

# **8 ELECTRICAL SYSTEM**

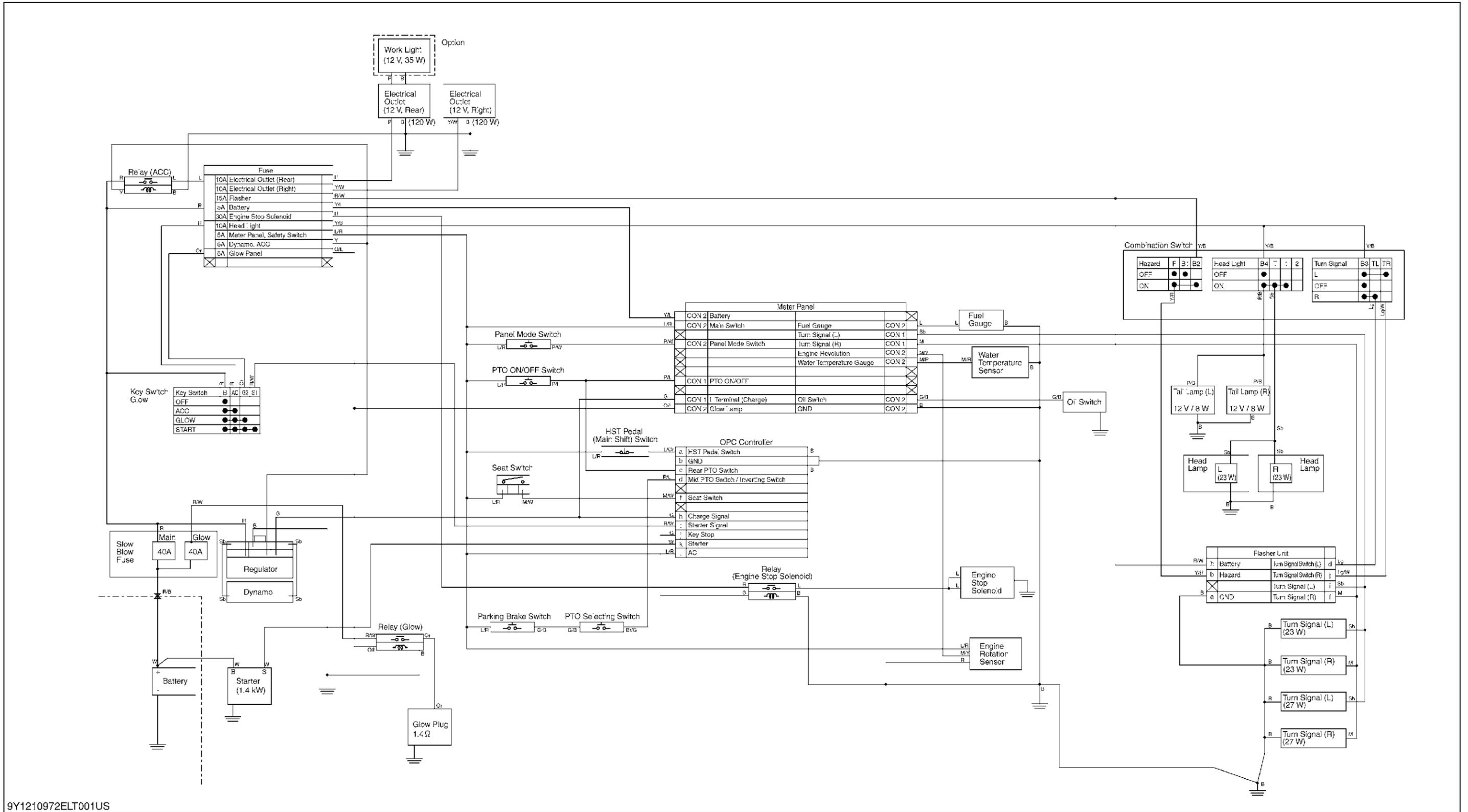
# MECHANISM

## CONTENTS

|   |       |
|---|-------|
| 1. ELECTRICAL CIRCUIT .....                           | 8-M1  |
| [1] B2650 .....                                       | 8-M1  |
| [2] B3350 .....                                       | 8-M2  |
| [3] B3350SU .....                                     | 8-M3  |
| 2. ENGINE STARTING SYSTEM AND STOPPING .....          | 8-M4  |
| [1] OPC SYSTEM CIRCUIT (B2650).....                   | 8-M4  |
| [2] OPC SYSTEM CIRCUIT (B3350).....                   | 8-M5  |
| [3] OPC SYSTEM CIRCUIT (B3350SU).....                 | 8-M6  |
| [4] CONTROLLER (for B2650) .....                      | 8-M6  |
| [5] SAFETY SWITCH .....                               | 8-M9  |
| (1) PTO Shift Lever Switch (for B2650 / B3350) .....  | 8-M9  |
| (2) Independent PTO Lever Switch.....                 | 8-M10 |
| (3) HST Pedal Switch.....                             | 8-M10 |
| (4) Seat Switch.....                                  | 8-M11 |
| (5) Parking Brake Switch .....                        | 8-M11 |
| [6] SAFETY SWITCH POSITION AND ENGINE CONDITION ..... | 8-M12 |
| 3. LIGHTING SYSTEM .....                              | 8-M13 |
| [1] LIGHT AND TAIL LIGHT .....                        | 8-M13 |
| [2] TURNING LIGHT .....                               | 8-M13 |
| [3] HAZARD LIGHT .....                                | 8-M14 |
| [4] TURN SIGNAL LIGHT AND HAZARD LIGHT .....          | 8-M14 |
| 4. EASY CHECKER™ .....                                | 8-M15 |
| [1] INDICATION ITEMS .....                            | 8-M15 |
| 5. DIGITAL DISPLAY.....                               | 8-M16 |
| [1] LCD MONITOR INDICATOR.....                        | 8-M16 |

