



SPICER®

Off-Highway Products

Service Manual

Transmission
T12000 3, 4, & 6-speed Intermediate Drop
VDT12000
VDT 17°

TSM-0022
April 2011



T12000, VDT & 17°

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MOT12000T20

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NOTICE

All information mentioned in the and Service manual T12000 Powershift Transmission 3, 4 & 6 Speed Intermediate Drop is valid, unless otherwise specified in this 17° Drop Box and VDT.

FOREWORD

This manual has been prepared to provide the customer and the maintenance personnel with information and instructions on the maintenance and repair of the SPICER OFF-HIGHWAY PRODUCTS product.

Extreme care has been exercised in the design, selection of materials, and manufacturing of these units.

The slight outlay in personal attention and cost required to provide regular and proper lubrication, inspection at stated intervals, and such adjustments as may be indicated will be reimbursed many times in low cost operation and trouble free service.

In order to become familiar with the various parts of the product, its principle of operation, troubleshooting and adjustments, it is urged that the mechanic studies the instructions in this manual carefully and uses it as a reference when performing maintenance and repair operations.

Whenever repair or replacement of component parts is required, only SPICER OFF-HIGHWAY PRODUCTS approved parts as listed in the applicable parts manual should be used. Use of "will-fit" or non-approved parts may endanger proper operation and performance of the equipment. SPICER OFF-HIGHWAY PRODUCTS does not warrant repair or replacement parts, nor failures resulting from the use of parts which are not supplied by or approved by SPICER OFF-HIGHWAY PRODUCTS.

TOWING OR PUSHING

Before towing the vehicle, be sure to lift the rear wheels off the ground or disconnect the driveline to avoid damage to the transmission during towing.



If the transmission has 4 wheel drive, disconnect both front and rear drivelines. Because of the design of the hydraulic system, the engine cannot be started by pushing or towing.

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SAFETY PRECAUTIONS

To reduce the chance of personal injury and/or property damage, the following instruction must be carefully observed. Proper service and repair are important to the safety of the service technician and the safe, reliable operation of the machine. If replacement parts are required the part must be replaced by a spare part which has the same part number or with an equivalent part. Do not use a spare part of lesser quality.

The service procedures recommended in this manual are effective methods for performing service and repair. Some of these procedures require the use of tools specifically designed for the purpose.

Accordingly, anyone who intends to use a spare part, service procedure or tool, which is not recommended by SPICER OFF-HIGHWAY PRODUCTS, must first determine that neither his safety nor the safe operation of the machine will be jeopardized by the spare part, service procedure or tool selected.



NOTE: IT IS IMPORTANT TO NOTE THAT THIS MANUAL CONTAINS VARIOUS 'CAUTIONS' AND 'NOTICES' THAT MUST BE CAREFULLY OBSERVED IN ORDER TO REDUCE THE RISK OF PERSONAL INJURY DURING SERVICE OR REPAIR, OR THE POSSIBILITY THAT IMPROPER SERVICE OR REPAIR MAY DAMAGE THE UNIT OR RENDER IT UNSAFE. IT IS ALSO IMPORTANT TO UNDERSTAND THAT THESE 'CAUTIONS' AND 'NOTICES' ARE NOT EXHAUSTIVE, BECAUSE IT IS IMPOSSIBLE TO WARN ABOUT ALL THE POSSIBLE HAZARDOUS CONSEQUENCES THAT MIGHT RESULT FROM FAILURE TO FOLLOW THESE INSTRUCTIONS.

CLEANING AND INSPECTION

CLEANING

Clean all parts thoroughly using solvent type cleaning fluid. It is recommended that parts be immersed in cleaning fluid and moved up and down slowly until all old lubricant and foreign material is dissolved and parts are thoroughly cleaned.



CARE SHOULD BE EXERCISED TO AVOID SKIN RASHES, FIRE HAZARDS, AND INHALATION OF VAPOURS WHEN USING SOLVENT TYPE CLEANERS.

BEARINGS

Remove bearings from cleaning fluid and strike flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning fluid to flush out particles. Repeat above operation until bearings are thoroughly clean. Dry bearings using moisture-free compressed air. Be careful to direct air stream across bearing to avoid spinning. Do not spin bearings when drying. Bearings may be rotated slowly by hand to facilitate drying process.

HOUSINGS

Clean interior and exterior of housings, bearing caps, etc..., thoroughly. Cast parts may be cleaned in hot solution tanks with mild alkali solutions providing these parts do not have ground or polished surfaces. Parts should remain in solution long enough to be thoroughly cleaned and heated. This will aid the evaporation of the cleaning solution and rinse water. Parts cleaned in solution tanks must be thoroughly rinsed with clean water to remove all traces of alkali. Cast parts may also be cleaned with steam cleaner.



CARE SHOULD BE EXERCISED TO AVOID INHALATION OF VAPOURS AND SKIN RASHES WHEN USING ALKALI CLEANERS.

All parts cleaned must be thoroughly dried immediately by using moisture-free compressed air or soft, lintless absorbent wiping rags free of abrasive materials such as metal fillings, contaminated oil, or lapping compound.

INSPECTION

The importance of careful and thorough inspection of all parts cannot be overstressed. Replacement of all parts showing indication of wear or stress will eliminate costly and avoidable failures at a later date.

BEARINGS

Carefully inspect all rollers: cages and cups for wear, chipping, or nicks to determine fitness of bearings for further use. Do not replace a bearing cone or cup individually without replacing the mating cup or cone at the same time. After inspection, dip bearings in Automatic Transmission Fluid and wrap in clean lintless cloth or paper to protect them until installed.

OIL SEALS, GASKETS, ETC.

Replacement of spring load oil seals, "O"-rings, metal sealing rings, gaskets, and snap rings is more economical when unit is disassembled than premature overhaul to replace these parts at a future time. Further loss of lubricant through a worn seal may result in failure of other more expensive parts of the assembly. Sealing members should be handled carefully, particularly when being installed. Cutting, scratching, or curling under of lip of seal seriously impairs its efficiency. When assembling new metal type sealing rings, these should be lubricated with coat of chassis grease to stabilize rings in their grooves for ease of assembly of mating members. Lubricate all "O"-rings and seals with recommended type Automatic Transmission Fluid before assembly.

GEARS AND SHAFTS

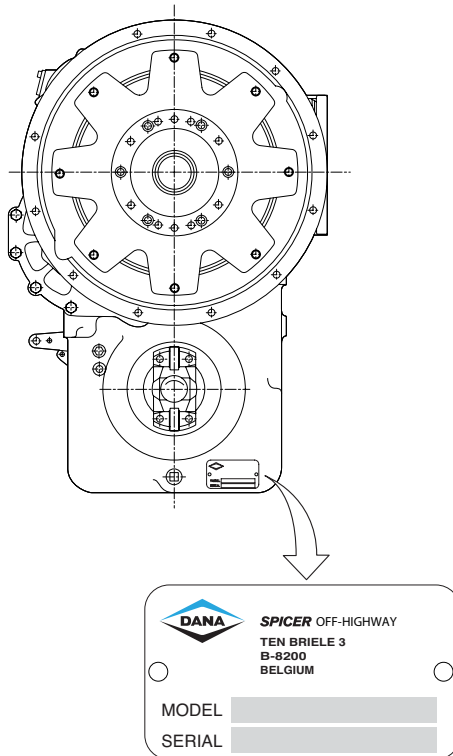
If magna-flux process is available, use process to check parts. Examine teeth on all gears carefully for wear, pitting, chipping, nicks, cracks, or scores. If gear teeth show spots where case hardening is worn through or cracked, replace with new gear. Small nicks may be removed with suitable hone. Inspect shafts and quills to make certain they are not sprung, bent, or splines twisted, and that shafts are true.

