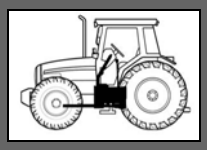
Chapter 5



Gearbox

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ML260 - General

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A. General

ML 260 type transmission

M Marshall, the original engineer of this development

L Power distribution between the mechanical and hydraulic parts

260 Average power that can be transmitted to the wheels

The Dyna-VT transmission is a forward and reverse continuous transmission. The switch from Hare/Tortoise range with synchronisation is built into the transmission. The Tortoise range permits forward speeds of 0 to 32 kph. The Hare range permits forward speeds of 0 to 50 kph (depending on country regulations). The standard maximum speed is electronically limited to 40 kph. The Tortoise range is intended for heavy traction work at low forward speeds, below 18 kph. The Hare range is intended for driving on roads (transport). At 50 kph, the transmission ratio is controlled electronically according to engine speed. Power transmission can be hydrostatic OR mechanical or hydrostatic AND mechanical. In simple terms:

- Slow forward travel: Power transmission is mainly hydrostatic/partially mechanical.
- Fast forward travel: Power transmission is partially hydrostatic/mainly mechanical.

For detailed explanations, see the transmission operating diagram.

B. Transmission operating principle

Power transmission hydrostatic system

The Dyna-VT transmission unit is elastically suspended inside the transmission housing. The latter also acts as an oil tank for the hydrostatic transmission.

Filling: Terrac Extra or Terrac Tractran 9/Fluid 9 oil, or any other oil complying with the standard CMS M1143 or CMS M1145.

The lubrication pump sucks oil through the suction strainer. The temperature sensor (X19) monitors the temperature of the transmission oil. Put simply, if the transmission oil is cold, a small amount of oil passes into the cooler and a lot of oil passes through the bypass valve. This valve opens at a differential pressure of approximately 3.5 bar. The temperature of the hydraulic oil is monitored by the temperature sensor (X19). The service pump produces the system pressure for the Dyna-VT control spool valves and the accessory control solenoid valves. The system pressure of approximately 18 bar is limited by a pressure relief valve with throttling port.

Two different pressures are present in the system:

- Low pressure for the Dyna-VT transmission control and auxiliary pressure for the rear PTO clutch and differential lock. The measurement point of this pressure is approximately 18 bar.
- High pressure inside the Dyna-VT transmission. Pressure measurement point: approx. 530 + 20 bar max.

Oil filter blockage is monitored by a pressure switch according to the transmission oil temperature. When this temperature is below 50°C, oil filter blockage is not monitored.

Cooled transmission oil enters the high-pressure system alternately via two non-return valves. Hot transmission oil leaves the high-pressure system via the pressure relief valve.

The following can be found inside the high-pressure system: a variable displacement pump and two hydrostatic motors, two non-return valves, two controlled high-pressure limiter valves, a relief valve, a coupler function solenoid valve, a clutch function controlled valve and a check connector. The adjustment rams for the pump and the motor are controlled by two 4/3 spool valves. These 4/3 spool valves are mechanically controlled by the cam channel control shaft. The control shaft is rotated as required by the control unit, which defines the flow rate and therefore the hydraulic power.

The variable displacement pump and the hydrostatic motors pivot proportionally. In limp home position, the adjustment shaft is manually activated from the operator's cab. In limp home position, the transmission is automatically locked on approximately 30 kph after engine start-up. If the clutch pedal, parking brake or neutral switch is used, the high-pressure system is automatically relieved by means of two high-pressure relief valves. The coupler function is controlled by the pressure relief valve.

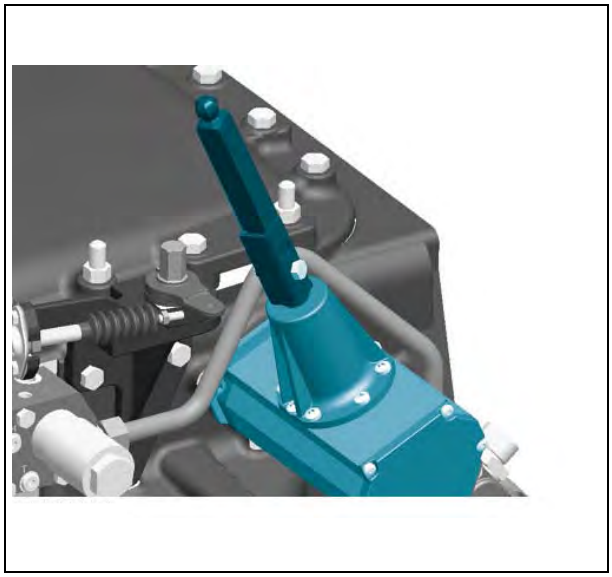
The control unit

The control unit operates the cam channel control shaft, which modifies the Dyna-VT transmission ratio.

The control unit comprises the following components:

- Limp home mode control (required in the event of electronic control failure)
- Coupling for the incremental angle of rotation sensor control with a digital resolution of 8000 pulses per revolution
- Epicyclic gear train transmission i = 192:1 (electric motor for the adjustment shaft)
- 12 VDC electric motor, 0.4 to 7 amps, control unit maximum speed without load 4500 rpm
- Friction clutch 2.5 to 3.5 Nm, with limp home lever end fitting, 4 to 5 Nm.

After switching on the ignition, the control unit searches for the reference point (approximate neutral point between forward and reverse drive).



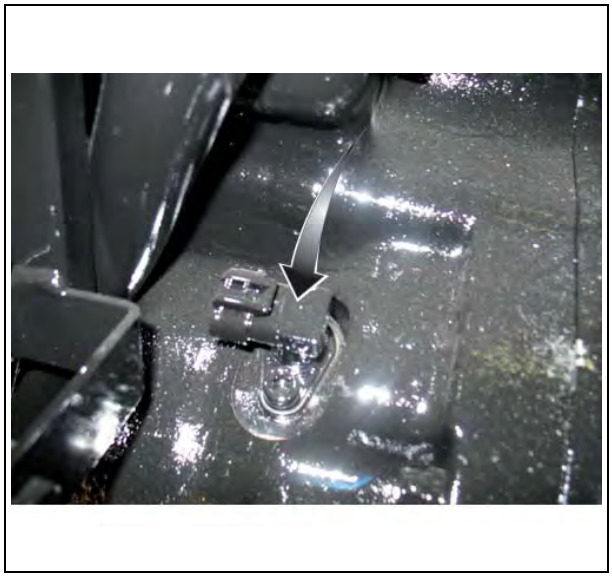
I006199

Fig. 1

Sensors

Engine sensor (X25)

Measures engine speed. In the event of a fault, only the limp home mode can be used.



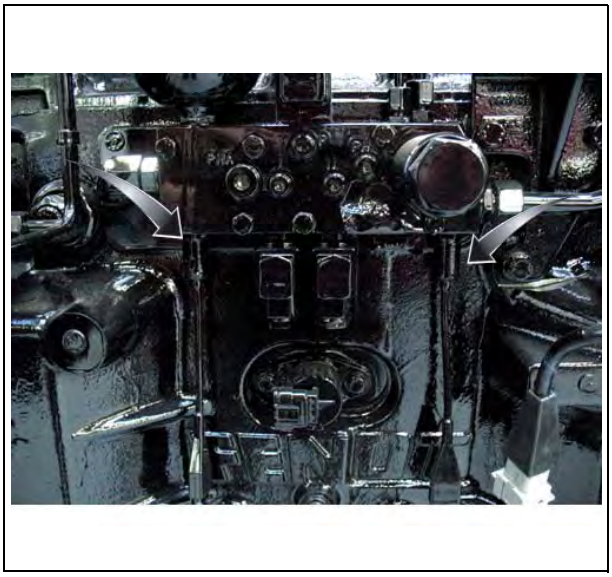
I006201

Fig. 2

Hall sensor for collector shaft (X10) and pinion (X8)
Measures the speed and recognises the direction of rotation.

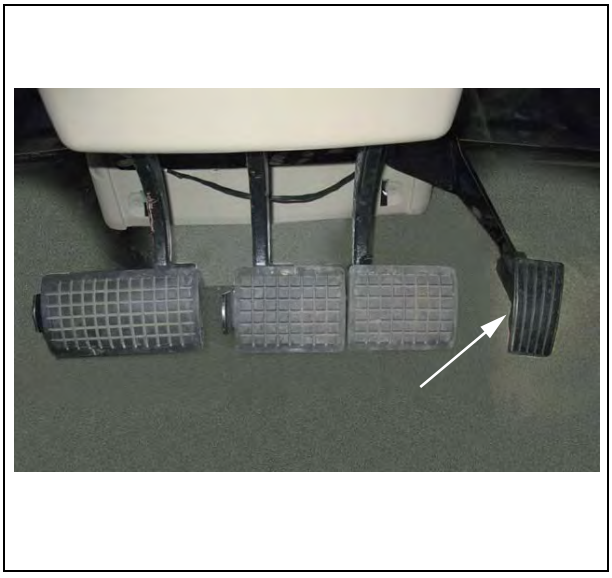
I006202 Fig. 3

High-pressure sensor (X34) and (X9)
Transmits the instantaneous oil pressure in the high-pressure system to the electronic system (Fig. 4). A second high-pressure sensor has been added. It is used for the shifting and DTM functions (Dynamic Transmission Management).



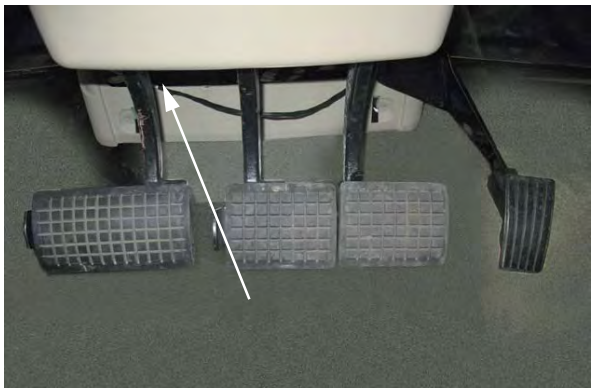
I006203 Fig. 4

Throttle pedal sensor
Transmits the throttle pedal position to the electronic system and compares it to the engine speed. This angle sensor will be used for load regulation.



I006206 Fig. 5

Clutch pedal potentiometer sensor:
Electronically monitors the clutch pedal travel.



I006208 Fig. 6

Hare/Tortoise position sensor (X17)
Electronically monitors the position of the range selector switch.

I006209 Fig. 7

Temperature sensor
Monitors the temperature of the transmission oil. Temperatures greater than 110°C are stored with an error code.

I006211 Fig. 8

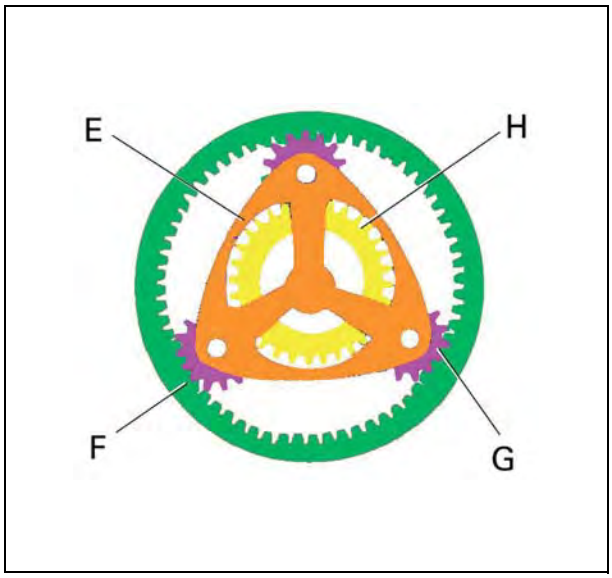
HP filter blockage sensor (X20)
Monitors the blockage status of the high-pressure filter.

I006212

Fig. 9

C. Transmission operating principle diagrams

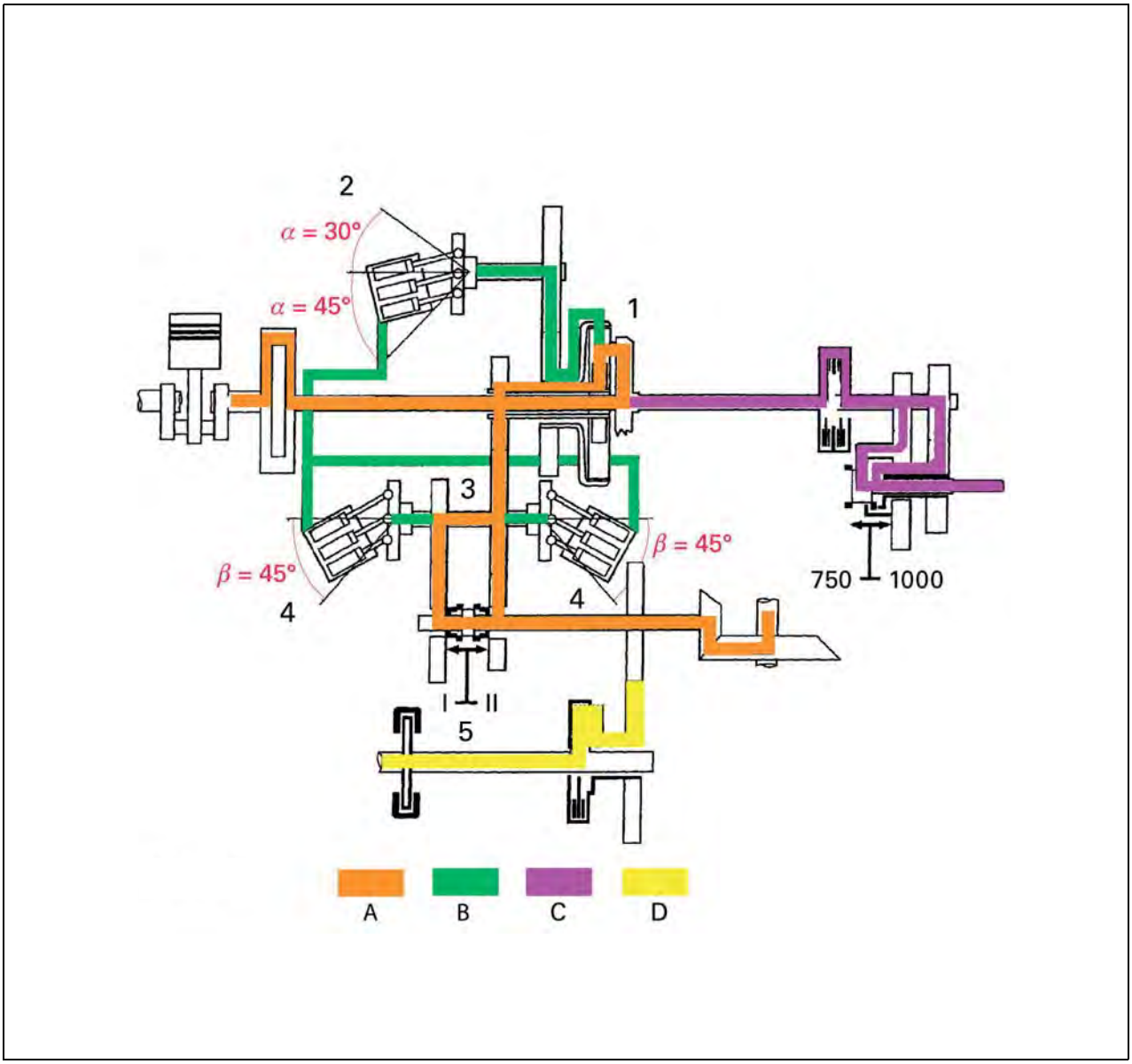
(E) Planet carrier, driven by the heat engine
(F) Ring gear, drives the hydrostatic pump
(G) Planet gear
(H) Sun gear, drives the collector shaft



I006219

Fig. 10

Epicyclic gear train/Power distribution

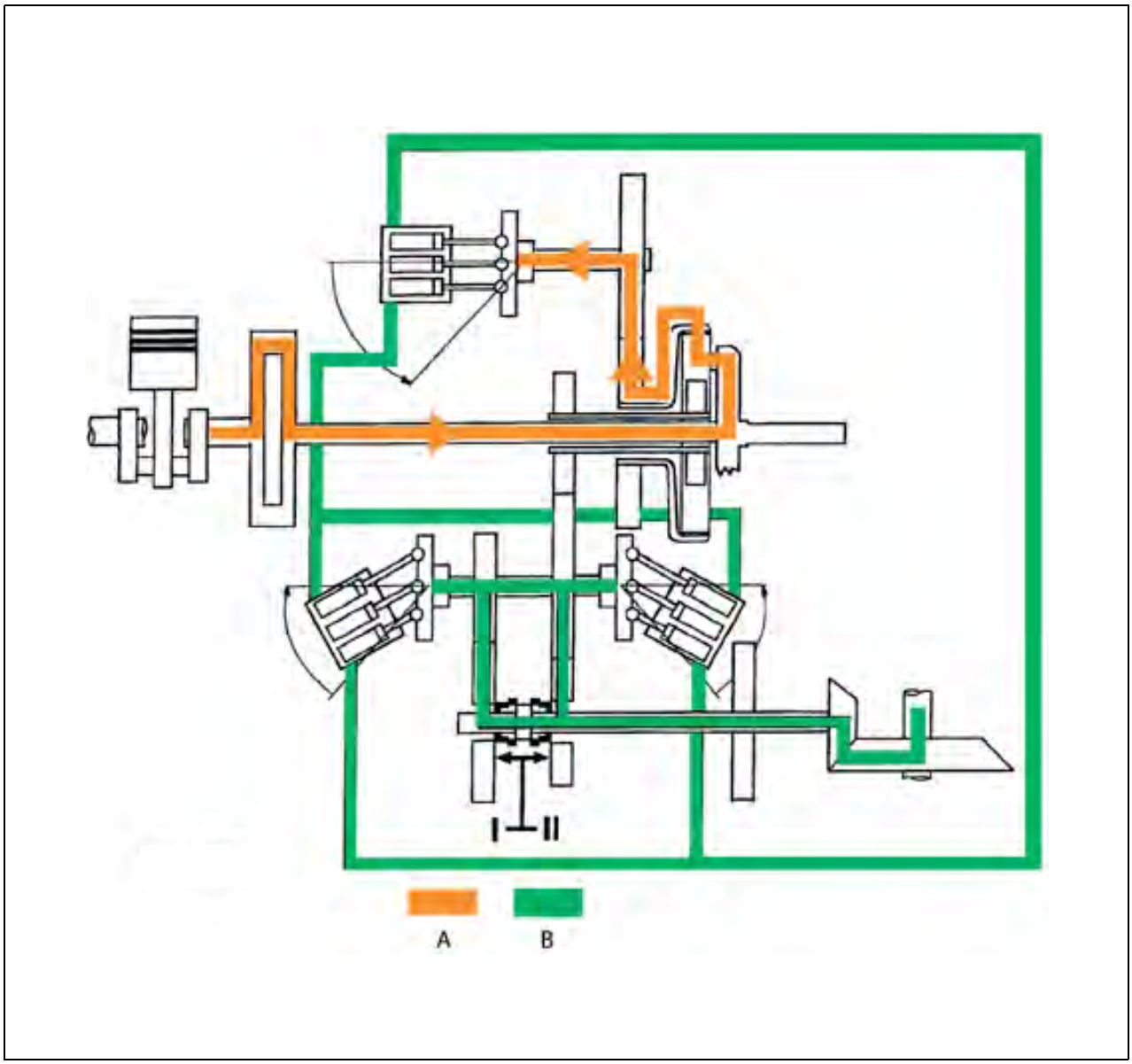


I006220

Fig. 11

(A) Transmission of mechanical force
(B) Transmission of hydrostatic force
(C) Power take-off drive
(D) Front axle drive
(1) Epicyclic gear train.
(2) Hydrostatic pump
(3) Collector shaft
(4) Hydrostatic motors
(5) Range shifting

Dynamic stop



I006221

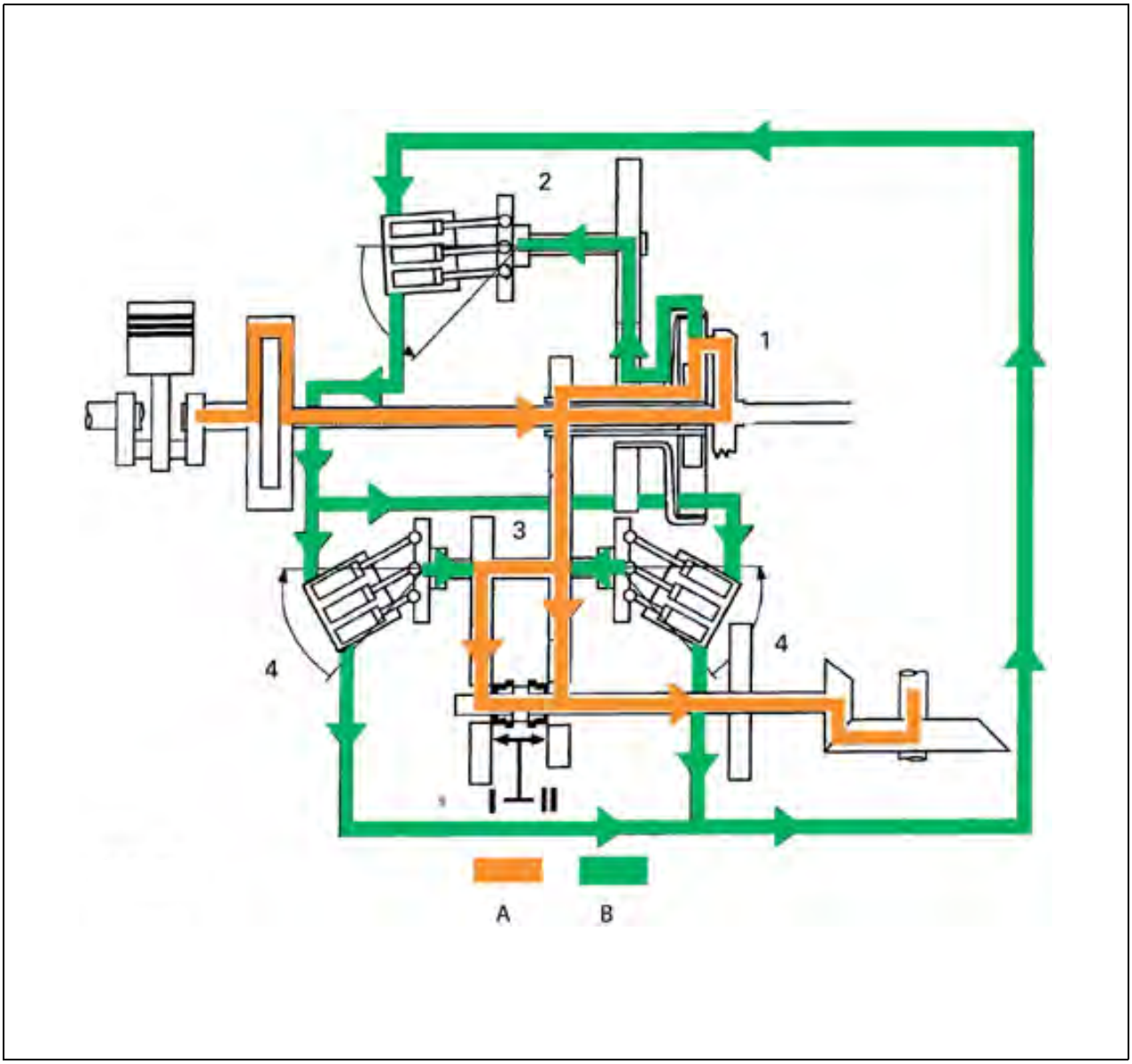
Fig. 12

Engine started, tractor at standstill

(A) Transmission of mechanical force
(B) Transmission of hydrostatic force

- The heat engine drives the planet carrier (E) (Fig. 10).
- The ring gear (F) turns, driving the pump (2) which has a zero flow rate.
- The hydrostatic motors (4) do not turn
- The sun gear (H) does not turn because it is locked by the tractor wheels via the rear axle crown wheel and pinion.

Start-up



I006222

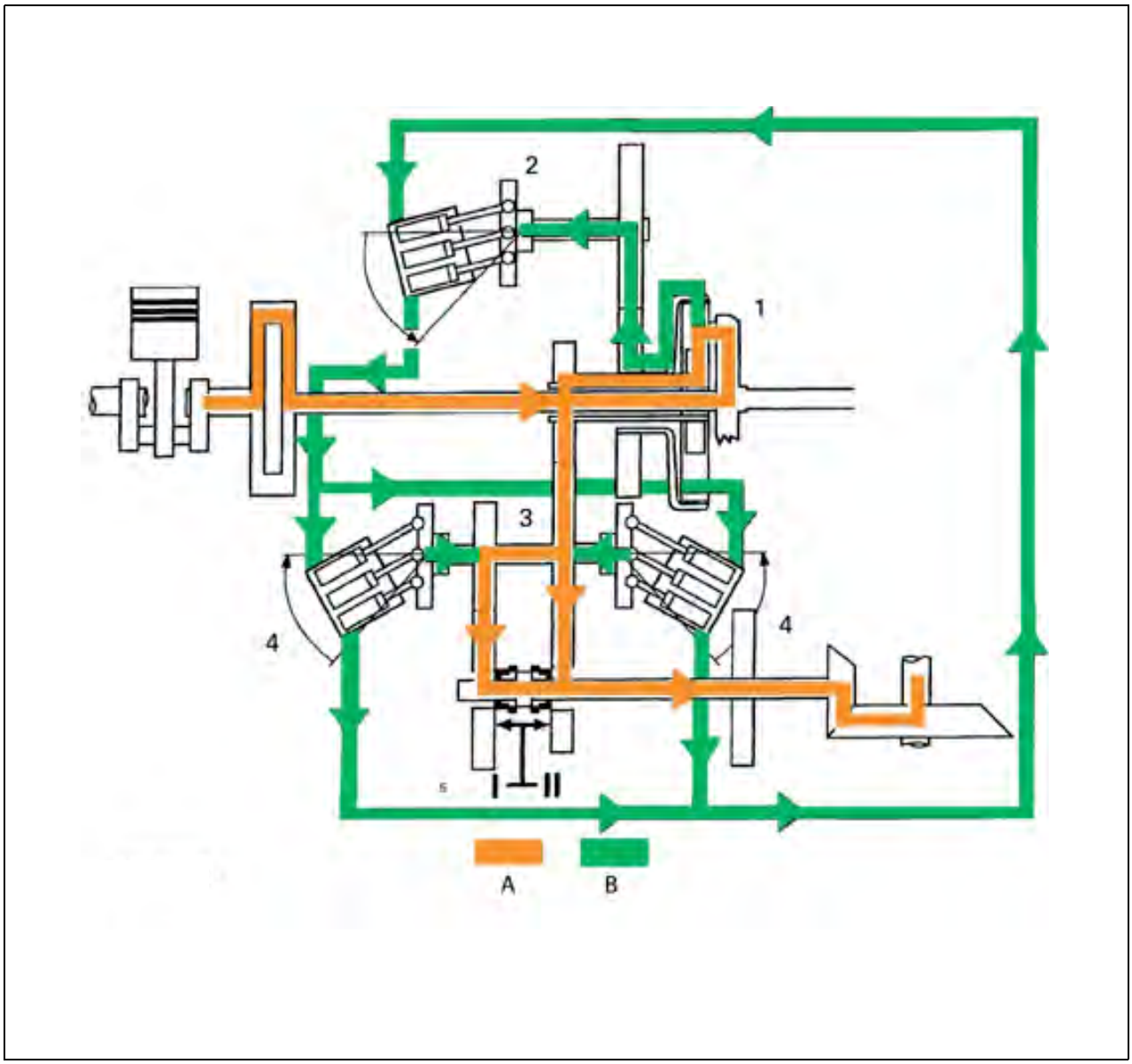
Fig. 13

99% transmission of hydrostatic power, 1% transmission of mechanical power.

(A) Transmission of mechanical force
(B) Transmission of hydrostatic force

- The pump (2) is angled and supplies flow to the motors (4).
- The motors (4) drive the rear axle.
- The sun gear starts to turn and the ring gear speed decreases

Average forward speed



I006223

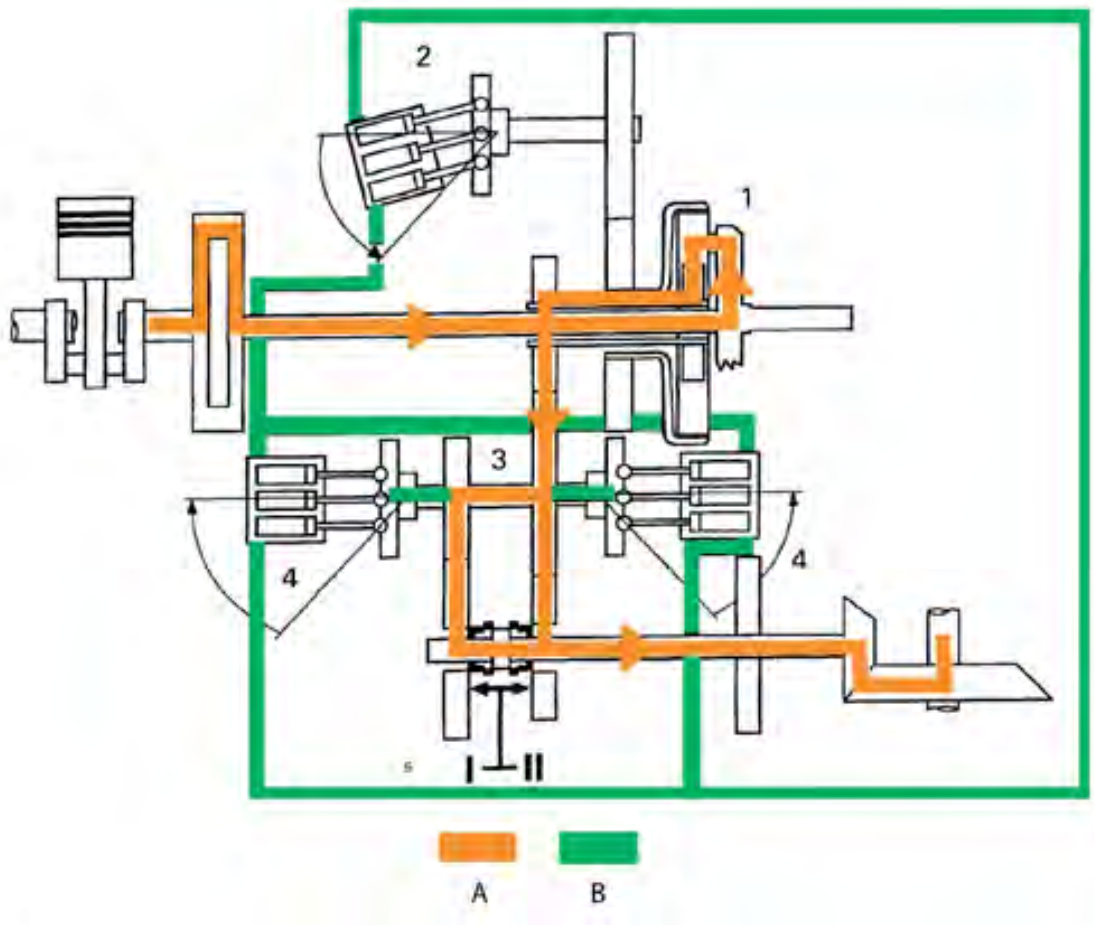
Fig. 14

50% transmission of hydrostatic power, 50% transmission of mechanical power.

(A) Transmission of mechanical force
(B) Transmission of hydrostatic force

- The angle of the pump (2) increases.
- The pump flow rate increases and the angle of the motors (4) is reduced.
- The sun gear speed increases, which increases the speed of the crown wheel and pinion.
- The planet carrier speed is constant.
- The ring gear speed decreases.

Transport



I006224

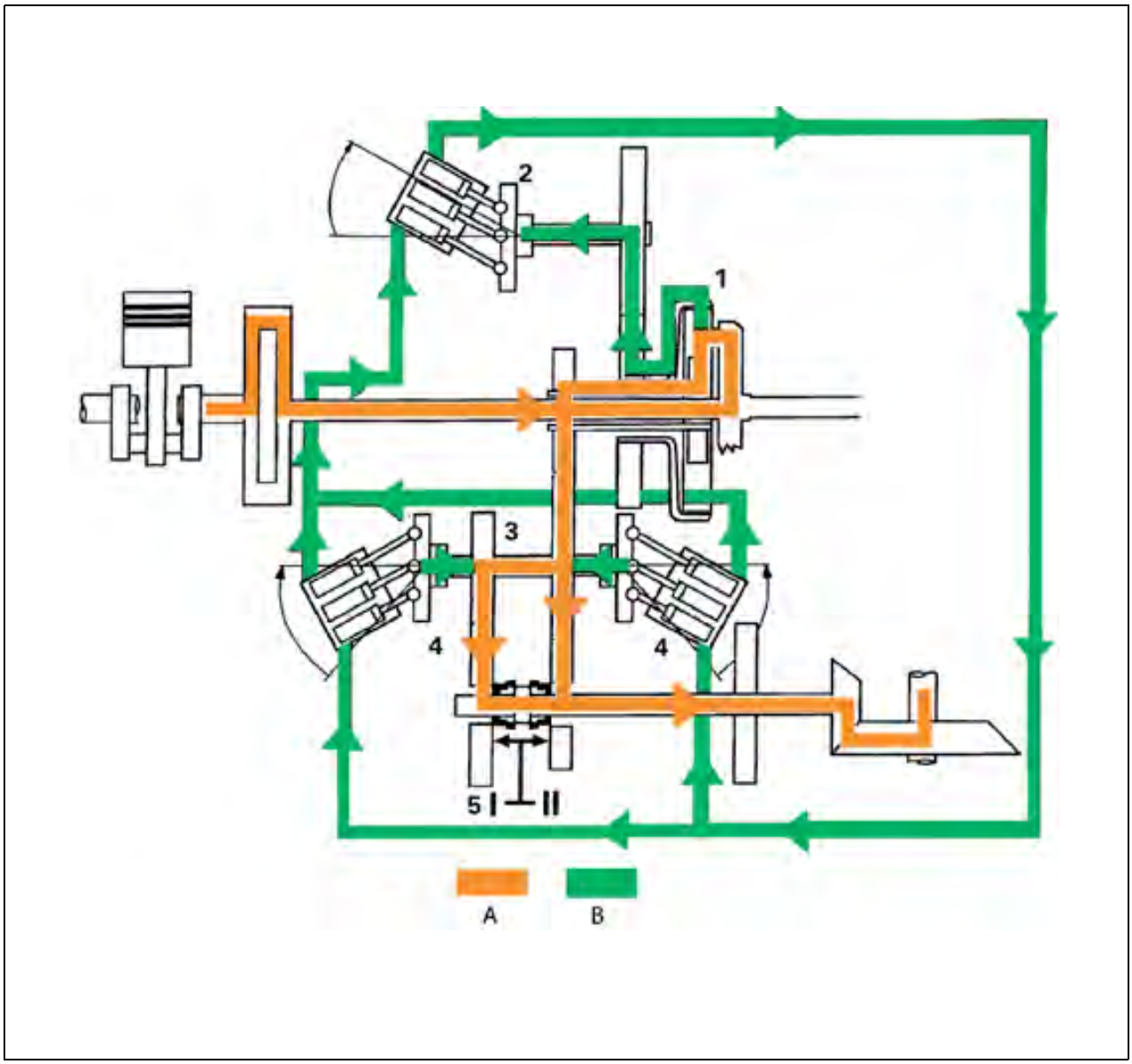
Fig. 15

Reduced engine speed, 100% transmission of mechanical power.

(A) Transmission of mechanical force
(B) Transmission of hydrostatic force

- The angle of the motors (4) is zero and the flow from the pump is blocked.
- The pump (2) does not turn; therefore the ring gear does not turn.
- The planet carrier turns.
- The sun gear turns, driving the crown wheel and pinion alone.

Reverse



I006226

Fig. 16

Average speed, 100% transmission of hydrostatic power, the ring gear turns faster than the heat engine.

(A) Transmission of mechanical force
(B) Transmission of hydrostatic force

- The flow from the pump (2) is reversed (pump tilted to the opposite angle)
- The motors (4) turn in the opposite direction.
- The sun gear therefore turns in the opposite direction to the planet carrier, also driving the crown wheel and pinion in the opposite direction.
- The ring gear speed increases

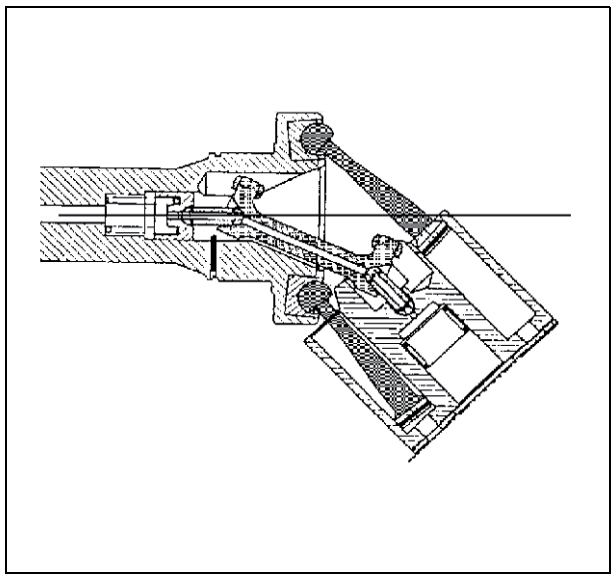
Layout of the hydrostatic components

For conventional hydrostatic components, the angle of rotation reaches only 30°.
Example of a conventional variable displacement pump with axial pistons.

In contrast to the hydrostatic components, this system is specially designed to provide an angle of rotation of 45°.

Example of a special variable displacement pump with axial pistons. This represents:

- Higher intrinsic yield of hydrostatic components with respect to conventional components.
- An angle of rotation of 45° offers the possibility of increasing the scope of the forward speed, resulting in a reduced number of mechanical ranges.



I007084

Fig. 17

5A11

ML260 - Error codes

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A. Reading error codes

	ERROR CODES DISPLAYED ON THE INSTRUMENT PANEL			
	DISPLAY with Dash Control Center			DISPLAY without Dash Control Center
Instrument panel		+	Letter D (Dashboard)	Letter D (Dashboard)
Engine		+	Letter E (Engine)	Letter E (Engine)
SCR system	no icon		Letter U (Urea)	Letter U (Urea)
Transmission/4WD/PTO		+	Letter T (Transmission)	Letter T (Transmission)
Lights module		+	Letter L (Light)	Letter L (Light)
ParkLock		+	Letter P (ParkLock)	Letter P (ParkLock)
Front axle		+	Letters FA (Front Axle)	Letters FA (Front Axle)
Linkage		+	Letters R (Linkage)	Letter R (Linkage)
Electrohydraulic		+	Letters H (Hydraulics)	Letter H (Hydraulics)
Cab		+	Letters C (Cab)	Letter C (Cab)
Auto-Guide		+	Letters A (Auto-Guide)	Letter A (Auto-Guide)
Control Arm		+	Letters AR (ARmrest)	Letter AR (ARmrest)

	OTHER DISPLAYS
Automatic air conditioning	Displayed on the air conditioning module.

