WSM

WORKSHOP MANUAL

ZD1211,ZD1211R,
ZD1211L,ZD1211RL



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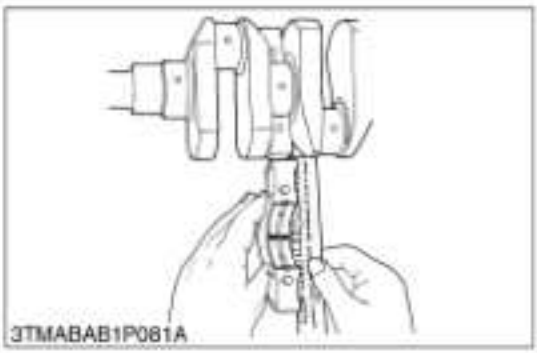
GENERAL

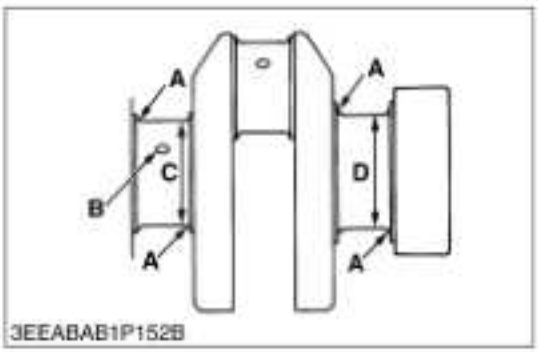
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Oil Clearance between Crankshaft Journal and Crankshaft Bearing 2 (Crankshaft Bearing 3)

1. Put a strip of plastigauge on the center of the journal.
2. Install the bearing case and tighten the baring case screws 1 to the specified torque, and remove the bearing case again.
3. Measure the amount of the flattening with the scale and get the oil clearance.
4. If the clearance exceeds the allowable limit, replace the crankshaft bearing 2 (1) and crankshaft bearing (3).
5. If the same size bearing is useless because of the crankshaft journal wear, replace it with an undersize one referring to the table and figure.

■ **NOTE**

- **Be sure not to move the crankshaft while the bearing case screws are tightened.**

Oil clearance between crankshaft journal and crankshaft bearing 2	Factory specification	0.034 to 0.095 mm 0.0014 to 0.0037 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D. (Intermediate)	Factory specification	47.934 to 47.950 mm 1.8872 to 1.8877 in.
Crankshaft bearing 2 I.D.	Factory specification	47.984 to 48.029 mm 1.8892 to 1.8909 in.

Oil clearance between crankshaft journal and crankshaft bearing 3	Factory specification	0.034 to 0.103 mm 0.0014 to 0.00405 in.
	Allowable limit	0.20 mm 0.0079 in.

Crankshaft journal O.D. (Flywheel side)	Factory specification	51.921 to 51.940 mm 2.0442 to 2.0448 in.
Crankshaft bearing 3 I.D.	Factory specification	51.974 to 52.024 mm 2.0463 to 2.0481 in.

(Reference)

- Undersize dimensions of crankshaft journal

Undersize	0.2 mm 0.0079 in.	0.4 mm 0.016 in.
Dimension **A**	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius	2.3 to 2.7 mm radius 0.091 to 0.10 in. radius
*Dimension **B**	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief	1.0 to 1.5 mm relief 0.040 to 0.059 in. relief
Dimension **C**	47.734 to 47.750 mm dia. 1.8793 to 1.8799 in. dia.	47.534 to 47.550 mm dia. 1.8715 to 1.8720 in. dia.
Dimension **D**	51.721 to 51.740 mm dia. 2.0363 to 2.0370 in. dia.	51.521 to 51.540 mm dia. 2.0284 to 2.0291 in. dia.
The crankshaft journal must be fine-finished to higher than Rmax = 0.8S *Holes to be de-burred and edges rounded with 1.0 to 1.5 mm (0.0394 to 0.0591 in.) relief.		

