WSM

WORKSHOP MANUAL

TRACTOR,MOWER, FRONT LOADER

BX1870,BX2370,BX2670, RCK48-18BX,RCK54-23BX, RCK60B-23BX, RCK48P-18BX,RCK54P-23BX, LA203A,LA243A

Kubota

KiSC issued 12, 2012 A

TO THE READER

This Workshop Manual tells the servicing personnel about the mechanism, servicing and maintenance of KUBOTA Tractor BX1870D, BX2370D, BX2670D, KUBOTA Rotary Mower RCK48-18BX, RCK54-23BX, RCK60B-23BX, RCK48P-18BX, RCK54P-23BX and KUBOTA Front Loader LA203A, LA243A. It contains 4 parts: **"Information"**, **"General"**, **"Mechanism"** and **"Servicing"**.

■ Information

This section primarily contains information below.

- Safety First
- Safety Decal
- Specifications
- Dimensions

■ General

This section primarily contains information below.

- Engine Identification
- Model Identification
- General Precautions
- Maintenance Check List
- Check and Maintenance
- Special Tools

■ Mechanism

This section contains information on the structure and the function of the unit. Before you continue with the subsequent sections, make sure that you read this section.

Refer to the latest version of Workshop Manual (Code No. 9Y021-01870 / 9Y021-18200) for the diesel engine / tractor mechanism that this workshop manual does not include.

■ Servicing

This section primarily contains information below.

- Troubleshooting
- Servicing Specifications
- Tightening Torques
- Checking, Disassembling and Servicing

All illustrations, photographs and specifications contained in this manual are of the newest information available at the time of publication.

KUBOTA reserves the right to change all information at any time without notice.

Since this manual includes many models, information or illustrations and photographs can show more than one model.

December, 2012

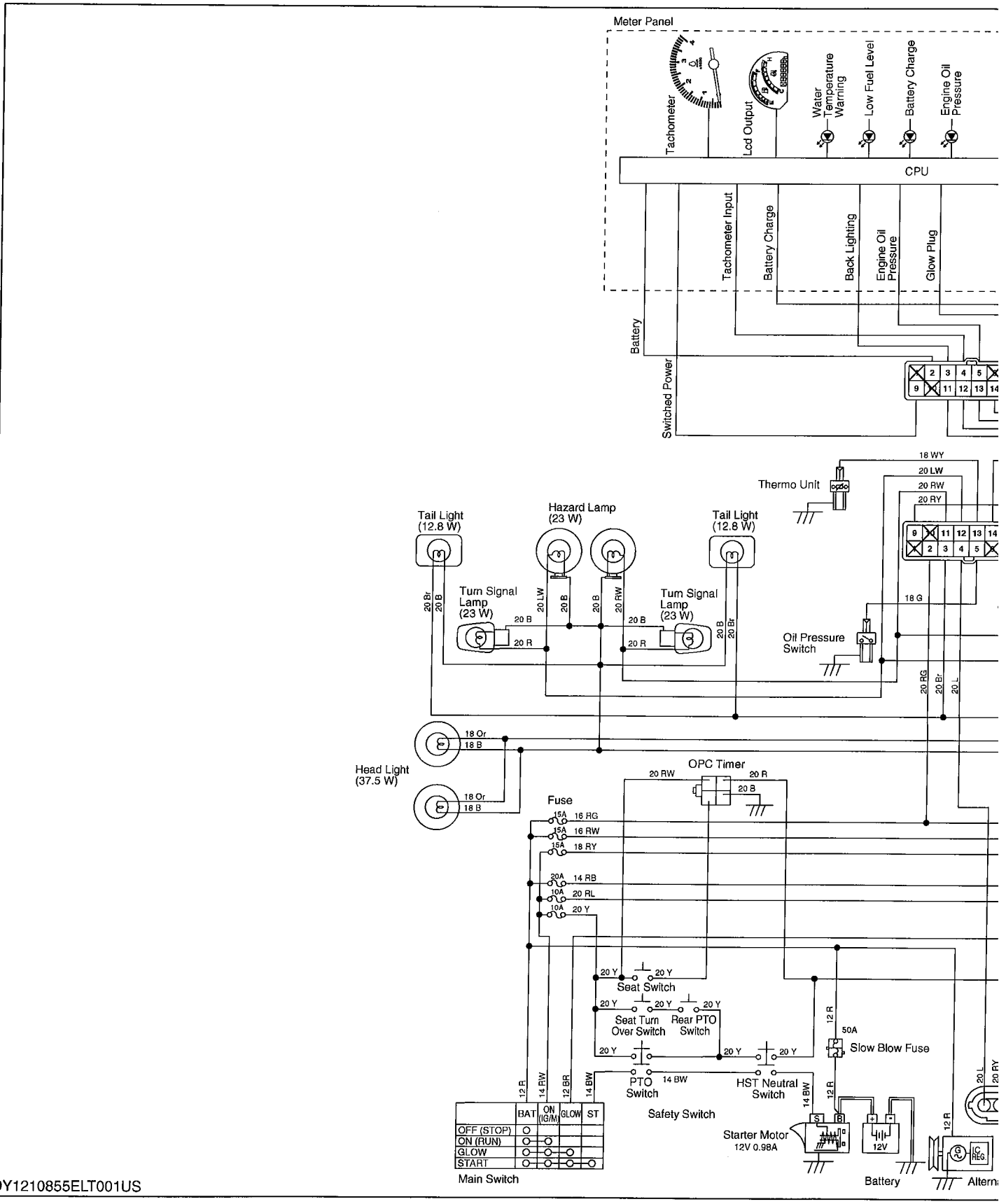
KiSC issued 12, 2012 A

6 ELECTRICAL SYSTEM

MECHANISM

CONTENTS

1. WIRING DIAGRAM



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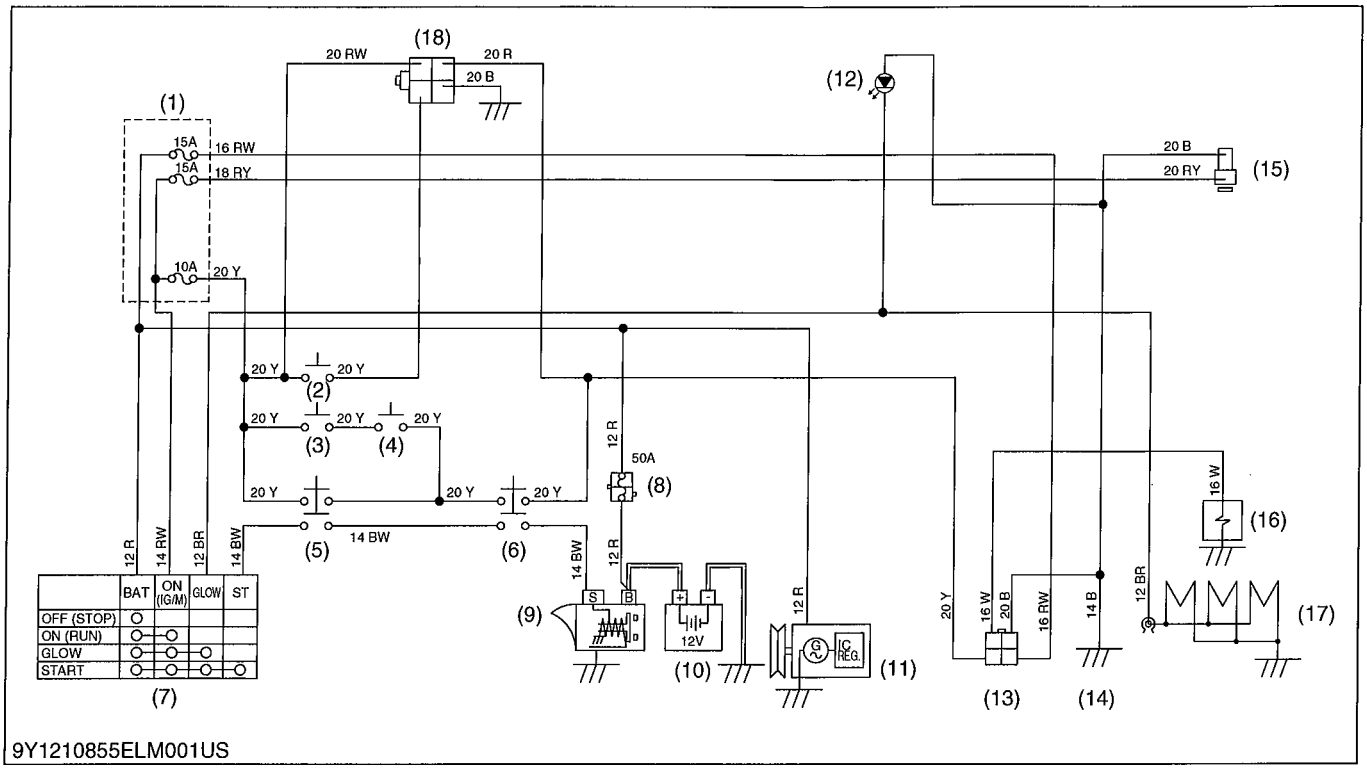
2. STARTING SYSTEM

[1] MAIN SWITCH POSITION



(1) Fuse
(2) Seat Switch
(3) Seat Turn Over Switch
(4) Rear PTO Switch
(5) PTO Switch
(6) HST Neutral Switch
(7) Main Switch
(8) Slow Blow Fuse
(9) Starter Motor
(10) Battery
(11) Alternator
(12) Glow Indicator
(13) Timer Relay
(14) Frame Earth
(15) Fuel Pump
(16) Solenoid
(17) Glow Plug
(18) OPC Timer

When the main switch (7) is turned to the **GLOW** position, the terminal **BAT** is connected to the terminal **ON** and **AC**. The glow plugs (17) become red-hot, and the preheat indicator lamp also lights on while preheating.

When the main switch is then turned to the **START** position with the safety switches on, the terminal **BAT** is connected to the terminals **GLOW** and **ST**. Consequently, battery (10) current flows to the starter motor (9) and start the engine.

The main switch automatically returns to the **ON** position, the terminal **BAT** is connected only to the terminal **GLOW**, thereby causing the starting circuit to be opened, stopping the starter motor.

When the main switch turned from the **ON** position to the **OFF** position, the fuel cut-off solenoid moves the fuel injection pump control rack to the **"No Fuel Injection"** position and stops the engine.

The BX2670D tractor (with the OPC timer (18)) equipped the operator presence control (OPC) system which automatically stops the engine in approximately one second when operator stands from the seat while shifting the PTO clutch lever and range gear shift lever.

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[2] SAFETY SWITCH

This switch is electrically closed in normal condition (normally closed type). The switch operates as sensor detecting and transmitting the position of HST pedal, PTO lever, independent PTO lever, and seat to engine stop solenoid.

Type of Switch	Safety Switch Name	Number of Switch Contact
Normal open type	Seat switch	1
	Seat turn over switch	1
	PTO shift lever switch	1
	Independent PTO Lever Switch (Rear PTO Switch)	2
	HST pedal neutral switch	2

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Lever / Pedal Position, Engine Condition and Switch Condition

No.	Lever / Pedal Position					Engine Condition	
	HST Pedal Neutral switch; Neutral: ON Forward or Reverse: OFF	**Independent PTO Lever Switch; Independent PTO engaged: ON Independent PTO disengaged: OFF**	**PTO Shift Lever Switch; Rear PTO Selected: ON Mid PTO or Mid PTO and Rear PTO Selected: OFF**	**Operator's Seat Switch; Occupied: ON Off Seat or Vacant: OFF**	**Seat Turn Over Switch; Normal position: OFF Turn over: ON**	**Engine Stopping**	**Engine Starting**
1	Neutral Position: ON	Disengaged: OFF	Rear PTO Selected: ON	On Seat: ON	Normal: OFF	Running	Can Start
2				Off Seat: OFF	Normal: OFF		
3					Turn Over: ON		
4			Mid PTO or Mid PTO and Rear PTO Selected: OFF	On Seat: ON	Normal: OFF		
5				Off Seat: OFF	Normal: OFF		
6					Turn Over: ON		
7		Engaged: ON	Rear PTO Selected: ON	On Seat: ON	Normal: OFF	Running	Can not Start
8				Off Seat: OFF	Normal: OFF	Stop	
9					Turn Over: ON	Running	
10			Mid PTO or Mid PTO and Rear PTO Selected: OFF	On Seat: ON	Normal: OFF	Running	
11				Off Seat: OFF	Normal: OFF	Stop	
12					Turn Over: ON	Stop	
13	Forward (OFF) or Reverse (OFF)	Disengaged: OFF	Rear PTO Selected: ON	On Seat: ON	Normal: OFF	Running	
14				Off Seat: OFF	Normal: OFF	Stop	
15					Turn Over: ON	Stop	
16			Mid PTO or Mid PTO and Rear PTO Selected: OFF	On Seat: ON	Normal: OFF	Running	
17				Off Seat: OFF	Normal: OFF	Stop	
18					Turn Over: ON	Stop	
19		Engaged: ON	Rear PTO Selected: ON	On Seat: ON	Normal: OFF	Running	
20				Off Seat: OFF	Normal: OFF	Stop	
21					Turn Over: ON	Stop	
22			Mid PTO or Mid PTO and Rear PTO Selected: OFF	On Seat: ON	Normal: OFF	Running	
23				Off Seat: OFF	Normal: OFF	Stop	
24					Turn Over: ON	Stop	

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[3] OPERATOR PRESENCE CONTROL (OPC)

The BX Tractor equips operator presence control (OPC) system which automatically stops the engine when operator stands up from the operator's seat while shifting the PTO lever or the speed control pedal.

Tractor without the OPC timer stops quickly and tractor with the OPC timer stops in approximately one second when standing up from the seat.

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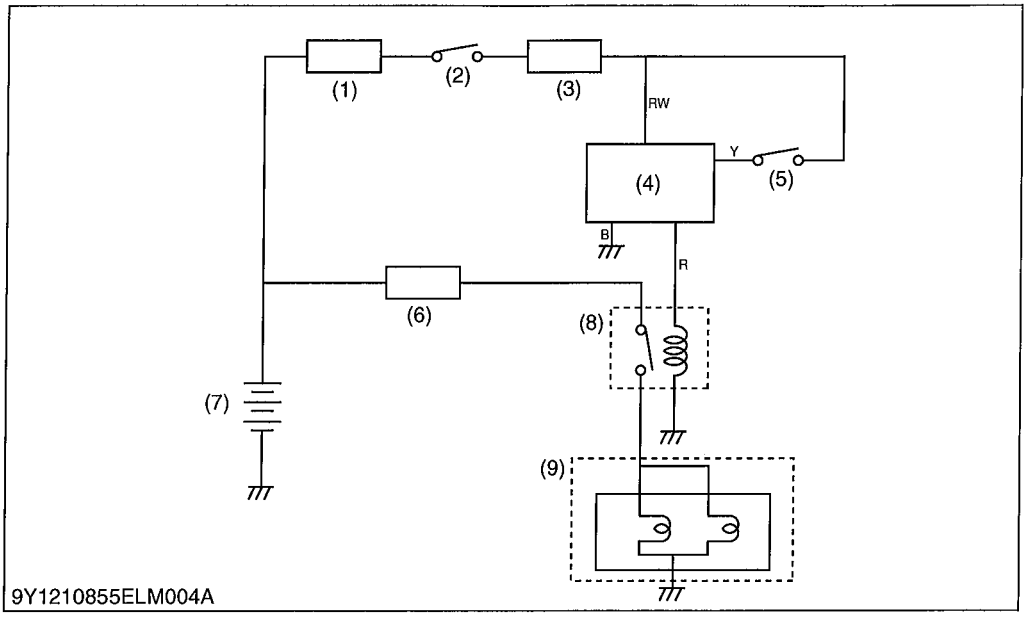
Electrical Circuit (Tractor with OPC Timer)



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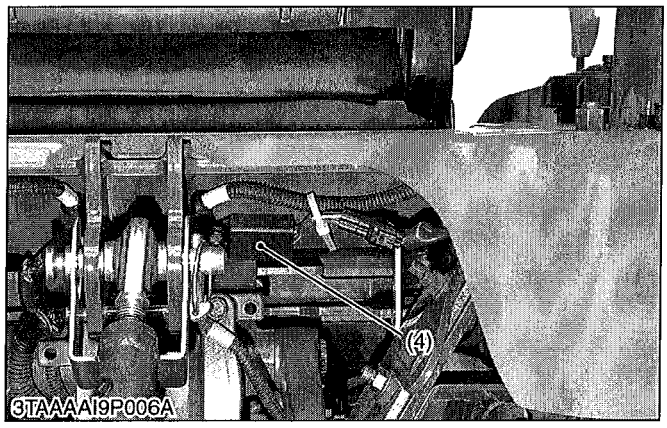
(1) Slow Blow Fuse
(2) Main Switch
(3) Fuse (10 A)
(4) OPC Timer
(5) Seat Switch (From Seat Switch **ON** or **OFF**)
(6) Fuse (15 A)
(7) Battery
(8) Engine Stop Solenoid Timer Relay
(9) Engine Stop Solenoid



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General electrical circuit of the tractor OPC timer is shown in the figure.

1. When sitting on the operator's seat in the state of the main switch **"ON"**, the battery voltage passes to the seat switch and the OPC timer (4), and keep the solenoid relay (8).
2. When standing up from the operator's seat, the circuit from the seat switch to the OPC timer is cut. However, if the PTO lever (or the speed control pedal) are set at **"Neutral"** position, the circuit from the battery to the solenoid relay (8) is formed with the PTO switch (or HST switch).
3. When standing up from the operator's seat while shifting the levers, the circuit from the battery to the solenoid relay (8) is cut, and the engine is stopped by function of the solenoid (9).

■ Seat Switch

The seat switch has two positions.

When the operator's seat is occupied, the switch contact point is at **"ON"** position. When the operator's seat is not occupied, its contact point is at **"OFF"** position.

■ OPC Timer

OPC timer is located electrically at between the seat switch (5) and the solenoid relay (8).

When the current supply from the seat switch (5) is cut, the OPC timer (4) adopted for the OPC system has kept the state of **"ON"** position for approximately one second.

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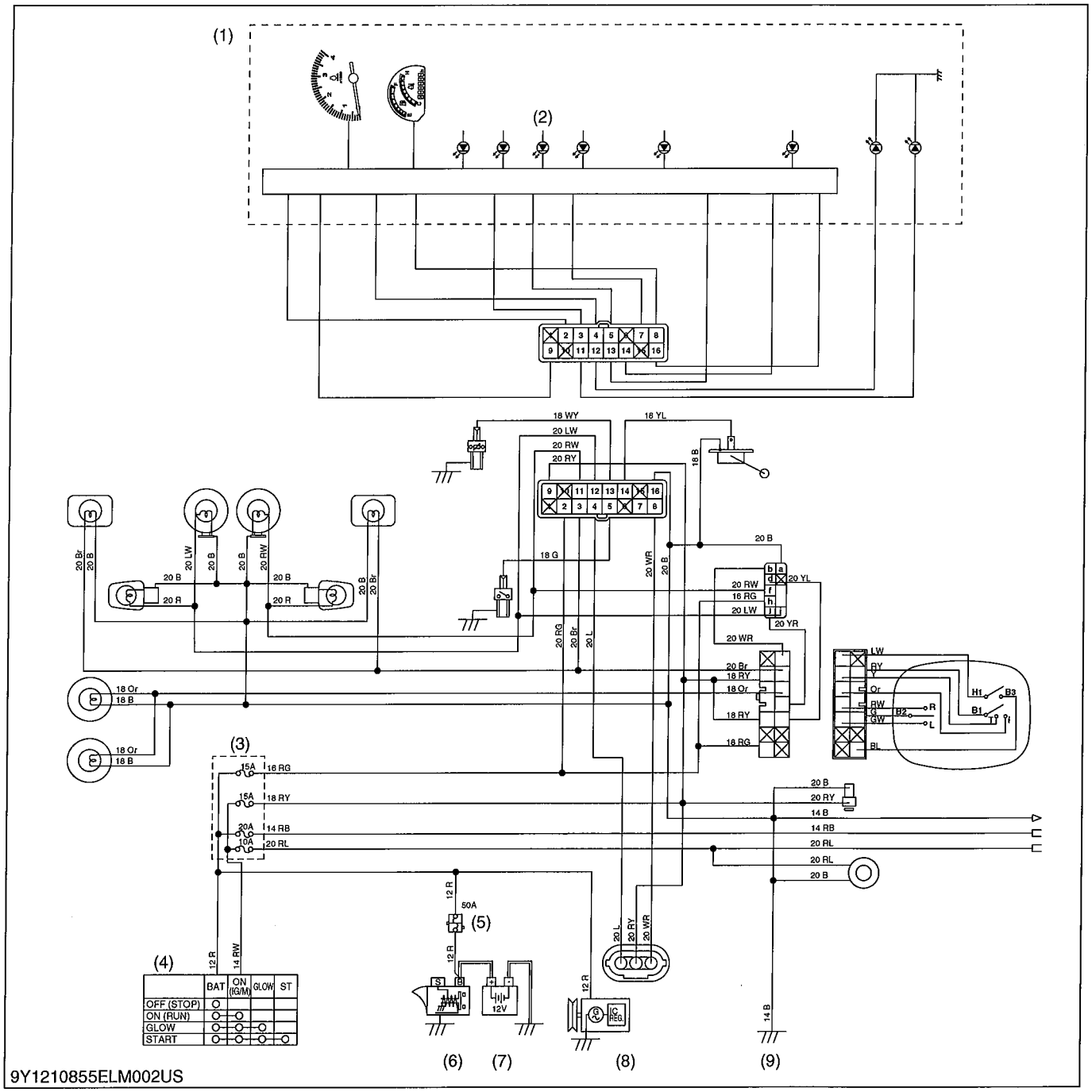
3. CHARGING SYSTEM

[1] ELECTRICAL CIRCUIT



(1) Meter Panel
(2) Battery Charge Indicator
(3) Fuse
(4) Main Switch
(5) Slow Blow Fuse
(6) Starter Motor
(7) Battery
(8) Alternator
(9) Frame Earth

The charging system supplies electric power for various electrical devices and also charges the battery while the engine runs.

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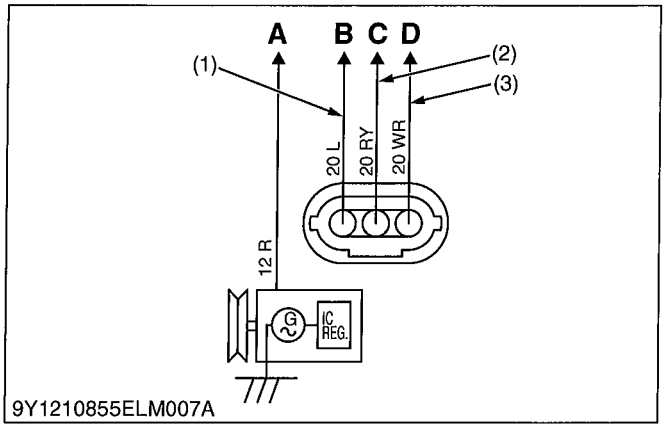
[2] IC REGULATOR (3P CONNECTOR TYPE)



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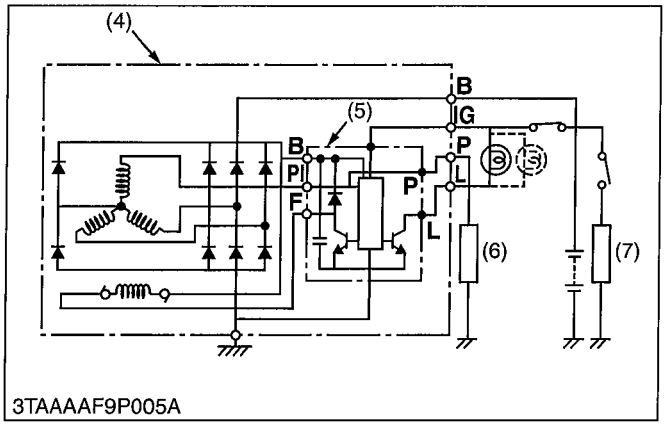

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3P connector is connected to the IC regulator. **3P** connector consists of three leads, L (Blue) lead (1), RY (Red / Yellow) lead (2), and WR (White / Red) lead (3).

L (Blue) lead (1) is a lead to transmit the pulse from the alternator to hour meter and tachometer. When turning on the main switch to **"ON"** position, the hour meter indicates operated hours.

While the engine runs, the tachometer indicates the present engine revolutions.

RY (Red / Yellow) lead (2) is a lead to chassis.

WR (White / Red) lead (3) is a lead to the charge lamp.

(1) L (Blue) Lead
(2) RY (Red / Yellow) Lead
(3) WR (White / Red) Lead
(4) Alternator Assembly
(5) IC Regulator
(6) Load
(7) Load

A: To the Battery
B: To Hour Meter and Tachometer
C: To Main Switch
D: To Charge Indicator

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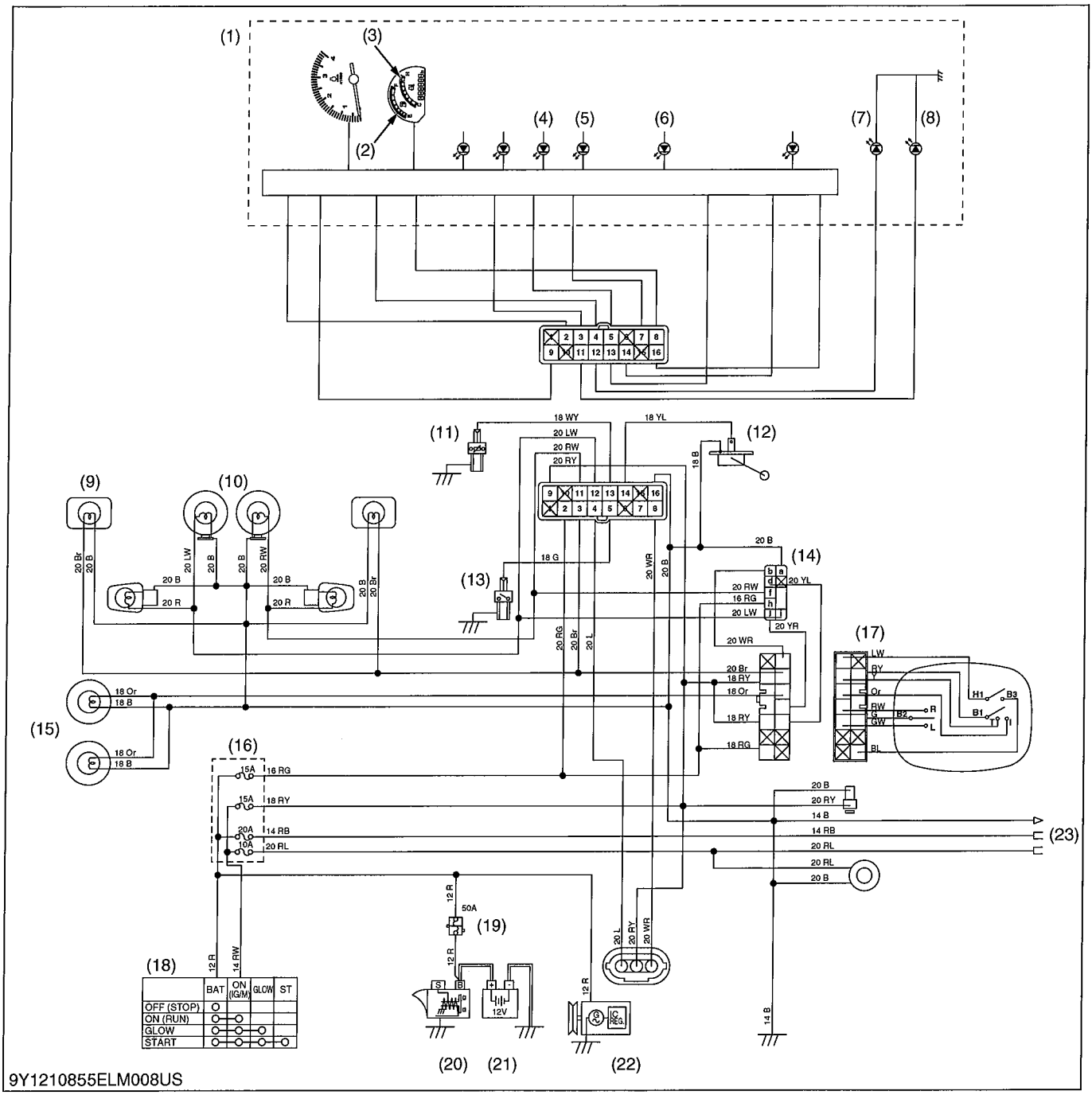
4. LIGHTING SYSTEM



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(1) Meter Panel
(2) Fuel Gauge
(3) Water Temperature Gauge
(4) Battery Charge Indicator
(5) Oil Pressure Lamp
(6) Glow Indicator
(7) Turn (Left)
(8) Turn (Right)
(9) Tail Light (12.8 W)
(10) Hazard Lamp (23 W)
(11) Thermo Unit
(12) Fuel Sensor
(13) Oil Pressure Switch
(14) Flasher Unit
(15) Head Light (37.5 W)
(16) Fuse
(17) Combination Switch
(18) Main Switch
(19) Slow Blow Fuse
(20) Starter Motor
(21) Battery
(22) Alternator
(23) Working Light

The lighting system consists of main switch, head light switch, turn signal light switch, hazard switch, head lights, turn signal lights, tail lights, and etc..

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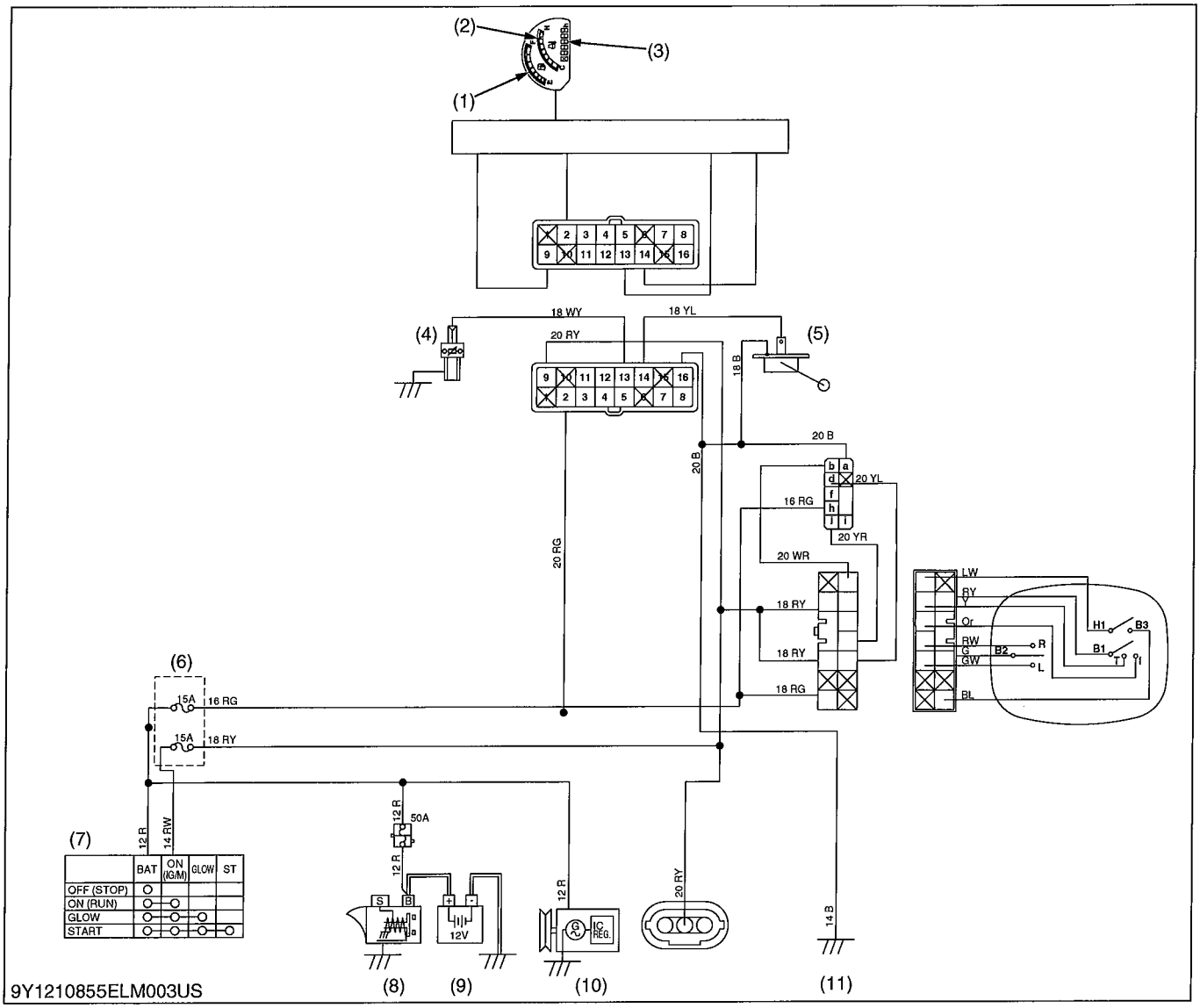
5. GAUGES

[1] ELECTRICAL CIRCUIT



(1) Fuel Gauge
(2) Water Temperature Gauge
(3) Hour Meter
(4) Thermo Unit
(5) Fuel Sensor
(6) Fuse
(7) Main Switch
(8) Starter Motor
(9) Battery
(10) Alternator
(11) Frame Earth

The fuel quantity is indicated by the fuel gauge. The coolant temperature is indicated by the water temperature gauge.