B. Transmission error codes

No.		Components concerned	Causes
T	4105	**X34** - Transmission oil high pressure sensor 2	Signal error - 8.5 V supply error
T	4107	**X9** - Transmission oil high pressure sensor 1	Signal error - 8.5 V supply error
T	4108	**X17** - Hare/Tortoise range position sensor	Signal error - 8.5 V supply error
T	4121		Signal error
T	4127	**X10** - Collecting shaft speed sensor	Signal error
T	4128	**X18** - Transmission control module	Signal error
T	412A	**X8** - Bevel gear theoretical speed sensor	Signal error
T	412B	**X123** - Hare/Tortoise range shift switch	Signal error
T	4131	**X10** - Collecting shaft speed sensor	Direction of rotation signal error
T	4142		Rotation speed signal error
T	4144	**X25** - Engine speed sensor	Signal error
T	4145	**X8** - Bevel gear theoretical speed sensor	Signal error
T	4150	**X20** - Transmission filter blockage switch	Filter blocked
T	4153	**X19** - Transmission hydraulic oil temperature sensor	Transmission oil temperature higher than 110°C
T	4156	**X20** - Transmission filter blockage switch	Signal error
T	4158	Transmission slip monitor	The transmission output speed indicates over 30% slippage compared to the value given
T	4159	Engagement of limp home mode	Manual engagement of limp home mode without reason
			Limp home mode error
T	4161	**X14** - Tortoise range solenoid valve	Control error when shifting from Hare to Tortoise mode
T	4162	**X13** - Hare range solenoid valve	Control error when shifting from Tortoise to Hare mode
T	4163	**X11** - Solenoid valve limiting speed to 30 kph	Control error
T	4164	**X12** - Coupler function solenoid valve	PWM control error
T	4172	**X20** - Transmission filter blockage switch	Signal error
T	4173	**X19** - Transmission hydraulic oil temperature sensor	Signal error
T	4182	**X8** - Bevel gear theoretical speed sensor	Inconsistent speeds
		X10 - Collecting shaft speed sensor	
T	4183	**X8** - Bevel gear theoretical speed sensor	Inconsistent direction of rotation.
		X10 - Collecting shaft speed sensor	
T	4185	**X25** - Engine speed sensor	Inconsistent speed
T	4186	**X9** - Transmission oil high pressure sensor 1	Inconsistent values
		X34 - Transmission oil high pressure sensor 2	
T	4189	**X19** - Transmission hydraulic oil temperature sensor	Inconsistent value
T	4192	**X67** - Right-hand brake pedal sensor	Data transfer interrupted
T	4193	**X66** - Left-hand brake pedal sensor	Data transfer interrupted
T	41A0	**X18** - Transmission control module	Control of control module interrupted
T	41A1	**X18** - Transmission control module	The angle of rotation is limited, but not by the speed limiting solenoid valve
T	41A2	**X18** - Transmission control module	The CAN network control is interrupted
		X174 - Autotronic 4 transmission controller	
T	41A3	**X18** - Transmission control module	Increment sensor signal (internal actual position sensor) interrupted or illogical
T	41A4	**X18** - Transmission control module	Autotronic 4 signal interrupted or illogical
T	41A5	**X18** - Transmission control module	Reference output (Position "0") not found at start-up
T	41A6	**X18** - Transmission control module	Reference point signal interrupted during operation

No.		Components concerned	Causes
T	41B0	CAN network	Initialisation error
T	41B1	**X174** - Autotronic 4 transmission controller	Illogical range shift
T	41B2	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41B3	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41B4	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41B5	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41C1	**X174** - Autotronic 4 transmission controller	The engine has stalled due to transmission overload
T	41CF	**X174** - Autotronic 4 transmission controller	Internal error (RAM/EEPROM)
T	41E0	**X174** - Autotronic 4 transmission controller	Coupler function reference curve incorrectly interpreted, faulty programming
		X12 - Coupler function solenoid valve	Signal error
T	41E1	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41E2	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41E3	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41E4	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41E5	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41E6	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41E7	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41E9	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41EA	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41EB	**X17** - Hare/Tortoise range position sensor	Calibration error or sensor value out of tolerance ranges
T	41EE	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41EF	**X174** - Autotronic 4 transmission controller	Faulty programming
T	41FF	**X174** - Autotronic 4 transmission controller	Internal error (RAM/EEPROM)

C. 4WD/Differential lock error codes

No.		Components concerned	Causes
T	5131	**X137** - 4WD switch	Incorrect manual engagement signal
T	5132		Incorrect automatic engagement signal
T	5133	**X5** - 4WD solenoid valve	Control error
T	5151	**X136** - Differential lock switch	Signal error
T	5153	**X6** - Differential lock solenoid valve	Control error
T	5154	**X66** - Left-hand brake pedal sensor	Signal error
T	5555	**X67** - Right-hand brake pedal sensor	Signal error

D. Armrest error codes

No.		Components concerned	Causes
AR	01	**X104** - Armrest Autotronic 5	10 V output fault
AR	02	**X104** - Armrest Autotronic 5	VIN Error - Vehicle electronic identification incorrect
AR	11	**X307** - FingerTIP 1	Short circuit 0 V
AR	12		Short circuit to 12 V
AR	21	**X308** - FingerTIP 2	Short circuit 0 V
AR	22		Short circuit to 12 V
AR	31	**X108** - FingerTIP 3	Short circuit 0 V
AR	32		Short circuit to 12 V
AR	41	**X109** - FingerTIP 4	Short circuit 0 V
AR	42		Short circuit to 12 V
AR	51	**X110** - FingerTIP 5	Short circuit 0 V
AR	52		Short circuit to 12 V
AR	61	**X130** - FingerTIP 6 front linkage function	Short circuit 0 V
AR	62		Short circuit to 12 V
AR	71	**X122** - Hand throttle	Short circuit 0 V
AR	72		Short circuit to 12 V
AR	81	**X121** - Rear linkage height/depth adjustment thumb wheel	Short circuit 0 V
AR	82		Short circuit to 12 V
AR	91	**X106** - Transmission lever in armrest	Short circuit 0 V
AR	92		Short circuit to 12 V

E. Instrument panel error codes

No.		Component(s) concerned	Cause(s)
D	121		Alternator regulator voltage too high (filtered battery signal)
D	122		Alternator regulator voltage too low (filtered battery signal)
D	127	**X197** - Diesel fuel gauge	Electrical signal too high
D	128		Electrical signal too low
D	129		Battery voltage too high (non-filtered battery signal)
D	130		Battery voltage too low (non-filtered battery signal)
D	133	**X71** - Throttle pedal sensor	Electrical signal too high
D	134		Electrical signal too low
D	135	**X56** - Power Control lever**X71** - Throttle pedal sensor	Electrical signal too high - C.N.
D	136		Electrical signal too low - C.N.
D	137	**X106** - Transmission lever in armrest	Electrical signal too high
D	138		Electrical signal too low
D	139	**X68** - Clutch pedal sensor	Electrical signal too high
D	140		Electrical signal too low
D	141	**X25** - Engine speed sensor	Engine speed signal not at maximum level
D	142	**X68** - Clutch pedal sensor	Short circuit to + 12 V AC
D	143		Short circuit to + 12 V AC - C.N.
D	144	**X56** - Power Control lever	Electrical signal too high
D	145		Electrical signal too low
D	146		Electrical signal too high
D	147		Electrical signal too low
D	148	**X55** - Instrument panel	Attempt to program with engine running
D	149		CAN network deactivated (CAN bus off)
D	150		CAN messages lost
D	151		Tractor speed too high
D	152	**X55** - Instrument panel	Hourmeter error for engine maintenance
D	153		Parameter table error
D	154		CAN communications from Autotronic 4 to DCC3 - C.N. Special failed
D	155	**X55** - Instrument panel	Incorrect tractor code selected
D	156	**X68** - Clutch pedal sensor	TOC stuck open
D	157	**X25** - Engine speed sensor	No electrical signal
D	158	**X106** - Transmission lever in armrest	Incorrect calibration of armrest lever
D	159	**X56** - Power Control lever	Neutral switch error in neutral - C.N. position
D	160		Neutral switch error outside neutral - C.N. position
D	164		CAN communications from EEM to DCC3 failed
D	170	**X122** - Hand throttle	
D	183	**X235** - Front axle steering sensor (WAS sensor)	Electrical signal too high
D	184		Electrical signal too low
D	185	**X57** - DOT Matrix keyboard	Electrical signal too high
D	186		Electrical signal too low
D	189	**X55** - Instrument panel	9.5 V output - electrical signal too high
D	190		9.5 V output - electrical signal too low
D	191	**X168** - Pneumatic brake system pressure sensor	Electrical signal too high
D	192		Electrical signal too low

No.		Component(s) concerned	Cause(s)
D	193	**X144** - Variable steering setting potentiometer (fast steering)	Electrical signal too high
D	194		Electrical signal too low
D	195	**X55** - Instrument panel	Electrical signal too high
D	196		Electrical signal too low
D	197	**X1** - Auxiliary hydraulic oil temperature sensor	Electrical signal too high
D	198		Electrical signal too low

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ML260 - Diagrams and plans

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Different systems
(1) Valve block (fuel lift/lubrication)
(2) Hydrostatic loop
(3) Settings
(4) Transmission control unit
(5) Rear axle
(6) Solenoid valve block on rear axle

Pumps
(1P1) Service pump
(1P2) Lubrication pump
(2P1) Hydrostatic pump

Drive components
(2A1) Hydrostatic motor
(2A2) Hydrostatic motor
(3A1) Piston for setting the hydrostatic pump displacement
(3A2) Piston for setting the hydrostatic motor displacement
(3A3) Forward speed limiter in limp home mode
(4A1) Forward range selector
(6A1) Rear PTO clutch
(6A3) 1000 rpm PTO selector piston
(6A4) Front axle clutch
(6A5) Rear axle differential lock
(6A6) 750 rpm PTO selector piston
(6A7) Front axle differential lock

Sensors
(1S1) Transmission oil temperature sensor
(1S2) Pressure filter blockage switch
(4S1) HP loop pressure sensor
(4S2) Pressure sensor

Other components
(1Z1) Intake filter with bypass
(1Z2) Pressure filter with bypass
(1Z3) Transmission oil cooler
(1Z4) Transmission lubrication
(3Z1) Cam channel adjustment shaft
(3Z2) Control unit
(4Z1) Clutch pedal with clutch master cylinder
(4Z2) Accumulator
(5Z2) Rear PTO lubrication
(5Z3) Differential and right-hand brake lubrication
(5Z4) Differential and left-hand brake lubrication

Valves (or spool valves/solenoid valves)
(1V1) Cooler bypass valve
(1V2) Flushing pressure relief valve
(1V3) Fuel lift pressure relief valve
(1V4) Lubricating pressure relief valve
(1V5) Service pump pressure relief valve
(1V6) System pressure relief valve
(2V1) Reverse fuel lift non-return valve
(2V2) Forward fuel lift non-return valve
(2V3) Forward high-pressure relief valve
(2V4) Reverse high-pressure relief valve
(2V5) Flushing valve
(2V6) Shuttle valve
(3V1) Hydrostatic pump control spool valve
(3V2) Hydrostatic motor control spool valve
(4V1) Hare range solenoid valve

Valves (or spool valves/solenoid valves)
(4V2) Tortoise range solenoid valve
(4V3) Forward speed limiting solenoid valve
(4V4) Coupler function solenoid valve
(4V5) Clutch function spool valve
(4V6) Rear axle pressure relief spool valve
(6V1) Rear PTO clutch solenoid valve
(6V3) 540 (or 750) rpm PTO control solenoid valve (depending on equipment)
(6V4) Front axle clutch solenoid valve
(6V5) Differential lock solenoid valve
(6V6) 1000 rpm PTO control solenoid valve

Measurement points
(M1) Pressure upstream of cooler
(M2) Lubricating pressure
(M3) Flushing pressure
(M4) Fuel lift pressure
(M5) Service pump pressure
(M6) Transmission system pressure
(M7) Range 1 engaging pressure (Tortoise)
(M8) Range 2 engaging pressure (Hare)
(M9) High pressure
(M10) Rear axle and brake system pressure
(M11) PTO clutch pressure
(M13) 540 (or 750) rpm PTO selector pressure (depending on equipment)
(M14) Front axle clutch pressure
(M15) Differential lock pressure
(M16) 1000 rpm PTO selector pressure
(M18) Lubricating pressure
(M22) Oil leak from clutch or coupler function valve

A.1 Transmission hydraulics diagram

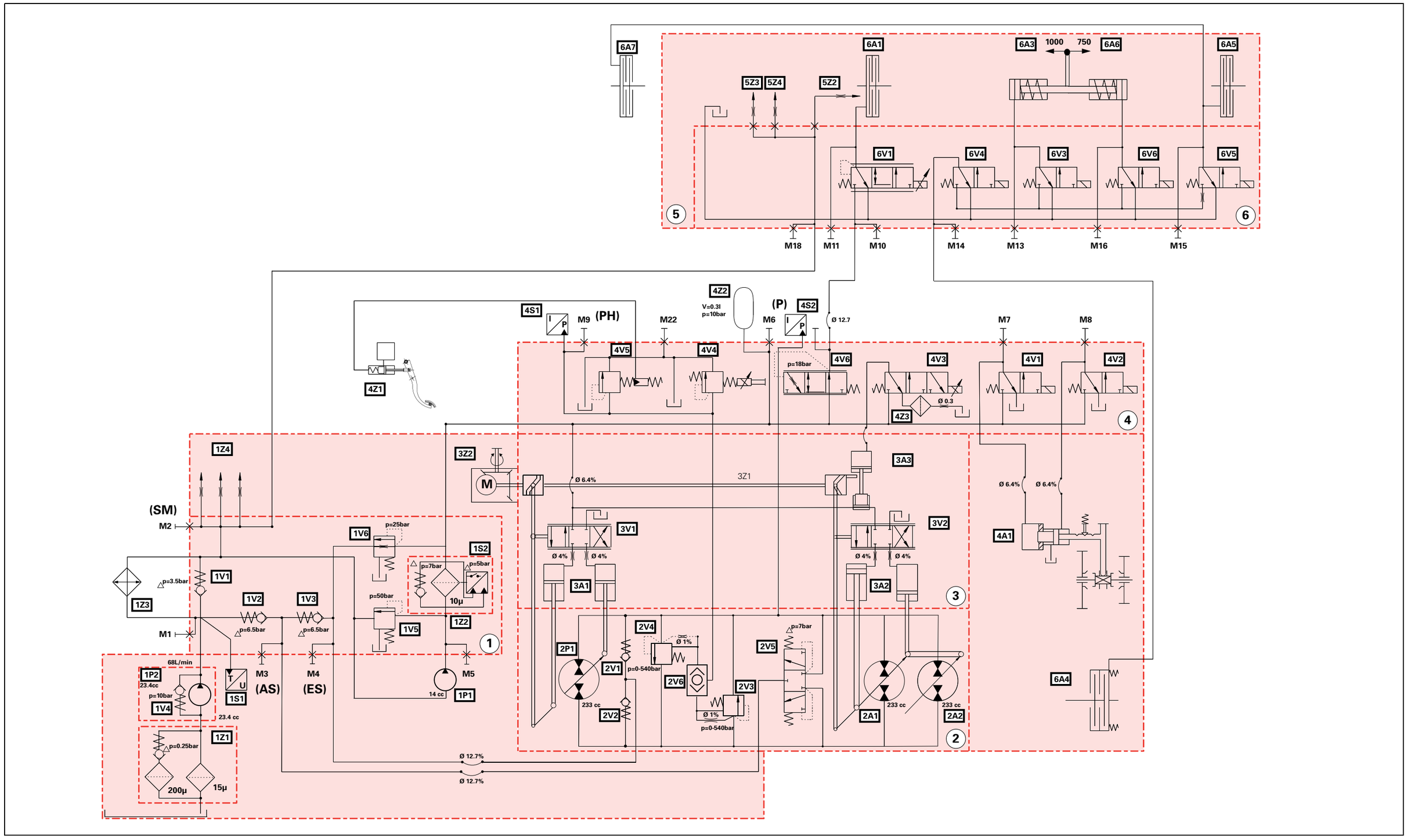
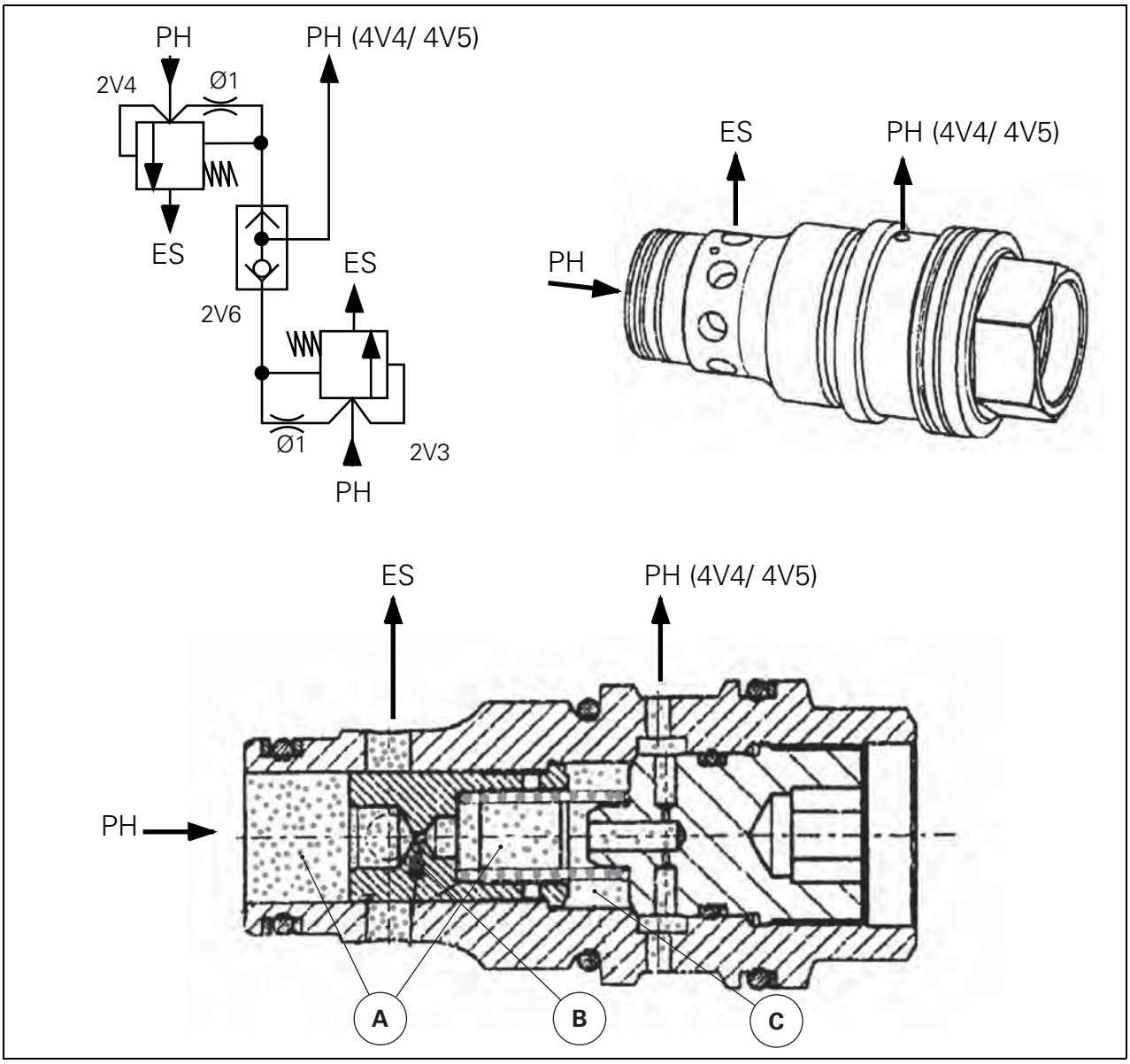


Fig. 1

A.2 Forward/reverse high-pressure relief valves

The purpose of the high-pressure relief valves is to regulate the increase in HP pressure. They protect the transmission components (hydrostatic motors and pump).



I008328

Fig. 2

(A) Coupler and clutch functions inactive: identical pressure in both chambers. The spool is held in closed position by the spring.

(B) Coupler and clutch functions active: the pressure drop caused by the restrictor (nozzle) applies a force to the spool that is greater than the force of the spring. The spool moves to the right, bringing PH into contact with ES (charge).

(C) HP pressure is limited by the coupler and clutch spools.

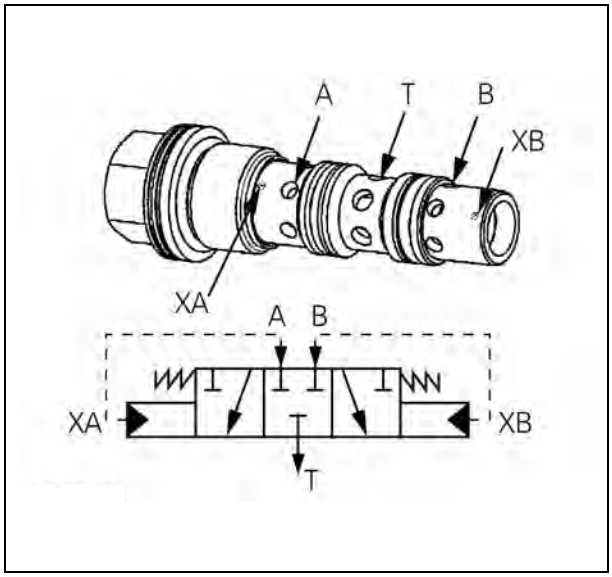
A.3 Flushing valve

This valve "rinses" the oil inside the hydrostatic loop.

Operation

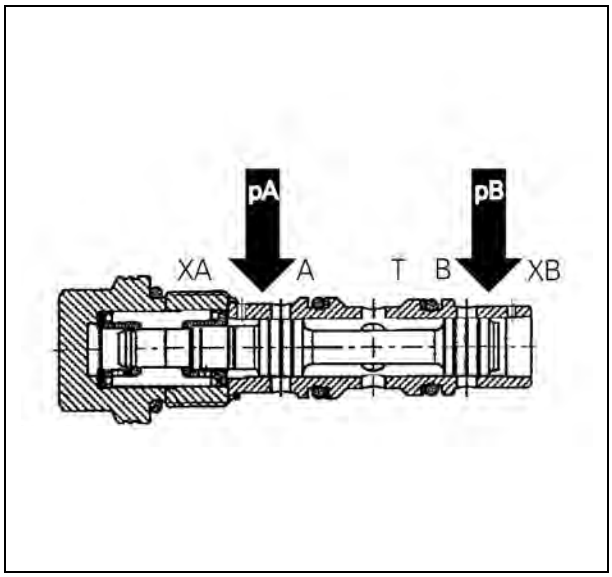
Pressure at A and B: max.. 500 bar
Pressure at T: max. 50 bar.
Opening pressure: delta p = 7 bar between A and B

Transmission in "neutral"



I008329 Fig. 3

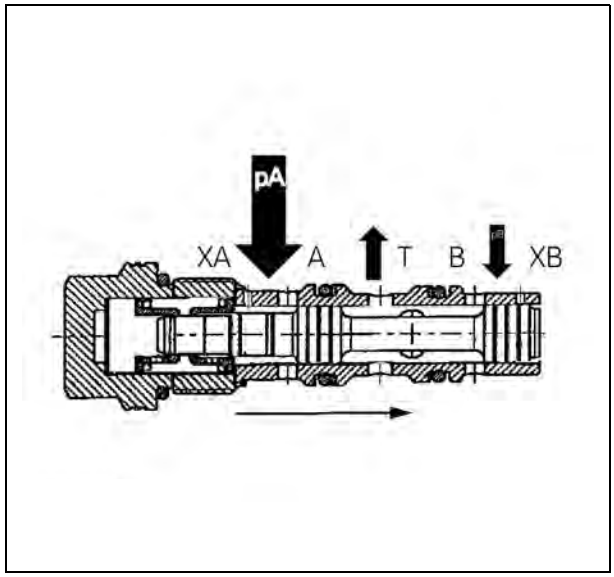
pA = pB, delta p < 7 bar
The spool is held in "mid" position by the spring.
The two channels (A and B) are closed.



I008330 Fig. 4

"Pulling" phase

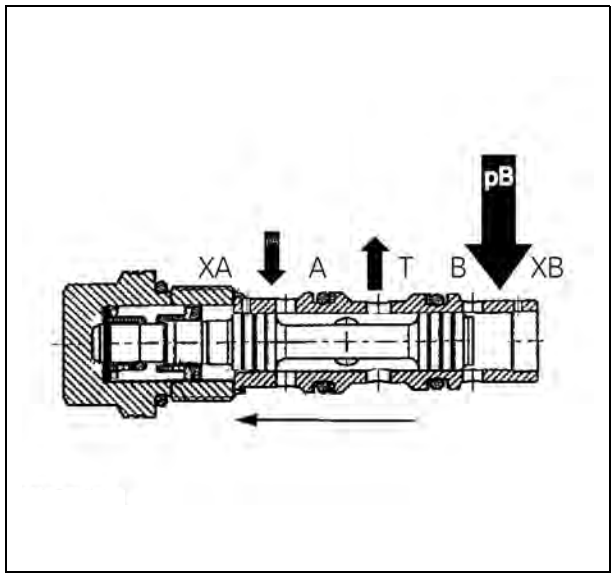
pA > pB, delta p > 7 bar
The spool moves upwards via the control port XA.
Channel B is linked to T. The hot oil coming from the low pressure side B can therefore be "rinsed" and flow through the cooler via port T.



I008331 Fig. 5

"Pushing" phase

pA < pB, delta p > 7 bar
The spool moves downwards via the control port XB.
Channel A is linked to T. The hot oil coming from the low pressure side A can therefore be "rinsed" and flow through the cooler via port T.



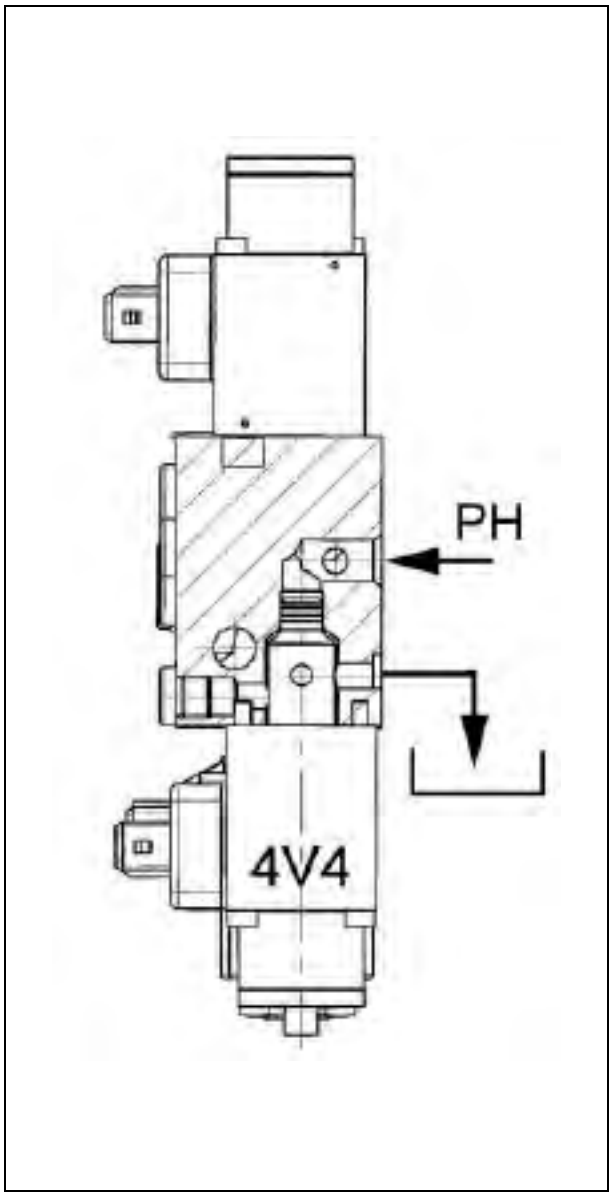
I008332 Fig. 6

A.4 Control spool valve

Pressure relief valve - 4V4 / Y004 coupler function

The coupler function valve (4V4) regulates the increase in hydrostatic pressure (PH) in proportion to the engine speed. This component simulates the coupler effect. The coupler function valve is fitted to the control unit where the hydrostatic loop PH and tank return junction is located. If this junction is not closed, the pressure in the hydrostatic loop cannot increase, and the tractor does not reach its maximum pulling power. The junction between the hydrostatic loop PH and tank is closed by the coupler function valve (4V4).

The coupler function valve is controlled by the electronic unit. The current supplied depends on the engine speed and changes as shown in the following table:



I009393

Fig. 7

Engine speed in rpm	Current supplied at A	Max. PH	Note
800	0	0 bar	Transmission in neutral
800	approx. 0.46	78 bar	Transmission "active"
1200	1.23	105 bar	
from 1400	1.71	540 bar	

The increase in pressure inside the HP loop depends on the electrical supply and the seal provided by the coupler function valve.

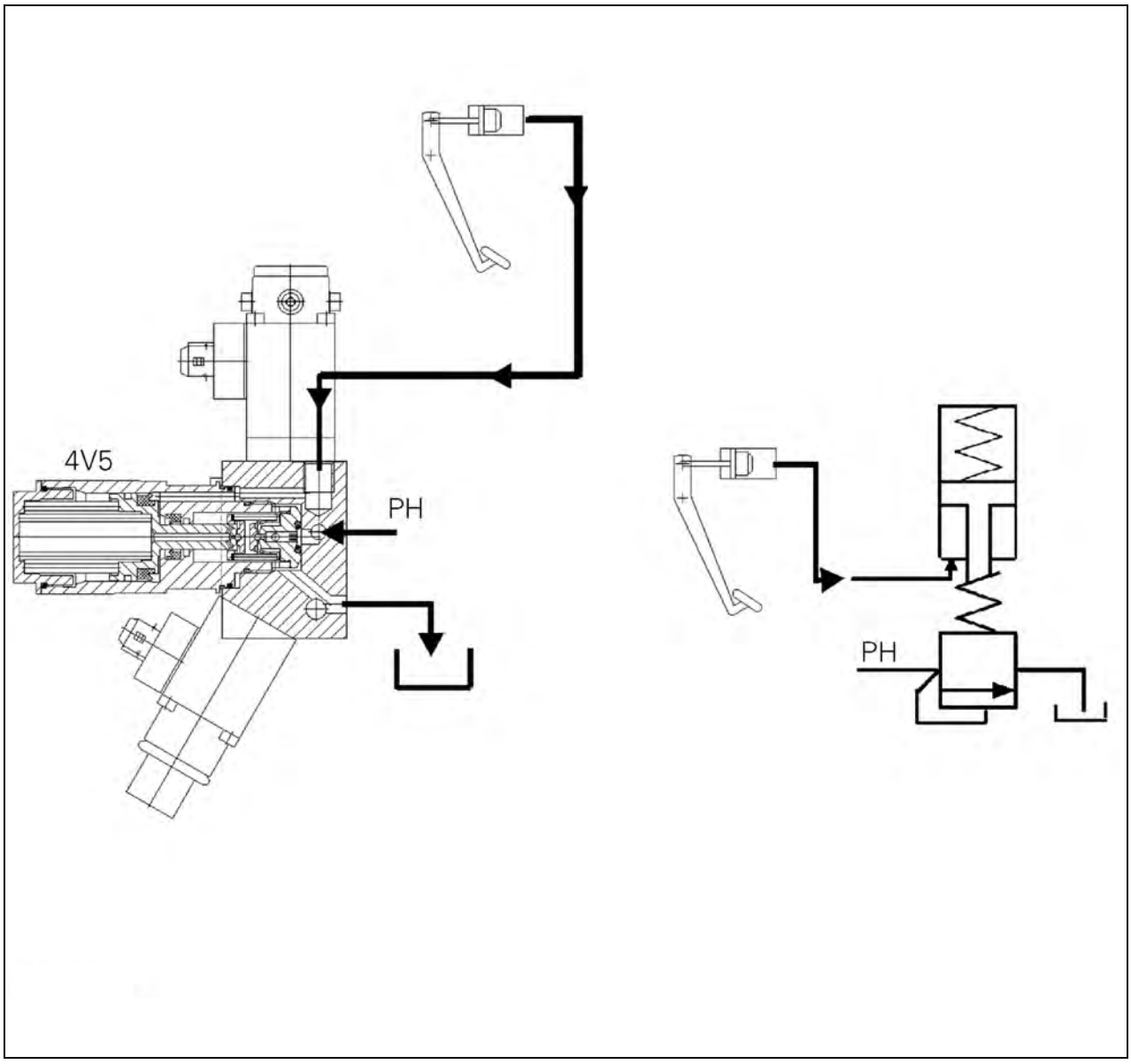
To check the sealing of this valve, it is possible to mechanically lock the seal.
Tighten the internal Allen screw.

Pressure relief valve - 4V5 clutch function

The clutch function valve is fitted to the control unit where the PH hydrostatic loop and tank return junction is located. This clutch function valve is also used to restrict the maximum PH pressure inside the hydrostatic loop to 550 bar (± 15 bar). Due to this clutch function valve, when the clutch pedal is not activated, the junction between the hydrostatic loop and the tank return is closed. By operating the clutch pedal, the clutch function valve opens and the hydrostatic loop is connected to the tank return channel. This results in a drop in pressure in the hydrostatic loop (interruption of the pulling effort), proportional to how far in the clutch pedal is pressed (comparable to a mechanical forward clutch).
With the clutch pedal fully depressed, High pressure PH = 0 bar
Maximum pressure inside the hydrostatic loop is dependent on perfect operation of the clutch valve (4V5).

I009394

Fig. 8



I008333

Fig. 9

Control unit

If maximum pressure is not reached when measuring the HP pressure, the transmission module may be defective, but it is also possible that internal sealing of the control unit is the cause of the problem. To ensure that it is necessary to disassemble the transmission module, it is recommended to first check the sealing of the spool valve unit (transmission control).

The pressure in the hydrostatic loop can only increase if the pressure relief valve seals are tight.

- Coupler function (4V4 / Y004)
- Clutch function (4V5)

When the following conditions are met, the coupler function valve authorises a pressure increase inside the hydrostatic loop:

- Engine speed above 1400 rpm (PWM - Signal)
- Limp home mode activated

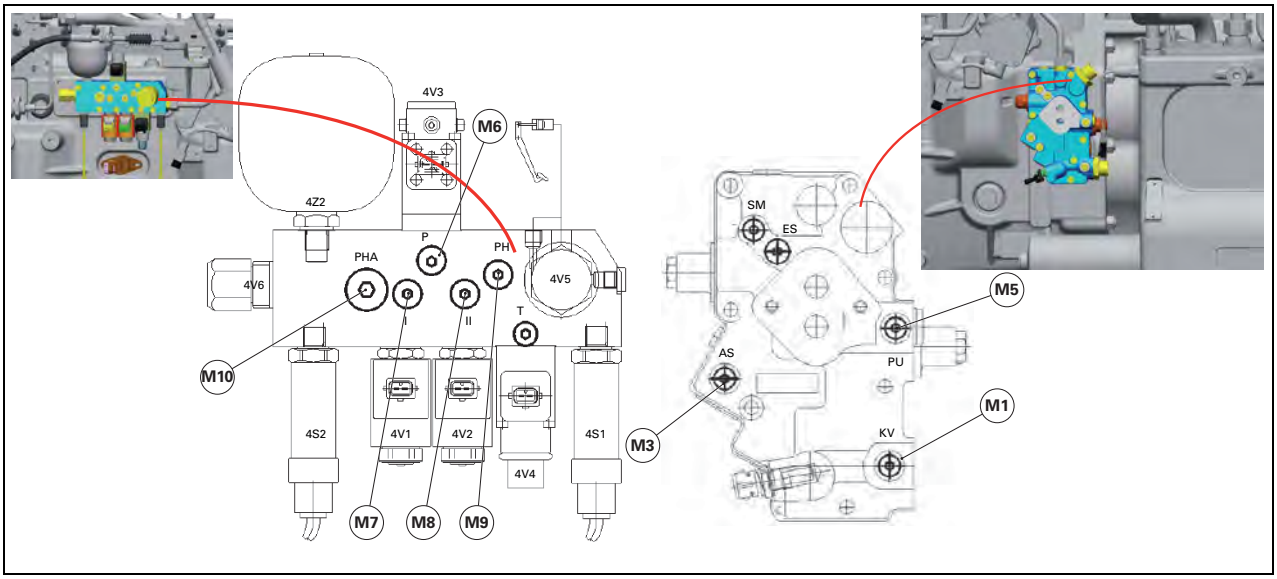
- Valve mechanically locked (tighten the internal Allen screw or move the lever).

The clutch function valve is closed (increase in HP pressure is possible) when the clutch pedal is not activated.

I008334

Fig. 10

Sealing of the 2 pressure relief valves (4V4 and 4V5) can be controlled by the T union.