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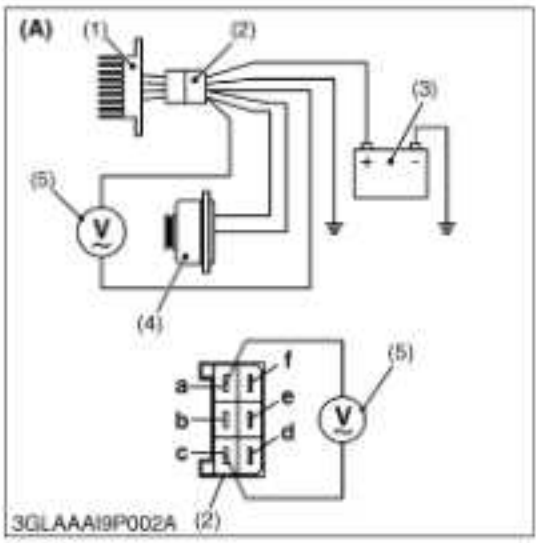
1. TROUBLESHOOTING

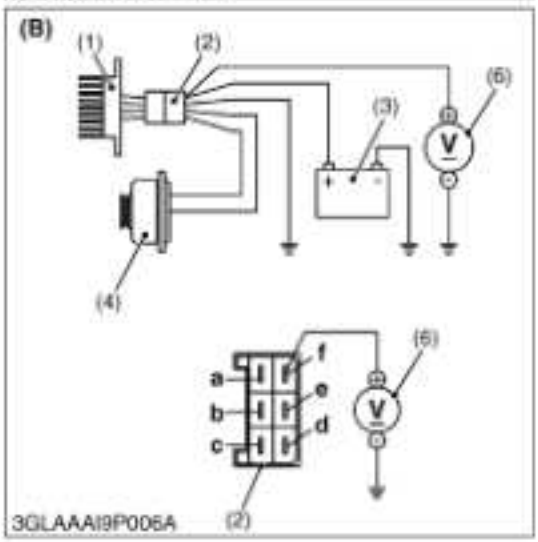
Symptom	Probable Cause and Checking Procedure	Solution	Reference Page
All Electrical Equipments Do Not Operate	1. Battery discharged or damaged	Recharge or replace	G-30
	2. Battery positive cable disconnected or improperly connected	Repair or replace	5-S6
	3. Battery negative cable disconnected or improperly connected	Repair or replace	5-S6
	4. Slow blow fuse blown	Replace	G-41
Fuse Blown Frequently	1. Short-circuited	Repair or replace	G-41

BATTERY

Symptom	Probable Cause and Checking Procedure	Solution	Reference Page
Battery Discharges Too Quickly	1. Battery damaged	Check and replace	G-30
	2. Dynamo damaged	Check and replace	5-S12, 5-S13
	3. IC regulator damaged	Check and replace	5-S12, 5-S13
	4. Wiring harness disconnected or improperly connected (between battery positive terminal and regulator **B** terminal)	Repair or replace	5-S6
	5. Cooling fan belt slipping	Adjust tension	G-32

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Regulation Voltage

WARNING

To avoid serious injury

- **To avoid personal injury, do not touch the rotating or hot parts while the engine is running.**

NOTE

- **Before performing this checking, make sure that the no-load dynamo output is proper.**
- **Complete the charging circuit with fully charged battery.**

1. Run the engine at the rated speed.
2. Keeping the regulator coupler (2) connected, measure the voltage with a volt meter (5) across the terminal **1** (**a**) and terminal **3** (**c**). (Refer to figure **(A)**.)
3. If the measurement is not within the specified value, replace the wire harness between the dynamo (4) and regulator (1).
4. If the measurement is within the specified value, measure the voltage with a volt meter (6) across the terminal **6** (**f**) and chassis. (Refer to figure **(B)**.)
5. If the measurement is not within specified value, replace the regulator (1).

Voltage	Terminal **1** (**a**) – Terminal **3** (**c**)	AC 20 V or more
	Terminal **6** (**f**) – Chassis	DC 14 to 15 V
Rate speed	Engine speed	3000 rpm

