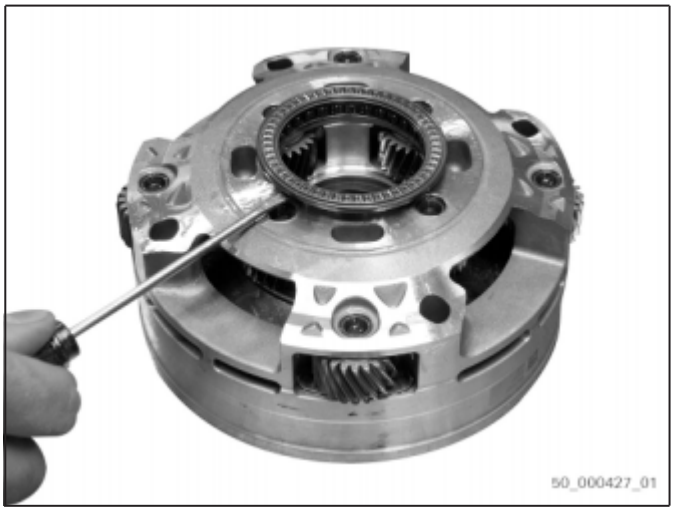


Fig. 133

9.14 Disassembling bearing support

Special tools:

- 5X46.909.841 Holder
- 5X46.004.158 Disassembly device
- AA01.215.336 Socket wrench
- AA01.217.411 Disassembly device
- 5X46.004.173 Centering ring
- AA01.357.282 Disassembly device
- AA01.202.461 Extracting device
- AA01.215.202 Extracting device

1. Insert bearing support with dowel pin into 5X46.909.841 [Holder] and screw down with four screws.

2. Clamp bearing support into vise using 5X46.909.841 [Holder].

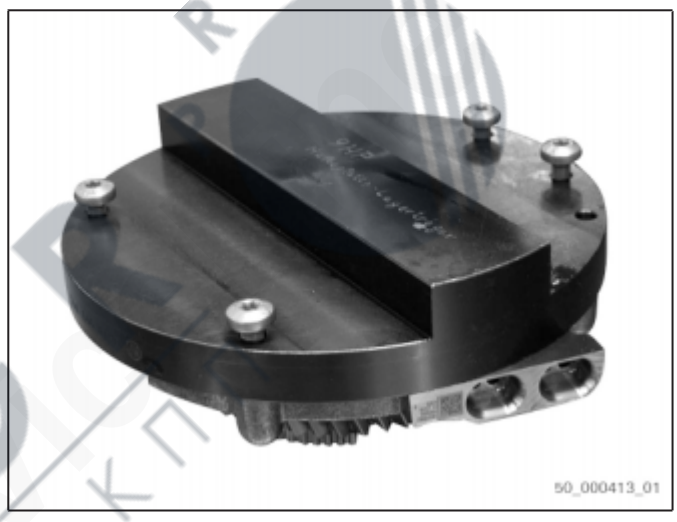


Fig. 134

3. Loosen staking of groove nut's safety plate using 5X46.004.158 [Disassembly device].

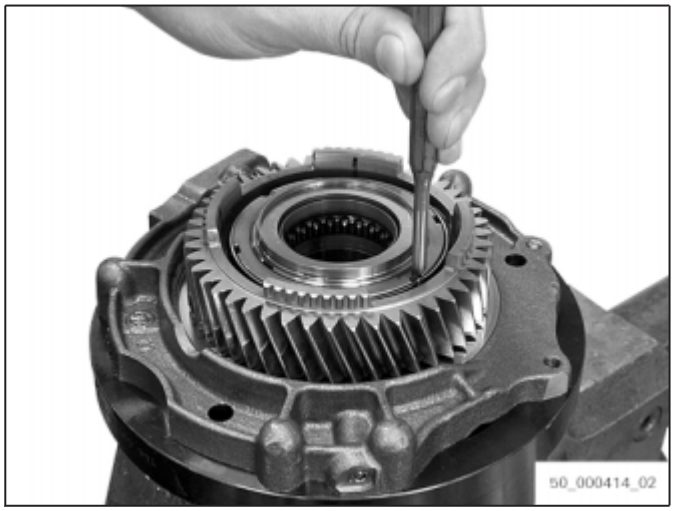


Fig. 135

4. Loosen groove nut using AA01.215.336 [Socket wrench] and remove.

Fig. 136

5. Take out safety plate.

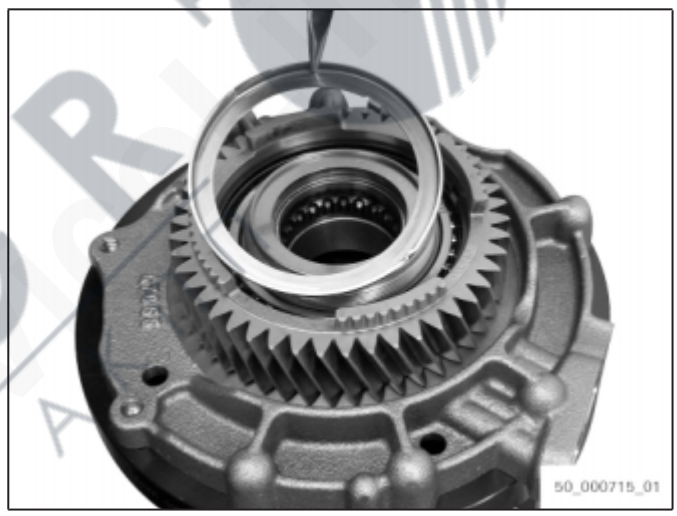


Fig. 137

6. Put thrust piece of AA01.217.411 [Disassembly device] on washer.

7. Put AA01.217.411 [Disassembly device] on input gear.

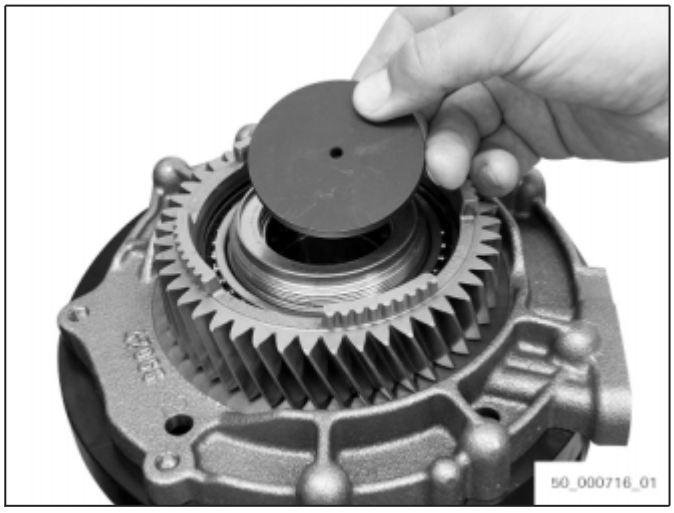


Fig. 138

8. Pull off input gear from bearing support.

9. Take off AA01.217.411 [Disassembly device] from input gear.

Fig. 139

10. Put 5X46.004.173 [Centering ring] below input gear.

11. Remove snap ring.

12. Remove angular ball bearing of input gear using AA01.357.282 [Disassembly device] and arbor press.

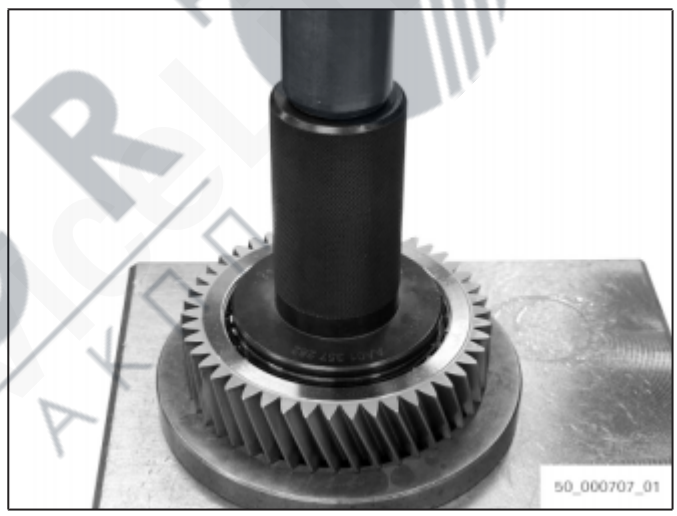


Fig. 140

13. Remove snap ring of dog F from bearing support using a screwdriver.

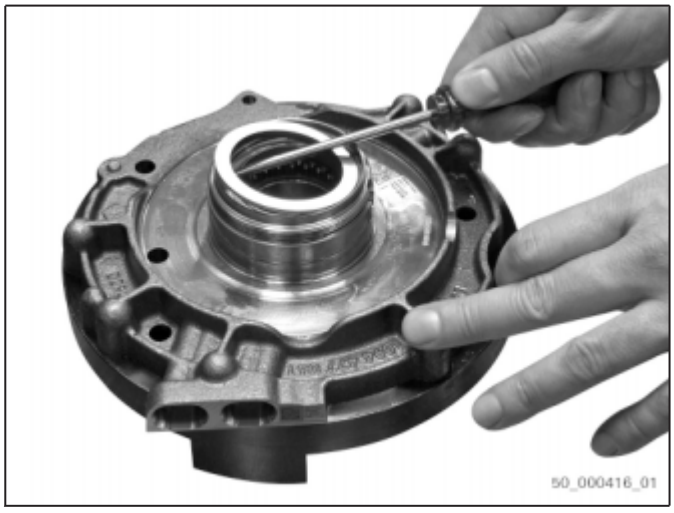


Fig. 141

14. Remove securing ring of dog F from bearing support.

Fig. 142

15. Put AA01.202.461 [Extracting device] and AA01.215.202 [Extracting device] into gearing of dog F.

16. Pull off dog F using AA01.215.202 [Extracting device].

17. Loosen four screws from 5X46.909.841 [Holder].

18. Remove 5X46.909.841 [Holder] from bearing support.

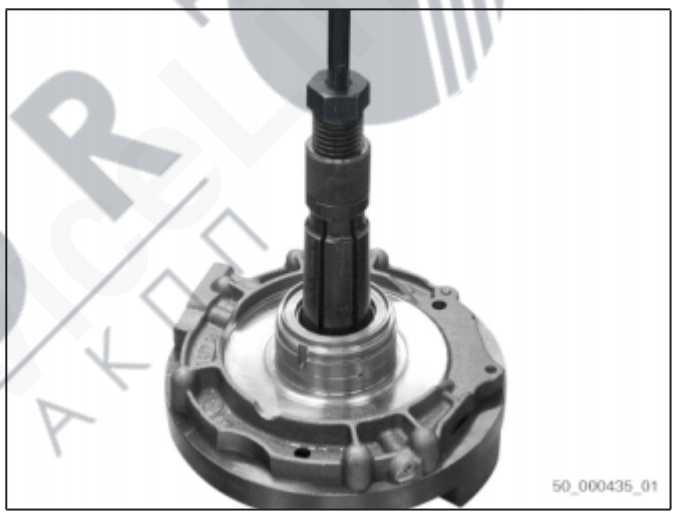


Fig. 143

19. Remove bearing ring from dog F.

20. Pull off blue O-ring from bearing ring.

Fig. 144

21. Pull off black inner O-ring and blue outer O-ring from dog F.

Fig. 145

22. Pull off black inner O-ring from bearing support.

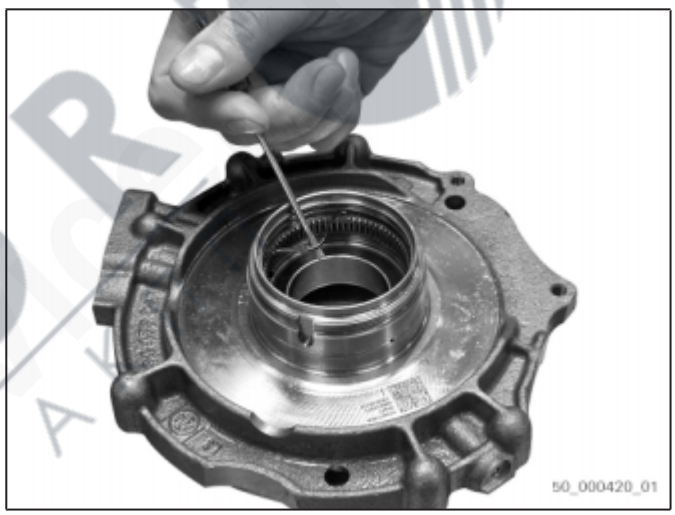


Fig. 146

9.15 Disassembling intermediate shaft

Special tools:

- 5X46.000.165 Extracting device
- 5X46.300.849 Disassembly device
- 5X46.010.011 Disassembly device
- AA00.611.954 Safety device
- AA01.222.595/AA01.222.627 Extracting device

1. Put 5X46.000.165 [Extracting device] on small tapered roller bearing of intermediate shaft.
2. Put 5X46.300.849 [Disassembly device] and 5X46.010.011 [Disassembly device] on tapered roller bearing.
3. Remove tapered roller bearing.
4. Take off 5X46.300.849 [Disassembly device] and 5X46.010.011 [Disassembly device].

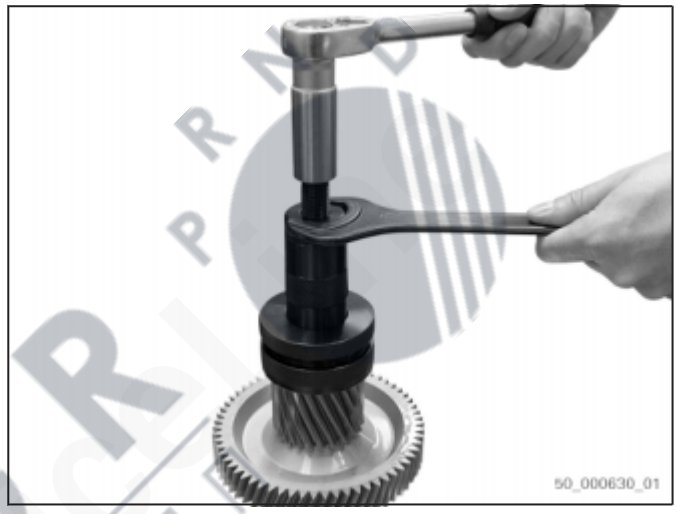


Fig. 147

5. Turn around intermediate shaft.
6. Put AA00.611.954 [Safety device] on intermediate shaft.
7. Set AA01.222.595/AA01.222.627 [Extracting device] on intermediate shaft.
8. Pull off bearing cup using AA01.222.595/ AA01.222.627 [Extracting device].

Fig. 148

9.16 Dismantling clutch E

Special tools:

- 5X46.001.502 Assembly fixture

Ensure to remove axial needle bearing. The axial needle bearing is installed in clutch E/spider shaft.

1. Turn around clutch E.

2. Remove axial needle bearing using a screwdriver.

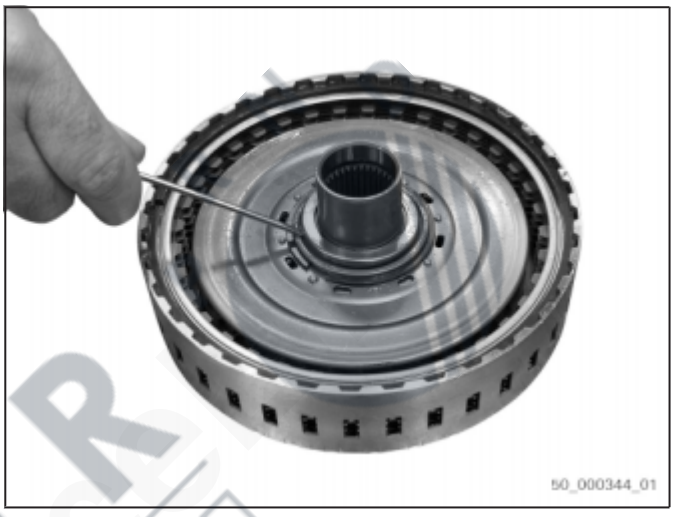


Fig. 149

3. Remove snap ring using a screwdriver.

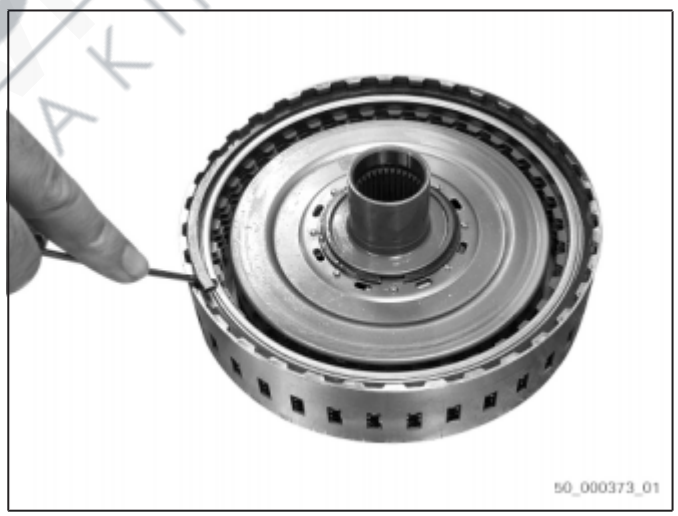


Fig. 150

4. Take out multidisk package E from cylinder E.

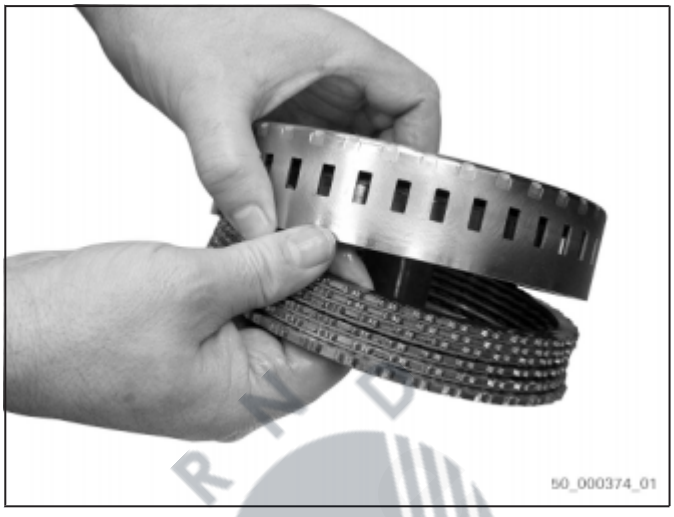


Fig. 151

5. Insert clutch E into arbor press.

6. Put 5X46.001.502 [Assembly fixture] on clutch E.

7. Prestress baffle plate.

8. Remove snap ring using snap ring pliers.

Fig. 152

9. Remove baffle plate of clutch E using a screwdriver.

Fig. 153

10. Remove disk spring of clutch E.

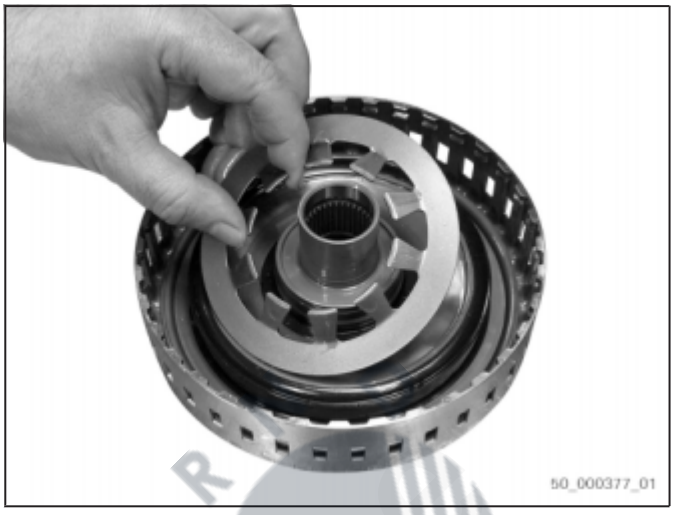


Fig. 154

11. Sealing element cannot be replaced. In case of damage, replace complete component.

Pry out piston E by applying a screwdriver at several spots.

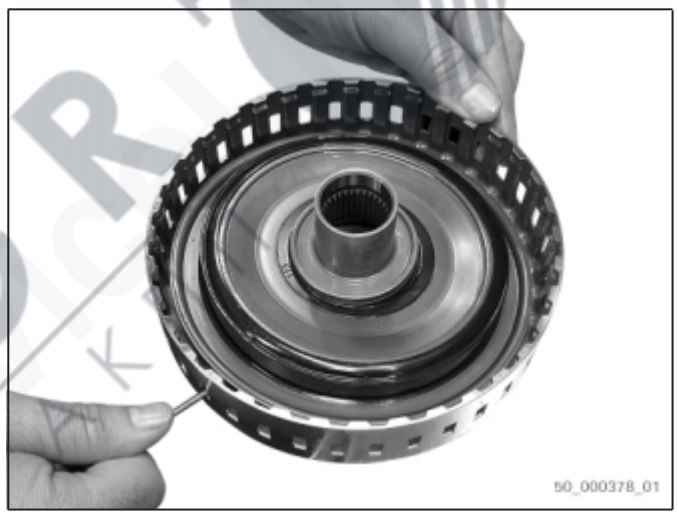


Fig. 155

9.17 Removing seal

1. Do not dispose of used seal.

Used seal is required during assembly to protect transmission housing.

Remove seal from transmission housing.

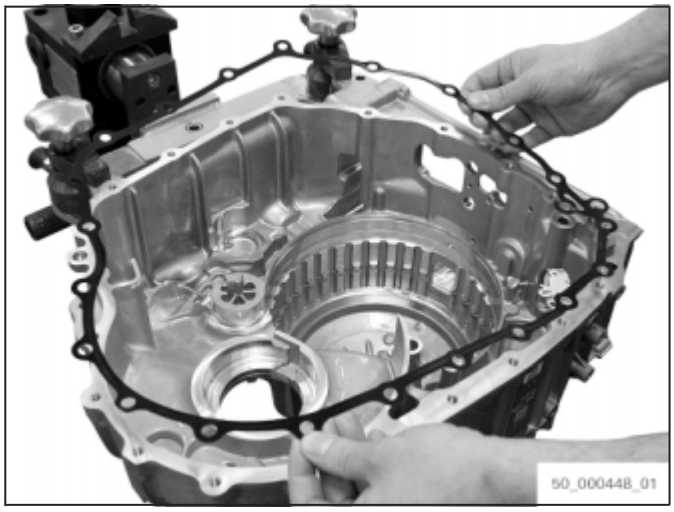


Fig. 156

2. Bushes might be stuck in transmission housing or torque converter bell housing.

NOTICE

Damage due to leakage possible.

⇨ Do not damage sealing face.

Remove two bushes from transmission housing or torque converter bell housing using pliers.

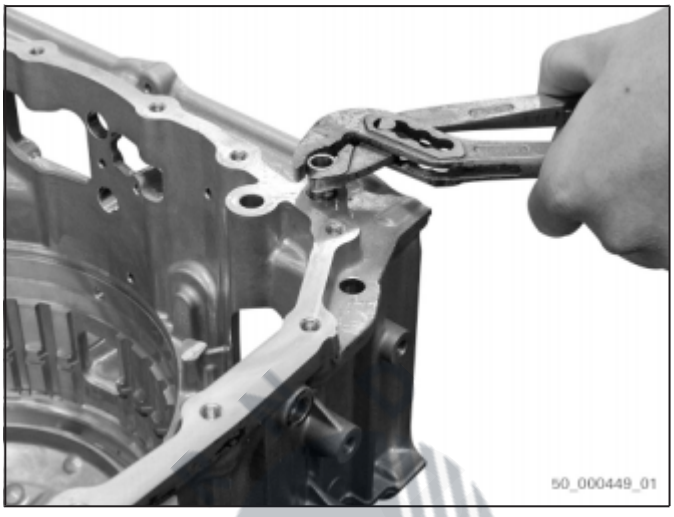


Fig. 157

10 Testing, Measuring, Adjusting

10.1 Setting axial clearance of chain wheel

Special tools:

- AA01.180.034 Test device

NOTICE

The chain wheel's axial clearance must be checked and set, if required.

⇨ Observe valid setting specification. The setting specifications are available for download from the ZF-ServiceLine.

Determine dimension h[1)]

1. Reset AA01.180.034 [Test device] on base plate.

Fig. 158

2. Put AA01.180.034 [Test device] on chain wheel.
3. Put measuring stylus on intermediate plate.
4. Repeat measurement at three spots.
5. Calculate average of the three measured values.
   h = 3,75 mm
6. The average must be within the tolerance range.

   Compare average to tolerance range.
   Tolerance range: 3.60 mm to 3.80 mm

Fig. 159

1) Height of intermediate plate - chain wheel

Determine dimension Z[2)]

7. Put AA01.180.034 [Test device] on stator shaft.

8. Put measuring stylus on stator shaft.

9. Repeat measurement at three spots.

10. Calculate average of the three measured values:
Z = 1,95 mm

11. The average must be within the tolerance range.

Compare average to tolerance range.
Tolerance range: 1.90 mm to 2.00 mm

Fig. 160

Formulas for calculation

12. h = X[3)] + Y[4)] – W[5)]
Available space = h – Z
Exemplary calculation:
Available space = 3,75 mm – 1,95 mm
Available space = 1,80 mm

13. Check value = available space - washer thickness
Exemplary calculation:
ACTUAL washer thickness = 1,60 mm
Check value = 1,80 mm – 1,60 mm
Check value = 0,20 mm

14. Tolerance range of chain wheel axial clearance 0.15 mm - 0.30 mm

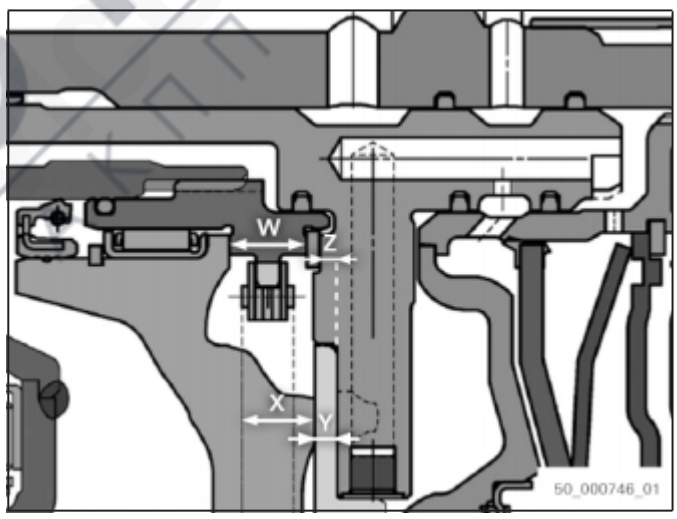


Fig. 161

→ Chain wheel setting is OK and is within the permissible tolerance range.
→ If value is outside of the tolerance range, use washer of different thickness and remeasure.

2) Depth of contact surface stator shaft
3) Depth of thrust face in the torque converter bell housing
4) Shoulder width of intermediate plate
5) Shoulder width of chain wheel

10.2 Setting running clearance of clutch B

Special tools:

- 5P01.001.330 Measuring device
- 5P01.001.458 Test device
- 5P01.000.329 Test device
- 5P70.000.130 Height measuring device

Composition of multidisk package in this example:

- one wave spring
- four internal clutch disks
- four lined clutch disks
- one end disk

The running clearance is set by using the end disk (02.040/140).

NOTICE

The composition of the multidisk package depends on the parts list [BoM] and may vary. The composition of the multidisk package affects the setting.

⇨ Observe valid setting specification. The setting specifications are available for download from the ZF-ServiceLine.

Assembling measuring equipment

1. Assemble 5P01.001.330 [Measuring device], 5P01.001.458 [Test device] and 5P01.000.329 [Test device].

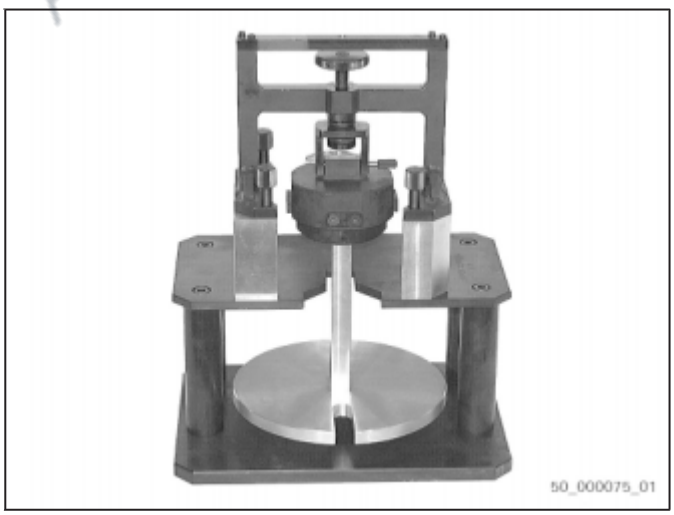


Fig. 162

Calculate dimension $h_{Multidisks}$[6)]

2. Center multidisk package without end disk.
3. Place multidisk package without end disk into center of measuring equipment.
4. Set specified preload force.
   F = 200 N ± 5 N
5. Put measuring bar with dial gage on pressure plate of measuring device.
6. Put measuring stylus on base plate.
7. Reset dial gage.
8. Measure from base plate to multidisk package.
9. Repeat measurement at three spots.
10. Calculate average of the three measured values:
    $h_{Multidisks}$ = 22,30 mm

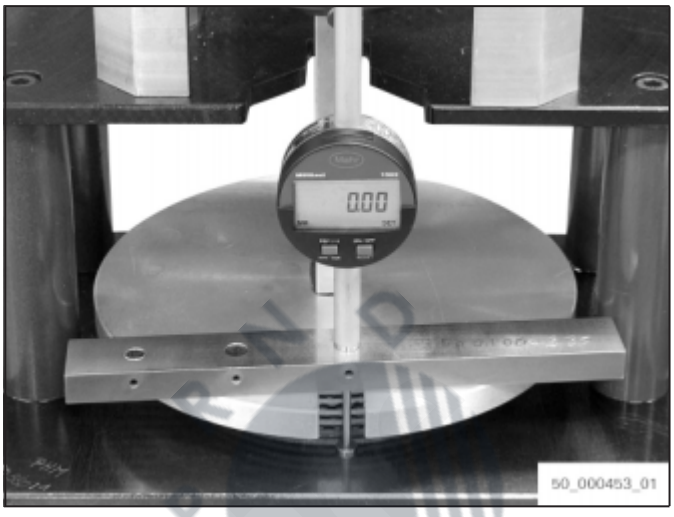


Fig. 163

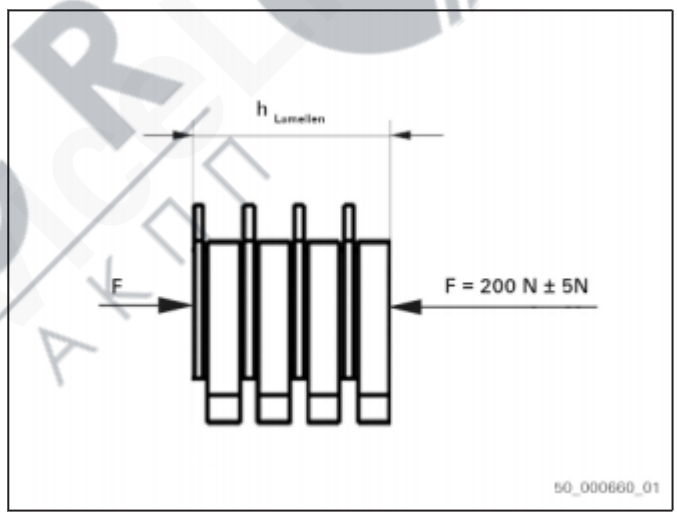


Fig. 164

6) Overall height of multidisk package

Calculate dimension $h_{Available\ space}$[7)]

11. Assemble multidisk carrier B with piston B, disk spring, supporting ring and end disk and secure with used snap ring.

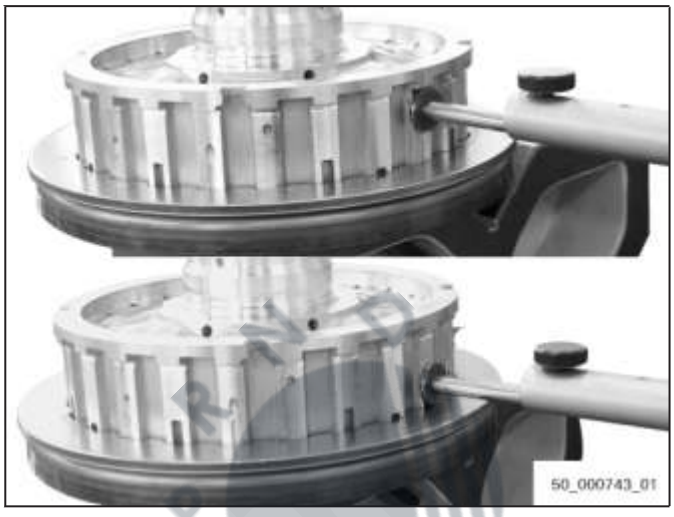


Fig. 165

12. Put measuring bar on piston B and reset 5P70.000.130 [Height measuring device].

13. Measure from lower edge of piston to supporting surface of end disk.

14. Repeat measurement at three spots.

15. Calculate average of the three measured values:
$h_{Available\ space}$ = 24,00 mm

16. Dismantle clutch B.

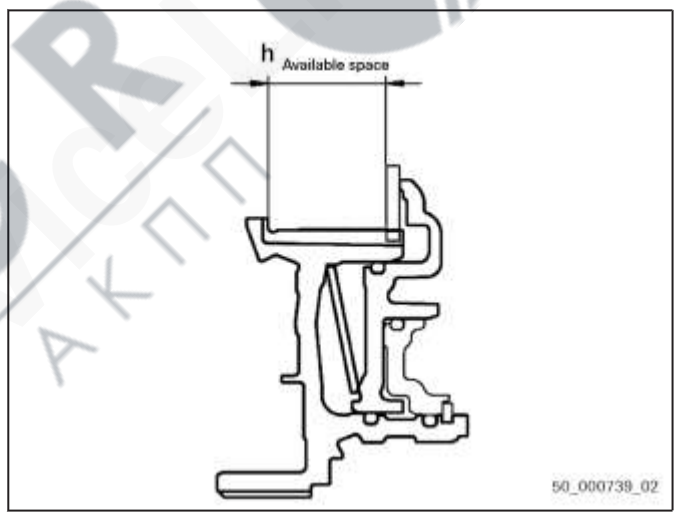


Fig. 166

Formulas for calculating the running clearance

17. $h_{Running\ clearance} = h_{Available\ space} - h_{Multidisks}$
Exemplary calculation:
$h_{Running\ clearance}$ = 24.00 mm – 22.30 mm
$h_{Running\ clearance}$ = 1.70 mm

18. Running clearance tolerance range of clutch B 1.28 mm - 1.77 mm

→ The running clearance is OK and is within the permissible tolerance range.
→ If value is outside of the tolerance range, use end disk of different thickness and remeasure.

7) Height of available space of cylinder

10.3 Setting running clearance of clutch E

Special tools:

- 5P01.001.330 Measuring device
- 5P01.001.458 Test device
- 5P01.000.329 Test device
- 5P33.000.009 / 5P74.001.051 Measuring bar with dial gage

Composition of multidisk package in this example:

- one wave spring
- five inner clutch disks
- five lined clutch disks
- one end disk

The running clearance is set by using the snap ring (71.200).

NOTICE

The composition of the multidisk package depends on the parts list [BoM] and may vary. The composition of the multidisk package affects the setting.

⇨ Observe valid setting specification. The setting specifications are available for download from the ZF-ServiceLine.

Assembling measuring equipment

1. Assemble 5P01.001.330 [Measuring device], 5P01.001.458 [Test device] and 5P01.000.329 [Test device].

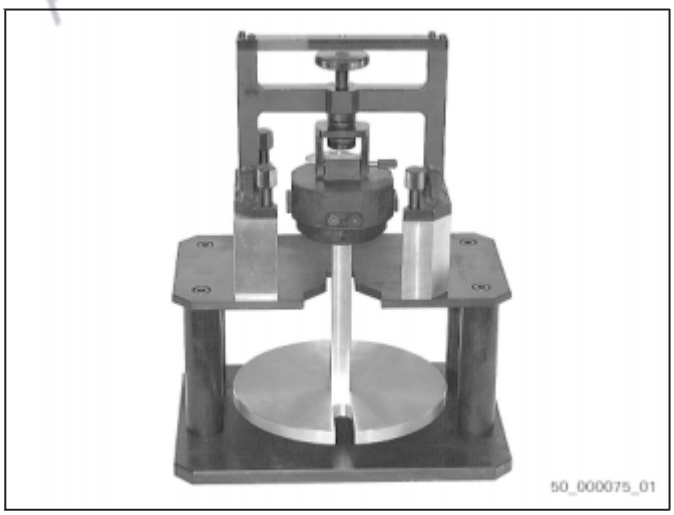


Fig. 167

Calculate dimension $h_{Multidisks}$[8)]

2. Center multidisk package with end disk.

3. Place multidisk package with end disk into center of measuring equipment.

4. Set specified preload force.
   F = 200 N ± 5 N

5. Put measuring bar with dial gage on pressure plate of measuring device.

6. Put measuring stylus on base plate.

7. Reset dial gage.

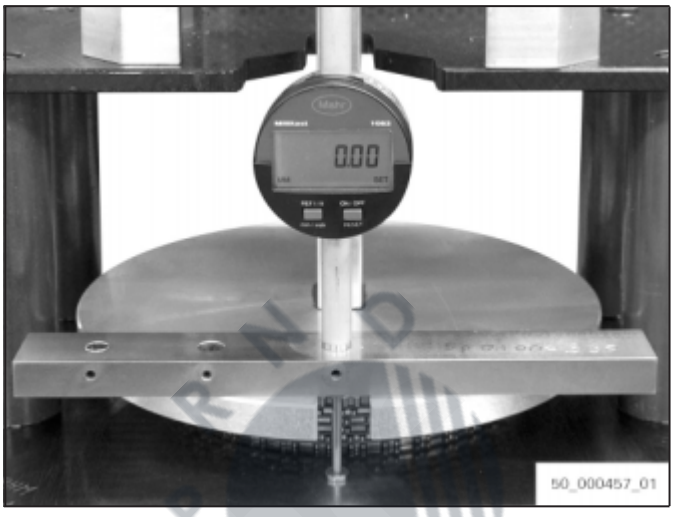


Fig. 168

8.

NOTICE

Incorrect settings might result in damage.

⇨ Measure multidisk package to offset.

Measure from base plate to multidisk package, offset of snap ring.

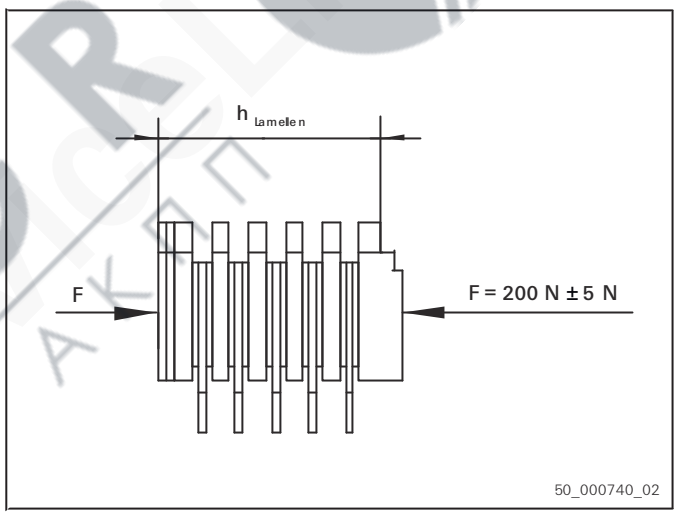


Fig. 169

9. Repeat measurement at three spots.

10. Calculate average of the three measured values:
    $h_{Multidisks}$ = 24,40 mm

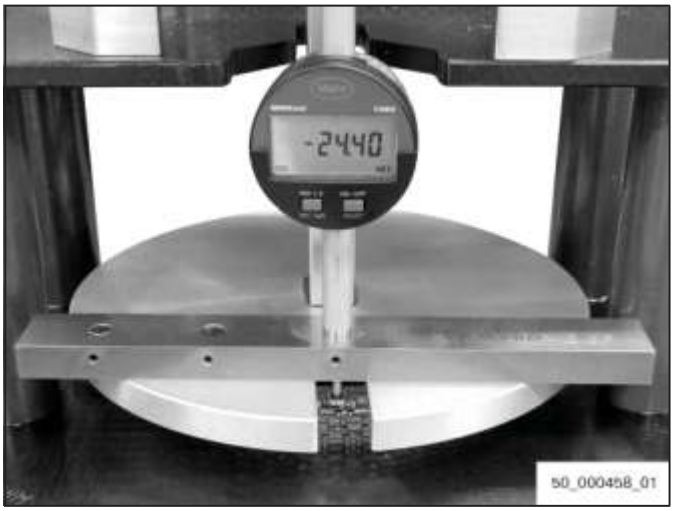


Fig. 170

8) Overall height of multidisk package

Calculate dimension $h_{Piston/Snap\ ring\ groove}$ [9)]

11. Put 5P33.000.009 / 5P74.001.051 [Measuring bar with dial gage] on surface of piston.

12. Reset dial gage.

Fig. 171

13. Measure from surface of piston/multidisk package to upper edge of snap ring groove.

14. Repeat measurement at three spots.

15. Calculate average of the three measured values:
$h_{Piston/Snap\ ring\ groove}$ = 28,00 mm

Fig. 172

9) Height of piston/snap ring groove

Formulas for calculating the running clearance

16. $h_{Available\ space} = h_{Piston/Snap\ ring\ groove} + h_{Measuring\ stylus}$
Exemplary calculation:
$h_{Available\ space}$ = 26.00 mm + 2.00 mm
$h_{Available\ space}$ = 28.00 mm

17. $h_{Running\ clearance} = h_{Available\ space} - h_{Multidisks} - h_{Snap\ ring}$
Exemplary calculation:
$h_{Running\ clearance}$ = 28,00 mm – 24,40 mm – 2,00 mm
$h_{Running\ clearance}$ = 1,60 mm

18. Running clearance tolerance range of clutch E 1.26 mm - 1.79 mm

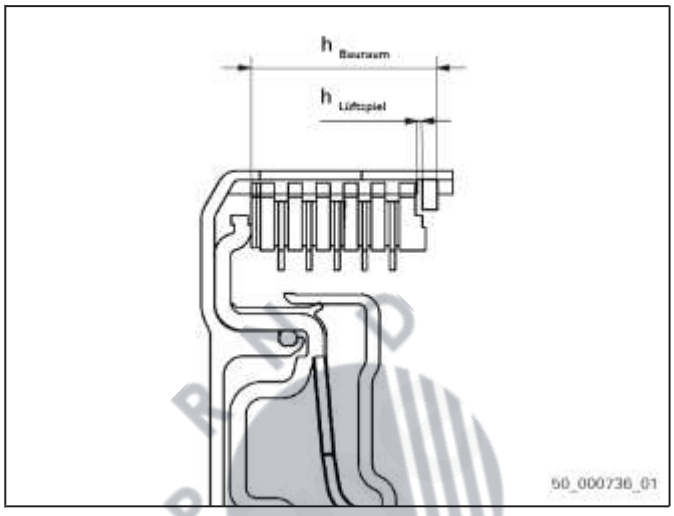


Fig. 173

→ The running clearance is OK and is within the permissible tolerance range.
→ If value is outside of the tolerance range, use snap ring of different thickness and remeasure.