I008335

Fig. 11

B. Electrical diagrams

B.1 Identification of electrical connectors and harnesses

Identification of electrical connectors
X1 - Auxiliary hydraulic oil temperature sensor
X2 - Auxiliary hydraulic oil filter blockage switch
X3 - 540 rpm PTO speed solenoid valve
X4 - 1000 rpm PTO speed solenoid valve
X5 - 4WD solenoid valve
X6 - Differential lock solenoid valve
X7 - Rear PTO solenoid valve
X8 - Bevel gear theoretical speed sensor
X9 - Transmission oil high pressure sensor 1
X10 - Collecting shaft speed sensor
X11 - Solenoid valve limiting speed to 30 kph
X12 - Coupler function solenoid valve
X13 - Hare range solenoid valve
X14 - Tortoise range solenoid valve
X15 - PTO clutch speed sensor
X16 - PTO shaft speed sensor
X17 - Hare/Tortoise range position sensor
X18 - Transmission control module
X19 - Transmission hydraulic oil temperature sensor
X20 - Transmission filter blockage switch
X21 - ParkLock brake pressure sensor
X22 - Radar
X23 - Steering pressure sensor
X24 - Auxiliary hydraulic oil gauge
X25 - Engine speed sensor
X26 - Pneumatic brake solenoid valve
X27 - Rear linkage lifting solenoid valve
X28 - Rear linkage lowering solenoid valve
X29 - Dual Control socket connector
X30 - Rear linkage position sensor
X31 - Rear linkage right-hand draft sensor
X32 - Rear linkage left-hand draft sensor
X33 - Transmission harness CAN junction
X34 - Transmission oil high pressure sensor 2
X35 - ParkLock hydraulic system pressure sensor
X36 - LS signal breaker solenoid valve
X37 - ParkLock pressure reversing solenoid valve
X38 - Trailer braking proportional solenoid valve
X39 - Trailer braking safety solenoid valve
X40 - Front linkage single/double acting function solenoid valve
X41 - Divider solenoid valve 1
X42 - Divider solenoid valve 2
X43 - Auto-hitch lifting solenoid valve
X44 - Auto-hitch lowering solenoid valve
X45 - Bleed for pneumatic suspended cab front and rear systems
X46 - Rear left-hand ram position sensor for cab suspension
X47 - Rear right-hand unit for suspended cab
X48 - Rear left-hand unit for suspended cab
X49 - Suspended cab rear lowering solenoid valve
X50 - Suspended cab front lowering solenoid valve
X51 - Transmission harness earth (chassis)

X52 - Engine harness/transmission harness junction
X53 - Cab transmission harness/transmission harness junction
X54 - Suspended cab lifting solenoid valve
X55 - Instrument panel
X56 - Power Control lever
X57 - DOT Matrix keyboard
X58 - Windscreen wiper and indicator control unit
X59 - DOT Matrix keyboard connection on instrument panel
X60 - Engine harness/instrument panel harness junction
X61 - Cab transmission harness/engine harness junction
X62 - Instrument panel harness/cab transmission harness junction
X63 - Instrument panel harness connection on fuse box
X64 - Instrument panel harness connection on fuse box
X65 - Front windscreen wiper motor
X66 - Left-hand brake pedal sensor
X67 - Right-hand brake pedal sensor
X68 - Clutch pedal sensor
X69 - Cab interior temperature sensor
X70 - Solar radiation sensor
X71 - Throttle pedal sensor
X72 - ParkLock switch on Power Control lever
X73 - Buzzer Control
X74 - Buzzer Supply (+12 V APC)
X75 - Pillar harness/right-hand fender harness junction
X76 - Rear right-hand indicator
X77 - Rear right-hand side light and stop light
X78 - Work light on rear right-hand fender
X79 - -
X80 - -
X81 - -
X82 - -
X83 - -
X84 - -
X85 - -
X86 - -
X87 - Linkage lifting/lowering switch on right-hand fender
X88 - Rear right-hand NA indicator extension
X89 - Earth (chassis)
X90 - Pillar harness/left-hand fender harness junction
X91 - Rear left-hand indicator
X92 - Rear left-hand side light and stop light
X93 - Work light on rear left-hand fender
X94 - PTO ON/OFF switch on left-hand fender
X95 - PTO Stop switch on left-hand fender
X96 - Hydraulic spool valve switch on left-hand fender
X97 - Linkage lifting/lowering switch on left-hand fender
X98 - Rear left-hand NA indicator extension
X99 - PTO and linkage console harness/cab transmission harness junction
X100 - Instrument panel harness earth (chassis)
X101 - Instrument panel harness/electric rear-view mirror harness junction
X102 - Right-hand fender lighting harness/trailer connector harness junction
X103 - Armrest harness/cab transmission harness junction
X104 - Armrest Autotronic 5
X105 - Datatronic CCD

X106 - Transmission lever in armrest
X107 - Headland mode switch (headland function)
X108 - FingerTIP 3
X109 - FingerTIP 4
X110 - FingerTIP 5
X111 - DTM dynamic transmission mode switch
X112 - Joystick
X113 - Armrest 6-button keyboard
X114 - Supply on fuse box for 3rd spool valve
X115 - Supply on fuse box for 4th spool valve
X116 - +12 V battery supply (for lighting module)
X117 - Isobus +12 V battery power socket
X118 - Automatic PTO switch
X119 - Rear linkage lifting/lowering switch
X120 - Datatronic CCD navigation keyboard
X121 - Rear linkage height/depth adjustment thumb wheel
X122 - Hand throttle
X123 - Hare/Tortoise range shift switch
X124 - Pedal/lever mode switch
X125 - SV1 speed setting potentiometer
X126 - SV2 speed setting potentiometer
X127 - Front PTO ON/OFF switch
X128 - Rear PTO ON/OFF switch
X129 - Fuse box +12 V battery connection
X130 - FingerTIP 6 front linkage function
X131 - Front linkage suspension solenoid valve
X132 - Instrument panel harness/armrest harness junction
X133 - Console harness/cab transmission harness junction
X134 - Console harness/pillar harness junction
X135 - Braking pressure sensor
X136 - Differential lock switch
X137 - 4WD switch
X138 - Hazard warning lights indicator light and switch
X139 - Suspended front axle switch
X140 - Suspended front axle setting potentiometer
X141 - Suspended cab switch
X142 - Suspended cab setting potentiometer
X143 - Variable steering switch (fast steering)
X144 - Variable steering setting potentiometer (fast steering)
X145 - PTO/linkage console
X146 - Rear linkage suspension switch
X147 - Roof harness/pillar harness junction
X148 - Roof harness/pillar harness junction
X149 - Headlights module (black connector)
X150 - Pillar harness/cab power socket harness junction
X151 - Pillar harness/cab power socket harness junction
X152 - Start switch
X153 - Non-Isobus implement connector
X154 - Suspended front axle lifting solenoid valve
X155 - Cigarette lighter socket (power)
X156 - Cigarette lighter socket (backlighting)
X157 - Left-hand side +12 V socket (power)
X158 - Left-hand side +12 V socket (backlighting)
X159 - Suspended front axle lowering solenoid valve
X160 - Console harness earth (chassis)
X161 - Solenoid valve 1 for suspended front axle suspension

X162 - Pillar harness connection on fuse box
X163 - Solenoid valve 2 for suspended front axle suspension
X164 - Pillar harness/cab transmission harness junction
X165 - Automatic air conditioning harness/pillar harness junction
X166 - Suspended front axle position sensor
X167 - +12 V APC fuse box connection
X168 - Pneumatic brake system pressure sensor
X169 - Power socket control switch (in cab)
X170 - Pillar harness connection on fuse box
X171 - Cab transmission harness connection on fuse box
X172 - Cab transmission harness connection on fuse box
X173 - Cab transmission harness earth
X174 - Autotronic 4 transmission controller
X175 - Emergency control switch
X176 - Earth (Autotronic 4 transmission controller)
X177 - Autotronic 5 Linkage
X178 - ParkLock/suspended front axle/passive suspended cab Autotronic 5
X179 - Main lighting, sidelight/dipped light activation switch
X180 - Front windscreen washer pump
X181 - Front linkage single acting / double acting function switch
X182 - Linkage external lifting switch
X183 - Diagnostics connector (tractor-Isobus CAN)
X184 - Diagnostics connector (engine-valve CAN)
X185 - Sisu EEM unit
X186 - Starter
X187 - Engine start relay
X188 - Engine identification module (ID module)
X189 - Fuel lift pump
X190 - Vistronic fan
X191 - Diesel fuel preheater
X192 - B + alternator 1
X193 - B + alternator 2
X194 - D + alternator 1
X195 - D + alternator 2
X196 - In line fuse (225 A)
X197 - Diesel fuel gauge
X198 - Pneumatic trailer brake sensor
X199 - Work light on left-hand step
X200 - Work light on right-hand step
X201 - Engine harness earth
X202 - Front accessory connection socket harness/front function harness junction
X203 - Engine harness/front headlights harness junction
X204 - Cooling unit harness/engine harness junction
X205 - Front axle harness/engine harness junction
X206 - Sensor detecting water in the diesel fuel
X207 - Pneumatic seat adjustment control
X208 - Front linkage suspension switch LED
X209 - Rear linkage external lowering switch
X210 - Orbitrol steering sensor (SASA sensor)
X211 - Rear Dual Control connector
X212 - Instrument panel harness/armrest harness junction
X213 - Power socket for additional heating
X214 - Armrest harness/cab transmission harness junction

X215 - Trailer connector (right-hand side light and number plate lights)
X216 - Reversing light
X217 - Isobus CAN connector
X218 - External Isobus tool connector
X219 - Cab Isobus harness/external Isobus harness junction
X220 - Trailer connector (left-hand side light)
X221 - Trailer connector (right-hand indicator)
X222 - Trailer connector (left-hand indicator)
X223 - Trailer connector (brake lights)
X224 - Trailer connector (earth)
X225 - Trailer connector (reversing light)
X226 - Trailer connector harness earth
X227 - Console harness/cab transmission harness junction
X228 - Front linkage single/double-acting function LED
X229 - 120 Ohm CAN 1 resistor (cab transmission harness)
X230 - 120 Ohm CAN 2 resistor (cab transmission harness)
X231 - 120 Ohm CAN 3 resistor (cab transmission harness)
X232 - 120 Ohm CAN 4 resistor (cab transmission harness)
X233 - Cab transmission harness/Isobus harness junction
X234 - 120 Ohm CAN ATC resistor
X235 - Front axle steering sensor (WAS sensor)
X236 - Electrohydraulic Orbitrol (grey connector)
X237 - Electrohydraulic Orbitrol (black connector)
X238 - Connector 1 for valve harness
X239 - Connector 2 for valve harness
X240 - 120 Ohm resistor for electrohydraulic spool valves
X241 - Sisu engine preheating supply (Grid Heater)
X242 - Exhaust temperature sensor
X243 - AdBlue/DEF reservoir (urea) level gauge and temperature sensor
X244 - CAN SCR harness
X245 - +12 V APC supply for SCR
X246 - Auto-Guide external harness/engine harness junction
X247 - Roof harness/electric rear-view mirror harness junction
X248 - Right and left-hand electric rear-view mirror adjustment switch
X249 - External rear-view mirror defroster switch
X250 - Power socket in cab
X251 - In line fuse (225 A)
X252 - Automatic air conditioning condenser
X253 - Air filter vacuum sensor
X254 - Horn (earth)
X255 - Horn
X256 - Roof harness/hand rail harness junction
X257 - Side light and indicator on hand rail (right and left)
X258 - Main beam on hand rail (right and left)
X259 - Hand rail upper work light
X260 - Hand rail upper work light
X261 - Front right-hand unit for suspended cab
X262 - Front left-hand unit for suspended cab
X263 - Floating stop relay control (US front-end loader)

X264 - Front linkage suspension switch
X265 - Rear linkage suspension switch indicator light
X266 - Rear linkage diagnostic and lifting/lowering LEDs
X267 - Switch for left-hand side heater
X268 - Pillar harness connection on fuse box
X269 - Cab suspension harness/cab transmission harness junction
X270 - Front accessories connection socket (rotary beacon)
X271 - Front accessories connection socket (+12 V battery)
X272 - Front accessories connection socket (+12 V APC)
X273 - Front accessories connection socket (main beam light)
X274 - Front accessories connection socket (main beam light)
X275 - Front accessories connection socket (work light)
X276 - Earth for front accessory connection socket harness
X277 - Front linkage lifting/lowering external control
X278 - Front linkage lifting switch (external)
X279 - Dual Control or TIC position sensor
X280 - Front linkage rams pressure sensor
X281 - Solenoid valve for front PTO
X282 - Roof harness/cab Auto-Guide harness junction
X283 - TopDock
X284 - Headlights module keyboard
X285 - Ad Blue (urea) metering valve
X286 - Ad Blue (urea) injection valve
X287 - Ad Blue (urea) reservoir preheating valve
X288 - 12/24 V converter for SCR system
X289 - SCR management module
X290 - Front accessory connection socket harness/front function harness junction
X291 - Front accessory connection socket harness/front function harness junction
X292 - Front windscreen washer pump
X293 - 540 rpm PTO switch
X294 - 540 eco rpm PTO switch
X295 - 1000 rpm PTO switch
X296 - USB connector
X297 - PTO/linkage console backlighting
X298 - Headland mode switch (headland function)
X299 - Linkage lowering speed potentiometer
X300 - -
X301 - PTO stop switch on left-hand fender
X302 - Switch for pre-selected engine speed A
X303 - Switch for pre-selected engine speed B
X304 - Instrument panel harness/armrest harness junction
X305 - Headlights module (grey connector)
X306 - Switch for pre-selected engine speed A/B
X307 - FingerTIP 1
X308 - FingerTIP 2
X309 - SV1/SV2 speed regulator switch
X310 - Divider 1 indicator light and solenoid valve (earth)
X311 - Divider 2 indicator light and solenoid valve (+12 V)
X312 - SV1/SV2 speed setting potentiometer in armrest
X313 - Pedal/lever transmission control mode switch and DTM switch
X314 - Hydraulics switch 1, road/field mode

X315 - Hydraulics switch 2, road/field mode
X316 - Headland mode switch (headland function)
X317 - + battery supply for headlights module
X318 - Automatic air conditioning compressor
X319 - + battery supply for headlights module
X320 - + battery supply on headlights module
X321 - + battery supply on headlights module
X322 - + battery supply on headlights module
X323 - + battery supply on headlights module
X324 - +12 V APC fuse box connector (battery isolator switch)
X325 - Pillar harness / non-Isobus implement connector harness junction
X326 - Pillar harness / non-Isobus implement connector harness junction
X327 - Battery earth (chassis)
X328 - Battery isolator switch earth terminal
X329 - Battery isolator switch earth terminal
X330 - Battery negative terminal contact (battery isolator switch)
X331 - Pillar harness connection on fuse box
X332 - + battery (start switch)
X333 - Engine harness earth (chassis)
X334 - Battery isolator switch earth terminal
X335 - Battery isolator switch earth terminal
X336 - Battery isolator switch
X337 - Pneumatic brake ParkLock solenoid valve
X338 - Earth (battery isolator switch)
X339 - Pneumatic trailer braking solenoid valve
X340 - + terminal on battery for fuse box
X341 - Starter supply
X342 - Positive battery terminal
X343 - RS232 diagnostics connector for Auto-Guide
X344 - Isobus connector in cab
X345 - Supply for additional terminal (mitron unit)
X346 - Auto-Guide switch
X347 - Cab transmission harness connection on fuse box
X348 - Cab transmission harness connection on fuse box
X349 - -
X350 - Front right-hand grille work light
X351 - Front right-hand grille work light
X352 - Front right-hand grille work light
X353 - Front left-hand grille work light
X354 - Front left-hand grille work light
X355 - Front left-hand grille work light
X356 - Right-hand main beam and dipped light
X357 - Left-hand main beam and dipped light
X358 - Outside temperature sensor
X359 - Cab suspension harness/cab transmission harness junction
X360 - Pillar harness connection on fuse box
X361 - Pillar harness connection on fuse box
X362 - Fuse box (+12 V battery)
X363 - Auto-hitch (Dromone) switch
X364 - 120 Ohm resistor for Auto-Guide/Isobus CAN network
X365 - Hand rail lower work light
X366 - Pneumatic brake harness / transmission harness junction
X367 - Switch 1 on joystick
X368 - Switch 2 on joystick

X369 - Engine speed + switch
X370 - Engine speed - switch
X371 - Engine speed stop switch
X372 - Orbitrol safety solenoid valve
X373 - Left-hand 12 V socket (cab) (power)
X374 - Left-hand 12 V socket (cab) (backlighting)
X375 - Instrument panel harness/cab transmission harness junction
X376 - Fuse box (reserve for + APC)
X377 - Fuse box (supply for cab suspension compressor)
X378 - FNRP lever and button
X379 - Front left-hand work light on roof
X380 - Front right-hand work light on roof
X381 - Front left-hand work light on roof
X382 - Front right-hand work light on roof
X383 - Front left-hand roof indicator
X384 - Front right-hand roof indicator
X385 - Rear left-hand work light on roof
X386 - Rear right-hand work light on roof
X387 - Rear left-hand work light on roof
X388 - Rear right-hand work light on roof
X389 - Rear left-hand work lights
X390 - Rear right-hand work lights
X391 - Rear left-hand roof indicator
X392 - Rear right-hand roof indicator
X393 - Earth
X394 - Radio aerial connector
X395 - Radio supply
X396 - Radio speaker connector
X397 - Front left-hand speaker
X398 - Front right-hand speaker
X399 - Rear left-hand speaker (+ supply)
X400 - Rear right-hand speaker (+ supply)
X401 - Rear left-hand speaker (- supply)
X402 - Rear right-hand speaker (- supply)
X403 - Rear windscreen wiper motor
X404 - Door switch
X405 - Interior light (earth)
X406 - Interior light (control)
X407 - Interior light (+12 V battery supply)
X408 - Right-hand console light
X409 - Left-hand rotary beacon
X410 - Right-hand rotary beacon
X411 - Rear windscreen wiper switch
X412 - Radio aerial
X413 - Earth (aerial)
X414 - Left-hand number plate light
X415 - Right-hand number plate light
X416 - Radio supply
X417 - Radio speaker connector
X418 - Earth
X419 - Earth
X420 - Rotary beacon harness earth (chassis)
X421 - Earth
X422 - Roof harness earth (chassis)
X423 - Left-hand side fan ON/OFF switch
X424 - Fan speed control knob
X425 - Air conditioning switch
X426 - Air conditioning indicator light
X427 - Manual air conditioning module
X428 - Electronic thermostat for heating

X429 - Speed 1relay for fan
X430 - Speed 2relay for fan
X431 - Speed 3relay for fan
X432 - Speed 4relay for fan
X433 - Left-hand heating resistor
X434 - Right-hand fan
X435 - Left-hand fan
X436 - Left-hand side fan switch
X437 - Relay for left-hand side fan
X438 - Earth (automatic air conditioning)
X439 - Air conditioning control module (blue connector)
X440 - Air conditioning control module (yellow connector)
X441 - Heating temperature sensor
X442 - TT2 sensor
X443 - Evaporator temperature sensor
X444 - Right-hand fan adapter module (signal)
X445 - Left-hand fan adapter module
X446 - Right-hand fan adapter module (supply)
X447 - Left-hand fan adapter module (supply)
X448 - Separation harness for automatic air conditioning
X449 - Motor for left-hand heating shutter
X450 - Motor for right-hand heating shutter
X451 - Motor for heating mixer shutter
X452 - Relay for heater pump
X453 - Heater accelerator pump
X454 - Earth (roof)
X455 - Roof harness earth
X456 - Solar panel
X457 - Earth (Auto-Guide)
X458 - Cab transmission harness/pillar harness junction
X459 - Linkage lifting switch on fender
X460 - Linkage lowering switch on fender
X461 - Pillar harness/TECU harness junction
X462 - Supply indicator light for power socket on pillar
X463 - Earth (Isobus)
X464 - Pillar harness/armrest harness junction
X465 - Battery positive terminal contact
X466 - Active suspended cab Autotronic 5
X467 - Right-hand electric rear-view mirror
X468 - Left-hand electric rear-view mirror
X469 - Additional fan connection
X470 - Operator presence in seat switch
X471 - Suspended cab harness connection

Identification of harnesses
FAI200 - Engine harness
FAI201 - Front headlights harness
FAI202 - Suspended front axle harness
FAI203 - Transmission harness
FAI204 - Cab/platform linkage external harness
FAI205 - Electrohydraulic valves harness
FAI206 - Transmission harness — PTO
FAI207 - Front Dual Control harness
FAI208 - Linkage with Dual Control and TIC harness
FAI209 - Instrument panel harness
FAI210 - Cab transmission harness
FAI211 - Cab linkage harness
FAI212 - Lighting harness
FAI213 - Cab interior lighting harness
FAI214 - Armrest harness

FAI215 - Pillar harness
FAI216 - Diagnostics connector harness
FAI217 - Datatronic 3 harness
FAI218 - Fieldstar harness
FAI219 - Cab interior power socket harness
FAI220 - BOC harness — safety switch
FAI221 - Automatic air conditioning harness — instrument panel
FAI222 - Autotronic 5 ParkLock/suspended front axle harness
FAI223 - Roof harness
FAI224 - Hand rail lighting harness
FAI225 - Electric rear-view mirror harness
FAI226 - Roof/external harness
FAI227 - Automatic air conditioning harness - roof
FAI228 - Number plate lighting harness
FAI229 - Xenon light adapter harness
FAI230 - GSPTO harness
FAI231 - Transmission harness — ParkLock
FAI232 - Radio harness
FAI235 - Front accessory connection socket harness
FAI236 - Start-up harness
FAI237 - +12 APC fuse box harness
FAI238 - +12 APC instrument panel harness
FAI239 - Permanent +12 V supply harness
FAI240 - +12 V permanent fuse box harness
FAI241 - Automatic air conditioning adapter harness
FAI242 - Main beams on hand rail adapter harness
FAI243 - Circuit breaker harness
FAI244 - Linkage external controls extension harness
FAI245 - Left-hand linkage external controls harness
FAI246 - Right-hand linkage external controls harness
FAI247 - PTO shunt harness
FAI248 - Linkage external controls harness
FAI249 - Suspended front axle harness
FAI250 - Engine harness
FAI251 - Parking brake harness
FAI252 - +12 V battery harness
FAI253 - Hand rail harness
FAI254 - Windscreen wiper harness
FAI255 - Windscreen wiper harness
FAI256 - High-visibility roof heating harness
FAI257 - High-visibility roof heating harness
FAI258 - Roof earth harness
FAI260 - Cooling unit harness
FAI261 - Isobus harness
FAI262 - Auto-Guide engine harness
FAI263 - Auto-Guide cab adapter harness
FAI265 - Pneumatic brake harness
FAI267 - Console harness
FAI268 - Front function harness
FAI271 - Cab electric rear-view mirror harness
FAI272 - Active suspended cab harness
FAI273 - Front linkage harness
FAI274 - Rear right-hand lighting harness
FAI275 - Trailer connector harness
FAI276 - Rear left-hand lighting harness
FAI280 - Negative battery harness
FAI281 - Negative battery harness
FAI282 - Negative battery harness
FAI283 - TopDock harness

FAIxxx - Non-Isobus tool connector harness
FAIxxx - Non-Isobus implement connector controller harness
FAIxxx - Additional fan harness

