COMPONENT LOCATIONS

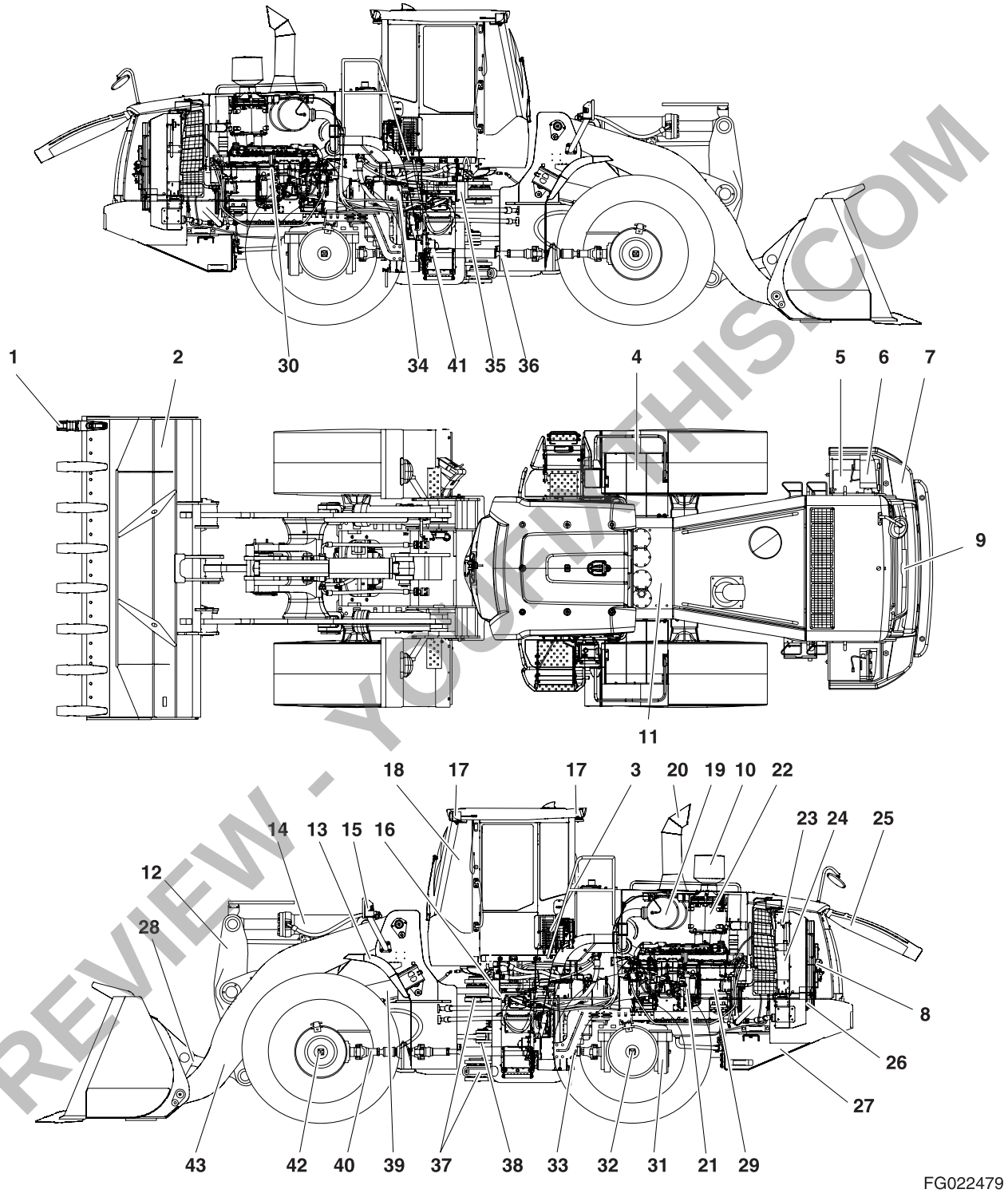


Figure 1

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WELDING PRECAUTIONS AND INSTRUCTIONS

WARNING

AVOID DEATH OR SERIOUS INJURY

To avoid accidents, personal injury and the possibility of causing damage to the machine or to components, welding must only be performed by properly trained and qualified personnel, who possess the correct certification (when required) for the specific welding fabrication or specialized repair being performed.

WARNING

AVOID DEATH OR SERIOUS INJURY

Structural elements of the machine may be built from a variety of steels. These could contain unique alloys or may have been heat-treated to obtain particular strength characteristics. It is extremely important that welding repairs on these types of steel are performed with the proper procedures and equipment. If repairs are performed incorrectly, structural weakening or other damage to the machine (that is not always readily visible) could result. Always consult *DOOSAN* After Sales Service before welding on integral components (loader arm, frames, car body, track frames, upper structure, attachment, etc.) of the machine. It is possible that some types of structurally critical repairs may require Magnetic Particle or Liquid Penetrant testing, to make sure there are no hidden cracks or damage, before the machine can be returned to service.

WARNING

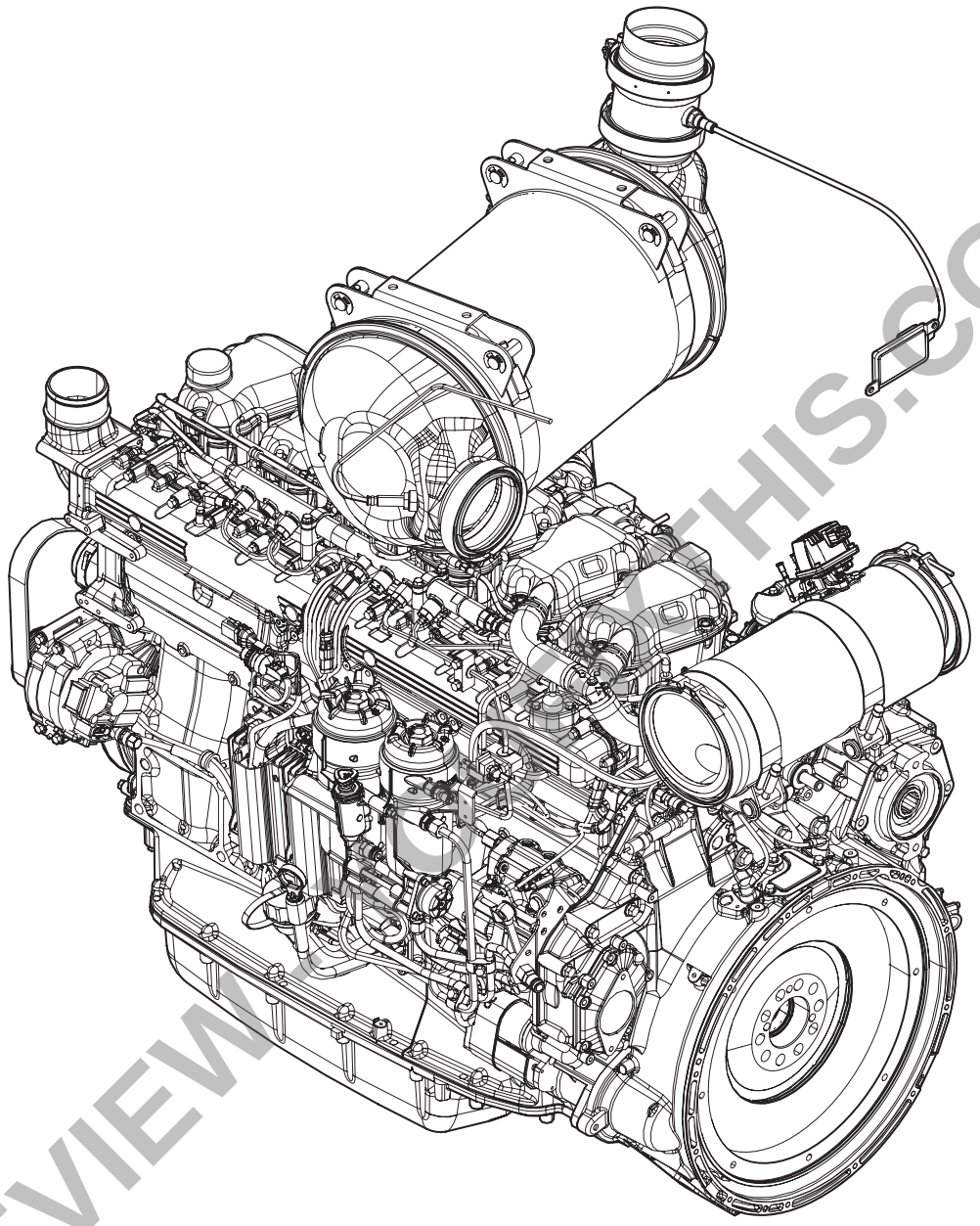
AVOID DEATH OR SERIOUS INJURY

Always perform welding procedures with proper safety equipment and adequate ventilation in a dry work area. Keep a fire extinguisher near and wear personal protective equipment.