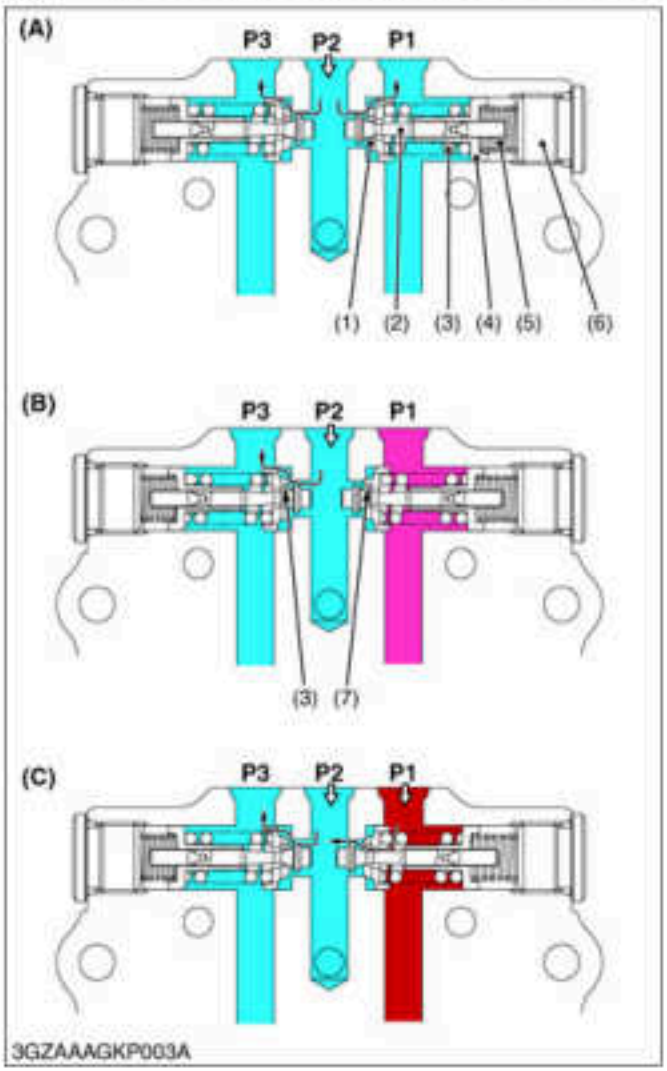
(1) Regulator
(2) Coupler
(3) Battery
(4) Dynamo
(5) Volt Meter (AC)
(6) Volt Meter (DC)

a: Terminal 1
b: Terminal 2
c: Terminal 3
d: Terminal 4
e: Terminal 5
f: Terminal 6

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(2) Check Valve and High Pressure Relief Valve



The check and high-pressure relief valve consists of pressure poppet (2), check valve seat (1), relief valve spring (3), spring guide (4) and check valve spring (5).

The valve is used to prevent an overload that would happen at a quick start, sudden stop or even during usual running. This valve doubles as a check valve.

The check and high-pressure relief valves are laid out facing each other as shown in the figure.

(A) In neutral, both valves are open and charging oil enters into the main oil circuit through the valves.

(B) At normal operation, the check valve in the high-pressure side is closed and it pushes and opens the another one. An excessive charge flow goes through the charge relief valve into HST housing.

(C) The check and high-pressure relief valve along the high-pressure line serves as a high-pressure relief valve. If the pressure exceeds a high-pressure limit level, the pressure poppet opens itself against the relief valve spring (3) force and opens the valve seat that is located between the check valve seat (1) and the pressure poppet (2). Now the flow goes from **P1** to **P2** and **P3**.

If the **P1** pressure drops, the relief valve spring forces the valve seat closed against the pressure. The high-pressure oil at **P1** does not flow to **P2** any longer.

As discussed above, the check and high-pressure relief valve protects engines, pumps, motors, gears and even the machine itself from overload.

Oil temperature	At engine speed	Valve operating pressure
50 °C (122 °F)	1600 min^{-1} (rpm)	19.5 to 22.5 MPa 199 to 229 kgf/cm^2 2830 to 3260 psi