B.2 Fuse box supply with circuit breaker

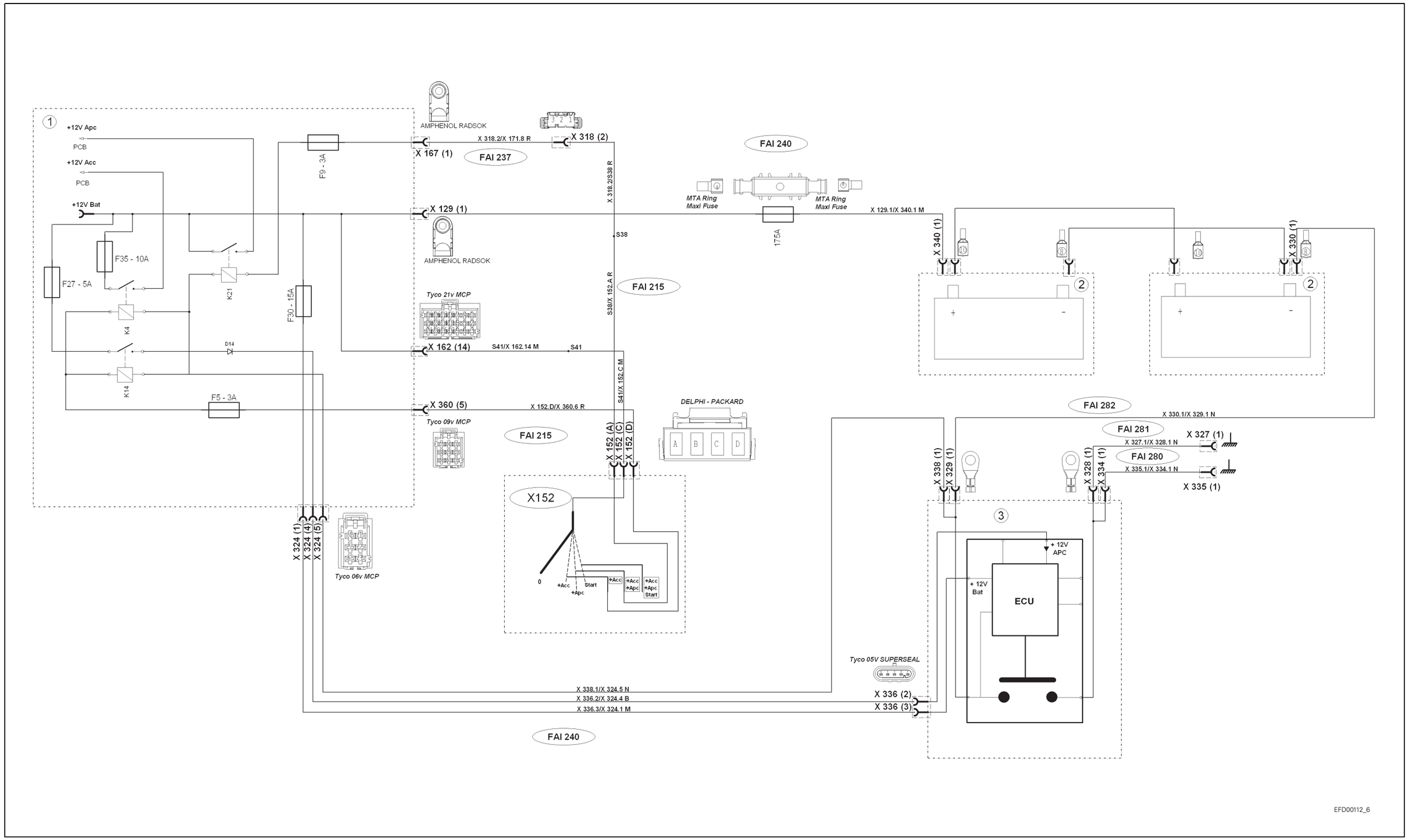


Fig. 12

B.3 Autotronic 4 electrical power supply

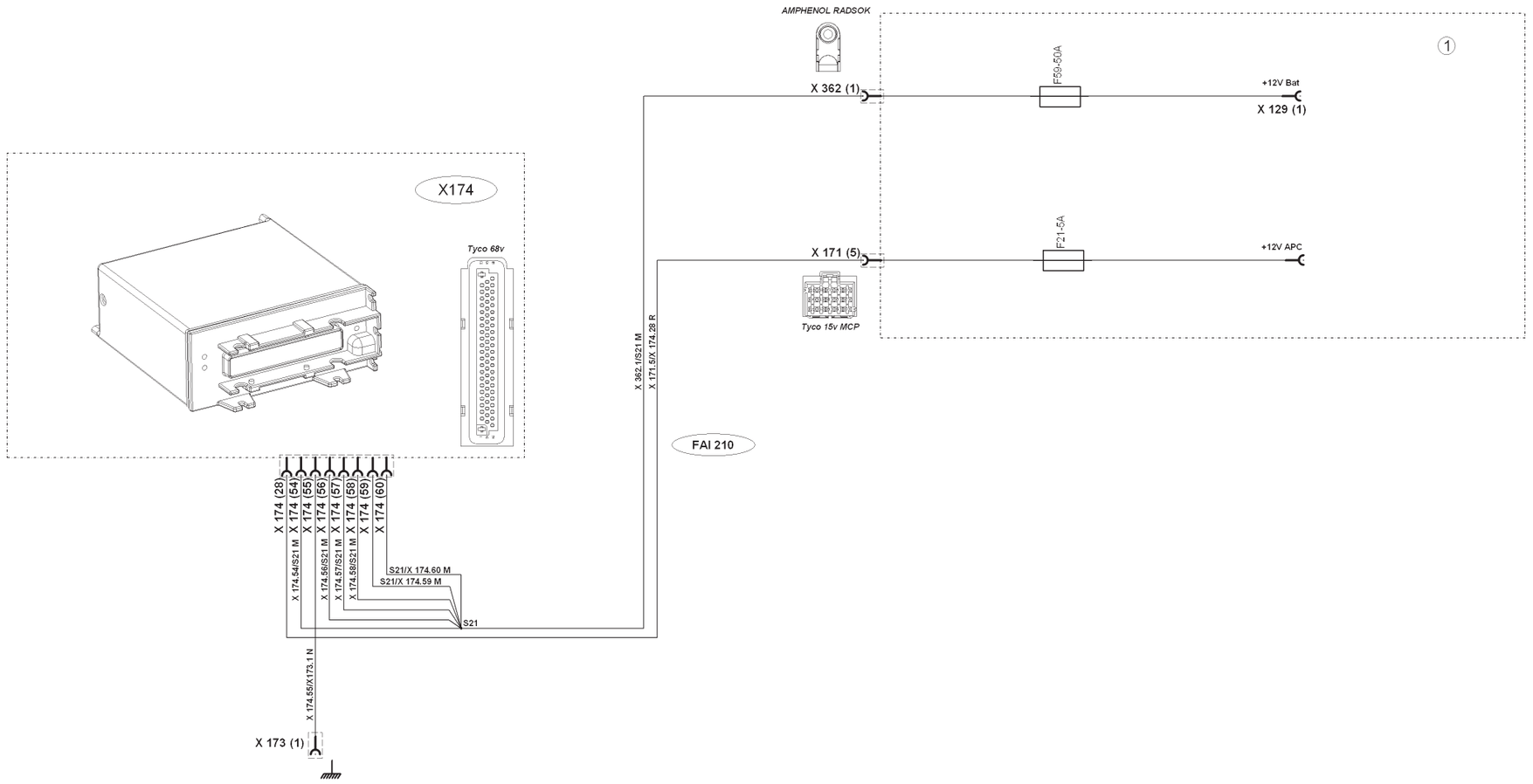


Fig. 13

B.4 Autotronic 5 linkage electrical power supply

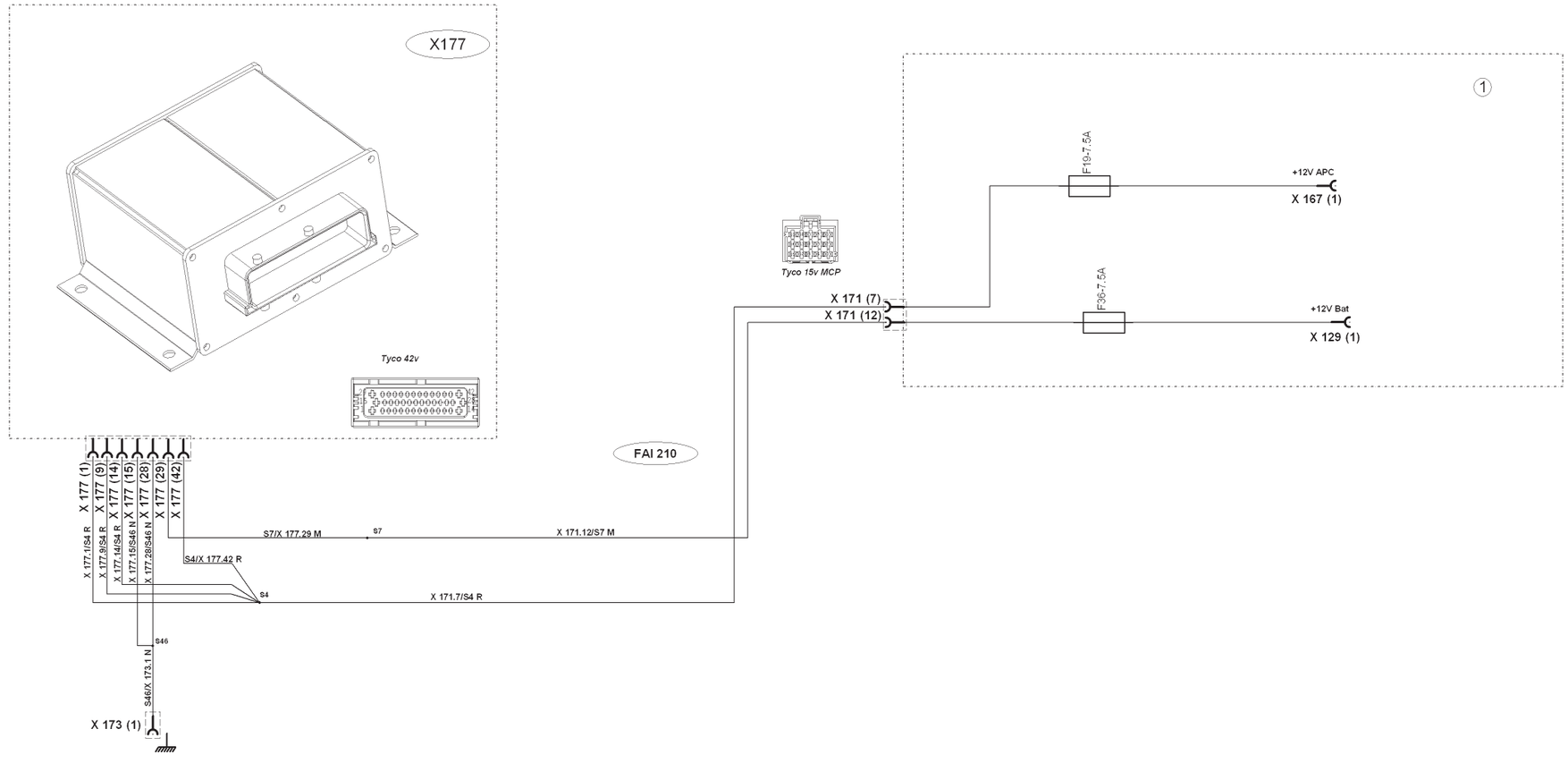


Fig. 14

B.5 Autotronic 5 ParkLock/suspended front axle electrical power supply

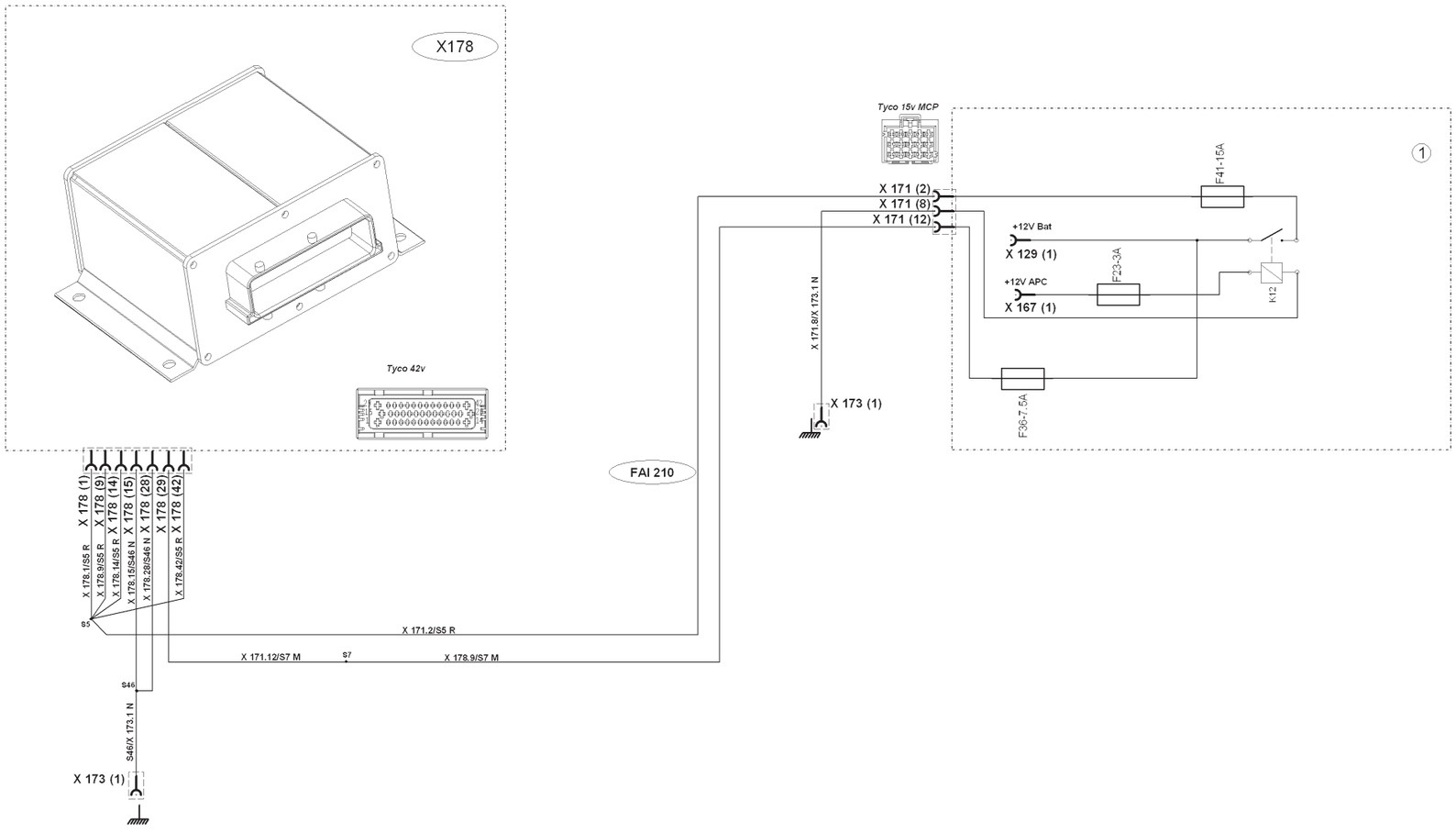


Fig. 15

B.6 DCC3 instrument panel electrical power supply

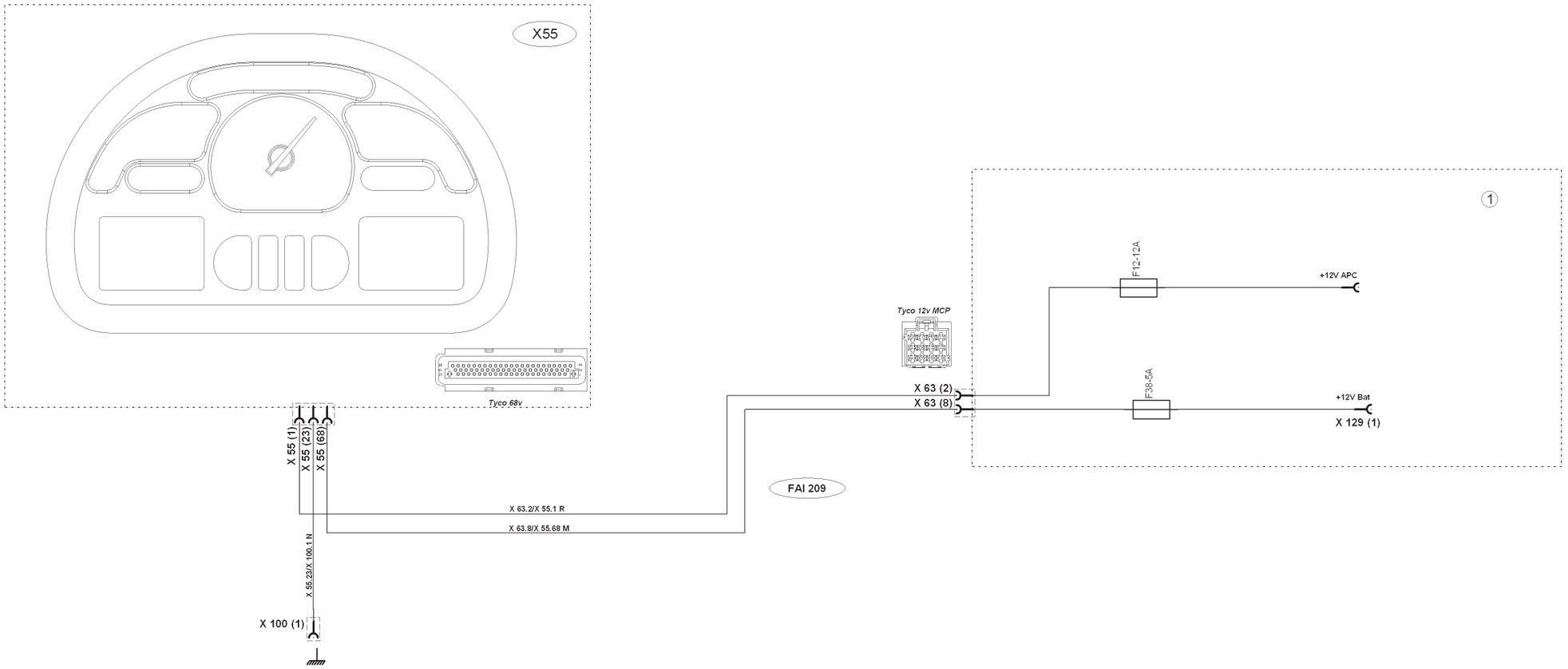


Fig. 16

B.7 Autotronic 5 armrest electrical power supply

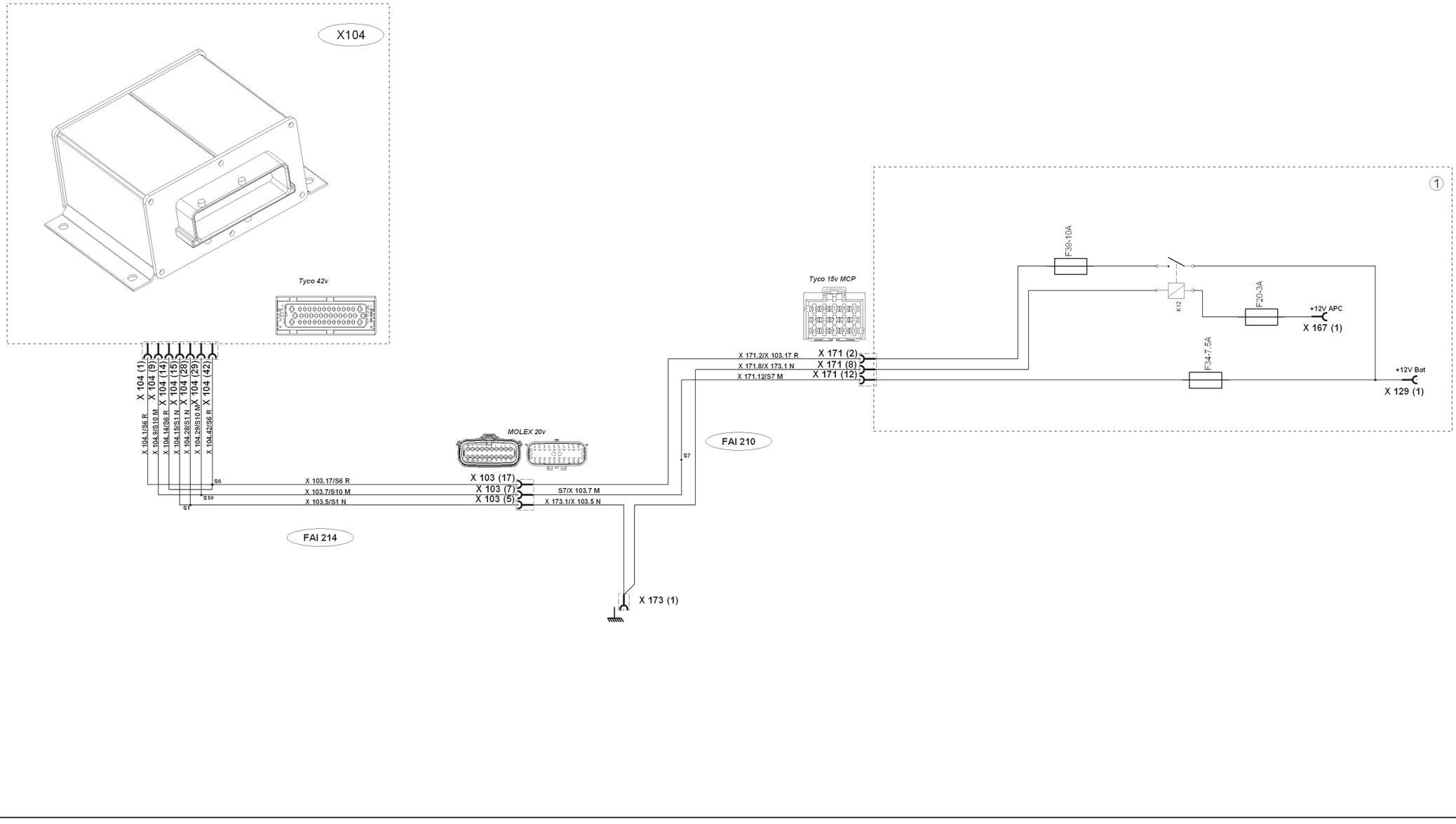


Fig. 17

B.8 Autotronic 5 active suspended cab electrical power supply

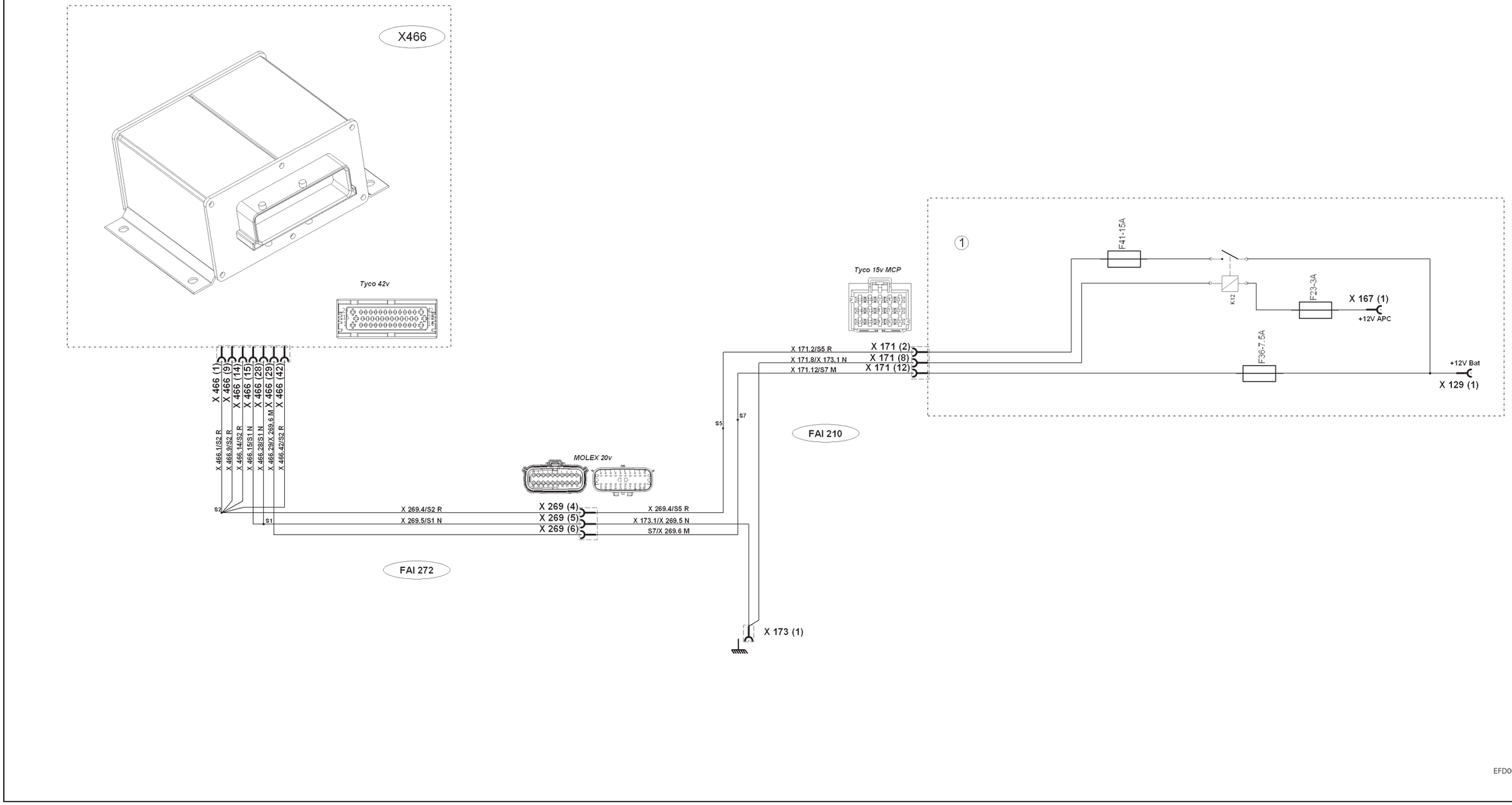


Fig. 18

B.9 Sisu EEM electronic unit electrical power supply

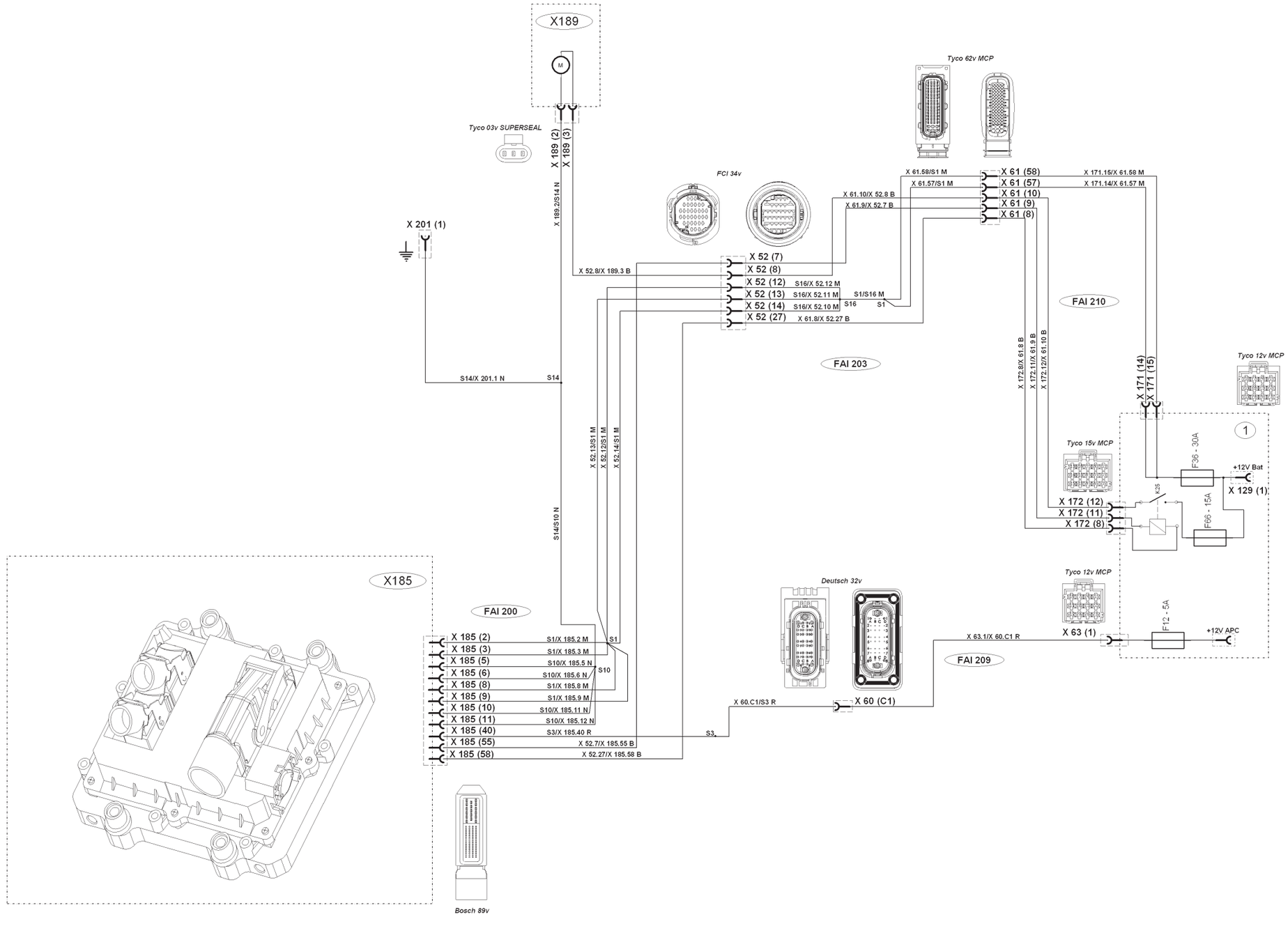


Fig. 19

B.10 Automatic air-conditioning unit electrical power supply

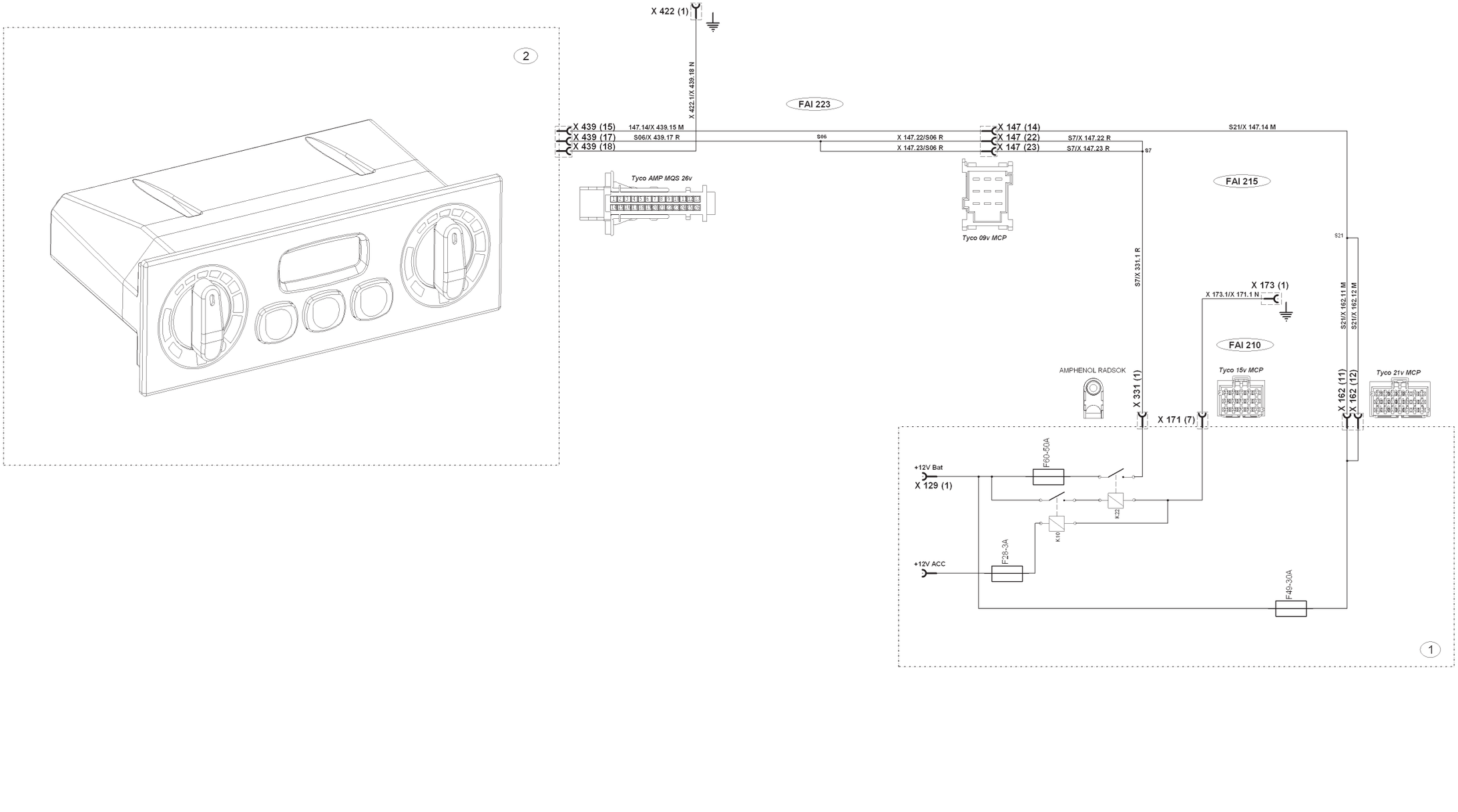


Fig. 20

B.11 Diagnostics connector electrical power supply

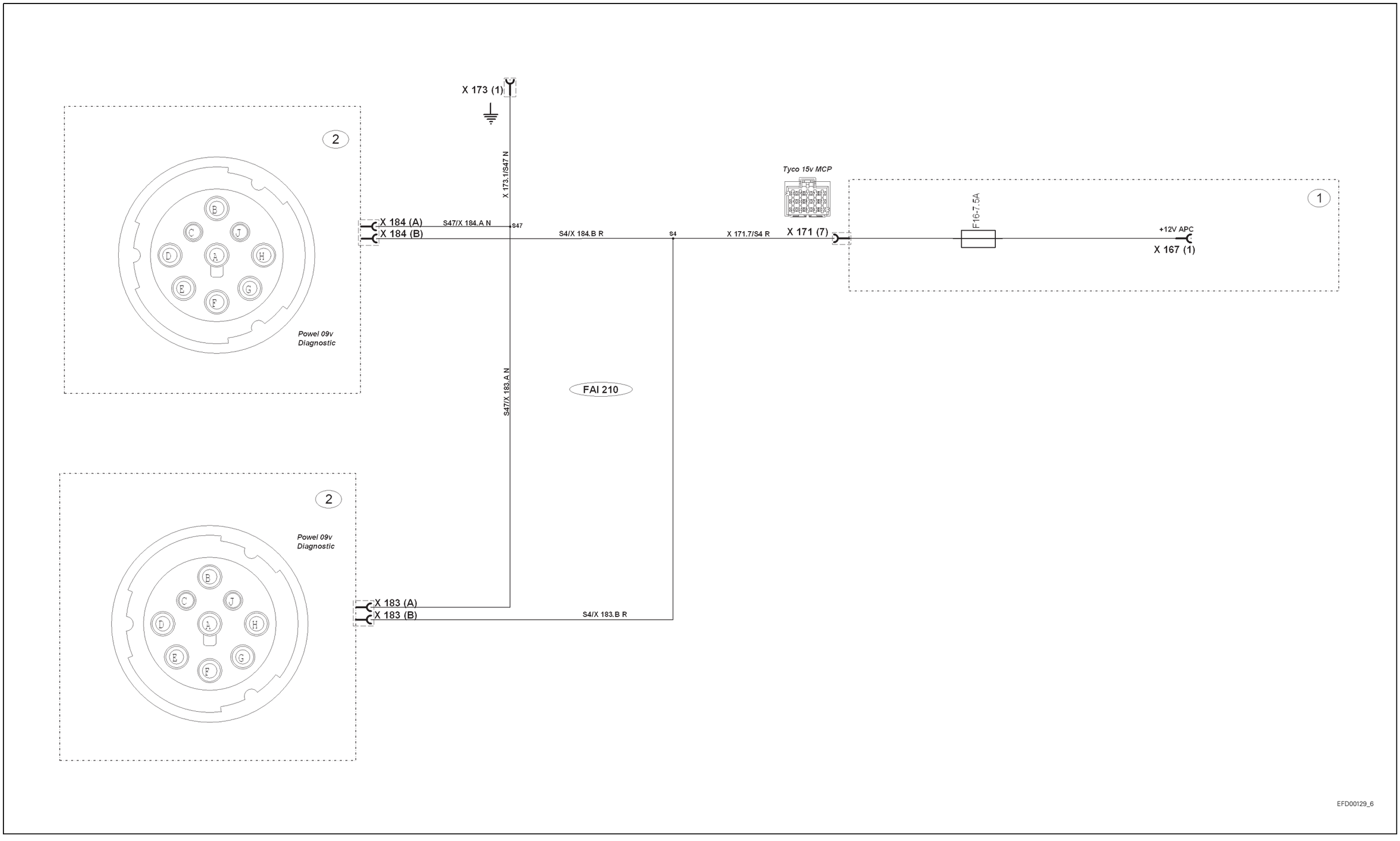


Fig. 21

B.12 Tractor CAN network

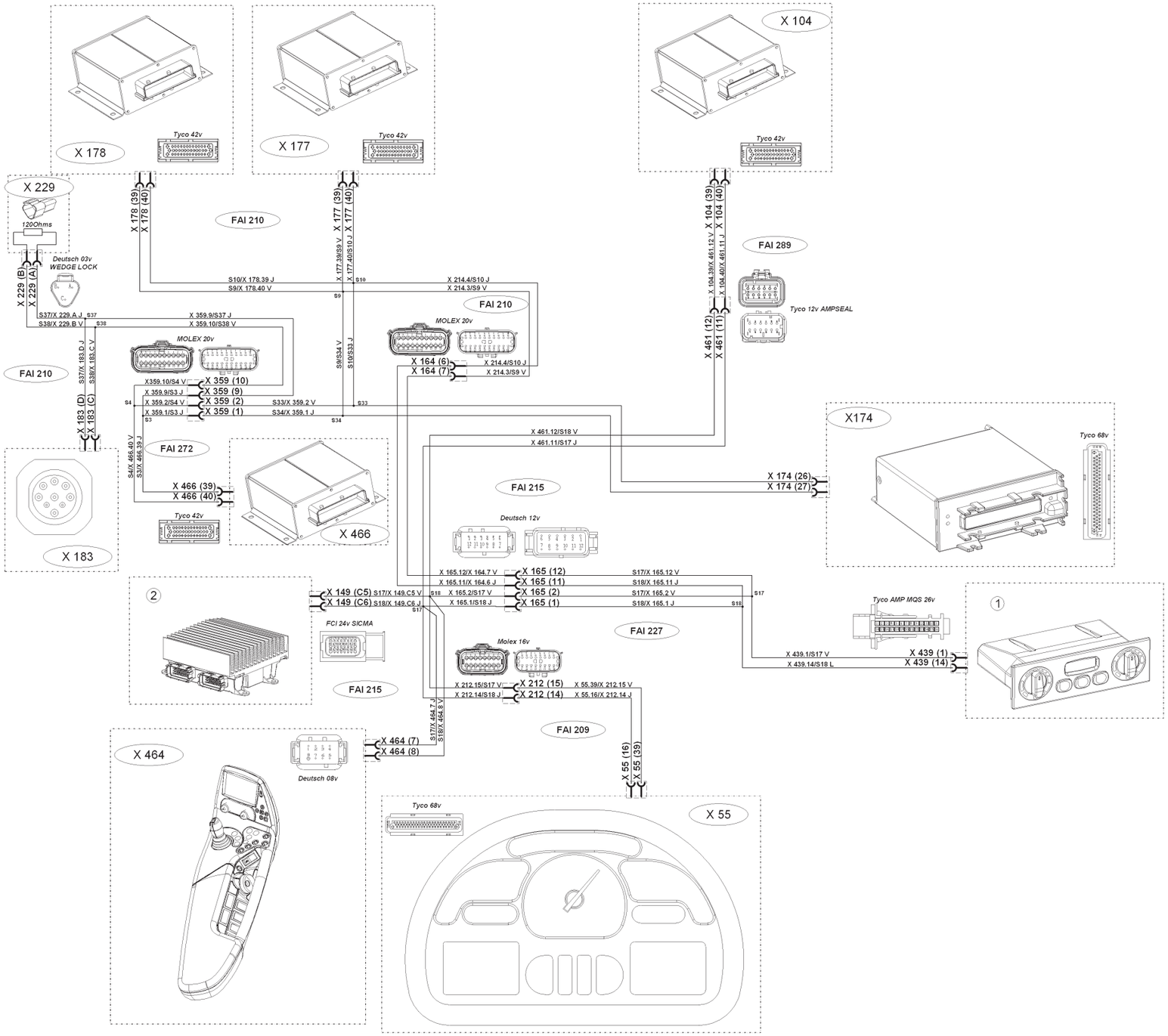
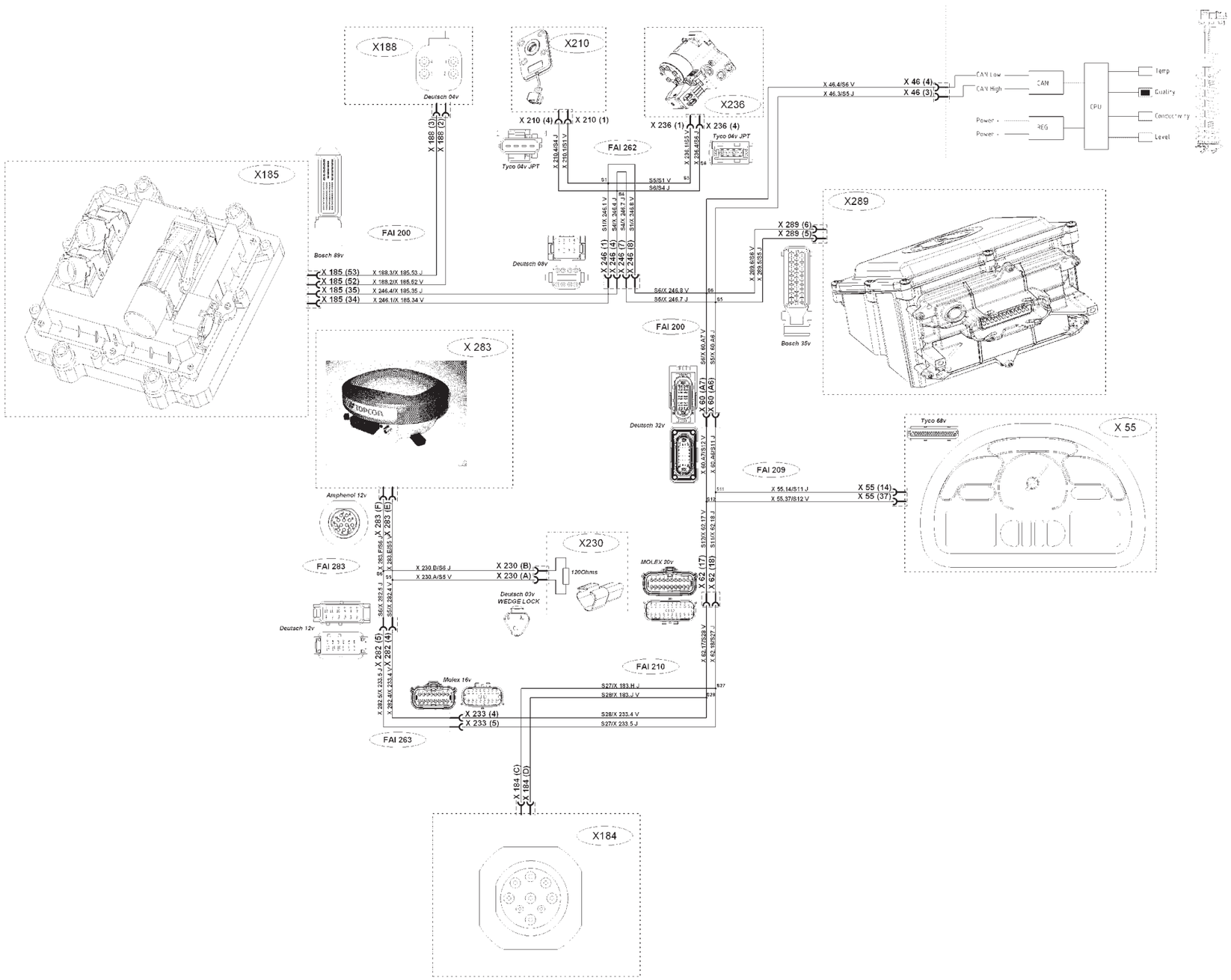