The operated hour indicated by the hour meter.

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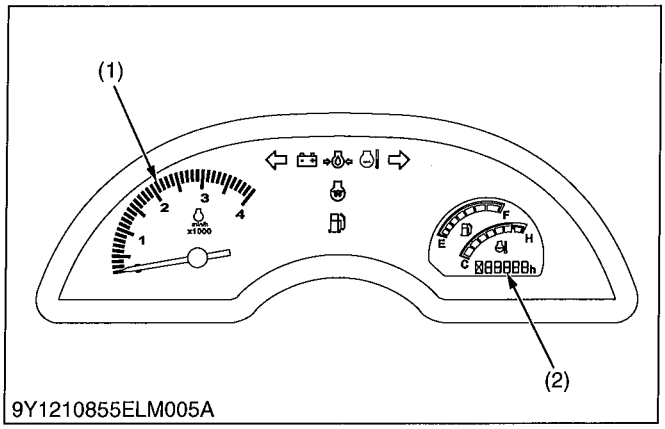
[2] HOUR AND TACHOMETER



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The electrical hour meter and tachometer is equipped on the meter panel.

This meter indicates the operated hours when the main switch is turned to **"ON"** position.

After starting the engine, this meter indicates the present engine revolution.

The meter picks up the voltage from the IC regulator located in the alternator.

The IC regulator sends a signal of the engine revolution to the meter.

The meter calculates the signal. It changes and indicates the signal to the engine revolution in cooperation with the voltage.

(1) Tachometer (2) Hour Meter

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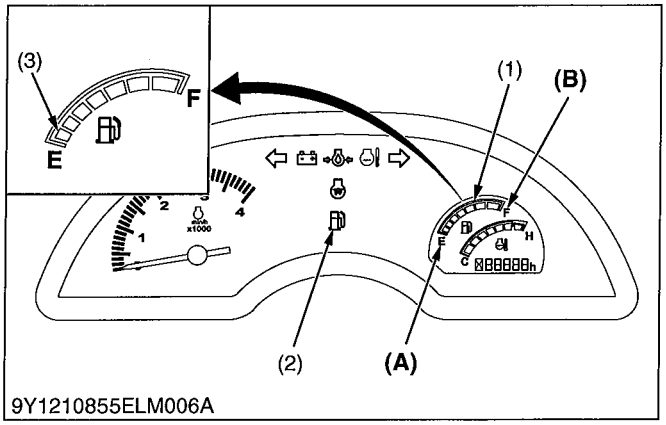
[3] FUEL LEVEL GAUGE



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Fuel level gauge and fuel level sensor are connected by the wiring.

Fuel level gauge detects the resistance from the fuel level sensor.

Fuel level gauge indicates the fuel level in the fuel tank.

The relationship between the resistance of the fuel level sensor and the fuel level gauges is as follows.

When the fuel is close to empty level, the low fuel indicator (2) of the Easy Checker™ comes on and the segment K1 (3) of the fuel gauge starts blinking at 1-second intervals.

Resistance of Fuel Level Sensor	Reading on Fuel Level Gauge
Approx. 110 Ω	Empty
Approx. 3 Ω	Full

(1) Fuel Level Gauge
(2) Low Fuel Indicator
(3) Segment K1
(A) Empty
(B) Full

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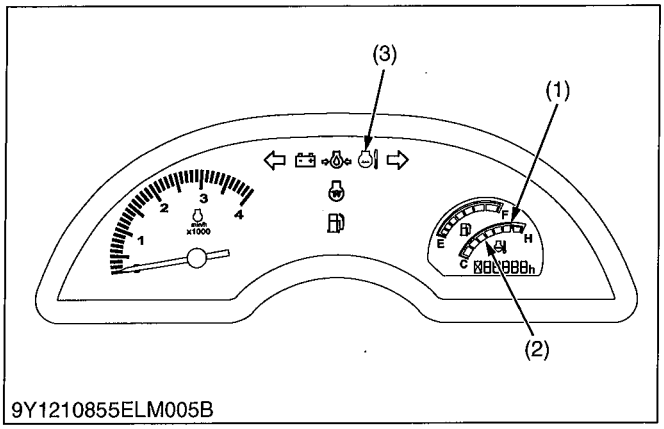
[4] WATER TEMPERATURE GAUGE



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Water temperature gauge is located on the meter panel board.

The water temperature gauge and the thermo unit are connected by the wiring.

The water temperature gauge detects the resistance from the thermo unit.

The water temperature gauge indicates the coolant temperature in the engine cylinder head.

The relationship between the resistance of thermo unit and reading on the water temperature gauge is as follows.

- When the coolant temperature stays at 125 °C (257 °F) for 5 seconds, the indicator on the Easy Checker™ comes on.
- When the coolant temperature stays above 130 °C (266 °F) for 5 seconds, the indicator remains on and all segments of the coolant temperature gauge start blinking at 1-second intervals.
- When the coolant temperature stays below 120 °C (248 °F) for 5 seconds, the indicator turns off.

Resistance of Thermo Unit	Reading on Water Temperature gauge
Approx. 220 Ω	Min.
Approx. 3 Ω	Max.

(1) Water Temperature Gauge
(2) Segments of Water Temperature
(3) Water Temperature Indicator

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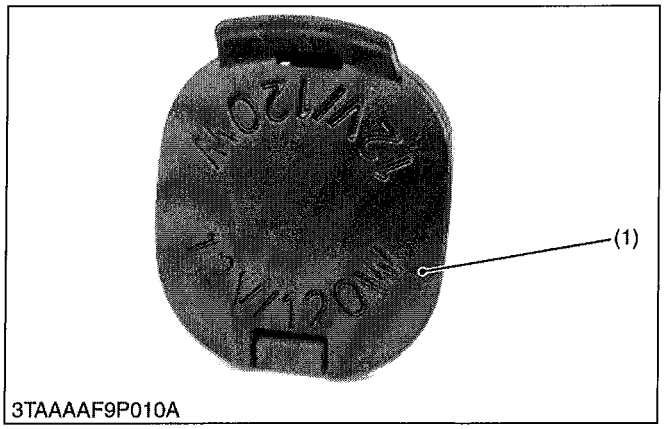
6. OTHERS

[1] DC OUTLET



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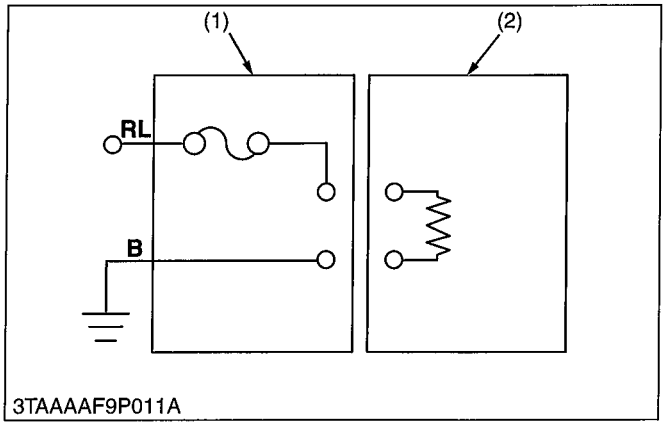

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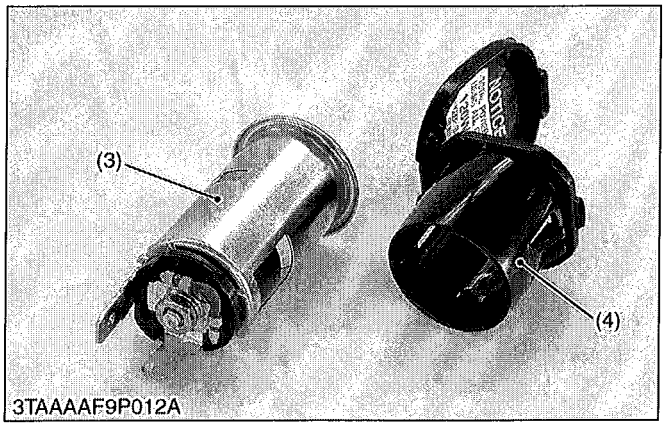

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DC outlet is equipped to this machine.

The capacity of the DC outlet is 12 V / 120 W.

The electrical device as a CD player, a mobile phone battery charger can be used to the DC outlet.

The DC outlet (1) consists of the DC outlet body (3) and the cover (4).

(1) DC Outlet
(2) Electrical Device
(3) DC Outlet Body
(4) Cover

RL: Red / Blue Lead
B: Black Lead

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SERVICING

CONTENTS

1. TROUBLESHOOTING

FUSE AND WIRING

Symptom	Probable Cause	Solution	Reference Page
All Electrical Equipments Do Not Operate	Battery discharged or damaged	Recharge or replace	G-25
	Battery positive cable disconnected or improperly connected	Repair or replace	–
	Battery negative cable disconnected or improperly connected	Repair or replace	–
	Slow blow fuse blown	Replace	G-39
Fuse Blown Frequently	Short-circuited	Repair or replace	–

BATTERY

Symptom	Probable Cause	Solution	Reference Page
Battery Discharges Too Quickly	Battery damaged	Replace	6-S7
	Alternator damaged	Repair or replace	6-S28
	IC Regulator damaged	Replace	–
	Wiring harness disconnected or improperly connected (between battery positive terminal and regulator **B** terminal)	Repair or replace	–
	Cooling fan belt slipping	Adjust tension	G-28

STARTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Starter Motor Does Not Operate	Battery discharged or damaged	Recharge or replace	G-25
	Slow blow fuse blown	Replace	G-39
	Safety switch improperly adjusted or damaged	Repair or replace	6-S12
	Wiring harness disconnected or improperly connected (between main switch **50** terminal and safety switches, between safety switches and starter motor, between battery positive terminal and starter motor)	Repair or replace	–
	Starter motor damaged	Repair or replace	6-S28
	Main switch damaged	Replace	6-S9
Engine Does Not Stop When Main Switch Is Turned OFF	Fuse blown (15 A)	Replace	G-39
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and engine stop solenoid)	Repair or replace	–
	Engine stop solenoid damaged	Replace	6-S16
	Timer relay damaged	Replace	6-S16
Engine Does Not Start	Engine stop solenoid damaged	Replace	6-S16
	Timer relay damaged	Replace	6-S16

OPERATOR PRESENCE CONTROL (OPC)

Symptom	Probable Cause	Solution	Reference Page
Engine Does Not Stop	Solenoid fuse blown (15 A)	Replace	G-39
	Engine stop solenoid relay damaged	Replace	6-S16
	Engine stop solenoid damaged	Replace	6-S16
	PTO shift lever switch damaged	Adjust or replace	6-S12
	HST pedal switch damaged	Adjust or replace	6-S13
	Wiring harness disconnected or improperly connected (between key stop solenoid relay and engine stop solenoid, between engine stop solenoid relay and battery positive terminal)	Repair or replace	–
Starter Motor Does Not Operate	Solenoid fuse blown (15 A)	Replace	G-39
	Engine stop solenoid damaged	Replace	6-S16
	Engine stop solenoid relay damaged	Replace	6-S16
	Seat switch or seat turn over switch damaged	Adjust or replace	6-S14
	PTO shift lever switch damaged	Adjust or replace	6-S12
	HST pedal switch damaged	Adjust or replace	6-S13
	Wiring harness disconnected or improperly connected (between key stop solenoid relay and engine stop solenoid, between engine stop solenoid relay and battery positive terminal)	Repair or replace	–
Engine Stops When HST Pedal Is Pushed in Forward or in Reverse	Wrong wiring of seat switch and seat turn over switch	Proper wiring	–
Engine Suddenly Stops	Seat reverse switch	Adjust the switch position	6-S14

CHARGING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Charging Lamp Does Not Light when Main Switch Is Turned ON	Fuse blown (15 A)	Replace	G-39
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and panel board, between panel board and dynamo)	Repair or replace	–
	Alternator damaged	Repair or replace	6-S28
	IC regulator damaged	Replace	–
Charging Lamp Does Not Go Off When Engine Is Running	Wiring harness disconnected or improperly connected (between main switch **30** terminal and dynamo, between panel board and dynamo)	Repair or replace	–
	Alternator damaged	Repair or replace	6-S28
	IC regulator damaged	Replace	–

LIGHTING SYSTEM

Symptom	Probable Cause	Solution	Reference Page
Head Light Does Not Light	Fuse blown (15 A)	Replace	G-39
	Bulb blown	Replace	G-40
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and head light switch, between head light switch and head light)	Repair or replace	–
Tail Light Does Not Light	Fuse blown (15 A)	Replace	G-39
	Bulb blown	Replace	G-40
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and head light switch, between head light switch and tail light)	Repair or replace	–
Illumination Light Does Not Light	Fuse blown (15 A)	Replace	G-39
	Wiring harness disconnected or improperly connected (between main switch **AC** terminal and head light switch, between head light switch and illumination light)	Repair or replace	–
Hazard Lamp Does Not Light	Fuse blown (15 A)	Replace	G-39
	Bulb blown	Replace	G-40
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Flasher unit damaged	Replace	6-S21
	Hazard switch damaged	Replace	6-S20
Hazard Indicator Lamp Does Not Light	Wiring harness disconnected or improperly connected	Repair or replace	–
Hazard Lamp Does Not Flicker	Flasher unit damaged	Replace	6-S21
Turn Signal Light Does Not Light	Fuse blown (15 A)	Replace	G-39
	Bulb blown	Replace	G-40
	Wiring harness disconnected or improperly connected	Repair or replace	–
	Flasher unit damaged	Replace	6-S21
	Turn signal switch damaged	Replace	6-S19
Turn Signal Light Indicator Lamp Does Not Light	Wiring harness disconnected or improperly connected (turn signal switch and indicator lamp)	Repair or replace	–
Turn Signal Light Does Not Flicker	Flasher unit damaged	Replace	6-S21
	Turn signal switch damaged	Replace	6-S19
Glow Lamp Does Not Light When Main Switch Is in Pre-heat Position	Battery discharged or damaged	Recharge or replace	G-25
	Slow blow fuse blown	Replace	G-39
	Wiring harness disconnected or improperly connected (between main switch **19** terminal and pre-heat indicator, between pre-heat indicator and glow plugs)	Repair or replace	–
	Main switch damaged	Replace	6-S9

Symptom	Probable Cause	Solution	Reference Page
Oil Pressure Lamp Lights Up When Engine Is Running	Engine oil pressure too low	Repair engine	–
	Engine oil insufficient	Fill	G-9
	Oil pressure switch damaged	Replace	6-S23
	Short circuit between oil pressure switch lead and chassis	Repair	–
Oil Pressure Lamp Does Not Light When Main Switch Is Turned ON and Engine Is Not Running	Oil pressure switch damaged	Replace	6-S23
	Wiring harness disconnected or improperly connected (between panel board and oil pressure switch)	Repair or replace	–

GAUGES

Symptom	Probable Cause	Solution	Reference Page
Fuel Warning Lamp Does Not Light	Fuel gauge damaged	Replace	–
	Fuel level sensor damaged	Replace	6-S23
	Wiring harness disconnected or improperly connected (between fuel gauge and fuel level sensor)	Repair or replace	–
Coolant Temperature Gauge Does Not Function	Coolant temperature gauge damaged	Replace	–
	Coolant temperature sensor damaged	Replace	6-S24
	Wiring harness disconnected or improperly connected (between coolant temperature gauge and coolant temperature sensor)	Repair or replace	–

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Battery	Voltage	More than 12 V	–
	Potential Difference	Less than 0.1 V	–
Glow Plug	Resistance	Approx. 0.9 Ω	–
Alternator	Charging Current / Alternator Speed	14 to 15 A / 5200 min^{-1} (rpm)	–
	Charging Voltage / Alternator Speed	14 to 15 A / 5200 min^{-1} (rpm)	–
Head Light Switch	Switch **OFF**	Infinity	–
	Switch **ON**	0 Ω	–
Turn Signal Switch	Switch **OFF**	Infinity	–
	Switch **R**	0 Ω	–
	Switch **L**	0 Ω	–
Hazard Lamp Switch	Switch **OFF**	Infinity	–
	Switch **ON**	0 Ω	–
Starter • Commutator	O.D.	30.0 mm 1.181 in.	29.0 mm 1.142 in.
	Difference of O.D.'s	Less than 0.02 mm 0.0008 in.	0.05 mm 0.0020 in.
• Mica	Undercut	0.50 to 0.80 mm 0.0197 to 0.0315 in.	0.20 mm 0.0079 in.
• Brush	Length	14.0 mm 0.551 in.	9.0 mm 0.354 in.
Alternator	No-load Voltage	More than 14 V	–
• Starter	Resistance	Less than 1.0 Ω	–
• Rotor	Resistance	2.9 Ω	–
• Slip Ring	O.D.	14.4 mm 0.567 in.	14.0 mm 0.551 in.
• Brush	Length	10.5 mm 0.413 in.	8.4 mm 0.331 in.
Hand Throttle Lever	Operating Force	89.0 to 11 N 9.08 to 11.3 kgf 20 to 25 lbf	–

9Y1210855ELS0002US0

3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-13.)

Item	N·m	kgf·m	lbf·ft
Starter **B** terminal nut	5.9 to 11.8	0.6 to 1.2	4.3 to 8.7
Pulley nut	58.4 to 78.9	5.95 to 80.5	43.1 to 58.2

9Y1210855ELS0003US0

4. CHECKING, DISASSEMBLING AND SERVICING

[1] CHECKING AND ADJUSTING

⚠ CAUTION

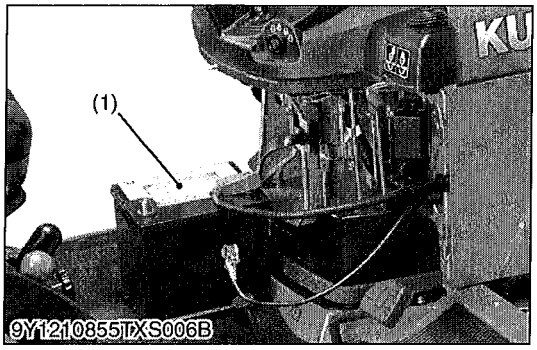
- **To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the negative cable is attached to the negative terminal.**
- **Never remove the battery cap while the engine is running.**
- **Keep electrolyte away from eyes, hands and clothes. If you are spattered 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.**

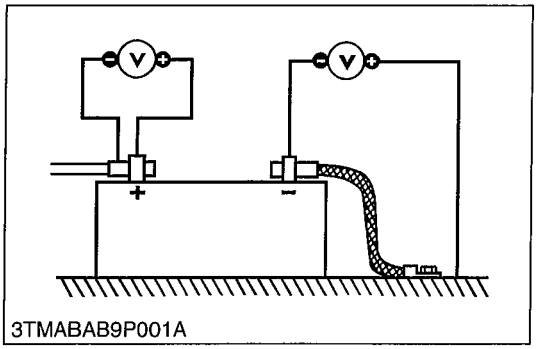
■ IMPORTANT

- **If the machine is to be operated for a short time without battery (using a slave battery for starting), use additional current (lights) while engine is running and insulate terminal of battery. If this advice is disregarded, damage to alternator and regulator may result.**

9Y1210855ELS0004US0

(1) Battery





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 specification	More than 12 V

9Y1210855ELS0005US0

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 specification	Less than 0.1 V

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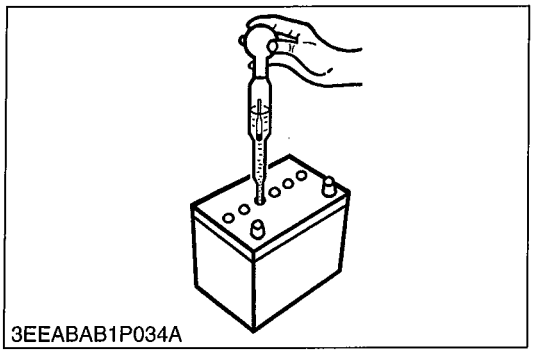
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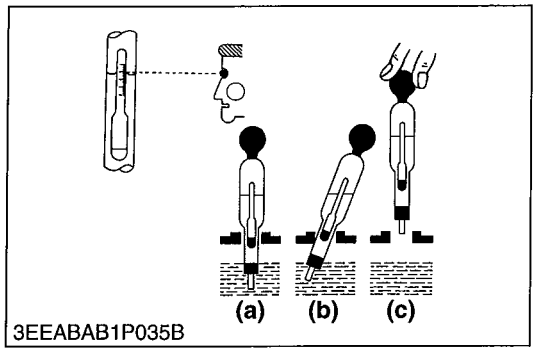

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Battery Specific Gravity

1. Check the specific gravity of the electrolyte in each cell with a hydrometer.
2. When the electrolyte temperature differs from that at which the hydrometer was calibrated, correct the specific gravity reading following the formula mentioned in **(Reference)**.
3. If the specific gravity is less than 1.215 (after it is corrected for temperature), charge or replace the battery.
4. If the specific gravity differs between any two cells by more than 0.05, replace the battery.

■ **NOTE**

- **Hold the hydrometer tube vertical without removing it from the electrolyte.**
- **Do not suck too much electrolyte into the tube.**
- **Allow the float to move freely and hold the hydrometer at eye level.**
- **The hydrometer reading must be taken at the highest electrolyte level.**

(Reference)

- Specific gravity slightly varies with temperature. To be exact, the specific gravity decreases by 0.0007 with an increase of 1 °C (0.0004 with an increase of 1 °F) in temperature, and increases by 0.0007 with a decreases of 1 °C (0.0004 with a decrease of 1 °F).
  Therefore, using 20 °C (68 °F) as a reference, the specific gravity reading must be corrected by the following formula:
  - Specific gravity at 20 °C = Measured value + 0.0007 × (electrolyte temperature −20 °C)
  - Specific gravity at 68 °F = Measured value + 0.0004 × (electrolyte temperature −68 °F)

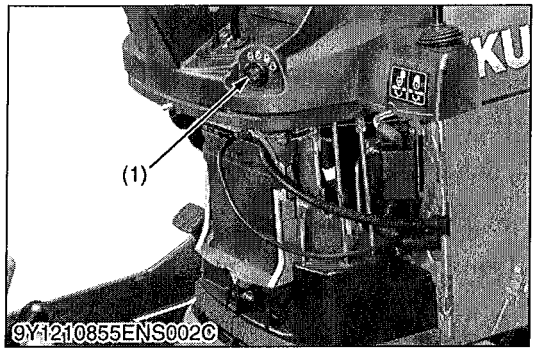
Specific Gravity	State of Charge
1.260 Sp. Gr.	100 % Charged
1.230 Sp. Gr.	75 % Charged
1.200 Sp. Gr.	50 % Charged
1.170 Sp. Gr.	25 % Charged
1.140 Sp. Gr.	Very Little Useful Capacity
1.110 Sp. Gr.	Discharged

At an electrolyte temperature of 20 °C (68 °F)

(a) Good
(b) Bad
(c) Bad

9Y1210855ELS0007US0

(2) Main Switch



Main Switch Connector Voltage

1. Remove the under cover panel.
2. Disconnect the **4P** connector and remove the main switch (1).
3. Measure the voltage with a voltmeter across the connector **30** (red) terminal and chassis.
4. If the voltage differs from the battery voltage (11 to 14 V), the wiring harness is faulty.

Voltage	Connector **30** terminal – chassis	Approx. battery voltage

(1) Main Switch

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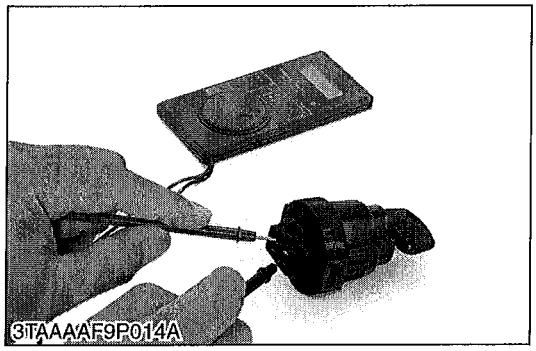
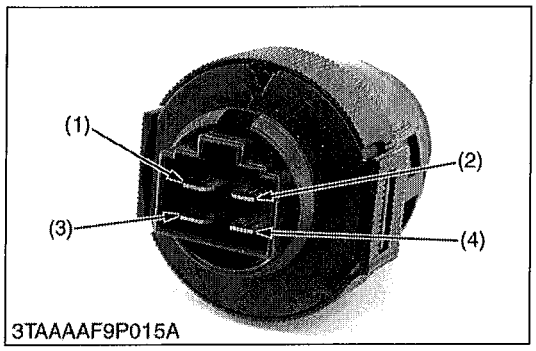




Main Switch Continuity

1) Main Switch Key at OFF Position

1. Set the main switch **OFF** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **ACC** terminal, **B** terminal and **ST** terminal, **B** terminal and **G** terminal.
3. If infinity is not indicated, the contacts of the main switch are faulty.

Resistance	**B** terminal – **ACC** terminal	Infinity
	B terminal – **ST** terminal	
	B terminal – **G** terminal	

2) Main Switch Key at ON Position

1. Set the main switch **ON** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **ACC** terminal.
3. If 0 ohm is not indicated, the **B** – **ACC** contact of the main switch are faulty.

Resistance	**B** terminal – **ACC** terminal	0 Ω

3) Main Switch Key at PREHEAT Position

1. Set and hold the main switch key at the **PREHEAT** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **G** terminal, and measure the resistance across the **B** terminal and the **ACC** terminal.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	**B** terminal – **G** terminal	0 Ω
	B terminal – **ACC** terminal	

4) Main Switch Key at START Position

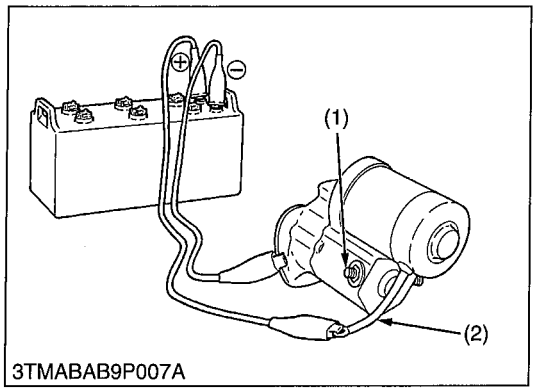
1. Set and hold the main switch key at the **START** position.
2. Measure the resistance with an ohmmeter across the **B** terminal and the **G** terminal, across the **B** terminal and the **ST** terminal, and across the **B** terminal and the **ACC** terminal.
3. If 0 ohm is not indicated, these contacts of the main switch are faulty.

Resistance	**B** terminal – **G** terminal	0 Ω
	B terminal – **ST** terminal	
	B terminal – **ACC** terminal	

(1) **B** Terminal
(2) **ST** Terminal
(3) **ACC** Terminal
(4) **G** Terminal

9Y1210855ELS0009US0

(3) Starter



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Motor Test

CAUTION

- **Secure the starter to prevent if from jumping up and down while testing the motor.**

1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable and the leads from the starter.
3. Remove the starter from the engine.
4. Disconnect the connecting lead (2) from the starter **C** terminal (1).
5. Connect a jumper lead from the connecting lead (2) to the battery positive terminal post.
6. Connect a jumper lead momentarily between the starter motor housing and the battery negative terminal post.
7. If the motor does not run, check the motor.

(1) **C** Terminal (2) Connecting Lead

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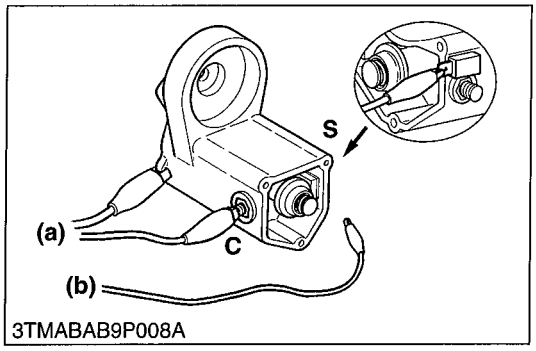

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Magnet Switch Test (Pull-in, Holding Coils)

1. Remove the motor from the starter housing.
2. Prepare a 6 V battery for the test.
3. Connect jumper leads from the battery negative terminal to the housing and the starter **C** terminal.
4. The plunger should be attracted and the pinion gear should pop out when a jumper lead is connected from the battery positive terminal to the **S** terminal. It's a correct.
5. Disconnect the jumper lead to the starter **C** terminal. Then the pinion gear should remain popped out. It's a correct.

■ **IMPORTANT**

- **Testing time must be 3 to 5 sec..**

C: C Terminal **(a) To Negative Terminal**
S: S Terminal **(b) To Positive Terminal**

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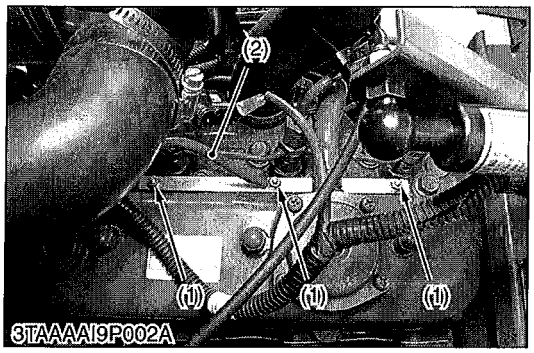
(4) Glow Plug



Lead Terminal Voltage

1. Disconnect the wiring lead (2) from the glow plug (1) after turning the main switch off.
2. Turn the main switch key to the **"PREHEAT"** position, and measure the voltage between the lead terminal and the chassis.
3. Turn the main switch key to the **"START"** position, and measure the voltage with a voltmeter between the lead terminal and the chassis.
4. If the voltage at either position differs from the battery voltage, the wiring harness or main switch is faulty.

Voltage (Lead terminal – Chassis)	Main switch key at **"PREHEAT"**	Approx. battery voltage
	Main switch key at **"START"**	Approx. battery voltage

(1) Glow Plug (2) Wiring Lead (Positive)

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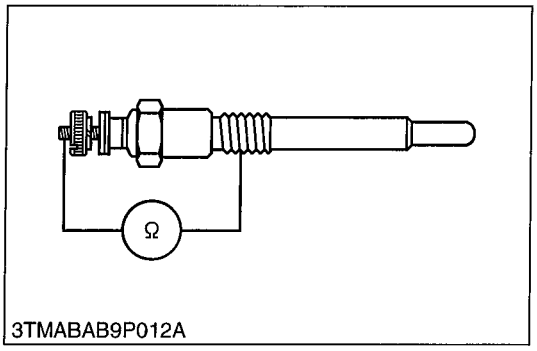

Glow Plug Continuity

1. Disconnect the lead from the glow plugs.
2. Measure the resistance with an ohmmeter between the glow plug terminal and the chassis.
3. If 0 ohm is indicated, the screw at the tip of the glow plug and the housing are short-circuited.
4. If the factory specification is not indicated, the glow plug is faulty.

Glow plug	Factory specification	Approx. 0.9 Ω

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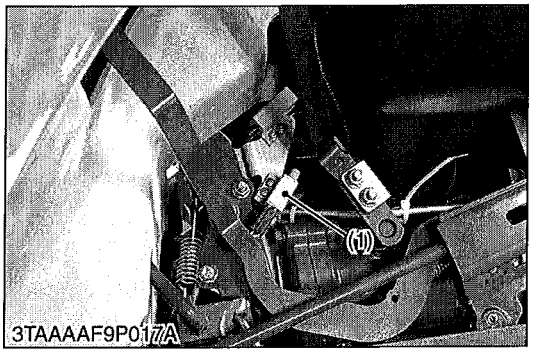
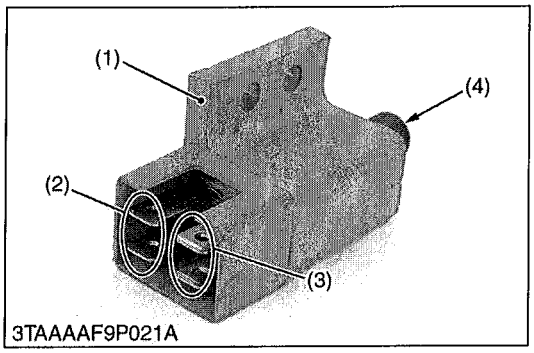
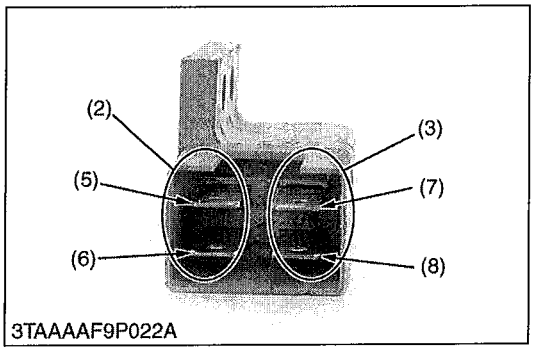
(5) Safety Switch







PTO Shift Lever Switch Continuity

1. Remove the left rear wheel.
2. Remove the PTO shift lever switch (1).
3. Measure the resistance with an ohmmeter across the switch terminals.
4. If the resistance values specified below are not indicated, the safety switch is faulty.

