Workshop Service Manual

FENDT 700 Vario SCR (Stage 3b)

732 .. 1001-
733 .. 1001-
734 .. 1001-
735 .. 1001-
736 .. 1001-
737 .. 1001-

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FENDT is a worldwide brand of AGCO

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FENDT X711 - EAME
English

- Only start the engine once all safety guards have been attached and nobody is standing in the danger area.
- Never let the engine run in enclosed spaces with no exhaust gas suction system.
- Cleaning, maintenance and repair work may only be carried out once the engine is switched off and secured to prevent it starting.
- Injection pipes and high-pressures lines must not be deformed.
- Any damaged injection pipe or high-pressure line must be replaced.
- Do not loosen any injection pipes for high-pressure fuel lines while the engine is running.
- Before carrying out checks to the running engine, always perform a visual check of all high-pressure components. Suitable protective clothing (e.g. protective goggles) should be worn while doing this. Leaks indicate potential sources of danger for workshop personnel.
- In the event of leaks to the high-pressure fuel system, always remain out of range of any possible fuel spray to avoid serious injury.
- Even when no leaks to the high-pressure fuel system can be detected, workshop personnel should avoid the immediate danger area and wear suitable protective clothing (such as protective goggles) when carrying out checks to the running engine and during the first test run.
- Smoking is forbidden while carrying out work to the fuel system.
- Do not work in the proximity of sparks or naked flames.
- Never disconnect an injector while the engine is running.

5. Working on the PTO

- Always switch off the engine before fitting or removing the drive shaft. PTO in "0" position!
- When working on the PTO, allow no-one in the vicinity of the rotating PTO or drive shaft.
- Make sure drive shaft and PTO are equipped with shield pipes and protective funnels.
- After deactivating the PTO, it is possible that parts on the mounted implement may continue to run. In this case, do not get too close to the implement. Work may only be carried out to the implement when nothing is moving!
- When the drive shaft is removed, cover the PTO shaft with its protective cap.
- Nobody should be in the cab when installing and removing the drive shaft.
  Operation of controls for the tractor and mounted implements by people in the cab, especially children, may result in severe or fatal injury.

6. Working on the front loader

- Before undertaking maintenance work, lower the front loader to the ground, switch off the engine and remove the ignition key.
- In the event of a collapsed pipe rupture feature, support the load before starting repair work, and slowly retract the cylinder.
- Check hydraulic hoses and pipes for signs of damage and aging regularly and replace with genuine spare parts in good time.
- Following installation and repairs, operate the tractor for a short time, then retighten all nuts and bolts and check them regularly.
- Retighten eccentric bolt for front loader attachment, if necessary.

Disposal

The work described in the operator's manual and workshop manual includes replacing parts, fuel and lubricants. These renewed parts/fuel/lubricants must be stored, transported and disposed of in accordance with regulations. The repairing workshop bears responsibility for this. The disposal encompasses the recycling and final disposal of parts, fuel and lubricants with recycling having the higher priority. Details about disposal and monitoring are specified in regional, national and international laws and directives, the observation of which is the sole responsibility of the repairing workshops.

2 Technical data: 1000 transmission

Tractor type		714 Vario	716 Vario	718 Vario	720 Vario	722 Vario	724 Vario
Chassis no.:		732/../	733/../	734/../	735/../	736/../	737/../
Transmission oil (Vario transmission)							
Oil grade	-	FENDT Extra Trans 10W-40 or STOU SAE 10W-40 STOU SAE 15W-40					
Transmission, initial fill	l	approx. 58					
Transmission, subsequent fills	l	approx. 47					
Oil quantity between Min. and Max. marks	l	approx. 3					
Oil change interval	Op. hrs / years	2000 / 2					

Tractor type		714 Vario	716 Vario	718 Vario	720 Vario	722 Vario	724 Vario
Chassis no.:		732/../	733/../	734/../	735/../	736/../	737/../
Vario: continuously variable transmission							
Transmission	Model	ML 140		ML 180			
Transmission unit (Vario insert)	Model	ML 180					
Travel range	-	I (Field)					
		II (Road)					
Speed (forwards)							
Speed range I (Field)	km/h	0.02 ... 28					
Speed range II (Road)	km/h	0.02 ... 50					
Speed (backwards)							
Speed range I (field)	km/h	0.02 ... 17					
Speed range II (road)	km/h	0.02 ... 33					
Acceleration rate I (if the joystick is touched once at rated engine speed)	km/h	0.02 ... 0.5 (adjustable)					
Acceleration rate II (if the joystick is touched once at rated engine speed)	km/h	0.5					
Acceleration rate III (if the joystick is touched once at rated engine speed)	km/h	1.0					

Specifications apply to: 732/../.... – 737/../....

Torque values: diesel engine (DEUTZ TCD 6.1)		
Cylinder head bolts: - Sealing surfaces (cylinder head/crankcase), oil-free. - Bolts oiled. - Tighten crosswise from interior to exterior. **Note:** Cylinder head bolts can be used a maximum of 3 times with written confirmation; otherwise replace each time they are loosened.	Nm	1. stage 1: 40 (pre-load value) 2. stage 2: 70 (pre-load value) 3. stage 3: +90° (1st retightening angle) 4. stage 4: +90° (2nd retightening angle)
Cylinder head cover	Nm	8.5
Crankshaft main bearing cap	Nm	1. stage 1: 50 (pre-load value) 2. stage 3: 90° (retightening angle) 3. stage 3: 90° (retightening angle)
Locknut (hexagon socket) to the valve adjustment screw	Nm	20
Valve cover to rocker arm housing	Nm	9
Rocker arm housing to cylinder head	Nm	20
Upper rocker arm shaft to rocker arm housing	Nm	10
Lower rocker arm shaft to rocker arm housing	Nm	25
Big-end bearing cap to connecting rod Screws oiled **Note:** Use new screws each time they are loosened.	Nm	1. stage 1: 30 (pre-load value) 2. stage 3: 60° (retightening angle) 3. stage 3: 60° (retightening angle)
Lubricating oil sump to crankcase **Note:** Note the length of the screws.	Nm	30
Oil sump drain plug (replace copper washer)	Nm	55
Flywheel to crankshaft **Note:** Tighten the bolts in the specified sequence. Use new screws each time they are loosened.		
M10x1 x85	Nm	1. stage 1: 30 (pre-load value) 2. stage 3: 60° (retightening angle) 3. stage 3: 60° (retightening angle)
M10x1 x80		
M10x1 x75		
M10x1 x70		
M10x1 x55		
M10x1 x50		
M10x1 x45		
M10x1 x40		
M10x1 x35		

B - Faults

Fault code	DIN brief description	Cause	Consequences	Reference	FENDIAS/Note
02.2.45	**A103 -** Terminal NT01/02	In the previous terminal 15 cycle, a different VarioGuide system was detected			
02.2.46	**A103 -** Terminal NT01/02	The combination of terminal and VarioGuide is not permitted	Not possible to activate VarioGuide		

8 Fault code 05.1.00 -

Fault code	DIN brief description	Cause	Consequences	Reference	FENDIAS/Note
05.1.00	**A050 -** Basic control ECU	EEPROM fault in basic control ECU			
05.1.31	**A100 -** MFA, multifunction armrest 4WD 100% button	Faulty button, Signal fault			
05.1.32	**A100 -** MFA, multifunction armrest Auto 4WD button	Faulty button, Signal fault			
05.1.33	**Y009 -** 4WD solenoid valve	Actuation fault	4WD engages	Circuit diagram Transmission control system	
05.1.34	**B168 -** Steering angle sensor	Sensor faulty, Signal fault		Circuit diagram Suspension	
		Faulty 8.5 V supply	A013, fuse 16		
05.1.51	**A100 -** MFA, multifunction armrest Differential lock 100% button	Faulty button, Signal fault	Other functions remain active		
		Faulty BUS			
05.1.52	**A100 -** MFA, multifunction armrest Differential lock auto system button	Faulty button, Signal fault			
05.1.53	**Y010 -** Differential lock solenoid valve	Actuation fault	Differential lock disengages	Circuit diagram Transmission control system	
05.1.54	**S106 -** Left brake switch	Faulty switch, Signal fault	TMS is switched off	Circuit diagram Trailer brake/brake	
05.1.55	**S105 -** Right brake switch	Faulty switch, Signal fault	TMS is switched off	Circuit diagram Trailer brake/brake	
05.1.56	**A050 -** Basic control ECU	Checksum error, 4WD/differential lock parameters	No auto mode possible		EOL programming
05.1.5C	**B097 -** Hydraulic parking brake pressure release sensor	Sensor faulty, Signal fault		Circuit diagram Trailer brake/brake	
		12 V supply fault	A013, fuse 30		

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Fault code	DIN brief description	Cause	Consequences	Reference	FENDIAS/Note
08.1.4A	**Y062 -** Rear field pressure control solenoid valve	Faulty valve	Valve moves to neutral and locks	Circuit diagram Hydraulics	
08.1.4B	**A100 -** MFA, multifunction armrest Rear power lift auto button	Faulty button (output via TeachIn)	No auto mode		
08.1.4F	**A100 -** MFA, multifunction armrest	Switch actuation/timeout time			
08.1.A2	**Y184 -** Rear power lift control valve	EEPROM is faulty (Valve)	Valve moves to neutral and locks		EOL programming
08.1.A3	**Y184 -** Rear power lift control valve	RAM_Test	Valve moves to neutral and locks Pilot pressure OFF		
08.1.A4	**Y184 -** Rear power lift control valve	Flash_Test	Valve moves to neutral and locks Pilot pressure OFF		
08.1.A5	**Y184 -** Rear power lift control valve	Incorrect valve code (SA/DA) for selecting EOL	Valve moves to neutral and locks		EOL programming
08.1.B0	**B145 -** Rear power lift position sensor	Position sensor not calibrated	No control possible, operable only via external button	Calibration code "8002"	
08.1.B2	**A100 -** MFA, multifunction armrest Rear power lift setpoint value potentiometer	Setpoint value potentiometer not calibrated	Setpoint values cannot be set, only position control possible	Calibration code "8001"	
08.1.B3	**X015 -** External control socket	External sensor not calibrated	Default values are used		
08.1.C0	**A100 -** MFA, multifunction armrest	MFA not fitted	No auto mode possible, operable only via external button		
08.1.C1	**A103 -** Terminal NT01/02	Terminal not fitted	Configuration cannot be changed		
08.1.CE	**Y184 -** Rear power lift control valve	Visual temperature limit warning			
08.1.CF	**Y184 -** Rear power lift control valve	Visual temperature limit warning			

Fault code	DIN brief description	Cause	Consequences	Reference	FENDIAS/Note
0A.1.D5	**S022 -** External front power lift lower button	Faulty button, Signal fault	Button inoperable until next trouble-free cold start	Circuit diagram Hydraulics	
0A.1.D6	**S021 -** External front power lift raise button	Faulty button, Signal fault	Button inoperable until next trouble-free cold start	Circuit diagram Hydraulics	
0A.1.D7	**B084 -** Hydraulic oil level sensor	Sensor faulty, Signal fault	Fill level is no longer monitored	Circuit diagram Instrument panel/ABS/operator's seat	
0A.1.D8	**B084 -** Hydraulic oil level sensor	Warning, hydraulic oil tank	Warning display only		
0A.1.D9	**B084 -** Hydraulic oil level sensor	Hydraulic oil tank empty	Valves are locked and pilot control is switched off	Circuit diagram Instrument panel/ABS/operator's seat	
0A.1.DA	**B013 -** Hydraulic oil temperature sensor	Warning, hydraulic oil temperature too high	Warning display only (without storing)		
0A.1.DB	**B013 -** Hydraulic oil temperature sensor	Hydraulic oil temperature too high	Is stored	Circuit diagram Instrument panel/ABS/operator's seat	
0A.1.DC	**B013 -** Hydraulic oil temperature sensor	Warning, hydraulic oil temperature not plausible	Warning display only		
0A.1.DD	**S119 -** Hydraulic oil filter contamination switch	Filter clogged	Warning display only		
0A.1.DE	**S119 -** Hydraulic oil filter contamination switch	Faulty switch, Signal fault	Warning display only		

Fault code	DIN brief description	Cause	Consequences	Reference	FENDIAS/Note
0E.1.A3	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	PPS signal not available, Short circuit or break in the wiring	No GPS position, System cannot be operated		
0E.1.A4	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	IMU sensor has an internal fault, cannot respond	No GPS position, System cannot be operated		
0E.1.A5	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	Vehicle type not recognised	System cannot be operated		
0E.1.A6	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	Internal temperature of control unit above 80°C			
0E.1.A7	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	Input voltage over 20 V			
0E.1.A8	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	Current input above 1 amp, possible internal short circuit			
0E.1.A9	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	Short circuit in GPS receiver power supply			
0E.1.AA	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	Incorrect GPS receiver			
0E.1.AB	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	K bus CAN buffer (CAN 1) full			
0E.1.AC	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	ISO bus CAN buffer (CAN 4) full			
0E.1.AD	**A101 -** VarioDoc ECU **U004 -** GNSS aerial	Tractor serial number in EEPROM is incorrect			EOL programming
Note: The following fault codes are displayed on the A103 - Terminal NT01/02					
0E.1.06	**A102 -** VarioGuide GNSS ECU	Switch off the automatic steering			
0E.2.40	**A102 -** VarioGuide GNSS ECU	The maximum contour line is too long			
0E.2.41	**A102 -** VarioGuide GNSS ECU	The current wayline exceeds the maximum bend radius.			

21 Fault code 18.1.00 -

Fault code	DIN brief description	Cause	Consequences	Reference	FENDIAS/Note
18.1.01	**A100 -** MFA, multifunction armrest VarioGuide partial activation button	Partial activation button in MFA faulty, Signal fault			
18.1.02	**A100 -** MFA, multifunction armrest VarioGuide full activation button	Full activation button in MFA faulty, Signal fault			
18.1.03	**A100 -** MFA, multifunction armrest	MFA fails to report			
18.1.06	**S053 -** Seat contact switch	Seat switch faulty, Signal fault	Seat switch diagnostics (fault code is output by the "EHL" function)		
18.1.07	**Y099 -** VarioGuide pilot pressure switch-off solenoid valve	Solenoid valve faulty, Signal fault		Circuit diagram Suspension/VarioGuide	
18.1.08	**Y099 -** VarioGuide pilot pressure switch-off solenoid valve	Solenoid valve faulty, Signal fault		Circuit diagram Suspension/VarioGuide	
18.1.1A	**B168 -** Steering angle sensor	Steering angle sensor faulty, Signal fault			
18.1.1C	**B168 -** Steering angle sensor	Invalid calibration values for steering angle sensor in EEPROM		Calibration code "2401" Calibration code "2403"	
18.1.2A	**B081 -** 360° steering wheel sensor	Steering wheel sensor faulty, Signal value faulty			
		12 V supply	A013, fuse 29		
18.1.2C	**B081 -** 360° steering wheel sensor	Invalid calibration values for steering wheel sensor in EEPROM		Calibration code "2401" Calibration code "2403"	

Fault code for calibration code 4003

Fault code	Cause	DIN short description
F01	User terminated calibration with "ESC"	**A050** - Basic control ECU
F02	Speed above 0,1 Km/h	
F03	Engine speed below 600 rpm	
F04	Engine speed above 900 rpm	
F05	Transmission not in neutral	
F06	Clutch not depressed	
F07	- **B015** - Bevel pinion sensor faulty	
F08	- **B014** - Collecting shaft sensor faulty	
F09	- **B010** - Engine speed sensor faulty	
F10	Neutral switch, joystick faulty (**A100** - MFA, multi-function armrest)	
F11	- **B016** - Travel speed range detection sensor faulty	
F12	- **Y002** - Travel speed range 1 — solenoid valve faulty	
F13	- **Y003** - Travel speed range 2 — solenoid valve faulty	
F20	Calibrated values for neutral position incorrect	
F21	Calibrated values for travel speed range I incorrect	
F22	Calibrated values for travel range II incorrect	
F23	Calibrated values do not match	
F30	Error reading from EEPROM (**A050** - Basic control ECU)	
F31	Error while writing to EEPROM (**A050** - Basic control ECU)	

Fault code for calibration code 4005

Fault code	Cause	DIN short description
F21	Transmission in "ACTIVE STANDSTILL". (Remedy: Put transmission into neutral)	**A050** - Basic control ECU **B055** - Foot throttle sensor
F22	Signal smaller than 3 mA_{DC}	
F23	Signal greater than 21 mA_{DC}	
F24	Rotation angle of **B055** - Foot throttle sensor is too great (more than 250 steps)	
F25	Distance between idle and full throttle too short (less than 12 mA_{DC}) or **B055** - Foot throttle sensor incorrectly calibrated	
F26	Distance between idle and full throttle too short (less than 70%) or **B055** - Foot throttle sensor incorrectly calibrated	
F27	Time for a calibration increment exceeded (longer than 60 seconds)	
F28	Internal error in the **A050** - Basic control ECU Error while saving calibrated values to EEPROM (EOL reprogramming may be necessary)	
F30	User interrupted with ESC	

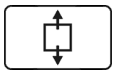
Deutz KWP code	Bosch SPN/FMI code	FENDT Fault code	FENDT — component	Fault description
472	94/3	1D.1.02	B087 sensor	**Fuel system** Fuel low pressure "primary pressure" Sensor signal has exceeded upper limit
473	94/4	1D.1.02	B087 sensor	**Fuel system** Fuel low pressure "primary pressure" Sensor signal has underrun lower limit
474	94/1	1D.1.02	B087 sensor	**Fuel system** Power low pressure "pilot pressure" has exceeded the limit Warning message output
475	94/1	-	-	**Fuel system** Power low pressure "pilot pressure" has exceeded the limit Engine switches off
481	174/0	-	-	**Fuel system** Fuel temperature has exceeded the limit Warning message output
482	174/0	-	-	**Fuel system** Fuel temperature has exceeded the limit Engine switches off
488	523619 / 2	-	B105 sensor	**SCR catalytic converter (AdBlue)** Excess temperature in SCR catalytic converter Exhaust gas temperature of above 570°C
500	523915 / 0	-	-	**Diesel particulate filter (DPF)** HCI flow valve (DV1); Overcurrent at the end of the injection phase
501	523915 / 12	-	-	**Diesel particulate filter (DPF)** HCI flow valve (DV1); Excess temperature at power level
502	523915/3	-	-	**Diesel particulate filter (DPF)** Power level at HCI flow valve (DV1) Short circuit to battery+
503 505	523915/11	-	-	**Diesel particulate filter (DPF)** Power level (plus side) at HCI flow valve (DV1) Short circuit to battery+
504	523915/4	-	-	**Diesel particulate filter (DPF)** Power level at HCI flow valve (DV1) Earth connection
506	523916/2	-	-	**Diesel particulate filter (DPF)** Pressure sensor Pressure downstream of HCI flow valve (DV1) implausible
508	523916/0	-	-	**Diesel particulate filter (DPF)** Pressure sensor Pressure downstream of HCI flow valve is too high (above the limit)
511	523916/1	-	-	**Diesel particulate filter (DPF)** Pressure sensor Pressure downstream of HCI flow valve is too low (below the limit)

Deutz KWP code	Bosch SPN/FMI code	FENDT Fault code	FENDT — component	Fault description
974	523612/14	1D.1.1B	ECU A099/A127	**Engine control unit** CPU software reset SWReset_1
975	523612/14	1D.1.1B	ECU A099/A127	**Engine control unit** CPU software reset SWReset_2
976	91/11	1D.1.06	B055 sensor	**Speed control** Foot throttle sensor APP1 signal and APP2 signal implausible or APP1 signal and low fuel switch signal implausible
980	523550/12	1D.1.1C	S002 ignition switch ECU A099/A127	**Starter** Ignition switch (start) Terminal 50 active for too long
981	172/3	1D.1.27	B138 sensor	**Charge air system** Temperature sensor downstream of air filter Sensor fault Signal has exceeded upper limit
982	172/4	1D.1.27	B138 sensor	**Charge air system** Temperature sensor downstream of air filter Sensor fault Signal is below the lower limit
984	523921/11	-	-	**Diesel particulate filter (DPF)** Temperature sensor in combustion space Temperature in combustion space implausible
986	523921/0	-	-	**Diesel particulate filter (DPF)** Temperature sensor in combustion space Temperature in combustion space has exceeded upper limit (too high)
989	523921/1	-	-	**Diesel particulate filter (DPF)** Temperature sensor in combustion space Temperature in combustion space has underrun lower limit (too low)
994	105/3	1D.1.03	B092 sensor	**Charge air system** Charge air temperature sensor Sensor fault Signal has exceeded upper limit
995	105/4	1D.1.03	B092 sensor	**Charge air system** Charge air temperature sensor Sensor fault Signal is below the lower limit
996	105/0	-	B092 sensor	**Charge air system** Charge air temperature sensor Charge air temperature has exceeded upper limit Warning message output
997	105/0	-	-	**Charge air system** Charge air temperature sensor Charge air temperature has exceeded upper limit Engine switches off

Deutz KWP code	Bosch SPN/FMI code	FENDT Fault code	FENDT — component	Fault description
1412	1186 / 11	1D.1.30	A124	**Exhaust system** Wastegate actuator; EOL calibration not carried out correctly
1413	1186 / 13	1D.1.30	A124	**Exhaust system** Wastegate actuator; deviation from calibration value too great, recalibration required
1414	1186 / 2	1D.1.30	A124	**Exhaust system** Wastegate; no status message from control unit
1415	1186 / 7	1D.1.30	A124	**Exhaust system** Wastegate actuator; blocked
1416	1186 / 11	1D.1.30	A124	**Exhaust system** Wastegate actuator; excess temperature (> 145°C)
1417	1186 / 11	1D.1.30	A124	**Exhaust system** Wastegate actuator; excess temperature (> 135°C)
1418	1186 / 11	1D.1.30	A124	**Exhaust system** Wastegate actuator; operating voltage fault
1431	524028 / 2	-	-	**CAN BUS system** CAN message PROEGRActr implausible
1432	524029 / 2	-	-	**CAN BUS system** Timeout during receipt of CAN message ComE-GRActr — exhaust-gas recirculation control system
1436	524034 / 5	-	-	**Exhaust system** Disc separator; cable break
1437	524034 / 12	-	-	**Exhaust system** Disc separator; excess temperature at power level
1438	524034 / 3	-	-	**Exhaust system** Disc separator; battery short circuit
1439	524034 / 4	-	-	**Exhaust system** Disc separator; earth short circuit
1448	175/0	-	-	**Engine oil system** Temperature of oil supplied by customer too high; warning threshold reached
1449	175/0	-	-	**Engine oil system** Temperature of oil supplied by customer too high; shut-off threshold reached
1458	523960 / 0	-	-	**Exhaust system** EGR exhaust temperature too high; warning threshold reached
1459	523960 / 1	-	-	**Exhaust system** EGR exhaust temperature too high; shut-off threshold reached
1460	1180 / 0	1D.1.29	B140 sensor	**Exhaust system** Exhaust temperature upstream of turbine; warning threshold reached
1461	1180 / 1	1D.1.29	B140 sensor	**Exhaust system** Exhaust temperature upstream of turbine; shut-off threshold reached
1462	1180 / 0	1D.1.29	B140 sensor	**Exhaust system** Exhaust temperature upstream of turbine; warning threshold reached

B008 - High-pressure Sensor 1

Right side of transmission, on transmission hydraulic system valve block



Remove right rear wheel and panel

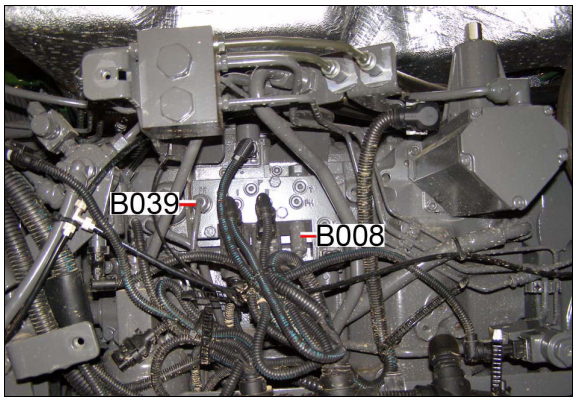
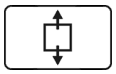


Fig. 26. I028120

B009 - Discharge temperature sensor

Right side of transmission on high-pressure filter



Remove right rear wheel and panel

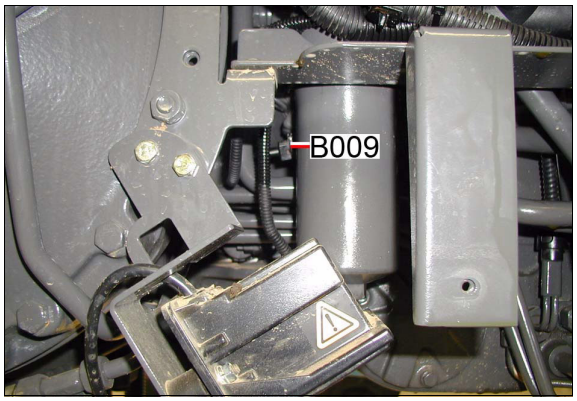


Fig. 27. I028572

B013 - Hydraulic oil temperature sensor

Right side of tractor, on the hydraulic oil tank interior

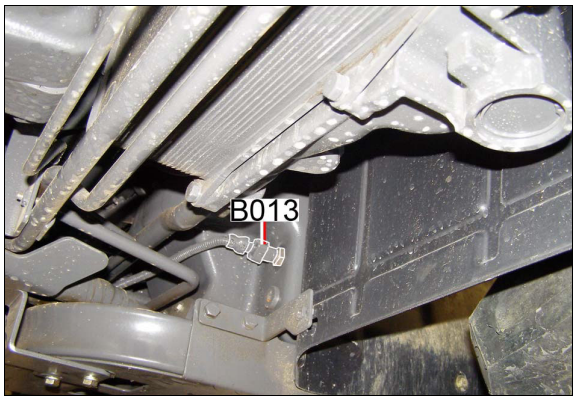
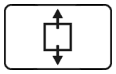


Fig. 28. I027987

B014 - Collecting shaft sensor

Right side of transmission, below transmission hydraulic system valve block



Remove right rear wheel and panel

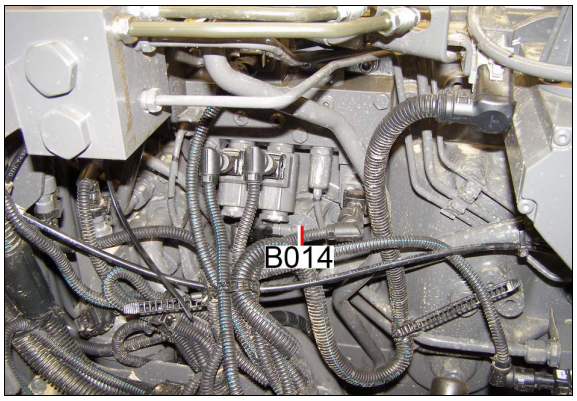


Fig. 29. I028121

E158 - Right LED cab lighting

Fig. 78. I028856

E171 - Licence plate LED lighting

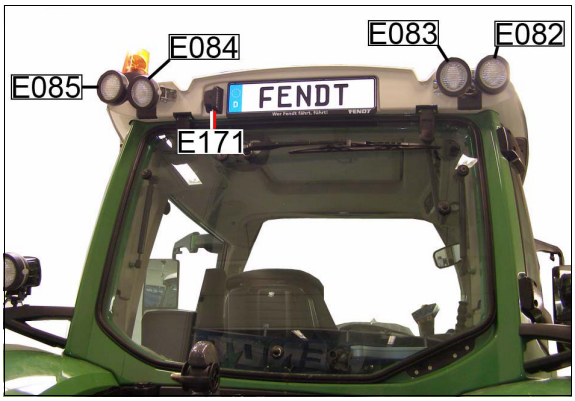


Fig. 79. I028015

E172 - Left LED cab lighting

Fig. 80. I028857

E173 - Entry LED lighting

Fig. 81. I028870

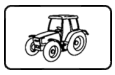
9 Electrical/electronic components - S

S002 - Ignition switch

In cab, steering column right.

