ME7503ZT

COMPACT EXCAVATOR

SERVICE MANUAL

PART #918165

Revision A - 09/05

Mustang Manufacturing Company, Inc.

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2 Specifications

2.1 Chassis

Sturdy steel sheet chassis, rubber-mounted engine

2.2 Engine

Engine Model	Yanmar 4TNV98-VNS EPA Type II
Engine Type	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	Force-feed 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 lb-ft (249 N·m) @ 1400 rpm
Maximum Engine Speed without Load	2275 ±50 rpm
Idling Speed	1050 ±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	Counter-clockwise (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% 3 minutes. This is exceeded by the machine's theoretical climbing ability (30°/58%)
Exhaust Values According to	97/68/EC Tier II EPA Tier II

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3.5 Maintenance Schedule

Check, Clean or Inspect

Service Activity	Daily	Every 50 Hours	Every 250 Hours	Every 500 Hours	Every 1000 Hours	Customer	Dealer
Check engine oil level. Refill as needed.	x					x	
Check engine coolant level. Refill as needed.	x					x	
Check hydraulic oil level. Refill as needed.	x					x	
Check gearbox oil level. Refill as needed.[1]		x				x	
Clean water ducts.[2]					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 inspection).	x					x	
Replace cab air filter for heating and air conditioning.				x			x
Inspect air filter for damage.	x					x	
Inspect water separator prefilter and 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 valve tip clearance. Adjust if necessary.					x		x
Inspect fuel injection pump, injection and pressure, injection nozzles and valves.					x		x
Inspect fuel injection nozzles and valves.					x		x
Empty diesel fuel tank.				x			x
Check battery electrolyte. Fill with distilled water if necessary.		x		x		x	
Check alternator, starter and electrical connections, bearing play and function.				x			x
Check preheating system and electrical connections.				x			x
Check air filter contamination gauge.				x			x
Preform pressure check of primary pressure relief valves.[3]		x		x			x

1. Check the gearbox oil every second time 50 s/h servicing is performed.
2. Clean the water ducts every second time 1000 s/h servicing is performed.
3. First check at 50 s/h, then every 500 s/h.

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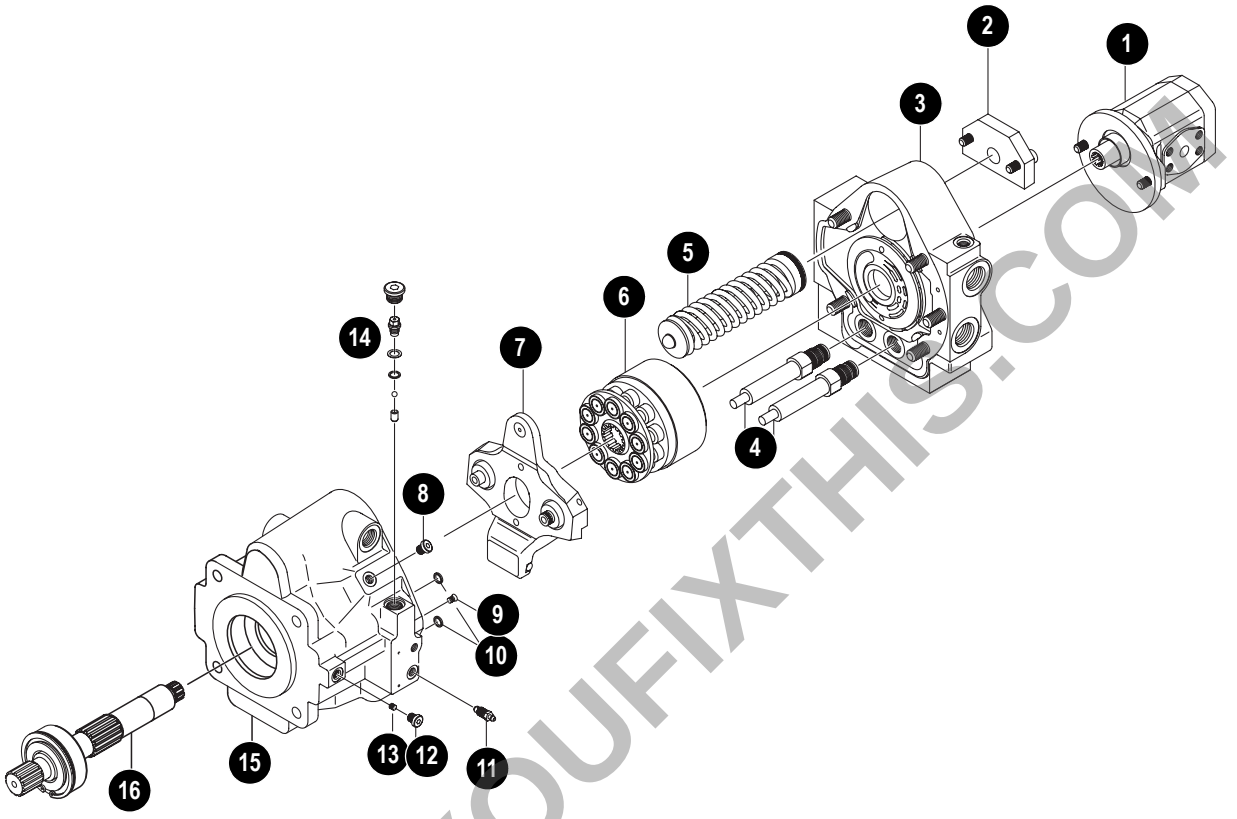
4.15 Engine Troubleshooting

