



ME8003

**COMPACT
EXCAVATOR**

**SERVICE
MANUAL**

PART #918170

Revision A - 09/05

MUSTANG  [®]

Mustang Manufacturing Company, Inc.

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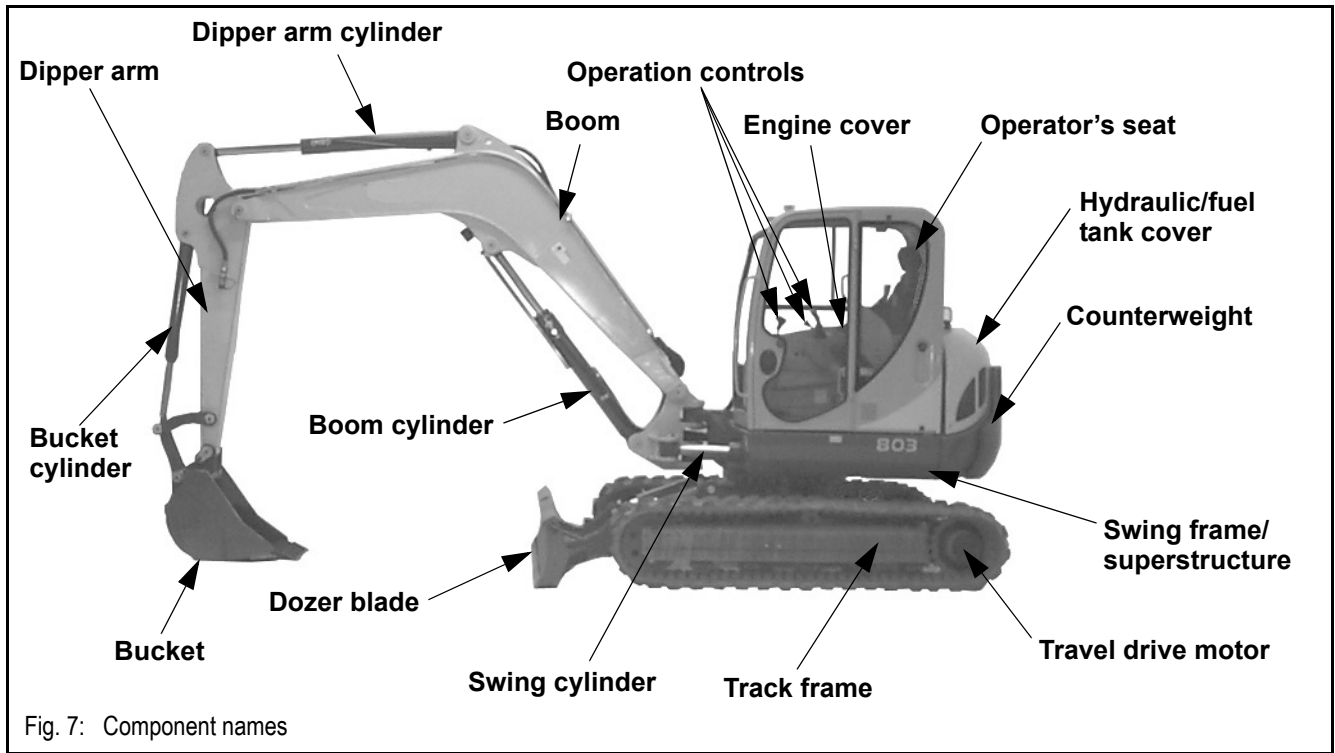
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1.6 Machine: overview



1.15 ISO operating controls (selectable)

ISO boom and bucket functions are controlled by the right- and left-hand joystick control levers located on the seat consoles.

