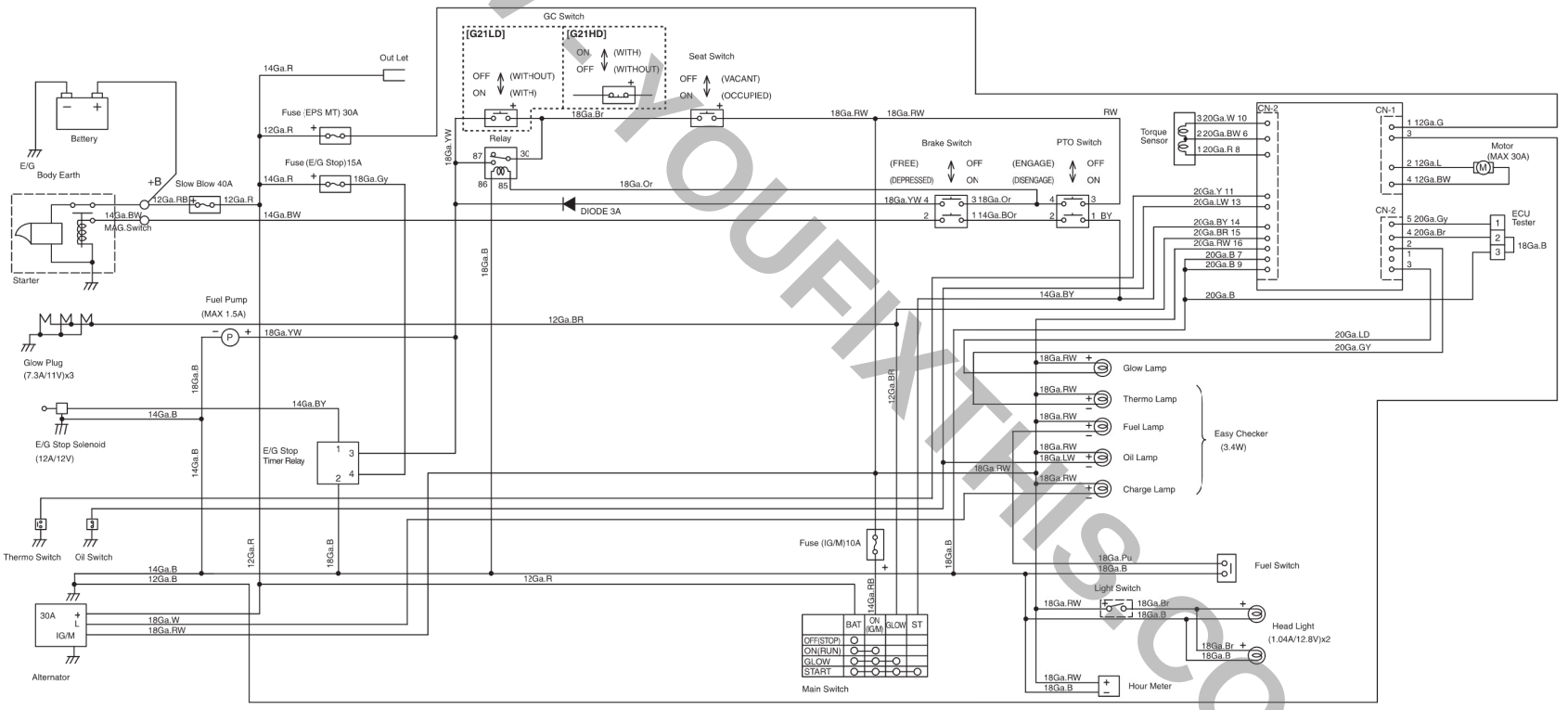
1. WIRING DIAGRAM AND ELECTRICAL CIRCUIT

[1] WIRING DIAGRAM (G21LD and G21HD)

• Color of Wiring

B .....Black	Br .... Brown	L ..... Blue	Pu ....Purple	Y .....Yellow
BOr ..Black / Orange	G ..... Green	LD ... Blue DK	R ..... Red	YW .. Yellow / White
BR ... Black / Red	GY ...Green / Yellow	LW ... Blue / White	RB ... Red / Black	
BW .. Black / White	GW ..Green / White	Or .... Orange	RW .. Red / White	
BY ... Black / Yellow	Gy ... Gray	Pi ..... Pink	W ..... White	



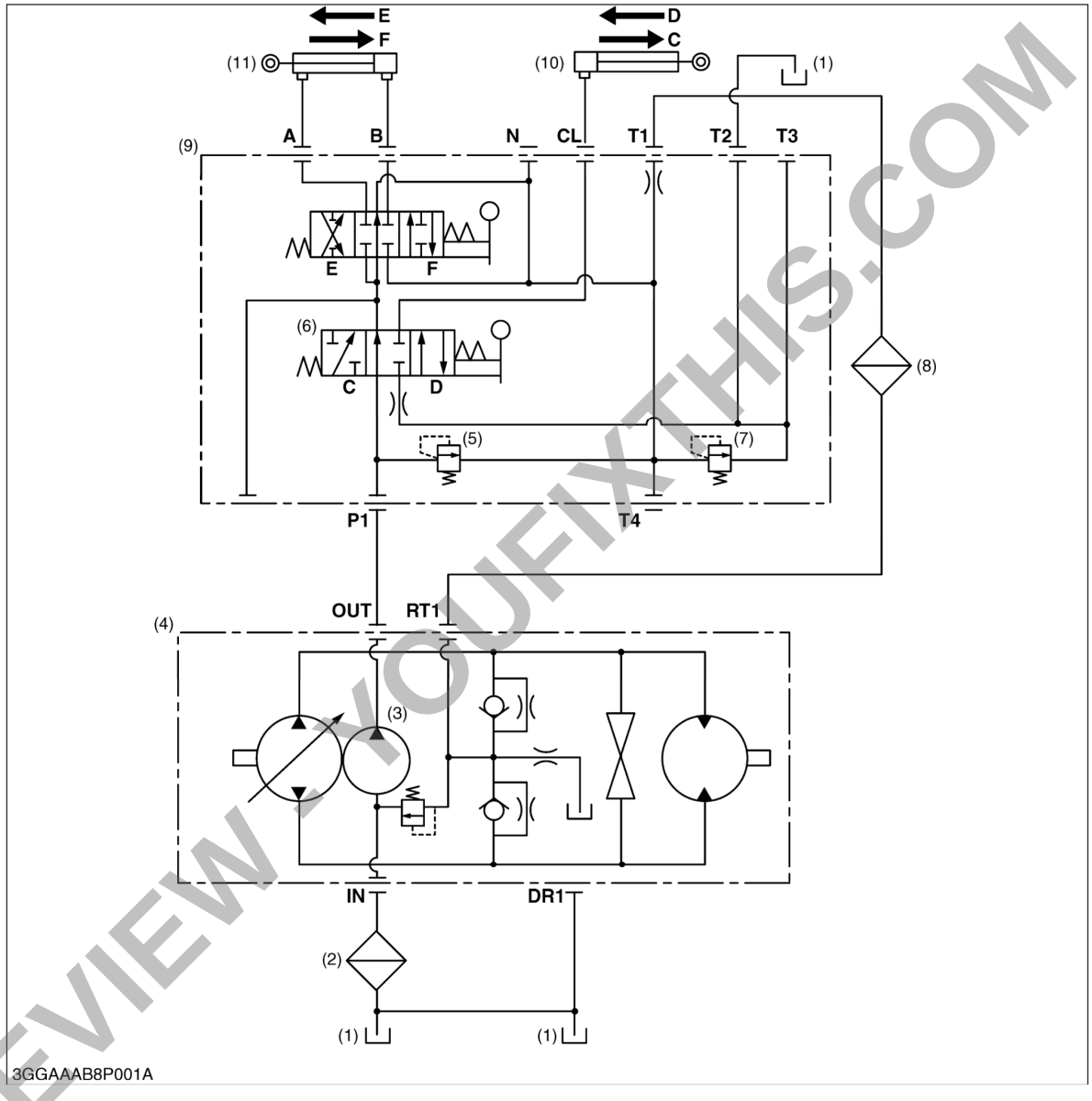
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1. HYDRAULIC CIRCUIT

