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Functional description and troubleshooting
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TVT 195

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INTRODUCTION

There is a clear trend in automobile and farm implement technology towards an increasing replacement of mechanical components by electronic components.

This thereby allows the maker to provide the customer with more comfort and more safety inside the vehicle.

However, this also means that vehicle electronics are becoming ever more complex and are equipped with a growing number of sensors and actuators.

In the future, these increased requirments can no longer be implemented by autonomous control devices.

The solution to the problem lies in the networking of various electronic modules with a data bus.

The simple motto is: "Less hardware, and more software".

This provides many advantages, which will be described in detail in this document.

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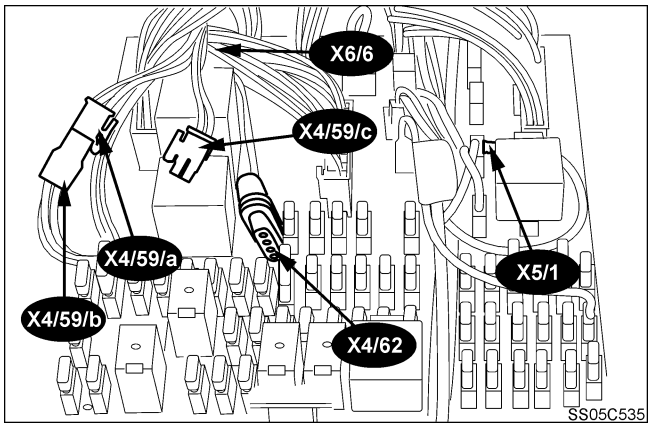
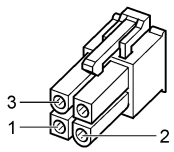


Fig. 15

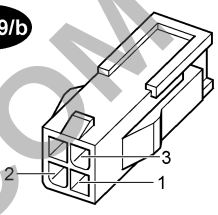
X4/59/a

1: CI - C 304
2: CI - H 40422/1
3: CI - C 307



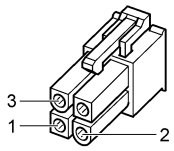
X4/59/b

1: CI - C 304 L
2: CI - H 40422/1L
3: CI - C 307 L



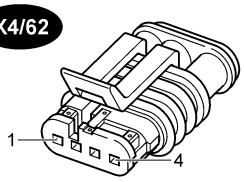
X4/59/c

1: CI - C 14726
2: CI - H LIMP
3: CI - C 14727



X4/62

1: CI - C 501
2: CI - C 502
4: CI - S 507



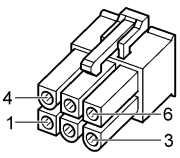
X5/1

1: CI - S 900



X6/6

1: CI - E 113
2: CI - K 127
3: CI - C 118
4: CI - E 58
5: CI - C 117



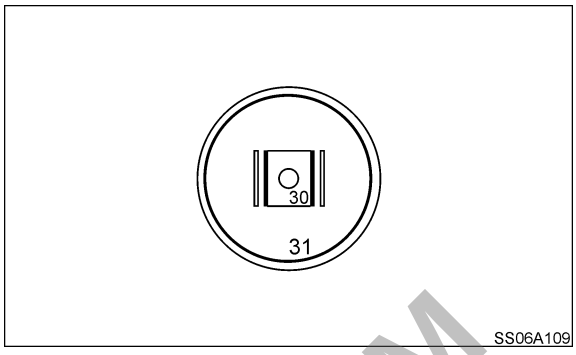
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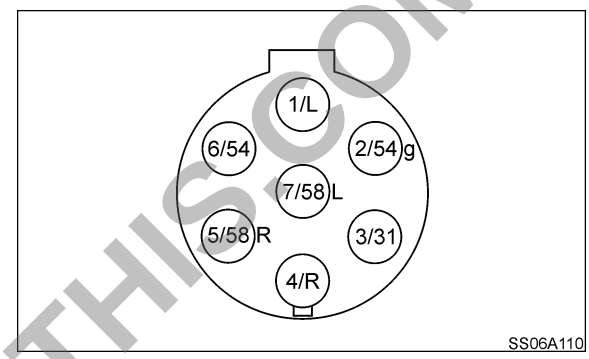
Socket X2/1

30 12 V potential 30 (7.5 A)
31 Ground



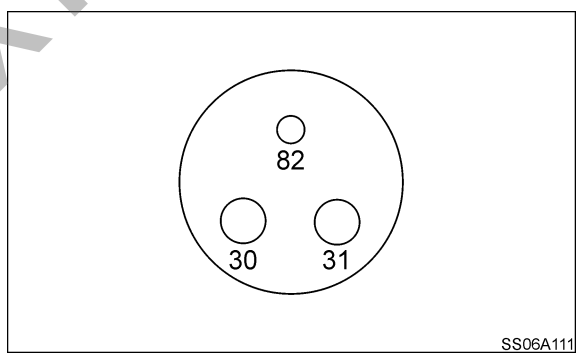
Trailer socket X10/1, X10/2

1/L Turn signal, left
2/54g Not assigned
3/31 Ground
4/R Turn signal, right
5/58R Side marker light, right
6/54 Brake light (not assigned with X10/2)
7/58L Side marker light, left



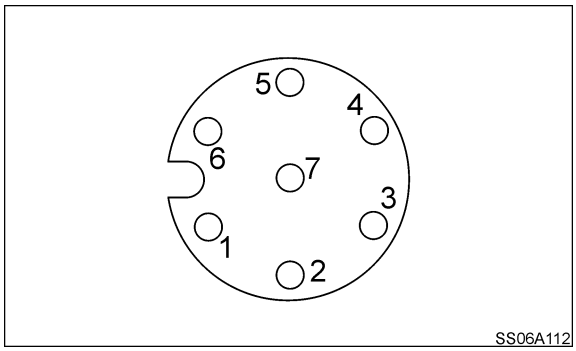
Power socket X14/1, X14/20, X14/30, X15

30 12 V potential 30 (40 A, 30 A only with X14/30)
82 12 V potential 15/2 (10 A)
31 Ground



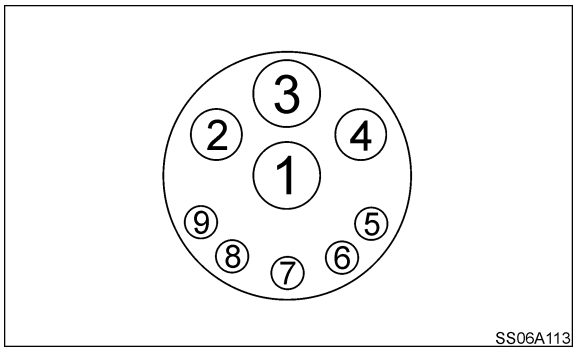
Standard signal socket X29

1 Speed of radar 130 pulse/m (standard)
(actual speed) 505 Hz at 14 km/h
2 Speed of transmission sensor 130 pulse/m (standard)
(theoretical speed)
3 PTO shaft, rear 6 pulse/rev (standard)
4 REAR POWER LIFT: Stroke height >50% = 12V,
<50% = 0 V (in basic setting)
5 Not assigned
6 12 V potential 15/2
7 Ground