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DC13 ENGINE



FG024616

Figure 1

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TRANSMISSION ELECTRIC COMPONENTS

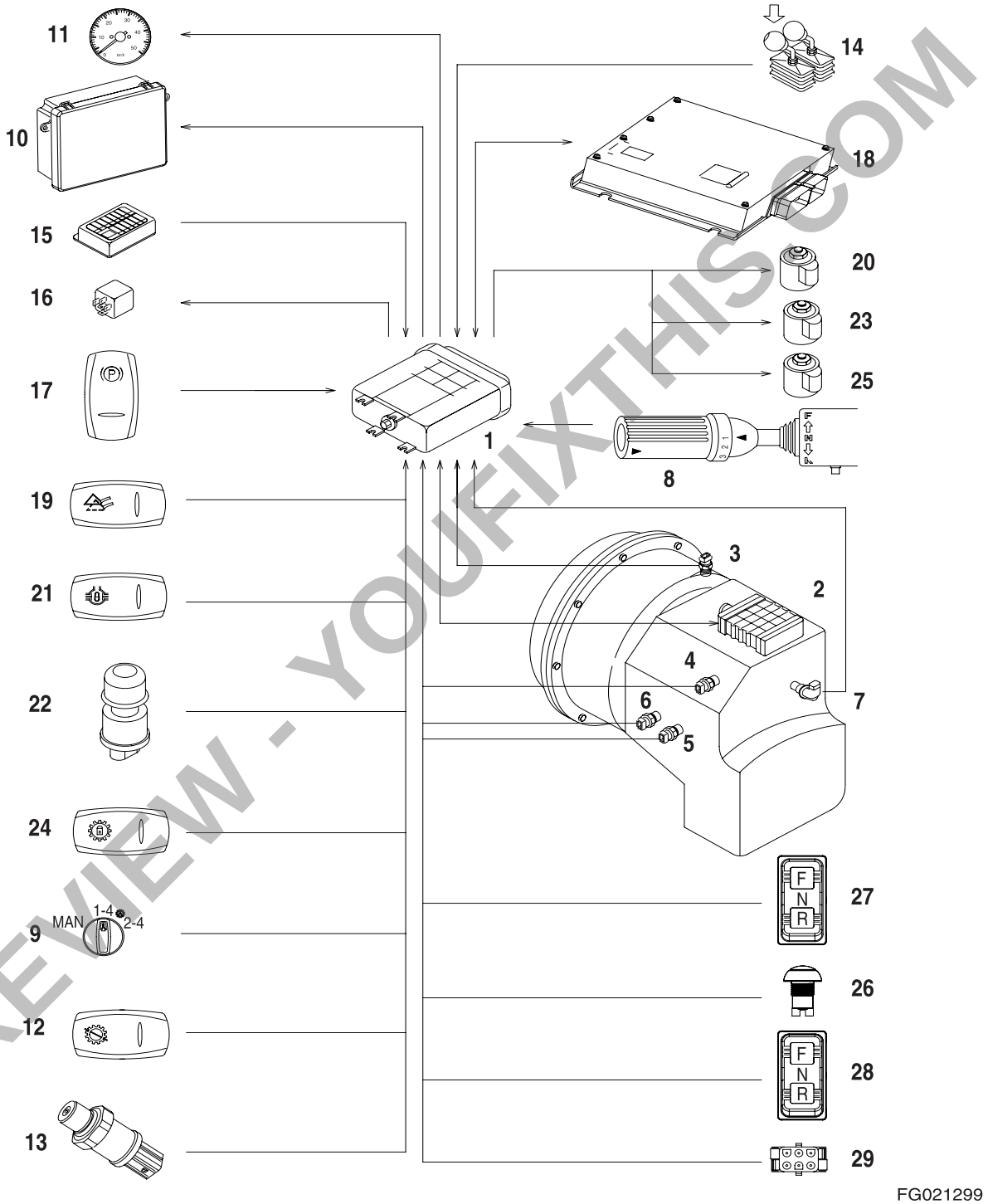


Figure 1

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DEFINITION OF OPERATING MODES

Normal

There is no failure detected in transmission system or failure has no or slight effects on transmission control. TCU will work without or in special cases with little limitations. (See “Table of Fault Codes” on page -8.)

Substitute Clutch Control

TCU can't change the gears or the direction under the control of the normal clutch modulation. TCU uses the substitute strategy for clutch control. All modulations are only time controlled (Comparable with EST 25).

Limp-home

The detected failure in the system has strong limitations to transmission control. TCU can engage only one gear in each direction. In some cases only one direction will be possible.

TCU will shift the transmission into neutral at the first occurrence of the failure. First, the operator must shift the gear selector into neutral position.

If output speed is less than a threshold for neutral to gear and the operator shifts the gear selector into forward or reverse, the TCU will select the limp-home gear.

If output speed is less than a threshold for reversal speed and TCU has changed into the limp-home gear and the operator selects a shuttle shift, TCU will shift immediately into the limp-home gear of the selected direction.

If output speed is greater than the threshold, TCU will shift the transmission into neutral. The operator has to slow down the vehicle and must shift the gear selector into neutral position.

Transmission Shut Down

TCU has detected a severe failure that disables control of the transmission.

TCU will shut off the solenoid valves for the clutches and the common power supply (VPS1).

Transmission shifts to Neutral. The park brake will operate normally, also the other functions which use ADM 1 to ADM 8.

The operator has to slow down the machine. The transmission will stay in neutral.

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LUBRICATION AND MAINTENANCE INSTRUCTIONS

Oil Grade

ZF List of Lubricants TE-ML 05 are authorized for ZF axles MT-L 3085 II / 3095 II.

The list of lubricants is being continuously updated and can be obtained or viewed as follows:

- at all ZF plants.
- at all ZF service organizations.

Oil Change

Precondition for a correct oil change is the horizontal installation position of the axle in every direction.

Place the machine in a horizontal position.

Clean all drain plugs, fill plugs and level check plugs carefully before opening them.

Oil drain only immediately after a longer driving time.