HOUSINGS, COVERS, ETC.

Inspect housings, covers and bearing caps to ensure that they are thoroughly clean and that mating surfaces, bearing bores, etc..., are free from nicks or burrs. Check all parts carefully for evidence of cracks or conditions which would cause subsequent oil leaks or failures.

TECHNICAL SPECIFICATION

T12000 - 3,4,6 speed



IDENTIFICATION OF THE UNIT

- 1 Model and type of the unit.
- 2 Serial number.

WEIGHT, DIMENSIONS, OIL CAPACITY

Weight (dry): ±174.6 kg (385 lb.)

DIMENSIONS	T-MODEL	MT-MODEL
Maximum length:	623.1 mm (24.53")	623.1 mm (24.53")
Maximum width:	477.0 mm (18.78")	477.0 mm (18.78")
Maximum height:	701.1 mm (27.60")	701.1 mm (27.60")

OIL CAPACITY

±12.9 l (3.4 US Gallon) without cooler and hydraulic lines.

Consult operator's manual on applicable machine for system capacity.

PRESSURE AND TEMPERATURE SPECIFICATIONS

- Normal operating temperature 70 - 120 °C (158 - 248 F) measured at temperature check port converter out (port 71 - **).
- Maximum allowed transmission temperature 120 °C (248 F).
- Transmission regulator pressure (*) - (neutral) - port 31 (**).
 - At 600 RPM min. 12.76 bar (185 PSI) minimum.
 - At 2000 RPM: 19.31 bar (280 PSI) maximum.
- Pump flow (*)
 - At 2000 RPM in neutral: 53 l/min. minimum (14 GPM).
- Clutch pressures (*)
 - 1st clutch: port 41 (**).
 - 2nd clutch: port 42 (**).
 - 3rd clutch: port 43 (**).
 - Forward High clutch: port 44 (**).
 - Forward clutch: port 45 (**).
 - Reverse clutch: port 46 (**).
- At 1800 RPM :
 - 16.5 - 19.3 bar (240 - 280 PSI) clutch activated.
 - 0 - 0.2 bar (0 - 3 PSI) clutch released.
- Filter bypass valve set at 2.1 - 3.5 bar (*) (30 - 50 PSI).
- Lube pressure (*) (port 33) 2.9 - 4.0 bar (42 - 58 PSI) at 49 l/min. (13 GPM) pump flow (±1850 RPM).
- Safety valve: cracking pressure (*) 8.27 - 10.20 bar (120 - 148 PSI), measured at port 32 with convertor out shut off.
- Transmission out pressure (*) (port 32) 2.9-6.41 bar (42-93 PSI) at 49 l/min, (13 GPM) pump flow (±1850 RPM), and max. 8.27 bar (120 PSI) at no load governed speed.

(*)All pressures and flows to be measured with oil temperature of 82-93 °C (180-200 F)

(**)Refer to section 7 “Troubleshooting” for check port identification.

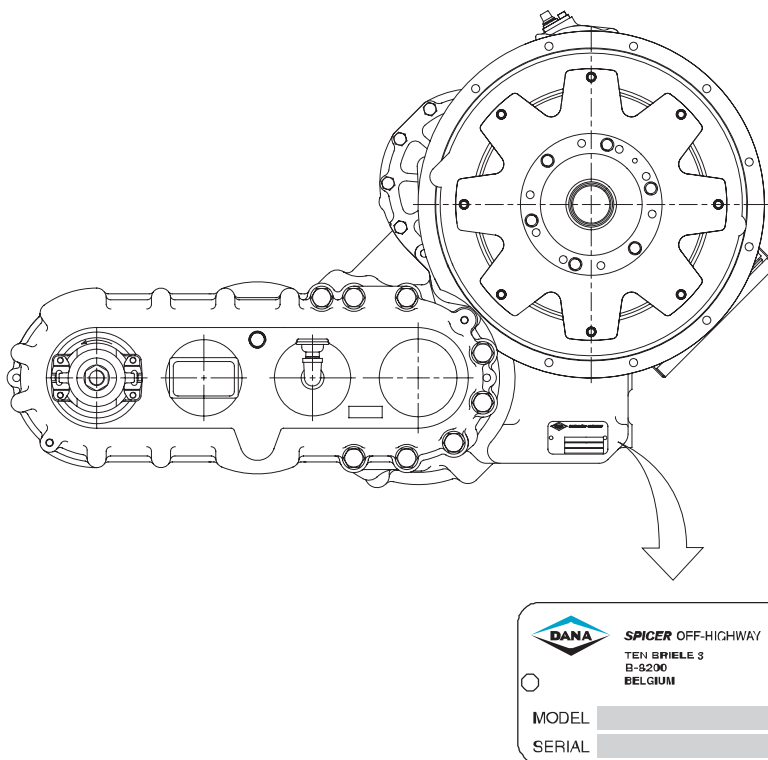
ELECTRICAL SPECIFICATIONS

- Solenoid (forward, reverse, 1st, 2nd and splitter).
- Coil resistance:
 - 12V: 9.79 Ω ±0.5 Ω.
 - 24V: 39.3 Ω ±2 Ω.
- Speed sensor:
 - Type: magneto resistive sensor.
 - Sensing distance: 0 - 1.8 mm (0” - 0.07”).
 - Sensor signal: generates a square current with a fixed amplitude changing between 7 and 14 mA.

HYDRAULIC COOLER AND FILTER LINE SPECIFICATIONS

- Minimum 19 mm (.75”) internal diameter for lines and fittings.
- Suitable for operation from ambient to 120 °C (248 F) continuous operating temperature.
- Must withstand 20 bar (290 PSI) continuous pressure and with 40 bar (580 PSI) intermittent surges.
- Conform SAE J1019 and SAE J517, 100RI.

VDT12000



IDENTIFICATION OF THE UNIT

- 1 Model and type of the unit.
- 2 Serial number.

WEIGHT, DIMENSIONS, OIL CAPACITY

TRANSMISSION WITH A 3 SHAFT DROP BOX

Weight (dry): ± 255 kg [562 Lbs.]

DIMENSIONS	VDT3 SHAFT DROP BOX
Max. length:	529.3 mm [20.84"]
Max. Width:	872.0 mm [34.33"]
Max. Height:	619.2 mm [24.38"]

OIL CAPACITY

Transmission: ± 13.5 l [3.6 US gallon]

(without cooler and hydraulic lines. Consult Operator's Manual on applicable machine for system capacity.)

Drop Box: ± 0.75 l [0.2 US gallon]

TRANSMISSION WITH A 4 SHAFT DROP BOX

Weight (dry): ± 255 kg [562 Lbs.]

TRANSMISSION WITH A 4 SHAFT DROP BOX

Weight (dry): ± 272 kg [600 Lbs.]

