Service Manual

ROBOT 190, 1110

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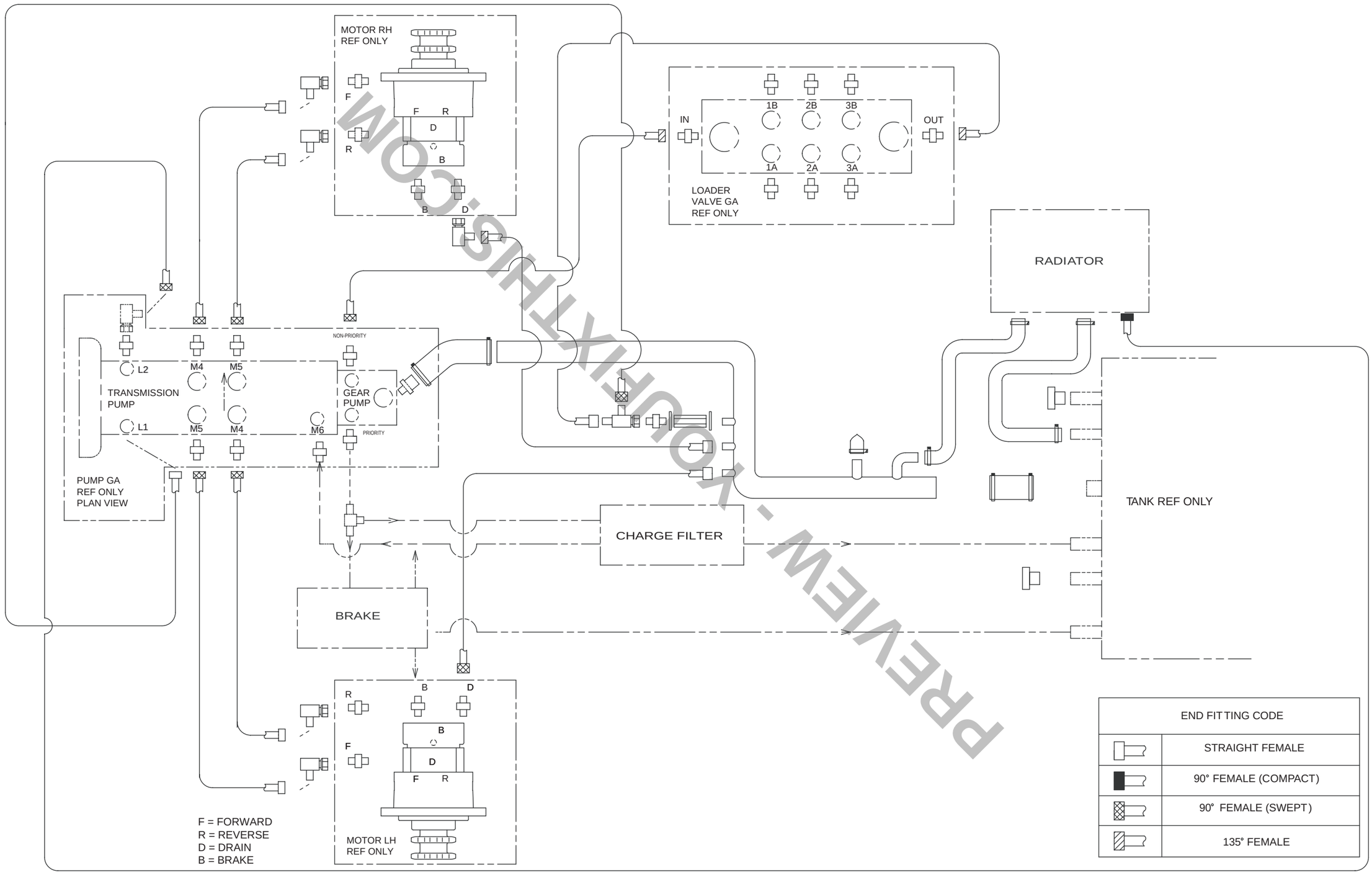
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