Fig. 124. I028031

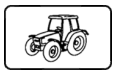
S015 - Parking brake switch



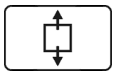
Right rear axle

Fig. 125. I029285

S017 - Filter contamination switch



Right side of transmission, on transmission oil filter



Remove right rear wheel and panel

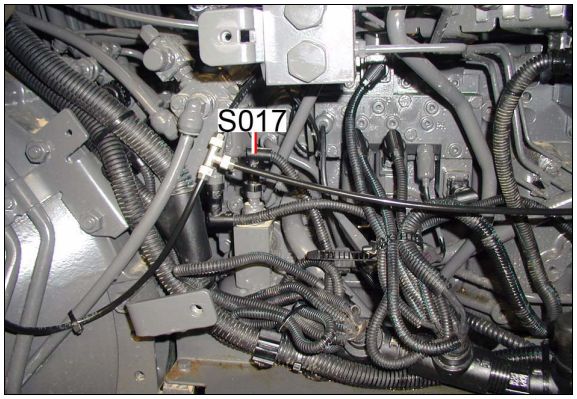


Fig. 126. I028607

S019 - Left-hand external rear PTO button

Rear of tractor, on left mudguard

Fig. 127. I028032

X1586 - V-BUS cable coupling (VarioGuide)
X1587 - cable coupling for Y087

Under the cab, next to the steering unit

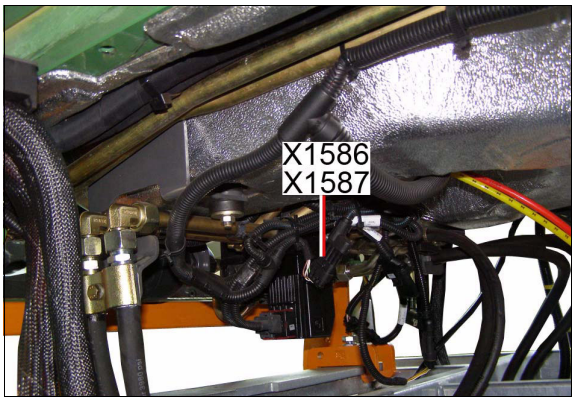
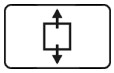


Fig. 172. I038397

X1590 - Separation point on S079
X1591 - Separation point on S079

Cab, right side of steering column on the ignition switch



Detach panel

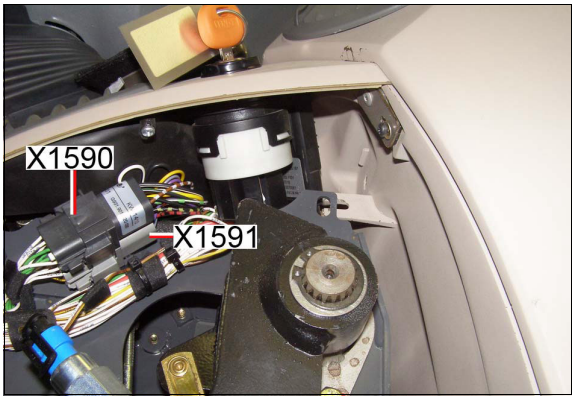


Fig. 173. I028894

X1611 - Separation point on X400 PCB, ISO (bus terminal)
X1612 - Separation point on X400 PCB, ISO (bus terminal)

Rear of tractor

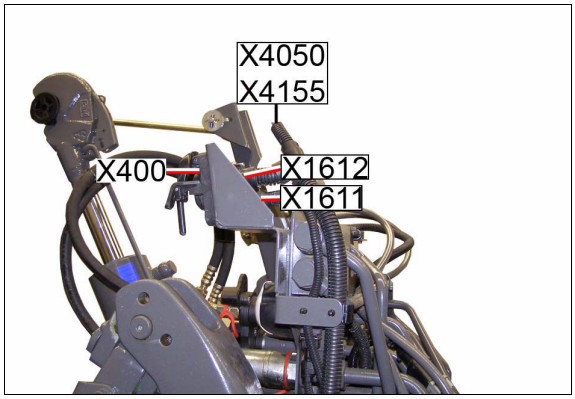
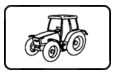
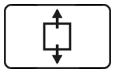


Fig. 174. I028693

X1616 - Separation point on X1806
X1617 - Separation point on X1806
X1618 - Separation point on X1806



Right side of tractor, behind the hydraulic oil tank



Detach panel

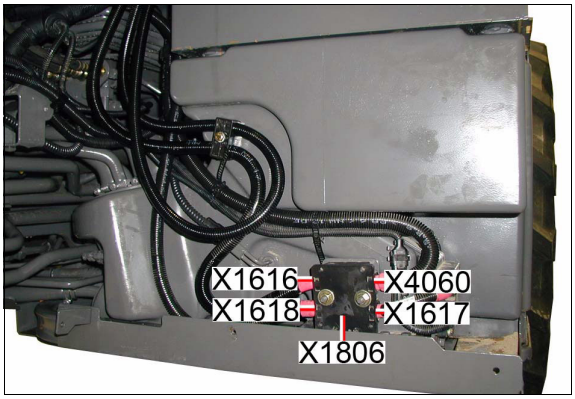
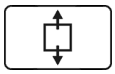


Fig. 175. I028694

X4107 - UB 30 connector

Cab, bottom of left mudguard



Detach panel

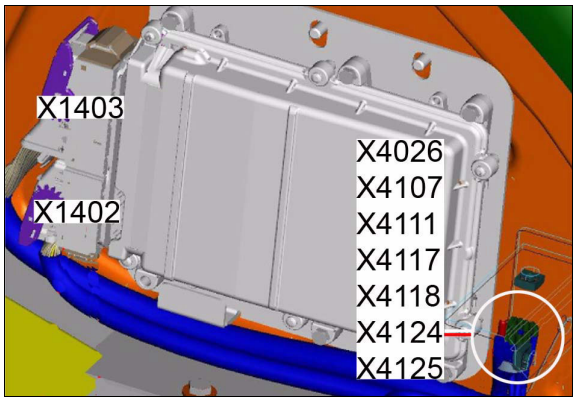
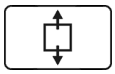


Fig. 224. I029625

X4108 - UB 15 connector
X4109 - UB 30 EDC connector

Cab, right side on the cab floor



Detach panel

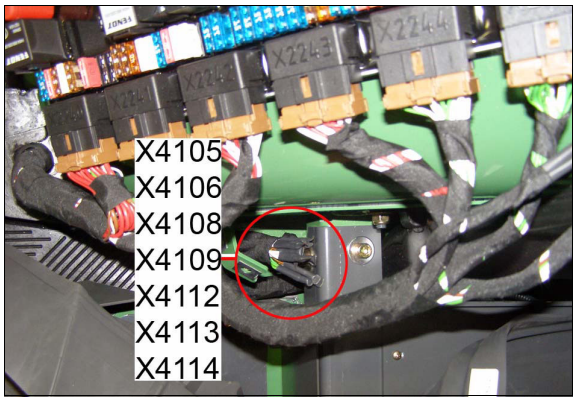
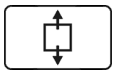


Fig. 225. I030073

X4111 - EXT earth connector

Cab, bottom of left mudguard



Detach panel

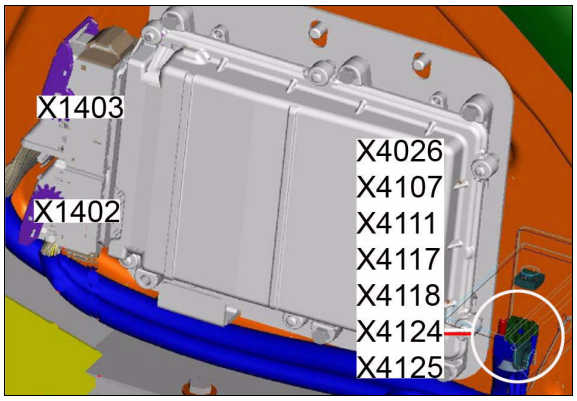
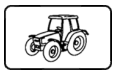
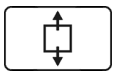


Fig. 226. I029625

X4112 - Sensor system earth connector
X4113 - Sensor system earth connector
X4114 - Sensor system earth connector



Cab, right side on the cab floor



Detach panel

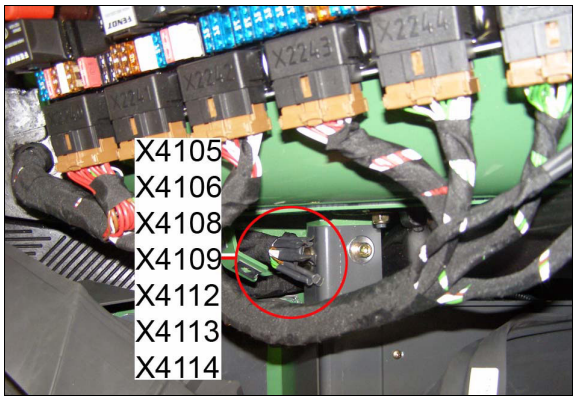


Fig. 227. I030073

X4238 - Interior lighting connector
X4239 - UB 30D connector

Cab, top right in roof lining

Remove connection panel

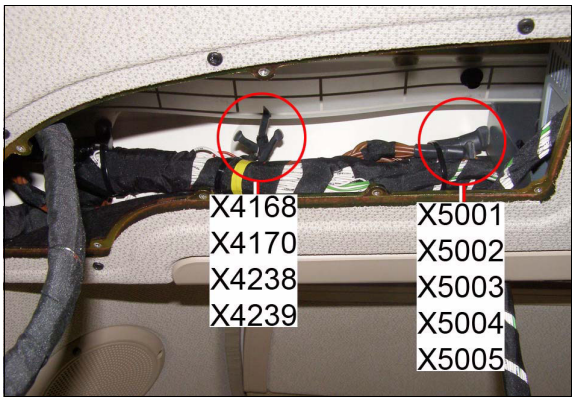


Fig. 276. I030094

X4240 - Sensor system earth connector
X4241 - Sensor system earth connector

Left side of transmission

Detach left rear wheel and panel

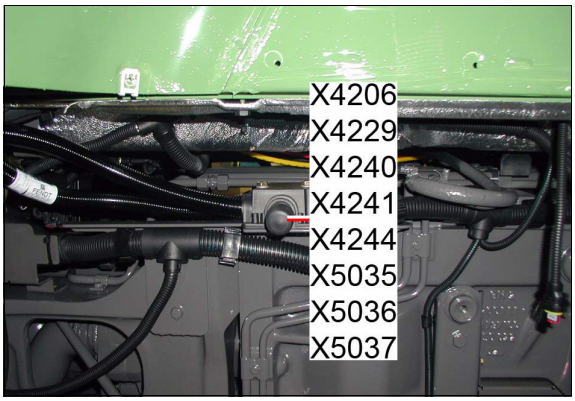


Fig. 277. I029855

X4243 - UB 15 connector

Cab, top right in roof lining

ECU, remove air conditioning control

Fig. 278. I029647

X4244 - Connector 58

Left side of transmission

Detach left rear wheel and panel

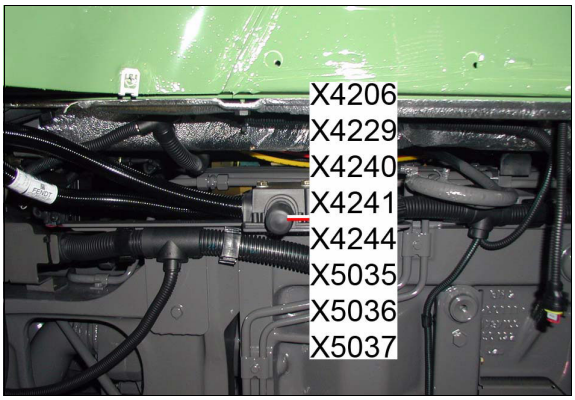
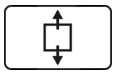


Fig. 279. I029855

Y120 - AdBlue flow valve

Right side of engine, in the exhaust pipe



Open bonnet.

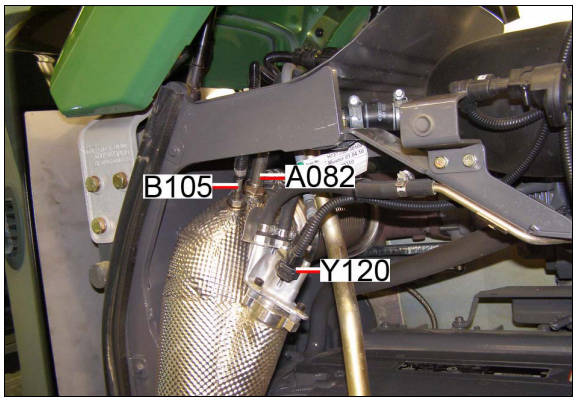
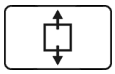


Fig. 328. I027941

Y122 - Transmission cooler bypass solenoid valve

Right side of transmission, on the valve block (inlet or outlet)



Remove right rear wheel and panel

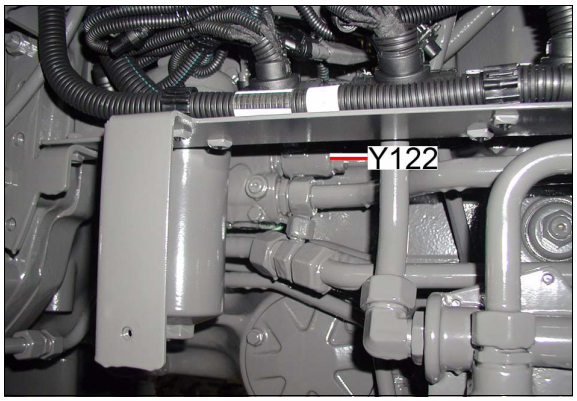
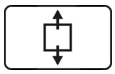


Fig. 329. I029406

Y169 - AdBlue tank heater solenoid valve

Left side of tractor, on frame



Detach cover panel

Fig. 330. I028129

Y170 - Engine brake solenoid valve

Bulkhead between engine and cab

NOTE: *Photographed without the cab for clarity.*

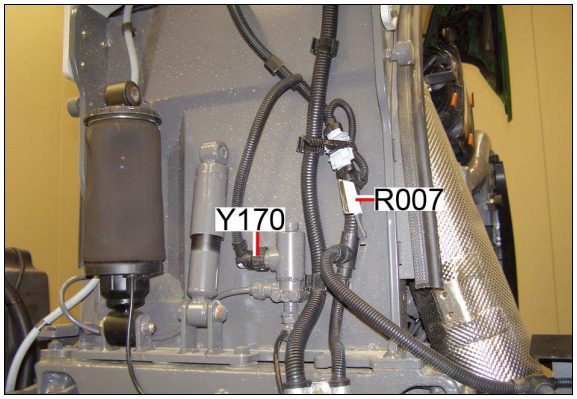
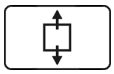


Fig. 331. I028124

MVV2 [Y060] - Side pre-heating solenoid valve

Right side of tractor, in the Power Beyond end plate



Detach panel

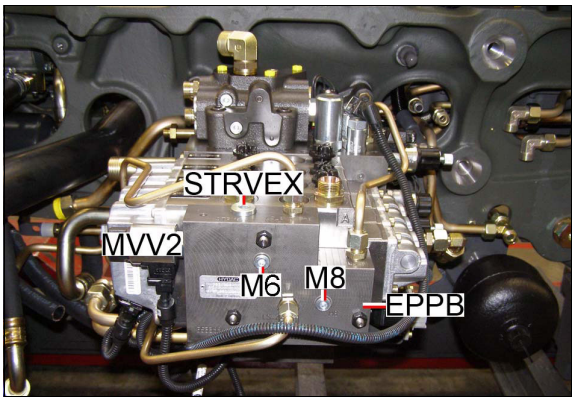


Fig. 380. I029681

OETR - Oil temperature regulator

Right side of transmission, in the connector plate of the heat exchanger

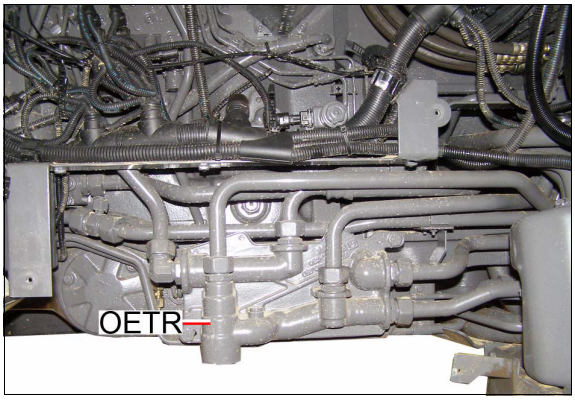


Fig. 381. I030173

PEX - External pressure supply (Power Beyond)

Rear of tractor

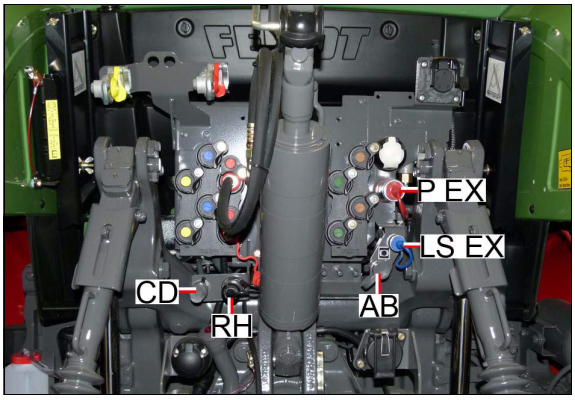
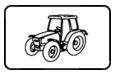


Fig. 382. I029519

PH - Auxiliary pump
PNL - Emergency steering pump
PR - LS pump



Centre of tractor, fitted on the transmission housing

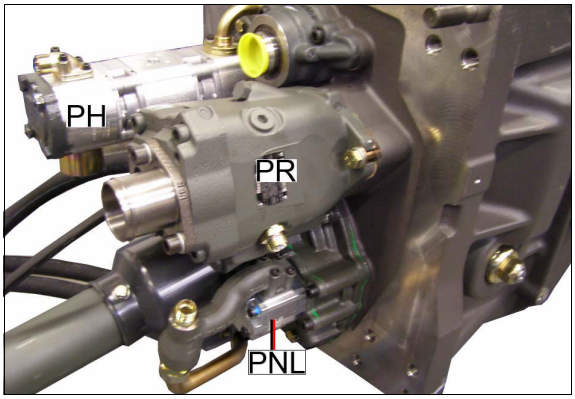


Fig. 383. I029834

Rear PTO calibration, Display (A)

Select factory setting for auto mode switch-on point, Display (B) (see also: Operating Manual)

Change auto mode switch-on point, Display (C) (see also: Operating Manual)

4 Calibration code 1001 (crossgate lever)

3. Calibrating the crossgate lever (1001)

Important: The following preparatory steps must be carried out.

- Hand brake applied
- Ignition ON
- If fault messages are displayed, the faults must be confirmed one by one.

IMPORTANT: *Refer to KDM 18/2012!*

Press "ESC" to confirm the warning and fault messages displayed on the A007 instrument panel

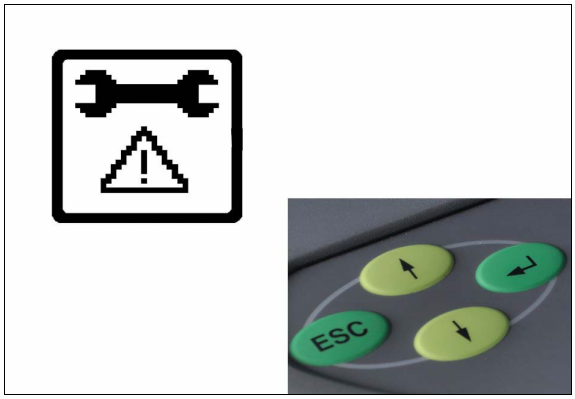
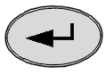
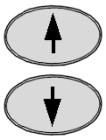


Fig. 49. I029265



Press "Return" and the first main menu appears in the multiple display



Press one of the buttons repeatedly until the symbol (A) flashes

Press "Return", the second main menu appears in the multiple display

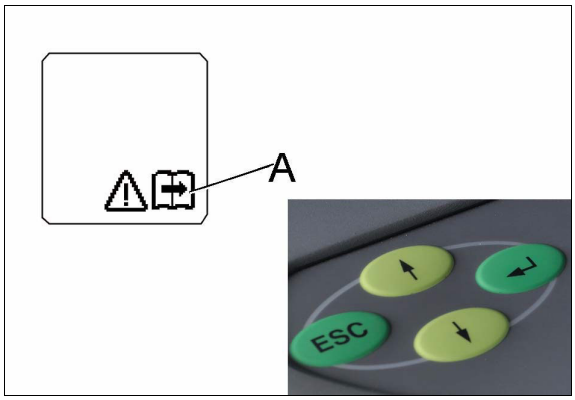
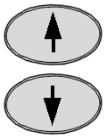
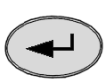


Fig. 50. I029138

The second main menu appears in the multiple display



Press one of the buttons repeatedly until the symbol (A) flashes



Press "Return" to confirm

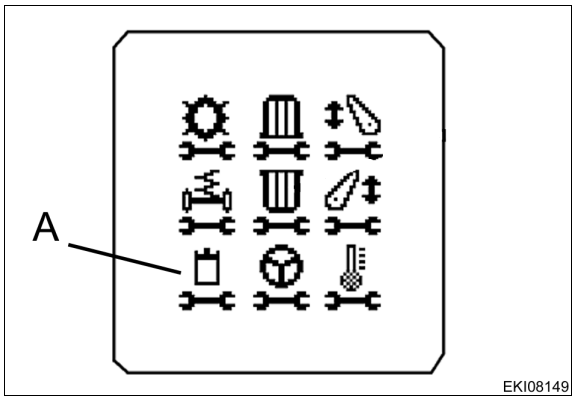


Fig. 51. I000935

7 Calibration code 2401 (steering angle sensor)

9. Calibrating the steering angle sensor (2401)

NOTE: *Calibration only possible on tractors with VarioGuide*

Important: The following preparatory steps must be carried out.

– Engine is running

– If fault messages are displayed, the faults must be confirmed one by one.

Press "ESC" to confirm the warning and fault messages displayed on the A007 instrument panel

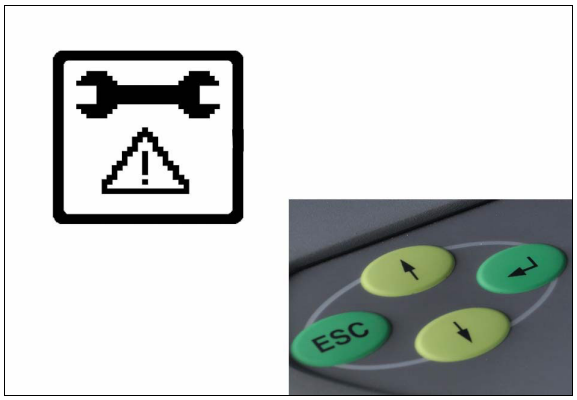
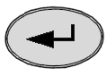
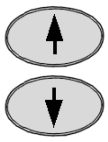


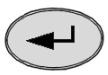
Fig. 89. I029265



Press "Return" and the first main menu appears in the multiple display



Press one of the buttons repeatedly until the symbol (A) flashes



Press "Return", the second main menu appears in the multiple display

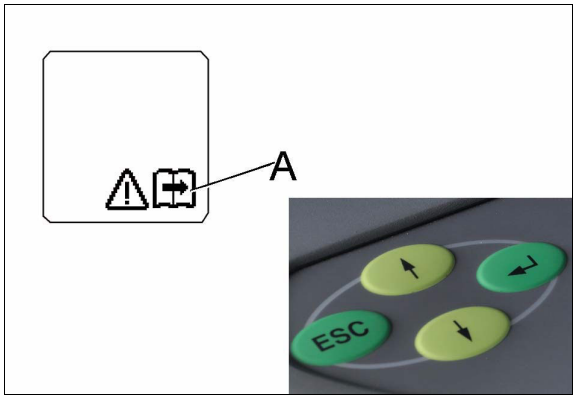
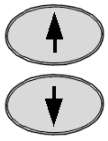
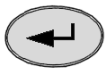


Fig. 90. I029138

The second main menu appears in the multiple display



Press one of the buttons repeatedly until the symbol (A) flashes



Press "Return" to confirm

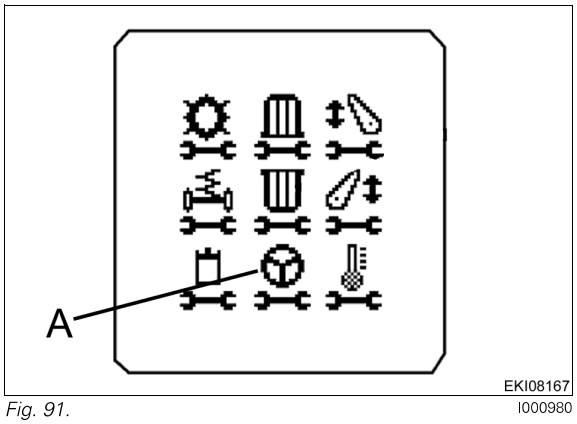
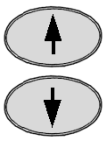


Fig. 91. I000980

The transmission menu appears in the multiple display



Press one of the buttons repeatedly until the symbol (A) flashes

Press "Return" to confirm

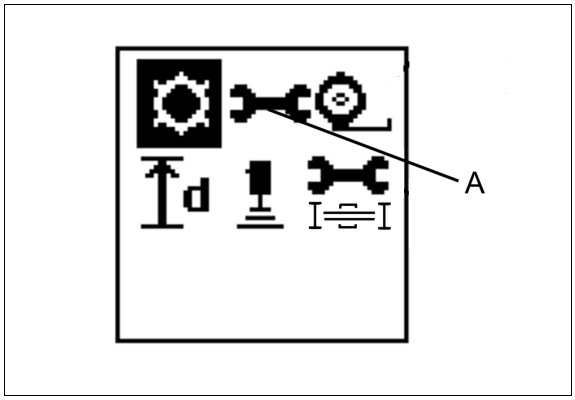
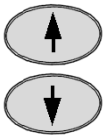


Fig. 127. I029542

Input code **4001**



Press one of the buttons until desired number is displayed

Press "Return" to confirm

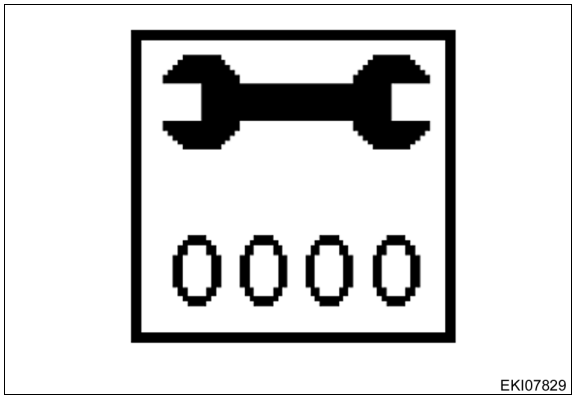


Fig. 128. I000773

Clutch pedal **not** depressed

Press "Return" to confirm

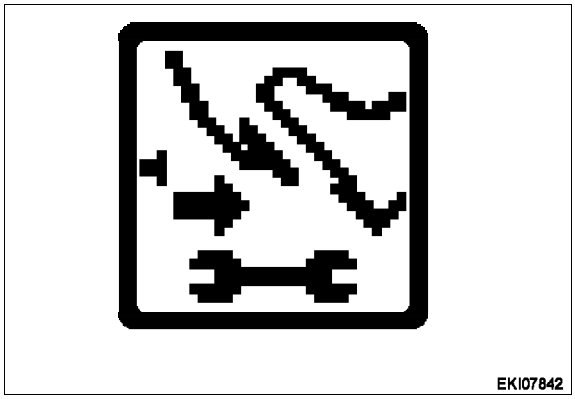


Fig. 129. I000990

Clutch pedal depressed

Press "Return" to confirm

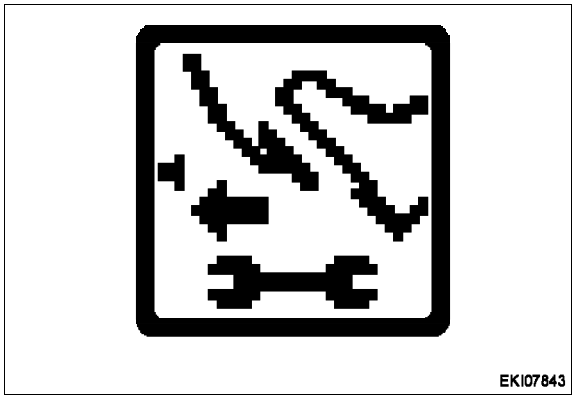
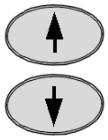
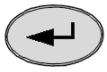


Fig. 130. I000991

Input code **4007**



Press one of the buttons until desired number is displayed



Press "Return" to confirm

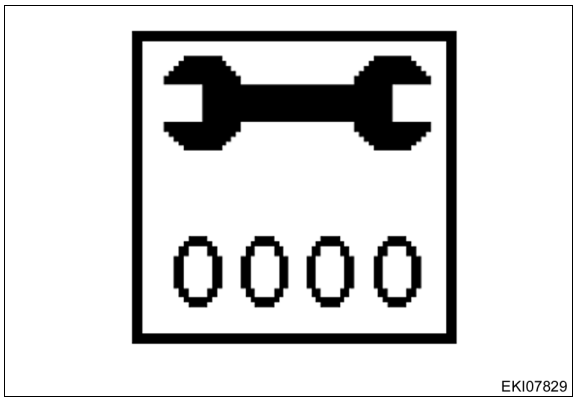


Fig. 168. I000773

Step1 (test step 1) to …

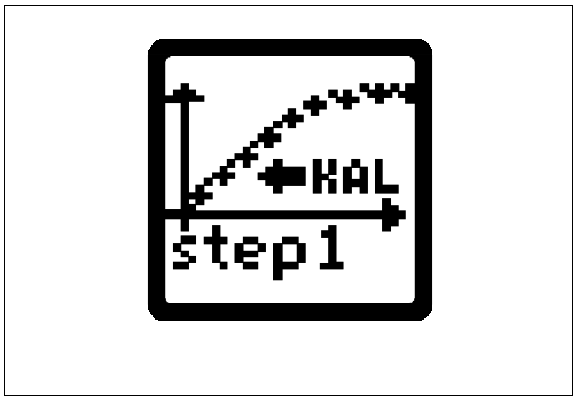


Fig. 169. I000555

... Step 7 (test step 7) is carried out automatically

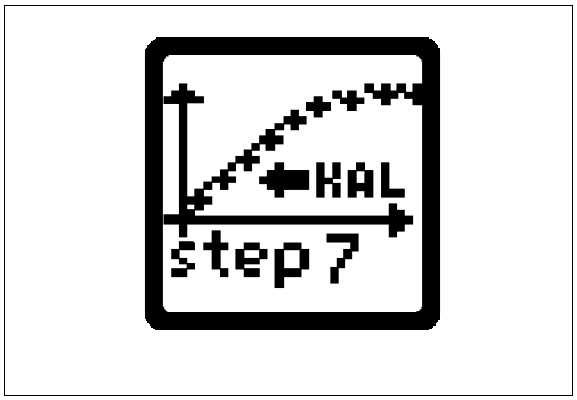


Fig. 170. I000556

If calibration completes successfully, the image is displayed and the new sensor values are saved

Press "ESC" to confirm

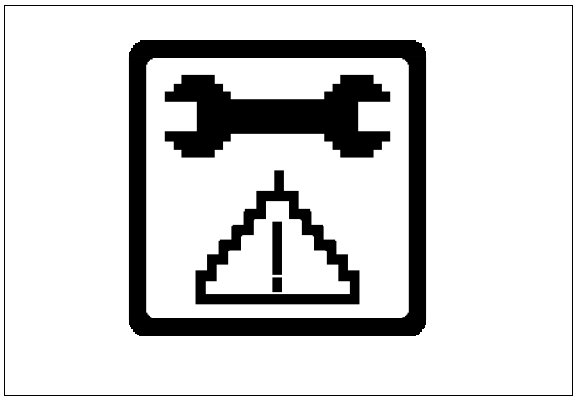
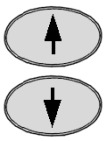


Fig. 171. I000558

The transmission menu appears in the multiple display



Press one of the buttons repeatedly until the symbol (A) flashes

Press the "Enter" key, the following screen is displayed.