10.4 Setting running clearance of clutch C

Special tools:

- 5P01.001.330 Measuring device
- 5P01.001.458 Test device
- 5P01.000.329 Test device
- 5P33.000.009 / 5P74.001.051 Measuring bar with dial gage

Composition of multidisk package in this example:

- three outer clutch disks
- three lined clutch disks
- one end disk

The running clearance is set by using the snap ring (75.160).

NOTICE

The composition of the multidisk package depends on the parts list [BoM] and may vary. The composition of the multidisk package affects the setting.

⇨ Observe valid setting specification. The setting specifications are available for download from the ZF-ServiceLine.

Assembling measuring equipment

1. Assemble 5P01.001.330 [Measuring device], 5P01.001.458 [Test device] and 5P01.000.329 [Test device].

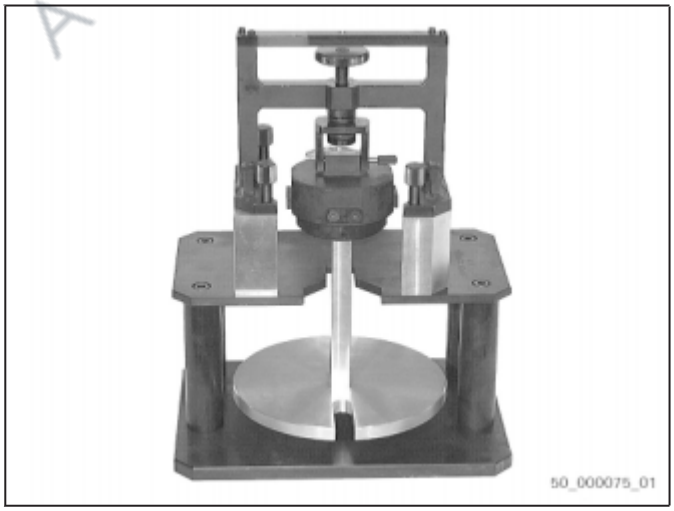


Fig. 174

Calculate dimension $h_{Multidisks}$[10)]

2. Center multidisk package with end disk.

3. Place multidisk package with end disk into center of measuring equipment.

4. Set specified preload force.
   F = 200 N ± 5 N

5. Put measuring bar with dial gage on pressure plate of measuring device.

6. Put measuring stylus on base plate.

7. Reset dial gage.

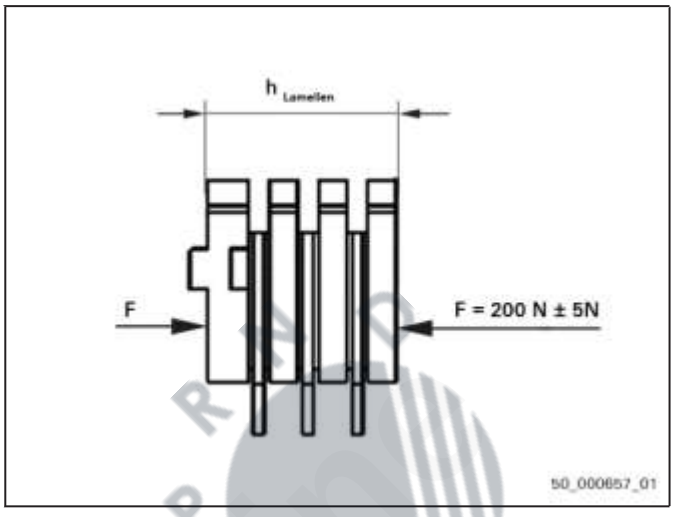


Fig. 175

8. **NOTICE**

   Damage due to incorrect settings possible.

   ⇨ Do not measure multidisk package to studs.

   Measure from base plate to multidisk package.

9. Repeat measurement at three spots.

10. Calculate average of the three measured values:
    $h_{Multidisks}$ = 20,82 mm

10) Overall height of multidisk package

Calculate dimension h_{Piston} [11)]

11. Put 5P33.000.009 / 5P74.001.051 [Measuring bar with dial gage] on piston.

12. Reset dial gage on base plate.

13. Measure from base plate to first offset of piston C.

14. Repeat measurement at three spots.

15. Calculate average of the three measured values:
    h_{Piston} = 12,44 mm

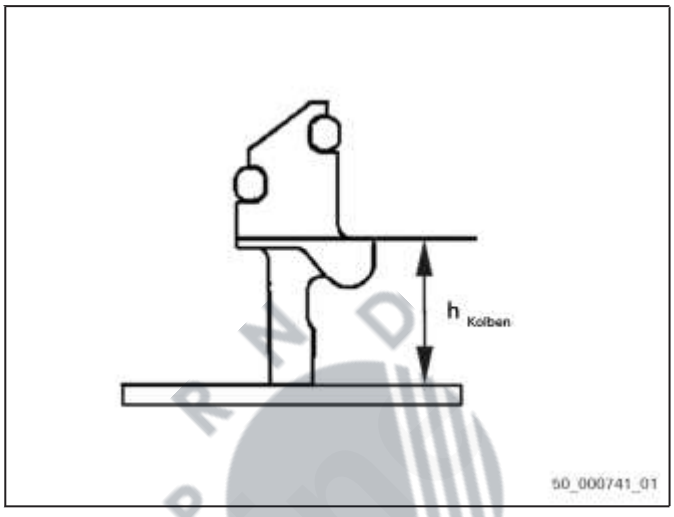


Fig. 176

Dimension A = fixed dimension

16. Observe specified fixed dimension.
    - $h_{Fixed\ dimension}$:
      36.0 + 0.1 mm

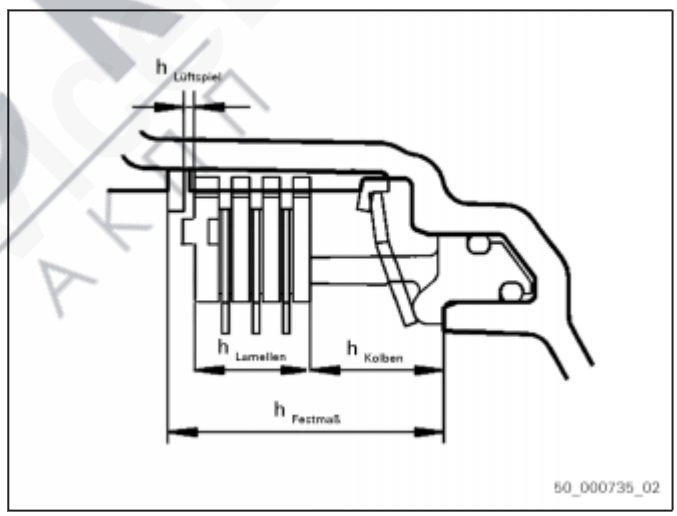


Fig. 177

Formulas for calculating the running clearance

17. $h_{Lüftspiel} = h_{Fixed\ dimension} - h_{Multidisks} - h_{Piston} - h_{Snap\ ring}$
    Exemplary calculation:
    $h_{Lüftspiel}$ = 36.10 mm − 20.82 mm − 12.44 mm − 1.80 mm
    $h_{Lüftspiel}$ = 0,95 mm

18. Running clearance tolerance range of clutch C 0.76 mm - 1.15 mm

→ The running clearance is OK and is within the permissible tolerance range.
→ If value is outside of the tolerance range, use snap ring of different thickness and remeasure.

11) Height of piston

10.5 Setting running clearance of clutch D

Special tools:

- 5P01.001.330 Measuring device
- 5P01.001.458 Test device
- 5P01.000.329 Test device
- 5P70.000.130 Height measuring device

Composition of multidisk package in this example:

- four outer clutch disks
- four lined clutch disks
- one setting disk

The running clearance is set by using the end disk (73.010).

NOTICE

The composition of the multidisk package depends on the parts list [BoM] and may vary. The composition of the multidisk package affects the setting.

⇨ Observe valid setting specification. The setting specifications are available for download from the ZF-ServiceLine.

Assembling measuring equipment

1. Assemble 5P01.001.330 [Measuring device], 5P01.001.458 [Test device] and 5P01.000.329 [Test device].

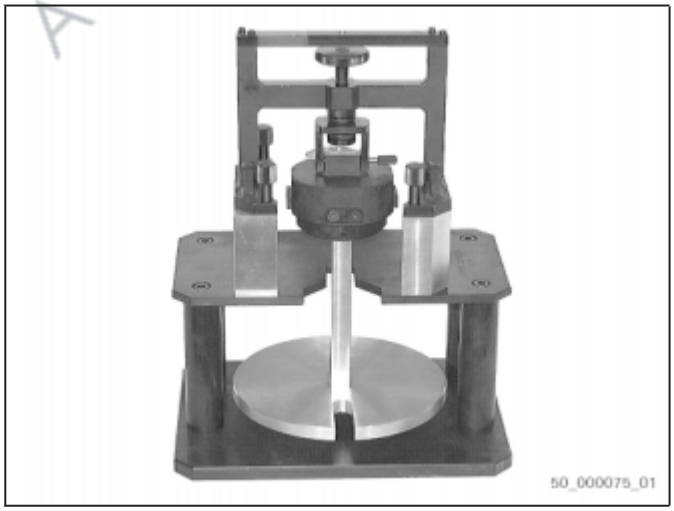


Fig. 178

Calculate dimension $h_{Multidisks}$[12)]

2. Center multidisk package with end disk.
3. Place multidisk package with end disk into center of measuring equipment.
4. Set specified preload force.
   F = 200 N ± 5 N
5. Put measuring bar with dial gage on pressure plate of measuring device.
6. Put measuring stylus on base plate.
7. Reset dial gage.
8. Measure from base plate to multidisk package.
9. Repeat measurement at three spots.
10. Calculate average of the three measured values:
    $h_{Multidisks}$ = 22,79 mm

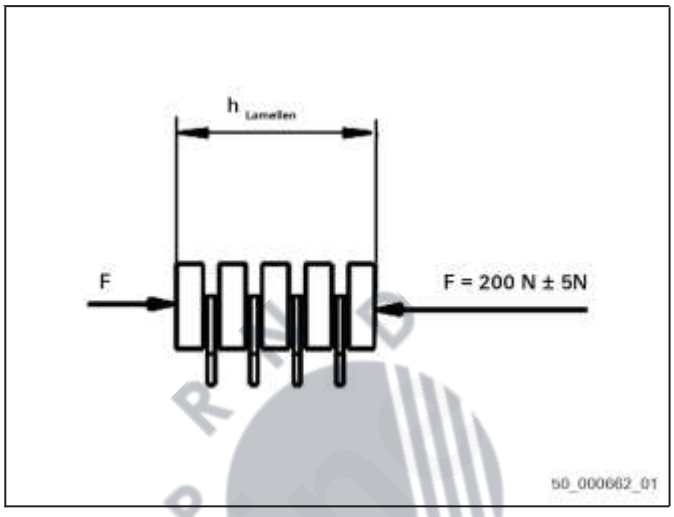


Fig. 179

Calculate dimension $h_{Cylinder/Piston}$[13)]

11. Assemble cylinder D and piston D without oil.
12. Put cylinder D and piston D on base plate in installation position.
13. Reset 5P70.000.130 [Height measuring device] on base plate.
14. Determine dimension from base plate to surface of cylinder.
15. Repeat measurement at three spots.
16. Calculate average of the three measured values:
    $h_{Piston/Cylinder}$ = 35,59 mm

Fig. 180

12) Overall height of multidisk package
13) Height of cylinder and piston

Dimension A = fixed dimension

17. Observe specified fixed dimension.
    - $h_{Fixed\ dimension}$:
      62.5 + 0.1 mm

Dimension D[14)]

18. Determine height of snap ring using sliding caliper.

Formulas for calculating the running clearance

19. $h_{Lüftspiel} = h_{Fixed\ dimension} - h_{Cylinder/Piston} - h_{Multidisks} - h_{Snap\ ring}$
    Exemplary calculation:
    $h_{Lüftspiel}$ = 62.60 mm – 35.59 mm – 22.79 mm – 2.95 mm
    $h_{Running\ clearance}$ = 1.27 mm

20. Running clearance tolerance range of clutch
    D 1.01 mm - 1.50 mm

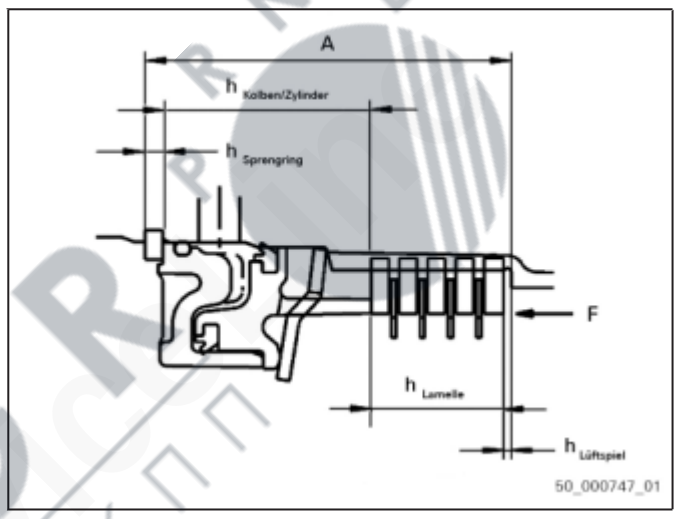


Fig. 181

→ The running clearance is OK and is within the permissible tolerance range.
→ If value is outside of the tolerance range, use end disk of different thickness and remeasure.

14) Height of snap ring

10.6 Setting backlash

Special tools:

- 5P70.000.122 Depth gage
- AA01.175.522 Measuring support
- AA01.183.838 Test device
- AA01.183.841 Setting master MIN
- AA01.183.839 Depot plate
- AA01.183.843 Setting master MAX

NOTICE
The backlash must be checked and set, if required. ⇨ Observe valid setting specification. The setting specifications are available for download from the ZF-ServiceLine.

Calculate dimension A[15)]

1. Sealing face of transmission housing must be free from oil and damage.

   Reset 5P70.000.122 [Depth gage] on measuring plate.

2. Put 5P70.000.122 [Depth gage] on transmission housing and set measuring stylus on oil feed bush, supporting surface of adjustment plate.

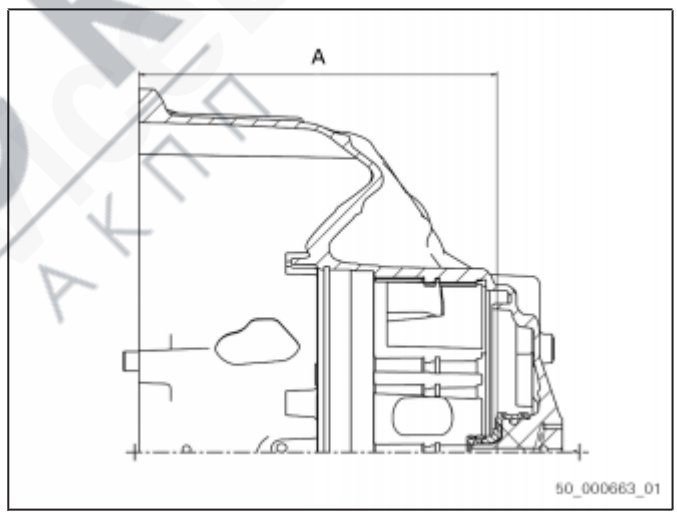


Fig. 182

15) Measurement from transmission housing to oil feed bush

3. Repeat measurement at three spots.

4. Calculate average of the three measured values:
   A = 225,43 mm

5. The average must be within the tolerance range.

   Compare average to tolerance range.
   Tolerance range dimension A:
   225.30 mm to 225.50 mm

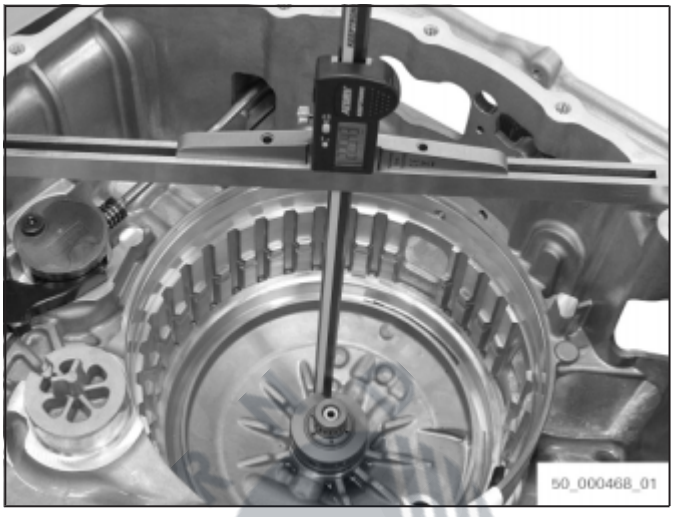


Fig. 183

Dimension B[16)]

6. Dimension B is not determined. Fixed dimension of seal in pressed-in condition:
   Dimension B = 0,37 mm

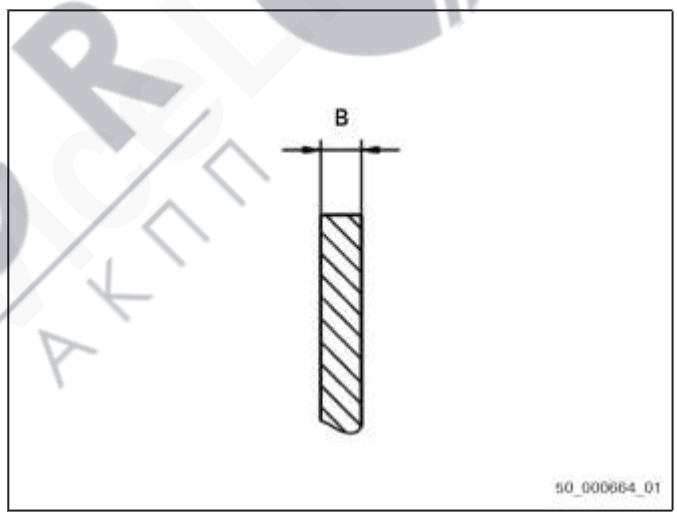


Fig. 184

16) Seal in pressed-in condition

Calculate dimension C[17)]

7. Reset 5P70.000.122 [Depth gage] on measuring plate.

8. Put 5P70.000.122 [Depth gage] on intermediate plate and measure to sealing face of torque converter bell housing.

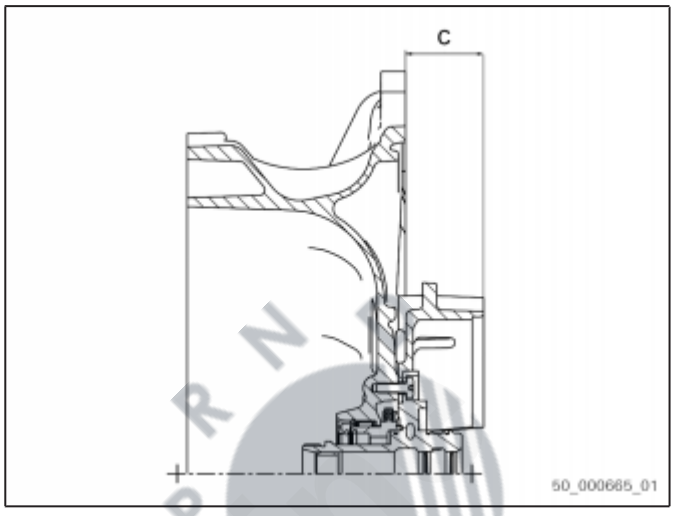


Fig. 185

9. Repeat measurement at three spots.

10. Calculate average of the three measured values:
C = 44,39 mm

11. The average must be within the tolerance range.

Compare average to tolerance range.
Tolerance range dimension C:
44.10 mm to 44.50 mm

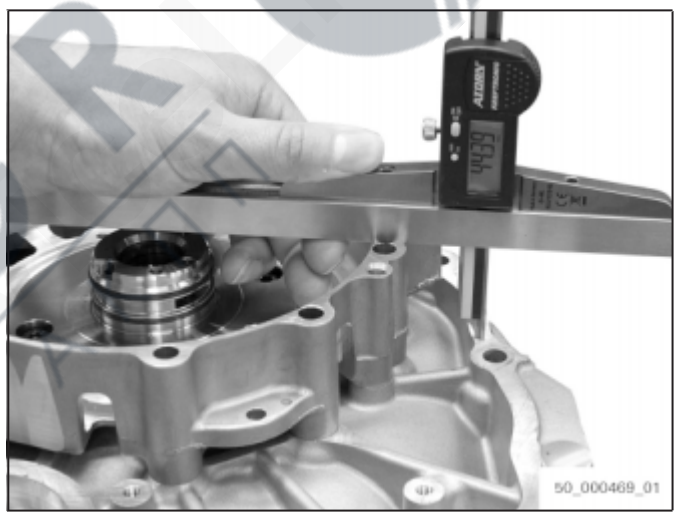


Fig. 186

17) Measurement from torque converter bell housing to intermediate plate

Calculate Dimension D[18)]

12. Insert pin into bore.

13. Put bearing support on AA01.175.522 [Measuring support].

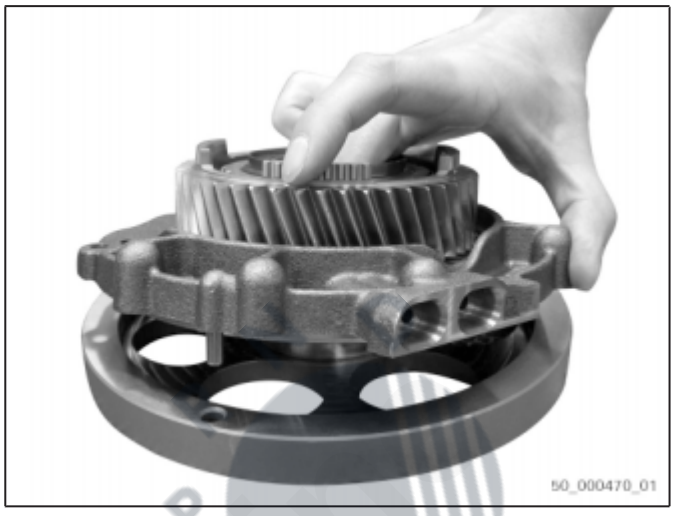


Fig. 187

14. Put 5P70.000.122 [Depth gage] on bearing support.

15. Reset 5P70.000.122 [Depth gage] on AA01.175.522 [Measuring support].

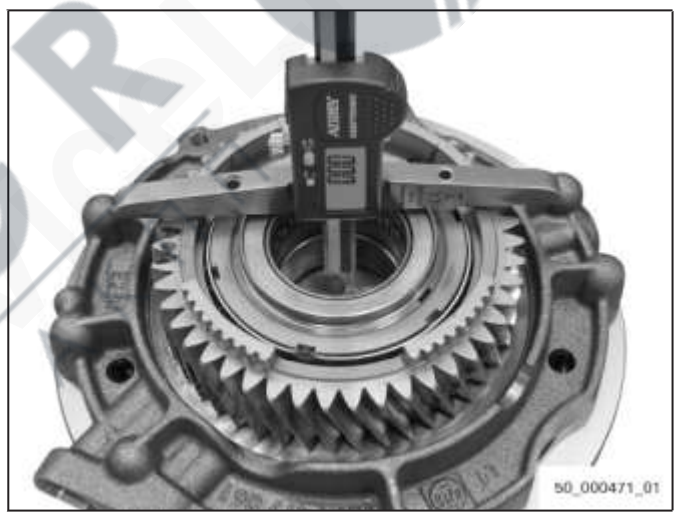


Fig. 188

16. Measure from AA01.175.522 [Measuring support] to washer.

17. Repeat measurement at three spots.

Fig. 189

18) Overall height of bearing support

18. Calculate average of the three measured values:
D = 45,58 mm

19. The average must be within the tolerance range.

Compare average to tolerance range.
Tolerance range dimension D:
45.40 mm to 45.60 mm

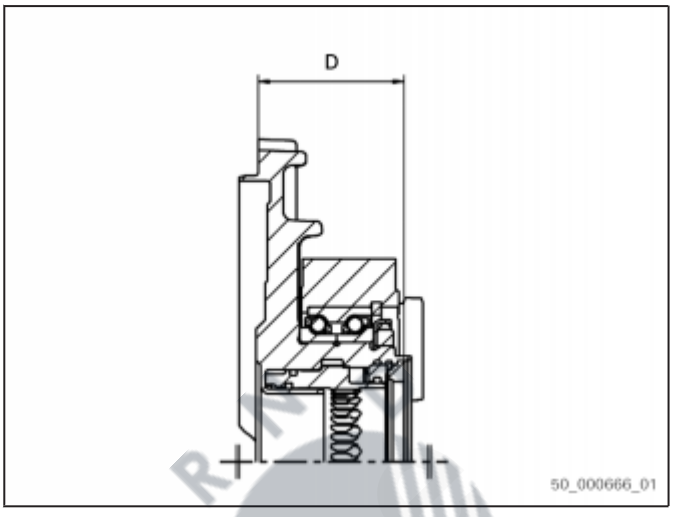


Fig. 190

Check dimension E[19)]

20. Hook AA01.183.838 [Test device] into crane.

21. Put AA01.183.841 [Setting master MIN] on AA01.183.839 [Depot plate].

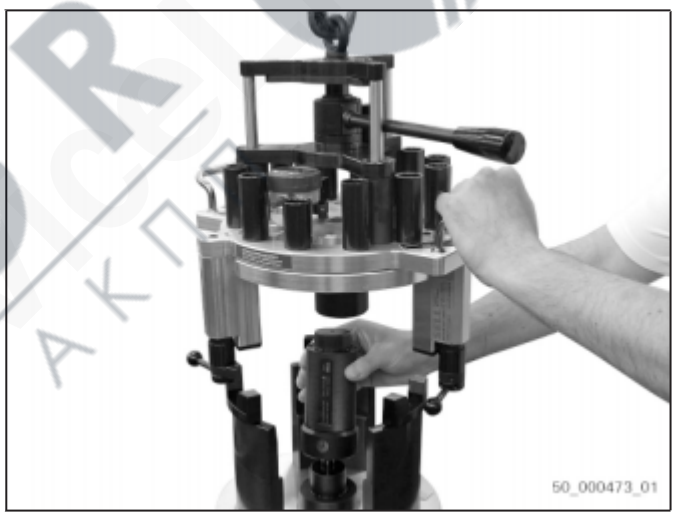


Fig. 191

22.

⚠ CAUTION

Risk of crushing due to moving load.
Slight or moderate injury possible.
⇨ Move load slowly and carefully.
⇨ Do not reach into danger area!

Put AA01.183.838 [Test device] on AA01.183.839 [Depot plate] and AA01.183.841 [Setting master MIN].

23. Secure AA01.183.838 [Test device] on depot plate using three levers.

Fig. 192

19) Overall height of tower including axial needle bearing of bearing point 8

24. Tension lever for test force.
F = 1.200 N ± 50 N

25. Set dial gage to actual dimension setting master MIN.

26. Relax lever.

27. Take off AA01.183.838 [Test device] and AA01.183.841 [Setting master MIN].

28. Put AA01.183.843 [Setting master MAX] on AA01.183.839 [Depot plate].

29.

⚠ CAUTION

Risk of crushing due to moving load.
Slight or moderate injury possible.
⇨ Move load slowly and carefully.
⇨ Do not reach into danger area!

Put AA01.183.838 [Test device] on AA01.183.839 [Depot plate] and AA01.183.843 [Setting master MAX].

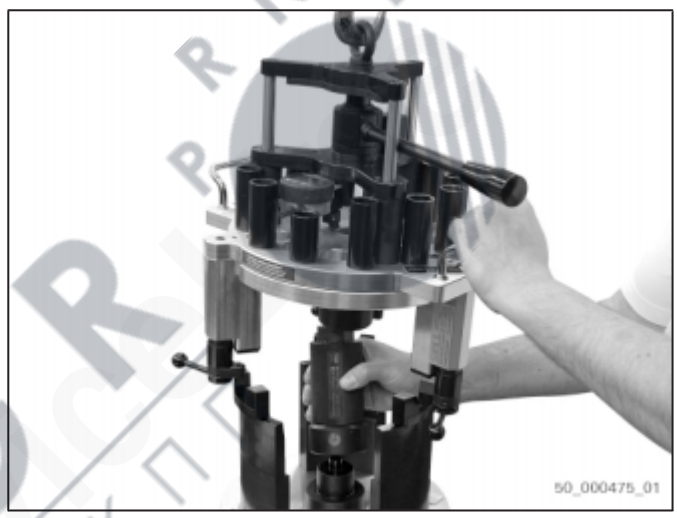


Fig. 193

30. Secure AA01.183.838 [Test device] on depot plate using three levers.

31. Tension lever for test force.
F = 1.200 N ± 50 N

32. Read off measured value from dial gage.

33.

NOTICE

Damage due to incorrect measured values possible.
⇨ If the measured value and the actual dimension setting master MAX match, the measurement is correct.
⇨ If the measured value and the actual dimension setting master MAX do not match, repeat the whole procedure (as of "Check dimension E").

Relax lever.

34. Take off AA01.183.838 [Test device] and AA01.183.843 [Setting master MAX].

35. Insert tower with axial needle bearing into AA01.183.839 [Depot plate].

Fig. 194

36. Put AA01.183.838 [Test device] on AA01.183.839 [Depot plate] and tower.

37. Secure AA01.183.838 [Test device] on depot plate using three levers.

38. Tension lever for test force.
F = 1.200 N ± 50 N

39. Read off measured value: dimension E = 134,42 mm

40. Dimension E must be within the tolerance range.

    Tolerance range for dimension E:
    133,77 mm bis 134,80 mm

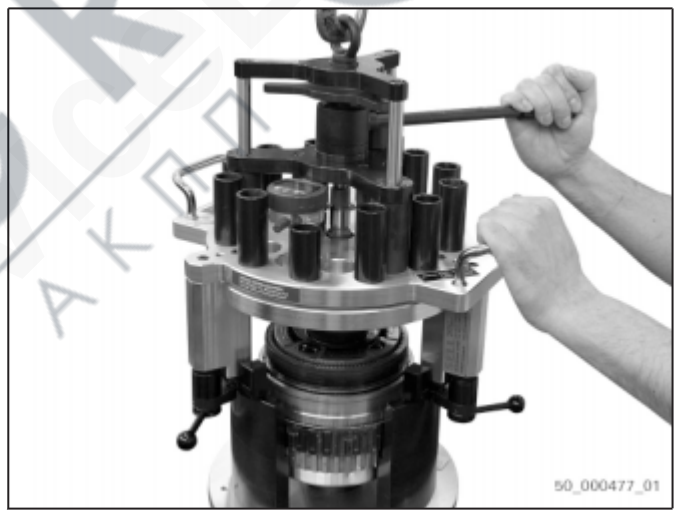


Fig. 195

41. Relax lever.

42. Remove AA01.183.838 [Test device] and tower.

Formulas for calculation of backlash

43. Available space = A + B – (C + D + E)
    Exemplary calculation:
    Available space = 225,430 + 0,370 – (44,380 + 45,570 + 134,420) [mm]
    Available space = 225,430 + 0,370 – 224,370 [mm]
    Available space = 1,430 mm

44. Backlash = available space - adjustment plate thickness
    Exemplary calculation:
    Backlash = 1,430 mm – 1,200 mm
    Backlash = 0,230 mm

45. Backlash tolerance range 0.07 - 0.32 mm

→ Backlash is OK and is within the permissible tolerance range.
→ If value is outside of the tolerance range, use adjustment plate of different thickness.

10.7 Setting axial clearance at intermediate shaft

Special tools:

- 5P70.000.122 Depth gage
- AA01.257.418 Test device
- AA01.259.174 Setting master MIN
- AA01.259.176 Setting master MAX

NOTICE
The intermediate shaft's axial clearance must be checked and set, if required. ⇨ Observe valid setting specification. The setting specifications are available for download from the ZF-ServiceLine.

Calculate dimension X[20)]

1. Reset 5P70.000.122 [Depth gage] on base plate.

2. Measure depth from seat of intermediate shaft bearing cup to support surface of torque converter bell housing.

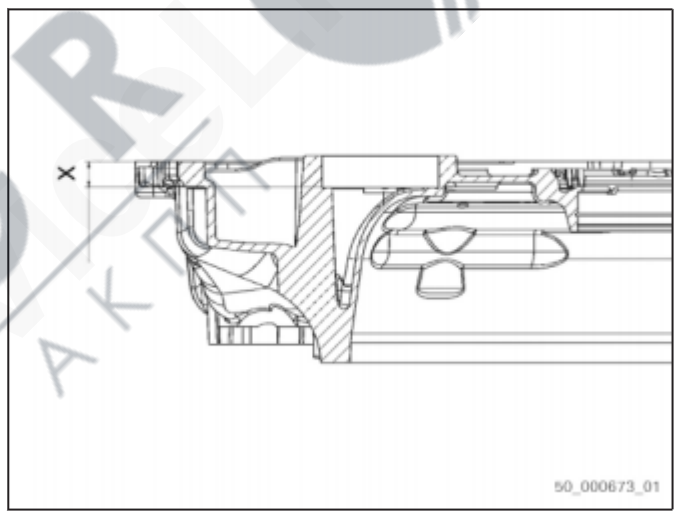


Fig. 196

3. Repeat measurement at three spots.

4. Calculate average of the three measured values:
   X = 15,11 mm

5. The average must be within the tolerance range.

   Compare average to tolerance range.
   Tolerance range dimension X:
   15.00 mm to 15.20 mm

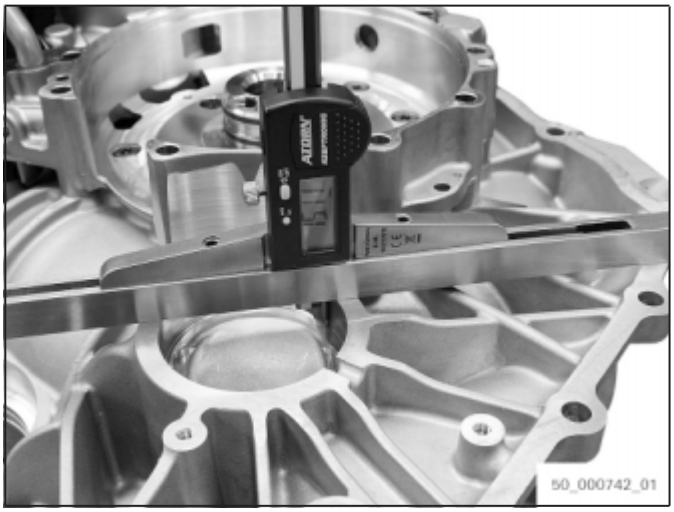


Fig. 197

20) Depth of bearing seat in torque converter bell housing

Calculate dimension Y[21)]

6. Reset 5P70.000.122 [Depth gage] on base plate.

7. Place measuring bar on transmission housing.

8. Measure depth from seat of intermediate shaft bearing cup to support surface of transmission housing.

9. Repeat measurement at three spots.

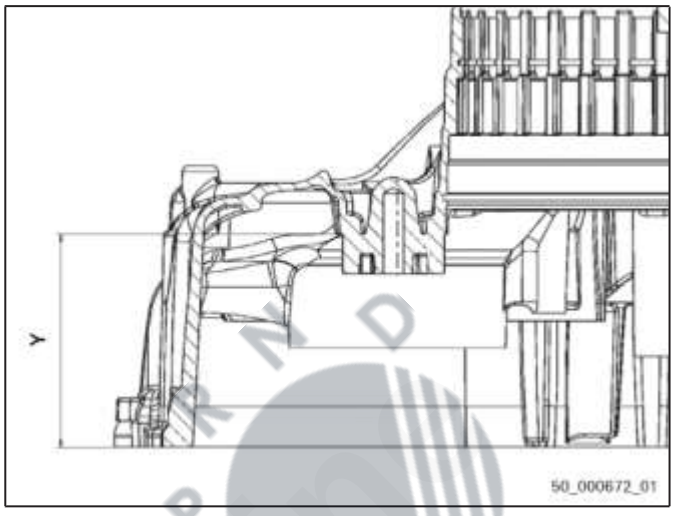


Fig. 198

10. Calculate average of the three measured values:
Y = 105,34 mm

11. The average must be within the tolerance range.

Compare average to tolerance range.
Tolerance range dimension Y:
105.20 mm to 105.40 mm

Fig. 199

21) Depth of bearing seat in transmission housing

Fixed dimension DV[22)]

12. Dimension is not determined. Fixed dimension of seal in pressed-in condition: Dimension DV = 0,37 mm

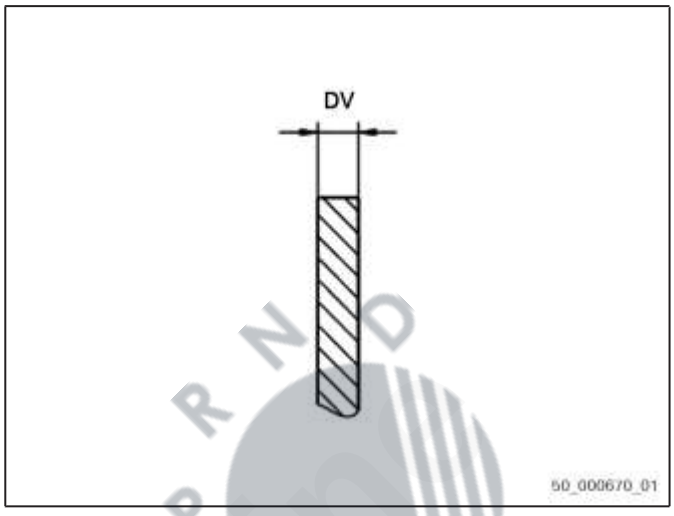


Fig. 200

Calculate dimension P[23)]

13. Insert adapter into AA01.257.418 [Test device].

14. Put AA01.259.174 [Setting master MIN] on adapter into AA01.257.418 [Test device].

15. Put measurement bridge on AA01.259.174 [Setting master MIN] and prestress.
F = 1.000 N ± 30 N

16. Set two dial gages for intermediate shaft to setting of setting master MIN.

17. Relax AA01.257.418 [Test device].

18. Remove measurement bridge and AA01.259.174 [Setting master MIN].

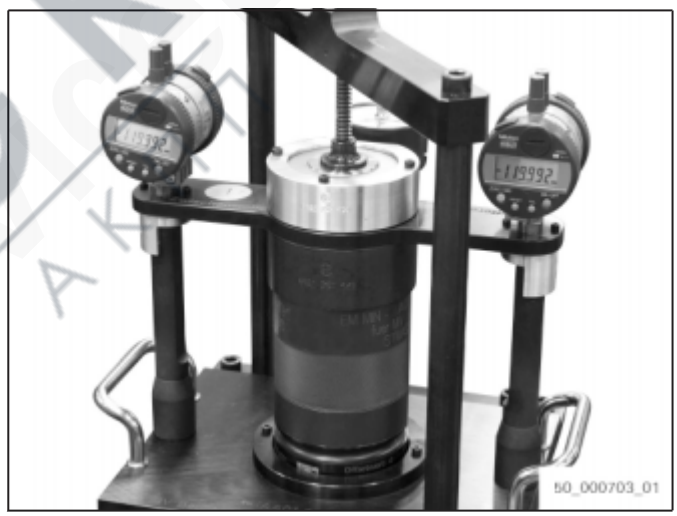


Fig. 201

22) Dimension of the seal in pressed-in condition

23) Overall height of intermediate shaft

19. Put AA01.259.176 [Setting master MAX] on adapter in AA01.257.418 [Test device] and prestress.

20. Put measurement bridge on AA01.259.176 [Setting master MAX] and prestress.
F = 1.000 N ± 30 N

21.