ISO left-hand joystick

- 1 — Boom lower
- 2 — Boom raise
- 3 — Swing left
- 4 — Swing right

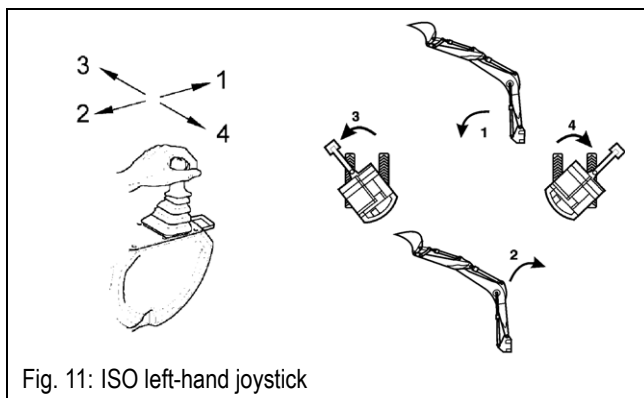


Fig. 11: ISO left-hand joystick

ISO right-hand joystick

- 5 — Arm extend
- 6 — Arm retract
- 7 — Curl bucket in
- 8 — Curl bucket out

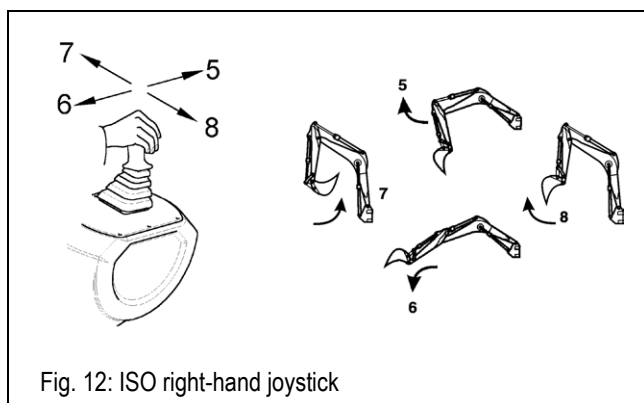


Fig. 12: ISO right-hand joystick

Note: The joystick controls are proportional in operation: the farther the controls are moved from center, the faster the machine will function.

2 Specifications

2.1 Chassis

Sturdy steel sheet chassis, rubber-mounted engine.

2.2 Engine

Engine	
Product	Yanmar diesel engine
Model	4TNV98-VNS
Design	Water-cooled, 4-stroke diesel engine
No. of cylinders	4
Fuel injection system	Direct injection
Aspiration	Naturally aspirated
Cooling system	Water-cooled/aspirating fan
Lubrication system	Pressurized lubrication with trochoidal pump
Displacement	202 cu. in. (3.3 L)
Nominal bore and stroke	3.858 x 4.33 in. (98 x 110 mm)
Output	57 hp (42.5 kW) @ 2100 RPM
Maximum torque	184 lbf.-ft. (249 Nm) @ 1400 RPM
Maximum engine speed without load	2290 ± 50 RPM
Idling speed	1100 ± 50 RPM
Valve tip clearance (intake = outlet)	0.006–0.010 in. (0.15–0.25 mm) (cold)
Injection pressure	3190–3336 psi (220–230 bar)
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	7.3 ± 1.5 psi (0.5 ± 0.1 bar)
Opening temperature of thermostat	157–163°F (69.5–72.5°C)
Thermal switch	225–235°F (107–113°C)
Firing order	1-3-4-2
Direction of rotation	Counterclockwise (as seen from the flywheel)
Starting aid	Intake manifold (preheating time 10–15 sec)
Maximum inclined position (engine still supplied with oil)	25°/46% in all directions 30°/58% three minutes. Follow the machine's hill climbing ability (30°/58%)
Exhaust values according to:	97/68/EC Tier II EPA Tier II

2.11 Dimensions

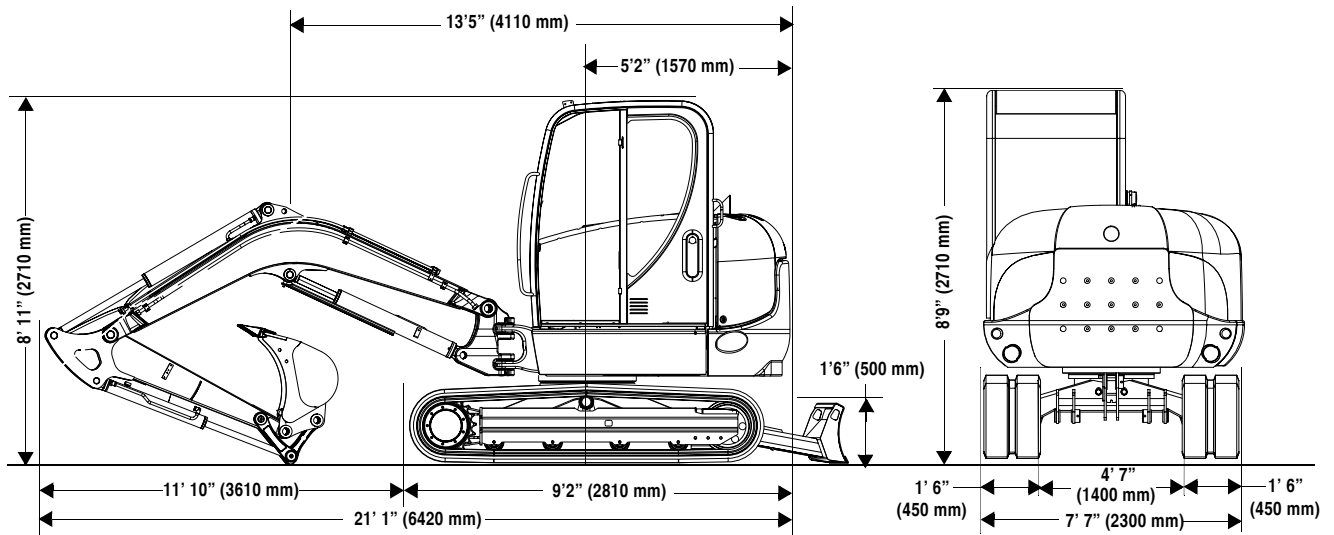
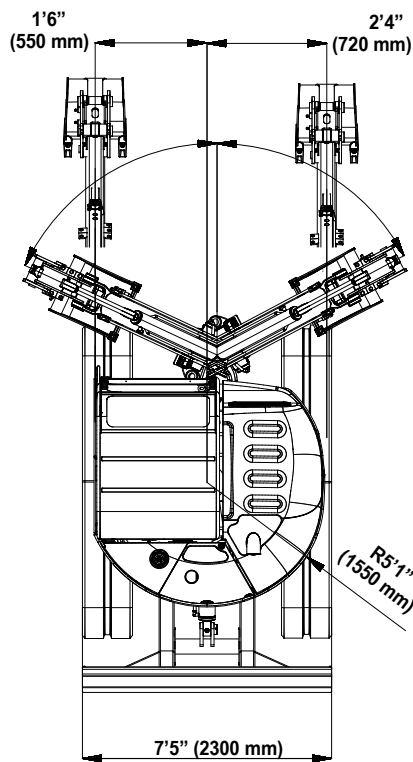