Plunger is pushed into the switch body

Resistance	**1** terminal (5) – **2** terminal (6)	0 Ω
	3 terminal (7) – **4** terminal (8)	0 Ω

Plunger is released

Resistance	**1** terminal (5) – **2** terminal (6)	Infinity
	3 terminal (7) – **4** terminal (8)	Infinity

(1) PTO Shift Lever Switch
(2) **2P** Connector (LH)
(3) **2P** Connector (RH)
(4) Plunger
(5) **1** Terminal
(6) **2** Terminal
(7) **3** Terminal
(8) **4** Terminal

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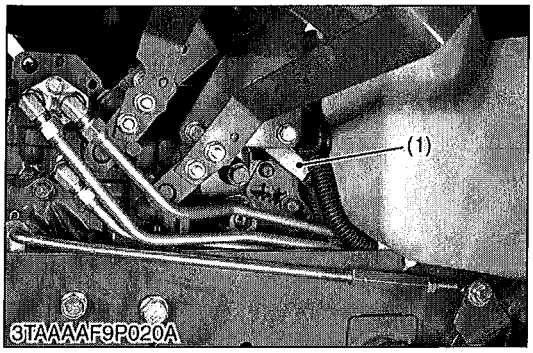

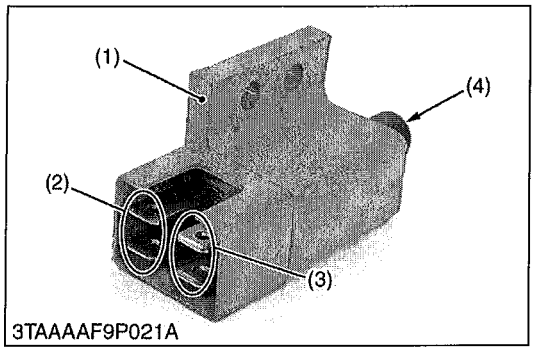

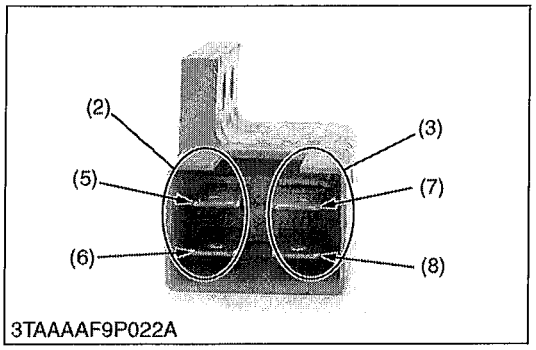

HST Neutral Switch Continuity

1. Remove the right rear wheel.
2. Remove the HST neutral switch (1).
3. Measure the resistance with an ohmmeter across the HST neutral switch terminals.
4. If the resistance values specified below are not indicated, the safety switch is faulty.

Plunger is pushed into the switch body

Resistance	**1** terminal (5) – **2** terminal (6)	0 Ω
	3 terminal (7) – **4** terminal (8)	0 Ω

Plunger is released

Resistance	**1** terminal (5) – **2** terminal (6)	Infinity
	3 terminal (7) – **4** terminal (8)	Infinity

(1) HST Neutral Switch
(2) **2P** Connector (LH)
(3) **2P** Connector (RH)
(4) Plunger
(5) **1** Terminal
(6) **2** Terminal
(7) **3** Terminal
(8) **4** Terminal

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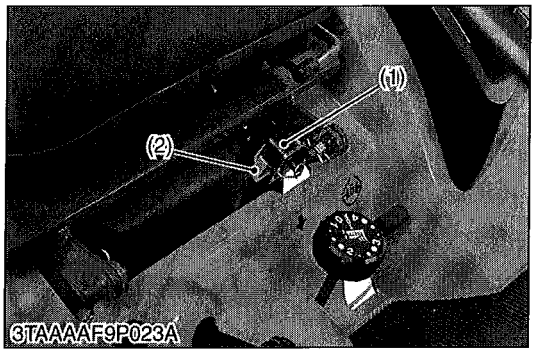
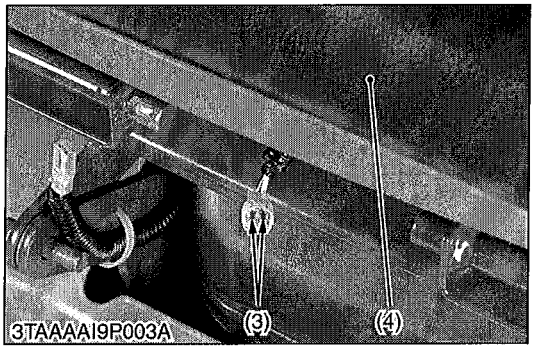
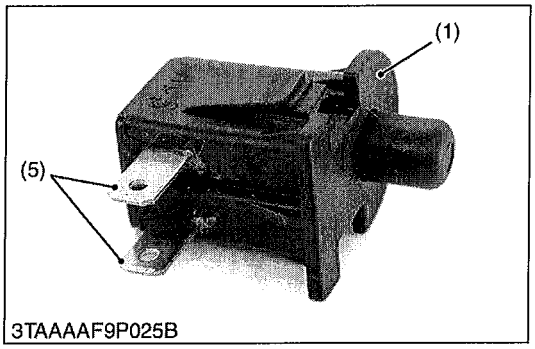
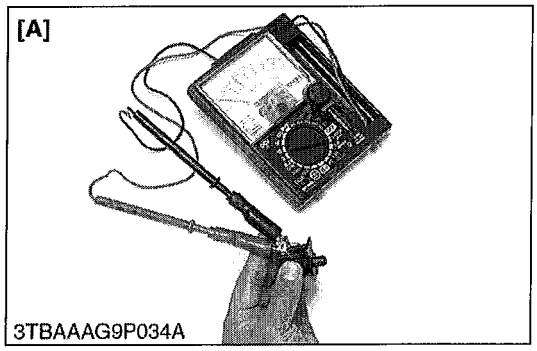
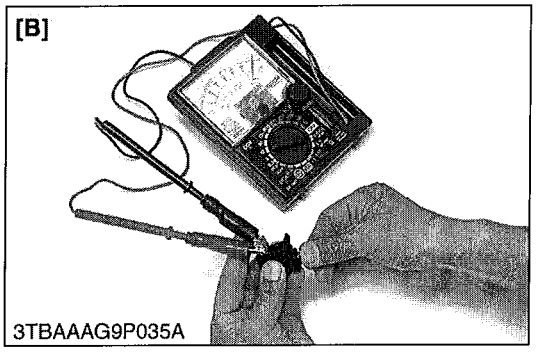
(6) Operator Presence Control (OPC) Switch











Seat Switch and Seat Turnover Switch Continuity Check

1. Disconnect the **2P** connectors (2) from the seat turnover switch (1) and the seat switch.
2. Remove the seat turnover switch (1).
3. Connect the circuit tester to the terminals (5).

(When switch is not pushed / When operator leave the seat)

1. Measure the resistance between terminals (5).
2. If continuity is not infinity, the switch is faulty. Replace it.

(When switch is pushed / When operator sits on the seat)

1. Measure the resistance between terminals (5).
2. If continuity is not 0 Ω, the switch is faulty. Replace it.

Resistance	When switch is not pushed / When operator leave the seat	Infinity
	When switch is pushed / When operator sits on the seat	0 Ω

(1) Seat Turnover Switch
(2) **2P** Connector
(3) Seat Switch **2P** Connector
(4) Seat
(5) Terminal

[A] Seat switch is not pushed.
[B] Seat switch is pushed.

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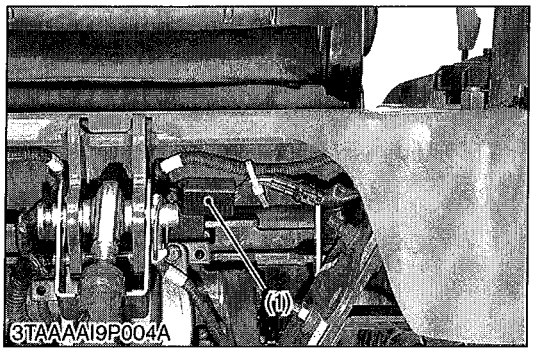

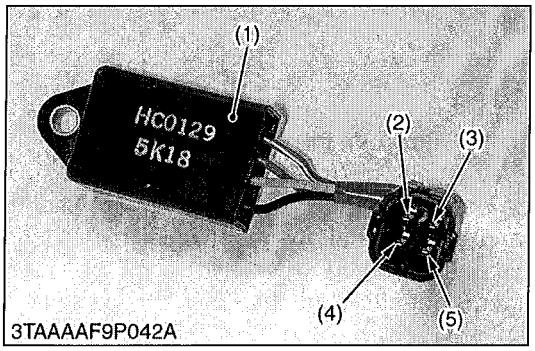

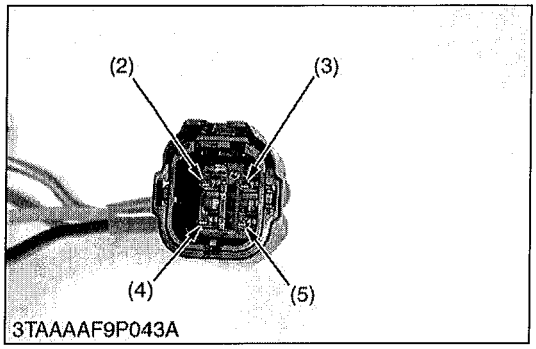

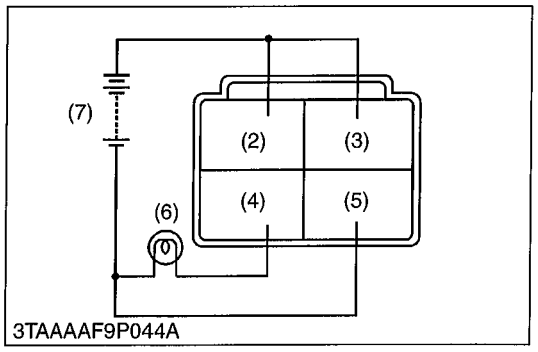

Checking OPC Timer

1. Remove the OPC timer. (The OPC timer is located under the fender center stay.)
2. Connect the jumper leads across the battery terminal and the Red / White terminal (2), and across the battery positive terminal and the Yellow terminal (3).
3. Connect the jumper lead across the battery negative terminal and the Black terminal (5), and across the battery negative terminal and the Blue terminal.
4. Connect the jumper lead across the Red terminal (4) and the bulb terminal.
5. The bulb lights up when disconnecting the jumper lead from the Red / White terminal (2) 0.7 to 1.3 seconds, the OPC timer (1) is proper.

(1) OPC Timer
(2) Red / White Terminal (From Battery)
(3) Yellow Terminal (From OPC Switch)
(4) Red Terminal (To Key Stop Solenoid)
(5) Black Terminal (To Frame Earth)
(6) Bulb (Load)
(7) Battery

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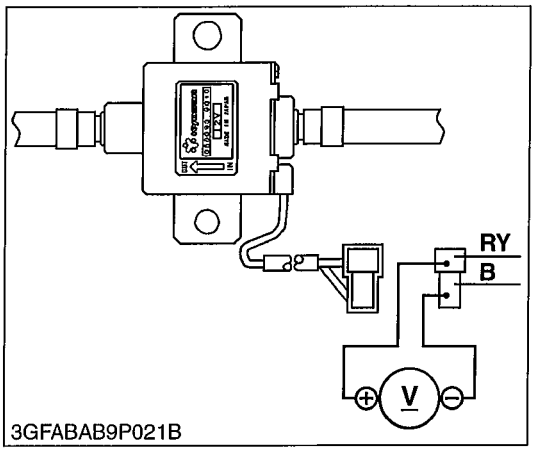
(7) Fuel Pump



Connector Voltage

1. Disconnect the **2P** connector from the fuel pump.
2. Turn the main switch key to the **"ON"** position, and measure the voltage with a voltmeter between the connector terminals.
3. If the voltage differs from the battery voltage, the wiring harness or main switch is faulty.

Voltage	Between connector terminals	Approx. battery voltage

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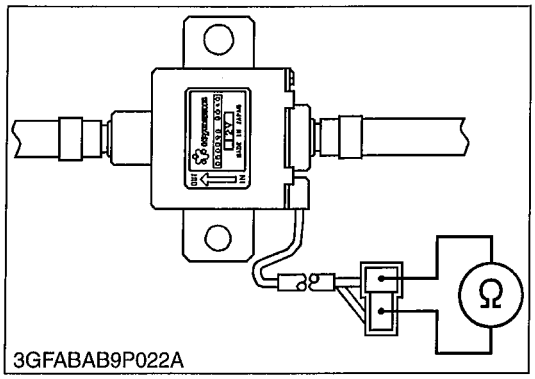

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Fuel Pump Continuity

1. Disconnect the **2P** connector from the fuel pump.
2. Check the continuity between the connector terminals with an ohmmeter.
3. If it does not conduct, the fuel pump is faulty.

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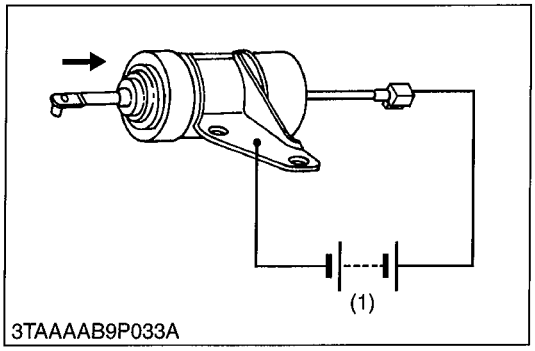
(8) Engine Stop Solenoid



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Engine Stop Solenoid Test

1. Disconnect the **1P** connector from the engine stop solenoid.
2. Remove the engine stop solenoid from the engine.
3. Connect the jumper leads from the battery positive terminal to the **1P** connector, and from the battery negative terminal to the engine stop solenoid body.
4. If the solenoid plunger is not attracted, the engine stop solenoid is faulty.

(1) Battery (12 V)

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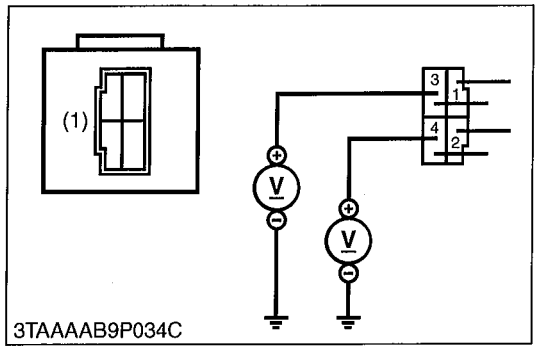
(9) Timer Relay



3TAAAAB9P034C

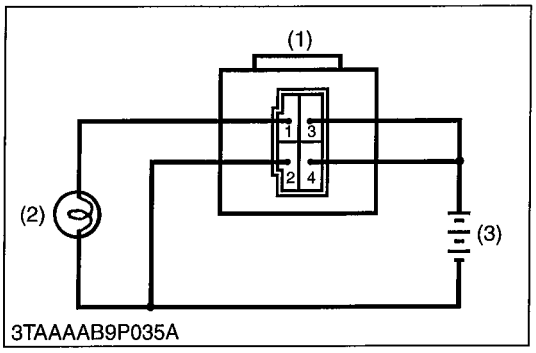
Timer Relay Connector Voltage

1. Disconnect the connector from the timer relay after turning the main switch off.
2. Measure the voltage with a voltmeter across the connector terminal **4** and chassis.
3. Turn the main switch on, and measure the voltage across the connector terminal **3** and chassis.
4. If these voltages differ from the battery voltage, the wiring harness or main switch is faulty.

Voltage	Connector terminal **4** – Chassis	Approx. battery voltage
	Connector terminal **3** – Chassis	Approx. battery voltage

(1) Timer Relay

9Y1210855ELS0021US0



3TAAAAB9P035A

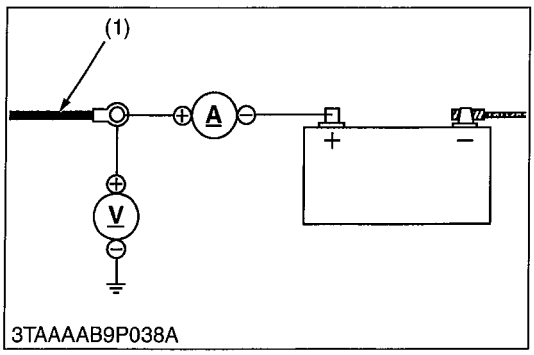
Test of Timer Relay

1. Remove the timer relay from the tractor.
2. Connect jumper leads across the battery positive terminal and the timer relay terminal **3**, and across the battery positive terminal and the timer relay terminal **4**.
3. Connect jumper leads across the battery negative terminal and the timer relay terminal **2**, and across the battery negative terminal and the bulb terminal.
4. Connect jumper lead across the timer relay terminal **1** and the bulb terminal.
5. The bulb lights up when disconnecting a jumper lead from the terminal **3** arid goes off 6 to 13 seconds late, the timer relay is proper.

(1) Timer Relay
(2) Load (Lamp)
(3) Battery (12 V)

9Y1210855ELS0022US0

(10) Charging System



3TAAAAB9P038A

Battery Charging Current

1. After starting the engine, disconnect the battery positive cord (+), and connect an ammeter and voltmeter. Then switch on all electrical loads (such as head lights) and measure the charging current.

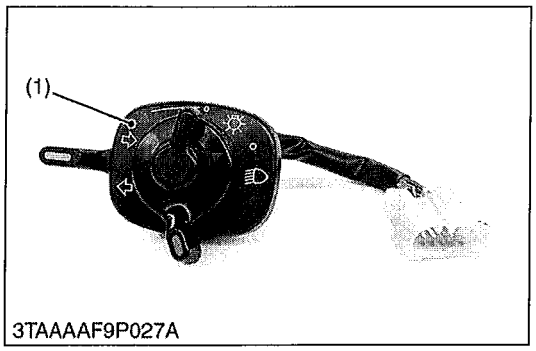
■ **NOTE**
- **Connect an ammeter only after starting the engine.**
- **When the electrical loads is considerably low or the battery is fully charged, the specified reading may not be obtained.**

Current	Factory specification	14 to 15 A
Voltage		14 to 15 V
Alternator speed		5200 min^{-1} (rpm)

(1) Battery Positive Cord

9Y1210855ELS0023US0

(11) Combination Switch



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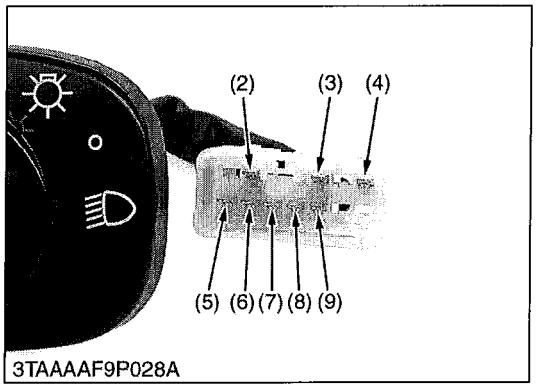

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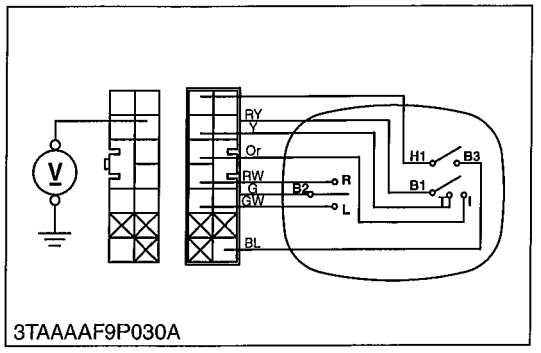


3TAAAAF9P030A

Combination Switch

1. Remove the meter panel, and disconnect the combination switch connector.
2. Remove the combination switch (1) and perform the following checks **1)** to **8)**.

(1) Combination Switch
(2) Red / Yellow Lead
(3) Green Lead
(4) Black / Blue Lead
(5) Blue / White Lead
(6) Yellow Lead
(7) Orange Lead
(8) Red / White Lead
(9) Green / White Lead

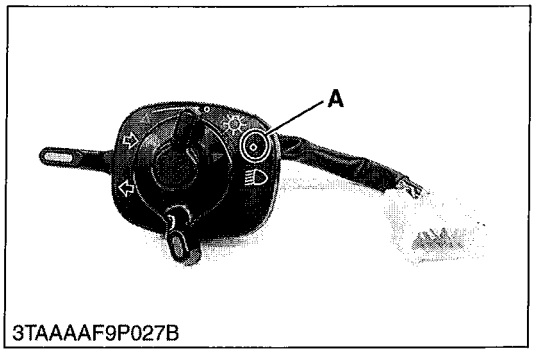
9Y1210855ELS0029US0

1) Connector Voltage

1. Connect the combination switch connector to the main wire harness.
2. Measure the voltage with a voltmeter across the connector **B1** terminal and chassis when the main switch is **ON** position.
3. If the voltage differs from the battery voltage, the wiring harness and main switch is faulty.

Voltage	Main switch at **ON** position	**B1** terminal – Chassis	Battery voltage

9Y1210855ELS0030US0



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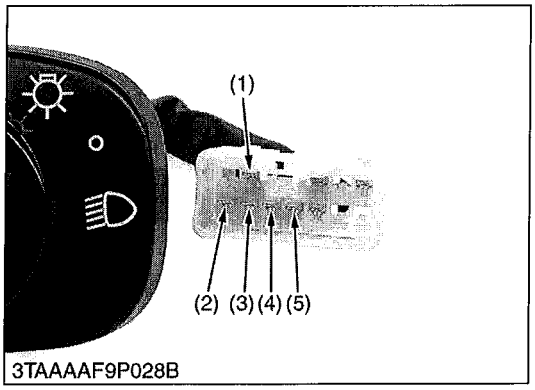


3TAAAAF9P028B

2) Head Light Switch Continuity when Setting Switch at "OFF" Position

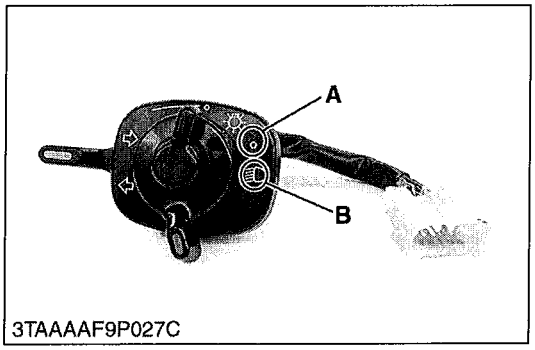
1. Set the light switch to the **OFF** position.
2. Measure the resistance with an ohmmeter across the red / yellow lead (1) to the orange lead (4), the red / yellow lead (1) to the yellow lead (3).
3. If infinity is not indicated, the head light switch is faulty.

Resistance (Switch at **OFF** position)	Red / Yellow lead (1) – Orange lead (4)	Infinity
	Red / Yellow lead (1) – Yellow lead (3)	

(1) Red / Yellow Lead
(2) Blue / White Lead
(3) Yellow Lead
(4) Orange Lead
(5) Red / White Lead

A: Head Light "OFF" Position

9Y1210855ELS0031US0



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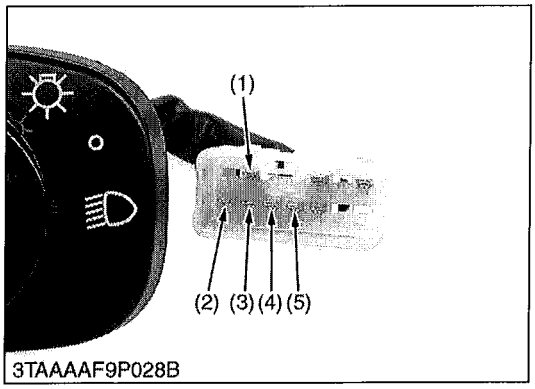

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3) Head Light Switch Continuity when Setting Switch at "ON" Position

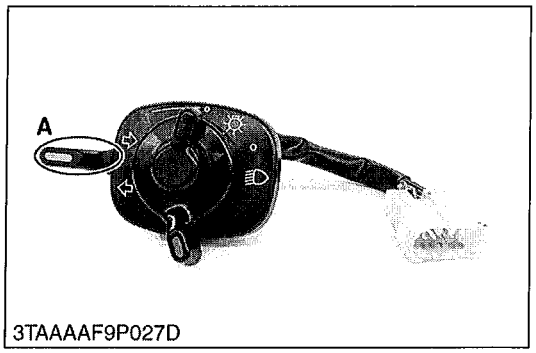
1. Set the light switch to the **ON** position.
2. Measure the resistance with an ohmmeter across the red / yellow lead (1) to the orange lead (4) and the red / yellow lead (1) to the yellow lead (3).
3. If infinity is not indicated, the head light switch is faulty.

Resistance (Switch at **ON** position)	Red / Yellow lead (1) – Orange lead (4)	0 Ω
	Red / Yellow lead (1) – Yellow lead (3)	

(1) Red / Yellow Lead
(2) Blue / White Lead
(3) Yellow Lead
(4) Orange Lead
(5) Red / White Lead

A: Head Light "OFF" Position
B: Head Light "ON" Position

9Y1210855ELS0032US0



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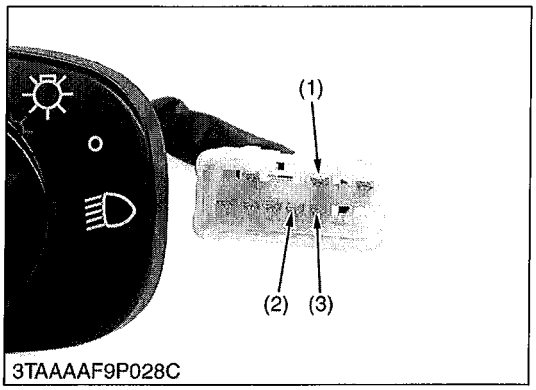


3TAAAAF9P028C

4) Turn Signal Light Switch Continuity when Setting Switch Knob "OFF" Position

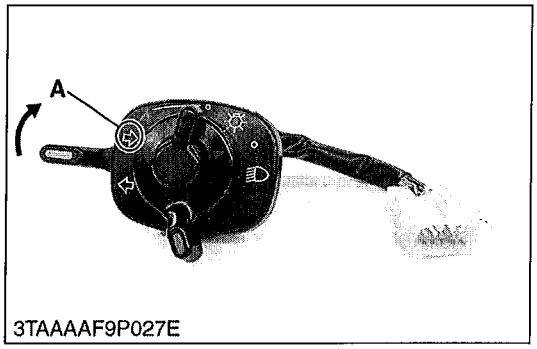
1. Set the turn signal switch knob to the **OFF** position.
2. Measure the resistance with an ohmmeter across the green lead (1) and red / white lead (2), and across to the green lead (1) and green / white lead (3).
3. If infinity is not indicated, the combination switch is faulty.

Resistance (Switch knob at **OFF** position)	Green lead (1) – Red / White lead (2)	0 Ω
	Green lead (1) – Green / White lead (3)	

(1) Green Lead
(2) Red / White Lead
(3) Green / White Lead

A: Turn Signal Light Switch "OFF" Position

9Y1210855ELS0033US0



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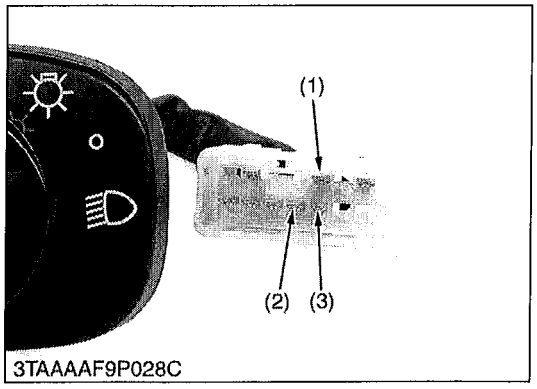


3TAAAAF9P028C

5) Turn Signal Light Switch Continuity when Setting Switch Knob "RIGHT" Position

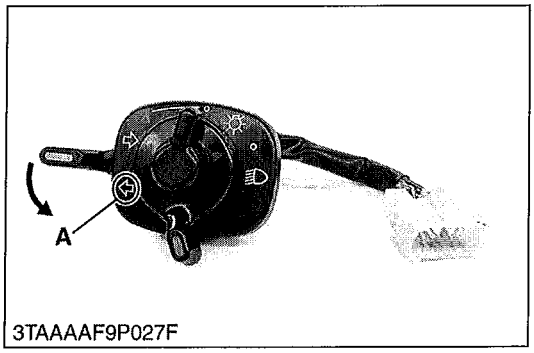
1. Set the turn signal switch knob to the **RIGHT** position.
2. Measure the resistance with an ohmmeter across the green lead (1) and red / white lead (2), and across to the green lead (1) and green / white lead (3).
3. If 0 Ω is not indicated, the combination switch is faulty.

Resistance (Switch knob at **OFF** position)	Green lead (1) – Red / White lead (2)	0 Ω
	Green lead (1) – Green / White lead (3)	Infinity

(1) Green Lead
(2) Red / White Lead
(3) Green / White Lead

A: Turn Signal Light Switch "RIGHT" Position

9Y1210855ELS0034US0



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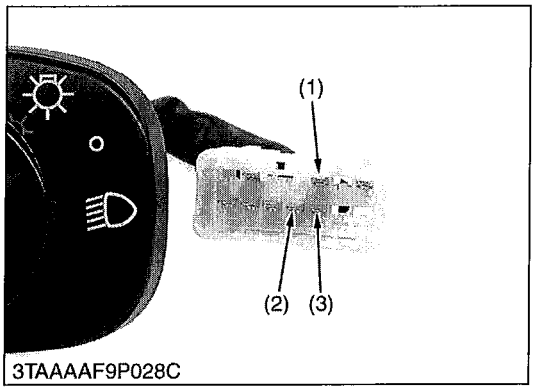

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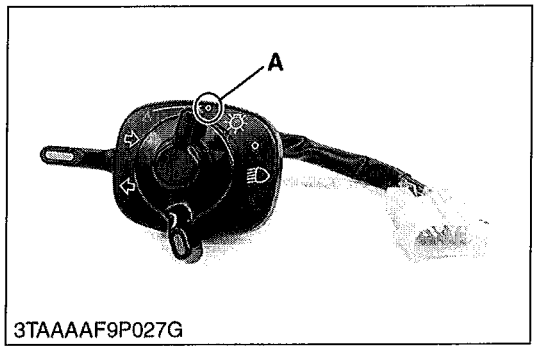

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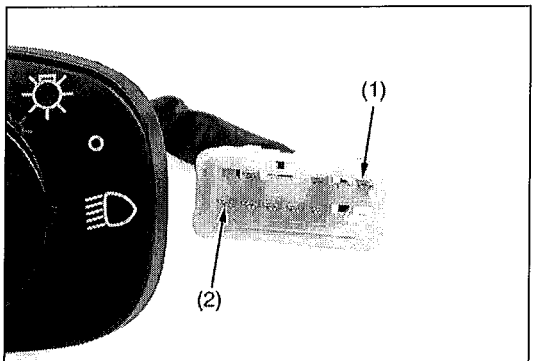


3TAAAAF9P028D

6) Turn Signal Light Switch Continuity when Setting Switch Knob "LEFT" Position

1. Set the turn signal switch knob to the **LEFT** position.
2. Measure the resistance with an ohmmeter across the green lead (1) and red / white lead (2), and across to the green lead (1) and green / white lead (3).
3. If 0 Ω is not indicated, the combination switch is faulty.

Resistance (Switch knob at **LEFT** position)	Green lead (1) – Red / White lead (2)	Infinity
	Green lead (1) – Green / White lead (3)	0 Ω

(1) Green Lead
(2) Red / White Lead
(3) Green / White Lead

A: Turn Signal Light Switch "LEFT" Position

9Y1210855ELS0035US0

7) Hazard Switch Continuity when Setting Switch Knob at "OFF" Position

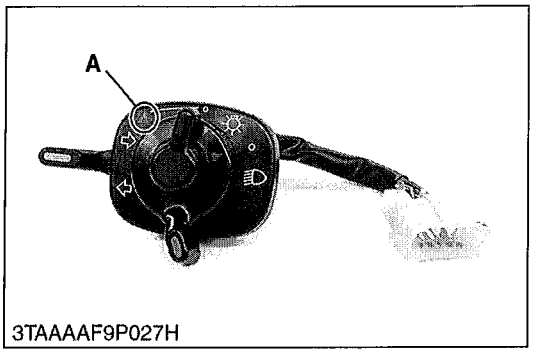
1. Set the hazard switch knob to the **OFF** position.
2. Measure the resistance with an ohmmeter across the black / blue lead (1) and blue / white lead (2).
3. If infinity is not indicated, the combination switch is faulty.

Resistance (Hazard switch at **OFF** position)	Black / Blue lead (1) – Blue / White lead (2)	Infinity

(1) Black / Blue Lead
(2) Blue / White Lead

A: Hazard Switch "OFF" Position

9Y1210855ELS0036US0



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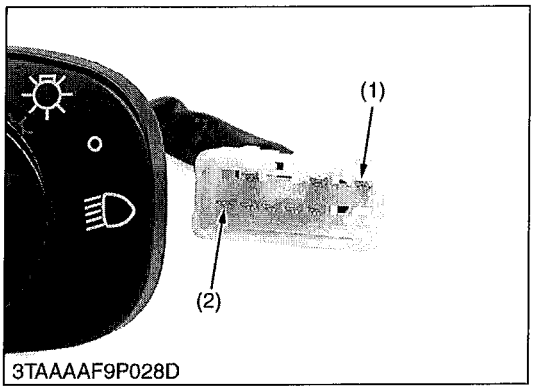
8) Hazard Switch Knob at "ON" Position

1. Set the hazard switch knob to the **ON** position.
2. Measure the resistance with an ohmmeter across the black / blue lead (1) and blue / white lead (2).
3. If 0 Ω is not indicated, the combination switch is faulty.