Fig. 22

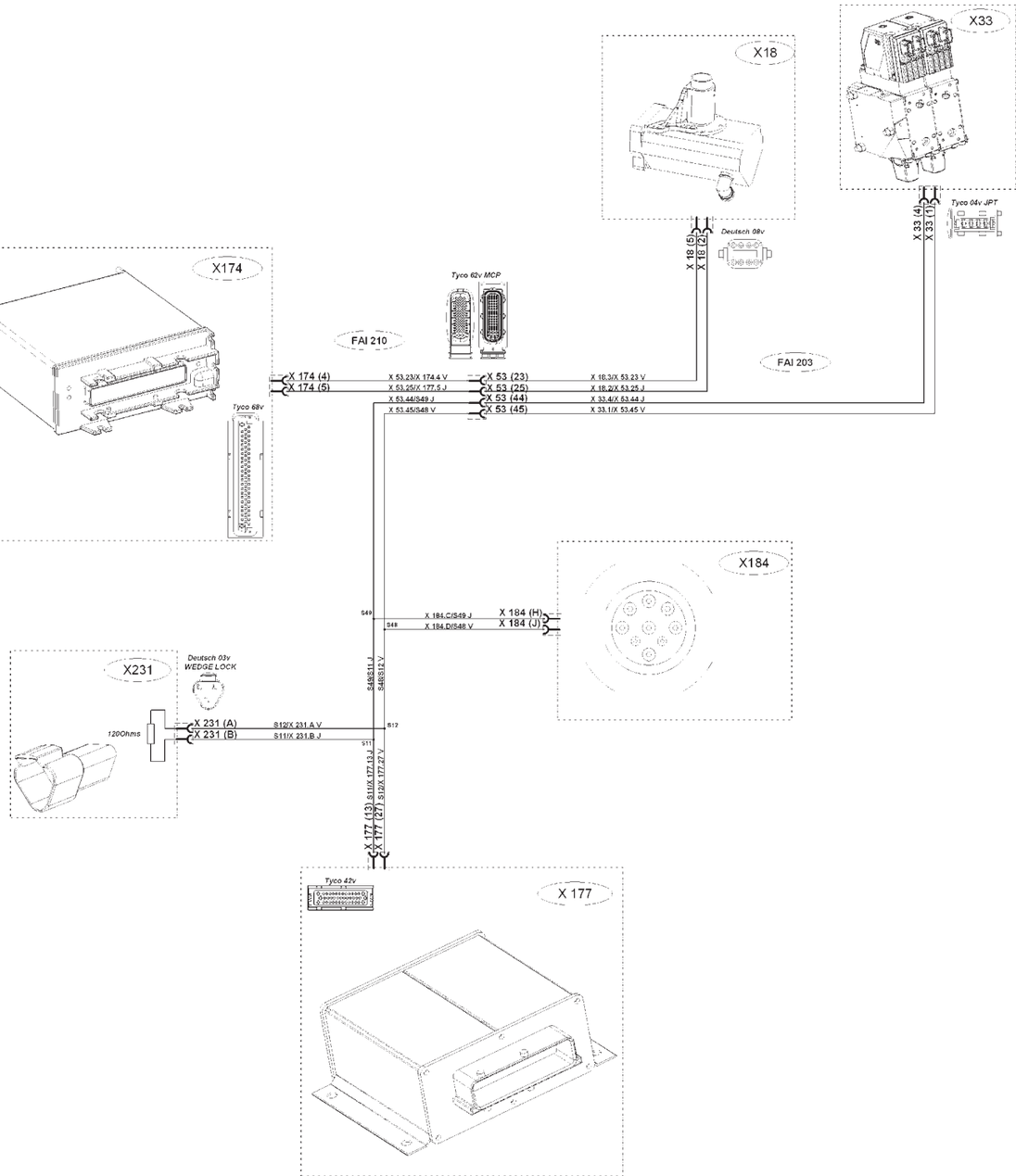
B.13 Engine CAN network



EFD00131_17_2

Fig. 23

B.14 Linkage CAN network



EFD00131_17_3

Fig. 24

B.15 Isobus CAN network

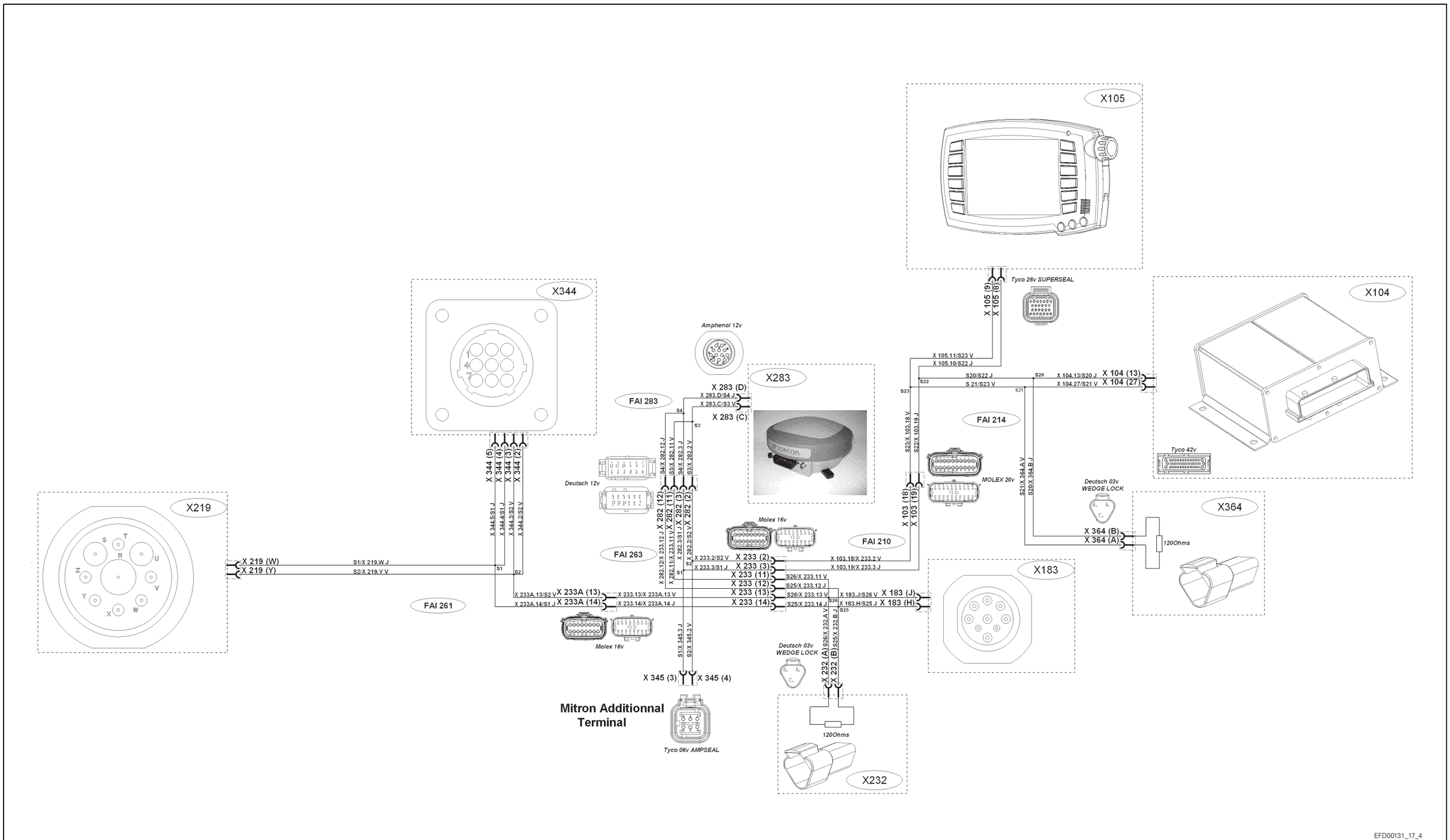


Fig. 25

B.16 Transmission

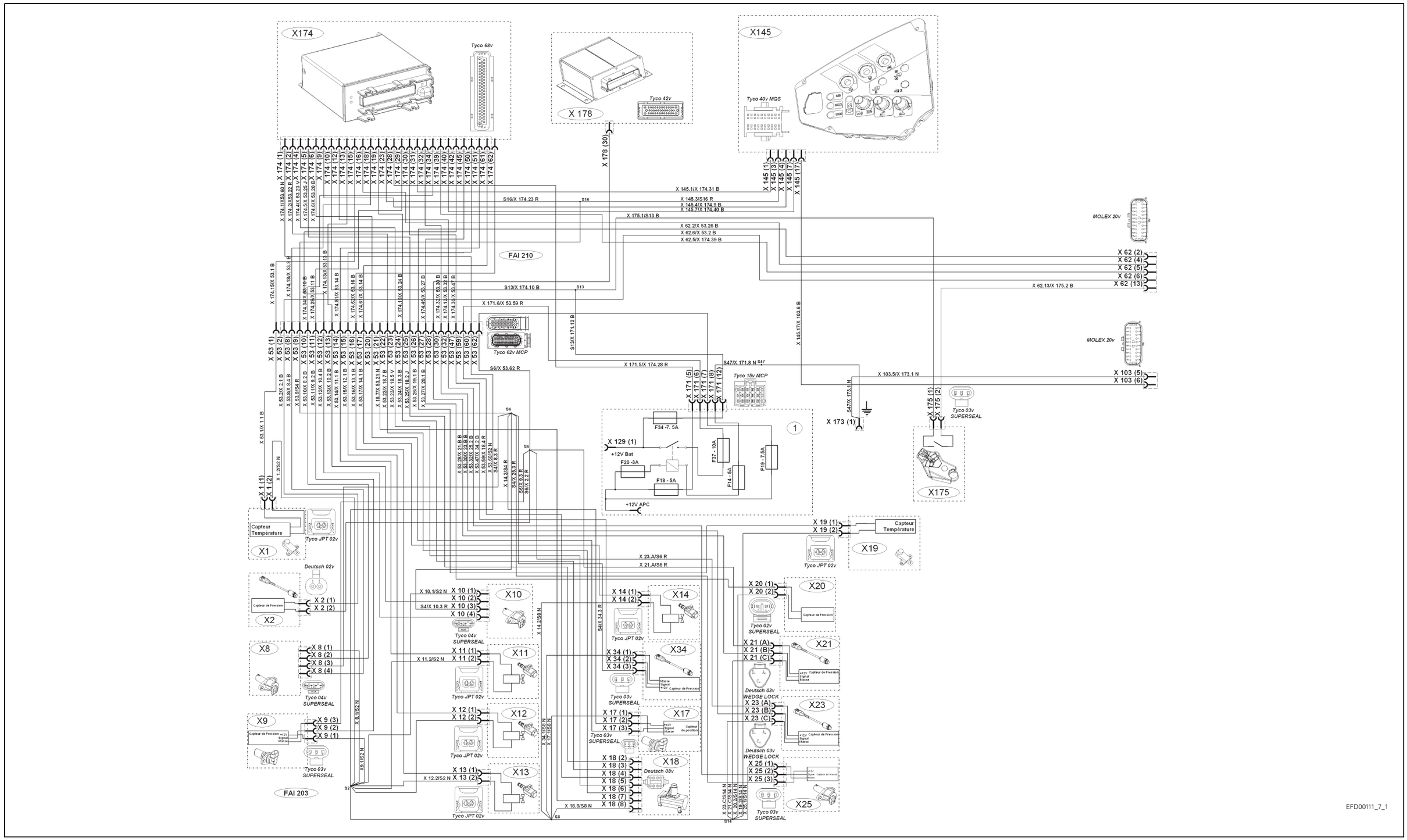


Fig. 26

B.17 Transmission

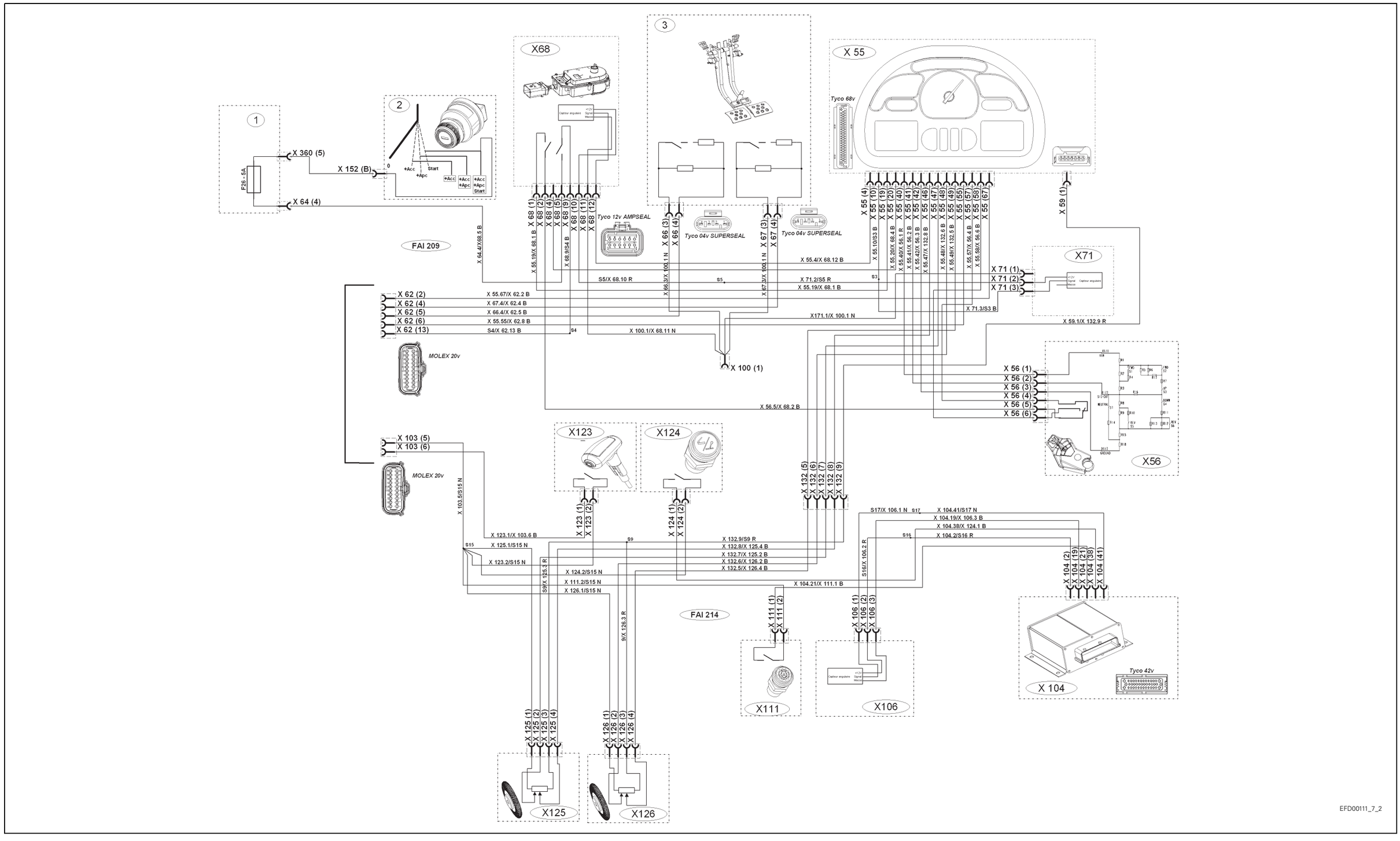


Fig. 27

B.18 4WD front axle

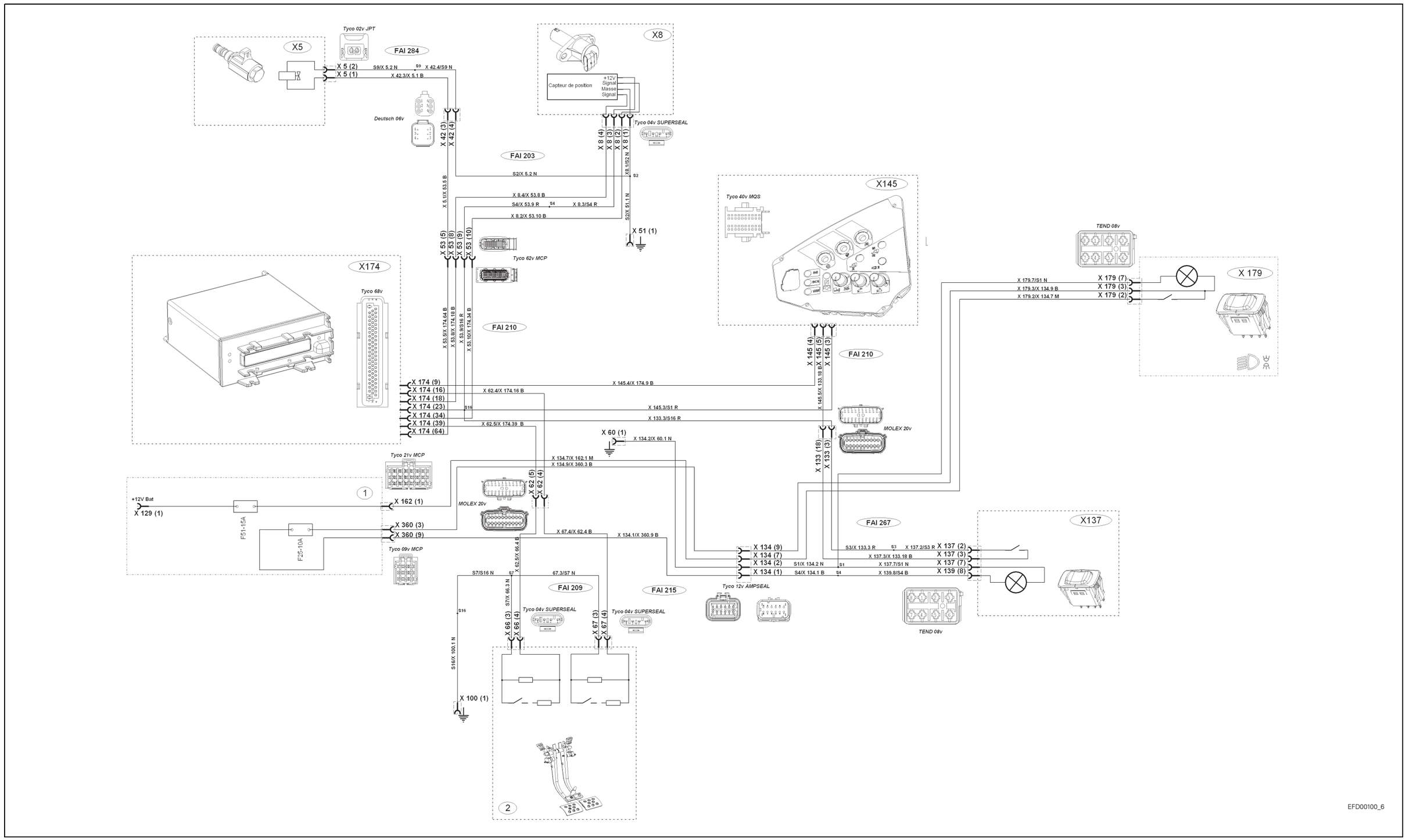


Fig. 28

B.19 Differential lock

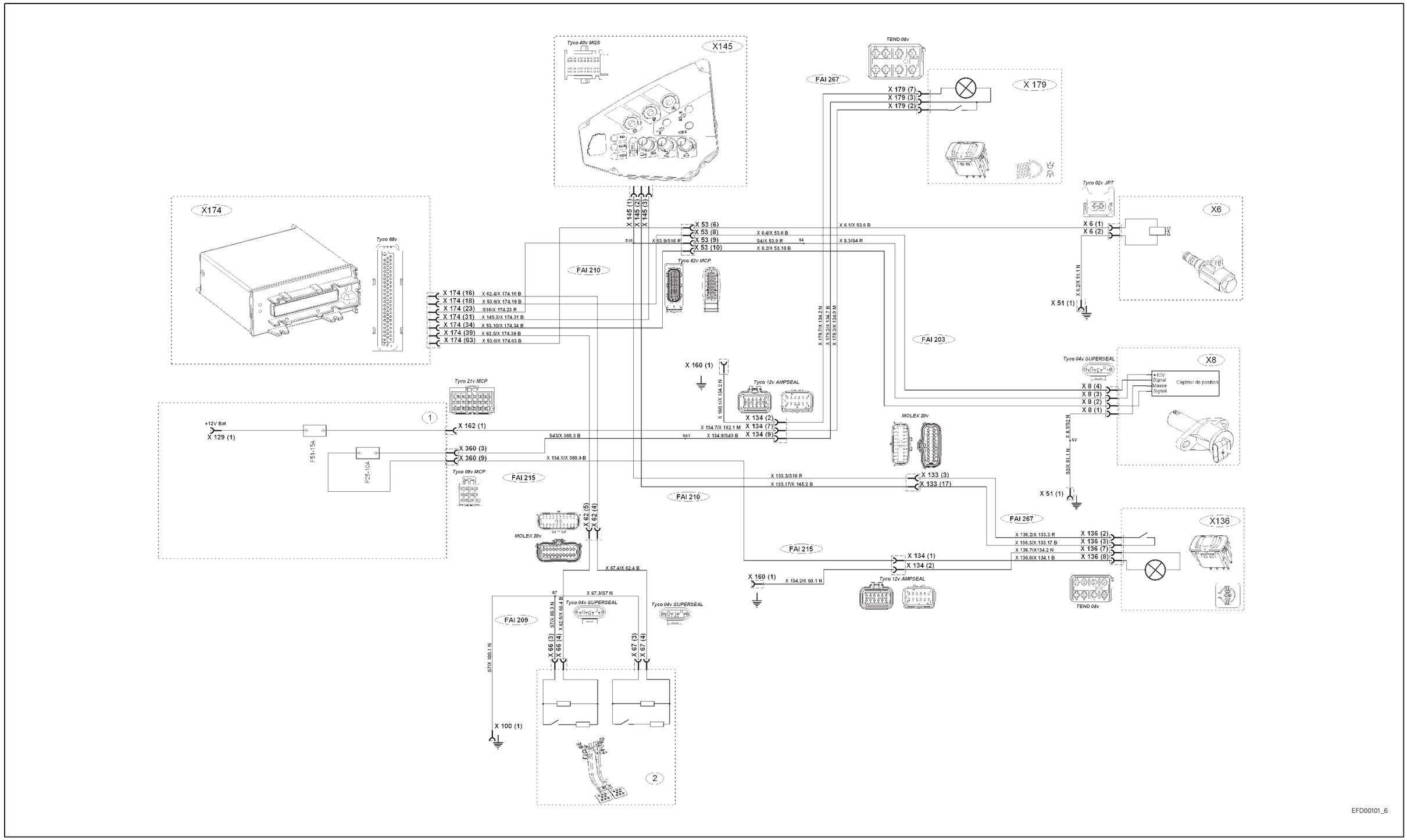


Fig. 29

5A13

ML260 - Layout of components

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A. Gearbox main components

Ref.	Component description	Location
(1)	Transmission module	In the gearbox housing
(2)	Engine speed sensor	On the left-hand side on the engine block
(3)	Hare/Tortoise range sensor	On the left-hand side on the gearbox housing
(4)	Transmission control unit	On the right-hand side on the gearbox housing
(5)	High-pressure filter	On the right-hand side on the transmission control unit
(6)	Transmission control unit	On the right-hand side on the gearbox housing
(7)	Filter blockage sensor	On the right-hand side on the transmission control unit
(8)	Temperature sensor	On the right-hand side on the transmission control unit

A.1 Gearbox main components - diagram

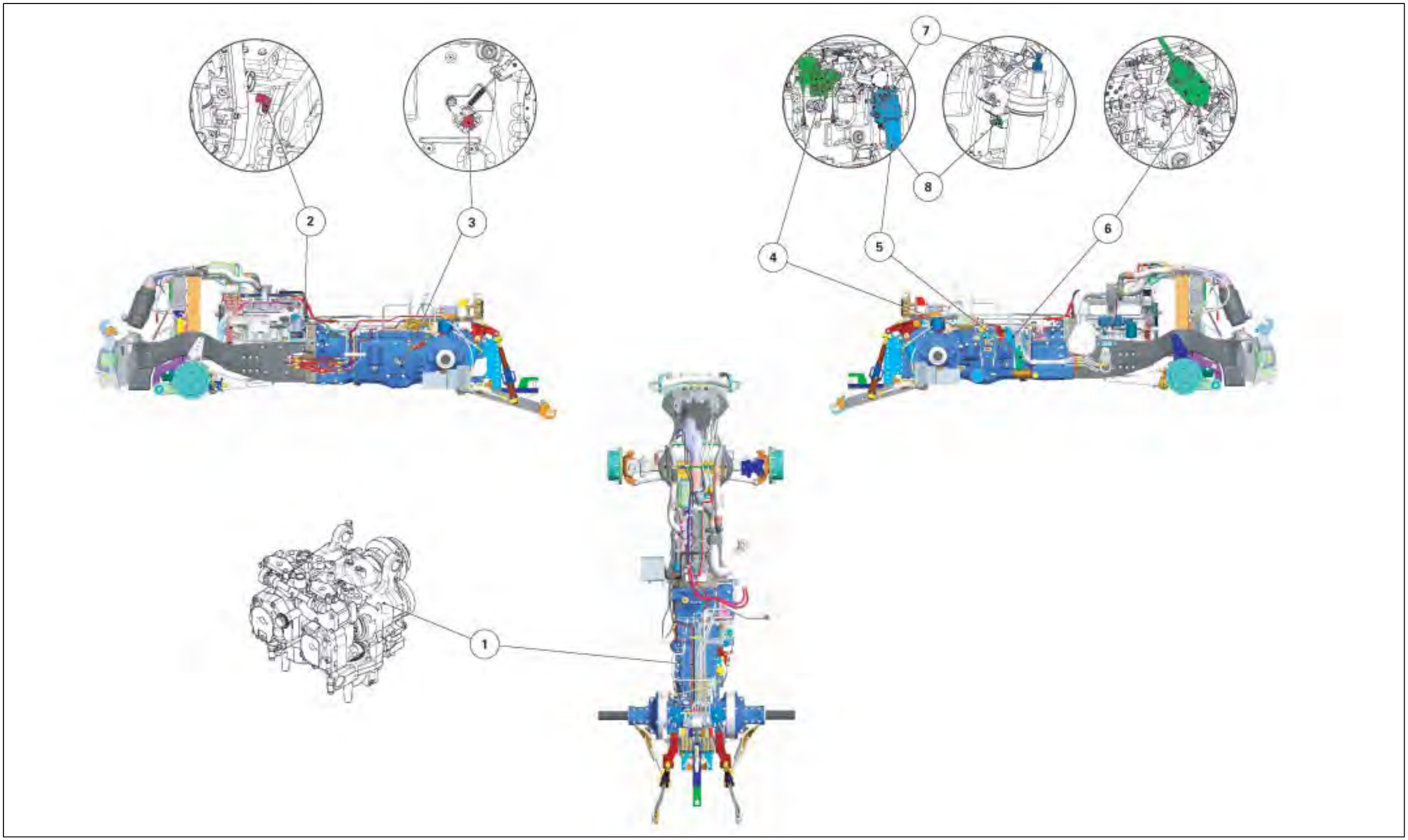

Fig. 1

5A14

ML260 - Tests and diagnostics

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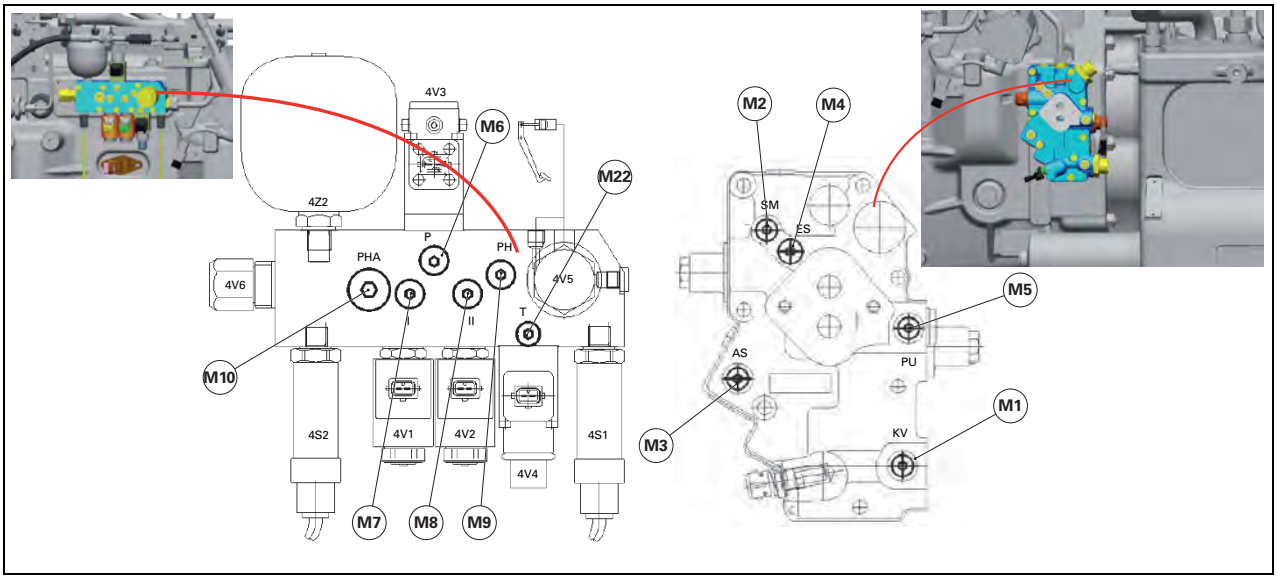
A. Hydraulic tests

A.1 Accumulator pressure and volume

Type	Volume	Pressure
Front axle left accumulator	1 l (of which 200 ml is oil)	10 bar
Front axle right accumulator	1,4 l	50 bar
ParkLock accumulator	0,75 l	108 bar
Main braking accumulator	0,75 l	44 bar
Passive suspended cab accumulator (the pressure cannot be modified)	0,075 l (of which 0,025 l is oil)	30 bar
Semi-active suspended cab accumulator (the pressure cannot be modified)	0,075 l	38 bar
Transmission accumulator (the pressure cannot be modified)	0,3 l	10 bar

A.2 Supply pressure measurements



I008344

Fig. 1

Measurement points	Reference on component	Description
M1	KV	Cooler upstream pressure
M2	SM	Lubricating pressure
M3	AS	Flushing pressure
M4	ES	Fuel lift pressure
M5	PU	Service pump pressure
M6	P	Transmission system pressure
M7	I	Tortoise range engaging pressure
M8	II	Hare range engaging pressure

Measurement points	Reference on component	Description
M9	PH	High pressure (HP)
M10	PHA	Rear axle and brake system pressure
M22	T	Oil leak on clutch function spool valve / coupler function solenoid valve

Precaution to be taken during the pressure measurements: the oil temperature must be between 35°C and 45°C.

IMPORTANT: *When measuring the transmission pressure, raise all wheels of the tractor to prevent accidents.*

1. Set transmission ratio (hare/tortoise) to speed of 0.

2. Release the hand brake.

3. Engage the front axle.

4. Differential lock and PTO clutch are not engaged.

On right-hand side, in the middle of the tractor:

5. Remove right-hand rear wheel and the protection plate.

6. Connect a pressure gauge. Measure the pressures set out below according to the different engine speeds (see settings table below)
- PU Pressure (M5). Pressure measuring point located between the service pump and the pressure filter.
- P Pressure (M6). System pressure downstream of pressure filter.
- ES charge pressure.
- AS flushing or discharge pressure.
- SM transmission lubricating pressure.

Set values for pressure measurement

Engine speeds	PU (M5)	P (M6)	ES (M4)	AS (M3)	SM (M2)
800	25 bar ± 2 bar	25 bar ± 2 bar	16 bar ± 2 bar	9 bar ± 2 bar	2 bar ± 0.4 bar
1200	26 bar ± 2 bar	25.5 bar ± 2 bar	19 bar ± 2 bar	11 bar ± 2 bar	3 bar ± 0.5 bar
1600	27 bar ± 2 bar	26 bar ± 2 bar	21 bar ± 2 bar	13 bar ± 2 bar	4.2 bar ± 0.6 bar
2000	28 bar ± 2 bar	27 bar ± 2 bar	24.5 bar ± 3 bar	16 bar ± 2.5 bar	5.5 bar ± 0.8 bar

A.3 High pressure (HP) measurements

DANGER: High pressure measurements must never exceed a maximum of 5 seconds, to prevent the oil from heating.

Preliminary steps
Engage hare range and set the starting speed to maximum, or transmission to limp home mode (do not turn the control unit by more than 15° in order to avoid heating the oil).

Measurement points	Engine speed	Specified value:
PH (M9)	1600	540 bar + 20 bar

NOTE: *Load the hydrostatic loop for a maximum of 5 seconds before taking the following measurements.*

Measurement points	Engine speed	Specified value
P (M6)	1600	26 bar ± 2 bar
ES (M4)	1600	22 bar ± 2 bar
AS (M3)	1600	15 bar ± 2 bar
SM (M2)	1600	3.5 bar ± 0.4 bar

NOTE: *If the high pressure PH is not reached, but the AS and ES pressures are correct, check the clutch pressure relief valves 4V4 and 4V5.*

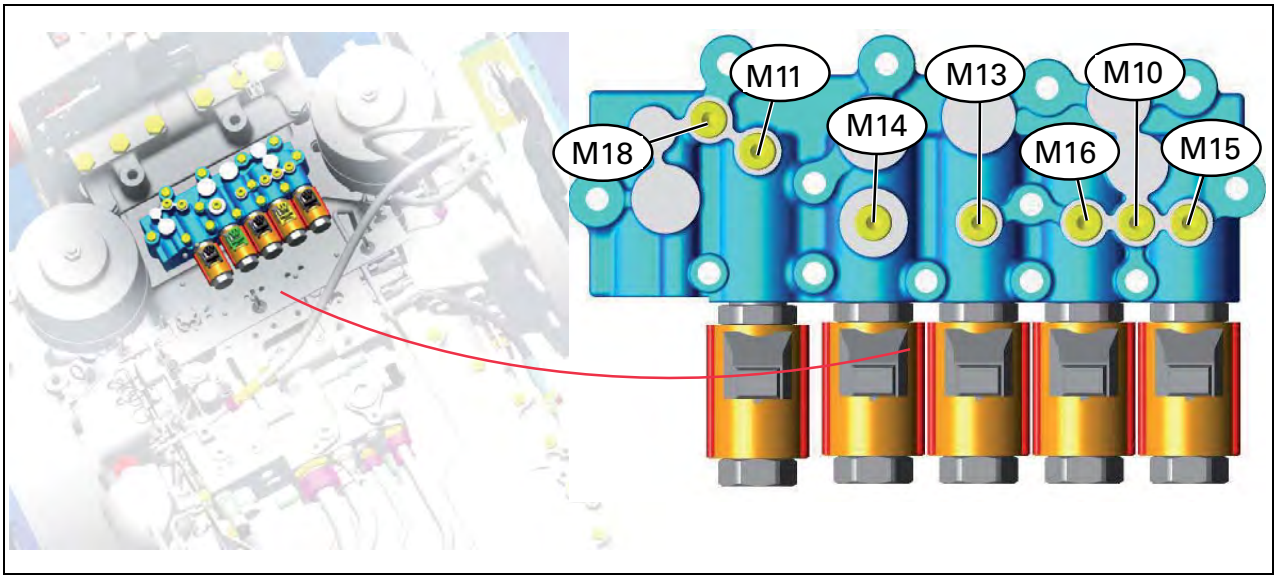
A.4 Shifting pressure measurements

Measurement points	Engine speed	Specified value:
In Hare or Tortoise range (M7/M8)	1600	26 bar ± 2 bar

NOTE: *Alternately supply solenoid valves 1 (4V1) and 2 (4V2) with a 12 V (DC) supply*

A.5 Rear PTO, differential lock and front axle clutch solenoid valve measurement

NOTE: *The unit is located on the rear axle housing, behind the spool valves. Access is limited, so great care must be taken.*



I008345

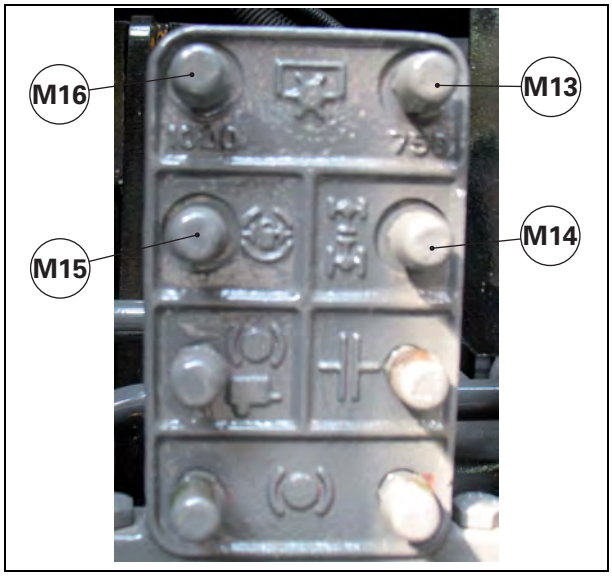
Fig. 2

M10 Rear axle, brakes and front PTO system pressure
M11 Rear PTO clutch
M13 750 rpm PTO selector pressure
M14 Front axle clutch (4WD)
M15 Differential lock
M16 1000 rpm PTO selector pressure
M18 Rear axle lubricating pressure

The pressure connectors can be accessed from the rear of the tractor.

NOTE: *Run the engine at 1200 rpm. Simultaneously check the pressure at unions M10 and M18 (SM).*

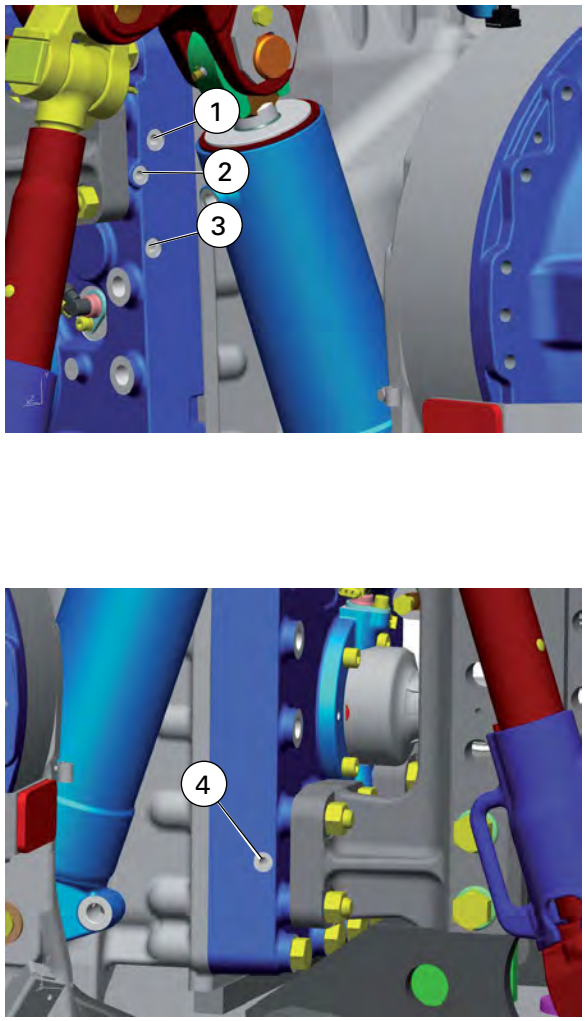
Switching status of components that consume electricity	Measurement points	M10 system pressure	M18 lubricating pressure
Power take-off - On / Off	M11	18 bar ± 0.2 bar	2 bar ± 0.3 bar
Differential lock - On/Off	M15	18 bar ± 0.2 bar	2 bar ± 0.3 bar
Front axle (4WD) - On / Off	M14	18 bar ± 0.2 bar	2.1 bar ± 0.3 bar
Activation of locked brake pedal		18 bar ± 0.2 bar	1.2 bar ± 0.3 bar



I008346 Fig. 3

(1) Rear PTO clutch (M12 - 1.5 union)
(2) Rear axle lubricating pressure (M10 - 1 union)
(3 - 4) 750 or 540 speed selection (M10 - 1 union)

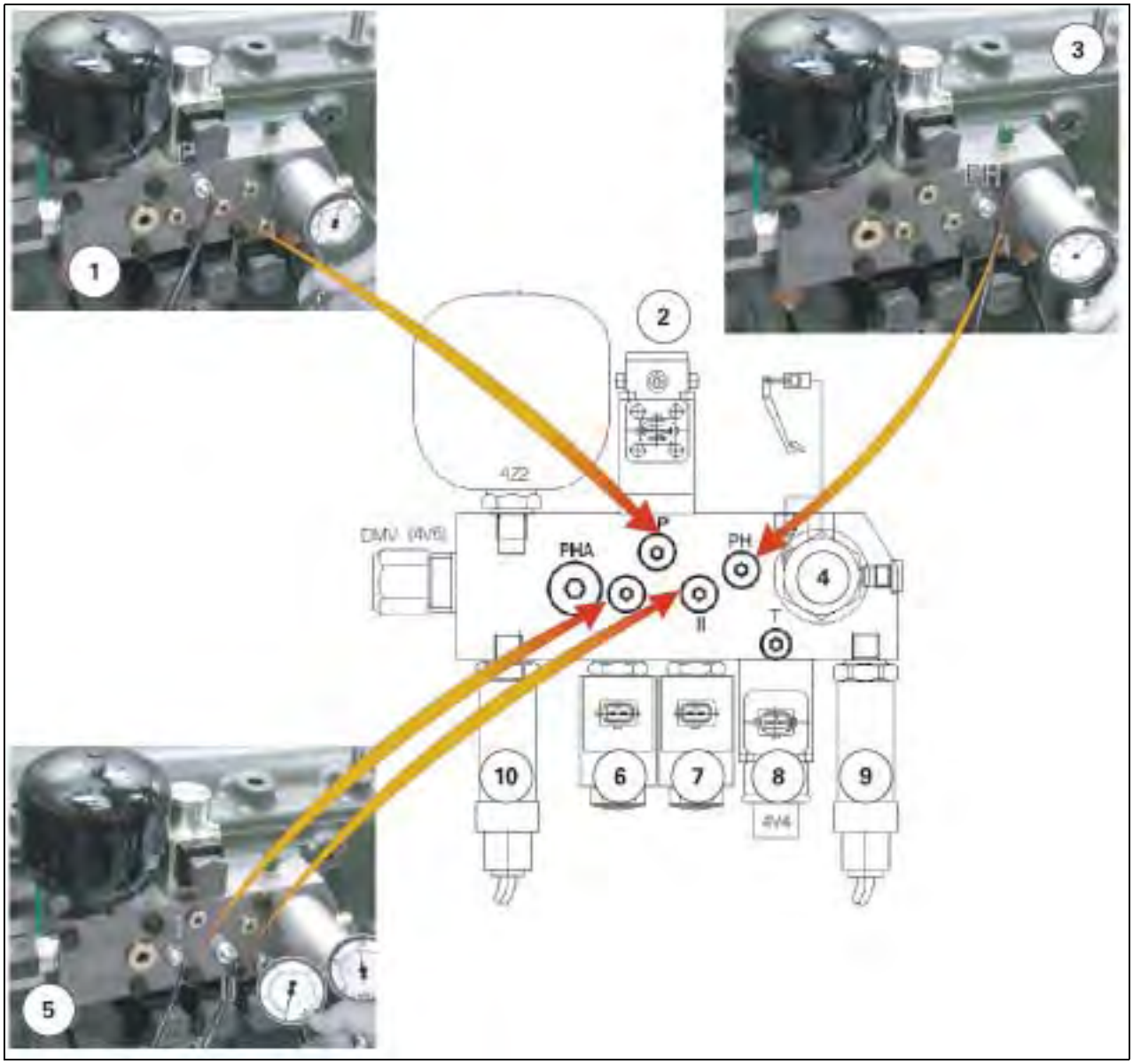
In order to check the rear PTO, it is also possible to measure pressure levels at the unions located at the rear right and left-hand sides of the rear axle housing.



I008347

Fig. 4

Diagram showing the pressure connectors on the valve block

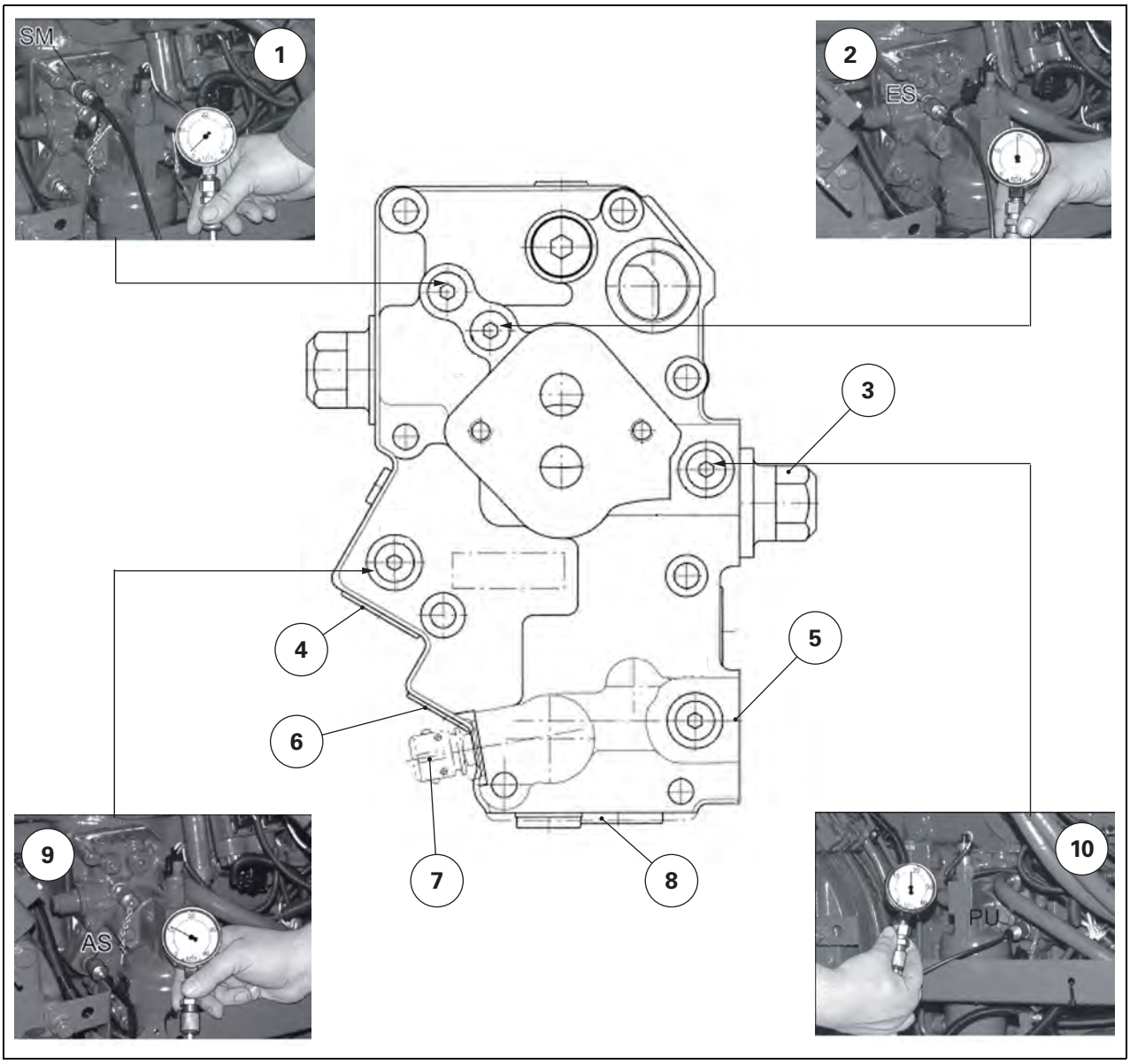


I008349

Fig. 5

(1) Service pump check
(2) Speed limiting solenoid valve
(3) PH pressure check
(4) Clutch function controlled valve
(5) Supply pressure for Hare/Tortoise range check
(6) Tortoise range solenoid valve
(7) Hare range solenoid valve
(8) Coupler function solenoid valve
(9) HP Pressure sensor
(10) HP Pressure sensor

Valve block with test connections



I008350

Fig. 6

(1) Lubricating pressure check (SM)
(2) Charge pressure check (ES)
(3) Service pump relief valve (50 b)
(4) Charge valve (6.5 b)
(5) Cooler bypass valve
(6) Flushing valve (6 b)
(7) Temperature sensor
(8) Lubricating pressure valve (6.5 b)
(9) Flushing pressure check (AS)
(10) Service pressure check (PU)

A.6 Checking the hydrostatic loop in the control unit

DANGER: Chock the tractor (HP pressure measurement).