Socket for LBS, ISO-BUS X85

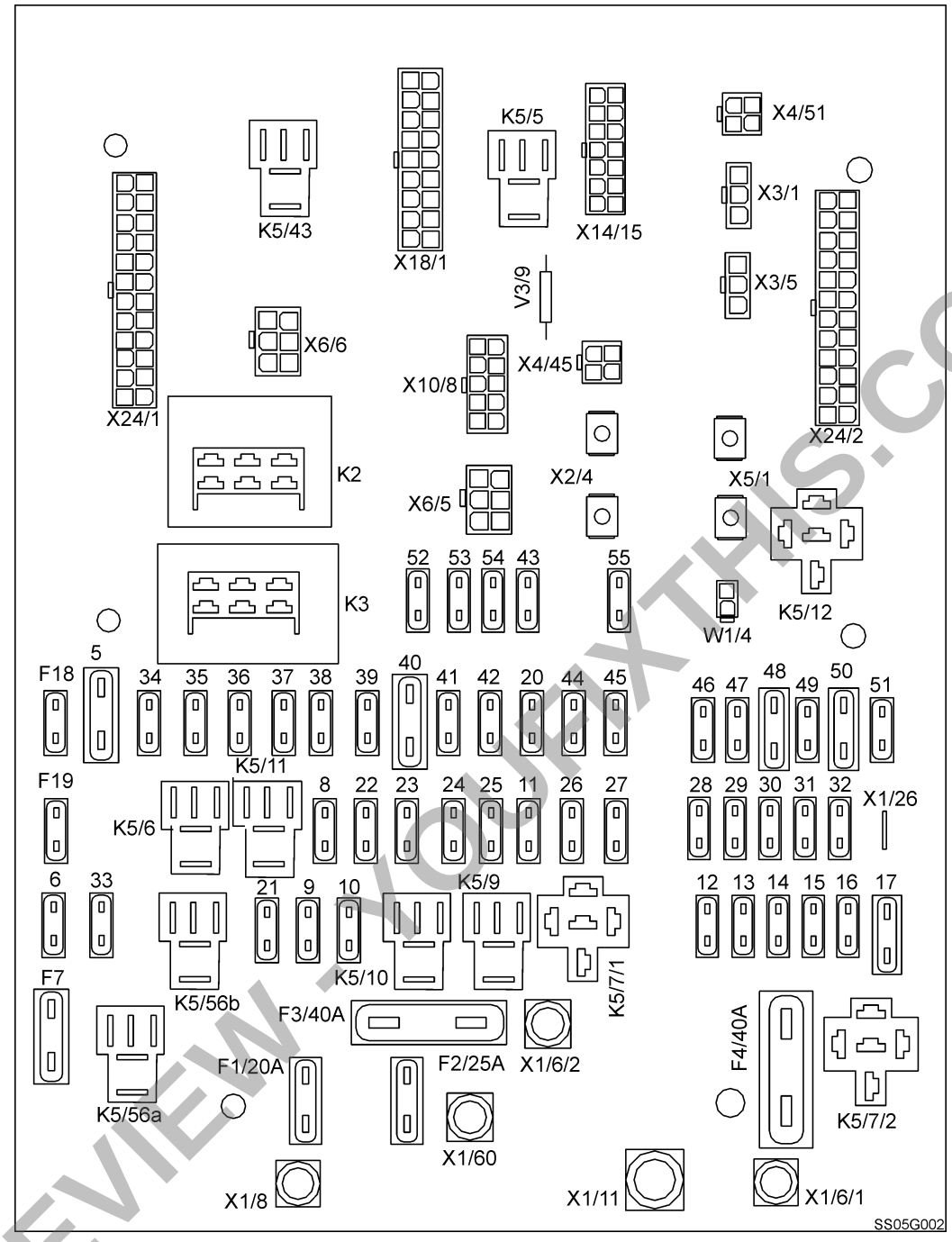
1 Ground (40 A)
2 Ground (25 A)
3 Potential 30 (40 A)
4 Potential 30 (25 A)
5 Not assigned
6 CAN PWR
7 CAN GND
8 CAN H
9 CAN L



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Central print A12



List of plugs

W1/4	Radio start plug connection
X1/6/1	Screw connection for 2nd power socket 40 A
X1/6/2	Screw connection for 1st power socket 40 A
X1/8	Screw connection for start switch supply
X1/11	Screw connection for potential 30
X1/26	Plug connection for potential 15/2, heating blower
X1/60	Screw connection for power socket, cab 30 A, potential 30
X2/4/1	Screw - plug connection for potential 15/2
X2/4/2	Screw - plug connection for potential 15/2
X3/1	Radar sensor plug connection
X3/5	Plug connection for reserve
X4/45	Plug connection for sprung front axle
X4/51	Plug connection for „Italy“ trailer brake
X5/1	Screw - plug connection for potential 31
X6/5	Reserve
X6/6	Plug connection for instruments wiring harness
X10/8	Plug connection for wiring harness, cab, left
X14/15	Plug connection for wiring harness for roof supply (15)
X18/1	Plug connection for instruments wiring harness
X24/1	Plug connection for instruments wiring harness
X24/2	Plug connection for right cab wiring harness

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Designation of sections

A	Italy brake
B	Heating

Ground points

Electrical equipment

A12	Central print
A14	Engine print
F10	Fuse, supply, ECCU2, potential 30
F17	Fuse, heating blower, potential 15/2
F48	Fuse, supply for seat, 'Italy' trailer brake, potential 15/1
K5/37	Relay for trailer brake, Italy
K6/HEAT	Relay for heating blower
M3	Heating blower motor
S7	Switch for handbrake
S50	Pushbutton for trailer brake valve
S50/1	Blower switch 1-2-3
X0/7/17	Weld point for wiring harness, cab, right, handbrake
X0/15/1	Weld point for additional line, hydraulic trailer brake, potential 31
X0/15/2	Weld point for additional line, hydraulic trailer brake, potential 15/1
X1/26	Plug connection, potential 15/2, 15 A heating blower
X1/HZG	Plug connection, heating GND
X4/25	Plug connection for handbrake switch [25]
X4/50	Plug connection for heating
X4/51	Plug connection for 'Italy' trailer brake, central print [ITALB]
X4/52	Plug connection for additional line, Italy trailer brake [MGV]
X24/2	Plug connection for cab wiring harness, right - central print
Y50	Solenoid valve, trailer brake