Problem	Possible Causes
Engine does not start or is not easy to start	Wrong SAE grade of engine lubrication oil
	Fuel grade incorrect
	Defective or dead battery
	Loose or oxidized cable connections in starter circuit
	Starter defective, or pinion does not engage
	Wrong 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 starting
Engine starts, but does not run smoothly	Fuel grade incorrect
	Wrong 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 fouled
	Oil cooler fins fouled
	Fan defective, 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
	Fuel grade incorrect
	Air filter fouled
	Air filter maintenance switch or gauge defective
	Wrong valve tip clearance
	Injection line leaks
	Fuel injector defective
Engine does not run on all cylinders	Injection line leaks
	Fuel injector defective
Insufficient or no engine oil pressure	Oil level too low
	Machine inclination too steep (maximum 15°)
	Wrong SAE grade of engine lubrication oil

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Pump Unit — Exploded View



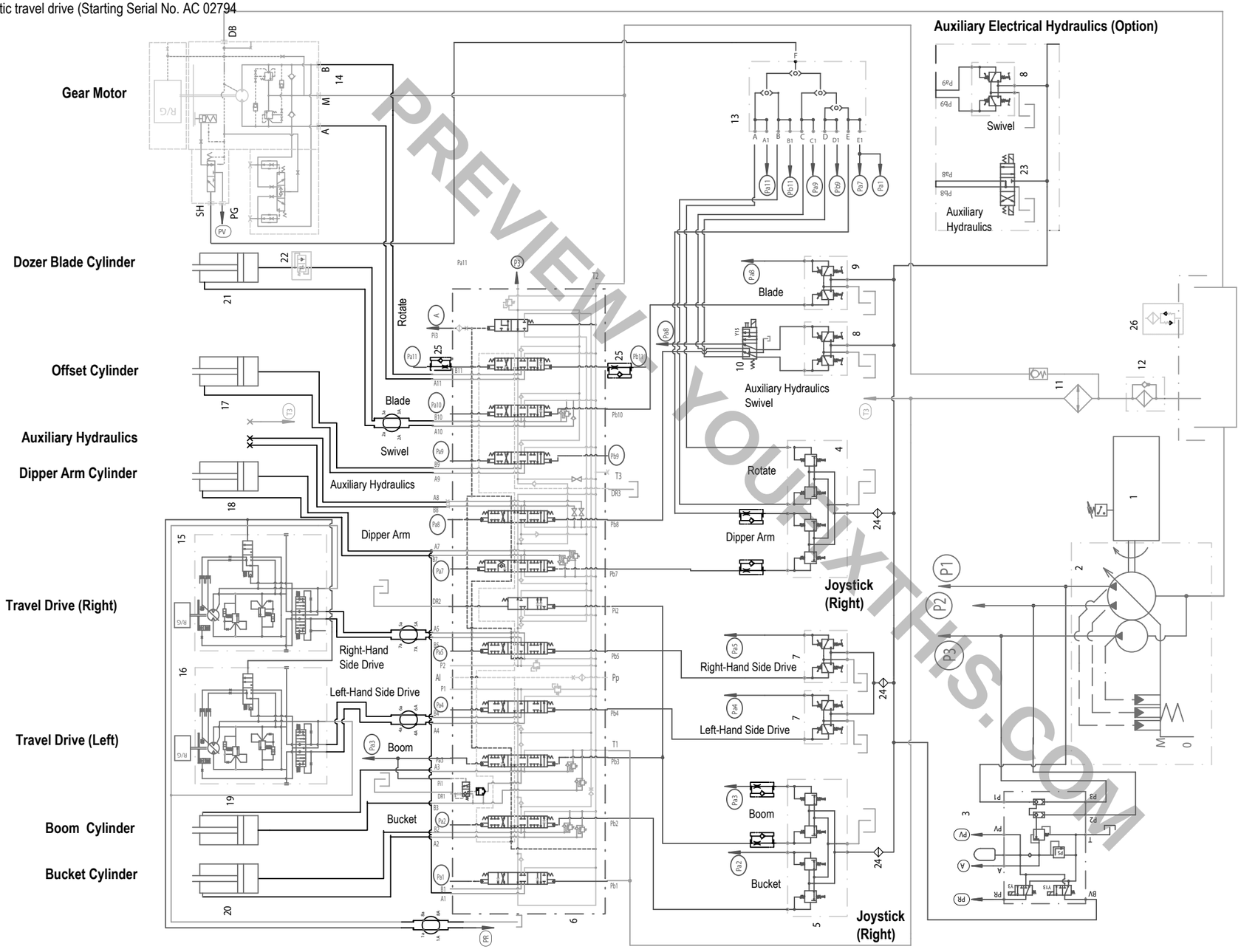
Ref.	Description
1	Gear Pump
2	End Plate
3	Pump Cover
4	Piston Valve
5	Spring
6	Drive Unit
7	Cradle
8	Plug
9	Plug
10	O-Ring
11	Bleeder Valve
12	Plug
13	Nozzle
14	Shuttle Valve (for Lubrication)
