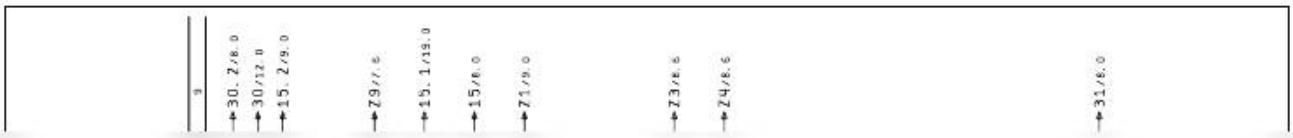
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SHEET 7 - Power supply / Starter engine



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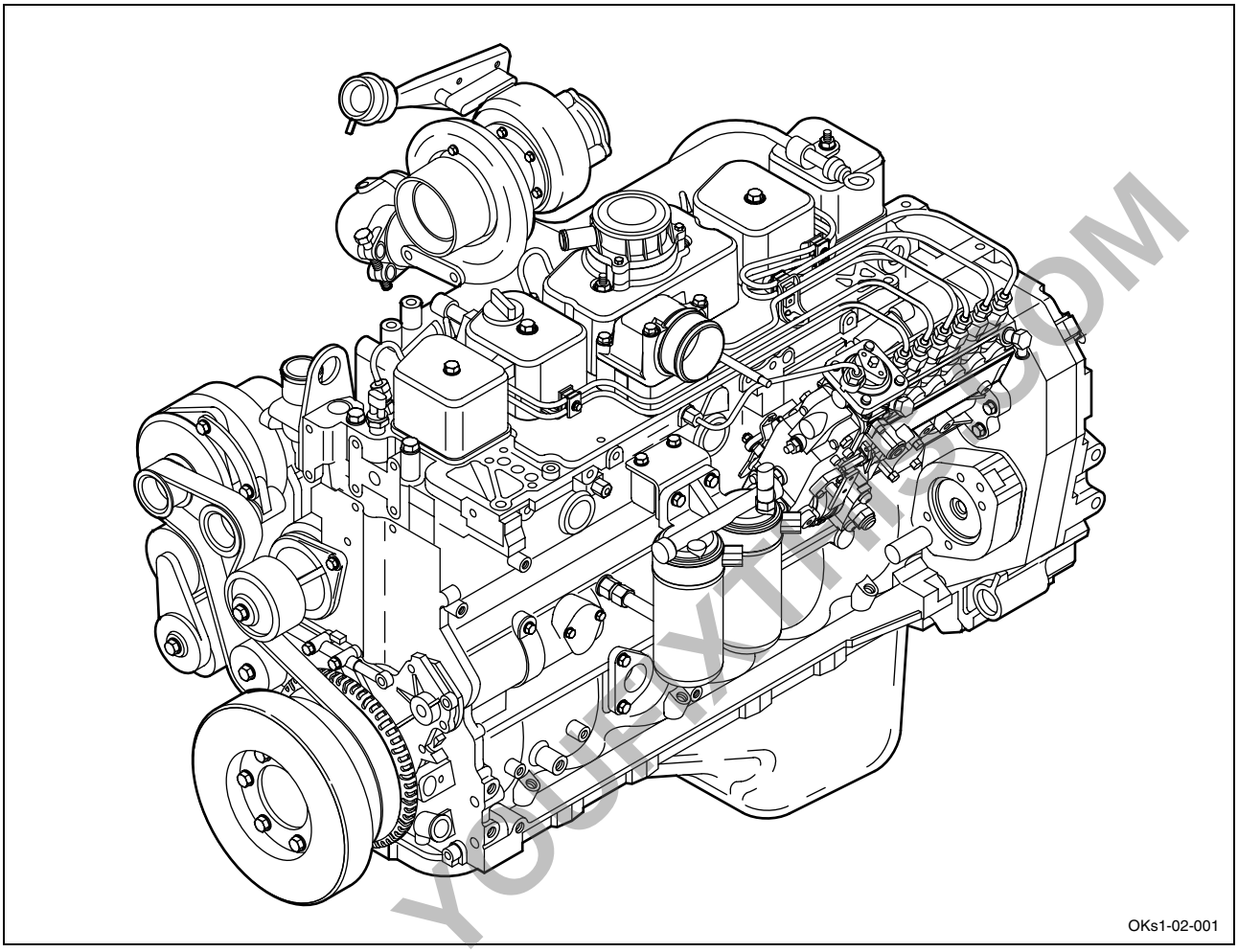


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2.1 ENGINE F4BE0684K



OKs1-02-001

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2.1.5 TIGHTENING TORQUES

PART			TORQUE	
			Nm	(kgm)
Cylinder head fastening screw	1st phase:	screws M12x1.75x70	50 ± 5	(5 ± 0.5)