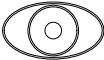
















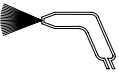

Fig. 1: Machine dimensions



General specifications

Weight	17,549 lbs. (7960 kg)
Height	8' 11" (2710 mm)
Width	7' 11" (2300 mm)
Transport length	21' 1" (6420 mm)
Dipper arm length (standard arm)	6' 1" (1850 mm)
Dipper arm length (extended arm)	7' 1" (2150 mm)
Maximum digging depth w/ standard arm	14' 1" (4290 mm)
Maximum digging depth w/ optional long arm	14' 11" (4580 mm)
Maximum vertical digging depth w/ standard arm	12' 0" (3670 mm)
Maximum vertical digging depth w/ optional long arm	13' 0" (3970 mm)
Maximum digging height w/ standard arm	22' 11" (6980 mm)
Maximum digging height w/ optional long arm	23' 6" (7170 mm)
Maximum dump height w/ standard arm	15' 11" (4840 mm)
Maximum dump height w/ optional long arm	16' 6" (5030 mm)
Maximum digging radius w/ standard arm	23' 6" (7170 mm)
Maximum digging radius w/ optional long arm	24' 5" (7440 mm)
Maximum reach at ground level w/ standard arm	23' 2" (7020 mm)
Maximum reach at ground level w/ optional long arm	23' 11" (7300 mm)
Maximum breakout force at bucket tooth	11,758 lbf (52.30 kN)
Maximum tearout force (standard arm)	8700 lbf (38.70 kN)
Maximum tearout force (optional long arm)	7891 lbf (35.10 kN)
Minimum tail end slewing radius	5' 1" (1550 mm)
Maximum tail end lateral projection over tracks	1' 4" (400 mm)
Maximum boom distance to bucket center (right-hand side)	2' 4" (720 mm)
Maximum boom distance to bucket center (left-hand side)	1' 10" (550 mm)
Maximum boom slew angle (left-hand side)	67°
Maximum boom slew angle (right-hand side)	63°

3.3 Maintenance decal symbols

Symbol	Assembly	Explanation
	General	Visual check
	General	Grease instructions
	Fuel system	Drain condensation water
	Fuel system	Replace the fuel filter, clean the fuel prefilter
	Radiator	Check the coolant level
	Radiator	Drain and fill with new coolant
	Engine	Check valve tip clearance; adjust if necessary
	Engine	Check the engine oil level
	Engine	Change engine oil
	Engine	Replace the oil filter
	Engine	Check V-belt tension
	Traveling drive	Change oil
	Traveling drive	Check oil
	Undercarriage	Check track tension
	Hydraulic system	Check oil level
	Hydraulic system	Change hydraulic oil
	Hydraulic system	Replace the hydraulic oil filter, replace the breather filter
	Radiator fins	Clean
	Heating, air conditioning	Replace the cab air filter

Purging air from the fuel system



WARNING!

DO NOT air bleed a hot engine. Spilled fuel can cause a fire.

The fuel system runs from the fuel tank, through the water separator, fuel filter, fuel injection pump and high pressure piping to the fuel injection nozzles. If the fuel tank has been run dry, or if the fuel filter, water separator or fuel lines have been replaced, trapped air will have to be removed, or bled, from the fuel system.

Bleed air from the fuel system according to the following steps:

1. Fill the fuel tank.
2. Make sure that the valve on the water separator (2) is in the ON position.
3. Turn the ignition key to the first position.
4. Wait about five minutes while the fuel system bleeds itself automatically.
5. Start the engine.

If the engine runs smoothly and then stops, or if it does not run smoothly, turn off the engine and bleed the system again as described above.