[1] G21LD (LOW DUMP)



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(1) Transmission Case
(2) Oil Strainer
(3) Charge Pump
(4) Hydrostatic Transmission (HST)
(5) Main Relief Valve
(6) Valve (for Mower Lift Cylinder)
(7) Filter Relief Valve
(8) Oil Filter Cartridge
(9) Control Valve
(10) Mower Lift Cylinder
(11) Grass Collector Lift Cylinder

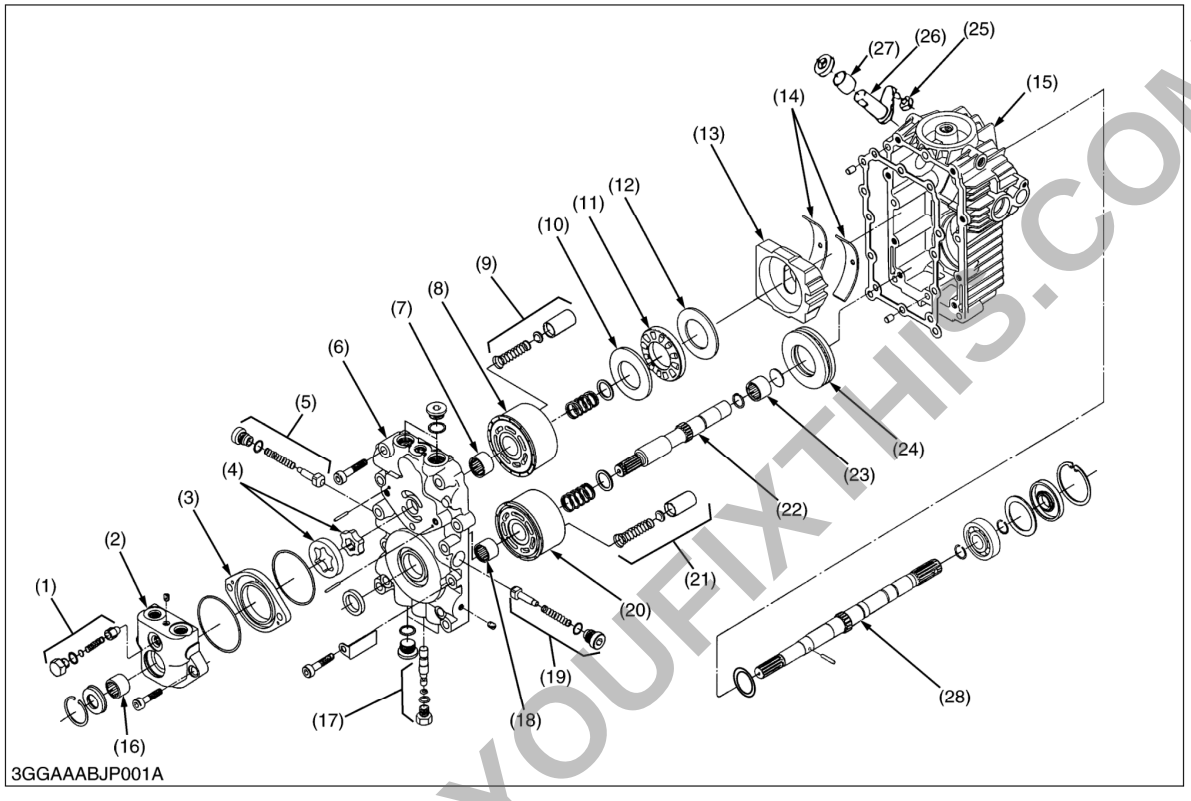
A : Port A
B : Port B
C : Up
D : Down
E : Grass Collector Open
F : Grass Collector Close

P1 :Pump Port
DR1 :Drain Port
RT1 :Return Port
T1, T2, T3, T4 :Tank Port
N : Neutral Port
IN : Inlet Port
OUT :Outlet Port
CL :Cylinder Port

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2. HYDROSTATIC TRANSMISSION

[1] STRUCTURE



(1) Charge Relief Valve
(2) Charge Pump Housing
(3) Charge Pump Spacer
(4) Gerotor
(5) Check Valve
(6) Center Section
(7) Needle Bearing
(8) Cylinder Block (Pump)
(9) Piston Assembly
(10) Thrust Plate
(11) Thrust Roller Bearing
(12) Thrust Washer
(13) Swashplate
(14) Cradle Bearing
(15) Housing
(16) Needle Bearing
(17) By-pass Valve
(18) Needle Bearing
(19) Check Valve
(20) Cylinder Block (Motor)
(21) Piston Assembly
(22) Motor Shaft
(23) Needle Bearing
(24) Thrust Ball Bearing
(25) Slot Guide
(26) Trunnion Arm
(27) Journal Bearing
(28) Pump Shaft

The hydrostatic transmission consists of a variable displacement piston pump and a fixed displacement piston motor.