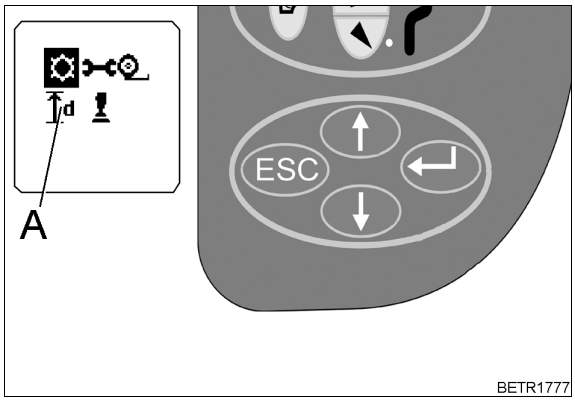
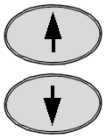
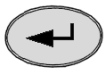


Fig. 202. I002923

The first digit for the track information flashes.
The measured track length for the track information must now be entered.
E.g. 100 m



Repeatedly press one of the keys repeatedly until the desired figure shows. E.g. 1



Press "Enter" to confirm. Enter the remaining two positions in the same manner.

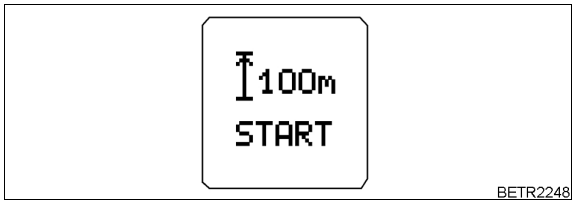


Fig. 203. I002924

After confirming the last digit, "START" will flash.

Press the key, the display changes from "START" to "STOP".

Drive off with the tractor and stop with the front wheel on the end marker of the measured distance (stop with clutch).

Press "Enter" to confirm.

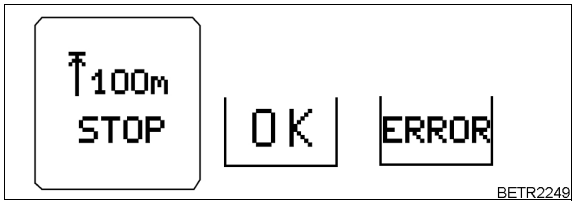


Fig. 204. I002925

If incorrect values are detected or the conditions are not met, an **ERROR** message appears

If the calibration has run correctly the message **OK** is displayed and the new tyre circumference and the radar impulses are saved.

Using the "ESC" key, work back until Time and Operating Hours are displayed

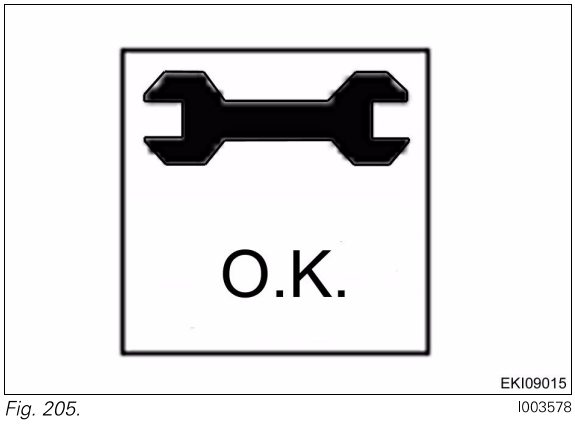


Fig. 205. I003578

3 Transmission control system functional sequence

Transmission type ML 180

M – Marschall, designer of this development
L – Power distribution, mechanical and hydrostatic power transmission
180 – Vario transmission size

The ML 180 transmission

The ML 180 is a continuously variable transmission for forwards and reverse travel.
Power transmission can be hydrostatic or mechanical, or hydrostatic and mechanical.
Basically this means:
Slow forward travel = high hydrostatic transmission power/low mechanical transmission power
Fast forward travel = low hydrostatic transmission power/high mechanical transmission power
For a detailed explanation, see transmission function plan

Hydrostatic power distribution

The ML transmission unit is flexibly mounted in the transmission housing. The transmission housing is also the oil reservoir for the hydrostatic drive.
Oil fill: Fendt Extra Trans 10W-40 or STOU oil, viscosity SAE 10W-40 or 15W-40
Initial fill: approx. 58 litres
Refill: approx. 47 litres, e.g. at oil change
Functional sequence, see transmission hydraulic circuit diagram
The servo pump draws in oil through the suction filter.
The temperature sensor (B009) monitors the temperature of the transmission oil.
Flow through the oil cooler is temperature-dependent.
This means that if the transmission oil is cold, little oil flows through the oil cooler, while most flows through the bypass valve. The bypass valve opens when the pressure differential exceeds approx. 3.5 bar. The transmission oil temperature is monitored by the temperature sensor.
The servo pump generates the system pressure for the ML control valves and enhanced control valves. The system pressure of approx. 18 bar is restricted by the pressure relief valve and restrictor orifice.

The system uses two different pressures.

1. System pressure for the ML transmission control system and the comfort pressure for the rear PTO clutch, rear PTO shaft control, differential lock and 4WD switchover approx. 18 bar
2. High pressure in the ML transmission, maximum 550 bar + 15 bar

Pressure filter contamination is monitored by a pressure switch (S017) as a function of the transmission oil temperature. Filter contamination is not monitored if the transmission oil temperature is below 50°.
Two non-return valves (2V1 and 2V2) alternately feed cooled transmission oil into the high-pressure circuit.
Hot transmission oil is discharged from the high-pressure circuit via the flushing valve (2V5).
The high-pressure circuit incorporates: a variable-displacement pump (2P1) and a variable-displacement motor (2A1), two non-return valves (2V1 and 2V2), two servo-assisted high-pressure limiting valves (2V3 and 2V4), a flushing valve (2V5), a clutch/turbo-clutch pressure relief valve (4V4), a high-pressure safety valve (4V7) and a test connection (PH).
The servo cylinders (3A1 and 3A2) on the variable-displacement pump and motor are actuated by two 4/3-directional control valves (3V1 and 3V2).
The 4/3 directional control valves are mechanically actuated by the actuator shaft (3Z1).
The actuator shaft (3Z1) is rotated as required by the actuator unit (A009), thereby setting the correct quantity of oil to be supplied or consumed.
The variable-displacement pump (2P1) and variable-displacement motor (2A1) swivel accordingly.
In the emergency mode switch position, the actuator shaft (3Z1) is actuated manually from the cab.
In the emergency mode switch position, the transmission is automatically locked at approx. 30 km/h after the engine has been started.
If the clutch pedal, hand brake or neutral switch is operated, the high-pressure circuit is depressurised by the two high-pressure limiting valves (2V3 and 2V4).
The clutch and turbo-clutch function is controlled by the pressure relief valve (4V4).
Important note on filling the ML 180 transmission with oil:
During normal maintenance work, e.g. for a transmission oil change, the transmission oil should be added as in a normal mechanical gear transmission.
If there is no oil in the high-pressure circuit, the transmission must be filled from an external pressurised filling unit.
During filling, the transmission oil is additionally filtered through connection PU (measuring point M5).

6 Pressure measuring points on transmission and control hydraulics

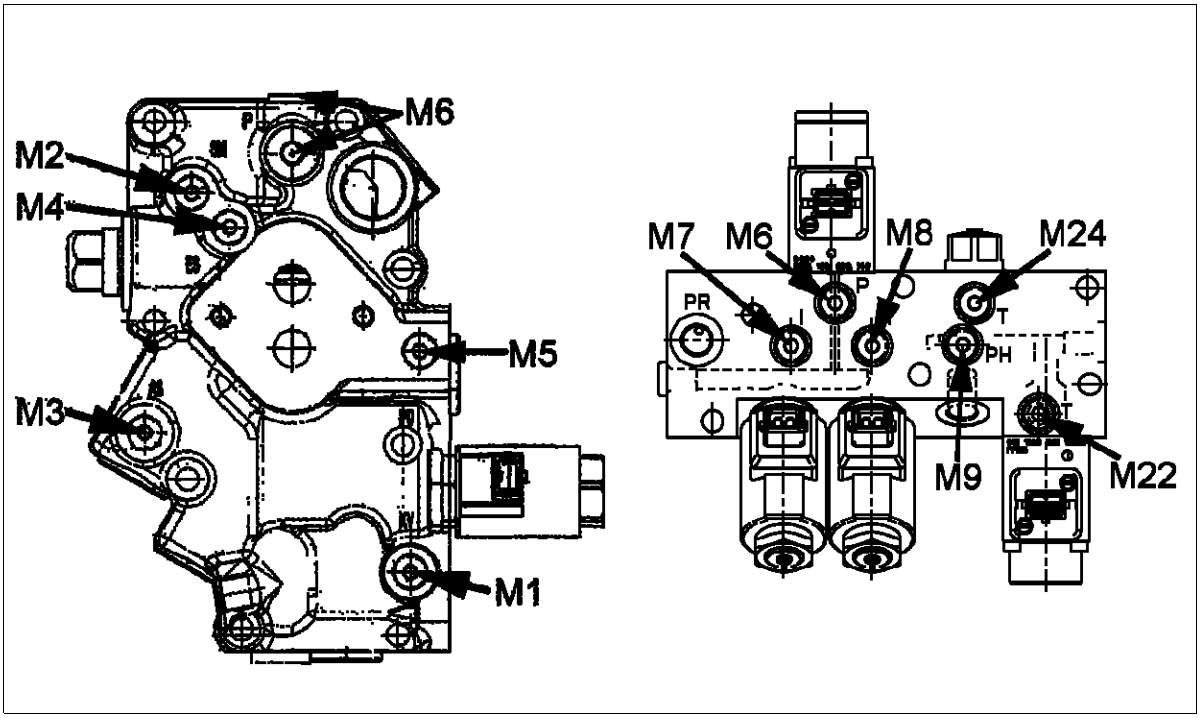


Fig. 47. Pressure measuring points on the transmission hydraulics I029484

Tightening torque for mini measuring connection/plug

Test point	Tightening torque
M1 - M6	**7 Nm + 2 Nm**
M7 - M9	**10 Nm + 3 Nm**
M10 - M16	**12 Nm**
M22 - M24	**10 Nm + 3 Nm**

M10 System pressure, rear axle
M11 Rear PTO clutch pressure (**V**)

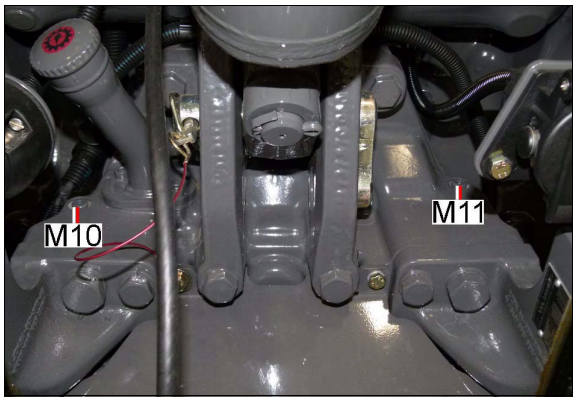


Fig. 48. I029506

Pry off the circlip

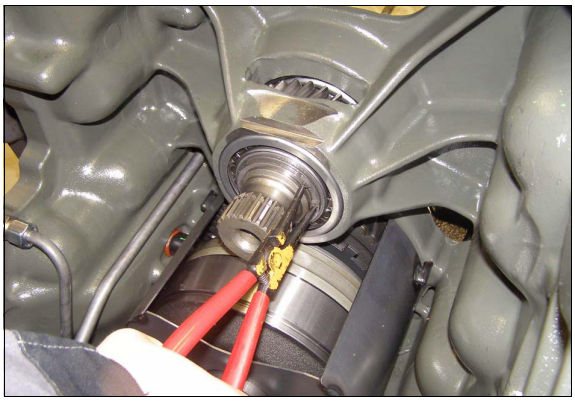


Fig. 5. I036147

Remove shims

Fig. 6. I036149

Remove upper banjo bolt

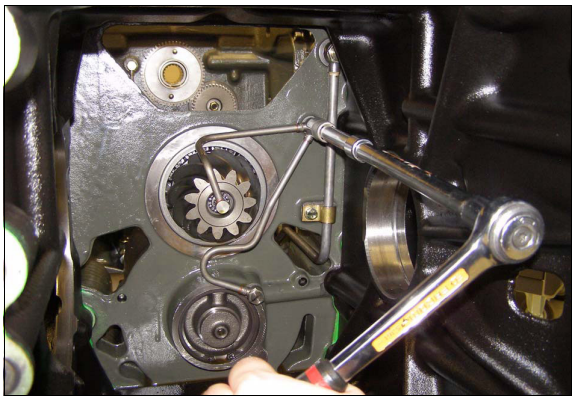


Fig. 7. I036150

Remove lower banjo bolt

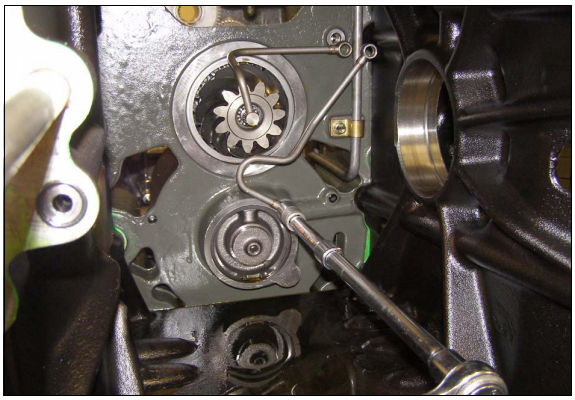


Fig. 8. I036151

2. Fit lubrication oil line and tighten banjo bolts

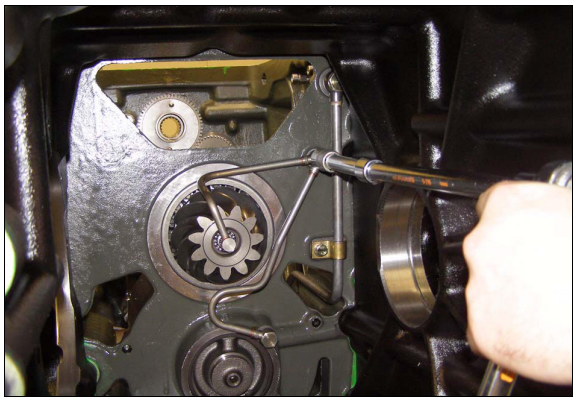


Fig. 51. I037247

The following subsequent work must be carried out

- Install the ML vario insert *see 1080, §2, page 156*
- Fit rear wheel brake *see 1070, §3, page 114*
- Fit drive axle *see 1015, §3, page 92*
- Fill with oil

7 Install differential and set backlash

IMPORTANT: *The pinion shaft and crown wheel must be fitted in pairs!*

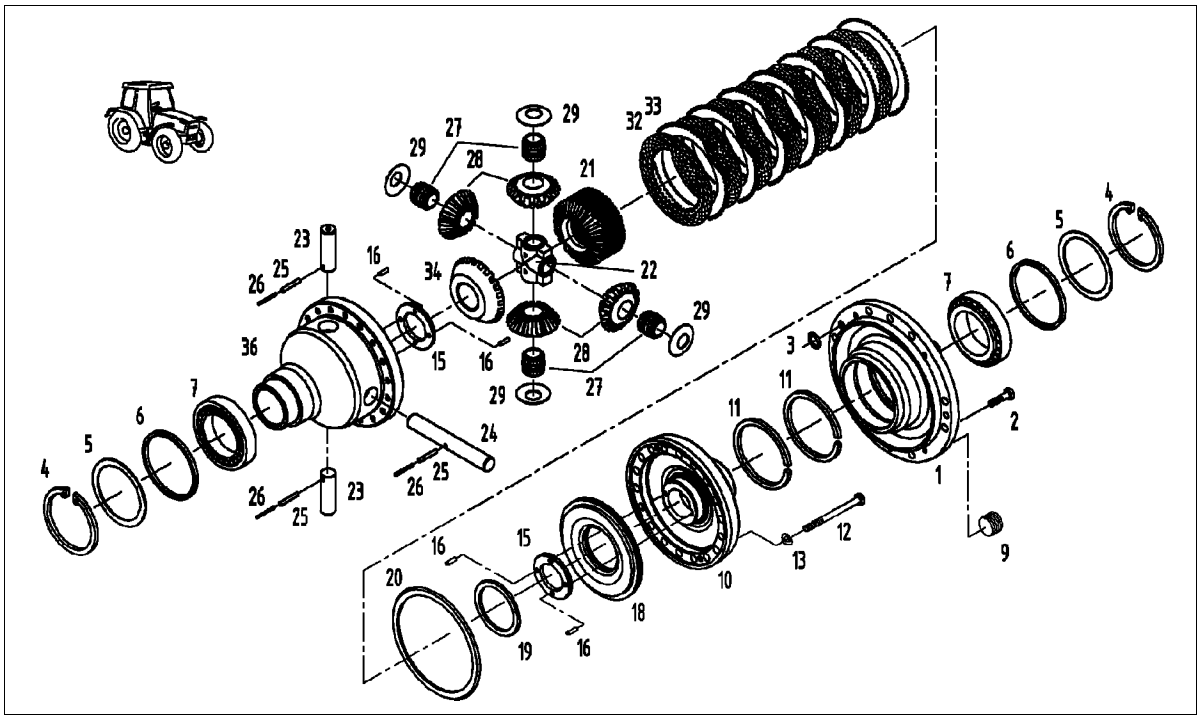


Fig. 90. I034192

1 Bearing flange
2 Hex bolt
3 O-ring
4 Circlip
5 Shim pack
6 Ring
7 Taper roller bearing
10 Housing flange
11 Rectangular-section ring
12 Hex bolt
13 Spring washer
15 Ring
16 Dowel pin
18 Piston
19 Lip seal
20 Lip seal
21 Axle bevel gear
22 Cross bearing
23 Axle
24 Axle
25 Roll pin
26 Roll pin
27 Cylinder roller ring
28 Pinion gear
29 Thrust ring
32 Internally toothed disc
33 Externally toothed disc
34 Axle bevel gear
36 Housing

DANGER:
Falling loads can cause injury!
Do not walk or stand under suspended loads!

Fit suspension cylinder bolt and tighten
Tightening torque: 85 Nm

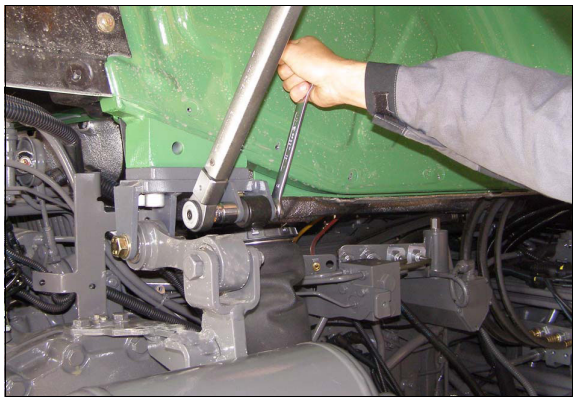


Fig. 41. I032666

Install compressed air block and install all compressed air hoses and electrical plugs

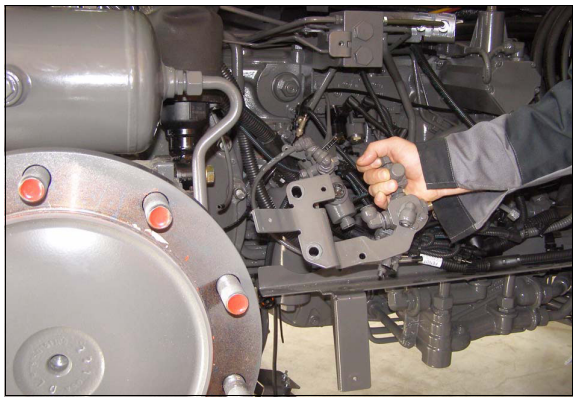


Fig. 42. I032667

Install and tighten nuts

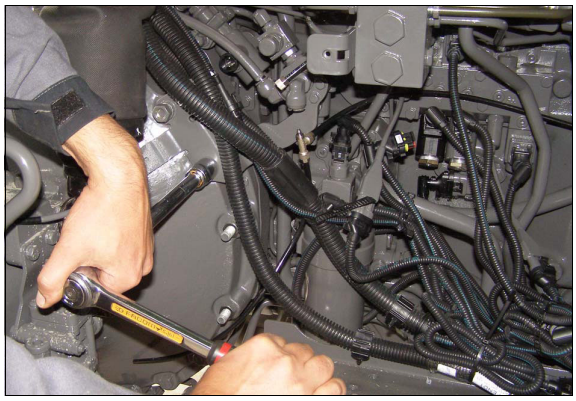


Fig. 43. I032668

Mount compressed air line on the bulkhead union

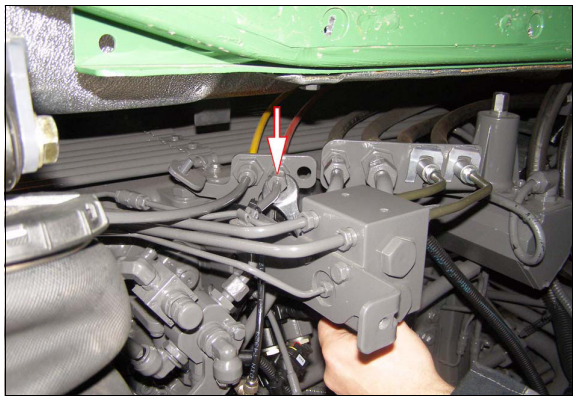


Fig. 44. I032669

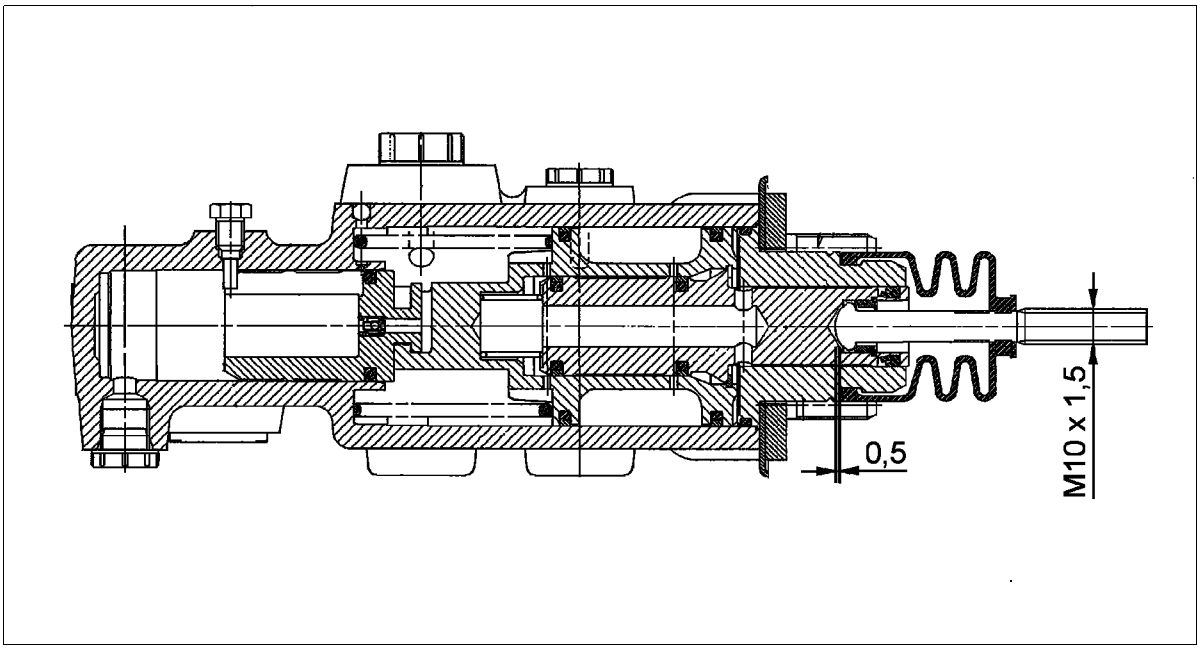


Fig. 2. Adjust the piston rod play (0,5 mm) I033493

Mount sheet metal bracket

Fig. 41. I032815

Characteristic curve of the relay valve

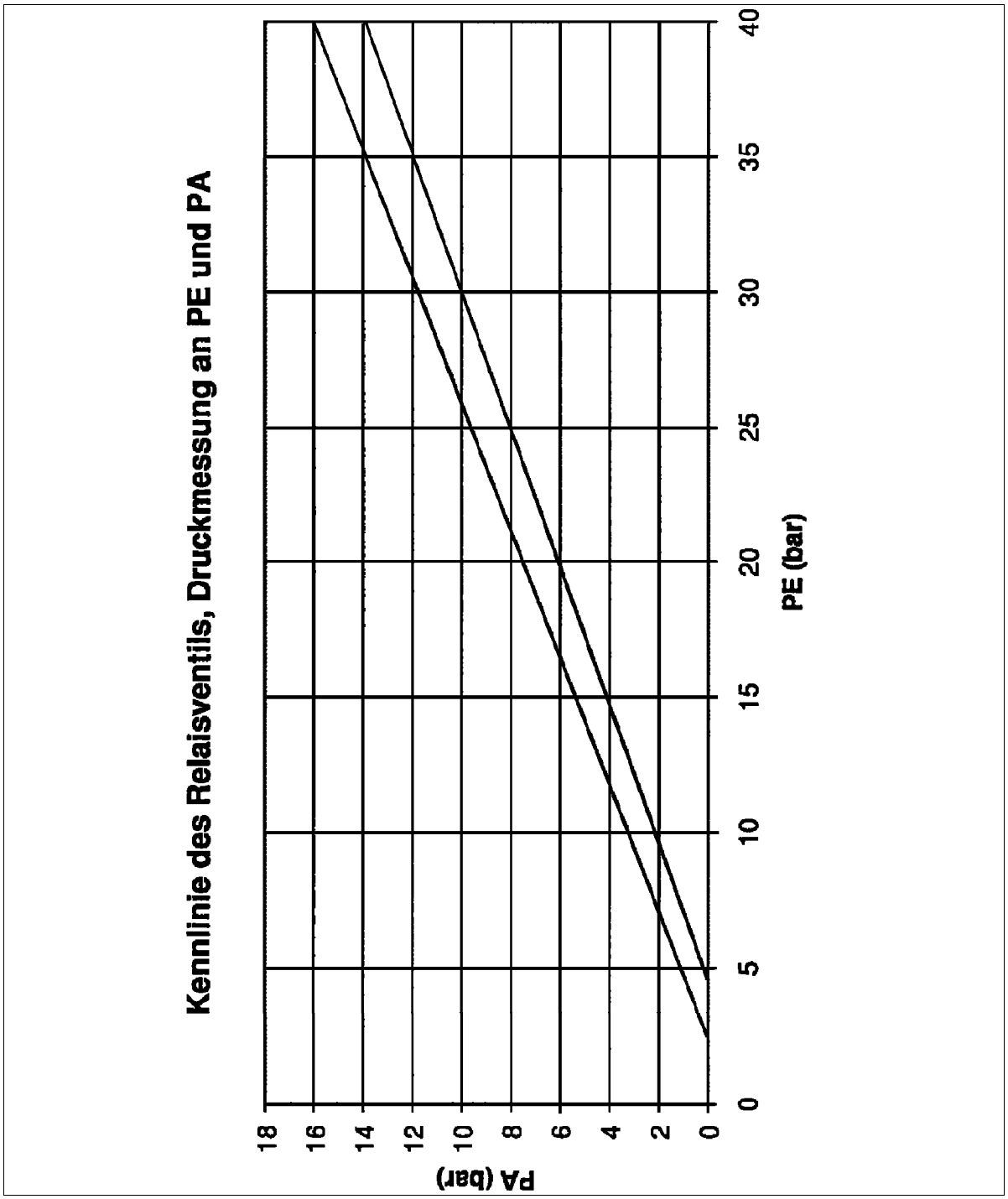


Fig. 66. Characteristic curve of the relay valve, pressure measurement at PE and PA I035477