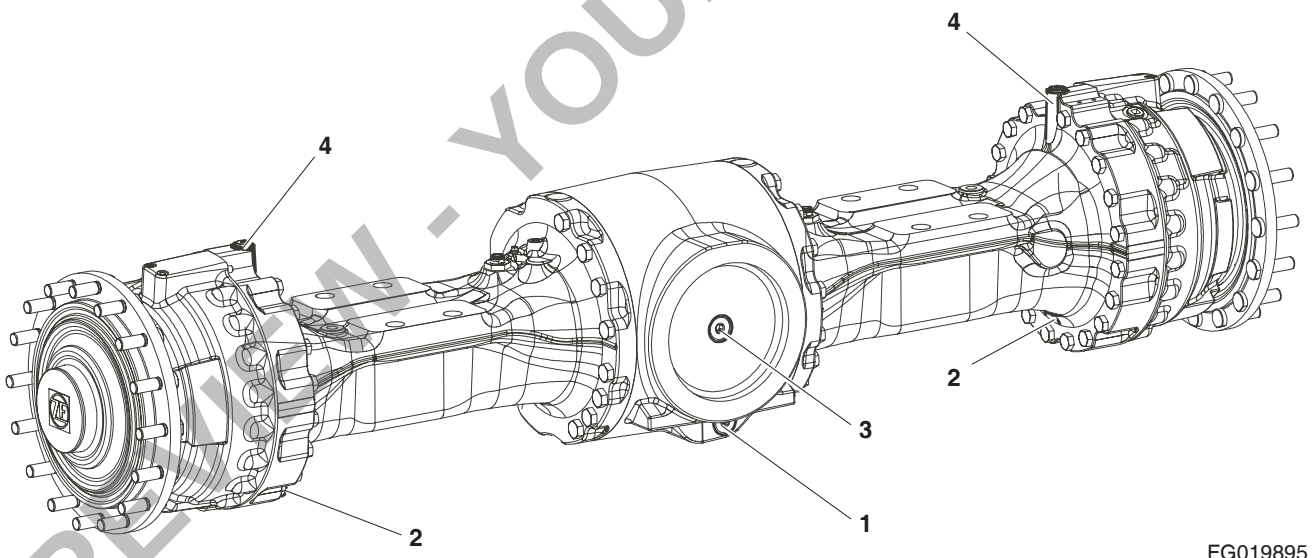


Figure 1 DRIVE AXLE ASSEMBLY

Reference Number	Description
1	Oil Drain Hole M36x1.5 Axle Drive Housing
2	Oil Drain Hole M24x1.5 Axle Housing

Reference Number	Description
3	Oil Filler Hole M36x1.5
4	Brake Breather

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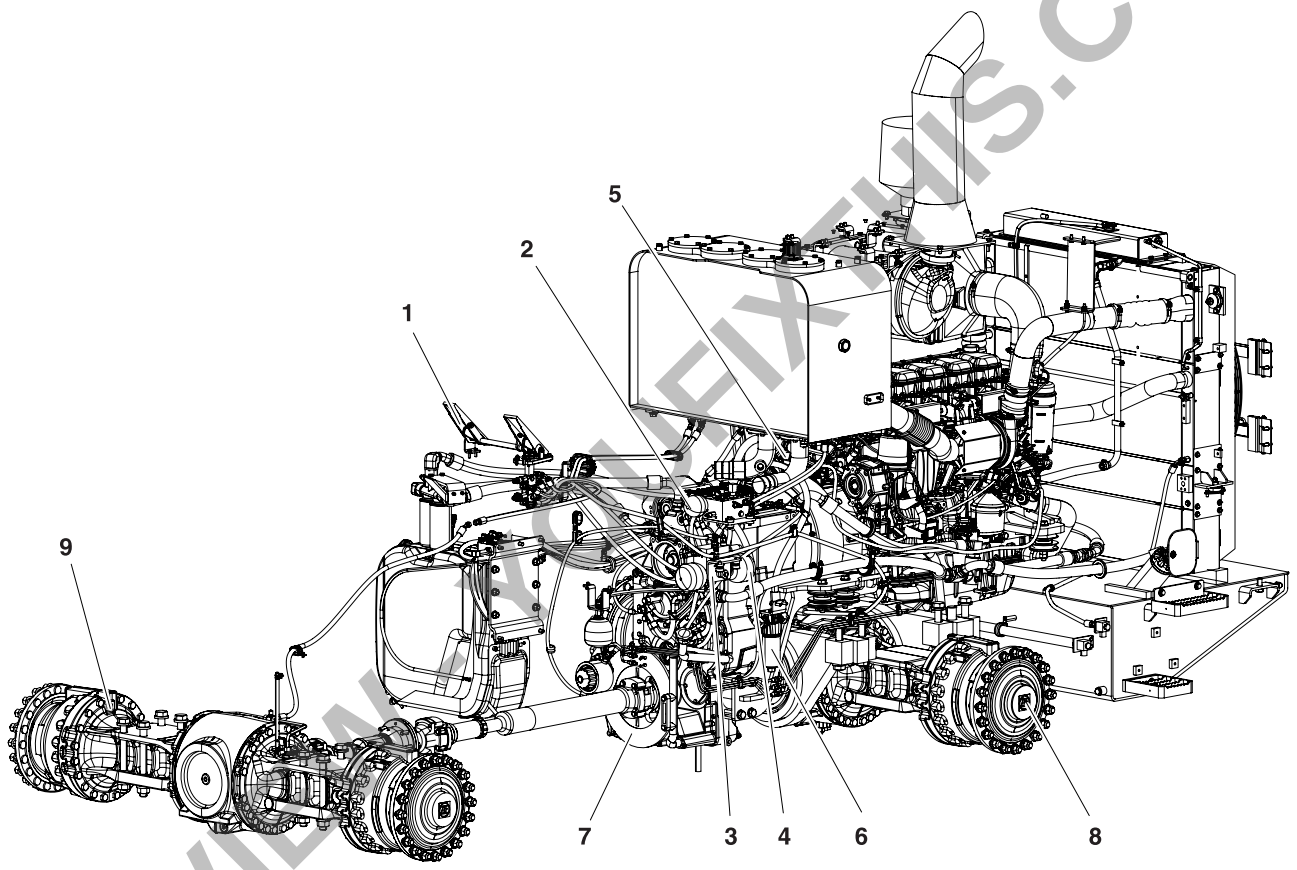
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GENERAL DESCRIPTION

This machine is equipped with a fully hydraulic operated brake system and an independent circuit for the front axle and rear axle.

The brake system is composed of brake pedal valve, brake supply valve and accumulators and provided with oil through brake supply valve from pump.

A system pressure drop below 66 kg/cm² (65 bar (943 psi)) will be indicated on the display panel in the cabin, warning light will flash and alarm will sound.



FG020737

Figure 1

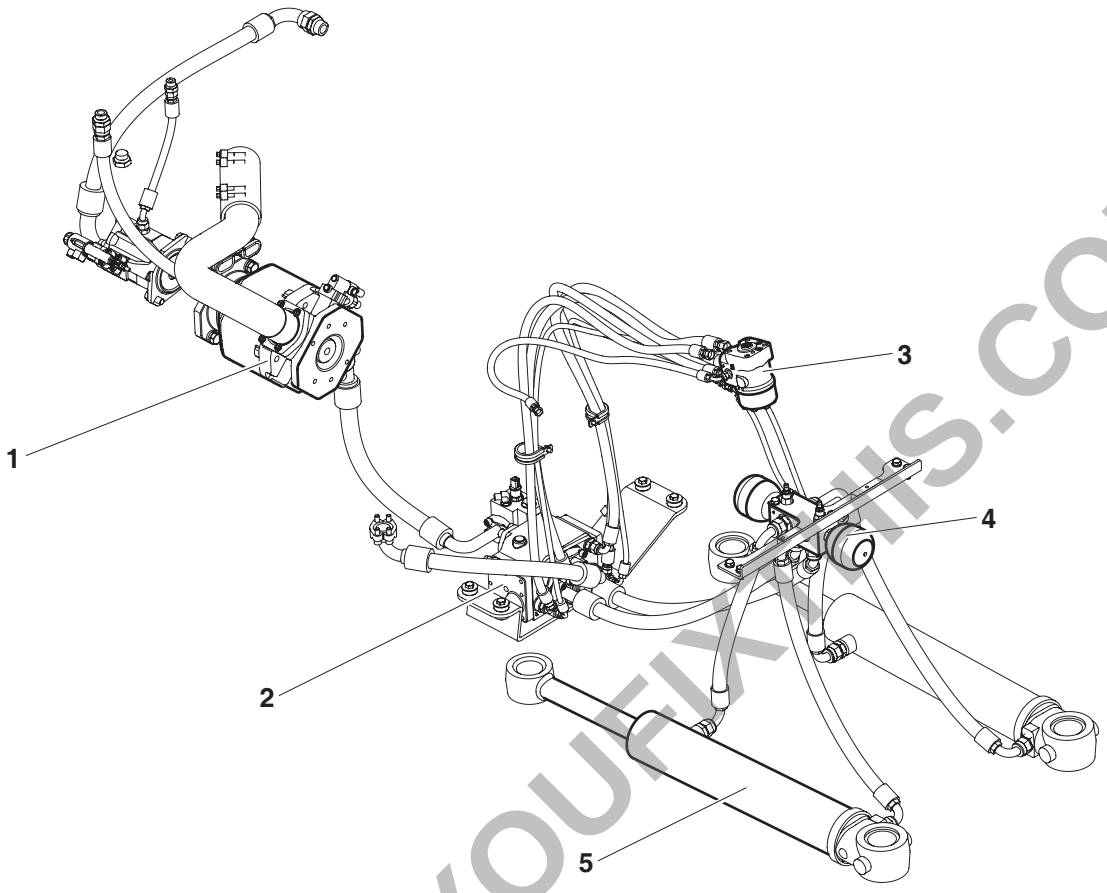
Reference Number	Description
1	Brake Pedal Valve
2	Brake Supply Valve
3	Accumulator Block
4	Brake Accumulator
5	Fan and Brake Pump