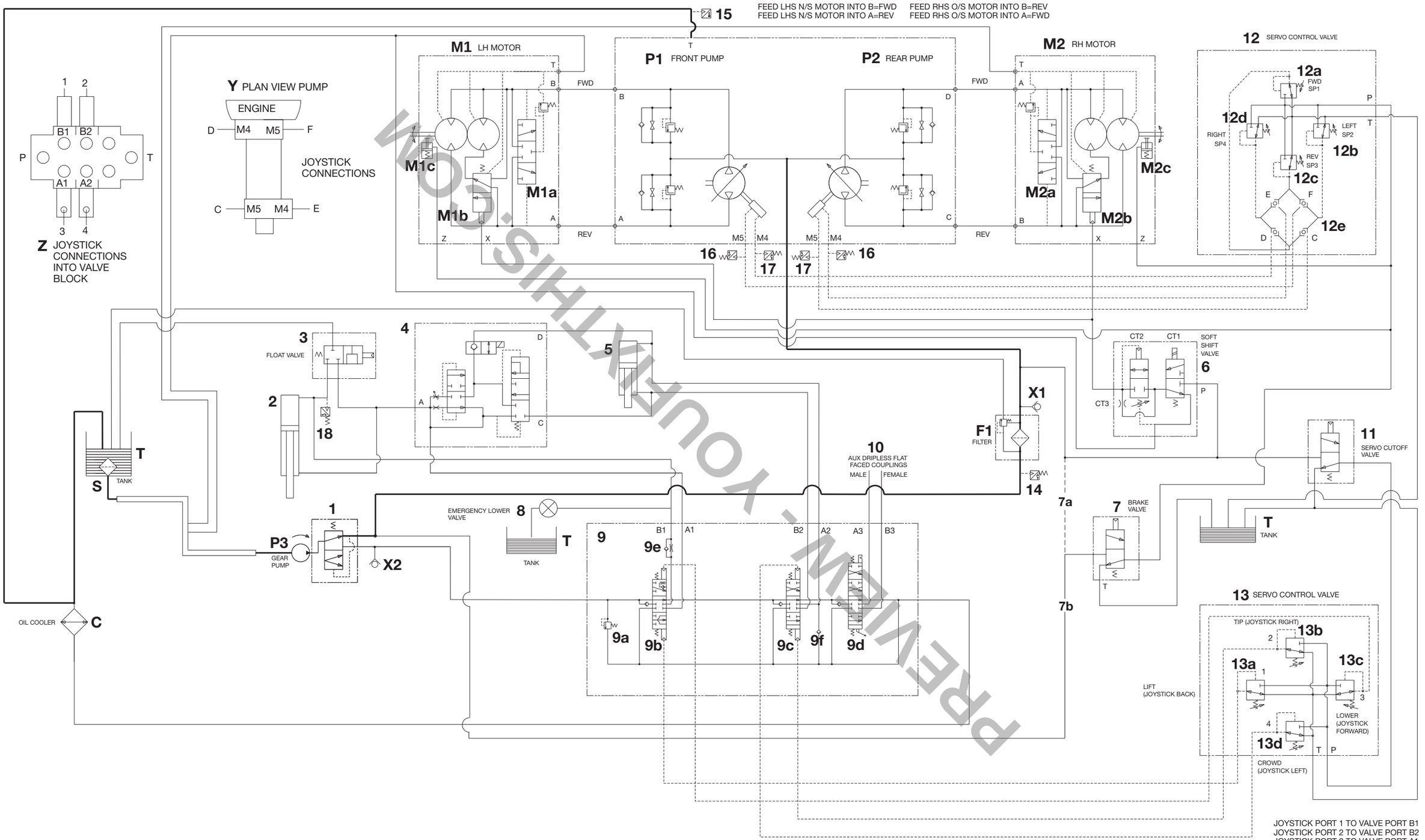
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* **Standard Circuit - RE and RG Engine Build**

