2803ZT

Compact Excavator

SERVICE MANUAL

PART #918279

Revision A - 05/08

Mustang Manufacturing Company, Inc.

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2 Specifications

2.1 Chassis

Sturdy steel sheet chassis, rubber-mounted engine.

2.2 Engine

Engine	
Make	Yanmar diesel engine
Type	3TNV76-NNS
Design	Water–cooled 4–stroke diesel engine
No. of cylinders	3
Fuel injection system	Indirect injection
Aspiration	Natural aspiration
Cooling system	Water-cooled/aspirating fan
Lubrication system	Force-feed lubrication with trochoidal pump
Displacement	68 cu. in. (1.114 L)
Nominal bore and stroke	3.0 x 3.2 in. (76 x 82 mm)
Output	20.4 hp (15.2 kW) @ 2500 rpm
Max. torque	49 lb.- ft. (66.1 Nm) @ 1800 rpm
Max. engine speed without load	2675 ± 25 rpm
Idling speed	1300 ± 25 rpm
Valve tip clearance (intake = outlet)	0.006 – 0.010 in. (0.15 – 0.25 mm) (cold)
Compression	497 ± 14.5 psi (34.3 ± 1 bar) @ 250 rpm
Engine oil pressure (at rated speed)	42 – 64 psi (2.9 – 4.4 bar)
Pressure switch for engine oil pump	7 ± 1.5 psi (0.5 ± 0.1 bar)
Thermostat opening temperature	158 – 165° F (70 – 73° 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	Glow plug (pre-heating time 4 seconds)
Max. inclined position (engine no longer supplied with oil)	25° in all directions, 30° briefly Observe the machine's climbing ability (30°/ 58%).
Specific fuel consumption	279 g/kWh @ rated output
Exhaust values in compliance	97/68/EC EPA
Average engine droop	About 60 rpm; after turning off a warm engine boom, dipper and bucket as far as it will go

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2.10 Model-specific tightening torques

Tightening grades and torques in lb.-ft. (Nm)		
Live ring	M12 10.9	88 lb.-ft. (120 Nm) *
Track roller	M14 10.9	88 lb.-ft. (120 Nm) *
Drive pinion	M12 10.9	88 lb.-ft. (120 Nm) *
Travelling drive	M12 10.9	88 lb.-ft. (120 Nm) *
Gear motor	M12 10.9	88 lb.-ft. (120 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	33 lb.-ft. (45 Nm)
Pump	M12 10.9	81 lb.-ft. (110 Nm)
Swivel joint	M10 10.9	74 lb.-ft. (100 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.

2.11 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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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
Pre–heating 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 3-11 and “Bleeding the fuel system” on page 3-10.
2. Check after first 50 hrs. every 500 hrs. thereafter.

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Changing engine oil and filter

