⚠ SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and decals on the machine itself to warn of the possibility of personal injury. Read these instructions carefully.
It is essential that you read the instructions and safety regulations before you attempt to repair or use this unit.

⚠ **DANGER : Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**

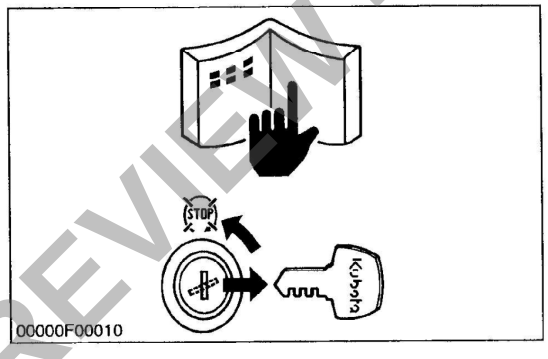
⚠ **WARNING : Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

⚠ **CAUTION : Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.**

■ **IMPORTANT : Indicates that equipment or property damage could result if instructions are not followed.**

■ **NOTE : Gives helpful information.**

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BEFORE SERVICING AND REPAIRING

(1) Read all instructions and safety instructions in this manual and on your machine safety decals.
(2) Clean the work area and machine.
(3) Park the machine on a firm and level ground, and set the parking brake.
(4) Lower the implement to the ground.
(5) Stop the engine, and remove the key.
(6) Disconnect the battery negative cable.
(7) Hang a **"DO NOT OPERATE"** tag in operator station.

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SPECIFICATIONS

Model			M-90	M-110		M-120	
			4WD	2WD	4WD	2WD	4WD
PTO power (Factory observed)			52.6 kW (70.5 HP, 2400 rpm)	65.6 kW (88 HP, 2400rpm)		73 kW (98 HP, 2400 rpm)	
Engine	Model		V4702-TL	F5802-TEI		F5802-TE	
	Type		Direct injection, W / wastegate turbocharger, water-cooled 4 cycle diesel				
	No. of cylinders		4	5			
	Total displacement		4665 cm^3 (284.7 cu.in.)	5832 cm^3 (335.9 cu.in.)			
	Bore and stroke		109 × 125 mm (4.3 × 4.9 in.)				
	Engine rated output		66.2 kW (88.7 HP)	82.06 kW (110 HP)		89.52 kW (120 HP)	
	Rated revolution		2400 rpm				
	Maximum torque		335 N·m (34 kgf·m, 247 ft-lbs) / 1200 rpm	442 N·m (43.0 kgf·m, 311.2 ft-lbs) / 1200 rpm		461 N·m (47.0 kgf·m, 339.9 ft-lbs) / 1200 rpm	
	Battery		12 V, RC: 270 mm, CCA 916A	12 V, RC: 304 mm, CCA 1045A			
	Fuel		Diesel fuel No. 1-D [below –10 °C (14 °F)] Diesel fuel No. 2-D [above –10 °C (14 °F)]				
	Fuel tank capacity		150 L (39.7 U.S.gals., 33 Imp.gals.)			200 L (52.9 U.S.gals., 44 Imp.gals.)	
	Engine crankcase capacity		16.3 L (17.2 U.S.qts., 14.3 Imp.qts.)	20.8 L (22.0 U.S.qts., 18.3 Imp.qts.)			
	Engine coolant capacity		12.0 L (12.7 U.S.qts., 10.6 Imp.qts.)	13 L (3.4 U.S.qts., 2.86 Imp.qts.)			
Dimensions	Overall length		3930 mm (154.7 in.)	4097 mm (161.3 in.)	4223 mm (166.3 in.)	4238 mm (166.9 in.)	4365 mm (171.9 in.)
	Overall width (Minimum tread)		1970 mm (77.6 in.)	2181 mm (85.9 in.)		2195 mm (86.4 in.)	
	Overall height (with ROPS)		2650 mm (100.8 in.)	2685 mm (105.7 in.)		2725 mm (107.3 in.)	
	Wheel base		2300 mm (90.6 in.)	2945 mm (98.2 in.)	2510 mm (98.8 in.)	2635 mm (103.7 in.)	2690 mm (105.9 in.)
	Tread	Front	1530 mm (60.2 in.)	1520 to 2120 mm (59.8 to 83.5 in.)	1530 mm (60.2 in.) 1660 mm (63.8 in.)	1520 to 2120 mm (59.8 to 83.5 in.)	1640 mm (64.6 in.) 1740 mm (68.5 in.)
		Rear	1510 to 1990 mm (59.4 to 78.3 in.)	1520 to 2020 mm (59.8 to 79.5 in.)		1550 to 2110 mm (61.0 to 83.1 in.)	
	Minimum ground clearance		570 mm (22.4 in.)	510 mm (20.1 in.)	590 mm (23.2 in.)	560 mm (22.0 in.)	615 mm (24.2 in.)
Weight (Std.)			3650 kg (8048 lbs)	3900 kg (8598 lbs)	4200 kg (9259 lbs)	4100 kg (9040 lbs)	4400 kg (9700 lbs)
Travelling system	Standard tire size	Front	12.4 - 24	10.6 - 16	13.6 - 24	11.0 - 16	14.9 - 24
		Rear	16.9R - 34	18.4R - 34		18.4R - 38	
	Clutch		Multiple wet disc, electronic hydraulically operated				
	Steering		Full hydrostatic power steering				
	Transmission		Power shift, electronic shuttle, 16F / 16R (with creep speed 24F / 24R)				
	Brake	Travelling	Wet type, multiple discs (hydraulic)				
		Parking	Wet discs (mechanical)				
	Differential		Bevel gears (with differential lock (hydraulic))				

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GENERAL

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[7] MAINTENANCE

No.	Item	Period	Indication on hour meter																Since then every		Reference page
			50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800			
1	Engine oil	Change	★					☆						☆					300 Hr		G-15
2	Engine oil filter	Replace	★											☆					600 Hr		G-16
3	Fuel filter	Replace								☆								☆	400 Hr	@	G-29
4	Transmission fluid	Change	★											☆					600 Hr		G-17
5	Front differential case oil	Change	★											☆					600 Hr		G-18
6	Front axle gear case oil	Change	★											☆					600 Hr		G-18
7	Hydraulic oil filter (Suction side)	Replace	★			☆				☆				☆				☆	200 Hr		G-16
8	Hydraulic oil filter (Return side)	Replace	★			☆				☆				☆				☆	200 Hr		G-17
9	Engine start system	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	50 Hr		G-19
10	Wheel bolt torque	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	50 Hr		G-20
11	Wire harness, battery cable	Check	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	☆	50 Hr		–
12	Battery condition	Check		☆		☆		☆		☆		☆		☆		☆		☆	100 Hr		G-20
13	Greasing	–		☆		☆		☆		☆		☆		☆		☆		☆	100 Hr		G-25
14	Fan belt	Adjust		☆		☆		☆		☆		☆		☆		☆		☆	100 Hr		G-22
15	Brake pedal	Adjust		☆		☆		☆		☆		☆		☆		☆		☆	100 Hr		G-23
16	Parking brake lever	Adjust		☆		☆		☆		☆		☆		☆		☆		☆	100 Hr		G-24
17	Fuel line	Check		☆		☆		☆		☆		☆		☆		☆		☆	100 Hr *	@	G-24
		Replace																	2 years **		G-24
18	Air cleaner element [Double type]	Primary element: Clean		☆		☆		☆		☆		☆		☆		☆		☆	100 Hr	@	G-22
		Primary element: Replace																	1 year		G-22
		Secondary element: Replace																	1 year		G-22
19	Toe-in	Adjust				☆				☆				☆				☆	200 Hr		G-26
20	Power steering oil line	Check				☆				☆				☆				☆	200 Hr		G-27
		Replace																	2 years ***		G-27
21	Radiator hose and clamp	Check				☆				☆				☆				☆	200 Hr		G-27
		Replace																	2 years ***		G-27
22	Fuel tank water	Drain				☆				☆				☆				☆	200 Hr		G-30
23	Brake oil	Change												☆					600 Hr		G-30
24	Front axle pivot	Adjust												☆					600 Hr		G-31
25	Engine valve clearance	Adjust																☆	800 Hr		G-28
26	Intake air line	Check				☆				☆				☆				☆	200 Hr	@	G-28
		Replace																	2 years ***		G-28
27	Greasing (2WD front wheel hub)	–								☆								☆	400 Hr		G-29
28	Fuel injection nozzle injection pressure	Check																	1500 Hr	@	E1-S50 1-S51
29	Turbo charger	Check																	3000 Hr	@	E1-S52 1-S52
30	Injection pump	Check																	3000 Hr	@	E1-S23 1-S29
31	Fuel injection timer	Check																	3000 Hr	@	1-S29
32	Intake air heater	Check																	3000 Hr	@	9-S14
33	Cooling system	Flush																	2 years		G-33, 34
34	Coolant	Change																	2 years		G-33, 34

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[8] CHECK AND MAINTENANCE

CAUTION

- **Be sure to check and service the tractor on a flat place with engine shut off, the parking brake on and chock the wheels.**

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(1) Daily Check

To prevent trouble from occurring, it is important to know the condition of the tractor. Check the following items before starting.

- Check areas where previous trouble was experienced.
- Walk around the tractor.

1) Check the tire pressure, and check wear and damage.
2) Check the bolts and nuts of the tires are tight.
3) Check water separator.
4) Check for oil and water leaks.
5) Check the engine oil level.
6) Check the transmission fluid level.
7) Check the brake oil level.
8) Check and clean the radiator screen and grille.
9) Check and clean the precleaner if equipped.
10) Check the evacuator valve.
11) Check the number plate or SMV emblem for damage and cleaner replace as necessary if equipped.
12) Care of danger, warning and caution labels.
13) Clean around the exhaust manifold and the muffler of the engine.
14) Check and clean head lights, tail lights, flasher lights and hazard lights.

- While sitting in the operator's seat.

1) Check the throttle pedal, brake pedals.
2) Check the parking brake.
3) Check the steering wheel.

- Turning the key switch.