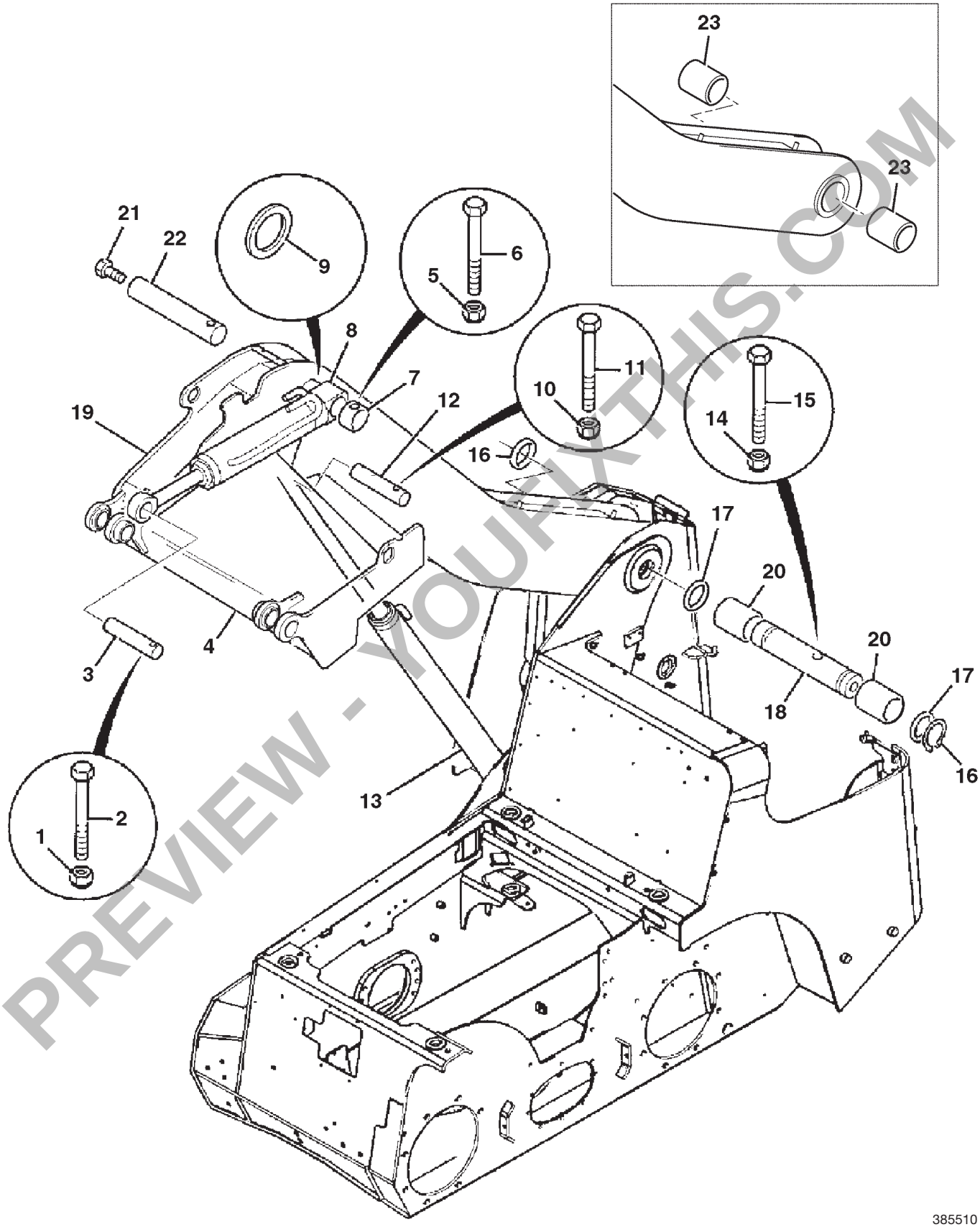


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* **Standard Servo Machine (single lever drive control) - AR and AK engine Builds**



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Use only where no torque setting is specified in the text. Values are for dry threads and may be within three per cent of the figures stated. For lubricated threads the values should be REDUCED by one third.