A fan is used to cool the hydrostatic transmission, eliminating the need for an oil cooler.

Convenient single lever control permits simple operation of the machine, starting, stopping, increasing or decreasing speeds, changing direction of travel, and even going up or down hills.

As for operation of the hydrostatic transmission, refer to Workshop Manual for G1700 · G1800 · G1900 · G2000 (Code No.97897-10835).

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3. 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-9.)

Item	Size x Pitch	N·m	kgf·m	ft-lbs
Starter M terminal nut	M6 × 1.0	9.8 to 13.7	1.0 to 1.4	7.2 to 10.1
Alternator B terminal nut	M6 × 1.0	7.8 to 9.3	0.80 to 0.95	5.8 to 6.9
Glow plug terminal mounting nut		1.0 to 1.8	0.10 to 0.18	0.74 to 1.33
Universal joint mounting screw	M8 × 1.25	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Engine mounting nut	M8 × 1.25	23.5 to 27.5	2.4 to 2.8	17.4 to 20.3
Cylinder head screw	M8 × 1.25	37.3 to 42.2	3.8 to 4.3	27.5 to 31.1
* Cylinder head cover cap nut	M6 × 1.0	3.9 to 5.9	0.4 to 0.6	2.9 to 4.3
Injection pipe retaining nut	M12 × 1.5	24.5 to 34.3	2.5 to 3.5	18.1 to 25.3
Nozzle holder assembly	M20 × 1.5	49.0 to 68.6	5.0 to 7.0	36.2 to 50.6
Overflow pipe assembly retaining nut	M12 × 1.5	19.6 to 24.5	2.0 to 2.5	14.5 to 18.1
Glow plug	M8 × 1.0	7.85 to 14.7	0.8 to 1.5	5.8 to 10.8
* Rocker arm bracket nut	M6 × 1.0	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
* Fan drive pulley retaining screw	M12 × 1.5	117.7 to 127.5	12.0 to 13.0	86.8 to 94.0
* Idle gear shaft mounting screw	M6 × 1.0	9.8 to 11.3	1.00 to 1.15	7.2 to 8.3
* Connecting rod screw	M7 × 0.75	26.5 to 30.4	2.7 to 3.1	19.5 to 22.4
* Flywheel bolt	M10 × 1.25	53.9 to 58.8	5.5 to 6.0	39.8 to 43.4
* Main bearing case screw 2	M7 × 1.0	26.5 to 30.4	2.7 to 3.1	19.5 to 22.4
* Main bearing case screw 1	M6 × 1.0	12.7 to 15.7	1.3 to 1.6	9.4 to 11.6
Oil pressure switch	PT 1/8	14.7 to 19.6	1.5 to 2.0	10.8 to 14.5
Nozzle holder		34.3 to 39.2	3.5 to 4.0	25.3 to 28.9

■ **NOTE**

- **For * marked screws, bolts and nuts on the table, apply engine oil to their threads and seats before tightening.**
- **The letter "M" in Size x Pitch means that the screw, bolt or nut dimension stands for metric. The size is the nominal outside diameter in mm of the threads. The pitch is the nominal distance in mm between two threads.**

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[2] TROUBLESHOOTING BASED ON ERROR CODE

EPS SYSTEM TROUBLESHOOTING PROCEDURE

Symptom	Probable Cause	Solution	Reference Page
Error Code 02	**4P** connector disconnected	Connect the connector	5-S13
	30A fuse blown	Replace the fuse	5-S24
	Harness of **4P** connector broken or disconnected	Replace or repair	5-S13
	Resistance of the motor infinite	Replace the column assembly	5-S17
	Pin **No.3** of **4P** connector grounded	Secure continuity of the grounding section	5-S23
	All of the above are founded not to be the cause	Replace the EPS controller	5-S17
Error Code 03	**4P** and **16P** connectors to the EPS controller	Disconnect both connectors, wait for 20 seconds then reconnect them to the controller. Repeat turning **ON** and **OFF** the engine and check if the error occurs again. If not, check the harness and relevant sections.	5-S13
	EPS controller is not normal	Replace	5-S17
Error Code 05	Motor harness ground-shorted	Repair or replace	5-S13
	Motor harness is normal but error remains	Replace the EPS controller	5-S17
Error Code 06	Motor harness ground-shorted	Repair or replace	5-S13
	Short between motor harness pins	Replace the harness or column assembly	5-S13
	Both of the above are found not to be the cause	Replace the EPS controller	5-S17
Error Code 11	**Perform fail-safe history erasing before checking the following probable causes.**		
	Torque sensor harness coupler disconnected	Connect the coupler	5-S13
	Torque sensor coupler water-damaged	Clean and dry the inside of the coupler	5-S13
	16P coupler water-damaged	Clean and dry the inside of the coupler	5-S13
	All of the above are found not to be the cause	Replace the EPS controller	5-S17

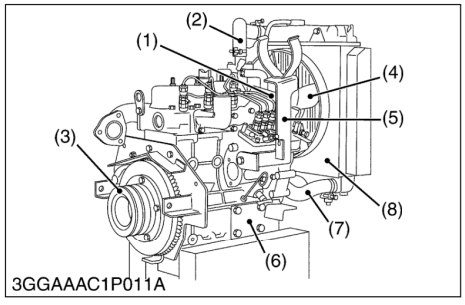
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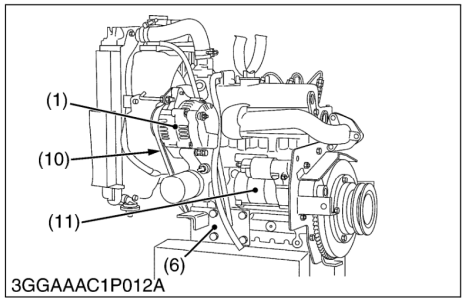
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(2) Disassembling and Assembling

(A) Cylinder Head and Valves



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External Components

1. Remove the air cleaner stay (5).
2. Remove the water pipe 1 (2), water pipe 2 (7) and radiator (8) with the recovery tank.
3. Remove the alternator (9) and fan belt (10).
4. Remove the cooling fan (4) and fan pulley.
5. Remove the starter (11).
6. Remove the engine stop solenoid (1).
7. Remove the engine mounting stays (6).
8. Remove the PTO pulley.