Reference Number	Description
6	Hydraulic Filter
7	Parking Brake
8	Rear Axle
9	Front Axle

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GENERAL DESCRIPTION



FG021989

Figure 1

Reference Number	Description
1	Steering Pump
2	Flow Amplifier
3	Steering Unit

Reference Number	Description
4	Jerk Softener and Accumulator
5	Steering Cylinder

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GENERAL DESCRIPTION

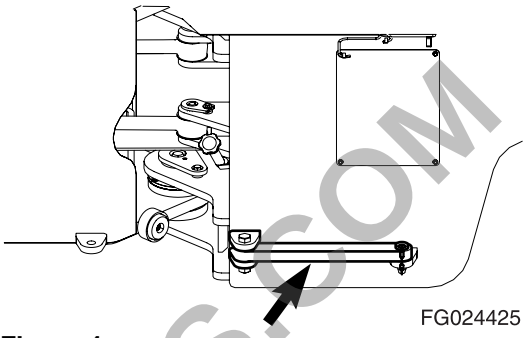
The loader frame is an articulated type: the front frame is joined to the rear frame with two hinge pins around which the loader pivots for steering.

WARNING

AVOID DEATH OR SERIOUS INJURY

Keep out of the articulation area unless the articulated frame lock is installed.

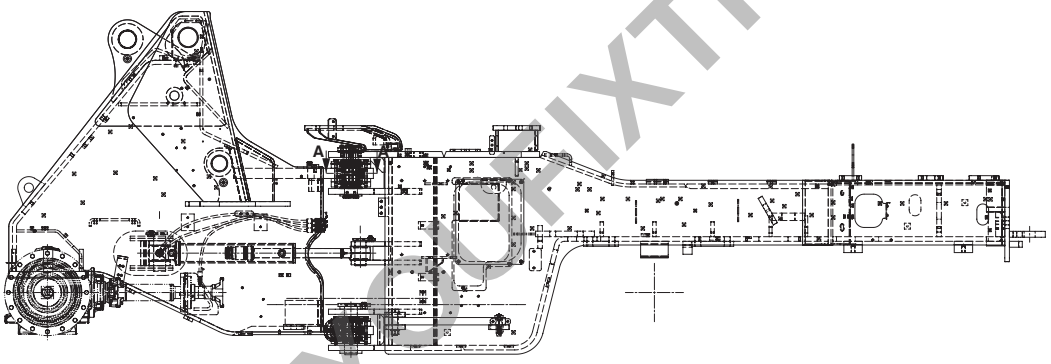
Always install the articulated frame lock before servicing or traveling.

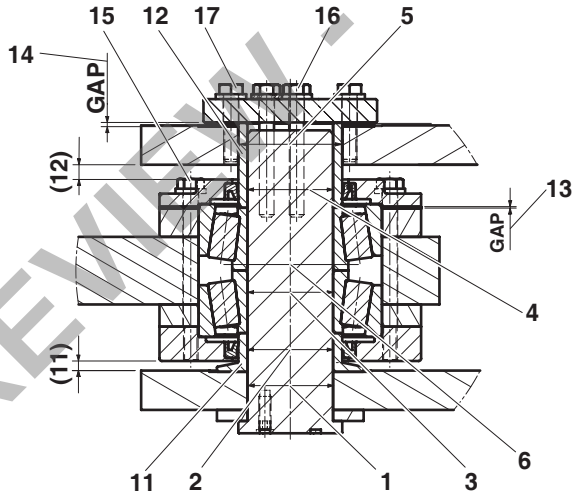


FG024425

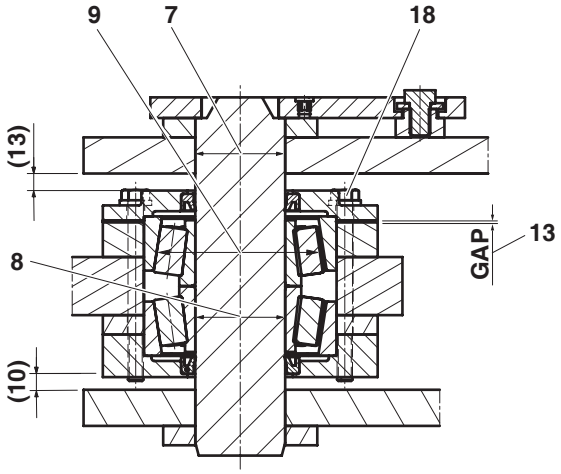
Figure 1

Maintenance Standard





SECTION A-A
(UPPER HINGE BEARING)



SECTION A-A
(LOWER HINGE BEARING)