UNF Grade 'S' Bolts

Bolt Size in	(mm)	Hexagon (A/F) in	Torque Settings Nm	kgf m	lbf ft
1/4	(6.3)	7/16	14	1.4	10
5/16	(7.9)	1/2	28	2.8	20
3/8	(9.5)	9/16	49	5.0	36
7/16	(11.1)	5/8	78	8.0	58
1/2	(12.7)	3/4	117	12.0	87
9/16	(14.3)	13/16	170	17.3	125
5/8	(15.9)	15/16	238	24.3	175
3/4	(19.0)	1 1/8	407	41.5	300
7/8	(22.2)	1 5/16	650	66.3	480
1	(25.4)	1 1/2	970	99.0	715
1 1/4	(31.7)	1 7/8	1940	198.0	1430
1 1/2	(38.1)	2 1/4	3390	345.0	2500

Metric Grade 8.8 Bolts

Bolt Size in	(mm)	Hexagon (A/F) in	Torque Settings Nm	kgf m	lbf ft
M5	(5)	8	7	0.7	5
M6	(6)	10	12	1.2	9
M8	(8)	13	28	3.0	21
M10	(10)	17	56	5.7	42
M12	(12)	19	98	10	72
M16	(16)	24	244	25	180
M20	(20)	30	476	48	352
M24	(24)	36	822	84	607
M30	(30)	46	1633	166	1205
M36	(36)	55	2854	291	2105

Note: All bolts used on JCB machines are high tensile and must not be replaced by bolts of a lesser tensile specification.

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Hydrostatic Transmission

Before carrying out any problem solving or any tests on the machine, make sure that the hydraulic system is filled to the correct level with the correct grade of hydraulic oil (see Section 3) and that the system is at the correct working temperature.

PROBLEM	CAUSE
No drive in any direction	1, 2, 4, 5, 10, 16, 22, 23, 24
No drive in either forward or reverse	6, 8, 11, 18, 24
No spin turn either left or right	3, 4, 5, 11, 16, 18, 21, 24
No drive on one side	5, 6, 9, 11, 18, 21, 22, 24
Machine will not travel in straight line	3, 8, 9, 11, 16, 18, 19, 20, 21
No brakes	13, 14, 15, 17
Brakes on all the time	12, 13, 14, 15, 17
No tractive effort	4, 5, 6
Machine creeps in neutral	7
Motor noisy (pulsing)	25
Motor noisy (continuous)	26
Transmission circuit overheating	27

KEY TO CAUSE		REMEDY	PAGE REF.
1	No oil in hydrostatic system	Check supply of oil to pump.	3/8-1
2	Restraint not in correct position	Ensure restraint is in operating position, check electrical wiring and switch as required.	Sect. C
3	Tyres worn or pressure incorrect	Check tyre pressures and condition.	3/9-2
4	Charge pressure incorrect	Charge pressure is controlled by the Priority Valve. Carry out flow check. Check that transmission pump charge valve is disabled.	E22-1
5	No or low pump output	Check pump - carry out wheel speed check. If one pump suspect, swop motor feed hoses and notice if problem changes sides - if 'yes', pump related fault; if 'no', motor related fault.	E10-5 E10-4
6	A high pressure 'loop' relief valve/tow valve open/set incorrectly	Replace relief valve and re-check.	E10-9
7	Pump neutral position set incorrectly	Adjust servo neutral position.	E10-7
* 8	Pump servos incorrectly set	Adjust servos - servo machines. Adjust linkage - manual machines	E10-6
9	Feed hose failure	Check motor feed hoses.	
10	No hydraulic feed to joystick	Check for feed to joystick.	E10-10
11	No hydraulic feed from joystick to pump	Check for feed from joystick to pump.	E10-10
12	Brake hose failure	Inspect brake hoses.	
13	Brake release pressure incorrect	Check charge/brake pressure.	E22-1