(When reassembling)

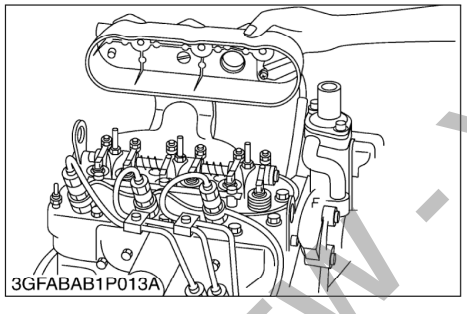
- Connect the water pipe 1 with the white marking facing upward.
- Connect the water pipe 2 with the yellow marking facing upward.
- Install the engine stop solenoid so that the plunger moves smoothly.

■ **IMPORTANT**

- **After reassembling the fan belt, be sure to adjust the fan belt tension. (See page 1-S49)**

(1) Engine Stop Solenoid
(2) Water Pipe 1
(3) PTO Pulley
(4) Cooling Fan
(5) Air Cleaner Stay
(6) Engine Mounting Stay
(7) Water Pipe 2
(8) Radiator
(9) Alternator
(10) Fan Belt
(11) Starter

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Cylinder Head Cover

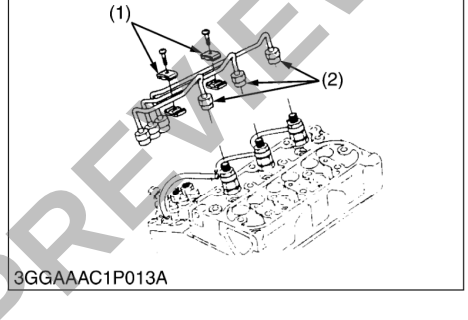
1. Remove the head cover cap nuts.
2. Remove the cylinder head cover.

(When reassembling)

- Check to see if the cylinder head cover gasket is not defective.
- Apply engine oil to the cylinder head cover cap nuts. And tighten them.

Tightening torque	Cylinder head cover cap nut	3.9 to 5.9 N·m 0.4 to 0.6 kgf·m 2.9 to 4.3 ft-lbs

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Injection Pipes

1. Loosen the screws on the pipe clamps (1).
2. Detach the injection pipes (2).

(When reassembling)

- Blow out dust from the pipes with compressed air. Then reassemble the pipes in the reverse order..

Tightening torque	Injection pipe retaining nut	24.5 to 34.3 N·m 2.5 to 3.5 kgf·m 18.1 to 25.3 ft-lbs

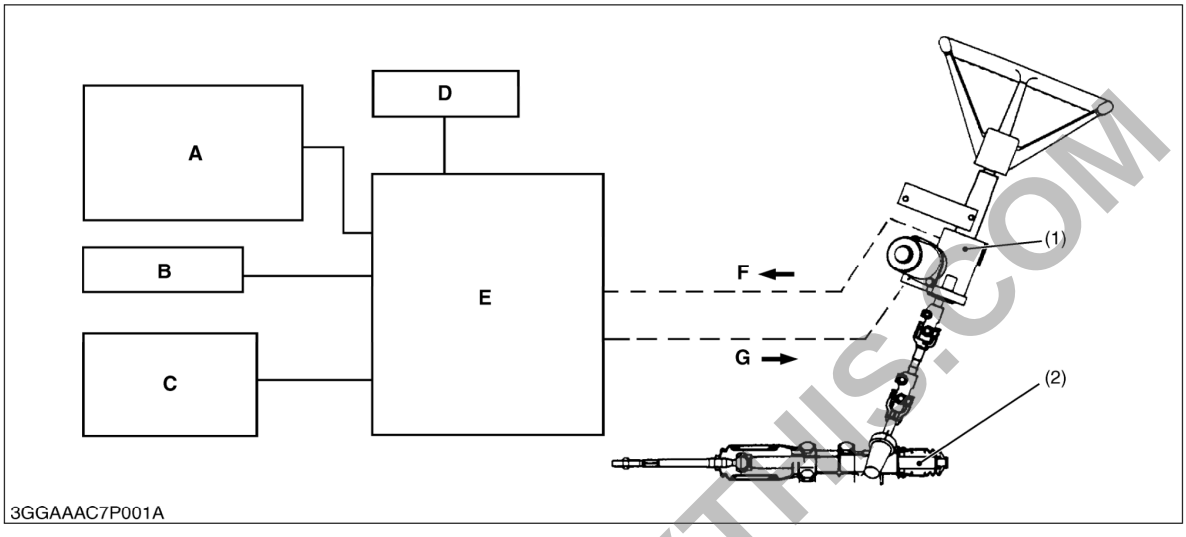
(1) Pipe Clamp
(2) Injection Pipe

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1. SYSTEM CONFIGURATION



(1) Power Steering Assembly
(2) Power Steering Gear Case

A : Engine Revolution Signal (Oil Switch)
B : Warning Lamp
C : Connector for Servicing
D : Battery
E : EPS Controller
F : Steering Torque Signal
G : Motor Driving Current

The steering system employs an electric power steering (EPS). The EPS system has recently been developed as an alternative to the hydrostatics power steering system. In this system, an electric motor is used to reduce the power necessary for steering. As compared with the hydrostatics power steering, the electric power steering has the following features.

1. Eliminating the need for using a hydraulic pump, it is an electric-power-saving system in which the motor is energized only when the steering wheel is operated. Therefore it causes no engine power loss, enhancing fuel economy.
2. Needing no hydraulic pump or tank, it is light and compact.
   The three main components of the electric power steering are a power steering assembly, EPS controller and power steering gear case.

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1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Start	No fuel	Replenish fuel	–
	Air in the fuel system	Bleed fuel system	–
	Water in the fuel system	Change fuel and replace fuel system	–
	Fuel pipe clogged	Clean fuel pipe	–
	Fuel filter clogged	Replace fuel filter	G-36
	Excessively high viscosity of fuel or engine oil at low temperature	Use specified fuel or engine oil	G-7
	Fuel with low cetane number	Use specified fuel	G-7
	Fuel leak due to loose injection pipe retaining nut	Tighten retaining nut	1-S55
	Incorrect injection timing	Adjust injection timing	1-S52
	Fuel camshaft worn	Replace fuel camshaft	1-S25
	Injection nozzle clogged	Clean injection nozzle	1-S54
	Injection pump malfunctioning	Repair or replace injection pump	1-S52
	Seizure of crankshaft, camshaft, piston, cylinder or bearing	Replace crankshaft, camshaft, piston, cylinder or bearing	1-S29, S30
	Compression leak from cylinder	Replace head gasket, tighten cylinder head screw, glow plug and nozzle holder	1-S21, S22
	Improper valve timing	Correct valve timing	1-S52
	Piston ring and cylinder worn	Replace piston ring and bore oversize cylinder	1-S28, S46
	Excessive valve clearance	Adjust valve clearance	1-S19

