6.13 Wiring diagram: legend

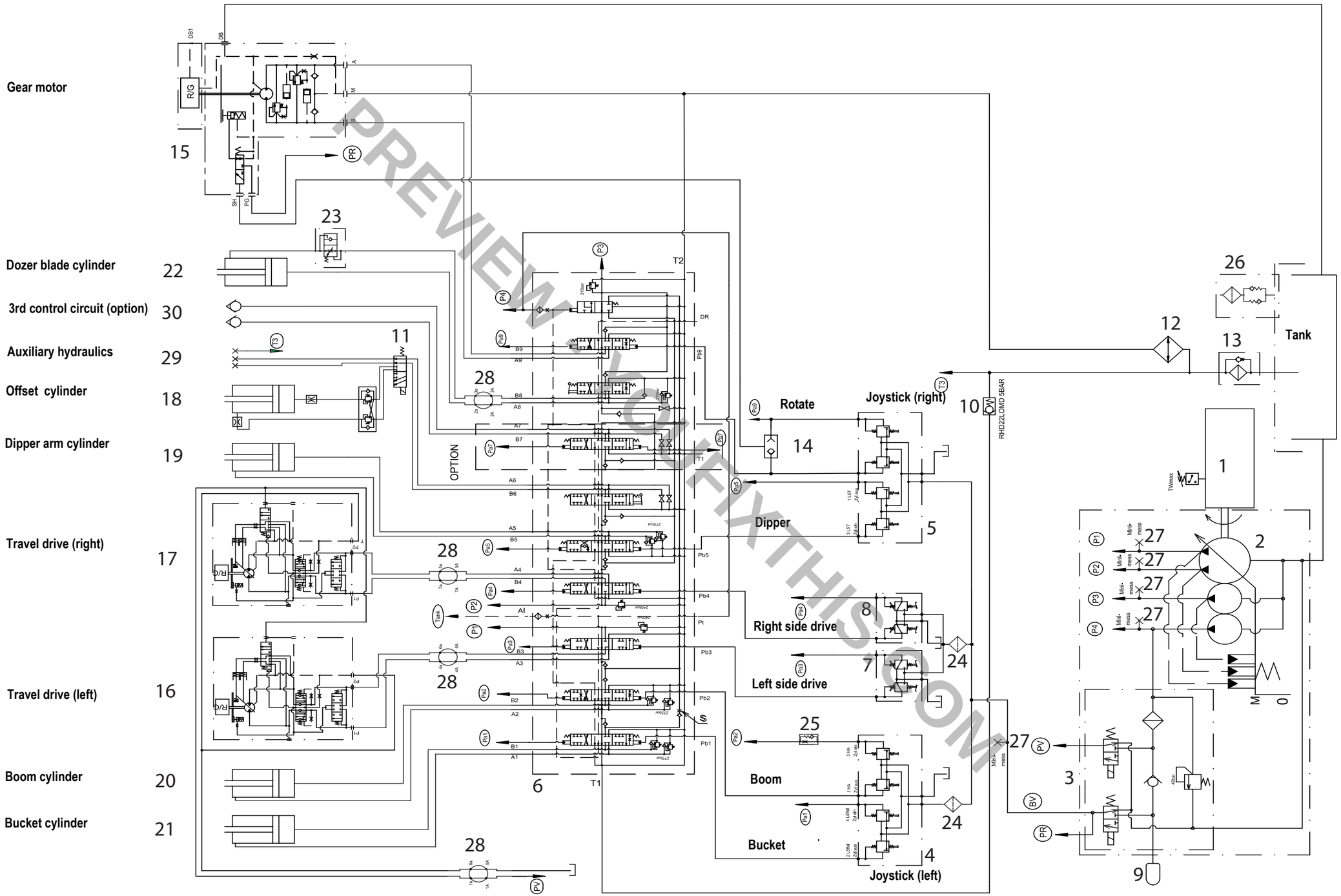
No.	Description	Section	Loc.
A1	Radio	E14	Option
B1	Fuel indicator	F7	
B2	Horn	E7	
B11	Loudspeaker	E15	Option
B12	Loudspeaker	E15	Option
B14	Warning buzzer	C2	
E7	Rear roof light	F14	Option
E9	Front roof light	F13	Option
E11	Boom light	F8/9	
E14	Interior light	F13	.
E15	Cigarette lighter	D15	
F1	Main fuse: starter, preheating	E2	
F2	Main fuse + fuel-filling pump	E1	
F3	Indicators, engine relay	A5	
F4	Boom working light	A7	
F5	Cab working light	A13	
F6	Valves, horn	A9	
F7	Fan, air conditioning	A11	
F8	Wiper, interior light	A12	
F9	Rotating beacon, radio, drive interlock	A14	
F10	Socket, cigarette lighter	A8	
G1	Alternator	F2	
G2	Battery	F1	
H2	Preheating indicator	B/C1	
H3	Engine temperature indicator	B/C1	
H4	Engine oil pressure indicator	B/C1	
H5	Alternator charge function indicator	B/C1	
H6	Air filter indicator	B/C1	
H7	Hydraulic oil filter indicator	B/C1	
H9	Safe load indicator indicator	B/C1	Option
H28	Rotating beacon	F13	Option
K5	Preheating high current relay	E4	
K6	Preheating time lag relay	E5	
K7	High current relay – start	E2	
K8	Cut-off solenoid time lag relay	E3	
K9	Cut-off solenoid switching relay	E3	
M1	Starter	F2	
M2	Wiper motor	F12	Option
M4	Fan	C12	Option
M5	Washer pump	F8	Option
M9	Fuel pump	F3	
P1	Hour meter	B1	
P2	Fuel level indication	B1	
R1	Glow plug	F4	
S1	Preheating start switch	A1	
S2	Engine oil pressure switch	F5	
S3	Engine temperature switch	E5	
S4	Air filter pressure switch	F6	
S5	Hydraulic oil pressure switch	F5	
S16	Boom working light switch	B8	
S17	Cab working light switch	C14	Option
S18	Rotating beacon switch	C13	Option