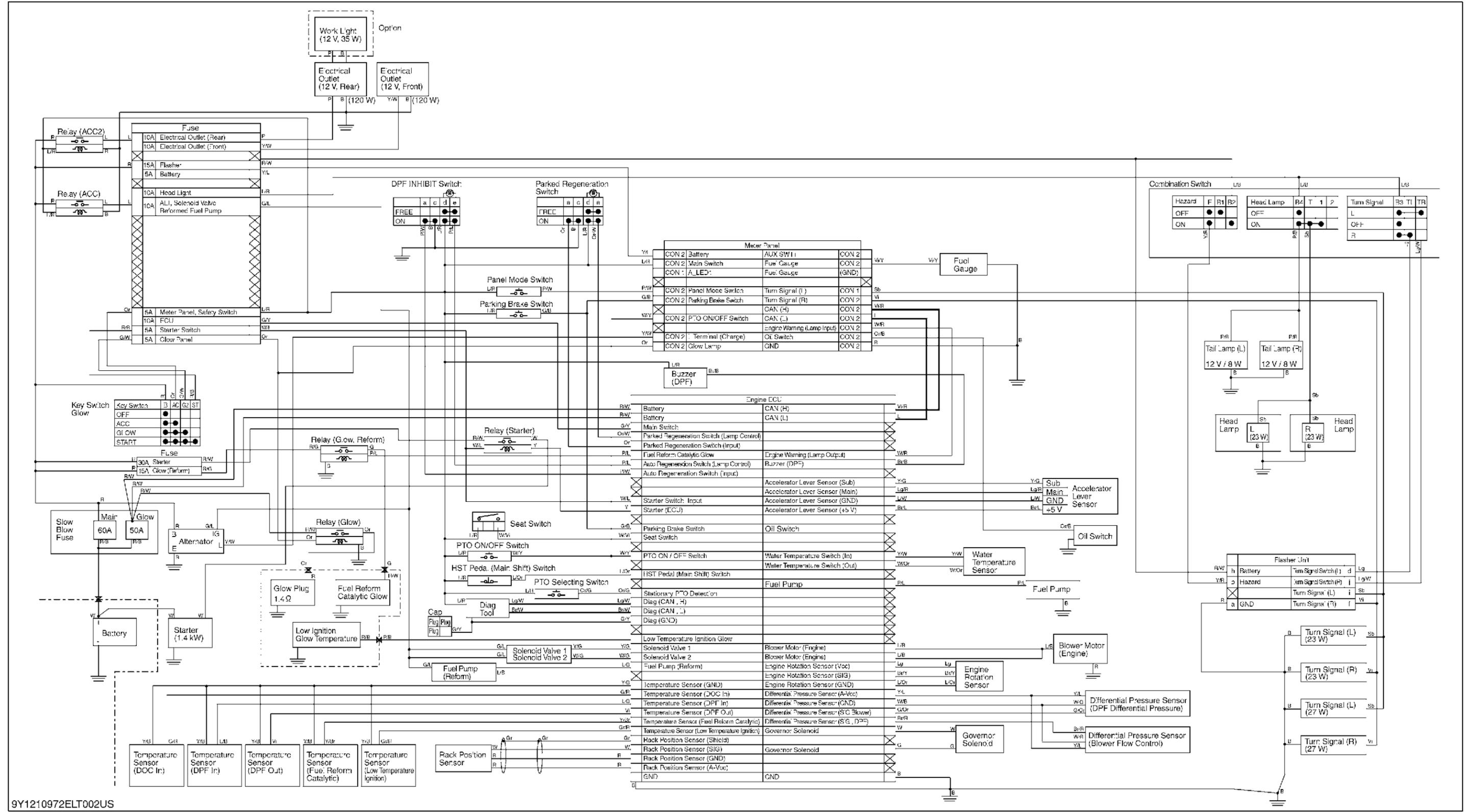
# 1. ELECTRICAL CIRCUIT

## [1] B2650



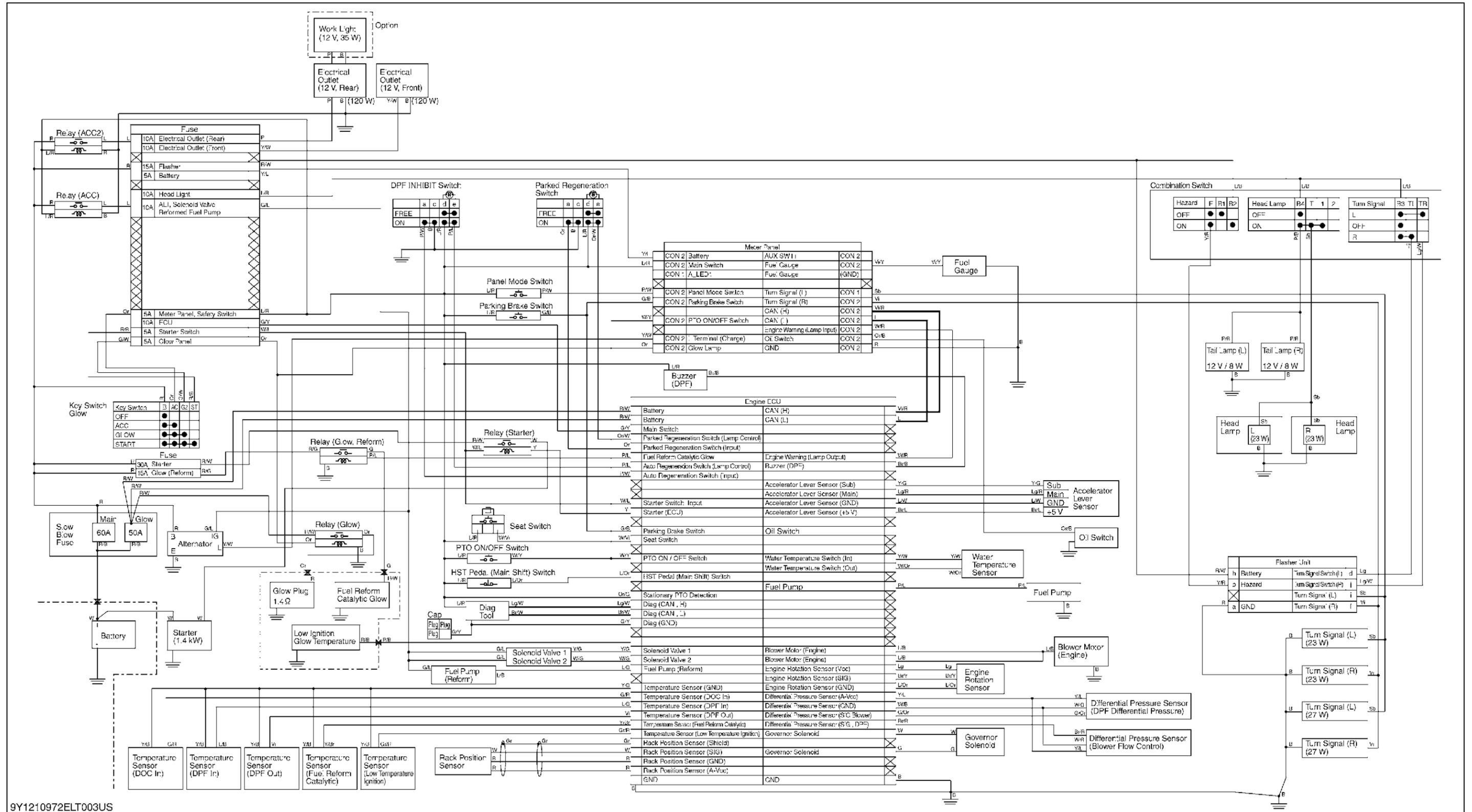
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[2] B3350