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Fluids, Capacities and Lubricants - Except North America

ITEM	CAPACITY	FLUID/LUBRICANT	SPECIFICATION
Engine Oil AR and AK Build	10.8 litres (2.4 UK gal)	**JCB High Performance 15W/40** -10 °C to 50 °C (14 °F to 122 °F) **JCB High Performance 10W/30** -15 °C to 40 °C (5 °F to 104 °F)	ACEA E2:B2:A2, API CF-4/SG API CF-4/SG
* **Engine Oil** RE and RG Build	10.5 litres (2.3 UK gal)	**JCB High Performance 15W/40** -10 °C to 50 °C (14 °F to 122 °F)	CG-4/SG
* **Hydraulic System**	26 litres (5.7 UK gal)	**JCB High Performance 10W/30** **JCB High Performance 15W/40** (top up only)	API CF-4/SG ACEA E2:B2:A2, API CF-4/SG
Cooling System **Total Coolant** **Antifreeze**	 15 litres (3.3 UK gal) 7.5 litres (1.7 UK gal)	**JCB Four Seasons Antifreeze & Summer Coolant/Water** (see ***Coolant Mixtures***)	ASTM D3306, BS6580
Fuel System	107 litres (23.5 UK gal)	Diesel oil (see ***Types of Fuel***)	ASTM D975-66T Nos. 1D, 2D
Grease Points	—	**JCB HP Grease** or **JCB Special MPL-EP Grease**	Lithium complex NLGI No. 2 consistency including extreme pressure additives. Lithium based NLGI No. 2 consistency including extreme pressure additives.
Chain Case - LH **Chain Case - RH**	10.8 litres (2.4 UK gal) 12.5 litres (2.8 UK gal)	Engine Oil	

Fluids, Capacities and Lubricants - North America

ITEM	CAPACITY	FLUID/LUBRICANT	SPECIFICATION
Engine Oil AR and AK Build	2.9 US gal (10.8 liters)	**JCB 15W/40 Engine Oil** -14 °F to 122 °F (10 °C to 50 °C) **JCB Engine Oil 10W/30** -4 °F to 50 °F (-20 °C to +10 °C)	CF-4/SG,SAE 15W 40 CF-4/SG, SAE 10W
* **Engine Oil** RE and RG Build	2.8 US gal(10.5 liters)	**JCB 15W/40 engine oil** -10 °C to 50 °C (14 °F to 122 °F)	CG-4/SG
* **Hydraulic System**	6.9 US gal (26 litres)	**JCB 30W** **JCB 15W/40** (top up only)	API CD/CE MIL-L-2104E
Cooling System **Total Coolant** **Antifreeze**	 4 US gal (15 liters) 2 US gal(7.5 liters)	**Permanent Antifreeze**	ASTM D3306-74
Fuel System	28.2 US gal (107 liters)	Diesel oil (see ***Types of Fuel***)	ASTM D975-66T Nos. 1D, 2D
Grease Points	—	**JCB MOLY EP #2 Grease**	Lithium based NLGI No. 2 consistency including extreme pressure additives.
Chain Case - LH **Chain Case - RH**	2.88 US gal (10.8 liters) 3.36 US gal (12.5 liters)	Engine Oil	API CE 15W 40 or API CC 10W 30

Note: New engines DO NOT require a running-in period. The engine/machine should be used in a normal work cycle immediately; glazing of the piston cylinder bores, resulting in excessive oil consumption, could occur if the engine is gently run-in. Under no circumstances should the engine be allowed to idle for extended periods; (e.g., warming up without a load). Engines of new machines are filled at the factory with JCB 10W/30 Multigrade oil. This oil should be drained after the first 100 hours operation and the engine filled with the appropriate recommended grade as shown in the lubrication chart. JCB 10W/30 Multigrade should also be used for the first 100 hours operation whenever a new or reconditioned engine is fitted to the machine. After the first 100 hours operation, it is essential that the 10W/30 oil is replaced by the lubricant recommended above.