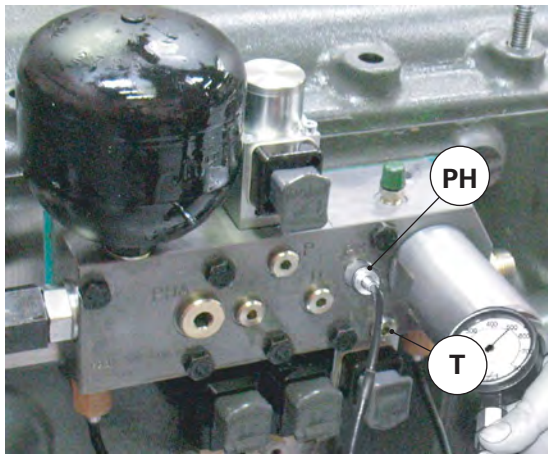
1. Remove the right-hand rear wheel and the protection plate located behind it.

2. Remove the T union.

3. Fit a pressure gauge to measure pressures higher than 540 bar at the PH union.

Checking procedure:

4. Start the engine.



I008341 Fig. 7

5. Activate limp home mode by pressing in the clutch pedal fully and pressing the button.

6. Apply the hand brake.

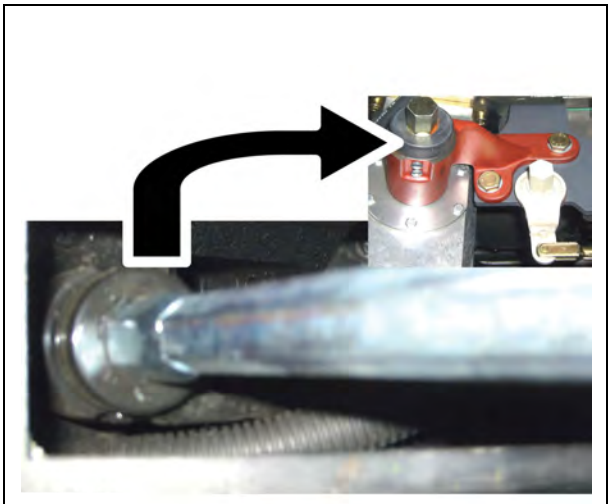
I008342 Fig. 8

7. Use the limp home mode lever to start the transmission.

PH	T union	Possible causes
250 bar	No oil flow to the T union	Transmission module error (shuttle valve, pressure pipe union). =>Remove the module.
250 bar	Oil flows from the T union	Coupler function valve (4V4) or clutch function valve (4V5) not tightly sealed. => Change the valve.

Checking the coupler function valve (4V4)

8. Mechanically lock the valve.



I008343 Fig. 9

PH	T union	Possible causes
250 bar	Oil flows from the T union	Clutch function valve (4V5) not tightly sealed => Change the valve.
540 bar	Oil flows from the T union, but the pressure is not constant	Electrically check the coupler function valve > Change the valve if faulty

A.7 Pressure measurement sheet

	-VT transmission pressure tests			
Dealer number		Customer	Chassis number:	
			Engine number:	
			Entry into service:	
			Number of hours:	

ımendation: The measurements should be taken with all 4 tractor wheels raised.

CAUTION: Risk of accident

Measuring conditions: Transmission oil temperature between 35°C and 45°C

I. Measuring the supply pressures

Measurement point	Engine speed in rpm	Recommended value in bar/PSI		Measurement in bar/ PSI	Note
		Measurement	Tolerance		
PU	800	25 bar	2 bar		
	1200	26 bar	2 bar		
	1600	27 bar	2 bar		
	2000	28 bar	2 bar		
P	800	25 bar	2 bar		
	1200	25.5 bar	2 bar		
	1600	26 bar	2 bar		
	2000	27 bar	2 bar		
ES	800	16 bar	2 bar		
	1200	19 bar	2 bar		
	1600	21 bar	2 bar		
	2000	24.5 bar	2 bar		
AS	800	9 bar	2 bar		
	1200	11 bar	2 bar		
	1600	13 bar	2 bar		
	2000	16 bar	2 bar		

		Dyna-VT transmission pressure tests			
SM	800	2 bar	2 bar		
	1200	3 bar	2 bar		
	1600	4.2 bar	2 bar		
	2000	5.5 bar	2 bar		
II. Measuring the high pressures. *(Measure the pressures in forward gear and reverse gear, with a maximum measuring time of 5 seconds.)*					
Measurement point	Engine speed in rpm	Recommended value/bar		Measurement in bar	Remarks
		Measurement	Tolerance		
Forward/reverse PH	1600	500 bar	+ 20 bar -40 bar		
P		26 bar	+ 2 bar		
ES		13 bar	± 2 bar		
AS		12 bar	± 2 bar		
SM		1.6 bar	± 0.4 bar		
III Measuring the engagement of hare and tortoise ranges. *Solenoid valves 1 and 2 supplied alternately with 12 V DC*					
Measurement point	Engine speed in rpm	Recommended value/bar		Measurement in bar	Remarks
		Measurement	Tolerance		
Hare	1600	26 bar	± 2 bar		
Tortoise	1600	26 bar	± 2 bar		
Date:			Signature:		

5A15

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ML260 - Adjustments, bleeding and calibrations

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A. Calibrations

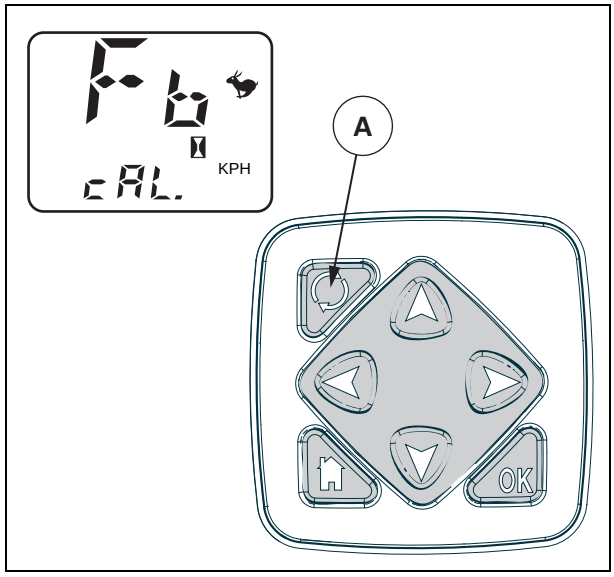
A.1 Forward speed display.

This calibration allows improved precision of forward speed depending on:

- the different tyre sizes available
- radar (if fitted)

1. Mark out a 100 m (depending on the unit of measurement selected) on a firm surface.
2. Start up the tractor, then press and hold the display selector switch (A) for 15 seconds.

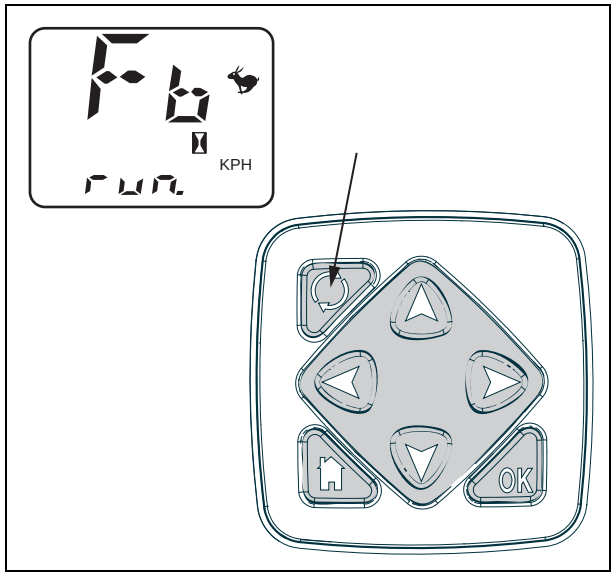
   NOTE: *The daily hourmeter resets to 0 after 5 seconds.*
3. "CAL" should appear on the screen (Fig. 1).
4. Drive the tractor forwards at normal working speed.
5. Press the display selector switch when crossing the starting line of the 100 m course.



I007510 Fig. 1

6. "run" should appear on the screen (Fig. 2).
7. Press the display selector switch when crossing the finish line of the course.
8. Press the display selector switch; the constant forward speed (theoretical) measured during calibration is displayed.
9. Press the display selector switch again; the actual constant forward speed (radar) measured during calibration is displayed on tractors fitted with radar.
10. Press the display selector switch a final time to return the instrument panel to normal operating mode.

NOTE: *The tractor must always be moving before starting out on the measured course; otherwise calibration will be incorrect.*



I007511 Fig. 2

A.2 Throttle pedal potentiometer

The calibration of the throttle pedal potentiometer must be carried out each time one of the following elements is replaced or modified:

- throttle potentiometer
- instrument panel.

Preliminary steps

11. Switch on the ignition, with ParkLock engaged.

12. The power take-off must be disengaged.

Calibration

The calibration is carried out in two successive steps so as to determine the minimum and maximum engine speeds in relation to the pedal position.

Minimum speed

13. Pedal fully released, minimum engine speed.

14. Press and hold down the differential lock switch for 5 seconds.

15. An alarm sounds. This indicates the end of the first calibration phase (pedal fully released).
Release the differential switch.

Maximum speed

16. Pedal fully depressed, maximum engine speed.

17. Press and hold down the differential lock switch for 5 seconds.

18. An alarm sounds. This indicates the end of the second calibration phase (pedal fully depressed).
Release the differential switch.

A.3 Forward lever on armrest

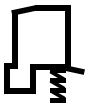
Input at level 2 - CAL 2

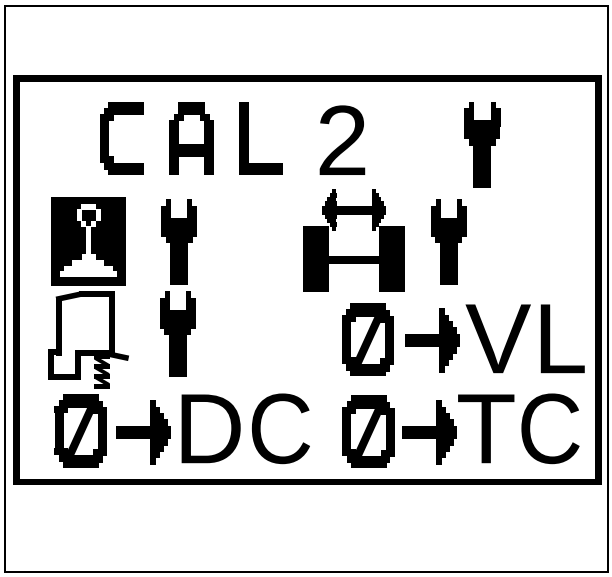
To select CAL2:

1. Switch on the ignition (do not start the engine).

2. Engage and release the clutch pedal in order to delete the "TC" "DC" display from the screen on the right-hand side of the instrument panel.

3. Within the next 5 seconds, simultaneously press keys  on the DOT MATRIX control keyboard.
The screen (Fig. 3) is displayed with 5 available texts and icons:

-  Calibration of the forward lever on the armrest
-  Calibration of the automatic differential disengagement function
-  Calibration of the suspended cab
- "DC": Clears the error codes stored in DCC3



I007461

Fig. 3

- "TC": Clears the error codes stored in TC (Autotronic 4)
- "VL": Clears the calibration values

The selected function is displayed in reverse video.

4. Select the required function using keys  on the DOT MATRIX control keyboard and then press "OK".

Calibrating the forward lever on the armrest

The calibration of the armrest lever must be carried out each time one of the following elements is replaced or modified:

- Armrest lever potentiometer
- DCC3.

Select the icon  and press "OK". The screen (Fig. 4) is displayed:

5. The value on the first line indicates the current position of the lever, i.e. Neutral.

6. Push the lever fully forward to "+", and the value of the first line will change. When the lever reaches its stop, validate the position by pressing the arrow at the top of the control keyboard.

7. Move the lever back to Neutral, and the value on the first line will change back until it reaches this position. Validate the position by pressing the "OK" key on the control keyboard.

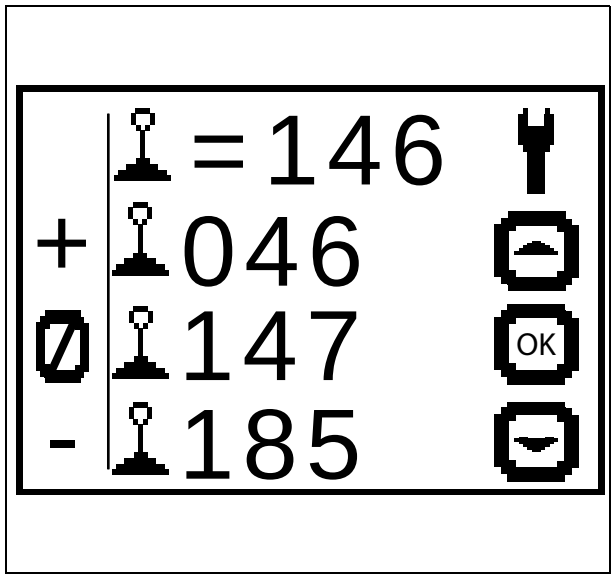
8. Pull the lever fully backwards towards the rear of the cab to validate the limit position. When it reaches its back stop, press the arrow at the bottom of the control keyboard.

9. When calibration is complete, the values can be checked by moving the lever to the three positions "+", "0" and "-" and comparing the value on the first line with the selected position.

10. To quit this mode, press the "House" icon on the control keyboard.

11. Switch off the ignition for at least 5 seconds to validate calibration.

NOTE: *If "ERROR" is displayed, repeat the procedure, making sure to observe the time of action and the lever position.*



I007462

Fig. 4

A.4 Automatic disengagement of the differential

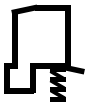
Input at level 2 - CAL 2

To select CAL2:

1. Switch on the ignition (do not start the engine).

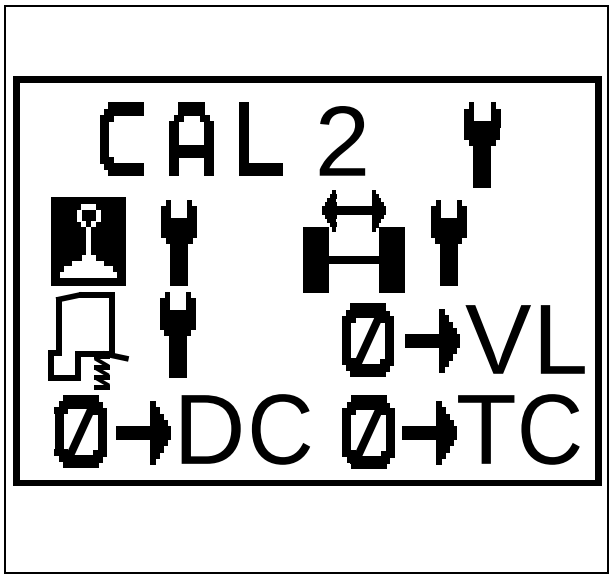
2. Engage and release the clutch pedal in order to delete the "TC" "DC" display from the screen on the right-hand side of the instrument panel

3. Within the next 5 seconds, simultaneously press keys  on the Dash Control Center keypad.
The screen (Fig. 3) is displayed with 5 available texts and icons:

-  Calibration of the forward lever on the armrest
-  Calibration of the automatic differential disengagement function
-  Calibration of the suspended cab
- "DC": Erase the error codes stored in the instrument panel
- "TC": Clears the error codes stored in TC (Autotronic 4)
- "VL": Clears the calibration values

The selected function is displayed in reverse video.

4. Select the required function using keys  on the Dash Control Center keypad and then press "OK".



I007461 Fig. 5

Calibrating the automatic differential disengagement function

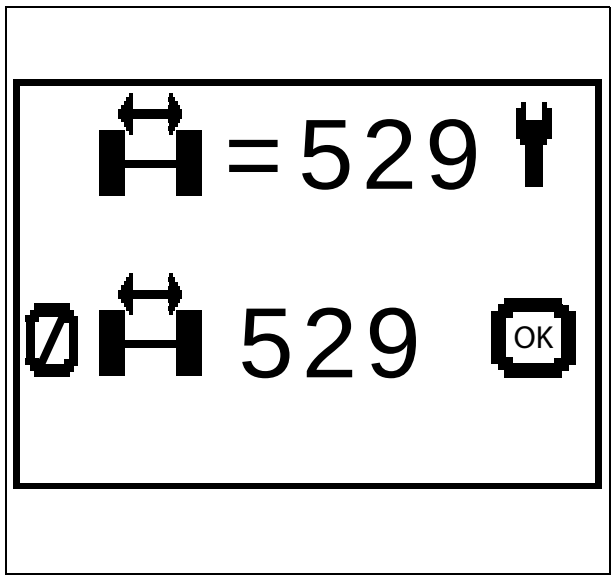
This function must be calibrated whenever one of the following elements is replaced or modified:

- angular sensor in the front axle
- front axle

NOTE: *Before any calibration operations, move the front axle to central position. Switch off the engine in order to return to the CAL2 screen.*

Select the icon  and press "OK". The screen (Fig. 6) is displayed:

1. The value on the first line is the reference value of the central position.
2. Press the "OK" key on the control keyboard to display this value. When the two values are identical, the calibration is considered to be correct.
3. To quit this mode, press the "House" icon on the control keyboard.



I007463 Fig. 6

A.5 Autotronic 4 - Hare/Tortoise range - Transmission - Coupler function - Power take-off

Calibration of the following Autotronic 4 functions is necessary for optimum performance:
- Hare/Tortoise range
- transmission
- coupler function

Calibration of the power take-off is also possible with special tools if there is a problem when starting.

Input at level 1 - CAL 1

IMPORTANT: *In order to carry out a calibration, any error codes must be corrected.*
If an error code is active: the calibration returns an error immediately.
To select CAL1:

1. Start the engine.
2. Engage and release the clutch pedal in order to delete the "TC" "DC" display from the screen on the right-hand side of the instrument panel
3. Within the next 5 seconds, simultaneously press keys  on the Dash Control Center keypad.
4. The screen (Fig. 9) appears, displaying the 4 symbols of the functions to be calibrated:

 Hare/Tortoise range

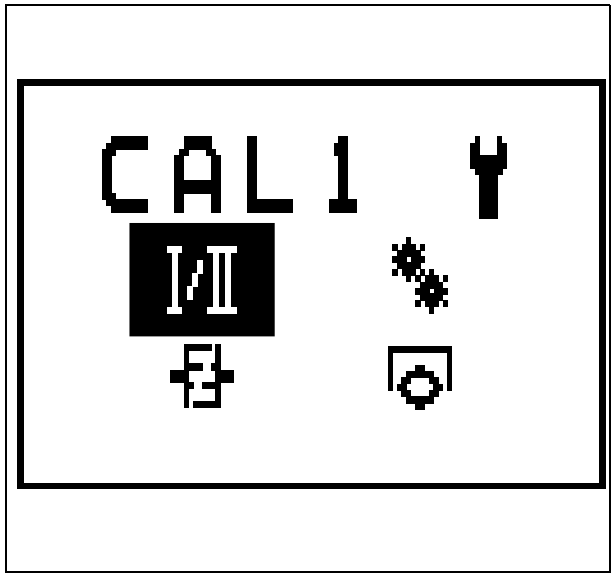
 Transmission

 Coupler function

 Power take-off

The selected function is displayed in reverse video.

5. Before starting calibration, ensure that the tractor is in a suitable condition.



I007464 Fig. 7

6. Select the function to be calibrated using keys  on the Dash Control Center keypad and then press "OK".

NOTE: *This procedure must be repeated for each calibration.*

Hare/Tortoise range

Calibration procedure

This calibration must be carried out systematically after changing any of the following:
- Hare range solenoid valve
- Tortoise range solenoid valve
- Range position sensor
- Autotronic 4

Preliminary conditions

1. Hand brake or ParkLock disengaged.

2. Power Control lever in neutral position.

3. Clutch pedal pressed down.

4. Engine speed less than 1000 rpm.

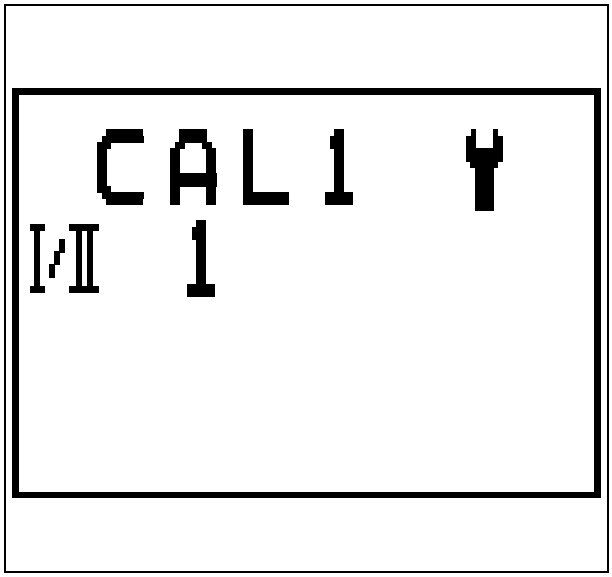
Calibration

5. Having selected  in the CAL1 screen (Fig. 9), press "OK" to start calibration.

6. The calibration lasts for approximately 6 minutes and takes place in 3 steps, shown one after the other on the screen (Fig. 10):
- Step 0: Tortoise range
- Step 1: Hare range
- Step 2: Neutral (intermediate position)

7. The calibration result is displayed:
- "OK": successful calibration (since the calibration procedure is ended by placing the transmission in neutral, the Hare/Tortoise symbols flash alternately on the right-hand screen)
- "ERROR": calibration failed (repair the fault before resuming the procedure)

8. ***IMPORTANT:*** *Switch off the ignition for at least 30 seconds in order to validate the calibration.*



I007465 Fig. 8

Transmission

Calibration procedure

This calibration must be carried out systematically after changing any of the following:
- transmission control module
- transmission
- transmission high pressure sensor
- Autotronic 4

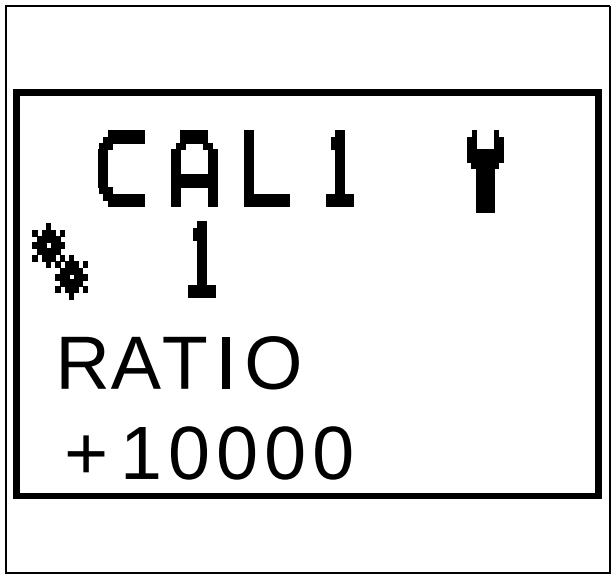
Preliminary conditions

Calibration must be carried out just after the range has been calibrated:

1. Hand brake applied or ParkLock engaged.
2. Power Control lever in neutral position.
3. Hare/Tortoise range in neutral (Hare/Tortoise symbols flash alternately on the right-hand screen).
   The Hare/Tortoise range should be in neutral because calibration of the range has been carried out in the previous step.

Calibration

4. Having selected in the CAL1 screen (Fig. 9), press "OK" to start calibration.
5. Engine speed automatically adjusts to 1600 rpm.
6. Hare/Tortoise symbols continue to flash alternately.
7. The calibration lasts for approximately 6 seconds and takes place in 7 steps, shown one after the other on the screen (Fig. 11).
   These 7 steps allow calibration of the hydraulic motors and pumps.



I007466

Fig. 9

8. The calibration result is displayed:
- "OK": successful calibration (Fig. 12)
- "ERROR": calibration failed (repair the fault before resuming the procedure)

9. ***IMPORTANT:*** *Switch off the ignition for at least 30 seconds in order to validate the calibration.*

Coupler function

Calibration procedure

This calibration must be carried out systematically after changing any of the following:
- coupler function solenoid valve
- transmission oil high pressure sensor
- Autotronic 4

Preliminary conditions

1. Transmission temperature higher than or equal to 40°C (recommendation: do not cancel calibration if the value is too low).

There are 2 ways to view the transmission temperature:
- The value can be viewed on the gearbox screen of the diagnostic tool.
- Use the instrument panel DIAG mode via the Dash Control Center:
  - Press the top arrow for 3 seconds.
  - Select DATA (in reverse video) then press "OK".
  - The value is indicated by the "Trans Temp" line.

2. Hand brake applied or ParkLock engaged.

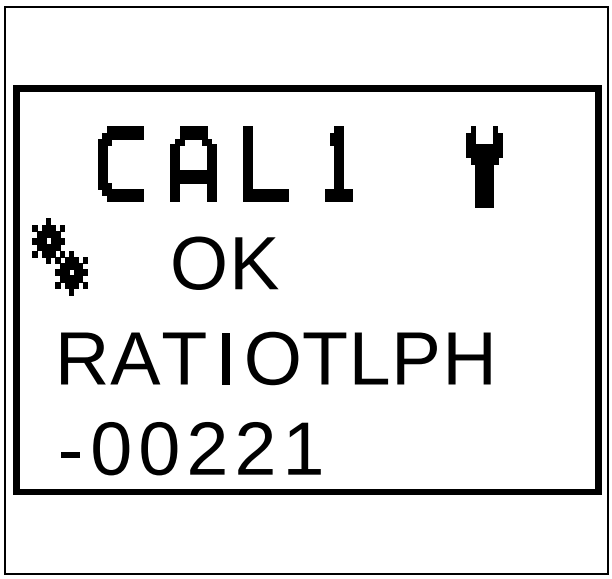
3. Power Control lever in neutral position.

4. Hare range engaged.

Calibration

5. Having selected in the CAL1 screen (Fig. 9), press "OK" to start calibration.

6. Engine speed automatically adjusts to 1100 rpm.

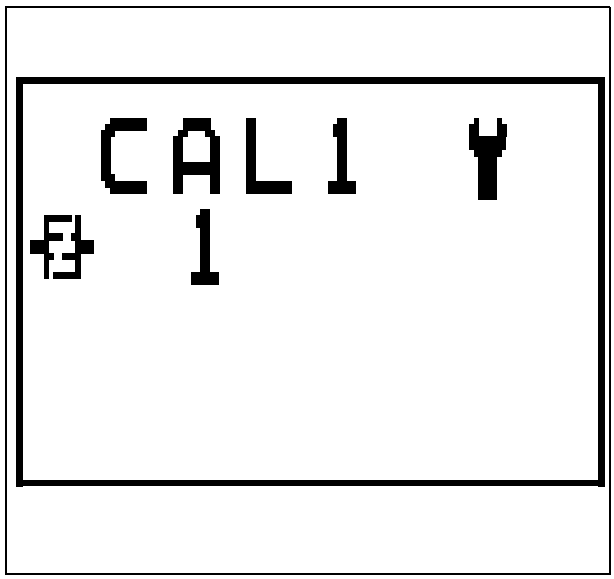


I007467 Fig. 10

7. The calibration lasts for approximately 2 minutes and takes place in 9 steps, shown one after the other on the screen (Fig. 13).
These 9 steps allow calibration of the solenoid valve current.

8. The calibration result is displayed:
- "OK": successful calibration
- "ERROR": calibration failed (repair the fault before resuming the procedure)

9. ***IMPORTANT:*** *Switch off the ignition for at least 30 seconds in order to validate the calibration.*



I007468 Fig. 11

Power take-off

Calibration procedure

- This calibration must be performed only in the event of a starting problem with a high-inertia implement
- when changing the PTO solenoid valve
- when changing the Autotronic 4

Preliminary conditions

1. Hand brake applied or ParkLock engaged.

2. Power Control lever in neutral position.

3. Select a PTO speed (540, 540ECO or 1000 rpm) depending on the implement.

Calibration

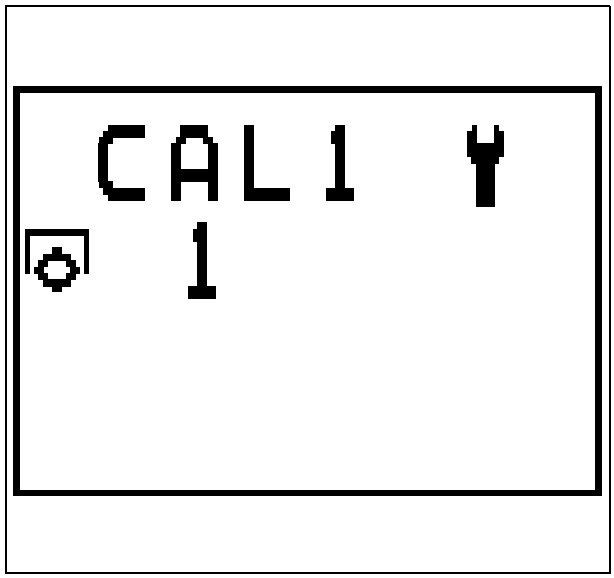
4. Having selected in the CAL1 screen (Fig. 9), press "OK" to start calibration.

5. Engage the PTO.

6. Calibration takes place automatically, and the time taken depends on the implement (Fig. 14).

7. The calibration result is displayed:
- "OK": successful calibration
- "ERROR": calibration failed

8. ***IMPORTANT:*** *Switch off the ignition for at least 30 seconds in order to validate the calibration.*



I007469 Fig. 12

B. Bleeding

B.1 Gearbox clutch control bleed device

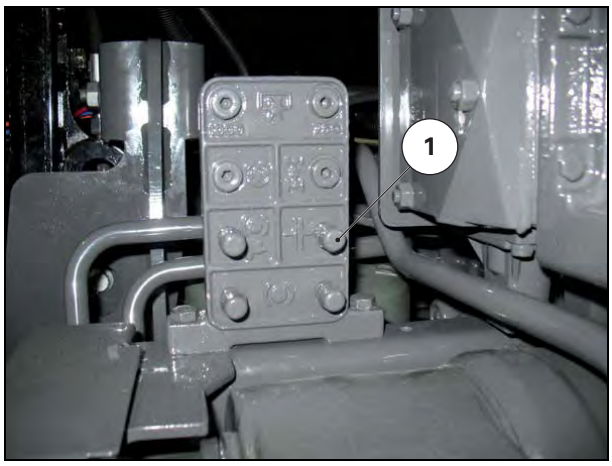
9. Empty the clutch reservoir using a syringe.

10. Obtain a transparent pipe to connect to the bleed device (1) (Fig. 25)

11. Obtain an oil pump or a piston burette (measuring glass).

12. Obtain hydraulic clutch fluid type Pentosin CHS 11S

Essential instructions prior to bleeding



I009734 Fig. 13

13. Remove the protective plug

14. Connect one end of the pipe to the clutch bleed device and connect the other end of the pipe to the burette.

15. Fill the burette with clutch fluid.

16. Open the bleed device.

17. Activate the burette in order to fill the clutch reservoir up to the maximum level

18. Close the bleed device.

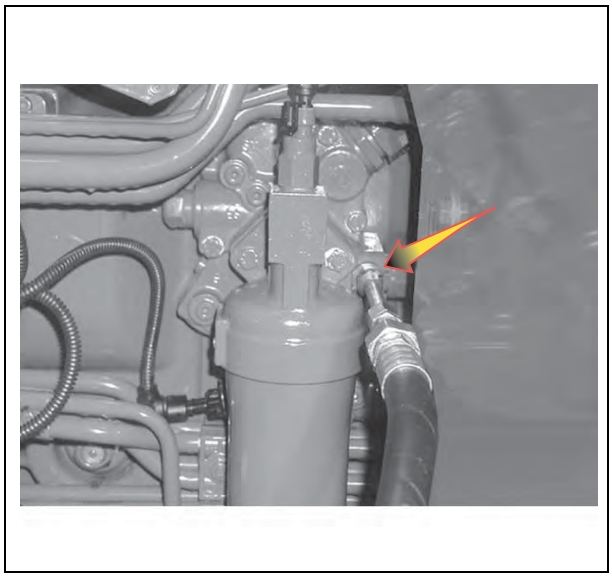
19. Disconnect the pipe.

NOTE: *Do not forget to refit the protective plug on the bleed device.*

I009733 Fig. 14

B.2 Filling the transmission unit

1. Unscrew the plug marked PU.



I008323 Fig. 15

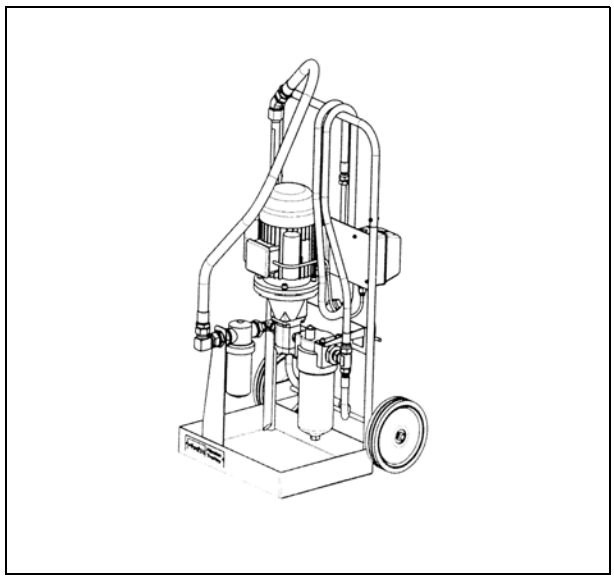
2. Connect the filling station.

NOTE: *Using the external filling station it is possible to avoid dry operation of the hydrostatic pump and hydrostatic motor.*

3. Use the correct quantity and type of oil.

NOTE: *During the filling process, swivel the hydrostatic pumps and motors. Ensure the hydraulic unions are completely sealed. Fill the transmission oil with a filling station.*

4. Smear the contact face of the transmission housing with sealant (ref. X903.050.074).



I008324 Fig. 16

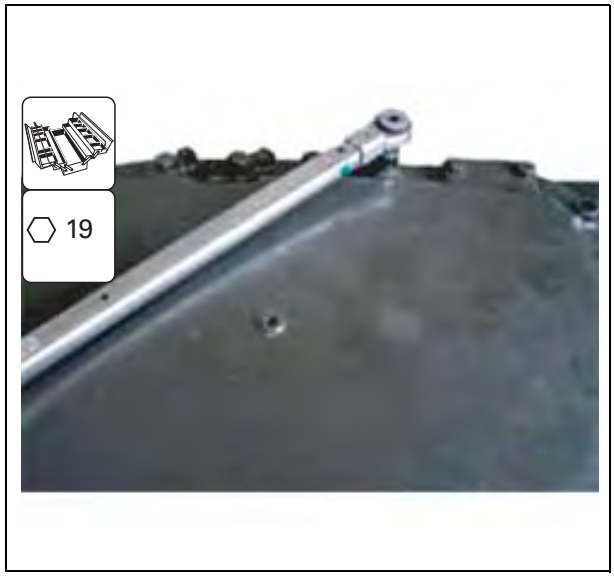
5. Fit the cover.

6. Tighten the M12 screws to a torque of:

7. Repeat the removal operations for the wiring, electrical connectors, hydraulic pipes and pneumatic system in reverse order.

8. Check all the levels.

9. Check that there are no leaks



I008325 Fig. 17

5A17

ML260 - Disassembly and reassembly

TABLE OF CONTENTS

A. Disassembling the Dyna-VT unit

Preliminary steps

1. Drain the transmission oil (approx. 65 l).
2. Disassemble the cab.

DANGER: Before disconnecting the pipes, it is necessary to release the pressure in the brake accumulator by pumping on the pedals.

3. Remove the unions after emptying, taking all necessary precautions to prevent any dirty particles from entering the air conditioning system

   NOTE: *It is recommended to raise the cab slightly before splitting it.*

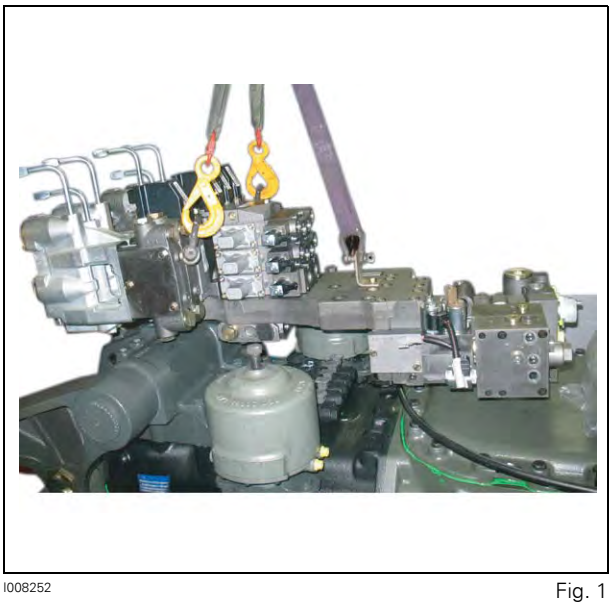
4. Pinch the heating pipes closed to avoid draining the system.
5. Attach the cab to a suitable lifting system and raise it.

CAUTION: Take care not to damage the roof cap.

6. Disconnect the cables and hydraulic unions, taking care to mark them.
7. Remove the spool valve block.

CAUTION: Mark all parts at disassembly.

8. Raise and move the cab.
9. Remove all the pipes passing over the transmission cover.
10. Remove the spool valve assembly.