No.	Description	Section	Loc.
S15	Heating switch	B11	
S20	Wiper/washer switch	C12	Option
S21	High speed switch	B9	
S21.1	High-speed tip switch (prepared)	E9	Option
S27	Additional hydraulics/swivel tip switch	D10	
S28	Safety switch	D7	
S30	Additional control circuit tip switch	E10	Option
S31	Additional control circuit tip switch	E11	Option
S41	Safe load indicator pressure switch	E8	Option
S42	Safe load indicator switch	B7	Option
S48	Automatic idling speed tip switch	C9	Option
S51	Air conditioning switch	B10	Option
S52	Air conditioning pressure switch	E7	Option
S54	Air conditioning thermostat	C10	Option
S55	Horn tip switch	C6	
V1	Recovery diode	F4	
X1	13 pole connection – engine/chassis	D4-6	
X2	11 pole connection – engine/chassis	D7-9	
X3	2 pole main connection	D0	
X4	9 pole connection – drive interlock	C/D3	
X8	6 pole connection – joystick (left)	D10	
X10	15 pole connection – indicator	B/C1	
X12	9 pole connection – cab	D13/14	
X13	5 pole connection – engine temperature	A3	
X15	1 pole connection – drive alarm	D7	
X16	3 pole connection – drive alarm	D2-3	
X19	1 pole connection – socket	F7	
XE11	2 pole connection – boom working light	F9	
XS41	2 pole connection – safe load indicator	F8	
Y1	Cut-off solenoid	F3	
Y3	High-speed solenoid valve	F9	
Y13	Solenoid valve for safety valve	F10	
Y15	Solenoid valve – auxiliary hydraulics/swivel	F10	
Y16	Auxiliary hydraulics solenoid valve	F11	Option
Y17	Auxiliary hydraulics solenoid valve	F11	Option
Y31	Air conditioning clutch	F7	Option