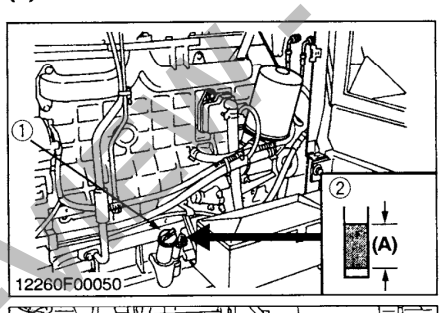
1) Check the performance of the Easy Checker lights.
2) Check head lights, tail lights, flasher lights and hazard lights.
   Clean if necessary.
3) Check the performance of the meters and gauges.

- Starting the engine.

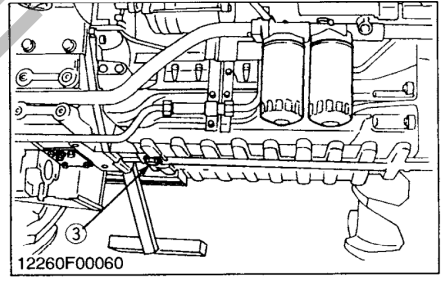
1) Check to see that the lights on the Easy Checker go off.
2) Check the color of the exhaust.
3) Check the brakes for proper operation.

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(2) Check Points of Initial 50 Hours



12260F00050



12260F00060

Changing Engine Oil

CAUTION

- **Before changing oil, be sure to stop the engine.**
- **Allow engine to cool down sufficiently, oil can be hot and can burn.**

1. To drain the used oil, remove the drain plug at the bottom of the engine and drain the oil completely into the oil pan.
   All the used oil can be drained out easily when the engine is still warm.
2. After draining reinstall the drain plug.
3. Fill with the new oil up to the upper notch on the dipstick.
   Refer to **"LUBRICANTS, FUEL AND COOLING WATER"**. (See page G-9.)

Oil capacity with filter	M-90	16.3 L 17.2 U.S.qts. 14.3 Imp.qts.
	M-110 M-120	20.8 L 22.0 U.S.qts. 18.3 Imp.qts.

(1) Oil Inlet
(2) Dipstick
(3) Drain Plug

(A) Oil level is acceptable within this range.

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[5] LUBRICANTS, FUEL AND COOLING WATER

	Place	Capacity			Lubricants, fuel and cooling water
		M-90	M-110	M-120	
1	Fuel	150 L 39.6 U.S.gals. 33 Imp.gals.		200 L 52.8 U.S.gals. 44 Imp.gals.	No. 2-D diesel fuel No. 1-D diesel fuel if temperature is below –10 °C (14 °F)
2	Coolant (Engine block radiator)	12.0 L 12.7 U.S.qts. 10.6 Imp.qts.	13.0 L 13.7 U.S.qts. 11.4 Imp.qts.		Fresh clean water with anti-freeze
	Coolant (Reserve tank)	1.5 L 1.6 U.S.qts. 1.3 Imp.qts.			
3	Engine crankcase	16.3 L 17.2 U.S.qts. 14.3 Imp.qts.	20.8 L 22.0 U.S.qts. 18.3 Imp.qts.		Engine oil : API Service Classification CD Below –23 °C (–10 °F): ..... SAE5W or 5W-30 –23 to 0 °C (–10 to 32 °F) ..... SAE10W or 10W-30 0 to 25 °C (32 to 77 °F) ..... SAE20 or 10W-30 Above 25 °C (77 °F) ..... SAE30 or 10W-30
4	Transmission case	55 L 58.1 U.S.qts. 48.4 Imp.qts.		58 L 61.3 U.S.qts. 51.0 Imp.qts.	KUBOTA UDT or SUPER UDT fluid*
5	Front axle differential case	6 L 6.3 U.S.qts. 5.3 Imp.qts.	7 L 7.4 U.S.qts. 6.2 Imp.qts.	12 L 12.7 U.S.qts. 10.6 Imp.qts.	KUBOTA UDT or SUPER UDT fluid* or SAE80, SAE90 gear oil
6	Front axle gear case for each side	3.5 L 3.7 U.S.qts. 3.1 Imp.qts.		4.6 L 4.9 U.S.qts. 4.0 Imp.qts.	
7	Brake oil	0.3 L 0.3 U.S.qts. 0.3 Imp.qts.			KUBOTA UDT or SUPER UDT fluid* or Turbine oil 32 (See below) regular type, multipurpose straight mineral oil Mobil DTE Oil #32 TEXACO Regal Oil #32 CHEVRON-GST Oil #32 TERESSO Oil #32 Never use automotive brake oil
8	Washer liquid	1.3 L 1.4 U.S.qts. 1.1 Imp.qts.			Automobil washer liquid

* KUBOTA original transmission hydraulic fluid.

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[6] TIGHTENING TORQUES

(1) General Use Screws, Bolts and Nuts

Screws, bolts and nuts whose tightening torques are not specified in this Workshop Manual should be tightened according to the table below.

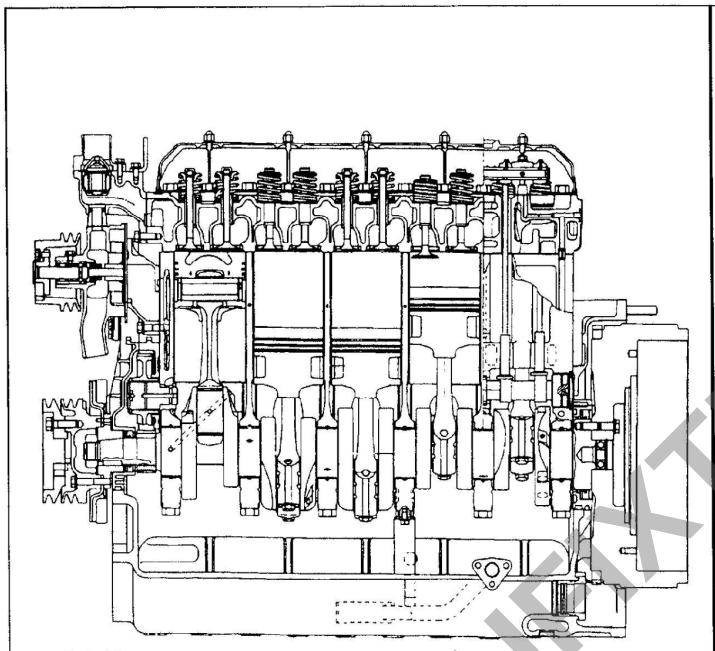
Indication on top of bolt	⟨4⟩ No-grade or 4T						⟨7⟩ 7T						⟨9⟩ 9T		
Material of bolt	SS400, S20C						S43C, S48C						SCr435, SCM435		
Material of opponent part	Ordinariness			Aluminum			Ordinariness			Aluminum			Ordinariness		
Diameter	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs	N·m	kgf·m	ft-lbs
M6 (6 mm, 0.24 in.)	7.84 to 9.31	0.80 to 0.95	5.79 to 6.87	7.84 to 8.83	0.80 to 0.90	5.79 to 6.51	9.80 to 11.2	1.00 to 1.15	7.24 to 8.32	7.84 to 8.83	0.80 to 0.90	5.79 to 6.51	12.3 to 14.2	1.25 to 1.45	9.05 to 10.5
M8 (8 mm, 0.31 in.)	17.7 to 20.5	1.8 to 2.1	13.0 to 15.2	16.7 to 19.6	1.7 to 2.0	12.3 to 14.5	23.6 to 27.4	2.4 to 2.8	17.4 to 20.2	17.7 to 20.6	1.8 to 2.1	13.0 to 15.2	29.4 to 34.3	3.0 to 3.5	21.7 to 25.3
M10 (10 mm, 0.39 in.)	39.2 to 45.0	4.0 to 4.6	29.0 to 33.2	31.4 to 34.3	3.2 to 3.5	23.1 to 25.3	48.1 to 55.8	4.9 to 5.7	35.5 to 41.2	39.2 to 44.1	4.0 to 4.5	28.9 to 32.5	60.8 to 70.5	6.2 to 7.2	44.9 to 52.1
M12 (12 mm, 0.47 in.)	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5				77.5 to 90.1	7.9 to 9.2	57.2 to 66.5	62.8 to 72.5	6.4 to 7.4	46.3 to 53.5	103 to 117	10.5 to 12.0	76.0 to 86.8
M14 (14 mm, 0.55 in.)	108 to 125	11.0 to 12.8	79.6 to 92.5				124 to 147	12.6 to 15.0	91.2 to 108				167 to 196	17.0 to 20.0	123 to 144
M16 (16 mm, 0.63 in.)	167 to 191	17.0 to 19.5	123 to 141				196 to 225	20.0 to 23.0	145 to 166				260 to 303	26.5 to 31.0	192 to 224
M18 (18 mm, 0.71 in.)	245 to 284	25.0 to 29.0	181 to 210				275 to 318	28.0 to 32.5	203 to 235				343 to 401	35.0 to 41.0	254 to 297
M20 (20 mm, 0.79 in.)	334 to 392	34.0 to 40.0	246 to 289				368 to 431	37.5 to 44.0	272 to 318				490 to 568	50.0 to 58.0	362 to 420

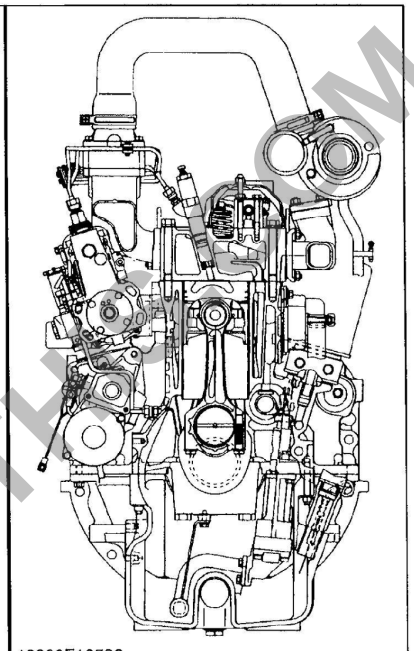
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[1] FEATURES


12260F10520


12260F10530

The F5802-TE1 and F5802-TE are vertical, water-cooled, 4-cycle diesel engines. In these engines are incorporated Kubota's most advanced technologies.