NOTICE

Damage due to incorrect measured values possible.

⇨ If the measured value and the setting of setting master MAX match, the measurement is correct.

⇨ If the measured value and the actual dimension setting master MAX do not match, repeat the whole procedure (as of "Calculate dimension P").

Read off measured values on both dial gages.

22. Relax AA01.257.418 [Test device].

23. Remove measurement bridge and AA01.259.176 [Setting master MAX].

24. Put tapered roller bearing (09.010/130) on adapter in AA01.257.418 [Test device].

Fig. 202

Fig. 203

25. Put pre-assembled intermediate shaft into AA01.257.418 [Test device] together with tapered roller bearing and attached bearing cup.

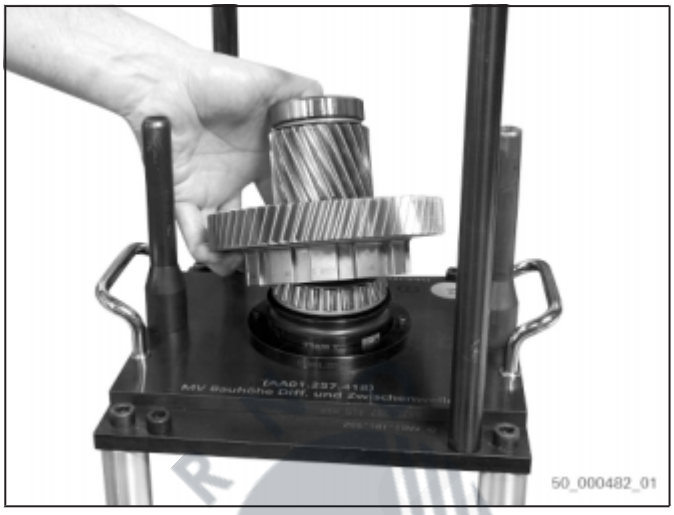


Fig. 204

26. Put measurement bridge on intermediate shaft and prestress.
F = 1.000 N ± 30 N

27.

NOTICE

Damage due to incorrect measured values possible.

⇨ Turn intermediate shaft at least ten times to allow the bearings to set.

Check prestressing and set, if required.

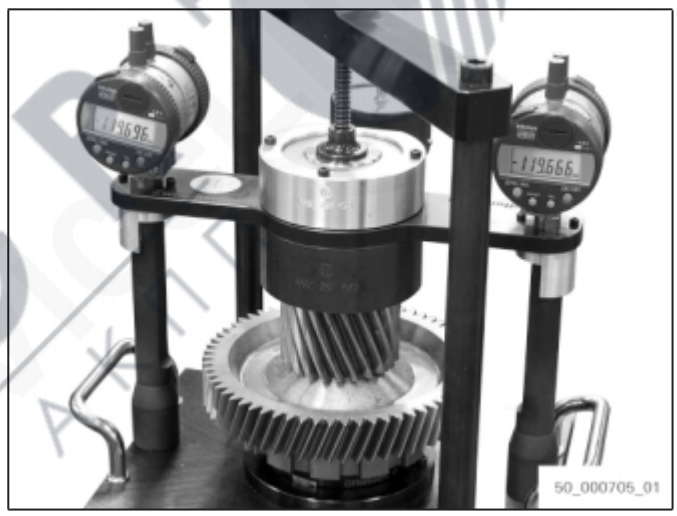


Fig. 205

28. Read off both dial gages.

29. Calculate average of the three measured values:
Dimension P = 119,68 mm

30. The average must be within the tolerance range.

Compare average to tolerance range.
Tolerance range dimension P:
119.35 mm to 119.95 mm

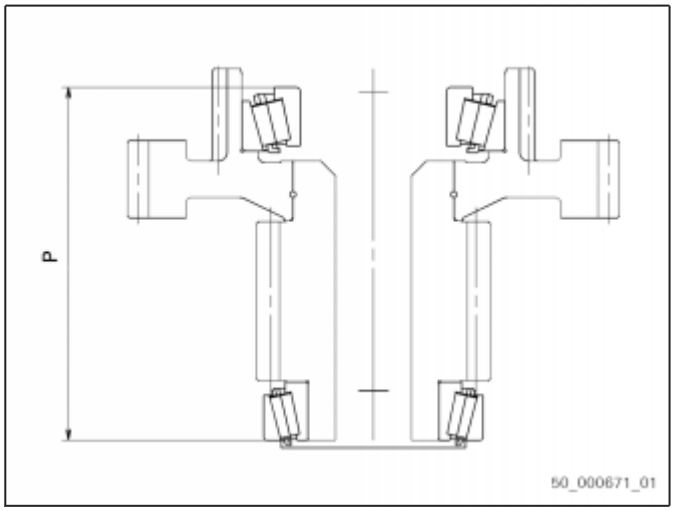


Fig. 206

31.

NOTICE

Damage due to damaged component possible.

⇨ When removing the intermediate shaft, ensure that the tapered roller bearing does not fall down.

Remove AA01.257.418 [Test device].

Correction value PK[24)]

32. Observe provided correction value.
    - PK = 0.04 mm

Measure dimension S[25)]

33. Measure overall height of adjustment plate.
    - S = 1.10 mm

Formulas for calculation

34. Check value of bearing setting = X + Y + DV − P − PK − S
    Exemplary calculation:
    Check value of bearing setting = 15,11 + 105,34 + 0,37 − 119,68 − 0,04 − 1,10 [mm]
    Check value of bearing setting = 0,00 mm

35. Tolerance range of bearing setting for intermediate shaft -0.03 to 0.03 mm

→ Tolerance range of bearing setting for intermediate shaft is OK and is within the permissible tolerance range.
→ If value is outside of the tolerance range, use adjustment plate of different thickness and remeasure.

24) Correction value of intermediate shaft with both bearings
25) Measure adjustment plate

10.8 Setting axial clearance of differential

Special tools:

- 5P70.000.122 Depth gage
- AA01.259.174 Setting master MIN
- AA01.257.418 Test device
- AA01.259.176 Setting master MAX

NOTICE
The differential's axial clearance must be checked and set, if required. ⇨ Observe valid setting specification. The setting specifications are available for download from the ZF-ServiceLine.

Calculate dimension X[26)]

1. Reset 5P70.000.122 [Depth gage] on base plate.

2. Measure depth from seat of differential bearing cup to supporting surface of torque converter bell housing.

Fig. 207

3. Repeat measurement at three spots.

4. Calculate average of the three measured values:
   X = 69,40 mm

5. The average must be within the tolerance range.

   Compare average to tolerance range.
   Tolerance range dimension X:
   69.30 mm to 69.50 mm

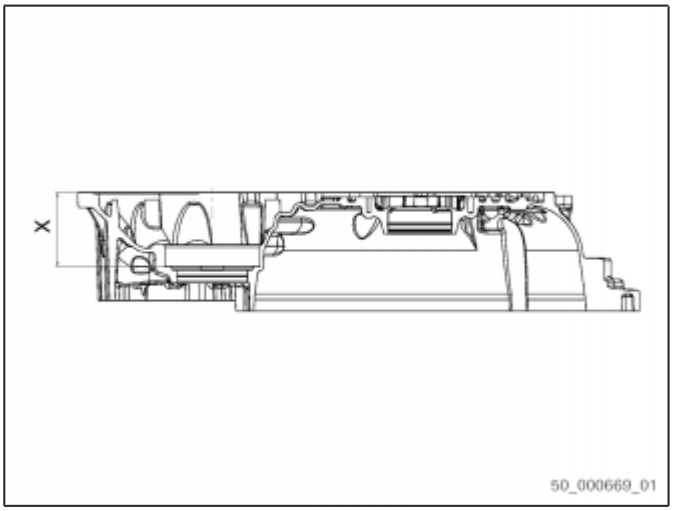


Fig. 208

26) Depth of bearing seat in torque converter bell housing

Calculate dimension Y[27)]

6. Reset 5P70.000.122 [Depth gage] on base plate.

7. Place measuring bar on transmission housing.

8. Measure depth from seat of differential bearing cup to supporting surface of transmission housing.

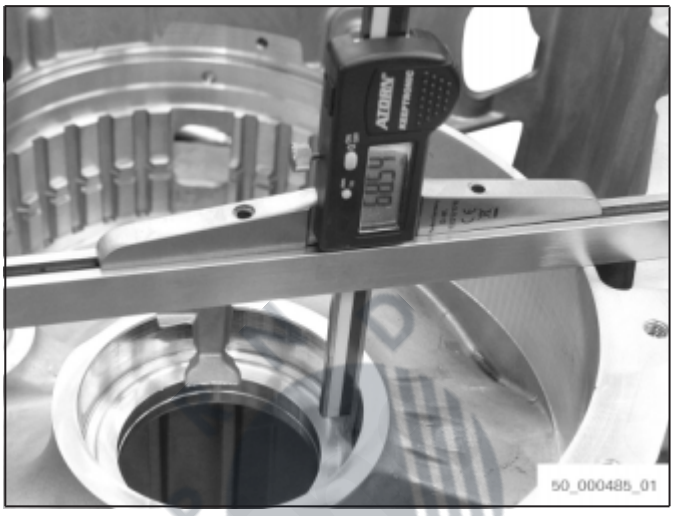


Fig. 209

9. Repeat measurement at three spots.

10. Calculate average of the three measured values:
Y = 68,54 mm

11. The average must be within the tolerance range.

Compare average to tolerance range.
Tolerance range dimension Y:
68.40 mm to 68.60 mm

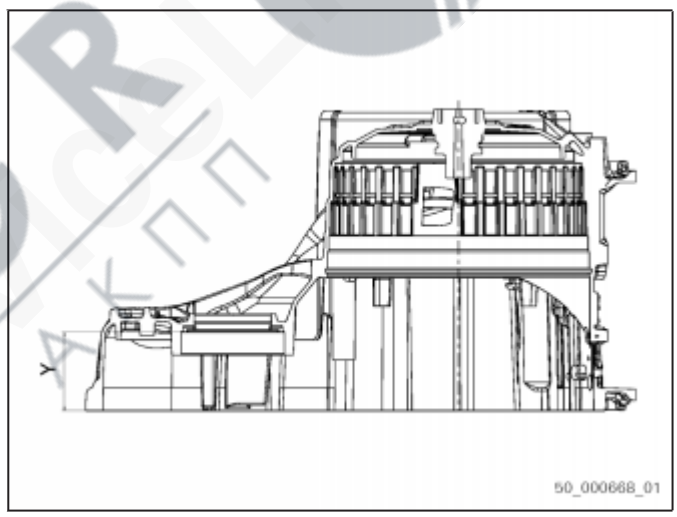


Fig. 210

27) Depth of bearing seat in transmission housing

Fixed dimension DV[28)]

12. Dimension is not determined. Fixed dimension of seal in pressed-in condition: Dimension DV = 0,37 mm

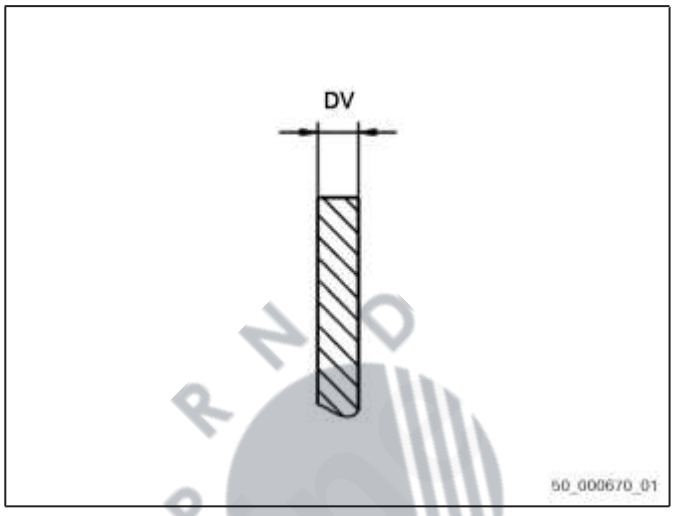


Fig. 211

Calculate dimension P[29)]

13. Insert AA01.259.174 [Setting master MIN] into AA01.257.418 [Test device].

14. Put measurement bridge on AA01.259.174 [Setting master MIN] and prestress.
F = 1.000 N ± 30 N

15. Set two dial gages for differential to setting of setting master MIN.

16. Relax AA01.257.418 [Test device].

17. Remove measurement bridge and AA01.259.174 [Setting master MIN].

Fig. 212

28) Dimension of the seal in pressed-in condition

29) Overall height of differential

18. Insert AA01.259.176 [Setting master MAX] into AA01.257.418 [Test device].

19. Put measurement bridge on AA01.259.176 [Setting master MAX] and prestress.
F = 1.000 N ± 30 N

20.

NOTICE

Damage due to incorrect measured values possible.

⇨ If the measured value and the setting of setting master MAX match, the measurement is correct.

⇨ If the measured value and the actual dimension setting master MAX do not match, repeat the whole procedure (as of "Calculate dimension P").

Read off measured values on both dial gages.

Fig. 213

21. Relax AA01.257.418 [Test device].

22. Remove measurement bridge and AA01.259.176 [Setting master MAX].

23. Put bearing cup (09.150/120) into AA01.257.418 [Test device].

Fig. 214

24. Place differential on bearing cup.

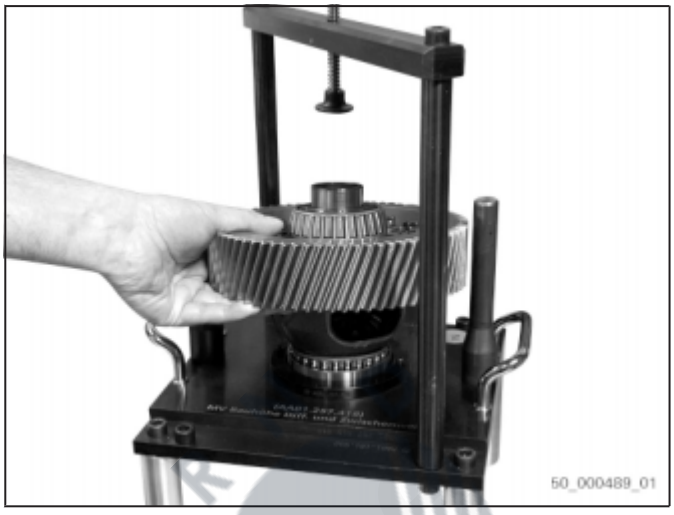


Fig. 215

25. Put second bearing cup (09.150/130) on differential.

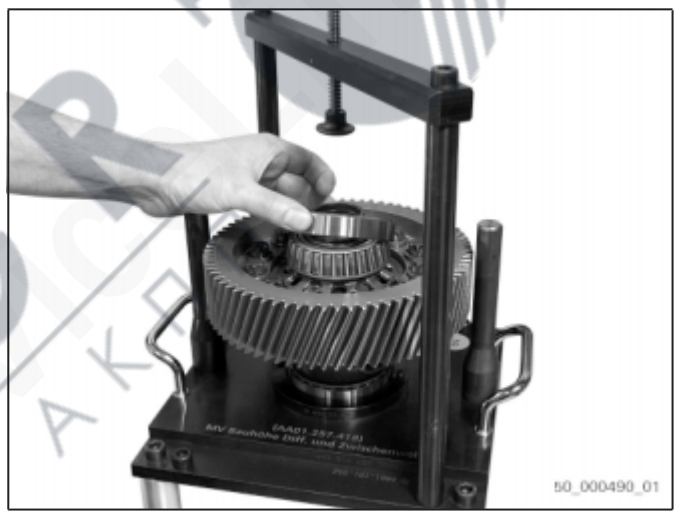


Fig. 216

26. Put measurement bridge on differential and prestress.
F = 1.000 N ± 30 N

27.

NOTICE

Damage due to incorrect measured values possible.

⇨ Turn differential at least ten times to allow the bearings to set.

Check prestressing and set, if required.

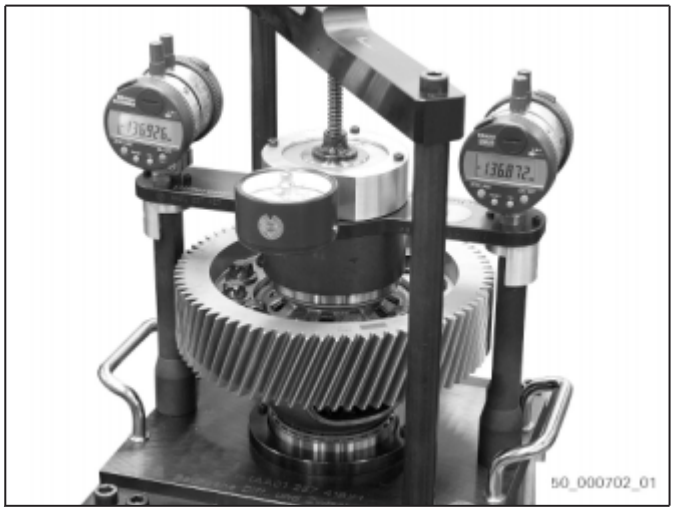


Fig. 217

28. Read off both dial gages.

29. Calculate average of the three measured values:
P = 136,89 mm

30. The average must be within the tolerance range.

Compare average to tolerance range.
Tolerance range dimension P:
136.46 mm to 137.30 mm

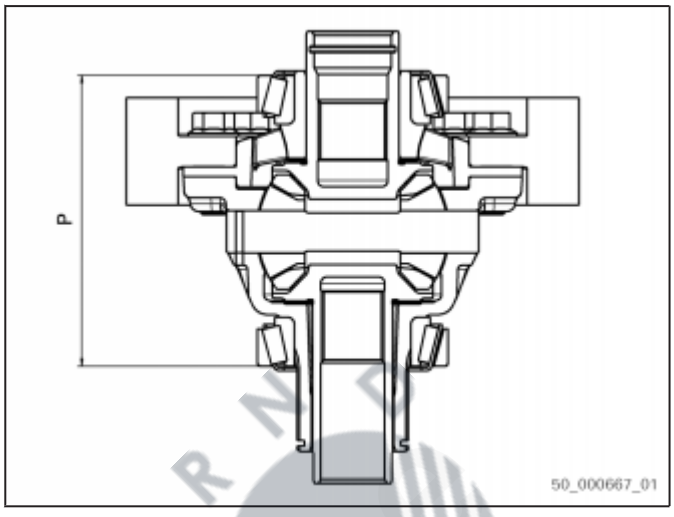


Fig. 218

31.

NOTICE

Do not damage component.

⇨ When removing the differential, ensure that the tapered roller bearing does not fall down.

Remove AA01.257.418 [Test device].

Correction value PK[30)]

32. Observe specified fixed dimension.
- PK = 0.06 mm

Measure dimension S[31)]

33. Measure overall height of adjustment plate.
- S = 1.45 mm

Formulas for calculation

34. Check value of bearing setting = X + Y + DV − P − PK − S
Exemplary calculation:
Check value of bearing setting = 69,40 + 68,53 + 0,37 − 136,89 − 0,06 − 1,45 [mm]
Check value of bearing setting = -0,10 mm

35. Tolerance range of bearing setting for differential -0.26 to -0.19 mm

36. Bearing setting for differential is not correct and is not within the permissible tolerance range.

37. Select adjustment plate of different thickness: S = 1.55 mm

38. Recalculate bearing setting.

30) Correction value of differential with both bearings

31) Measure adjustment plate

New calculation

39. Check value of bearing setting = 69,400 + 68,530 + 0,370 – 136,899 – 0,060 – 1,550 mm
Check value of bearing setting = -0,209 mm

→ Bearing setting for differential is OK and is within the permissible tolerance range.
→ If value is outside of the tolerance range, use adjustment plate of different thickness and remeasure.

10.9 Directives on screw connections

10.9.1 Cover of ducting

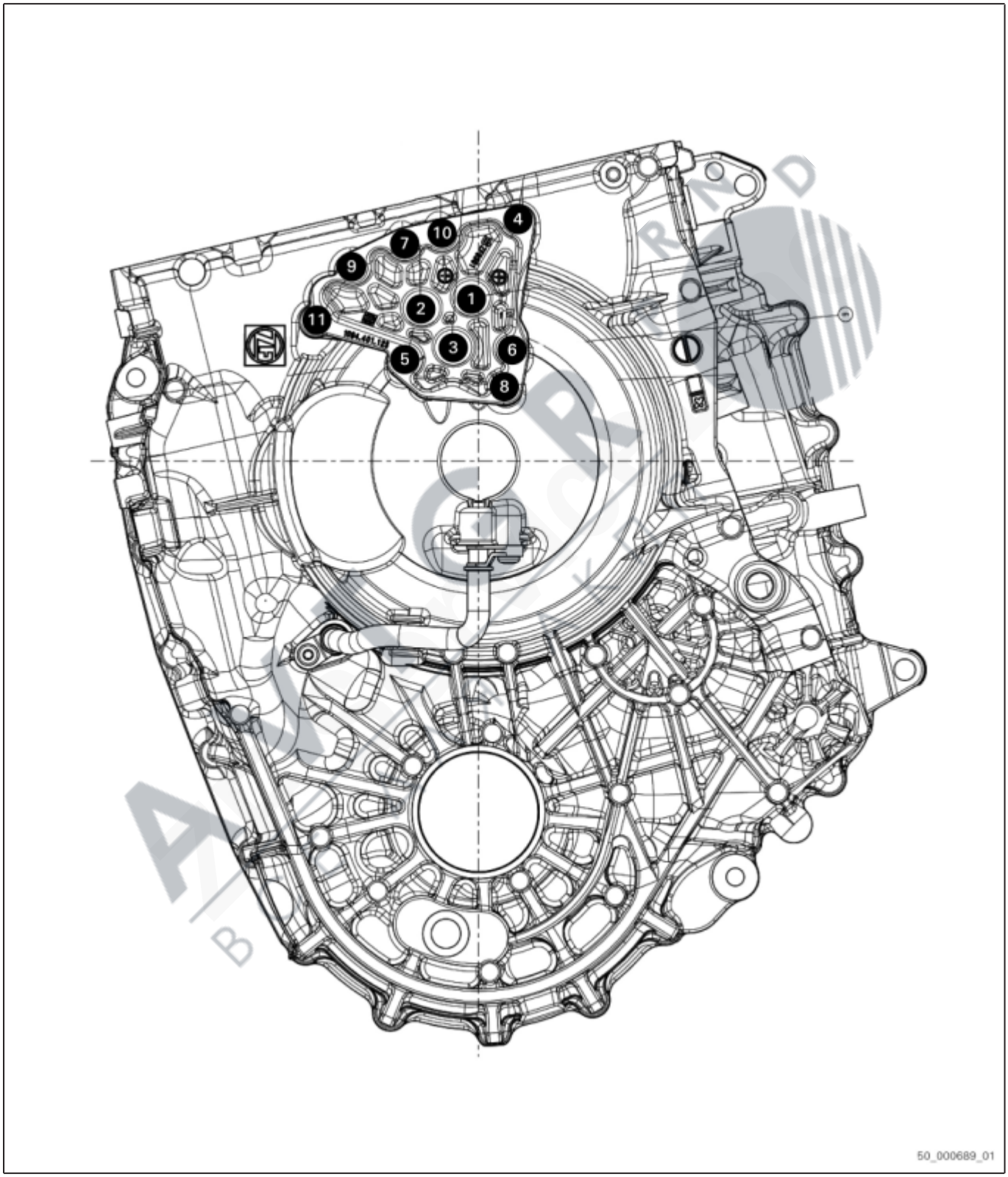


Fig. 219 Specification no. 1094.700.206

10.9.2 Oil supply

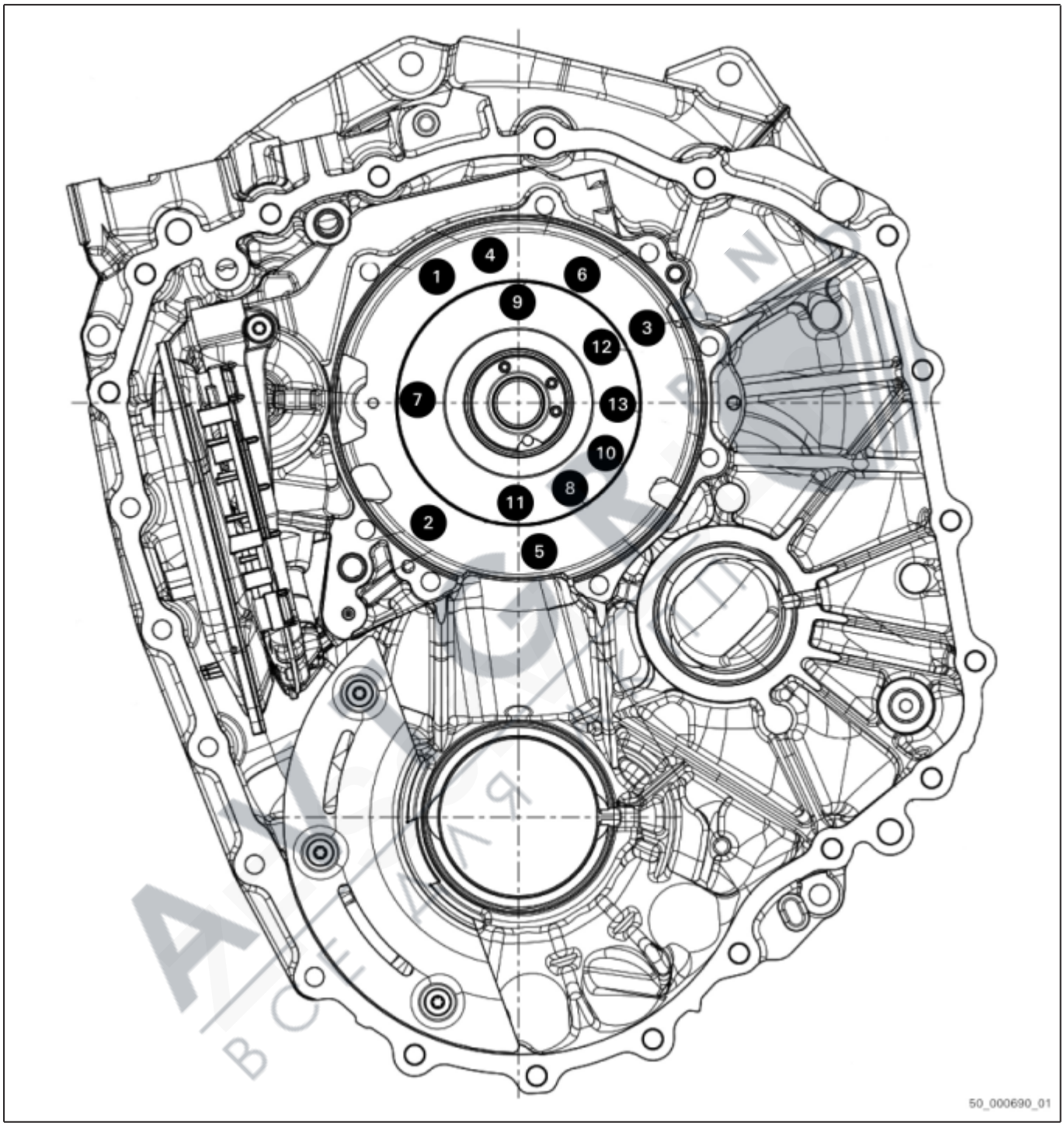


Fig. 220 Vorschrift 1094.700.049

Sequence	Screw	Tightening torque
1	9	Pre-torque: 5 Nm (±1.0 Nm)
2	11	Pre-torque: 5 Nm (±1.0 Nm)
3	1 to 13	10 Nm (±1.0 Nm)

Tab. 1 Oil supply screw connection

10.9.3 Bearing support / intermediate plate / torque converter bell housing

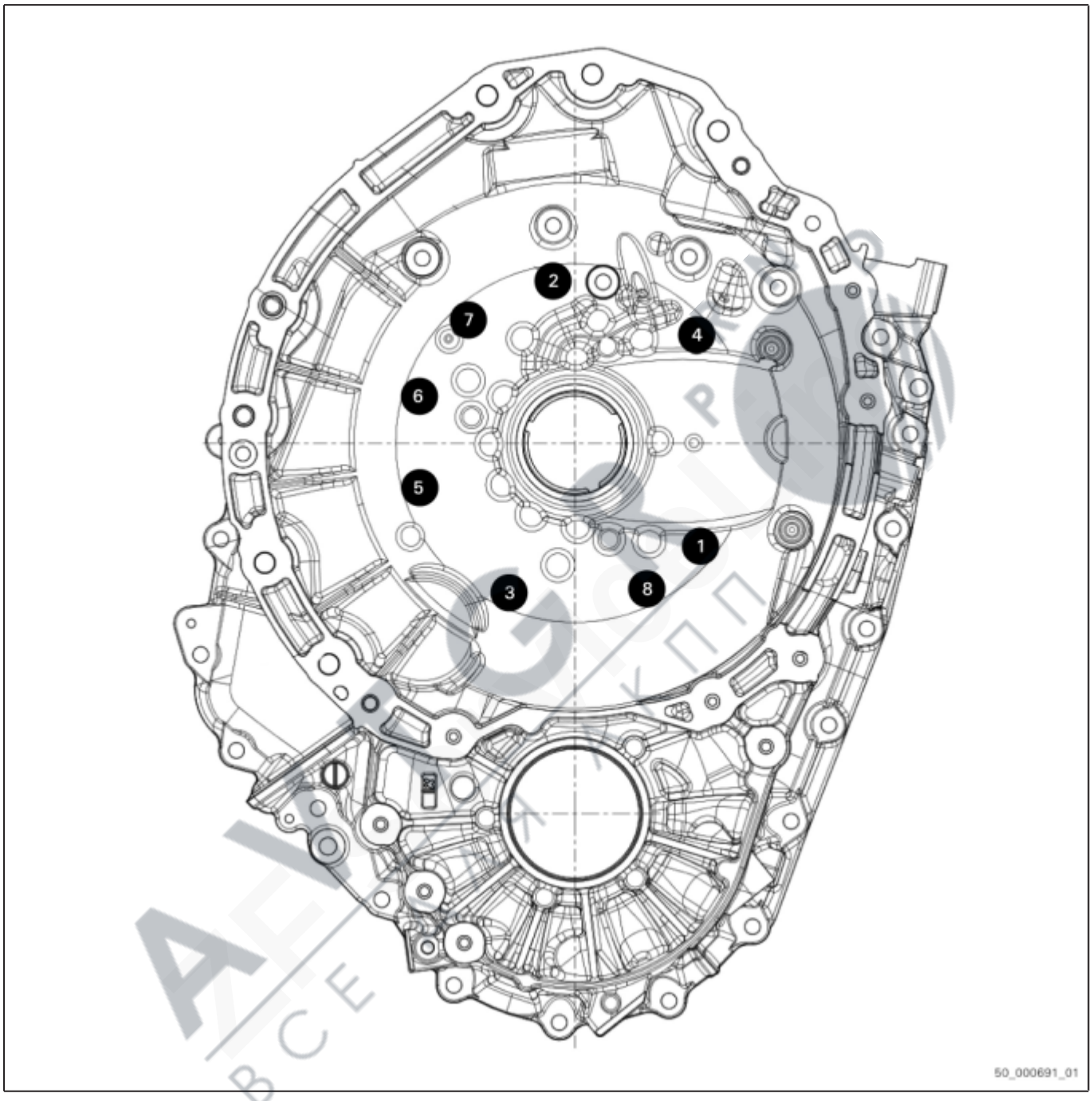


Fig. 221 Vorschrift 1094.700.359

Sequence	Screw	Tightening torque
1	1	Pre-torque: 6 Nm (±1.0 Nm)
2	2	Pre-torque: 6 Nm (±1.0 Nm)
3	3 to 7	25 Nm (±2.5 Nm)
4	2	25 Nm (±2.5 Nm)
5	1	25 Nm (±2.5 Nm)
6	8	25 Nm (±2.5 Nm)

Tab. 2 Bearing support / intermediate plate / torque converter bell housing screw connection

10.9.4 Torque converter bell housing / transmission housing

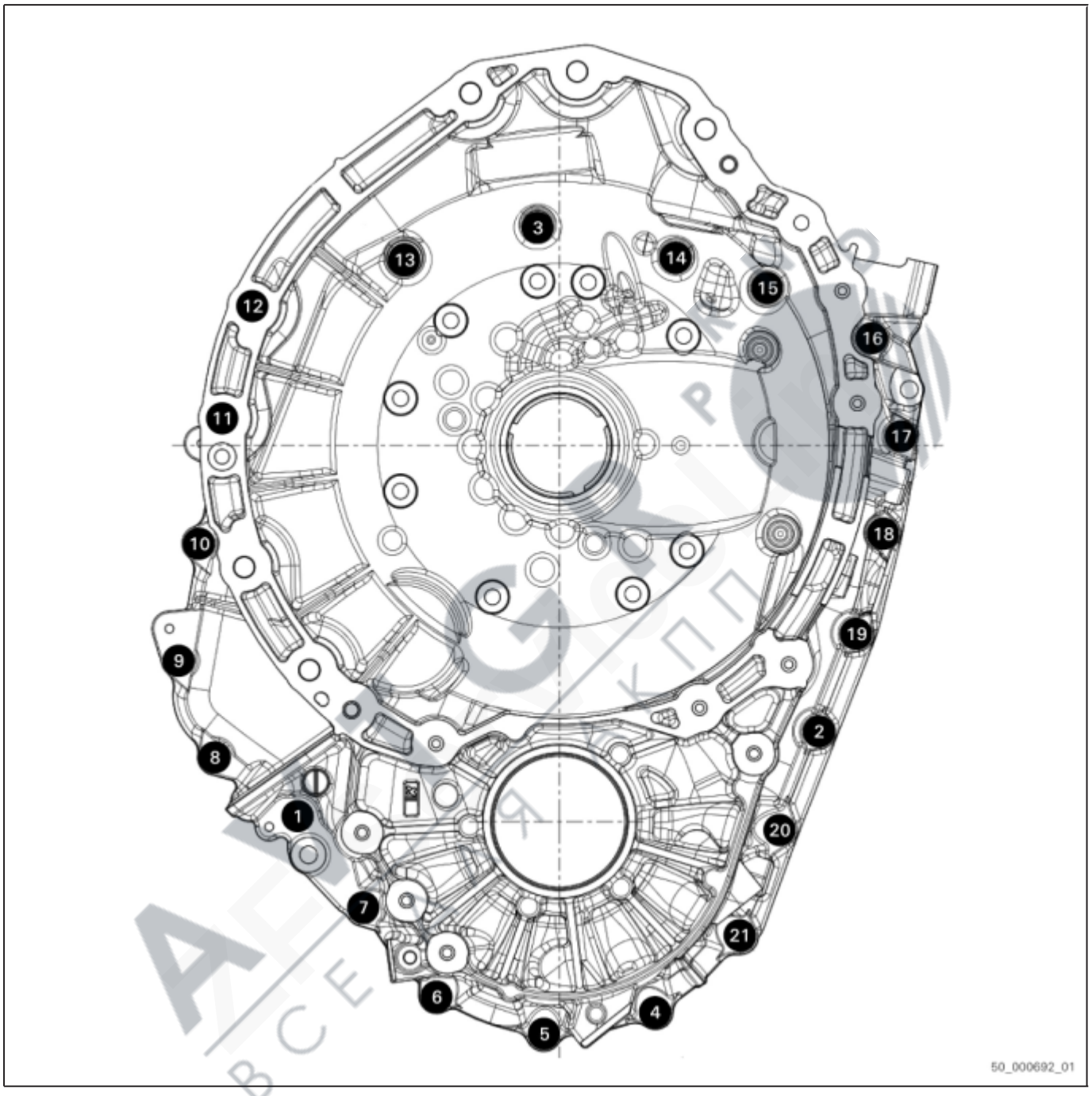


Fig. 222 Vorschrift 1094.700.359

Sequence	Screw	Tightening torque
1	1 and 2	Pre-torque: 10 Nm (±1.0 Nm)
2	3 to 7	25 Nm (±2.5 Nm)
3	1	25 Nm (±2.5 Nm)
4	8 to 19	25 Nm (±2.5 Nm)
5	2	25 Nm (±2.5 Nm)
6	20 and 21	25 Nm (±2.5 Nm)