Resistance (Hazard switch at **OFF** position)	Black / Blue lead (1) – Blue / White lead (2)	0 Ω

(1) Black / Blue Lead
(2) Blue / White Lead
A: Hazard Switch "ON" Position

9Y1210855ELS0037US0



3TAAAAF9P028D

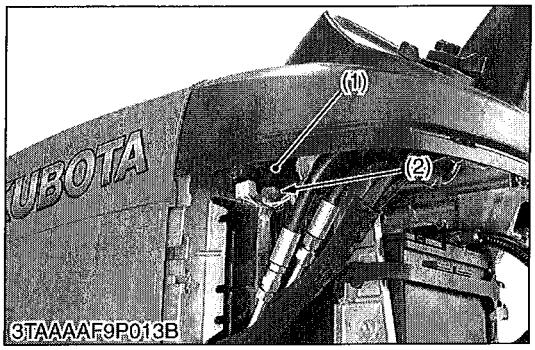
Flasher Unit

1. Remove the under panel.
2. Disconnect the coupler (2) from flasher unit.
3. Measure the voltage with a voltmeter across the terminal **h** and terminal **c** or chassis.
4. If the voltage differs from the battery voltage, the wiring harness is faulty.

Voltage	Terminal **h** – Terminal **c** or Chassis	Approx. battery voltage

(1) Flasher Unit (2) Coupler

9Y1210855ELS0038US0



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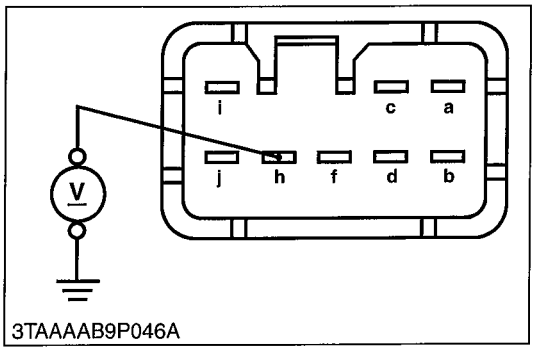

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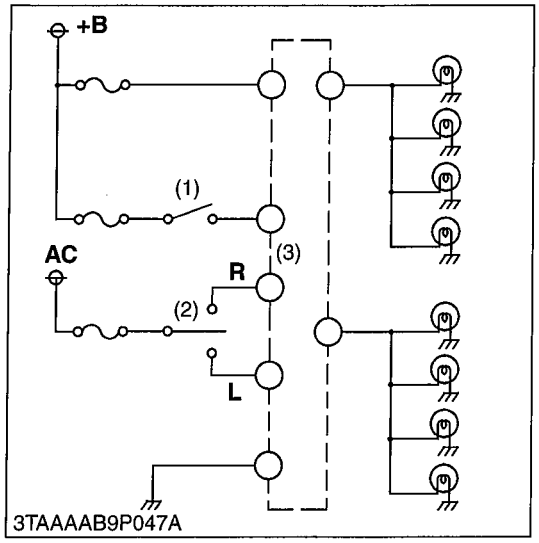
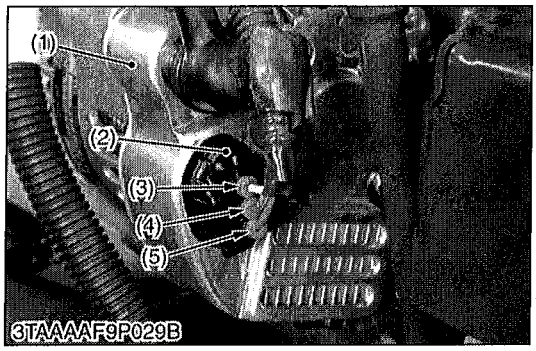


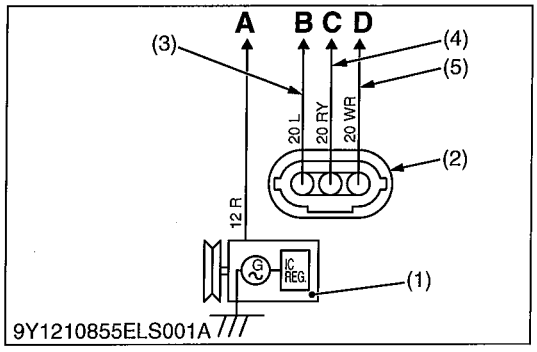
Flasher Unit Actuation Test

1. Set the hazard switch to the **ON** position, and make sure the hazard lamp gives 60 to 85 flashes for a minute.
2. With the main switch and the hazard switch at the **ACC** and **ON** positions, respectively, move the turn signal light switch to the left. Make sure that the right-hand light stays on and the left-hand light gives flashes earlier (by about 20 flashes) than when the hazard lamp is activated. Then move the turn signal light switch to the right and make sure the corresponding actions take place.
3. Now set the main switch to the **ACC** position and move the turn signal switch alone. Make sure the same actions as above result.
4. If both the hazard switch and the turn signal light switch function but the above actions do not take place, replace the flasher unit with new one.

(1) Hazard Lamp Switch
(2) Turn Signal Light Switch
(3) Flasher Unit

9Y1210855ELS0039US0





Charge Lamp (Charging Circuit)

1. Disconnect the **3P** connector from the alternator after turning the main switch **OFF**.
2. Turn the main switch **ON** and connect a jumper lead from the wiring harness connector terminal (White / Red) to the chassis.

■ **NOTE**

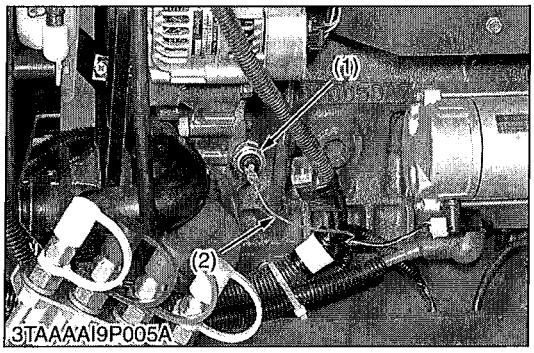
- **If you connect the jumper lead from the wiring harness connector terminal (White / Red) to the chassis, 15 A fuse will be blown. Do not connect the lead to Red / Yellow terminal.**

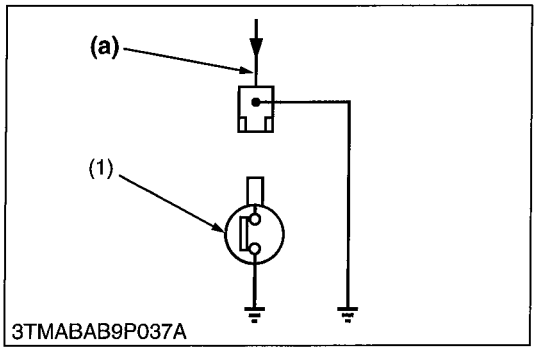
3. If the charge lamp does not light, the wiring harness or fuse is faulty.

(1) Alternator
(2) **3P** Connector
(3) L (Blue) Terminal
(4) RY (Red / Yellow) Terminal
(5) WR (White / Red) Terminal

A: To the Battery
B: To Hour Meter and Tachometer
C: To Main Switch
D: To Charge Indicator

9Y1210855ELS0040US0



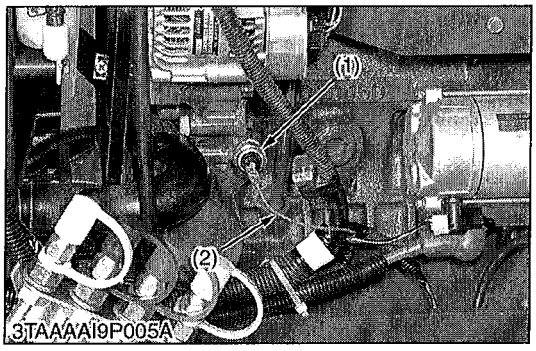


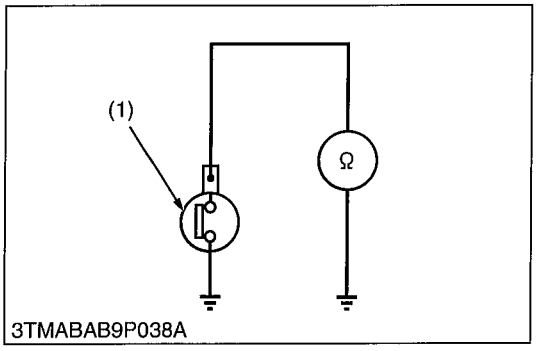
Engine Oil Pressure Lamp

1. Disconnect the lead (2) from the engine oil pressure switch (1) after turning the main switch **OFF**.
2. Turn the main switch **ON** and connect a jumper lead from the lead to the chassis.
3. If the engine oil pressure indicator lamp does not light, the wiring harness is faulty.

(1) Engine Oil Pressure Switch
(2) Lead
(a) From Oil Pressure Lamp

9Y1210855ELS0041US0





Engine Oil Pressure Switch Continuity

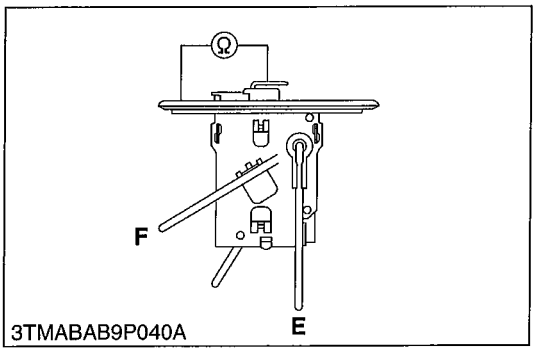
1. Disconnect the lead (2) from the engine oil pressure switch (1).
2. Measure the resistance with an ohmmeter across the switch terminal and the chassis.
3. If 0 ohm is not indicated in the normal state, the switch is faulty.
4. If infinity is not indicated at pressure over 4.9 kPa (0.5 kgf/cm^2, 7 psi), the switch is faulty.

Resistance (Switch terminal – Chassis)	In normal state	0 Ω
	At pressure over approx. 4.9 kPa (0.5 kgf/cm^2, 7 psi)	Infinity

(1) Engine Oil Pressure Switch (2) Lead

9Y1210855ELS0042US0

(12) Gauge



Fuel Level Sensor

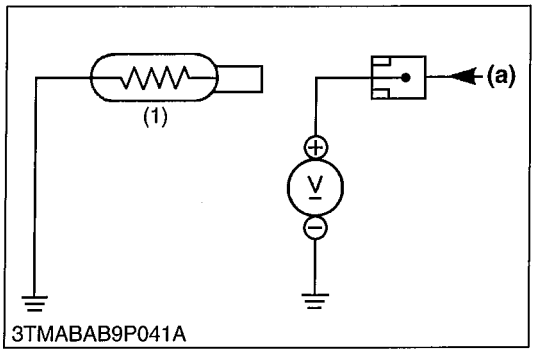
1) Sensor Continuity

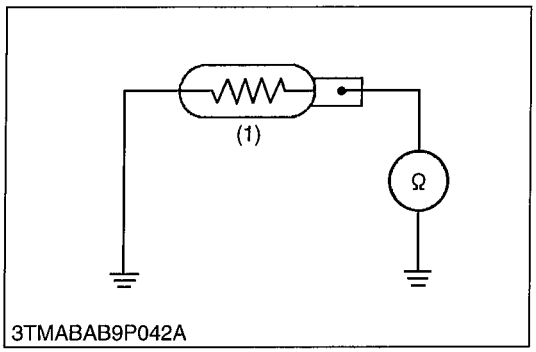
1. Remove the fuel level sensor from the fuel tank.
2. Measure the resistance with an ohmmeter across the sensor terminal and its body.
3. If the reference values are not indicated, the sensor is faulty.

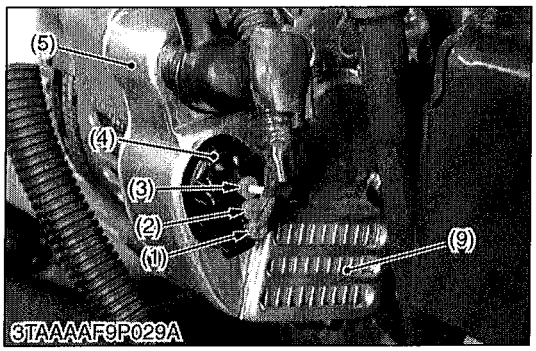
Resistance (Sensor terminal – its body)	Reference value	Float at upper-most position	1 to 5 Ω
		Float at lower-most position	103 to 117 Ω

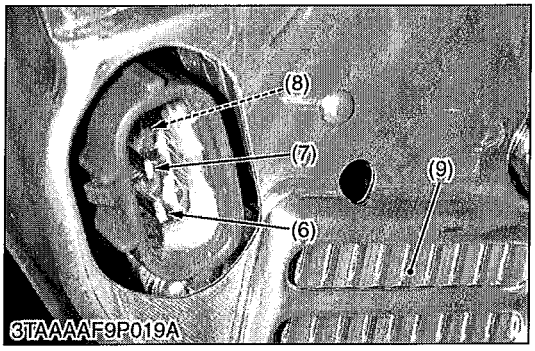
E: Empty **F: Full**

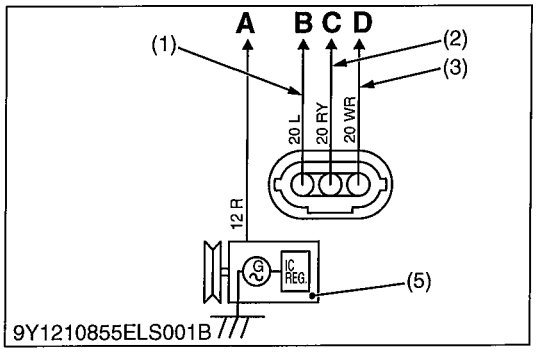
9Y1210855ELS0043US0











Coolant Temperature Sensor (Thermo Unit)

1) Lead Terminal Voltage

1. Disconnect the lead from the coolant temperature sensor after turning the main switch **OFF**.
2. Turn the main switch **ON** and measure the voltage with a voltmeter across the lead terminal and the chassis.
   If the voltage differs from the battery voltage, the wiring harness, fuse or coolant temperature gauge is faulty.

Voltage	Lead terminal – Chassis	Approx. battery voltage

2) Sensor Continuity

1. Measure the resistances with an ohmmeter across the sensor terminal and the chassis.
2. If the reference value is not indicated, the sensor is faulty.

Resistance (Sensor terminal – Chassis)	Reference value	Approx. 16.1 Ω at 120 °C (248 °F)
		Approx. 27.4 Ω at 100 °C (212 °F)
		Approx. 51.9 Ω at 80 °C (176 °F)
		Approx. 153.9 Ω at 50 °C (122 °F)

(1) Coolant Temperature Sensor
(a) From Temperature Gauge

9Y1210855ELS0044US0

Hour Meter and Tachometer

1. Disconnect the **3P** connector (4) from the IC regulator (9) located in the alternator (5) after starting the engine.
2. Measure the voltage with a voltmeter across the hour meter terminal (6) and the alternator body when the hour meter or tachometer does not indicated the proper value.
3. If the measured voltages differ from the specified voltage, the hour meter and tachometer is faulty.

Voltage while engine runs at idling speeds	Hour meter terminal – Alternator body	Approx. battery voltage

(1) L (Blue) Lead
(2) RY (Red / Yellow) Lead
(3) WR (White / Red) Lead
(4) **3P** Connector
(5) Alternator
(6) Hour Meter and Tachometer Terminal
(7) Ground Terminal
(8) Charge Lamp Terminal
(9) IC Regulator

A: To the Battery
B: To Hour Meter and Tachometer
C: To Main Switch
D: To Charge Indicator

9Y1210855ELS0045US0

(13) DC Outlet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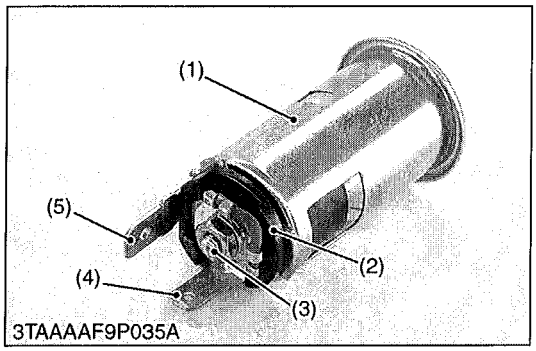

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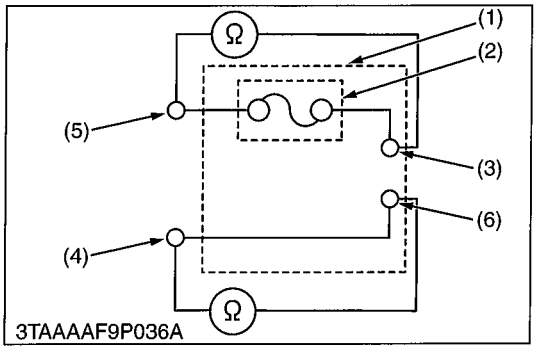


3TAAAAF9P036A

DC Outlet Connector Voltage and DC Outlet Continuity

1. Disconnect the connector from the DC outlet. And turn the main switch **"ON"**.
2. Measure the voltage with a voltmeter across the connector red / blue lead and the chassis.
   If the voltage differs from the battery voltage the wiring harness is faulty.
3. Disconnect the connector from the DC outlet. Since the DC outlet can not be removed easily, measure the continuity with a ohm meter across the plus terminal (4) and the nut (3), and across the earth terminal (5) and the DC outlet case (6).
4. If the resistance differs from 0 ohm, the DC outlet body (1) is faulty.

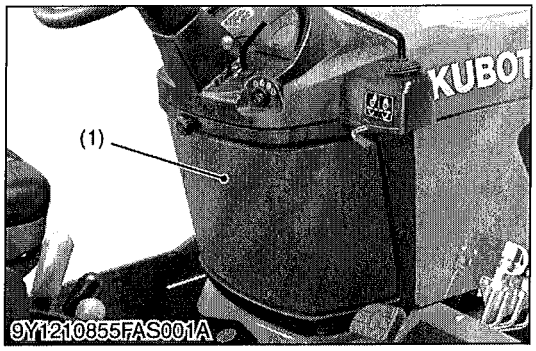
DC outlet connector voltage	Red / Blue lead – Chassis	Battery voltage
DC outlet continuity	Plus terminal – Nut	0 Ω
	Earth terminal – DC outlet case	

(1) DC Outlet Body
(2) Fuse
(3) Nut
(4) Plus Terminal (for Battery)
(5) Earth Terminal (for Chassis)
(6) DC Outlet Case

9Y1210855ELS0046US0

(14) Meter Panel

[A] Removing The Meter Panel



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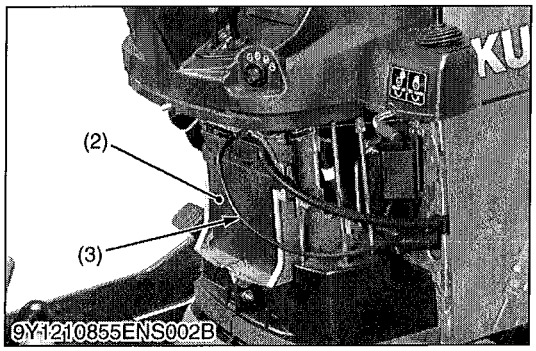


9Y1210855ENS002B

Battery

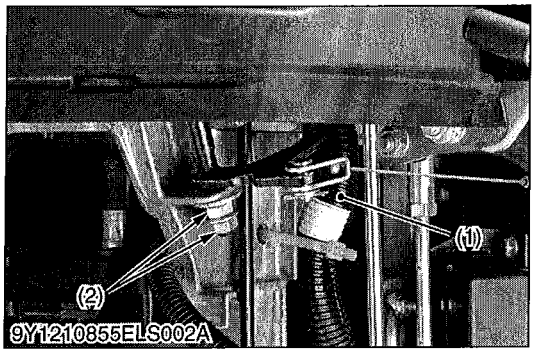
CAUTION

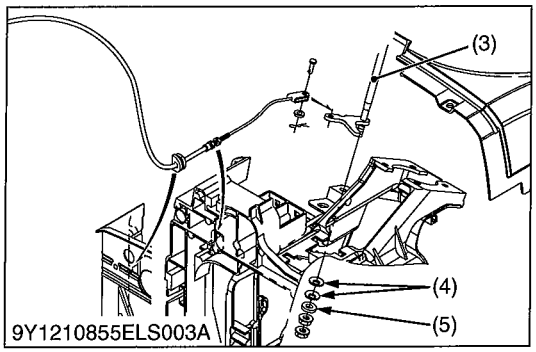
- **When disconnecting the battery cables, disconnect the negative cable from the battery first. When connecting, connect the positive cable to the battery first.**

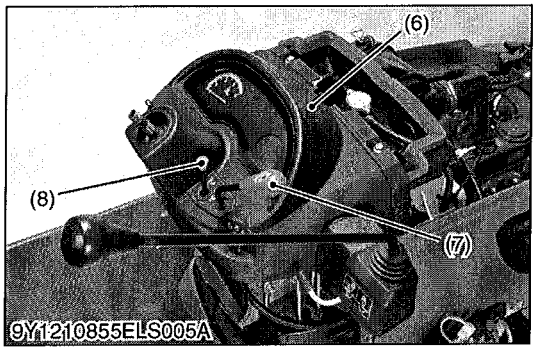
1. Remove the under panel (1).
2. Disconnect the negative cable (3) from the battery (2).

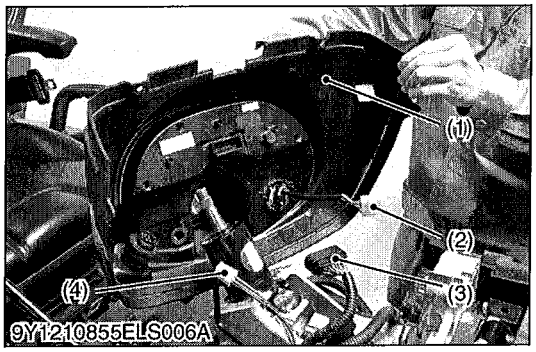
(1) Under Panel
(2) Battery
(3) Negative Cable

9Y1210855ELS0047US0









Hand Throttle Lever and Grip

1. Remove the throttle wire cable (1).
2. Remove the hand throttle lever nuts (2).
3. Remove the cruise lever grip (8) and hand throttle lever grip (7).
4. Remove the upper panel (6) mounting screw.

(When reassembling)

- Be sure to assemble the belleville washers (4) and plane washer (5) to the original position.
- Adjust the hand throttle lever operating force as below.

Hand throttle lever operating force	Factory specification	89.0 to 11 N 9.08 to 11.3 kgf 20 to 25 lbf

(1) Throttle Wire Cable
(2) Nut
(3) Hand Throttle Lever
(4) Belleville Washer
(5) Plane Washer
(6) Upper Panel
(7) Hand Throttle Lever Grip
(8) Cruise Lever Grip

9Y1210855ELS0048US0

Meter Panel with Upper Panel

1. Disconnect the connectors (2), (3) and (4).
2. Remove the meter panel with upper panel (1).

(1) Upper Panel
(2) Connector (Main Switch)
(3) Connector (Meter Panel)
(4) Connector (Combination Switch)

9Y1210855ELS0049US0

[B] Checking Meter Panel

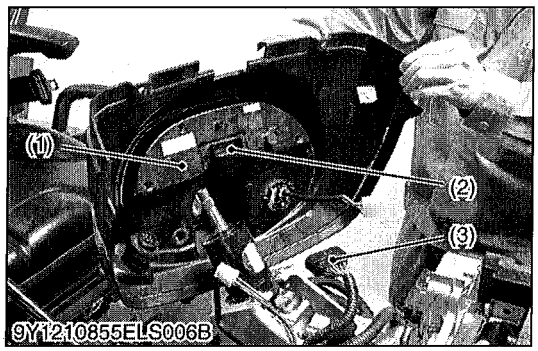
CAUTION

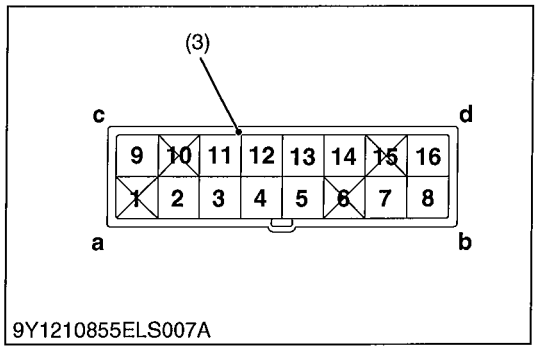
- **For checking of electric circuit, use the circuit tester.**
- **As for the checking of sensors and switches, do the following order; check the battery, fuse and grounding line first, check by the test function of meter panel next, and check the connectors of panel or related electronic switch or sensor. If any problem is found there, check individual sensors or switches to see whether the problem exists at the sensor and switch side or at the wire harness side.**
- **When any problem is not found for sensors, switches and harness, replace meter panel with new one.**

IMPORTANT

- **When connecting or disconnecting the connector for the purpose of checking, be sure to turn OFF the main switch before hand. Moreover, pay attention not to allow the terminal to come in contact with other terminal or chassis while checking.**
- **When applying the test pin of the tester to the connector terminals, use care not to damage to the connector terminal.**

9Y1210855ELS0050US0





9Y1210855ELS007A

Checking Connector Voltage, Sensor Resistance and Switch

1. DIsconnect the **16P** connector (3) from the meter panel.
2. Check the main voltage (battery voltage) first and check the connector voltage, sensor resistance or switch continuity which related for damaged indication of meter panel as table below.

[16P Connector: Wire Harness Side]

Terminal No.	Color of wiring	Terminal name (Related item)
T1	–	–
T2	R/G	Battery
T3	Br	Back Light
T4	L	Tachometer (Alternator)
T5	G	Engine Oil Pressure Switch
T6	–	–
T7	B/R	Glow Plug
T8	W/R	Battery Charge
T9	R/Y	Switched Power (Alternator)
T10	–	–
T11	R/W	Right Turn (Combination Switch)
T12	L/W	Left Turn (Combination Switch)
T13	W/Y	Water Temperature Sensor
T14	Y/L	Fuel Level Sensor
T15	–	–
T16	B	Ground

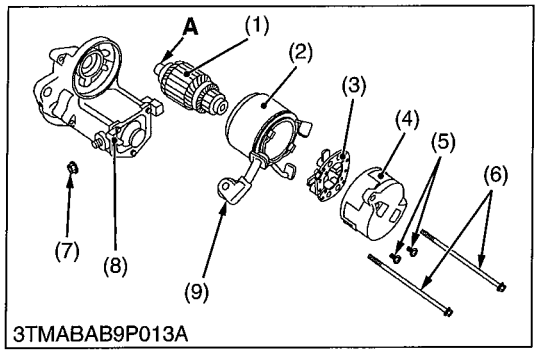
(1) Meter Panel
(2) **16P** Connector Meter Panel Side
(3) **16P** Connector Wire Harness Side

a: Terminal 1 (T1)
b: Terminal 8 (T8)
c: Terminal 9 (T9)
d: Terminal 16 (T16)

9Y1210855ELS0051US0

[2] DISASSEMBLING AND ASSEMBLING

(1) Starter



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Motor

1. Disconnect the connecting lead (9) from the magnet switch (8).
2. Remove the screws (6), and then separate the end frame (4), yoke (2) and armature (1).
3. Remove the two screws (5), and then remove the brush holder (3) from the end frame (4).

(When reassembling)

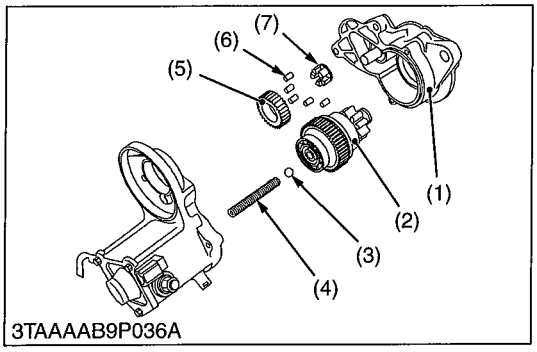
- Apply grease to the spline teeth **"A"** of the armature (1).

Tightening torque	Nut (7)	5.9 to 11.8 N·m 0.6 to 1.2 kgf·m 4.3 to 8.7 lbf·ft

(1) Armature
(2) Yoke
(3) Brush Holder
(4) End Frame
(5) Screw
(6) Screw
(7) Nut
(8) Magnet Switch
(9) Connecting Lead

A: Spline Teeth

9Y1210855ELS0052US0



3TAAAAB9P036A

Magnet Switch

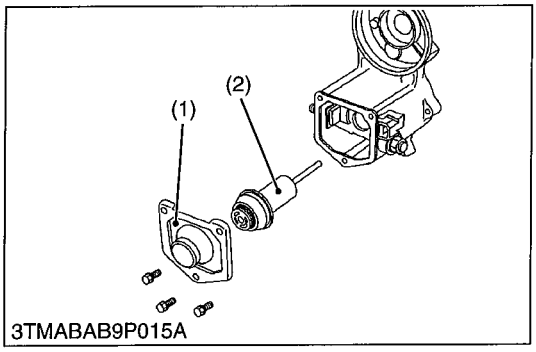
1. Remove the drive end frame (1) mounting screws.
2. Remove the overrunning clutch (2), ball (3), spring (4), gears (5), rollers (6) and retainer (7).

(When reassembling)

- Apply grease to the gear teeth of the gears (5) and overrunning clutch (2), and ball (3).

(1) Drive End Frame
(2) Overrunning Clutch
(3) Ball
(4) Spring
(5) Gear
(6) Roller
(7) Retainer

9Y1210855ELS0053US0



3TMABAB9P015A

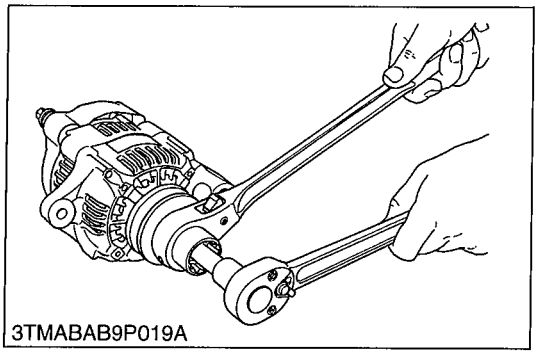
Plunger

1. Remove the end cover (1).
2. Remove the plunger (2).

(1) End Cover
(2) Plunger

9Y1210855ELS0054US0

(2) Alternator


3TMABAB9P019A

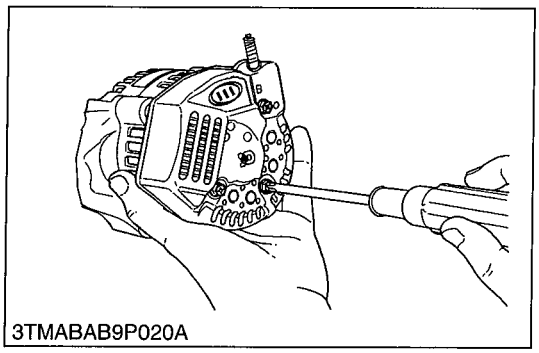
Pulley

1. Secure the hexagonal end of the pulley shaft with a double-ended ratchet wrench as shown in the figure, loosen the pulley nut with a socket wrench and remove it.