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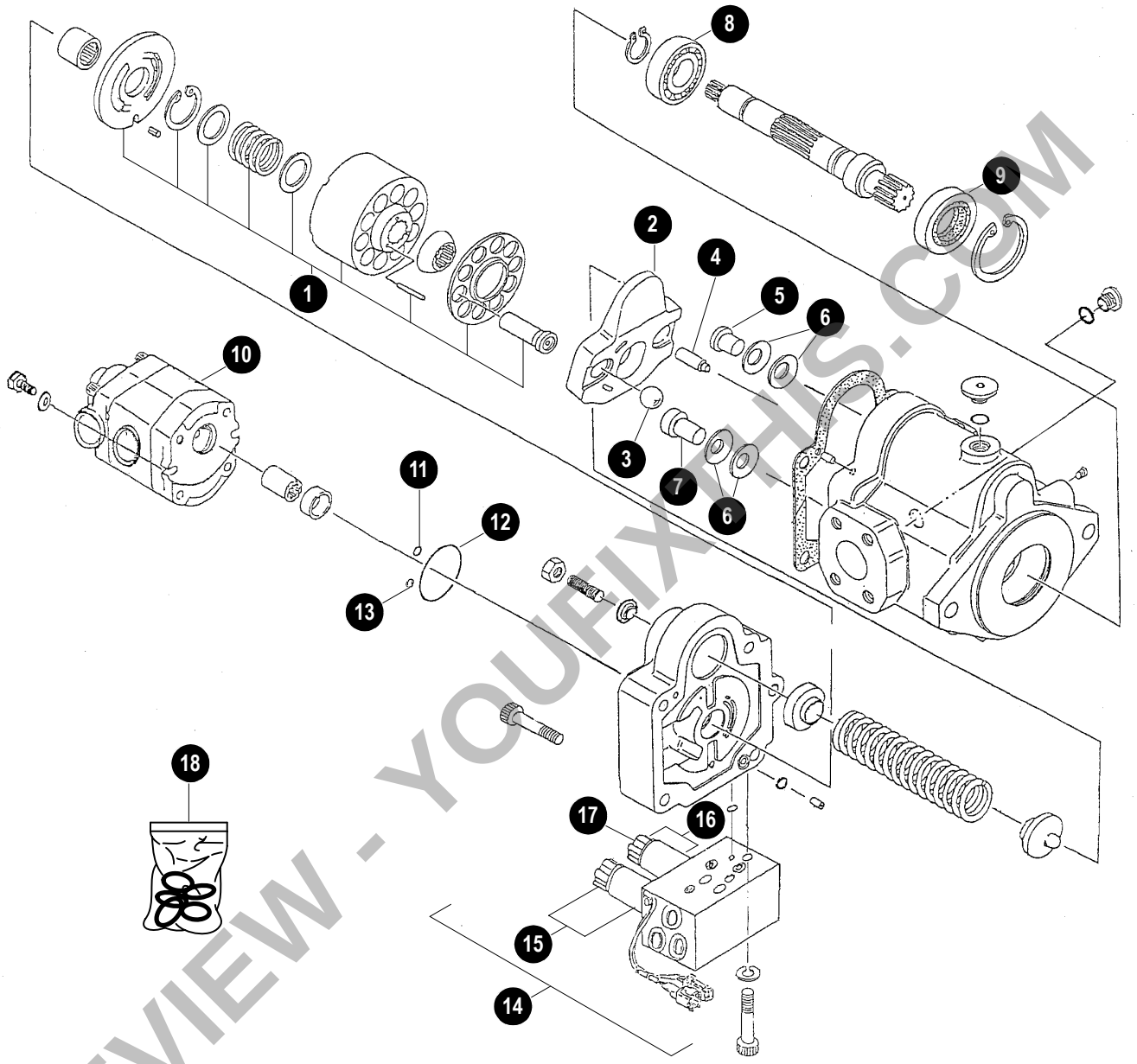
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5.17 Hydraulics diagram



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Pump unit: exploded view



Ref. No.	Description	Ref. No.	Description
1	Drive unit	10	Gear pump
2	Swash plate	11	O-ring
3	Ball	12	O-ring
4	Stop stud	13	O-ring
5	Stop pin	14	Pilot oil supply unit
6	Spring	15	Solenoid switch
7	Stop pin	16	Solenoid switch
8	Grooved ball bearing	17	Fastening screw
9	Rotary shaft lip seal	18	Variable-displacement pump sealing kit

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2.9 Model-specific tightening torques

Tightening grades and torques in lb.-ft. (Nm)		
Live ring	M14 10.9	133 lb.-ft. (180 Nm) *
Track roller	M16 10.9	203 lb.-ft. (275 Nm) *
Drive pinion	M14 10.9	133 lb.-ft. (180 Nm) *
Travel drive	M14 10.9	133 lb.-ft. (180 Nm) *
Gear motor	M16 10.9	203 lb.-ft. (275 Nm) *
Angled engine bracket	M10 8.8	33 lb.-ft. (45 Nm)
Engine mounting	M10 8.8	33 lb.-ft. (45 Nm)
Pump mounting	M10 10.9	52 lb.-ft. (70 Nm)
Pump	M12 10.9	81 lb.-ft. (110 Nm)
Swivel joint	M10 10.9	47 lb.-ft. (64 Nm) *
Counterweight/additional counterweight	M20 8.8	214 lb.-ft. (290 Nm) *

*All connections with an * must be glued with Loctite S2420 or VaryBond 12-43.