Tab. 3 Torque converter bell housing / transmission housing screw connection

10.9.5 Control unit

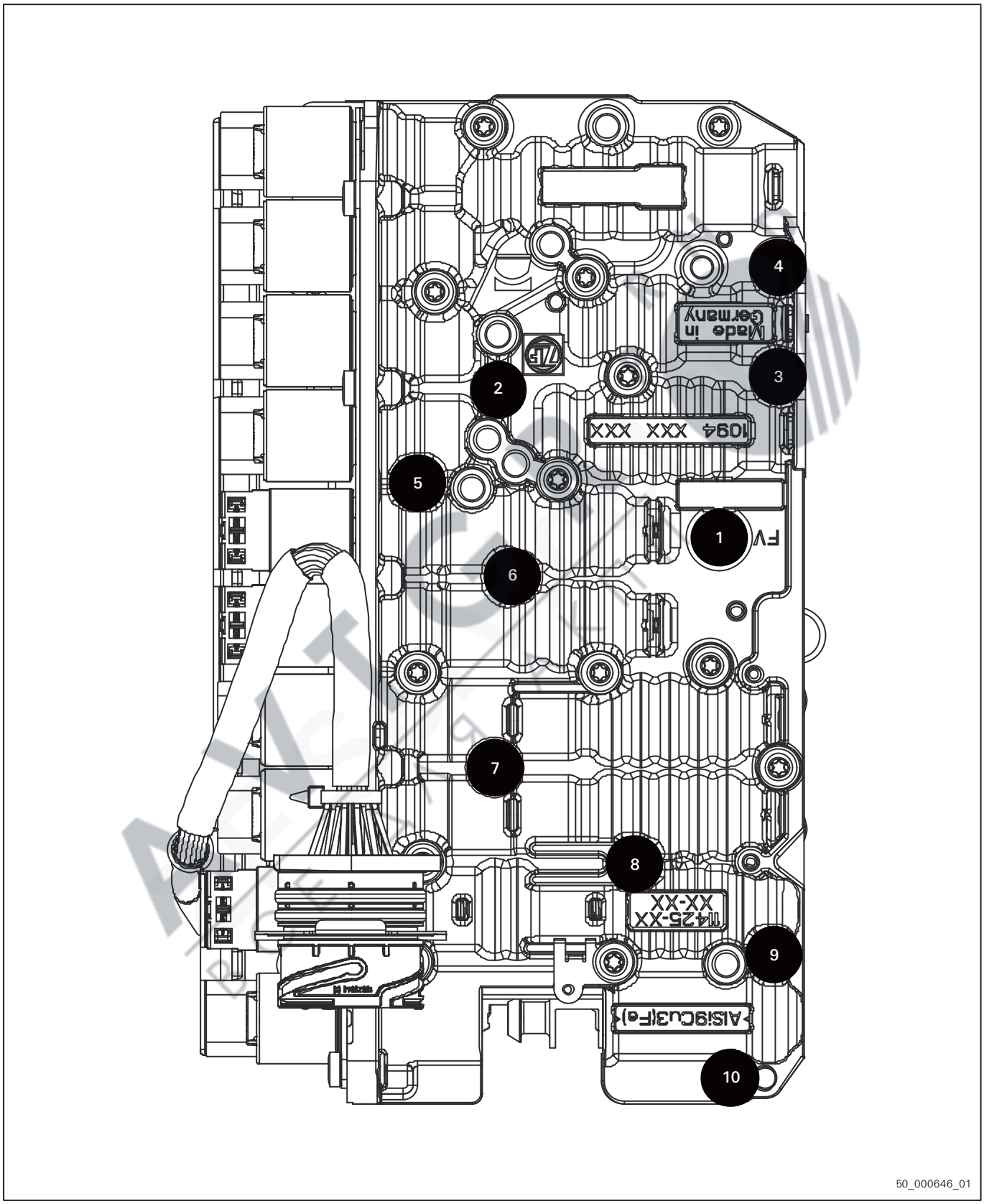


Fig. 223 Vorschrift 1094.700.160

10.9.6 Oil pan

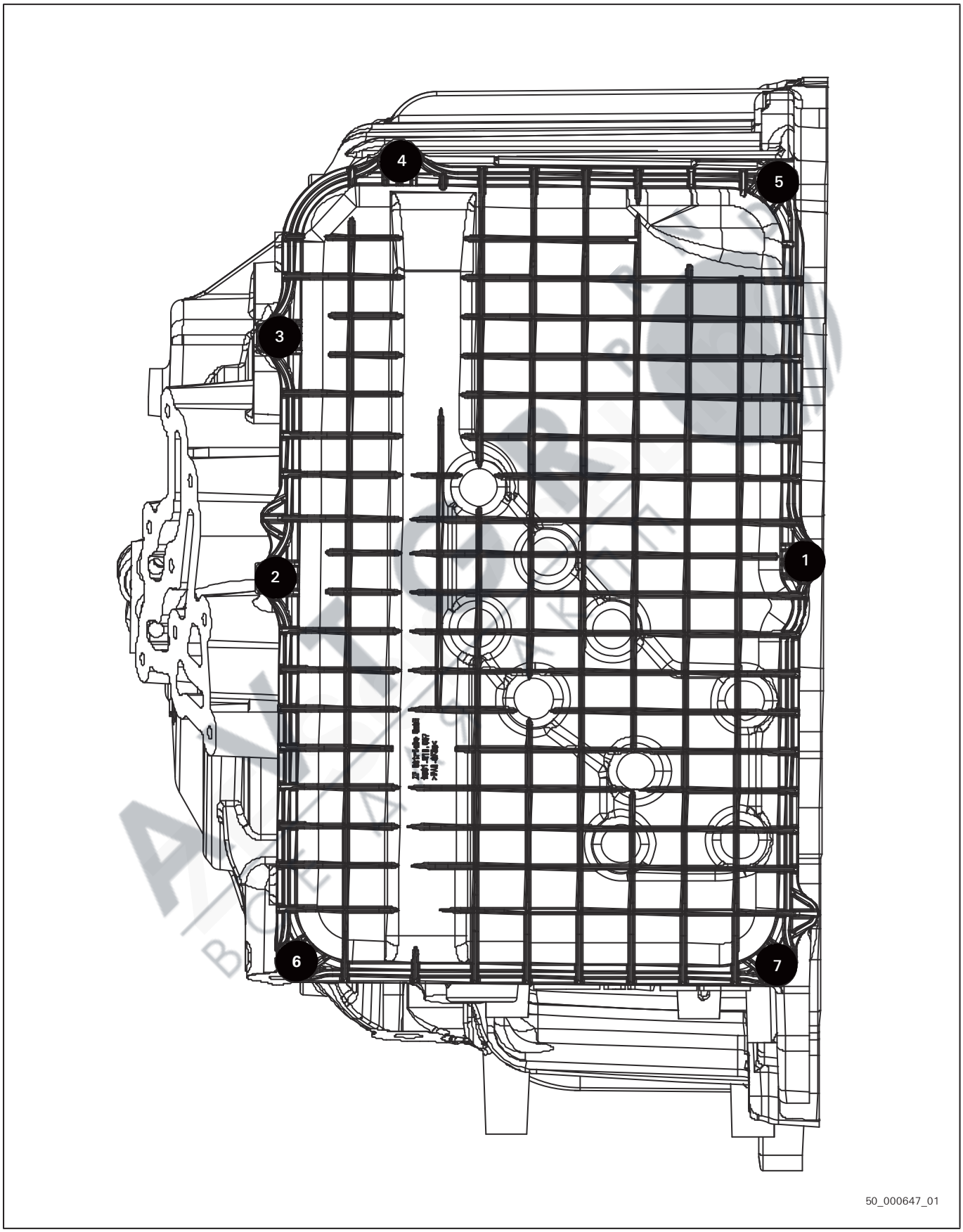


Fig. 224 Specification no. 1094.700.134

11 Assembly

11.1 Assembling transmission housing

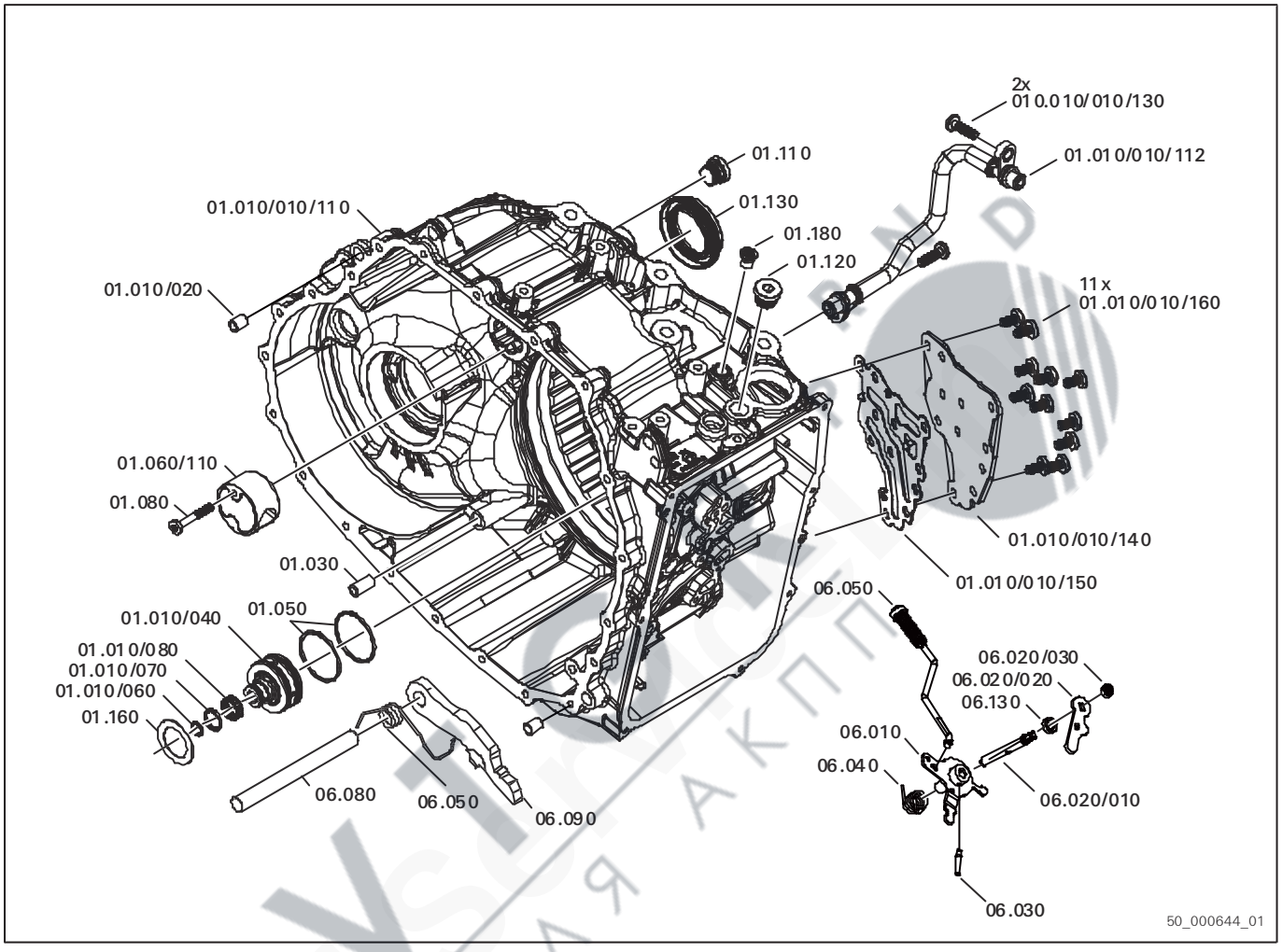


Fig. 225 01 - Transmission housing, 06 - Shift system

11.1.1 Fitting oil feed bush

Special tools:

- AA01.239.914 Supporting fixture
- AA01.249.419 Assembly fixture

1. Fit needle ring (needle roller and cage assemblies) (01.010/080) on oil feed bush (01.010/040).

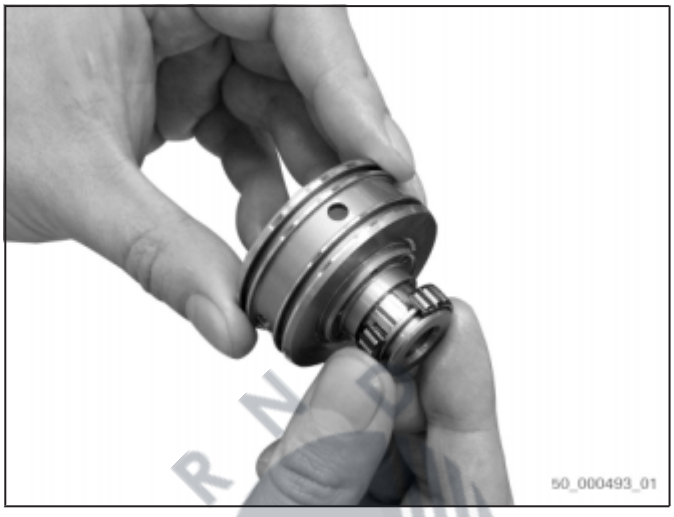


Fig. 226

2. Fit two large rectangular rings (01.050) and small rectangular ring (01.010/070) on oil feed bush.

Fig. 227

3. Fit new O-ring (01.010/060) in oil feed bush.

Fig. 228

4. Insert transmission housing (01.010/110) into dowel pins of AA01.239.914 [Supporting fixture].

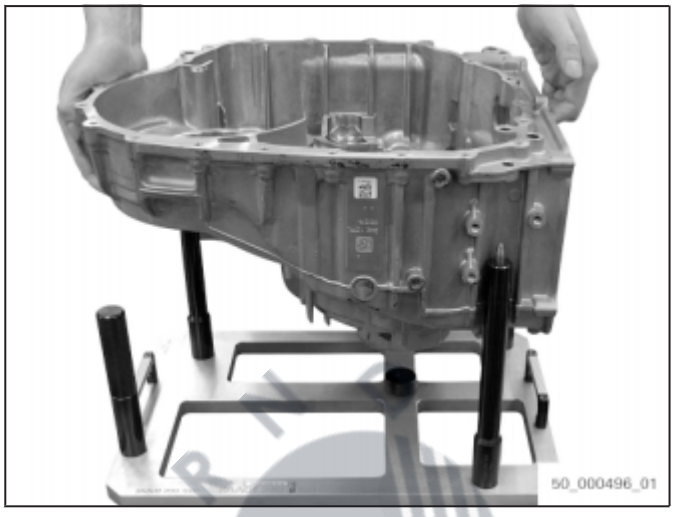


Fig. 229

5. Insert dowel pins of AA01.249.419 [Assembly fixture] into bores of transmission housing.

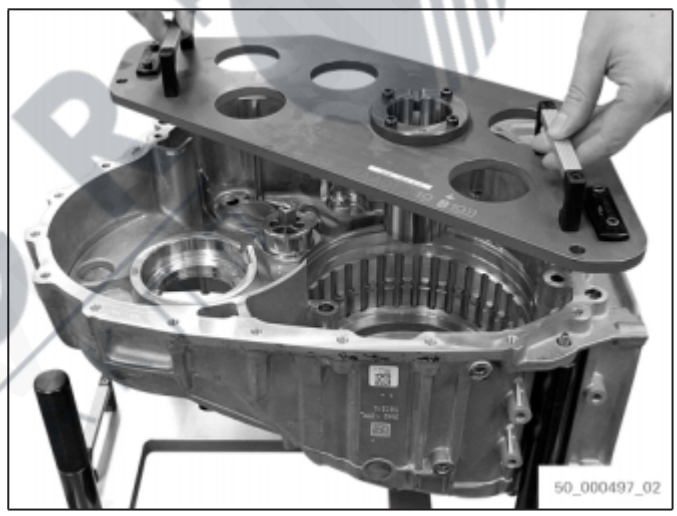


Fig. 230

6. Put transmission housing into press using AA01.249.419 [Assembly fixture].

7. Insert AA01.249.419 [Assembly fixture] into opening together with oil feed bush.

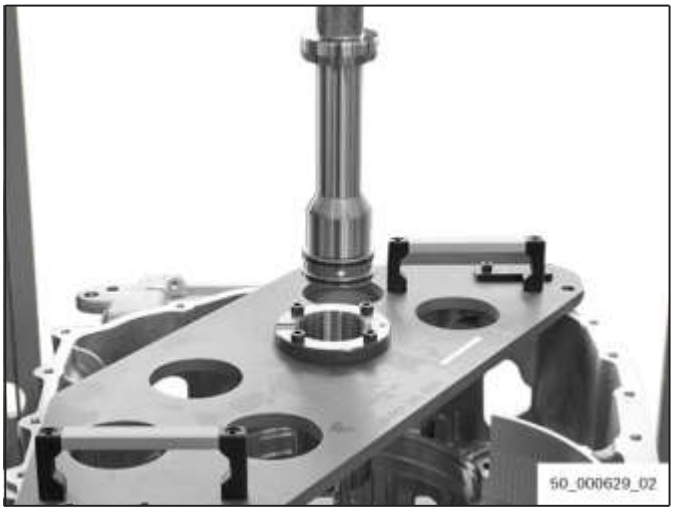


Fig. 231

8. Press in oil feed bush until firmly home using press.

9. Take out AA01.249.419 [Assembly fixture].

10. Hook transmission housing into assembly trolley.

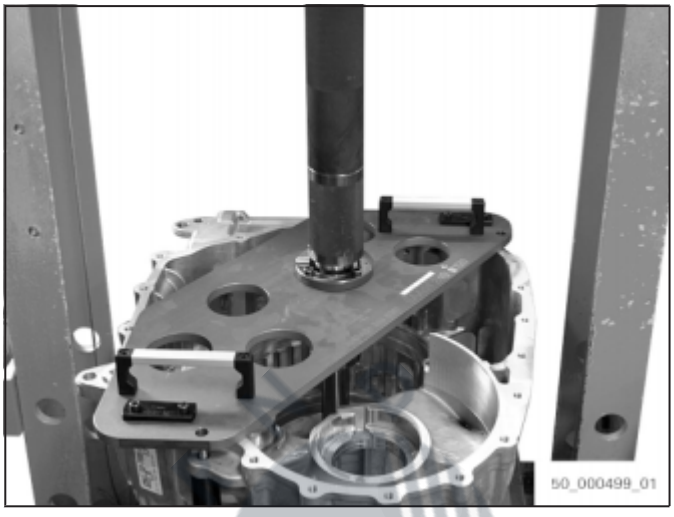


Fig. 232

11. Drive in two new bushes (01.010/020) into transmission housing until firmly home using nonrecoil hammer.

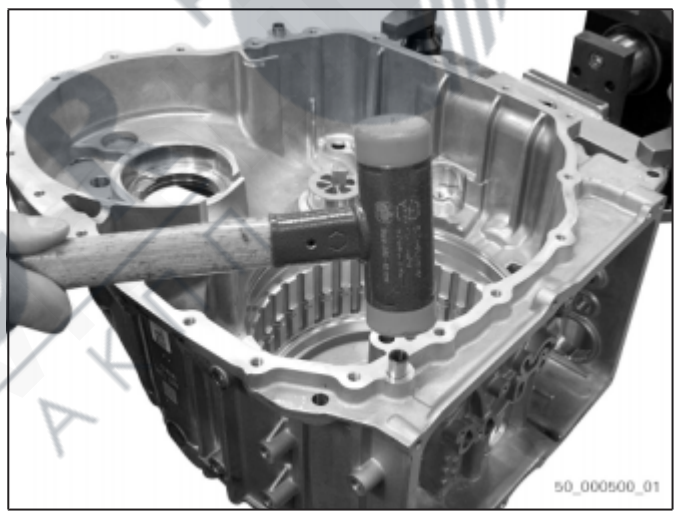


Fig. 233

11.1.2 Fitting cover and oil tube

1. Place transmission with torque converter end facing downwards.

2. Position new seal (01.010/010/150) and cover (01.010/010/140) on ducting. Insert seal with nose pointing towards transmission housing.

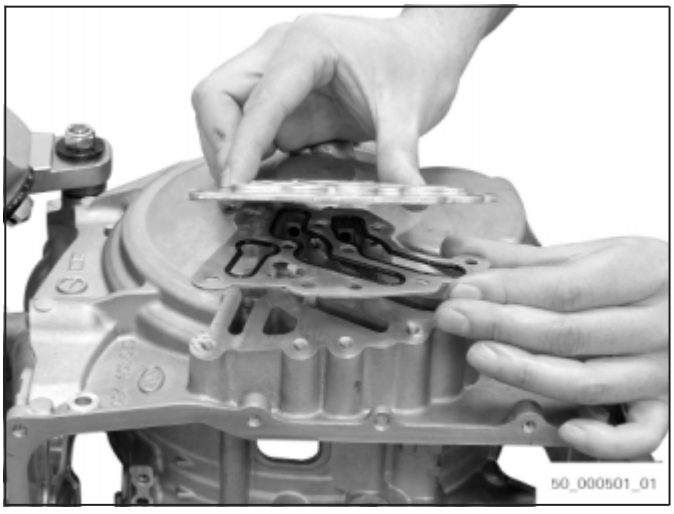


Fig. 234

3.

NOTICE

Material damage possible.

⇨ Observe tightening torque and screw connection directive (refer to section Cover of ducting, page 138).

Screw eleven new M6x15 torx screws (01.010/010/160) into cover of ducting.
Tightening torque: **10 Nm (±1.0 Nm)**

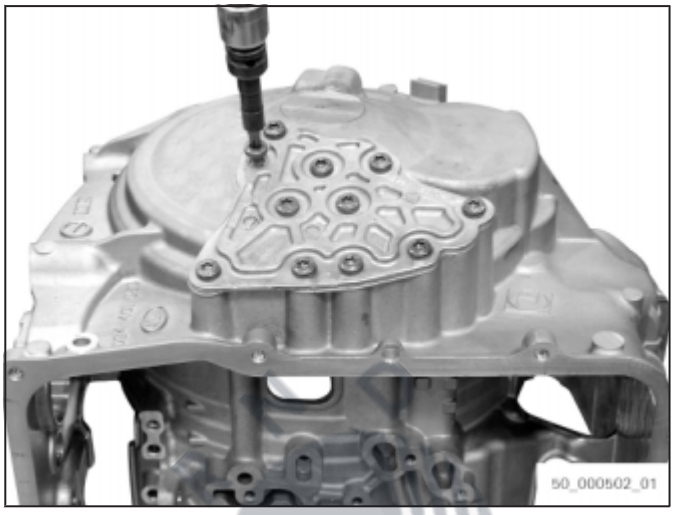


Fig. 235

4. Put two new O-rings (01.010/010/010/112) on oil tube (01.010/010/120).

Fig. 236

5. Fit oil tube at transmission housing.

6. Screw in two new M6x20 torx screws (01.010/010/130).
Tightening torque: **10 Nm (±1.0 Nm)**

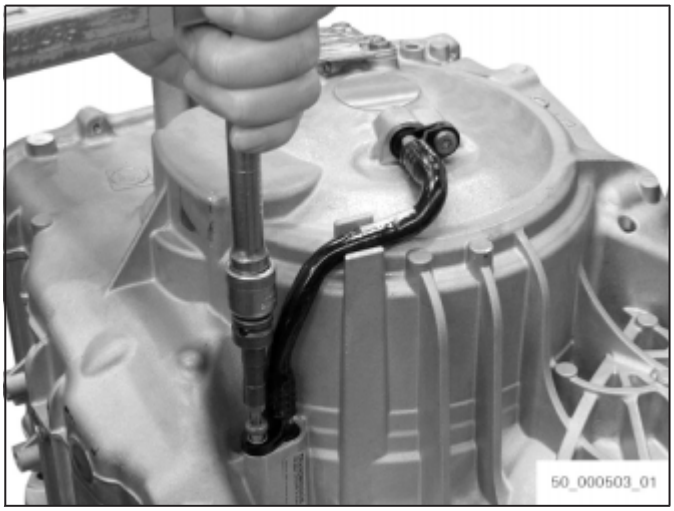


Fig. 237

7. Screw M18x1.5 screw plug (01.110) into transmission housing.
Tightening torque: **35 Nm (±3.5 Nm)**

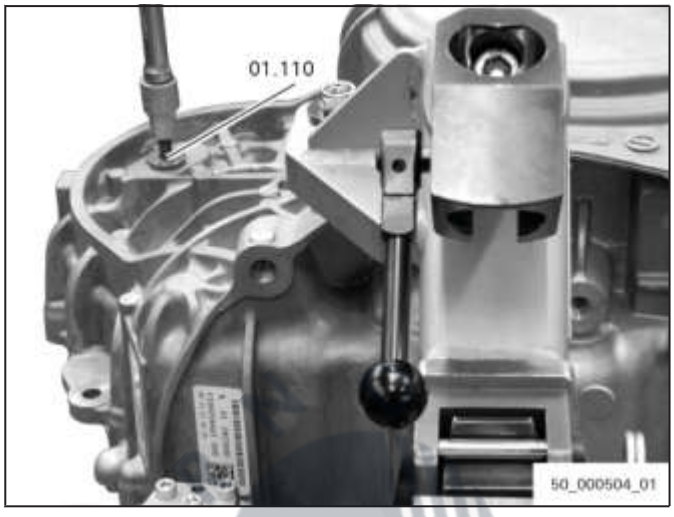


Fig. 238

8. Screw M18x1.5 screw plug (01.120) into transmission housing.
Tightening torque: **35 Nm (±3.5 Nm)**

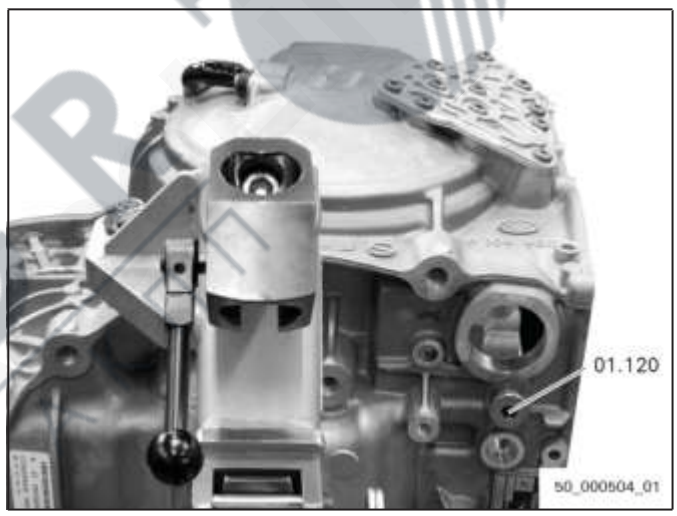


Fig. 239

11.1.3 Completing transmission housing

Special tools:

- AA00.870.485 Assembly fixture
- 5X46.001.368 Press-in device

1. Put breather tube (01.180) on tool and fit in transmission housing.

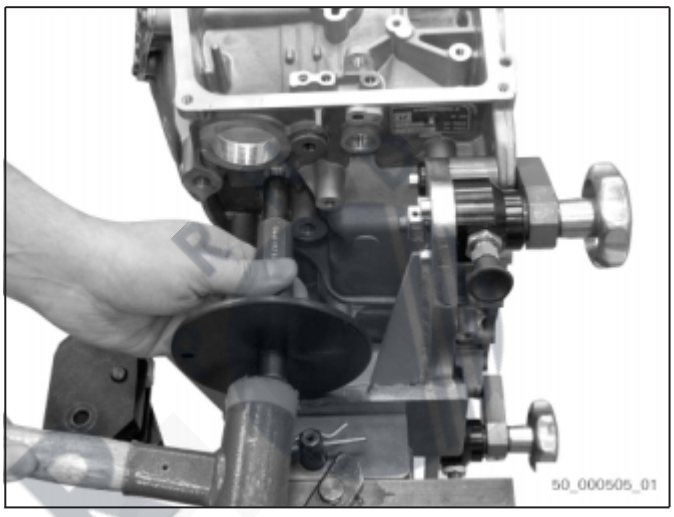


Fig. 240

2. Place transmission housing with torque converter end facing upwards.

3. Insert guide bush (01.060) into transmission housing.

4. Screw M6x42 torx screw (01.090) into guide bush.
   Tightening torque: **12.5 Nm (±1.25 Nm)**

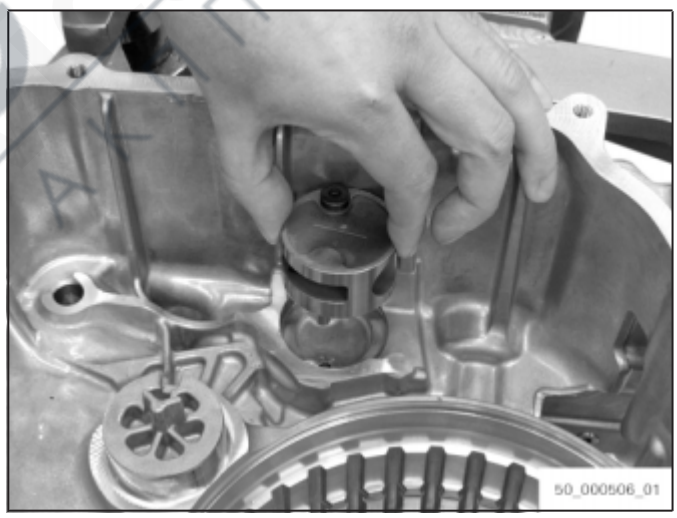


Fig. 241

Fitting parking lock

5. Fit bolt (06.080), ratchet (06.090) and spiral spring (06.060) in transmission housing:
   - Fit ratchet and bolt.
   - Insert ratchet into guide bush.
   - Hook in spiral spring.

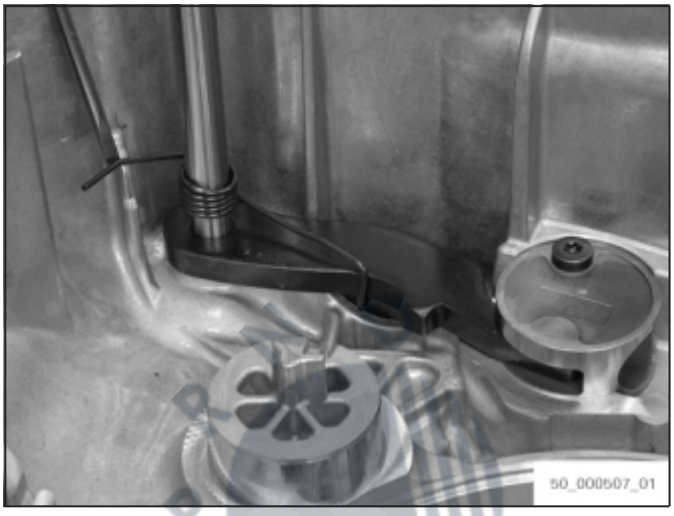


Fig. 242

6. Insert new sealing sleeve (01.030) into transmission housing.

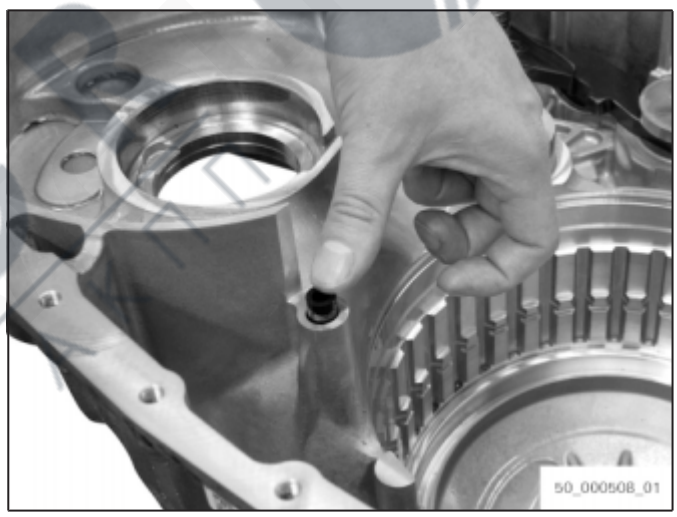


Fig. 243

7. Place transmission housing with oil pan end facing upwards.

8. **NOTICE**

   Damage due to leakage possible.
   ⇨ Use AA00.870.485 [Assembly fixture].

   Drive new shaft sealing ring of selector shaft (06.130) into transmission housing using AA00.870.485 [Assembly fixture].

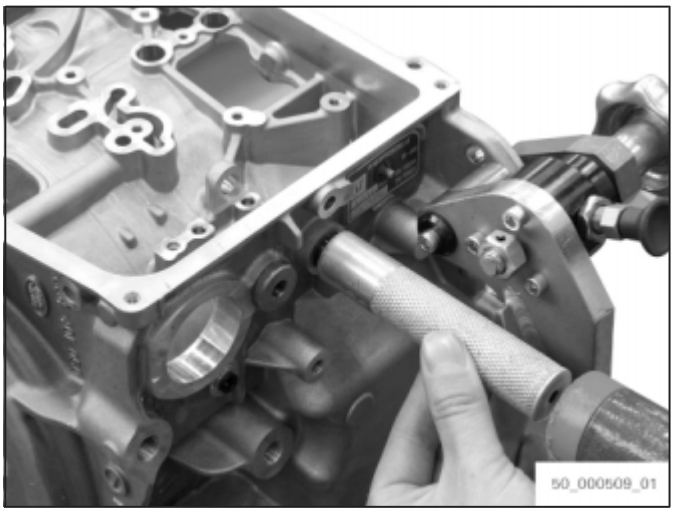


Fig. 244

9. Complete parking disk (06.010), connecting rod (06.050) and spiral spring (06.040) and fit into transmission.

10. Fit connecting rod into guide bush.

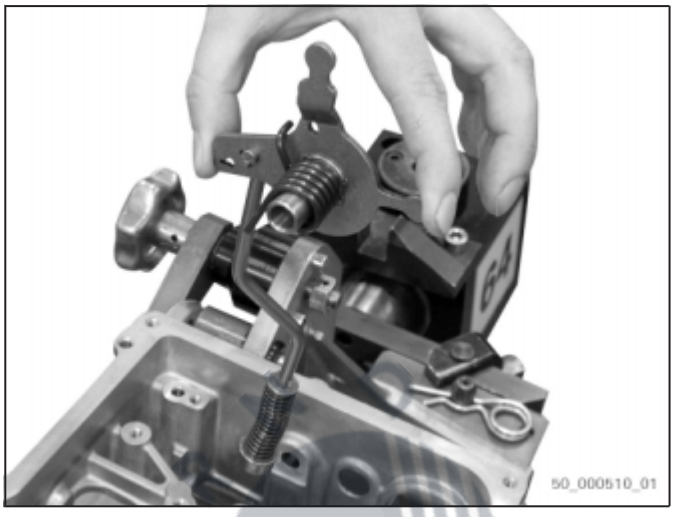


Fig. 245

11. Insert spiral spring into bore.

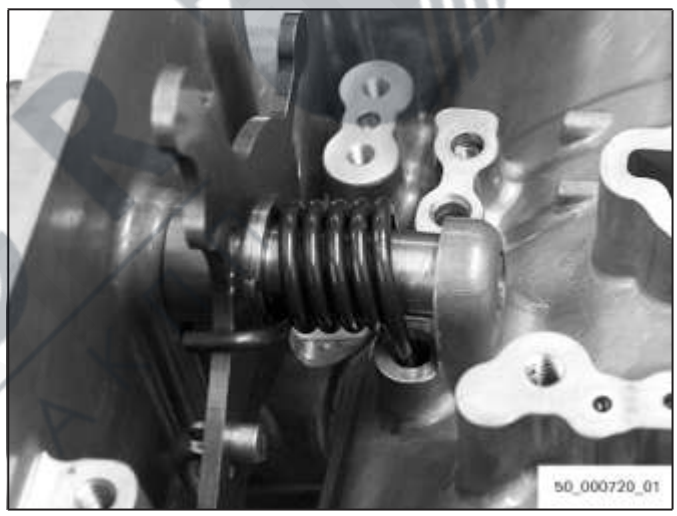


Fig. 246

12. Fit selector shaft (06.020/010) and secure with new nut.

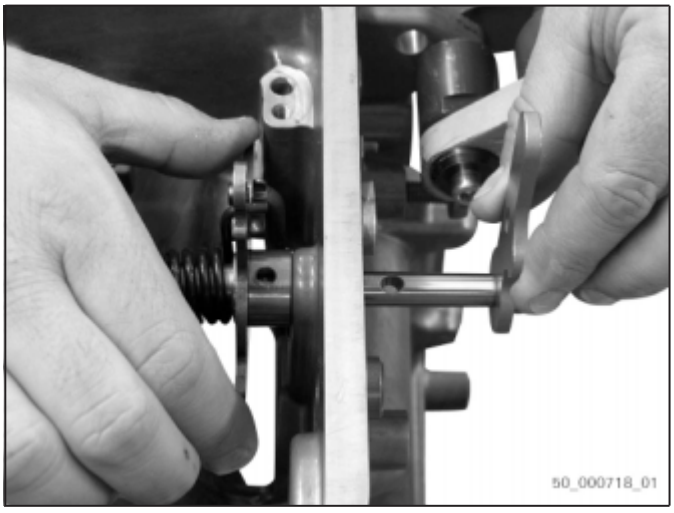


Fig. 247

13. Insert clamping sleeve (06.030) with taper facing forward into 5X46.001.368 [Press-in device].

Fig. 248

14. Drive clamping sleeve through parking disk (06.030) into selector shaft.

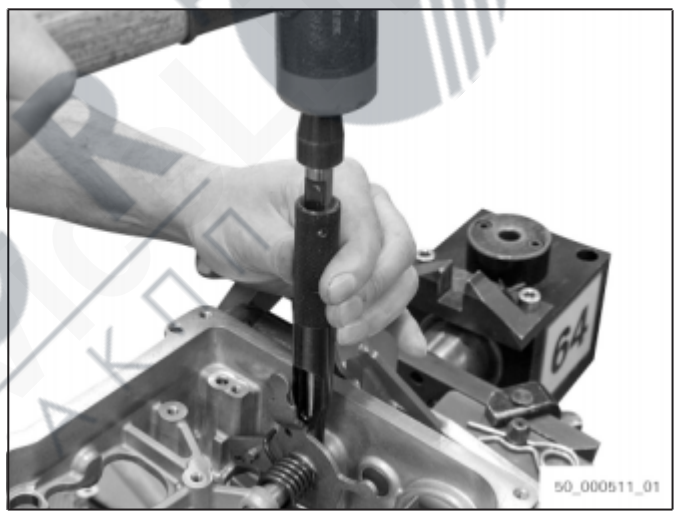


Fig. 249

15. Hook spiral spring into parking disk using a screwdriver or pliers.

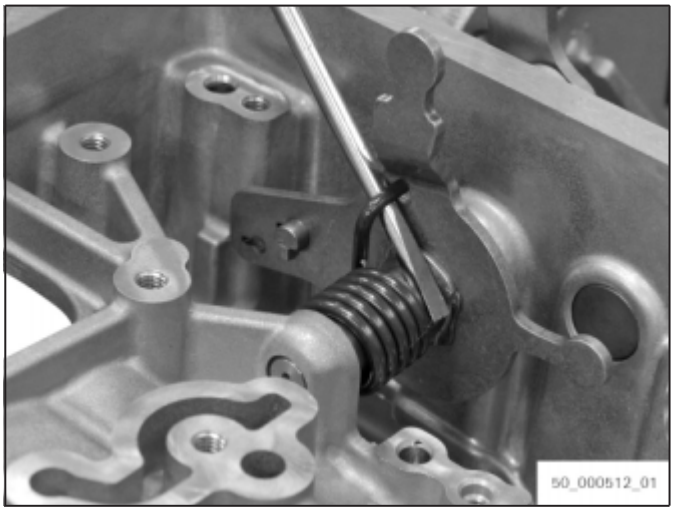


Fig. 250

11.2 Assembling torque converter bell housing

Special tools:

- AA01.233.211 Bracket
- AA00.343.868 Assembly fixture
- AA00.347.308 Assembly fixture
- AA01.158.209 Press-in mandrel

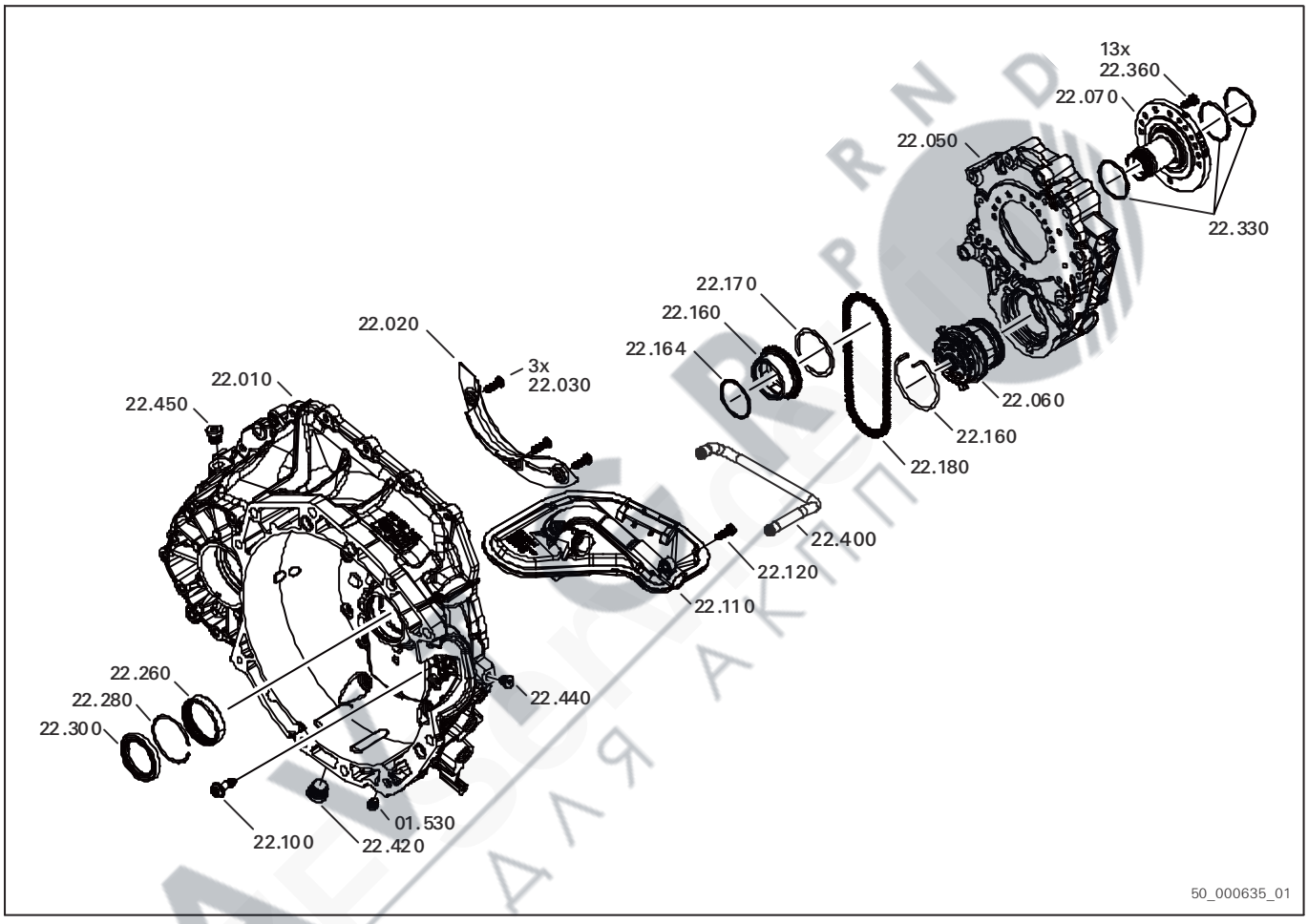


Fig. 251 22 - Torque converter bell housing

1. Get components ready.

Screw in four new screw plugs into torque converter bell housing

2. Screw new M14x1.5 screw plug (22.450) into torque converter bell housing.
Tightening torque: **23 Nm (±2.3 Nm)**

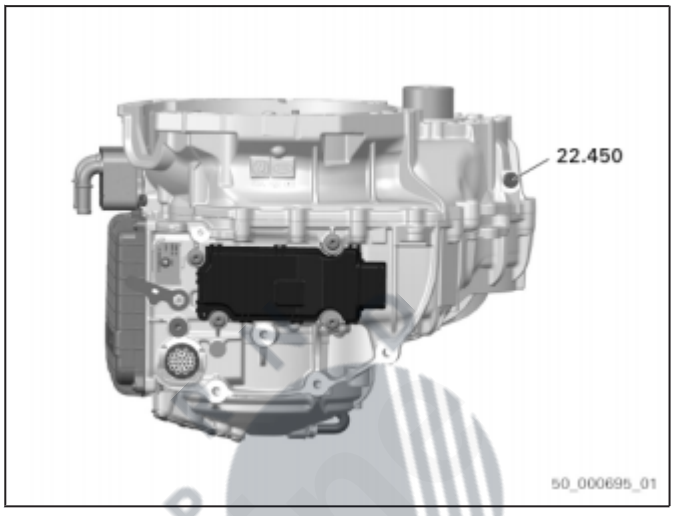


Fig. 252

3. Screw new M10x1 screw plug (22.440) into torque converter bell housing.
Tightening torque: **12 Nm (±1.2 Nm)**

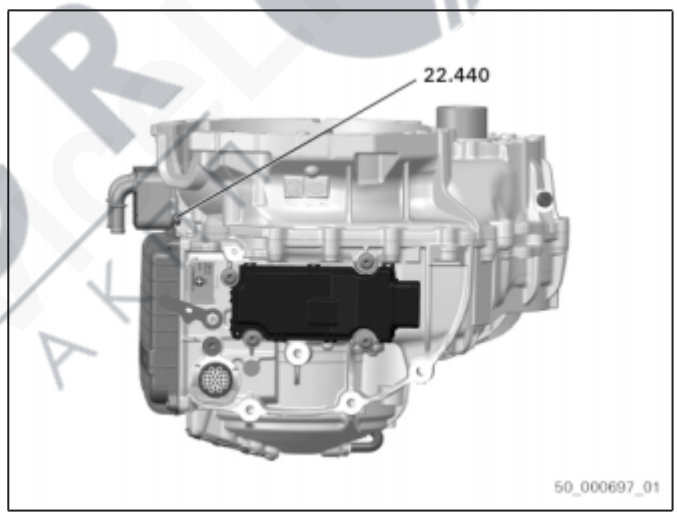


Fig. 253

4. Screw new M18x1.5 screw plug (22.420) into torque converter bell housing.
Tightening torque: **35 Nm (±3.5 Nm)**

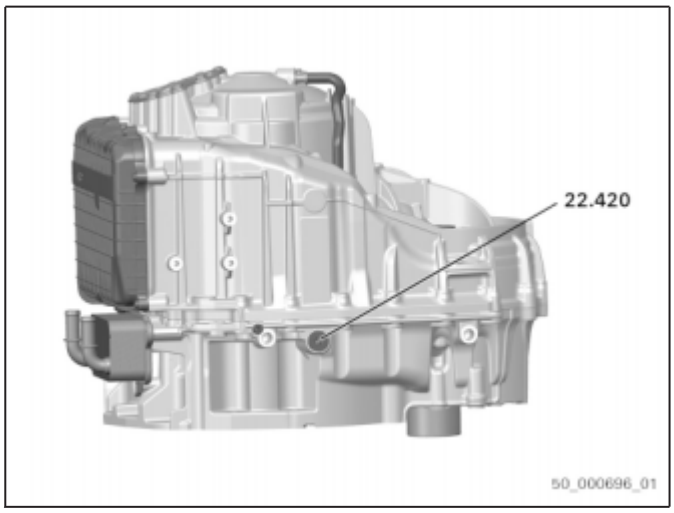


Fig. 254

5. Screw new M8x1 PZT screw plug (01.530) into torque converter bell housing.
Tightening torque: **8 Nm (±0.8 Nm)**

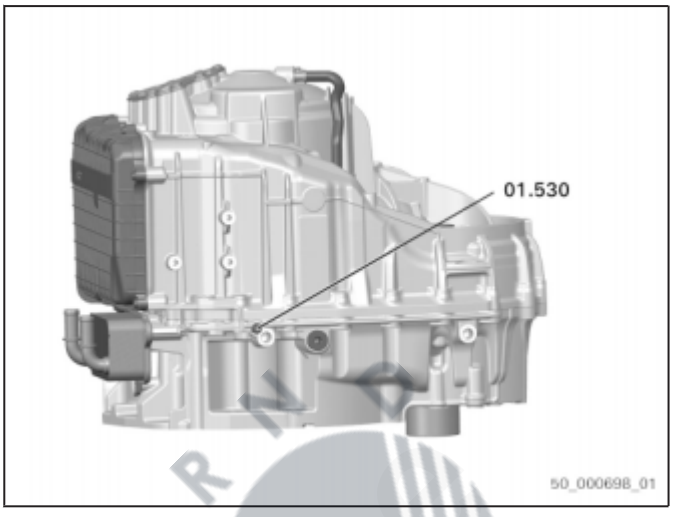


Fig. 255

6. Screw in AA01.233.211 [Bracket] into torque converter bell housing (22.010).

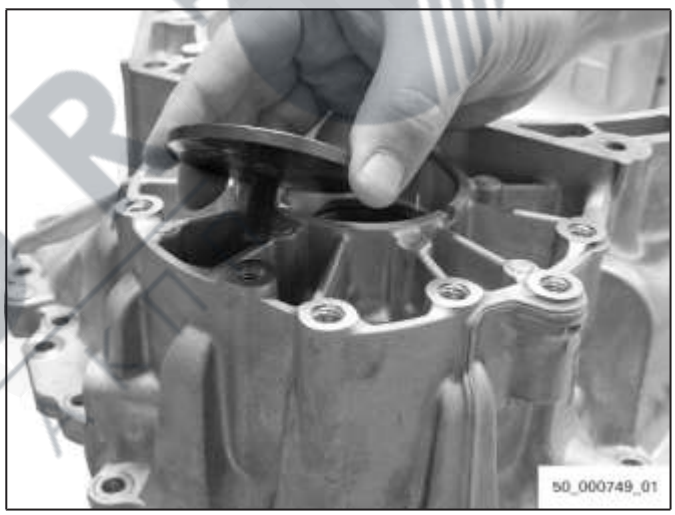


Fig. 256

7. Position torque converter bell housing on AA00.343.868 [Assembly fixture].

8. Put drawn cup needle roller bearing of torque converter bell housing (22.260) on AA00.347.308 [Assembly fixture] and fit.