9Y1210972ELT002US

[3] B3350SU



9Y1210972ELT003US

## 2. ENGINE STARTING SYSTEM AND STOPPING

Operator presence control (OPC) system which B2650, B3350 and B3350SU tractor are equipped with will automatically stop the engine when operator stands up from the seat while shifting the PTO lever, the independent PTO shift lever or the HST pedal.

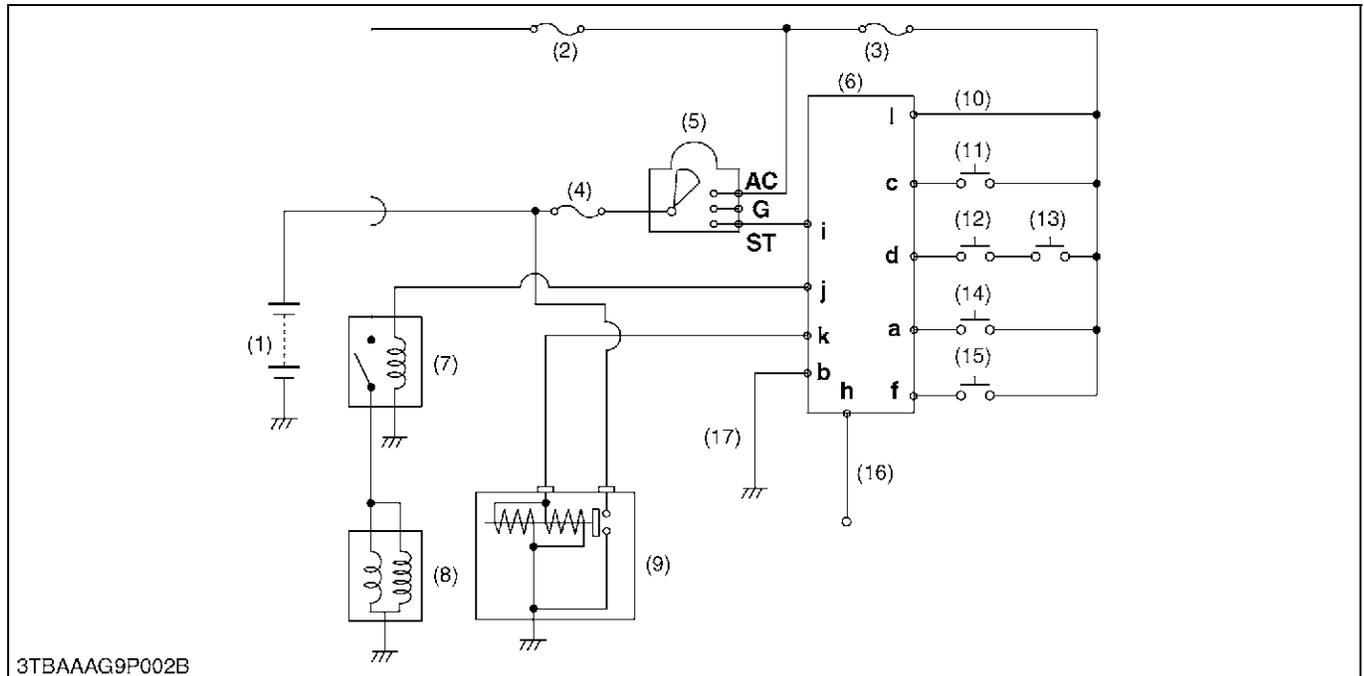
This system is controlled by five safety switches, (independent PTO lever switch, PTO shift lever switch, parking brake switch, HST pedal switch, seat switch) and controller.

Engine starting is operated with starter motor after current flowing from controller to starter motor.

Engine stopping is operated with key stop solenoid after current flowing from controller through key stop solenoid relay to key stop solenoid.

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### [1] OPC SYSTEM CIRCUIT (B2650)