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3.3.5 TROUBLESHOOTING

Fault Code (hex)	MEANING OF THE FAULT CODE possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
11	LOGICAL ERROR AT GEAR RANGE SIGNAL TCU detected a wrong signal combination for the gear range • *cable from shift lever to TCU is broken* • *cable is defective and is contacted to battery voltage or vehicle ground* • *shift lever is defective*	TCU shifts transmission to neutral OP-Mode: transmission shutdown	• check the cables from TCU to shift lever • check signal combinations of shift lever positions for gear range	failure cannot be detected in systems with DW2/DW3 shift lever fault is taken back if TCU detects a valid signal for the position
12	LOGICAL ERROR AT DIRECTION SELECT SIGNAL TCU detected a wrong signal combination for the direction • *cable from shift lever to TCU is broken* • *cable is defective and is contacted to battery voltage or vehicle ground* • *shift lever is defective*	TCU shifts transmission to neutral OP-Mode: transmission shutdown	• check the cables from TCU to shift lever • check signal combinations of shift lever positions F-N-R	fault is taken back if TCU detects a valid signal for the direction at the shift lever
25	S.C. TO BATTERY VOLTAGE OR O.C. AT TRANSMISSION SUMP TEMPERATURE SENSOR INPUT the measured voltage is too high: • *cable is defective and is contacted to battery voltage* • *cable has no connection to TCU* • *temperature sensor has an internal defect* • *connector pin is contacted to battery voltage or is broken*	no reaction, TCU uses default temperature OP-Mode: normal	• check the cable from TCU to the sensor • check the connectors • check the temperature sensor	
26	S.C. TO GROUND AT TRANSMISSION SUMP TEMPERATURE SENSOR INPUT the measured voltage is too low: • *cable is defective and is contacted to vehicle ground* • *temperature sensor has an internal defect* • *connector pin is contacted to vehicle ground*	no reaction, TCU uses default temperature OP-Mode: normal	• check the cable from TCU to the sensor • check the connectors • check the temperature sensor	

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Carefully read personal and machine SAFETY INSTRUCTIONS (at the beginning of this manual)

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2.6 DIAGNOSTICS

Main engine operating anomalies:

1 - Engine won't start;
2 - Engine overheats;
3 - Engine lacks power and works erratically;
4 - Engine exhaust smoke light blue;
5 - Engine exhaust smoke grey (verging on white);
6 - Engine exhaust smoke black or dark grey;
7 - Engine knocks irregularly;
8 - Engine stops;
9 - Engine exceeds max. revs number;
10 - Excessive or insufficient oil pressure;
11 - Excessive fuel consumption;
12 - Engine won't stop.

1	ENGINE WON'T START

⇩

Connections to battery terminals are in working order — NO → Clean, check, tighten or replace clamp nuts

YES ↓

Batteries in working order — NO → Carry out the checks described in the "Electric system" repair manual

YES ↓

Starter motor in working order — NO → Carry out the checks described in the "Electric system" repair manual

YES ↓

Thermal starter in working order — NO → Replace

YES ↓

Injection pump timed — NO → Verify correct timing as described in the relevant chapter

(to be continued)

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1.3 ENGINE

1.3.1 ENGINE SPECIFICATIONS

	F4BE0684K

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AEB – Cycle

WHEN

- After every oil change
- 50 hours after putting the transmission into service for the first time, afterwards every 1000 hours of service (recommendation of ZF)
- After every replacement of a component of the transmission or of the respective electronics
- After every replacement of the transmission

DURATION

- AEB cycle ca. 3 – 4 minutes

EXECUTION

The program for AEB cycle is set down in the electronic control unit EST-37. Terminated the AEB cycle, the optimised parameters are stored in EEPROM of EST-37.
Attachment of special tools on the plug-type connection Diagnosis **XA5**

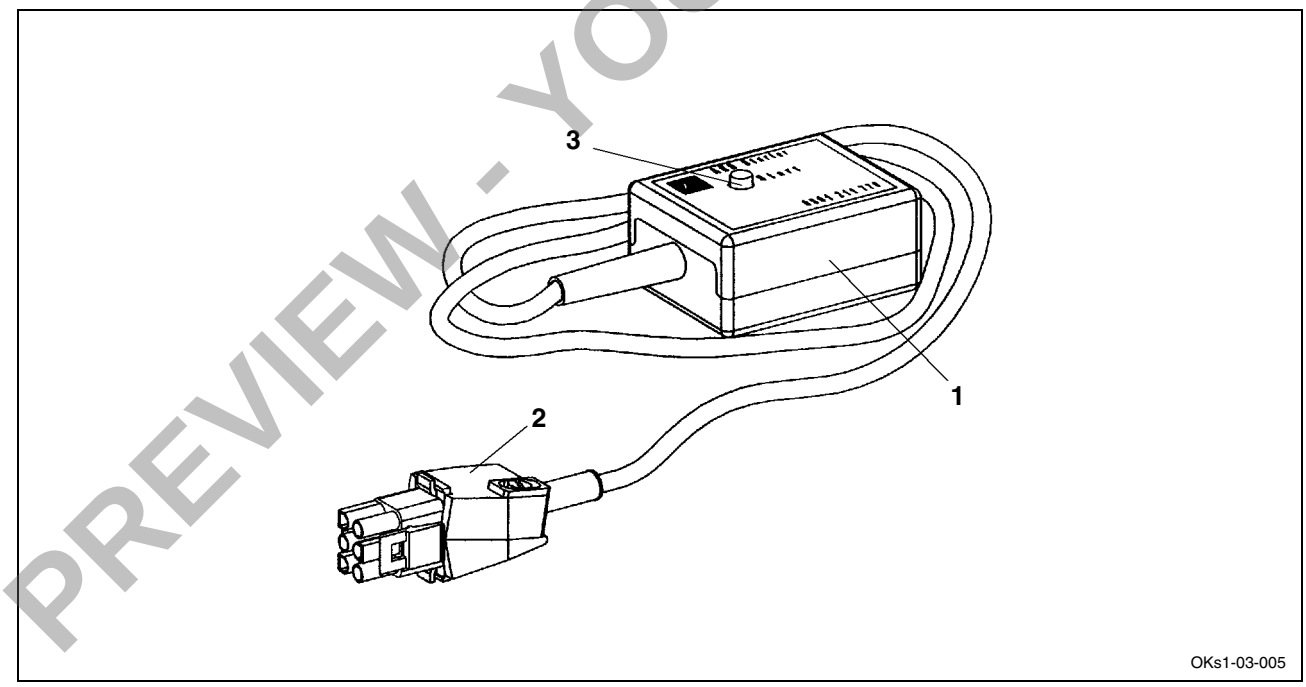
- AEB Starter (Part No. 0501 211 778) **or**
- Laptop with Diagnosis Set (Windows 95/98/NT, Part No. 5870 211 179) and Diagnosis Software

Detailed information for starting the AEB cycle can be taken from the attached Operating Instructions.