Fig. 257

9. Secure drawn cup needle roller bearing with snap ring.

Fig. 258

10.

NOTICE

Damage due to leakage possible.

⇨ Use AA01.158.209 [Press-in mandrel].

Put new shaft sealing ring (22.300) on AA01.158.209 [Press-in mandrel].

11. Slide sleeve AA01.158.214 over AA00.343.868 [Assembly fixture].

12. Press in shaft sealing ring.

Fig. 259

11.3 Assembling intermediate plate

Special tools:

- AA01.386.036 Workpiece support
- 5X54.909.346 Press-in device
- AA01.349.059 Press-in mandrel
- AA01.157.946 Press-in mandrel
- AA01.233.211 Bracket

1. Put intermediate plate (22.050) on AA01.386.036 [Workpiece support].

2. Ensure plane positioning.

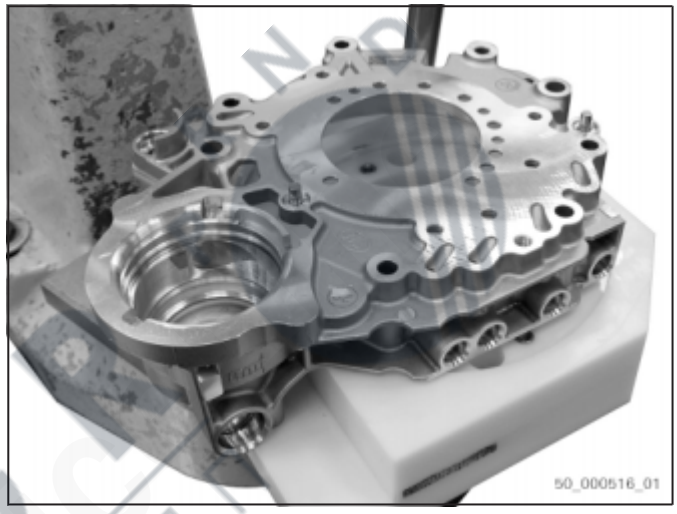


Fig. 260

3.

NOTICE

Damage due to turning of pump possible.

⇨ Do not turn pump.

NOTICE

Positioning dog points at pump might break off.

⇨ Prestress pump with light pressure.

Insert pump into intermediate plate.

Fig. 261

4. Put 5X54.909.346 [Press-in device] on pump (22.150).

5. Position intermediate plate in arbor press and prestress pump.

6. Secure pump with snap ring (22.060).

7. Remove supporting fixture and intermediate plate from arbor press.

8. Check pump after assembly of oil supply.

   Pump must be easily turnable. If this is not the case, a component got jammed during assembly.

   Fit new valve (22.130) in intermediate plate.

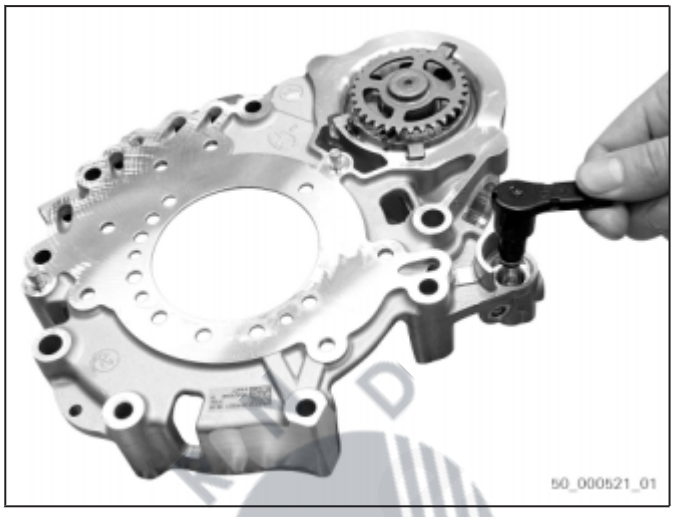


Fig. 262

9. Fit new O-ring (22.164) in chain wheel.

Fig. 263

10. Fit chain (22.180), pump (22.150) and chain wheel (22.160) in intermediate plate:
    - Hold chain between pump and chain wheel under tension.

11. Put intermediate plate in torque converter bell housing and position over dowel pins.

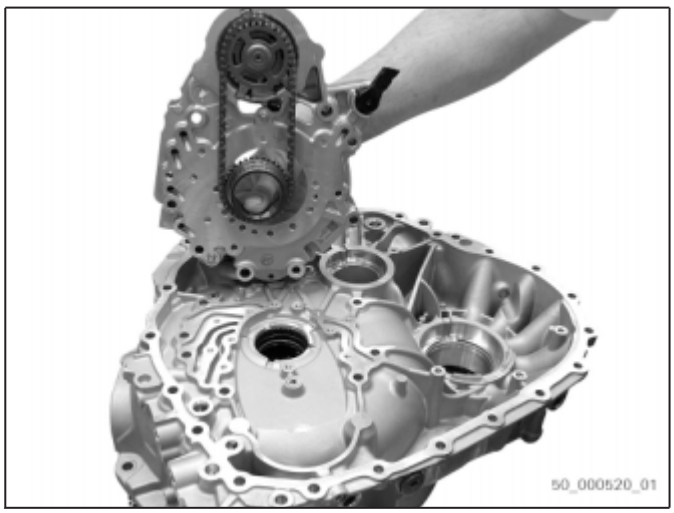


Fig. 264

12.

NOTICE

Material damage possible.

⇨ Observe tightening torque and screw connection directive (refer to section Oil supply, page 139).

Screw six new M6x17 screws (22.360) into intermediate plate.
Tightening torque: **10 Nm (±1.0 Nm)**

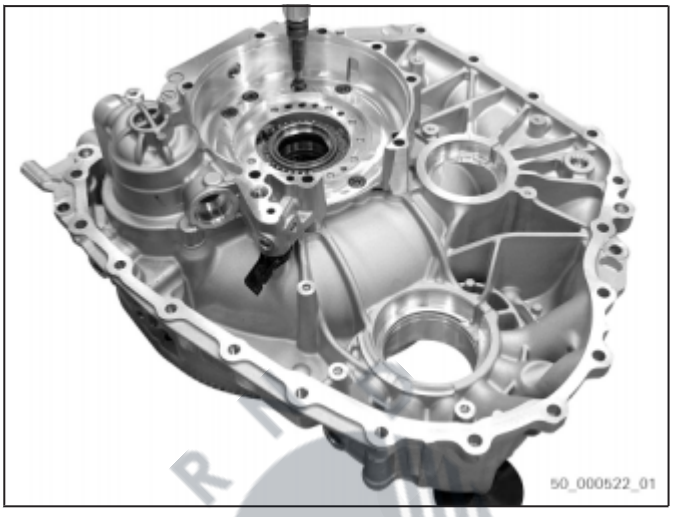


Fig. 265

13.

NOTICE

Material damage possible.

⇨ Set axial clearance of chain wheel (refer to section Setting axial clearance of chain wheel, page 102).

Put adjustment plate (22.170) into chain wheel.

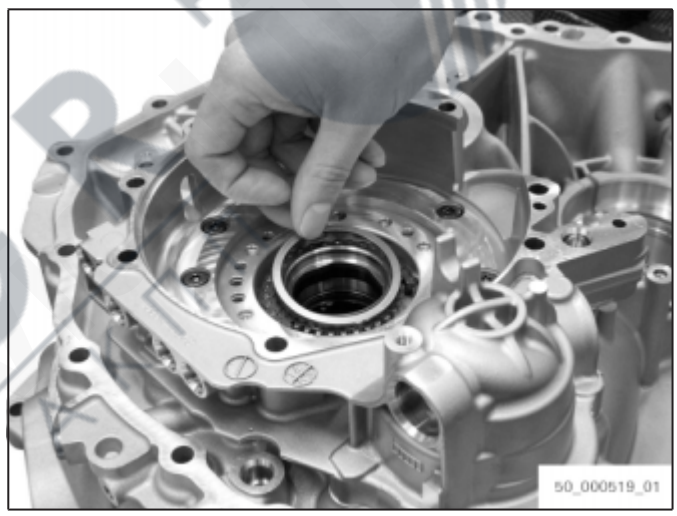


Fig. 266

14. Fit two new rectangular rings (22.330) above the stator shaft screw flange.

15. Fit new rectangular ring (22.330) below stator shaft screw flange.

Fig. 267

16. Insert stator shaft (22.070) into chain wheel.

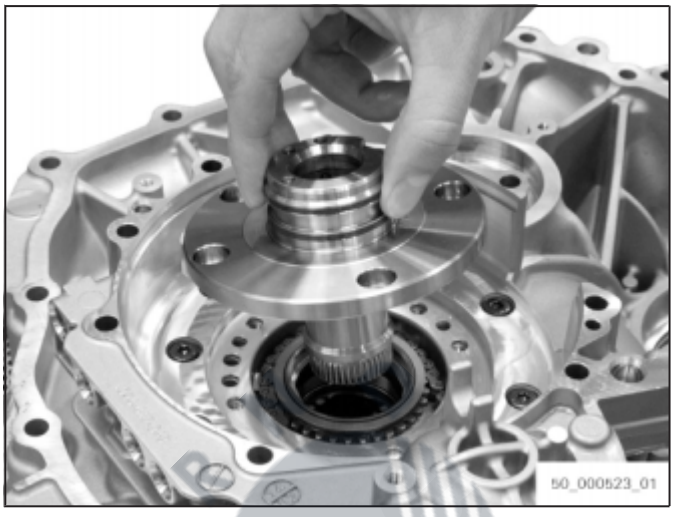


Fig. 268

17.

NOTICE

Material damage possible.

⇨ Observe tightening torque and screw connection directive (refer to section Torque converter bell housing / transmission housing, page 141).

Screw down stator shaft and intermediate plate using seven new M6x17 torx screws (22.360).
Tightening torque: **10 Nm (±1.0 Nm)**

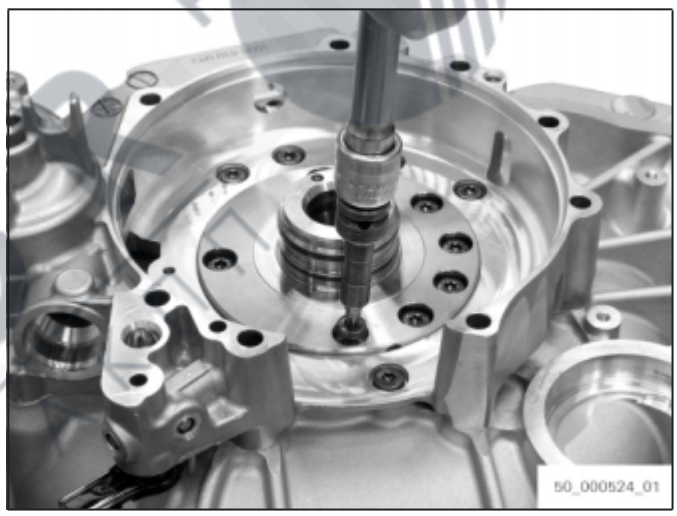


Fig. 269

18. Put two new O-rings (22.400/120) on oil tube (22.400).

19. Fit oil tube in intermediate plate.

Fig. 270

20. Fit oil filter (22.110) in intermediate plate.

21. Screw M6x22 torx screw (22.120) into oil filter.
Tightening torque: **7,5 Nm (±0,75 Nm)**

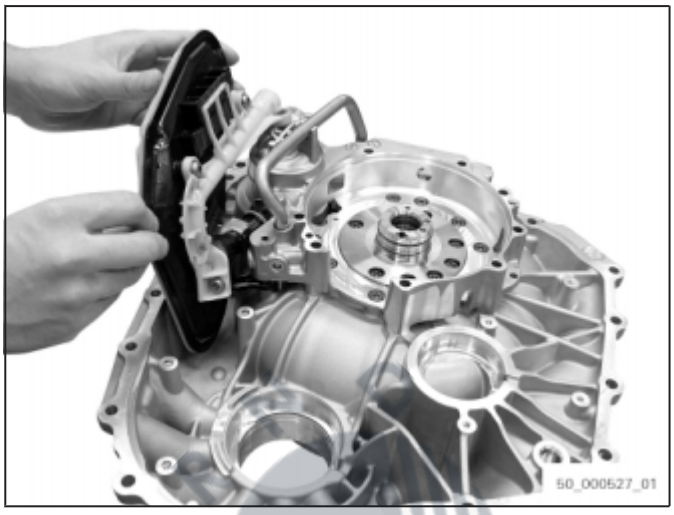


Fig. 271

22.

NOTICE

Damage due to incorrect installation possible.

⇨ Do not mix up bearing cups.

⇨ Do not cant bearing cups.

Fit bearing cup of intermediate shaft (09.010/120) using AA01.349.059 [Press-in mandrel].

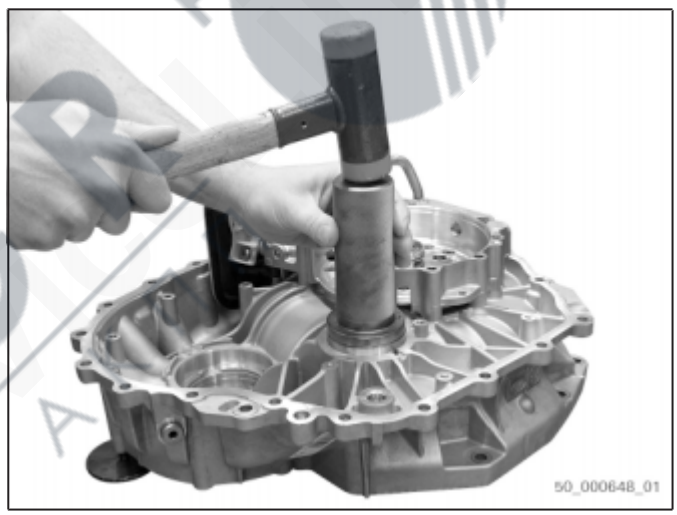


Fig. 272

23.

NOTICE

Damage due to incorrect installation possible.

⇨ Do not mix up bearing cups.

⇨ Do not cant bearing cups.

Fit bearing cup of differential (09.150/120) using AA01.157.946 [Press-in mandrel].

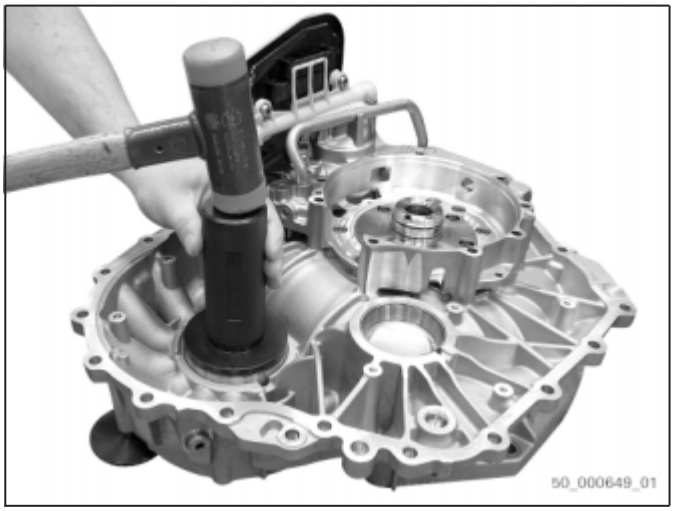


Fig. 273

24. Fit oil baffle plate (22.020).

25. Secure oil baffle plate using three M6x22 torx screws (22.030).
Tightening torque: **10 Nm (±1.0 Nm)**

26. Remove AA01.233.211 [Bracket].

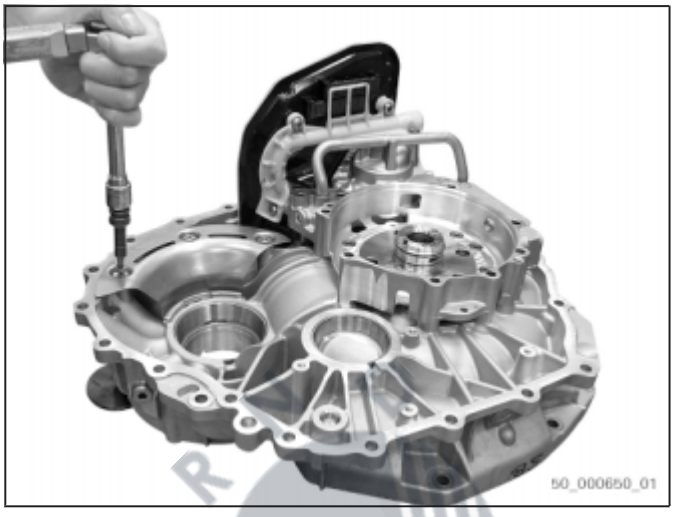


Fig. 274

11.4 Assembling clutch B and input shaft

Special tools:

- 5X54.909.301 Assembly fixture
- AA01.211.988 Supporting fixture
- 5X54.909.311 Press-in device

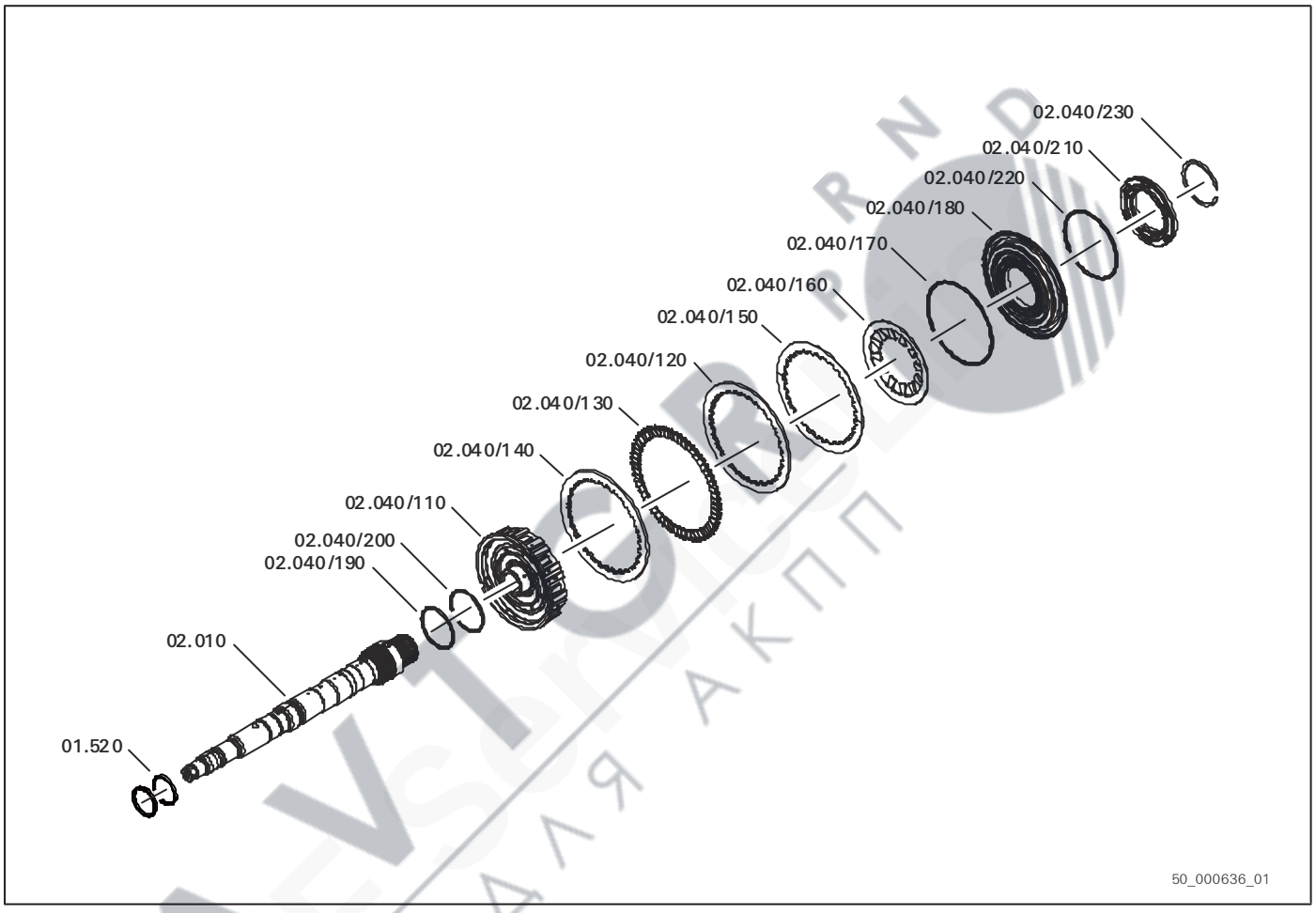


Fig. 275 02 - clutch B and input shaft

1. Get components ready.

2. Pull two O-rings (02.040/190) (02.040/200) onto multidisk carrier B (02.040/110).

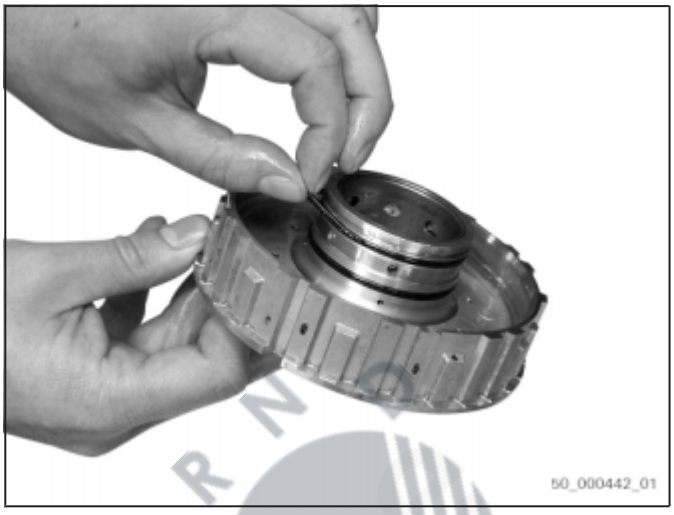


Fig. 276

3. Fit disk spring (02.040/160).

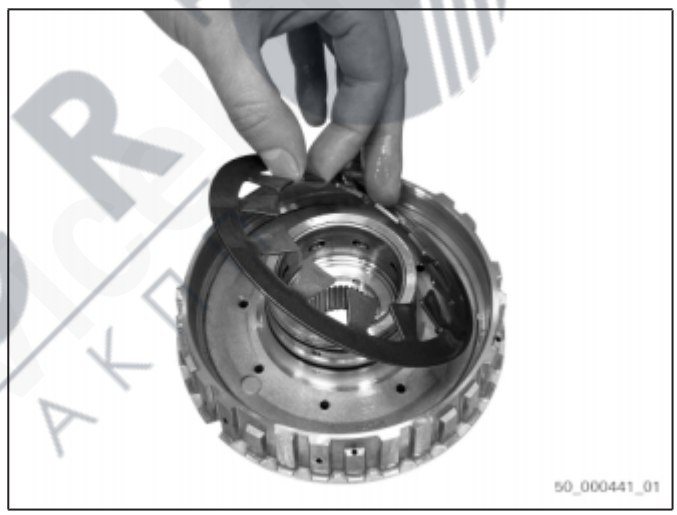


Fig. 277

4. Pull new O-ring (02.040/170) onto piston B (02.040/180).

Fig. 278

5. Pull new O-ring (02.040/220) onto supporting ring (02.040/210).

Fig. 279

6.

NOTICE

Material damage possible.

⇨ Observe running clearance setting of clutch B (refer to section Setting running clearance of clutch B, page 104).

Put multidisk package of clutch B on multidisk carrier:

- End disk (02.040/140)
- Lined clutch disks (02.040/130) and inner clutch disks (02.040/120) in alternating way
- Wave spring (02.040/150)

Fig. 280

7. Assemble piston B and supporting ring.

8. Insert piston B and supporting ring into multidisk carrier.

Fig. 281

9. Position clutch B in arbor press.

10. Put 5X54.909.301 [Assembly fixture] and press in snap ring (02.040/230).

Fig. 282

11. Put input shaft (02.010) into AA01.211.988 [Supporting fixture].

Fig. 283

12. Position clutch B on input shaft.

13. Put 5X54.909.311 [Press-in device] on input shaft and press in snap ring.

14. Remove input shaft from AA01.211.988 [Supporting fixture].

Fig. 284

11.5 Assembling ring gear 2/multidisk carrier B/C/D

Special tools:

- AA01.211.988 Supporting fixture
- 5X54.909.312 Press-in device

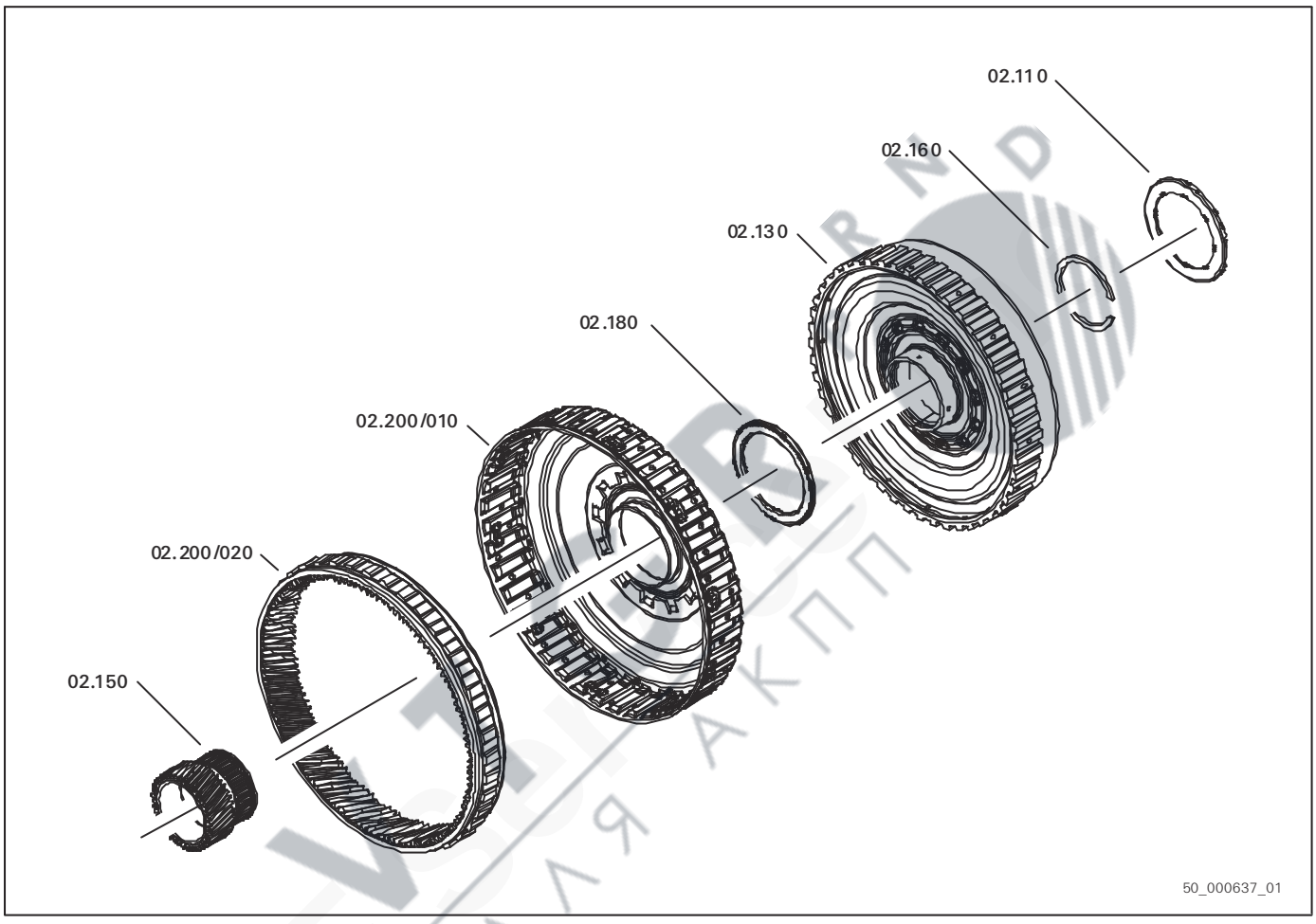


Fig. 285 02 - clutch B

1. Get components ready.

2. Put sun gear 1 (02.150) on AA01.211.988 [Supporting fixture].

3. Put multidisk carrier D (02.200/010) with ring gear 2 (02.200/020) on sun gear 1.

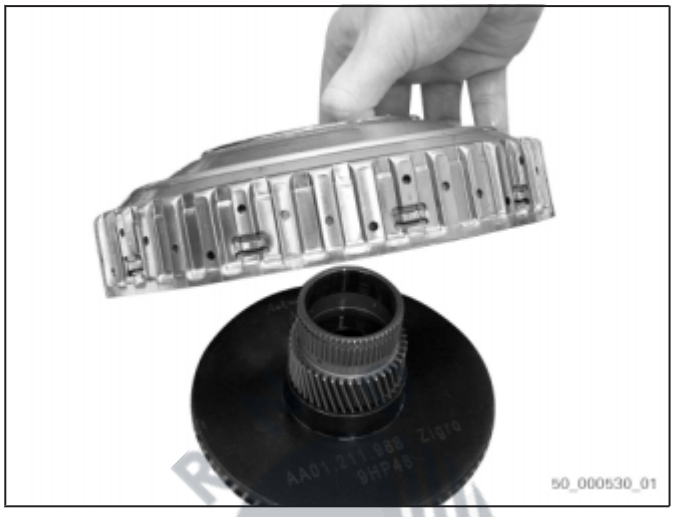


Fig. 286

4. Fit axial needle bearing (02.180) in multidisk carrier B/C (02.130).

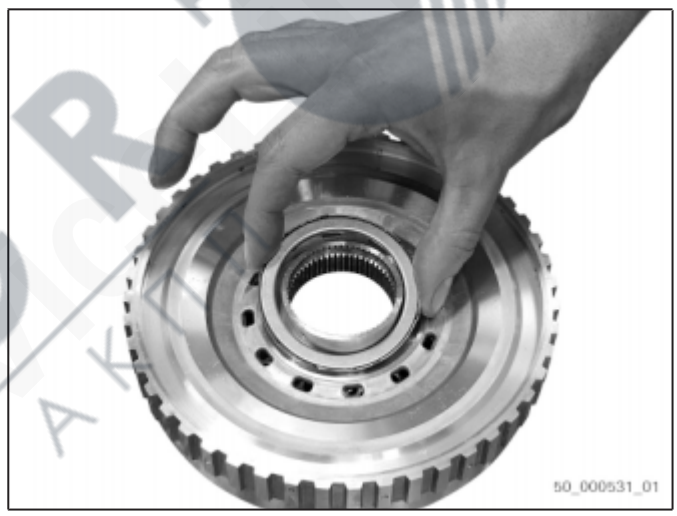


Fig. 287

5. Put multidisk carrier B/C on multidisk carrier D.

Fig. 288

6. Put 5X54.909.312 [Press-in device] on sun gear and secure multidisk carrier B/C with snap ring (02.160).

Fig. 289

7. Mount axial needle bearing (02.110) on multidisk carrier B/C.

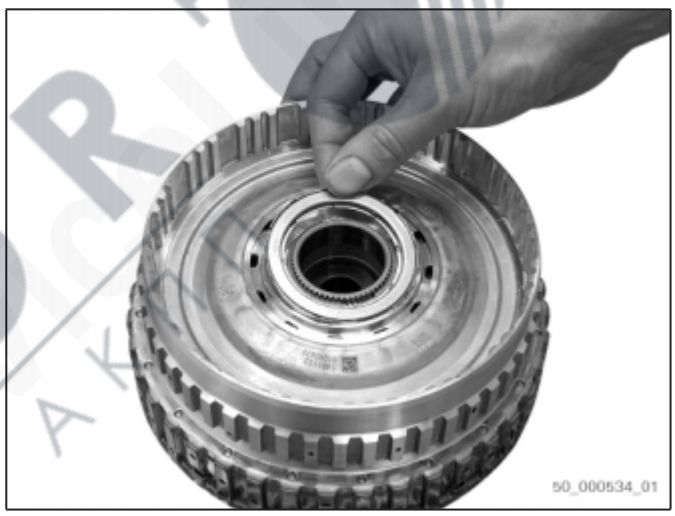


Fig. 290

11.6 Assembling planetary gearset 1/2

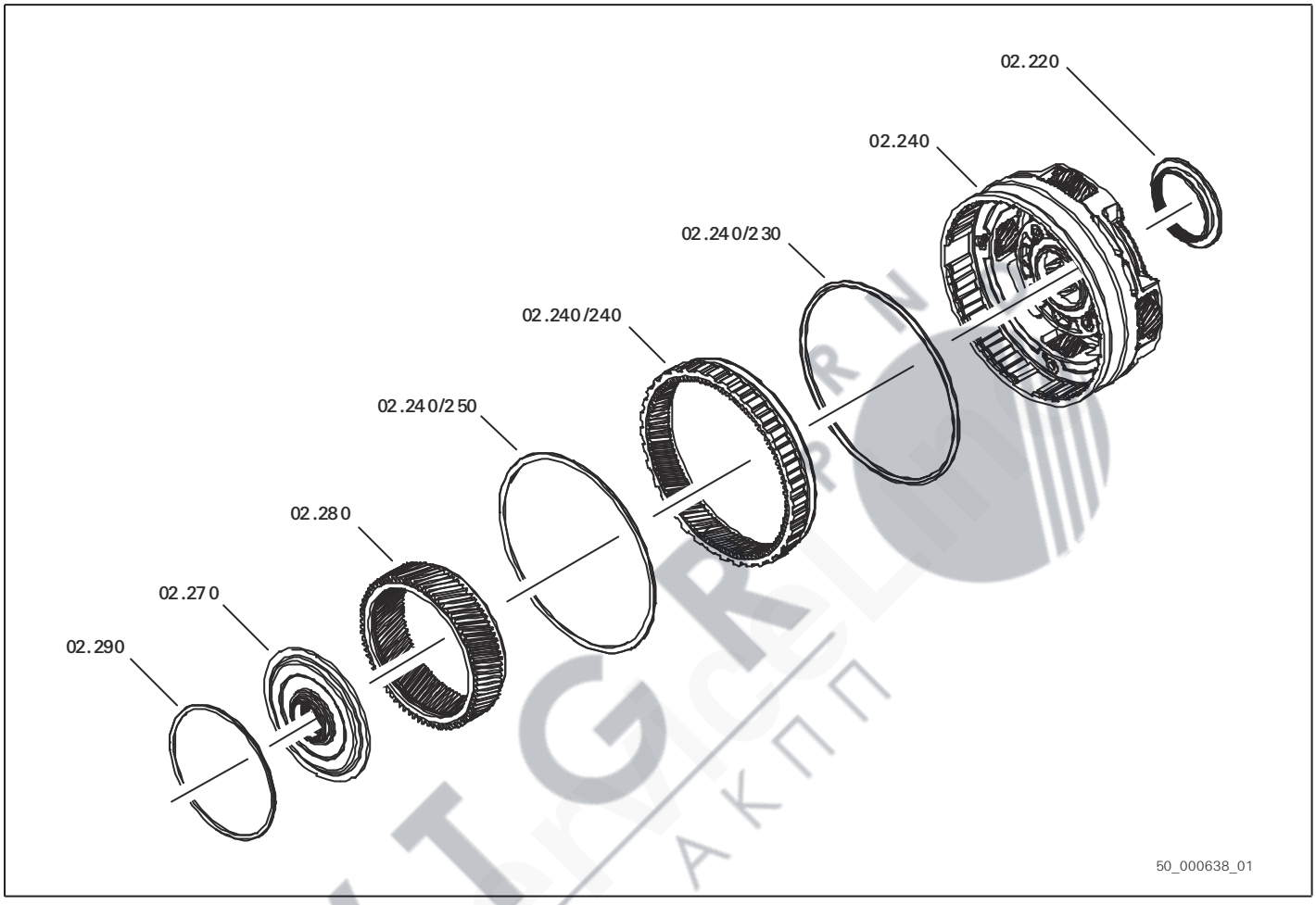


Fig. 291 02 - input

1. Get components ready.
2. Put planet carrier 1/2 (02.240) into arbor press.
3. Fit combination bearing (02.220) in planet carrier 1/2 using suitable thrust piece.
4. Turn around planet carrier 1/2.