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Service Schedules

Pre-start Cold Checks Service Points and Fluid Levels	100 Hr	250 Hr	500 Hr	1000 Hr	2000 Hr
ENGINE (Stopped)					
Engine and Pump Mount Security	O		☐	☐	☐
Engine Oil Level		☐	☐	☐	☐
Oil and Filter - Change (see note 1) AK and AR Build	O		☐	☐	☐
Oil and Filter - Change (see note 1) RE and RG Build			☐	☐	☐
Coolant Level and Antifreeze Strength	☐	☐	☐	☐	☐
Coolant - Change					☐
Air Cleaner Dust Valve - Clean		☐	☐	☐	☐
Air Cleaner Outer Element - Change (see note 2)			☐	☐	☐
Air Cleaner Inner Element - Change					☐
Valve Clearances-Check/Adjust				☐	☐
Fan Belt Tension/Condition	☐	☐	☐	☐	☐
Fuel Sedimentor - Drain	☐	☐	☐	☐	☐
Fuel Filter - Change AK and AR Build		☐	☐	☐	☐
Fuel Filter - Change RE and RG Build			☐	☐	☐
Radiator Hose - Condition	☐	☐	☐	☐	☐
Air Cleaner Hose Security	☐	☐	☐	☐	☐
Fuel System for Leaks and Contamination	☐	☐	☐	☐	☐
External Oil Leaks	☐	☐	☐	☐	☐
Clean Radiator Matrix	☐	☐	☐	☐	☐
TRANSMISSION					
Motor Bearing - Check					☐
Motor Mounting Bolts - Tightness	O		☐	☐	☐
Wheel Nut Security	☐	☐	☐	☐	☐
Wheel Hub Mounting Nuts - Tightness			☐	☐	☐
Tyre Pressures - (See Handbook)	☐	☐	☐	☐	☐
Drive Chain Case Oil Level - Check	O		☐	☐	
Drive Chain Case Oil - Change				☐	☐
Wheel Hub Bearing Clearance - Check					☐
Drive Chain Tension - Check and Adjust				☐	☐
HYDRAULICS					
Oil - Sample/Change (Clean Suction Strainer)*					☐
Oil Level	☐	☐	☐	☐	☐
Oil Filter(s) - Change	O		☐	☐	☐
Ram Piston Rods for Damage/Leaks	☐	☐	☐	☐	☐
Hoses - Damage or Leaks	☐	☐	☐	☐	☐
Pipework - Damage or Leaks	☐	☐	☐	☐	☐
Operation of Breather - Clean	☐	☐	☐	☐	☐
ELECTRICS					
Battery Electrolyte Level - Check (if applicable)			☐	☐	☐
Battery Charge Condition			☐	☐	☐
Battery Terminals for Condition and Tightness	☐	☐	☐	☐	☐
Wiring for Chafing	☐	☐	☐	☐	☐
BODY AND FRAMEWORK					
All Pivot Pins - Check and Grease	☐	☐	☐	☐	☐
All Hinges - Lubricate	☐	☐	☐	☐	☐
Throttle Controls and Linkages - Lubricate	☐	☐	☐	☐	☐
General Damage	☐	☐	☐	☐	☐
Seat Belt - Condition/Security	☐	☐	☐	☐	☐
Windscreen Washer Level (if fitted)	☐	☐	☐	☐	☐
Quickhitch Locking Peg Housings - Clean	☐	☐	☐	☐	☐
TRACK & RUNNING GEAR					
Track Tension - Check	☐	☐	☐	☐	☐
Track Roller Oil & Seals - Change*				☐	☐
Track Idler Wheel Oil & Seals - Change*				☐	☐
ATTACHMENTS					
Optional Equipment (as required) - Check		☐	☐	☐	☐