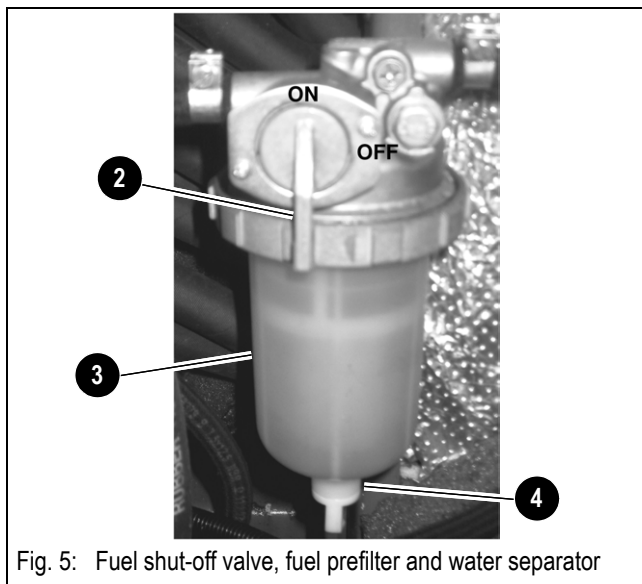


Fig. 5: Fuel shut-off valve, fuel prefilter and water separator

Checking the primary pressure limiting valve 2 (PPLV 2) for pump 4

1. Connect a pressure gauge to measuring port MP 4 (4). See Fig. 15.
2. At maximum engine RPM, extend the dozer blade cylinder as far as it will go.
3. Check and record the pressure value.
 - Pressure is limited to 2393 psi (165 bar) by pressure cut-off valve. See *Pressure cut-off valve* on page 5-27.
4. Check with the retract dozer blade, boom swivel and rotate functions.

Checking pilot control pressure

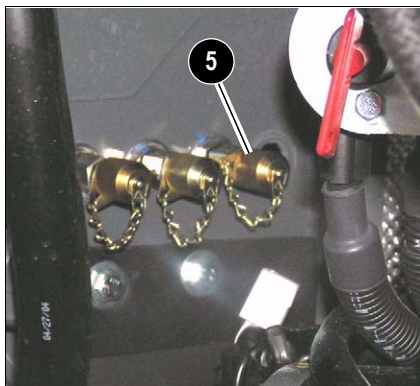


Fig. 17: Pilot control pressure measuring port

Checking pilot control pressure

1. Connect a pressure gauge to measuring port MP (5), Fig. 17.
2. Move the control lever base (safety switch) to the work position.
3. Activate the joystick.
4. Check and record the pressure value.

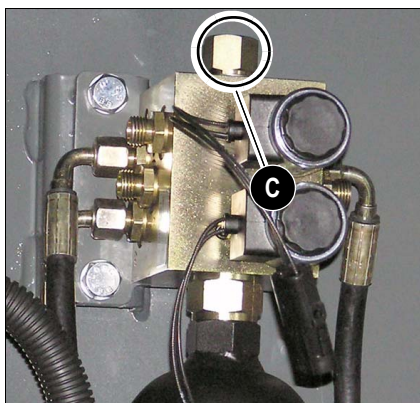


Fig. 18: Pressure reducing valve

Adjusting pressure reducing valve (PREV. 4)

1. Adjust the pressure at the pressure reducing valve (PREV 4) on the control oil unit (C), Fig. 18. See *Hydraulic system* on page 2-3 for pressure values.
2. Check the pilot control pressure again after adjustment is complete.

Checking hydraulic pressure lines

Specific safety instructions



WARNING!

Hydraulic reservoir is under pressure. Never use your hands to search for hydraulic fluid leaks; use a piece of paper or cardboard to find leaks. Escaping fluid under pressure can be invisible and can penetrate the skin, causing serious injury. If any fluid is injected into your skin, see a doctor immediately. Injected fluid **MUST** be surgically removed by a doctor familiar with this procedure, or gangrene may result.

Release hydraulic system pressure before re-tightening leaking threaded fittings and hose connections.

Never weld or solder faulty or leaking pressure lines and connections. Replace damaged parts with new ones.

- Leaks and damaged pressure lines must be immediately repaired or replaced. This not only increases the operating safety of the machine but also helps to protect the environment.
- Replace hydraulic hoses every six years from the date of manufacture, even if they do not appear to be damaged.

In this respect, we recommend that you follow all the relevant safety regulations for hydraulic lines, as well as the safety regulations regarding accident prevention and occupational health and safety in your country.

The date of manufacture (month or quarter and year) is indicated on the hose.

Example:

The indication “1 Q/05” means manufactured in the 1st quarter of 2005.