Fig. 292

5. Fit new O-ring (02.240/230) in planetary gearset 1/2.

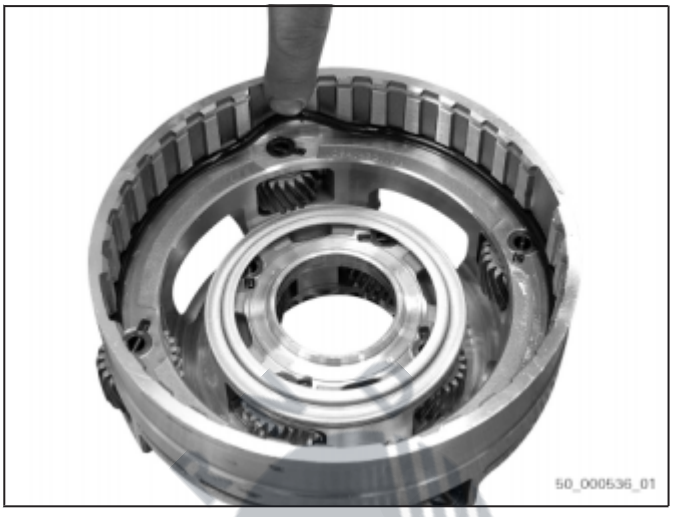


Fig. 293

6. Fit ring gear 3 (02.240/240) in planet carrier 1/2.

7. Secure ring gear 3 with snap ring (02.240/250).

Fig. 294

8. Secure ring gear carrier (02.270) and sun gear 2/ring gear 1 (02.280) with snap ring (02.290).

Fig. 295

9. Insert axial needle bearing (02.250) into ring gear carrier.

Fig. 296

10. Put ring gear 1/sun gear 2 into planet carrier 1/2.

Fig. 297

11.7 Assembling planetary gearset 4

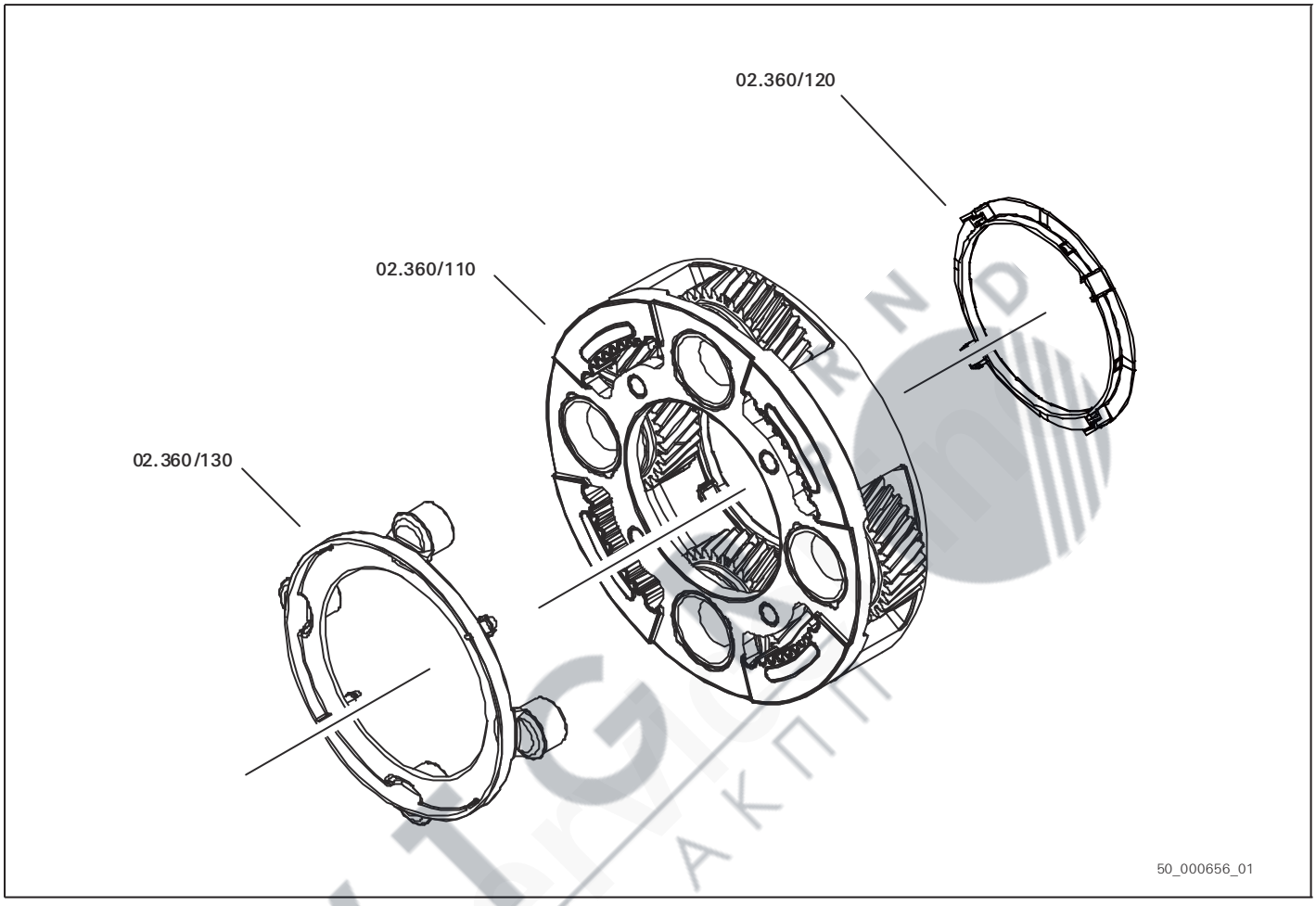


Fig. 298 02 - input

1. Get components ready.
2. Fit oil drip pan (02.360/130) in planet carrier 4 (02.360/110).
3. Turn around planet carrier 4.

Fig. 299

4. Fit axial plain bearing in planet carrier 4 (02.360/120).

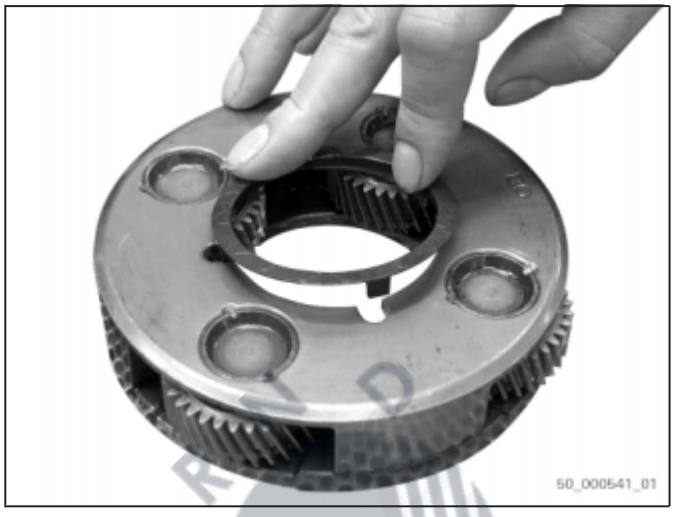


Fig. 300

11.8 Assembling bearing support

Special tools:

- 5X46.909.841 Holder
- AA00.622.346 Assembly sleeve
- 5X46.004.173 Centering ring
- AA01.216.173 Press-in mandrel
- 5X46.909.843 Assembly sleeve
- AA01.215.336 Socket wrench
- AA01.215.392 Staking device

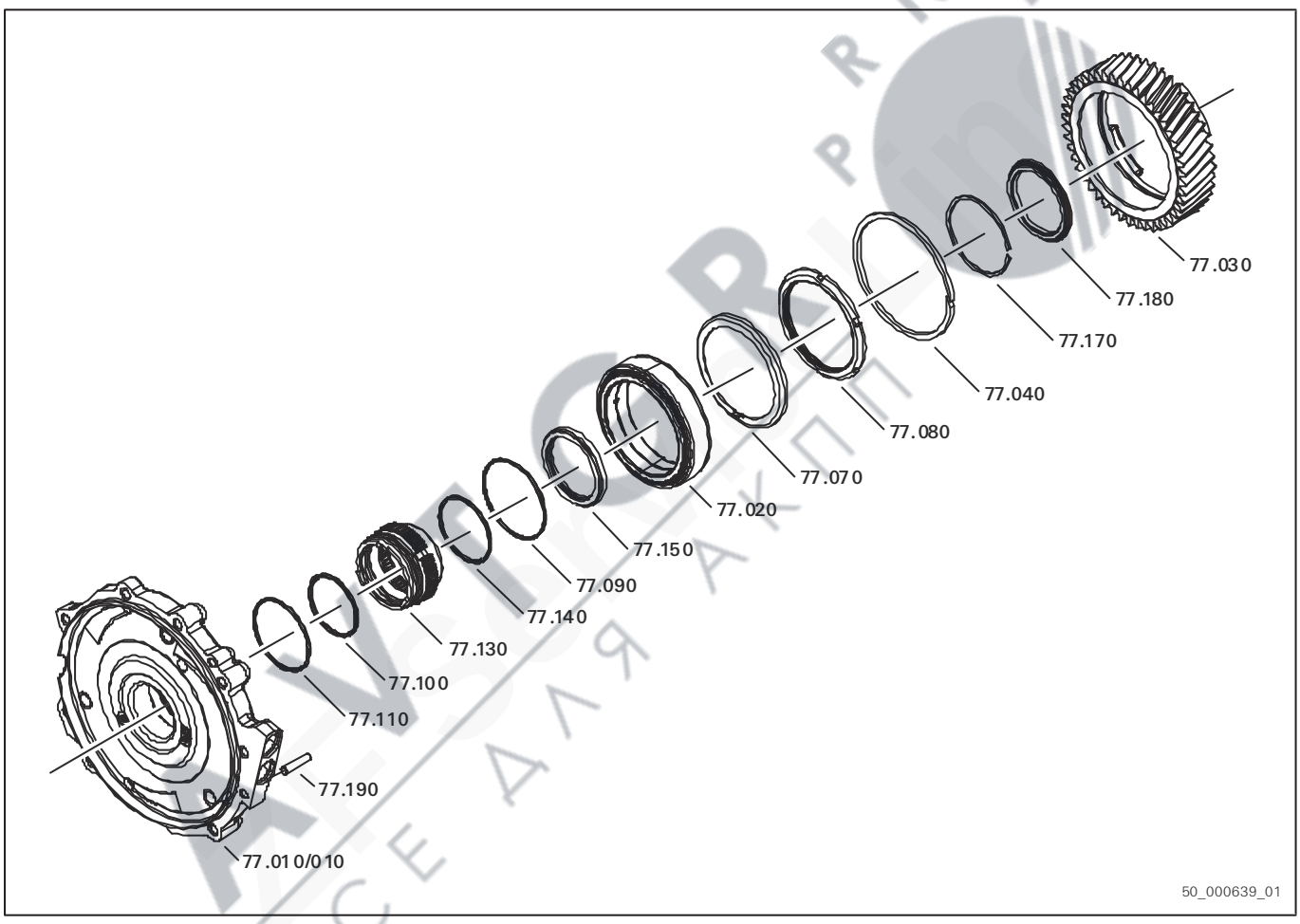


Fig. 301 77 - Lagerträger

1. Get components ready.

2. Fit new black O-ring (77.100) in dog F (77.130).

3. Put new blue O-ring (77.110) onto dog F.

Fig. 302

4. Fit new blue O-ring (77.140) in bearing ring (77.180).

Fig. 303

5. The chamfered edge of the bearing ring must face downwards.

Fit bearing ring on dog F.

Fig. 304

6. Fit new blue O-ring (77.090) in bearing support.

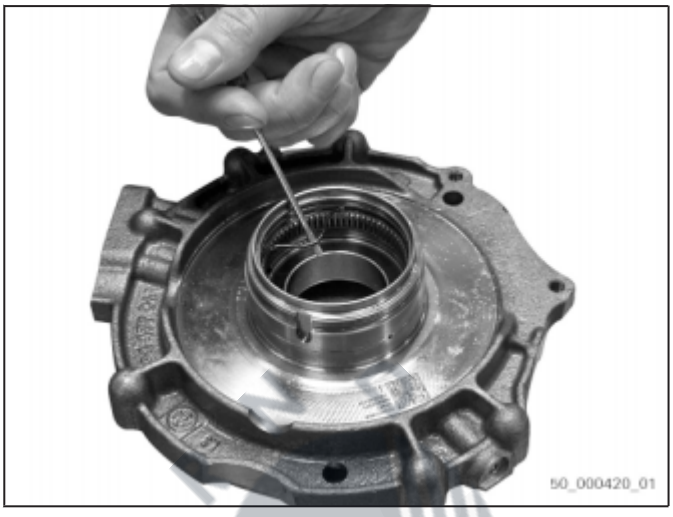


Fig. 305

7. Insert bearing support (77.010/010) with dowel pin into 5X46.909.841 [Holder] and screw down with four screws.

8. Turn around bearing support using 5X46.909.841 [Holder].

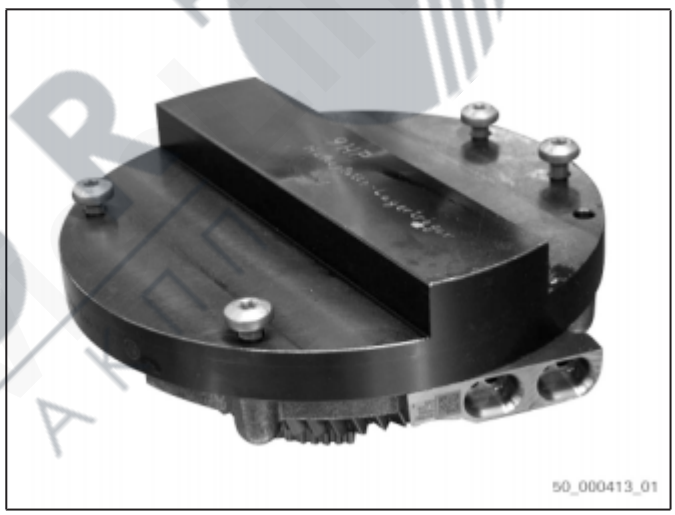


Fig. 306

9. Insert bearing support into arbor press.

10. Insert dog F into bearing support.

11. Put AA00.622.346 [Assembly sleeve] on dog F and press in.

12. Secure dog F with snap ring (77.170).

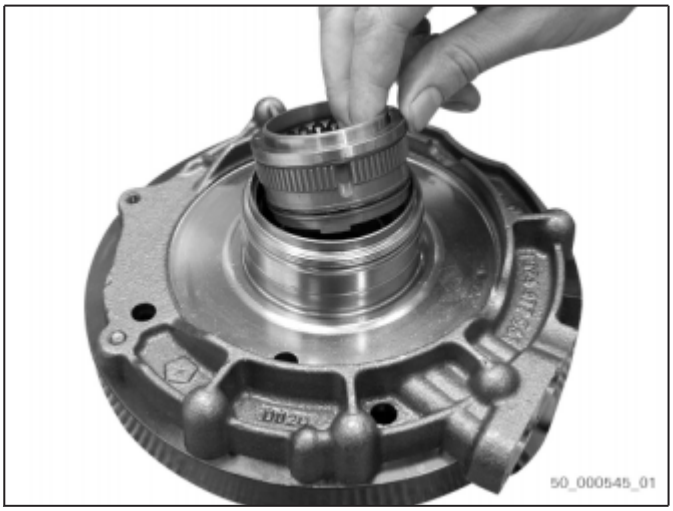


Fig. 307

13. Fit washer (77.150) of dog F in bearing support.

Fig. 308

14. Put input gear on 5X46.004.173 [Centering ring] and insert into arbor press.

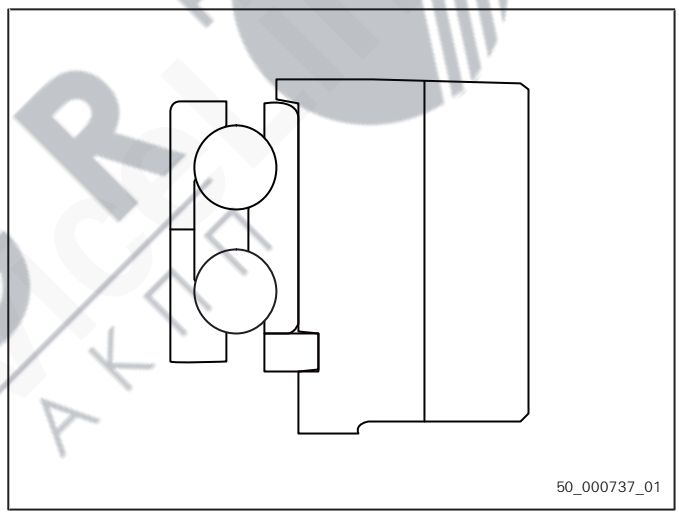


Fig. 309

15. Put angular ball bearing into input gear with offset facing downwards.

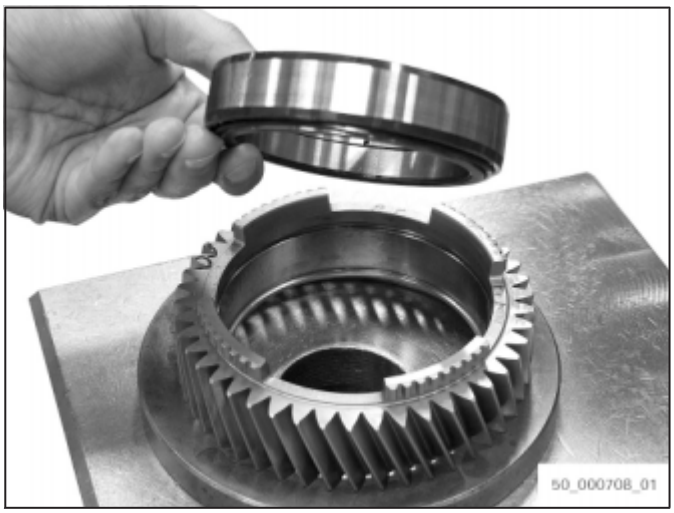


Fig. 310

16. Press angular ball bearing (77.020) into input gear (77.030) using AA01.216.173 [Press-in mandrel].

Fig. 311

17. Secure angular ball bearing with snap ring (77.040).

Fig. 312

18. Put input gear on bearing support.

19. Insert bearing support into arbor press.

20. Press input gear on bearing support using 5X46.909.843 [Assembly sleeve].

Fig. 313

21. Insert safety plate (77.070) and groove nut (77.080) into groove.

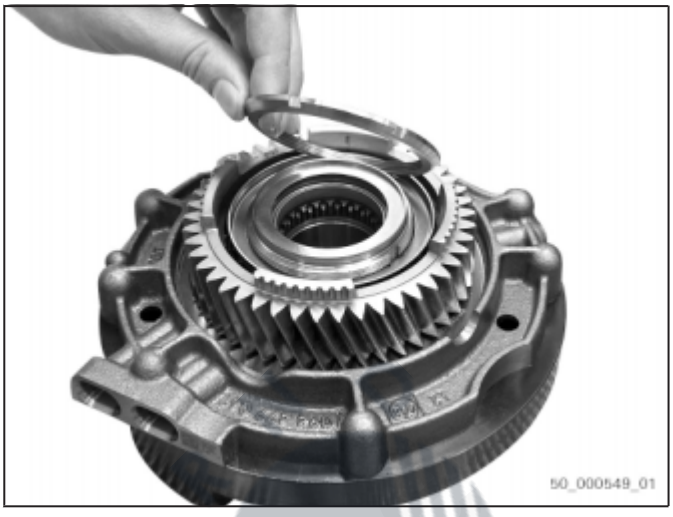


Fig. 314

22. Clamp bearing support into vise using 5X46.909.841 [Holder].

23. Use AA01.215.336 [Socket wrench] to tighten groove nut.
Tightening torque: **60 Nm (±3.0 Nm)**

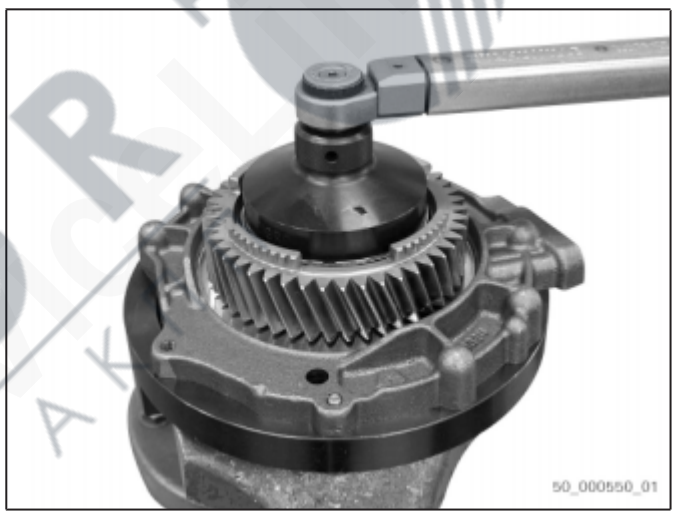


Fig. 315

24. Stake safety plate using AA01.215.392 [Staking device].

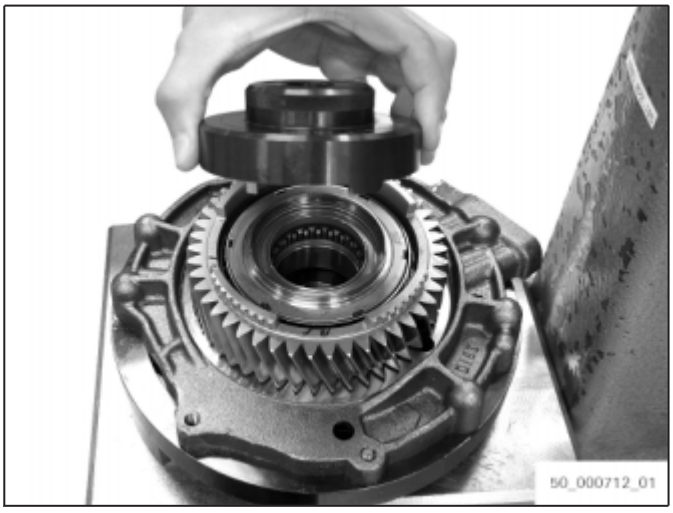


Fig. 316

11.9 Assembling clutch E

Special tools:

- 5X54.909.307 Assembly fixture

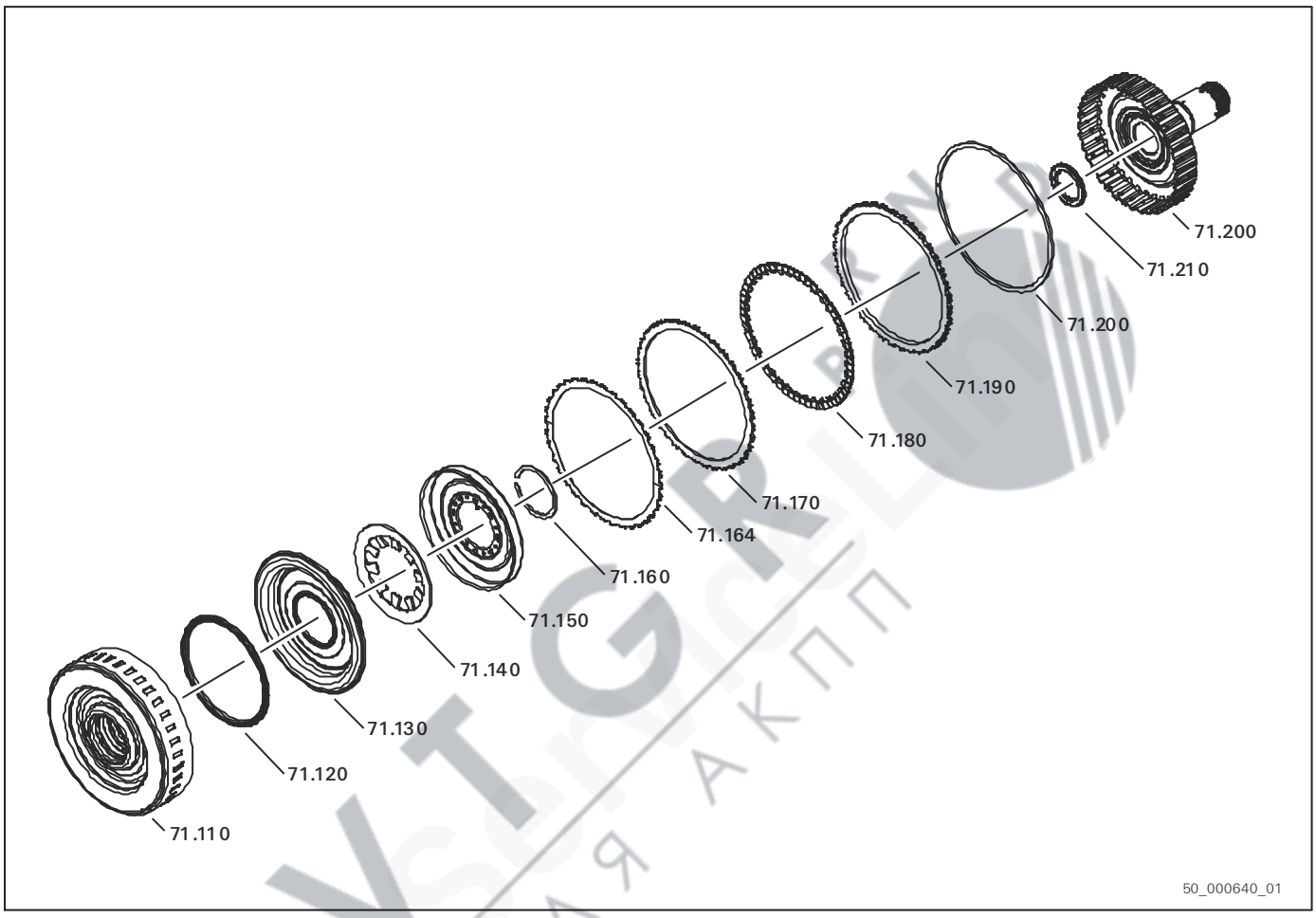


Fig. 317 71 - Kupplung E

1. Get components ready.

2. Sealing element cannot be replaced. In case of damage, replace complete component.

Fit piston E (71.130) in cylinder E (71.110).

Fig. 318

3. Insert disk spring E (71.140) into piston E.

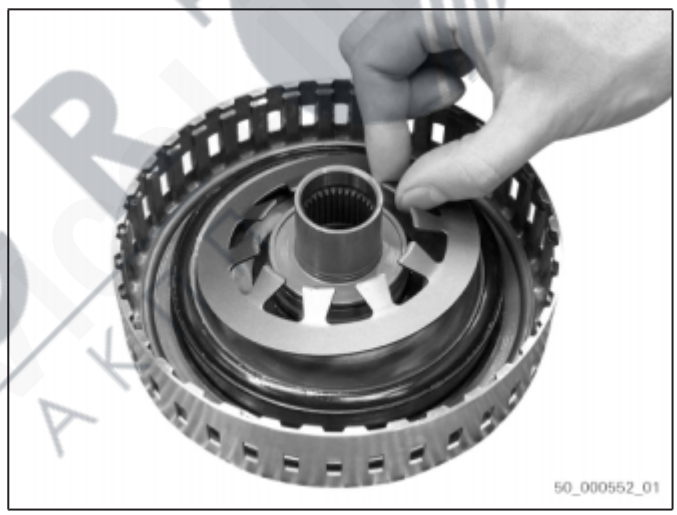


Fig. 319

4. Put baffle plate (71.150) on disk spring E.

Fig. 320

5. Put 5X54.909.307 [Assembly fixture] on cylinder.

6. Position cylinder beneath arbor press using 5X54.909.307 [Assembly fixture].

7. Fit snap ring (71.160).

8. Remove 5X54.909.307 [Assembly fixture] and cylinder E from arbor press.

Fig. 321

9.

NOTICE

Material damage possible.

⇨ Observe running clearance setting of clutch E (refer to section Setting running clearance of clutch E, page 107).

Insert multidisk package of clutch E into cylinder E:

- Wave spring (71.164)
- Outer clutch disks (71.170) and lined clutch disks (71.180) in alternating way
- Subsequently, one end disk (71.190)

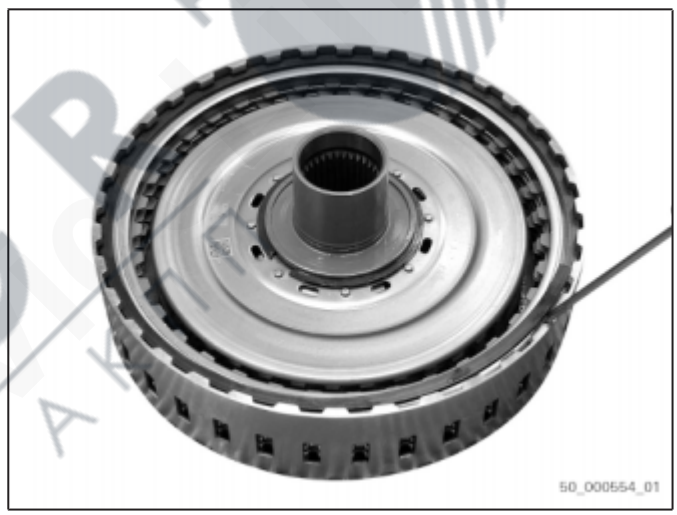


Fig. 322

10. Secure multidisk package with snap ring (71.200).

11. Fit axial needle bearing (71.210).

Fig. 323

12. Put spider shaft (71.200) on clutch E.

Fig. 324

11.10 Completing clutch C and D

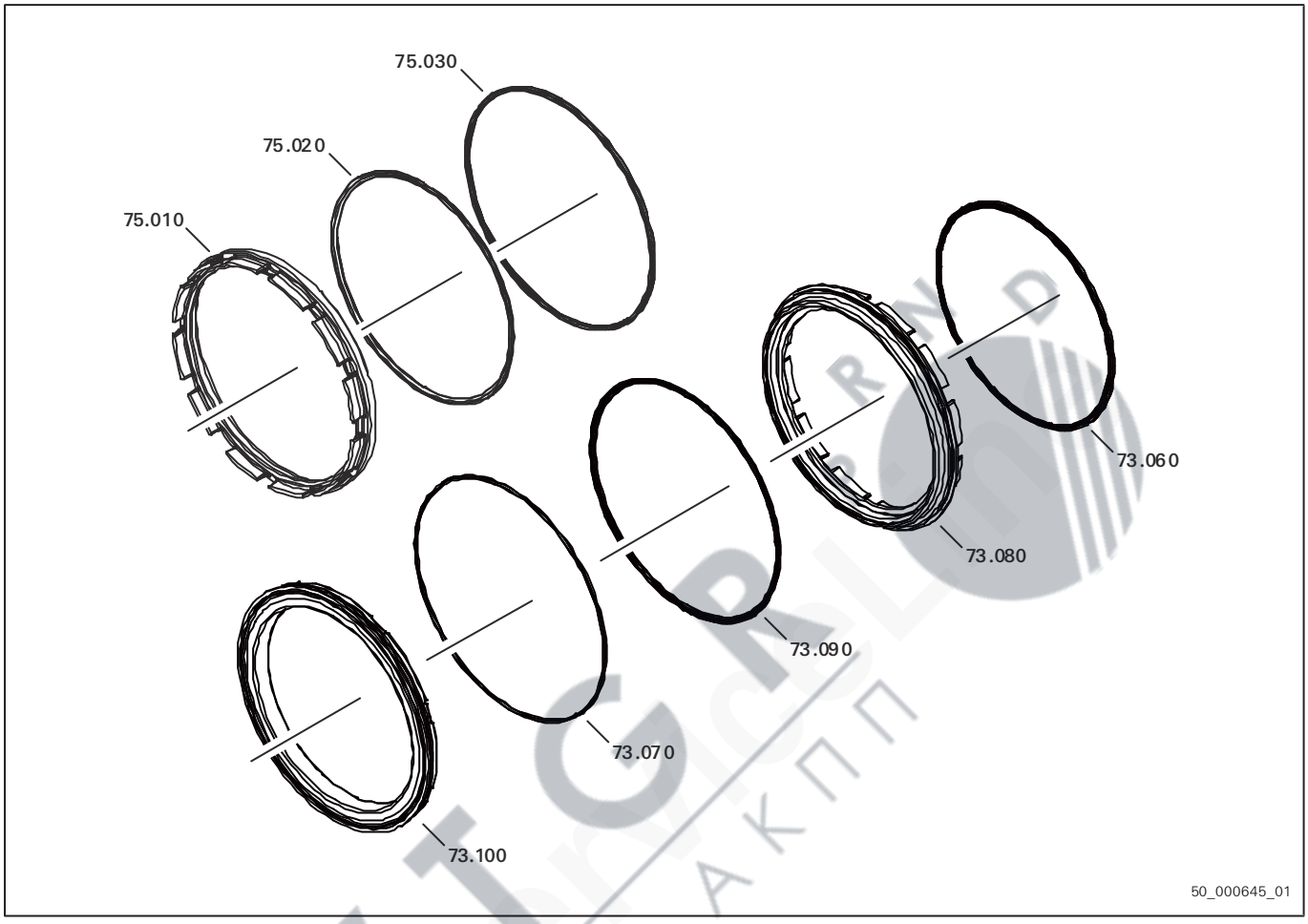


Fig. 325 75 - clutch C, 73 - clutch D

1. Get components ready.

Completing clutch C

2. Put two new lipped seal rings (75.020) (75.030) on piston C (75.010). (red O-ring outside, black O-ring inside)

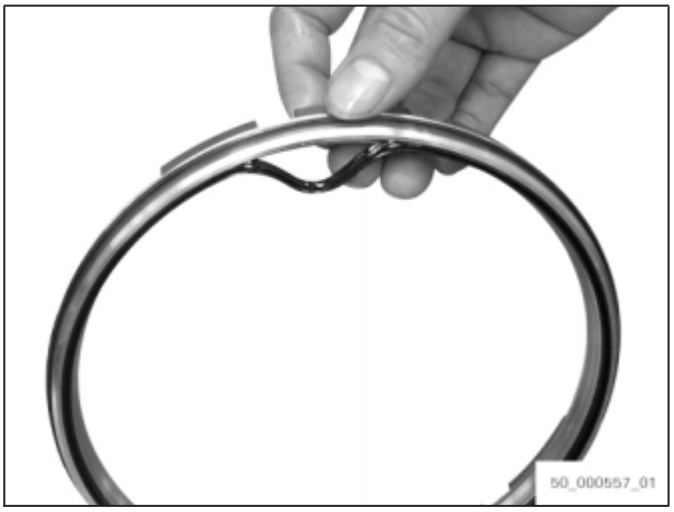


Fig. 326

Completing clutch D

3. Put O-ring (73.070) onto cylinder D (73.100).

Fig. 327

4. Put two lipped seal rings (73.060) (73.090) on piston D (73.080).

Fig. 328

5. Assemble cylinder D and piston D.

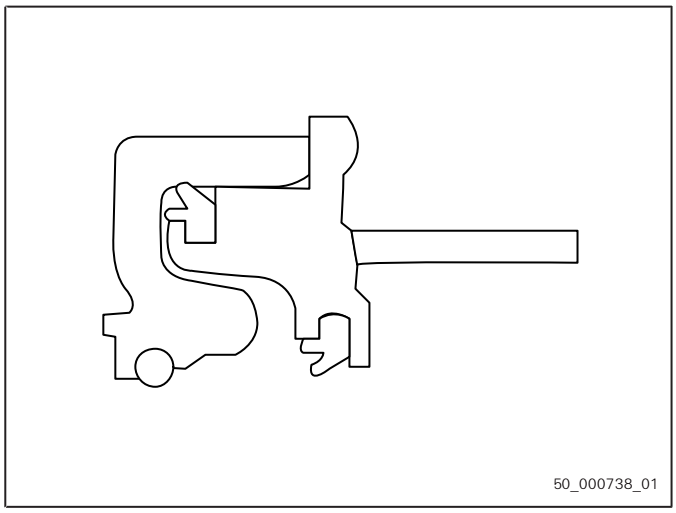


Fig. 329

11.11 Assembling tower

Special tools:

- 5X46.909.896 Supporting fixture

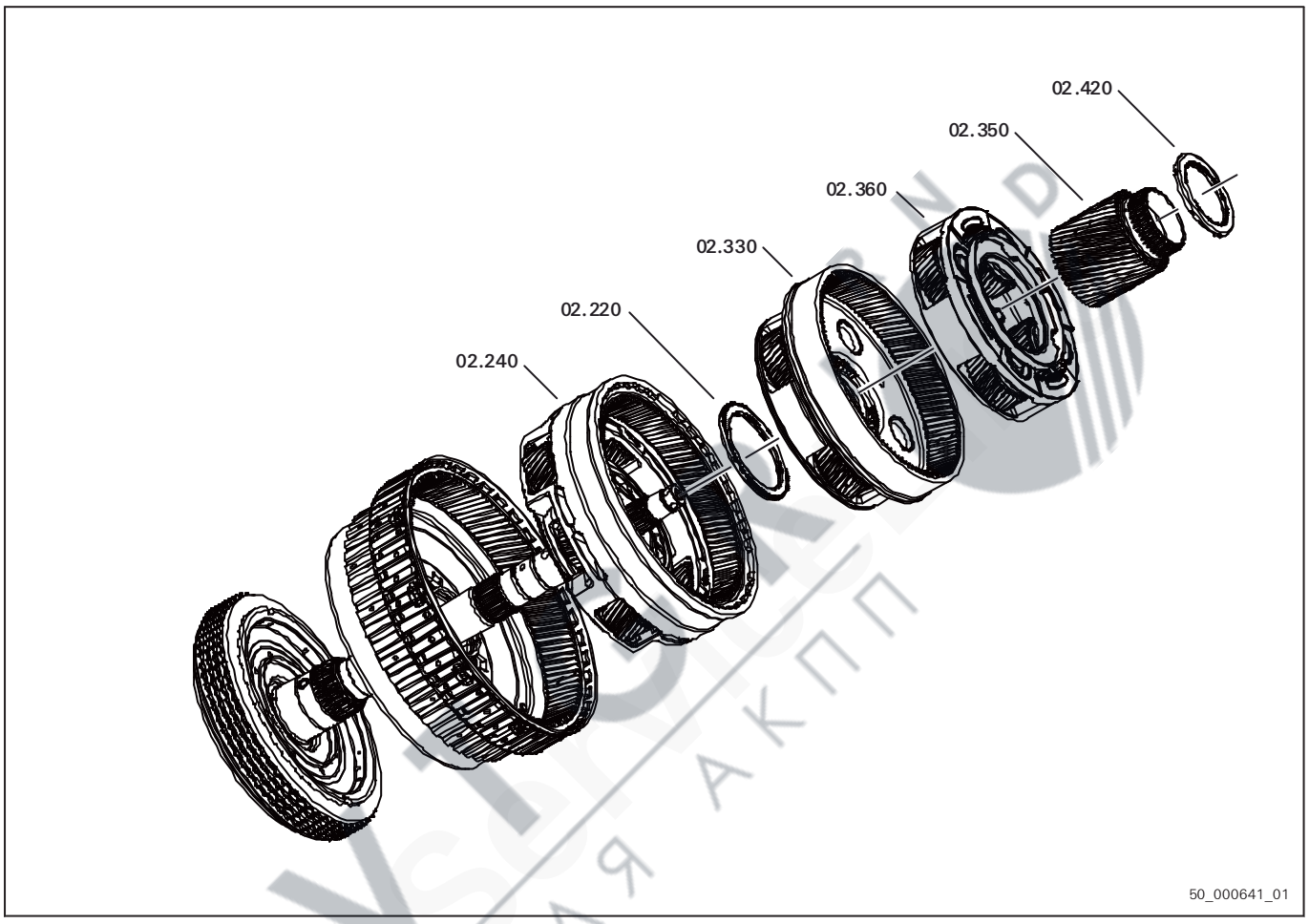


Fig. 330 02 - clutch B and input

1. Get components ready.

2.

NOTICE

Axial needle bearing might get lost during assembly.

⇨ Coat axial needle bearing with Vaseline before assembly.

Fit axial needle bearing in cylinder B (02.080).

Fig. 331

3. Turn input shaft and insert into 5X46.909.896 [Supporting fixture].

Fig. 332

4. Fit assembly of multidisk carriers B/C/D with ring gear 2 in input shaft while turning.

Fig. 333

5. Insert planet carrier 1/2 with ring gear 3 (02.240) into ring gear 2.

Fig. 334

6. Fit axial needle bearing (02.300) in planet carrier.

Fig. 335

7. Insert planet carrier 3 with ring gear 4 (02.330) into ring gear 3.

Fig. 336

8. Insert planet carrier 4 (02.360) into ring gear 4.

Fig. 337

9. Put axial needle bearing (02.420) on sun gear 3/4 (02.350).

Fig. 338

10. Insert sun gear 3/4 into planet carrier 3/4.

11.

NOTICE

Material damage possible.

⇨ Calculate backlash (refer to section Setting backlash, page 117).

Calculate backlash.