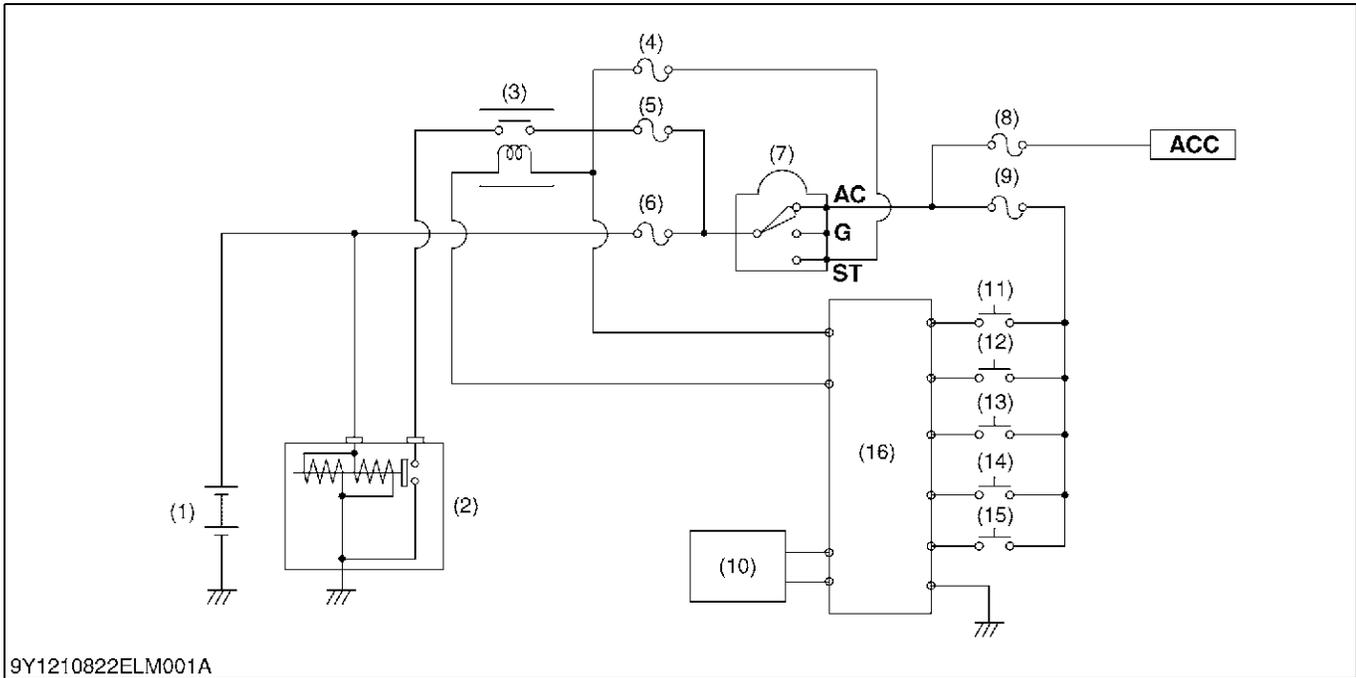
3TBAAAG9P002B

- |                          |                                   |                                |
|--------------------------|-----------------------------------|--------------------------------|
| (1) Battery              | (7) Key Stop Solenoid Relay       | (12) PTO Shift Lever Switch    |
| (2) Fuse (30A)           | (8) Key Stop Solenoid             | (13) Parking Brake Switch      |
| (3) Fuse (5A)            | (9) Starter Motor                 | (14) HST Pedal Switch          |
| (4) Slow Blow Fuse (60A) | (10) AC Terminal Lead             | (15) Seat Switch               |
| (5) Main Switch          | (11) Independent PTO Lever Switch | (16) Regulator L Terminal Lead |
| (6) Controller           |                                   | (17) Frame Earth               |

**a to l: Controller Terminal**  
**AC: AC Terminal**  
**G: G Terminal**  
**ST: ST Terminal**

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## [2] OPC SYSTEM CIRCUIT (B3350)

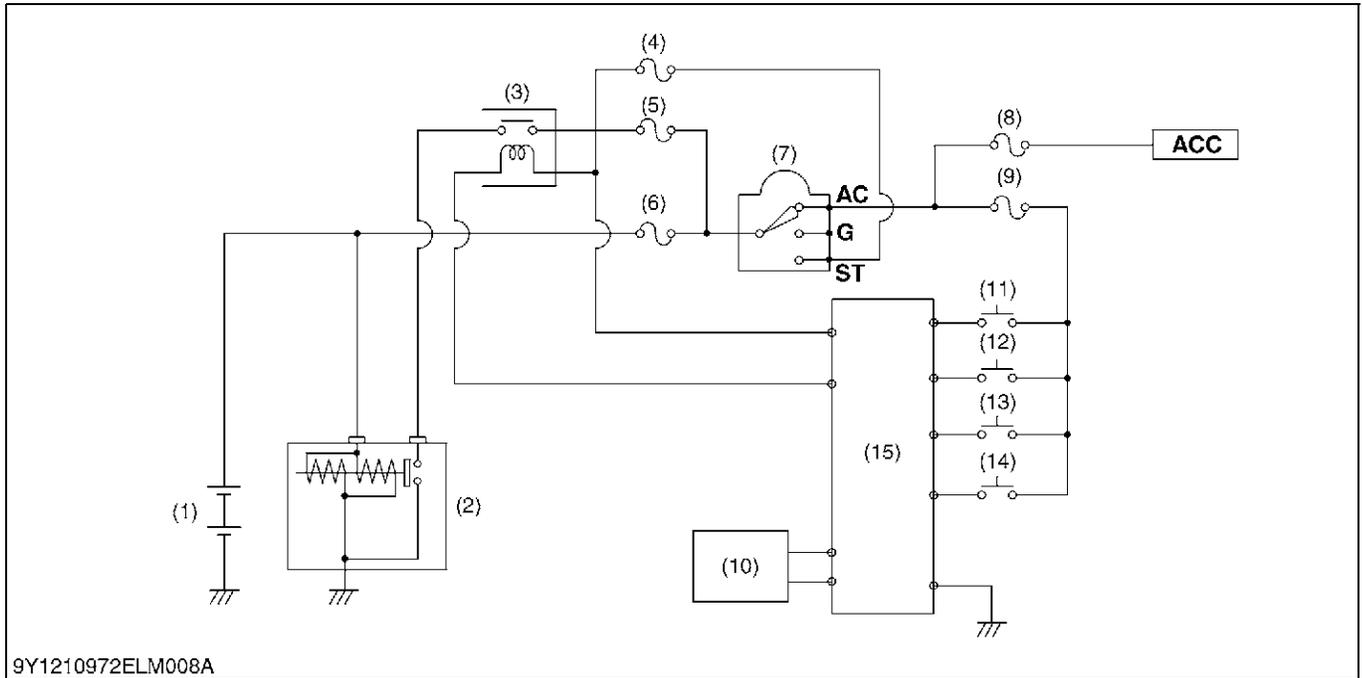


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- |                           |                           |                                   |                        |
|---------------------------|---------------------------|-----------------------------------|------------------------|
| (1) Battery               | (7) Main Switch           | (13) Independent PTO Lever Switch | <b>AC: AC Terminal</b> |
| (2) Starter Motor         | (8) Fuse (5A)             | (14) HST Pedal Switch             | <b>G: G Terminal</b>   |
| (3) Relay Stator          | (9) Fuse (5A)             | (15) PTO Shift Lever Switch       | <b>ST: ST Terminal</b> |
| (4) Fuse (5A)             | (10) Governor Solenoid    | (16) ECU                          |                        |
| (5) Fuse (30A)            | (11) Parking Brake Switch |                                   |                        |
| (6) Slow Blow Fuse (60 A) | (12) Seat Switch          |                                   |                        |