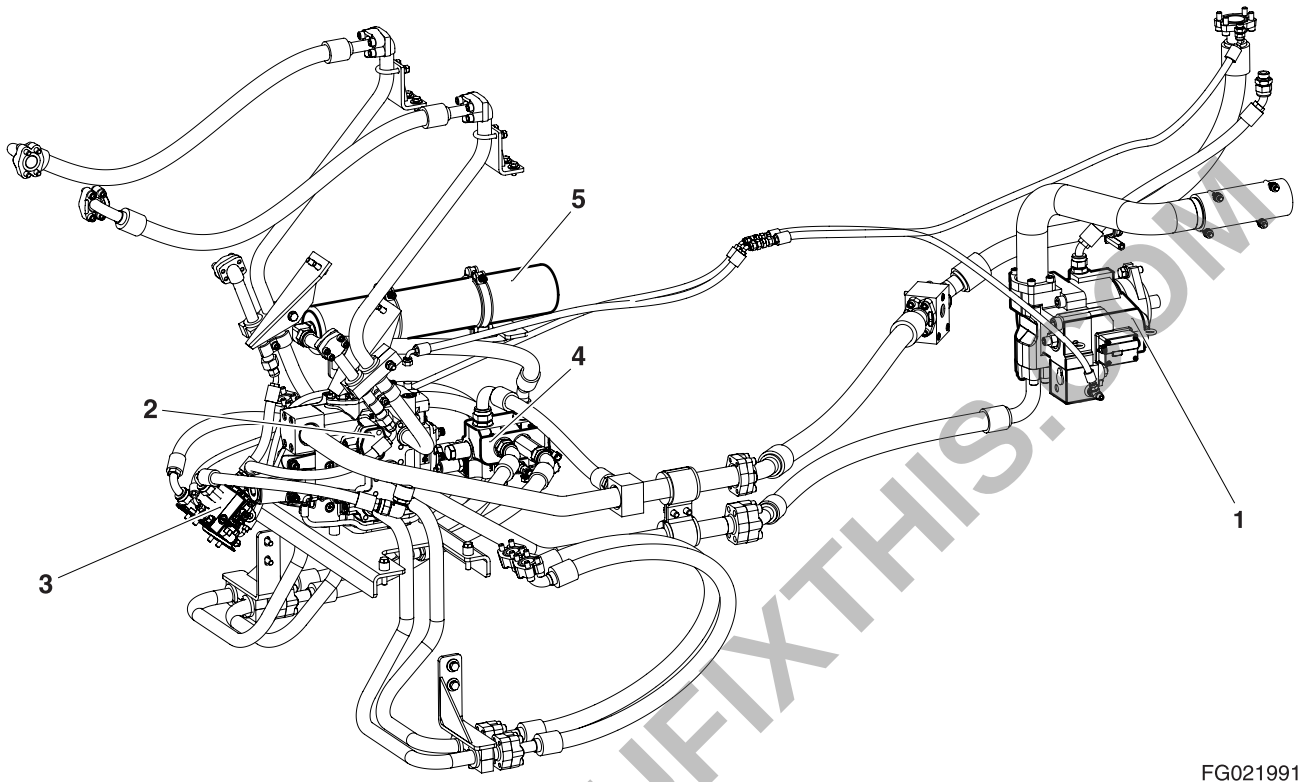
FG022002

Figure 2

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GENERAL DESCRIPTION



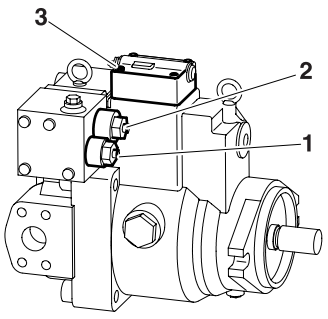
FG021991

Figure 1

Reference Number	Description
1	Main Pump
2	MCV
3	3rd Spool Valve

Reference Number	Description
4	Load Isolation System Valve
5	Accumulator

Reference Number	Description
1	Flow Control (Differential Pressure) Regulator
2	Pressure Cut-off Regulator
3	Power Control Regulator

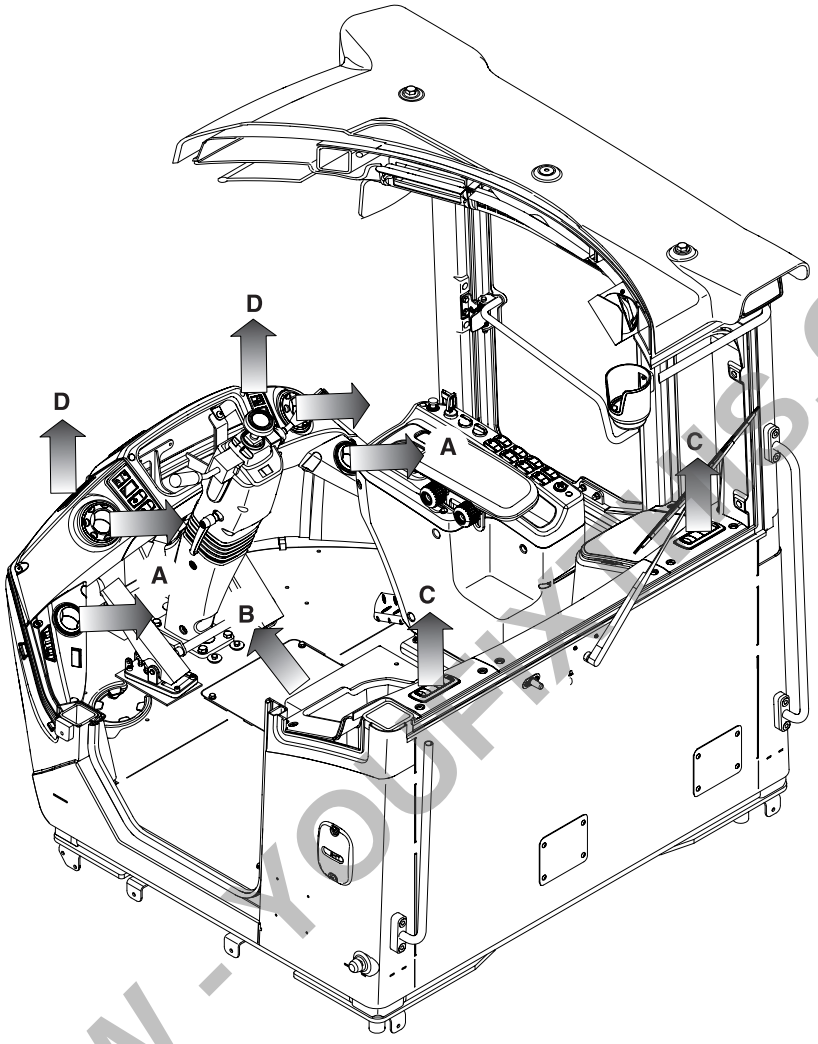


FG021992

Figure 2

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FG021249

Figure 1

Soild-type heater and air conditioner are installed in the cover behind the operator's seat.

Temperature of the operator's cabin is adjusted automatically to the temperature set by operator.

(Please refer to the Operation and Maintenance Manual for detailed full automatic control.

Vent mode selects the direction of discharged air.

Outlets by vent modes

Modes				
Outlets	A+C	A+B+C	B+C	B+D

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SAFETY MESSAGES

Safety messages and safety decals included in this manual and on the machine provide instructions how to operate, service and maintain the machine. Safety messages and safety decals indicate potential hazards and describe safety precautions required to avoid hazards. Operator and maintenance personnel should read and understand these safety messages and decals before beginning operation or maintenance.

SAFETY ALERT SYMBOL

Be Prepared - Get to Know All Operating and Safety Instructions.

This is a Safety Alert Symbol. Wherever it appears in this manual or on safety decals on the machine, you must be alert to the potential for personal injury or accidents. Always observe safety precautions and follow recommended procedures.

Signal Words

The signal words "DANGER", "WARNING", "CAUTION" are used throughout safety messages and safety decals in this manual or on the machine. They indicate an existence of, and the relative seriousness of a hazard. All three indicate that a safety risk is involved. Observe the precautions indicated whenever a Safety Alert Symbol is present, no matter which signal word appears next to it.

DANGER

DANGER - This signal word is used on safety messages and safety labels and indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING - This signal word is used on safety messages and safety labels and indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION - This signal word is used on safety messages and safety labels and indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

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Steering

Power Steering System SP002465
Steering Unit SP002425
Steering Pump SP002433
Flow Amplifier SP002434
Jerk Softener and Accumulator SP002435
Emergency Steering SP002466

Frame

Articulation Center SP002467
Counterweight SP002437

Tank

Oil Tank SP002468
Fuel Tank SP002469

Hydraulics

Main Pump SP002470
Main Control Valve SP002441
3rd Control Valve (Option) SP002442
Load Isolation System SP002536
Cooling System SP002490
Pilot System SP002445
Hydraulic Schematic (DL420-3) SP002471

Electrical System

Air Conditioner SP002447
Electrical System SP002575
Electrical Schematic DL350-3 / DL420-3 / DL450-3 ..... SP002449

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Be careful when installing sealing members, to avoid cutting or scratching. Curling under of any seal lip will seriously impair its efficiency. Apply a thin coat of Loctite #120 to outer diameter of metal casing and on oil seals to assure an oil tight install into retainer. Use extreme care not to get Loctite on lips of oil seals. If this happens, that portion of the seal will become brittle and allow leakage.

When replacing lip type seals, make sure spring loaded side is towards oil to be sealed.

5. If available, use magna-flux or similar process for checking for cracks that are not visible. Examine teeth on all gears carefully for wear, pitting, chipping, nicks, cracks or scores. Replace all gears showing cracks or spots where case-hardening has worn through. Small nicks may be removed with suitable hone. Inspect shafts and quills to make certain they have not been sprung, bent, or no twisted splines, and that shafts are true.

   NOTE: *Spline wear is not considered detrimental except where it affects tightness of splined parts.*

   Inspect thrust washers for distortion, scores, burs, and wear. Replace thrust washer if defective or worn.

6. Inspect bores and bearing surfaces of cast parts and machined surfaces for scratches, wear, grooves and dirt. Remove any scratches and burrs with crocus cloth. Remove foreign material. Replace any parts that are deeply grooved or scratched which would affect their operation.

Bearing Inspection

The conditions of the bearing are vital to the smooth and efficient operation of the machinery. When any component containing bearings is disassembled, always carefully examine the condition of the bearings and all of its components for wear and damage.