(When reassembling)

Tightening torque	Pulley nut	58.4 to 78.9 N·m 5.95 to 8.05 kgf·m 43.1 to 58.2 lbf·ft

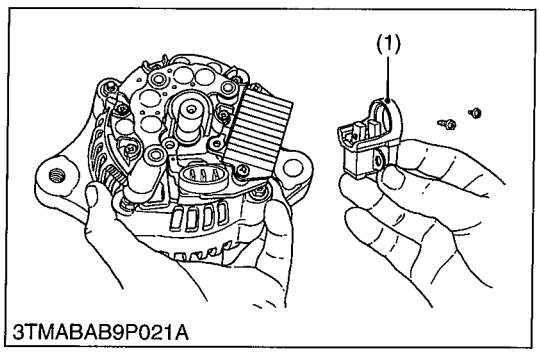
9Y1210436ELS0004US0


3TMABAB9P020A

Rear End Cover

1. Remove the three rear end cover screws and the **B** terminal nut, and remove the rear end cover.

9Y1210855ELS0055US0



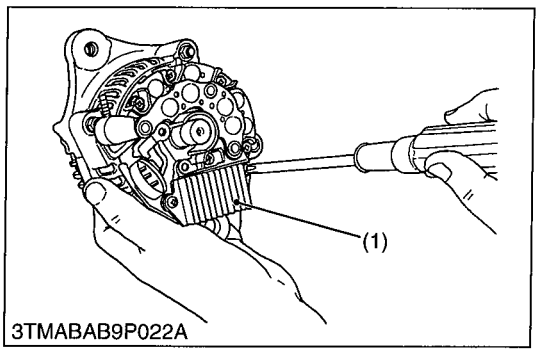
3TMABAB9P021A

Brush Holder

1. Remove the two screws holding the brush holder, and remove the brush holder (1).

(1) Brush Holder

9Y1210855ELS0059US0



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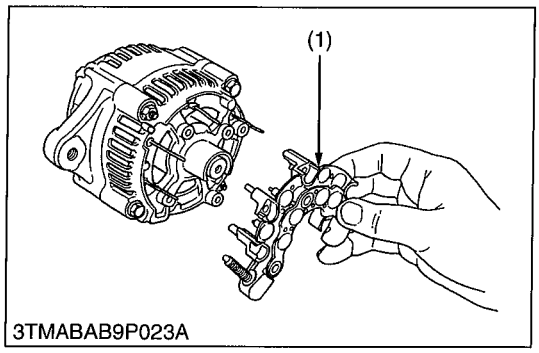
IC Regulator

1. Remove the three screws holding the IC regulator, and remove the IC regulator (1).

(1) IC Regulator

9Y1210855ELS0060US0



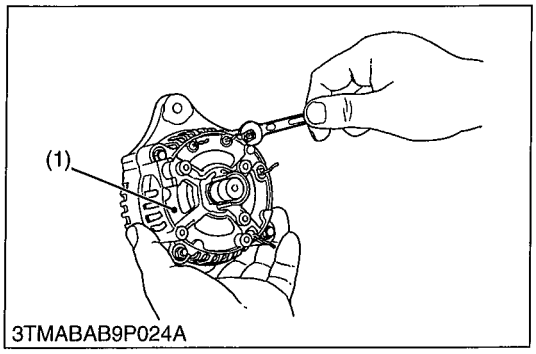
3TMABAB9P023A

Rectifier

1. Remove the four screws holding the rectifier and the stator lead wires.
2. Remove the rectifier (1).

(1) Rectifier

9Y1210436ELS0008US0



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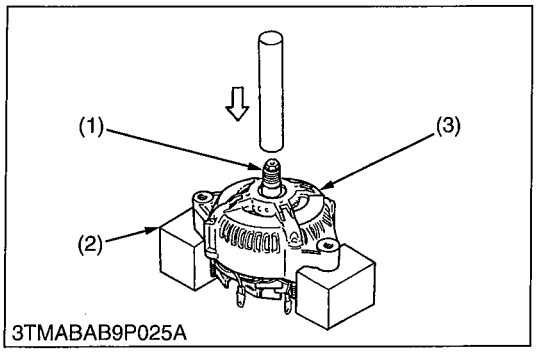
Rear End Frame

1. Remove the two nuts and two screws holding the drive end frame and the rear end frame.
2. Remove the rear end frame (1).

(1) Rear End Frame

9Y1210855ELS0061US0



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Rotor

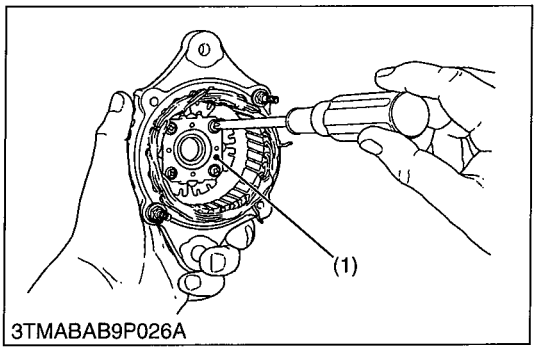
1. Press out the rotor (1) from drive end frame (3).

■ **IMPORTANT**

- **Take special care not to drop the rotor and damage the slip ring or fan, etc..**

(1) Rotor
(2) Block
(3) Drive End Frame

9Y1210436ELS0010US0



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Retainer Plate

1. Remove the four screws holding the retainer plate, and remove the retainer plate (1).

(1) Retainer Plate

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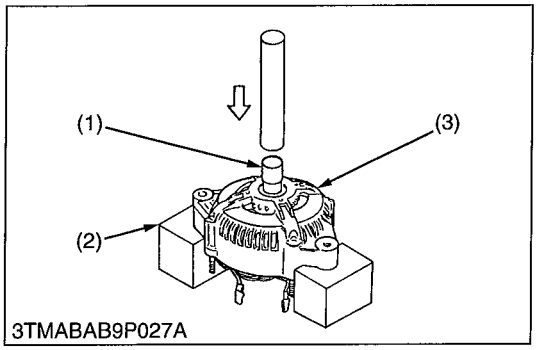

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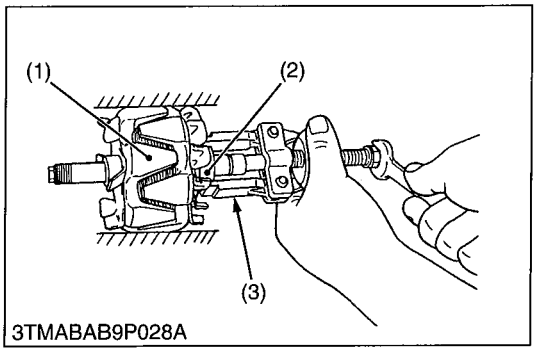
Bearing on Drive End Side

1. Press out the bearing from drive end frame (3) with a press and jig (1).

(1) Jig
(2) Block
(3) Drive End Frame

9Y1210436ELS0012US0



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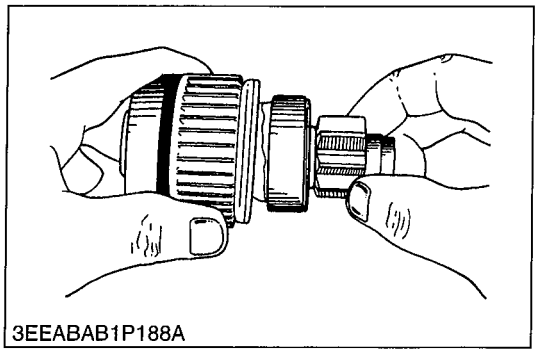
Bearing at Slip Ring Side

1. Lightly secure the rotor (1) with a vise to prevent damage, and remove the bearing (2) with a puller (3).

(1) Rotor
(2) Bearing
(3) Puller

9Y1210436ELS0013US0

[3] SERVICING
(1) Starter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Overrunning Clutch

1. Inspect the pinion for wear or damage.
2. If there is any problem, replace the overrunning clutch assembly.
3. Check that the pinion turns freely and smoothly in the overrunning direction and does not slip in the cranking direction.
4. If the pinion slips or does not rotate in the both directions, replace the overrunning clutch assembly.

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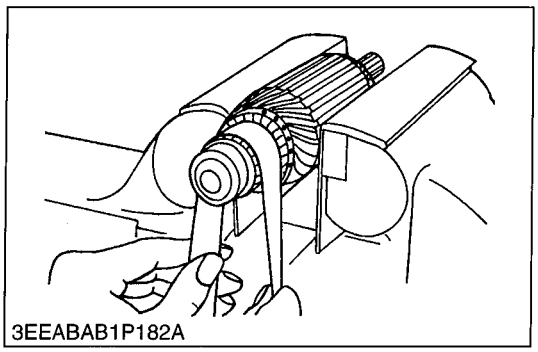
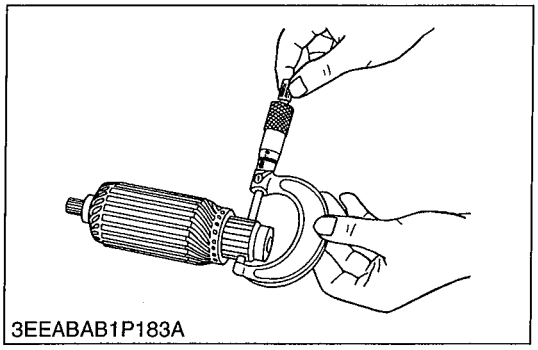
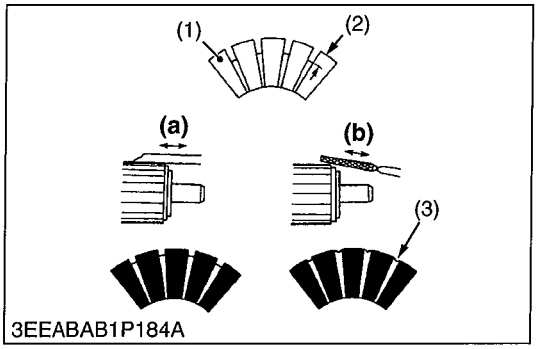

3EEABAB1P182A

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.


3EEABAB1P183A

Commutator O.D.	Factory specification	30.0 mm 1.181 in.
	Allowable limit	29.0 mm 1.142 in.
Difference of O.D.'s	Factory specification	Less than 0.02 mm 0.0008 in.
	Allowable limit	0.05 mm 0.0020 in.
Mica undercut	Factory specification	0.50 to 0.80 mm 0.0197 to 0.0315 in.
	Allowable limit	0.20 mm 0.0079 in.



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(1) Segment
(2) Undercut
(3) Mica
(a) Correct
(b) Incorrect

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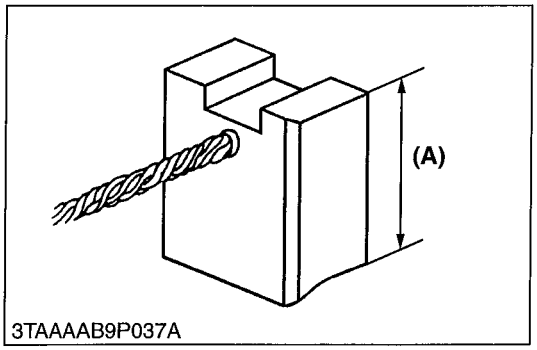

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Brush Wear

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 specification	14.0 mm 0.551 in.
	Allowable limit	9.0 mm 0.354 in.

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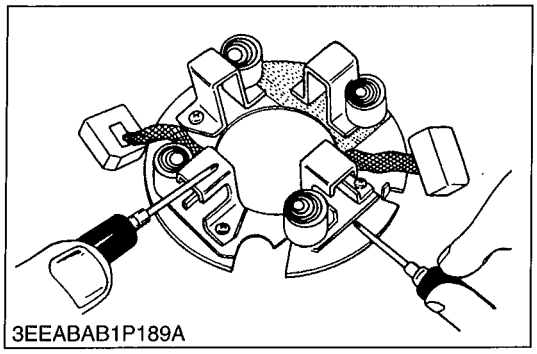
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Brush Holder

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

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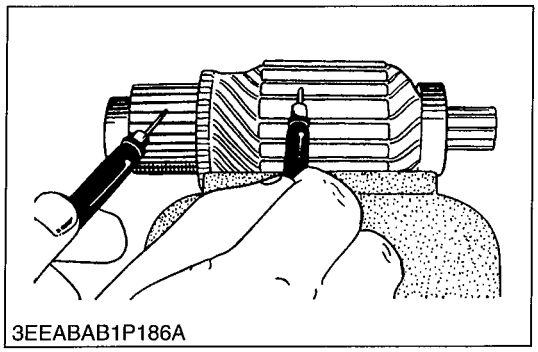
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Armature Coil

1. Check the continuity across the commutator and armature coil core with an ohmmeter.
2. If it conducts, replace the armature.
3. Check the continuity across the segments of the commutator with an ohmmeter.
4. If it does not conduct, replace the armature.

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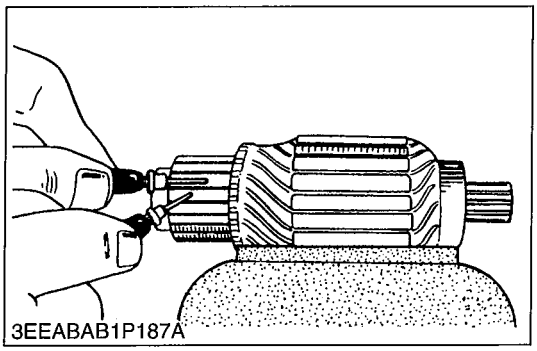
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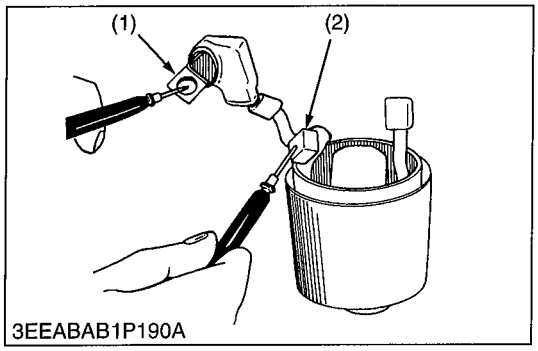

3EEABAB1P190A

Field Coil

1. Check the continuity across the lead (1) and brush (2) with an ohmmeter.
2. If it does not conduct, replace the yoke assembly.
3. Check the continuity across the brush (2) and yoke (3) with an ohmmeter.
4. If it conducts, replace the yoke assembly.

(1) Lead
(2) Brush
(3) Yoke

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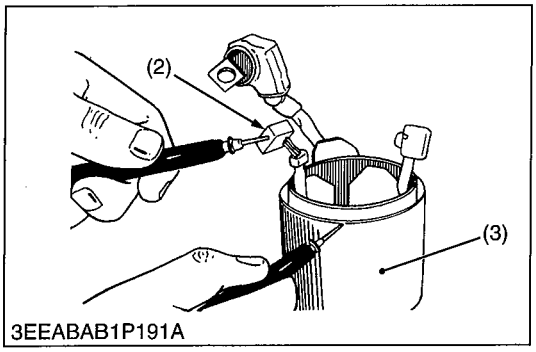

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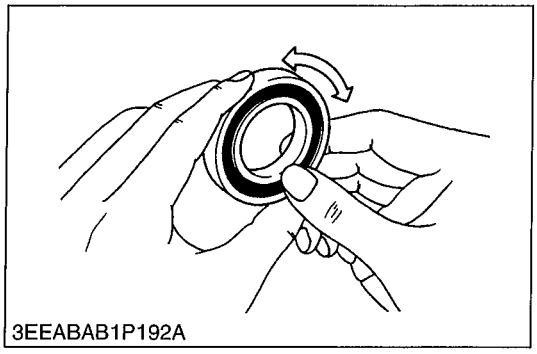
(2) Alternator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Bearing

1. Check the bearing for smooth rotation.
2. If it does not rotate smoothly, replace it.

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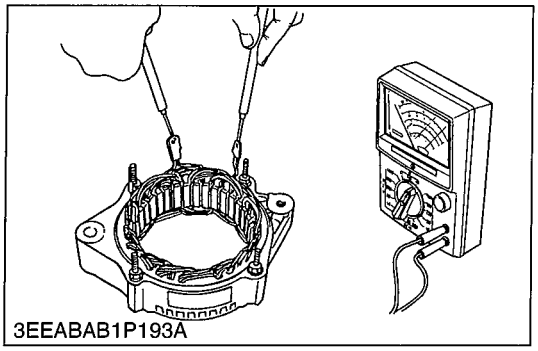
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Stator

1. Measure the resistance across each lead of the stator coil with resistance range of circuit tester.
2. If the measurement is not within factory specification, replace it.
3. Check the continuity across each stator coil lead and core with resistance range of circuit tester.
4. If infinity is not indicated, replace it.

Resistance	Factory specification	Less than 1.0 Ω

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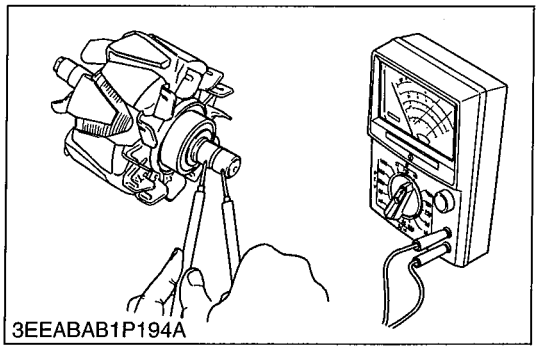
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Rotor

1. Measure the resistance across the slip rings.
2. If the resistance is not the factory specification, replace it.
3. Check the continuity across the slip ring and core with resistance range of circuit tester.
4. If infinity is not indicated, replace it.

Resistance	Factory specification	2.9 Ω

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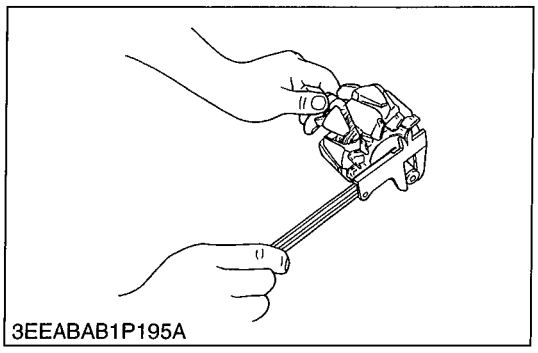
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Slip Ring

1. Check the slip ring for score.
2. If scored, correct with an emery paper or on a lathe.
3. Measure the O.D. of slip ring with vernier calipers.
4. If the measurement is less than the allowable limit, replace it.

Slip ring O.D.	Factory specification	14.4 mm 0.567 in.
	Allowable limit	14.0 mm 0.551 in.

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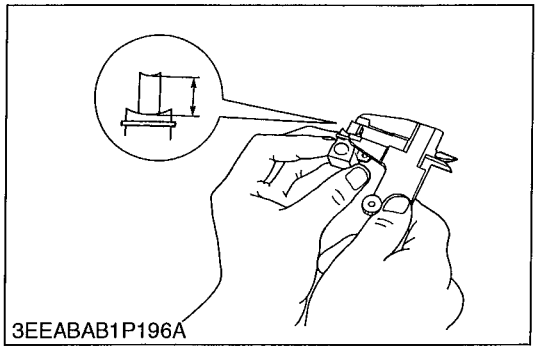
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Brush Wear

1. Measure the brush length with vernier calipers.
2. If the measurement is less than allowable limit, replace it.
3. Make sure that the brush moves smoothly.
4. If the brush is damaged, replace it.

Brush length	Factory specification	10.5 mm 0.413 in.
	Allowable limit	8.4 mm 0.331 in.

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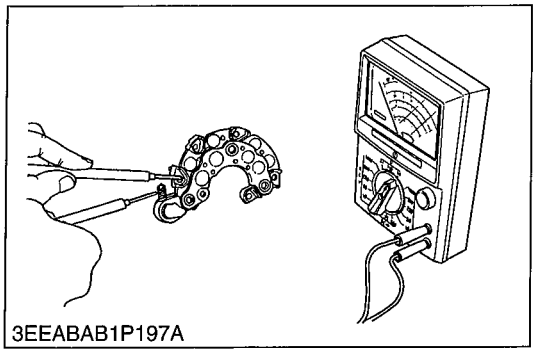

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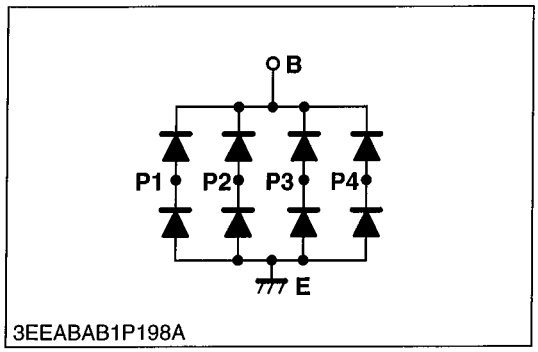

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Rectifier

1. Check the continuity across each diode of rectifier with resistance range of circuit tester.
2. The rectifier is normal if the diode in the rectifier conducts in one direction and does not conduct in the reverse direction.

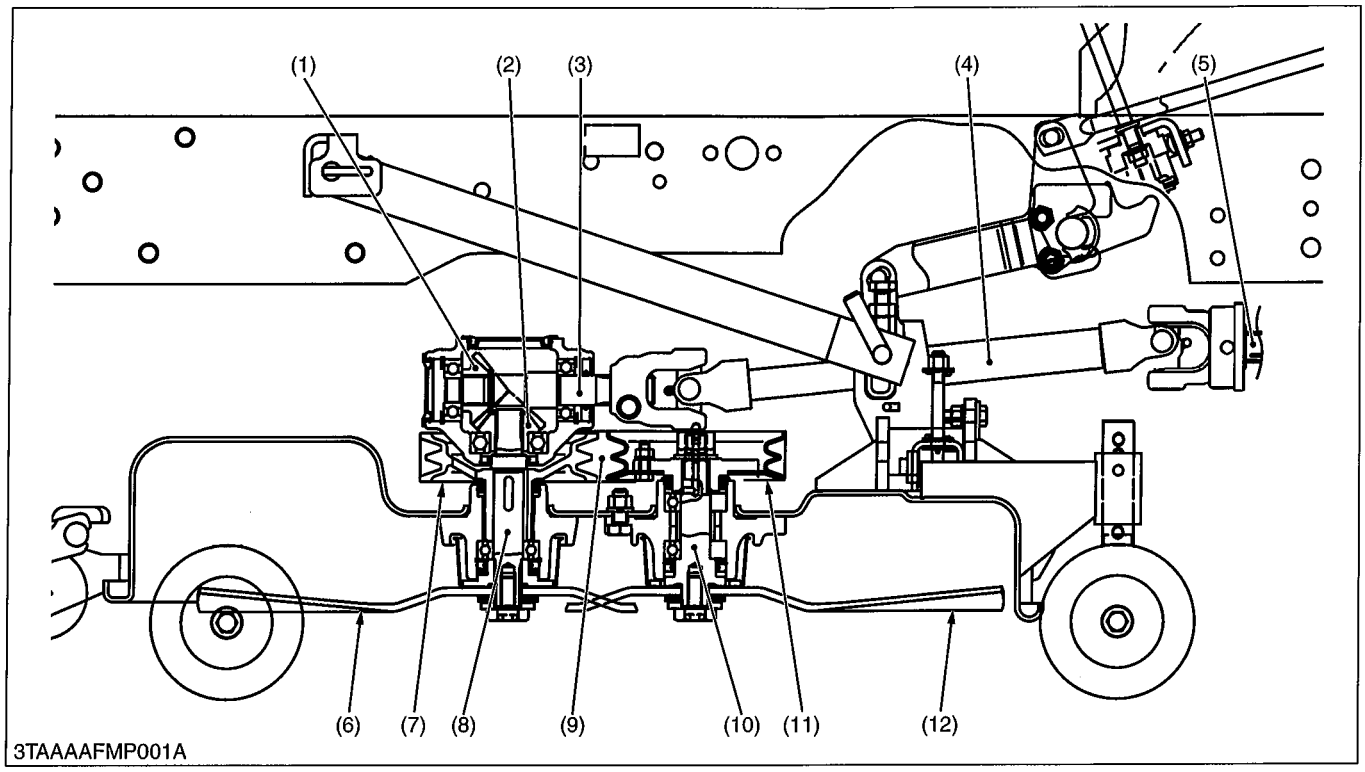
9Y1210855ELS0028US0

7 MOWER

MECHANISM

CONTENTS

1. POWER TRANSMISSION



(1) Bevel Gear
(2) Bevel Gear
(3) Pinion Shaft
(4) Universal Joint
(5) Mid-PTO Shaft
(6) Center Blade
(7) Center Pulley
(8) Bevel Gear Shaft
(9) Mower Belt
(10) Blade Shaft
(11) Outer Pulley
(12) Outer Blade

The power is transmitted from mid-PTO to blades as follows:

■ **Center Blade**

Mid-PTO Shaft (5) → Universal Joint (4) → Pinion Shaft (3) → Bevel Gear (1) → Bevel Gear (2) → Bevel Gear Shaft (8) → Center Blade (6)

■ **Outer Blade**

Mid-PTO Shaft (5) → Universal Joint (4) → Pinion Shaft (3) → Bevel Gear (1) → Bevel Gear (2) → Bevel Gear Shaft (8) → Center Pulley (7) → Mower Belt (9) → Outer Pulley (11) → Blade Shaft (10) → Outer Blade (12)

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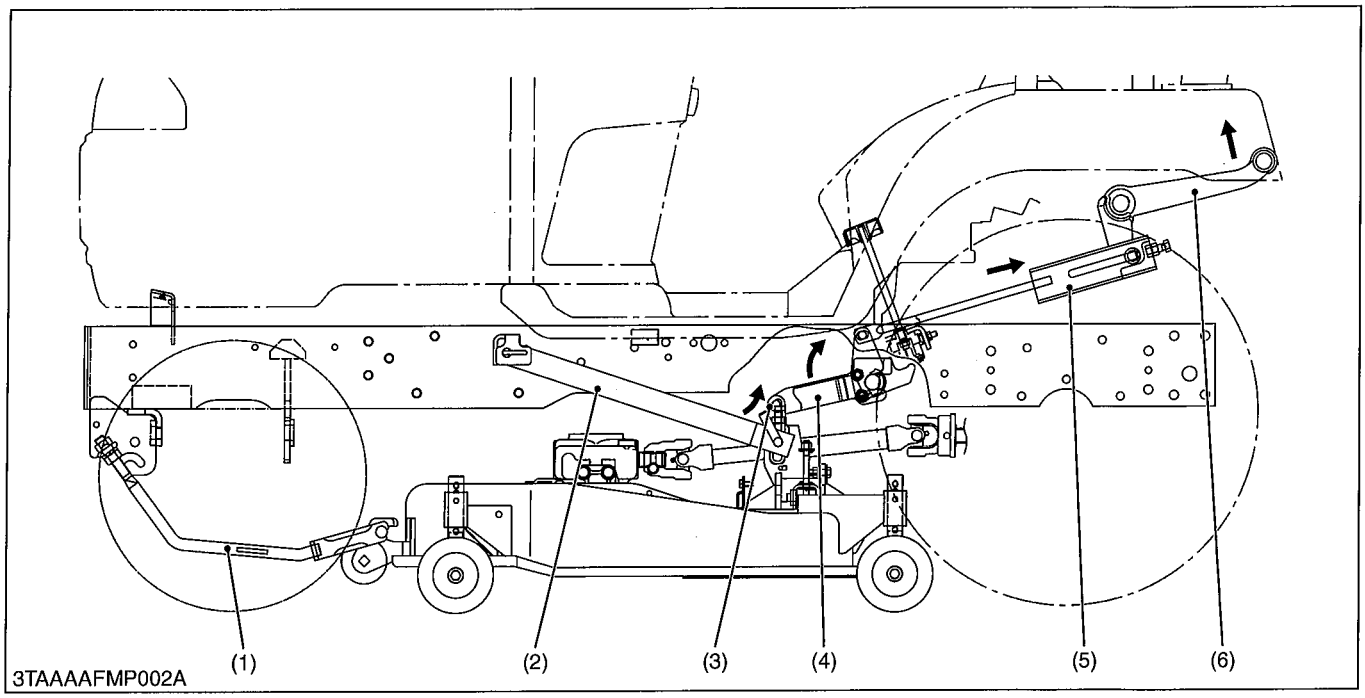
2. LIFTING MECHANISM



(1) Front Link
(2) Rear Link
(3) Lift Link
(4) Rear Lift Link (RH)
(5) Rear Lift Link (LH)
(6) Lift Arm

The lifting of mower is performed by the hydraulic system installed on the tractor.

The mower should be kept lift when traveling. When the position control lever is moved to **"LIFT"** position, the lift arm (6) is lifted up by the oil pressure of hydraulic system, and the rear lift link (LH) (5) is pulled rearward.

Therefore, rear lift links (4), (5) rotate and the mower is lifted by the lift links (3) and rear links (2).

As this link system is a parallel linkage, the mower can be kept parallel at every position.

CAUTION

- **Never operate mower in transport position.**

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3. SELF-BALANCER SYSTEM

This system reduces the stepped differences in cutting height when mowing rolling terrain.

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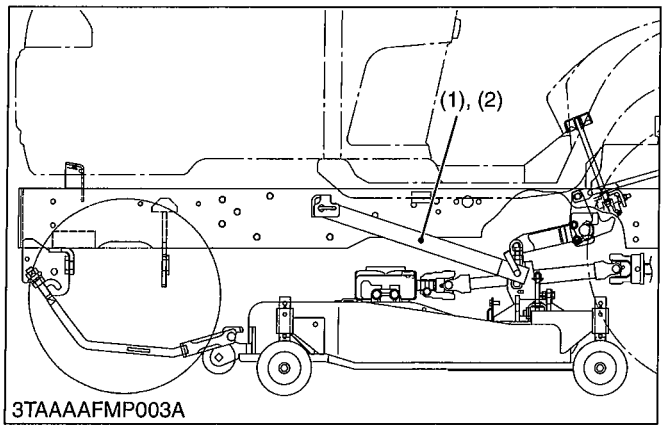

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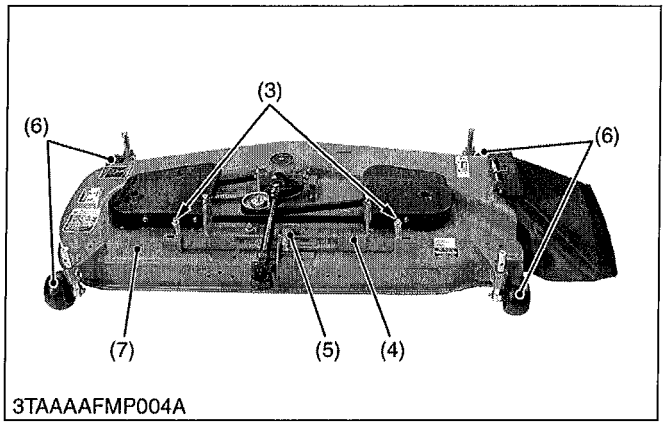

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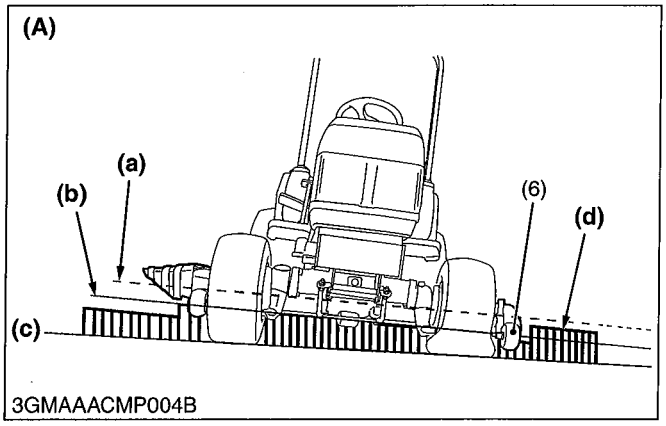

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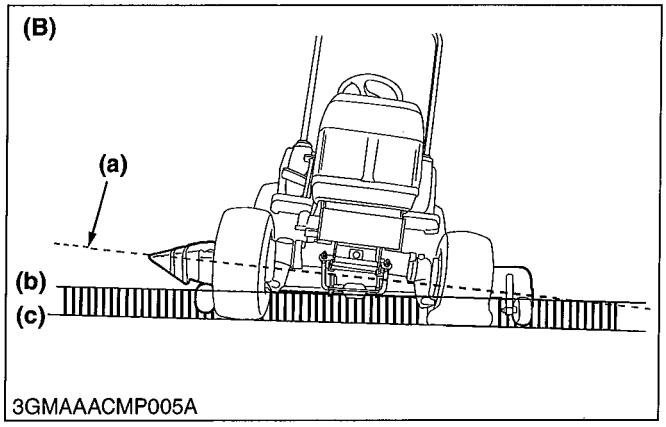

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■ Self-Balancer

1. The mower deck is held in place via the balancer plate (4) and the support by the rear link (1), (2).
2. The mower deck is suspended by, and is tilted to the right and left by, the balancer support (5). The balancer springs (3) at both sides adjust themselves for suitable tension to keep the mower deck out of excessive tilt.

■ Without Self-Balancer Type (A)

- When working on a wavy ground, the tractor itself, with the mower deck, goes along the curves of the terrain. If not equipped with the self-balancer, the tractor tends to tilt itself greater than the ground's waves by its own weight. This may cause an uneven mowing. The wider the mower is, the more unevenness is caused.

■ With Self-Balancer Type (B)

- When working on a wavy ground, the tractor itself goes along the curves of the terrain like with the tractor that is not equipped with the self-balancer. The balancer springs (3), however, serve to keep the mower deck in parallel with the ground's curves until the anti-scalp roller (6) comes in contact with the ground.
- If the tractor temporarily tilts itself more than the ground's slope or the like, the anti-scalp roller (6) touches the ground. Now the mower deck is brought back in parallel with the ground by the counter force of the roller (6) just hitting the ground as well as the tension of the balancer springs (3). This helps reduce an uneven mowing.

■ NOTE

- **Always keep the anti-scalp roller with specified position (Refer to Operator's Manual).**

(1) Rear Link (RH)
(2) Rear Link (LH)
(3) Balancer Spring
(4) Balancer Plate
(5) Balancer Support
(6) Anti-scalp Roller
(7) Mower Deck

(A) Without Self-Balancer
(B) With Self-Balancer
(a) Tilt: Tractor
(b) Tilt: Mower Deck
(c) Ground
(d) Grass

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SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Blade Does Not Turn	Mid-PTO system malfunctioning	Check transmission	2-S39
	Mower belt broken	Replace mower belt	7-S11
Blade Speed Is Slow	Mower belt loosen	Replace mower belt or tension spring	7-S11
	Grass clogged	Remove grass	–
	Cup washer flattened out or worn	Replace cup washer	7-S12
	Engine rpm too low	Mow at full throttle, check and reset engine rpm	–
Cutting Is Poor	Mower blade worn or broken	Sharpen or replace mower blade	7-S12
	Mower blade screw loosen	Retighten mower blade screw	7-S12
	Cutting height improper	Adjust cutting height	7-S7 to 7-S10
	Ground speed too fast	Slow-down	–
	Low tire inflation	Add air to correct	G-60
	Anti-scalp rollers not adjusted correctly	Adjust anti-scalp rollers	7-S10
Mower Is Not Lifted	Linkage system broken	Replace linkage system	7-S7
	Trouble of hydraulic system	Check hydraulic system	–

9Y1210855MOS0001US0

2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Stopper and Rear Link	Clearance	0 to 0.5 m 0 to 0.01 in.	–
Front Tip and Rear Tip of Blade	Difference	0.0 to 5.0 mm 0.0 to 0.20 in.	–
Left Tip and Right Tip of Blade	Difference	Less than 3 mm 0.12 in.	–
Balancer Spring	Length	55.0 mm 2.17 in.	–
Input Shaft (without Mower Belt)	Turning Torque	Less than 0.7 N·m 0.07 kgf·m 0.52 lbf·ft	–
Bevel Gears in Gear Box **[RCK48-18BX, RCK54-23BX and RCK60B-23BX]**	Backlash	0.10 to 0.20 mm 0.0040 to 0.0078 in.	0.40 mm 0.016 in.
[RCK48P-18BX and RCK54P-23BX]	Backlash	0.13 to 0.25 mm 0.0051 to 0.0098 in.	0.40 mm 0.016 in.