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SPECIFICATIONS

Model			G21LD	G21HD
Maximum gross power			15.6 kw (21 HP)	
Engine	Model		D782-E2-G21	
	Type		Indirect injection, vertical, water cooled, 4-cycle diesel engine	
	Number of cylinders		3	
	Bore and stroke		67.0 × 73.6 mm (2.64 × 2.90 in.)	
	Total displacement		778 cm^3 (47.48 cu.in.)	
	Rated revolution		3000 rpm	
	Combustion chamber		Spherical type (E-TVCS)	
	Fuel injection pump		Bosch MD type mini pump	
	Governor		Centrifugal ball mechanical governor	
	Injection nozzle		Bosch throttle type	
	Injection timing		0.28 to 0.31 rad (16° to 18°) before T.D.C.	
	Injection order		1-2-3	
	Injection pressure		13.73 MPa (140 kgf/cm^2, 1991 psi)	
	Compression ratio		24 : 1	
	Lubricating system		Forced lubrication by gear pump	
	Cooling system		Pressurized radiator, forced circulation with water pump	
	Lubricating oil		API Service classification CC or CD, Below 0°C (32 °F) : SAE 10W or 10W-30, 0 to 25 °C (32 °F to 77 ° F) : SAE 20 or 10W-30, Above 25 °C (77 °F) : SAE 30 or 10W-30	
	Starting system		Electric starter (12 V, 1.0 kW)	
	Battery		51R (12V, 450CCA)	
	Fuel		No.2-D diesel fuel (ASTM D975) [No.1-D diesel fuel, if temperature is below - 10 °C (14 °F)]	
Capacities	Fuel tank		22L (5.8U.S.gals., 4.8 Imp. gals.)	
	Engine crankcase		2.8L (2.95 U.S.qts., 2.4 Imp.qts.)	
	Engine coolant		2.1L (2.2 U.S.qts., 1.8 Imp.qts.)	
	Recovery tank		0.25 L (0.26 U.S.qts., 0.22 Imp.qts.)	
	Transmission (Including HST and cylinder)		4.5L (4.75 U.S.qts., 3.96 Imp.qts.)	6.0L (6.34 U.S.qts., 5.28 Imp.qts.)
	Mower gear case oil		0.40L (0.42 U.S.qts., 0.35 Imp.qts.)	
Tires	Front		16 × 6.50-8 (4PR) Turf	
	Rear		23 × 10.5-12 (4PR) Turf	
Traveling speeds	Forward		0 to 15.0 km/h (0 to 9.3 mph)	
	Reverse		0 to 6.0 km/h (0 to 3.8 mph)	
Dimensions	Overall length (with grass collector)		2930 mm (115.4 in.)	2990 mm (117.7 in.)
	Overall width (with mower)		1280 mm (50.4 in.)	
	Overall height		1280 mm (50.4 in.)	1450 mm (57.1 in.)
	Wheel base		1280 mm (50.4 in.)	
	Treads	Front	825 mm (32.5 in.)	
		Rear	780 mm (30.7 in.)	
Weight (Without mower deck and grass collector)			440 kg (970 lbs)	510 kg (1124 lbs)
PTO			Shaft drive	
PTO clutch			Belt tension	
Revolution (PTO speed)			2576 min^{-1} (rpm)	
PTO brake			Available	

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6. MAINTENANCE CHECK LIST

No.	Item / Period		Every 50 Hr	Hour meter reading									Reference page
				50	100	150	200	300	400	450	500	After	
1	Tires	Check	☆										G-24
2	Battery condition	Check			☆		☆	☆	☆		☆	Every 100 Hr	G-32
3	Safety device	Check	☆										G-28
4	Engine oil	Change		★	☆		☆	☆	☆		☆	Every 100 Hr	G-22
5	Engine oil filter cartridge	Change		★			☆		☆			Every 200 Hr	G-22
6	Transmission fluid	Change					☆				☆	Every 300 Hr	G-35
7	Transmission oil filter cartridge	Replace		★			☆				☆	Every 300 Hr	G-23
8	Transmission oil strainer	Clean					☆				☆	Every 300 Hr	G-36
9	Hydraulic hose	Check					☆		☆			Every 200 Hr	G-34
		Replace										Every 2 Years*	G-42
10	Fuel lines	Check			☆		☆	☆	☆		☆	Every 100 Hr	G-30
		Replace[1]										Every 2 Years*	G-41
11	Fuel filter	Check			☆		☆	☆	☆		☆	Every 100 Hr	G-30
		Replace[1]									☆	Every 500 Hr	G-36
12	Radiator hose and clamp	Check					☆		☆			Every 200 Hr	G-33
		Replace[1]										Every 2 Years*	G-41
13	Radiator core	Clean			☆		☆	☆	☆		☆	Every 100 Hr**	G-30
14	Cooling system	Clean										Every 1 Year	G-38
15	Coolant	Change										Every 1 Year	G-38
16	Air cleaner element	Clean	☆**										G-27
		Replace										Every 1 Year**	G-38
17	Fan belt tension	Adjust	☆										G-25
18	Front PTO belt tension	Adjust	☆****										G-27
19	Brake play	Adjust[1]	☆										G-24
20	Greasing	–	☆										G-26
21	Fuel injection nozzle	Check										Every 1500 Hr	1-S54
22	Injection pump	Check										Every 3000 Hr	1-S52

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SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels 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.