2.10 General tightening torques

Tightening torques for hydraulic screw connections (dry assembly)

Metric hose fittings for hydraulic applications (light execution, DKOL)				
Nominal ø	**Outer ø**	**Thread**	**Width across flats**	**Tightening torque lb.-ft. (Nm)**
05	6L	M12X1.5	W/F 14	11 lb.-ft. (15 Nm)
06	8L	M14X1.5	W/F 17	15 lb.-ft. (20 Nm)
08	10L	M16X1.5	W/F 19	30 lb.-ft. (40 Nm)
10	12L	M18X1.5	W/F 22	37 lb.-ft. (50 Nm)
12	15L	M22X1.5	W/F 27	55 lb.-ft. (75 Nm)
16	18L	M26X1.5	W/F 32	63 lb.-ft. (85 Nm)
20	22L	M30X2	W/F 36	74 lb.-ft. (100 Nm)
25	28L	M36X2	W/F 41	133 lb.-ft. (180 Nm)
32	35L	M45X2	W/F 55	162 lb.-ft. (220 Nm)

Galvanized and dry surface (O-ring slightly oiled). Torque tolerance: -10 %
Values determined empirically and to be applied as approximate figures.

Metric hose fittings for hydraulic applications (heavy execution, DKOL)				
Nominal ø	**Outer ø**	**Thread**	**Width across flats**	**Tightening torque lb.-ft. (Nm)**
05	8S	M16X1.5	W/F 19	30 lb.-ft. (40 Nm)
06	10S	M18X1.5	W/F 22	37 lb.-ft. (50 Nm)
08	12S	M20X1.5	W/F 24	44 lb.-ft. (60 Nm)
10	14S	M22X1.5	W/F 27	55 lb.-ft. (75 Nm)
12	16S	M24X1.5	W/F 30	66 lb.-ft. (90 Nm)
16	20S	M30X2	W/F 36	74 lb.-ft. (100 Nm)
20	25S	M36X2	W/F 41	133 lb.-ft. (180 Nm)
25	30S	M42X2	W/F 50	199 lb.-ft. (270 Nm)
32	38S	M52X2	W/F 60	295 lb.-ft. (400 Nm)

Galvanized and dry surface (O-ring slightly oiled). Torque tolerance: -10 %
Values determined empirically and to be applied as approximate figures.

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Procedure in case of malfunction

CAUTION!

In case of system proportional control system malfunction:

☞ *Disconnect the electronic controls from the power supply before performing hydraulic system service/maintenance.*

☞ *Keep clear of hydraulic system components or hydraulically-actuated components (crushing danger).*

☞ *Do not get in between hydraulically-actuated components and fixed obstacles (crushing danger).*

☞ *The operator of the machine or hydraulic system must be aware of possible machine or system errors.*

Diagnosis display

The control unit status display uses a flashing code. The following errors are identified by the number of flash pulses:

No.	Pin no.	Description	Error	Troubleshooting	Critical error
0	-	-	No error	-	-
1	B 5	Channel 1 input (left)	Defective input voltage	Check voltage, home position: 2.5 V deflected: 0.7 V – 4.3 V	-
2	A4, A9	Channel 1 output; Y16/Y17	Overload or overheating (output stage)	Check magnet on valve	-
3	A4, A9	Channel 1 output; Y16/Y17	Short circuit on ground or operating voltage	Check wiring	x
4	B4	Channel 2 input (right)	Defective input voltage	Check voltage, home position: 2.5 V deflected: 0.7 V – 4.3 V	-
5	A7, A8	Channel 2 output; Y18/Y19	Overload or overheating (output stage)	Check magnet on valve	-
6	A7, A8	Channel 2 output; Y18/Y19	Short circuit on ground or operating voltage	Check wiring	x
7	-		System start	-	x
8	A10, A11	Motor output	Overheating (output stage)	Check motor	x
9	-	-	EEProm data error	-	x
10	B6	+5V joystick	Defective 5V supply	-	x

The system switches off automatically if a critical error is detected. Activating the control unit is only possible by repeatedly switching the power supply on/off.

Only the error occurring last is issued if several errors occur at the same time. Trouble-shooting one error after another until the status display no longer flashes.

To obtain a detailed status of the output stage for channels no. 1 and 2, the hammer operation input must be activated during system start. The system flashes only briefly if there are no errors.