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### [3] OPC SYSTEM CIRCUIT (B3350SU)

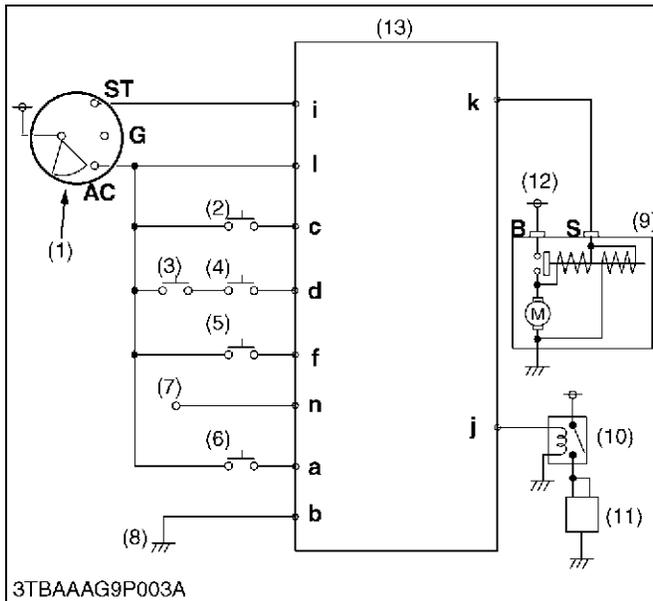


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- |                           |                           |                                   |                        |
|---------------------------|---------------------------|-----------------------------------|------------------------|
| (1) Battery               | (7) Main Switch           | (12) Seat Switch                  | <b>AC:</b> AC Terminal |
| (2) Starter Motor         | (8) Fuse (5A)             | (13) Independent PTO Lever Switch | <b>G:</b> G Terminal   |
| (3) Relay Stator          | (9) Fuse (5A)             | (14) HST Pedal Switch             | <b>ST:</b> ST Terminal |
| (4) Fuse (5A)             | (10) Governor Solenoid    | (15) ECU                          |                        |
| (5) Fuse (30A)            | (11) Parking Brake Switch |                                   |                        |
| (6) Slow Blow Fuse (60 A) |                           |                                   |                        |

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### [4] CONTROLLER (for B2650)



3TBAAAG9P003A

#### Operator Presence Control (OPC) System

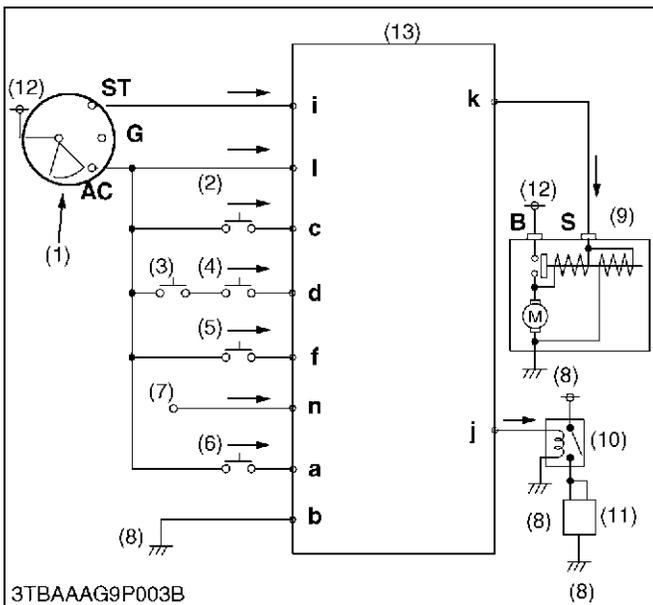
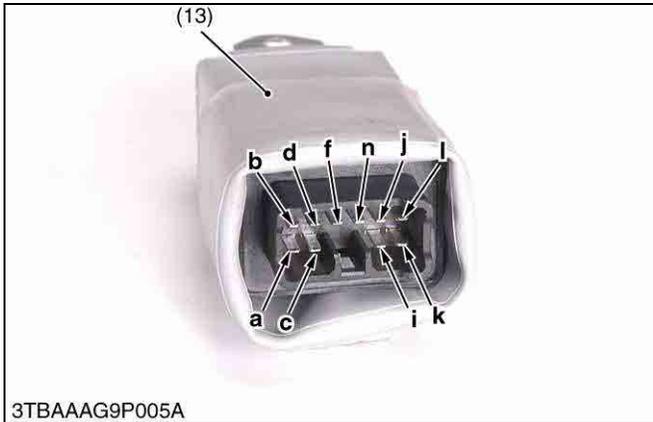
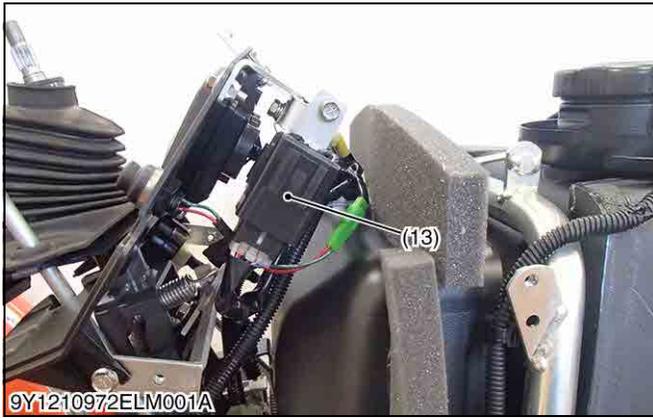
B2650 is configured with an "Operator Presence Control (OPC)" system to control engine starting and engine automatically stopping.

This OPC system mainly consists of controller and engine starting / stopping control switches such as HST pedal switch, independent PTO lever switch, seat switch, parking brake switch and PTO lever switch.

Main parts regarding OPC system are laid out as shown in the electrical circuit.