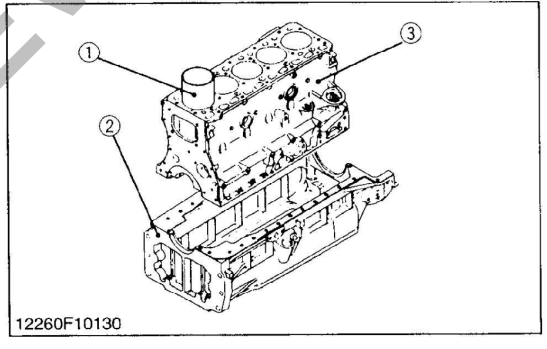
In particular, these engines meet the current US Environmental Protection Agency regulations for the purpose of preserving the earth's environment. Here are the key features.

1. The reentrant type combustion chamber improves the burning efficiency to satisfy the emission control requirements. The exhaust gas generated during operation can be rendered invisible.
2. A large mechanical timer optimizes the dynamic injection time to achieve better fuel economy and cleaner exhaust.
3. The series PE-AD high-pressure injection pump is durable and easy to maintain.
4. The suction port is designed to give optimum swirling for uniform air mixture.
5. The PTC intake heater upgrades the starting performance in cold regions.

12260M10010

[2] ENGINE BODY

(1) Cylinder Block



12260F10130

The cylinder block is made of cast iron, containing dry liners.

The crankshaft is supported by the crankshaft bearings and the bearing cases.

Furthermore, dry-type cylinder liners pressed into the cylinders allow effective cooling, less distortion and greater wear-resistance.

(1) Cylinder Liner
(2) Oil Pan
(3) Crank Case

12260M10020

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SERVICING SPECIFICATIONS

ENGINE BODY

Item		Factory Specification	Allowable Limit
Cylinder Head Surface	Flatness	–	0.05 mm / 100 mm 0.0020 in. / 3.94 in.
Compression Pressure (When Cranking with Starting Motor)		2.94 MPa 30 kgf/cm^2 427 psi	2.16 MPa 22 kgf/cm^2 313 psi
Difference among Cylinders		within 10 %	–
Top Clearance		0.75 to 0.95 mm 0.030 to 0.037 in.	–
Cylinder Head Gasket Shim	Thickness	0.20 mm 0.0079 in.	–
Cylinder Head Gasket	Thickness (Free)	1.53 to 1.66 mm 0.0602 to 0.0654 in.	–
	Thickness (Tightened)	1.30 to 1.40 mm 0.0512 to 0.0551 in.	–
Valve Timing (Intake Valve)	Open	0.1047 rad. 6° before T.D.C.	–
	Close	0.4536 rad. 26° after B.D.C.	–
Valve Timing (Exhaust Valve)	Open	0.8461 rad. 48°30′ before B.D.C.	–
	Close	0.1047 rad. 6° after T.D.C.	–
Valve Clearance (When Cold)		0.25 mm 0.0098 in.	–
Valve Recessing (Intake)		0.8 to 1.2 mm 0.032 to 0.047 in.	1.4 mm 0.055 in.
Valve Recessing (Exhaust)		0.7 to 1.1 mm 0.028 to 0.043 in.	1.4 mm 0.055 in.
Valve Seat	Angle (Intake)	1.047 rad. 60°	–
	Angle (Exhaust)	0.785 rad. 45°	–
Valve Face	Angle (Intake)	1.056 rad. 60.5°	–
	Angle (Exhaust)	0.794 rad. 45.5°	–

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TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	• No fuel	Replenish fuel	G-9
	• Air in the fuel system	Bleed air	E1-S50
	• Water in the fuel system	Change fuel and repair or flush fuel system	–
	• Fuel pipe clogged	Clean	–
	• Fuel line filter clogged	Clean	–
	• Fuel filter clogged	Replace	G-29
	• Excessively high viscosity of fuel or engine oil at low temperature	Use the specified fuel or engine oil	G-9
	• Fuel with low cetane number	Use the specified fuel	G-9
	• Fuel leak due to loose injection pipe retaining nut	Tighten nut	E1-S18, S21
	• Incorrect injection timing	Adjust	E1-S23
	• Injection nozzle clogged	Clean	E1-S50
	• Injection pump malfunctioning	Repair or replace	E1-S23
	• Fuel feed pump malfunctioning	Repair or replace	–
	• Seizure of crankshaft, camshaft, piston, cylinder liner or bearing	Repair or replace	E1-S30 to S32, S38 to S45
	• Compression leak from cylinder	Replace head gasket, tighten cylinder head screws, glow plug and nozzle holder	E1-S19, S21
	• Improper valve seat alignment, valve spring broken, valve seized	Repair or replace	E1-S34, S35
	• Improper valve timing	Correct or replace timing gear	E1-S28
	• Piston ring and liner worn	Replace	E1-S31, S40, S45
	• Excessive valve clearance	Adjust	E1-S20
(Starter Does Not Run)	• Battery discharged	Charge	9-S8
	• Starter malfunctioning	Repair or replace	9-S14
	• Starter relay defective	Replace	9-S11
	• Main switch defective	Repair or replace	9-S10
	• Wiring disconnected	Connect	–
Engine Revolution Is Not Smoothly	• Fuel line filter dirt	Clean	–
	• Fuel filter clogged	Replace	G-29
	• Air cleaner clogged	Clean or replace	G-22
	• Fuel leak due to loose injection pipe retaining nut	Tighten nut	–
	• Injection pump malfunctioning	Repair or replace	E1-S23
	• Incorrect nozzle opening pressure	Adjust	E1-S50
	• Injection nozzle stuck or clogged	Repair or replace	E1-S50
	• Fuel over flow pipe clogged	Clean	–
	• Governor malfunctioning	Repair	–

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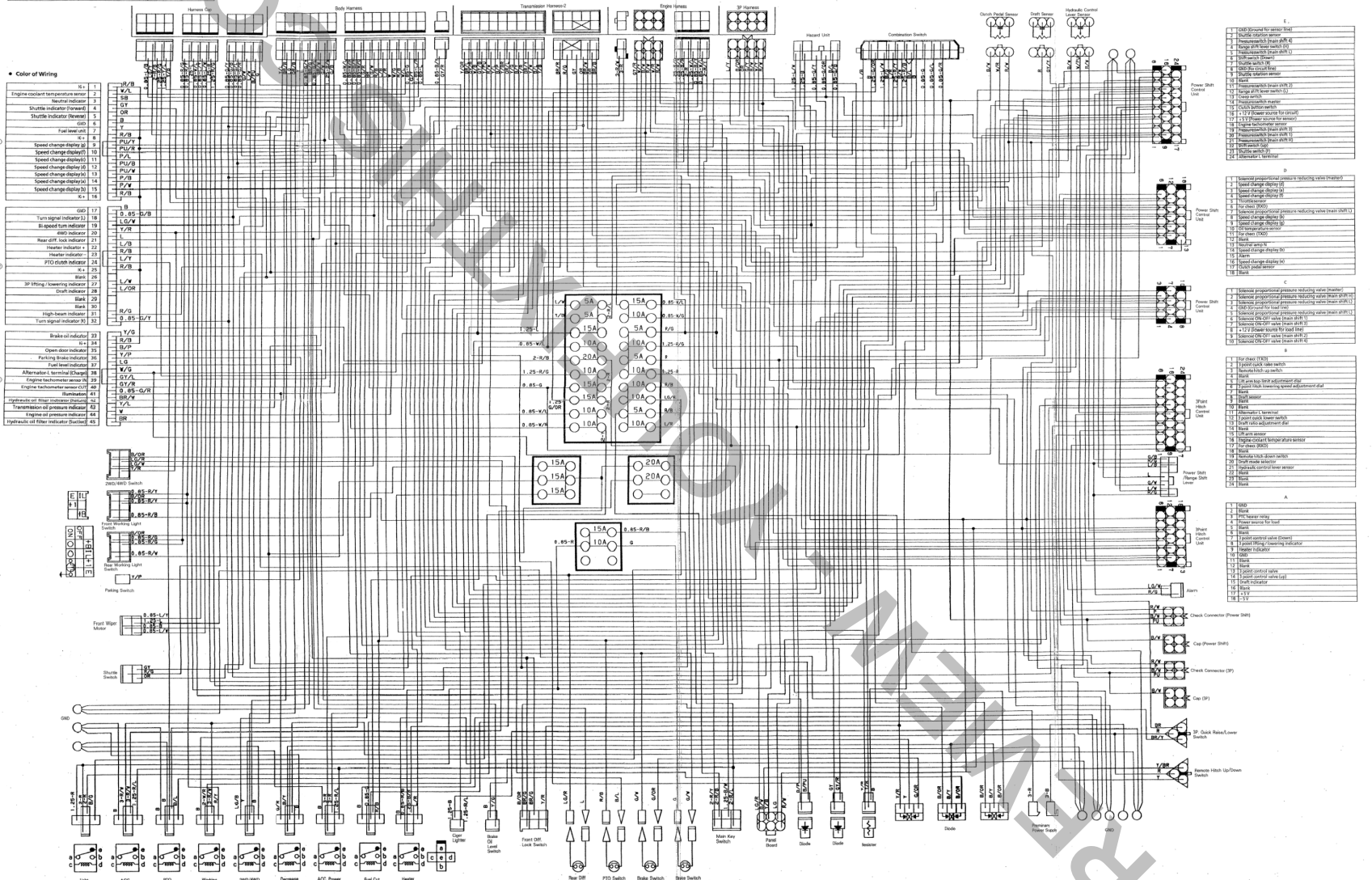
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(1) Wiring Diagram

• Color of Wiring

B ——— Black	Lg ——— Light Green	BY ——— Black / Yellow	GY ——— Green / Yellow		
W ——— White	WB ——— White / Black	BrB ——— Brown / Black	YR ——— Yellow / Red		
R ——— Red	WR ——— White / Red	RB ——— Red / Black	YB ——— Yellow / Black		
G ——— Green	WG ——— White / Green	RW ——— Red / White	YG ——— Yellow / Green		
Or ——— Orange	BL ——— Black / Blue	RY ——— Red / Yellow	GW ——— Blue / White		
Y ——— Yellow	BG ——— Black / Green	GB ——— Green / Black	LR ——— Blue / Red		
Br ——— Brown	BR ——— Black / Red	GW ——— Green / White	OrW ——— Orange / White		
L ——— Blue	BW ——— Black / White	GR ——— Green / Red			