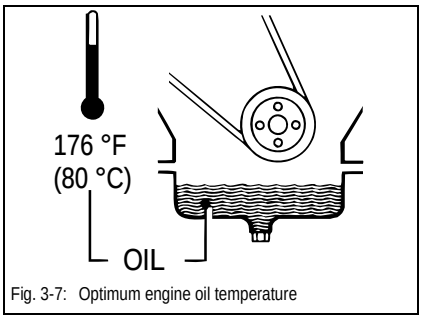


Fig. 3-7: Optimum engine oil temperature

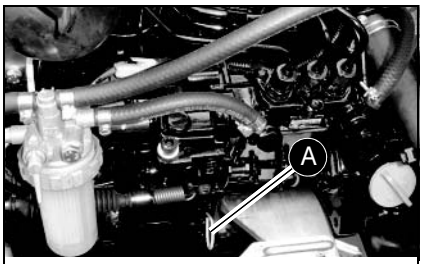


Fig. 3-8: Engine oil filter position

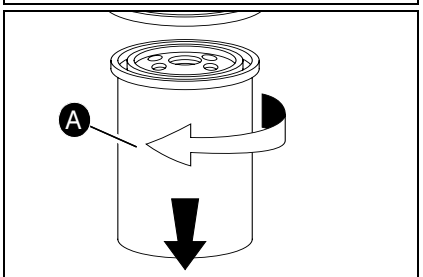


Fig. 3-9: Unscrewing the engine oil filter

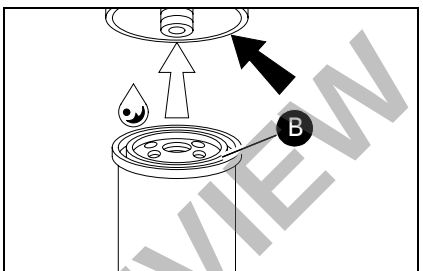


Fig. 3-10: Cleaning the filter head and oiling the gasket

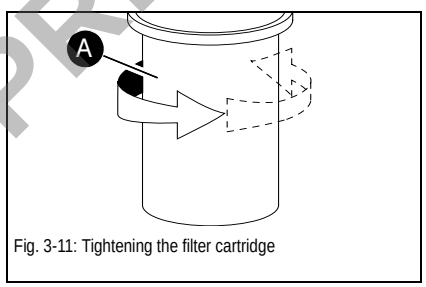


Fig. 3-11: Tightening the filter cartridge

DANGER!

Caution when draining hot engine oil –

Risk of burns.

☞ *Wear protective gloves.*

☞ *Use suitable tools.*

Environment!

Use a suitable container to collect the engine oil as it drains and dispose of it in an environmentally friendly manner.

☞ *Position the machine on a level surface. Run the engine until it is at operating temperature (oil temperature about 176 °F [80 °C]), then turn off the engine.*

☞ *Open the engine cover.*

☞ *Position a waste oil collection container under engine oil pan.*

☞ *Remove the drain plug from the oil pan and allow the oil to drain into the waste oil collection container.*

☞ *Dispose of waste engine oil according to environmental laws or take to a recycling center for proper disposal. DO NOT pour waste engine oil onto the ground or down a drain.*

☞ *Remove the oil filter A, using a filter wrench as necessary.*

☞ *Clean the filter housing surface. Put a film of clean oil on the filter gasket. Install the new filter with gasket and hand-tighten.*

☞ *Reinstall the drain plug.*

☞ *Clean the area around the oil filler cap.*

☞ *Remove the oil filler cap and raise the oil dipstick slightly to allow any trapped air to escape.*

☞ *Add new oil. – see Fluids and lubricants on page 3-1 for the correct oil type. Crankcase capacity with filter is 3.5 qts. (3.3 L). DO NOT fill crankcase above the MAX mark on the dipstick.*

☞ *Replace and tighten the oil filler cap.*

☞ *Push the oil dipstick back in as far as possible.*

☞ *Wait about three minutes to allow the oil to run into the oil sump and check the oil level according to – see Checking the oil level on page 3-13.*