15	Pump Housing
16	Shaft

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5.19 Hydraulic Diagram)

Two-speed automatic travel drive (Starting Serial No. AC 02794



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6.16 Wiring Diagram Legend

No.	Description	Section	Loc.
A1	Radio	E14	Option
B1	Fuel Indicator	F6	
B2	Horn	D/E10	
B6	Engine Oil Temperature Sensor	E6	
B11	Speaker	E15	Option
B12	Speaker	E15	Option
B14	Warning Buzzer	C2	
E7	Rear Roof Light	F14	Option
E9	Front Roof Light	F13	Option
E10	Front Roof Light		Option
E11	Boom Light	F8/9	
E14	Interior Light	E/F13	
E15	Cigarette Lighter	A14	
F1	Main Fuse and Fuel-Filling Pump	E1	
F2	Engine Indicator Relays	A4	
F3	Indicators, Engine Relay	A4	
F4	Boom Working Light	A7	
F5	Cab Working Light	A8	
F6	Valves, Horn	A9	
F7	Fan, Air Conditioning	A10	
F8	Wiper, Interior Light	A12	
F9	Rotating Beacon, Radio, Drive Interlock	A13	
F10	Accessory Socket	A14	
G1	Alternator	F3	G1
G2	Battery	F1	
H2	Preheating Indicator	B1	
H3	Engine Temperature Indicator	B1	
H4	Engine Oil Pressure Indicator	B1	
H5	Alternator Change Function Indicator	B1	
H6	Air Filter Indicator	B1	
H7	Hydraulic Oil Filter Indicator	B1	
H9	Safe Load Indicator	C3	
H28	Rotating Beacon	B1	
H30	Spare Indicator	C3	