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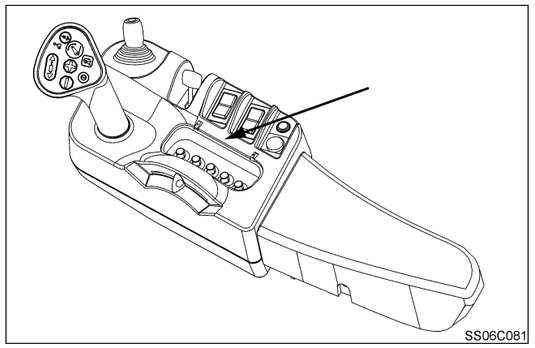
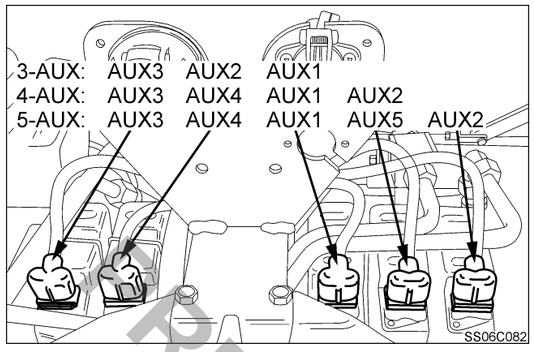


Fig. 1



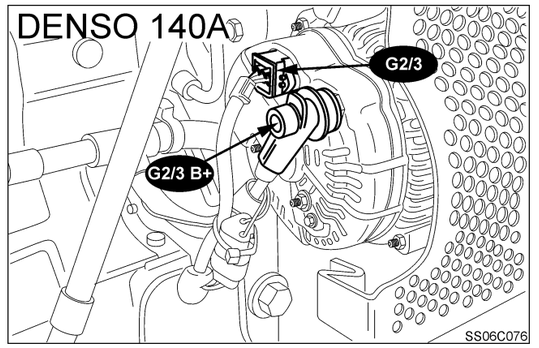


Fig. 5

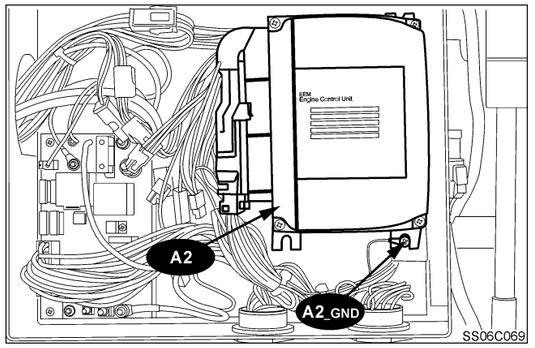
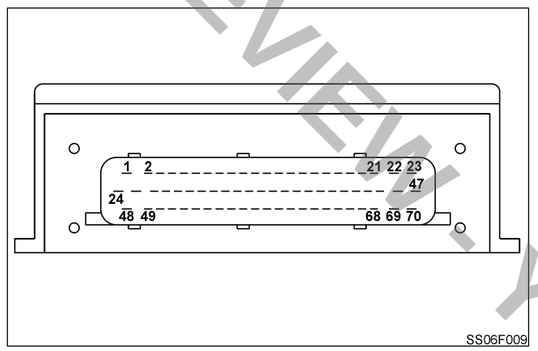


Fig. 2



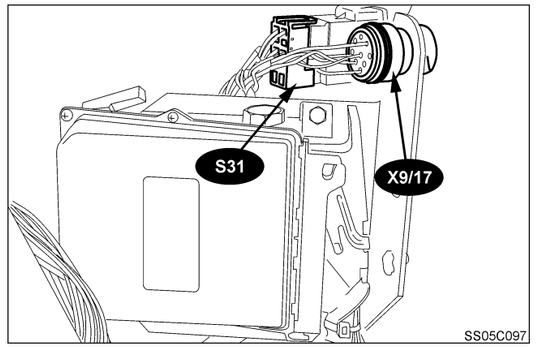
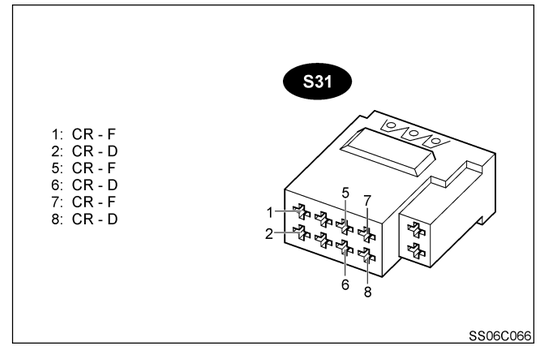


Fig. 6



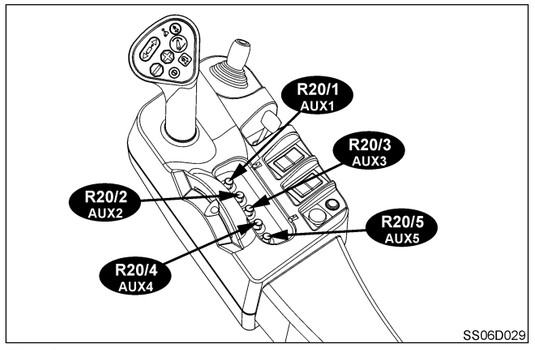
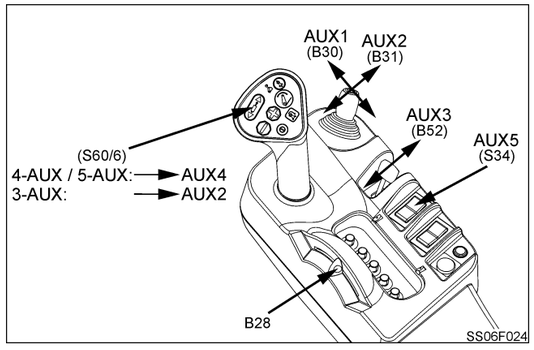


Fig. 3



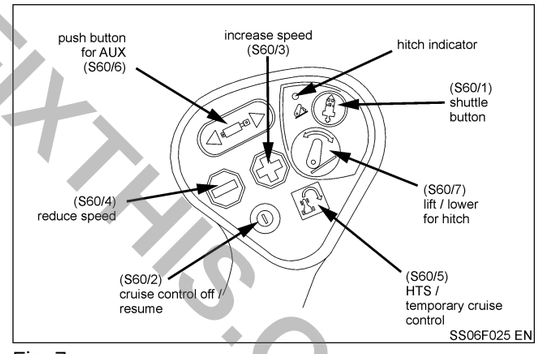
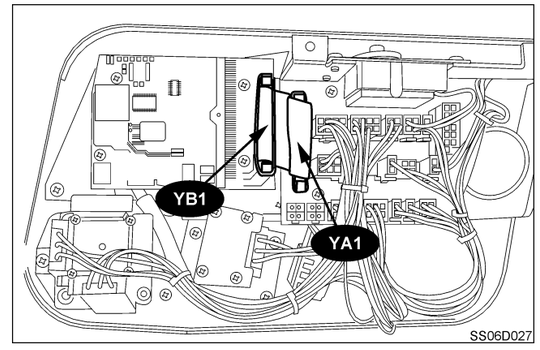