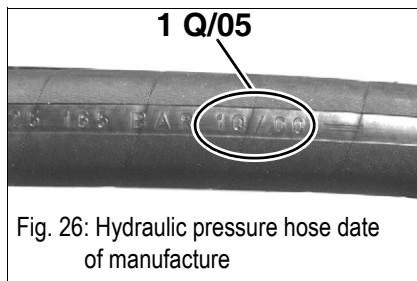


Fig. 26: Hydraulic pressure hose date of manufacture

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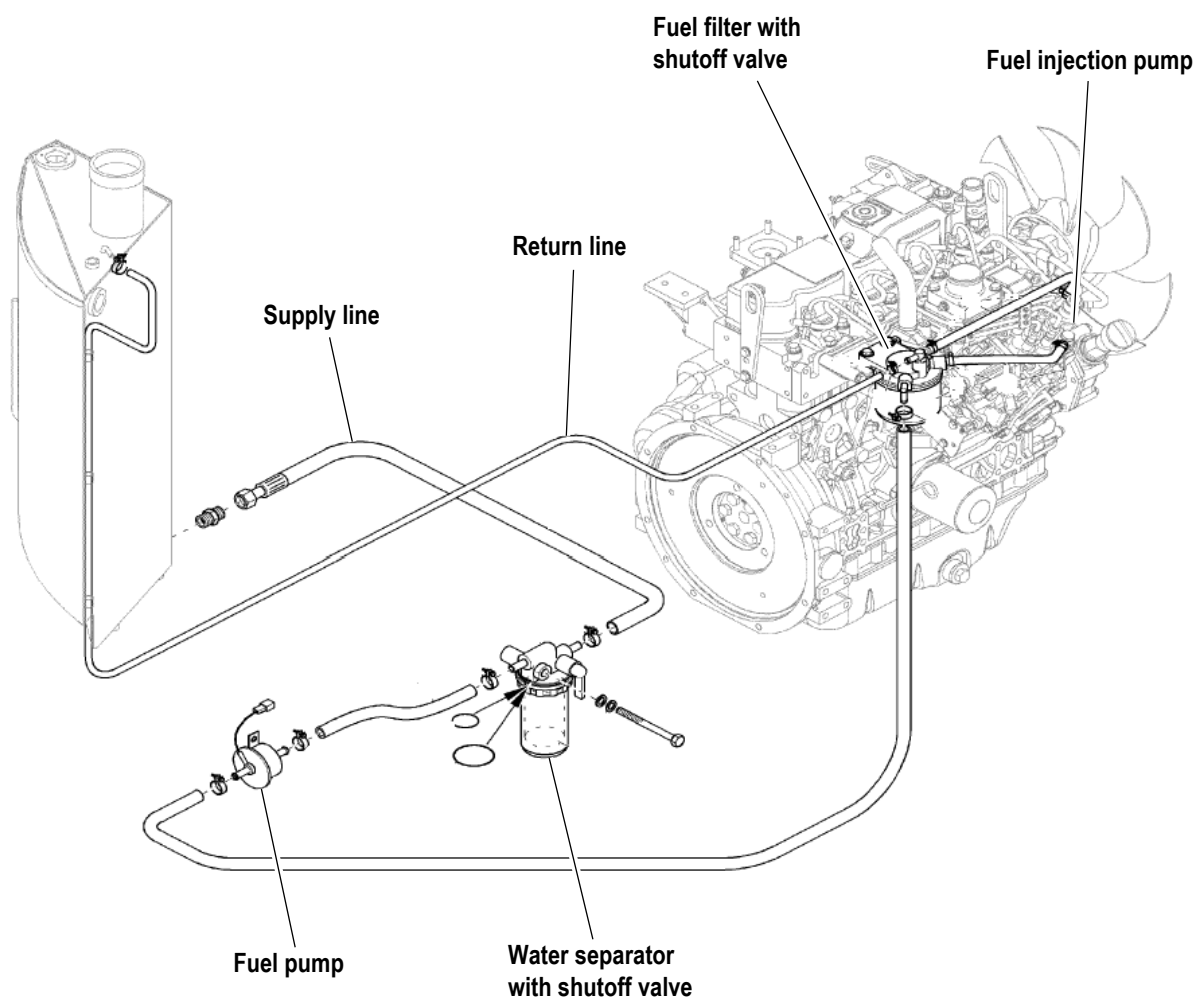
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4.2 Fuel system



Problem		Possible causes
Engine oil consumption too high		Oil level too high
		Machine inclination too high (maximum 15°)
Engine smoke	Blue	Oil level too high
		Machine inclination too high (maximum 20°)
	White	Engine starting temperature too low
		Fuel grade incorrect
		Wrong valve tip clearance
		Fuel injector defective
		Coolant combustion (defective cylinder head gasket)
	Black	Air filter is dirty
		Air filter maintenance switch or gauge defective
		Wrong valve tip clearance
		Fuel injector defective
		Engine oil combustion (defective cylinder head gasket)

Pump/tank lines

Connection	Legend
P1	Port for pump 1
P2	Port for pump 2
P3	Port for pump 3
P4	Port for pump 4
PR5	Pumps P3 and P4 input
PA	Pilot oil supply unit port
PP	Port for automatic RPM control (option)
PT	Drive alarm port (option)
T1	Tank line via non-return valve and filter in tank
T2	Tank line via oil cooler and filter in tank
T3	Plug (tank line)
T4	Plug (tank line)
T6	Plug (tank line)
DR1	Tank line
dr1, dr2	Tank lines for boom summation
pcc	Tank line

5.8 Secondary pressure limiting valves for the auxiliary hydraulics (option)

The limiting valve provides over-pressure protection for components in the secondary circuit (e.g., hydraulic hammer).