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1.14 Tilting the cab

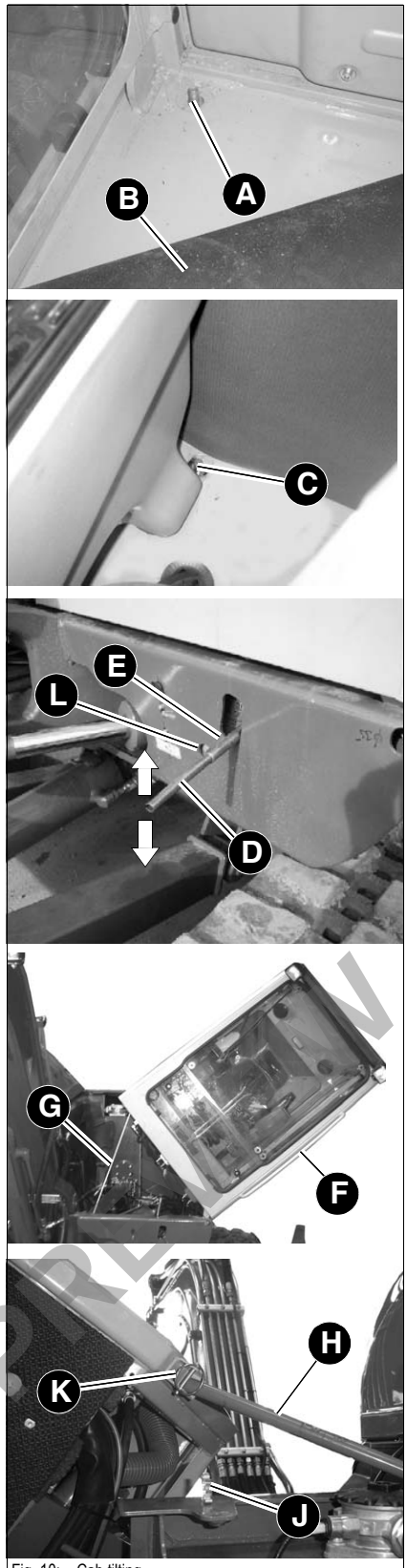


Fig. 10: Cab tilting

WARNING!

Careful when tilting the cab –

Risk of accidents.

☞ *Always tighten cab lock-down nuts before driving or using the machine.*

☞ *Always close the cab door before tilting the cab.*

☞ *Stay clear from underneath the cab as it is tilted.*

☞ *Always secure the tilt rod in the support position the when cab is tilted.*

Tilting the cab up:

Tilt the cab up as follows:

☞ *Follow the "Mandatory Safety Shutdown Procedure" in the Operator's Manual.*

☞ *Raise the floor mat (B) on the right, front of the cab and remove cab lock-down nut (A). Remove cab lock-down nut (C) at the right rear of the cab.*

☞ *Securely close the cab door.*

☞ *Locate the jack handle tubes (D) from the tool kit in the engine compartment and insert into the jack (E) and jack to the limit. The cab will be raised as far as the jack will travel.*

☞ *Pull on handle (F) until the cab is completely tilted and supported by safety cable (G).*

☞ *Remove the tilt rod (H) from the storage bracket (J) and slide the tilt rod into the guide bracket (K) and secure with the split pin.*

Tilting the cab down:

Tilt the cab down as follows:

☞ *Remove the tilt rod (H) from the guide bracket (K) by removing the split pin and slide the tilt rod out of the guide bracket and secure with the split pin back in the storage bracket (J).*

☞ *Use handle (F) to slowly lower the cab back onto the jack.*

☞ *Remove jack handle tubes (D) from the jack and insert the opposite end of the jack handle tubes onto the release pin (L). Slowly turn the release pin counter-clockwise until the cab is lowered.*

☞ *Turn the release pin (L) clockwise.*

☞ *Reinstall the cab lock-down nuts (C) and (A).*

☞ *Place the jack handle tubes (D) back in the tool kit.*

CAUTION!