9Y1210855MOS0002US0

3. TIGHTENING TORQUES

Tightening torques of screws, bolts and nuts on the table below are especially specified.
(For general use screws, bolts and nuts: Refer to "5. TIGHTENING TORQUES" on page G-13.)

[RCK48-18BX, RCK54-23BX and RCK60B-23BX]

Item	N·m	kgf·m	lbf·ft
Gear box mounting screw	78 to 90	7.9 to 9.2	58 to 66
Mower blade screw	103 to 117	10.5 to 12.0	76.0 to 86.7
Center pulley holder bolt and nut	78 to 90	7.9 to 9.2	58 to 66
Outer pulley mounting nut	197 to 225	20.0 to 23.0	145 to 166
Gear box bracket mounting bolt and nut	78 to 90	7.9 to 9.2	58 to 66
Pulley boss mounting nut	24 to 27	2.4 to 2.8	18 to 20
Outer pulley holder mounting bolt and nut (RCK48-18BX)	48.0 to 55.9	4.9 to 5.7	35.4 to 41.2
Outer pulley holder mounting bolt and nut (RCK54-23BX and RCK60B-23BX)	78 to 90	7.9 to 9.2	58 to 66

[RCK48P-18BX and RCK54P-23BX]

Item	N·m	kgf·m	lbf·ft
Mower blade screw	103 to 117	10.5 to 12.0	76.0 to 86.7
Gear box screw	24 to 27	2.4 to 2.8	17 to 20
Gear box mounting screw (for aluminum gear case)	39 to 44	4.0 to 4.5	29 to 33
Gear box bracket mounting bolt and nut	78 to 90	7.9 to 9.2	58 to 67
Center pulley holder bolt and nut	78 to 90	7.9 to 9.2	58 to 67
Outer pulley mounting nut	167 to 186	17.0 to 19.0	123 to 137
Outer pulley holder mounting bolt and nut	48.0 to 55.9	4.9 to 5.7	35.4 to 41.2

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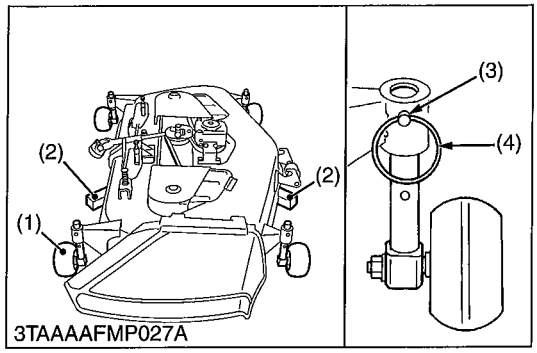
4. SETTING UP MOWER



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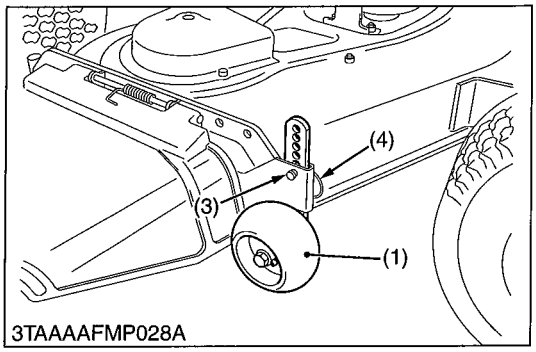

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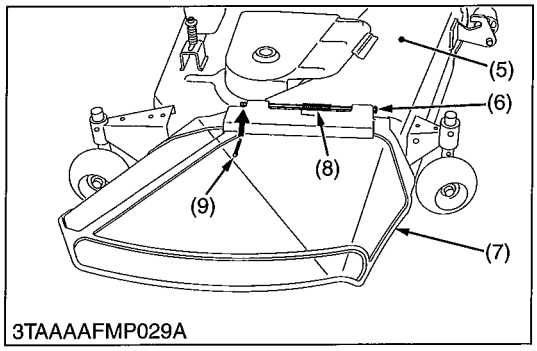

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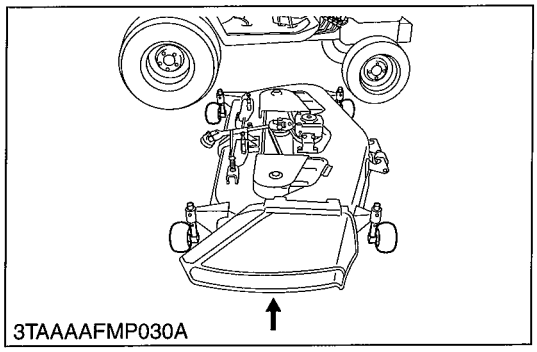
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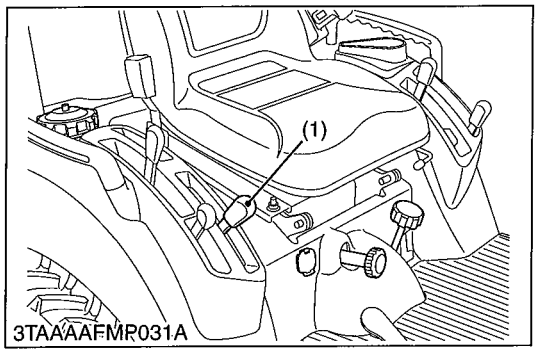

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Assembling Mower

1. Place the mower on blocks as illustrated.
   Turn the anti-scalp rollers sideways and attach to the arms of the deck at the upper position with clevis pins and snap rings. Remove the blocks. (RCK60B-23BX, RCK54P-23BX and RCK54-23BX)
2. Attach the front anti-scalp rollers to the deck with clevis pins and snap rings. (RCK48P-18BX and RCK48-18BX)
3. Attach the discharge to the deck with the spring, discharge pin and cotter pin.
   Secure the spring to the discharge deflector as illustrated.

(1) Anti-scalp Roller
(2) Block
(3) Clevis Pin
(4) Snap Ring
(5) Deck
(6) Discharge Pin
(7) Discharge Deflector
(8) Spring
(9) Cotter Pin

9Y1210855MOS0004US0

Setting Mower

CAUTION

- **Park the tractor on a firm, flat and level surface, set the parking brake, stop the engine and remove the key.**

1. Start the engine and the hydraulic lever rearward to raise the mower rear link to the highest position.
2. Stop the engine and remove the key.
3. Roll the mower under the tractor from right side.

(1) Hydraulic Control Lever

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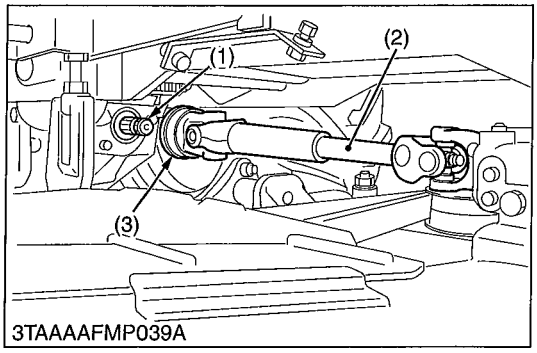

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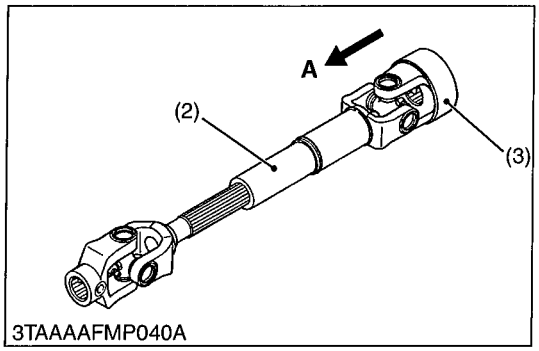

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Universal Joint

1. Pull back the coupler (3) of the universal joint (2).
2. Push the universal joint (2) onto the mid-PTO shaft (1), until the coupler locks.
3. Slide the universal joint back and forward to make sure the universal joint is locked securely.

■ **IMPORTANT**

- **Finally, tug on the universal joint to make sure it is locked on the PTO shaft.**

(1) Mid-PTO Shaft
(2) Universal Joint
(3) Coupler

A: Tug

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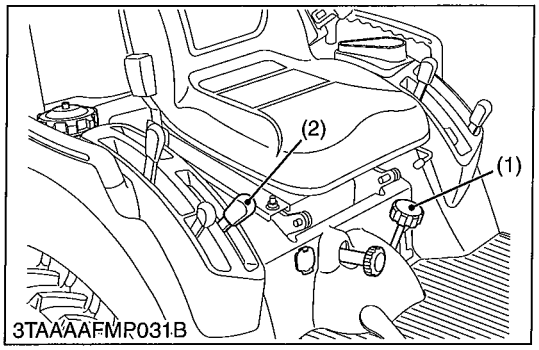

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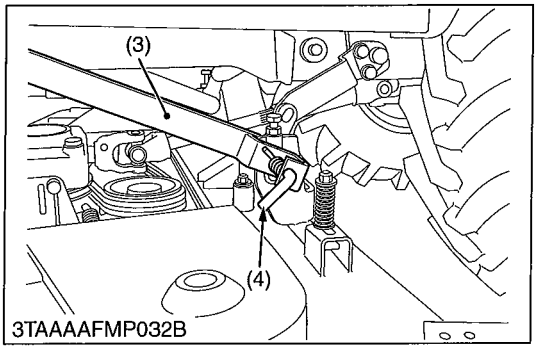

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Rear Link

1. Set the cutting height control dial (1) to zero inch position.
2. Operate the tractor's hydraulic control lever (2) forward to lower the mower rear links (3).
   Attach the rear links (3) to the mower with the L pins (4).

(1) Cutting Height Control Dial
(2) Hydraulic Control Lever
(3) Rear Link
(4) L Pin

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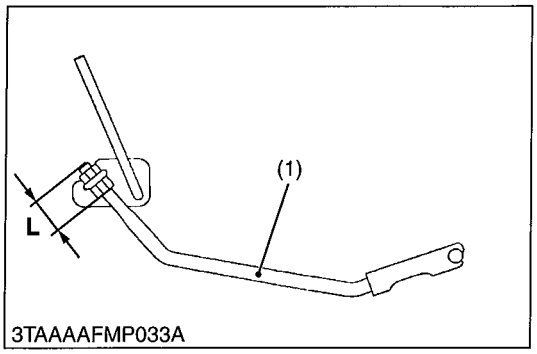

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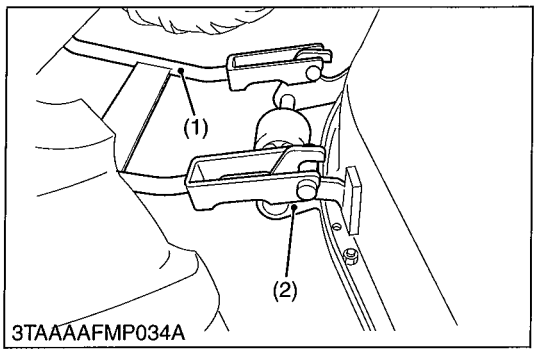

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Front Link

1. Hook the front link (1) to the front bracket groove (2) as shown in the figure.

(Reference)

- Make sure the length **"L"** of the front link (1) is 47 mm (1.85 in.).

(1) Front Link
(2) Front Bracket Groove

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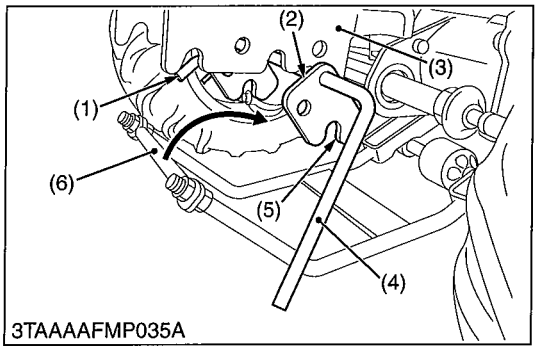

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Mounting Front Link

1. Position the front lever to the front link bracket.
2. Pull and lock the L pin. Then lower the front lever.
3. Hook the front link to the lever fulcrum, and lift the front lever.
4. Release the L pin to lock the front lever.

■ **NOTE**

- **When hooking the front link to the lever fulcrum, normal position of the lever fulcrum groove is open to downward.**

■ **IMPORTANT**

- **Check that the front lever is locked securely with the L pin.**

(1) L pin
(2) Lever Fulcrum
(3) Front Link Bracket
(4) Front Lever
(5) Lever Fulcrum Groove
(6) Front Link

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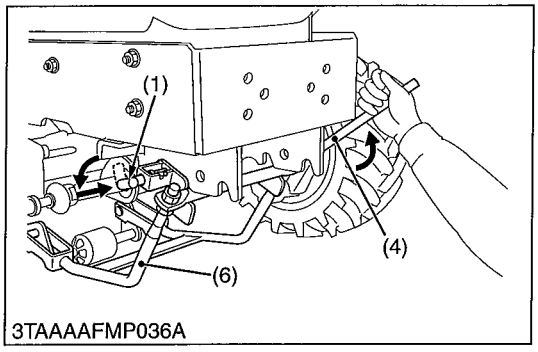

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5. CHECKING AND ADJUSTING

[1] MOWER ADJUSTMENT

CAUTION

- **Park the tractor on a firm, flat and level surface and set the parking brake.**
- **Stoop the engine, remove the key, and allow the blades to stop before making adjustments.**
- **Wear heavy gloves or wrap end of blade with a rag when you handle blades.**
- **Before starting the engine, set the PTO clutch lever to off position and range gear shift lever to the neutral position.**

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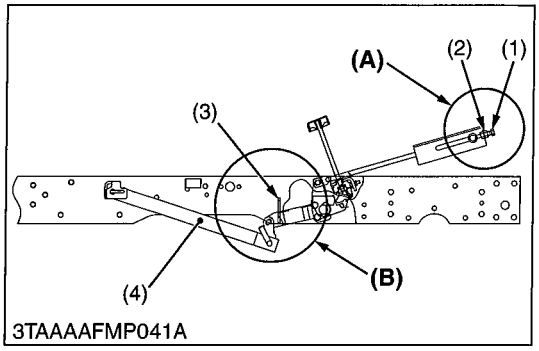

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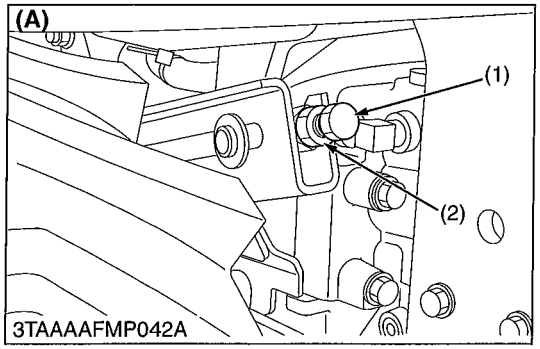

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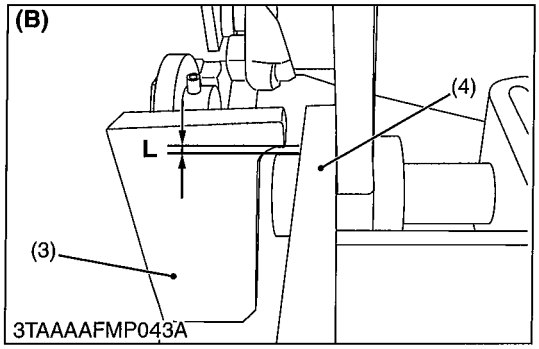

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Adjusting Mower Link

1. Tire pressure must be correct.
2. Move the hydraulic control lever rearward to raise the mower to the highest position.
3. Stop the engine and remove the key.
4. Adjust the left side links with bolt so that the clearance **"L"** is as follows.

Clearance **"L"** between stopper and rear link	Factory specification	0 to 0.5 mm 0 to 0.01 in.

(1) Bolt
(2) Lock Nut
(3) Stopper
(4) Rear Link

L: 0 to 0.5 mm (0 to 0.01 in.)
(A) Adjustment Point
(B) Check Point

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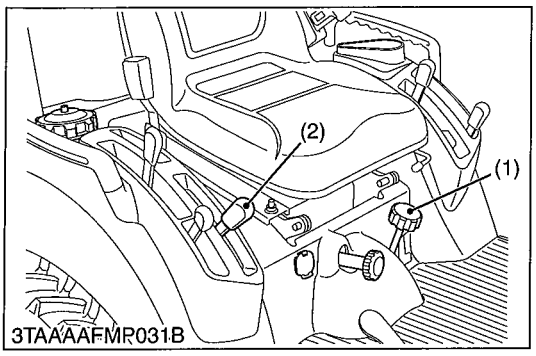

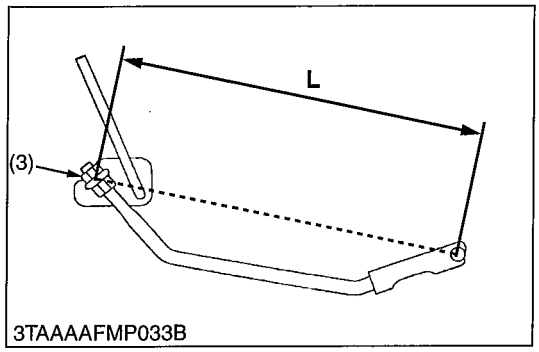

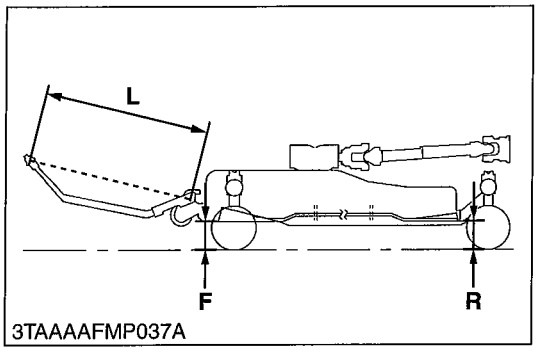

Adjusting Front and Rear Cutting Height

1. Tire pressure must be correct.
2. Make sure the level of the mower blades is adjusted as shown below. Then tighten the lock nuts securely.
3. Turn the cutting height control dial to "2.0" and the anti-scalp roller's height to keep clearance between rollers and ground from 6 to 13 mm (0.25 to 0.5 in.).
4. Turn right blade by hand parallel to direction of travel.
5. Adjust **"L"** of front links with lock nuts so that **"A"** is 0 to 5 mm (0 to 0.2 in.) **"A"** = **"R"** – **"F"**.
6. If the difference between front tip and rear tip of blade is not within the factory specification, adjust the length **"L"** of front link with lock nut (3). The height of rear blade tip **"R"** should be bigger than the front.

Difference **"R"** – **"F"** (**"R"** ≥ **"F"**) between front tip and rear tip of blade	Factory specification	0.0 to 5.0 mm 0.0 to 0.20 in.

(1) Cutting Height Control Dial
(2) Hydraulic Control Lever
(3) Lock Nut

L: Length of Front Link
F: Height of Blade Tip (Front)
R: Height of Blade Tip (Rear)

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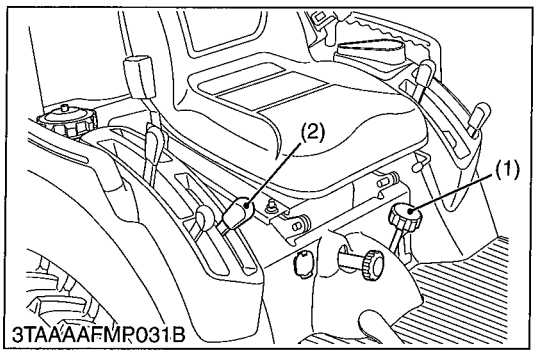

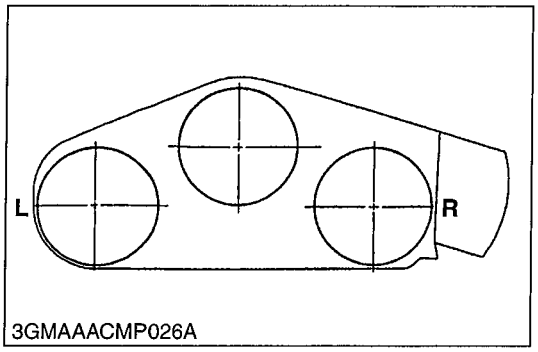

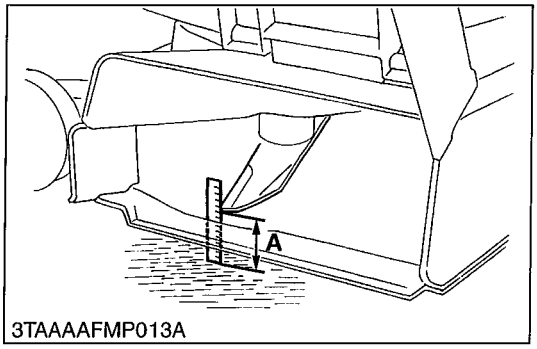

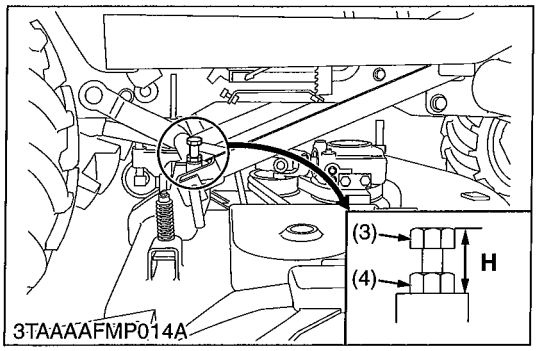

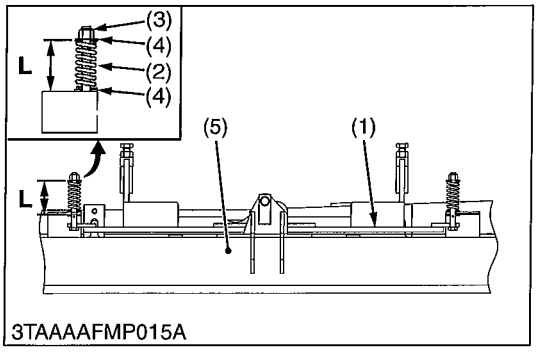

Adjusting Left and Right Cutting Height

1. Tire pressure must be correct.
2. Operate the hydraulic control lever (2) rearward to raise the mower deck to the highest position.
3. Stop the engine and remove the key.
4. Turn the cutting height control dial to the desired height.
5. Set the anti-scalp roller's height to keep clearance between rollers and ground from 6 to 13 mm (0.2 to 0.5 in.).
6. Lower the mower deck by moving the hydraulic control lever forward.
7. Turn left blade by hand parallel to tractor axle and turn right blade parallel to axle to measure from the outside blade tip at **"L"** and **"R"** to the level surface.
8. The difference between measurement should be less than 3 mm (0.12 in.).
9. If the difference between measurement is more than 3 mm (0.12 in.), loosen the lock nut of the left side.
10. Adjust the cutting height fine turning bolts so that the difference between measurement **"L"** and **"R"** is less than 3 mm (0.12 in.). Then lock the nut.

Difference **"L" – "R"** between left tip and right tip of blade	Factory specification	Less than 3 mm 0.12 in.

(1) Cutting Height Control Dial
(2) Hydraulic Control Lever
(3) Cutting Height Fine Turning Bolt
(4) Lock Nut

L: Left Blade Measurement Position
R: Right Blade Measurement Position
A: Blade Height

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Adjusting Self-Balance Suspended Linkage [RCK60B-23BX Only]

1. Check the length **"L"** of balancer spring (2).
2. If the length **"L"** is not within the factory specification, adjust the length of balancer spring (2) with lock nut (3).

■ **NOTE**

- **Check the left and right cutting height difference after adjusting the self-balancer linkage.**

Balancer spring length **"L"** (Right and left)	Factory specification	55.0 mm 2.17 in.

(1) Self-Balancer
(2) Balancer Spring
(3) Lock Nut
(4) Plain Washer
(5) Mower Deck

L: Balancer Spring Length

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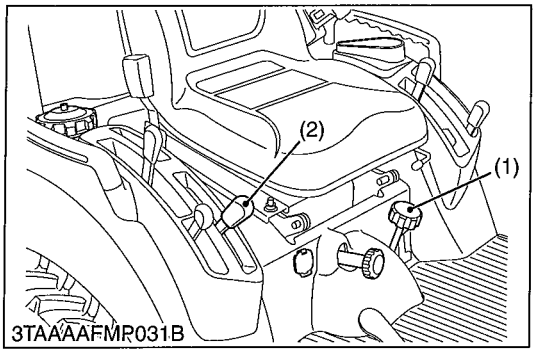

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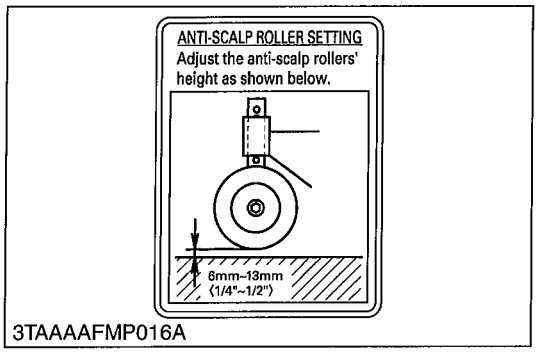

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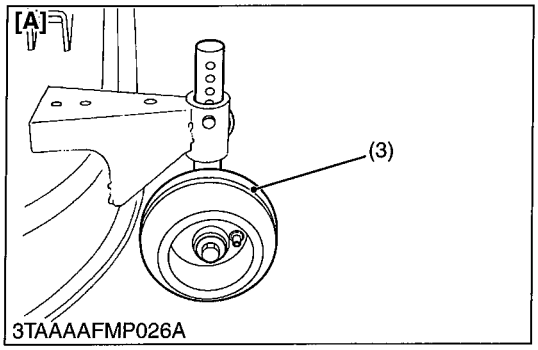

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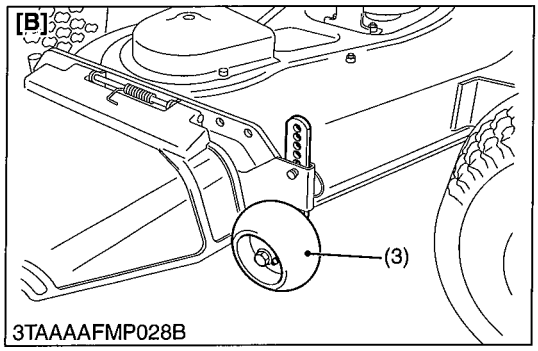

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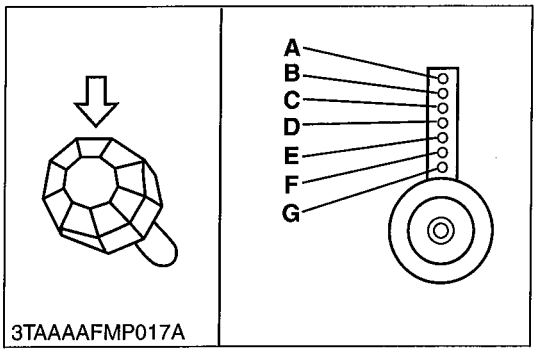

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Cutting Height

DANGER

- **Never operate the mower in transport position.**

IMPORTANT

- **(for self-balance suspended linkage)**
  To reduce the stepped difference in cutting height when mowing rolling terrain, follow the procedure below.

1. To set the cutting height, move the hydraulic control lever rearward to raise the mower to the highest position. Turn the cutting height control dial (1) to adjust height.
2. Set the anti-scalp roller's (3) height as shown to keep clearance between rollers and ground from 6 to 13 mm (0.2 to 0.5 in.).
3. Lower the mower deck by moving the hydraulic control lever (2) forward.
4. Use the higher settings for mowing in a rough area or when mowing tall grass. Lower settings should be used only for smooth lawns where short grass is desired.
5. To set the cutting height, move the hydraulic control lever (2) rearward to raise the mower to the highest position. Turn the cutting height control dial to adjust height.
6. Set the anti-scalp roller's (3) position as shown to have the same cutting height.

Dial (Cutting Height)	Anti-scalp Roller
25 mm (1.0 in.), 32 mm (1.25 in.)	G
38 mm (1.5 in.), 45 mm (1.75 in.)	F
51 mm (2.0 in.), 57 mm (2.25 in.)	E
64 mm (2.5 in.), 70 mm (2.75 in.)	D
76 mm (3.0 in.), 83 mm (3.25 in.)	C
89 mm (3.5 in.), 95 mm (3.75 in.)	B
102 mm (4.0 in.)	A

(1) Cutting Height Control Dial
(2) Hydraulic Control Lever
(3) Anti-scalp Roller

[A] RCK60B-23BX, RCK54P-23BX and RCK54-23BX
[B] RCK48P-18BX and RCK48-18BX

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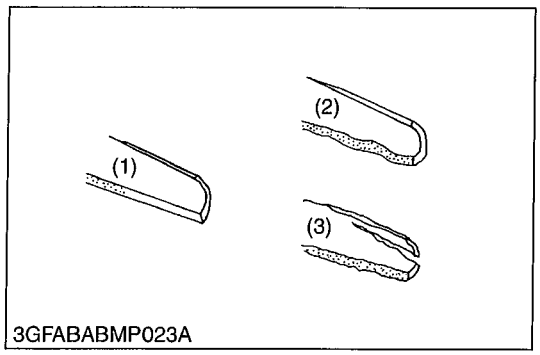
[2] CHECKING MOWER BLADE AND BELT



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Checking Mower Blade

1. Check the cutting edge of mower blade.
2. Sharpen the cutting edges, if the mower blades are as shown in figure (2).
3. Replace the mower blades, if they are as shown in figure (3).

■ **IMPORTANT**

- **Never forget to set the dust cover, cup washer(s) and lock washer, when reassembling the mower blades. (See page 7-S12.)**

■ **NOTE**

- **To sharpen the mower blades by yourself, clamp the mower blade securely in a vise and use a large mill file along the original bevel.**
- **To balance the mower blade, place a small rod through the center hole and check to see if the blade balance evenly. File heavy side of the blade until it balance out even.**

(1) New Blade
(2) Worn Blade
(3) Cracked Blade

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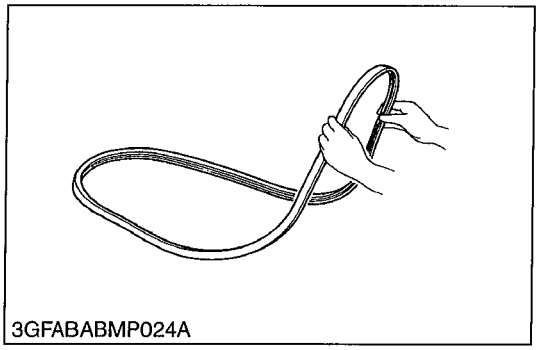
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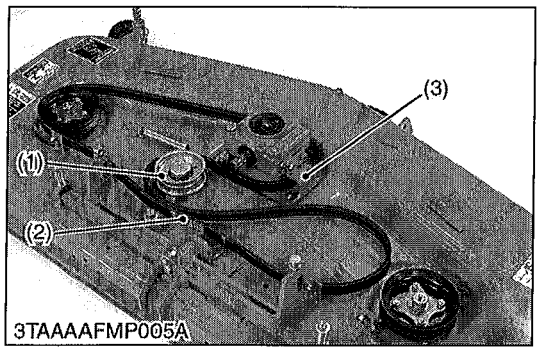

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Checking Mower Belt

1. Check to see the mower belt.
2. Replace the mower belt with a new one, if there is found surface split at more than 3 positions.

(When replacing mower belt)

1. Dismount the mower from the tractor.
2. Remove the left and right hand belt cover from the mower deck.
3. Clean around the gear box.
4. Remove the gear box bracket (right) (3) which mounts the gear box to the mower deck.
5. Remove the mower belt (2) from the tension pulley (1). Slip the mower belt over the top of the gear box.
6. To install a new belt, reverse the above procedure.