Fig. 7



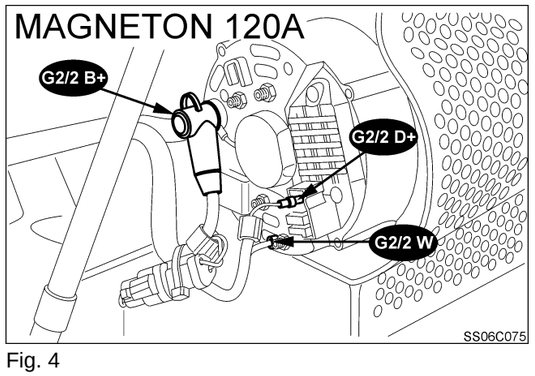
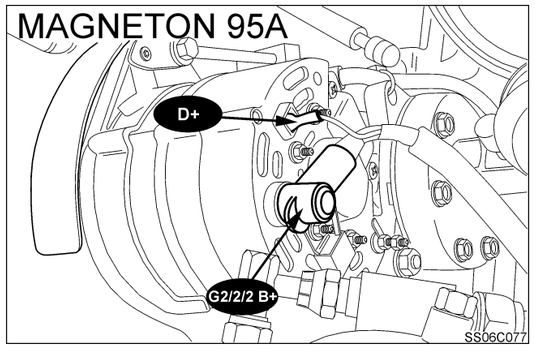


Fig. 4



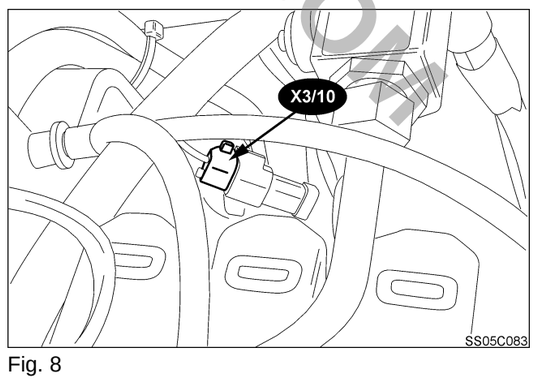
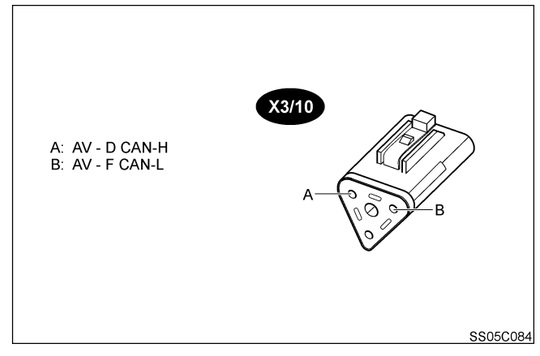
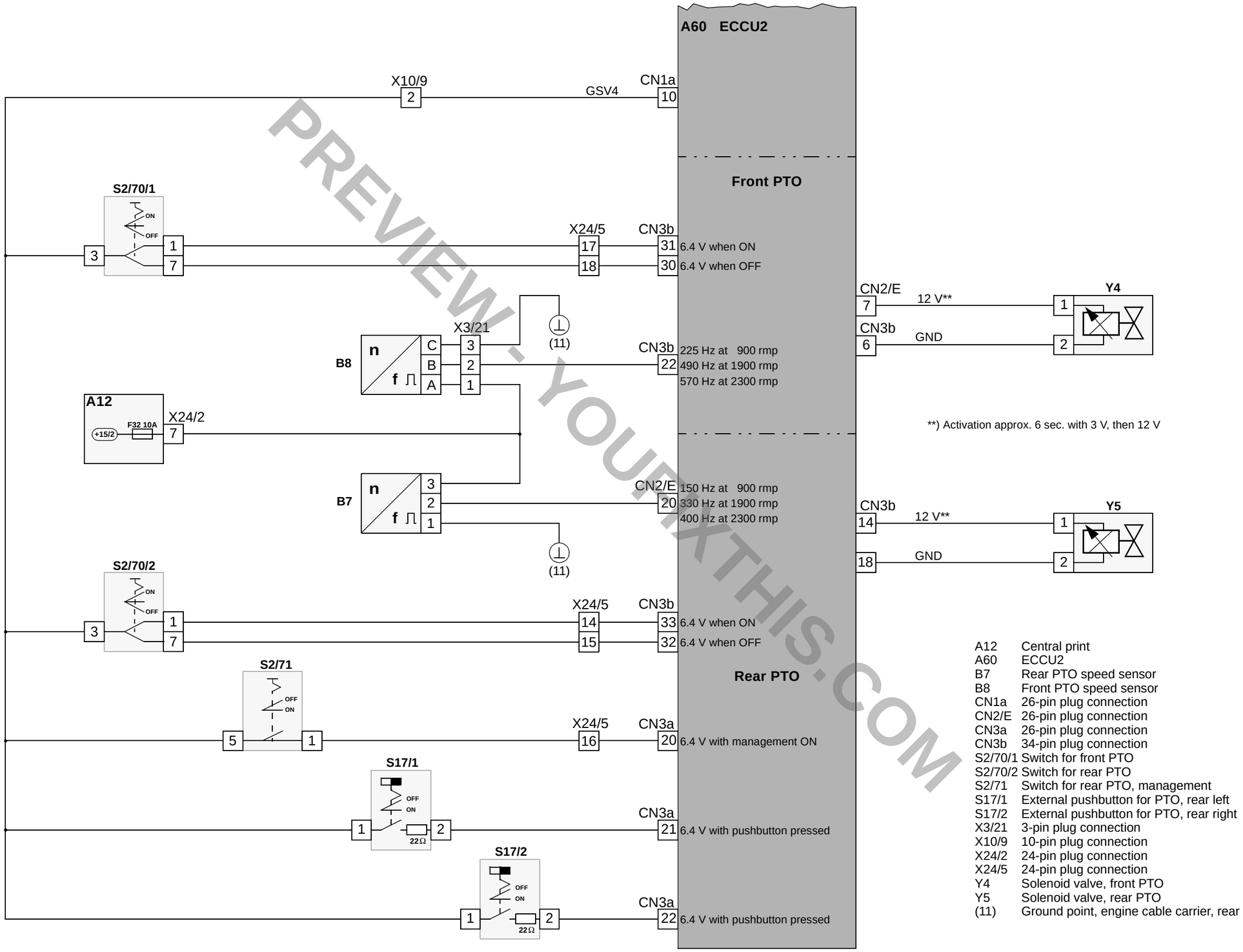


Fig. 8



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A12	Central print
A60	ECCU2
B7	Rear PTO speed sensor
B8	Front PTO speed sensor
CN1a	26-pin plug connection
CN2/E	26-pin plug connection
CN3a	26-pin plug connection
CN3b	34-pin plug connection
S2/70/1	Switch for front PTO
S2/70/2	Switch for rear PTO
S2/71	Switch for rear PTO, management
S17/1	External pushbutton for PTO, rear left
S17/2	External pushbutton for PTO, rear right
X3/21	3-pin plug connection
X10/9	10-pin plug connection
X24/2	24-pin plug connection
X24/5	24-pin plug connection
Y4	Solenoid valve, front PTO
Y5	Solenoid valve, rear PTO
(11)	Ground point, engine cable carrier, rear

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EEM3 - 323 Injector 2 - solenoid valve open circuit

Description:

The engine controller detects an open circuit in the drive circuit to injector 2.