DIMENSIONS	4 SHAFTS DROP BOX
Max. length:	529.3 mm [20.84"]
Max. Width:	1007.2 mm [39.66"]
Max. Height:	619.2 mm [24.38"]

OIL CAPACITY

Transmission: ± 13.5 l [3.6 US gallon]

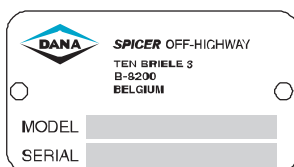
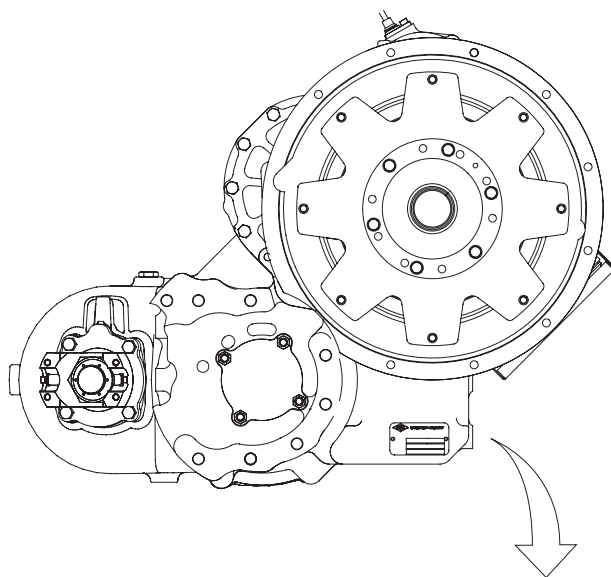
(without cooler and hydraulic lines. Consult Operator

Drop Box: ± 1.0 l [0.26 US gallon]



NOTE: THE OIL OF THE DROP BOX IS COMPLETELY SEPARATED FROM THE OIL OF THE TRANSMISSION.

VDT 17 DEGREES



IDENTIFICATION OF THE UNIT

- 1 Model and type of the unit.
- 2 Serial number.

WEIGHT, DIMENSIONS, OIL CAPACITY

Weight (dry): ± 249 kg 9 Lbs.

DIMENSIONS	17 DEGREES VERSION
Max. length:	730.7 mm .77"
Max. Width:	803.4 mm .63"
Max. Height:	619.9 mm .40"

OIL CAPACITY

- Transmission: ± 13.5 l 6 US gallon (without cooler and hydraulic lines. Consult Operator's Manual on applicable machine for system capacity.)
- 17° Drop Box: ± 0.25 l [0.07 US gallon]



NOTE: THE OIL OF THE DROP BOX IS COMPLETELY SEPARATED FROM THE OIL OF THE TRANSMISSION.

TIGHTENING TORQUES

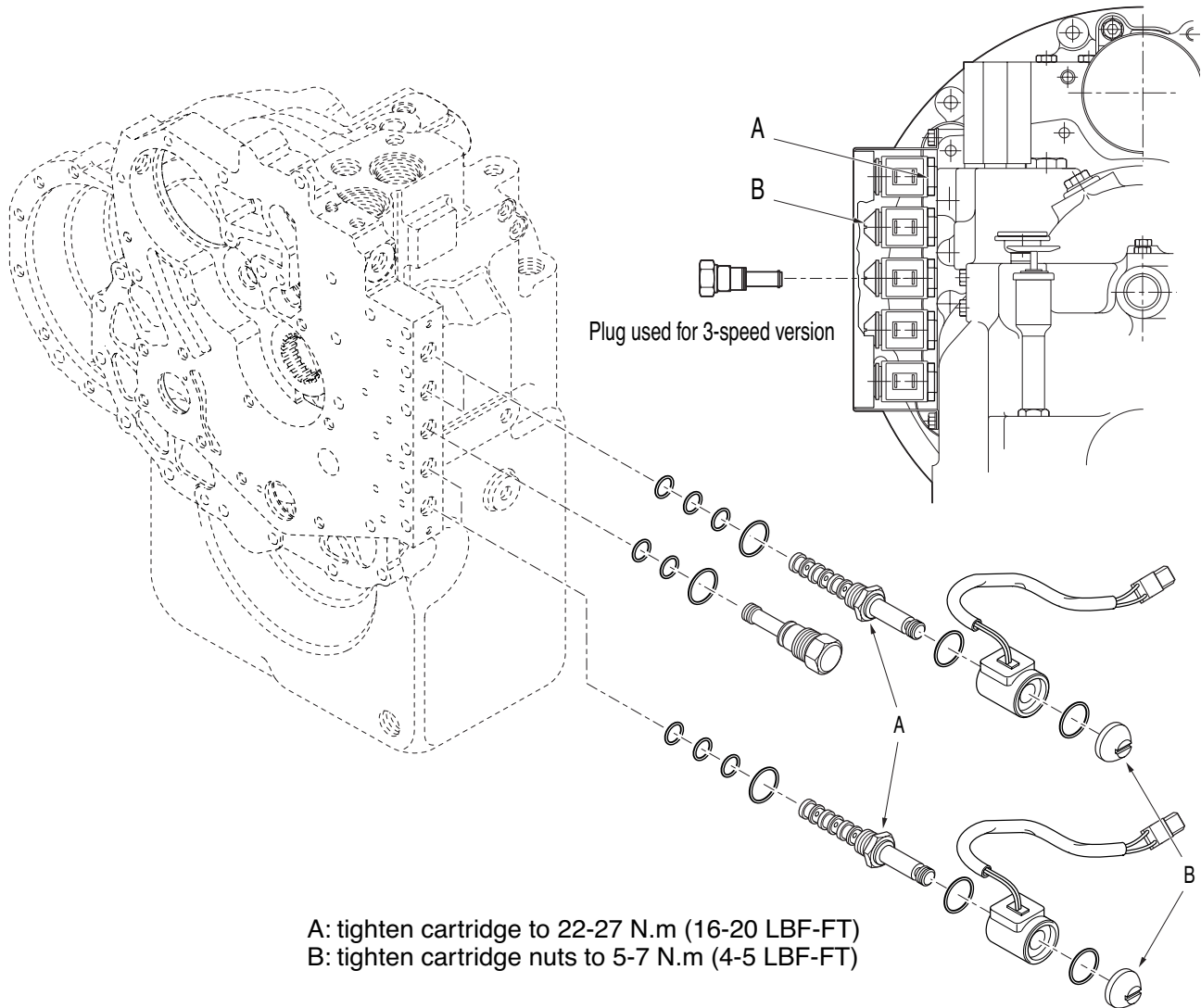
COARSE PITCH

SIZE OF BOLT	TORQUE WRENCH					
	8.8	8.8 + Loctite 270	10.9	10.9 + Loctite 270	12.9	12.9 + Loctite 270
M6 x 1	9,5 – 10,5	10,5 – 11,5	14,3 – 15,7	15,2 – 16,8	16,2 – 17,8	18,1 – 20
M8 x 1,25	23,8 – 26,2	25,6 – 28,4	34,2 – 37,8	36,7 – 40,5	39 – 43	43,7 – 48,3
M10 x 1,5	48 – 53	52 – 58	68 – 75	73 – 81	80 – 88	88 – 97
M12 x 1,75	82 – 91	90 – 100	116 – 128	126 – 139	139 – 153	152 – 168
M14 x 2	129 – 143	143 – 158	182 – 202	200 – 221	221 – 244	238 – 263
M16 x 2	200 – 221	219 – 242	283 – 312	309 – 341	337 – 373	371 – 410
M18 x 2,5	276 – 305	299 – 331	390 – 431	428 – 473	466 – 515	509 – 562
M20 x 2,5	390 – 431	428 – 473	553 – 611	603 – 667	660 – 730	722 – 798
M22 x 2,5	523 – 578	575 – 635	746 – 824	817 – 903	893 – 987	974 – 1076
M24 x 3	675 – 746	732 – 809	950 – 1050	1040 – 1150	1140 – 1260	1240 – 1370
M27 x 3	998 – 1103	1088 – 1202	1411 – 1559	1539 – 1701	1710 – 1890	1838 – 2032
M30 x 3,5	1378 – 1523	1473 – 1628	1914 – 2115	2085 – 2305	2280 – 2520	2494 – 2757