Once the bearing is removed, clean all parts thoroughly using a suitable cleaning solution. If the bearing is excessively dirty, soak the bearing assembly in a light solution and move the bearing around until all lubricants and/or foreign materials are dissolved and the parts are thoroughly clean.

When drying bearings, moisture free compressed air can be used. Be careful not to direct the air in a direction which will force the bearing to dry spin while not being properly lubricated.

After the bearings have been cleaned and dried, carefully inspect all bearing rollers, cages and cups for wear, chipping or nicks. If the bearing cannot be removed and is to be inspected in place, check for roughness of rotation, scoring, pitting, cracked or chipped races. If any of these defects are found replace the whole bearing assembly. NEVER replace the bearing alone without replacing the mating cup or the cone at the same time.

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Disassembly

Remove oil mist separator from the engine before it is disassembled.

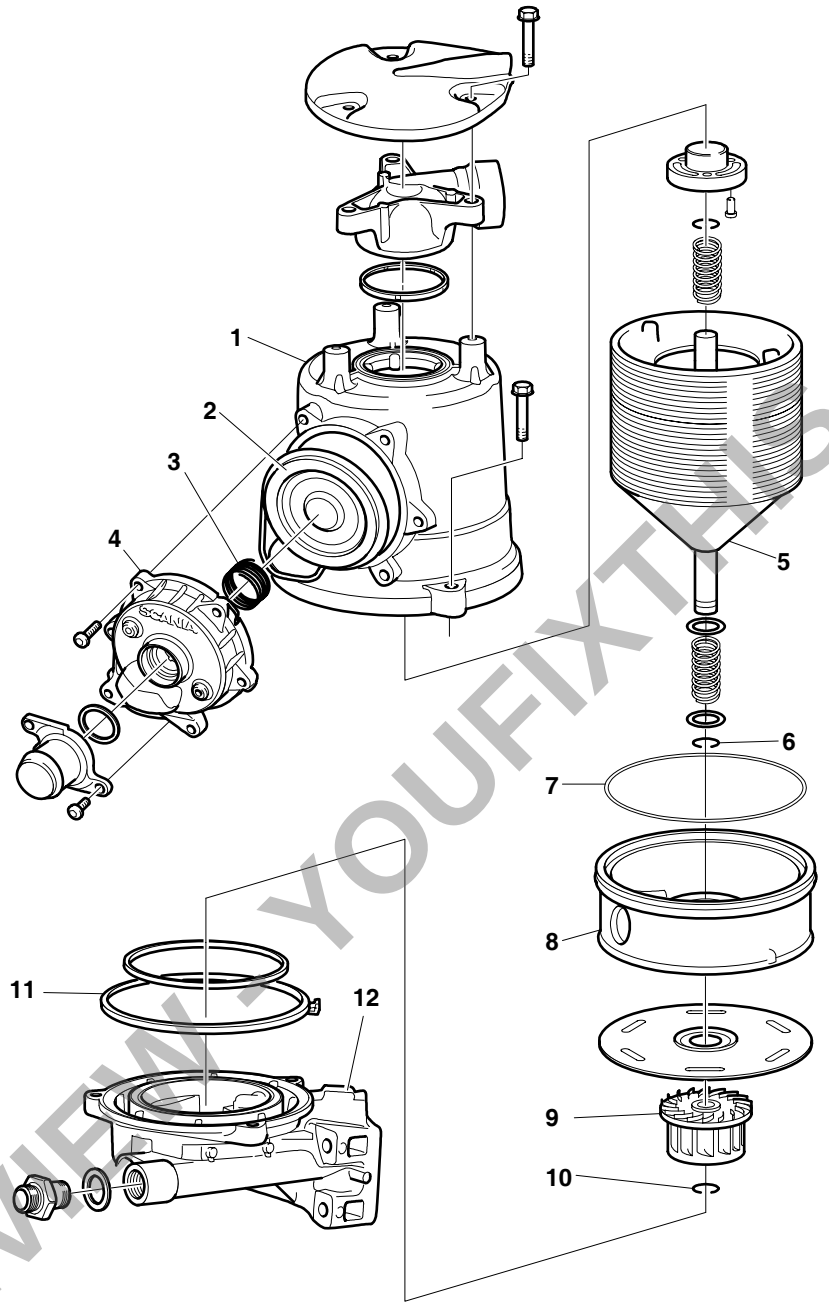


Figure 116

Reference Number	Description
1	Separator Housing
2	Diaphragm
3	Spring
4	Diaphragm Cover
5	Rotor Disk
6	Retaining Ring

Reference Number	Description
7	O-ring
8	Rotor
9	Turbine
10	Retaining Ring
11	Gasket
12	Turbine Housing

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3. Install the control unit cooler on the control unit.

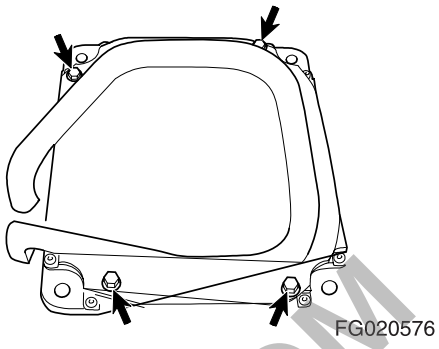


Figure 303

Clamping and Routing the Electrical Cables

IMPORTANT

Electrical cables must be correctly routed and clamped to prevent chafing and cable faults.

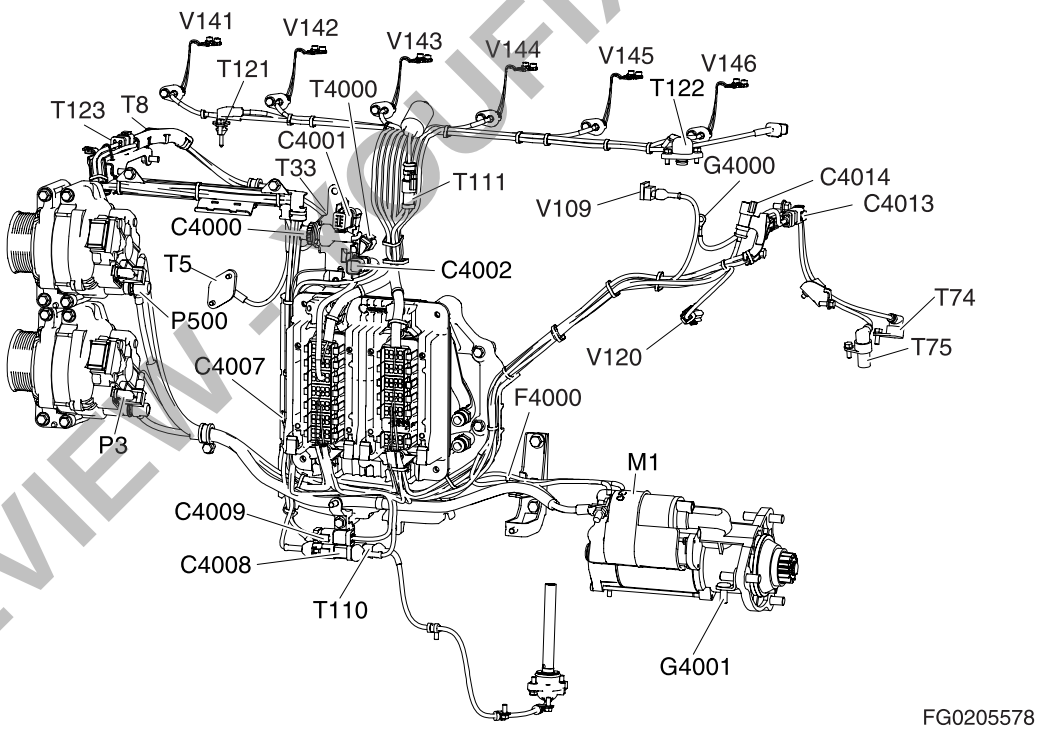


Figure 304

EMS, Engine Management System S8

NOTE: *Tightening torques for the engine are found in section 01-00, Engine assembly.*