PA (M17) Pressure to cardan brake
PE Pressure from booster

Remove the screws on the transmission housing cover

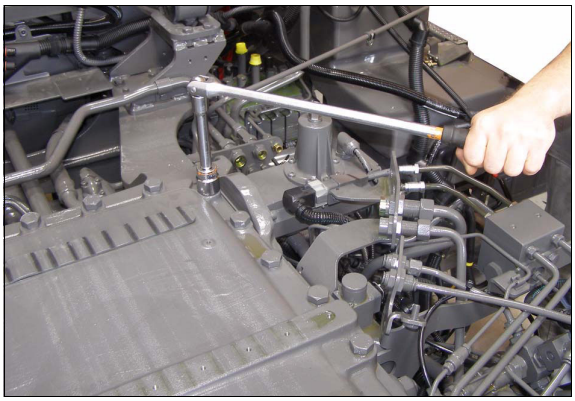


Fig. 40. I032747

Remove transmission housing cover

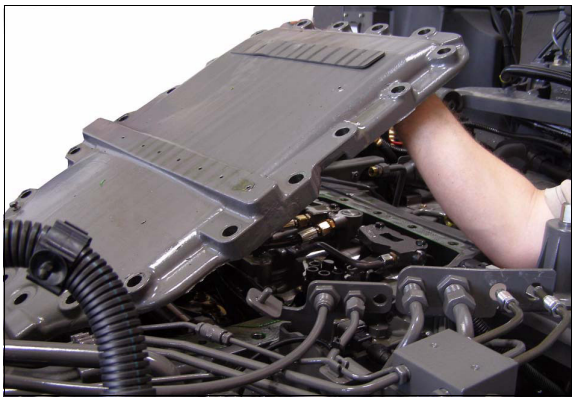


Fig. 41. I032750

Unplug all electrical connectors on the transmission valve block and the feed valve block

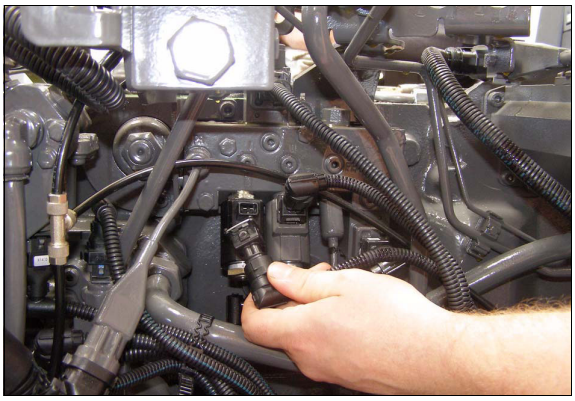


Fig. 42. I032807

NOTE: *The following steps were carried out on a model for greater clarity!*

Remove hexagon socket head screws from the actuator unit

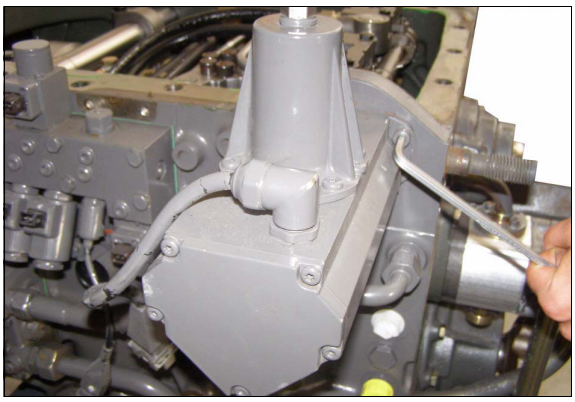


Fig. 43. I032759

Install feed valve block with new gasket

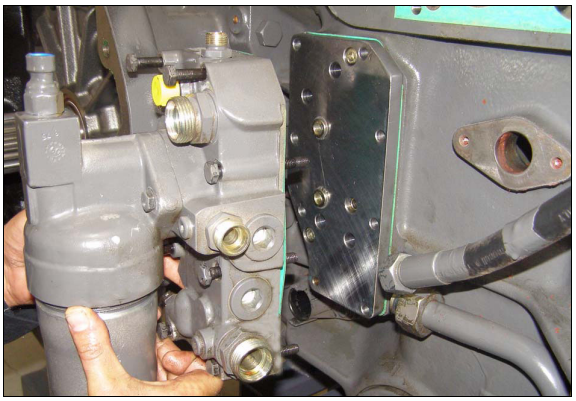


Fig. 89. I033025

Tighten the securing bolts
Tightening torque: **25 Nm**

Fig. 90. I033026

Install and tighten both lines

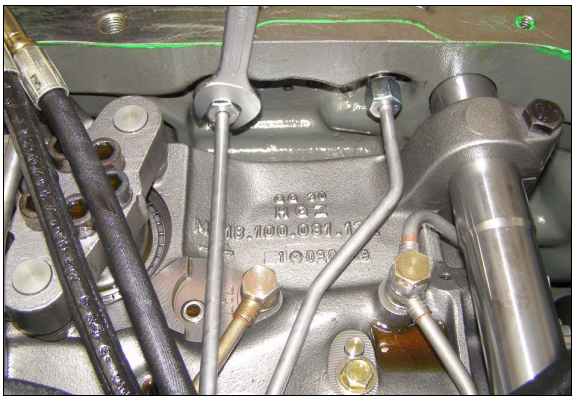


Fig. 91. I032767

Install bracket and clamp

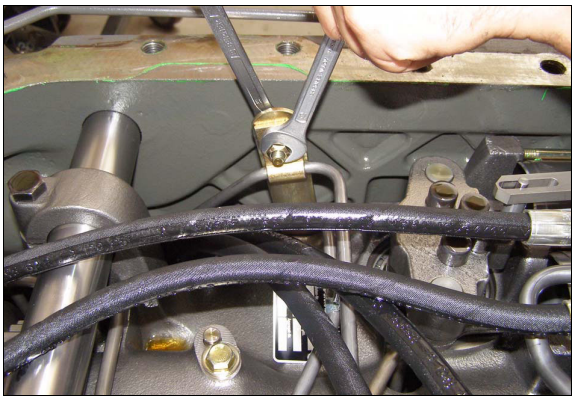


Fig. 92. I032769

Install retaining screws of the distribution box

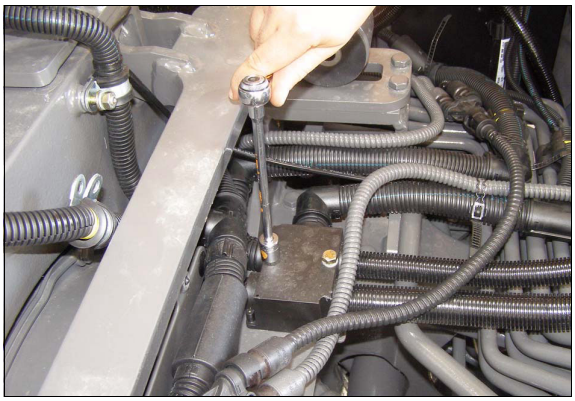


Fig. 141. I032708

Mount all cable fixings

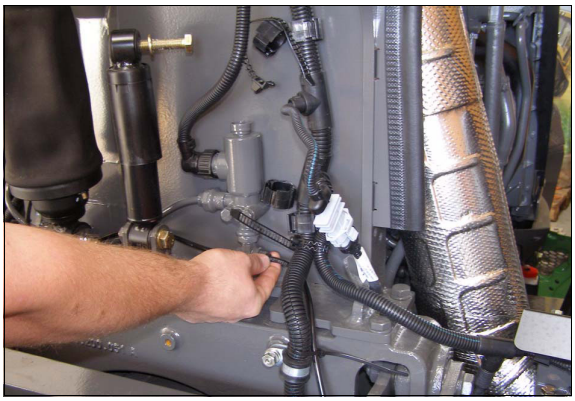


Fig. 142. I032711

Mount cable clip.

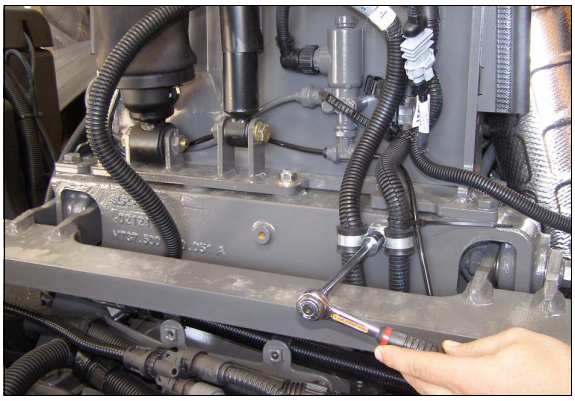


Fig. 143. I032707

IMPORTANT: *After the transmission has been installed, it must be filled using the external filling station!*
Unscrew the cap screw labelled PU
Connect external oil filling unit and fill the transmission externally
Observe instructions for oil type and quantity

Fit piston (14) and valve spool (26)

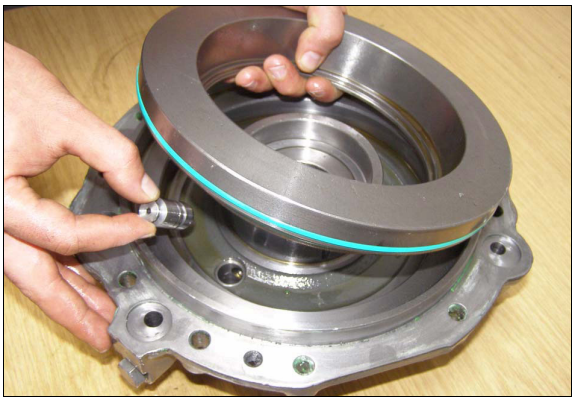


Fig. 16. I033892

Insert valve spool (26) into the piston (14)

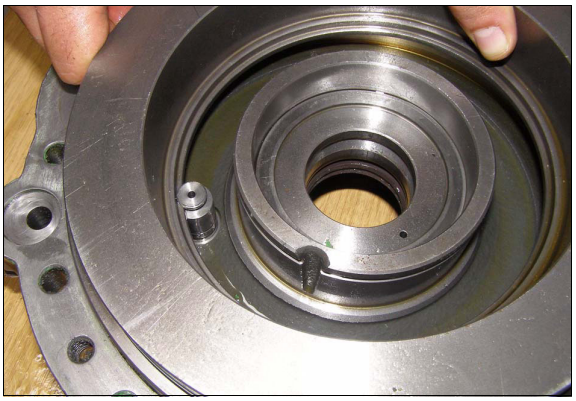


Fig. 17. I033893

Fit the Belleville spring pack (18)

NOTE: *Insert the first Belleville spring with the convex end facing upwards.*

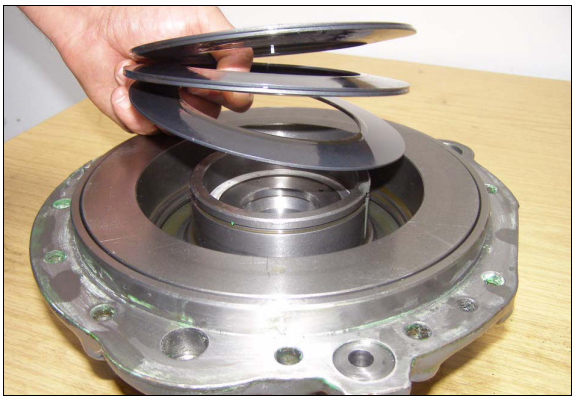


Fig. 18. I033894

Fit locating ring (19)

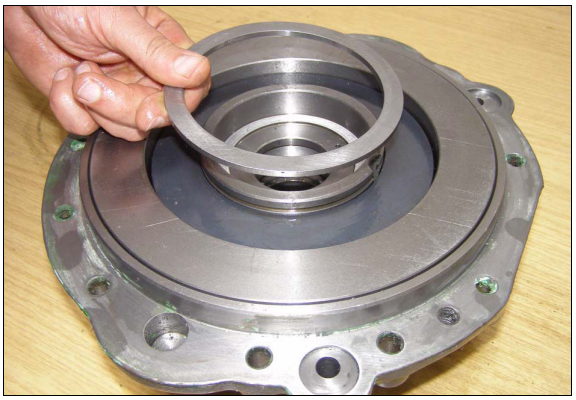


Fig. 19. I033895

1 Technical drawing of rear PTO

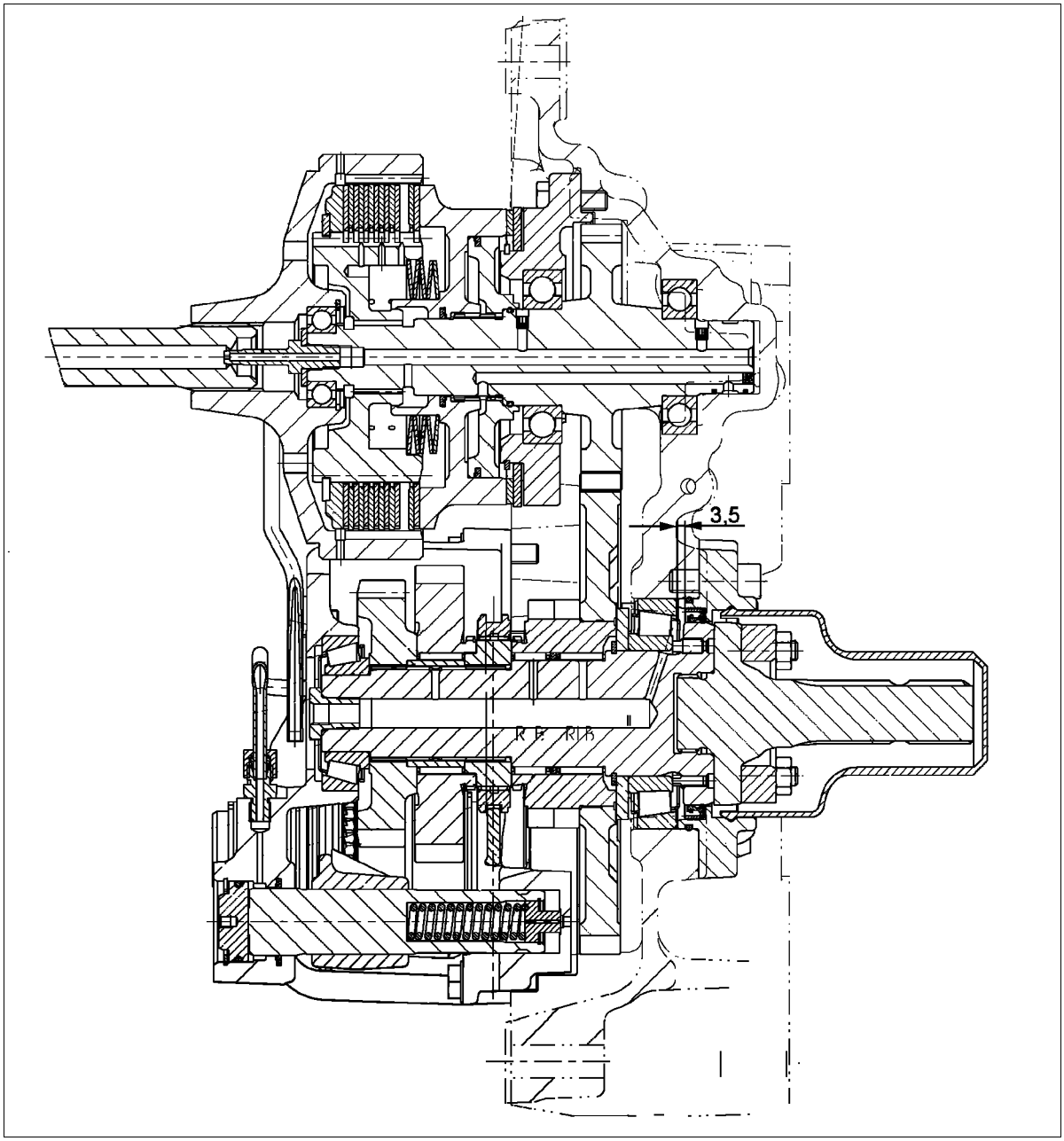


Fig. 1. Engine PTO 737.150.220.000 I030788

Insert a new lip seal (27) into piston groove (25) and grease it. The sealing lips must face towards the oil pressure chamber

Fig. 43. I034640

Slide the piston (25) onto the shaft

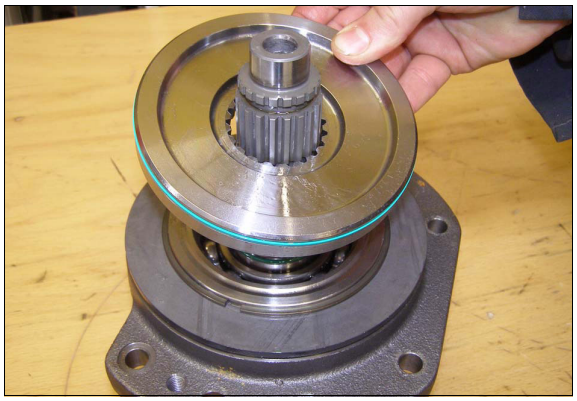


Fig. 44. I034641

Insert two rectangular-section rings (31) into grooves on the spur gear shaft (7) so that they are offset relative to each other, then secure and grease them.

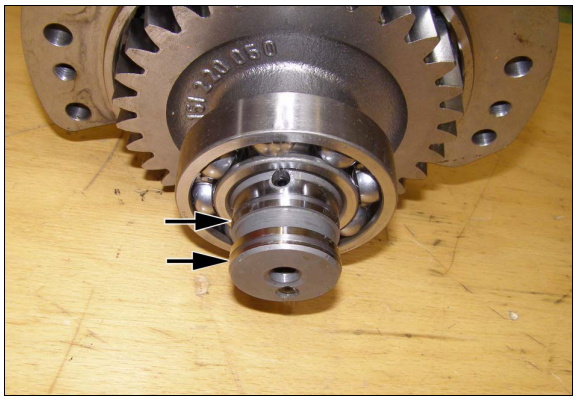


Fig. 45. I034656

Fit the pre-assembled flange into the rear axle cover

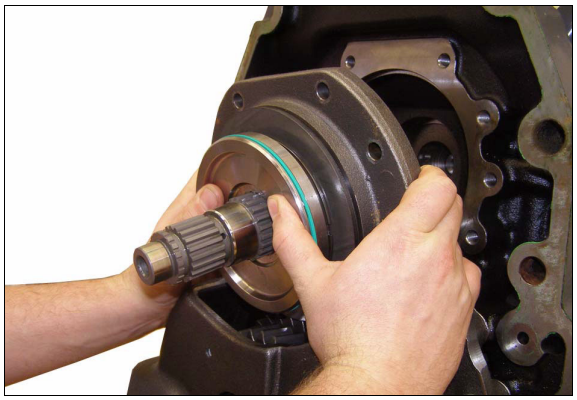


Fig. 46. I034643

Remove special tool and take out shims

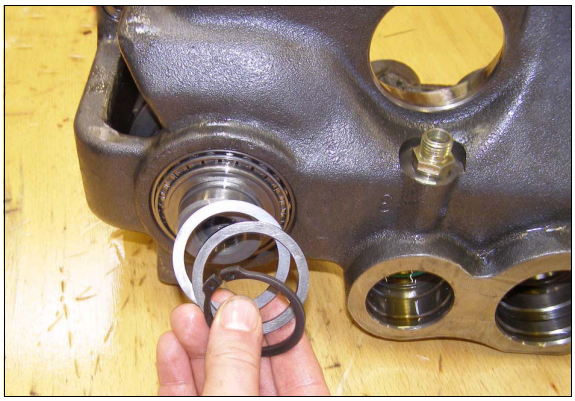


Fig. 91. I034705

Remove set of spur gear shafts

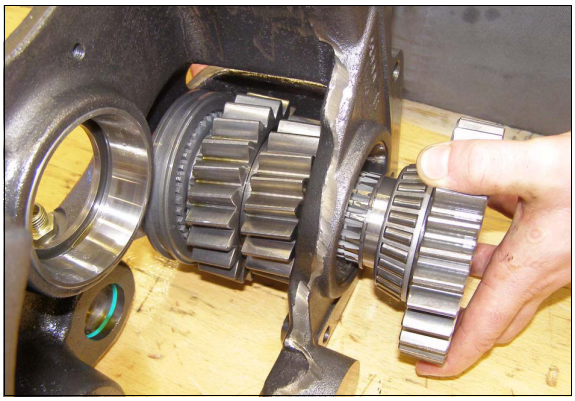


Fig. 92. I034706

Remove bearing inner ring

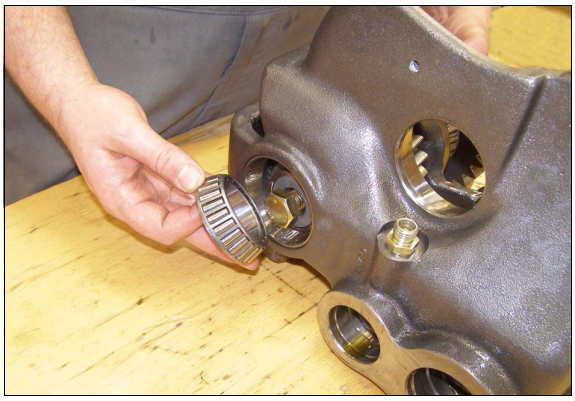


Fig. 93. I034707

Take taper roller bearing off shaft II

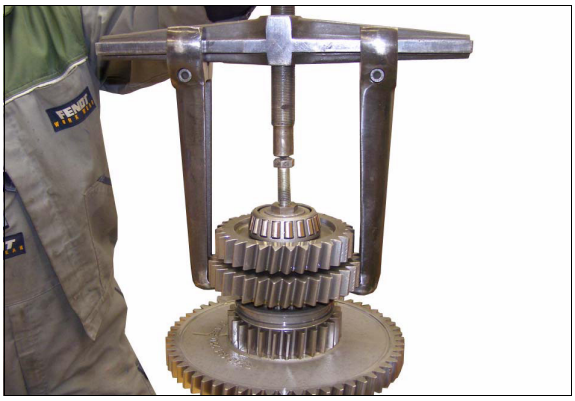


Fig. 94. I034769

15 Needle bearing
16 Spur gear
17 Circlip
18 Thrust ring
19 Taper roller bearing
20 Shim pack
22 Bush
23 Spur gear
24 Circlip
25 Locating ring
26 Shim pack
27 Taper roller bearing
28 Bush
29 Shim pack
31 Spur gear
32 Spur gear
33 Circlip
34 Taper roller bearing

DANGER:
Risk of burns!
Wear protective gloves

Heat taper roller bearing (19) to approx. 90°C and mount on shaft (5)

Fig. 137. I034785

Mount the thrust ring (18)

Fig. 138. I034788

Snap on circlip (17)

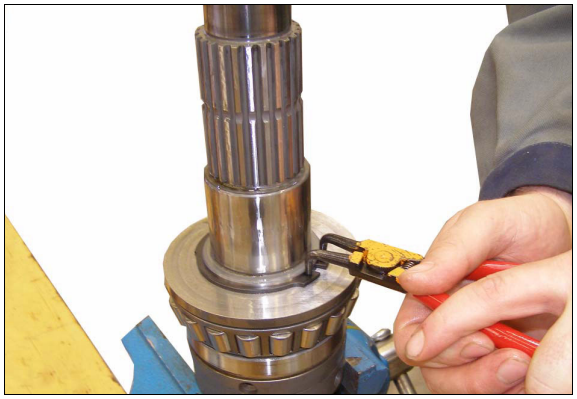


Fig. 139. I034782

1 Front-wheel drive clutch

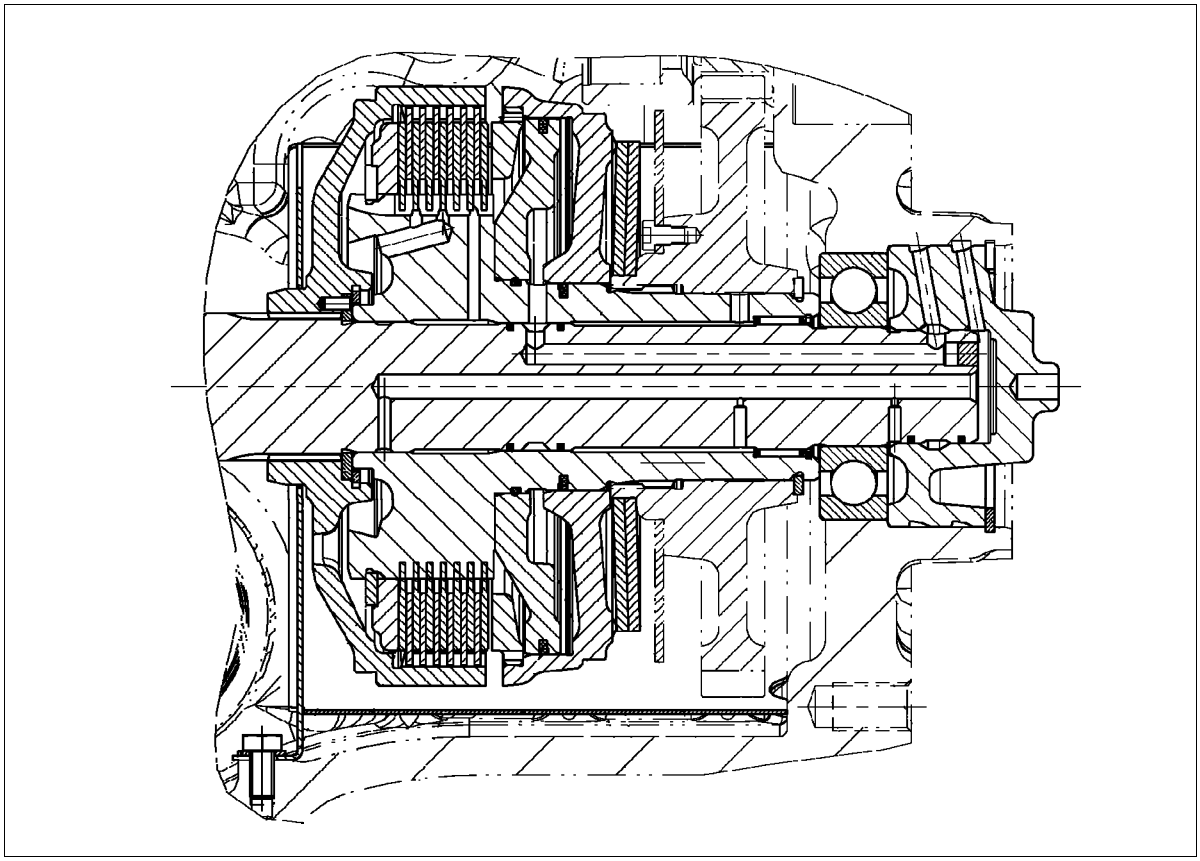


Fig. 1. I031530

Apply the sealant Stucarit 203 = X903.050.864.000 to the cover sealing surface.