FINE PITCH

SIZE OF BOLT	TORQUE WRENCH					
	8.8	8.8 + Loctite 270	10.9	10.9 + Loctite 270	12.9	12.9 + Loctite 270
M8 x 1	25,7 – 28,3	27,5 – 30,5	36,2 – 39,8	40 – 44	42,8 – 47,2	47,5 – 52,5
M10 x 1,25	49,4 – 54,6	55,2 – 61	71,5 – 78,5	78 – 86	86 – 94	93 – 103
M12 x 1,25	90 – 100	98 – 109	128 – 142	139 – 154	152 – 168	166 – 184
M12 x 1,5	86 – 95	94 – 104	120 – 132	133 – 147	143 – 158	159 – 175
M14 x 1,5	143 – 158	157 – 173	200 – 222	219 – 242	238 – 263	261 – 289
M16 x 1,5	214 – 236	233 – 257	302 – 334	333 – 368	361 – 399	394 – 436
M18 x 1,5	312 – 345	342 – 378	442 – 489	485 – 536	527 – 583	580 – 641
M20 x 1,5	437 – 483	475 – 525	613 – 677	674 – 745	736 – 814	808 – 893
M22 x 1,5	581 – 642	637 – 704	822 – 908	903 – 998	998 – 1103	1078 – 1191
M24 x 2	741 – 819	808 – 893	1045 – 1155	1140 – 1260	1235 – 1365	1363 – 1507
M27 x 2	1083 – 1197	1178 – 1302	1520 – 1680	1672 – 1848	1834 – 2027	2000 – 2210
M30 x 2	1511 – 1670	1648 – 1822	2138 – 2363	2332 – 2577	2565 – 2835	2788 – 3082

COIL AND CARTIDGE TORQUE



MAINTENANCE

OIL SPECIFICATIONS

RECOMMENDED LUBRICANTS

CUSTOMER	OIL TYPE
CATERPILLAR	TO-4.
JOHN DEERE	J20 C. D.
MILITARY	MIL-PRF-2104G.
ALLISON	C-4.
DEXRON	II Equivalent - See note below.



DEXRON* II EQUIVALENT IS ACCEPTABLE; HOWEVER IT IS NOT COMPATIBLE WITH TORQUE CONVERTERS OR TRANSMISSIONS EQUIPPED WITH GRAPHITIC FRICTION MATERIAL CLUTCH PLATES.



DEXRON* III, ENGINE OIL OR GL-5 OILS ARE NOT RECOMMENDED.

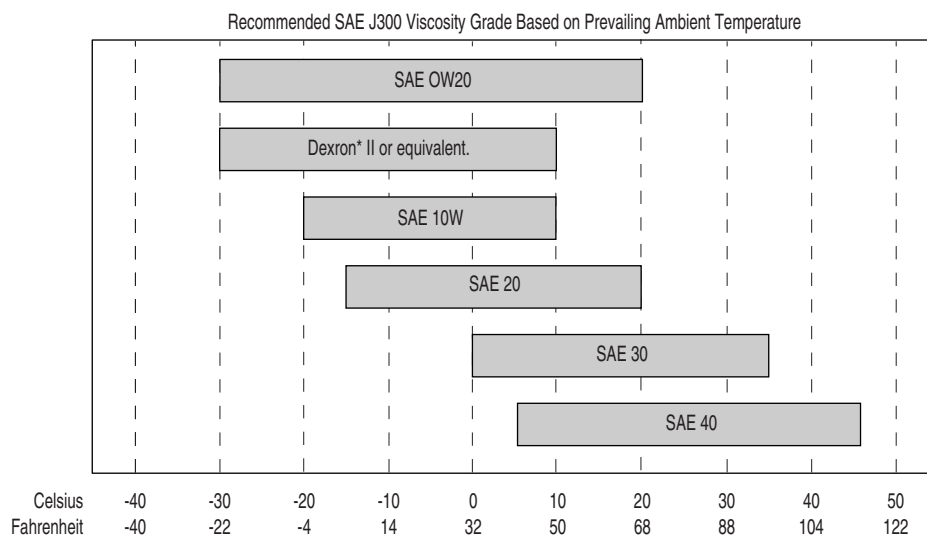
PREFERRED OIL VISCOSITY

It is recommended that the highest viscosity monograde lubricant available be used for the anticipated ambient temperature. Typically this will be a CAT TO-4 qualified lubricant. When large swings in ambient temperature are probable, J20 C, D multigrades are recommended. Multigrade lubricants should be applied at the lower viscosity rating for the prevailing ambient temperature, i.e. a 10W20 should be used where a 10W monograde is used. If a C-4 multigrade is used in stead of J20 lubricant it is recommended that the viscosity span no more than 10 points, i.e. 10W20.



SYNTHETIC LUBRICANTS ARE APPROVED IF QUALIFIED BY ONE OF THE ABOVE SPECIFICATIONS. OIL VISCOSITY GUIDELINES APPLY, BUT SYNTHETIC MULTIGRADES MAY SPAN MORE THAN 10 POINTS.

FOR FIRE RESISTANT FLUID RECOMMENDATIONS PLEASE CONTACT SPICER OFF-HIGHWAY PRODUCTS.



**VALID FOR: VDT12000 & T12000****NORMAL OIL CHANGE INTERVAL**

Drain and refill system every 1000 hours for average environmental and duty cycle conditions. Severe or sustained high operating temperature or very dusty atmospheric conditions will result in accelerated deterioration or contamination. Judgement must be used to determine the required change intervals for extreme conditions.

EXTENDED OIL CHANGE INTERVAL

Extended oil service life may result when using synthetic fluids. Appropriate change intervals should be determined for each transmission by measuring oil oxidation and wear metals, over time, to determine a baseline. Wear metal analysis can provide useful information but a transmission should not be removed from service based solely on this analysis.

VALID FOR: T12000**SUMP PREHEATERS**

Preheat the transmission fluid to the minimum temperature for the oil viscosity used before engine start up.

FILTERS

Service oil filters element every 1000 hours under normal environmental and duty cycle conditions.

*Dexron is a registered trademark of GENERAL MOTORS CORPORATION.

T12000 - 3, 4, 6 speed

MAINTENANCE INTERVALS

DAILY

Check oil level daily with engine running at idle (600 RPM) and oil at 82 - 93 °C (180-200 F).

Maintain oil level at full mark.

NORMAL DRAIN PERIOD

Normal drain period and oil filter element change are for average environment and duty cycle condition.

Severe or sustained high operating temperature or very dusty atmospheric conditions will cause accelerated deterioration and contamination.

For extreme conditions judgement must be used to determine the required change intervals.

EVERY 1000 HOURS

Change oil filter element.

Drain and refill system as follows (Drain with oil at 65 - 93 °C (150 - 200 F)):

- 1 Drain transmission.
- 2 Remove and discard filter. Install new filter.
- 3 Refill transmission to FULL mark.
- 4 Run engine at 500 - 600 RPM to prime convertor and lines.
- 5 Recheck level with engine running at 500 - 600 RPM and add oil to bring level to FULL mark. When oil temperature is hot 82.2 - 93.3 °C (180- 200 F) make final oil level check and adjust if necessary to bring oil level to FULL mark.



NOTE: IT IS RECOMMENDED THAT OIL FILTER BE CHANGED AFTER 100 HOURS OF OPERATION ON NEW, REBUILT OR REPAIRED UNIT.


SERVICING MACHINE AFTER COMPONENTS OVERHAUL

The transmission, torque converter, and its allied hydraulic system are important links in the driveline between the engine and the wheels. The proper operation of either unit depends greatly on the condition and operation of the other. Therefore, whenever repair or overhaul of one unit is performed, the balance of the system must be considered before the job can be considered complete.

After the overhauled or repaired transmission has been installed in the machine, the oil cooler, and connecting hydraulic system must be thoroughly cleaned. This can be accomplished in several manners and a degree of judgement must be exercised as to the method employed.