IMPORTANT!

The attachment manufacturer (e.g., hammer, offset bucket, etc.) is responsible for attachment over-pressure protection. Mustang is not liable for damage to attachments.

Problem

The secondary circuit is also protected by the primary pressure limiting valve if the spool valve is enabled. There is no protection if the spool valve is not enabled.

Ensuring protection with the spool valve disabled requires two secondary pressure limiting valves instead of the plugs.

Adjusting the secondary pressure limiting valves

The pressure limiting valves must be set at 4061 psi (280 bar) while adjusting the limiting valves.

Short-term pressure peaks can be reduced with this setting.

follow the following should the pressure limiting valves be set to less than 4061 psi (280 bar):

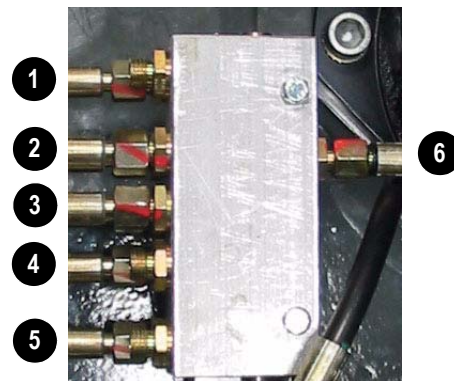
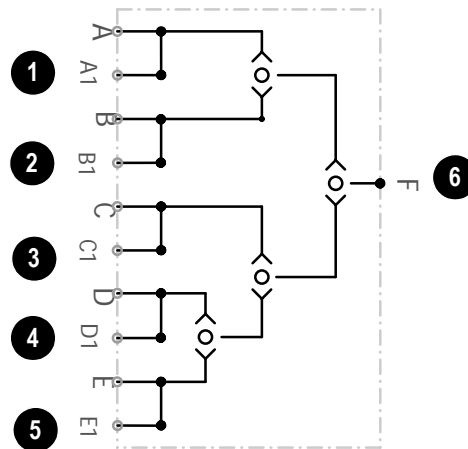
- Have the pressure setting performed by a hydraulic systems technical specialist.
- The pump's high flow rate, and the fact that the pressure peaks are now reduced by the secondary pressure limiting valve cartridges at the auxiliary hydraulics section, may cause the hydraulic oil to overheat.
- Reset the pressure setting to the initial 4061 psi (280 bar) when changing attachment.

Location

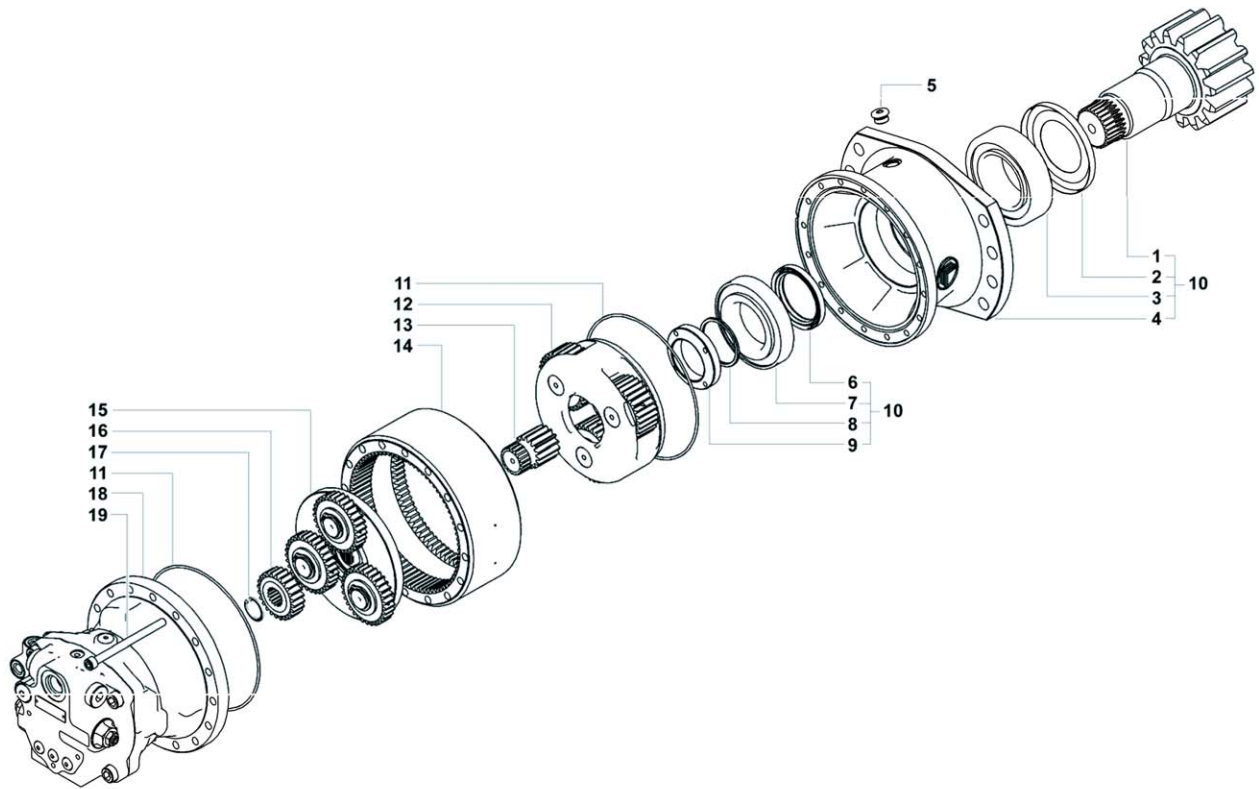
[See Pressure limiting valves](#) on page 5-11.