• Color of Wiring

①	IG+	1
	Engine coolant temperature sensor	2
	Neutral indicator	3
	Shuttle indicator (forward)	4
	Shuttle indicator (Reverse)	5
	GND	6
	Fuel level unit	7
	IG+	8
	Speed change display (g)	9
	Speed change display(f)	10
	Speed change display(c)	11
	Speed change display (d)	12
	Speed change display (e)	13
	Speed change display (a)	14
	Speed change display (b)	15
	IG+	16
	GND	17
	Turn signal indicator (L)	18
	Bi-speed turn indicator	19
	4WD indicator	20
	Rear diff. lock indicator	21
	Heater indicator +	22
	Heater indicator −	23
②	PTO clutch indicator	24
	IG+	25
	Blank	26
	3P lifting / lowering indicator	27
	Draft indicator	28
	Blank	29
	Blank	30
	High-beam indicator	31
	Turn signal indicator (R)	32
③	Brake oil indicator	33
	IG+	34
	Open door indicator	35
	Parking Brake indicator	36
	Fuel level indicator	37
	Alternator-L terminal (Charge)	38
	Engine tachometer sensor IN	39
	Engine tachometer sensor OUT	40
	Illumination	41
	Hydraulic oil filter indicator (Return)	42
	Transmission oil pressure indicator	43
	Engine oil pressure indicator	44
	Hydraulic oil filter indicator (Suction)	45

E	1	GND (Ground for sensor line)
	2	Shuttle intertion sensor
	3	Pressureswitch (main shift 4)
	4	Range shift lever switch (H)
	5	Pressureswitch (main shift L)
	6	Shift switch (Down)
	7	Shuttle switch (R)
	8	GND (for circuit line)
	9	Shuttle rotation sensor
	10	Blank
	11	Pressureswitch (main shift 2)
	12	Range shift lever switch (L)
	13	Creep switch
	14	Pressureswitch master
	15	Clutch button switch
	16	+ 12 V (Power source for circuit)
	17	+ 5 V (Power source for sensor)
	18	Engine tachometer sensor
	19	Pressureswitch (main shift 3)
	20	Pressureswitch (main shift 1)
	21	Pressureswitch (main shift H)
	22	Shift switch (up)
	23	Shuttle switch (F)
	24	Alternator-L terminal

D	1	Solenoid proportional pressure reducing valve (master)
	2	Speed change display (c)
	3	Speed change display (e)
	4	Speed change display (f)
	5	Thoticsensor
	6	For check (RXO)
	7	Solenoid proportional pressure reducing valve (main shift L)
	8	Speed change display (b)
	9	Speed change display (g)
	10	Oil temperature sensor
	11	For check (TXO)
	12	Blank
	13	Neutral amp N
	14	Speed change display (a)
	15	Alarm
	16	Speed change display (e)
	17	Clutch pedal sensor
	18	Blank

C	1	Solenoid proportional pressure reducing valve (master)
	2	Solenoid proportional pressure reducing valve (main shift H)
	3	Solenoid proportional pressure reducing valve (main shift L)
	4	GND (Ground for load line)
	5	Solenoid proportional pressure reducing valve (main shift L)
	6	Solenoid ON-OFF valve (main shift 1)
	7	Solenoid ON-OFF valve (main shift 3)
	8	+ 12 V (Power source for load line)
	9	Solenoid ON-OFF valve (main shift 2)
	10	Solenoid ON-OFF valve (main shift 4)

B	1	For check (TXO)
	2	3 point quick raise switch
	3	Remote hitch up switch
	4	Blank
	5	Lift arm top limit adjustment dial
	6	3 point hitch lowering speed adjustment dial
	7	Blank
	8	Draft sensor
	9	Blank
	10	Blank
	11	Alternator L terminal
	12	3 point quick lower switch
	13	Draft ratio adjustment dial
	14	Blank
	15	Lift arm sensor
	16	Engine coolant temperature sensor
	17	For check (RXO)
	18	Blank
	19	Remote hitch down switch
	20	Draft mode selector
	21	Hydraulic control lever sensor
	22	Blank
	23	Blank
	24	Blank

A	1	GND
	2	Blank
	3	PTC heater relay
	4	Power source for load
	5	Blank
	6	Blank
	7	3 point control valve (Down)
	8	3 point lifting / lowering indicator
	9	Heater indicator
	10	GND
	11	Blank
	12	Blank
	13	3 point control valve
	14	3 point control valve (up)
	15	Draft indicator
	16	+ 5 V
	17	+ 5 V
	18	+ 5 V

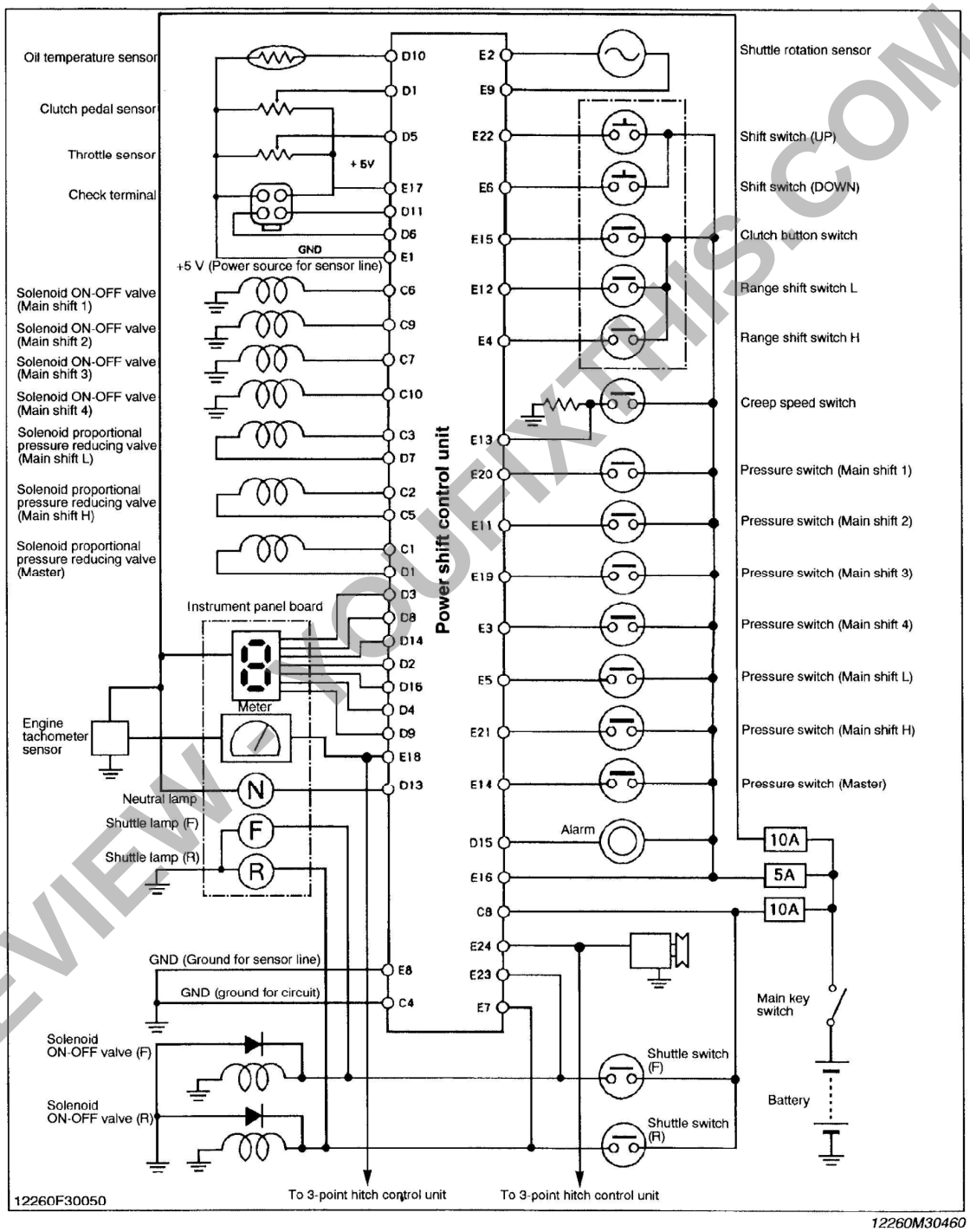
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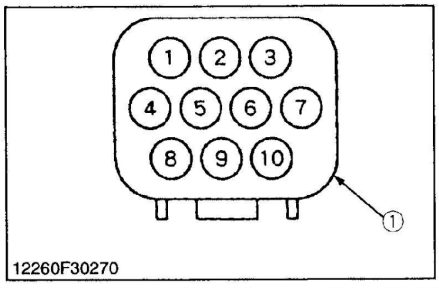
[3] ELECTRICAL SYSTEM

(1) Electrical Circuit of Power Shift

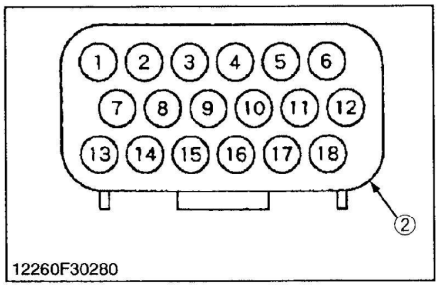


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12260F30270



12260F30280

Arrangement of Micro Computer Connector Pin

1) CNT-C

No.	Color of Wiring	Terminal Name
1	Orange / Blue	Solenoid proportional pressure reducing valve (master)
2	Brown / Blue	Solenoid proportional pressure reducing valve (main shift H)
3	Brown / Yellow	Solenoid proportional pressure reducing valve (main shift L)
4	Black	GND (Ground for load line)
5	Black / Blue	Solenoid proportional pressure reducing valve (main shift L)
6	Brown / Black	Solenoid ON-OFF valve (main shift 1)
7	Brown / Red	Solenoid ON-OFF valve (main shift 3)
8	Red / Green	+ 12 V (Load line power source)
9	Brown / White	Solenoid ON-OFF valve (main shift 2)
10	Brown / Green	Dolenoid ON-OFF valve (main shift 4)