- |                                  |                                    |
|----------------------------------|------------------------------------|
| (1) Main Switch                  | (11) Key Stop Solenoid             |
| (2) Independent PTO Lever Switch | (12) Battery                       |
| (3) Parking Brake Switch         | (13) OPC Controller                |
| (4) PTO Lever Switch             | <b>a to l: Controller Terminal</b> |
| (5) Seat Switch                  | <b>ST: Main Switch ST Terminal</b> |
| (6) HST Pedal Switch             | <b>G: Main Switch G Terminal</b>   |
| (7) Regulator L Terminal         | <b>AC: Main Switch AC Terminal</b> |
| (8) Body Earth                   | <b>B: Starter Motor B Terminal</b> |
| (9) Starter Motor                | <b>S: Starter Motor S Terminal</b> |
| (10) Key Stop Solenoid Relay     |                                    |

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**Controller**

Controller is located inside the panel board.

Current from the main switch, safety switches and regulator L terminal flows to controller.

Controller receives current as data, processes the data, and sends out current computing results to starter motor, key stop solenoid relay, and key stop solenoid.

OPC controller (13) controls engine starting and engine stopping.

Current flows from battery to controller.

Current from switches such as independent PTO lever switch (2), parking brake switch (3), PTO lever switch (4), seat switch (5) and HST pedal switch (6), flows to the controller.

Current from regulator L terminal (7) flows to the controller.

After starting the engine, the controller (13) supplies current to starter motor S terminal or key stop solenoid relay (10).

Controller (13) receives data, processes the data, and sends out the computing results.

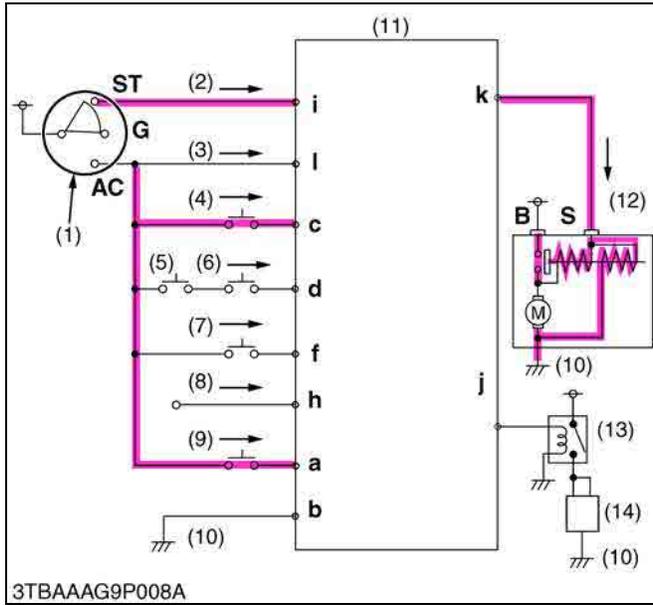
Controller (13) receives data from safety switches, processes the data inside the controller itself, and sends out the computing results to starter motor (9) for engine starting, and key stop solenoid relay (10) for engine stopping.

Controller (13) is configured with a delay timer in the controller unit to hold fuel cut signal from the controller unit to key stop solenoid (11) for about 1 second.

- (1) Main Switch
- (2) Independent PTO Lever Switch
- (3) Parking Brake Switch
- (4) PTO Lever Switch
- (5) Seat Switch
- (6) HST Pedal Switch
- (7) Regulator L Terminal
- (8) Body Earth
- (9) Starter Motor
- (10) Key Stop Solenoid Relay
- (11) Key Stop Solenoid
- (12) Battery
- (13) OPC Controller

- a to I: Controller Terminal**
- ST: Main Switch ST Terminal**
- G: Main Switch G Terminal**
- A: Main Switch AC Terminal**
- B: Starter Motor B Terminal**
- S: Starter Motor S Terminal**
- : Current Flow**

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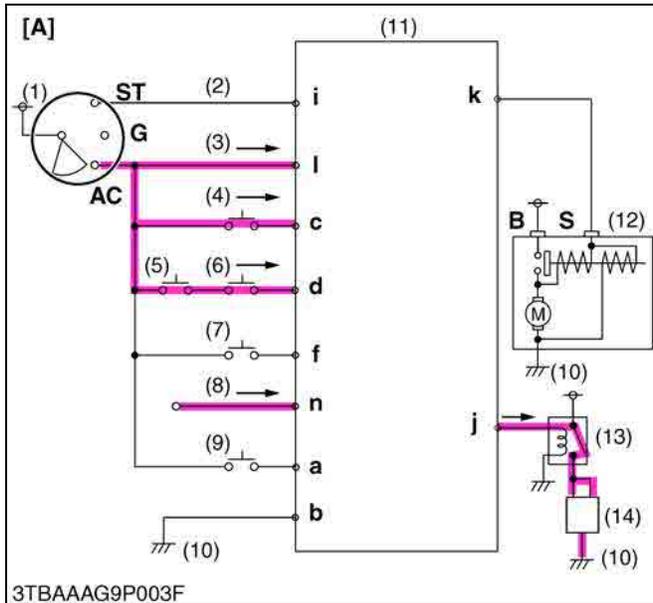
**Engine Starting**

When the following conditions become complete, output voltage (12 V) reaches coil terminal of the starter motor from controller **K** terminal, the engine can be started.

|  |    |
|--|----|
| Independent PTO Lever Switch<br>(Disengaged: ON, Engaged: OFF) | ON |
| HST Pedal Switch<br>(Neutral: ON, Forward and Reverse: OFF)    | ON |

- (1) Main Switch
  - (2) **ST** Terminal Lead
  - (3) **AC** Terminal Lead
  - (4) Independent PTO Lever
  - (5) Parking Brake Switch
  - (6) PTO Lever Switch
  - (7) Seat Switch
  - (8) Regulator **L** Terminal Lead
  - (9) HST Pedal Switch
  - (10) Frame Earth
  - (11) Controller
  - (12) Starter Motor
  - (13) Key Stop Solenoid Relay
  - (14) Key Stop Solenoid Switch
- ST, G, AC: Main Switch Terminals**  
**a to I: Controller Terminals**  
**B: Starter Motor B Terminals**  
**S: Starter Motor S Terminal**  
 →: **Current Flow**

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**One Second Delay Engine Shutting Off**

When one condition of the three patterns becomes complete, output voltage (12 V) reaches the key stop solenoid relay and key stop solenoid from controller **j** terminal, the engine can be shut off in one second delay.