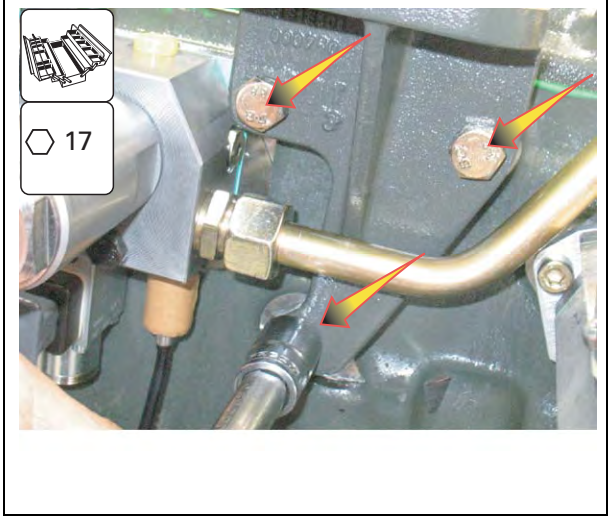


I008252

Fig. 1

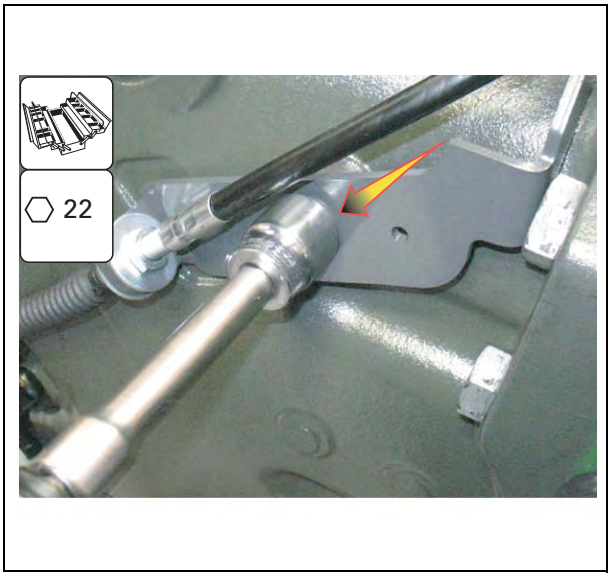
11. Move the range selector to neutral.

12. Remove the limp home console from the right-hand side of the transmission.



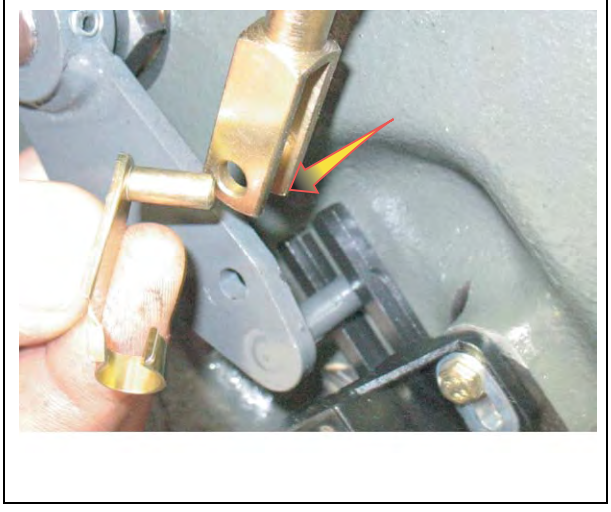
I008253 Fig. 2

13. Remove the limp home mode cable support from the left-hand side of the transmission.



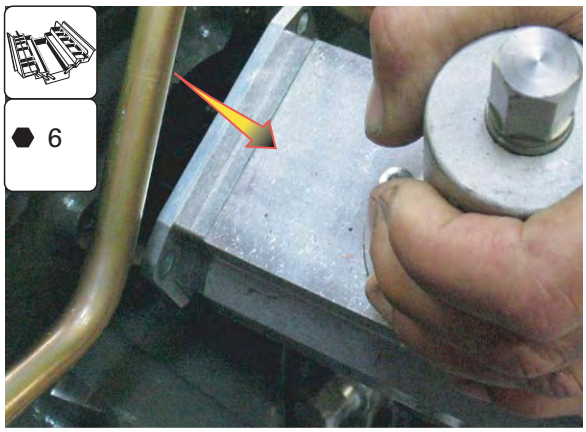
I008254 Fig. 3

14. Remove the control cable connection then the cable.



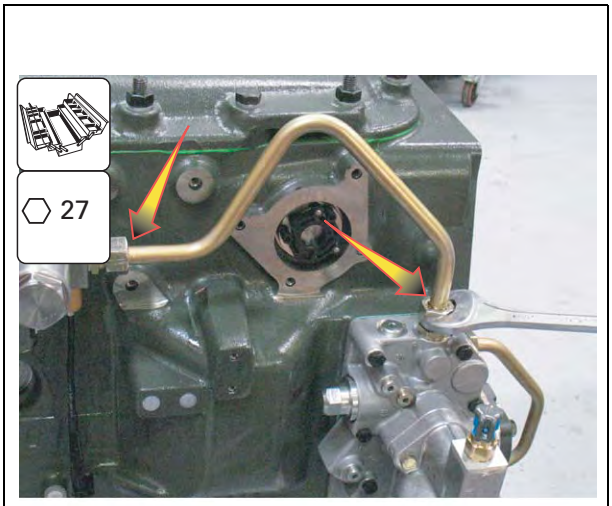
I008255 Fig. 4

15. Unscrew the three attachment screws from the control unit, then remove it.



I008256 Fig. 5

16. Remove the pipe between the filter support and the hydraulic unit.

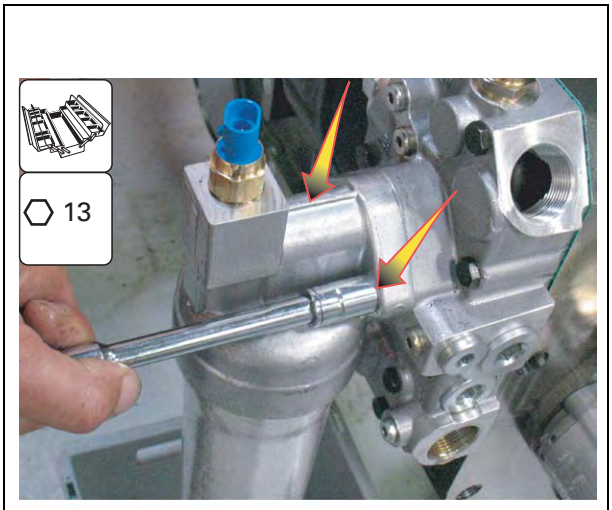


I008257 Fig. 6

17. Disconnect and mark all the connectors from the filter carrier.

18. Remove the filter (two screws).

NOTE: *Ensure there is an oil drip pan underneath the filter when disassembling.*

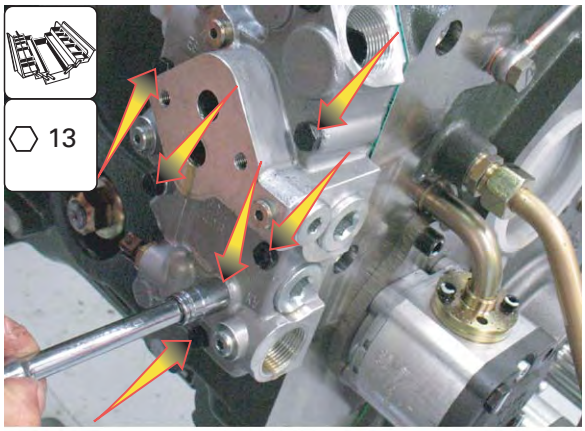


I008258 Fig. 7

19. Remove six screws from the filter support.

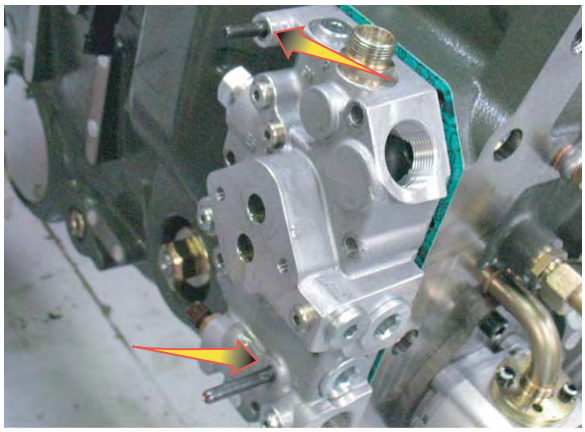
20. Install two guide studs (M8x80).

21. Remove the two remaining screws.



I008259 Fig. 8

22. Remove the filter support by sliding it over the two guide studs.



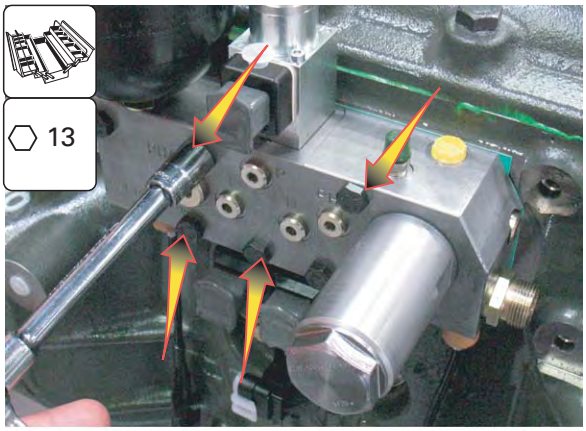
I008260 Fig. 9

23. Disconnect and mark all the connectors from the unit.

24. Remove four screws from the hydraulic unit.

25. Fit two guide studs.

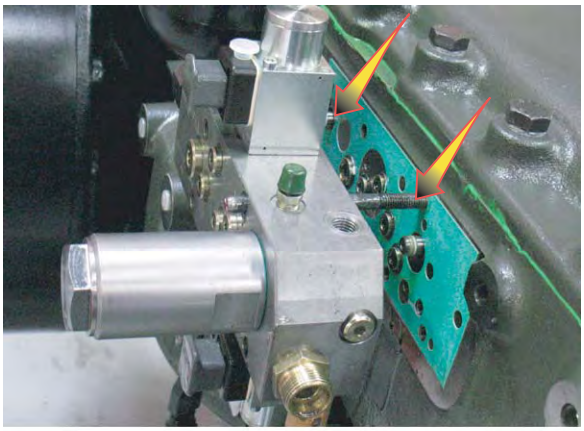
26. Remove the two remaining screws.



I008261 Fig. 10

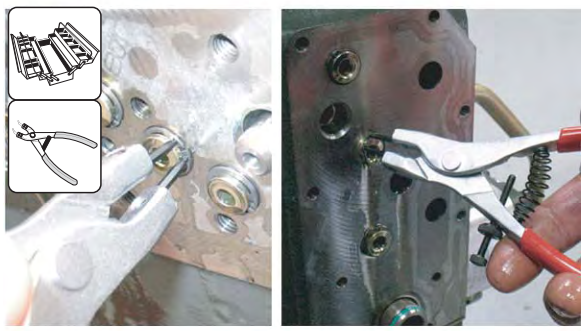
27. Remove the hydraulic unit, sliding it over the guide studs.

NOTE: *Ensure there is an oil drip pan underneath the filter when disassembling.*



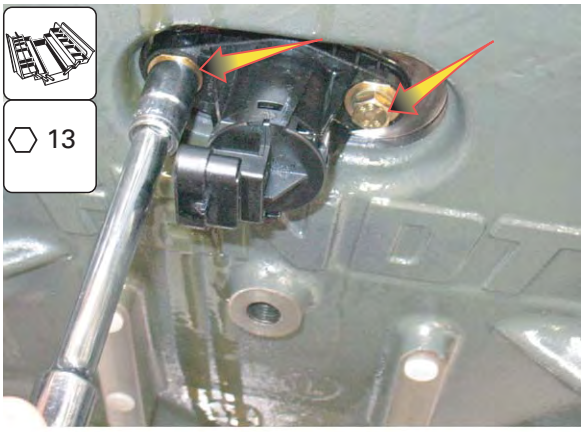
I008262 Fig. 11

28. Using external circlip pliers, remove all the circlips from the transmission hydraulic outlets.



I008263 Fig. 12

29. Disconnect the electrical connector and remove the screws from the collector shaft sensor.



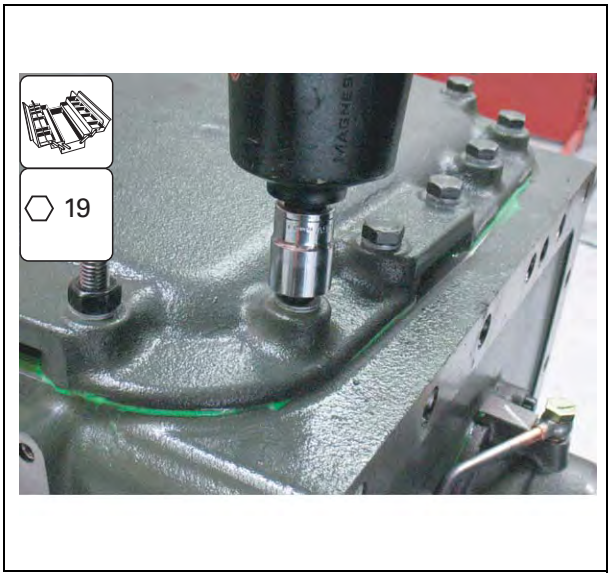
I008264 Fig. 13

30. Loosen the seal and remove the sensor.

I008265 Fig. 14

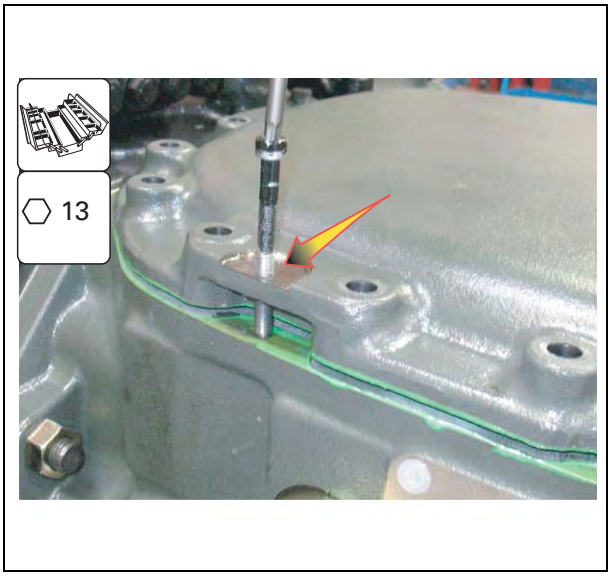
31. Unscrew the cover plate screws.

32. Raise the cover using the M10 eye-bolt.



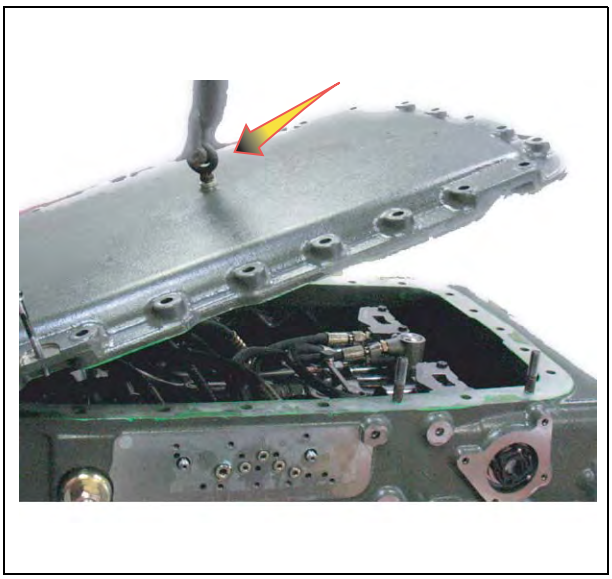
I008266 Fig. 15

33. Using two screws, release the cover plate.



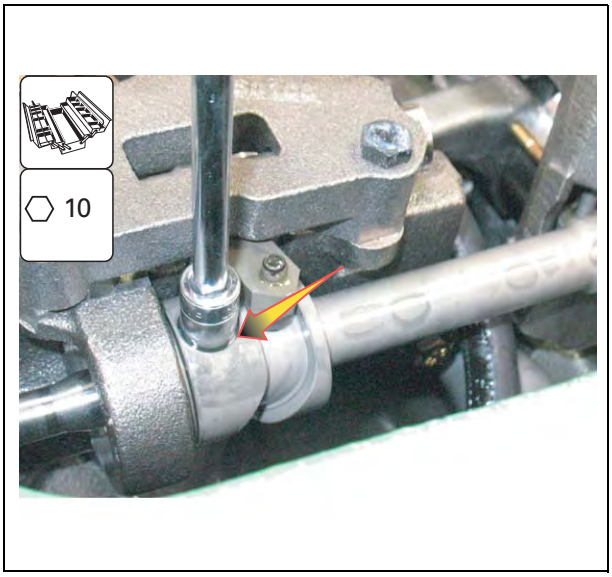
I008267 Fig. 16

34. Using a hoist, lift the cover plate.



I008268 Fig. 17

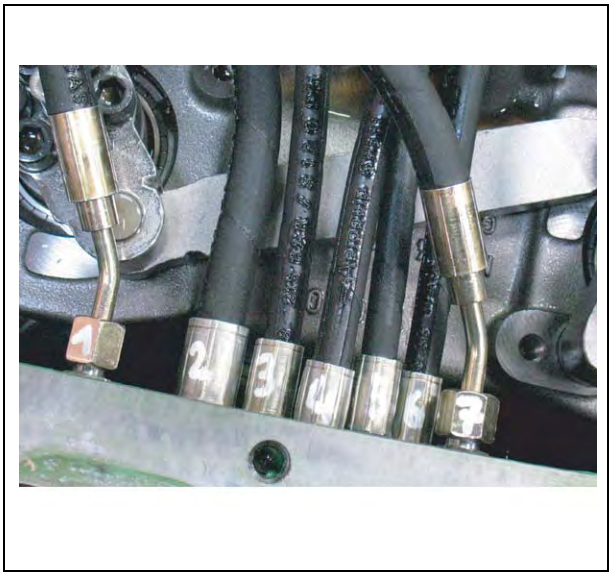
35. Remove the retaining screw from the control shaft.



I008269 Fig. 18

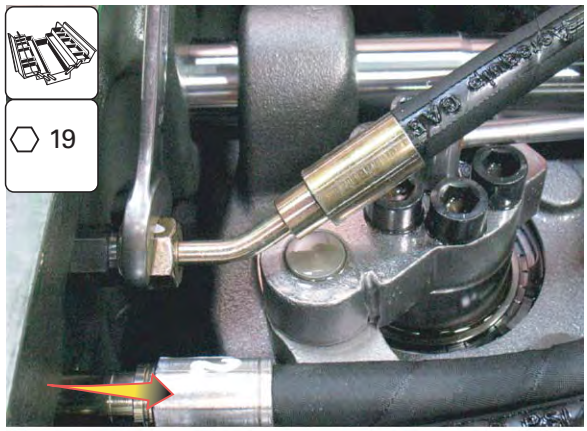
(1) Reverse high pressure sensor slotted line
(2) Rear axle system pressure
(3) Hare range shifting pressure
(4) Forward speed limit
(5) Tortoise range shifting pressure
(6) System pressure
(7) Control pipe for the high-pressure limiter valves

36. Mark all the hydraulic hoses.



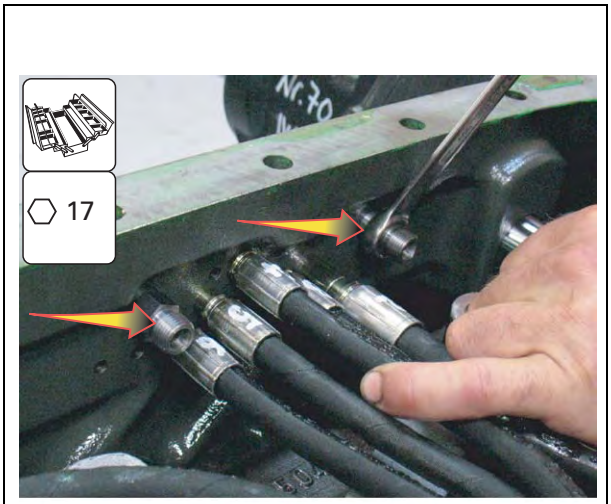
I008270 Fig. 19

37. Unscrew the two hoses with threaded end fittings, then push out the other hoses towards the inside of the gearbox.



I008271 Fig. 20

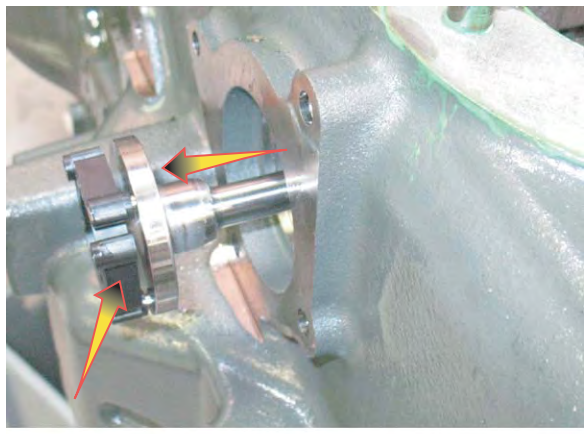
38. Remove the two connecting sleeves.



I008272 Fig. 21

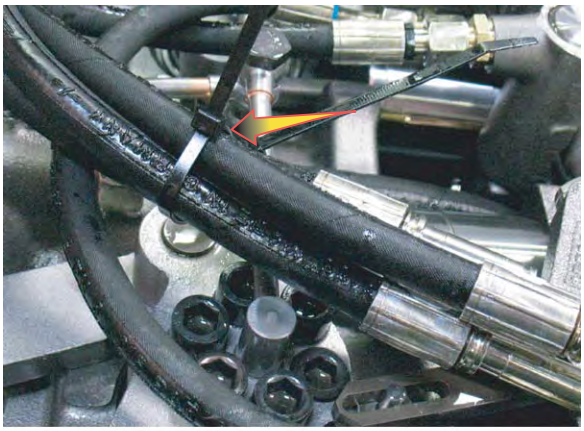
39. Take the control shaft out of its housing.

NOTE: *Do not lose the connecting ring (left arrow).*



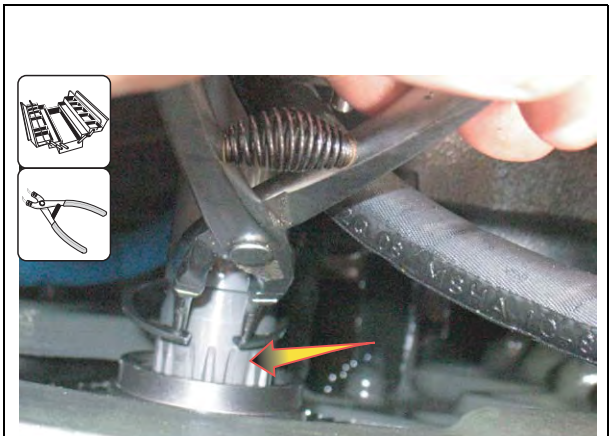
I008273 Fig. 22

40. Attach the hydraulic hoses together using a plastic clip to assist disassembly.



I008274 Fig. 23

41. Using internal circlip pliers, remove the circlip from the motor shaft.



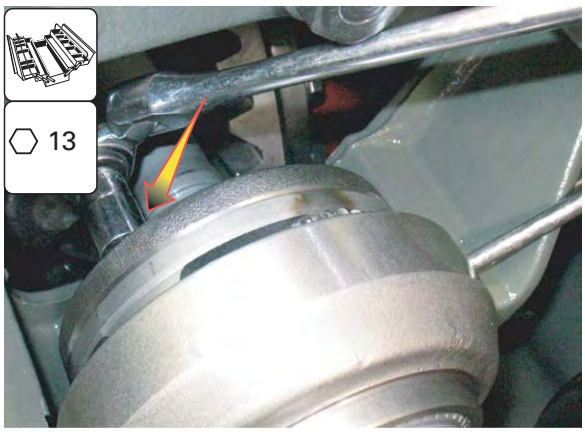
I008275 Fig. 24

42. Take the shaft out of its housing, pushing it out towards the inside of the gearbox.

I008276 Fig. 25

43. Unscrew the 3 M8 screws from the planet carrier.

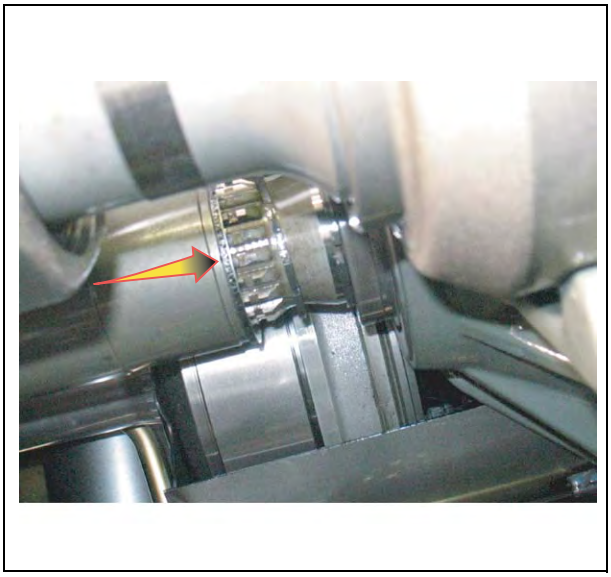
44. Push the shaft towards the rear axle.



I008277 Fig. 26

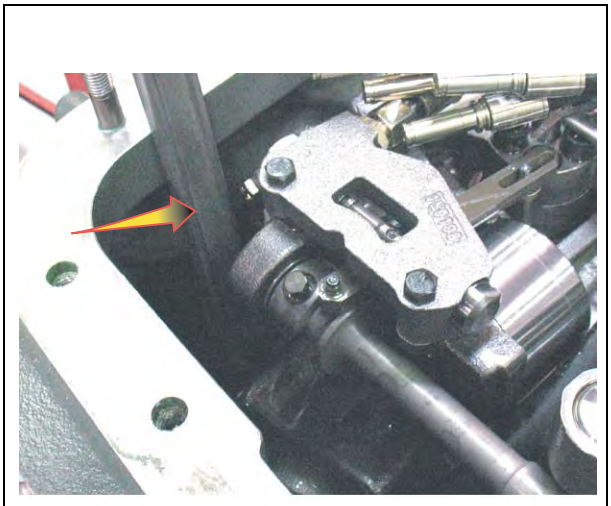
45. Remove the pinion circlip.

46. Push the circlip, washer and socket towards the pinion, as indicated by the arrow.



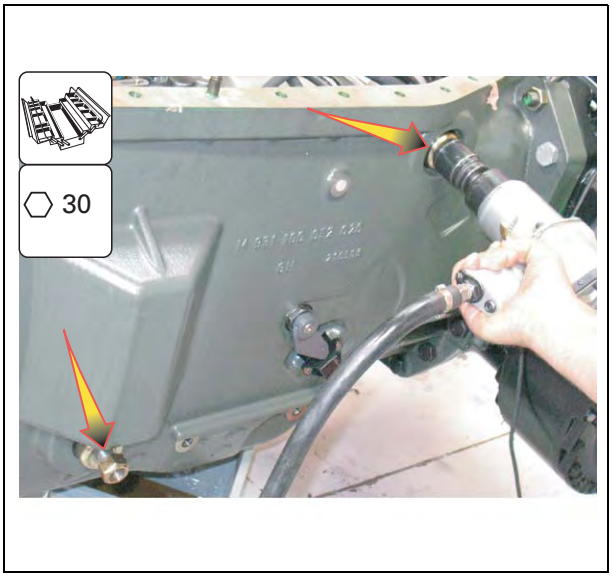
I008278 Fig. 27

47. Swivel the hydrostatic motors and the pump inwards using a lever.



I008279 Fig. 28

48. Unscrew the 2 nuts (see arrows) located on the left and right.



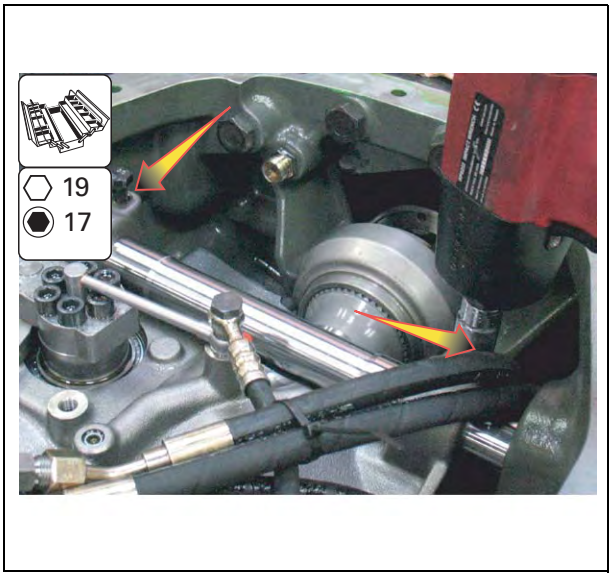
I008281 Fig. 29

49. Unscrew the upper M12 lock screws.

50. On the inner surface of the gearbox housing, unscrew the 2 closing plugs.

51. Recover the oil.

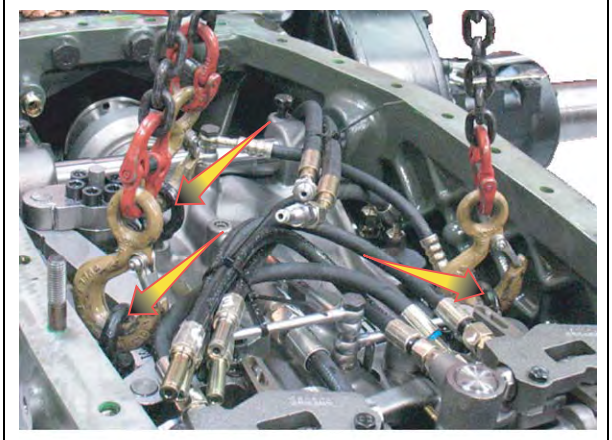
52. Unscrew the 2 lock screws on the lower shaft.



I008282 Fig. 30

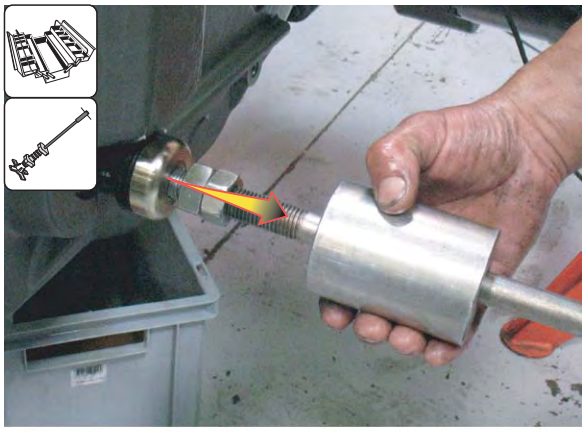
53. Install a lifting device (3 anchor points).

54. Slightly raise the hydraulic module, ensuring the lifting device remains under a certain level of tension.



I008283 Fig. 31

55. Using a slide hammer puller on the M20 threads, extract the flexible suspension shafts.

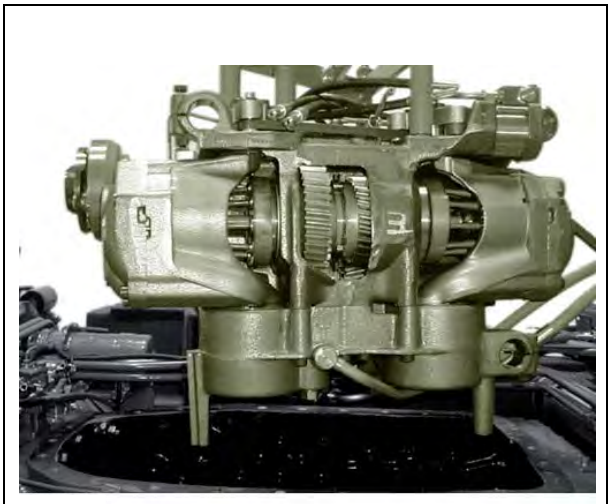


I008284 Fig. 32

56. Take the transmission module carefully out of the gearbox housing using the hoist.

57. Be aware of the movement of other parts.

DANGER: Do not stand under heavy loads.



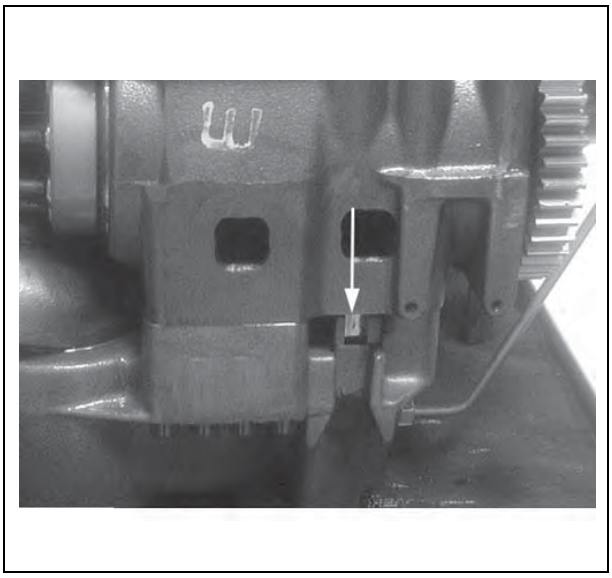
I008286 Fig. 33

B. Assembling the Dyna-VT unit

CAUTION: Before reassembly, all components, mating faces and grooves must be clean. Any rust, mud or water must be removed.

58. Raise the transmission unit with a hoist, after securing it.

59. Move the range selector (Hare / Tortoise) (arrow (Fig. 34)) to "Neutral" (middle position).



I008287 Fig. 34

60. Clean any oil or seal fragments from the transmission housing mating face.

61. Move the range selector finger (arrow (Fig. 35)) to "Neutral" (middle position).

If necessary:

I008288 Fig. 35

62. Fit the circlip and washer on the shoulder of the pinion.

63. Push the socket onto the pinion.

64. Fit the flange on the connecting shaft (PTO drive) and fit the link shaft.

I008289 Fig. 36

65. Fit the transmission module in the transmission housing. Be aware of the movement of other parts.

66. Fit the two shafts into the bores of the transmission housing and transmission module.

NOTE: *The two shafts are of different lengths; the longer one is fitted at the base of the gearbox housing.*

I008290 Fig. 37

67. Check the sockets (flexible) for wear, and fit new sockets if necessary.

68. Fit the sockets home in the bores.

I008291 Fig. 38

69. Fit the ring, with the bore turned towards the flexible socket.

70. Tighten the M20 nut.

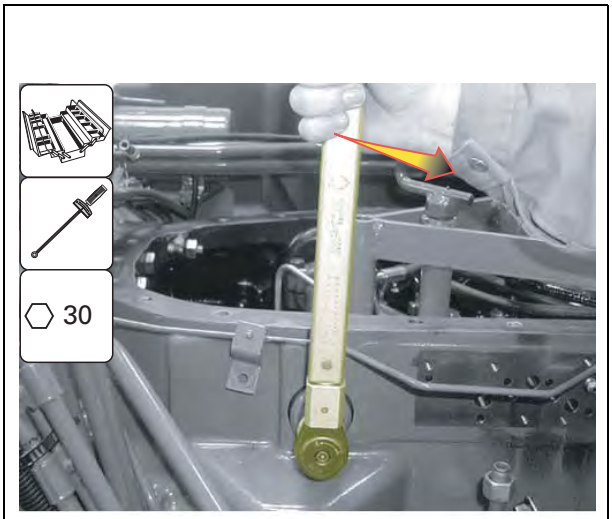
71. Carry out the same assembly operation on the three other threads.

I008292 Fig. 39

72. Tighten the four M20 nuts to a torque of:

NOTE: *When tightening, hold the opposite nut still.*

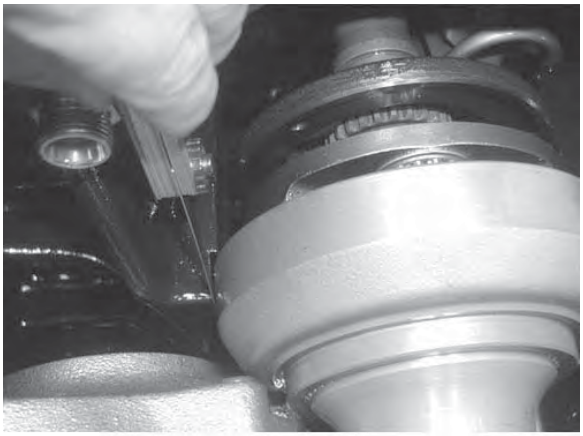
73. Unhook the hoist.



I008293 Fig. 40

74. Install a planet gear of the power transmission epicyclic gear train turned upwards.

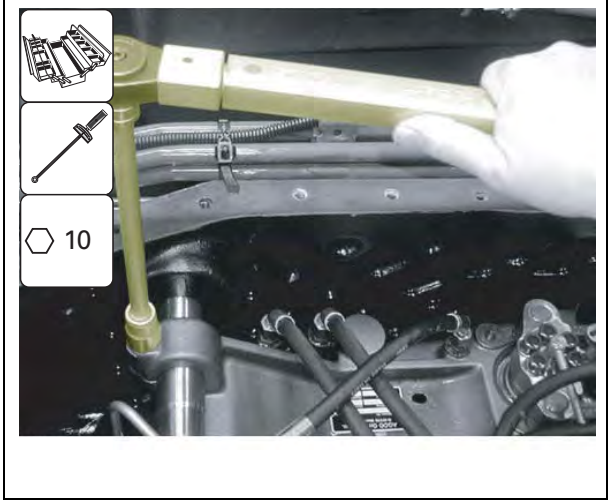
75. Centre the transmission module. The distance between the ring gear and the transmission housing must be identical on either side.



I008294 Fig. 41

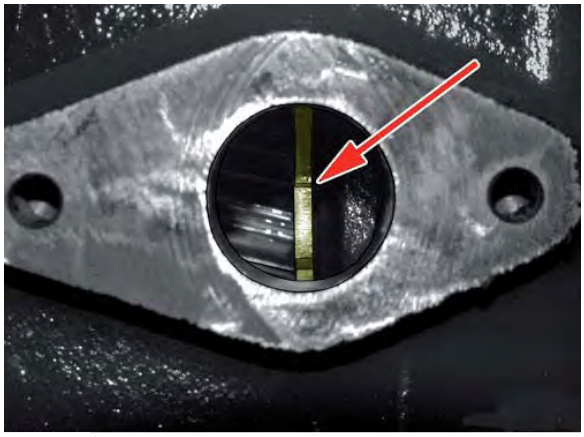
76. Tighten the 4 locking screws to a torque of:

77. Check that the Hare/Tortoise range shifting operates correctly (check finger positioning).



I008295 Fig. 42

78. Turn the transmission module until a tooth of the disc, intended for the Hall sensor, can be seen at the centre of the bore (arrow).