The following are considered the minimum steps to be taken:

- 1 Drain entire system thoroughly.
- 2 Disconnect and clean all hydraulic lines. Where feasible hydraulic lines should be removed from machine for cleaning.
- 3 Replace oil filter element.
- 4 The oil cooler must be thoroughly cleaned. The cooler should be "back flushed" with oil and compressed air until all foreign material has been removed. Flushing in direction of normal oil flow will not adequately clean the cooler. If necessary, cooler assembly should be removed from machine for cleaning, using oil, compressed air, and steam cleaner for that purpose.
- 5 Reassemble all components and use only type oil (See chapter 4.1.1 "Recommended lubricants"). Fill the transmission through filler opening until fluid comes up to FULL mark on transmission dipstick.

 **NOTE:** IF THE DIPSTICK IS NOT ACCESSIBLE OIL LEVEL CHECK PLUGS ARE PROVIDED.

- Remove check plug, fill until oil runs from oil hole. Relift filler and level plug.
 - Run engine two minutes at 500 - 600 RPM to prime torque convertor and hydraulic lines.
 - Recheck level of fluid in transmission with engine running at idle (500 - 600 RPM).
 - Add quantity necessary to bring fluid level to FULL mark on dipstick or runs from oil level check plug hole.
 - Install oil level plug of dipstick.
 - Recheck with hot oil 82.2 - 93.3 °C (180 - 200 F).
 - Adjust oil level to FULL mark on dipstick or runs freely from oil level plug.
- 6 Recheck all drain plugs, lines, connections, etc...., for leaks and tighten where necessary.

VDT12000

MAINTENANCE INTERVALS FOR THE 3 & 4 SHAFT DROP BOX

DAILY

Check oil level daily.

Maintain oil level at full mark. (Middle of oil level glass)

NORMAL DRAIN PERIOD

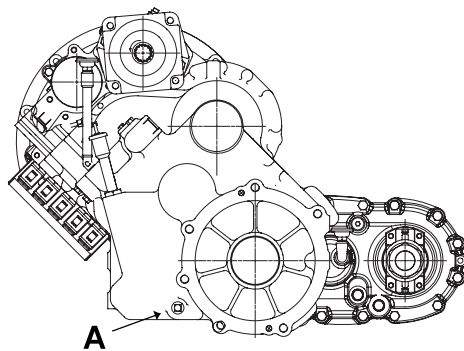
Normal drain period is every 1000 hours for average environment and duty cycle condition. Severe or sustained high operating temperature or very dusty atmospheric conditions will cause accelerated deterioration and contamination. For extreme conditions judgement must be used to determine the required change intervals.

MAINTENANCE INTERVALS FOR THE TRANSMISSION.