2000 - Engine

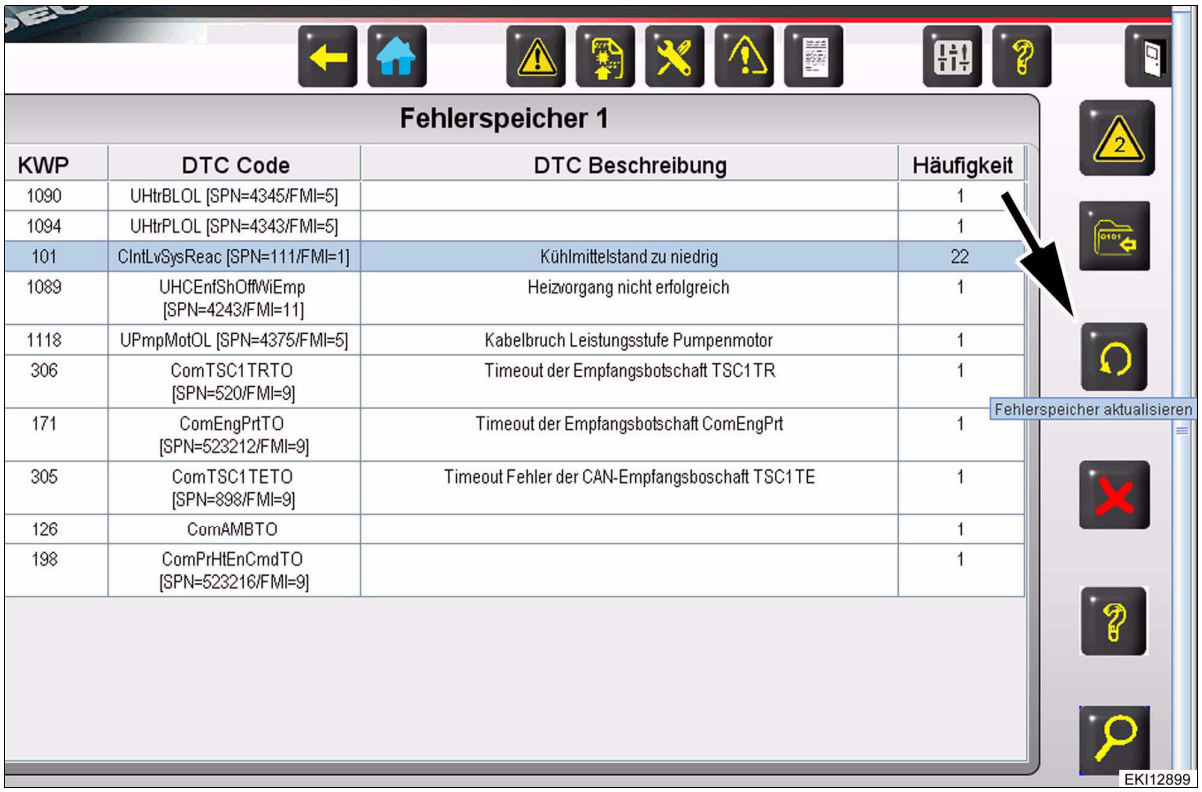


Fig. 17. Update fault memory I032580

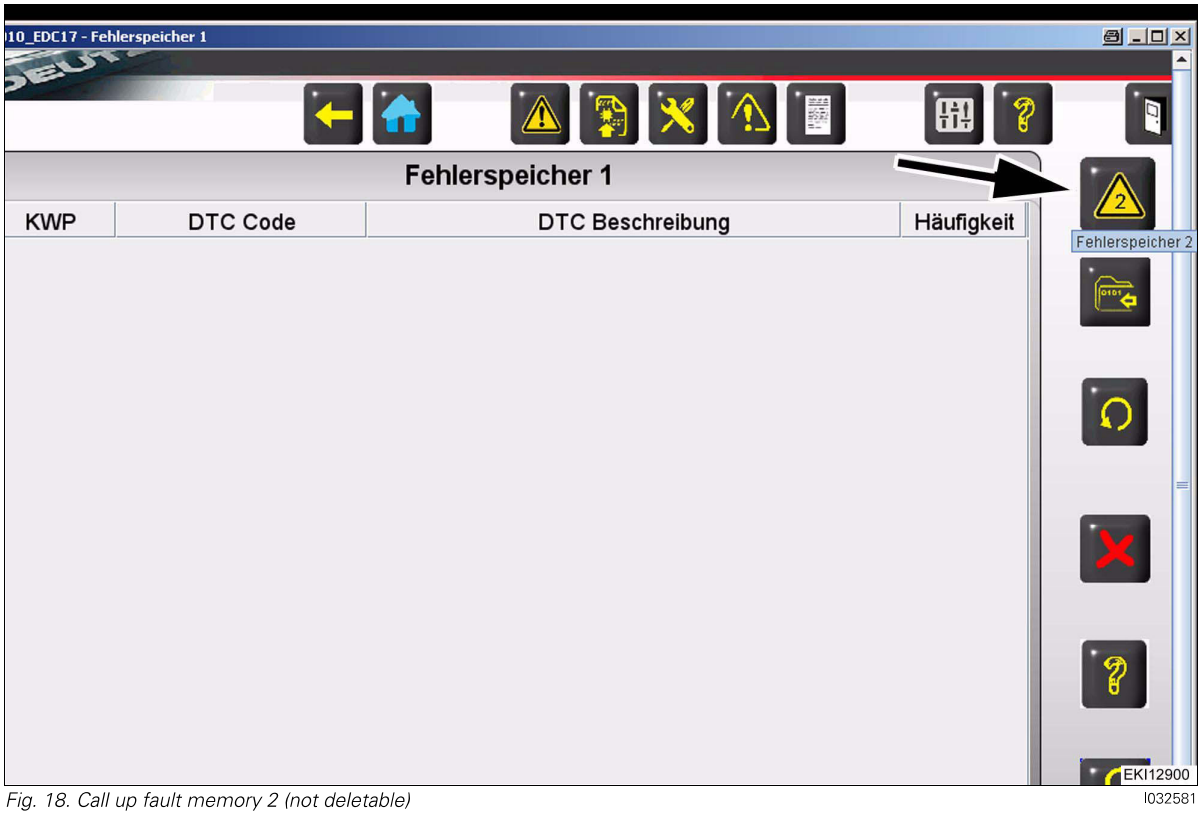


Fig. 18. Call up fault memory 2 (not deletable) I032581

Fully depress foot throttle (B055 foot throttle sensor), accelerate the tractor using the joystick (A039 multi-function armrest) until the
engine speed reaches approx. 1800..1900 rpm. (Diesel engine running a maximum power)

Calculation example:

– Tractor power = 155 HP (max. engine power)

– Tractor operating under full load

Approx. fuel consumption per running hour = 2 l x (155/10) HP x 1 Rhr

Fuel consumption per operating hour = approx. 31 l

Operating the diesel engine for optimum fuel consumption (l/Rhr)

Opt. = Economical operating level of the diesel engine

In the partial-load operating range = 2/3 of full load operating ("driving with reduced engine speed")

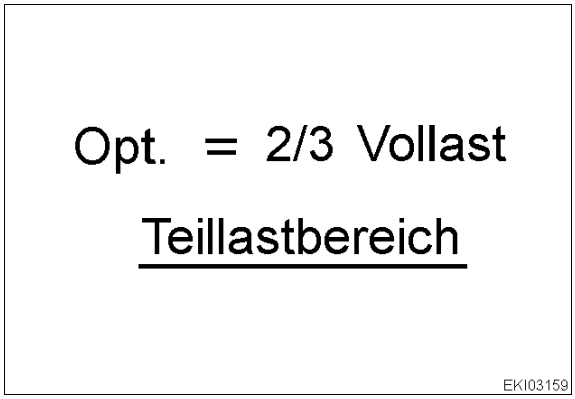


Fig. 21. I003106

Driving in the partial-load operating range of the diesel engine

Using the foot throttle (B055 foot throttle sensor), set the engine speed to approx. 2000 rpm and accelerate the tractor using the A034 joystick
until the engine speed reaches approx. 1800..1900 rpm. (The diesel engine is running in the partial-load operating range)

Measuring fuel consumption with the A008 terminal (approx. value)

Press (F4)

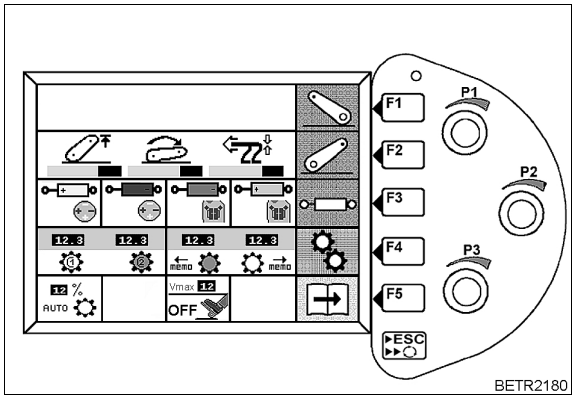


Fig. 22. I004788

The sub-menu is displayed.

Press (F4)

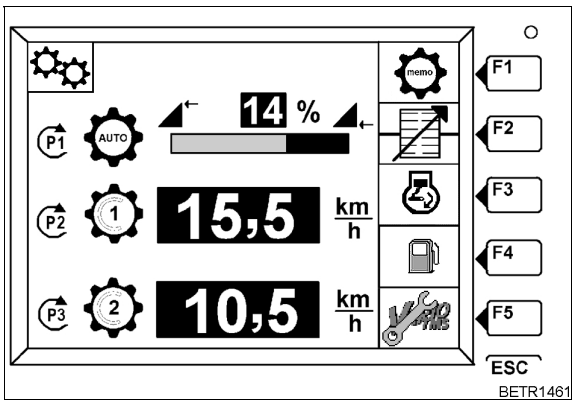


Fig. 23. I004789

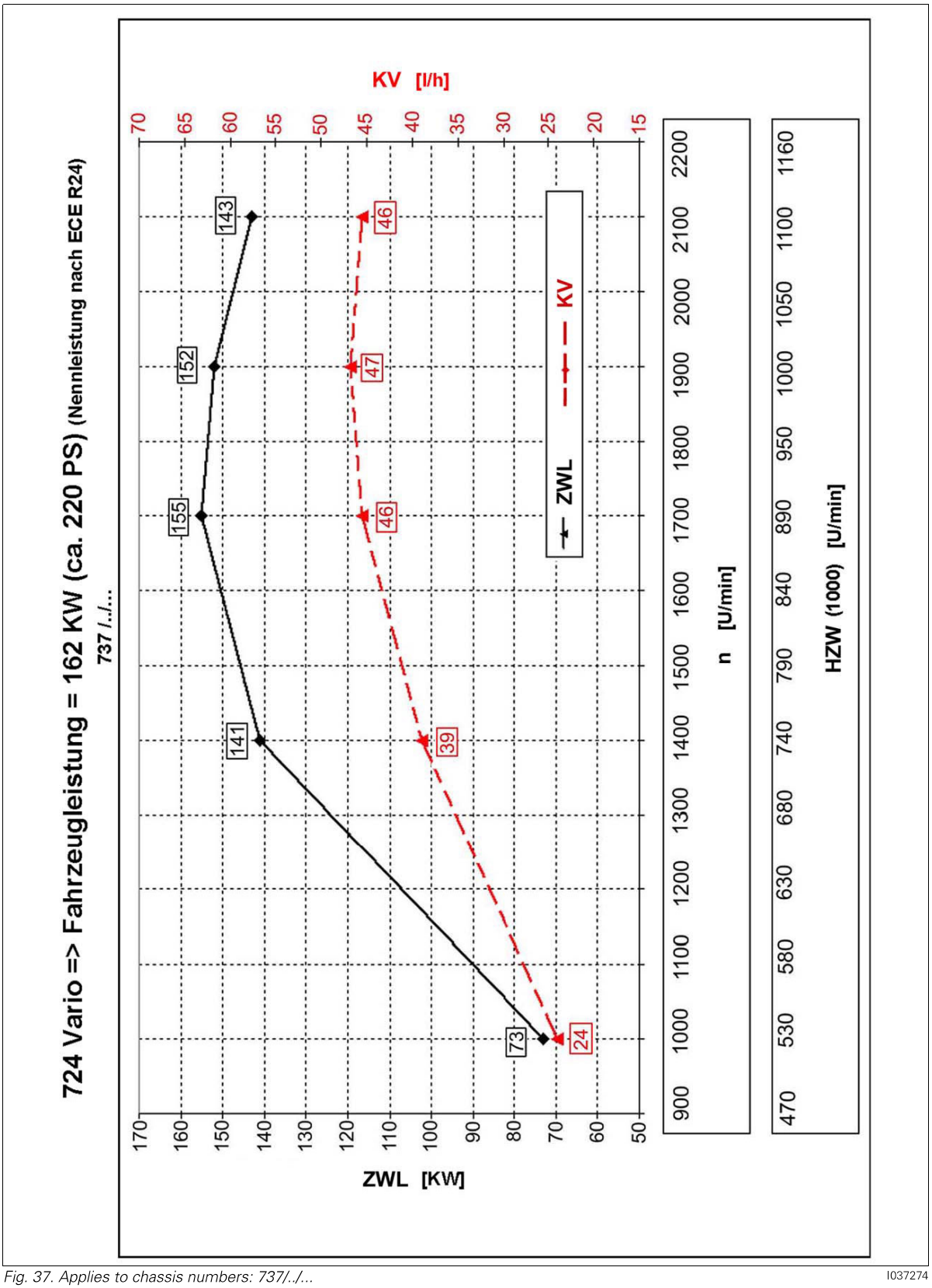


Fig. 37. Applies to chassis numbers: 737/../...

I037274

HZ
W Rear PTO speed (level 1000) [U/min]
KV Fuel consumption [l/h]
n Engine speed [U/min]
ZWL PTO power [kW]

A007	Instrument panel
A050	Basic control ECU
A082	Nitrogen oxide NOx sensor 1, upstream of SCR
A083	Nitrogen oxide NOx sensor 2, downstream of SCR
A084	AdBlue module
A124	Wastegate ECU
A127	Engine control ECU (EDC 17)
B004	Air filter vacuum switch
B055	Foot throttle sensor
B086	Rail pressure sensor
B087	Fuel low pressure sensor
B088	Crankshaft speed sensor
B089	Engine temperature sensor (Deutz)
B090	Oil pressure sensor
B091	Water in fuel sensor
B092	Boost pressure/charge air temperature sensor
B102	AdBlue temperature/level sensor
B105	Exhaust temperature before SCR sensor
B180	Ambient air temperature sensor (EDC)
K063	Heater flange relay
K065	Starter relay
K083	AdBlue relay
K090	AdBlue module relay heater
K091	AdBlue suction and return line heater relay
K092	AdBlue pressure line heater relay
R002	Heater flange
R006	Engine BUS terminating resistance
R007	Engine BUS terminating resistance
S002	Ignition switch
S047	Engine brake switch
S074	Starter lockout & clutch pedal limit switch
Y091	Fuel dispensing unit
Y095	Injector 1
Y096	Injector 2
Y097	Injector 3
Y098	Injector 4
Y100	Injector 5
Y101	Injector 6
Y120	AdBlue flow valve
Y169	AdBlue tank heater solenoid valve
Y170	Engine brake solenoid valve

Functions of the A127 - Engine control ECU (EDC 17)

The A127 - Engine control ECU (EDC 17) **manages and controls the engine.**
The **A127** - Engine control ECU (EDC 17) has the following management functions:

All speed control
The **A127** - Engine control ECU (EDC 17) keeps the engine under constant load at the speed set by the foot throttle, hand throttle and memory key (target value), as long as the engine is capable of providing the necessary power.
Restriction of the maximum engine speed ("engine cut-off speed")

Torque restriction
Restriction of the maximum torque (maximum injection volume)

Rail pressure restriction
The **Y091** - Fuel dispensing unit dispenses the exact fuel quantity to the rail that will be discharged by the injectors (Y095 to Y101). Control is exercised by the **B086** - Rail pressure sensor, which reports the actual pressure to the **A127** - Engine control ECU (EDC 17).

Multiple injection
With a view to a reduction in exhaust gas and noise emissions, the injectors (Y095 to Y101) are activated by the **A127** - Engine control ECU (EDC 17) up to 3 times per working cycle.

Cylinder switch-off
If the **A127** - Engine control ECU (EDC 17) detects a short circuit at an injector (Y095 to Y101) (short circuit low-high), this injector is no longer activated (shut down).

Engine start
If all input signals are present the start procedure is initiated.

NOTE: *If the rotational speed signals (camshaft / crankshaft) are not present after 5 sec, the start process is aborted*

Engine stop
The injectors cease to be activated.

Monitoring and signal output functions
Coolant temperature and charge-air temperature –> for fault displays and/or reductions in power see chapter 0000 Reg. B - Fault code table

Charge pressure-dependent engine management ("LDA function")
If the charge-air temperature increases, the injection quantity will be restricted. If the boost pressure drops, the injection quantity will be restricted.

20 B092 - Boost pressure/charge air temperature sensor

Pin	Function
-1	Earth
+2	Temperature signal
-3	+ supply
+4	Pressure signal

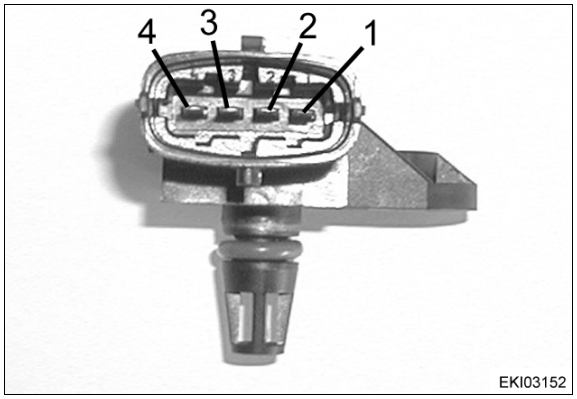


Fig. 59. I005051

Duty:
Component **B092** - Boost pressure/charge air temperature sensor reports the boost pressure and charge air temperature to the **A127** - Engine control ECU (EDC 17)

The **B092** - Boost pressure/charge air temperature sensor is a combination sensor. Two sensors with a shared power supply are mounted in the same component

Function of the pressure sensor:
The charge pressure (physical variable) is converted into a voltage signal (electrical variable). The pressure and the signal voltage are proportional, so that as the charge pressure increases, the signal voltage increases proportionately. ("LDA function")

Function of the temperature sensor:
The resistance of the temperature sensor changes depending on the temperature. The sensor has either an NTC (negative temperature coefficient) or a PTC (positive temperature coefficient) characteristic.

The **B092** - Boost pressure/charge air temperature sensor is an NTC sensor, i.e. as the temperature rises, the resistance of the sensor falls.

Circuit diagram of the B092 charge air pressure/temperature sensor

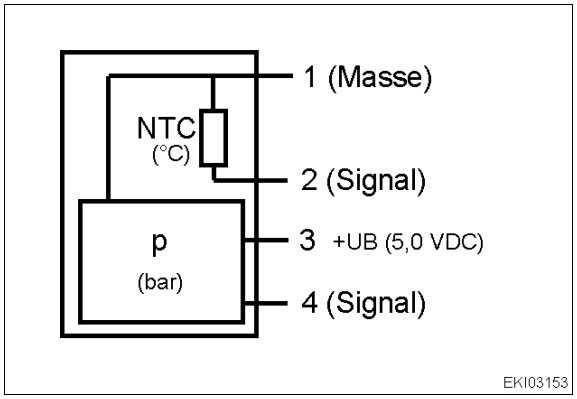


Fig. 60. I005052

Duty:

Used for controlling the engine (A127 - Engine control ECU (EDC 17))
The **B092** - Boost pressure/charge air temperature sensor picks up the boost pressure and the charge air temperature.
The signals are forwarded to the **A127** - Engine control ECU (EDC 17).
In the **A127** - Engine control ECU (EDC 17), the boost pressure is used to control the engine ("LDA function").

For charge air temperature warning message (on the A007 - Instrument panel)
The **A127** - Engine control ECU (EDC 17) picks up the charge air temperature from the **B092** - Charge air pressure/temperature sensor and forwards it to the A050 basic control ECU via the G BUS.
The "Warning threshold" for the charge air temperature is stored in the A050 basic control ECU.
If the charge air temperature rises above the "warning threshold", the **A050** - Basic control ECU issues an error message.

Valve adjustment diagram, engine rotating backwards Note: Rotate the G002/G004 alternator motor against its rotational direction						
Overlap Inlet valve closes Exhaust valve opens	**6**	**3**	**5**	**1**	**4**	**2**
Adjust	**1**	**4**	**2**	**6**	**3**	**5**

Set the valves

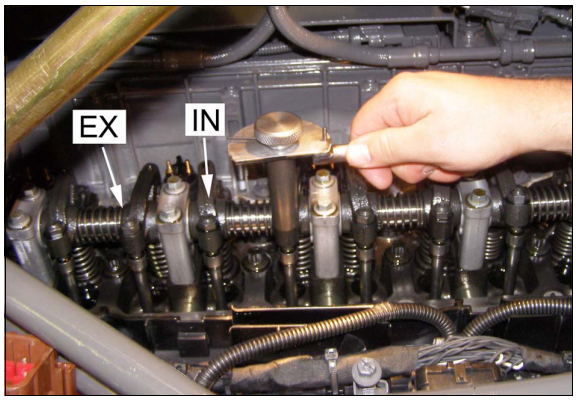


Fig. 23. I024629

Fit the **X899.980.236.051** adjustment tool
Loosen locknut
Screw in the adjustment screw until the rocker arm touches the valve with no clearance
Set the indicator to 0
Turn back the adjustment screw until the required clearance is achieved.
Tighten locknut
Tightening torque: **20 Nm**

Intake valve (IN) = in. 75 ° (=0.3 mm)
Exhaust valve (EX) = ex. 120° (=0,5 mm)

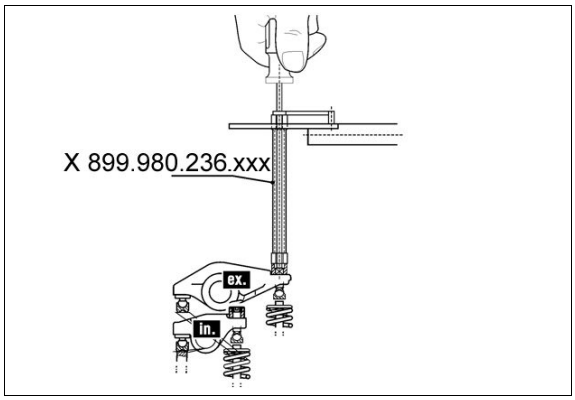
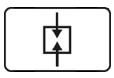


Fig. 24. I002496



Clean the sealing surfaces (use vacuum cleaner)

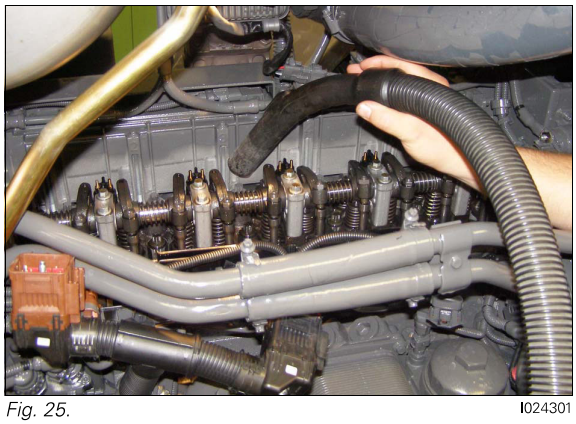


Fig. 25. I024301

8 Y095 to Y101 — Injectors 1 to 6

DANGER:
After switching the engine off, wait at least 30 seconds before starting any work on the fuel system!

WARNING:
Ensure the utmost cleanliness!
See Service Information 14/2007.

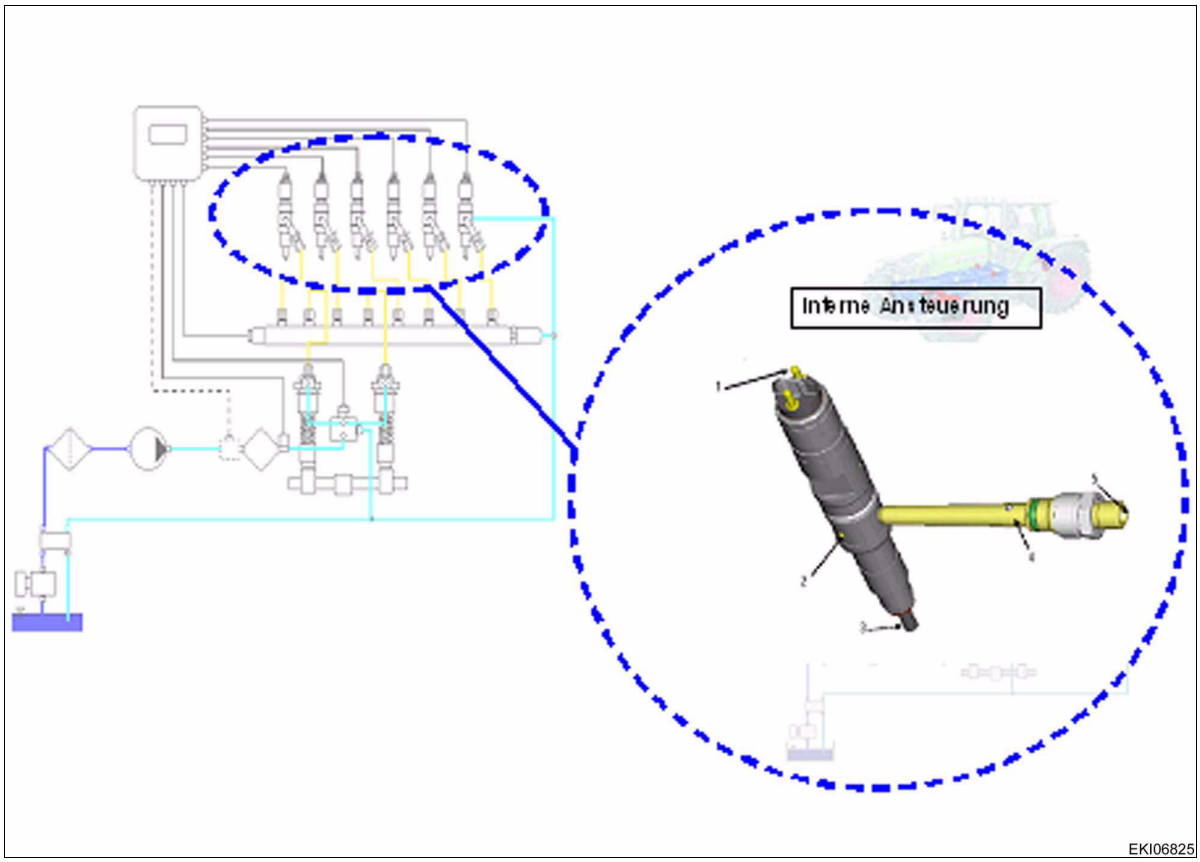


Fig. 11. I006262

Item	Designation	Item	Designation
-1	Electrical connection	+4	External high-pressure connection
+2	Return flow	-5	High-pressure connection from rail
-3	Nozzle		

10 Measuring fuel low pressure

Measuring fuel low pressure "primary pressure" (B087 sensor)

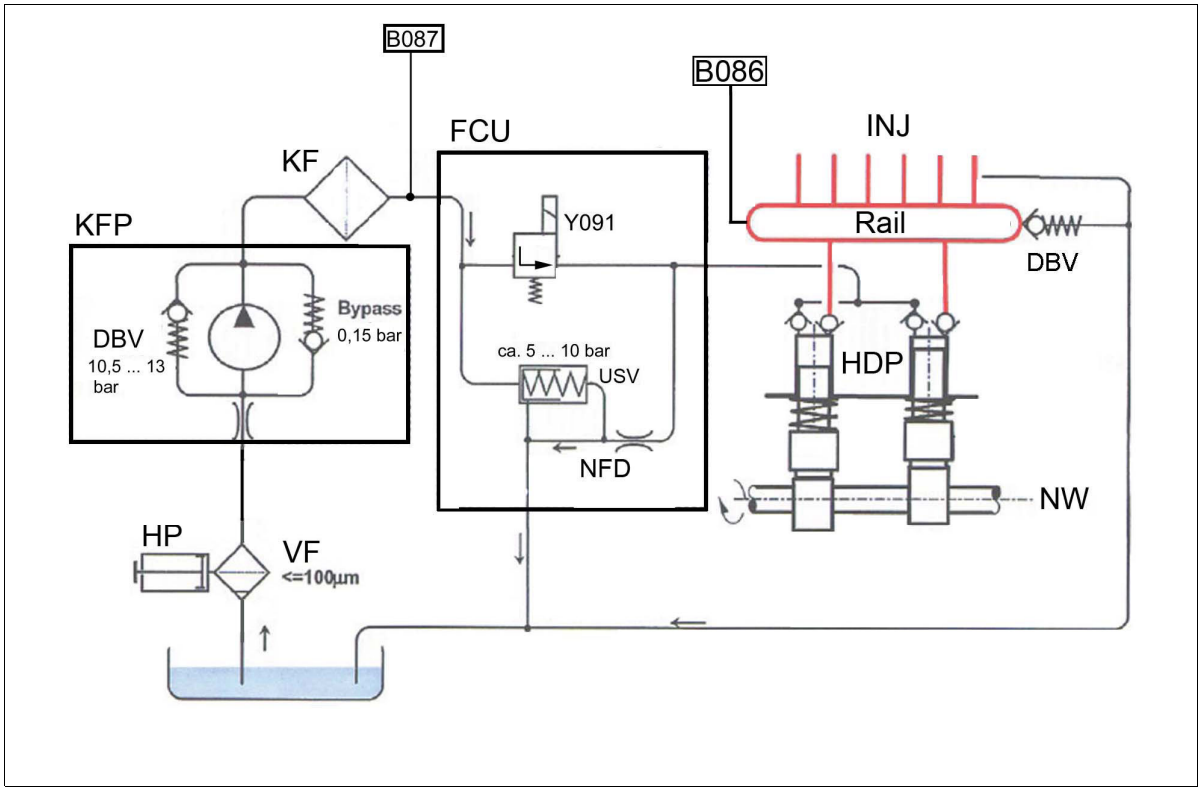


Fig. 24. I024816

B086 - Rail pressure sensor
B087 - Fuel low pressure sensor
DBV Pressure relief valve 2300 bar
FCU Fuel control unit
HDP High-pressure pump
HP Hand pump
INJ Injectors
KF Main fuel filter
KFP Fuel pump
NFD Zero-delivery restrictor
NW Camshaft
Rail High-pressure accumulator
USV Bypass valve
VF Pre-filter with water sedimentor:

Connect the pressure gauge (measuring range: 15 bar) to the fuel filter measuring connection

Fig. 25. I022713

Note: the fuel low pressure is influenced by the fuel temperature	
Fuel low pressure "primary pressure" at operating temperature	**Signal from B087 sensor**
0 bar	Approx. 0.5 VDC
Approx. 6.0 bar, irrespective of engine speed.	approx. 3.9 VDC