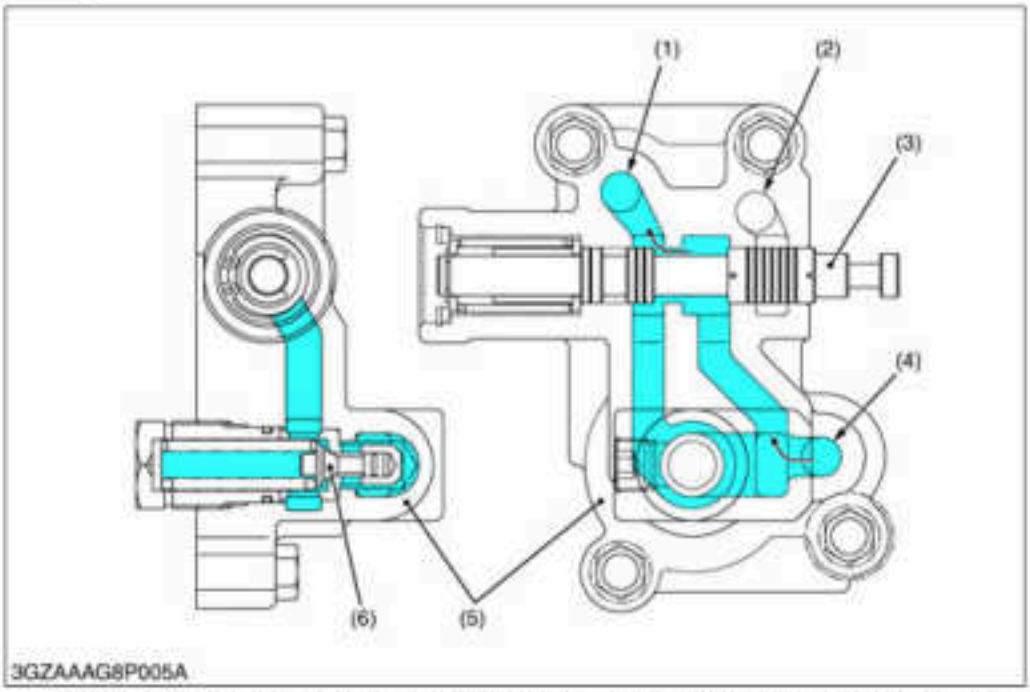
(1) Check Valve Seat
(2) Pressure Poppet
(3) Relief Valve Spring
(4) Spring Guide
(5) Check Valve Spring
(6) Valve Plug
(7) Neutral Orifice

(A) In Neutral (Stop)
(B) When Check Valve Activating (Normal Operation)
(C) When High Pressure Relief Valve Activating
P1: Forward
P2: Change
P3: Reverse

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Neutral

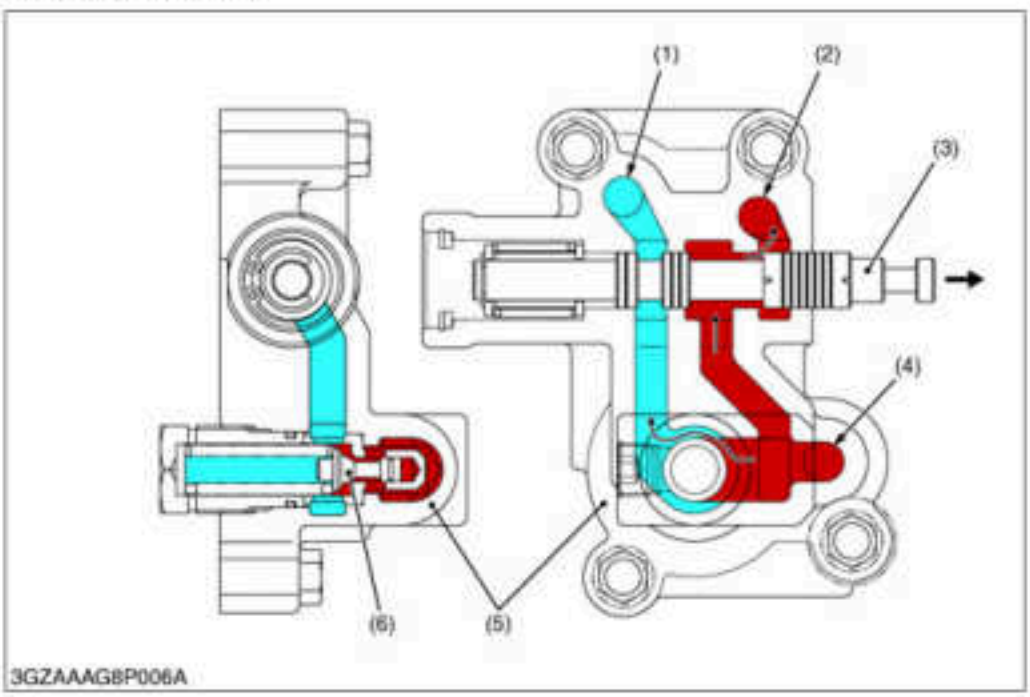


(1) To PTO Clutch and Hydrostatic Transmission
(2) **C** (Cylinder) Port
(3) Spool
(4) **P** (Pump) Port
(5) Valve Body
(6) Relief Valve

The oil sent from the pump passes through a gap between the spool (3) and the valve body (5), through the regulator valve, and then flows to the PTO valve and HST charge circuit. The oil sent to the mower-lifting cylinder is interrupted by the spool (3).