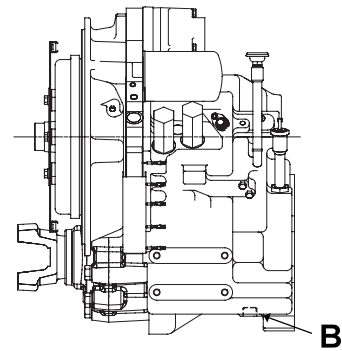


TO DRAIN THE TRANSMISSION, BOTH DRAIN PLUGS (A & B) NEED TO BE REMOVED

- 3 shaft drop box

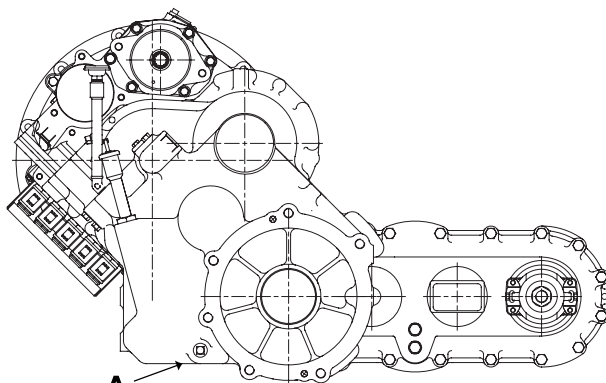


REAR VIEW

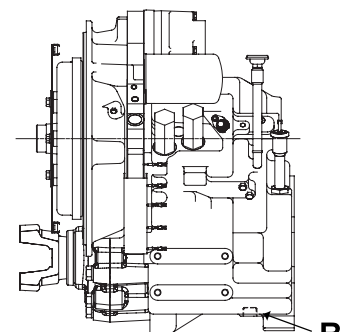


LEFT VIEW

- 4 shaft drop box



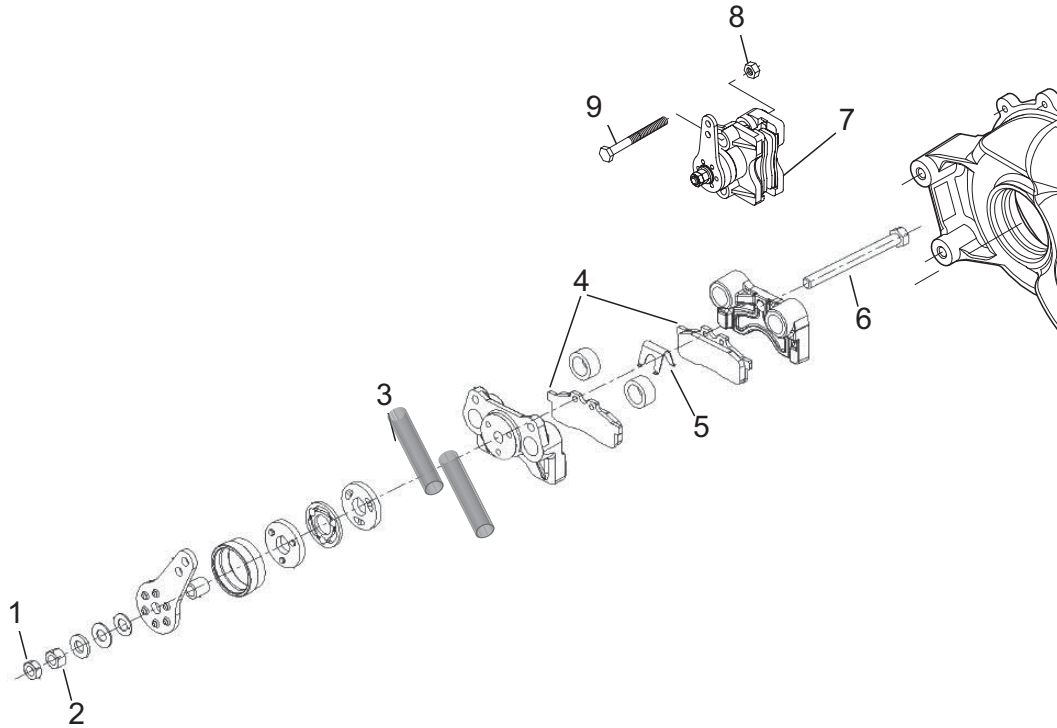
REAR VIEW



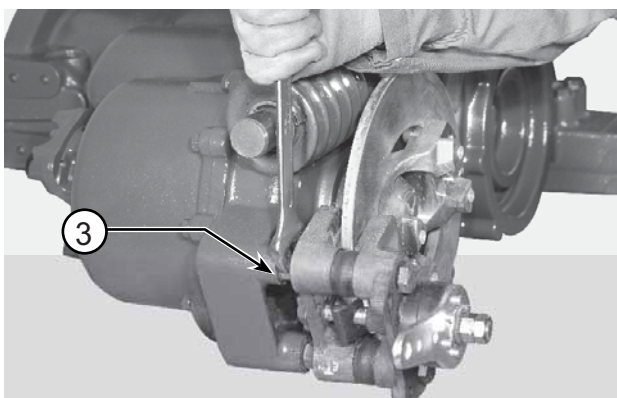
LEFT VIEW

INSTRUCTIONS FOR LINING REPLACEMENT AND ADJUSTMENT OF PARKING BRAKE ASSEMBLY

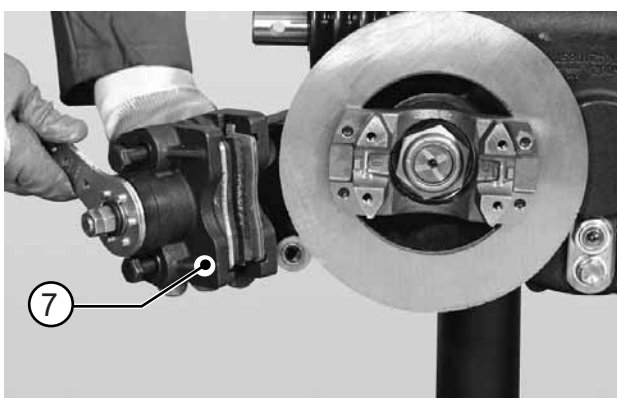
ASSEMBLY DIAGRAM



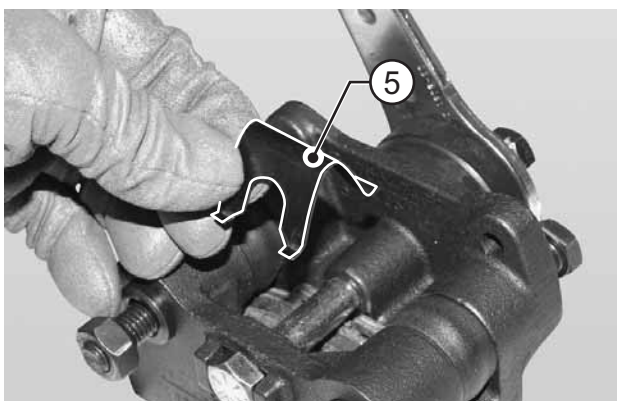
DISASSEMBLY

**1**

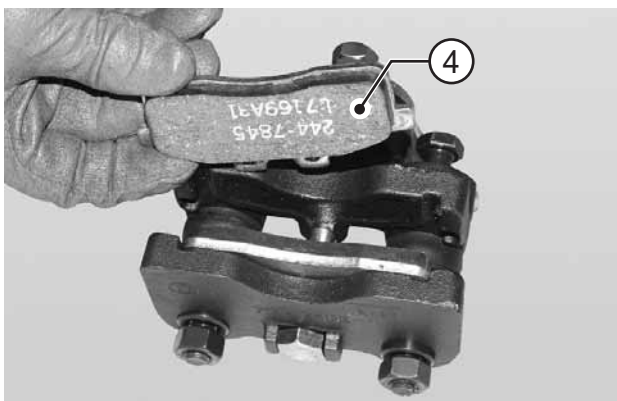
Undo the lock nuts (9) securing the runner pins (10). Remove the runner pins (10), holding the lock nuts (9) in position.

**2**

Remove the brake calliper (8).

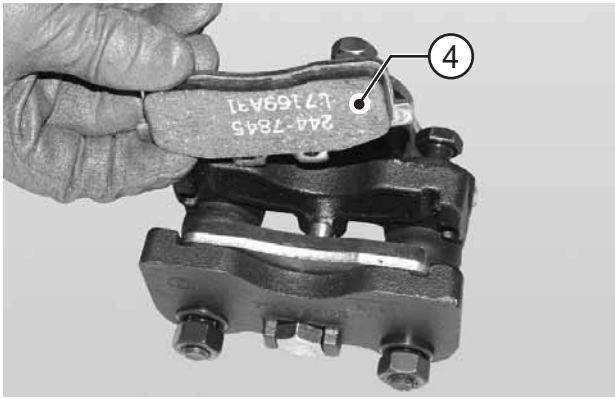
**3**

With a plier press and remove the spring flat.

**4**

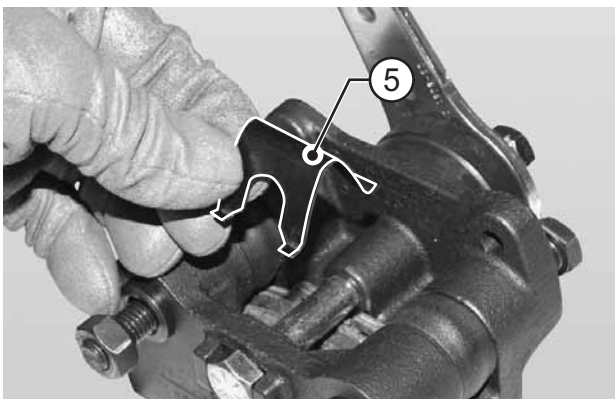
Remove the pads (4).

ASSEMBLY



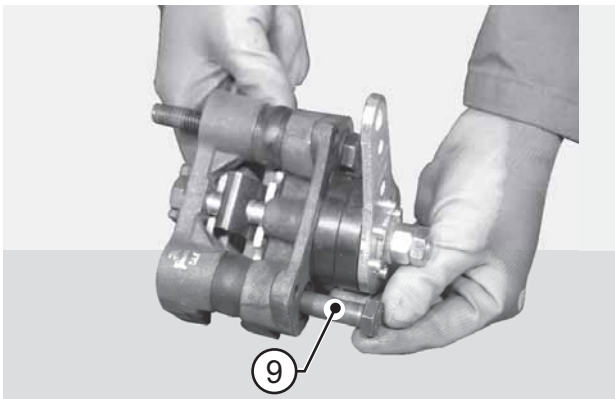
5

Install the brake pads (4).



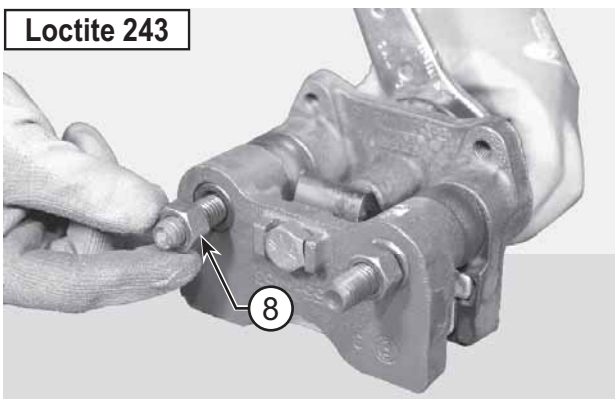
6

Install the spring flat (5) and fit it in the pads holes.



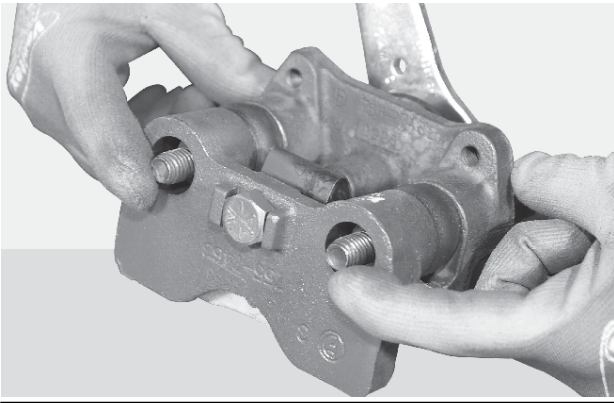
7

Insert the fixing screws (9) through the sleeves (3) in the brake caliper (7).