OPERATION SEQUENCE

1. Warm up transmission
2. Ignition "OFF"
3. Connect connector (**2**) to plug connection Diagnosis **XA5** in driver's cab
   - The plug connection Diagnosis **XA5** can be found at the cable harness of the electronic control unit EST-37 (driver's seat console, right hand behind the map pocket)
   - The map pocket need not be removed
4. Put shift lever on "**N**", apply parking brake
5. Ignition "ON", EST-37 must recognize AEB Starter for at least 2 s
6. Adjust engine speed
7. Start button (**3**), press on AEB starter, AEB cycle is started
8. After a successful run, the display must show "O.K."
9. Ignition "OFF", disconnect AEB starter

The display messages of AEB starters are shown on the display of the dashboard



1. AEB Starter
ZF Part No.: 0501 211 778
2. Connector
3. Start button

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4.2.6 SERVICE SCHEDULE

OPERATION	FIRST TIME	SEASONALLY OR EVERY 1000 OPERATING HOURS(1)
Axle gear oil change Tandem gear oil change Tanden gear chain tension Check/Adjust	50 hours ▲ ● ▲ ■	◆ ■ ◆ ■
Lubrication works	▲ ■	◆ ■
Check and in case adjust oil level	50-100 hours ■	monthly ●
Clean magnetic oil plugs	150-200 hours ■	every oil change ●
Clean oil breather	▲ ■	monthly ●
Greasing	150-200 hours ●	weekly ●
Tandem gear oil level check Axle gear oil level check	250 hours ●	■
Tandem gear oil level check Chain case tension check Axle gear oil level check	500 hours ●	■
Tandem gear oil level check Chain case tension check Axle gear oil level check Tandem, axle, wheel hub gear oil change	1000 hours ●	■

Remarks

● Operation performed only by personnel authorized by the manufacturer

■ Operation performed only by trained personnel

(1) Which of both conditions comes first

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OPERATION

GENERAL INSTRUCTIONS

Never operate the machine before having read and understood the operating instructions.

Pay special attention to:

"Fundamental Safety Instructions" and all warnings and safety instructions attached to the machine.

Familiarize yourself with the layout, the functioning and the activating devices of the control elements prior to starting up the machine.
Activate the control elements from the driver's seat only.

Keep the operating instructions with the machine at all times.

OPERATING PERSONNEL

The operating personnel must be fully informed of the operation and application of this or comparable machines.

The necessary know-how can be acquired in several days' instruction, e.g. by a CNH mechanic or by attending a CNH operators' training course.

PERSONAL PROTECTIVE WEAR AND WORKING CLOTHING

Wear a safety helmet and working footwear with non-slip soles.
Smooth soles may slip from steps and pedals, resulting in injury or incorrect operation.

Wear closely fitting working clothing when operating the machine.
Loose, wide garments may result in the control lever being inadvertently activated.

SAFETY BELT

For machines with a safety belt for operating personnel:

Check safety belt attached to driver's seat. In the event of damage or after an accident, have it replaced immediately.

Apply safety belt before starting work.

STATE OF THE MACHINE

Operate the machine only in a safe state and only in accordance with its designated use. Always observe the safety instructions.

Always have inspection and maintenance work carried out on schedule.

Operate the machine only with the equipment and component combinations approved by the Manufacturer. Clearcut data are given in the technical specifications.

Never install and commission other equipment and component combinations without the Manufacturer having first inspected and approved the project.

Before starting work or travelling with the machine, check that the braking, steering, signalling and lighting systems are fully functional.

Poor visibility may result in accidents. Always clean the windows and the glass covers of all lights before starting up the machine.

Check that all warnings and safety instructions attached to the machine are present and legible.

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2.2 ENGINE REMOVAL – INSTALLATION

2.2.1 REMOVAL

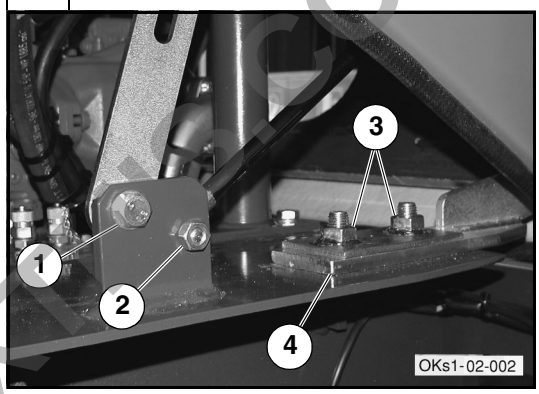
DANGER

Lift and handle all heavy parts with a lifting device of appropriate capacity.
Make sure that groups or parts are held by appropriate slings and hooks.
Make sure that no bystanders are in the vicinity of loads to be lifted.

LEFT SIDE

Remove the engine hood, proceeding as follows:
- Sustain the hood in an appropriate manner;
- Remove screw (**1**) securing the hood sliding bracket and screw (**2**) securing the hood shock absorber.
- Remove the two screws (**3**) securing the hood to the rear frame and recover plate (**4**).