1 General explanation about the SCR system

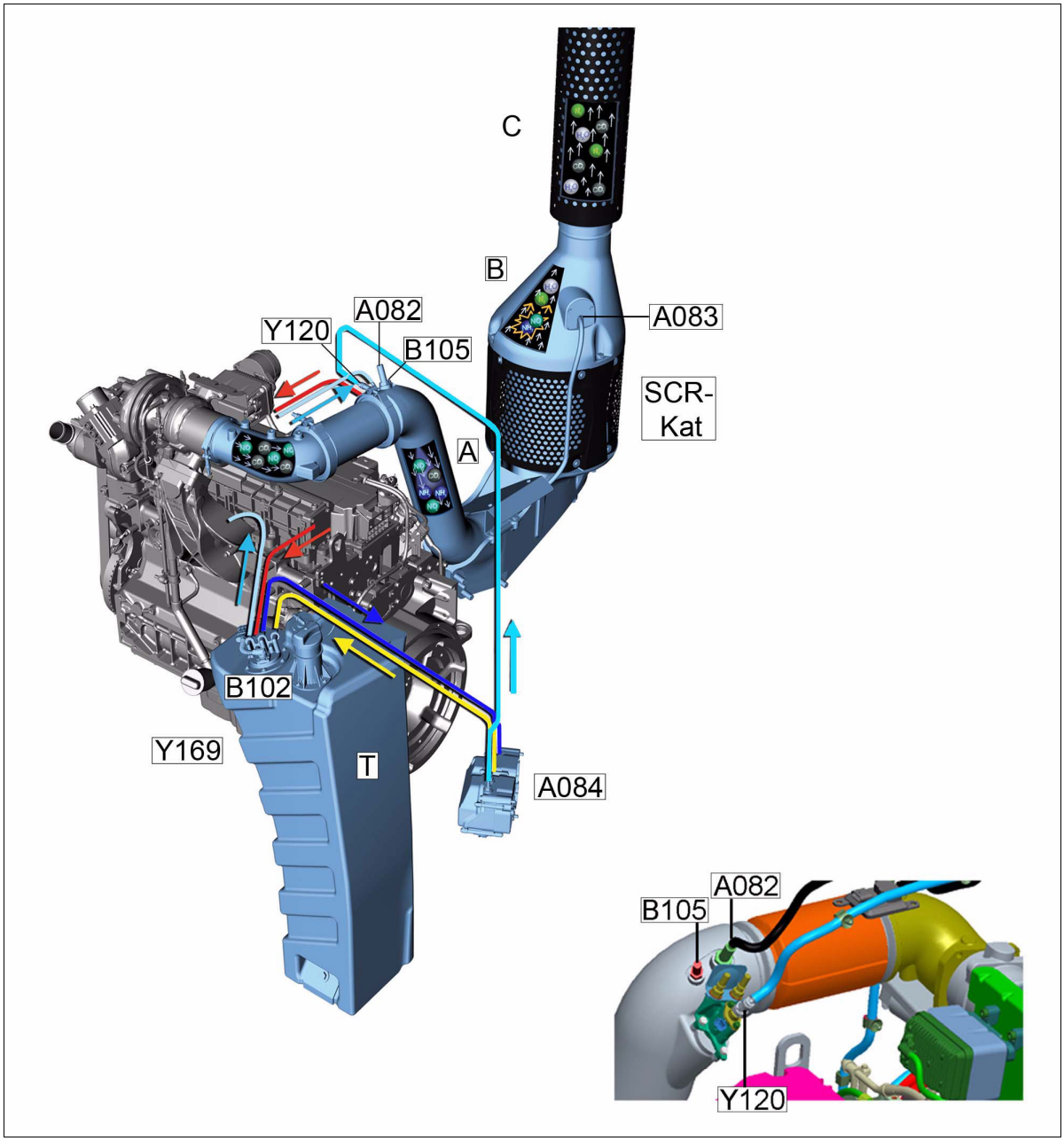


Fig. 1. I030348

A082	Nitrogen oxide NOx sensor 1, upstream of SCR	**A084**	AdBlue module
A083	Nitrogen oxide NOx sensor 2, downstream of SCR	**B102**	AdBlue temperature/level sensor
Y120	AdBlue flow valve	**B105**	Exhaust temperature before SCR sensor
		Y169	AdBlue tank heater solenoid valve

A	AdBlue injection
B	Chemical reaction between ammonia and nitrogen oxide
C	Discharge of water vapour and nitrogen, as well as the remaining exhaust gas components
SCR cat	**S**elective **C**atalytic **R**eduction - cat
T	AdBlue tank

Wheel-driven steering pump supplies oil to steering

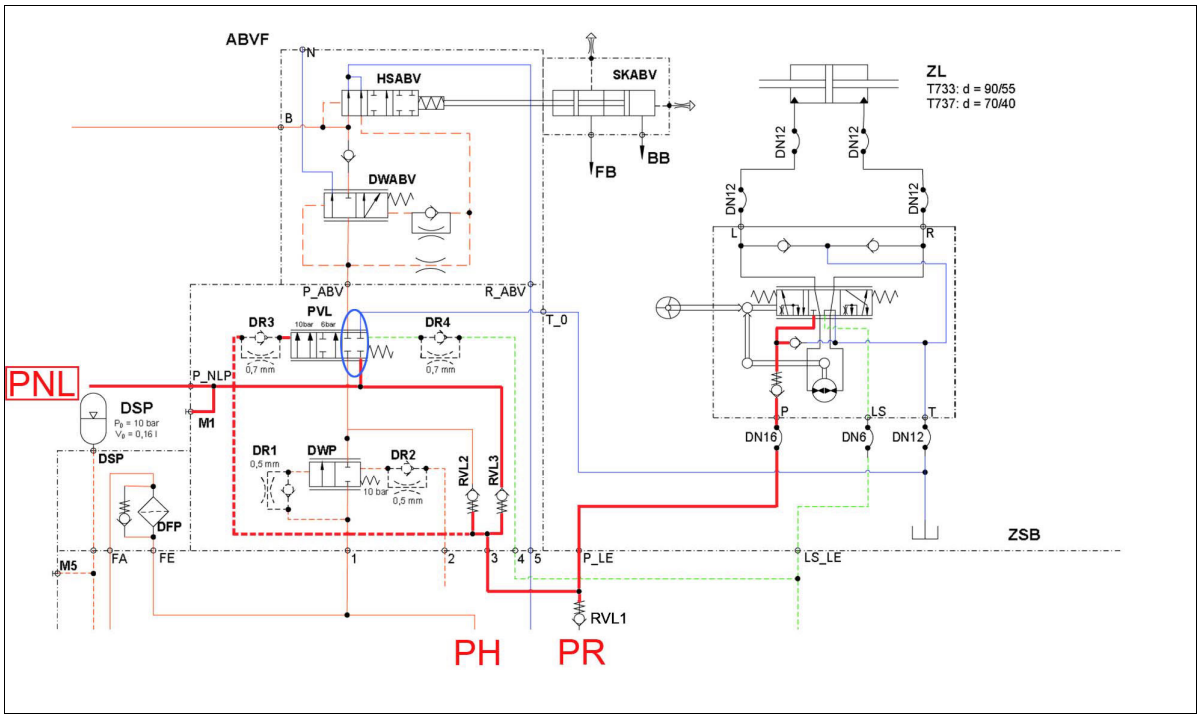


Fig. 4. I031527

Operation from the emergency steering pump (PNL)

If the diesel engine is not in use and the tractor is being towed, the emergency steering pump is active. The oil flows from the emergency steering pump (PNL) to the steering non-return valve 3 (RVL3), opens it and closes steering non return valves 1+ 2 (RVL1 + 2) in addition to the spring force. The pressure at the steering priority valve (PVL) falls below 6 bar () and is pushed fully to the left by the spring force, thereby severing the connection from the emergency steering pump to the tank. This allows oil to flow to the steering unit (LE).

Fit the rubber mat

Fig. 47. I033774

Fit the seat

Fig. 48. I033773

Fit the nuts to the seat bracket

Fig. 49. I033772

Plug in the electrical connectors to the seat

Fig. 50. I033771

Lower linkage (release)

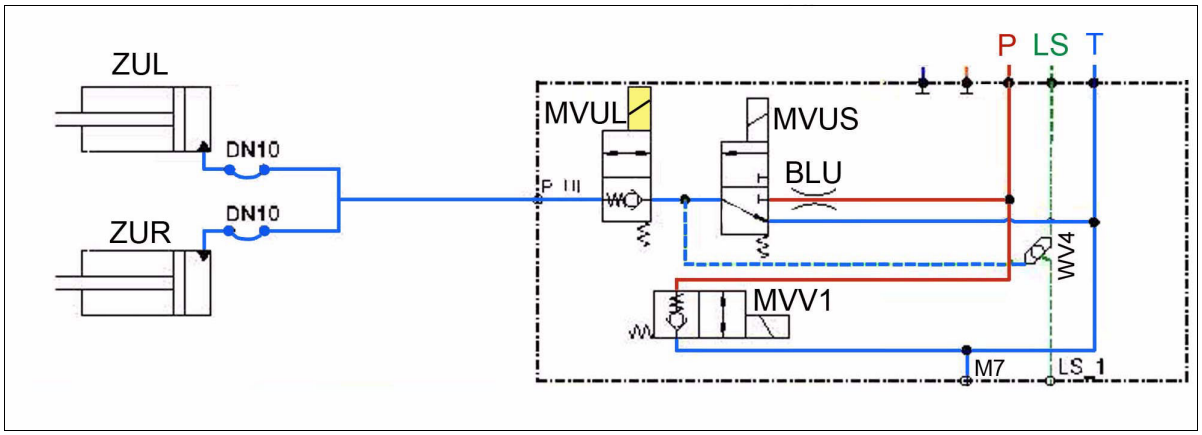


Fig. 9. I031498

The **MVUL [Y083]** - Lower link stabiliser release solenoid valve is energised continuously. This frees the lower linkages.

NOTE: *If the linkage is operated externally, the hydraulic lower linkage stabiliser will switch from "automatic mode" to "manual mode" for safety reasons.*

3V1 - Trailer spool valve

Right side of tractor, behind the bulkhead

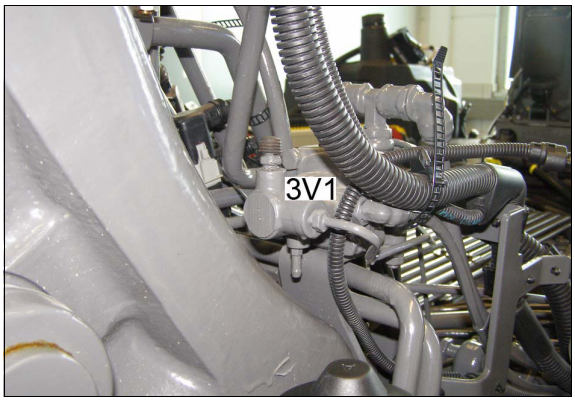
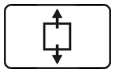


Fig. 6. I038275

3V2 [Y023] - Compressed air pilot control system solenoid valve
3V3 - Pressure controller for compressed air pilot control system

Right side of transmission.



Remove right rear wheel and panel

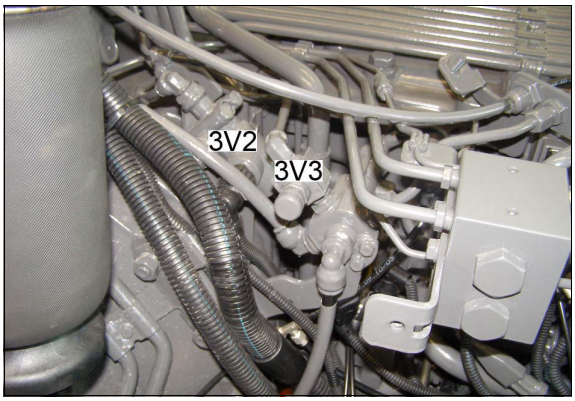
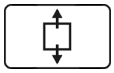


Fig. 7. I038274

3V5 - Parking brake valve

Cab, in the left-hand side of the steering column



Detach panel

Fig. 8. I038281

3Z1 - Spring-loaded cylinder

On the rear axle

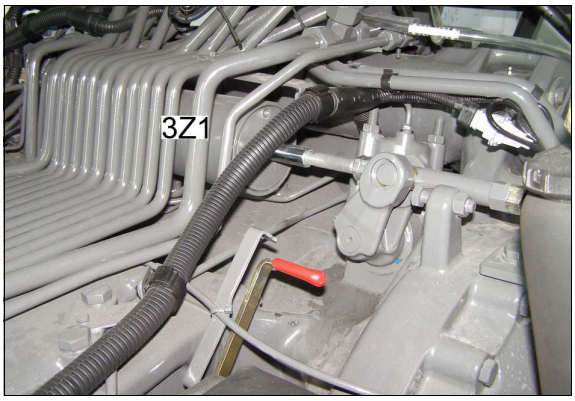


Fig. 9. I038282

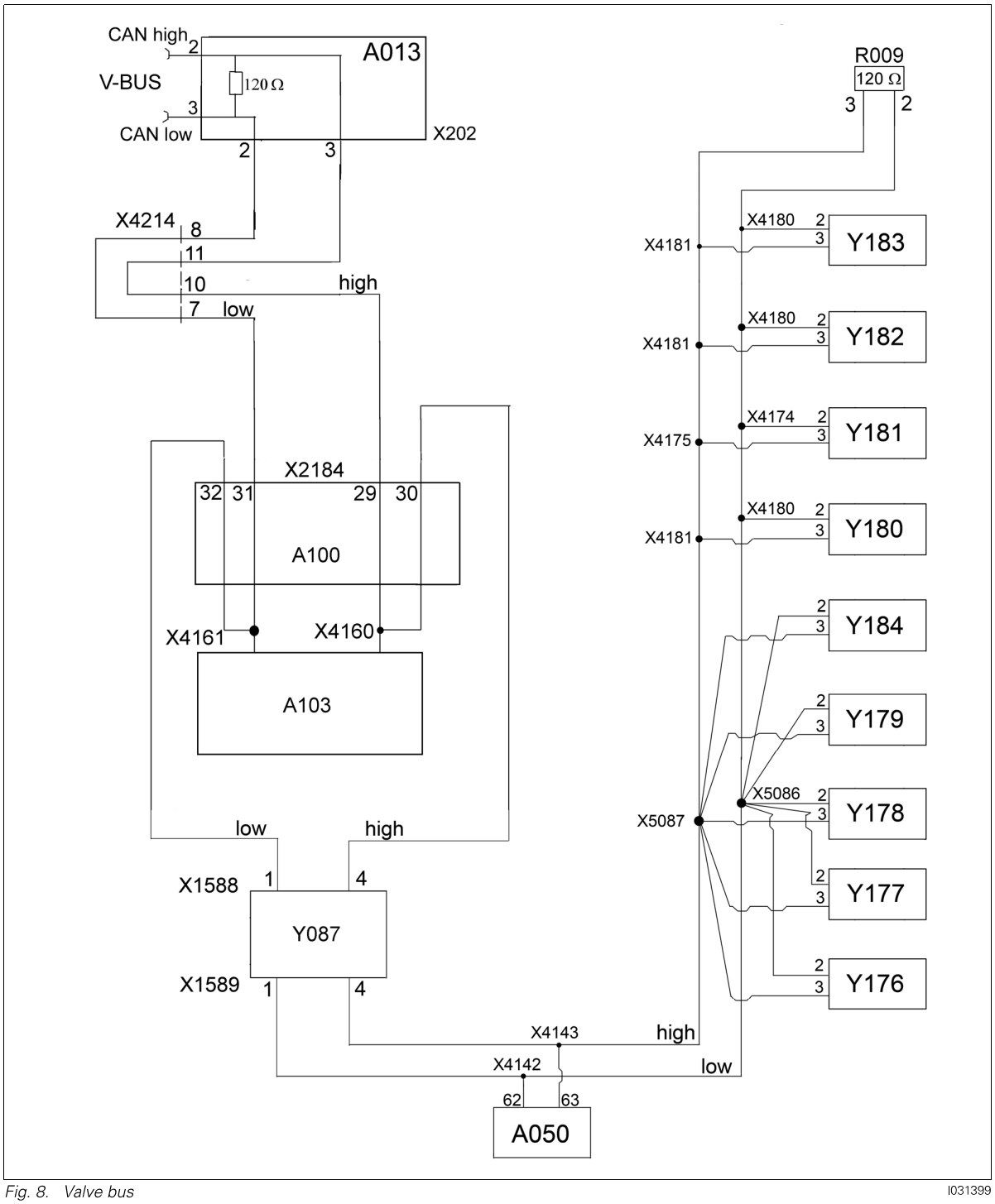


Fig. 8. Valve bus

I031399

A013	PCB, microfuses	**Y178**	Spool valve, position 3 (red)
A050	Basic control ECU	**Y179**	Spool valve, position 4 (green)
A100	MFA, multifunction armrest	**Y180**	Spool valve, position 5 (brown)
A103	Terminal NT01/02	**Y181**	Front power lift control valve
R009	Valve BUS terminating resistance	**Y182**	Spool valve, position 7 (olive)
Y087	VarioGuide steering valve	**Y183**	Spool valve, position 8 (grey)
Y176	Spool valve, position 1 (yellow)	**Y184**	Rear power lift control valve
Y177	Spool valve, position 2 (blue)		

Pin	Description	condition	Signal Specified value	Wire interrupted	
				Signal from A007	Signal from component
		Rear power lift, lower limit position	0 VDC	0 VDC	0 VDC
		Rear power lift, upper limit position	10 VDC	10 VDC	0 VDC
-23	Not assigned				
-24	Not assigned				
*25	Not assigned				
-26	**Comfort Bus (CAN high)** Note: end resistor in the A013 PCB (120 ohms) and in the A007 instrument panel (120 ohms)	Ignition OFF, measure resistance between CAN low (pin 13) and CAN high (pin 26)	**approx. 60 ohms**		
		Ignition ON, measure voltage between CAN high (pin 26) and earth (X101, pin 12)	2.5 VDC	2.7 VDC	1.8 VDC

Measurement at X101 - Separation point on A007 (yellow)

NOTE:

- *The following measurements are from separation point X101 "yellow"*
- *Pin 12 earth, X101 separation point, "yellow"*
- *Ignition on*
- *All measurements ± 10%*

Pin	Description	condition	Signal Specified value	Wire interrupted	
				Signal from ECU	Signal from component
-1	**A128** - Control panel, right/left dashboard			5.0 VDC	0 VDC
	"Enter" button	"Enter" button not depressed	1.7 VDC		
		"Enter" button depressed	0.5 VDC		
+2	**A128** - Control panel, right/left dashboard			5.0 VDC	0 VDC
	"ESC" button	"ESC" button not depressed	1.7 VDC		
		"ESC" button depressed	0.5 VDC		
-3	**A128** - Control panel, right/left dashboard			5.0 VDC	0 VDC
	UP arrow key	"UP arrow" key not actuated	1.7 VDC		
		"UP arrow key" actuated	0.5 VDC		
+4	**A128** - Control panel, right/left dashboard			5.0 VDC	0 VDC

Fuses (X202 separation point) "area C"			
Vehicle earth			
Pin	**Fuse**	**Specified value**	**Component**
C1	-	-	-
C2	-	approx. 2.2 VDC	Valve bus_Low
C3	-	approx. 2.5 VDC	Valve bus_High
Ignition OFF, C2 and C3 Measure	-	approx. 60 ohms	**Valve bus** 2x 120 ohms parallel Terminating resistance: **A013** - PCB, microfuses (120 ohms) **R009** - Valve BUS terminating resistance (120 ohms)
C4	S 32	12.0 VDC	**B008** - High-pressure Sensor 1
C5	S 31	12.0 VDC	**B039** - High-pressure sensor 2
C6	S 30	12.0 VDC	**B097** - Hydraulic parking brake pressure release sensor
C7	S 29	12.0 VDC	**B081** - 360° steering wheel sensor (for Auto-Guide only)
C8	S 37	12.0 VDC	**S074** - Starter lockout & clutch pedal limit switch
C9	S 36	12.0 VDC	**B002** - Front PTO speed sensor
C10	S 35	12.0 VDC	**B020** - Rear PTO stub shaft speed sensor
C11	S 34	12.0 VDC	**B021** - Rear PTO clutch speed sensor
C12		approx. 2.5 VDC	ISO bus_Low In
C13		approx. 2.5 VDC	ISO bus_Low Out
C14		approx. 2.6 VDC	ISO bus_High In
C15		approx. 2.6 VDC	ISO bus_High Out
C12 and C14		1.5 VDC - 3.5 VDC	**ISO bus**
C16		12 VDC	ISO bus terminal, bus on
C17			Serial Rx (receiving)
C18			Serial Tx (transmitting)

Signal	# 10 (A93)	8.5 V_{DC}	Pump **OFF**	Exhaust temperature upstream of the SCR catalytic converter must be higher than 200°C
		7.2 V_{DC}	Pump **running** in normal mode	
		2.1 V_{DC}	Pump **running** in extraction mode	
Earth	# 8 (A7)			

NOTE: *If the AdBlue was operated previously, the AdBlue extraction system solenoid valve is not energised until the diesel engine is switched off.*

AdBlue extraction system solenoid valve

Test	Pin	Specified value	condition	Note
MV_high	# 11 (A8)	7.4 ohms	Ignition **OFF**	Reading with coil resistance of 20°C
MV_low	# 12 (A30)			

MV_high	# 11 (A8)	12 V_{DC}	Switch position **Suction**	The solenoid valve is energised for max. 120 seconds 10 seconds after the engine has been switched OFF
		0 V_{DC}	Switch position **OFF**	
MV_low	# 12 (A30)			

Recommended tools

- Diagnostic PC with current FENDIAS software
- Adapter cable X899.980.246.217 - connection to AdBlue module
- Adapter box X899.980.304.000
- Adapter cable X899.980.304.205 - pin connection to adapter box

NOTE:

To continue dismantling the A100 multi-function armrest, an anti-static strap must be used.

An **anti-static strap** is used to earth persons and also to prevent electrostatic discharge (ESD).
If the strap is not used, this discharge would easily destroy the integrated circuits (PCB).

Fig. 48. I034572

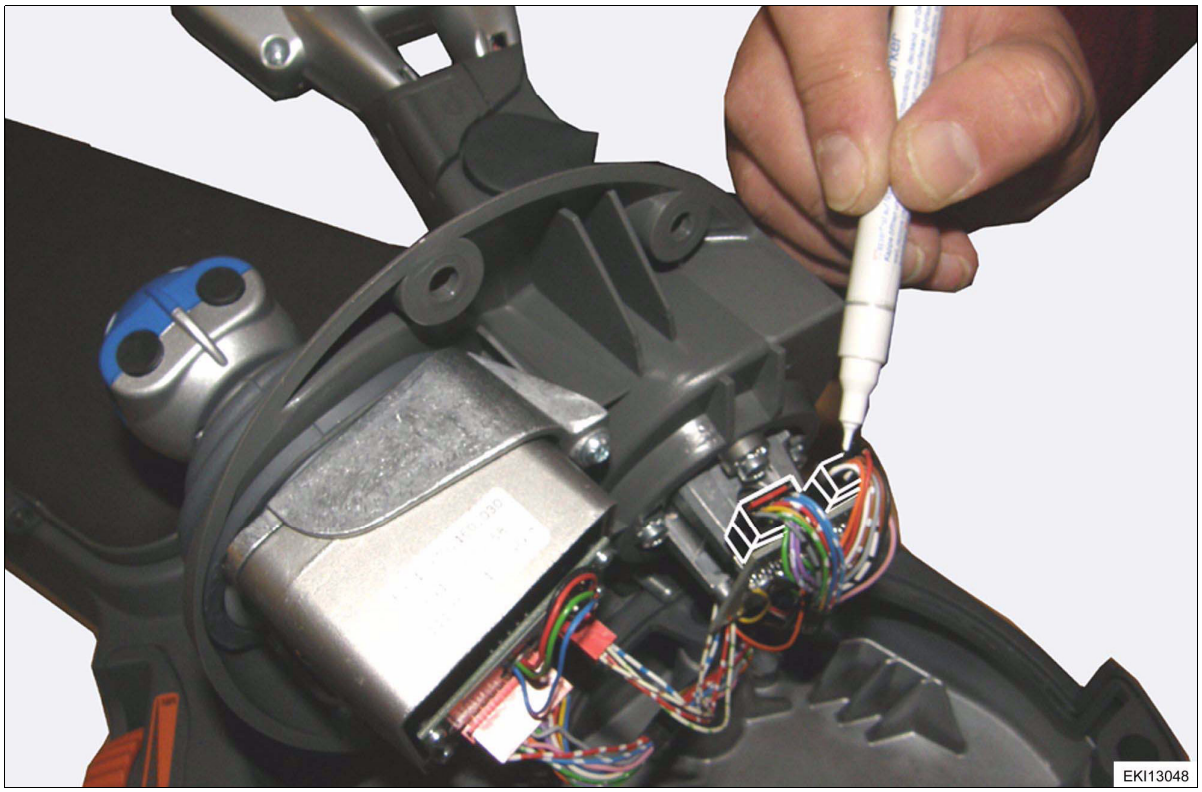


Fig. 49. I034475

Remove the **console for the joystick and the crossgate lever**.
Mark and disconnect the joystick separation points.

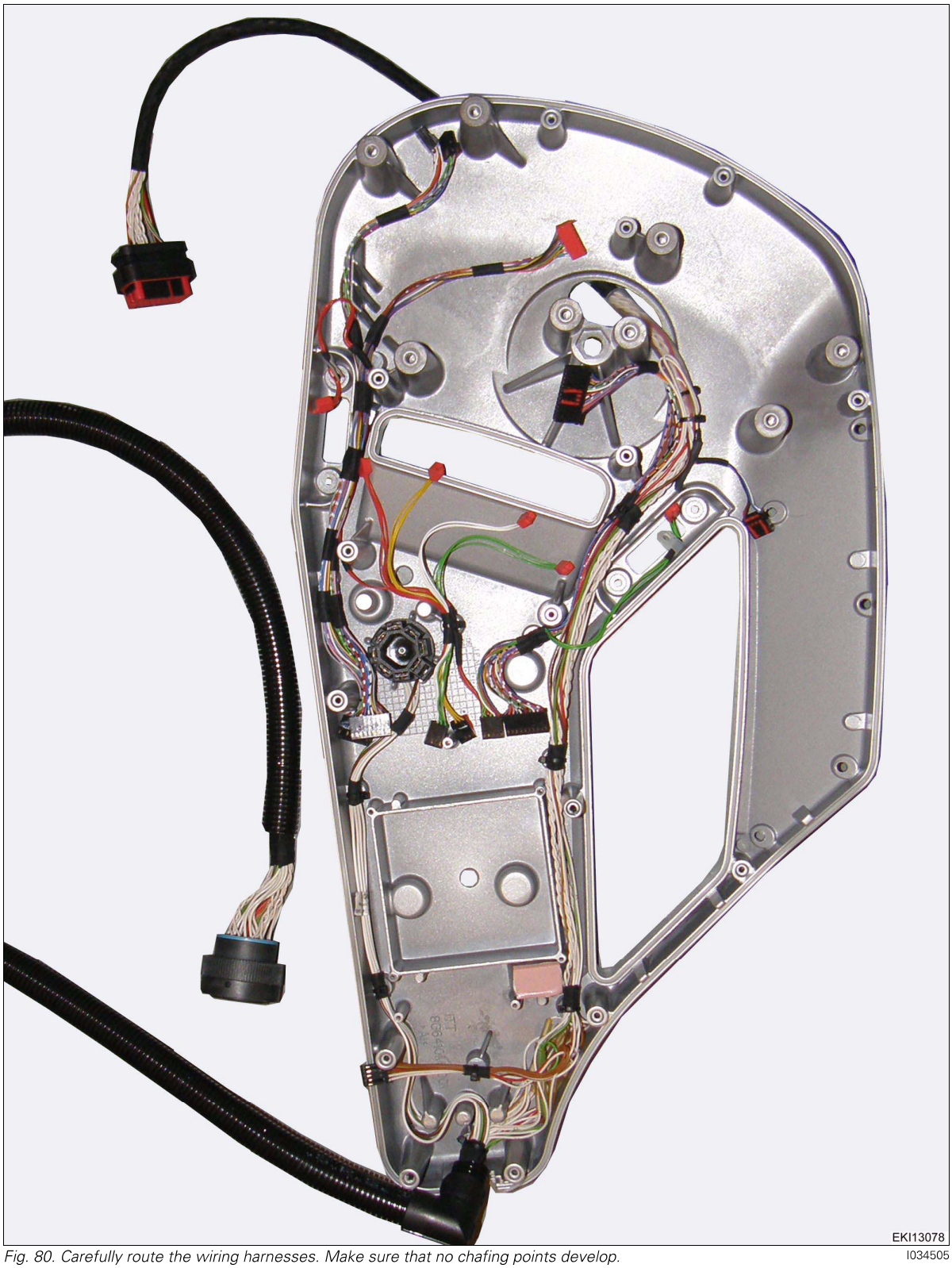


Fig. 80. Carefully route the wiring harnesses. Make sure that no chafing points develop. I034505

Carefully route the wiring set for the camera connections along the armrest and secure using cable ties.

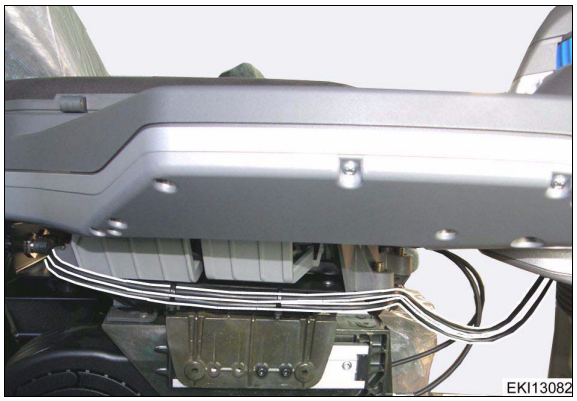


Fig. 112. I034532

Fit panel.