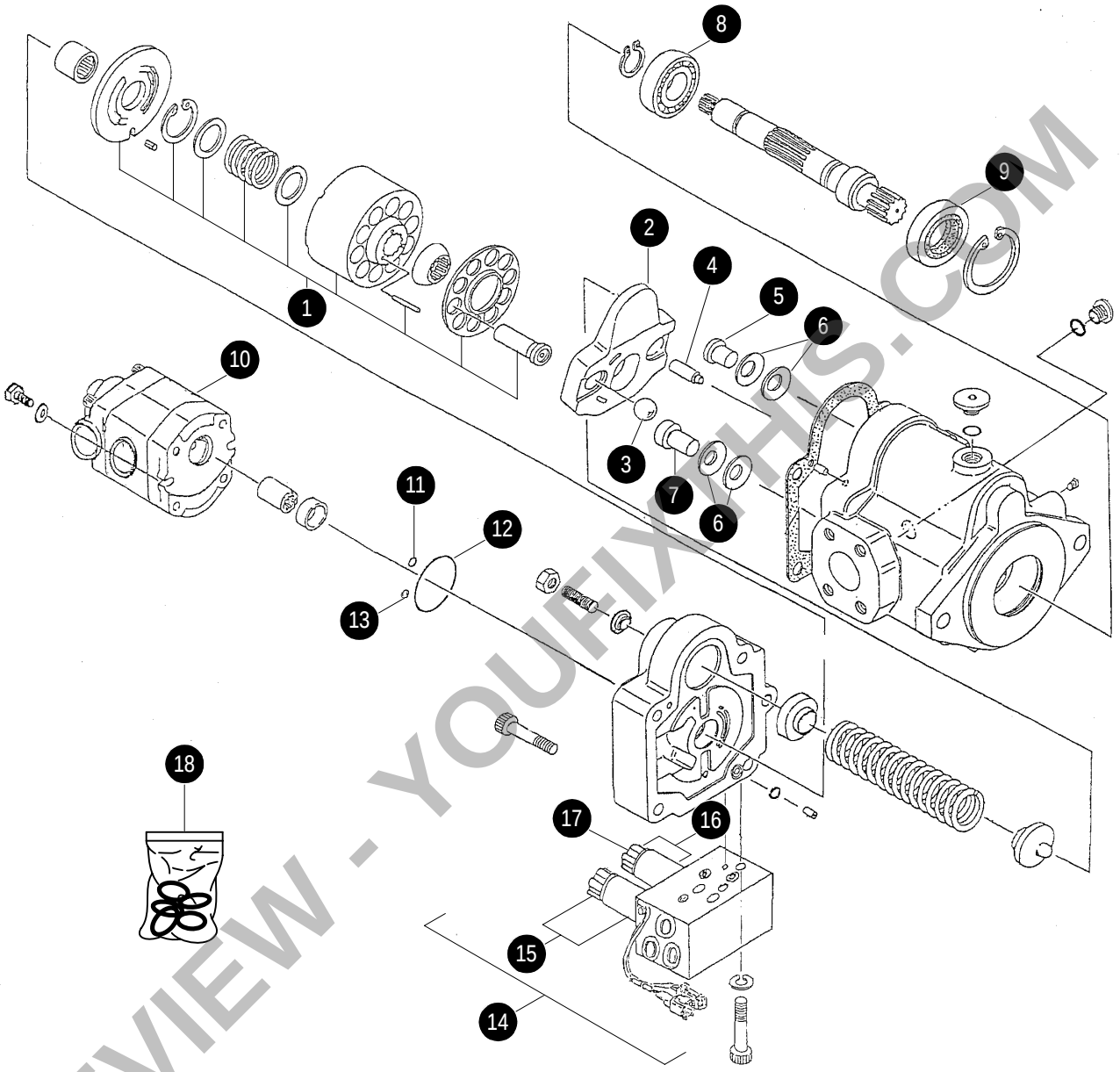
☞ *Start the engine and let it run for several minutes. Watch the engine oil light on the control panel. The light should turn off after several seconds. If it does not, shut off the engine, determine the cause and fix the problem before restarting the engine.*