[RCK48-18BX, RCK54-23BX and RCK60B-23BX]

Tightening torque	Gear box bracket mounting bolt and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Gear box mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

[RCK48P-18BX and RCK54P-23BX]

Tightening torque	Gear box bracket mounting bolt and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft
	Gear box mounting screw (for aluminum gear case)	39 to 44 N·m 4.0 to 4.5 kgf·m 29 to 33 lbf·ft

■ **IMPORTANT**

- **After setting the gear box bracket mounting screws on the deck without tightening, then mount the other screws on the gear box. And finally tighten them.**

(1) Tension Pulley
(2) Mower Belt
(3) Gear Box Bracket (Right)

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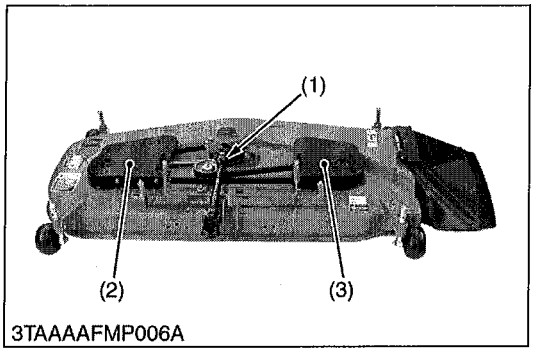
6. DISASSEMBLING AND SERVICING

[1] DISASSEMBLING AND ASSEMBLING



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Universal Joint and Belt Cover

1. Remove the universal joint screw.
2. Remove the universal joint (1).
3. Remove the left and right belt covers (2), (3).

(1) Universal Joint
(2) Belt Cover (Left)
(3) Belt Cover (Right)

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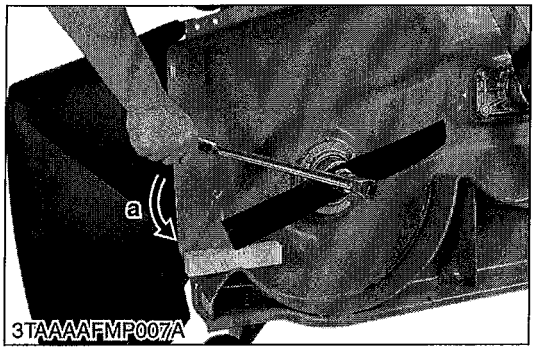

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Mower Blades (Center Blade and Outer Blades)

1. Turn over the mower.
2. Remove the mower blade screw (5), and remove the lock washer (4), cup washer(s) (3), mower blade (2) and dust cover (1).

■ **NOTE**

- **To remove the blade securely, wedge a block of wood between one blade and the mower deck in such position that it will hold the blade safely while loosing or tightening the blade screw.**

(When reassembling)

[RCK48-18BX, RCK54-23BX, RCK48P-18BX and RCK54P-23BX]

- Install the blade in position together with the dust cover and the cup washer. Tighten them up with the screw.

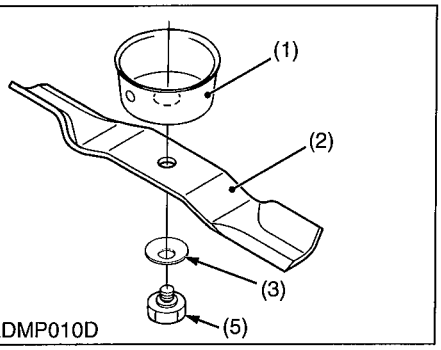
[RCK60B-23BX]

- Install the blade in position together with the dust cover, the lock washer and the 2 cup washers. Tighten them up with the screw.

■ **IMPORTANT**

- **Make sure the cup washer is not flattened out or worn, causing blade to slip easily.**
  Replace cup washer(s) if either is damaged.

Tightening torque	Mower blade screw	103 to 117 N·m 10.5 to 12.0 kgf·m 76.0 to 86.7 lbf·ft

[A]


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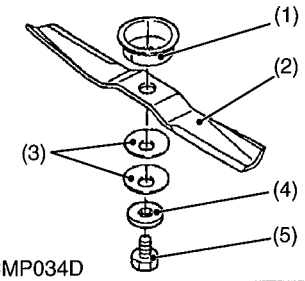

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(1) Dust Cover
(2) Mower Blade
(3) Cup Washer
(4) Lock Washer
(5) Mower Blade Screw

[A] RCK48-18BX, RCK54-23BX, RCK48P-18BX and RCK54P-23BX
[B] RCK60B-23BX
a: Loosen

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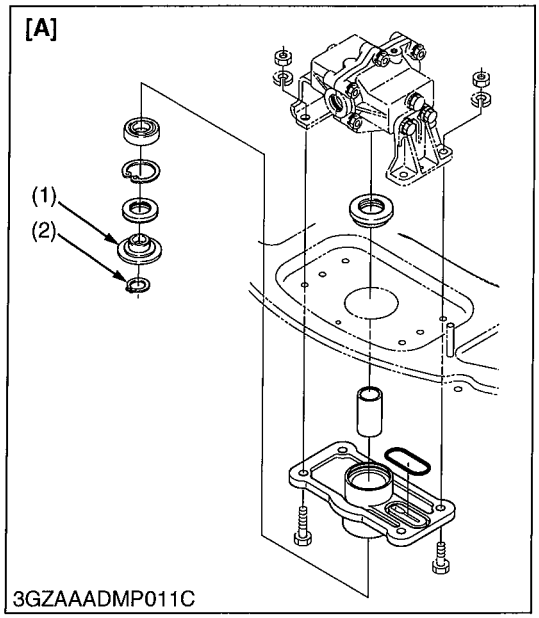

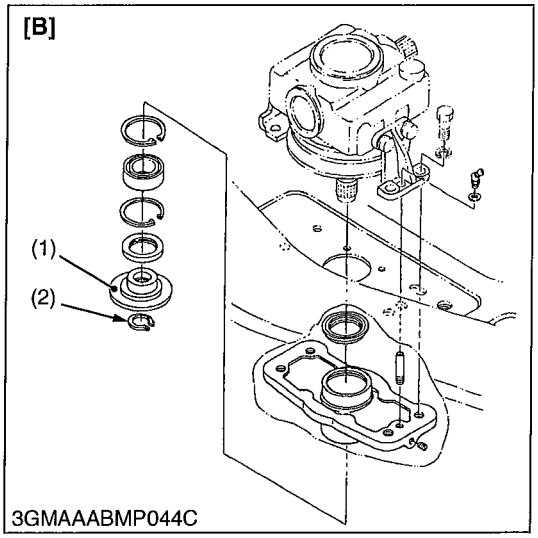

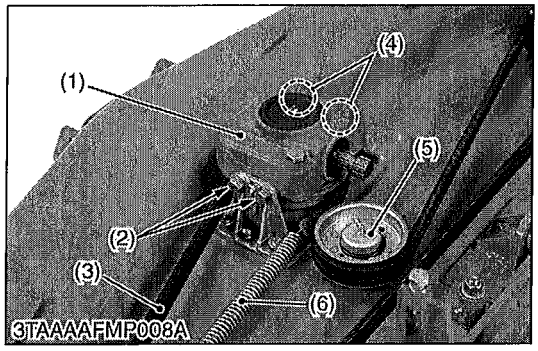

Blade Boss

1. Remove the external snap ring (2).
2. Remove the blade boss (1).

(1) Blade Boss
(2) External Snap Ring

[A] RCK48P-18BX and RCK54P-23BX
[B] RCK48-18BX, RCK54-23BX and RCK60B-23BX

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Gear Box and Mower Belt

1. Turn over the mower.
2. Remove the mower belt (3) from the tension pulley (5).
3. Remove the left and right gear box mounting screws (2), (4) and remove the gear box (1) from the mower deck.

(When reassembling)

- Install the reamer screws (2) at their original positions as shown in the figure.

[RCK48-18BX, RCK54-23BX and RCK60B-23BX]

Tightening torque	Gear box mounting screw	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

[RCK48P-18BX and RCK54P-23BX]

Tightening torque	Gear box mounting screw (for aluminum gear box)	39 to 44 N·m 4.0 to 4.5 kgf·m 29 to 33 lbf·ft

(1) Gear Box
(2) Gear Box Mounting Screw (Reamer Screw)
(3) Mower Belt
(4) Gear Box Mounting Screw
(5) Tension Pulley
(6) Tension Spring

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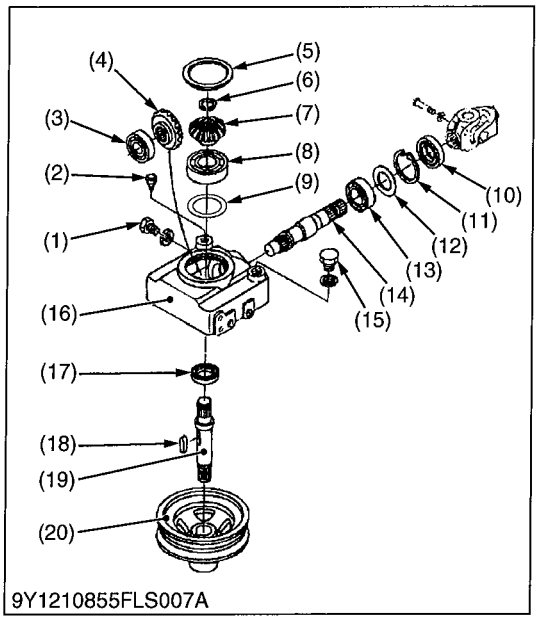

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Disassembling Gear Box [RCK54-23BX and RCK60B-23BX]

1. Remove the drain plug (1), and drain the gear box oil.
2. Remove the center pulley (20) with a puller, and remove the feather key (18) on the bevel gear shaft (19).
3. Remove the gear box cap (5).
4. Remove the oil seal (10), internal snap ring (11) and shim (12).
5. Tap out the pinion shaft (14) with the ball bearing (13), and remove the bevel gear (4).
6. Remove the ball bearing (3) and shims (if installed).
7. Remove the external snap ring (6), and draw out the bevel gear shaft (19).
8. Remove the bevel gear (7), ball bearing (8), shim (9) and oil seal (17).

(When reassembling)

- Replace the oil seals (10), (17) and gear box cap (8) with new ones.
- Check the backlash and turning torque.
  If not proper, adjust with the shims.
  (See page 7-S18 and 7-S19.)

(1) Drain Plug
(2) Breather
(3) Ball Bearing
(4) 19T Bevel Gear (RCK54-23BX)
18T Bevel Gear (RCK60B-23BX)
(5) Gear Box Cap
(6) External Snap Ring
(7) 16T Bevel Gear (RCK54-23BX)
17T Bevel Gear (RCK60B-23BX)
(8) Ball Bearing
(9) Shim
(10) Oil Seal
(11) Internal Snap Ring
(12) Shim
(13) Ball Bearing
(14) Pinion Shaft
(15) Oil Filler Plug
(16) Gear Box
(17) Oil Seal
(18) Feather Key
(19) Bevel Gear Shaft
(20) Center Pulley

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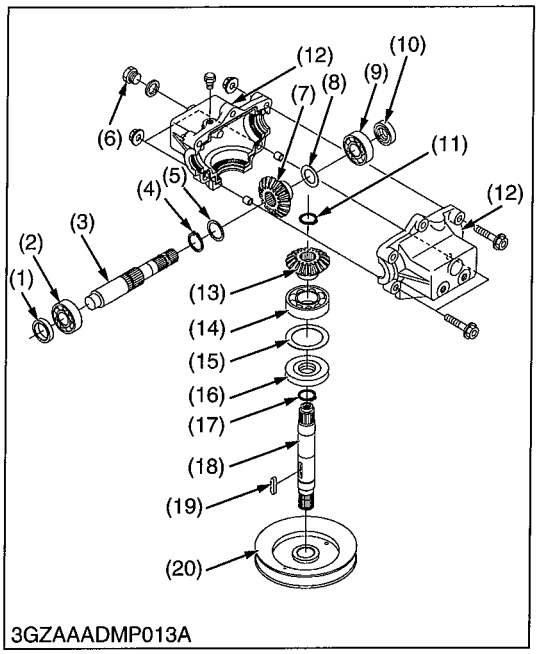

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Disassembling Gear Box [RCK48P-18BX and RCK54P-23BX]

1. Remove the drain plug (6), and drain the gear box oil.
2. Remove the center pulley (20) with a puller.
3. Remove the gear box.
4. Open the gear box.
5. Remove the input shaft (3) and the blade shaft (18).
6. Disassembling the input shaft (3) and the blade shaft (18).

(When reassembling)

- Replace the oil seals (1), (10), (16) and gear box caps with new ones.
- Check the backlash and turning torque.
  If not proper, adjust with the shims.
  (See page 7-S18 and 7-S19.)
- After cleaning dirty and gear box oil and the gear box surface, apply the liquid gasket.

Tightening torque	Gear box screw	24 to 27 N·m 2.4 to 2.8 kgf·m 17 to 20 lbf·ft

(1) Oil Seal
(2) Ball Bearing
(3) Input Shaft
(4) External Circlip
(5) Shim
(6) Drain Plug
(7) Bevel Gear
(8) Shim
(9) Ball Bearing
(10) Oil Seal
(11) External Circlip
(12) Bevel Gear Case
(13) Bevel Gear
(14) Ball Bearing
(15) Shim
(16) Oil Seal
(17) External Circlip
(18) Blade Shaft
(19) Feather Key
(20) Center Pulley

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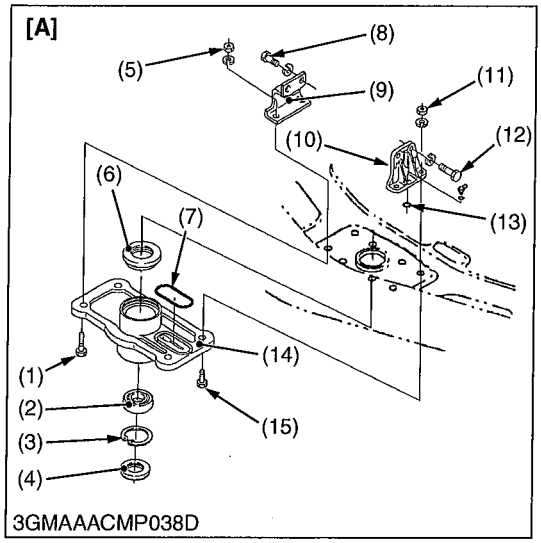

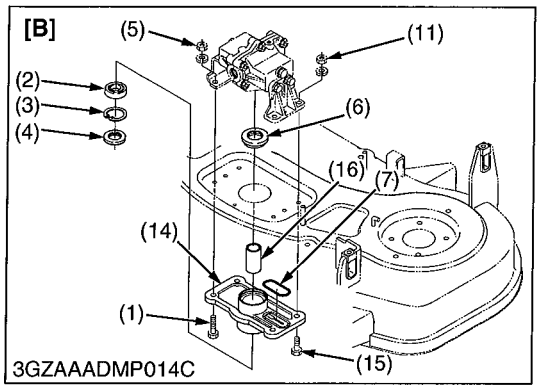

Center Pulley Holder

1. Remove the center pulley holder bolt (1), (15) / center pulley nut (5), (11).
2. Remove the upper oil seal (6) and lower oil seal (4).
3. Remove the internal snap ring (3) and ball bearing (2).

(When reassembling)

- Replace the oil seals (4), (6) with new ones.
- Install the reamer screw (12) / reamer bolt (15) at their original positions as shown in the figure.
- Be sure to fix the O-rings (7), (13) to the original position.

■ **NOTE**

- **When reassembling the center pulley holder (14), gear box and gear box bracket (9), (10), tighten the bolts and nuts in the order as below, to prevent the incline the gear box.**
- **Tighten the reamer screw (12) to the gear box first, then tighten the reamer bolts (15) and nut (11) to the center pulley holder (14) with specified torque.**
- **Tighten the gear box screws (8) to the gear box and then tighten the center pulley holder bolts (1) and nut (5) with specified torque.**
- **See page 7-S13 for tightening torque of gear box mounting screw.**

Tightening torque	Center pulley holder bolt and nut	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

(1) Center Pulley Holder Bolt
(2) Ball Bearing
(3) Snap Ring
(4) Oil Seal
(5) Nut
(6) Oil Seal
(7) O-ring
(8) Gear Box Mounting Screw
(9) Gear Box Bracket (Right)
(10) Gear Box Bracket (Left)
(11) Nut
(12) Gear Box Reamer Screw
(13) O-ring
(14) Center Pulley Holder
(15) Center Pulley Holder Reamer Bolt
(16) Collar

[A] RCK48-18BX, RCK54-23BX and RCK60B-23BX
[B] RCK48P-18BX and RCK54P-23BX

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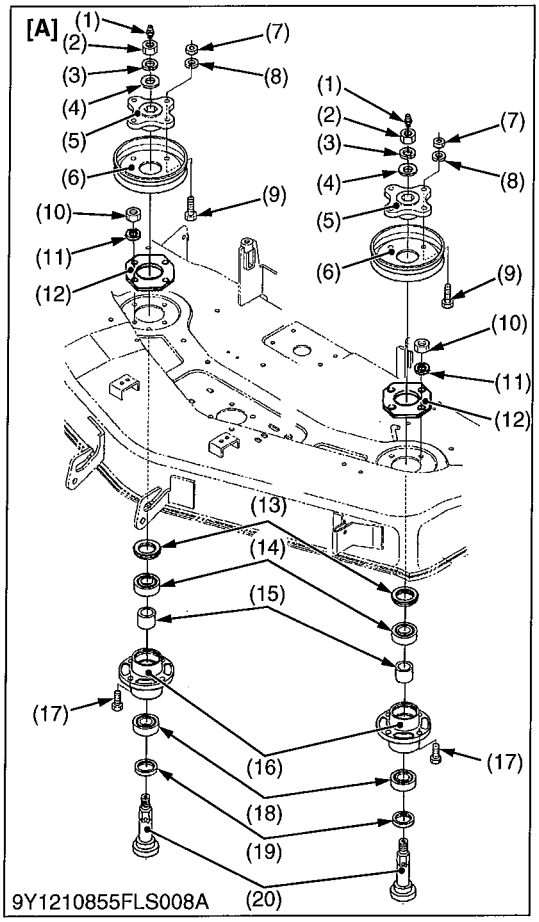

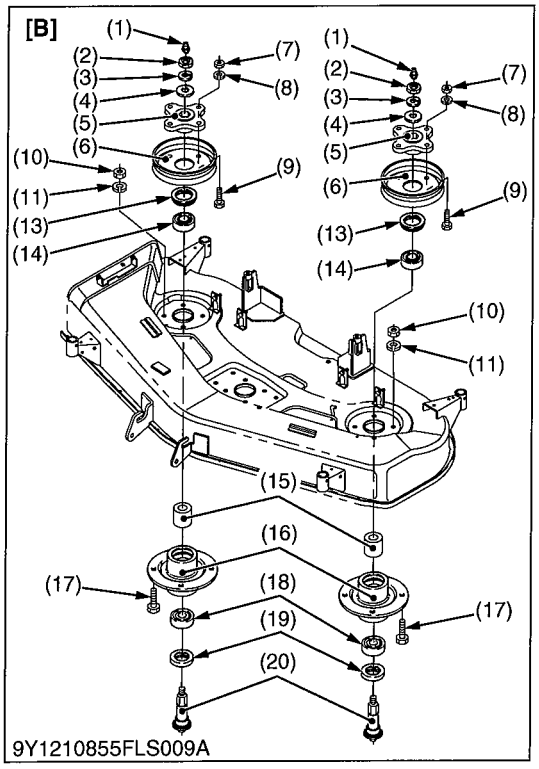

Outer Pulley and Blade Shaft [RCK48-18BX, RCK54-23BX and RCK60B-23BX]

1. Remove the outer pulley mounting nut (2), and remove the outer pulley (6).
2. Remove the outer pulley holder mounting nut (10), and remove the outer pulley holder (16).
3. Remove the oil seal (13) and tap out the blade shaft (20) with the ball bearing (18) and (14), taking care not to damage the grease fitting (1).
4. Remove the ball bearing (14), and collar (15) from the blade shaft (20).
5. Remove the ball bearing (18), and oil seal (19).

(When reassembling)

- Replace the oil seals (13) and (19) with new ones.

Tightening torque	Outer pulley mounting nut	197 to 225 N·m 20.0 to 23.0 kgf·m 145 to 166 lbf·ft
	Pulley boss mounting nut	24 to 27 N·m 2.4 to 2.8 kgf·m 18 to 20 lbf·ft
	Outer pulley holder mounting bolt and nut (RCK48-18BX)	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft
	Outer pulley holder mounting bolt and nut (RCK54-23BX and RCK60B-23BX)	78 to 90 N·m 7.9 to 9.2 kgf·m 58 to 66 lbf·ft

(1) Grease Fitting
(2) Outer Pulley Mounting Nut
(3) Spring Washer
(4) Plain Washer
(5) Outer Pulley Boss
(6) Outer Pulley
(7) Nut
(8) Spring Washer
(9) Pulley Boss Mounting Bolt
(10) Nut
(11) Spring Washer
(12) Pulley Holder Plate (RCK48-18BX)
(13) Oil Seal
(14) Ball Bearing
(15) Collar
(16) Outer Pulley Holder
(17) Outer Pulley Holder Mounting Bolt
(18) Ball Bearing
(19) Oil Seal
(20) Blade Shaft

[A]) RCK48-18BX
[B] RCK54-23BX and RCK60B-23BX

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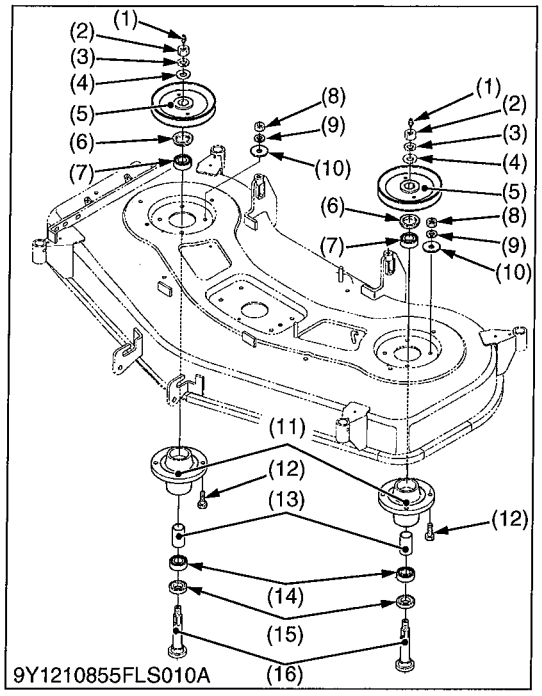

Outer Pulley and Blade Shaft [RCK48P-18BX and RCK54P-23BX]

1. Remove the outer pulley mounting nut (2), and remove the outer pulley (5).
2. Remove the outer pulley holder mounting nut (8), and remove the outer pulley holder (11).
3. Remove the oil seal (6) and tap out the blade shaft (16) with the ball bearings (14) and (7), taking care not to damage the grease fitting (1).
4. Remove the ball bearing (7) and collar (13) from the blade shaft (16).
5. Remove the ball bearing (14) and oil seal (15).

(When reassembling)

- Replace the oil seals (6) and (15) with new ones.

Tightening torque	Outer pulley mounting nut	167 to 186 N·m 17.0 to 19.0 kgf·m 123 to 137 lbf·ft
	Outer pulley holder mounting bolt and nut	48.0 to 55.9 N·m 4.9 to 5.7 kgf·m 35.4 to 41.2 lbf·ft

(1) Grease Fitting
(2) Outer Pulley Mounting Nut
(3) Spring Washer
(4) Plain Washer
(5) Outer Pulley
(6) Oil Seal
(7) Ball Bearing
(8) Nut
(9) Spring Washer
(10) Plain Washer
(11) Outer Pulley Holder
(12) Outer Pulley Holder Mounting Bolt
(13) Collar
(14) Ball Bearing
(15) Oil Seal
(16) Blade Shaft

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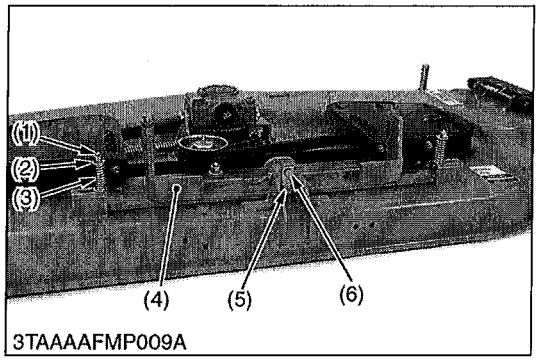

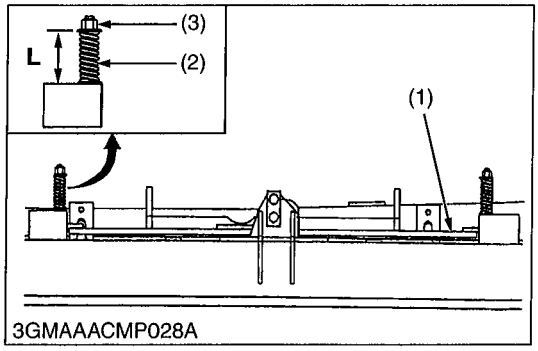

Balancer

1. Remove the lock nut (1) both side.
2. Remove the plain washer (2) and balancer spring (3).
3. Remove the center pin bolt (6).
4. Remove the center pin (5) and balancer plate (4).

(When reassembling)

- Apply grease to the center pin (5).
- Adjust the balancer spring (3) length to the factory specification, with lock nut (1).

Balancer spring length "L" (Right and left)	Factory specification	55.0 mm 2.17 in.

(1) Lock Nut
(2) Plain Washer
(3) Balancer Spring
(4) Balancer Plate
(5) Center Pin
(6) Center Pin Bolt

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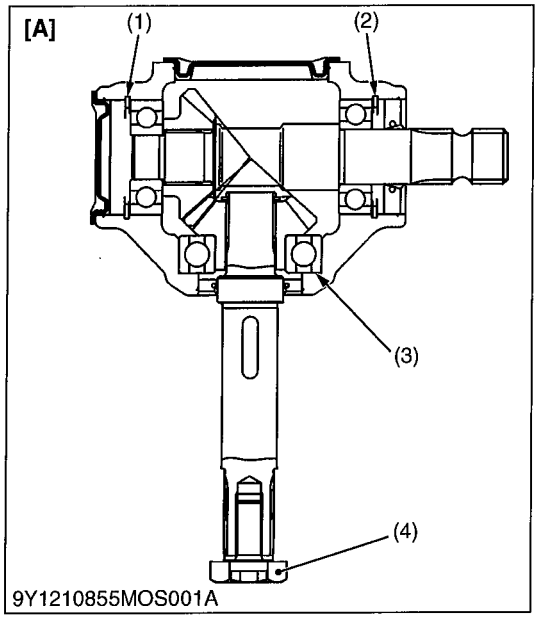
[2] SERVICING



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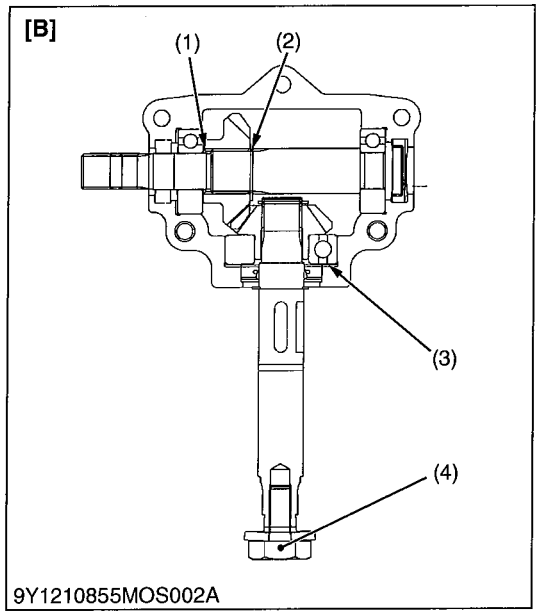

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Turning Torque of Pinion Shaft

1. Set the blade screw (4) for the blade shaft to measure the turning torque.
2. Turn the blade screw (4) clockwise with torque wrench and measure the turning torque

Turning torque	Factory specification	Less than 0.7 N·m 0.07 kgf·m 0.52 lbf·ft

(Reference)

- Thickness of adjusting shims (1), (2):
  0.2 mm (0.0079 in.)
  0.3 mm (0.0118 in.)
- Thickness of adjusting shims (3):
  0.2 mm (0.0079 in.)
  0.3 mm (0.0118 in.)

(1) Adjusting Shim
(2) Adjusting Shim
(3) Adjusting Shim
(4) Blade Screw

[A] RCK48-18BX, RCK54-23BX and RCK60B-23BX
[B] RCK48P-18BX and RCK54P-23BX

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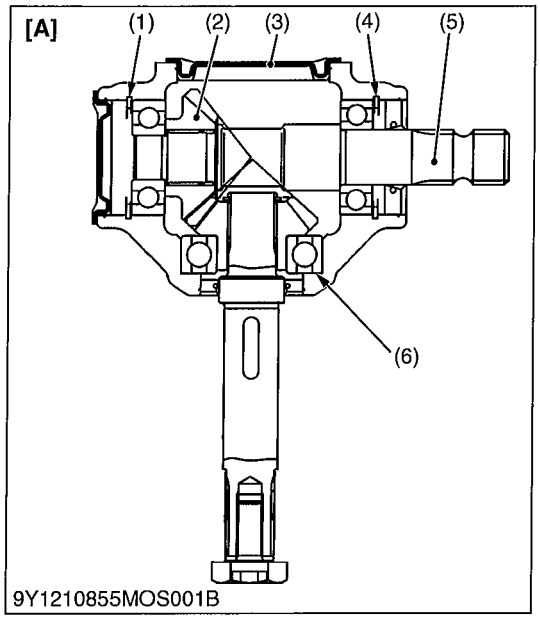

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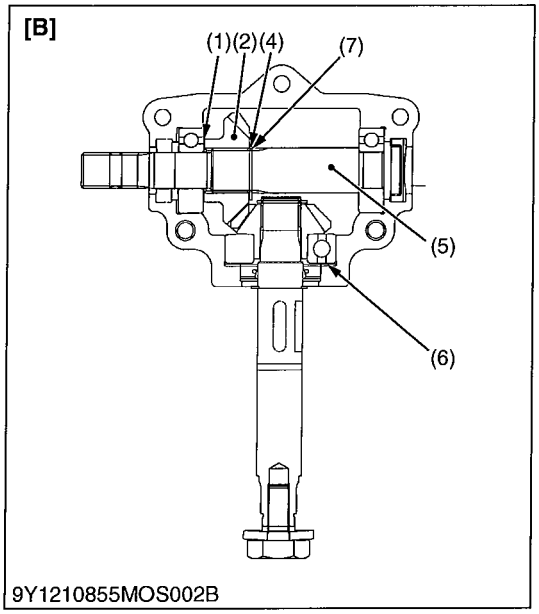

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Backlash between Bevel Gears

1. Remove the gear box cap (3).
2. Place the plastigauges or wire of solder the bevel gear (2) on the input shaft (5).
3. Turn the input shaft (5).
4. Remove the plastigauges or wire of solder, and measure the thickness with the gage or an outside micrometer.
5. If the backlash exceeds the allowable limit, adjust with shims (1), (4), (6).

[RCK48-18BX, RCK54-23BX and RCK60B-23BX]

Backlash between bevel gears	Factory specification	0.10 to 0.20 mm 0.0040 to 0.0078 in
	Allowable limit	0.40 mm 0.016 in.

(Reference)

- Thickness of adjusting shims (1), (4):
  0.2 mm (0.0079 in.)
  0.3 mm (0.0118 in.)
- Thickness of adjusting shims (6):
  0.1 mm (0.0039 in.)
  0.2 mm (0.0079 in.)

[RCK48P-18BX and RCK54P-23BX]

Backlash between bevel gears	Factory specification	0.13 to 0.25 mm 0.0051 to 0.0098 in.
	Allowable limit	0.40 mm 0.016 in.

(Reference)

- Thickness of adjusting shims (1), (4):
  0.2 mm (0.0079 in.)
  0.3 mm (0.0118 in.)
- Thickness of adjusting shims (6):
  0.2 mm (0.0079 in.)
  0.3 mm (0.0118 in.)

(1) Shim
(2) 21T Bevel Gear
(RCK48-18BX and RCK48P-18BX)
19T Bevel Gear
(RCK54-23BX and RCK54P-23BX)
18T Bevel Gear
(RCK60B-23BX)
(3) Gear Box Cap
(4) Shim
(5) Input Shaft
(6) Shim
(7) External Circlip
[A] RCK48-18BX, RCK54-23BX and RCK60B-23BX
[B] RCK48P-18BX and RCK54P-23BX

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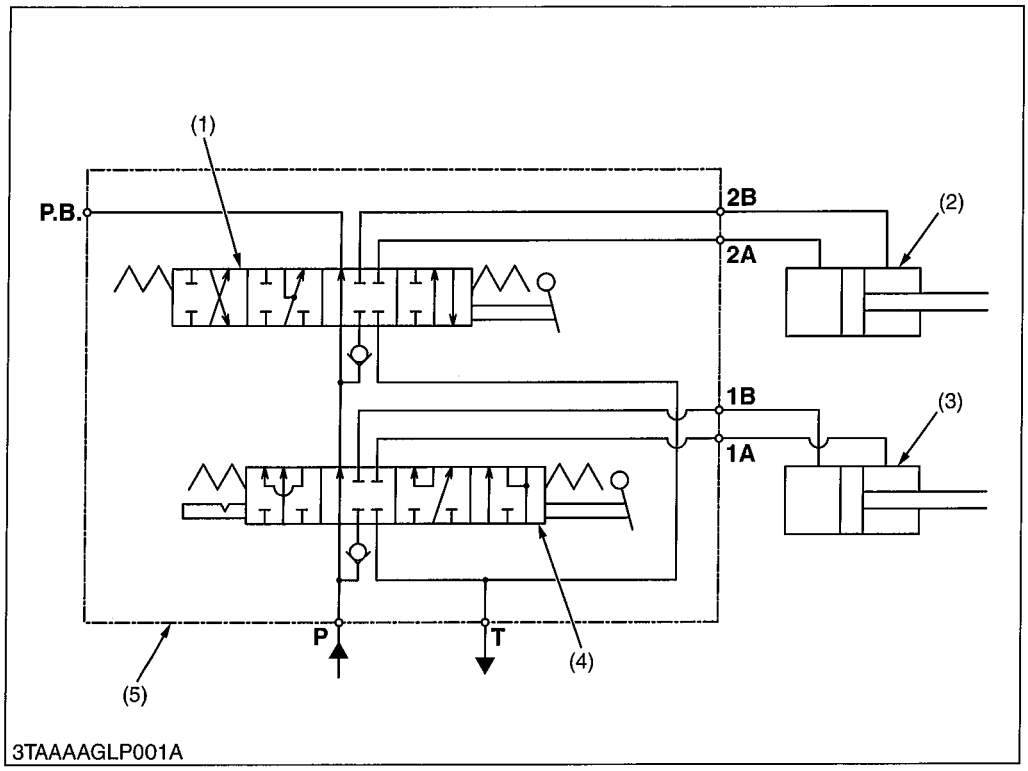
8 FRONT LOADER

MECHANISM

CONTENTS

1. HYDRAULIC CIRCUIT SCHEMATIC



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(1) Bucket Control Valve
(2) Bucket Cylinder
(3) Boom Cylinder
(4) Boom Control Valve
(5) Control Valve Assembly

P: From Pump
P.B.: To 3 Point Hydraulic System
T: To Tank
1A: 1A Port
2A: 2A Port
1B: 1B Port
2B: 2B Port

To operate the front loader, the hydraulic oil pressurized by the hydraulic pump flows from **P** port through the boom control valve (4) and the bucket control valve (1) to **P.B.** port or **T** port.