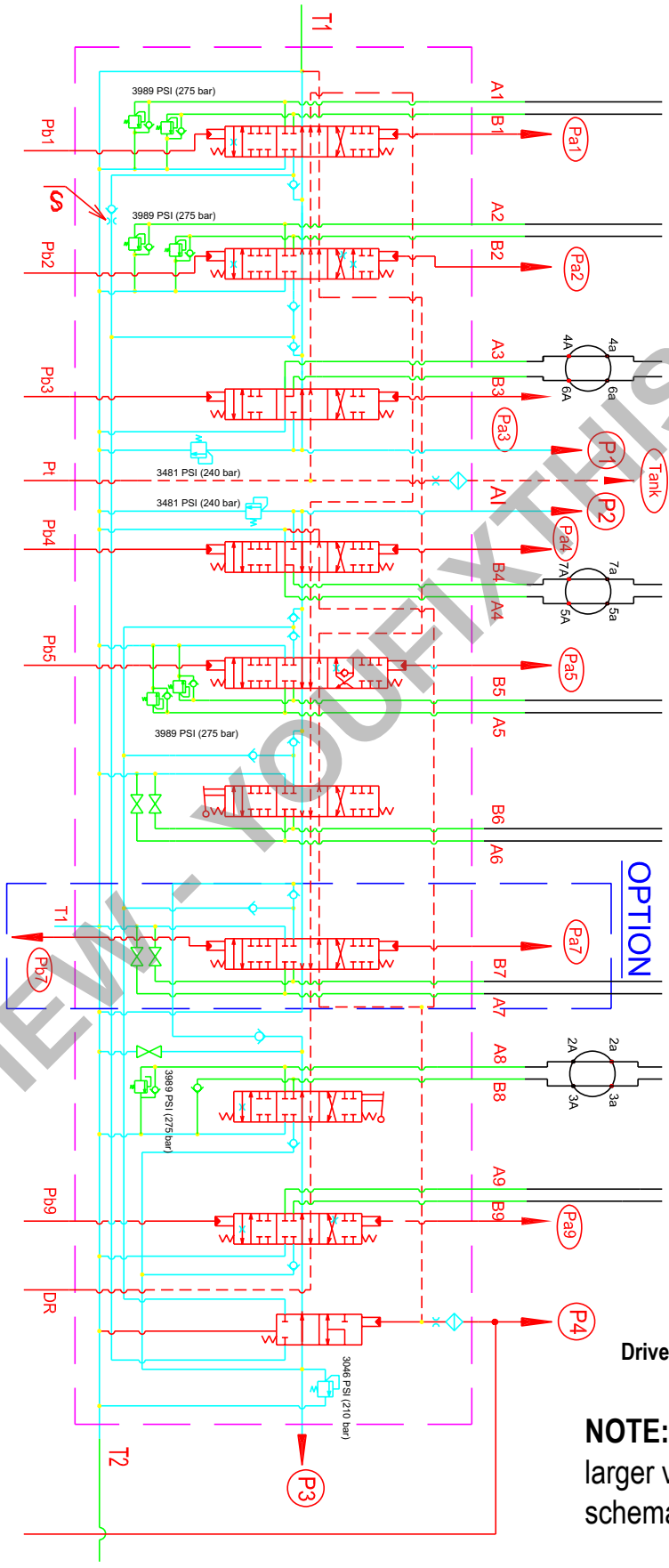
Check the tilt rod (H), split pin (K) and safety cable (G) at regular intervals for cracks and cuts.

☞ *Replace defective parts immediately.*

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Main valve block diagram



NOTE: See page 5-36 for a larger version of this hydraulic schematic.

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4.14 Engine troubleshooting

Problem	Possible causes
Engine does not start or is not easy to start	Wrong SAE grade of engine lubrication oil
	Incorrect fuel grade
	Defective or dead battery
	Loose or oxidized cable connections in starter circuit
	Starter defective, or pinion does not engage
	Incorrect valve tip clearance
	Fuel injector defective
	Starting relay defective
	Glow plug defective
	Solenoid switch defective
	Cut-off solenoid does not engage starter
	Cut-off solenoid without current
	High pressure in hydraulic system preventing engine start
Engine starts, but does not run smoothly or faultless	Incorrect fuel grade
	Incorrect valve tip clearance
	Injection line leaks
	Fuel injector defective
Engine overheats. Temperature warning system responds	Oil level too low
	Oil level too high
	Air filter not working
	Fouled oil cooler fins
	Defective fan; V-belt torn or loose
	Resistance in cooling system too high, flow capacity too low
	Fuel injector defective
Insufficient engine output	Oil level too high
	Incorrect fuel grade
	Air filter is dirty
	Air filter maintenance switch or gauge defective
	Incorrect valve tip clearance
	Injection line leaks
	Fuel injector defective
Engine does not run on all cylinders	Injection line leaks
	Defective fuel injector
Insufficient or no engine oil pressure	Oil level too low
	Machine inclination too high (max. 15°)
	Wrong SAE grade of engine lubrication oil