2) CNT-D

No.	Color of Wiring	Terminal Name
1	Black / Pink	Solenoid proportional pressure reducing valve (master)
2	Purple / Black	Speed change display (d)
3	Pink / Black	Speed change display (a)
4	Purple / Red	Speed change display (f)
5	White / Yellow	Throttle sensor
6	Purple	For check
7	Black / Yellow	Solenoid proportional pressure reducing valve (main shift L)
8	Pink / White	Speed change display (b)
9	Purple / Yellow	Speed change display (g)
10	White / Black	Oil temperature sensor
11	Pink	For check
12	–	Blank
13	Light blue	Neutral lamp
14	Pink / Blue	Speed change display (c)
15	Light green / White	Buzzer
16	Purple / White	Speed change display (e)
17	White / Red	Clutch pedal sensor
18	–	Blank

(1) CNT-C Connector (2) CNT-D Connector

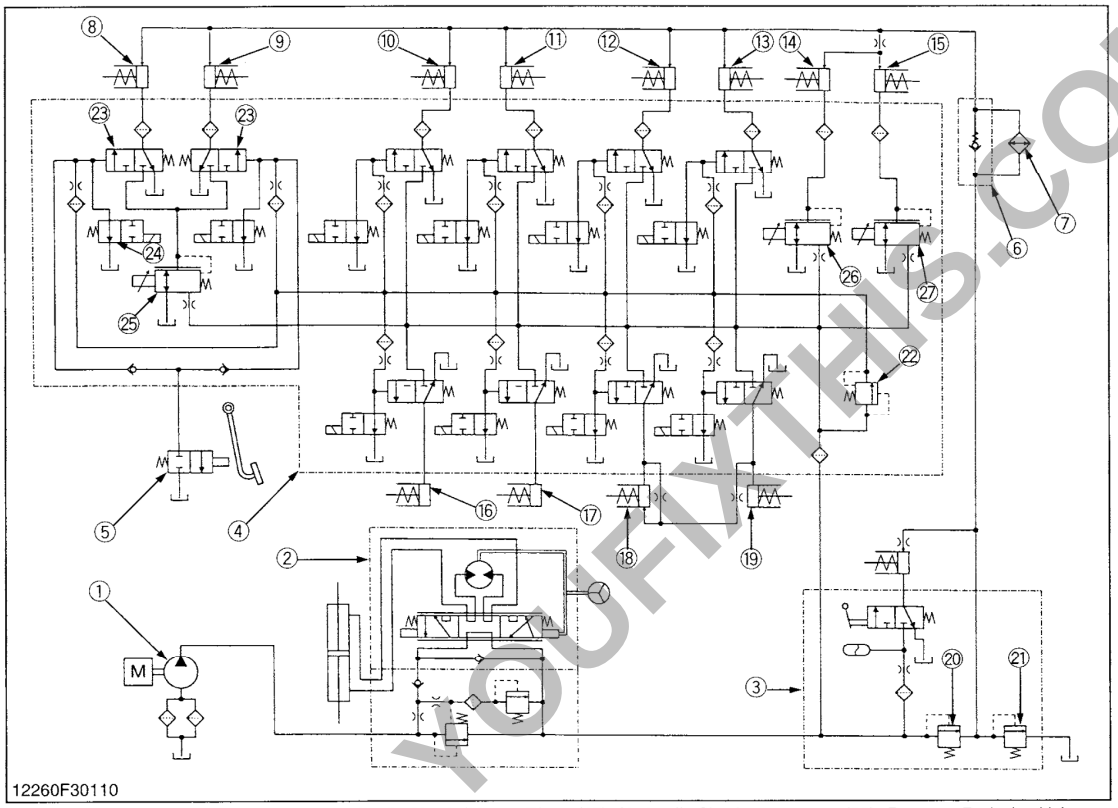
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[4] HYDRAULIC SYSTEM

(1) Hydraulic Circuit



(1) Hydraulic Oil Pump
- 2WD : Single Pump
- 4WD : Tandem Pump

(2) Steering Controller
(3) PTO Clutch Valve
(4) Power Shift Valve
(5) Safety Valve
(6) Check Valve
(7) Oil Cooler
(8) Hydraulic Clutch (Master **F**)
(9) Hydraulic Clutch (Master **R**)
(10) Hydraulic Clutch (Main Shift **1**)
(11) Hydraulic Clutch (Main Shift **2**)
(12) Hydrualic Clutch (Main Shift **3**)
(13) Hydraulic Clutch (Main Shift **4**)
(14) Hydraulic Clutch (Main Shift **L**)
(15) Hydraulic Clutch (Main Shift **H**)
(16) Hydraulic Clutch (Front Differential Lock)
(17) Hydraulic Clutch (Rear Differential Lock)
(18) Hydraulic Clutch (4WD)
(19) Hydraulic Clutch (Bi-speed Turn)
(20) Relief Valve (System Pressure)
(21) Relief Valve (Lubricating Oil Pressure)
(22) Pressure Reducing Valve (Pilot Pressure)
(23) Main Spool
(24) Solenoid **ON / OFF** Valve
(25) Solenoid Proportional Reducing Valve (**F-R**)
(26) Solenoid Proportional Reducing Valve (**L**)
(27) Solenoid Proportional Reducing Valve (**H**)

The figure above shows the oil pressure circuit diagram of power shift system.

The hydraulic oil coming out of the hydraulic oil pump (1) passes through the steering controller (2) and enters the PTO clutch valve (3). Here, its pressure is regulated to 2.01 to 2.30 MPa (20.5 to 23.5 kgf/cm^2, 291.5 to 333.5 psi) by means of the system pressure relief valve (20) and then it is sent to the power shift valve (4). In the power shift valve, the oil flow channel and the oil pressure are controlled by the main spool (23), solenoid **ON** / **OFF** valve (24) and solenoid operated proportional reducing valve (25) and sent to hydraulic clutches.

In the power shift valve, this value 2.01 to 2.30 MPa (20.5 to 23.5 kgf/cm2, 291.5 to 333.5 psi) is used as hydraulic clutch operating pressure. As the pilot pressure for operating main spools, this pressure is also used after having been reduced to 0.78 MPa (8 kgf/cm^2), 113.8 psi by the pressure reducing valve (22).

In the PTO clutch valve is provided a lubricating oil relief valve (21) to reduce the oil pressure to 0.2 to 1.18 MPa (2 to 12 kgf/cm^2, 28.4 to 170.7 psi) for lubrication of hydraulic clutches.

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■ Indication of Trouble by Fail-safe Function and the Cause of Trouble

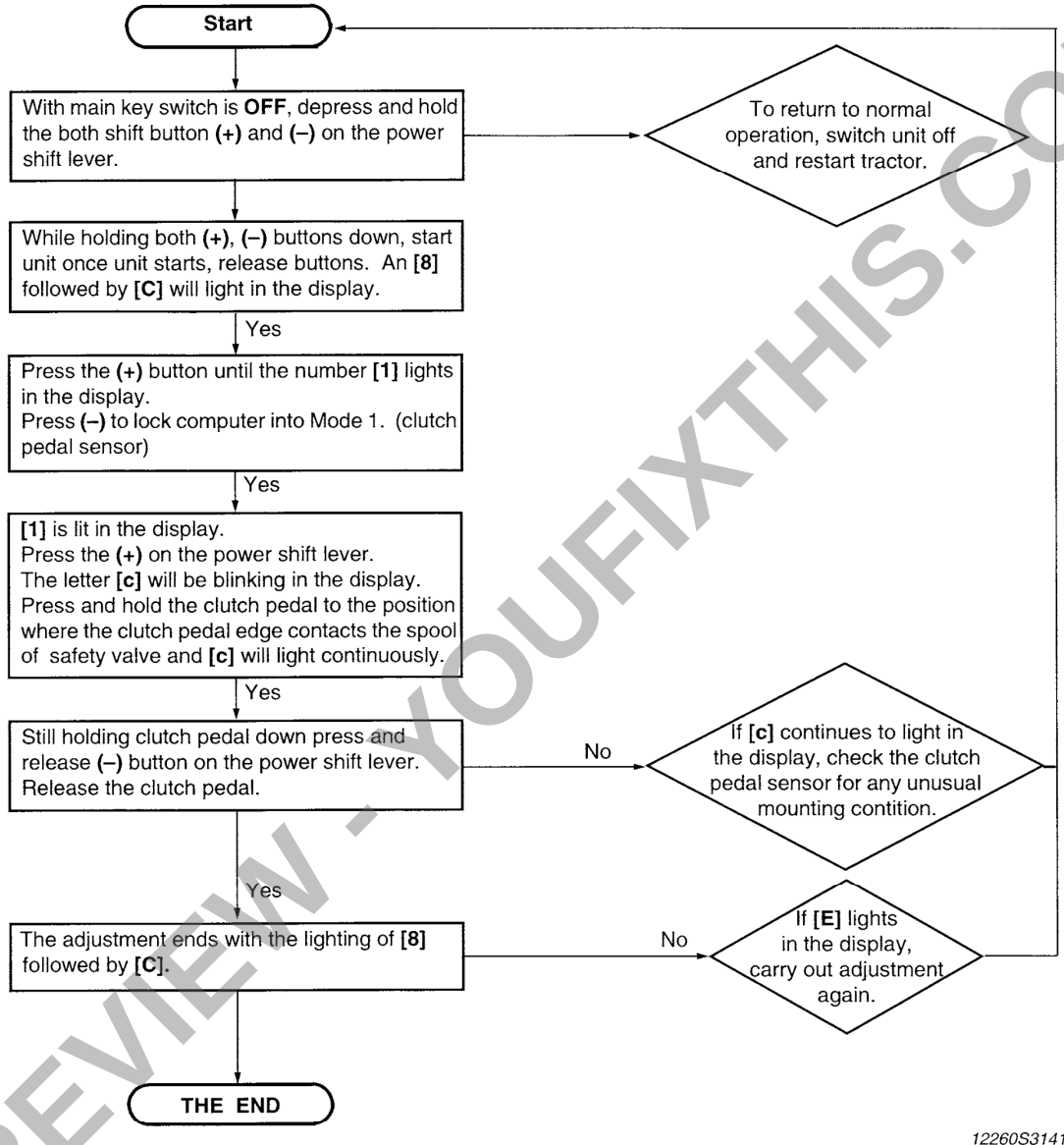
Indication			Cause	Remarks (Emergency Solution etc.)	Reference Page
Shift Indication	Neutral Lamp	Alarm Buzzer			
Alternate blinking of **L** and **1** to **8**	– –	Three times continuous sound	Pressure switch (master) is lit all the times. • Pressure switch (master) is in ON-defect. • Malfunction of solenoid proportional reducing valve (master)	This occurs when operating clutch (It is possible to move the tractor when shifting the power shift / range shift lever to L and main shift button to 1 to 4.)	3-S30 3-S39
Alternate blinking of **L** and **E**	– –	Three times continuous sound	Pressure switch (master) is lit all the times. • Pressure switch (master) is in ON-defect. • Malfunction of solenoid proportional reducing valve (master)	This occurs when shifting the shuttle lever (It is possible to move the tractor when shifting the power shift / range shift lever to L and main shift button to 1 to 4.)	3-S30 3-S39
Alternate blinking of **c** and **1** to **8**	– –	Three times continuous sound	Output voltage of clutch pedal sensor is below 0.2 volts or above 4.8 volts. • Malfunction of clutch pedal sensor	It is possible to move the tractor when shifting the power shift / range shift lever to L and main shift button to 1 to 4.	3-S28
Blinking c	– –	Three times continuous sound	Solenoid proportional reducing valve (master) does not operate. • Wire Breakage or short-circuiting of solenoid proportional reducing valves (master)	Can not move.	3-S31
Blinking c	– –	– –	Both shuttle switches (F and R) are lit. • Shuttle switches (F and R) are in ON-defect	• Both the shuttle lamps are lit. (It will become possible to move the tractor by setting both of the shuttle lamps so that they should not be lit simultaneously.)	3-S25
Blinking **1** to **8**	– –	Three times continuous sound	Related solenoid valves do not operate. • Solenoid ON-OFF valve is shortcircuited. • Wire breakage or short-circuiting of solenoid proportional reducing valves (Main shift L and H).	It will become possible to move the tractor by returning the power shift / range shift lever to the neutral position and setting it at other position than indicated by blinking.	3-S31
Blinking **1** to **8**	– –	– –	The pressure switches not related to the speed change step indicated by blinking is ON. • The pressure switch is in ON-defect. • Malfunction of the main spool	It will become possible to move the tractor by returning the power shift / range shift lever to the neutral position and setting it again at L or H position. The speed is changed automatically to the speed which raises the cause.	3-S25 3-S39
Blinking E	– –	– –	The clutch button switch fails to turn ON even when the power shift / renge shift lever is moved. • Neutral switch is in OFF-defect.	This occurs when shifting the power shift / range shift lelver. The system functions properly only when the engine has got started and the power shift / range shift lever is first operated.	3-S25
– –	Blinking	– –	Both range shift lever change switches (L and H) are lit. • Auxiliary range shift lever switches (L and H) are in ON-defect.	This occurs when shifting the power shift / range shift lelver. The system functions properly by moving the power shift / range shift lever to any position where the lamp does not flash.	3-S25