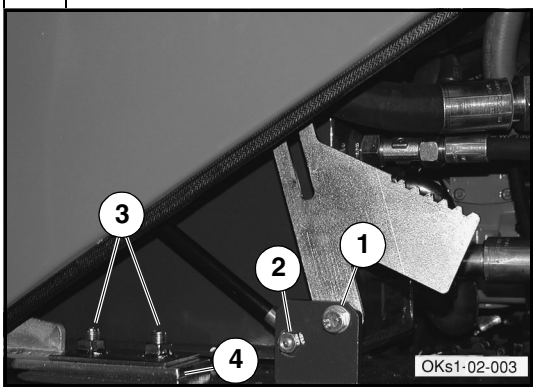
1



RIGHT SIDE

- Remove screw (**1**) securing the hood sliding bracket and screw (**2**) securing the hood shock absorber.
- Remove the two screws (**3**) securing the hood to the rear frame and recover plate (**4**).

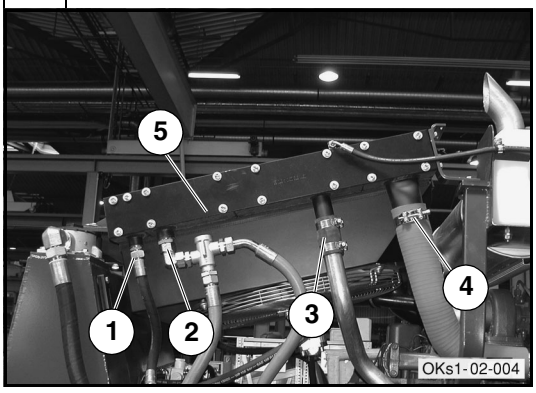
2



RIGHT SIDE

Disconnect pipes (**1**) (**2**) (**3**) and (**4**) of heat exchanger (**5**).

3



1. Hydraulic oil outlet pipe
2. Transmission oil inlet pipe
3. Coolant outlet pipe
4. Compressed air inlet pipe.

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SUMMARY

SAFETY INSTRUCTIONS ..... SECTION 0

TECHNICAL DATA ..... SECTION 1

ENGINE ..... SECTION 2

TRANSMISSION ..... SECTION 3

REAR AXLE ..... SECTION 4

FRONT AXLE ..... SECTION 5

ATTACHMENT ..... SECTION 6

HYDRAULIC SYSTEM ..... SECTION 7

BRAKE SYSTEM ..... SECTION 8

STEERING SYSTEM ..... SECTION 9

ELECTRICAL SYSTEM ..... SECTION 10

OPERATOR'S CAB ..... SECTION 11

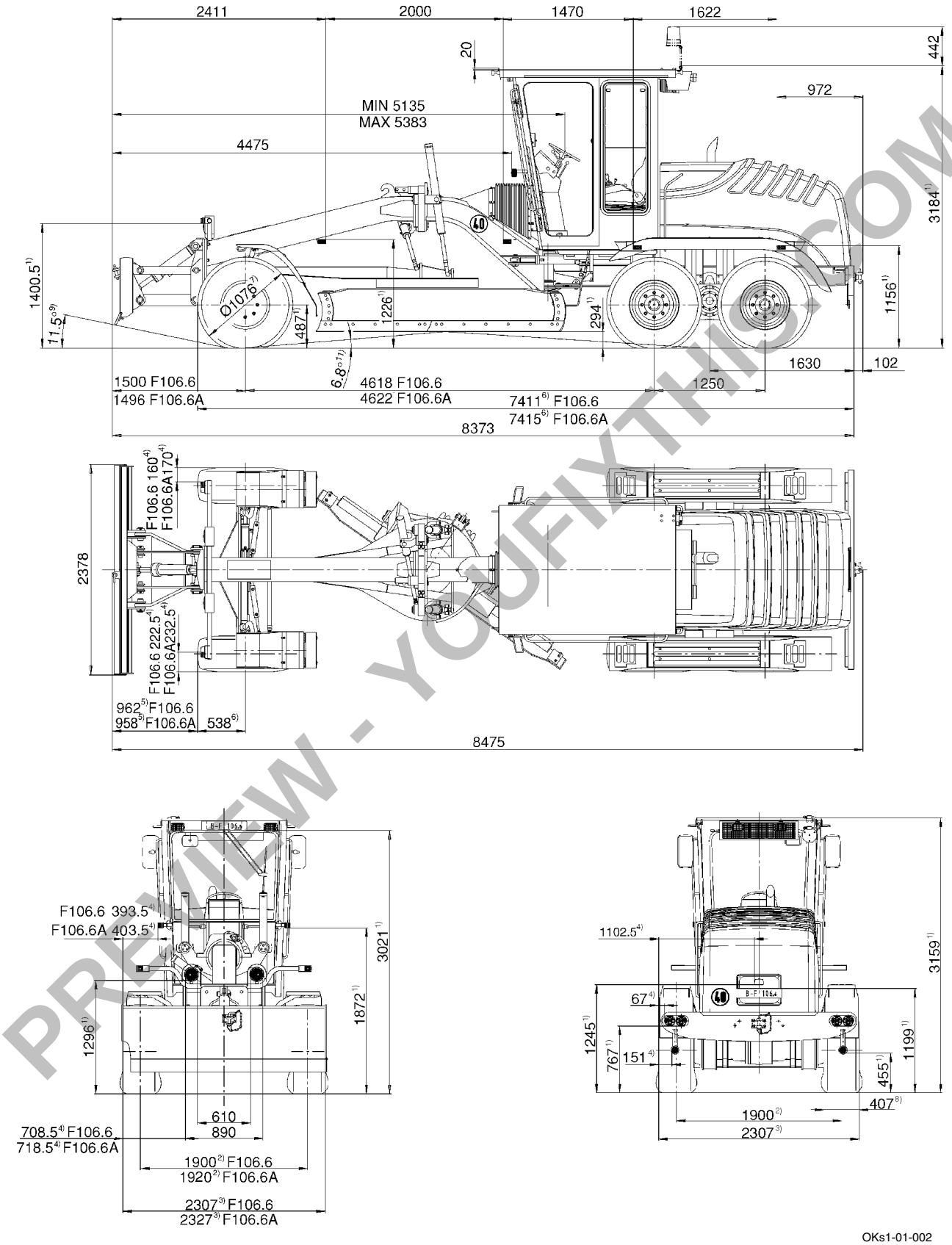
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1.1.2 TRAVEL DIMENSIONS