No.	Description	Section	Loc.
H33	Spare Indicator	B1	
K5	High Current Relay — Preheating	E4	
K6	Preheating Time Lag Relay	D5	
K7	High Current Relay — Start	E2	
K8	Cut-Off Solenoid Time Lag Relay	D3	
K9	Cut-Off Solenoid Switching Relay	E3	
M1	Starter	F2	
M2	Wiper Motor	F13	Option
M4	Fan	C12	Option
M5	Washer Pump	F8	Option
M7	Fuel-Flling Pump	F1	Option
M9	Fuel Pump	F3	
P1	Hour Meter	B1	
P2	Fuel Level Indicator	B1	
P3	Engine Oil Temperature Gauge	A3	
R1	Glow Plug	F4	
S1	Preheating Start Switch	A1	
S2	Pressure Switch — Engine Oil	F5	
S3	Engine Temperature Switch	E5	
S4	Air Filter Pressure Switch	F6	
S5	Hydraulic Oil Pressure Switch	F7	
S8	Battery Master Switch	F1	
S15	Ventilation Switch	A10	
S16	Boom Working Light Switch	A7	
S17	Cab Working Light Switch	A8	Option
S18	Rotating Beacon Switch	A13	Option
S20	Wiper/Washer Switch	A20	Option
S21	High Speed Switch	A9	
S21.1	High-Speed Tip Switch (Prepared)	E9	Option
S27	Additional Hydraulics/Swivel Tip Switch	D10	
S28	Safety Switch	C28	
S30	Additional Control Circuit Tip Switch	D9	Option
S31	Additional Control Circuit Tip Switch	D9	Option
S41	Safe Load Indicator Pressure Switch	E8	Option

No.	Description	Section	Loc.
S42	Safe Load Indicator Switch	A7	Option
S48	Automatic Idling Speed Tip Switch	C9	Option
S51	Switch — Air Conditioning	A11	Option
S52	Air Conditioning Pressure Switch	E12	Option
S54	Air Conditioning Thermostat	D12	Option
S55	Horn Tip Switch	C10	
V1	Recovery Diode	E4	
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	
X5	7 Pole Connection — Armrest/Chassis	D11/12	
X6	5 Pole Connection — Armrest Switch	C11/12	
X7	6 Pole Connection — Joystick (Right)	C11	
X8	6 Pole Connection — Joystick (Left)	D11	
X10	15 Pole Connection — Indicator	B/C1	
X11	2 Pole Connection — Vario Indicator (Not Used)	B6	
X12	9 Pole Connection — Cab	C13/14	
X13	5 Pole Connection — Engine Temperature	A3	
X14	2 Pole Connection — Automatic Revs Setting	D3	
X15	1 Pole Connection — Drive Alarm	D1	
X16	3 Pole Connection — Drive Alarm	E2	
X19	1 Pole Connection — Socket	F7	
XE11	2 Pole Connection — Boom Working Light	E9	
XS41	2 Pole Connection — Safe Load Indicator	E8	
Y1	Cut-Off Solenoid	F4	
Y3	High-Speed Solenoid Valve	F9	
Y13	Solenoid Valve for Safety Valve	F13	
Y14	Solenoid Valve — Automatic Idling Speed Setting	F9	Option
Y15	Solenoid Valve — Auxiliary Hydraulics/Swivel	F10	
Y16	Solenoid Valve — Additional Control Circuit	F10	Option
Y17	Solenoid Valve — Additional Control Circuit	F11	Option
Y31	Solenoid Valve — Air Conditioning	F12	Option

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TORQUE SPECIFICATIONS

Note: Use these torque values when tightening hardware (excluding: locknuts and self-tapping, thread forming and sheet metal screws) unless specified otherwise.

Hydraulic fittings with various seals (light application). All torque values are in lb.-ft. (Nm) unless marked otherwise.