Possible causes:

1. Faulty connector or wiring
2. Faulty solenoid

Reaction:

EC is stored and the warning lamp is activated. The engine power is reduced to 50% and the engine speed limited to 1,500 rpm.

Solution:

NOTE: *As soon as the cause of the error code has been removed, you must delete the error code and check the system for proper functioning.*

1. Check the electrical connections of the injector Y22 and the connector X16/1 of the engine controller.
   a) Ensure the connector is connected, not damaged, the pins are in the correct position and that the fit is tight. Repair or replace as required. Check the nuts of the injector connecting lead for the correct tightening torque of 1.5 Nm.

   b) If the electrical connections are OK, continue with step 2.
2. Check the wiring between the injector und dem Motorsteuergerät auf einen offenen Stromkreis.
   a) Disconnect the electrical connections at the injector and the connector X16/1. Check for continuity between:
   Cable C SH2 and X16/1 PIN11
   Cable C SL2 and X16/1 PIN6
   If an open circuit is displayed, the cable must be repaired or replaced.

   b) If an open circuit is not indicated, continue to step 3.
3. Check the resistance of the coil: 0.2 - 0.25 Ohm at 20 °C.
   a) If the resistance is not reached, replace the injector.

EEM3 - 324 Injector 2 - solenoid valve is open too long

Description:

The electronics monitor whether the solenoid valve shuts quickly enough after each injection. The error becomes active if the solenoid valve stays open longer than scheduled during an injection. Injectors 2, 4 and 6 are disabled.

Possibile cause:

1. Faulty engine controller

Reaction:

EC is stored and the warning lamp is activated. The engine power is reduced to 50% and the engine speed limited to 1,500 rpm.

Solution:

NOTE: *As soon as the cause of the error code has been removed, you must delete the error code and check the system for proper functioning.*

1. Turn the starter switch to the "OFF" position and then back to "ON". Start the engine. If the error code continues active, the cause of the problem lies in a faulty engine controller. Replace the engine controller.
   (see chapter 2002A)

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FMGR - 251 Reception of vehicle side CAN bus signal ECCU1 in register 11 is faulty up to DBD100000

Cause:

The control unit detects that a time limit for a periodic data transmission between FMGR and ECCU has been exceeded.

Possible causes:

1. Temporary malfunction of CAN communications between FMGR and ECCU.
2. Short circuit on the CAN bus.
3. Bus termination incorrect or missing.
4. Contacts of the CAN bus plugs bent, broken or corroded.
5. Control unit hardware fault of the FMGR or ECCU

Remedy:

1. A temporary malfunction can be caused by a temporary bus overload. Ensure that the power supply to FMGR and ECCU is correct and that both control modules are ONLINE on the bus. Use the "Control module status" function of the Service Tool to check this. If one of the control units is OFFLINE, go to step 2. If both control units are ONLINE, this is a temporary fault. Store the fault using the Service Tool and then delete it. Make a test drive to check the function. If the fault code does not occur again, no further action is required.
2. Check the power supply to the module which is OFFLINE.
   a) Check supply to ECCU:

      I. Ground from CN1a PIN 19, PIN 25 and PIN 26 to weld point X0/7/5 and grounding point 16 starter.
      Ground from CN2/E PIN 21 and PIN 26 to weld point X0/7/5 and grounding point 16 starter.

      II. 12V (potential 15/1) from CN1a PIN1, PIN 2 and PIN3 to weld point X0/7/8 to plug X4/85a and X4/85b and X24/2.
      From CN3b PIN25 and PIN34 to weld point X0/7/8.
      From weld point X0/7/8 to central print A12 X24/2 PIN 8 and PIN 9 to F50.

      III. Continuous plus CN1a PIN14 to central print A12 X24/2 PIN22 to F10.

   b) Check supply to FMGR:

      I. Ground at A4/3 PIN13 runs via weld point X0/7/5 from grounding point 16 starter.

      II. 12V (potential 15/1) at A4/3 PIN10. Runs from fuse F51 (10A) on A12 central print via connector X24/2 PIN1 to FMGR A4/3 PIN10.

      III. 12V (potential 30) at A4/3 PIN14. Runs from fuse F14 (7.5A) on A12 central print via X24/2 PIN6 to FMGR A4/3 PIN14.
3. If the power supply to the two control modules is correct, check the entire CAN bus for short-circuits. On the CAN bus, disconnect one control module after the other and reconnect it again, checking the status of the control units ("Control module status" function of the Service Tool). If the control unit status is ONLINE, the disconnected unit is causing the problem.
4. If the power supply to the two control modules is correct, check the entire CAN bus for interruptions or defective terminating resistors. If the CAN bus is interrupted, only those control modules are OFFLINE which are connected to the CAN bus after the interruption.
   a) Check vehicle bus:
   Diagnostics interface S31(CAN**H** PIN8, CAN**L** PIN7),
   Armrest X18/4 (CAN**H** PIN17, CAN**L** PIN18),
   AUX1 X4/90 (CAN**H** PIN3, CAN**L** PIN2),
   AUX2 X4/91 (CAN**H** PIN3, CAN**L** PIN2),
   AUX3 X4/92 (CAN**H** PIN3, CAN**L** PIN2),
   AUX4 X4/93 (CAN**H** PIN3, CAN**L** PIN2),
   AUX5 X4/94 (CAN**H** PIN3, CAN**L** PIN2),
   ECCU2 CN1a (CAN**H** PIN15, CAN**L** PIN16),
   EDC X55 (CAN**H** PIN50, CAN**L** PIN52),
   EEM2 X70 (CAN**H** PIN18, CAN**L** PIN42).
   ICU P8/1 (CAN**H** PIN3, CAN**L** PIN4) via P8/2 (CAN**H** PIN3, CAN**L** PIN4) to ADIC CN3 (CAN**H** PIN26, CAN**L** PIN25),
   KEYPAD X4/63 (CAN**H** PIN3, CAN**L** PIN2),
   Also check whether the jumper on X70 of the EEM between PIN 66 and PIN 67 is present.
   Terminating resistor X3/10 (CAN**H** PIN**A**, CAN**L** PIN**B**).