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2 Specifications

2.1 Chassis

Sturdy steel sheet chassis, rubber-mounted engine

2.2 Engine

Engine	
Product	Yanmar diesel engine
Model	3TNV88-PNS
Design	Water-cooled 4-stroke diesel engine, EPA2
No. of cylinders	3
Fuel injection system	Direct injection
Aspiration	Natural aspiration
Cooling system	Water-cooled/aspirating fan
Lubrication system	Force-feed lubrication with trochoidal pump
Displacement	100 cu. in. (1.6 L)
Nominal bore and stroke	3.5 x 3.5 in. (88 x 90 mm)
Output	28 hp (21 kW) @ 2400 rpm
Max. torque	74 – 81 lb.-ft. (101 – 110 Nm) @ 1100 rpm)
Max. engine speed without load	2500 +/- 10 rpm
Idling speed	1100 +/- 50 rpm
Valve tip clearance (intake = outlet)	0.006 - 0.010 in. (0.15 – 0.25 mm) (cold)
Compression	508 +/- 14.5 psi (35 +/- 1 bar) @ 250 rpm
Engine oil pressure	44-58 psi (3 – 4 bar)
Pressure switch for engine oil pump	7 +/- 1.5 psi (0.5 +/- 0.1 bar)
Thermostat opening temperature	157 – 163 °F (69.5 – 72.5 °C)
Thermal switch	225 – 235 °F (107 – 113 °C)
Firing order	1 – 3 – 2
Direction of rotation	Counterclockwise (as seen from the flywheel)
Starting aid	Intake manifold preheating (preheating time 10 – 15 sec)
Max. inclined position (engine still supplied with oil):	25°/46% in all directions (30°/58%) no longer than 3 minutes!
Specific fuel consumption	264 g/kWh
Exhaust values according to	97/68/EC Tier II EPA Tier II
Max. engine drop (all 3 pumps under full load)	9% less than the high idling speed (about 2275 rpm)

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3.3 Maintenance schedule

Check, clean or inspect

Service Activity	Daily	Every 50 Hours	Every 250 Hours	Every 500 Hours	Every 1000 Hours	Customer	Dealer
Engine oil level	x					x	
Engine coolant level	x					x	
Hydraulic oil level	x					x	
Gearbox oil level		x					x
Clean drain holes in cab/canopy					x		x
Check engine/hydraulic oil radiator and air conditioning for contamination. Clean if necessary.	x					x	
Check cooling system, heating and hoses for leaks and pressure (visual check)	x					x	
Replace cab air filter for heating and air conditioning				x			x
Air filter (damage)	x					x	
Inspect water separator prefilter: drain water	x					x	
Clean water separator				x			x
Check V-belt condition and tension	x					x	
Check exhaust system for damage	x					x	
Check engine valve clearance, set if necessary					x		x
Fuel injection pump, injection and pressure, injection nozzles and valves					x		x
Check and adjust injection timing					x		x
Empty diesel fuel tank[1]				x			x
Clean battery				x		x	
Check alternator, starter and electrical connections, bearing play and function				x			x
Preheating system and electrical connections				x			x
Air filter restriction gauge				x			x
Pressure check or primary pressure relief valves[2]		x		x			x
Check tracks for cracks or cuts	x					x	
Check track tension — tighten if necessary	x					x	
Cab tilt lock/support components[2]		x		x			x
Check cylinders piston rods for damage	x					x	
Check fasteners for tightness[2]		x		x			x
Pin lock (dipper arm and attachment)	x					x	
Hydraulic line clamps	x					x	
Check indicator lights for correct function[2]		x		x			x
Cab tilt lock/support components[2]		x		x			x

1. After emptying the tank, water must be removed and air must be purged from the fuel system before use. See “Fuel shut-off valve and water separator” on page 3-13 and “Bleeding the fuel system” on page 3-12
2. Check after first 50 hrs; every 500 hrs thereafter.

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1 Operation

1.1 General Information

Your decision to purchase the Mustang compact excavator was a good one. We are sure that your decision was carefully considered and that you are looking forward to many years of reliable performance from the machine.

Mustang Manufacturing has invested much time and effort in developing its lines of equipment. The machine you have purchased is built with a great deal of pride, and designed to provide long life, efficient operation, durability and dependability.

Modern machinery has become more sophisticated and, with that in mind, Mustang Manufacturing asks that you read and COMPLETELY understand the contents of this manual and become familiar with the new machine, BEFORE attempting to service it.

This manual was developed specifically for the machine you have purchased. The information within is for your assistance in preparing, adjusting, maintaining and servicing the machine. More importantly, this manual provides a service plan for safe and proper servicing of the machine. Refer to the Table of Contents for an outline (by chapters) of this manual. Use the Index, located at the back of this manual, for specific chapter and topic/page number references.

If the machine was purchased "used," or if the owner's address has changed, please provide your dealer or Mustang Manufacturing with the owner's name and current address, along with the machine model and serial number. This will allow the registered owner information to be updated, so that the owner can be notified directly in case of an important product issue, such as a safety update program.

“Right” and “left” are determined from the position of sitting in the operator’s seat, facing forward.

Mustang Manufacturing reserves the right to make changes or improvements in the design or construction of any part without incurring the obligation to install such changes on any unit
previously delivered.

Throughout this manual information is provided that is introduced by the word NOTE or IMPORTANT. Be sure to read carefully and comply with the message or directive given. Following this information will improve your maintenance efficiency, help you to avoid costly breakdowns or unnecessary damage and extend the machine's life.