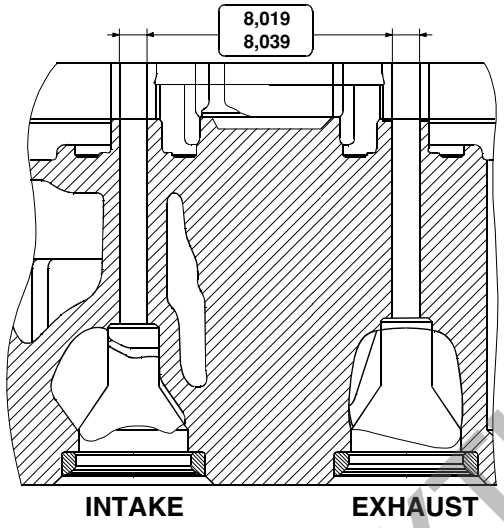


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Valve guides

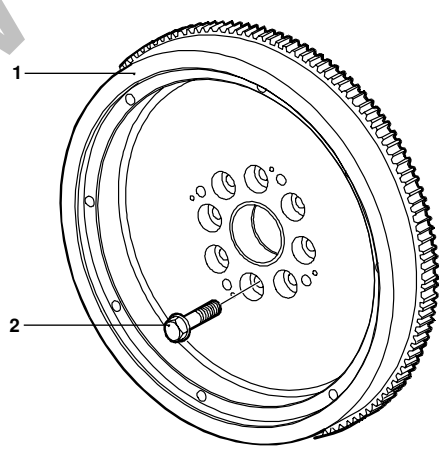
Detail of valve guides and seats



OKs1-02-028

Engine flywheel

The flywheel (**1**) does not need being positioned in a fixed manner on the drive shaft, since it does not bear any stamping, notch or reference hole for sensors or timing. The equidistance of fastening screw holes (**2**) allows it to be mounted in any position.



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3.2.3 POWERSHIFT TRANSMISSION

The multi-speed reversing transmission in countershaft design is power shiftable by hydraulically actuated multi-disk clutches.
All gears are constantly meshing and carried on antifriction bearings.
The gear wheels, bearings and clutches are cooled and lubricated with oil.
The 6-speed reversing transmission is equipped with 6 multi-disk clutches.
At the shifting, the actual plate pack is compressed by a piston, movable in axial direction, which is pressurized by pressure oil.
A compression spring takes over the pushing back of the piston, thus the release of the plate pack. As to the layout of the transmission as well as the specifications of the closed clutches in the single speeds, see following figures.

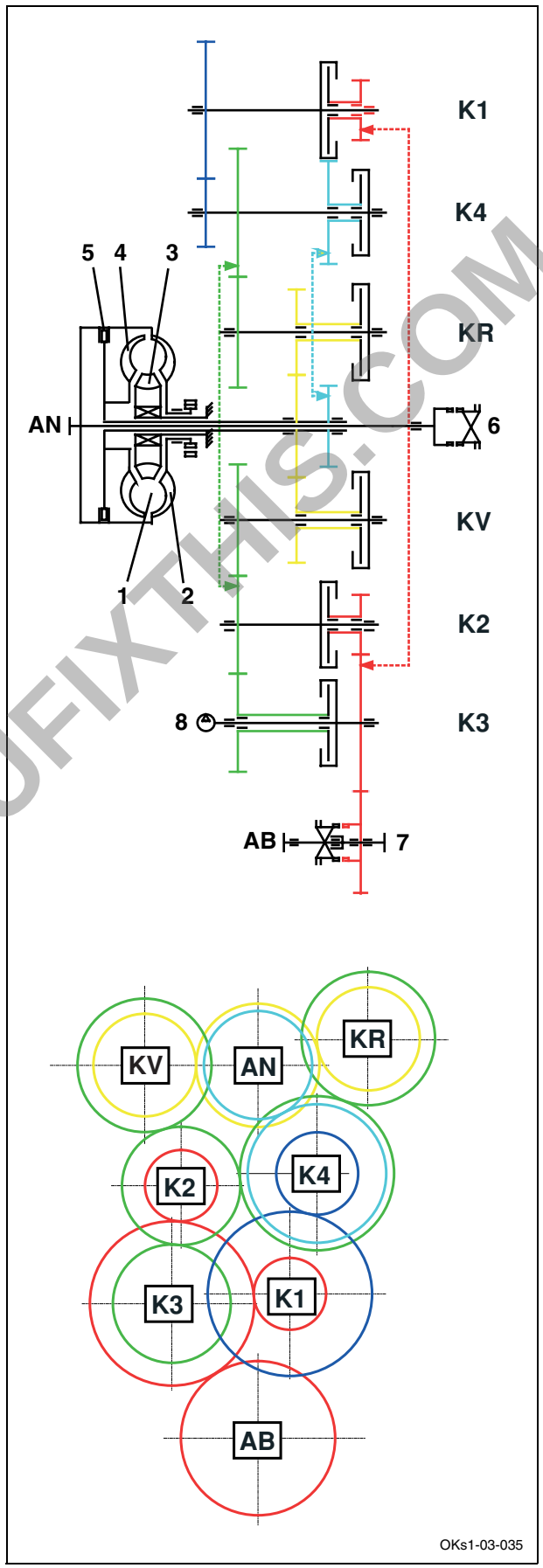
Diagram - Clutches

Driving direction	Speed	Clutch
Forward	1	KV/K1
	2	K4/K1
	3	KV/K2
	4	K4/K2
	5	KV/K3
	6	K4/K3
Reverse	1	KR/K1
	2	KR/K2
	3	KR/K3