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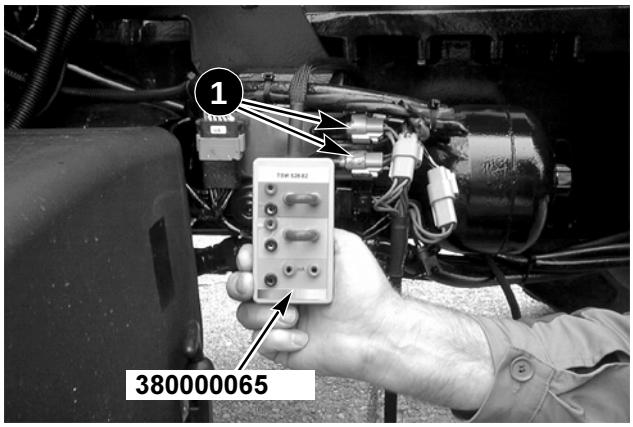
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Adjusting the Sensors

STEP 1

Put the tractor on solid, level ground and apply the parking brake. Lower the axle to its lower mechanical limit and switch the engine OFF. Place chocks in front of and behind the rear wheels.

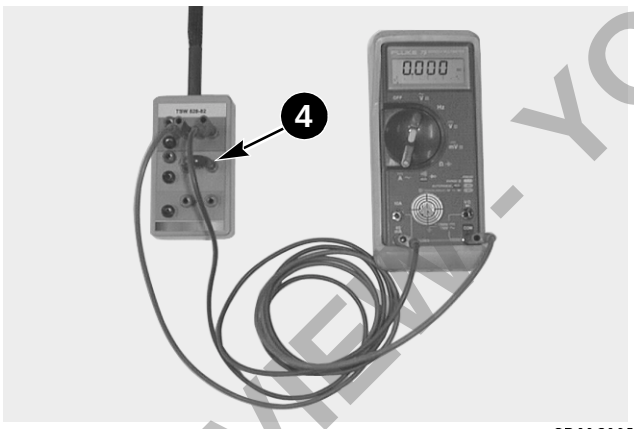
STEP 2



SD01J008

Remove the protective cover from the control block. Separate the plug-in connector (1) and connect the measurement adapter *380000065* into the sensor line.

STEP 3

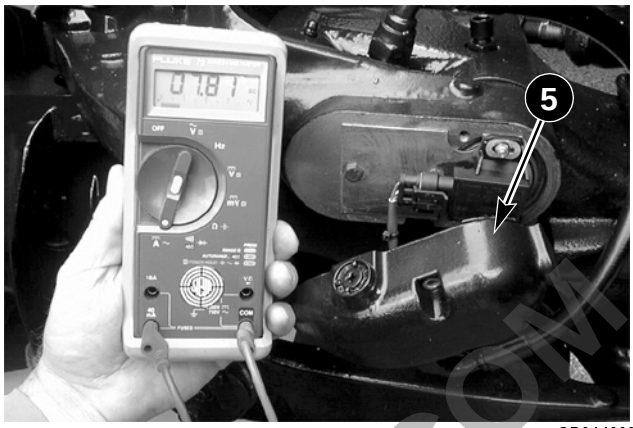


SD00C035

To adjust the right-hand sensor, remove the plug-in jumper from the measurement adapter's red field and replace it by the measuring cables.
Plug the measuring cables into the multimeter sockets "40 mA" and "COM". Insert the plug-in jumper (4) into the sockets in the blue field.

IMPORTANT: *Before turning the ignition switch to ON, make sure that all measuring cables are interconnected, that the multimeter is switched ON and set to* ***"ADC"*** *(DC Amps). If this point is not observed, an error code will be displayed.*

STEP 4



SD01J009

Remove the sensor covers (5) from both sides.
Turn the ignition switch to ON and loosen the sensor securing screws. Adjust the sensor, so that the multimeterindicates a value of
7.8 mA $^{\pm 0.5}$. Tighten the securing screws to a torque of 169 Nm.

STEP 5

Check the reading on the multimeter and repeat STEP 4 if necessary.

STEP 6

Turn the ignition switch to OFF. To adjust the left-hand sensor, plug the measuring cables into the sockets in the blue field and insert the plug-in jumper into the sokkets in the red field.

STEP 7

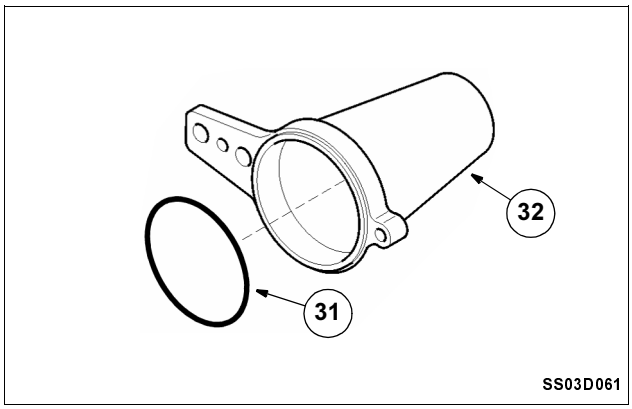
Repeat STEP 4 and STEP 5 to adjust the left-hand sensor.

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Fitting

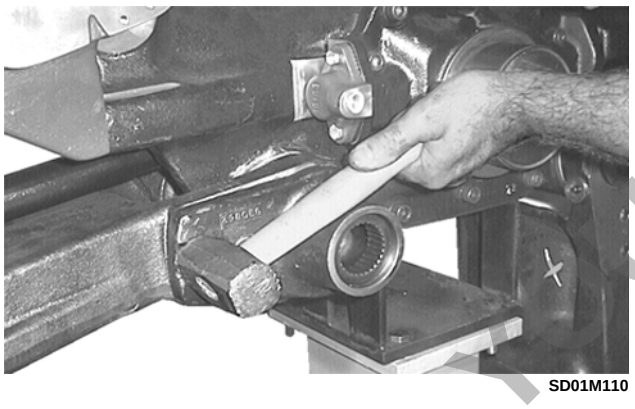
STEP 1



Use grease to fit the new O-Ring (item 31) on the front flange (item 32).

NOTE: *Insert the sealing ring with the spring pointing towards the flange.*

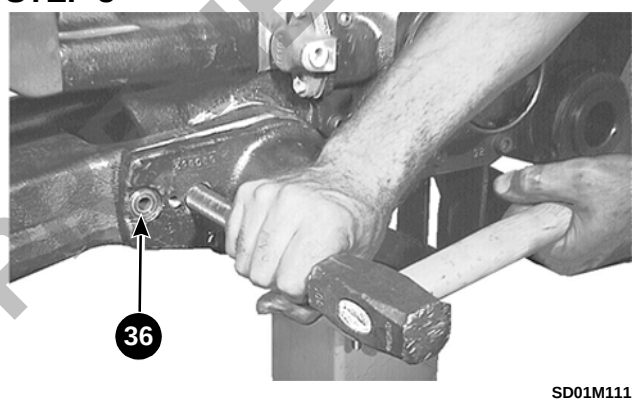
STEP 2



Position the front flange at the lower swinging arm and insert using a soft hammer.