Fig. 113. I034468

Tighten the bolts (arrowed).

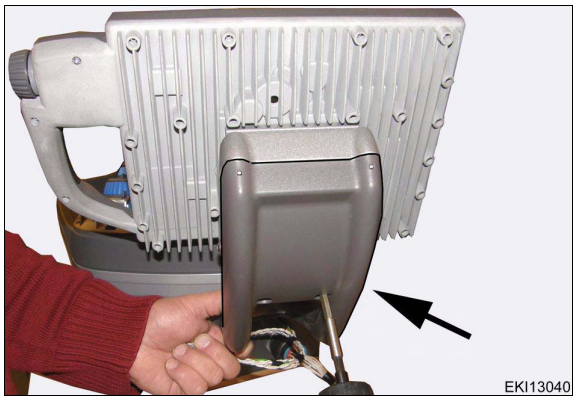


Fig. 114. I034467

Once the circuit board has been replaced, EOL programming must be completed.

Once the circuit board has been replaced, EOL programming must be completed.

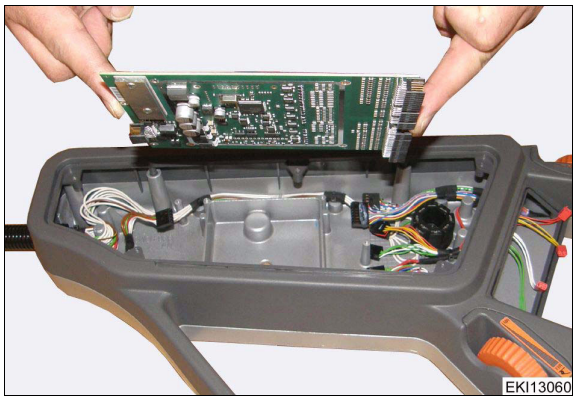


Fig. 115. I034487

Pin	Description	Signal type/condition	Signal	Wire interrupted	
				Signal from A111	Signal from compo-nent
		Left wide vehicle marker light/tail light (58L) **ON**	12 V_{DC}	12 V_{DC}	0 V_{DC}
C9 (X2242)	**Signal "Right wide vehicle marker light/tail light (58R)"**	Right wide vehicle marker light/tail light (58R) **OFF**	0 V_{DC}	0 V_{DC}	0 V_{DC}
		Right wide vehicle marker light/tail light (58R) **ON**	12 V_{DC}	12 V_{DC}	0 V_{DC}
C5 (X2242)	**Signal "Brake light (54)"**	Brake light **OFF**	12 V_{DC} not load-able	12 V_{DC} not load-able	0 V_{DC}
		Brake light **ON**	12 V_{DC}	12 V_{DC}	0 V_{DC}

NOTE: *see 9000, §15, page 92*

Pin	Description	Signal type/condition	Signal	Wire interrupted	
				Signal from A111	Signal from component
G17	Air con. clutch relay (86)	Air conditioning compressor **OFF**	0 V_{DC}	0 V_{DC}	0 V_{DC}
		Air conditioning compressor **ON**	14 V_{DC}	0 V_{DC}	14 V_{DC}
G19	Air con. clutch relay (87)	Air conditioning compressor **OFF**	0 V_{DC}	0 V_{DC}	0 V_{DC}
		Air conditioning compressor **ON**	14 V_{DC}	14 V_{DC}	0 V_{DC}

NOTE:

X2524 - Separation point on A127				
+UB 5 V				
Test	**Pin**	**Specified value**	**condition**	**Possible cause of fault**
+ supply	B24	5 V_{DC}	Ignition **ON**	wiring set also see circuit diagram: supply to electronics **S002** - Ignition switch3
		5 V_{DC}	Engine is running	
Earth	B40, B57			

X2523 - Separation point on A127				
50a (ignition switch)				
Test	**Pin**	**Specified value**	**condition**	**Possible cause of fault**
+ supply	A35	12 V_{DC}	Clutch pedal depressed **S002** - Ignition switch position II	wiring set also see circuit diagram: supply to electronics **S002** - Ignition switch3
Earth	A2, A4, A6			

Signal voltages

Pin	Description	Signal type/condition	Signal	Wire interrupted	
				Signal from A127	Signal from component
Supply (UB 30)					
A1 (X2523)	Supply (UB 30)	Ignition **OFF**	12 V_{DC}	12 V_{DC}	12 V_{DC}
A3 (X2523)	Supply (UB 30)	Ignition **OFF**	12 V_{DC}	12 V_{DC}	12 V_{DC}
A5 (X2523)	Supply (UB 30)	Ignition **OFF**	12 V_{DC}	12 V_{DC}	12 V_{DC}
Supply (UB 15)					
A88 (X2523)	Supply (UB 15)	Ignition **OFF** (min. 2 minutes)	0 V_{DC}	0 V_{DC}	0 V_{DC}
		Ignition **ON**	12 V_{DC}	0 V_{DC}	12 V_{DC}
+ UB sensors					
A68 (X2523)	+ UB sensors	Ignition **OFF** (min. 2 minutes)	0 V_{DC}	0 V_{DC}	0 V_{DC}
		Ignition **ON**	12 V_{DC}	12 V_{DC}	0 V_{DC}
50a					
A35 (X2523)	50a	Clutch pedal depressed, **S002** - Ignition switch in position II	12 V_{DC}	0 V_{DC}	12 V_{DC}
Earth					
A2 (X2523)	Earth	-	-	-	-

32 B007 - Fuel level sensor

Connect e-adapter box (68 pin) X899.980.208.100 with adapter cable X899.980.208.204 to the A007 instrument panel	
Pin at separation point	Pin on the adapter box (68-pin)
X101 separation point "yellow" (1 to 26)	1 to 26
X100 separation point "blue" (1 to 26)	31 to 56

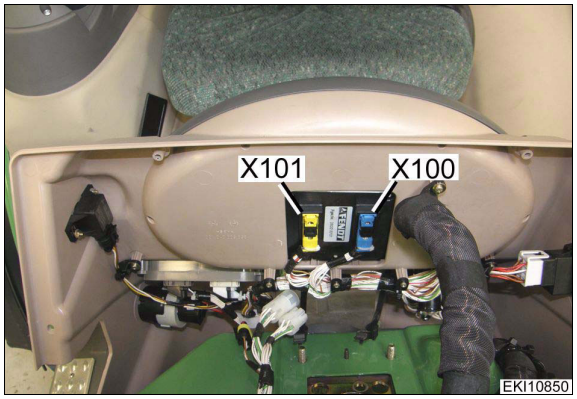


Fig. 151. I014447

Measuring points and signal values

Pin assignment	B007 - Fuel level sensor	A007 - Instrument panel
Earth	# 1 (X156)	-
Signal	# 2 (X156)	# 21 (X101)

Checking the B007 - Fuel level sensor
Remove **B007** - Fuel level sensor
Connect adapter cable X899.980.246.205 to **B007** - Fuel level sensor
Move float (arrow) by hand.

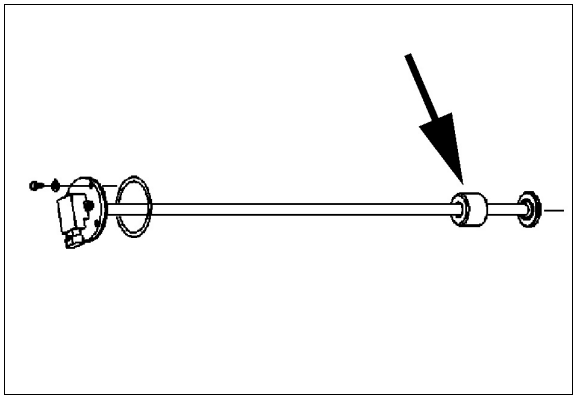


Fig. 152. I019268

When the float reaches the switch, the switch closes.
Total resistance is achieved by via series connection of resistors.
Test the total resistance using a multimeter (ohmmeter).
(For resistance values, see table below).

Test fuel gauge on the A007 instrument panel

Check fuel gauge display on A007 - Instrument panel
Connect adapter cable X899.980.246.205 to the X156 separation point (connection to B007 remains separate).
Connect the X 899.980.224 resistance decade.
Switch on ignition.
Select corresponding resistance (see table) and compare with display on the **A007** - Instrument panel.

NOTE: *Allow preconditioning time of approx. 1 minute.*

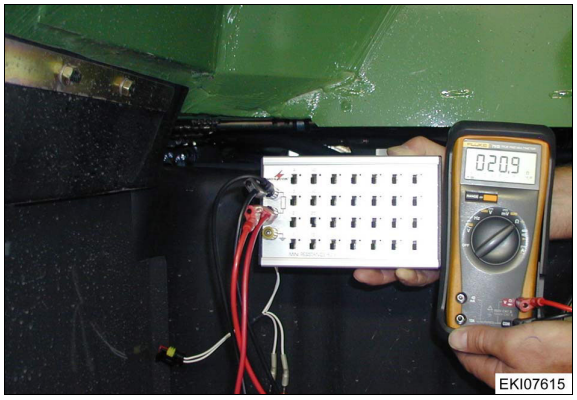


Fig. 153. I001514

39 B017 - Clutch pedal sensor

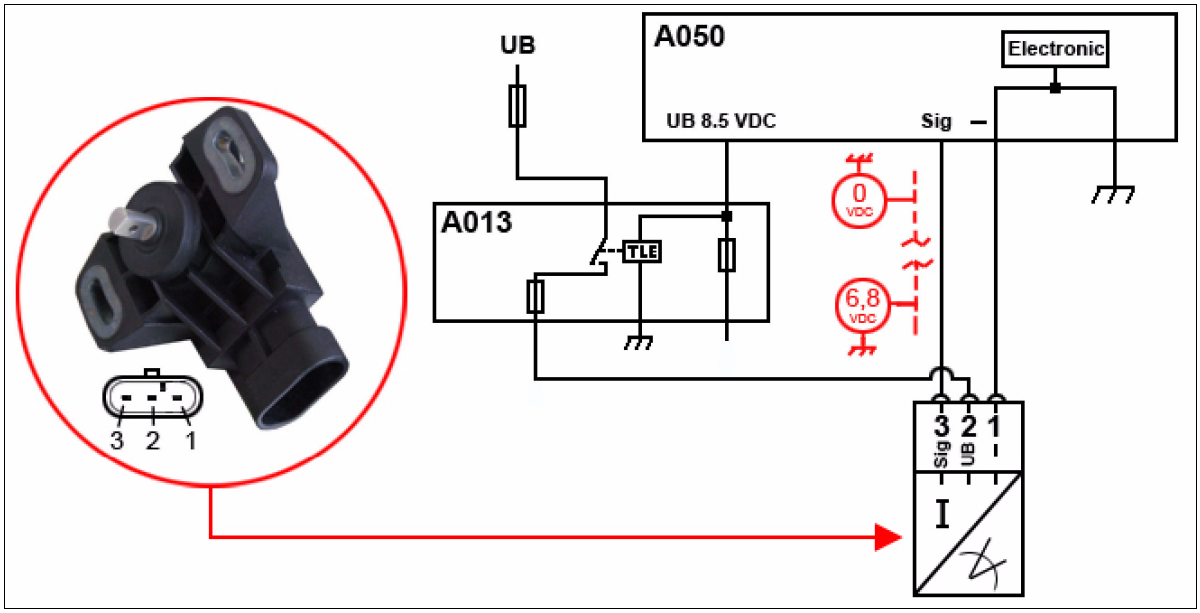


Fig. 163. I016403

Pin assignment	B017 - Clutch pedal sensor	A050 - Basic control ECU (EXT)
Earth	# 1 (X166)	# A45 (X1403)
UB	# 2 (X166)	-
Signal	# 3 (X166)	# B29 (X1402)

Measurement at component separation point (X166)

Test	Pin	Specified value	condition	Note
UB	# 2	8.5 V_{DC}	Ignition **ON**	Microfuse (S5) in A013 or wiring set faulty.
Earth	# 1			

Signal	# 3	1.2 V_{DC} (6 mA_{DC})	Clutch pedal **not** depressed	
		3.6 V_{DC} (17 mA_{DC})	Clutch pedal depressed	
Earth	# 1			

Recommended tools

- Diagnostic PC with current FENDIAS software
- X899.980.246.205 adapter cable - connection to sensor
- Adapter box X899.980.304.000
- Adapter cable X899.980.304.201 - connection to adapter box

NOTE:

see F, §11, page 338
see 9000, §6, page 40

Voltage	Pressure	Display
VDC	bar	Bars
0.31	0	1 flashes
0.40	0.5	1
0.51	1.1	2
0.65	1.9	3
0.80	2.7	4
0.94	3.5	5
1.09	4.4	6
1.24	5.2	7
1.37	5.9	8
1.53	6.8	9
1.67	7.6	10
1.79	8.3	11
1.8	8.4	12

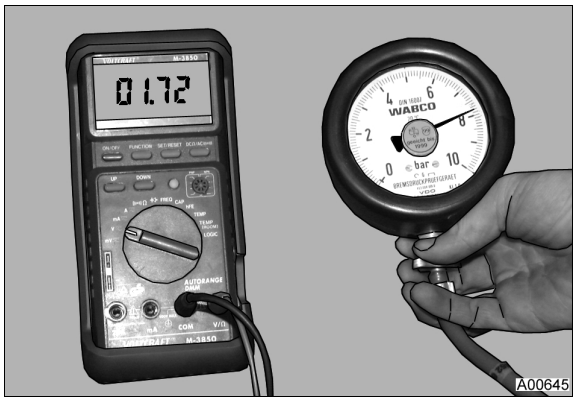


Fig. 173. I005064

Checking display (compressed air supply) on A007 - Instrument panel instrument panel.

Connect adapter cable X899.980.246.205 to component separation point X1410.
Connect X899.980.224 resistance decade and select corresponding resistance (see table).
Switch ignition ON.
Compressed air supply is displayed on the instrument panel.

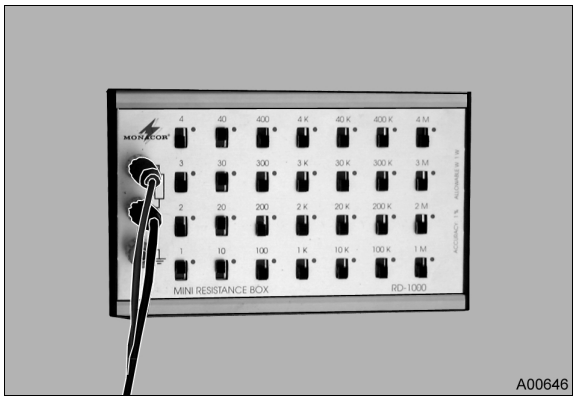


Fig. 174. I005065

Resistance	Display
Ohms	Bars
20	1 flashes
25	1
32	2
41	3
50	4
59	5
68	6
77	7
86	8
96	9
104	10
112	11
113	12

54 B088 - Crankshaft speed sensor

Measuring points and signal values

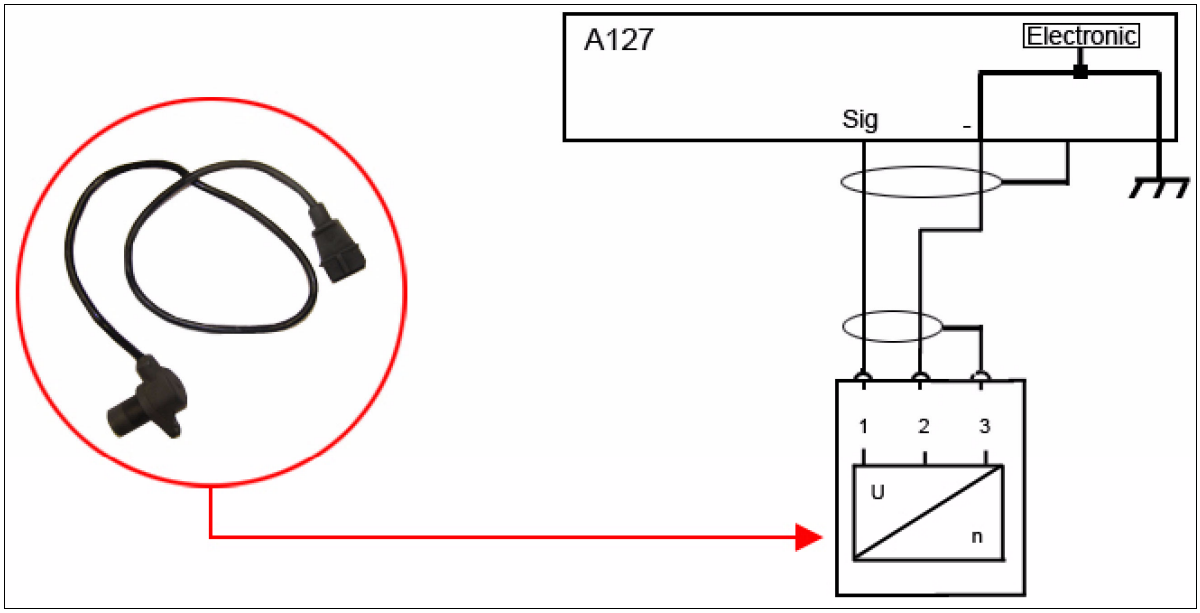


Fig. 190. I031098

Pin assignment	B088 - Crankshaft speed sensor	A127 - Engine control ECU (EDC 17)
Signal	# 1	# B39 (X2524)
Earth	# 2	# B54 (X2524)
Shielding against interference	# 3	# B38 (X2524)

– Connect adapter cable X899.980.246.202 to the sensor only
– Ignition off

Measuring the internal resistance

Test	Pin	Specified value	condition	Possible cause of fault
Signal	-1	Approx. 990 Ohm	Ignition **OFF**	Reading infinity: component fault.
Earth	+2			

59 B102 - AdBlue temperature/level sensor

Measuring points and signal values

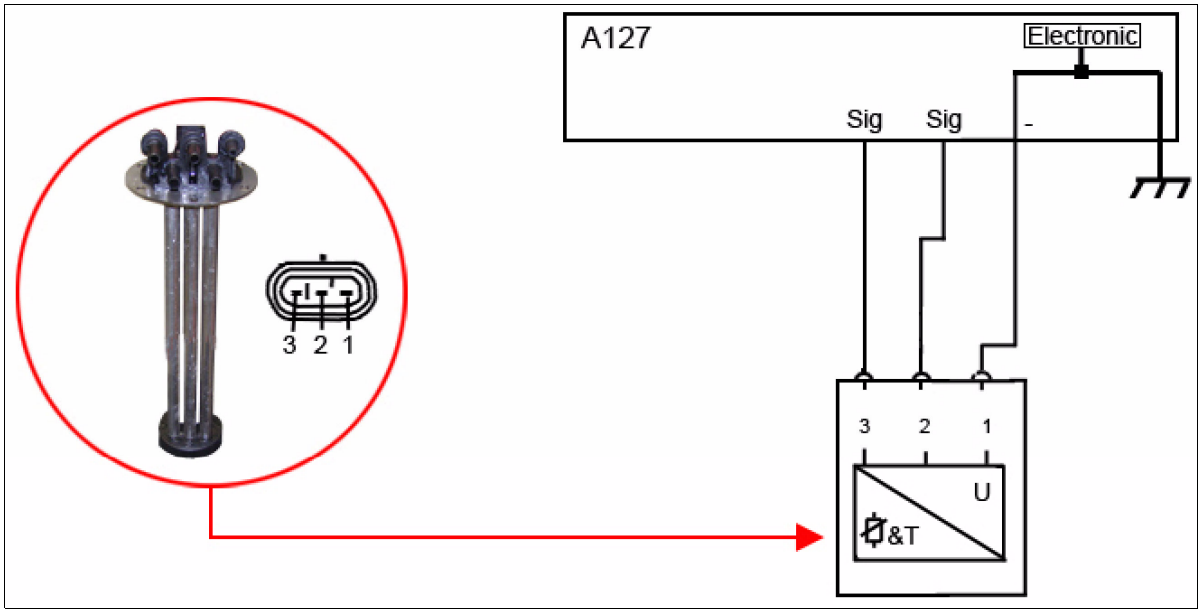


Fig. 206. I031124

Pin assignment	B102 - AdBlue temperature/level sensor	A127 - Engine control ECU (EDC 17)
Earth	# 1 (X2017)	# A64 (X2523)
AdBlue temperature signal	# 2 (X2017)	# A58 (X2523)
AdBlue level signal	# 3 (X2017)	# A39 (X2523)

Check B102 - AdBlue temperature/level sensor
Remove **B102** - AdBlue temperature/level sensor
Connect adapter cable X899.980.246.205 to **B102** - AdBlue temperature/level sensor
Move float (see arrow) by hand.

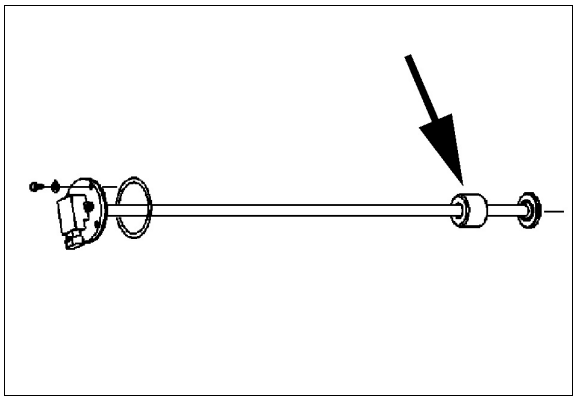


Fig. 207. I019268

When the float reaches the switch, the switch closes.
Total resistance is achieved by via series connection of resistors.
Test the total resistance using a multimeter (ohmmeter).
(For resistance values, see table below).

69 G002 - Alternator 1

Circuit diagram: G002 alternator

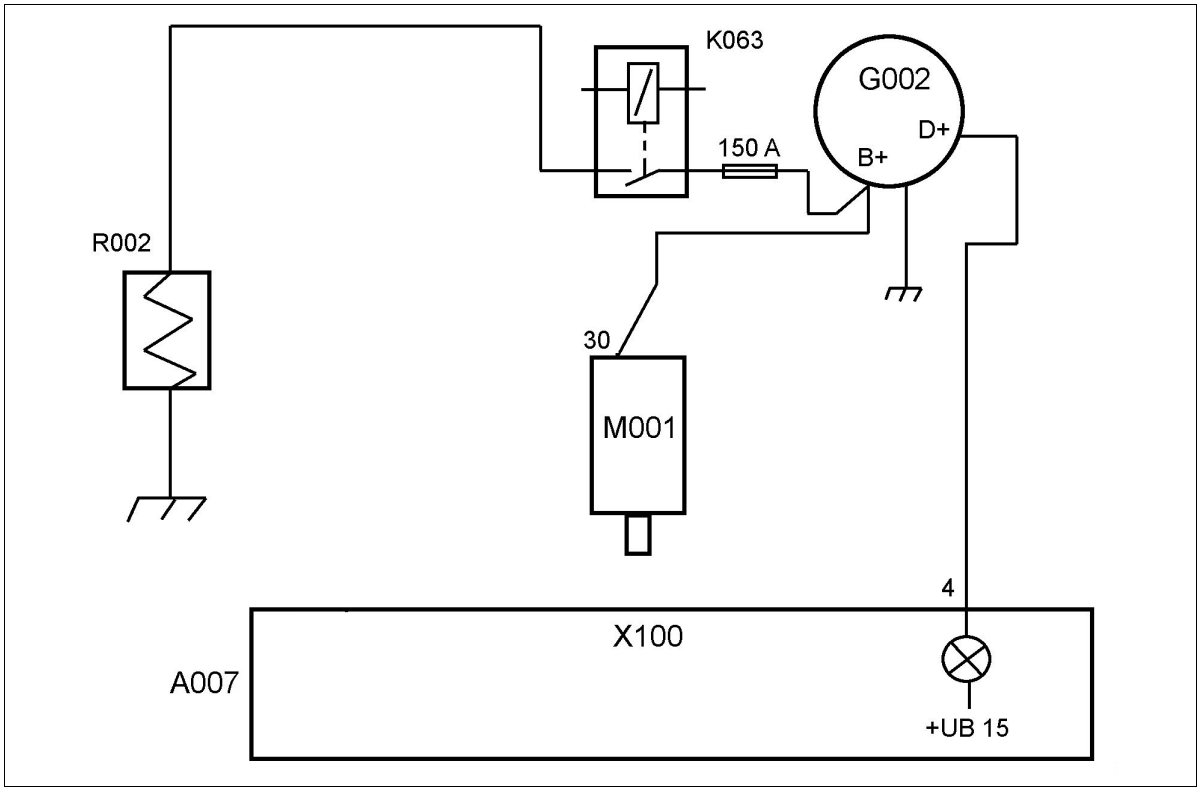


Fig. 222. I038229

A007	Instrument panel	**M001**	Starter
G002	Alternator 1	**R002**	Heater flange
K063	Heater flange relay		

NOTE: *The G002 alternator must not be operated unless a battery or another consumer (e.g. vehicle lighting) is connected, otherwise the rectifier or controller may be damaged*

Check regulating voltage (B+):

Measure B+ (rt 16) at G002 alternator and earth

	Voltage (VDC)
Ignition OFF	12 VDC
Ignition ON	12 VDC
Engine is running	Approx. 14 VDC

In the event of deviations, have G002 alternator repaired by a specialist workshop.

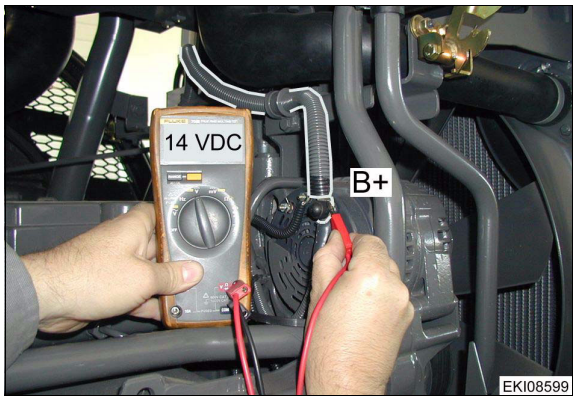


Fig. 223. I002398

74 S015 hand brake switch

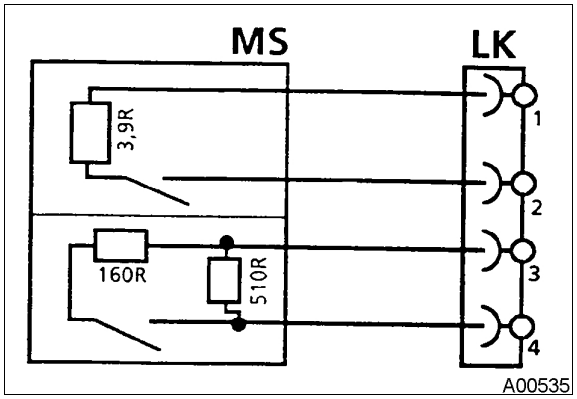


Fig. 241. I005284

Pin assignment	S015 - Parking brake switch	A050 - Basic control ECU (EXT)
Not assigned	# 1 (X226)	-
Not assigned	# 2 (X226)	-
Signal	# 3 (X226)	B34 (X1402)
Earth	# 4 (X226)	A45 (X1403)

Measurement at component separation point (X226)

Test	Pin	Specified value	condition	Note
Resistance	# 3	510 ohms	Hand brake applied	
		121 ohms	Hand brake released	
Earth	# 4			

Signal	# 3	3.8 V_{DC}	Hand brake applied	**Unplug component:** If measured value is 0 V_{DC}, there is a fault with the wiring set or the A050 ECU If measured value is 6.2 V_{DC}, there is a fault with the component.
		1.8 V_{DC}	Hand brake released	
Earth	# 4			

Recommended tools

- Diagnostic PC with current FENDIAS software
- Adapter cable X899.980.246.206 - connection to sensor
- Adapter box X899.980.304.000
- Adapter cable X899.980.304.201 - connection to adapter box

NOTE:

see 9000, §6, page 40

83 S047 - Engine brake switch

Measuring points and signal values

Pin assignment	S047 - Engine brake switch	A127 - Engine control ECU (EDC 17)
Engine brake switch	# 1 (X140)	# A40 (X2523)
+ UB sensors	# 2 (X140)	# A68 (X2523)

Measurement at component (X140)

Test	Pin	Specified value	condition	Possible cause of fault
+ UB sensors	+2	12 V_{DC}		Earth connection, component fault, **A127** - Engine control ECU (EDC 17)
Vehicle earth				

Test	Pin	Specified value	condition	Possible cause of fault
+ UB sensors	+2	0 V_{DC}	Switch **not** activated	
		12 V_{DC}	Switch pressed	
Engine brake switch	-1			

Recommended tools

- Diagnostic PC with current FENDIAS software
- Adapter cable X899.980.246.206 - connection to sensor
- Adapter box X899.980.304.000
- Adapter cable X899.980.304.208 - connection to adapter box

NOTE:

94 X007 implement socket "black"

X007 implement socket "black"

The X007 implement socket (7-pin) delivers signals for the operation of towed and mounted implements.
For example: Speed signals for the operation of a sprayer computer.

Cab, C-pillar, top right

Fig. 255. I028687

Plug an adapter cable (self-made with G312.810.210.030 plug) into the X007 implement socket.
The measurement can also be carried out without an adapter cable, though measurement errors may result due to the small socket pins.