☞ *Stop the engine and check for leaks at the oil filter and oil drain plug.*

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Pump unit: exploded view

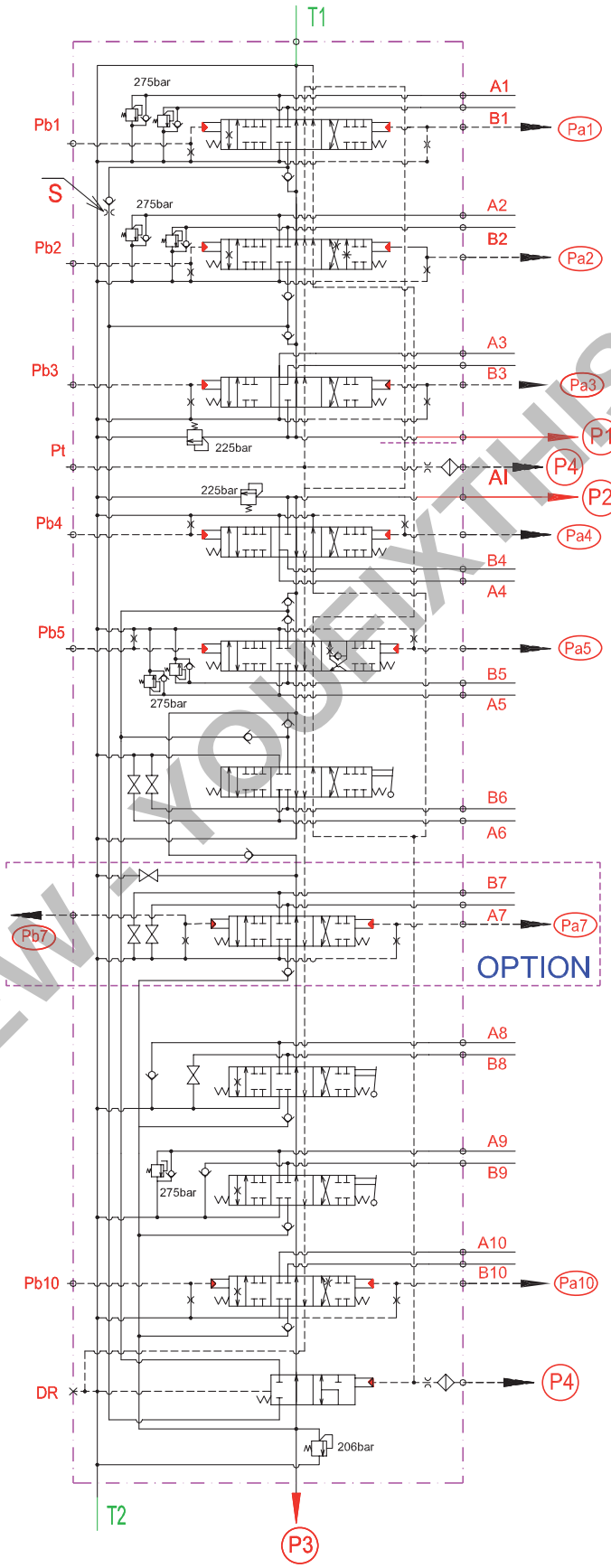


Pos.	Description	Pos.	Description
1	Drive unit	11	O-ring
2	Swash plate	12	O-ring
3	Ball	13	O-ring
4	Stop stud	14	Pilot oil supply unit
5	Stop pin	15	Solenoid switch
6	Spring	16	Solenoid switch
7	Stop pin	17	Fastening screw
8	Grooved ball bearing	18	Variable-displacement pump sealing kit
9	Rotary shaft lip seal		
10	Gear pump		

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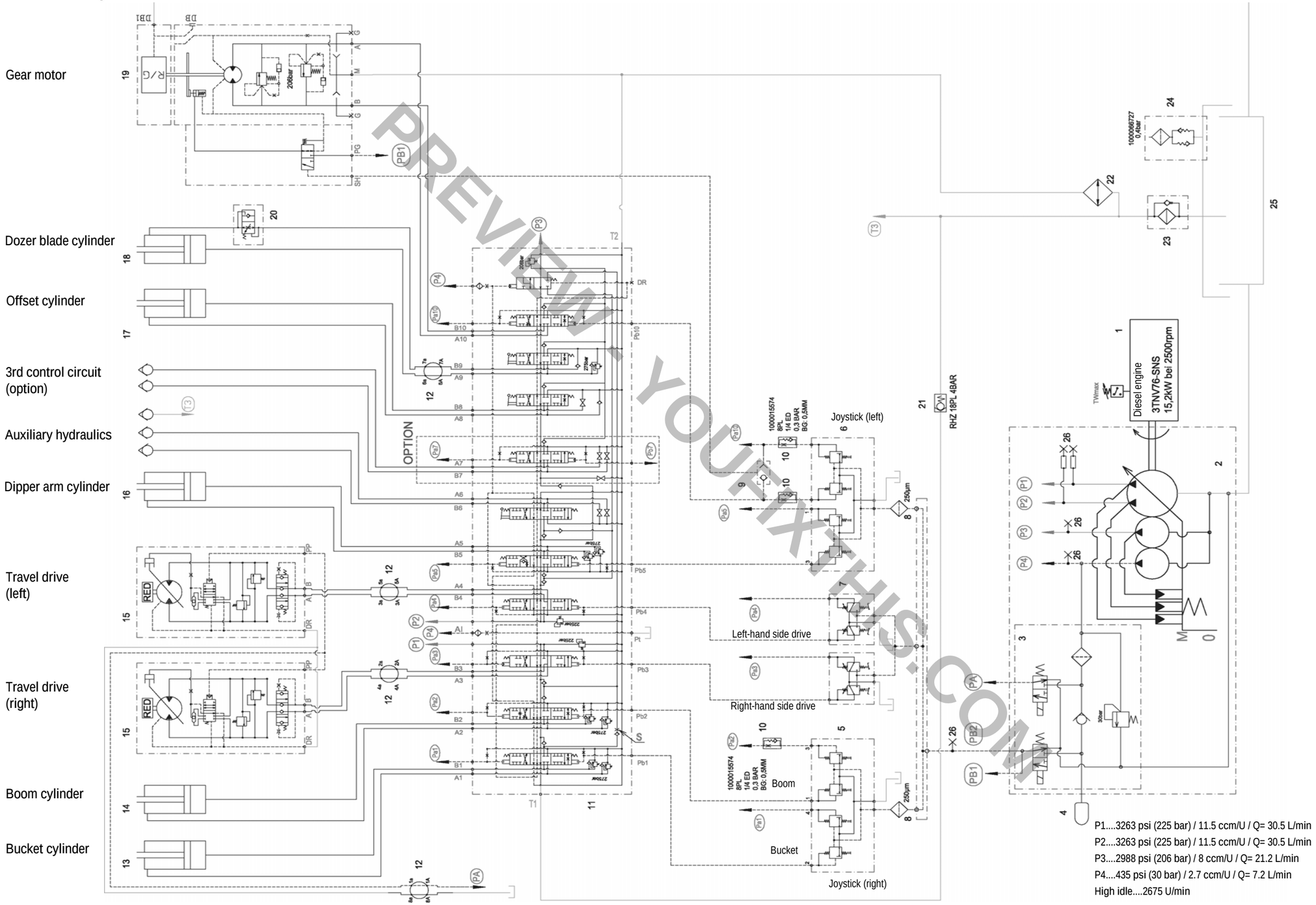
Main valve block diagram