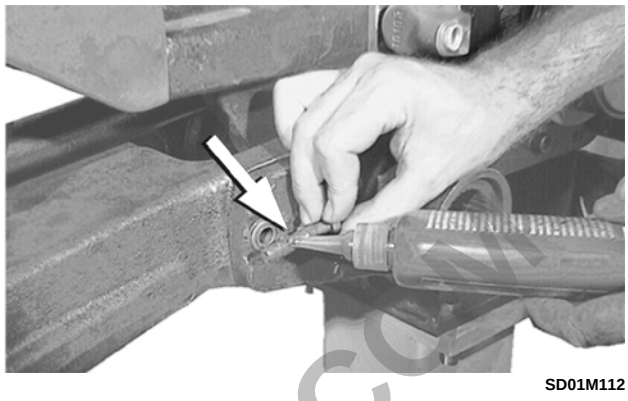
NOTE: *Do not damage the O-rings, items 31 and 166, Seite 65.*

STEP 3



Drive the centre pins (item 36) into the front flange using a suitable insertion tool.

STEP 4

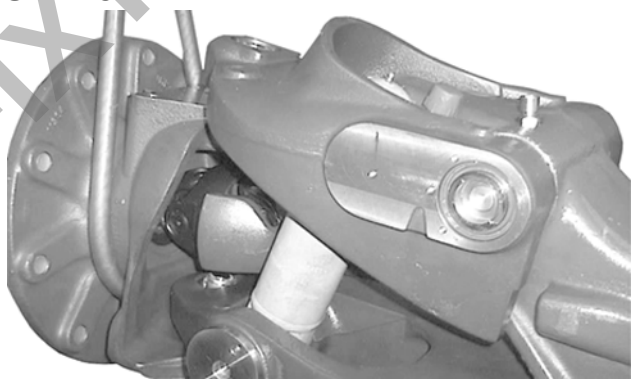


Screw in the screws (items 33 and 37) of the front flange and tighten them.

NOTE: *Observe the correct screw lengths! Secure the screws with Loctite 542.*

Tightening torque.....95 Nm

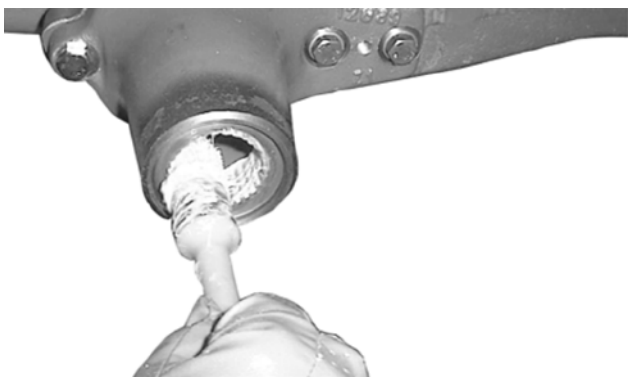
STEP 5



With the axle dismounted, lift up the kingpin housing to the uppermost position using a lifting device.

NOTE: *The uppermost point of the spring travel has been reached when the piston is moved in the hydraulic cylinder up to the stop.*

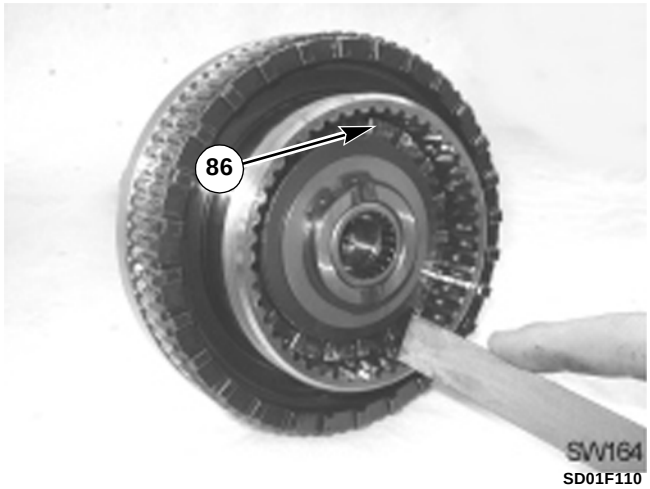
STEP 6



Grease the profile of the front flange.

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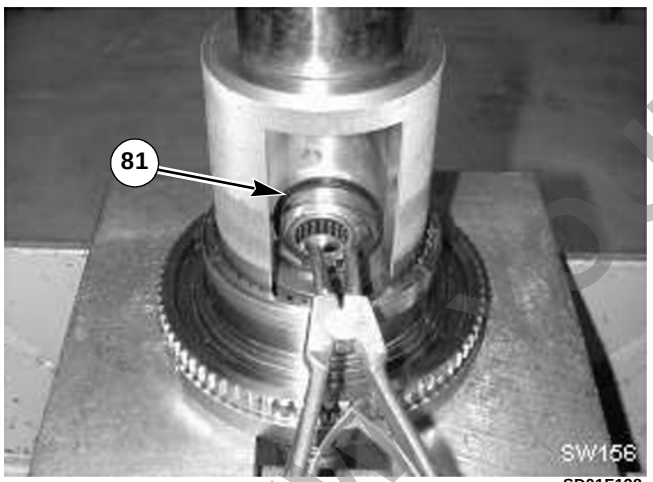
STEP 50



SD01F110

IMPORTANT: *To disconnect claw coupling K3 (item 86), the involute profile of the clutch shaft (item 90) must be worked on where the three safety threaded screws (item 78) have engaged. If required, remove the burrs using filers.*

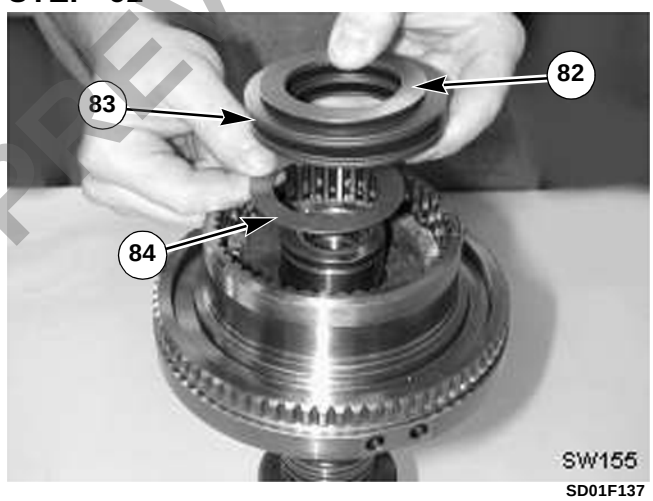
STEP 51



SD01F138

Compress the disk springs using the 380000421 assembly bush. Remove the circlip (item 81).