Functional Test and Final Inspection	100 Hr	250 Hr	500 Hr	1000 Hr	2000 Hr
ENGINE (Running)					
Idle Speed - Check/Adjust*	O			☐	☐
Max. No-load Speed-Check/Adjust*	O			☐	☐
Pulled Down Speed *	O			☐	☐
Exhaust System Security	O	☐	☐	☐	☐
Exhaust for Excessive Smoke		☐	☐	☐	☐
Coolant System for Leaks		☐	☐	☐	☐
Throttle System and Control Cable		☐	☐	☐	☐
TRANSMISSION					
Check Operation		☐	☐	☐	☐
Transmission Pressure - Check				☐	☐
HYDRAULICS					
Operation All Services		☐	☐	☐	☐
MRV Pressure - Check and Adjust				☐	☐
ARV Pressure - Check and Adjust				☐	☐
Control Isolation - Check		☐	☐	☐	☐
Hydraulic System - Leaks	☐	☐	☐	☐	☐
BRAKES					
Parking Brake - Operation	☐	☐	☐	☐	☐
ELECTRICS					
Starter Motor - Check		☐	☐	☐	☐
Alternator - Check		☐	☐	☐	☐
Gauges and Warning Lights - Check		☐	☐	☐	☐
Front Wiper Motor - Check (if fitted)		☐	☐	☐	☐
Cab Switches - Check Operation		☐	☐	☐	☐
Horn Operation	☐	☐	☐	☐	☐
Heater (if fitted)		☐	☐	☐	☐
Reverse Alarm (if fitted)	☐	☐	☐	☐	☐
Lights and Indicators (if fitted)	☐	☐	☐	☐	☐
Operate all Electrical Equipment		☐	☐	☐	☐
ATTACHMENTS					
Attachment Operation - Check		☐	☐	☐	☐
PAINTWORK					
Condition - See Diagram on Service/Inspection Report			☐	☐	☐
REGISTRATION/CERTIFICATE					
SWL Stickers (UK) - Renew as Required		☐	☐	☐	☐

Note 1: *We recommend that service procedures marked by an * be carried out by a recognised JCB distributor.*

Note 2: *Engine oil should be changed every 250 hours if machine is working in arduous applications.*

Note 3: *Air Cleaner Outer Element should be changed every 100 hours if machine is working in dusty conditions.*

Note 4: *Hydraulic Tank Breather should be changed more frequently if machine is working in dusty conditions.*

Key ☐ Routine Service
O First Service Only

9804/7320-2

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Removal

The engine and transmission pump should be removed as an assembly.

1 Position the machine on firm level ground. Fully lower the arm and stop the engine.

2 Open and remove the engine compartment top cover. Remove the rear grille. Remove the lower access plate.

3 Disconnect and remove the battery.

4 Drain the hydraulic tank. Drain the engine coolant and engine oil. Release the engine oil drain hose from its clip and tie it to the engine.

5 Disconnect the top and bottom hoses from the engine radiator. Disconnect and plug the hydraulic cooler hoses. Label the hoses to ensure correct reassembly.

6 Disconnect the wiring connection from the horn (if fitted).

7 Remove the cooler and radiator assembly.

8 Remove the cooler and radiator attachment frame.

9 Disconnect the exhaust silencer from the engine manifold.

10 Remove the coolant expansion bottle and earth wire.

11 Disconnect and remove the air filter assembly.

12 Disconnect the earthing strap from the engine.

13 Disconnect the throttle control at the fuel injection pump.

14 Clamp the fuel supply line then disconnect the line at the fuel filter, raise above the fuel level and tie securely. Remove the clamp.

15 On High-flow machines, disconnect the hoses from the High-flow pump on the left side of the engine. Label the hoses to ensure correct reassembly.

16 Remove the seat, seat base and pump cover.

17 Disconnect the engine harness from the mainframe harness at the main connector situated in front of the engine bulkhead on the right hand side. The engine harness will be removed with the engine assembly.