Wheel Diagram

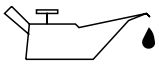
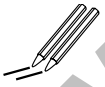
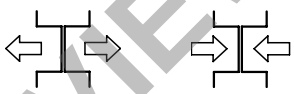
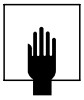
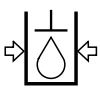
1. Torque converter
2. Pump
3. Stator
4. Turbine
5. Converter clutch
6. Power take-off engine dependent
7. Rear output for parking brake
8. Emergency steering pump

KV. Clutch forward
KR. Clutch reverse
K1. Clutch 1st speed
K2. Clutch 2nd speed
K3. Clutch 3rd speed
K4. Clutch 4th speed
AN. Input from engine
AB. Front output for tandem axle



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Symbology

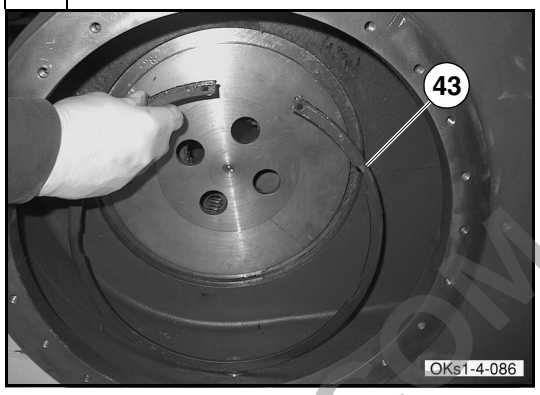
SYMBOLS	DESCRIPTION
	WARNING / DANGER
	REMOVE / INSTALL seals / gaskets / filters
	OIL FILLING OR OIL LEVEL OIL DRAIN
	LUBRICATION / GREASING
	ADJUSTMENTS / MEASUREMENTS tightening torques / preloads / backlash
	SPECIAL TOOLS
	SEALING / LOCKING FLUIDS APPLICATION
	MARK OR INDICATE
	DISASSEMBLY / ASSEMBLY OF BULKY PARTS OR SUBASSEMBLIES
	WARNING: respect assembly orientation
	CLEANING CAREFULLY
	APPLY PRESSURIZED FLUID

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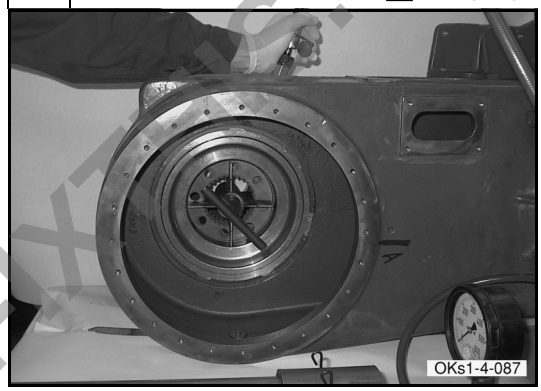
Assemble snap ring (**43**).

8



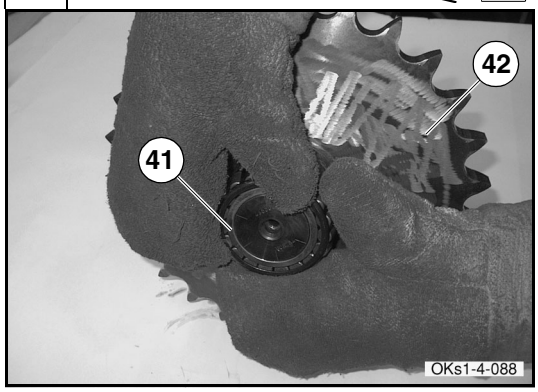
Align brake discs by means of tool 2897032 and feed brake with pressure, assemble adjacent shaft.

9



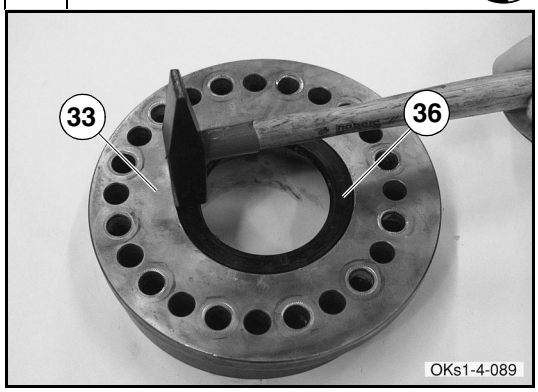
Warm bearing (**42**) till 100 °C and fit on shaft (**41**).

10



Fit WDR (**36**) in the flange (**33**) with Loctite®510.