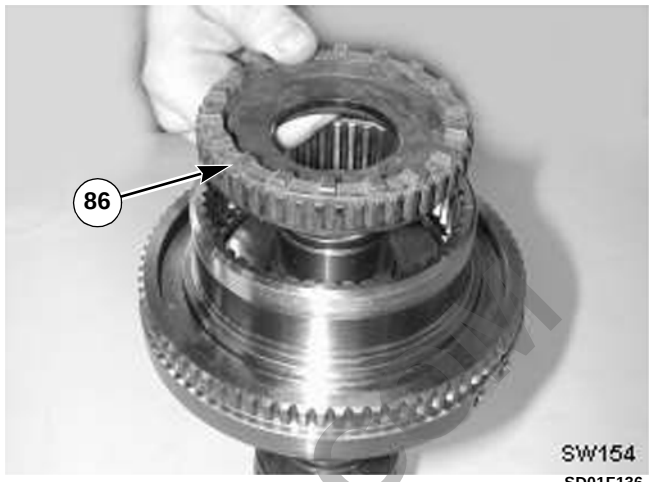
STEP 52



SD01F137

Remove the Belleville springs (item 83), and washers (items 82 and 84).

STEP 53



SD01F136

Remove the claw coupling (item 86).

STEP 54

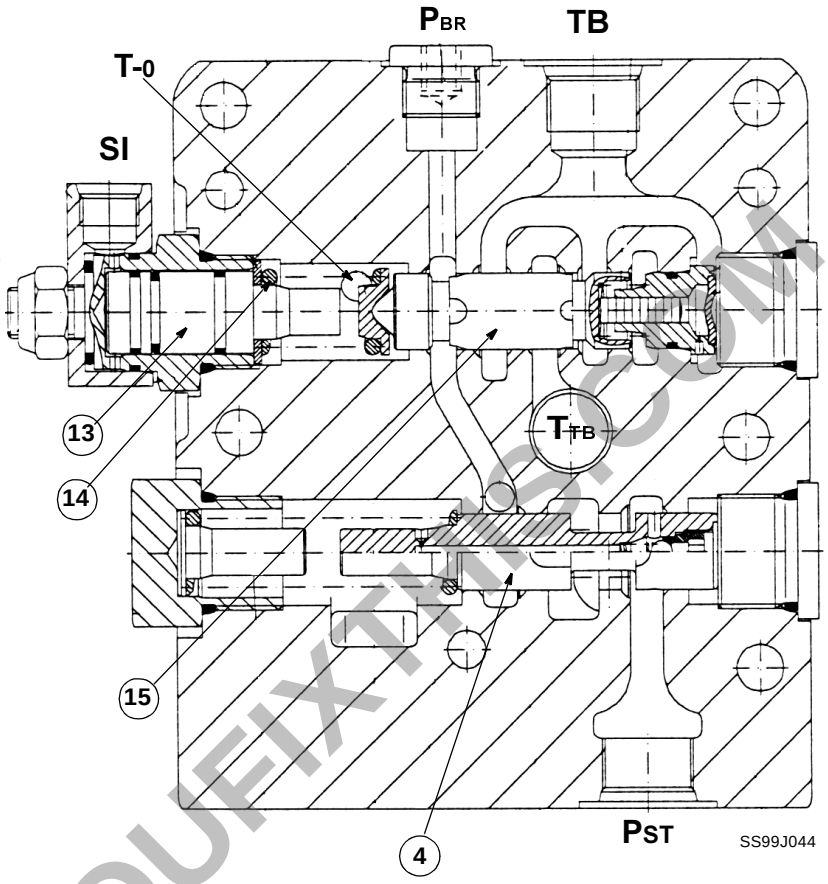
If required, dismount the needle bearing (item 43) and the clamping sleeve (item 45) from the clutch shaft.

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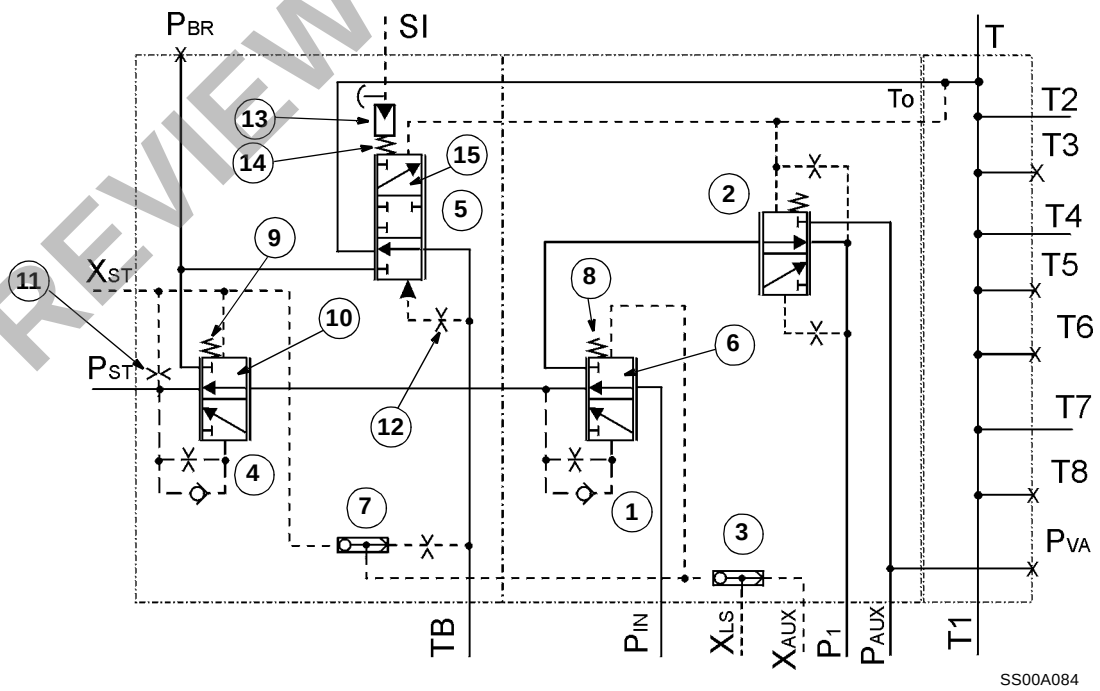
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PRIORITY BLOCK – BRAKE VALVE LT43 / LT44

P_{IN}	Input from the PFC pump
P_1	pilot pressure, auxiliary valves (22 bar)
P_{ST}	P connection, steering
P_{AUX}	P connection AUX / EHR
X_{AUX}	LS connection AUX / EHR
X_{LS}	LS connection, PFC pump controller
X_{ST}	LS connection, steering
TB	Hydraulic trailer brake connection (LT43)
TB	4-wheel brake connection (LT44)
P_{VA}	P connection, independent suspension
P_{BR}	P connection LT03 4-wheel brake + hydr. trailer brake (LT43)
S1	Connection, driving brake
i	adapter Ø 20mm LT43
i	adapter Ø 12mm LT44
T_{TB}	Return feed connection (tank)
T_0	Return feed connection (tank)
T1-8	Return feed collection plate connections (Tank)



Circuit Diagram



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