Fig. 339

11.12 Assembling intermediate shaft and differential

Special tools:

- AA01.349.059 Press-in mandrel
- AA00.575.010 Press-on fixture
- AA01.278.372 Assembly sleeve

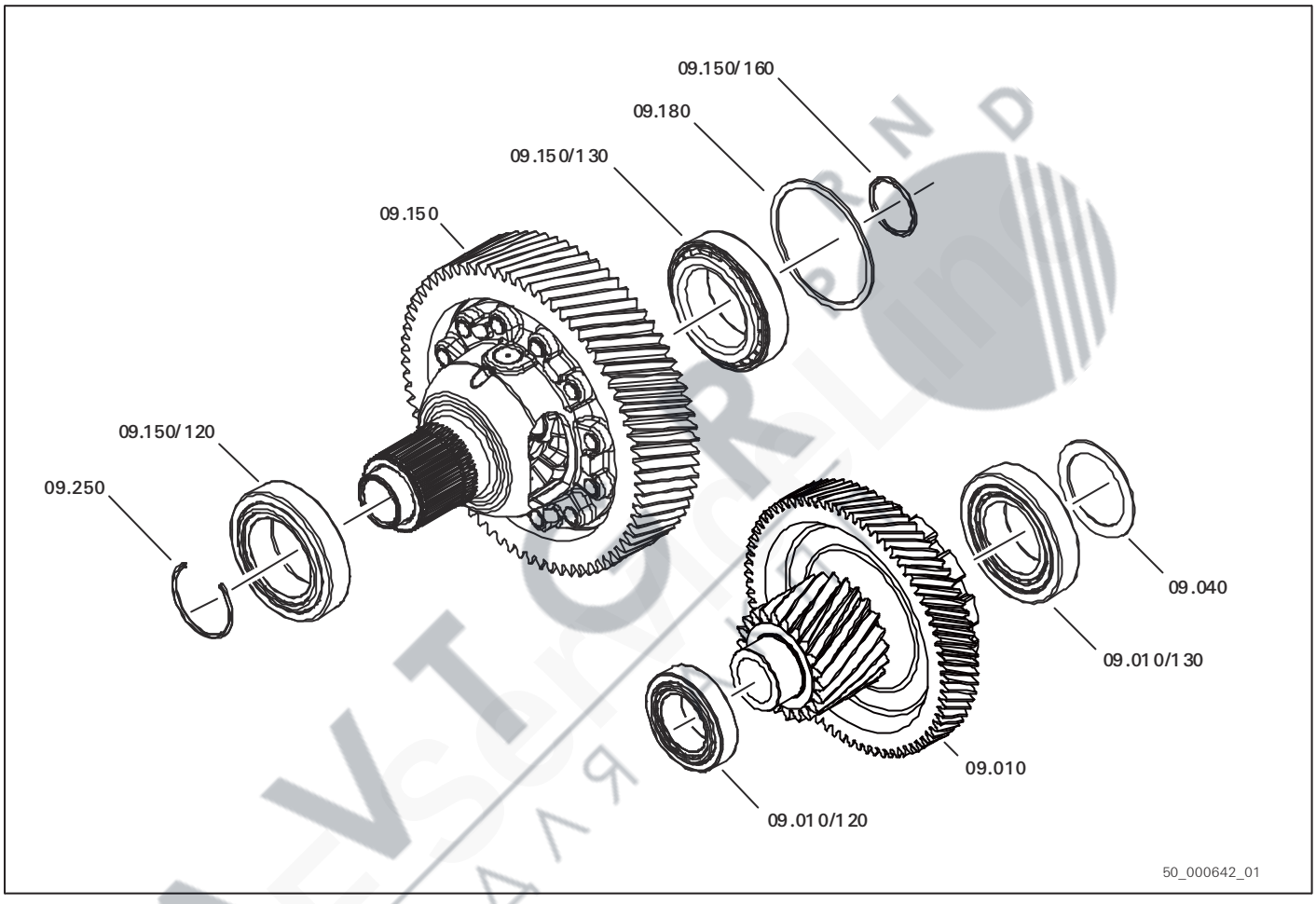


Fig. 340 09 - intermediate shaft and differential

1. Get components ready.

Assembling intermediate shaft

2.

NOTICE

Set bearing of intermediate shaft.

⇨ (refer to section Setting axial clearance at intermediate shaft, page 125)

Position intermediate shaft (09.010) in arbor press.

3. Put bearing cup (09.010/130) and AA01.349.059 [Press-in mandrel] on intermediate shaft.

4. Press in bearing cup.

5. Turn around intermediate shaft.

6. Put tapered roller bearing (09.010/120) and AA00.575.010 [Press-on fixture] on intermediate shaft.

7. Press in tapered roller bearing.

8. Remove intermediate shaft and tool from arbor press.

Fig. 341

Fig. 342

Assembling differential

9.

NOTICE

Set differential bearing.

⇨ (refer to section Setting axial clearance of differential, page 131)

Position differential (09.150) in arbor press.

10. Put tapered roller bearing (09.150/130) and AA01.278.372 [Assembly sleeve] on differential.

11. Press in tapered roller bearing.

Fig. 343

12. Put on bearing cup.

13. Turn differential.

14. Put tapered roller bearing (09.150/120) and AA01.278.372 [Assembly sleeve] on differential.

15. Press in tapered roller bearing.

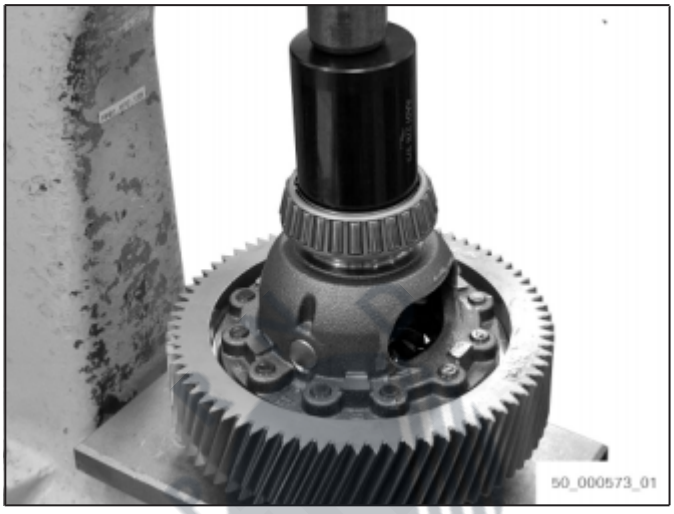


Fig. 344

16. Insert snap ring (09.150/180) into puncture of output gearing.

Fig. 345

17. Turn differential.

18. Fit O-ring (09.150/160) in differential.

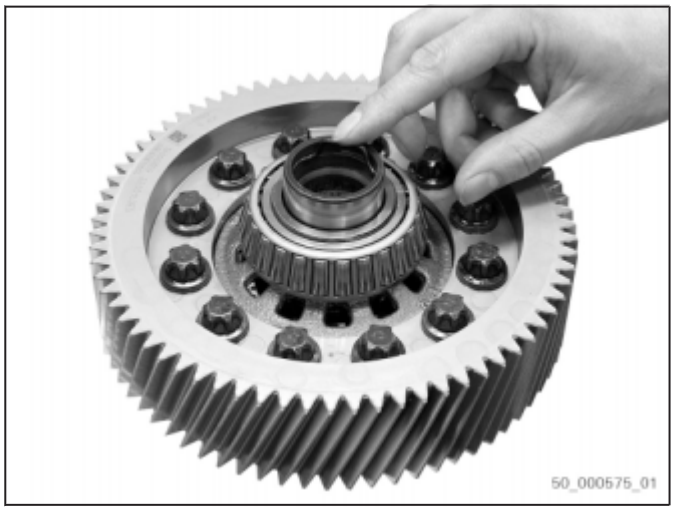


Fig. 346

11.13 Fitting input shaft, clutch C and clutch D

Special tools:

- 5X46.002.220 Press-in mandrel
- AA01.157.946 Press-in mandrel
- 5X46.909.932 Centering plate
- AA00.861.841 Downholder
- AA00.861.830 Counter support
- 5X46.909.896 Supporting fixture
- AA00.861.844 Downholder

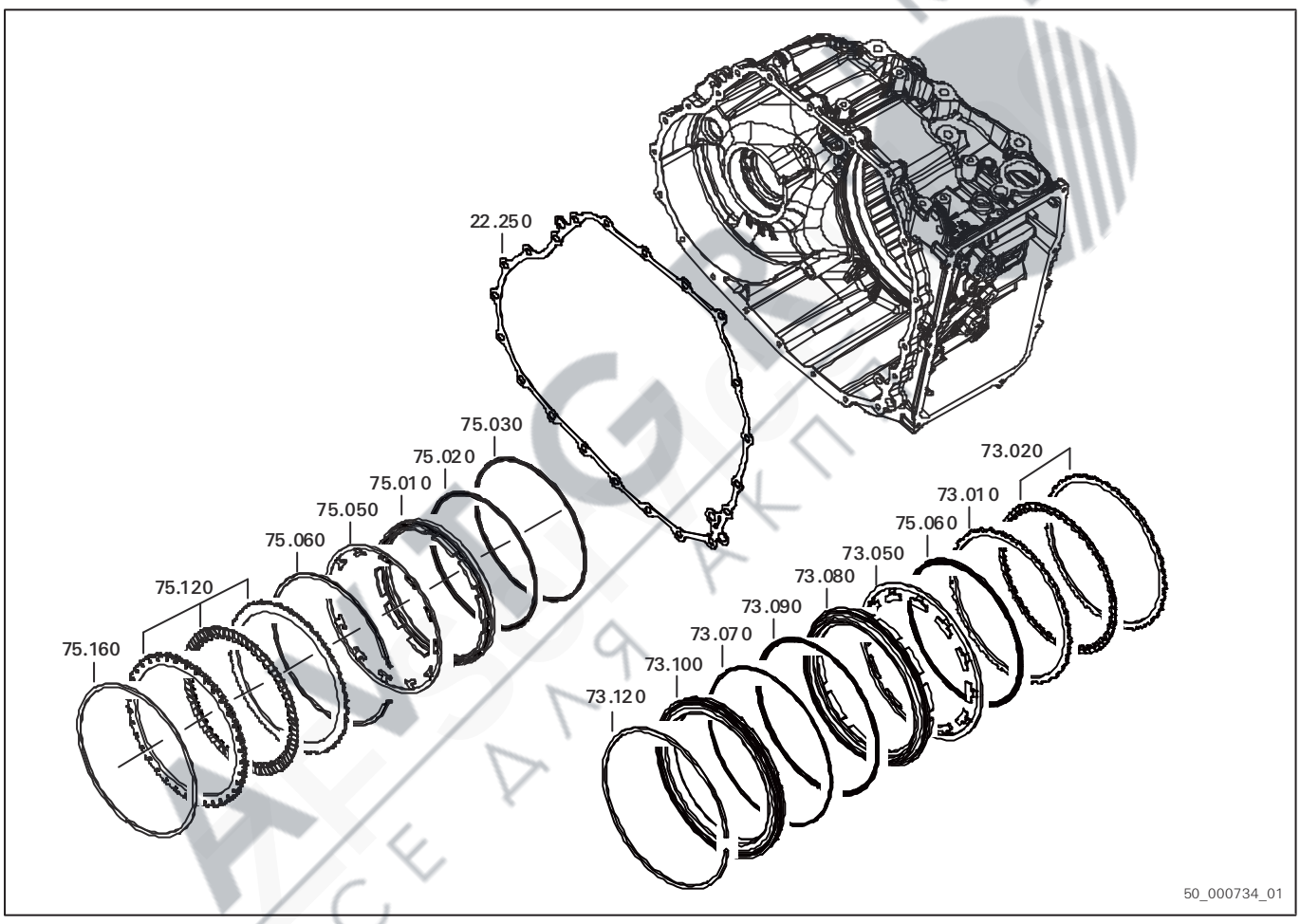


Fig. 347 75 - Kupplung C, 73 - Kupplung D

1. Get components ready.

2.

NOTICE

Material damage possible.

⇨ Calculate backlash (refer to section Setting backlash, page 117).

Put used seal on transmission housing (01.010/010).

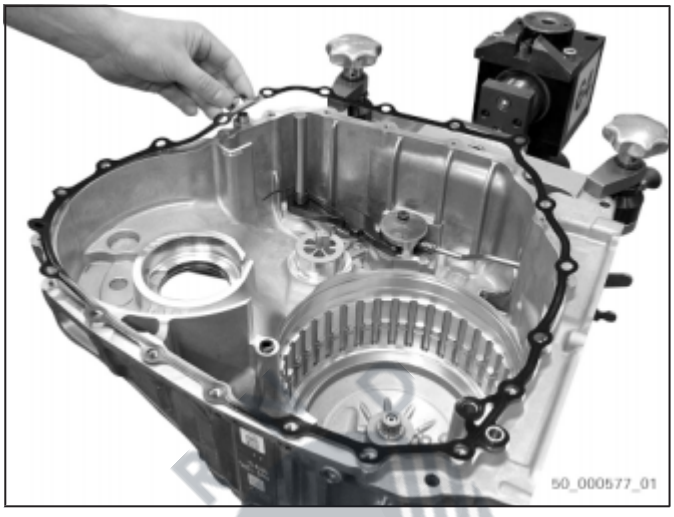


Fig. 348

3. Put adjustment plate (09.040) on intermediate shaft bearing point.

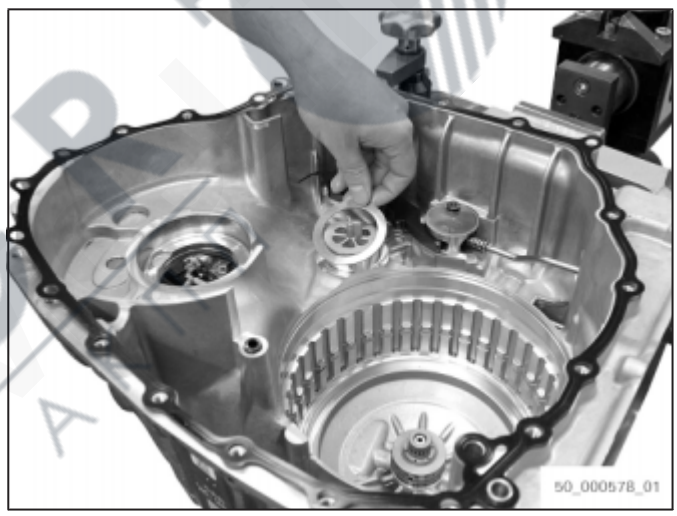


Fig. 349

4. Put tapered roller bearing (09.010/130) on intermediate shaft bearing point.

5. Put 5X46.002.220 [Press-in mandrel] on tapered roller bearing and fit.

6. Remove 5X46.002.220 [Press-in mandrel].

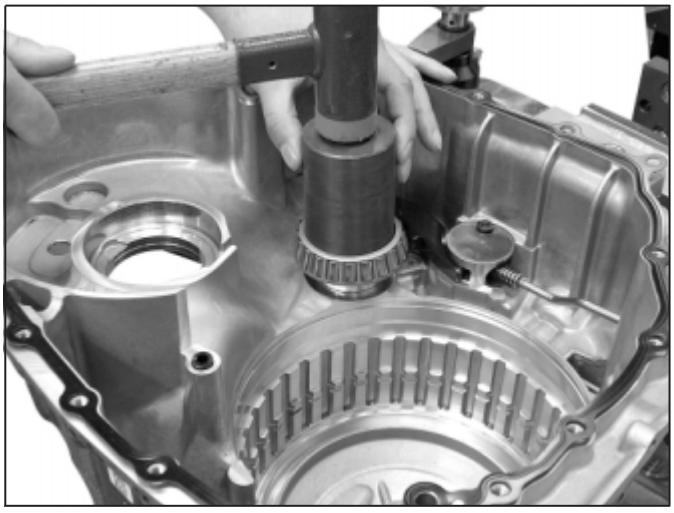


Fig. 350

7. Insert adjustment plate (09.180) into differential bearing point.

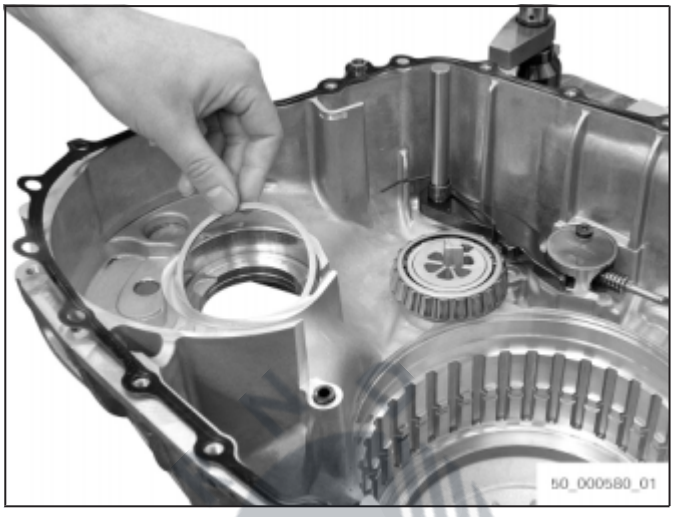


Fig. 351

8.

NOTICE

Damage due to incorrect installation possible.

⇨ Do not mix up bearing cups.

⇨ Do not cant bearing cups.

Put bearing cup (09.150/130) into differential bearing point.

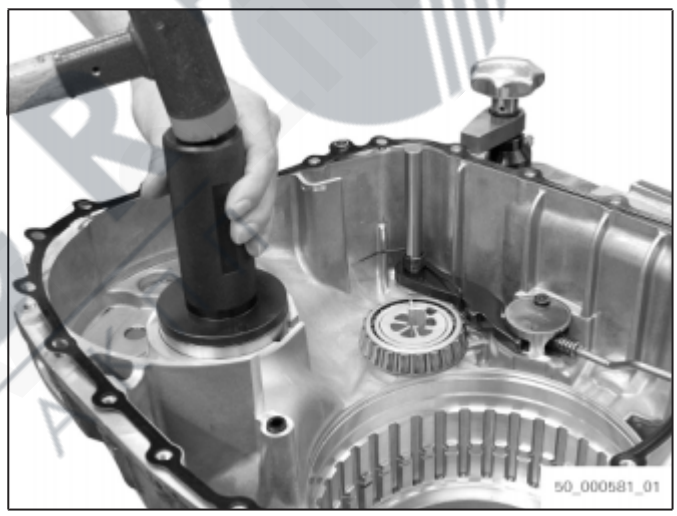


Fig. 352

9. Put AA01.157.946 [Press-in mandrel] on bearing and fit.

10. Remove AA01.157.946 [Press-in mandrel].

11.

NOTICE

Material damage possible.

⇨ Measure piston C (refer to section Setting running clearance of clutch C, page 111).

Insert piston C (75.010) into transmission housing.

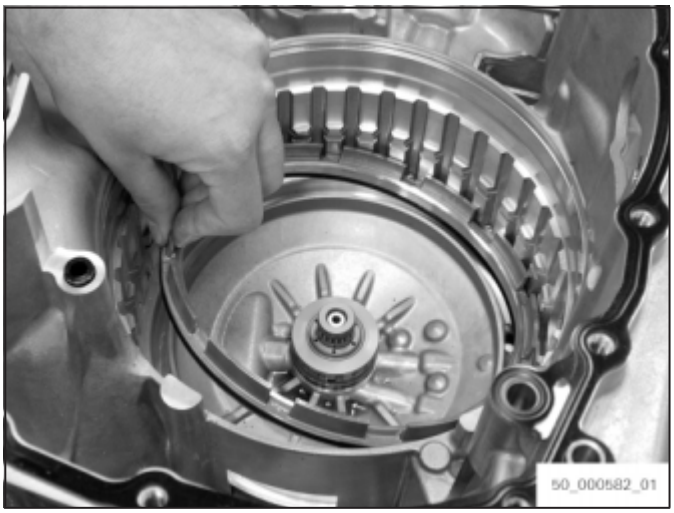


Fig. 353

12.

NOTICE

Damage due to incorrect installation position possible.

⇨ Insert spring shackles facing downwards.

Put disk spring (75.050) on piston C (75.010).

Fig. 354

13. Put 5X46.909.932 [Centering plate] on disk spring C and turn until centering pin is aligned with disk spring's shackle.

Fig. 355

14. Put AA00.861.841 [Downholder] on piston C.

Fig. 356

15. Position AA00.861.830 [Counter support] on AA00.861.841 [Downholder].

16. Fix dowel pins of counter support to transmission housing and transmission bracket.

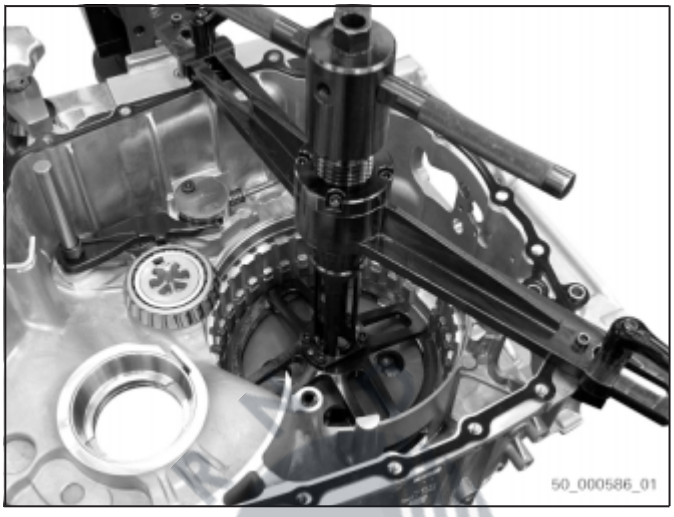


Fig. 357

17. Turn spindle to prestress disk spring of piston C.

Fig. 358

18.

NOTICE

Damage due to incorrect installation possible. Fit snap ring in correct position.

⇨ Observe specification 1094.700.285.

Secure piston C with snap ring (75.060).

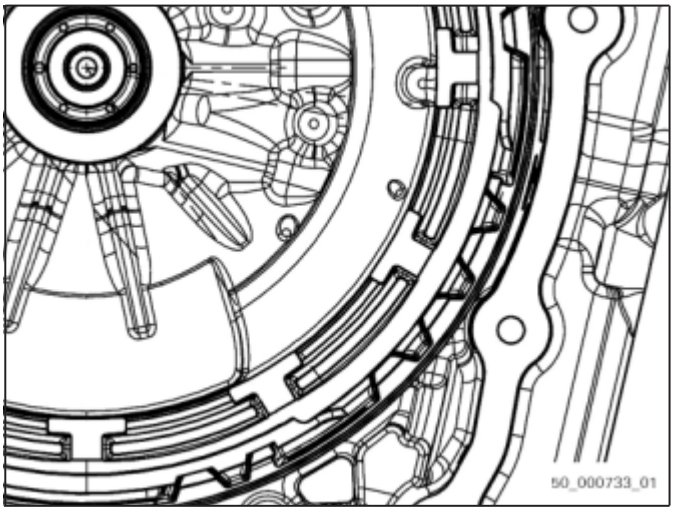


Fig. 359

19. Remove AA00.861.830 [Counter support] and AA00.861.841 [Downholder].

20. Take out 5X46.909.932 [Centering plate].

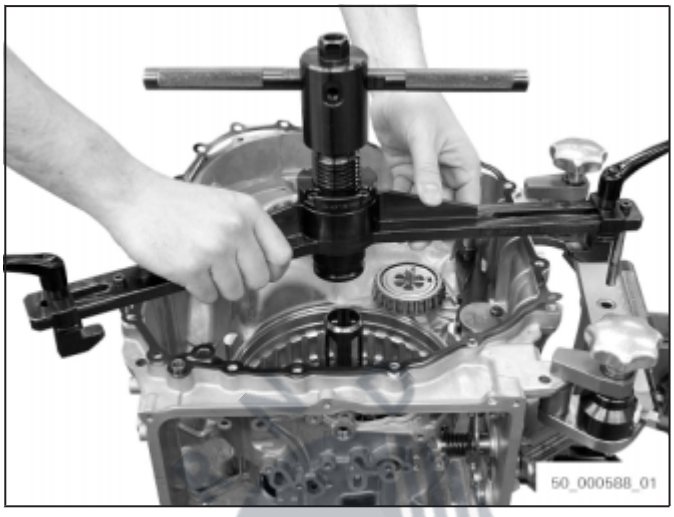


Fig. 360

21.

NOTICE

Material damage possible.

⇨ Set running clearance of clutch C (refer to section Setting running clearance of clutch C, page 111).

Align multidisk package C and insert into transmission housing:

- Outer clutch disks (75.120/120) and lined clutch disks (75.120/130) in alternating way
- End disk (75.120/140)

Fig. 361

22.

NOTICE

Observe installation position of clutch C's end disk.

⇨ Snap ring ends must be in line with studs.

Insert end disk according to setting specification 1094.700.207.

Fig. 362

23. Fit snap ring (75.060).

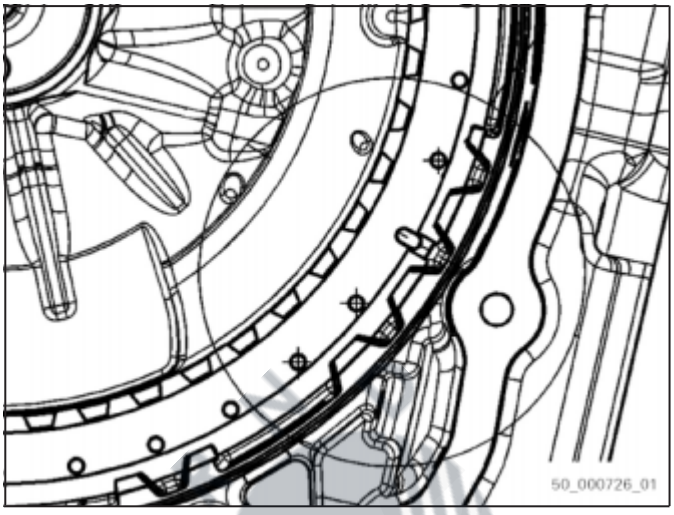


Fig. 363

24.

NOTICE

Material damage possible.

⇨ Observe running clearance setting of clutch D (refer to section Setting running clearance of clutch D, page 114).

Insert multidisk package D into transmission housing:

- End disk (73.010)
- Lined clutch disks (73.020/020) and outer clutch disks (73.020/030) in alternating way

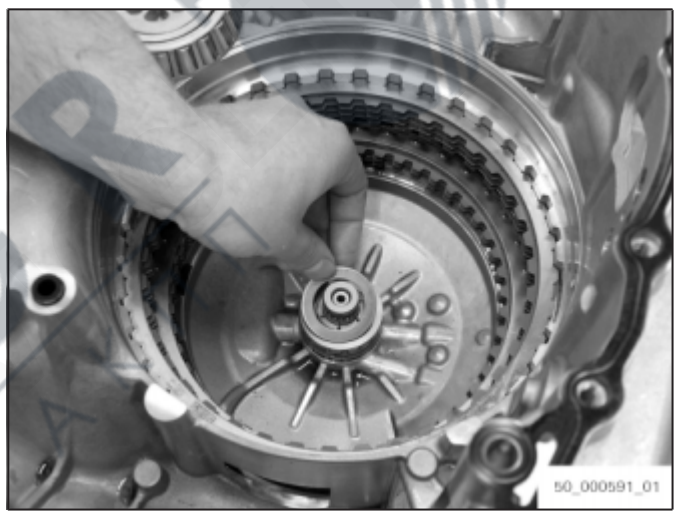


Fig. 364

25. Center multidisk package C and multidisk package D.

26. Put backlash adjustment plate (01.160) on oil feed bush.

27. To be able to fit the tower into the transmission housing, the tower must be partly dismantled.

Dismantle tower up to assembly multidisk carrier B/C/D with ring gear 2.

28. Ensure that the axial needle bearing does not get caught in the fixture.

Remove input shaft with clutch B and multidisk carrier B/C/D from 5X46.909.896 [Supporting fixture] and insert while turning into transmission housing.

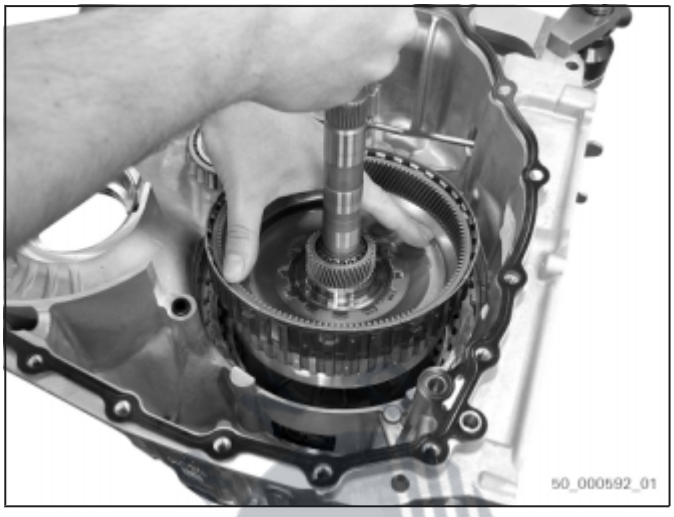


Fig. 365

29. Check correct installation of input shaft with clutch B and multidisk carrier B/C/D (refer to figure).

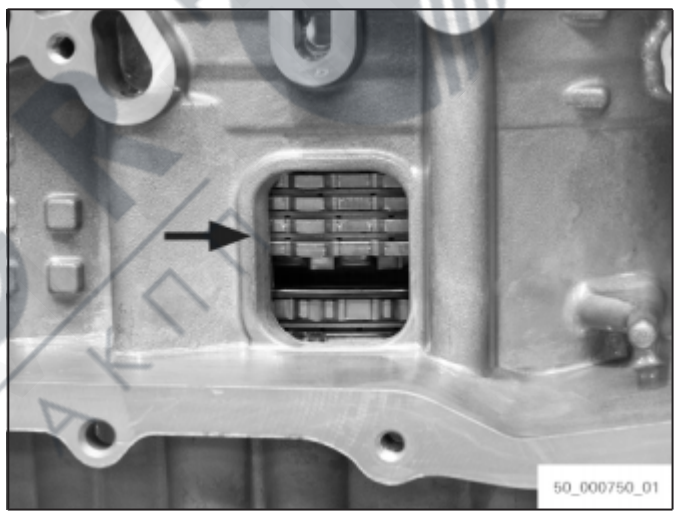


Fig. 366

30. Insert disk spring, cylinder D and piston D into transmission housing.

Fig. 367

31. Put AA00.861.844 [Downholder] on piston D.

32. Put AA00.861.830 [Counter support] on AA00.861.844 [Downholder].

33. Fix dowel pins of counter support to transmission housing and assembly bracket.

34. Turn spindle to prestress disk spring D.

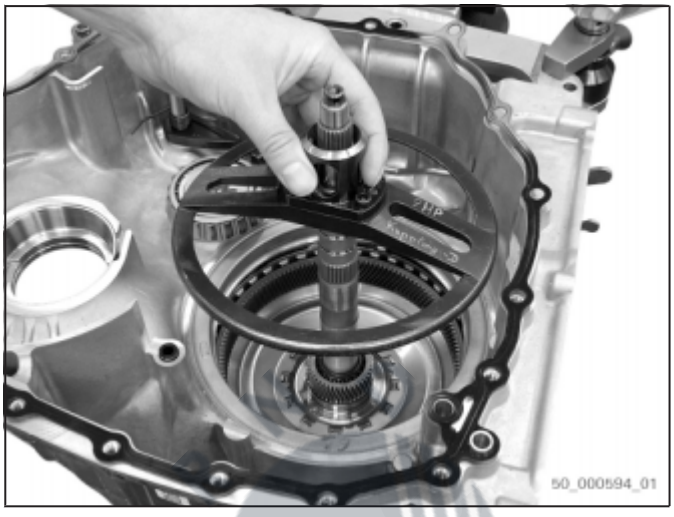


Fig. 368

35. Secure cylinder D with new snap ring (73.120).

Fig. 369

36. Remove AA00.861.830 [Counter support] and AA00.861.844 [Downholder].

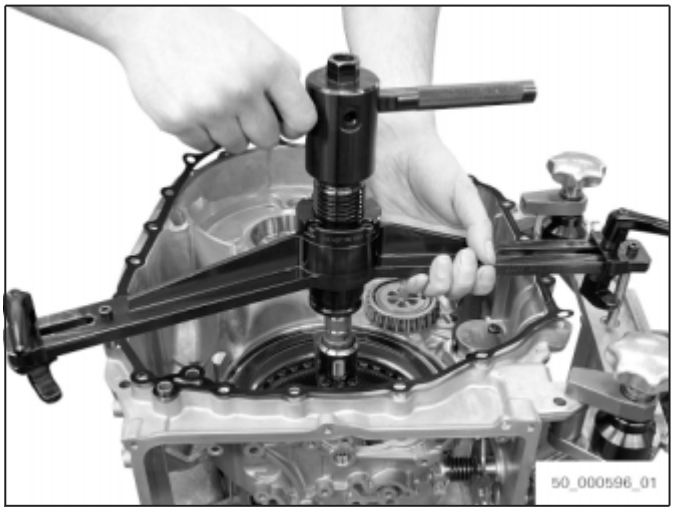


Fig. 370

37. Insert planet carrier 1/2 with ring gear 3.

Fig. 371

38. Insert planetary gearset 3/4 into ring gear 3.

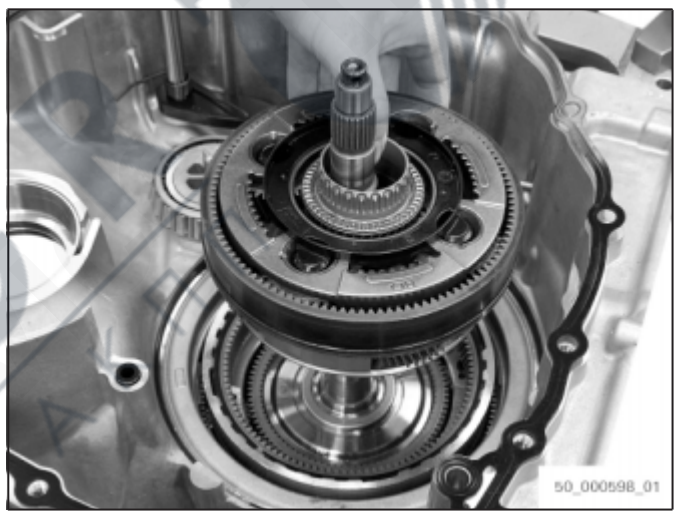


Fig. 372

39. Put intermediate shaft on tapered roller bearing.

Fig. 373

40. Fit differential.

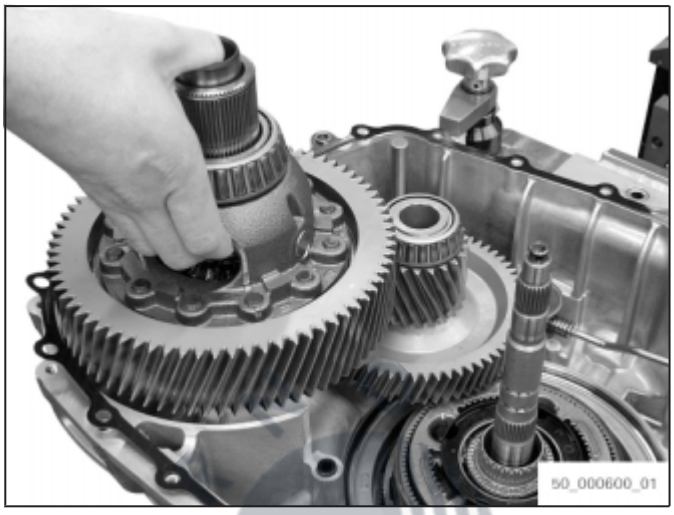


Fig. 374

41. Fit bearing support.

42. Align pressure connections of dog F with control unit end.

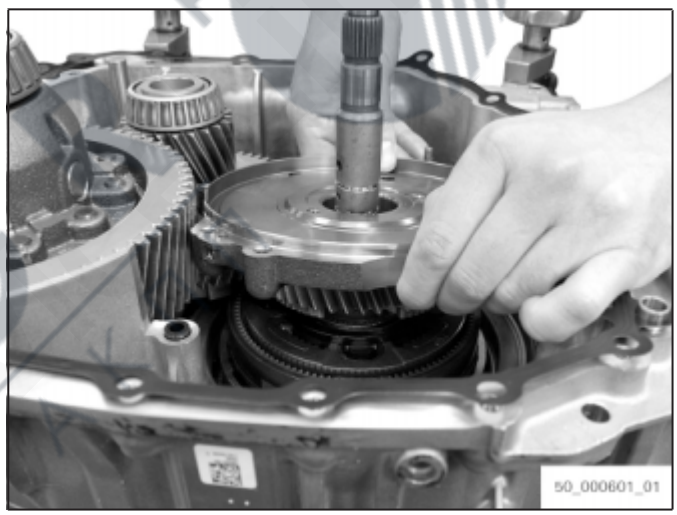


Fig. 375

43. Put two rectangular rings (01.520) on input shaft.

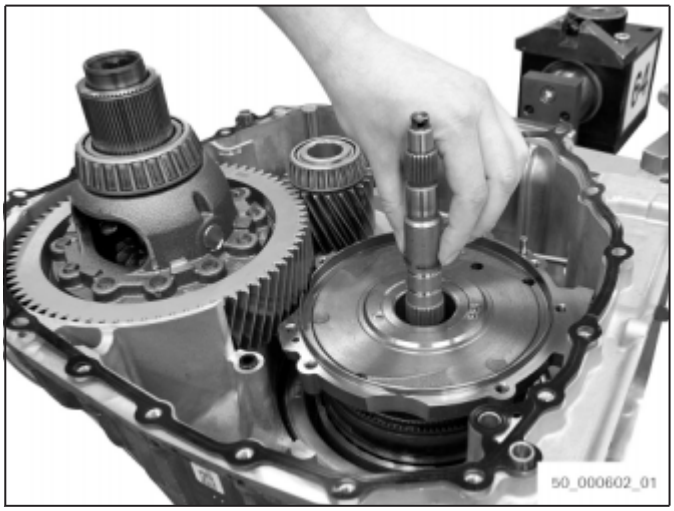


Fig. 376

44. Insert clutch E into tower with spider shaft.

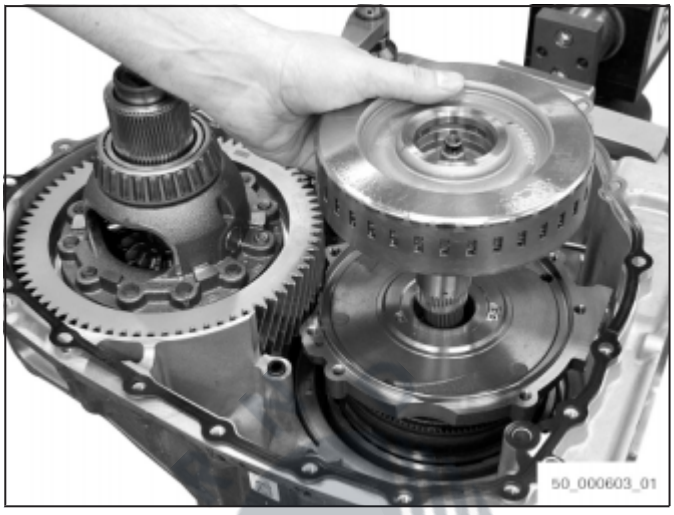


Fig. 377

11.14 Fitting torque converter bell housing

Special tools:

- AA00.805.056 Press-in device
- AA00.396.351 Press-in device
- AA01.221.521 Disassembly device
- AA01.221.533 Disassembly device
- AA00.396.745 Assembly fixture
- AA00.396.739 Assembly fixture

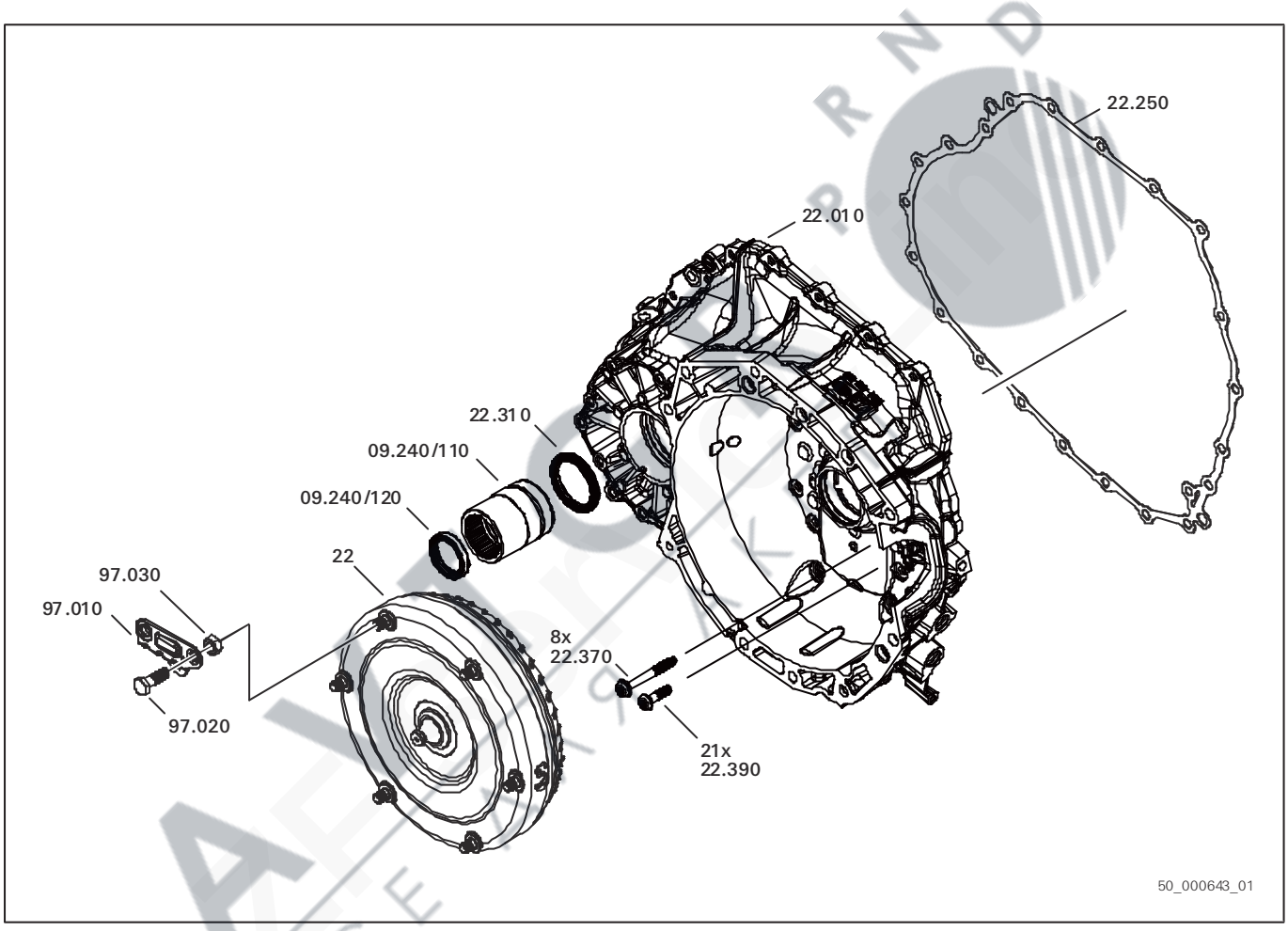


Fig. 378 22 - Wandlerglocke, 97 - Wandlerhaltebügel, 09 - Hohlwelle

1. Get components ready.

2. Keep seal free from oil and grease.

Replace used seal with new seal (22.250).