11



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Problem	Cause	Action
Fatigue failure of pinion teeth See if the fracture line is well defined (wave lines, beach lines)	1. Exhaustive use 2. Continuos overload	Replace bevel gear set.
Pinion and ring teeth breakage	Crash load of differential components	Check and/or replace other differential components.
Side gear spline worn out. Replace all scratched washers (Excessive backlash)	Excessive use	Replace differential gear group. Replace halfshaft if required.
Thrust washer surface worn out or scratched	1. Insufficient lubrication 2. Incorrect lubrication 3. Contaminated oil	Use correct lubrication and fill up to right level. Replace at intervals recommended. Replace all scratched washers and those with 0,1 mm thickness lower than the new ones.
Inner diameter of tapered roller bearing worn out	1. Excessive use 2. Excessive pinion axial backlash 3. Insufficient lubrication 4. Contaminated oil	Replace bearing. Check pinion axial backlash. Use proper lubrication, fill up to right level and replace at recommended intervals.
Bent or broken halfshaft	Vehicle intensively operated or overloaded	Replace.
Halfshaft broken at wheel side	1. Wheel support loosened 2. Beam body bent	Replace. Check that wheel support is not worn out or wrongly adjusted.

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NOTES:

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7.2.3 HYDRAULIC DIAGRAM F106.6A FRONT WHEEL DRIVE

Pos.	Description
1	Pump group
10	Hydraulic tank
25	Pressure relief valve, flushing circuit
60	Wheel motor
62	6/2-way valve
63	Flow divider
64	Solenoid valve block Y8.1 front wheel drive on/off Y8.2 chamber change over
65	Pressure limiting valve (1.5 bar)
66	Flush & feed pressure valve (16 bar)
67	Feed pressure filter (3.5 bar)
68	Hydraulic accumulator, Front wheel drive (14 bar)
69	Distributor block with nozzle (Ø 0.8 mm)

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7.6 OVERHAUL

7.6.1 GENERAL

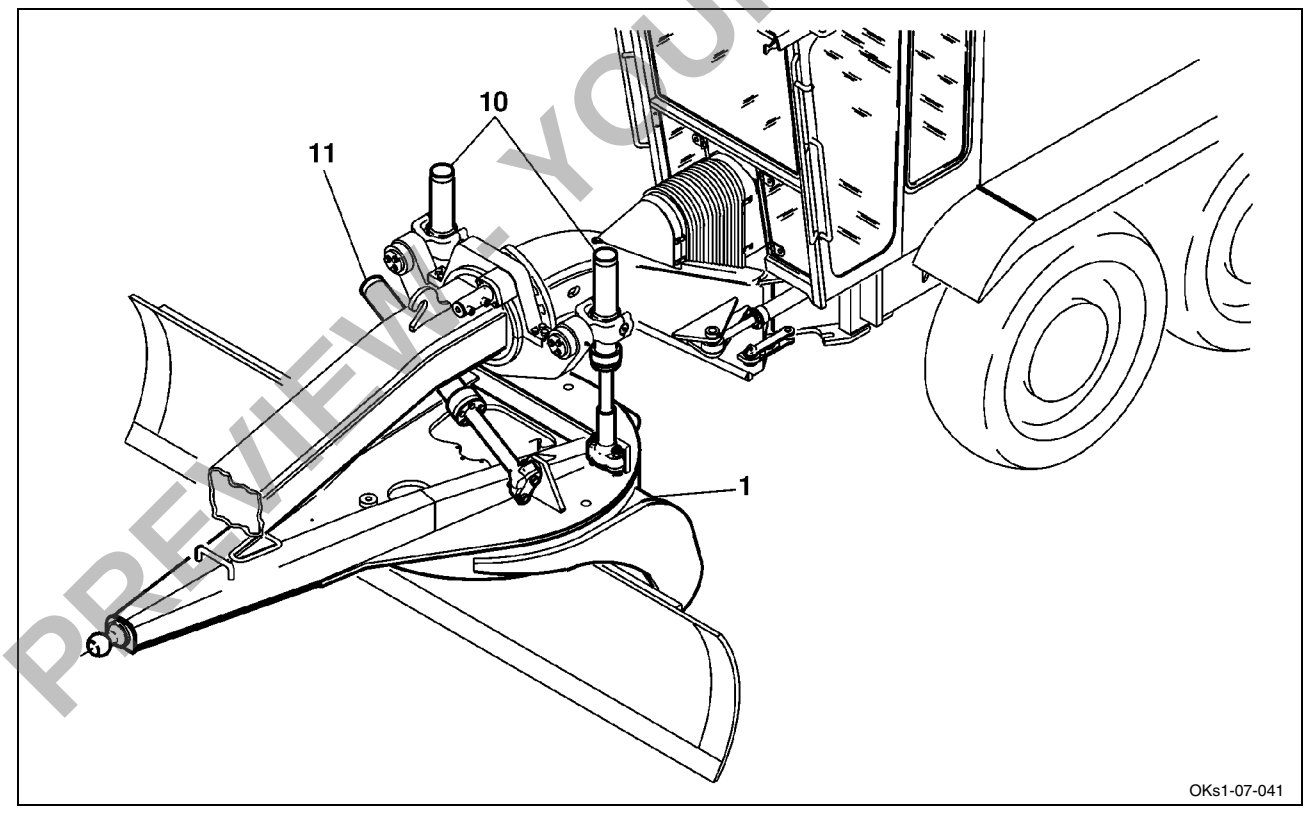
Overhaul plan

	Component	Main inspection	Cross reference
1	Actuators for working equipments	remove, disassemble and check	
2	Valve block	remove, disassemble and check	
3	Control Block (Upper, Lower)	remove, disassemble and check	
4	Valves (all)	remove, disassemble and check	
5	Double pump	remove, disassemble and check	
6	Radial piston motor	remove, disassemble and check	
7	Oil rotating feed rotor	remove, disassemble and check	