**Pattern 1**

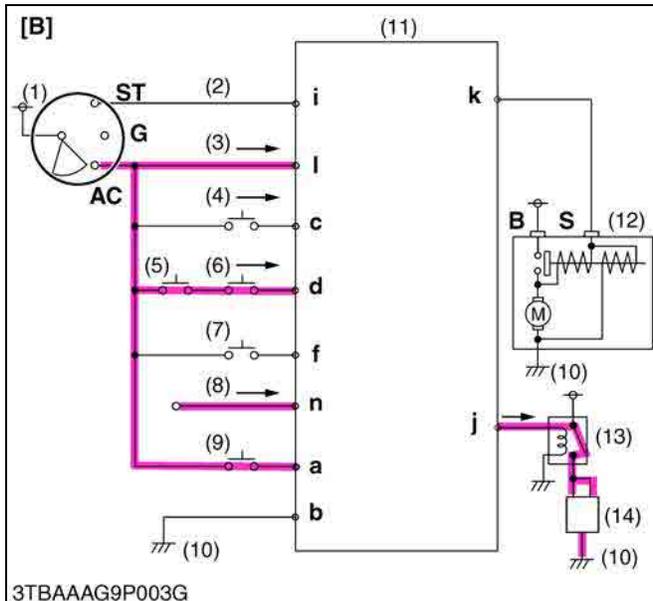
|   |     |
|---|-----|
| Seat Switch<br>(Occupied: ON, Vacant: OFF)                  | OFF |
| HST Pedal Switch<br>(Neutral: ON, Forward and Reverse: OFF) | OFF |

**Pattern 2**

|  |     |
|--|-----|
| Seat Switch<br>(Occupied: ON, Vacant: OFF)                     | OFF |
| Independent PTO Lever Switch<br>(Disengaged: ON, Engaged: OFF) | OFF |
| Parking Brake Switch<br>(Parking Lock: ON, Free: OFF)          | OFF |

**Pattern 3**

|  |     |
|--|-----|
| Seat Switch<br>(Occupied: ON, Vacant: OFF)                         | OFF |
| Independent PTO Lever Switch<br>(Disengaged: ON, Engaged: OFF)     | OFF |
| PTO Shift Lever Switch<br>(Rear PTO: ON, Rear/Mid or Mid PTO: OFF) | OFF |



- (1) Main Switch
  - (2) **ST** Terminal Lead
  - (3) **AC** Terminal Lead
  - (4) Independent PTO Lever
  - (5) Parking Brake Switch
  - (6) PTO Lever Switch
  - (7) Seat Switch
  - (8) Regulator **L** Terminal Lead
  - (9) HST Pedal Switch
  - (10) Frame Earth
  - (11) Controller
  - (12) Starter Motor
  - (13) Key Stop Solenoid Relay
  - (14) Key Stop Solenoid
- [A] Pattern 1**  
**[B] Pattern 2 and 3**  
**ST, G, AC: Main Switch Terminals**  
**B: Starter Motor B Terminal**  
**S: Starter Motor S Terminal**  
**a to I: Controller Terminals**  
 →: **Current Flow**

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## [5] SAFETY SWITCH

### ■ Type of Safety Switch

There are two types of safety switches, normally closed type and normally open type.

Normally closed type switch is electrically closed in normal condition.

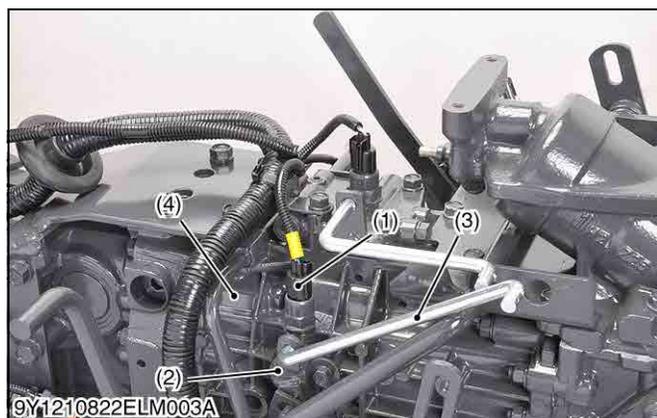
Normally open type switch is electrically opened in normal condition.

Safety switches adopted in B2650, B3350 and B3350SU tractor operate as sensor detecting and transmitting the position of HST pedal, PTO lever, independent PTO lever, seat and parking brake to controller ECU.

| Normally Closed Type         | Normally Open Type   |
|------------------------------|----------------------|
| PTO Shift Lever Switch       | HST Pedal Switch     |
| Independent PTO Lever Switch | Seat Switch          |
|                              | Parking Brake Switch |

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### (1) PTO Shift Lever Switch (for B2650 / B3350)



#### PTO Shift Lever Switch

This switch locates at transmission case (4).

This switch is a push type.

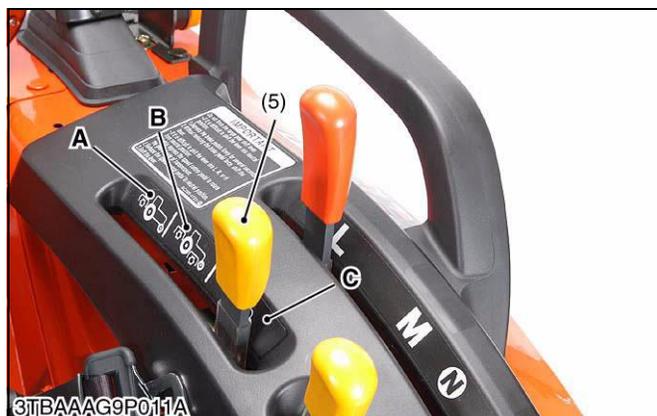
This switch detects the position of the PTO shift lever.

When the PTO shift lever is at "**REAR PTO**" position, this switch is turned to "**ON**".