Fig. 256. I002749

Pin assignment on the X007 implement socket

1 = actual road speed (A011 radar sensor, optional) (130 pulses per metre travelled)

Speed	Voltage level (U)
less than 1,0 km/h	14 VDC
greater than 1,0 km/h	approx. 6.5 VDC (UBatt/2)

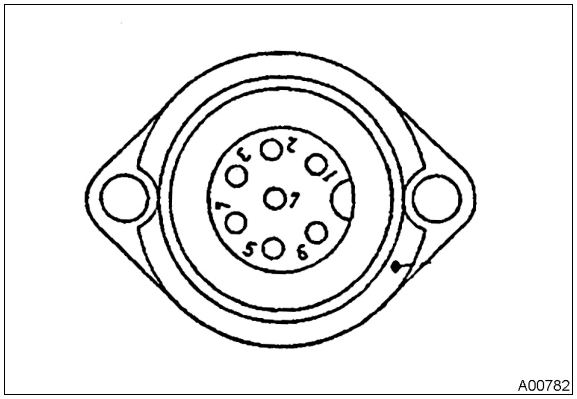


Fig. 257. I002748

2 = theoretical road speed (Transmission signal) (130 pulses per metre travelled)

Speed	Voltage level (U)
less than 1,0 km/h	14 VDC
greater than 1,0 km/h	approx. 6.5 VDC (UBatt/2)

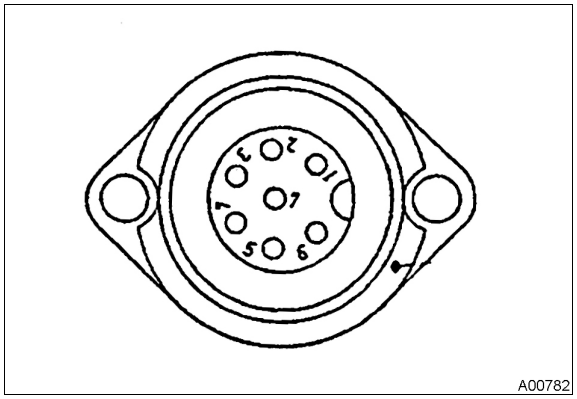


Fig. 258. I002748

NOTE:

Solenoid is controlled during the PWM start-up process, depending on the PTO calibration.

see F, §9, page 332
see 9000, §6, page 40

Measurement on electronics box - separation point X1403

NOTE: *Measurement of Y026: Remove bridge at pin **54** on adapter box.*

Test	Pin	Specified value	condition	Note
Current	# 54	1.7 A	Switch position ON	Remove bridge at pin 54 on adapter box
		0 A	Switch position OFF	

NOTE: *Measurement of Y027: Remove bridge at pin **53** on adapter box.*

Test	Pin	Specified value	condition	Note
Current	# 53	1.7 A	Switch position ON	Remove bridge at pin 53 on adapter box
		0 A	Switch position OFF	

NOTE: *Measurement of Y028: Remove bridge at pin **76** on adapter box.*

Test	Pin	Specified value	condition	Note
Current	# 76	1.7 A	Switch position ON	Remove bridge at pin 76 on adapter box
		0 A	Switch position OFF	

Recommended tools

- Diagnostic PC with current FENDIAS software
- Adapter cable X899.980.246.201 - connection to solenoid valve
- Adapter box X899.980.304.000
- Adapter cable X899.980.304.201 - connection to adapter box

NOTE:

see 9000, §6, page 40

After the high-pressure limiting valve opens, the warning message "**High-pressure limiting valve opened**" is displayed on the **A007** - Instrument panel
Since high pressure (approx. 700 bar) is relieved via the pressure-limiting valve, the fuel is heated.
Therefore, the engine is switched off automatically by the **A127** - Engine control ECU (EDC 17) after **approx. 4 minutes**.
Restart the tractor:
Switch ignition off.
Wait at least 30 seconds until the pressure in the rail (high-pressure accumulator) has dissipated and the pressure-limiting valve can close.
Restart the tractor.

5 Test report — fax template for tractors with VarioGuide equipment

Pressure testing

FENDT				Measurement no.
Chassis no.:	Op. hrs. reading:	Keyword:	Name:	Date:

NOTE: *Initial condition of tractor for all measurements:*

- *Engine in idle (800 rpm)*
- *Valves and EPC are locked*
- *No steering*
- *In tractors with hydraulic trailer brakes, release the pressure with the trailer brake button while the hand-brake is applied*
- *Oil temperature 40-50°C*

	LS pump test [PR]	Auxiliary pump (PH) M2 (bar)	LS pump (PR) M3 (bar)	Load sensing (LS pressure) M4 (bar)	Control pressure M5 (bar)	Oil temperature (°C)
A		SETPOINT ACTUAL	SETPOINT ACTUAL	SETPOINT ACTUAL	SETPOINT ACTUAL	
A1	Minimum standby pressure (Valves locked)	10–16	28–32	5–11	0	
A2	Minimum standby pressure (Valves unlocked)	30–36	28–32	5–11	18–24	
A3	Free steering when stationary To left/right (Valves unlocked)	30–36 /	Depending on resistance /	Depending on resistance /	18–24	
A4	Turn steering to stop To left/right (Valves unlocked)	30–36 /	190–195 /	175–180 /	18–24	
A5	Yellow spool valve Raise/lower	30–36 /	198-210 /	198-210 /	18–24	
A6	Blue spool valve Raise/lower	30–36 /	198-210 /	198-210 /	18–24	
A7	Red spool valve Raise/lower	30–36 /	198-210 /	198-210 /	18–24	
A8	Green spool valve Raise/lower	30–36 /	198-210 /	198-210 /	18–24	
A9	Brown spool valve Raise/lower	30–36 /	198-210 /	198-210 /	18–24	
A10	Olive spool valve Raise/lower	30–36 /	198-210 /	198-210 /	18–24	
A11	Grey spool valve Raise/lower	30–36 /	198-210 /	198-210 /	18–24	

Functional description of components with pulse width output A050 - Basic control ECU

Actuators with pulse width outputs

DIN	Designation	Pin at A050
Y004	- Turbo-clutch solenoid valve	B21
Y005	- Speed governor solenoid valve	A75
Y008	- Rear PTO clutch solenoid valve	A77
Y011	- Front PTO clutch solenoid valve	A86
Y021	- Standard front power lift raise solenoid valve (SA)	A49
Y021	- Front pressure compensator lock valve	
Y022	- Standard front power lift lower solenoid valve (SA)	A73
Y022	- Front field pressure control solenoid valve	
Y026	- Rear PTO solenoid valve, stage I	A54
Y027	- Rear PTO solenoid valve, stage II	A53
Y032	- Control pressure solenoid valve	A52
Y055	- Rear pressure compensator lock valve	A31
Y061	- Hydraulic oil pre-heater solenoid valve (middle)	A74
Y062	- Rear field pressure control solenoid valve	A56
Y063	- Wobble stabiliser solenoid valve	A01
Y064	- Suspension load pressure & lowering solenoid valve	A26
Y084	- Power Beyond solenoid valve	A50
Y085	- VarioGuide pilot pressure switch-off solenoid valve (High)	A07
Y085	- VarioGuide pilot pressure switch-off solenoid valve (Low)	A78
Y086	- VarioGuide steering disconnect solenoid valve (High)	A06
Y086	- VarioGuide steering disconnect solenoid valve (Low)	A79
Y088	- Trailer brake release solenoid valve (High)	A02
Y088	- Trailer brake release solenoid valve (Low)	A85

NOTE: For safety crical circuits, both the positive and negative sides are connected via the A050 - ECU, basic control unit.
The positive side is called _High in the E-box.
The negative side is called _Low in the E-box.

The **A050** - Basic control ECU supplies a voltage of **0 V_{DC} to 12 V_{DC}** for energising the solenoid valves
The voltage increase to 12 V_{DC} or the voltage shutoff to 0 V_{DC} is proportionally controlled.
The **A050** - Basic control ECU is capable of having diagnostics run at the outputs; this means that if a break in wiring or a short circuit occurs, this output is switched off and an error code is output.

NOTE: *A pulse width output can also be programmed to a given current value, e.g.* ***Y005*** *- Speed governor solenoid valve800 mA.*

Error pattern for a break in the signal wiring

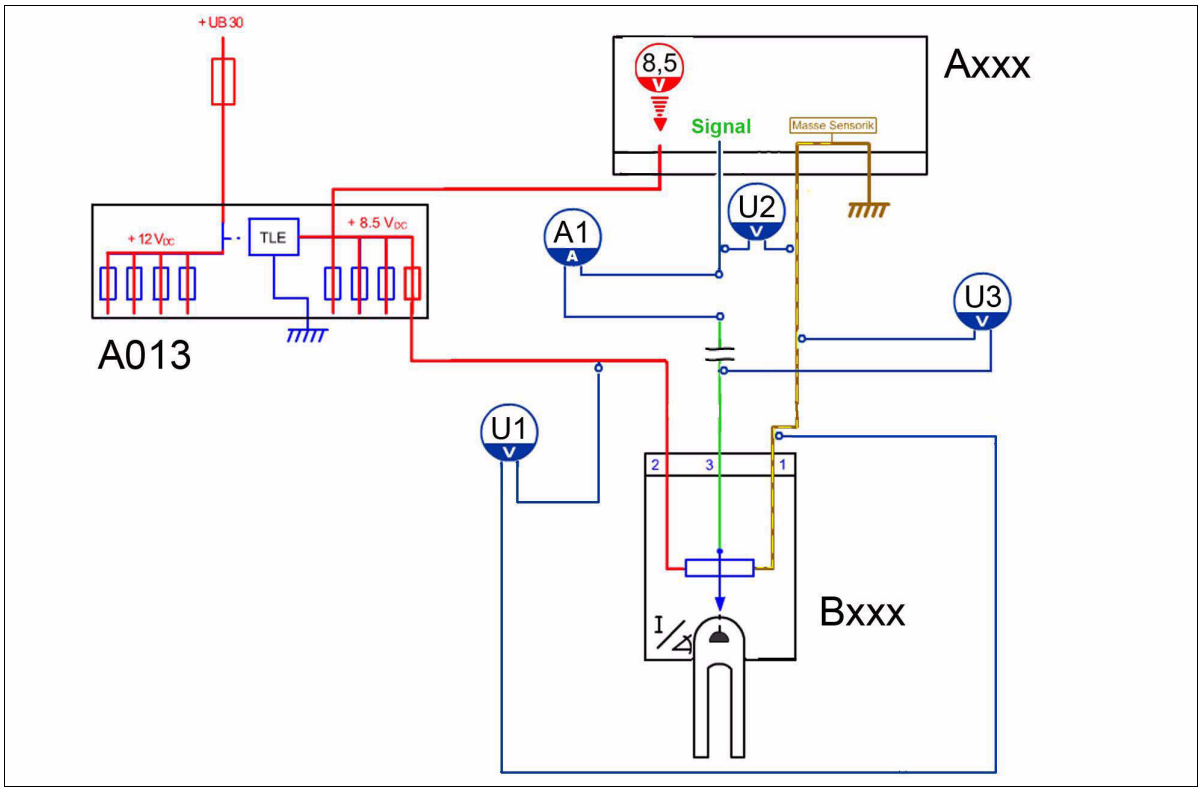


Fig. 20. I026984

	Reading	Note
U1	8.5 V	Ignition ON, E-box supplies 8.5 V (stabilised) Microfuse OK
A1	0 mA	No current flow when there is a break in the wiring
U2	0 V	The signal comes from the sensor, (**no** basic signal voltage from the E-box at the current input)
U3	6.8 V	Sensor tries to supply a current. A current cannot flow due to a wiring break, therefore voltage is used. Voltage is **not** dependent on the sensor position.

Error pattern for an earth connection in the signal wiring

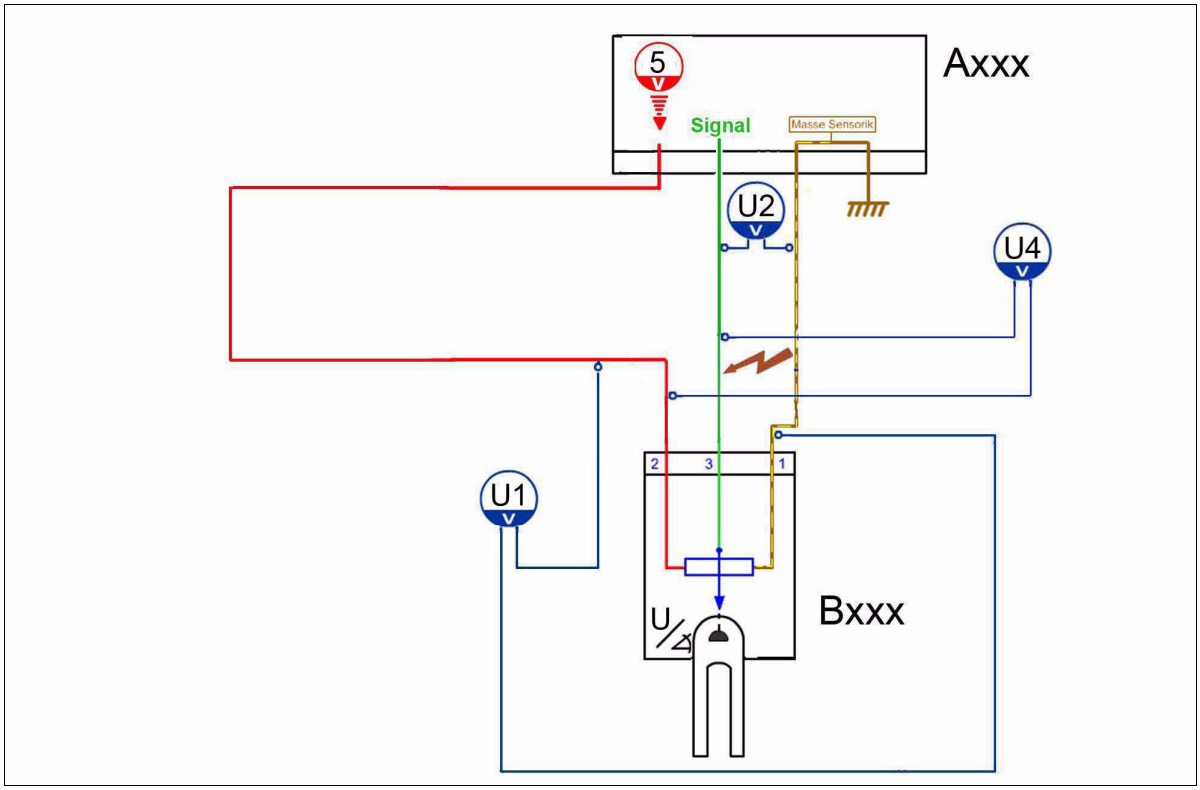


Fig. 33. I027023

	U2	Note
Error pattern	0 V_{DC}	U1 = 5 V_{DC}, the sensor can only provide a signal if it has a power supply

Diagnostic steps	U4	
1. Connect multimeter U4	5 V_{DC}	Earth connection in the sensor, wire or E-box
2. Disconnect sensor	0 V_{DC}	Sensor faulty
	5 V_{DC}	Earth connection in the wire or E-box
3. Bridge to Open adapter box	0 V_{DC}	E-box faulty
	5 V_{DC}	Earth connection in signal line

Other rotary position sensors (angle/voltage) that are installed on the tractor:

DIN	Designation	Note
B055 - Sensor, foot throttle		Combination sensor (A050 current divider/A051 voltage reducer)
B030 - Sensor, rear power lift position		Supply 10 V_{DC}

To compensate for mechanical and electrical tolerances in sensors, the sensor must be calibrated.

X899.980.304.201
Adapter cable (96/58/4x41-pin)
for testing the **A050** - Basic control ECU

Fig. 21. I002522

X899.980.304.203
adapter cable (21/1x41-pin)
for testing the **A111** - Central electrical system ECU

Fig. 22. I025548

X899.980.304.204
Adapter cable (68/2x41-pin)
Adapter for all adapter cables with a 68-pin separation point.

Fig. 23. I002525

X899.980.304.205
Adapter cable (94/60/4x41) pin
For testing **A127** - Engine control ECU (EDC 17)

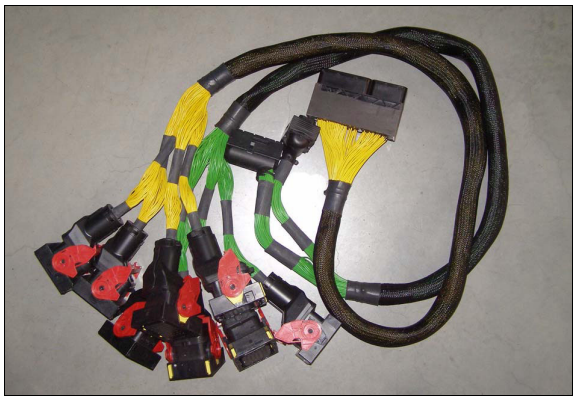


Fig. 24. I038339

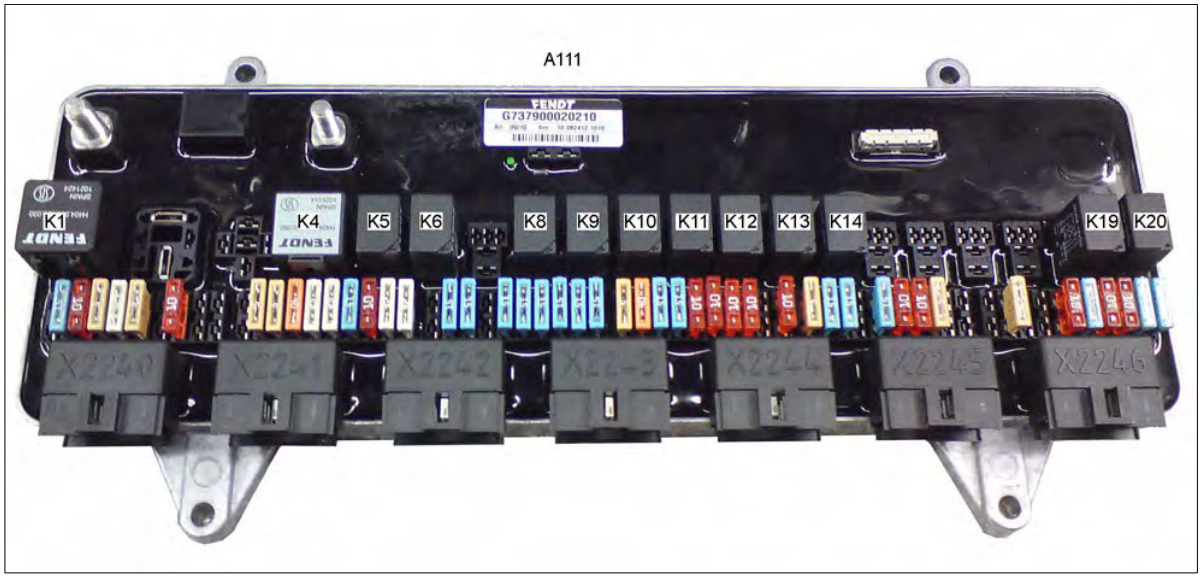
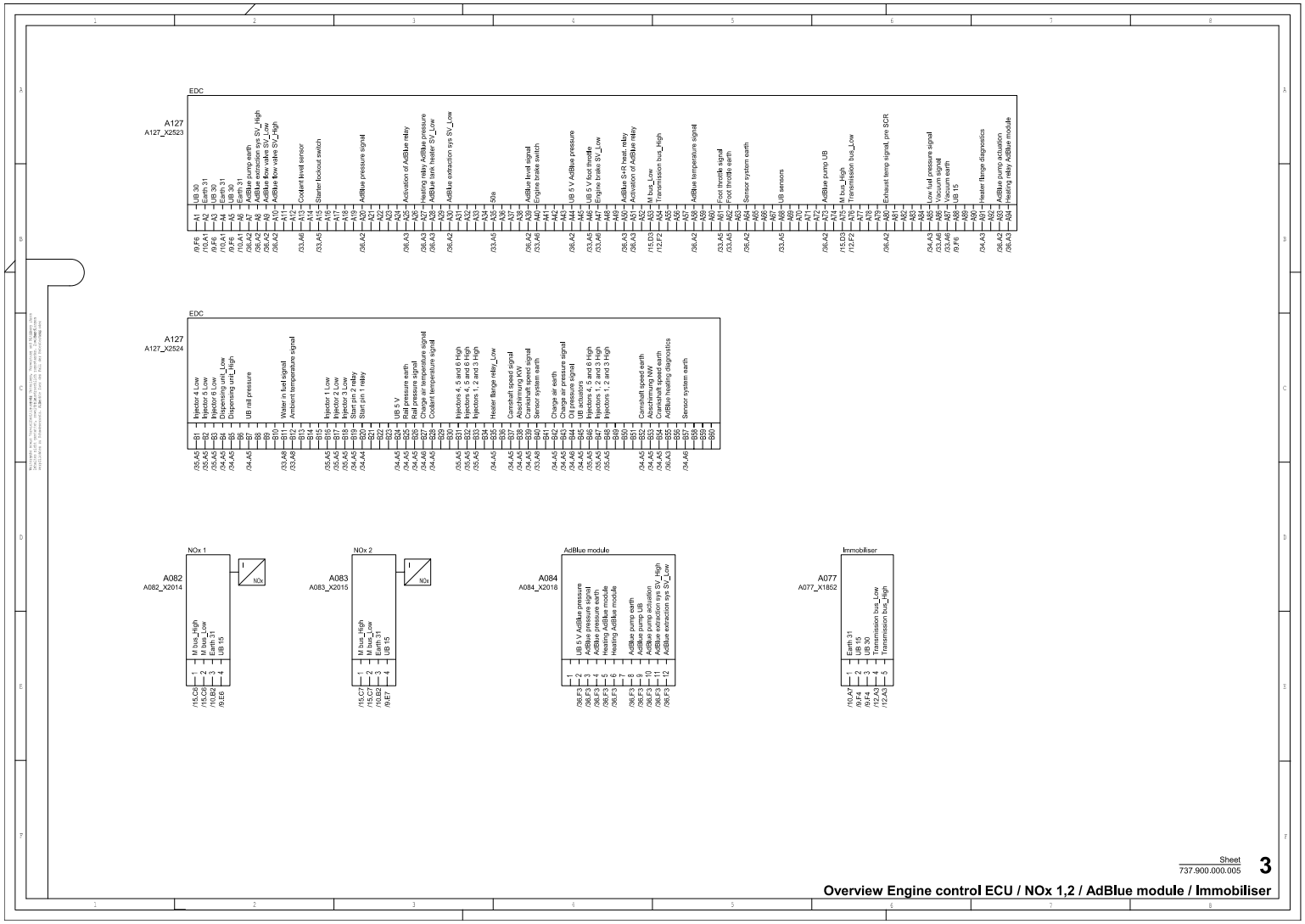


Fig. 6. Central electrical system - relay assignment I028098

Relay	Consumer	Relay	Consumer
1	**K1 (ZE)** - UB15 relay	11	**K11 (ZE)** - Rear lamp work light relay
2	Not assigned	12	**K12 (ZE)** - 3rd hydraulic circuit relay;
3	**K3 (ZE)** - Not assigned	13	**K13 (ZE)** - 4th hydraulic circuit relay;
4	**K4 (ZE)** - Rear window heater relay	14	**K14 (ZE)** - A pillar work light relay
5	**K5 (ZE)** - Rotating beacon relay	15	**K15 (ZE)** - Work light relay (NA)
6	**K6 (ZE)** - Front inner roof work light relay	16	**K16 (ZE)** - Not assigned
7	**K7 (ZE)** - Not assigned	17	**K17 (ZE)** - Not assigned
8	**K8 (ZE)** - Front outer roof work light relay	18	**K18 (ZE)** - Not assigned
9	**K9 (ZE)** - Rear inner roof work light relay	19	**K19 (ZE)** - Clutch & turbo-clutch relay
10	**K10 (ZE)** - Rear outer roof work light relay	20	**K20 (ZE)** - Air conditioning clutch relay

NOTE: *When testing the relay supply voltage, see WHB Chapter 9000 Reg. E, Measuring and testing* ***A111*** *- Central electrical system ECU*

DIN component designation	Circuit diagram sheet no.
X2241 - Separation point on A111	9, 14, 23, 25, 26, 28, 30, 37
X2242 - Separation point on A111	23, 25, 26, 27, 31
X2243 - Separation point on A111	16, 23, 24, 26, 27, 28, 30, 38
X2244 - Separation point on A111	22, 23, 24, 26, 27, 30, 31, 38
X2245 - Separation point on A111	18, 23, 24, 25, 31, 32
X2246 - Separation point on A111	9, 11, 16, 24, 28, 33, 36
X2250 - Separation point on S125	8
X2251 - Separation point on A112	11, 28
X2253 - Separation point on B158	28
X2254 - Separation point on A112	28
X2255 - Cab/air conditioning system cable coupling	28, 29
X2256 - Cab/air conditioning system cable coupling	28, 29
X2257 - Separation point on Y172	17
X2258 - Separation point on E158	25
X2259 - 10 amp socket	31
X2277 - Separation point for operator's seat	16, 22
X2285 - Steering angle sensor cable coupling	19
X2320 - Separation point on E171	25
X2321 - Separation point on E171	25
X2322 - Separation point on E172	25
X2323 - Separation point on E173	25
X2324 - Separation points on Y176	13, 18
X2325 - Separation points on Y177	13, 18
X2326 - Separation points on Y178	13, 18
X2327 - Separation points on Y179	13, 18
X2329 - Separation points on Y181	13, 18
X2331 - Separation points on Y183	13, 18
X2332 - Separation point on M033	26
X2334 - Separation point on U004	37
X2364 - Separation point on S132	18
X2379 - Separation point on Y184	13, 18
X2415 - Separation point on B167	28
X2420 - Separation point on B187	29
X2421 - Separation point on M048	29
X2422 - Separation point on M049	29
X2423 - Separation point on M050	29
X2424 - Separation point on K093	29
X2425 - Separation point on A129	29
X2426 - Separation point on A129	29
X2456 - Separation point on B180	33
X2457 - Separation point on S144	21
X2458 - Separation point on S134	17
X2513 - Separation point on B188	28
X2521 - Separation point on S142	25
X2522 - Separation point on S142	25



Sheet
737.900.000.005

3

Overview Engine control ECU / NOx 1,2 / AdBlue module / Immobiliser

10 Earth layout — Sheet 10

A007 - Instrument panel (Item A7)
A013 - PCB, microfuses (Item A8)
A050 - Basic control ECU (Items A4 and A5)
A077 - Immobiliser ECU (Item A7)
A082 - Nitrogen oxide NOx sensor 1, upstream of SCR (Item A2)
A083 - Nitrogen oxide NOx sensor 2, downstream of SCR (Item A2)
A100 - MFA, multifunction armrest (Item C8)
A103 - Terminal NT01/02 (Item A8)
A111 - Central electrical system ECU (Item A6)
A127 - Engine control ECU (EDC 17) (Item A1)
A128 - Control panel, right/left dashboard (Item A6)
G001 - Battery 1 (Item F1)

X2184 - Separation point on A100 (Item D8)
X4001 - Operator platform/front right chassis cable coupling (Item C3)
X4046 - Operator platform/front left chassis cable coupling (Item C3)
X4111 - EXT earth connector (Item C5)
X4112 - Sensor system earth connector (Item B3)
X4113 - Sensor system earth connector (Item B3)
X4114 - Sensor system earth connector (Item A3)
X4115 - Earth connector (Item C6)
X4225 - Sensor system earth connector (Item D4)
X4227 - Sensor system earth connector (Item D3)
X4228 - Sensor system earth connector (Item D4)
X4229 - Sensor system earth connector (Item D3)
X4240 - Sensor system earth connector (Item D3)
X4241 - Sensor system earth connector (Item D2)
X5000 - Cab earth point (Item E7)
X5001 - Cab earth connector (Item D8)
X5002 - Cab earth connector (Item D8)
X5003 - Cab earth connector (Item E8)
X5004 - Cab earth connector (Item E8)
X5005 - Cab earth connector (Item E8)
X5006 - Earth connector (Item E8)
X5010 - Earth point on right of operator platform (Item E7)
X5011 - Earth point on right of operator platform (Item E6)
X5012 - Earth point on right of operator platform (Item E6)
X5013 - Earth point on left of operator platform (Item E5)
X5014 - Earth point on right of operator platform (Item E6)
X5015 - Earth point on left of operator platform (Item E5)
X5016 - Frame earth point (Item F2)
X5017 - Cab aerial earth point (Item E8)
X5020 - Engine earth point (Item F5)
X5026 - Frame earth point (Item F4)
X5027 - Frame earth point (Item F2)
X5028 - Frame earth point (Item F3)
X5029 - Frame earth connector (Item F3)
X5030 - Frame earth connector (Item E3)
X5031 - Frame earth connector (Item E3)
X5032 - Frame earth connector (Item E3)
X5033 - Frame earth connector (Item E3)
X5034 - Frame earth point (Item F4)
X5035 - Frame earth connector (Items B1 and E4)
X5036 - Frame earth connector (Item E4)
X5037 - Frame earth connector (Item F4)
X5039 - Earth connector (Item E3)
X5045 - Frame earth connector (Item E3)
X5079 - Outer operator platform earth point (Item E4)