Since relief valve is not equipped in the front loader control valve, the main relief valve in the tractor operates.

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2. CONTROL VALVE ASSEMBLY

1. Refer to the "5. HYDRAULIC SYSTEM" section. (See page 5-M12.)

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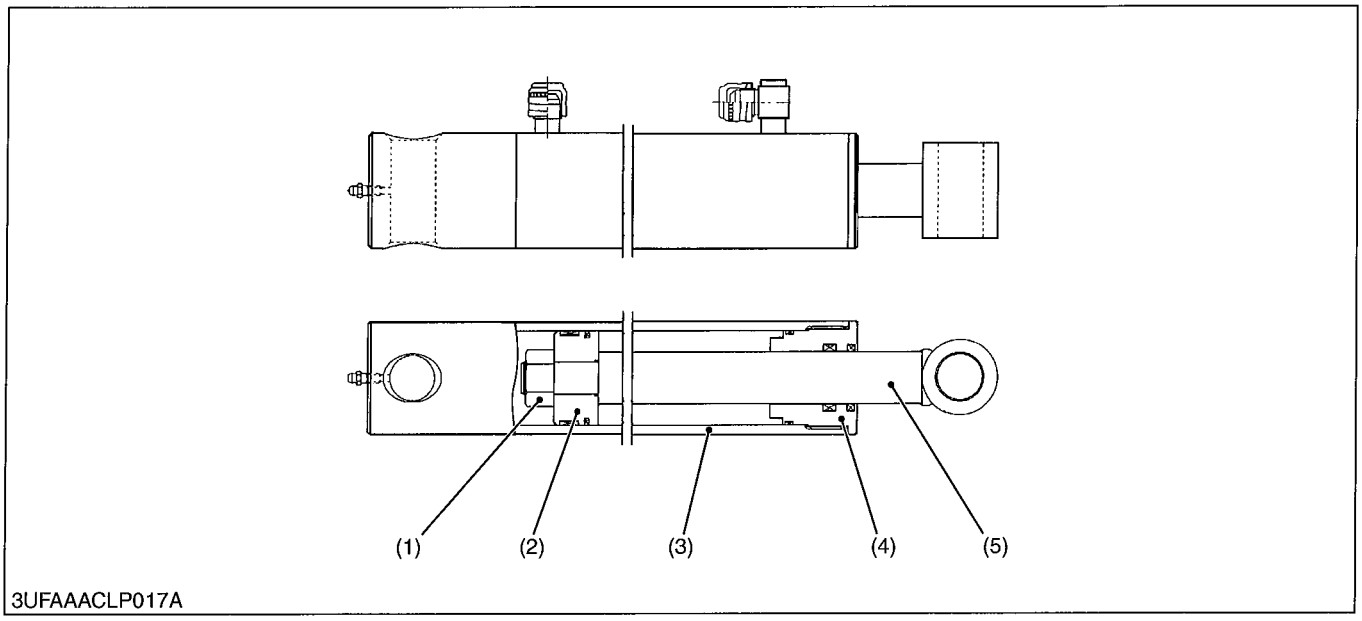
3. BOOM CYLINDER AND BUCKET CYLINDER



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(1) Nut
(2) Piston
(3) Cylinder Tube
(4) Head
(5) Piston Rod

Both boom cylinder and bucket cylinder consists of a head (4), cylinder tube (3), piston rod (5), piston (2), and other parts as shown in the figure above. They are single-rod double acting cylinder in which the reciprocating motion of the piston is controlled by hydraulic force applied to both of its ends.

Cylinder Specifications

		LA203	LA243
Boom Cylinder	Cylinder I.D.	40 mm (1.57 in.)	
	Rod O.D.	25 mm (0.98 in.)	
	Stroke	281 mm (11.1 in.)	326 mm (12.8 in.)
Bucket Cylinder	Cylinder I.D.	65 mm (2.56 in.)	
	Rod O.D.	30 mm (1.18 in.)	
	Stroke	204 mm (8.03 in.)	

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SERVICING

CONTENTS

1. TROUBLESHOOTING

Symptom	Probable Cause	Solution	Reference Page
Boom Does Not Rise	Control valve malfunctioning	Repair or replace	5-S16
	Boom cylinder damaged	Repair or replace	8-S6
	Control lever linkage damaged	Repair or replace	5-S16
	Hydraulic pump malfunctioning	Repair or replace	5-S11
	Oil filter clogged	Clean or replace	G-22
	Hydraulic hose damaged	Replace	–
Boom Does Not Lower	Control valve malfunctioning	Repair or replace	5-S16
Insufficient Boom Speed	Boom cylinder tube worn or damaged	Replace	8-S6
	Boom cylinder piston ring (piston seal and O-ring) worn or damaged	Replace	8-S7
	Oil leaks from tube joints	Repair	8-S6
	Relief valve setting pressure too low	Adjust	5-S4
	Insufficient transmission fluid	Refill	G-23
	Dirty relief valve	Clean	5-S4
Bucket Does Not Move	Control valve malfunctioning	Repair or replace	5-S16
	Bucket cylinder damaged	Repair or replace	8-S6
	Control lever linkage damaged	Repair or replace	5-S16
	Hydraulic pump malfunctioning	Repair or replace	5-S11
	Oil filter clogged	Clean or replace	G-22
	Relief valve spring damaged	Replace	5-S4
	Hydraulic hose damaged	Replace	–
	Dirty relief valve	Clean	5-S4
Insufficient Bucket Speed	Bucket cylinder tube worn or damaged	Replace	8-S6
	Bucket cylinder piston ring (piston seal and O-ring) worn or damaged	Replace	8-S7
	Oil leaks from tube joints	Repair	–
	Insufficient transmission fluid	Refill	G-32
Front End Loader Drops by its Weight	Boom cylinder tube worn or damaged	Replace	8-S6
	Boom cylinder piston ring (piston seal and O-ring) worn or damaged	Replace	8-S7
	Oil leaks from tube joints	Repair	–
	Control valve malfunctioning	Repair or replace	5-S16

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2. SERVICING SPECIFICATIONS

Item		Factory Specification	Allowable Limit
Piston Rod	Bend	–	0.25 mm 0.0098 in.

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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: Refer to "5. TIGHTENING TORQUES" on page G-13.)

Item	N·m	kgf·m	lbf·ft
Boom cylinder piston mounting nut	150 to 180	15.3 to 18.3	111 to 132
Bucket cylinder piston mounting nut	350 to 400	35.7 to 40.7	259 to 295
Main frame mounting screw (M14)	147	15.0	108

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4. DISASSEMBLING AND SERVICING

[1] DISMOUNTING AND MOUNTING FRONT LOADER

■ **IMPORTANT**

- **When dismounting the loader, park the tractor on flat and hard ground, apply the parking brake.**
- **When starting the engine or using the hydraulic control valve, always sit in the operator's seat.**

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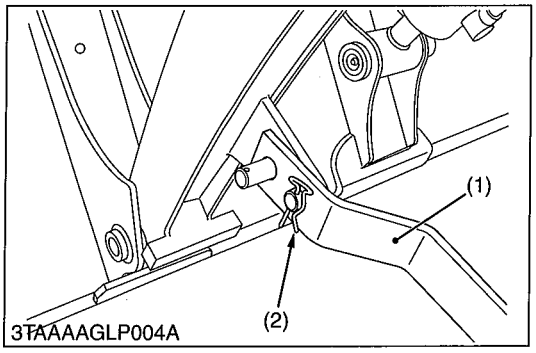
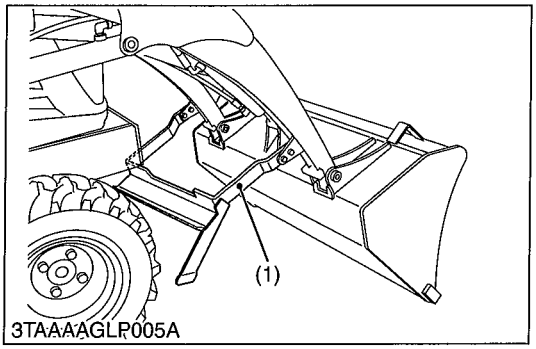
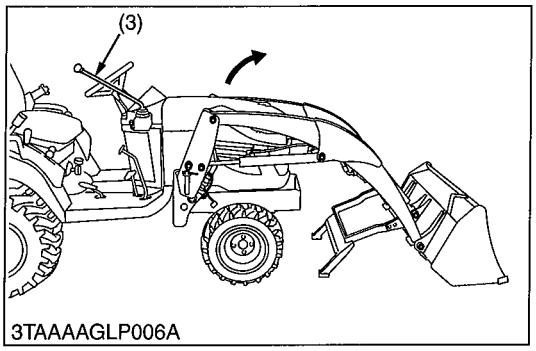
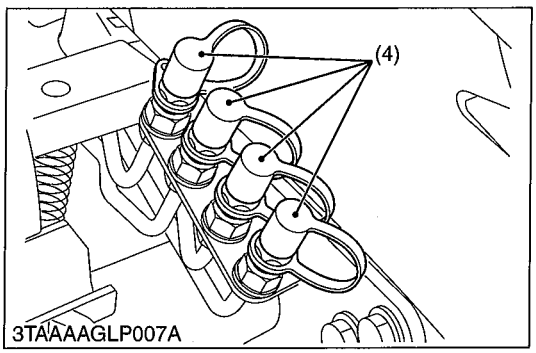
(1) Dismounting Front Loader From Tractor









Side Frame

1. Raise the boom until the stands (1) can be rotated.
2. Stop the engine.
3. Remove the spring pin (2) holding the stand (1) to the boom.
4. Slide the stands (1) leftward and rotate it until the hole in the stand and pin on the boom are aligned. Then slide the stand (1) rightward and insert the spring pin (2) as shown.
5. Start the engine and run at idle.
6. Dump the bucket approximately 20 degrees.
7. Lower the boom and raise the front wheels slightly.

■ **IMPORTANT**

- **Lift the front wheels with the bucket. Do not try to lift the with the stand.**

8. Stop the engine.
9. Remove the mounting pins from the loader side frames and hold them in the plate of side frame.
10. Start the engine and run at idle. Slowly move the hydraulic control lever (3) to rollback position to raise the loader side frames up and out of the receives of the main frames as shown.
11. Stop the engine.
12. Slowly release all hydraulic pressure by moving the hydraulic control lever (3) in all directions.
13. Disconnect the four hoses with quick couplers at the control valve and place them on the right side of the boom.
14. Place the protective caps and plugs (4) on the quick coupler ends.
15. Start the engine and slowly back the tractor away from the loader.

(1) Stand
(2) Spring Pin
(3) Hydraulic Control Lever
(4) Protective Plug

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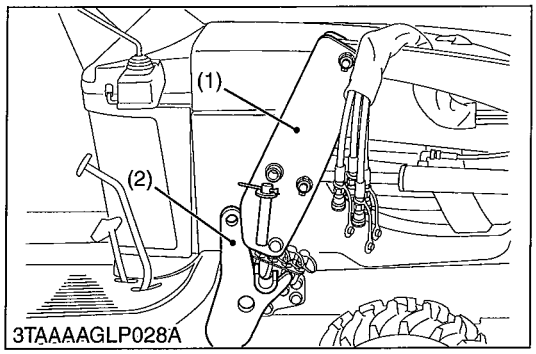
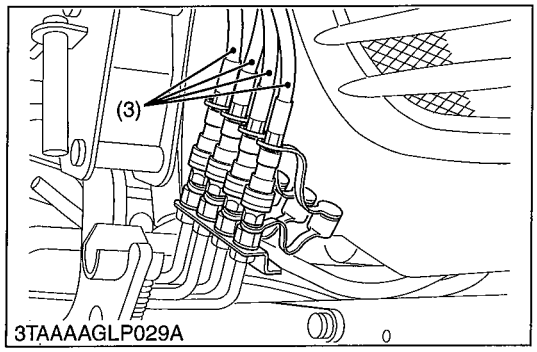
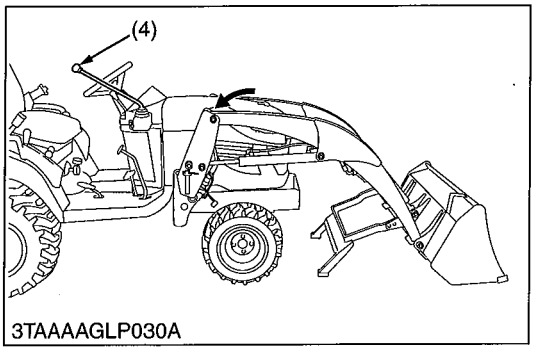
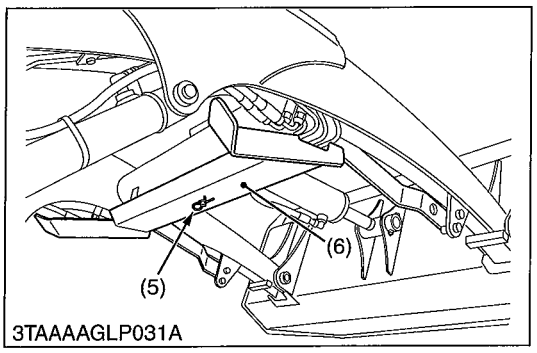
(2) Mounting Front Loader to Tractor









Side Frame and Hoses

1. Slowly drive the tractor between the loader side frames until the rear portion of both side frames touches the main frames as shown.
2. Stop the engine.
3. Connect four hoses with couplers to the fitting on the control valve as indicated with color marks. Then connect the protective caps and plugs to each other.
4. Start the engine and run at idle.
5. Slowly move the loader control lever to dump position to lower the side frames into the main frames and engage the bosses of the main frames to the guide bosses of the side frames. Then lift the front wheels slightly with the loader.

■ **IMPORTANT**

- **Do not try to lift the front wheels with the stand.**

6. Stop the engine. Reinstall the mounting pins and secure them with the locking rods.
7. Start the engine.
8. Raise the boom until the stand can be rotated.
9. Stop the engine.
10. Store the stand to their original positions and secure it with the spring pin as shown.
11. Start the engine.
12. Lower the boom and level the bucket.

(1) Side Frame
(2) Main Frame
(3) Hose
(4) Loader Control Lever
(5) Spring Pin
(6) Stand

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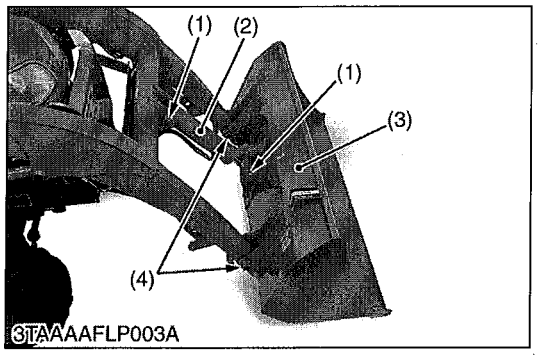
[2] FRONT LOADER

(1) Bucket, Boom and Hydraulic Cylinders



Bucket and Bucket Cylinder

1. Remove the pins (4) the lower pin (1) and remove the bucket (3).
2. Disconnect the hydraulic hoses from the bucket cylinder (2).
3. Remove the upper pin (1) and remove the bucket cylinder (2).

(When reassembling)

- When installing the bucket cylinder (2), the hydraulic port should face inside and be careful of the direction of grease fittings.

(1) Pin
(2) Bucket Cylinder
(3) Bucket
(4) Pin

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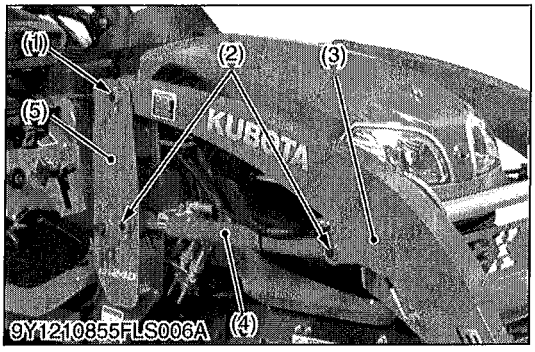
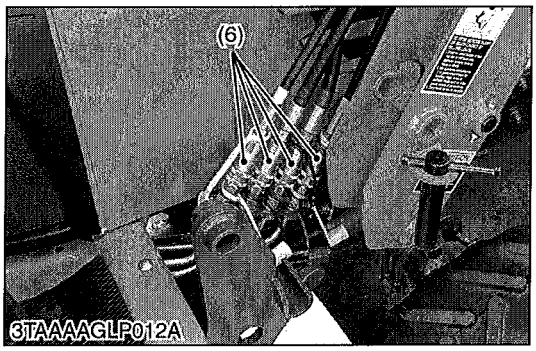


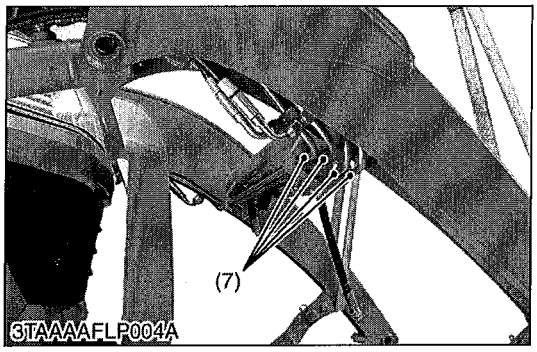
Boom Cylinder and Hydraulic Tubes

1. Disconnect the hydraulic hoses from the boom cylinders (4).
2. Remove the pins (2) and remove the boom cylinders (4).
3. Disconnect the hydraulic hoses (6) with quick couplers at the control valve.
4. Remove the pins (1) and remove the boom (3) from the side frame (5).
5. Remove the hydraulic tubes (7) from the boom (3).

(When reassembling)

- When installing the boom cylinders (4), the hydraulic port should face inside and be careful of the direction of grease fittings.





(1) Pin
(2) Pin
(3) Boom
(4) Boom Cylinder
(5) Side Frame
(6) Hydraulic Hose
(7) Hydraulic Tube

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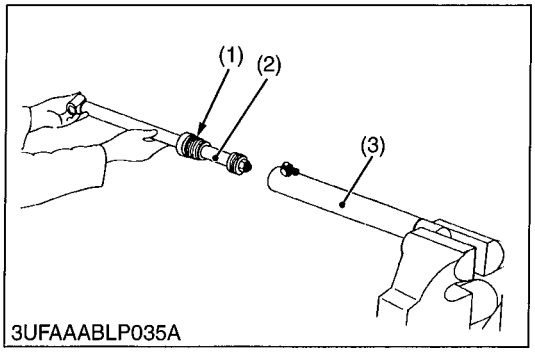

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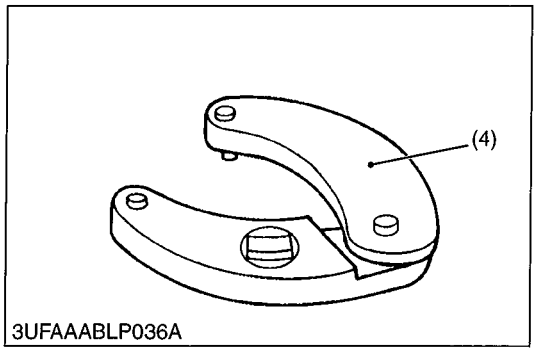

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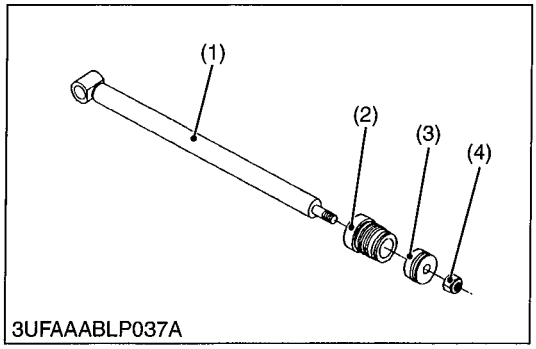

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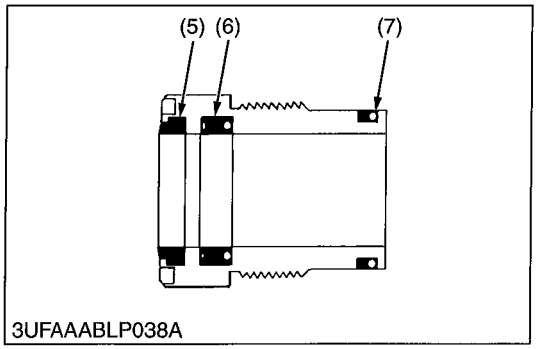

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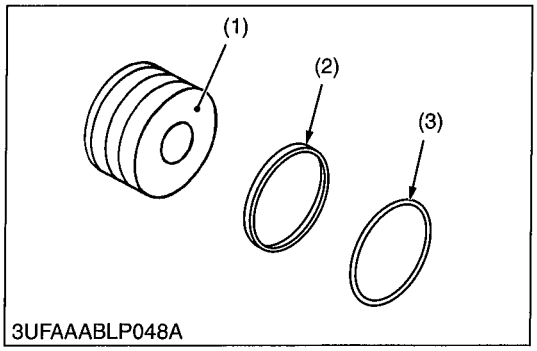

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Piston Rod Assembly

1. Drain hydraulic oil from the cylinder, and secure the tube end of the cylinder in a vise.
2. Remove the cylinder head (1) with the adjustable gland nut wrench (4).
3. Pull out the piston rod assembly (2) from the cylinder tube (3).

(When reassembling)

- Visually inspect the cylinder tube for signs of scoring or damage.
- Insert the piston rod assembly to the cylinder tube, not to damage the piston seal on the piston.
- Install the cylinder head to the cylinder tube, not to damage the O-ring on the cylinder head.

(1) Cylinder Head
(2) Piston Rod Assembly
(3) Cylinder Tube
(4) Adjustable Gland Nut Wrench

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Cylinder Head, Piston and Nut

1. Secure the rod end in a vise.
2. Remove the nut (4), and remove the piston (3) and cylinder head (2) from the piston rod (1).

(When reassembling)

- Visually inspect all parts for signs of scoring or damage.
- Insert the piston rod to the cylinder head, not to damage the wiper seal (5) and oil seal (6).

Tightening torque	Boom cylinder piston mounting nut	150 to 180 N·m 15.3 to 18.3 kgf·m 111 to 132 lbf·ft
	Bucket cylinder piston mounting nut	350 to 400 N·m 35.7 to 40.7 kgf·m 259 to 295 lbf·ft

(1) Piston Rod
(2) Cylinder Head
(3) Piston
(4) Nut
(5) Wiper Seal
(6) Oil Seal
(7) O-ring

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Piston Seal and O-ring

1. Remove the piston seal (2) and O-ring (3) from the piston (1).

■ **IMPORTANT**

- **When installing the O-ring (3) and piston seal (2) to the piston (1), use the slide jig and correcting jig as shown in "Special Tools" of "GENERAL" section.**

(1) Piston
(2) Piston Seal
(3) O-ring

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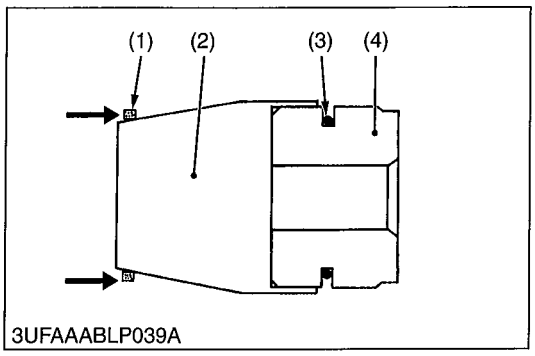

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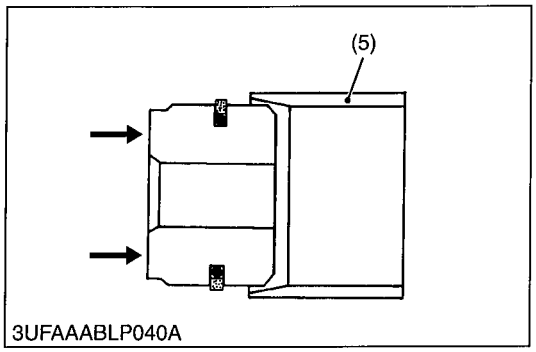

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Installing O-ring and Piston Seal

1. Place the slide jig (2) on the piston (4).
2. Install the O-ring (3) to the piston using the slide jig.
3. Install the piston seal (1) over the O-ring using the slide jig.
4. Compress the piston seal to the correct size by installing the piston into the correcting jig (5).

■ **NOTE**

- **Do not turn (roll) the piston seal as you install it.**

(1) Piston Seal
(2) Slide Jig
(3) O-ring
(4) Piston
(5) Correcting Jig

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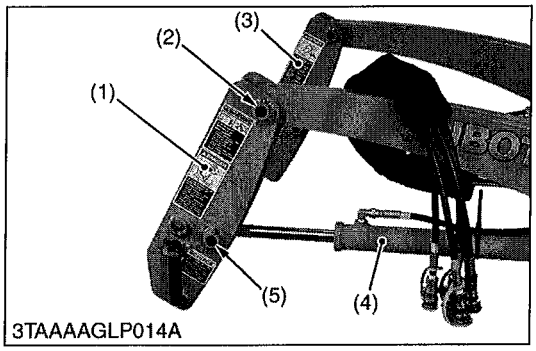
(2) Side Frames, Front Guard and Main Frames



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Side Frames

1. Remove the pins (2), (5).
2. Remove the side frames (1) from the boom assembly (3) and the boom cylinder (4).

(1) Side Frame
(2) Pin
(3) Boom Assembly
(4) Boom Cylinder
(5) Pin

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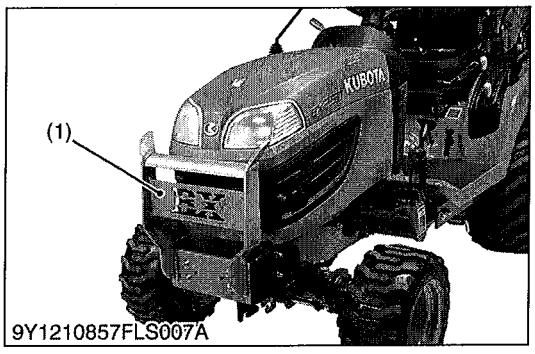

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Front Guard

1. Remove the front guard (1).

(1) Front Guard

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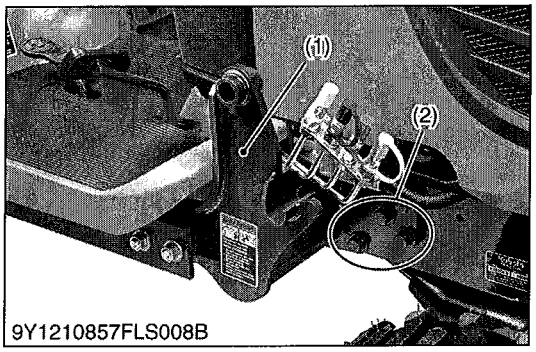

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Main Frames

1. Remove the main frame mounting screw (2) from the tractor body.
2. Remove the main frame (1).

Tightening torque	Main frame mounting screw (M14)	147 N·m 15.0 kgf·m 108 lbf·ft

(1) Main Frame
(2) Main Frame Mounting Screw

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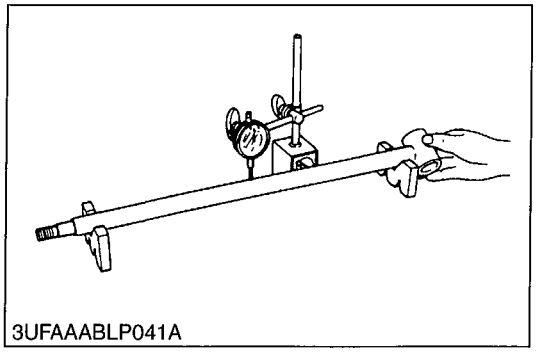
[3] SERVICING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Piston Rod Bend

1. Place piston rod on V blocks.
2. Set a dial indicator on the center of the rod.
3. Turn the piston rod and read the dial indicator.
4. If the measurement exceeds the allowable limit, replace it.

Piston rod bend	Allowable limit	0.25 mm 0.0098 in.

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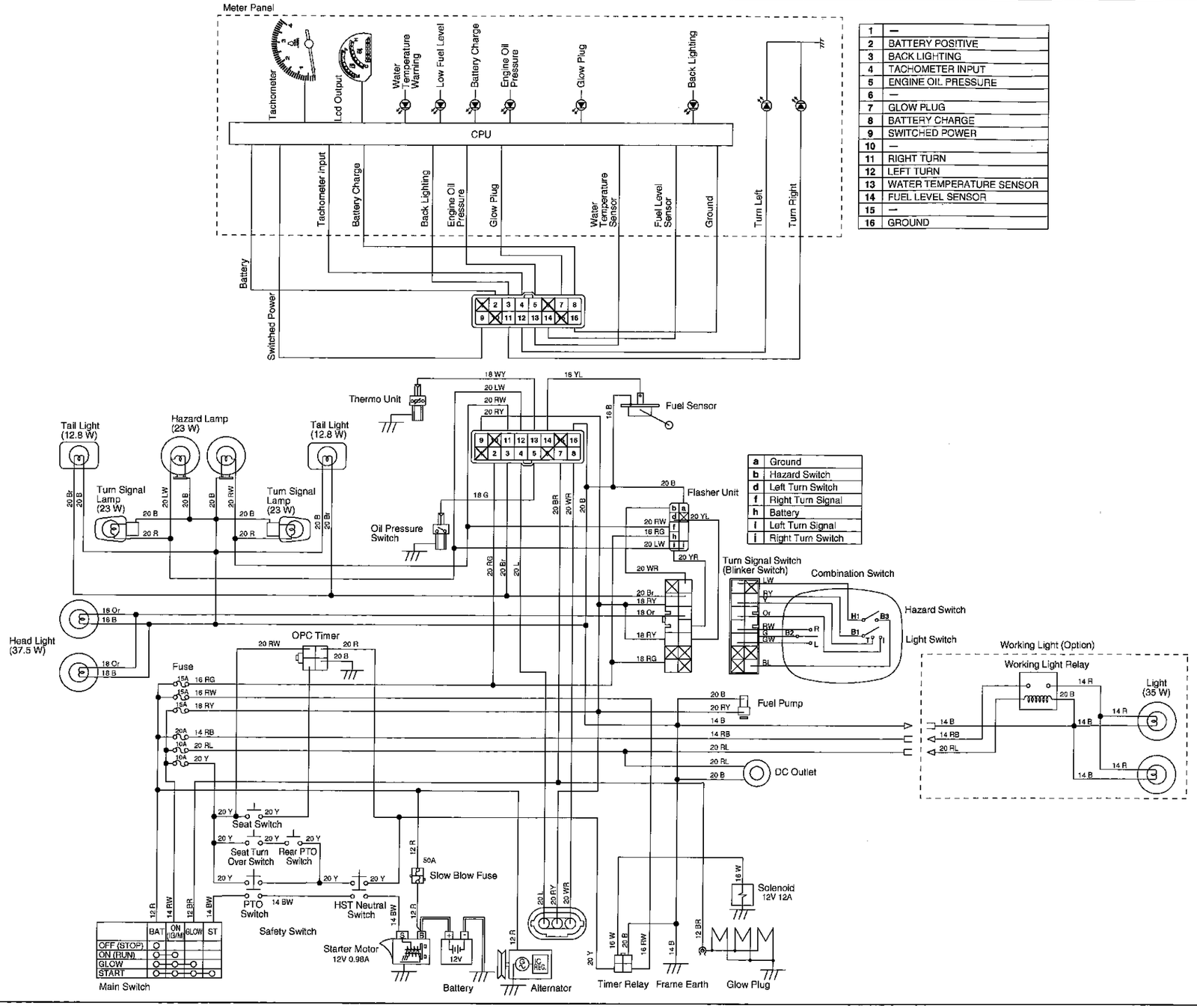
1. WIRING DIAGRAM



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