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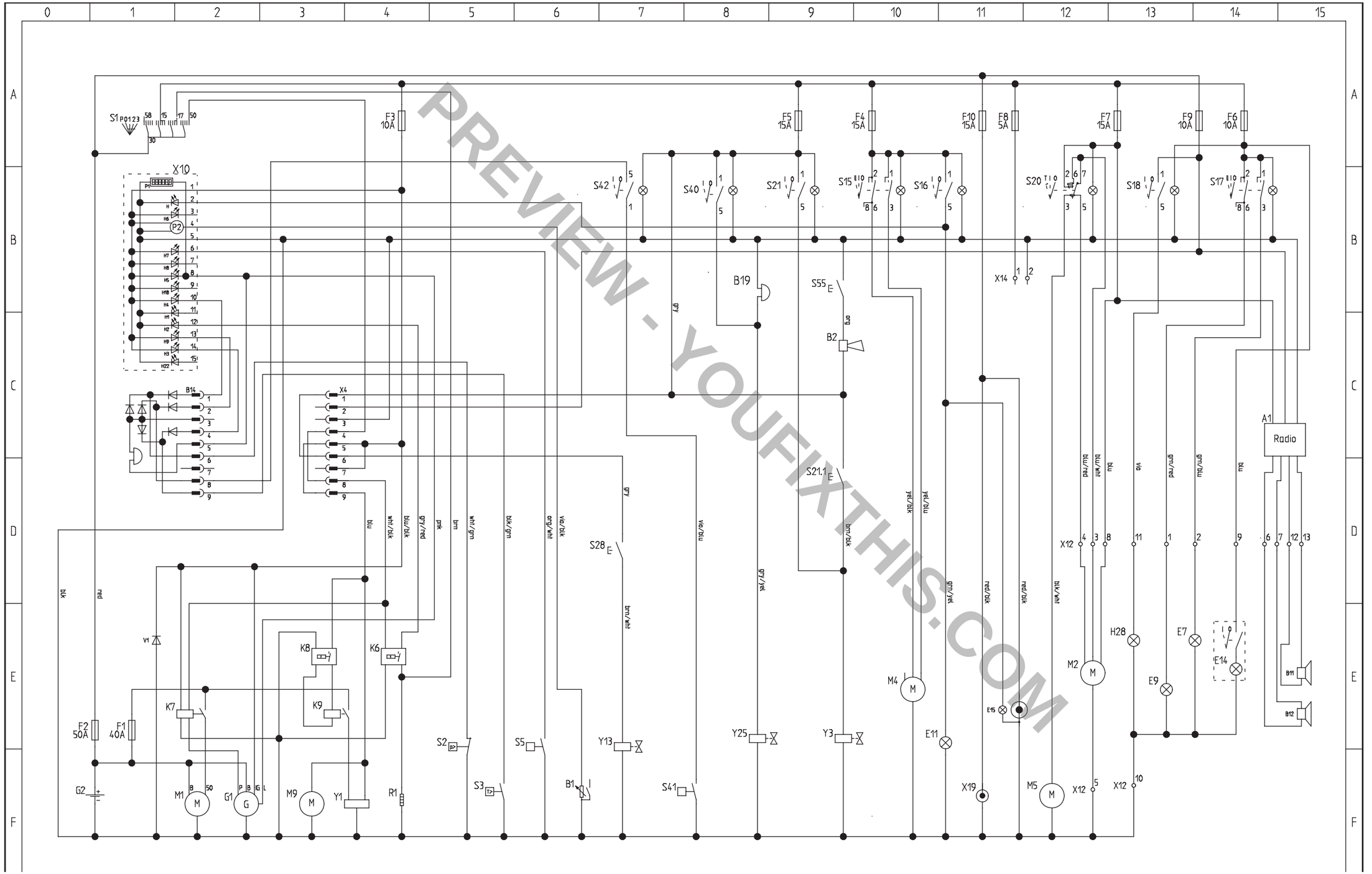
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5.16 Hydraulics diagram