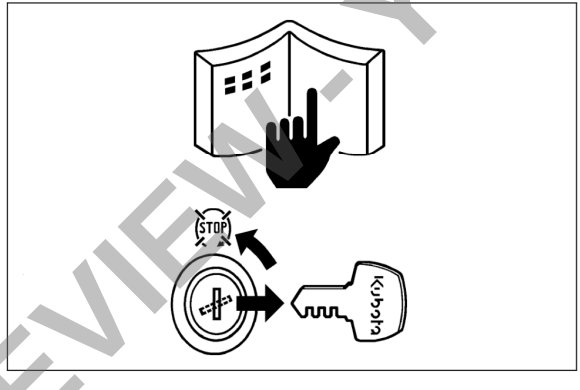
DANGER : **Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.**

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.**

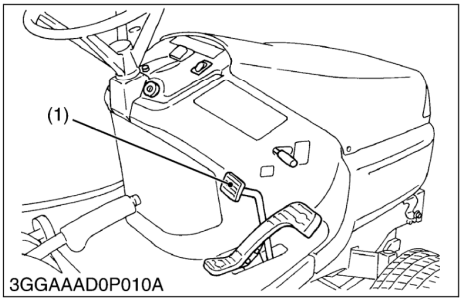


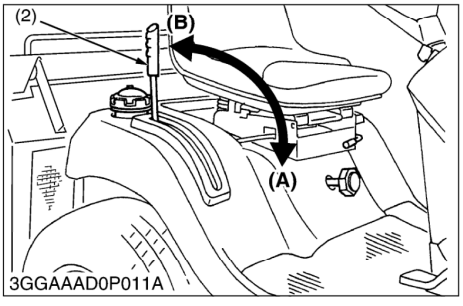
BEFORE SERVICING AND REPAIRING

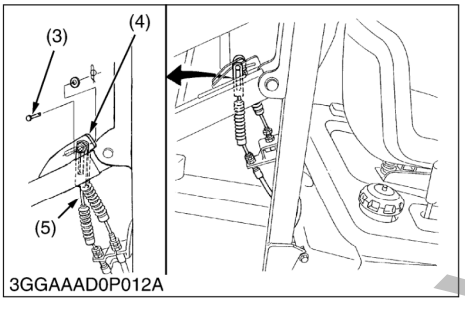
- Read all instructions and safety instructions in this manual and on your machine safety decals.
- Clean the work area and machine.
- Park the machine on a firm and level ground, and set the parking brake.
- Lower the implement to the ground.
- Stop the engine, and remove the key.
- Disconnect the battery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

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Checking Safety Devices

The Safety Devices in your machine help to protect you while operating. Please check this Safety Devices periodically–daily is best–to test function of the Safety Devices before operation.

CAUTION

To avoid personal injury :

- **Do not allow anyone near the machine while testing.**
- **If the machine does not pass a test, do not operate the machine.**
- **Sit on operator's seat for all tests.**

1. Check the following tests before operating the machine.
2. If the machine does not pass one of the following tests, do not operate the machine, check the related safety switches and the wiring harness.

Test 1 (Safety Start Control 1)

1. Depress the brake pedal (1) fully.
2. Engage the PTO lever (2).
3. Turn the key switch to **"START"** position.
4. The engine should not crank.

Test 2 (Safety Start Control 2)

1. Disengage PTO lever (2).
2. Release the brake pedal (1).
3. Turn the key to **"START"** position.
4. The engine should not crank.

Test 3 (Seat Safety Control 1)

1. Run the engine at half throttle.
2. Engage the PTO lever (2).
3. Stand up. (DO NOT GET OFF THE MACHINE.)
4. Engine should shut off.

Test 4 (Seat Safety Control 2)

1. Run the engine at half throttle.
2. Disengage PTO lever (2).
3. Release the brake pedal (1).
4. Stand up. (DO NOT GET OFF THE MACHINE.)
5. Engine should shut off.

(1) Brake Pedal
(2) PTO Lever
(3) Pin
(4) Joint of Lift Arm
(5) PTO Wire

(A) ENGAGED
(B) DISENGAGED

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[4] FUEL SYSTEM

Injection Pump

Item	Factory Specifications	Allowable Limit
Injection Timing	0.28 to 0.31 rad (16° to 18°) Before T.D.C.	–
Fuel Tightness of Pump Element	–	13.73 MPa 140 kgf/cm^2 1991 psi
Fuel Tightness of Delivery Valve	10 seconds 13.73 → 12.75 MPa 140 →130 kgf/cm^2 1991 → 1849 psi	5 seconds 13.73 → 12.75 MPa 140 →130 kgf/cm^2 1991 → 1849 psi

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Injection Nozzle

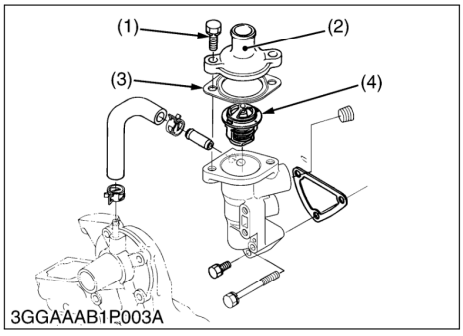
Fuel Injection Pressure	13.73 to 14.71 MPa 140 to 150 kgf/cm^2 1991 to 2134 psi	–
Fuel Tightness of Nozzle Valve Seat	When the pressure is 12.75 MPa (130 kgf/cm^2, 1849 psi), the valve seat must be fueltight	–

W1013973

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(2) Disassembling and Assembling



Thermostat Assembly

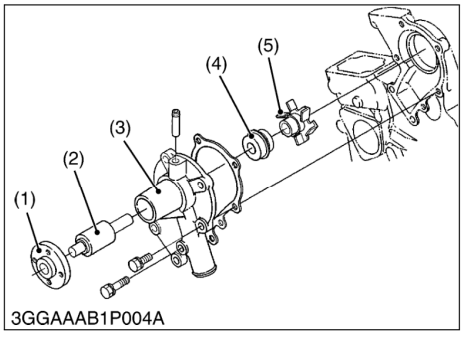
1. Remove the thermostat cover mounting screws (1), and remove the thermostat cover (2).
2. Remove the thermostat assembly (4).

(When reassembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) to both side of the gasket (3).

(1) Thermostat Cover Mounting Screw
(2) Thermostat Cover
(3) Thermostat Cover Gasket
(4) Thermostat Assembly

W10393690



Water Pump Assembly

1. Loosen the alternator mounting bolts, and remove the fan belt.
2. Remove the fan and fan pulley.
3. Remove the water pump assembly from the gear case cover.
4. Remove the water pump flange (1).
5. Press out the water pump shaft (2) with the impeller (5) on it.
6. Remove the impeller from the water pump shaft (2).
7. Remove the mechanical seal (4).

(When reassembling)

- Apply a liquid gasket (Three Bond 1215 or equivalent) to the both sides of gasket.
- Replace the mechanical seal with new one.