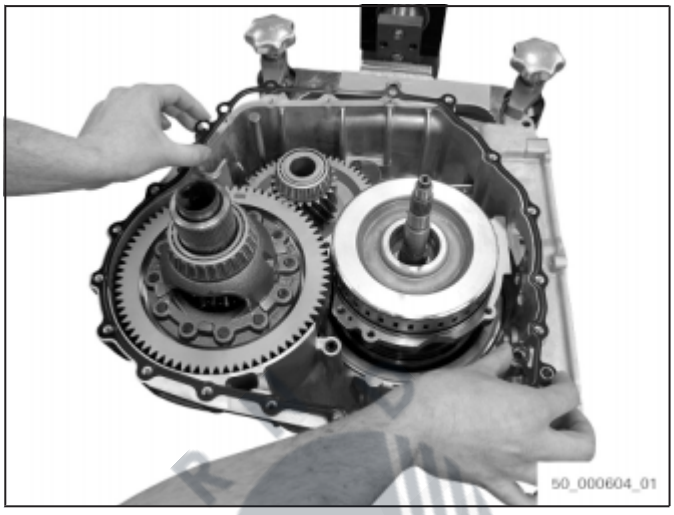


Fig. 379

3. Put torque converter bell housing (22.010) on transmission housing and carefully drive in until firmly home using a nonrecoil hammer.

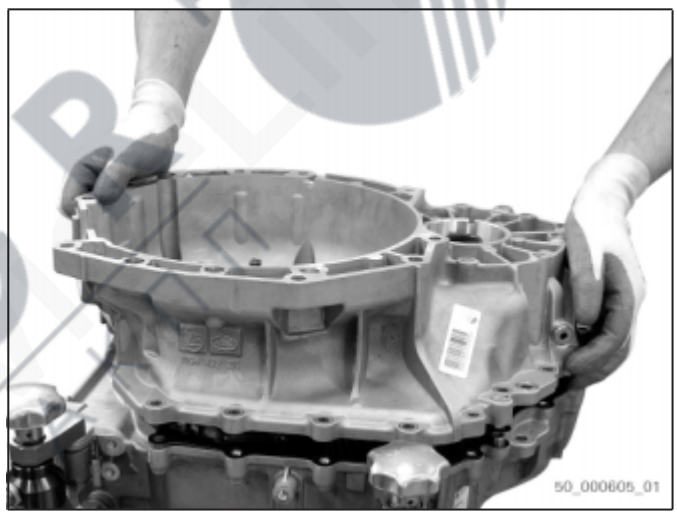


Fig. 380

4.

NOTICE

Material damage possible.

⇨ Observe tightening torque and screw connection directive (refer to section Bearing support / intermediate plate / torque converter bell housing, page 140).

Screw eight new M8x71 torx screws with Usit ring (22.370) into torque converter bell housing.
Tightening torque: **25 Nm (±2.5 Nm)**

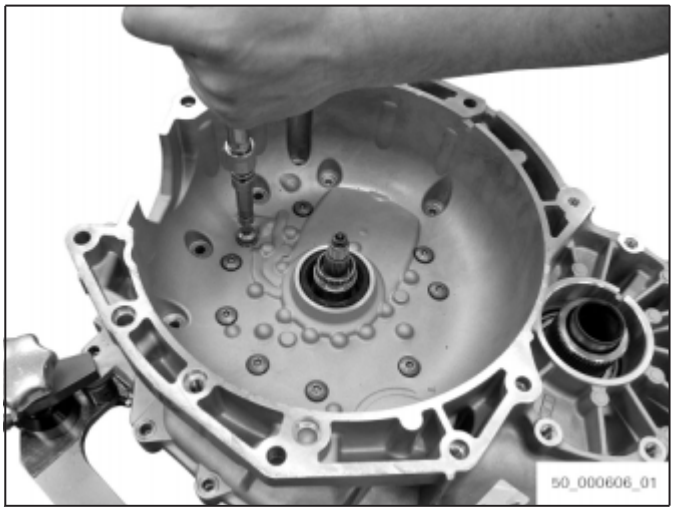


Fig. 381

5.

NOTICE

Material damage possible.

⇨ Observe tightening torque and screw connection directive (refer to section Torque converter bell housing / transmission housing, page 141).

21[32] Screw M8x33 torx screws (22.390) into torque converter bell housing and transmission housing.
Tightening torque: **26 Nm (±2.5 Nm)**

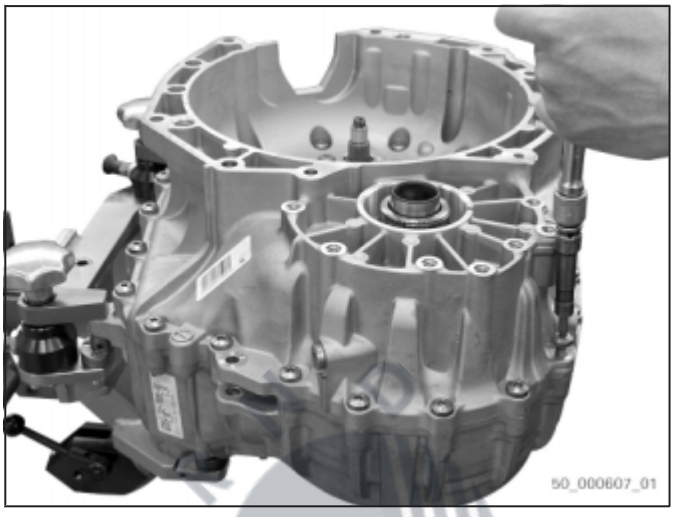


Fig. 382

6.

NOTICE

Damage due to leakage possible.

⇨ Use AA00.805.056 [Press-in device].

Fit shaft sealing ring (22.310) using AA00.805.056 [Press-in device].

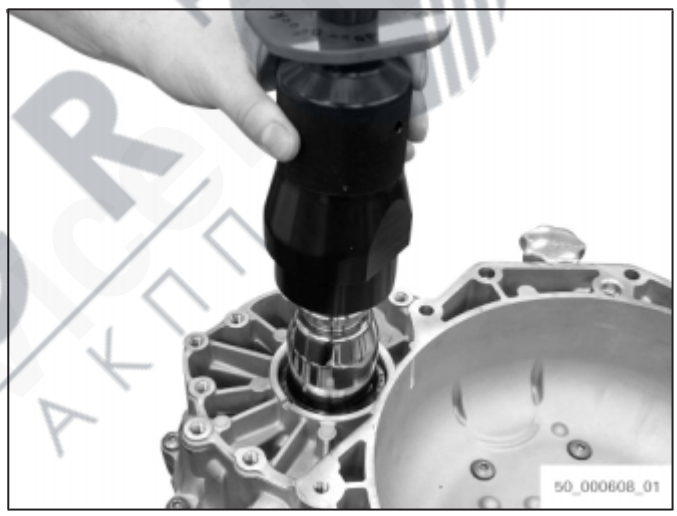


Fig. 383

7.

NOTICE

Damage due to leakage possible.

⇨ Use AA00.396.351 [Press-in device].

Put hollow shaft (09.240/110) on AA00.396.351 [Press-in device].

8. Put shaft sealing ring of hollow shaft (09.240/120) on AA00.396.351 [Press-in device] and fit in hollow shaft.

Fig. 384

32) 21/22 torx screws; depending upon master parts list

9. Fit hollow shaft.

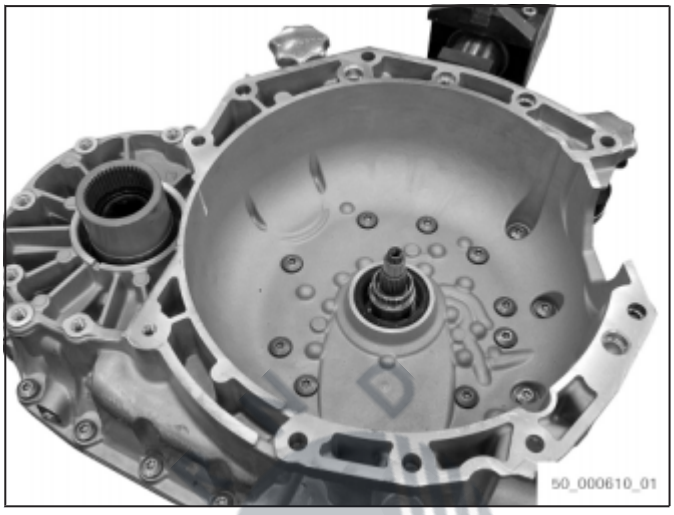


Fig. 385

10.

⚠ CAUTION

Risk of injury due to falling parts.
Slight or moderate injury possible.
⇨ Secure parts against falling down.

Attach AA01.221.521 [Disassembly device] or AA01.221.533 [Disassembly device] to torque converter (22).

11. Insert torque converter into torque converter bell housing.

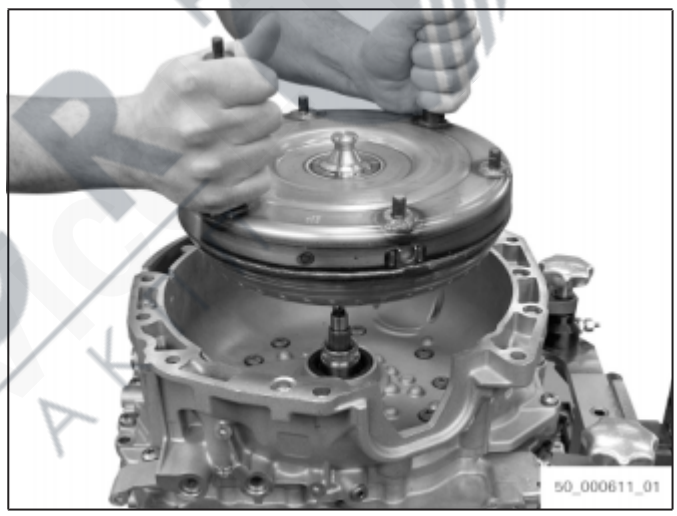


Fig. 386

12. Attach torque converter retaining bracket (97.010) to torque converter and transmission housing.

13. Screw in M10x8 hexagon nut (97.030)[33] and M10x30 hexagon screw (97.020)[34].
Tightening torque: **15 Nm (±2.25 Nm)**
Tightening torque: **15 Nm (±2.25 Nm)**

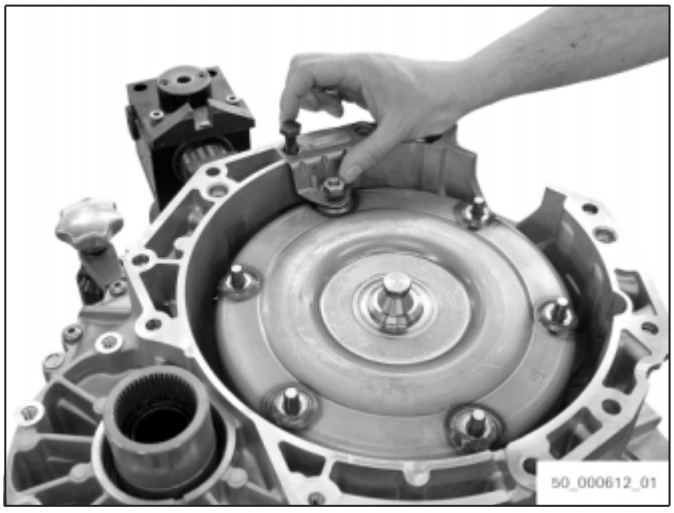


Fig. 387

33) Screw size depending upon master parts list
34) Screw size depending upon master parts list

14. Place transmission housing with torque converter bell housing facing downwards.

15.

NOTICE

Damage due to leakage possible.

⇨ Use AA00.396.745 [Assembly fixture] or AA00.396.739 [Assembly fixture].

Fit shaft sealing ring of differential (01.130) using AA00.396.745 [Assembly fixture] or AA00.396.739 [Assembly fixture].

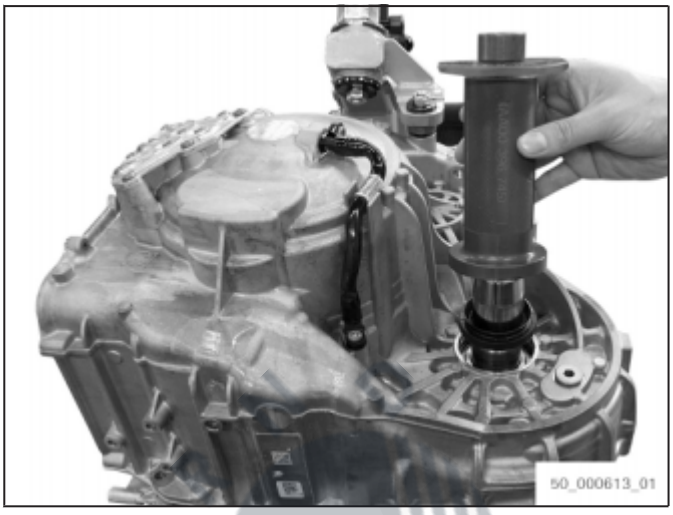


Fig. 388

11.15 Fitting control unit

Special tools:

- AA01.233.276 Holding device
- AA00.851.606 Assembly fixture
- AA01.216.098 Test device
- AA01.158.809 Retaining plate

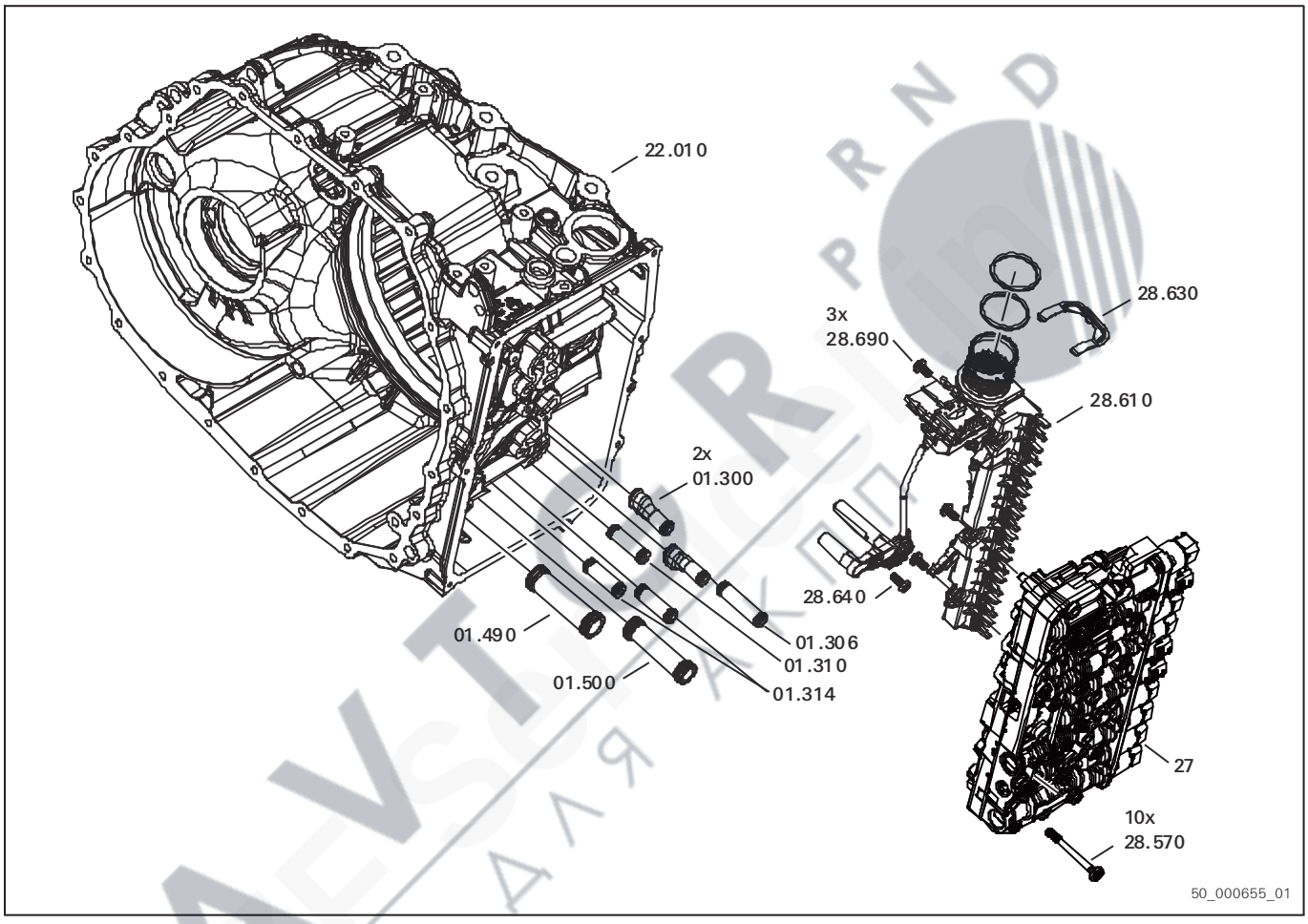


Fig. 389 27 - Control unit, 28 - Sensor unit

1. Get components ready.

2. Place transmission housing with oil pan end facing upwards.

3. Position AA01.233.276 [Holding device] on selector shaft.

4. Prestress selector shaft using AA01.233.276 [Holding device] and insert into blind hole.

5. Unlock parking lock.

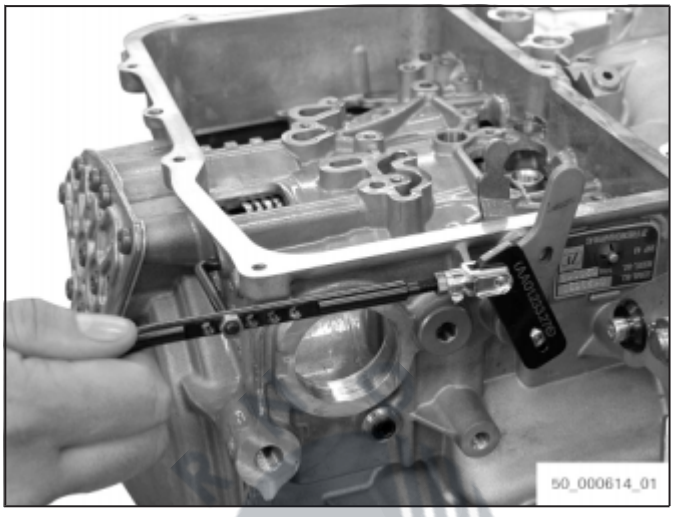


Fig. 390

6. Put two new O-rings each on six adapters and two tubes.

Fig. 391

7. Fit six adapters (01.300) (01.306) (01.310) (01.314) in transmission housing using AA00.851.606 [Assembly fixture].

Fig. 392

8. Insert two tubes (01.490) (01.500) into transmission housing.

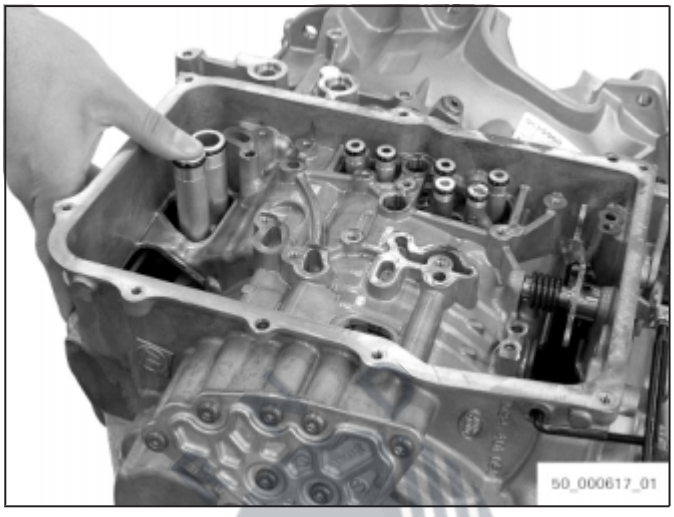


Fig. 393

9. Screw in AA01.216.098 [Test device] to transmission housing and check clutch function using compressed air.

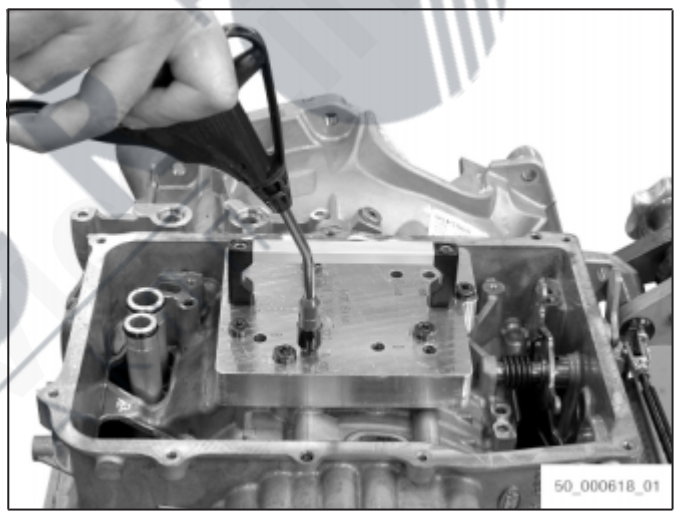


Fig. 394

10.

NOTICE

Check sensor unit for damage.

⇨ Dog points shall not break off.

Fit sensor unit (28.610) in control unit.

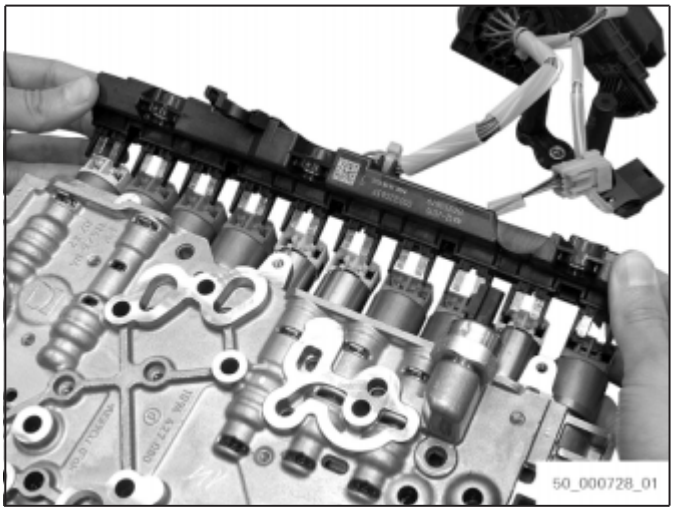


Fig. 395

11. Pressure sensor snaps into place.

    Fit plug in pressure sensor.

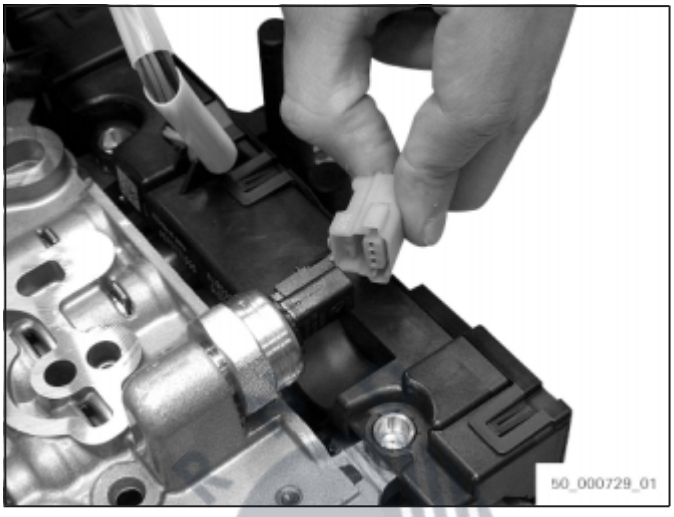


Fig. 396

12. Check correct seat of pressure sensor.

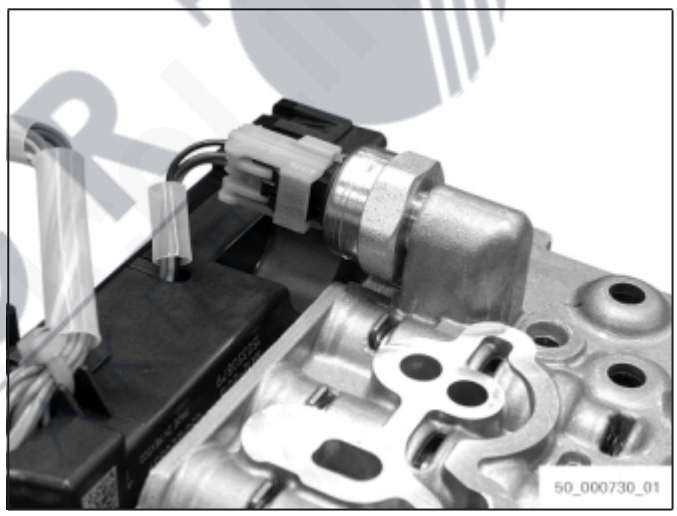


Fig. 397

13. Secure sensor unit using three torx screws (28.690).

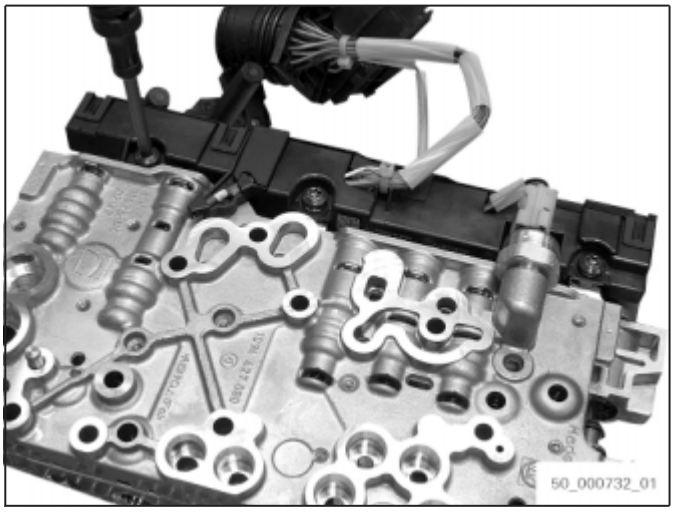


Fig. 398

14. Attach AA01.158.809 [Retaining plate] to transmission housing.

15. Put control unit (27.920) onto AA01.158.809 [Retaining plate].

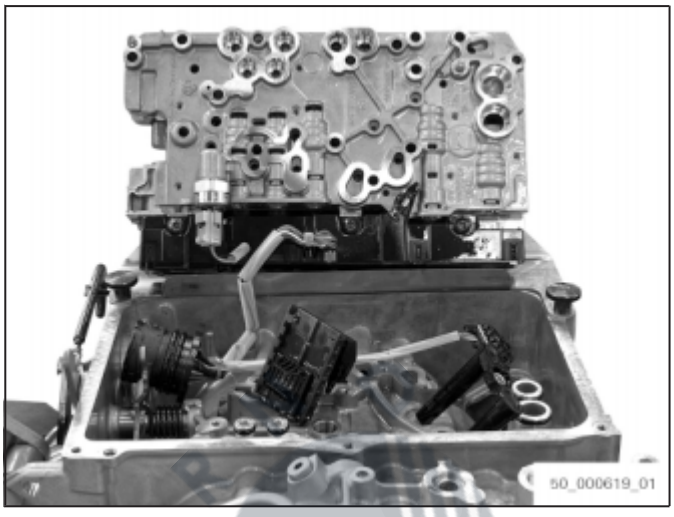


Fig. 399

16. Only one installation position possible.

Press in ECU connector until firmly home and secure using clip (28.630).

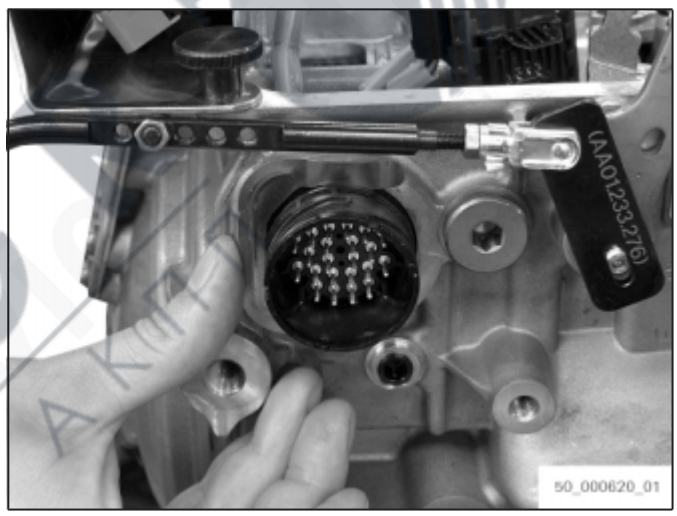


Fig. 400

17. Fit position sensor and hook into parking disk.

18. Screw M5x12 torx screw (28.690) into position sensor.
Tightening torque: **5.7 Nm (±0.57 Nm)**

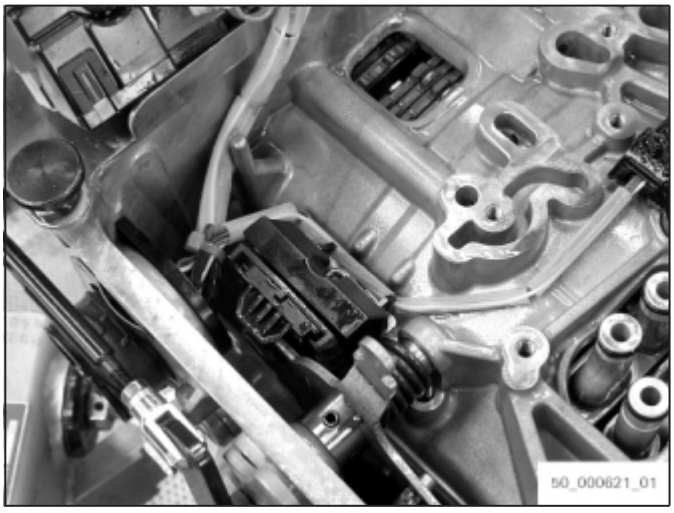


Fig. 401

19.

NOTICE

Speed sensor might break off.

⇨ Carefully remove speed sensor.

Fit speed sensor.

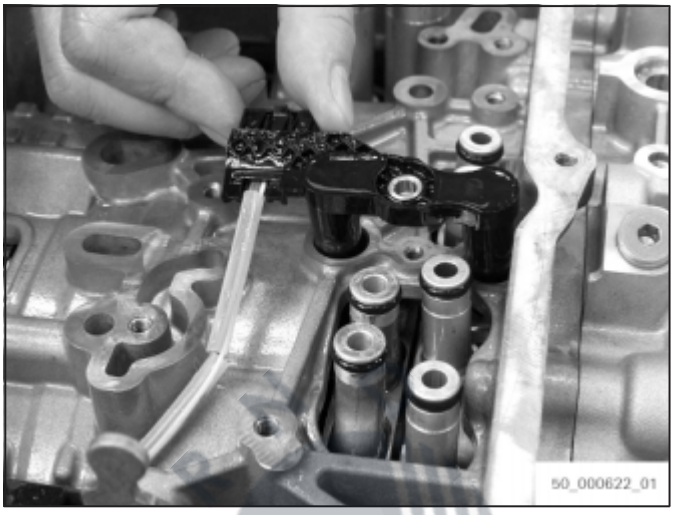


Fig. 402

20.

NOTICE

Material damage possible.

⇨ Observe tightening torque and screw connection directive (refer to section Control unit, page 142).

Screw M5x14 torx screw (28.640) into speed sensor.
Tightening torque: **5.5 Nm (±0.55 Nm)**

21.

NOTICE

Damage due to incorrect installation possible.

⇨ Cable must be clipped into position sensor.

Put wiring harness into recess clearance.

Fig. 403

22. Difficult installation due to dowel pins, tubes and adapters.

    Insert control unit into transmission housing.

23. Hook parking disk into parking lock.

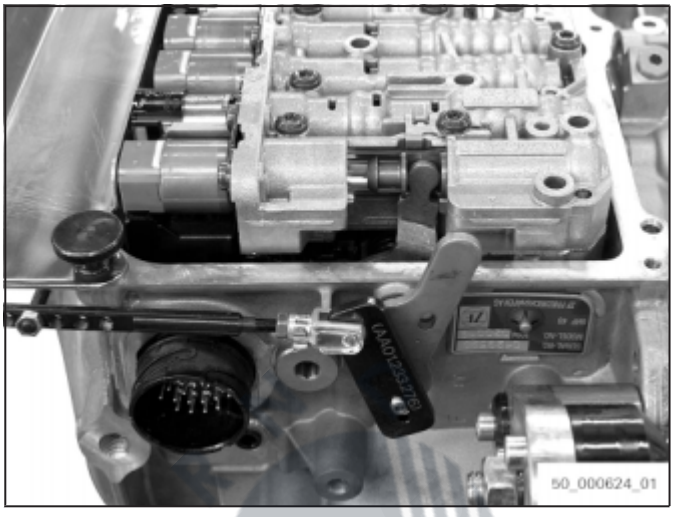


Fig. 404

24.

NOTICE

Material damage possible.

⇨ Observe tightening torque and screw connection directive (refer to section Control unit, page 142).

Screw ten new M6x62 torx screws (28.570) into control unit.
Tightening torque: **8 Nm (±0.8 Nm)**

Fig. 405

25. Remove AA01.233.276 [Holding device].

26. Remove AA01.158.809 [Retaining plate].

27. Put protective cover on ECU connector and breather.

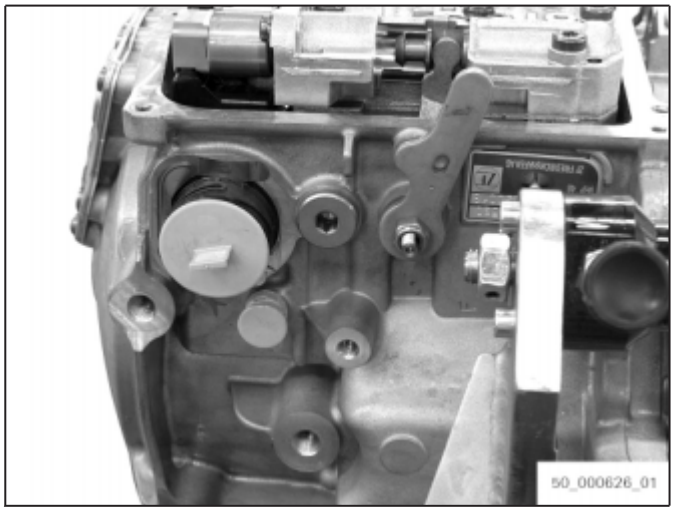


Fig. 406

11.16 Fitting oil pan and transmission control module

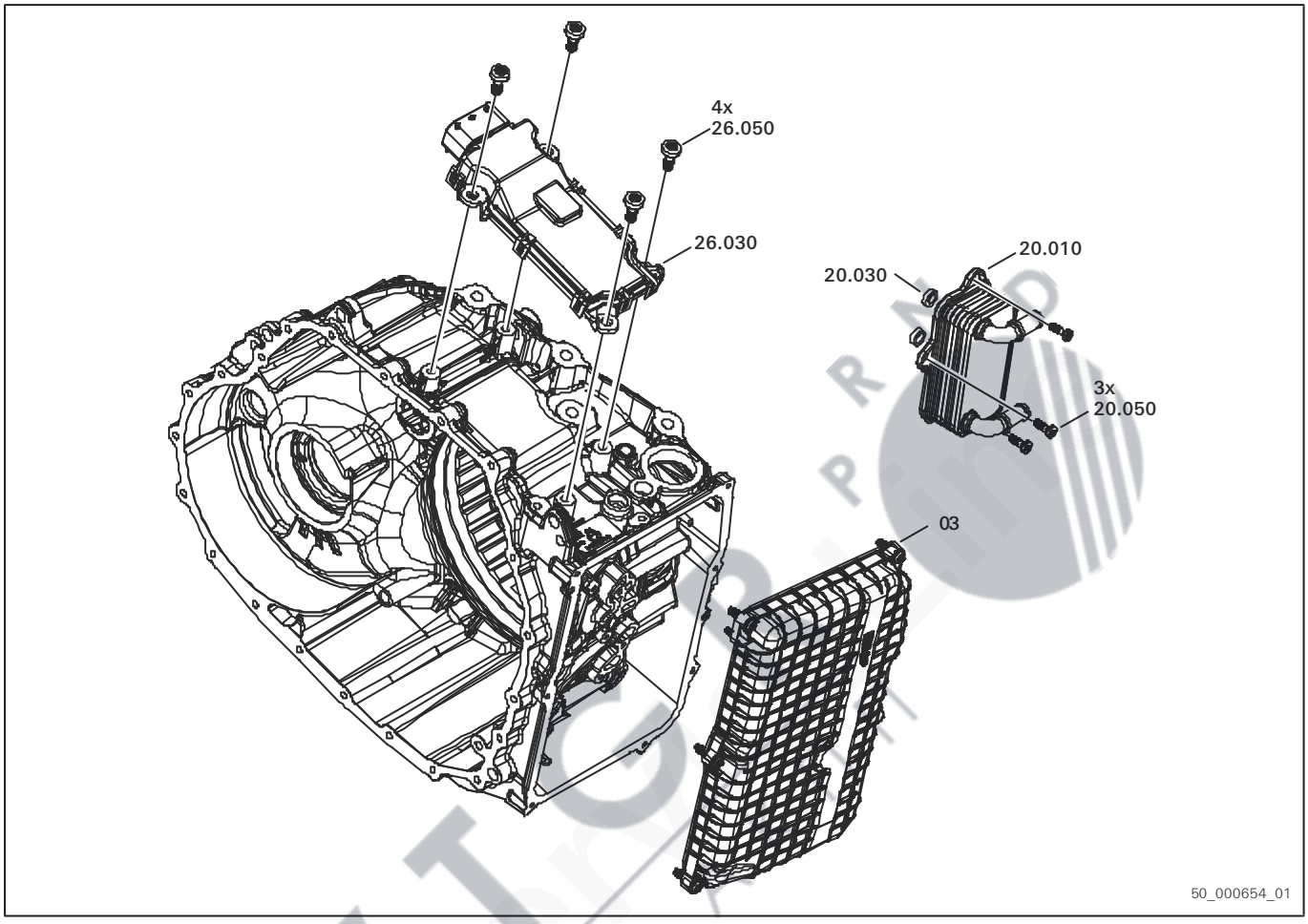


Fig. 407 03 - Ölwanne, 26 - Elektronische Getriebesteuerung, 20 - Ölkühler

1. Get components ready.

2. Seal is integrated into oil pan. Torx screws of oil pan are protected against loss.

NOTICE

Material damage possible.

⇨ Observe tightening torque and screw connection directive (refer to section Oil pan , page 143).

Put new oil pan (03) on transmission housing and screw down.
Tightening torque: **9.5 Nm (±0.47 Nm)**

Fig. 408

3. Insert two new sealing rings (20.030) into flat dent of oil cooler.

Fig. 409

4. Screw down oil cooler (20.010) using three M6x20 torx screws (20.050).
Tightening torque: **10 Nm (±1.0 Nm)**

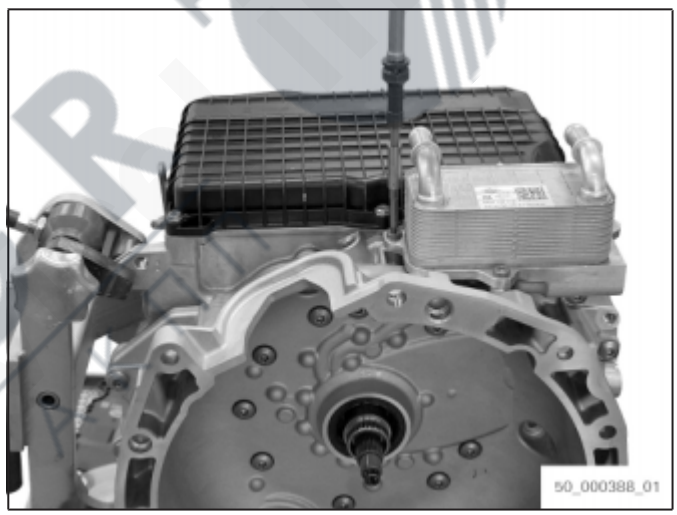


Fig. 410

5. Screw down EGS (26.030) using four M8x21 torx screws (26.050).
Tightening torque: **24 Nm (±2.4 Nm)**

Fig. 411

12 Annex

12.1 List of abbreviations

ECU connector	electronic control unit connector
EGS	transmission control module

12.2 Overview of revisions

Index	Date of issue	Initiator	Chapter	Comment
1.0	2016-09	MAPO14 Dept.	-	First edition
1.1	2017-04	MAPO14 Dept.	Preface Safety Instructions	Additional information

Tab. 4 Overview of revisions

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