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Lift and Overloaded



(1) To PTO Clutch and Hydrostatic Transmission
(2) **C** (Cylinder) Port
(3) Spool
(4) **P** (Pump) Port
(5) Valve Body
(6) Relief Valve

The oil flowing from the pump flows through a hydraulic circuit, which is switched over by the spool (3), and is sent to the mower-lifting cylinder (2). When the mower is lifted, the relief valve (6) also operates. As a result, the oil passing through the relief valve (6) is always sent to the PTO valve and HST charge circuit.

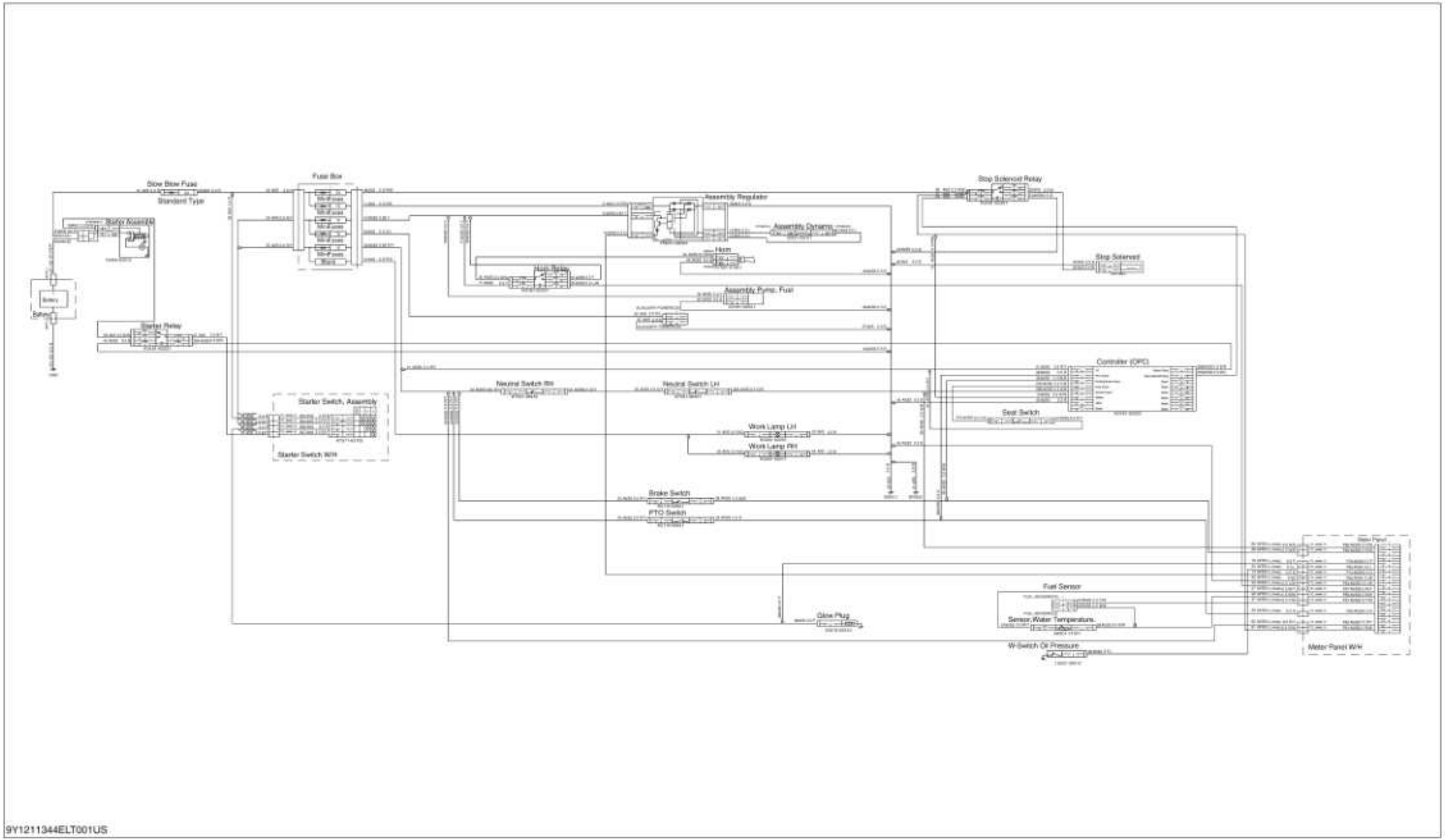
(Reference)

- Relief valve setting pressure: 5.5 to 7.0 MPa (56 to 71 kgf/cm^2, 800 to 1000 psi)
- Engine speed:1600 min^{-1}

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1. ELECTRICAL DIAGRAM



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