Shuttle valve block

- Rotation, boom swivel and dipper arm retraction must vent the gear motor's brake.
- High forces act on the brake and destroy it if it is not released during these operations.



Ref.	Description
1	Port A (and record joystick (left) 4 and record main valve block, right-hand side rotation control)
2	Port B (and record joystick (left) 2 and record main valve block, left-hand side rotation control)
3	Port C (and record pedal, swivel 2 and record main valve block, offset cylinder extension control)
4	Port D (and record pedal, swivel 1 and record main valve block, offset cylinder retraction control)
5	Port E (and record joystick (left) 1 and record main valve block, dipper arm cylinder extension control)
6	Port F (and record gear motor SH, brake release)



Ref.	Description
1	Pinion shaft
2	Bearing seal ring
3	Bearing
4	Gear housing
5	Plug
6	Sealing ring
7	Bearing
8	Spacer washer
9	Round nut
10	Complete drive
11	O-ring
12	Gear reduction
13	Sun gear
14	Ring gear
15	Gear reduction
16	Sun gear
17	Circlip
18	Hydraulic motor
19	Bolt

6 Electrical system

6.1 Ohm's law (current, voltage, resistance); power

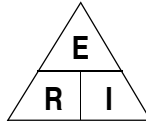
It describes the interrelation between current, voltage and resistance.

Current "I" – Ampere (A)

Voltage "E" – Volt (V)

Resistance "R" – Ohm (Ω)

Mnemonic:



Output

Power "P" – Watt (W)

$$P = E \times I = R \times I^2 = E^2/R$$

6.2 Measuring equipment, measuring methods

Multi-function measuring device

- Measurements of values (E, R, I, P)
- Continuity test
- Diode test

Calculate measuring range using known data (P, E, R, I) and set before measuring.

Use AC/DC basic setting.