(1) Water Pump Flange
(2) Water Pump Shaft
(3) Water Pump Body
(4) Mechanical Seal
(5) Impeller

W10395040

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1. TROUBLESHOOTING

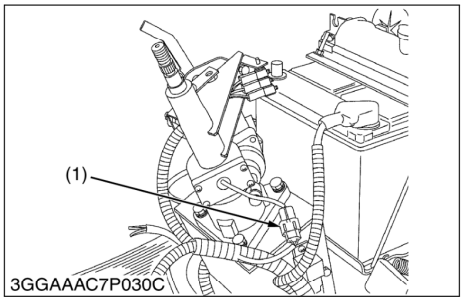
Symptom	Probable Cause	Solution	Reference Page
Insufficient Braking Force	Excessive brake pedal play	Adjust	3-S4
	Brake shoe worn	Replace	3-S10
	Brake drum worn	Replace	3-S10
	Grease or oil on brake shoe	Replace	3-S10
	Brake fulcrum shaft worn	Replace	3-S9
Brake Drags	Too small brake pedal play	Adjust	3-S4
	Weaken or broken brake return spring	Replace	–
Heavy brakes	Rusted brake pedal arm	Repair or replace	–
	Rusted brake actuating arm	Repair or replace	3-S9
	Rusted brake fulcrum shaft	Repair or replace	3-S9

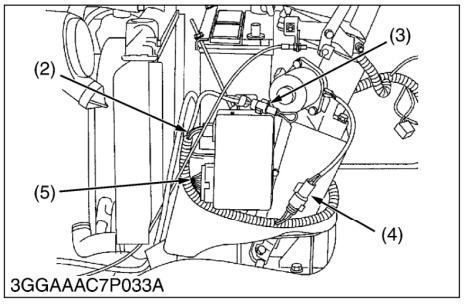
W1014322

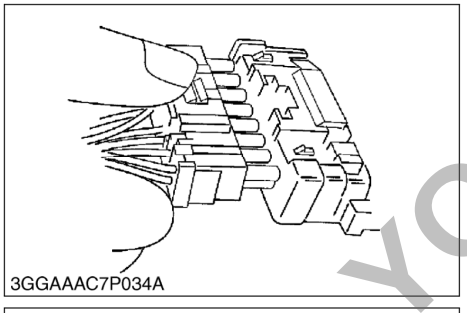
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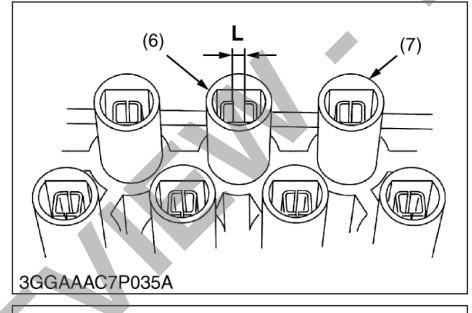
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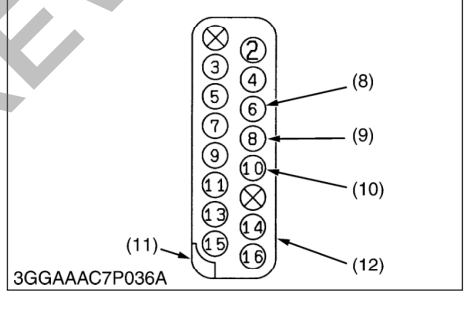
(5) Wire Harness











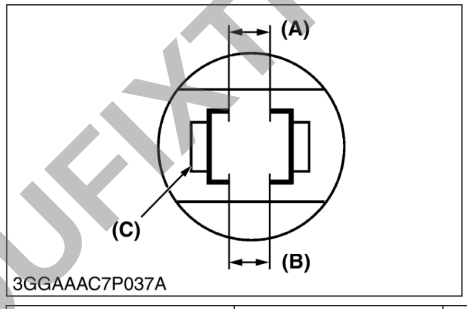
Checking the Torque Sensor Connectors for Poor Contact

1. Check the torque sensor **3P** connector (1) and related parts for the following defects.
   - Terminal off position
   - Terminal deformed or crushed
   - Female terminal too open: Improper connection (6)
   - Rubber sealing missing
   - Broken wire or sheath

■ **IMPORTANT**

- **To disconnect the connector, press the connector's lock and hold the connector itself. Never pull the cable.**

2. Visually check to see if the 3 terminals (8), (9) and (10), as shown below, are open as specified.
   Compare these terminals with the other ones for equal clearance. If any of them is too open, correct as follows.
3. Correction
   Put a precision regular screwdriver (0.9 mm (0.035 in.) or thinner tip) in the opening. Adjust the clearance to the specified value.



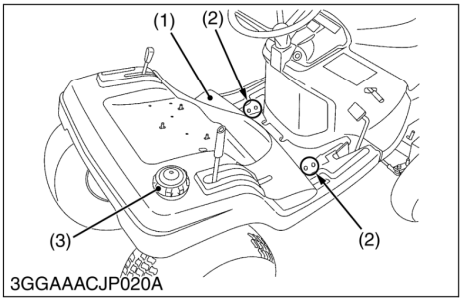
Coupler Pin Inside Clearance (**L**)	Factory spec.	0 to 0.1 mm 0 to 0.0039 in.

4. If any of the above problems is found, repair the trouble spot of replace the wire harness with new one. If there is no problem, go to “Checking the harness for continuity”

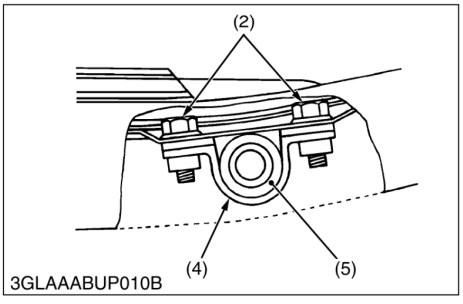
(1) Torque Sensor **3** Connector
(2) **4P** Connector (ECU)
(3) **3P** Connector (Service)
(4) **2P** Connector (Motor)
(5) **16P** Connector (ECU)
(6) Improper Connection
(7) Proper Connection
(8) Black/White Wire (Torque Sensor)
(9) Red Wire (Torque Sensor)
(10) White Wire (Torque Sensor)
(11) Notch
(12) EPS Controller **16P** Connector (As view from the wire-connected side)
(A) Clearance : L
(B) Clearance : L
(C) Put a Screwdriver

W1014281

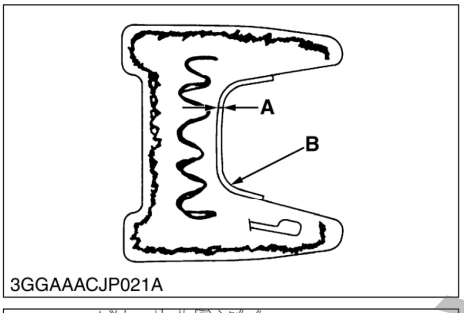
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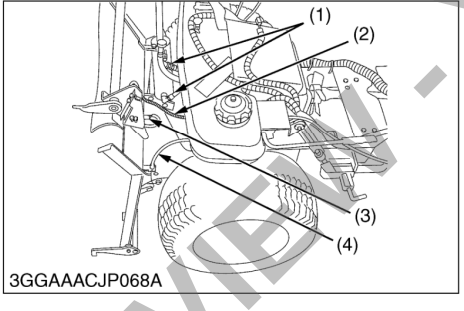
3GGAAACJP020A



3GLAAABUP010B



3GGAAACJP021A



3GGAAACJP068A

Separating Fender

1. Remove the speed change pedal.
2. Peel the step sheet (1) halfway.
3. Remove the step support mounting screws (2).
4. Remove the step support (5) and rubber bushing (6).
5. Remove the fuel cap (4).
6. Separate the fender from the frame.