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Disassembly	Reassembly	Part Number	Designation/Application
Figure 118 Figure 162 Figure 169 Figure 178 Figure 180 Figure 183 Figure 187 Figure 189 Figure 198 Figure 201		5873 001 020 5873 001 027 5873 011 012 5873 012 018 5873 012 019 5873 002 044 5873 012 013 5873 001 023 5873 001 034	Gripping insert
Figure 118 Figure 166 Figure 169 Figure 178 Figure 180 Figure 183 Figure 187 Figure 189 Figure 198 Figure 201		5873 001 000 5873 002 001	Basic tool
Figure 120 Figure 149 Figure 153 Figure 164 Figure 170 Figure 172 Figure 184 Figure 191 Figure 199		5870 971 002 5870 971 003	Three-armed puller
Figure 128 Figure 161		5870 300 017 5870 300 007	Internal extractor
Figure 128 Figure 161		5870 300 009 5870 300 003	Counter-support
Figure 134 Figure 140 Figure 147		5870 650 001 5870 650 014	Striker
Figure 137		5870 900 021	Clamping pliers
Figure 138		5870 280 004	Plastic hammer
Figure 146	Figure 399	5870 656 047	Socket wrench
Figure 147		5870 204 069	Threaded insert
Figure 150		5870 290 003	Internal hex. wrench, size 8
Figure 150		5870 204 005	Forcing screws
Figure 150		5870 281 061	Lifting tackle
Figure 152	Figure 341	5870 100 054	Stop washer
Figure 162		5870 026 100	Back Off insert
Figure 163 Figure 176 Figure 180 Figure 184 Figure 188	Figure 229 Figure 253 Figure 261 Figure 290	5870 654 033 5870 654 045	Clamping ring
Figure 166		5873 012 012	Rapid grip

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16. Snap-in and lock the rectangular rings (3x, see arrows).

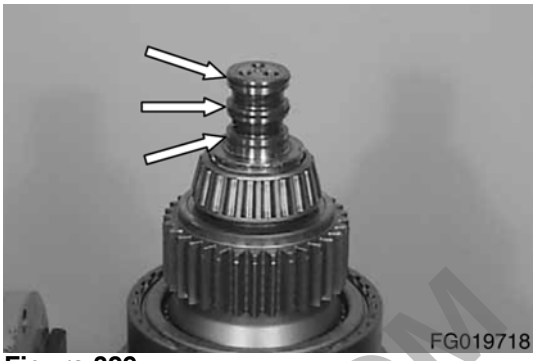


Figure 329

Installation of Layshaft Gear, Multidisk Clutches and Output Gear

1. Opposite figure shows the single components of the layshaft gear bearing.

Reference Number	Description
1	Bearing Inner Ring (2x)
2	Ring
3	Layshaft Gear

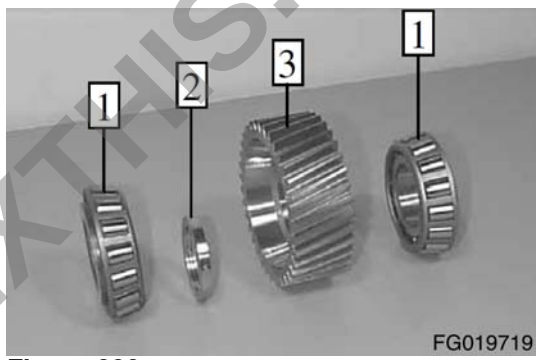


Figure 330

2. Position layshaft gear assembly in the housing.

   NOTE: *Only when the clutches are installed, the idler shaft can be mounted.*

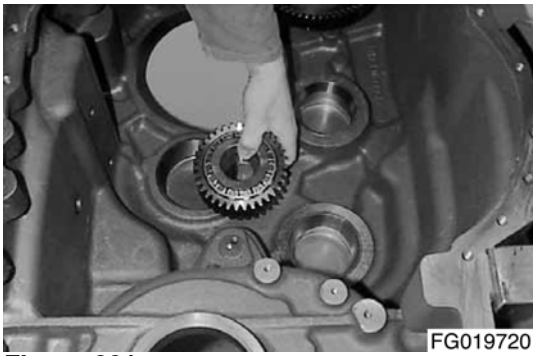


Figure 331

3. Insert the bearing outer rings KV/K1, KR/K2 and K3/K4 into the housing bores until contact, see arrows.

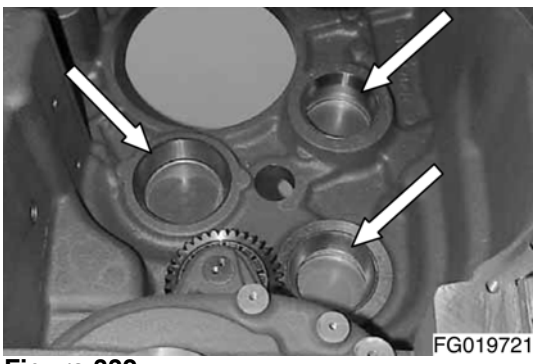


Figure 332

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11. Pull off spur gear KV from the disk carrier.

    (S) Three-armed puller 5870 971 003

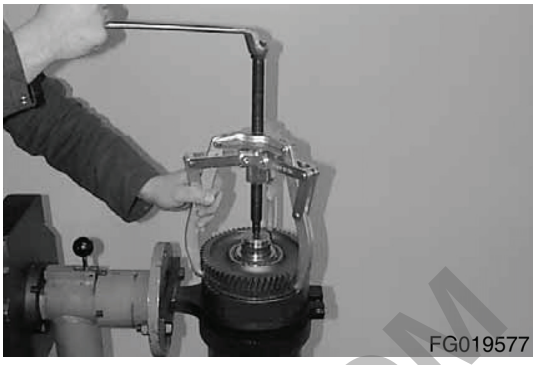


Figure 150

12. Remove ring.

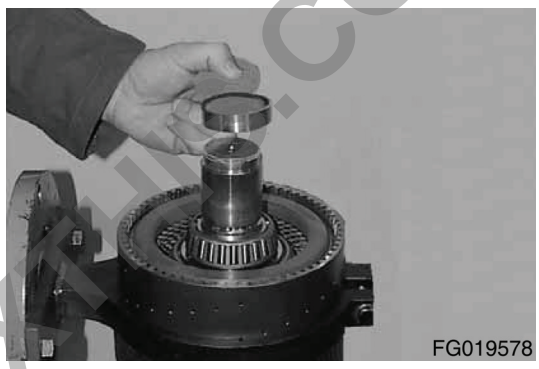


Figure 151

13. Pull off the taper roller bearing from the disk carrier (Figure 152).

    Squeeze out the retaining ring.

    Remove end shim and disk set KV.

    Remove both pistons (like described in Figure 125 and Figure 126).

    (S) Gripping insert 5873 001 034

    (S) Basic tool 5873 001 000

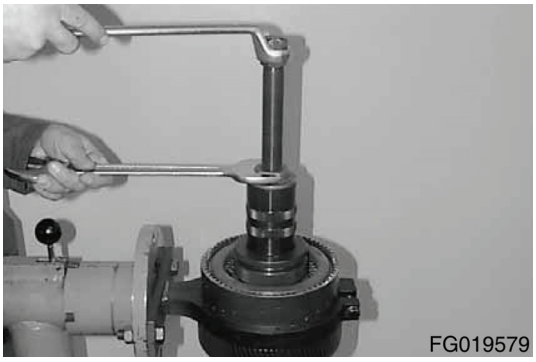


Figure 152

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Fault Code (hex)	Meaning of the Fault Code (Possible reason for fault detection.)	Reaction of the TCU	Possible Steps to Repair	Remarks
26	S.C. to ground at transmission sump temperature sensor input. The measured voltage is too low: • Cable is defective and is contacted to machine ground. • Temperature sensor has an internal defect. • Connector pin is contacted to machine ground.	No reaction, TCU uses default temperature. OP-Mode: normal	• Check the cable from TCU to the sensor. • Check the connectors. • Check the temperature sensor.	----------
27	S.C. to battery voltage or O.C. at retarder/torque converter temperature sensor input. The measured voltage is too high: • Cable is defective and is contacted to battery voltage. • Cable has no connection to TCU. • Temperature sensor has an internal defect. • Connector pin is contacted to battery voltage or is broken.	No reaction, TCU uses default temperature. OP-Mode: normal	• Check the cable from TCU to the sensor. • Check the connectors. • Check the temperature sensor.	----------
28	S.C. to ground at retarder torque converter temperature sensor input. The measured voltage is too low: • Cable is defective and is contacted to machine ground. • Temperature sensor has an internal defect. • Connector pin is contacted to machine ground.	No reaction, TCU uses default temperature. OP-Mode: normal	• Check the cable from TCU to the sensor. • Check the connectors. • Check the temperature sensor.	----------
31	S.C. to battery voltage or O.C. at engine speed input. TCU measures a voltage higher than 7.00 V at speed input pin. • Cable is defective and is contacted to battery voltage. • Cable has no connection to TCU. • Speed sensor has an internal defect. • Connector pin is contacted to battery voltage or is broken.	OP-Mode: substitute clutch control	• Check the cable from TCU to the sensor. • Check the connectors. • Check the temperature sensor.	----------