Thread	Straight pipe fitting with thread and screwed plug (GE)			Non-return valve with elastic seal	Identification aid outside Ø
	Sealing washer	Elastic seal	O-ring		
M10X1.0	7 (9)	13 (18)	11 (15)	13 (18)	0.4 in. (10 mm)
M12X1.5	15 (20)	18 (25)	18 (25)	18 (25)	0.5 in. (12 mm)
M14X1.5	26 (35)	33 (45)	26 (35)	26 (35)	0.6 in. (14 mm)
M16X1.5	33 (45)	41 (55)	30 (40)	37 (50)	0.6 in. (16 mm)
M18X1.5	41 (55)	52 (70)	33 (45)	52 (70)	0.7 in. (18 mm)
M22X1.5	48 (65)	92 (125)	44 (60)	92 (125)	0.9 in. (22 mm)
M27X2.0	66 (90)	133 (180)	74 (100)	107 (145)	1.0 in. (27 mm)
M33X2.0	111 (150)	229 (310)	118 (160)	155 (210)	1.3 in. (33 mm)
M42X2.0	177 (240)	332 (450)	155 (210)	266 (360)	1.7 in. (42 mm)
M48X2.0	214 (290)	398 (540)	192 (260)	398 (540)	1.9 in. (48 mm)
G1/8A	7 (9)	13 (18)	11 (15)	13 (18)	0.4 in. (9.73 mm)
G1/4A	26 (35)	26 (35)	22 (30)	26 (35)	0.5 in. (13.16 mm)
G3/8A	33 (45)	52 (70)	33 (45)	37 (50)	0.7 in. (16.66 mm)
G1/2A	48 (65)	66 (90)	41 (55)	48 (65)	0.8 in. (20.96 mm)
G3/4A	66 (90)	133 (180)	74 (100)	103 (140)	1.0 in. (26.44 mm)
G1A	111 (150)	229 (310)	118 (160)	140 (190)	1.3 in. (33.25 mm)
G1 1/4A	177 (240)	332 (450)	155 (210)	266 (360)	1.7 in. (41.91 mm)
G1 1/2A	214 (290)	398 (540)	192 (260)	398 (540)	1.9 in. (47.80 mm)

Hydraulic fittings with various seals (heavy application). All torque values are in lb.-ft. (Nm) unless marked otherwise.

Thread	Straight pipe fitting with thread and screwed plug (GE)			Non-return valve with elastic seal	Identification aid outside Ø
	Sealing washer	Elastic seal	O-ring		
M12X1.5	15 (20)	26 (35)	26 (35)	26 (35)	0.5 in. (12 mm)
M14X1.5	26 (35)	41 (55)	33 (45)	33 (45)	0.6 in. (14 mm)
M16X1.5	33 (45)	52 (70)	41 (55)	41 (55)	0.6 in. (16 mm)
M18X1.5	41 (55)	66 (90)	52 (70)	52 (70)	0.7 in. (18 mm)
M20X1.5	41 (55)	92 (125)	59 (80)	74 (100)	0.8 in. (20 mm)
M22X1.5	48 (65)	100 (135)	74 (100)	92 (125)	0.9 in. (22 mm)
M27X2.0	66 (90)	133 (180)	125 (170)	100 (135)	1.0 in. (27 mm)
M33X2.0	111 (150)	229 (310)	229 (310)	155 (210)	1.3 in. (33 mm)
M42X2.0	177 (240)	332 (450)	243 (330)	266 (360)	1.7 in. (42 mm)
M48X2.0	214 (290)	398 (540)	310 (420)	398 (540)	1.9 in. (48 mm)
G1/8A	26 (35)	41 (55)	33 (45)	33 (45)	0.5 in. (13.16 mm)
G1/4A	33 (45)	59 (80)	44 (60)	44 (60)	0.7 in. (16.66 mm)
G3/8A	48 (65)	85 (115)	55 (75)	74 (100)	0.8 in. (20.96 mm)
G1/2A	66 (90)	133 (180)	125 (170)	107 (145)	1.0 in. (26.44 mm)
G3/4A	111 (150)	229 (310)	229 (310)	192 (260)	1.3 in. (33.25 mm)
G1A	177 (240)	332 (450)	243 (330)	266 (360)	1.7 in. (41.91 mm)
G1 1/4A	214 (290)	398 (540)	310 (420)	398 (540)	1.9 in. (47.80 mm)