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6.12 Wiring diagram



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Safety features

☞ *Microcontroller: Diagnoses error reports by the output stage.*

☞ *Monitor: Disables the output stage if the microcontroller malfunctions.*

☞ *Output stage: Controls the status of the supply lines from the pressure regulating valves.*

☞ *Watchdog: Disables the microcontroller if the microcontroller malfunctions.*

☞ *Switch for valve supply: Disables the power supply to the valves if a critical error is detected.*

Measures to be taken in case of malfunctions

CAUTION!

System breakdowns can never be excluded, therefore:

- Disconnect the electronic controls from the power supply before performing hydraulic system maintenance or repair.
- Keep clear of hydraulic system components or hydraulically actuated components (risk of crushing).
- Do Not get in between moving hydraulic components and fixed obstacles (risk of crushing).
- The operator of the machine or hydraulic system must be aware of possible machine or system errors.

Diagnostic display

The control valve status displays using 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 turns off automatically if a critical error is detected. Activating the control unit is only possible by repeatedly turning on the supply voltage.

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4.13 Checking the coolant circuit

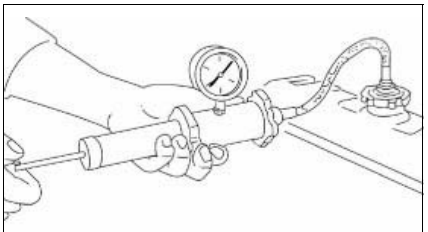


Fig. 10: Checking the radiator for leaks

Coolant system leakage check

☞ *Completely fill the radiator.*

☞ *Mount a hand pump adapter onto the radiator as shown.*

☞ *Using a hand pump, increase the pressure in the cooling system to about 34 psi (2.3 bar).*

➥ Check the coolant lines/connections for leaks if the pressure drops at the pressure gauge.

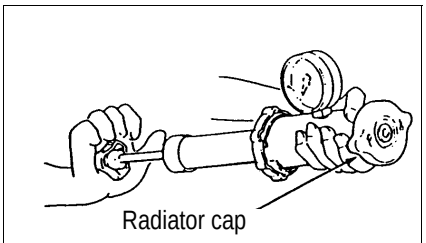


Fig. 11: Checking the radiator cap

Radiator cap check

☞ *Remove the radiator cap and mount it onto a pressure tester as shown.*

☞ *Increase the pressure to about 34 psi (2.3 bar) (stamped onto the radiator cap) with the pressure tester.*

➥ The radiator cap must open.

4.14 Engine troubleshooting

Problem	Possible causes
Engine does not start or is not easy to start	Engine oil wrong SAE grade
	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
	Fuse defective
	Fuel filter dirty
	Air filter very dirty
	Cutoff solenoid does not engage starter
	High pressure in hydraulic system preventing engine start
	Air in fuel system

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