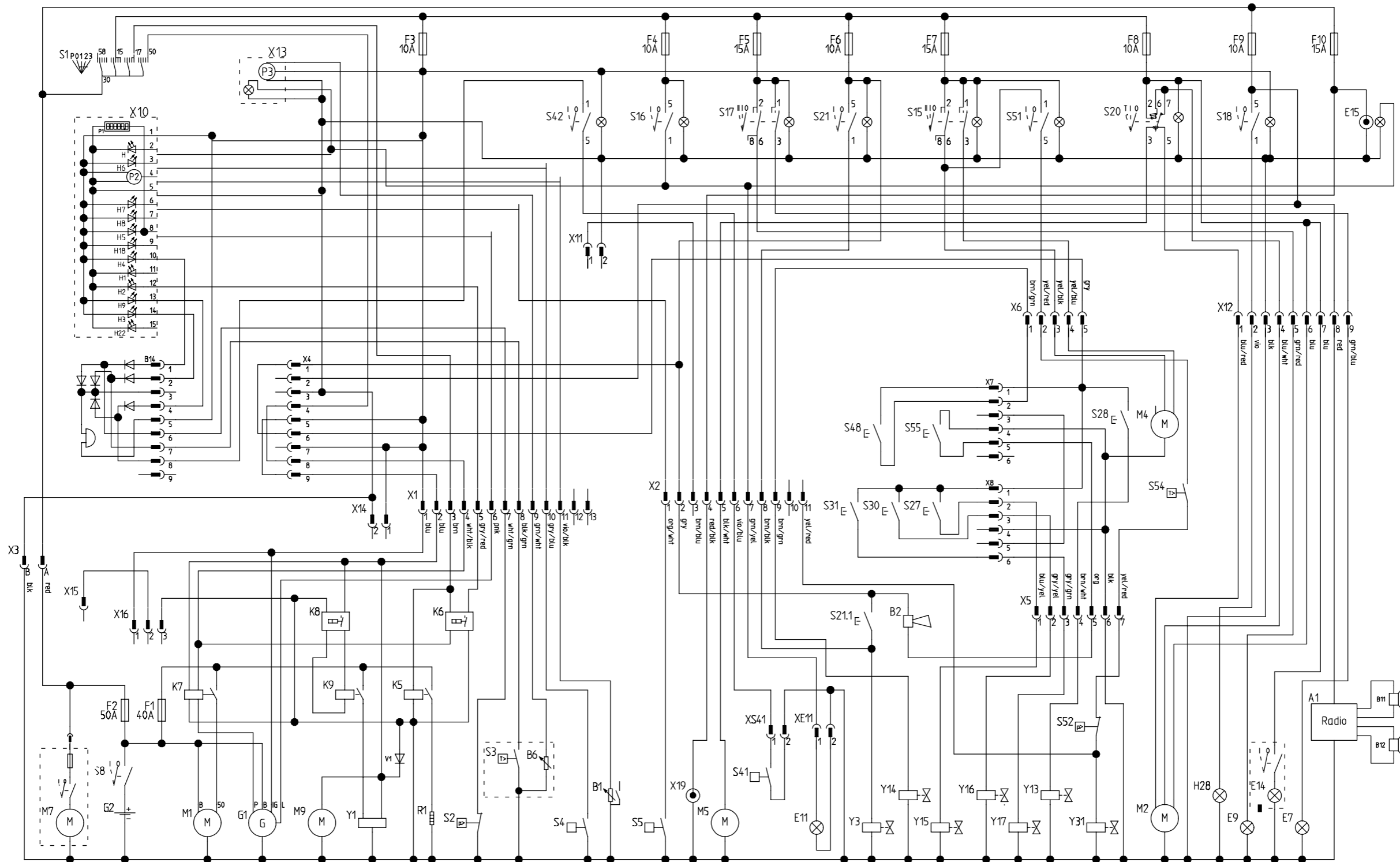
➡ AC = Alternating current/voltage;

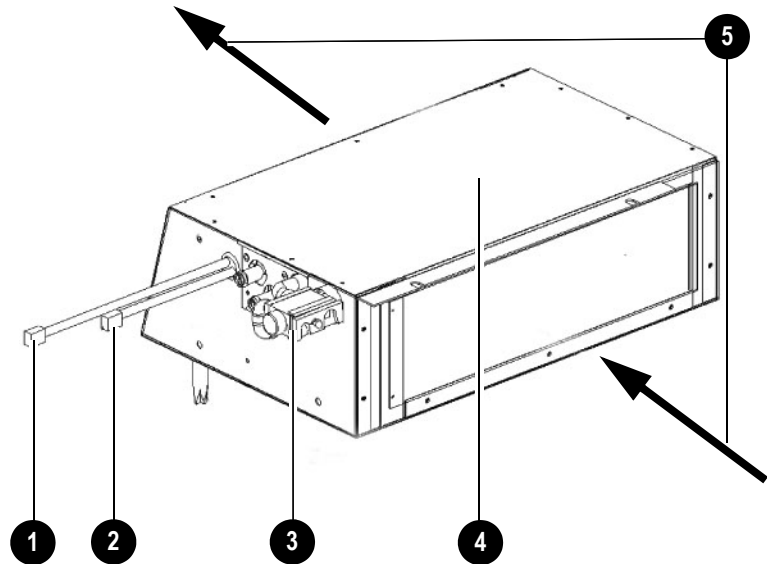
➡ DC = Direct current/voltage

Test device with acoustic and optical signal output

- Continuity test of self-energized machine electrical system and of wiring harnesses.

6.16 Wiring diagram





Ref.	Description
1	Thermostat cable
2	Fan cable
3	Expansion valve
4	Service cover
5	Intake/outlet direction

Compressor

The compressor takes refrigerant from the evaporator and passes it under pressure into the condenser. The engine drives the compressor via a V-belt and an electro-magnetic clutch.

Condenser

The refrigerant vapor is condensed into liquid by the condenser.

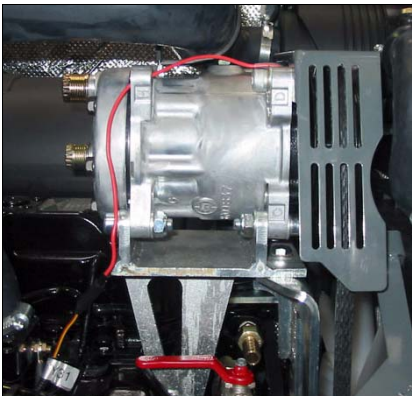


Fig. 1: Compressor

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