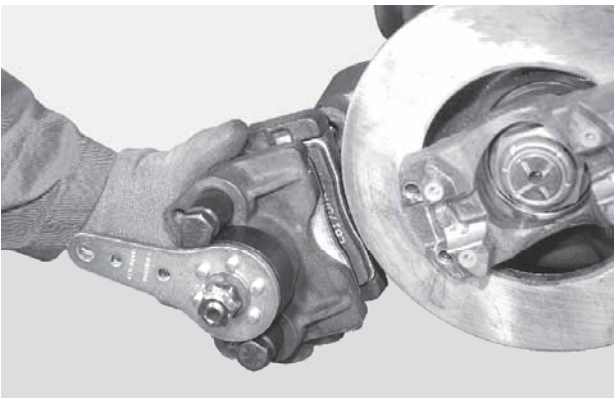
8

- ① Screw the lock nuts (8) on the fixing screws (9) and leave a gap of 2 mm between the lock nuts (8) and the sleeves (3).
- ② Spread the threaded portion of the screws (9) with LOC-TITE 243.



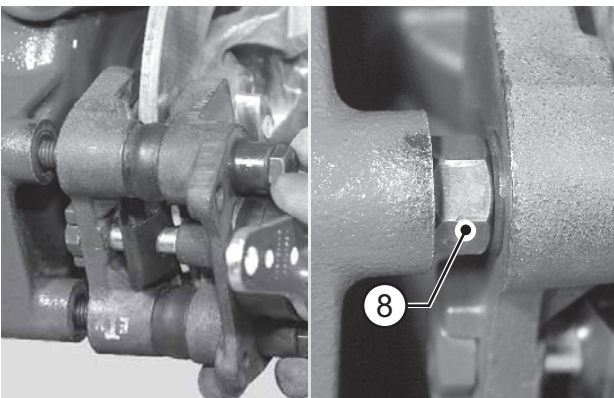
9

Move towards the external part of the brake caliper (7) the screws (9) complete with sleeves (3) and lock nuts (8) to facilitate the brake caliper (7) installation.



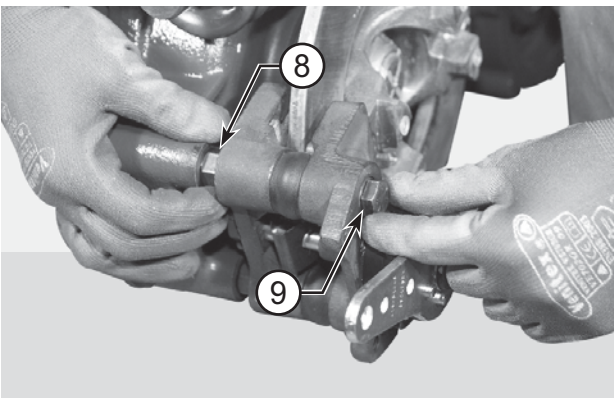
10

Insert the brake caliper (7) in the braking disc and install it in its seat, fasten the fixing screws (9).



11

Remove the backlash between screws (9) and sleeves (3) working on the lock nuts (8). Send the screws (9) to end stroke, complete with sleeves (3) and lock nuts (8).

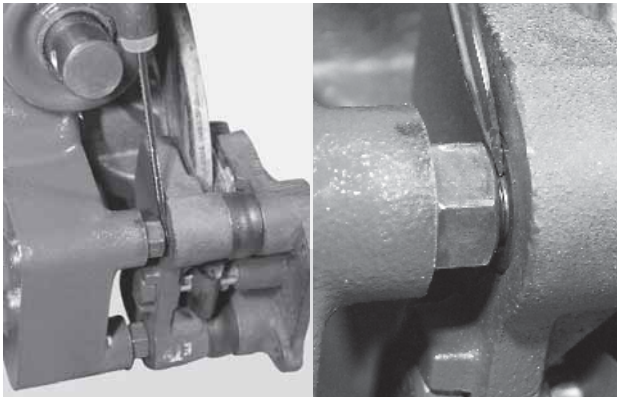


12

BRAKE CALIPER BACKLASH REGULATION

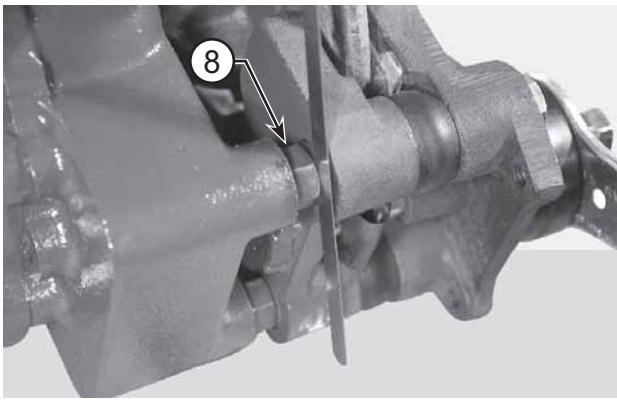
Repeat the operation on both screws.

Holding the lock lock nut in position, unloose the screw of about 1 turn.



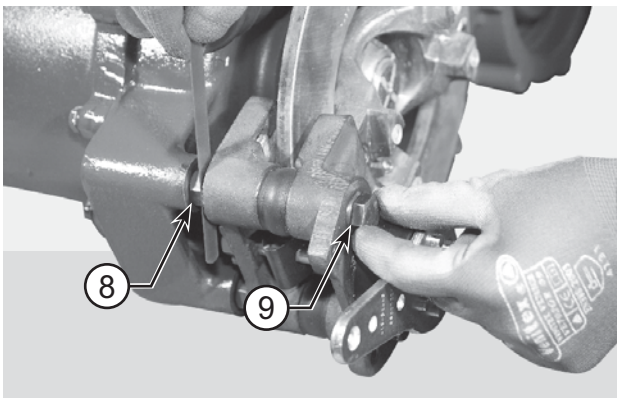
13

Repeat the operation on both screws.
Using a screwdriver adjust the sleeve (3) as shown in picture.



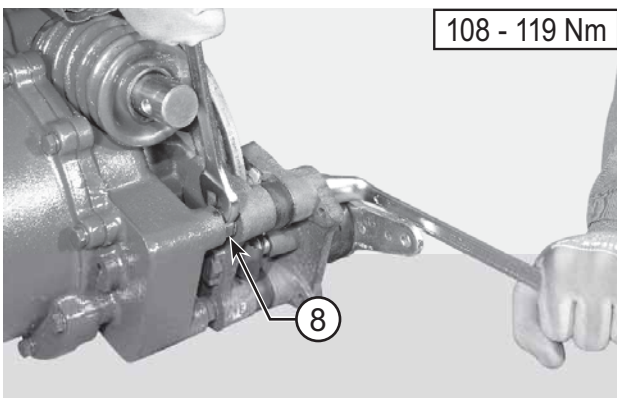
14

Repeat the operation on both screws.
Insert a 0,7 mm shim between the sleeve (3) and the lock nut (8) to check the brake caliper (7) backlash.
NOTE: Check that the lock nut (8) is at end of stroke.



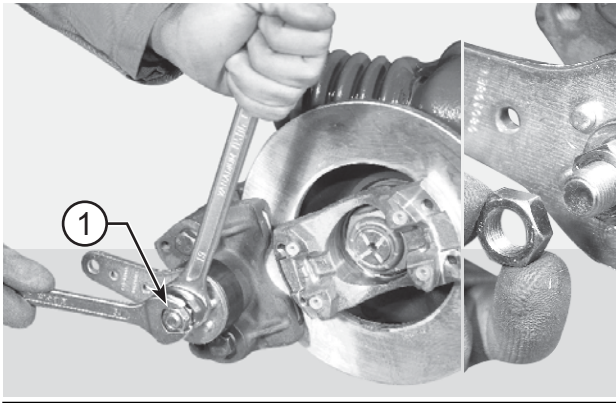
15

Repeat the operation on both screws. Keeping the shim in position, insert the screw (9) to regulate the backlash between sleeve (3) and lock nut (8).