Actuators for working equipments

The working equipments are driven by the following components:

- Hydraulic motor, blade rotating unit (geared motor Orbit)
- Blade lift cylinders RH/LH
- Blade slewing cylinder
- Slewing arm stop bolt cylinder
- Blade shifting cylinder
- Tip cylinder (blade cutting angle adjustment)
- Offset cylinder
- Rear ripper cylinder (Option)
- Front grading blade cylinder (Option)



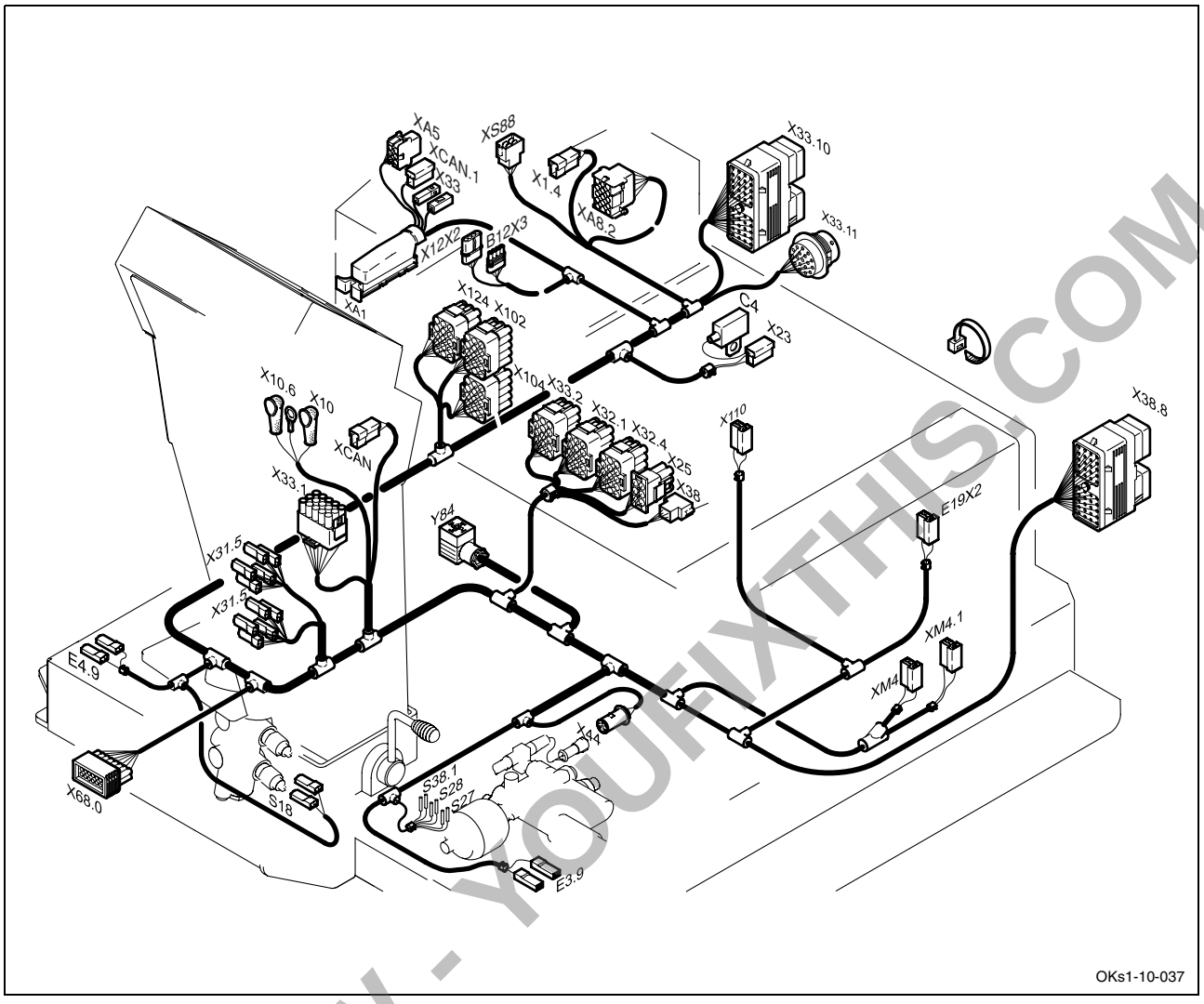
1. Working equipment, assembly centre
10. Blade lift cylinders (RH / LH)
11. Blade slewing cylinder

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TABLE 34 - ELECTRICAL SYSTEM CAB FLOOR CABLE HARNESS



Connector	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Sheet	Table	Table	Table	Table	Table
B12X2	16,3								28	34			
B12X3	16,2	16,4							28	34			
E19X2	20,6								34	45			
X1.4	7,4	7,7							34	36			
X10	7,2								30	34	35	37	40
X10.6	7,7								30	34	35	37	40
X23	15,4								27	34	45		
X25	13,8	18,1	18,2						30	34	40		
X31.5	7,6	8,1	8,9	9,4	9,5	10,3	10,6	11,7	30	34	35	40	
	11,8	12,0	12,1	12,3	12,5	12,7	12,8	12,9					
	13,3	13,4	13,5	13,6	13,7	13,8	14,8	15,1					
	15,4	15,8	16,1	16,9	17,2	17,3	17,4	17,5					
	17,6	17,7	17,8	18,2	18,7	19,0	19,7	20,6					
	20,7	21,1	22,2										
X32.1	10,4	10,6	10,8	11,4	11,6	15,1			30	34	40		
X32.4	11,2	12,3	13,3	14,4	14,8	15,4	15,5	19,0	30	34	40		

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