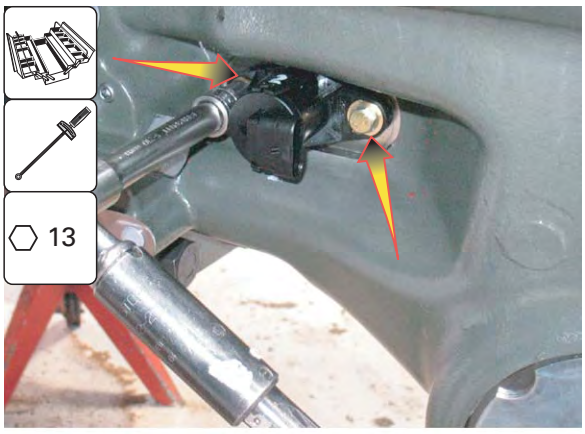
I008296 Fig. 43

79. Smear the contact face of the Hall sensor with sealant (ref. X903.050.553) (non-hardening) and insert the sensor into its housing.

80. Tighten the attachment screws to a torque of:

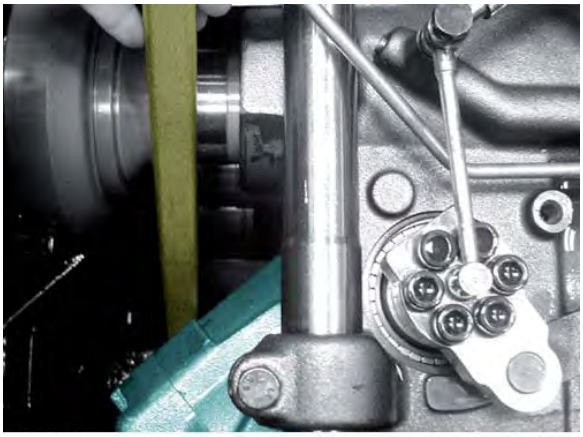
81. Reconnect the electrical connector.

NOTE: *If the Hall sensor is being reused, insert 2 strips of paper 0.9 mm thick into the Hall sensor groove (these strips ensure centring).*



I008297 Fig. 44

82. Swivel the hydrostatic motors to their stop (45°).

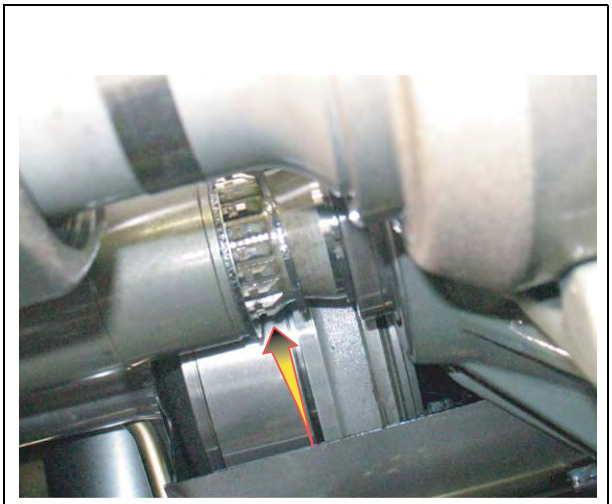


I008298

Fig. 45

83. Pull the pinion socket forwards to release the groove from the circlip. Insert the circlip into the groove.

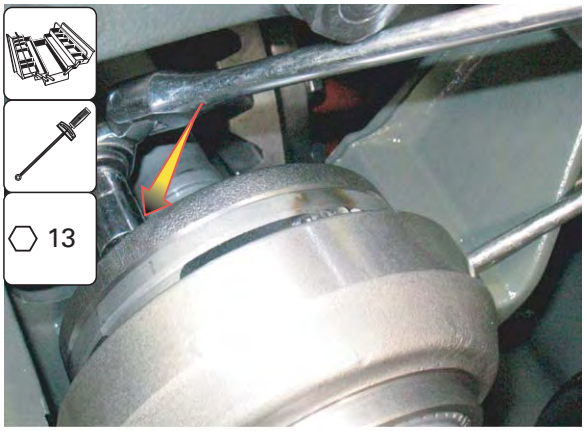
NOTE: *If the socket does not engage, chock a front wheel and turn it until the socket is engaged.*



I008299

Fig. 46

84. Fit the flange on the epicyclic gear train. Tighten the M8 screws to a torque of:

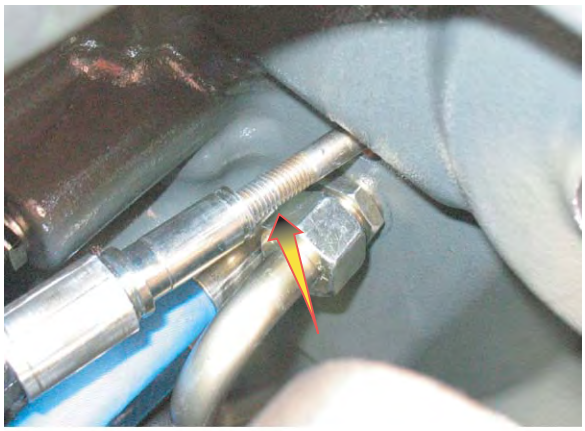


I008300

Fig. 47

85. Insert the hydraulic hoses into the bores on the front right-hand side of the transmission housing.

NOTE: *To assist in the assembly of hoses, an M10 threaded rod can be screwed onto the end of the hose (arrow).*



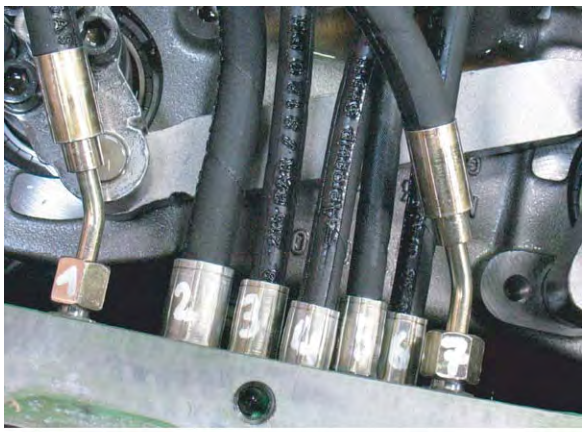
I008301 Fig. 48

(1) Reverse high pressure sensor slotted line
(2) Rear axle system pressure
(3) Hare range shifting pressure
(4) Forward speed limit
(5) Tortoise range shifting pressure
(6) System pressure
(7) Control pipe for the high-pressure limiter valves

86. Insert the pressure pipes in the bores in the right-hand side of the transmission housing.

87. Secure the hoses using circlips (opening facing downwards).

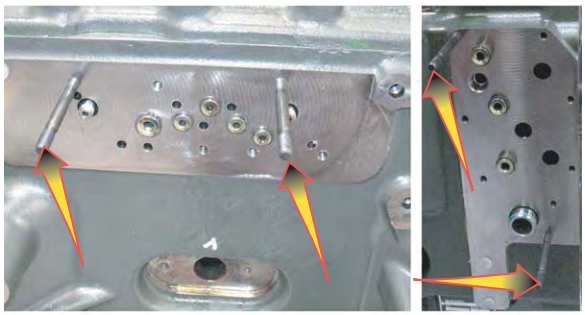
1- ..... short blue hose (flushing)
2 ..... long blue hose (charging)
3 ..... black hose (lubricating)



I008270 Fig. 49

88. Fit the M8x80 guide studs where specified by the arrows.

At the front on top of the transmission housing:

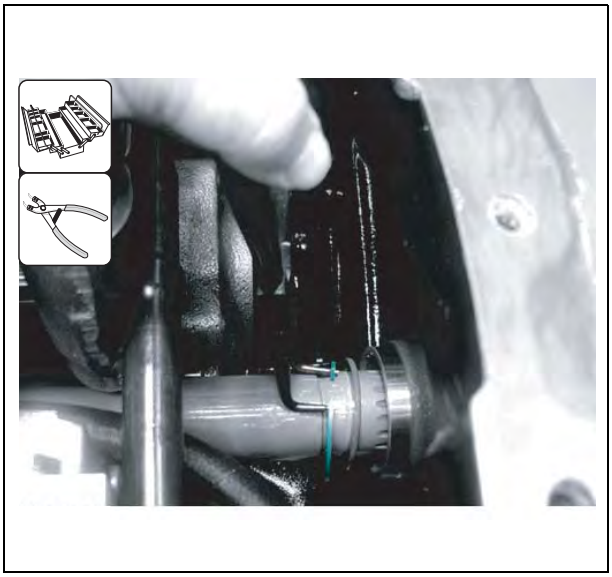


I008302 Fig. 50

89. Fit the ring in the groove of the shaft.

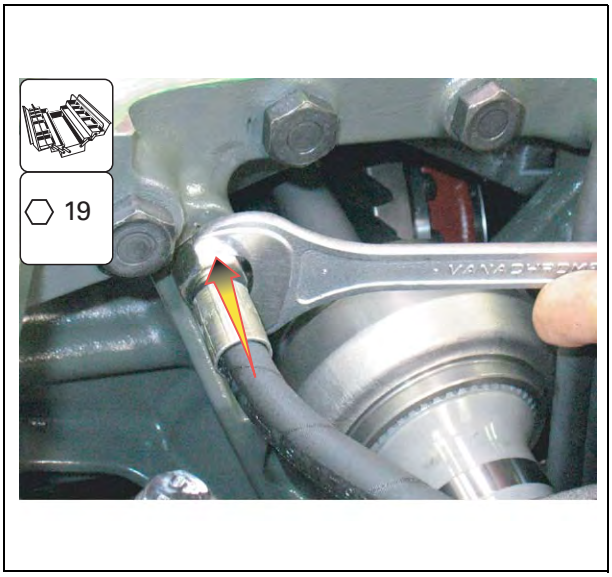
90. Push the shaft forwards. Install the washer.

91. Fit the circlip in the pinion groove.



I008303 Fig. 51

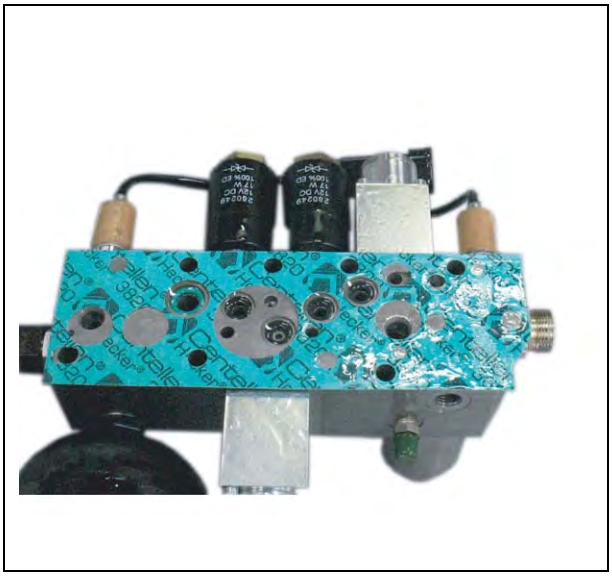
92. Fit the hydraulic pipe (supply pressure of auxiliary functions).



I008304 Fig. 52

93. Fit new "O" rings.

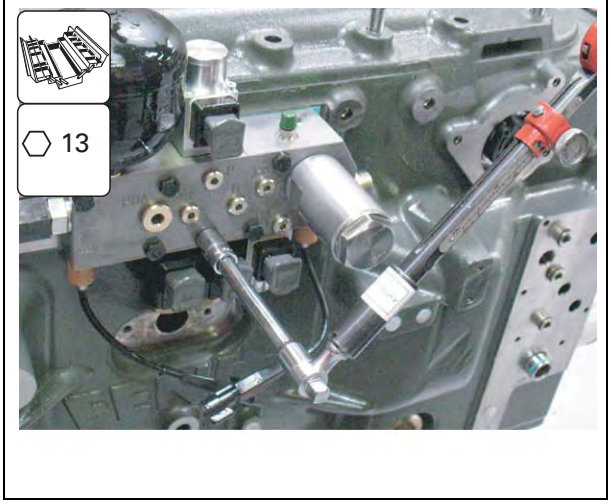
94. Stick seals in the block using grease.



I008305 Fig. 53

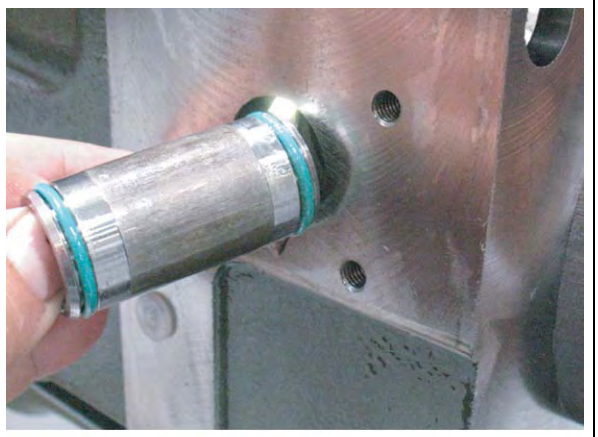
95. Fit the control unit using two guide studs.

96. Tighten the attachment screws (from the inside to the outside) to a torque of:



I008306 Fig. 54

97. Fit new "O" rings to the connecting pipe.



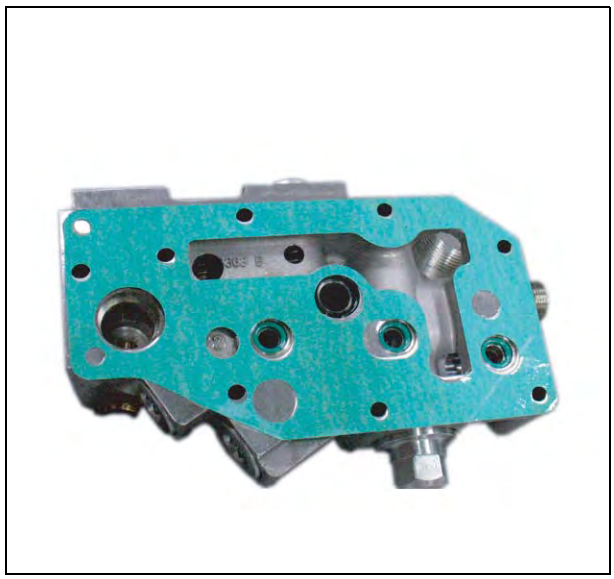
I008307 Fig. 55

98. Smear the "O" rings with grease, and insert the pipe into the transmission housing.

I008309 Fig. 56

99. Fit new "O" rings.

100. Stick seals in the block using grease.



I008312 Fig. 57

101. Fit the valve block using two guide studs.

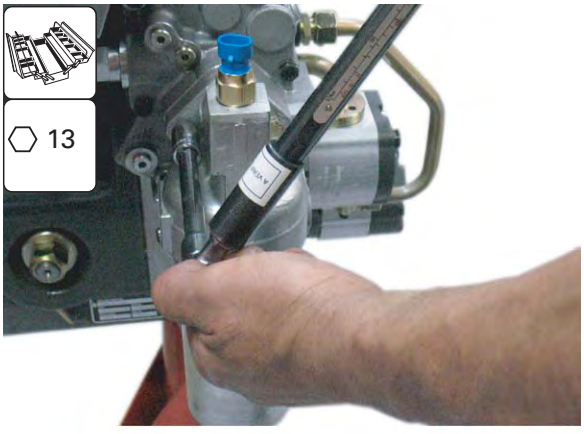
102. Tighten the attachment screws (from the inside to the outside) to a torque of:

I008313 Fig. 58

103. Fit the filter support fitted with new "O" rings.

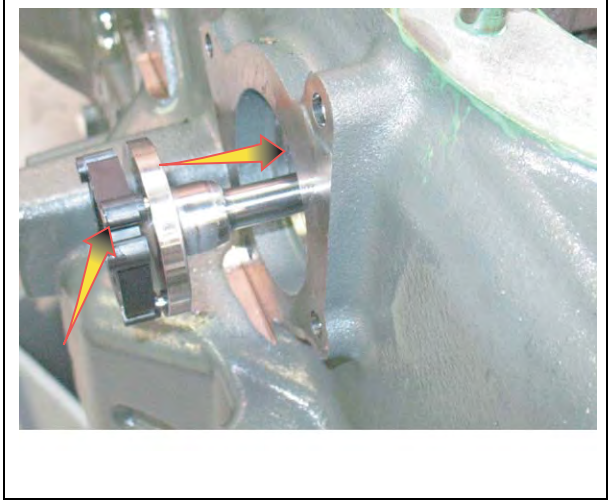
104. Tighten the attachment screws (from the inside to the outside) to a torque of:

105. Connect the connectors and hydraulic pipes.



I008315 Fig. 59

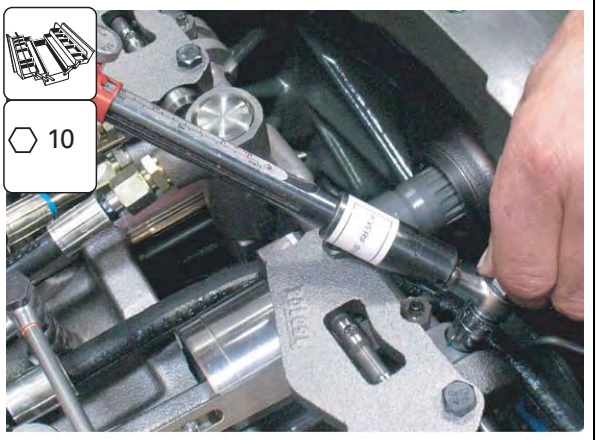
106. Fit the control shaft, fitted with the connecting ring.



I008316 Fig. 60

107. Turn the shaft until the lock screw thread can be seen.

NOTE: *Smear the thread of the Allen screw with plastic binder (LOCTITE) (Ref. X 903.050.084) and tighten the screw to the following torque:*

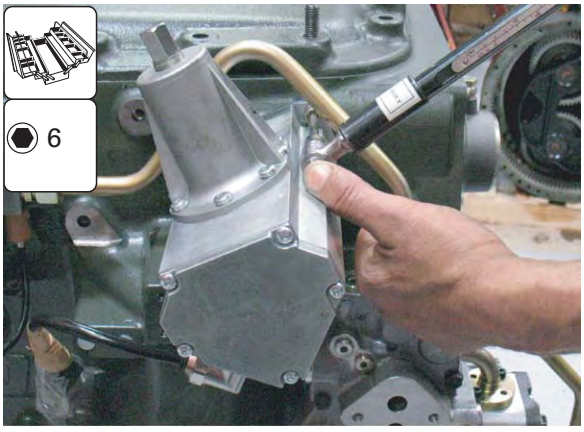


I008317 Fig. 61

108. Fit the pre-assembled control unit on the transmission housing.

109. Tighten the M8 cylindrical screws to a torque of:

110. Reconnect the electrical connector.



I008318 Fig. 62

111. Refit the blanking plugs to the underside of the transmission housing.

112. Fill the transmission unit.

I008319

Fig. 63

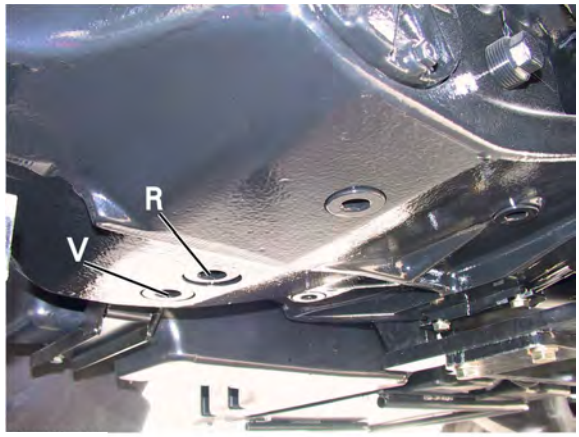
C. Removing and refitting the forward/reverse high pressure relief valves

1. Drain the transmission oil.

(V) Forward high pressure relief valve
(R) Reverse high pressure relief valve

2. Loosen the 2 hexagonal head plugs located under the transmission housing.

3. Use a wrench to remove the high pressure relief valves.



I008336 Fig. 64

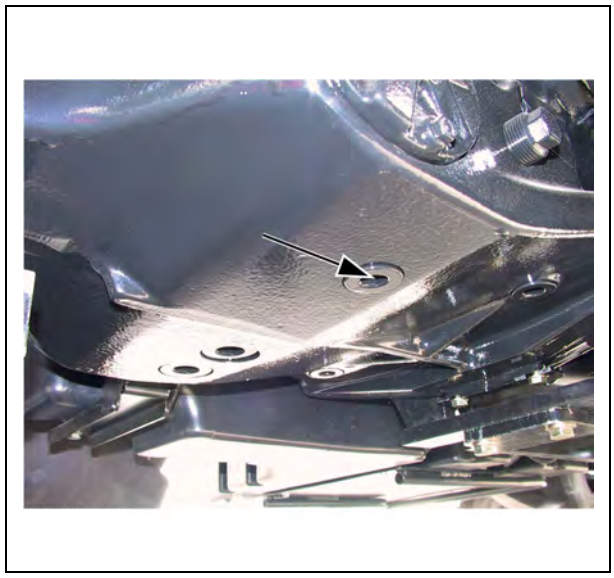
The high pressure relief valve is a controlled pressure relief valve
Adjustment pressure when new: 540 bar +20 bar.
Only replace "O" rings if they are damaged. Do not move the thrust collar. Tighten the pressure relief valve to a torque of:

NOTE: *Fill the transmission oil at an external filling station.*

I008337 Fig. 65

D. Removing/refitting the flushing valve

1. Drain the transmission oil.
2. Remove the plug located under the transmission housing.
3. Use a wrench to remove the flushing valve.

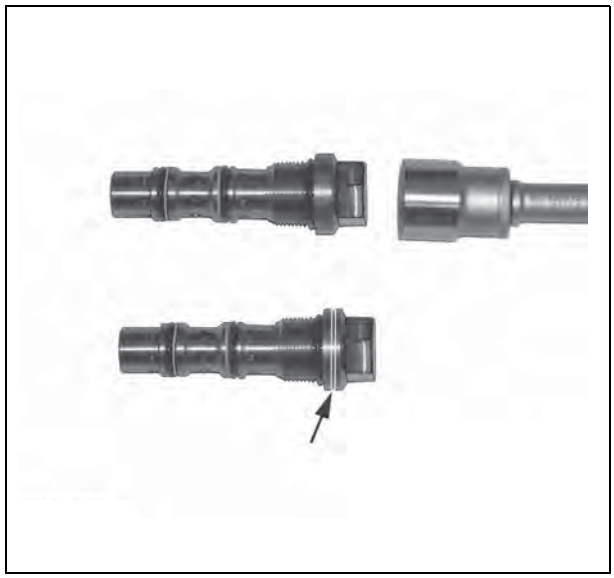


I008339 Fig. 66

Only replace "O" rings if they are damaged. Do not move the thrust collars. The thrust collars are positioned facing each other. Tighten the flushing valve to a torque of 200 Nm + 10 Nm

NOTE: *The new flushing valve with a seal groove is provided as a replacement. Tighten to the required torque of:*

4. Fill the transmission oil at an external filling station.



I008340 Fig. 67

E. ML260 gearbox - Removing the clutch control

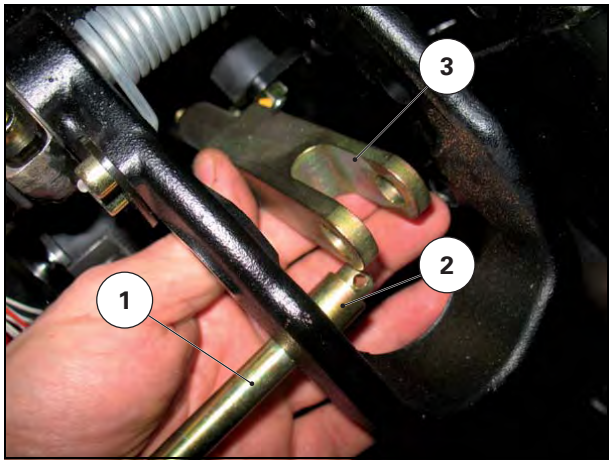
Steps required before disassembly

5. Remove the bonnet

6. Remove the trim under the steering wheel

7. Empty the clutch fluid reservoir using a syringe.

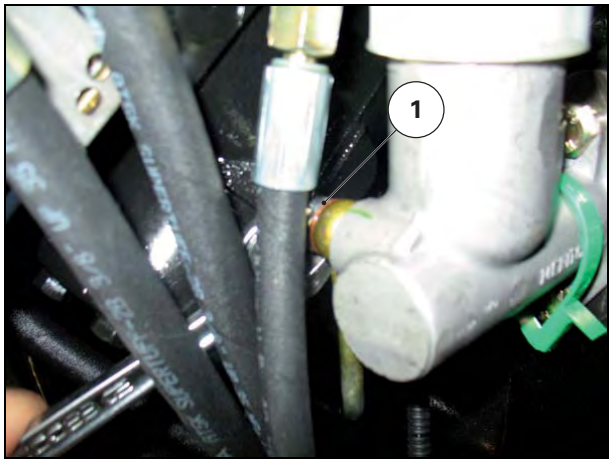
8. Inside the cab, remove the cotter pin retaining the clutch pedal shaft joint (1) (Fig. 68).



I009724 Fig. 68

9. Loosen the hydraulic union (1) (Fig. 69)

NOTE: *Take care not to lose the hydraulic union seals.*



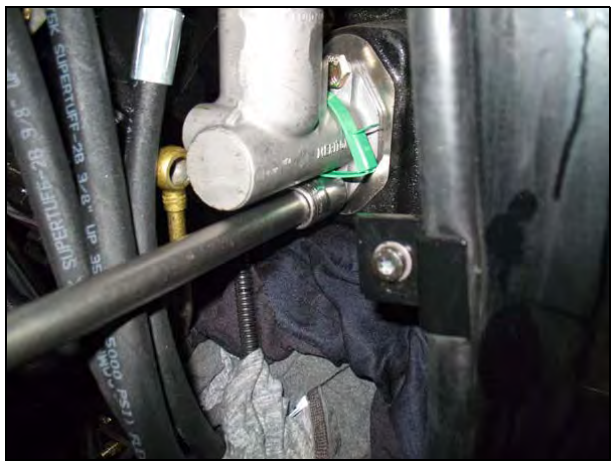
I009725 Fig. 69

10. Protect the surrounding area underneath the clutch reservoir.

11. Disconnect the hydraulic union.

I009726 Fig. 70

12. Remove the lower attachment screw from the clutch master cylinder.



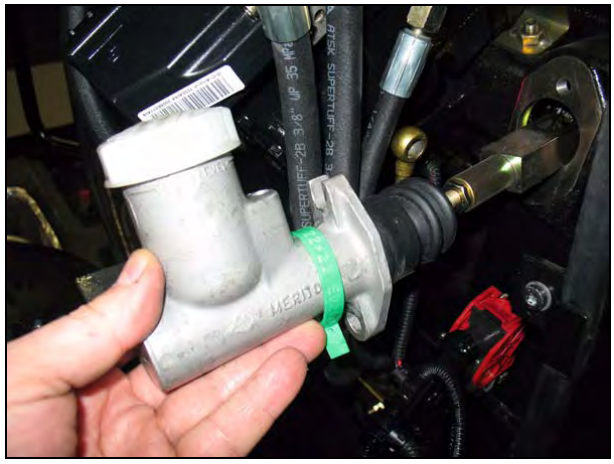
I009727 Fig. 71

13. Remove the upper attachment screw from the clutch master cylinder.

I009728 Fig. 72

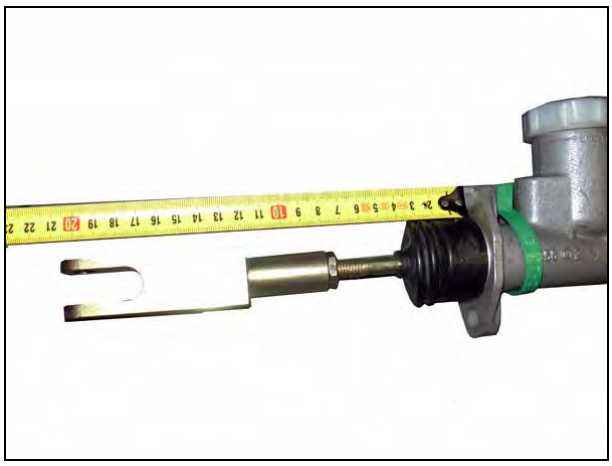
14. Remove the clutch master cylinder.

NOTE: *The control clevis is removed with the master cylinder*



I009729 Fig. 73

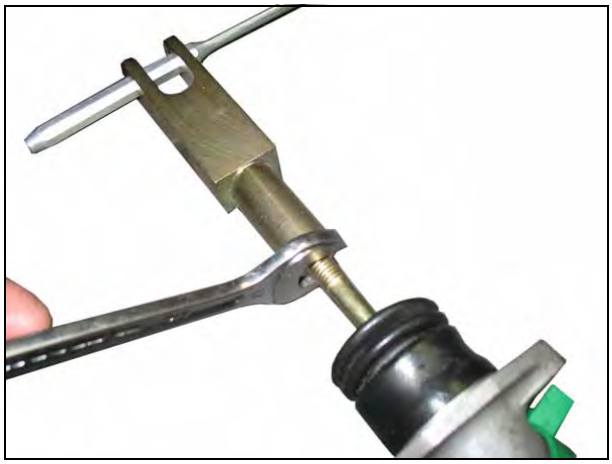
15. Measure and note down the distance from the support face of the master cylinder and the end of the control clevis.



I009730

Fig. 74

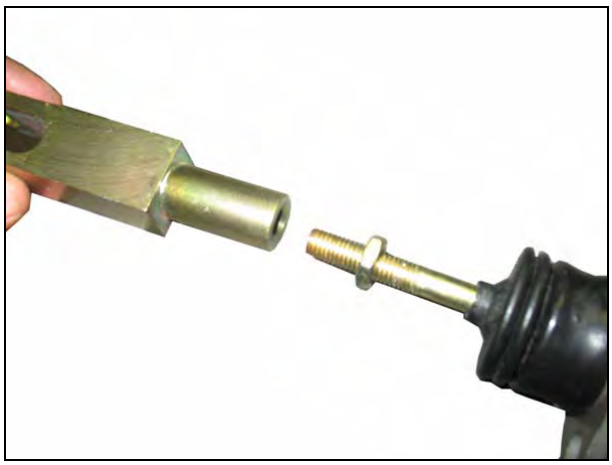
16. Immobilise the control clevis and loosen the counternut by one half-turn.



I009731

Fig. 75

17. Remove the control clevis.



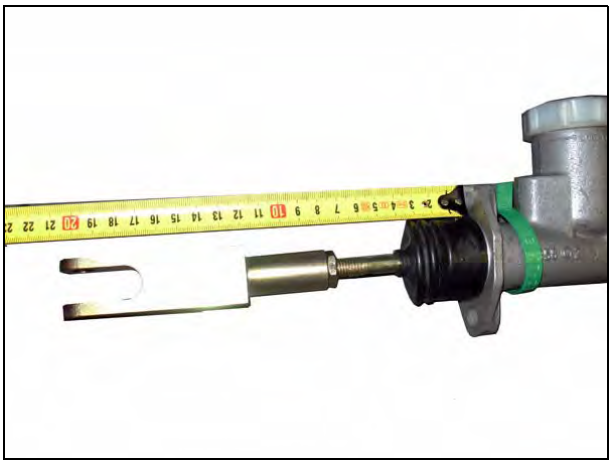
I009732

Fig. 76

F. ML260 gearbox - Refitting the clutch control

18. Fit the control clevis, observing the dimension measured at the time of removal.

19. Tighten the counter-nut.

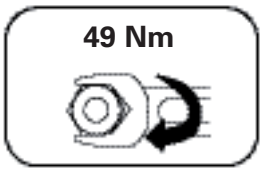


I009730 Fig. 77

20. Fit the master cylinder assembly and clevis.

I009729 Fig. 78

21. Fit the master cylinder attachment screws and torque

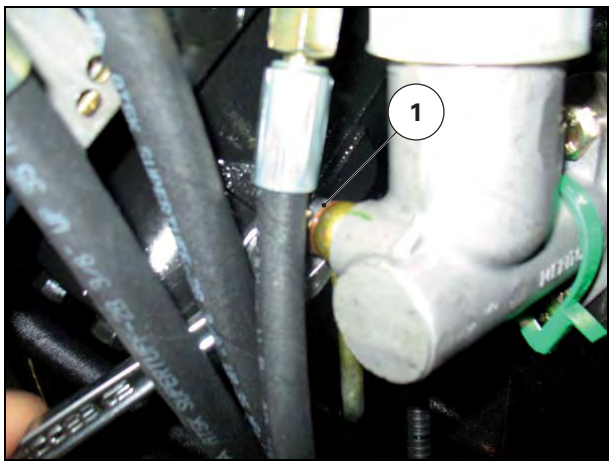


tighten them to

I009727 Fig. 79

22. Fit the hydraulic union (1) (Fig. 80) and its 2 copper seals.

NOTE: *Check the condition of the copper seals; it is preferable to fit new seals.*



I009725 Fig. 80

23. Fit the control pin (1) into the clevis (3) (Fig. 81).

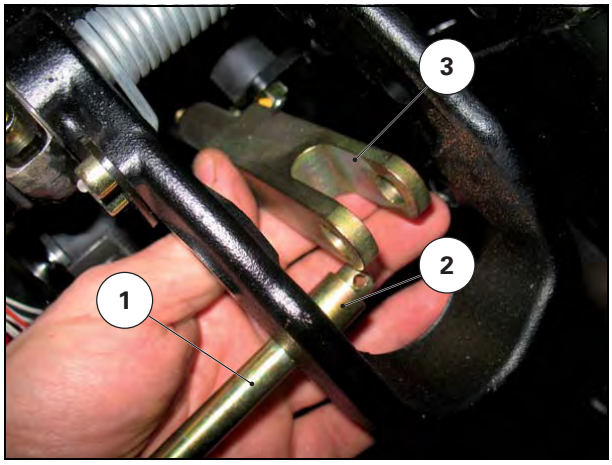
NOTE: *Observe the correct fitting position of the spacer (2).*

24. Refit the pin and lock it in place by bending it.

25. Refit the trim under the steering wheel.

26. Refit the bonnet.

27. Bleed the clutch control.



I009724 Fig. 81

5A18

ML260 - Service tools

TABLE OF CONTENTS

A. General

The tools described in this section can be ordered from the AGCO spare parts department or by contacting the tooling division of Beauvais by referring to AGCOnet bulletin Trac 60/07.
The prices will then be sent out to you.

B. ML260 - Service tools

Ref.	AG01
Description	Hydraulics test kit
Order	AGCO Stoneleigh

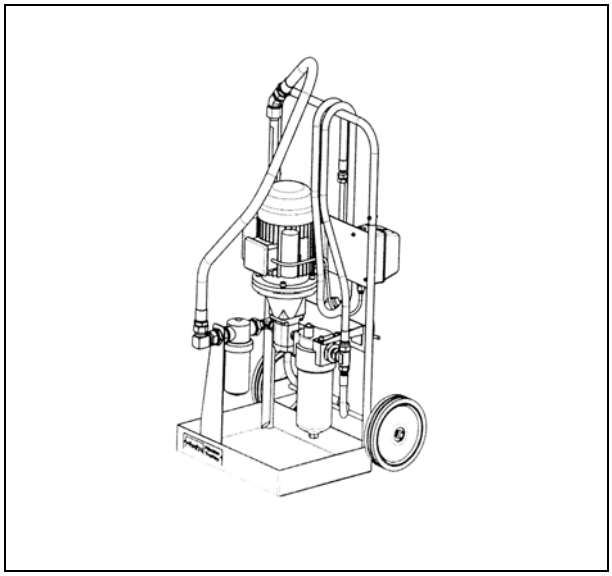
Contents

See Service Bulletin ADM 08/04

I009102

Fig. 1

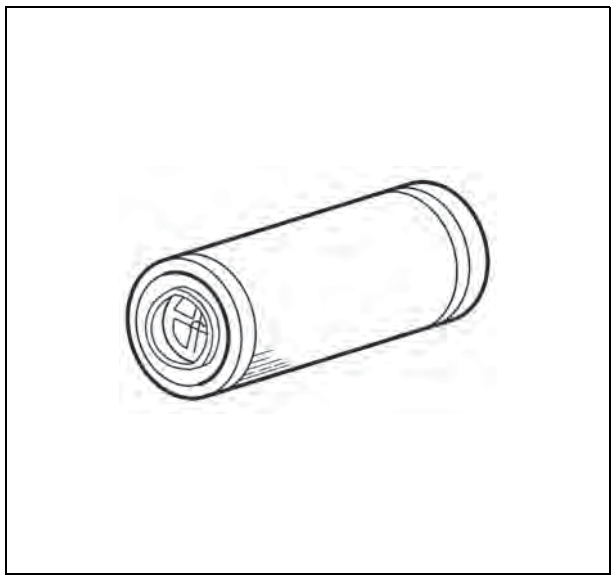
Ref.	X899.980.255.000
Description	External filling station
Order	Parts Division



I008324

Fig. 2

Ref.	X899.980.255.100
Description	Replacement filter
Order	Parts Division

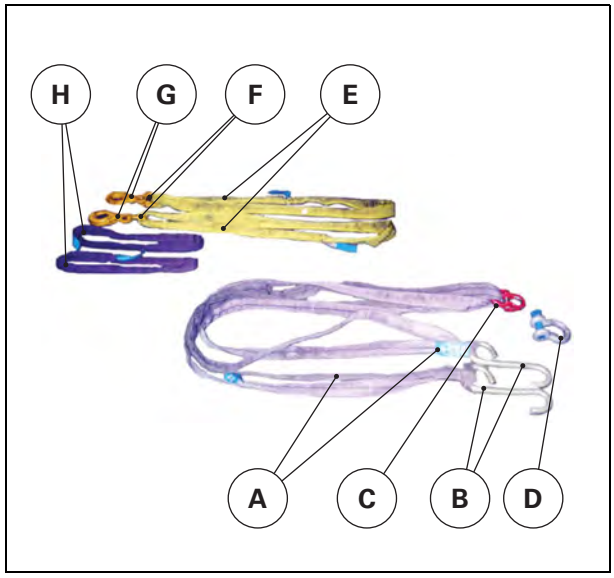


I012084 Fig. 3

Ref.	4315657M1
De-scrip-tion	Cab lifting sling
Order	AGCO Beauvais

Contents

Ref.	Description	Qty
	L2M actuator lever, 2 t	1-
A	Round slings 1 t - length 2 m	2
B	Hooks	2
C	13 connecting link	1-
D	16 shackle	1-
E	Round slings 3 t - length 1 m	2
F	"10" connecting links	2
G	Locking hooks with 01 eye	2
H	Round slings 1 t - length 0,5 m	2



I008688 Fig. 4