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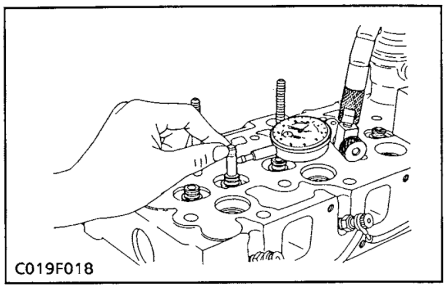
MODE 1 (CLUTCH PEDAL SENSOR) INITIAL SETTING PROCEDURE



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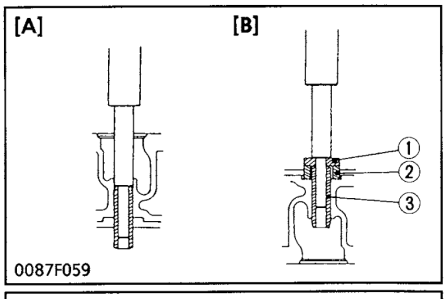
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C019F018

Valve Stem Clearance

1. Remove carbon from the valve guide and valve.
2. Make sure that the valve stem is straight and insert the valve into the valve guide.
3. Set a dial indicator with its tip on the stem near the end of valve guide.
4. Measure the clearance, moving the valve sideways.
5. If the measurement exceeds the allowable limit, replace the valve guide or the valve.

Valve stem clearance	Factory spec.	0.025 to 0.055 mm 0.00098 to 0.00217 in.
	Allowable limit	0.1 mm 0.004 in.
Valve guide bore I.D.	Factory spec.	10.000 to 10.015 mm 0.39370 to 0.39429 in.
Valve stem O.D.	Factory spec.	9.960 to 9.975 mm 0.39213 to 0.39272 in.



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Replacing Valve Guide

(When removing)

1. Tap out the valve guide using a valve guide replacing tool.

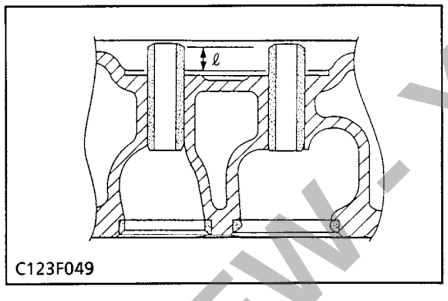
(When installing)

1. Clean the valve guide bore and apply engine oil to the bore, before installing the valve guide (3).
2. Press in the valve guide to the specified dimension from the cylinder head's upper side.

■ **IMPORTANT**

- **Do not hit the valve guide with a hammer during replacement.**
- **Ream precisely the bore of the valve guide to the specified dimension.**

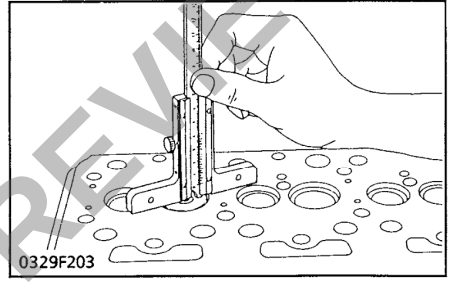
Valve guide bore I.D.	Factory spec.	10.000 to 10.015 mm 0.39370 to 0.39429 in.
Length "ℓ"	Factory spec.	13.8 to 14.2 mm 0.54 to 0.56 in.



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[A] When removing
[B] When installing

(1) Spacer
(2) Spacer (thickness 13.9 to 14.1 mm)
(3) Valve Guide

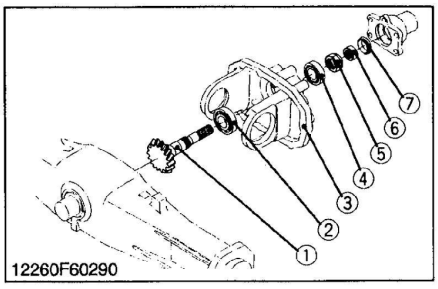

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Valve Recessing

1. Clean the cylinder head, the valve face and seat.
2. Insert the valve in the guide.
3. Measure the valve recessing with a depth gauge.
4. If the recessing exceeds the allowable limit, replace the valve and check the valve seating.
5. If the recessing exceeds the allowable limit after replacing valve, replace the valve insert.

Valve recessing	Factory spec.	IN.	0.8 to 1.2 mm 0.032 to 0.047 in.
		EX.	0.7 to 1.1 mm 0.028 to 0.043 in.
	Allowable limit		1.4 mm 0.055 in.

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12260F60290

Spiral Bevel Pinion Shaft [M-120]

1. Secure the spiral bevel pinion shaft (1) in the vise, and remove the staking nut (5) with the socket wrench 50 (Code No. 07916-31821).
2. Remove the spiral bevel pinion shaft (1) from the pinion bearing case (3).

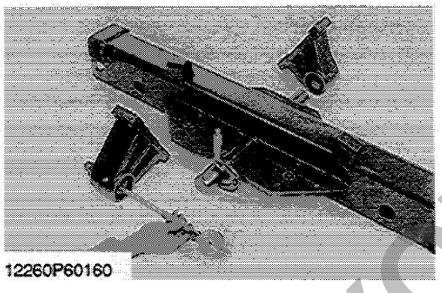
(When reassembling)

- Apply grease to the oil seal (7).
- Apply gear oil to the bearing.
- Stake the staking nut (5) after adjusting the turning torque of spiral bevel pinion shaft (1).

(1) Spiral Bevel Pinion Shaft
(2) Taper Roller Bearing
(3) Pinion Bearing Case
(4) Taper Roller Bearing
(5) Staking Nut
(6) Sleeve
(7) Oil Seal

12260S60390

SERVICING [2WD TYPE]


12260P60160

Clearance between Front Axle Middle Boss and Bracket Bushing

1. Measure the front axle middle boss O.D. at several points where it contacts with the bushings.
2. Measure the front axle bracket (front) bushing I.D. and bracket (rear) bushing I.D. in the same method, and calculate the clearance.
3. If the clearance exceeds the allowable limit, replace them.

Clearance between front axle middle boss and bracket bushing	Factory spec.	0.020 to 0.162 mm 0.00079 to 0.00638 in.
	Allowable limit	0.35 mm 0.0138 in.
Front axle middle boss O.D.	Factory spec.	44.938 to 45.000 mm 1.76921 to 1.77165 in.
Bracket bushing I.D.	Factory spec.	45.020 to 45.100 mm 1.77244 to 1.77559in.

(Reference)

- Before press-fitting the bushing, install the new thrust collar.
- Install the oil seals, noting their direction.

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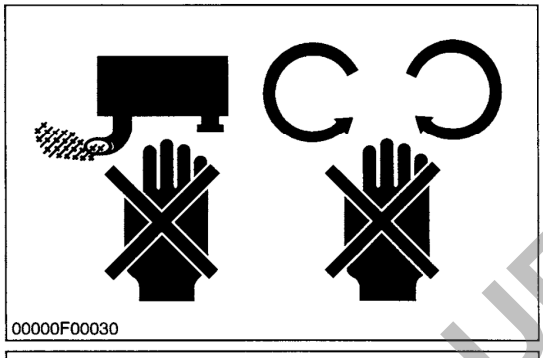
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SAFETY STARTING

(1) Do not start the engine by shorting across starter terminals or bypassing the safety start switch.
(2) Do not alter or remove any part of machine safety system.
(3) Before starting the engine, make sure that all shift levers are in neutral positions or in disengaged positions.
(4) Never start the engine while standing on ground. Start the engine only from operator's seat.