16

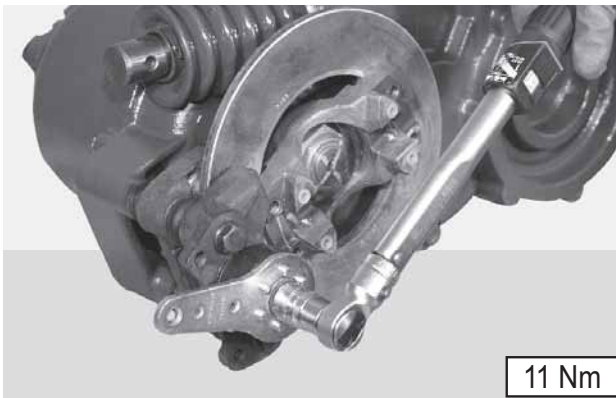
Repeat the operation on both screws. Keeping the screws (9) in position, torque the lock nuts (8) to a tightening torque of 108 - 119 Nm.



17

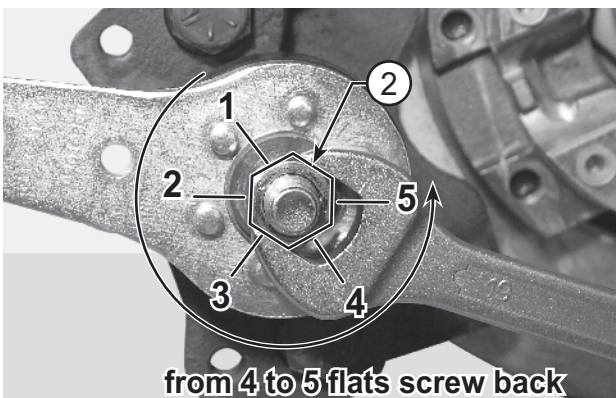
BRAKE PADS BACKLASH ADJUSTMENT

Loosen and remove the brake pads (4) outer adjustment nut (1).



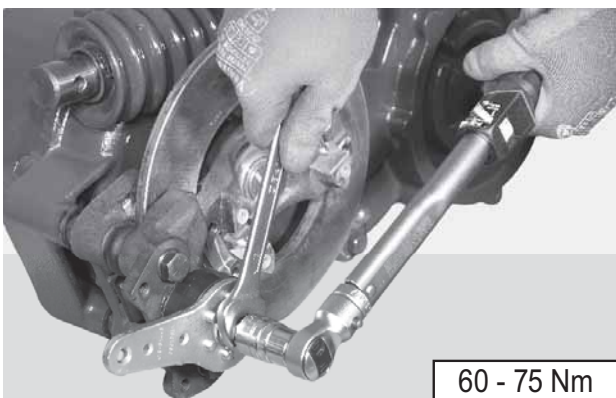
18

Tighten the inner adjustment nut (2) until firm contact is made with the disc by the pads (4). Using a dynamometric wrench tighten the nut to a tightening torque of 11 Nm.



19

Loosen the inner adjustment nut (2) by 4-5 surfaces. Check the correct working of the brake caliper (7).



20

Screw the outer nut (1) on the adjustment bolt (6). Keeping the inner nut (2) in position, torque the outer nut (1) to a tightening torque of 60 - 75 Nm.

TROUBLESHOOTING GUIDE

T12000 - 3, 4, 6 speed

The following information is presented as an aid to isolating and determining the specific problem area in a transmission that is not functioning correctly.

When troubleshooting a “transmission” problem, it should be kept in mind that the transmission is only the central unit of a group of related powertrain components. Proper operation of the transmission depends on the condition and correct functioning of the other components of the group. Therefore, to properly diagnose a suspected problem in the transmission, it is necessary to consider the transmission fluid, charging pump, torque converter, transmission assembly, oil cooler, filter, connecting lines, and controls, including the engine, as a complete system.

By analysing the principles of operation together with the information in this section, it should be possible to identify and correct any malfunction which may occur in the system.

T12000 TRANSMISSION

T12000 (power shift with torque converter transmission) troubles fall into three general categories:

- 1 Mechanical problems.
- 2 Hydraulic problems.
- 3 Electrical problems.

In addition to the mechanical and electrical components, all of which must be in the proper condition and functioning correctly, the correct functioning of the hydraulic circuit is most important. Transmission fluid is the “life blood” of the transmission. It must be supplied in an adequate quantity and delivered to the system at the correct pressures to ensure converter operation, to engage and hold the clutches from slipping, and to cool and lubricate the working components.

TROUBLESHOOTING PROCEDURES

STALL TEST

A stall test to identifies transmission, converter, or engine problems.

Use following procedure:

- 1 Put the vehicle against a solid barrier, such as a wall, and/or apply the parking brake and block the wheels.
- 2 Put the directional control lever in FORWARD (or REVERSE, as applicable).
- 3 Select the highest speed. With the engine running, slowly increase engine speed to approximately one-half throttle and hold until transmission (converter outlet) oil temperature reaches the operating range.



DO NOT OPERATE THE CONVERTER AT STALL CONDITION LONGER THAN 30 SECONDS AT ONE TIME, SHIFT TO NEUTRAL FOR 15 SECONDS AND REPEAT THE PROCEDURE UNTIL DESIRED TEMPERATURE IS REACHED.

EXCESSIVE TEMPERATURE 120 °C (250 F) MAXIMUM WILL CAUSE DAMAGE TO TRANSMISSION CLUTCHES, FLUID, CONVERTER, AND SEALS.

TRANSMISSION PRESSURE CHECKS

Transmission problems can be isolated by the use of pressure tests. When the stall test indicates slipping clutches, then measure clutch pack pressure to determine if the slippage is due to low pressure or clutch plate friction material failure.

In addition, converter charging pressure and transmission lubrication pressure can also be measured.

MECHANICAL AND ELECTIRCAL CHECKS

Prior to checking any part of the system for hydraulic function (pressure testing), the following mechanical and electrical checks should be made:

- Check the parking brake and inching pedal for correct adjustment.
- Be sure all lever linkage is properly connected and adjusted in each segment and at all connecting points.
- The controls are actuated electrically. Check the wiring and electrical components.
- Be sure that all components of the cooling system are in good condition and operating correctly. The radiator must be clean to maintain the proper cooling and operating temperatures for the engine and transmission. Air clean the radiator, if necessary.
- The engine must be operating correctly. Be sure that it is correctly tuned and adjusted to the correct idle and maximum no-load governed speed specifications.

HYDRAULIC CHECKS

Also, before checking the transmission clutches, torque converter, charging pump, and hydraulic circuit for pressure and rate of oil flow, it is important to make the following transmission fluid check:

Check oil level in the transmission. The transmission fluid must be at the correct (full level). All clutches and the converter and its fluid circuit lines must be fully charged (filled) at all times.



THE TRANSMISSION FLUID MUST BE AT OPERATING TEMPERATURE OF 82 - 93 °C (180 - 200 F) TO OBTAIN CORRECT FLUID LEVEL AND PRESSURE READINGS.

DO NOT ATTEMPT TO MAKE THESE CHECKS WITH COLD OIL.

To raise the oil temperature to this specification it is necessary to either operate (work) the vehicle or run the engine with converter at "stall" (Refer to 7.2.1 "Stall test").



BE CAREFUL THAT THE VEHICLE DOES NOT MOVE UNEXPECTEDLY WHEN OPERATING THE ENGINE AND CONVERTER AT STALL RPM.