Operational safety and readiness of the machine depends partially on maintenance and service. This is why regular maintenance and service work is absolutely necessary. Extensive maintenance and repair work must always be carried out by a qualified technician with appropriate training. Insist on using original service parts when carrying out maintenance and repair work. This ensures operational safety and readiness of the machine, and maintains its value.

Our wide dealership network stands ready to provide any assistance required, including genuine service parts. All parts should be obtained from or ordered through your dealer. Give complete information about the part as well as the model number and serial number of your machine. Record numbers, in the spaces provided, as a handy record for quick reference.

Purchased from: _____

Date of Purchase: _____

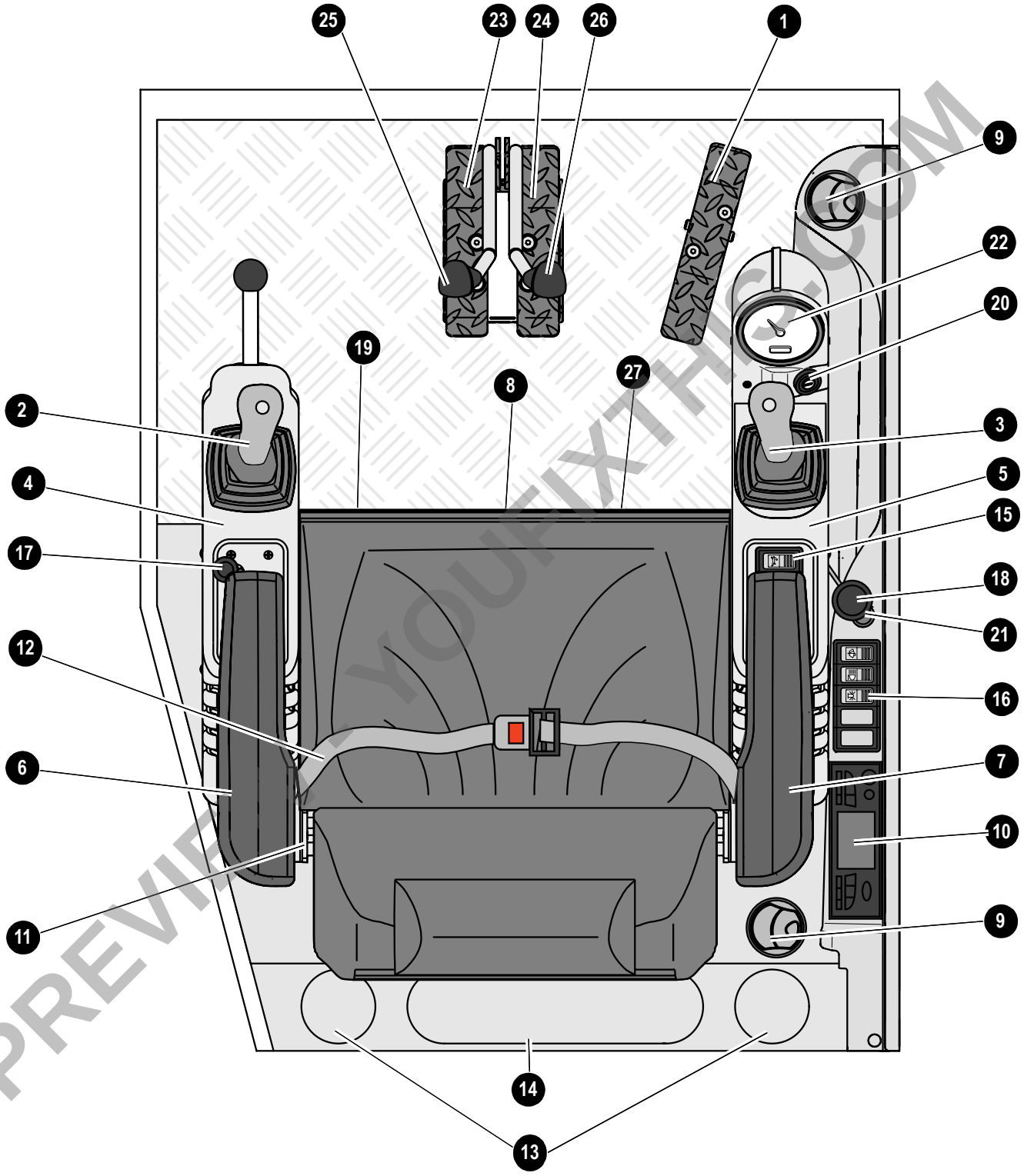
Model No.: _____

Serial No.: _____

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1.8 Cab: overview



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