18 Disconnect and plug the hydraulic suction and delivery hoses at the transmission pump and gear pump. Label the hoses to ensure correct reassembly.

19 On servo machines, disconnect and plug the servo hoses at the pump. Label the hoses to ensure correct reassembly.
On manual machines, disconnect the link rods from the pump levers.

20 Attach slings to the engine lifting eyes.

⚠ WARNING

Lifting Equipment

You can be injured if you use faulty lifting equipment. Make sure that lifting equipment is in good condition. Make sure that lifting tackle complies with all local regulations and is suitable for the job. Make sure that lifting equipment is strong enough for the job.
INT-1-3-7

21 Take the weight of the engine on the hoist and remove the engine mounting bolts - two at the back and two at the front.

22 Withdraw the engine in a level attitude until the hydraulic pump is clear of the chassis. Raise the engine to lift it clear of the machine.

Note: The metalastic flexible mounts can be removed by removing their securing bolts.

continued

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Technical Data

AR and AK Engine Builds

	Robot 190	Robot 1110
Type	Perkins 1004-42AR (80hp) naturally aspirated	Perkins 1004-42AK (92hp) turbocharged
Build Number	AR50806	AK50805
Number of cylinders	4	4
Bore	103 mm (4.055 in)	100 mm (3.937 in)
Stroke	127 mm (5.00 in)	127 mm (5.00 in)
Swept Volume	4230 cm^3 (258 in^3)	4230 cm^3 (258 in^3)
Compression Ratio	18.5 : 1	18.5 : 1
Compression Pressure	25 - 35 bar (375 - 525 lbf/in^2)	25 - 35 bar (375 - 525 lbf/in^2)
Maximum variation between cylinders	3.5 bar (50 lbf/in^2)	3.5 bar (50 lbf/in^2)
Injection Sequence	1,3,4,2	1,3,4,2
* Valve Clearance - Hot or Cold		
* - Inlet	0.20 mm (0.008 in)	0.20 mm (0.008 in)
- Exhaust	0.45 mm (0.018 in)	0.45 mm (0.018 in)
Maximum Speed (no load)	2300-2400 rev/min	2300-2400 rev/min
* Governed Speed	2200 rev/min (see note)	2200 rev/min
Idling Speed	750-870 rev/min	880-940 rev/min

Note: 190 High-flow machines from serial no. 888056 are governed to 2100 rev/min.

Fuel System

Injection System Details - Refer to Engine Service Manual

Induction System

Air Cleaner Type	2 stage, dry element	2 stage, dry element
Maximum Restriction (at which warning light operates)	635 mm (25 in) H^2O	635 mm (25 in) H^2O

Lubrication System

Oil Pump Type	Eccentric Rotor	Eccentric Rotor
Oil Pressure (hot) at maximum speed	2.0 bar (30 lbf/in^2) (minimum)	2.6 bar (40 lbf/in^2) (minimum)

Cooling System

Coolant Pressure	0.48 bar (7 lbf/in^2)	0.48 bar (7 lbf/in^2)
Coolant Temperature (normal)	80 - 85 °C (176 - 185 °F)	80 - 85 °C (176 - 185 °F)
Temperature Warning Light operates at	98 °C (209 °F)	98 °C (209 °F)

Note: For further details of the engine refer to Engine Service Manual 9806/2140.

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Safety Notices

In this publication and on the machine there are safety notices. Each notice starts with a signal word. The signal word meanings are given below.

⚠ DANGER

Denotes an extreme hazard exists. If proper precautions are not taken, it is highly probable that the operator (or others) could be killed or seriously injured.
INT-1-2-1

⚠ WARNING

Denotes a hazard exists. If proper precautions are not taken, the operator (or others) could be killed or seriously injured.
INT-1-2-2

⚠ CAUTION

Denotes a reminder of safety practices. Failure to follow these safety practices could result in injury to the operator (or others) and possible damage to the machine.
INT-1-2-3

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