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Inscriptions on Model Identification Plate

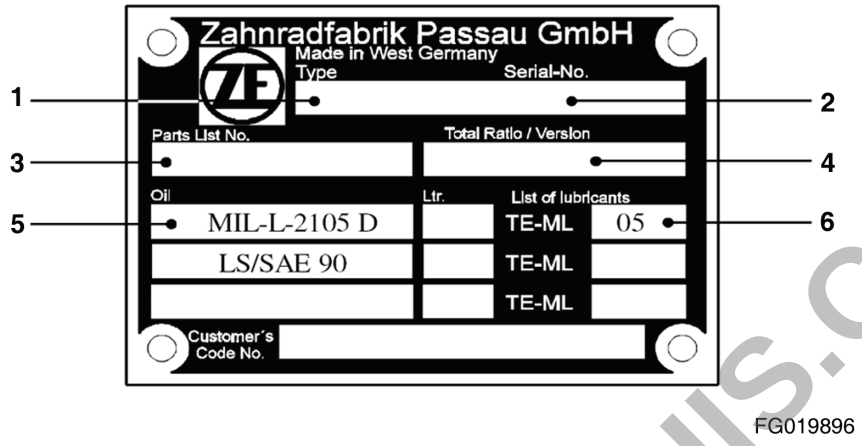


Figure 4

Reference Number	Description
1	Axle Type
2	Axle Number
3	ZF - Parts - List No.
4	Overall axle ratio/version with or without ZF multidisk differential lock
5	Oil Grade
6	Oil Quality

NOTE: *ZF List of Lubricants for ZF axles TE - ML 05*

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Mounting and Basic Setting Regulations

Basic brake setting is required after mounting new brake lining plates or brake disks, and during all repair stages and in case of insufficient braking performance.

All mounting and basic setting work must be done on brake when cold. Proceed as follows:

1. Release the screw cap (12, Figure 3).
2. Release the locknut (11, Figure 3) (size 24 or 30) and turn the adjusting screw (7, Figure 3) counterclockwise using a size 8 or 10 socket wrench until pressure bolt (8, Figure 2) comes to rest against the face surface of piston (6, Figure 2).
3. In this status, the brake can be mounted onto brake disk and fastened.
4. Mount the pressure connection and apply necessary release pressure to the brake until bank of cup springs (5, Figure 2) is completely pretensioned.
5. Turn the adjusting screw (7, Figure 3) manually clockwise until both brake pads (3, Figure 2) and (4, Figure 2) contact the brake disk (it is then no longer possible to turn the adjusting screw (7, Figure 3) without exerting a major amount of force).
6. Turn the adjusting screw (7, Figure 3) counterclockwise to set the following rated clearances:

Type	Adjusting screw	Clearance (mm)		Revolutions
Small	M16 (size 8)	min.	0.5	1/4
		Rated clearance	1.0	1/2
		max.	1.5	3/4
Large	M20 (size 10)	min.	1.0	2/5
		Rated clearance	2.0	4/5
		max.	3.0	1 1/5

7. Hold the adjusting screw in position (7, Figure 2) with a hex socket wrench and lock with locknut (11, Figure 3).
8. Mount the screw cap (12, Figure 3) and tighten as far as possible manually.
9. Mount the pressure connection according to the instructions of axle/gear manufacturer and bleed the piston chamber using bleeding valve (19, Figure 2).

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F. Install stop for directional spool (thickness: 5 mm) with Vaseline.



Figure 115

G. Guide in end cover.

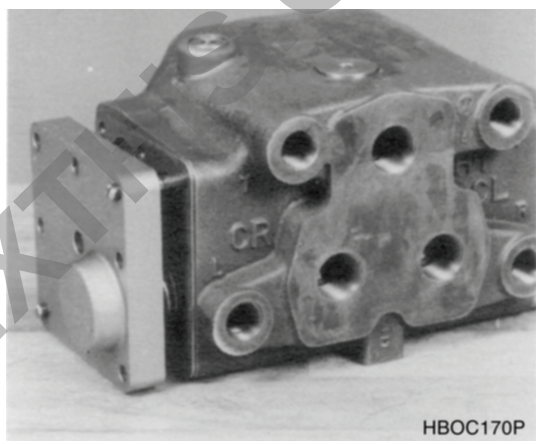


Figure 116

H. Install large screw with spring washer.

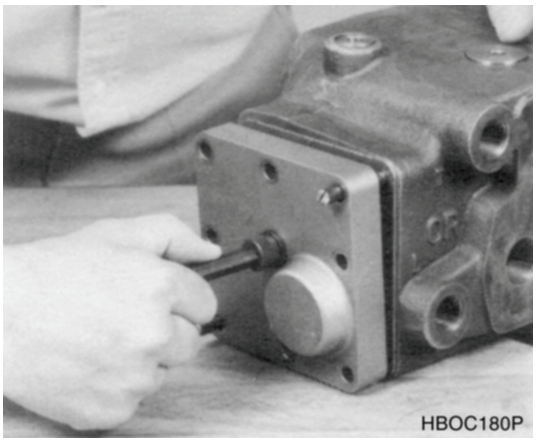


Figure 117

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GENERAL DESCRIPTION

Load Isolation System (LIS) reduces loader pitching movements that effect the machine and operator.

For this the lifting line is connected to the hydraulic accumulator by a switching valve that absorbs the loads caused by the pitching movement.

The following advantages apply when Load Isolation System is installed:

- Higher transport speeds
- Higher handling rates
- Stable steering characteristics
- Shorter braking distances
- More comfort for the operator
- Lower mechanical loading of the entire machine
- Fewer repairs or down times with identical handling rates

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3. If refrigerant does not flow freely into system, try starting engine first before operating air conditioner.

   - Temperature control switch setting: Maximum Cooling

     Blower Speed Setting: Hi (3 step)

     Engine Speed: 1,300 - 1,500 rpm

WARNING

AVOID DEATH OR SERIOUS INJURY

When charging refrigerant system with the engine running:

- **Always keep refrigerant supply container in the upright position.**
- **Never open the high side pressure valve.**

4. Open the manifold gauge low side valve and charge system to standard capacity.

Gauge Dial	Standard Reading
High Side Gauge	13 - 20 kg/cm^2 (13 - 20 bar (185 - 285 psi))
Low Side Gauge	1.5 - 3.5 kg/cm^2 (1.5 - 3.5 bar (22 - 50 psi))

NOTE: *These standards are for outside temperatures between 30° - 35°C (86° - 95°F). The gauge readings may vary for extreme temperature conditions.*

WARNING

AVOID DEATH OR SERIOUS INJURY

- **When outside temperature is low, warm the refrigerant supply container with warm water not exceeding 40°C (104°F). Do not allow water to come in contact with the charging adapter valve handle.**
- **When outside temperature is high, cool off refrigerant supply container and condenser to aid the refrigerant charging process.**

5. Close low-pressure side valve.
6. Shut off engine and close refrigerant supply container adapter valve. Disconnect manifold gauge hoses from machine.

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