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1.6 Machine Overview

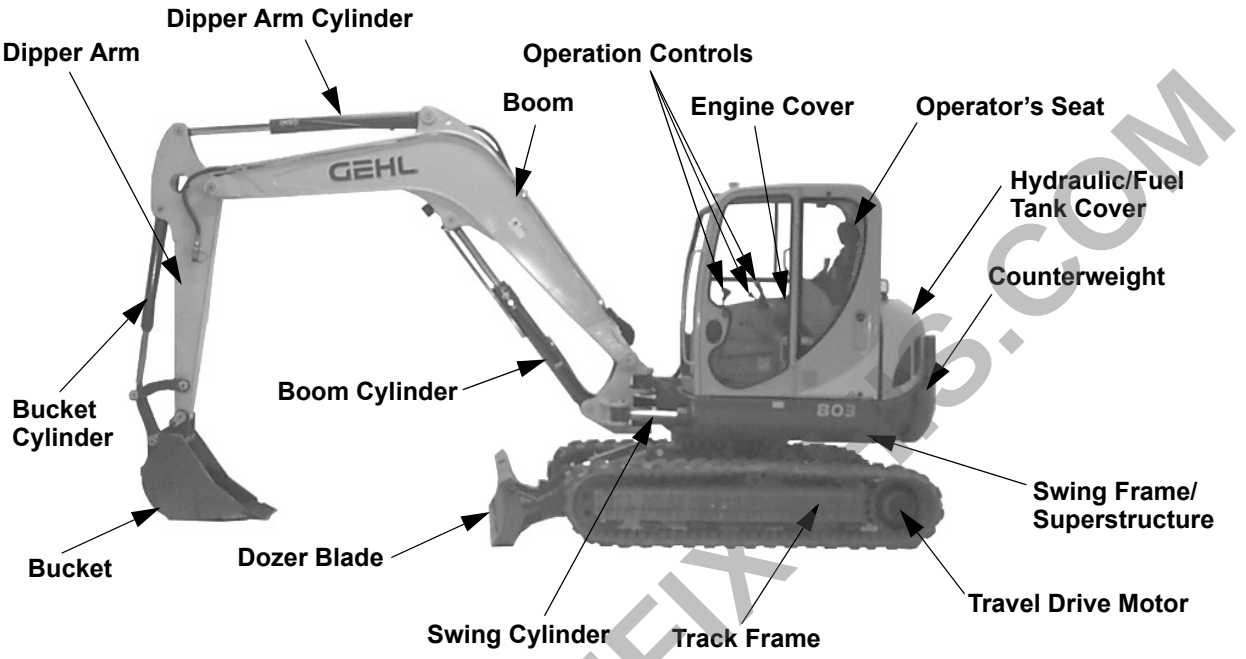
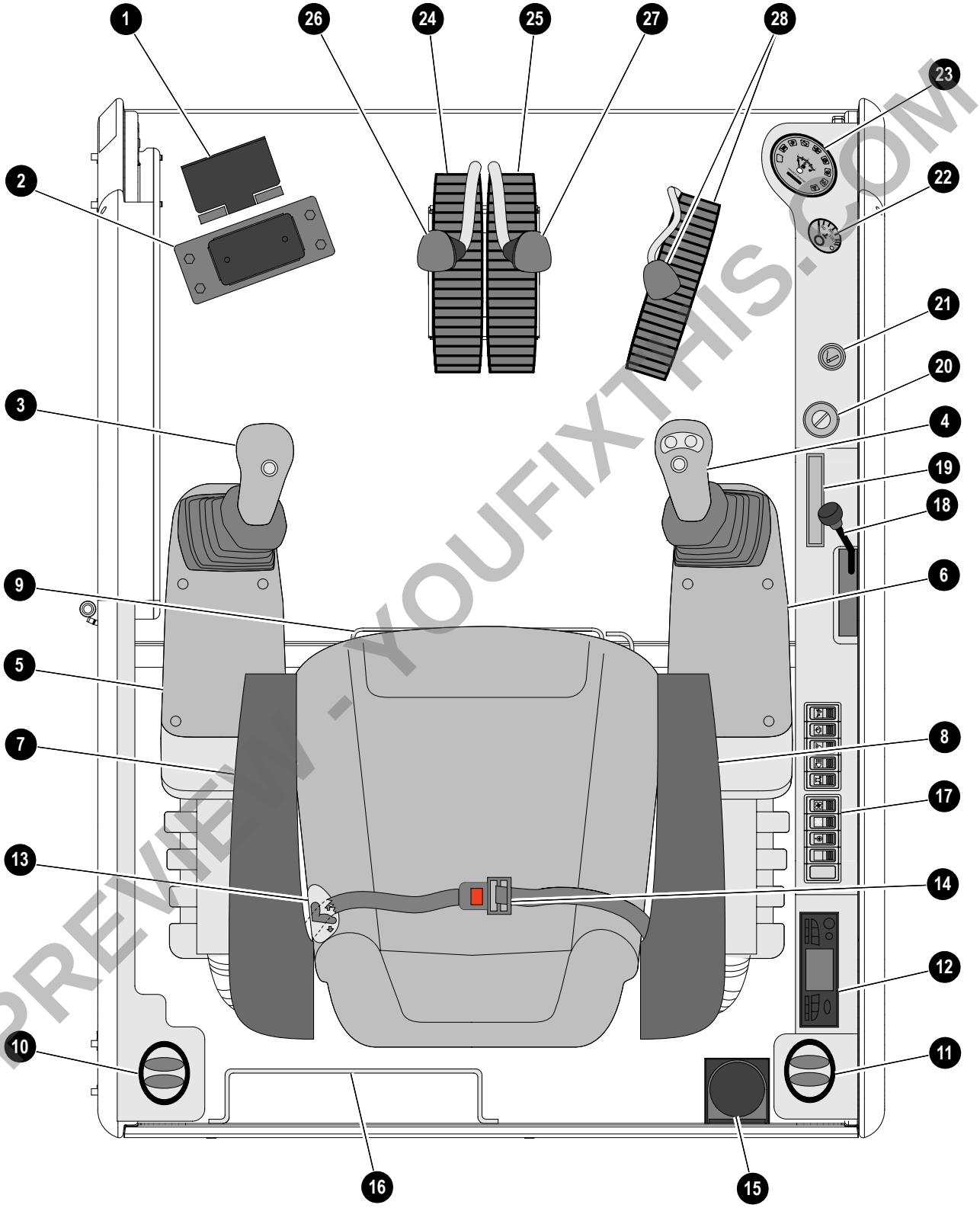