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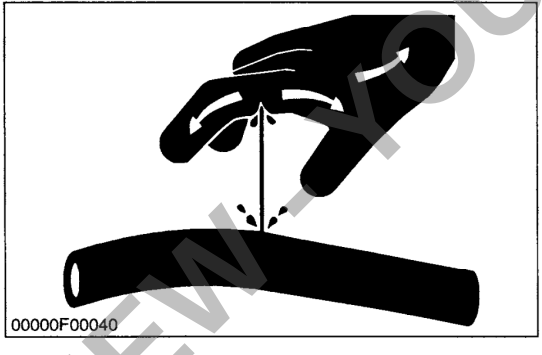

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SAFETY WORKING

(1) Do not work on the machine while under the influence of alcohol, medication, or other substances or while fatigued.
(2) Wear close fitting clothing and safety equipment appropriate to the job.
(3) Use tools appropriate to the work. Makeshift tools, parts, and procedures are not recommended.
(4) When servicing is performed together by two or more persons, take care to perform all work safely.
(5) Do not work under the machine that is supported solely by a jack. Always support the machine by safety stands.
(6) Do not touch the rotating or hot parts while the engine is running.
(7) Never remove the radiator cap while the engine is running, or immediately after stopping. Otherwise, hot water will spout out from radiator. Only remove radiator cap when cool enough to touch with bare hands. Slowly loosen the cap to first stop to relieve pressure before removing completely.
(8) Escaping fluid (fuel or hydraulic oil) under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic or fuel lines. Tighten all connections before applying pressure.
(9) 4WD tractor equipped with 4WD braking system.
To avoid the possibility of personal injury or property damage from machine runaway during testing, service or repair with the rear wheels off the ground, make sure :
- Battery is disconnected and engine is not started.

If it is necessary to run the engine, make sure :
- Both front and rear wheels are off the ground and secured with standards before starting engine.

12260Z00090

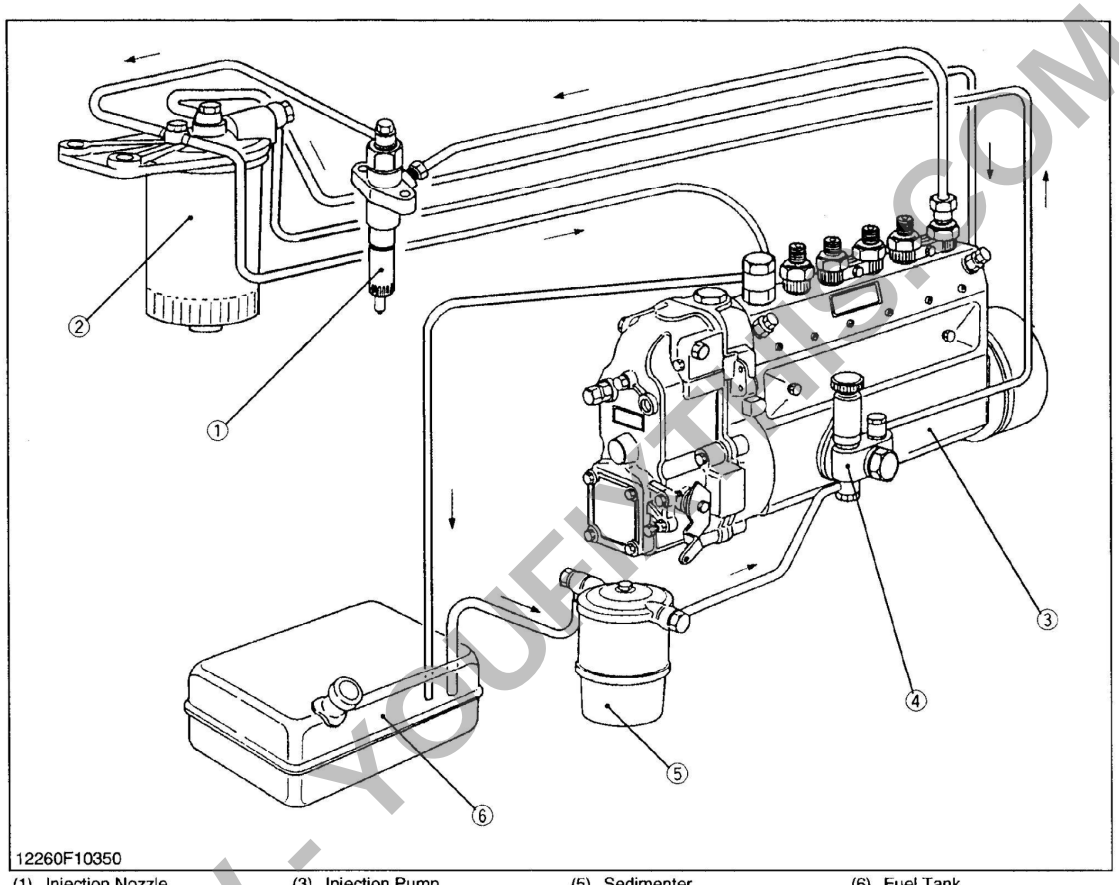

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[5] FUEL SYSTEM

(1) Fuel Flow



(1) Injection Nozzle
(2) Fuel Filter
(3) Injection Pump
(4) Feed Pump
(5) Sedimenter
(6) Fuel Tank

While the engine is in operation, fuel flows from the tank (6) to (5), (4), (2), (3) and (1) before it is injected into the cylinders.

Fuel feed pump (4) passes fuel from the fuel tank (6) to the injection pump (3), between which are located two fuel filters for removing impurities from the fuel so as to protect the injection pump and nozzles.

One is called sedimenter (5) and it mainly removes water and dust; and the other is fuel filter (2) which removes relatively small dust particles.

Fuel is introduced into injection pump (3) and pressurized to about 22.1 MPa (225 kgf/cm^2, 3200 psi) or injection nozzle valve opening pressure, and then is injected into each cylinder.

Excess fuel is usually supplied to injection pump (3) and oil also leaks inevitably from injection nozzle (1). this excess or leaked oil is returned to the filter and tank through an overflow pipe.

Water and dust contained in fuel is very detrimental to the engine, because the precisely machined portions of the injection pump (3) and injection nozzles are worn and corroded, thus bringing about increased fuel consumption and lowered output, etc.

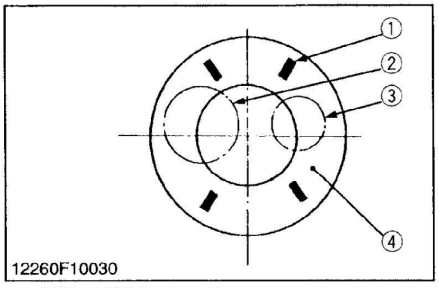
The fuel filter serves to remove such water and dust to protect the components. In this engine, a sedimenter (5) is installed between the tank (6) and the fuel feed pump (4), and a filter (2) between the fuel feed pump (4) and the fuel injection pump (3).

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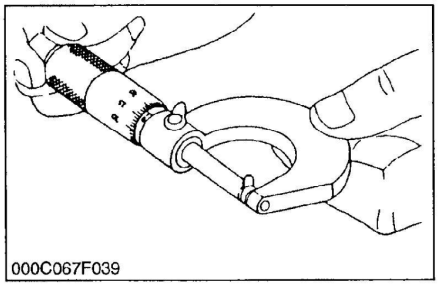
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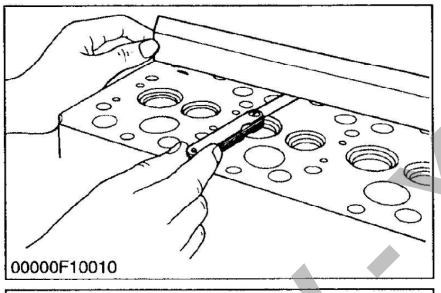
SERVICING

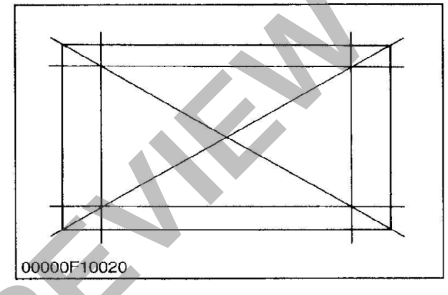
(1) Cylinder Head and Valve



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Top Clearance

1. Remove the cylinder head and replace the head gasket with a new one.
2. Move the piston up and stick four strips of fuse on the piston head (See figure) with grease.
3. Lower the piston and install the cylinder head and tighten the screws and nuts to the specified torque.
4. Turn the flywheel (crankshaft) 6 turns by hand.
5. Remove the cylinder head and measure the thickness of the fuses.
6. If the measurement is not within the factory specification, check the oil clearance between the crankpin and bearing and between the piston pin and bushing.

Top clearance	Factory spec.	0.75 to 0.95 mm 0.030 to 0.037 in.

Tightening torque	Cylinder head screw	127.5 to 137.3 N·m 13.0 to 14.0 kgf·m 94.0 to 101.3 ft-lbs

(1) Fuse (Dia. 1.5 mm, Length 5 mm)
(2) Inlet Valve
(3) Exhaust Valve
(4) Piston Head

12260S10400

Cylinder Head Surface Flatness

1. Clean the cylinder head surface.
2. Place a straightedge on the cylinder head's four sides and two diagonal as shown in the figure.
3. Measure the clearance with a feeler gauge.
4. If the measurement exceeds the allowable limit, correct it with a surface grinder.

■ IMPORTANT

- **Do not place the straightedge on the combustion chamber.**
- **Be sure to check the valve recessing after correcting.**

Cylinder head surface flatness	Allowable limit	0.05 mm 0.0020 in.