(When reassembling)

- Apply grease to the inside of rubber bushing.
- Clean up the step sheet and the step. Apply instantaneous adhesive on the step sheet as shown in the figure.
- Position the step sheet so that the clearance between the step sheet and the panel is less than 2.0 mm (0.079 in.) as shown in the figure.

(1) Step Sheet
(2) Step Support Mounting Screws
(3) Fuel Cap
(4) Step Support
(5) Rubber Bushing

A : Less than 2.0mm (0.079 in.)
B : Panel

W1016411

Connector, PTO Clutch Return Cable and Cylinder Hose

1. Disconnect the **2P** connector (3) from the grass collector switch.
2. Remove the wiring (2) from the platform.
3. Disconnect the PTO clutch return cable (4).
4. Remove the PTO clutch return cable (4) from the platform.
5. Remove the grass collector cylinder hoses (1) from the grass collector cylinder.

(When reassembling)

- After assembling the PTO clutch return cable, be sure to adjust the PTO clutch return cable (See page 7-S6).
- Attach the center hydraulic hose of the control valve to the upper adapter of the grass collector cylinder.
- Attach the outer hydraulic hose of the control valve to the lower adaptor of the grass collector cylinder.

Tightening torque	Grass collector cylinder hose	21.6 N·m 2.2 kgf·m 15.9 ft-lbs

(1) Grass Collector Cylinder Hoses
(2) Wiring
(3) **2P** Connector
(4) PTO Clutch Return Cable

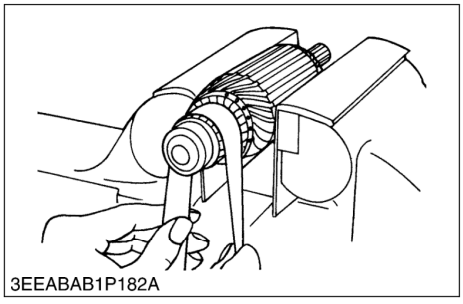
W1011677

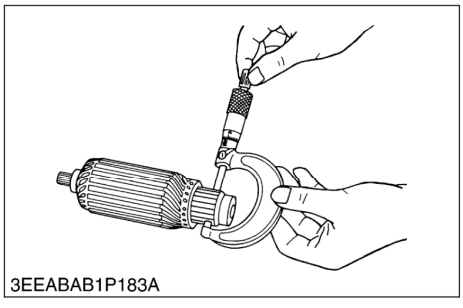
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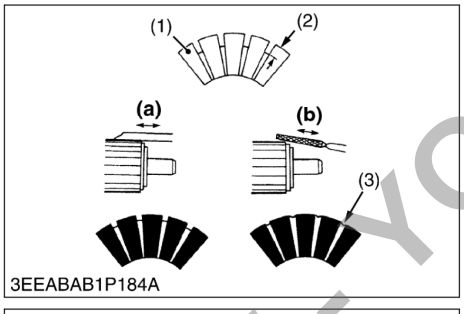
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(3) Servicing

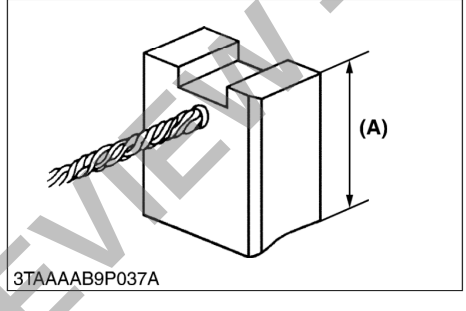
(A) Starter


3EEABAB1P182A

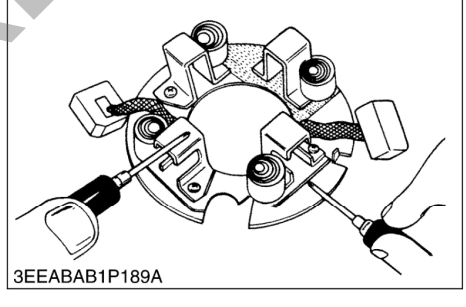

3EEABAB1P183A



3EEABAB1P184A



3TAAAAB9P037A


3EEABAB1P189A

Commutator and Mica

1. Check the contact face of the commutator for wear, and grind the commutator with emery paper if it is slightly worn.
2. Measure the commutator O.D. with an outside micrometer at several points.
3. If the minimum O.D. is less than the allowable limit, replace the armature.
4. If the difference of the O.D.'s exceeds the allowable limit, correct the commutator on a lathe to the factory specification.
5. Measure the mica undercut.
6. If the undercut is less than the allowable limit, correct it with a saw blade and chamfer the segment edges.

Commutator O.D	Factory spec.	28.0 mm 1.102 in.
	Allowable limit	27.0 mm 1.063 in.
Difference of O.D.'s	Factory spec.	Less than 0.02 mm Less than 0.0008 in.
	Allowable limit	0.05 mm 0.0020 in.
Mica undercut	Factory spec.	0.60 mm 0.0236 in.
	Allowable limit	0.20 mm 0.0079 in.

(1) Segment
(2) Undercut
(3) Mica

(a) Correct
(b) Incorrect

W1015371

Brush Wear

1. If the contact face of the brush is dirty or dusty, clean it with emery paper.
2. Measure the brush length **(A)** with vernier calipers.
3. If the length is less than the allowable limit, replace the yoke assembly and brush holder.

Brush length (**A**)	Factory spec.	14.0 mm 0.551 in.
	Allowable limit	11.1 mm 0.437 in.

W1015798

Brush Holder

1. Check the continuity across the brush holder and the holder support with an ohmmeter.
2. If it conducts, replace the brush holder.

W1015919

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