Fig. 7: Component

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1.7 Cab Overview



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1 Operation

1.1 Important Information about this Service Manual

WARNING!

- Read and understand the excavator operator's manual. Follow warnings and instructions for operation and maintenance in that manual. Failure to follow instructions can result serious injury.
- Read and understand all safety decals before operating the machine. DO NOT operate the machine unless all factory-installed guards and shields are in place.
- Be sure you are familiar with all safety devices and controls before operating the machine.
- Know how to stop the machine before starting.

This service manual contains important information about safely servicing the machine, correctly and economically. It serves as a reference for experienced users, helps to avoid hazardous situations, and reduces repair costs and downtimes. Additionally, the reliability and the service life of the machine will be increased by following the instructions in this manual.

Proper and careful work is the best protection against accidents!

Operational safety and readiness of the machine depends not only upon operator skill, but also upon proper maintenance and service.

Always use original service parts when performing maintenance and repair work. This ensures operational safety and readiness of the machine, and maintains its value.

1.2 Abbreviations/Symbols

- This symbol stands for a list.
  - Subdivision within lists or an activity. Follow the steps in the sequence in which they appear.

☞ *This symbol requires you to perform the activity described.*

➥ Description of the effects or results of an activity.

n. s. = not shown.

"Option" = optional equipment.

Stated whenever controls or other components of the machine are installed as an option.

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