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[2] TRANSMISSION AND DIFFERENTIAL GEAR

Symptom	Probable Cause	Solution	Reference Page
Excessive Transmission Noise	• Transmission fluid insufficient	Replenish	G-9
	• Gear worn or damaged	Replace	3-S62
	• Bearings worn or damaged	Replace	3-S61, S72
	• Shifter or shift fork worn or damaged	Replace	3-S72
	• Improper backlash between spiral bevel gear and spiral bevel pinion shaft	Adjust	3-S76
	• Improper backlash between differential pinion and differential side gear	Adjust	3-S76
	• Shift linkage improperly adjusted	Adjust	3-S52
	• PTO clutch brake improperly assembled	Reassemble	2-S16
	• Collars or shims have not been installed	Reassemble	3-S57
	• Counter shaft staking nut and spiral bevel pinion shaft staking nut improperly tightened	Tighten	3-S57, S72
	• Torsion spring of damper disc damaged	Replace	2-S5
Hard Shifting	• Shift linkage improperly adjusted	Adjust	3-S52
	• Shifter or shift fork worn or damaged	Replace	3-S72
	• Shift fork bent or worn	Replace	3-S72
	• Synchronizer unit damaged	Replace	
Gears Slip Out of Mesh	• Shift linkage improperly adjusted	Adjust	3-S52
	• Shift fork spring weaken or damaged	Replace	3-S72
	• Synchronizer unit damaged	Replace	3-S73
	• Shift fork or shift rod bent	Replace	3-S72
	• Gear worn or damaged	Replace	–
Rear Wheels Can Not Driven	• Gears broken	Replace	–
	• Rear differential gear broken	Replace	3-S70
	• Planetary gears broken	Replace	4-S4
Differential Lock Can Not Be Set	• Differential lock clutch tooth broken or worn	Replace	3-S70
	• Differential lock pedal switch defective	Replace	–
	• Differential lock valve malfunctioning	Replace	3-S30
	• Differential lock piston malfunctioning (D-ring)	Replace	3-S70
	• Wiring harness disconnect or improperly connected	Replace	–
Differential Lock Can Not Be Disengaged	• Differential lock pedal switch defective	Replace	–
	• Differential lock valve malfunctioning	Replace	3-S30
	• Differential lock return spring weaken or damaged	Replace	3-S69
	• Wiring harness disconnect or improperly connected	Replace	–

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TROUBLESHOOTING

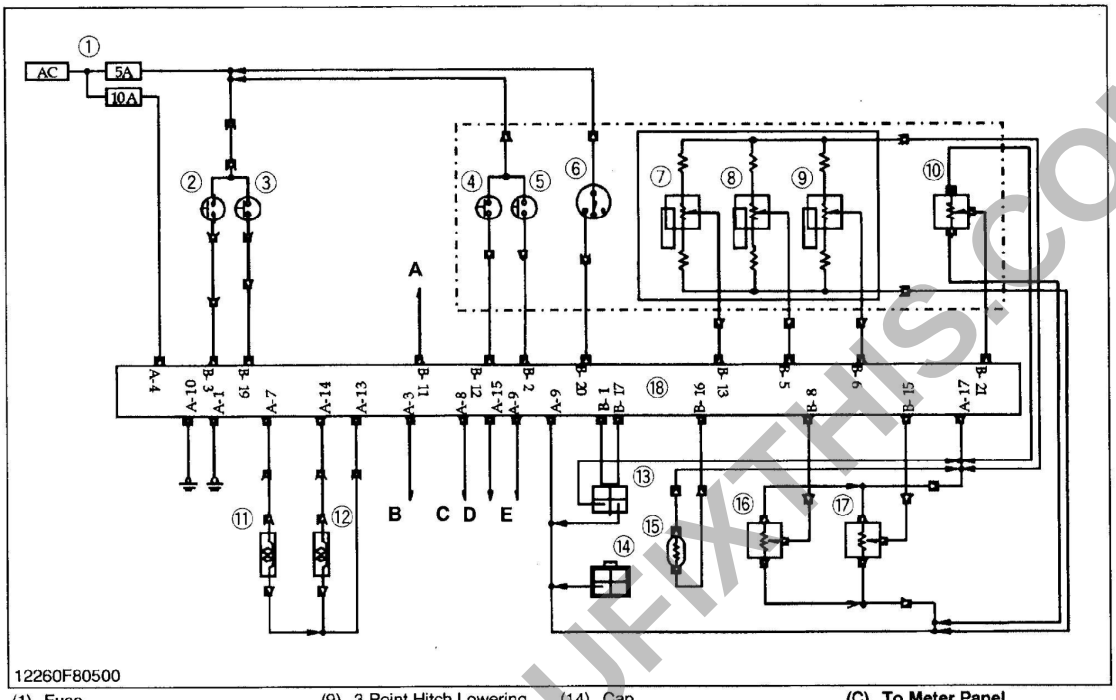
Symptom	Probable Cause	Solution	Reference Page
Poor Braking Force	• Brake pedal play excessive	Adjust	5-S3
	• Brake disc worn	Replace	5-S13
	• Brake piston warped	Replace	5-S13
	• Brake oil insufficient or improper	Replenish or Change with Specified Oil	5-S4
	• Brake oil leakage from brake pipes, bleeder, master cylinder or equalizer	Repair or Replace	–
	• Master cylinder or equalizer malfunctioning	Repair or Replace	5-S9
Uneven Braking Force	• Brake pedal travel unevenly adjusted	Adjust	5-S3, S4
	• Brake disc worn	Replace	5-S13
	• Brake piston warped	Replace	5-S13
	• Brake oil leakage from brake pipes, bleeder, master cylinder or equalizer	Repair or Replace	–
	• Equalizer or master cylinder malfunctioning	Repair or Replace	5-S9
Brake Drags	• Brake pedal play too small	Adjust	5-S3
	• Master cylinder return spring weaken or broken	Replace	5-S9
	• Master cylinder malfunctioning	Repair or Replace	5-S9
	• Brake seal failure	Replace	5-S13
	• Brake lines clogged	Clean	–
	• Brake pedal return spring weaken or broken	Replace	5-S8
	• Brake oil improper	Change with Specified Oil	5-S4
Spongy Brake Pedal	• Brake oil insufficient or improper	Replenish or Change with Specified Oil	5-S4
	• Air in brake system	Bleed Air	5-S6
Brake Oil Consumed Excessively	• Brake seal failure	Replace	5-S13
	• Brake oil leakage in brake lines	Repair or Replace	–
Poor Parking Brake Force	• Parking brake lever travel excessive	Adjust	5-S7
	• Brake pad worn	Replace	5-S15
Parking Brake Drags	• Parking brake lever travel too small	Adjust	5-S7

12260S50010

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(3) Electric Circuit



(1) Fuse
(2) Remote Control Down Switch
(3) Remote Control Up Switch
(4) 3 Point Hitch Quick lower Switch
(5) 3 Point Hitch Quick Raise Switch
(6) Mode Selector Switch
(7) Draft Ratio Adjustment Dial
(8) Lift Arm Top Limit Adjustment Dial
(9) 3 Point Hitch Lowering Speed Adjustment Dial
(10) Hydraulic Control Lever Sensor
(11) Control Valve for 3 Point Hitch Up
(12) Control Valve for 3 Point Hitch Down
(13) System Check Coupler
(14) Cap
(15) Engine Coolant Temperature Sensor
(16) Draft Sensor
(17) Lift Arm Sensor
(18) 3 Point Hitch Control Unit

(A) To Alternator L-terminal.
(B) To Heater Relay
(C) To Meter Panel (3 Point Hitch Quick Raise / Lower Indicator)
(D) To Meter Panel (Draft Indicator)
(E) To Meter Panel (Heater Indicator)

12260M80480

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TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts : See page G-11.)

Item	N·m	kgf·m	ft-lbs
Pulley nut	58.3 to 78.9	5.95 to 8.05	43.0 to 58.2

12260S40030

CHECKING, DISASSEMBLING AND SERVICING

⚠ CAUTION

- **To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the ground cable is attached to the negative terminal.**
- **Never remove the battery cap while the engine is running.**
- **Keep electrolyte away from eyes, hands and clothes. If you are spattered with it, wash it away completely with water immediately.**
- **Keep open sparks and flames away from the battery at all times. Hydrogen gas mixed with oxygen becomes very explosive.**

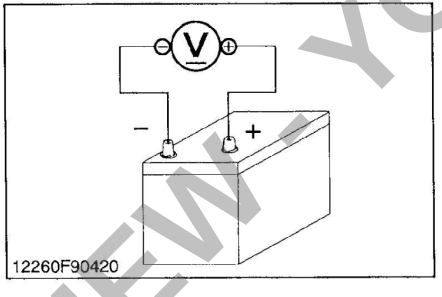
■ IMPORTANT

- **If the tractor is to be operated for a short time without battery (using a slave battery for starting), do not, under any circumstances, interrupt the circuit by switching off the key switch before stopping the engine by pulling engine stop knob. Use additional current (lights) while engine is running.**
- **Insulate terminal of battery. If this advice is disregarded, damage to alternator and regulator may result.**

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[1] BATTERY

CHECKING



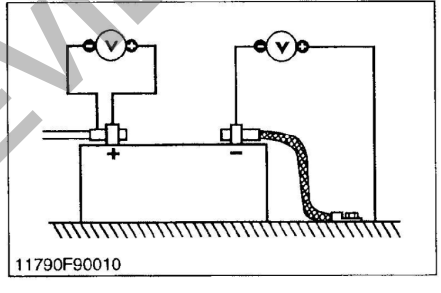
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Battery Voltage

1. Stop the engine and turn the main switch off.
2. Connect the COM (–) lead of the voltmeter to the battery's negative terminal post and the (+) lead to the positive terminal post, and measure the battery voltage.
3. If the battery voltage is less than the factory specification, check the battery specific gravity and recharge the battery.

Battery voltage	Factory spec.	More than 12 V

12260S90650



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Battery Terminal Connection

1. Turn the main switch on, and turn on the head light.
2. Measure the voltage with a voltmeter across the battery's positive terminal post and the cable terminal, and the voltage across the battery's negative terminal post and the chassis.
3. If the measurement exceeds the factory specification, clean the battery terminal posts and cable clamps, and tighten them firmly.

Potential difference	Factory spec.	Less than 0.1 V

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