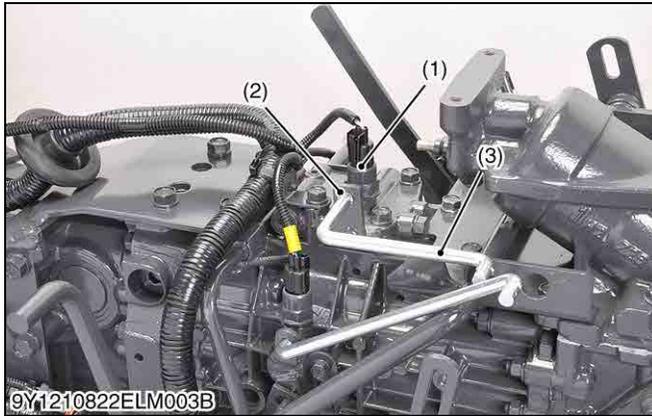
When the PTO shift lever is at "**Rear/Mid, Mid PTO**" position, this switch is turned to "**OFF**".

- |                            |                                       |
|----------------------------|---------------------------------------|
| (1) PTO Shift Lever Switch | <b>A: Rear PTO Position</b>           |
| (2) PTO Shift Arm          | <b>B: Rear PTO / Mid PTO Position</b> |
| (3) PTO Shift Rod          | <b>C: Mid PTO Position</b>            |
| (4) Transmission Case      |                                       |
| (5) PTO Shift Lever        |                                       |

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## (2) Independent PTO Lever Switch



### Independent PTO Lever Switch

This switch locations at the top of the independent PTO control valve.

This switch is a push type.

This switch detects the independent PTO valve operating.

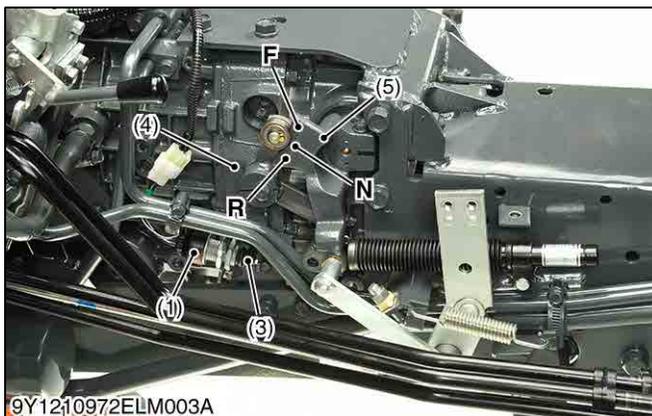
When the independent PTO lever is set to "**DISENGAGED**" position, this switch is turned to "**ON**".

When the independent PTO lever is set to "**ENGAGED**" position, this switch is turned to "**OFF**".

- |                                  |  |
|----------------------------------|--|
| (1) Independent PTO Lever Switch | <b>A:</b> " <b>DISENGAGED</b> " Position |
| (2) Independent PTO Valve        | <b>B:</b> " <b>ENGAGED</b> " Position    |
| (3) Control Rod                  |  |
| (4) Independent PTO Lever        |  |

9Y1210972ELM0012US0

## (3) HST Pedal Switch



### HST Pedal Switch

This switch located at the neutral switch stay.

This switch is a push type.

This switch detects the position of the HST pedal.

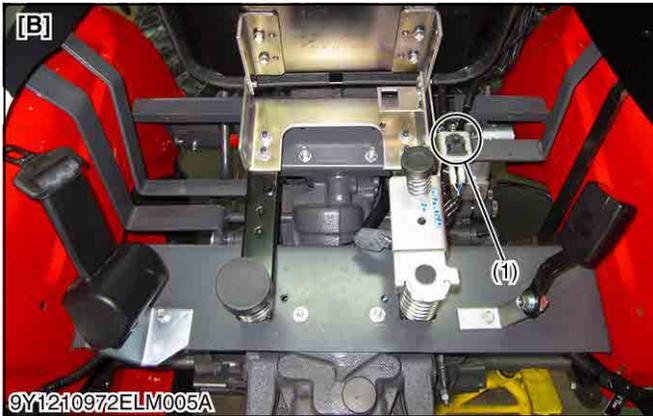
When HST pedal is at "**NEUTRAL**" position, this switch is turned to "**ON**".

When HST pedal is at "**FORWARD**" or "**REVERSE**" position, this switch is turned to "**OFF**".

- |                         |  |
|-------------------------|--|
| (1) HST Pedal Switch    | <b>F:</b> <b>FORWARD</b>               |
| (2) Neutral Switch Stay | <b>N:</b> <b>NEUTRAL</b>               |
| (3) Neutral Arm         | <b>R:</b> <b>REVERSE</b>               |
| (4) Transmission Case   | <b>A:</b> <b>Current from Battery</b>  |
| (5) Neutral Holder      | <b>B:</b> <b>Current to Controller</b> |

9Y1210972ELM0013US0

## (4) Seat Switch



### Seat Switch

This switch locates under the seat.

This switch is a push type.

This switch detects the operator's sitting on the seat or not.

When the operator sits on the seat, this switch is turned to **"ON"**.

When the operator stand up from the seat, this switch is turned to **"OFF"**.

(1) Seat Switch

[A] B2650 / B3350

[B] B3350SU

9Y1210972ELM0015US0

## (5) Parking Brake Switch



### Parking Brake Switch

This switch locates under the meter panel.

This switch is a push type.

This switch detects the parking brake lock or not.

When the parking brake is locked, this switch is turned to **"ON"**.

When the parking brake is not locked, this switch is turned to **"OFF"**.

(1) Parking Brake Switch

(2) Parking Brake Lever

9Y1210972ELM0014US0

**[6] SAFETY SWITCH POSITION AND ENGINE CONDITION**

Safety Switch Position and Engine Condition.

| No. | Independent PTO Lever          | Parking Brake Switch          | PTO Shift Lever Switch                          | Seat Switch                 | HST Pedal Switch                        | Engine Condition  |  |
|-----|--------------------------------|-------------------------------|---|-----------------------------|---|---|--|
|     |                                |                               |   |                             |   | Engine Starting   | Engine Stopping  |
|     | Disengaged: ON<br>Engaged: OFF | Parking Lock: ON<br>Free: OFF | Rear PTO: ON<br>Rear/Mid PTO<br>or Mid PTO: OFF | Occupied: ON<br>Vacant: OFF | Neutral: ON<br>Forward and Reverse: OFF | Current to Starter:<br>Can start<br>No current to starter:<br>Can not start | No current to key stop solenoid relay:<br>engine running<br>Current to key stop solenoid: one second delay engine shut off |
| 1   | ON                             | OFF                           | ON / OFF  | ON                          | ON                                      | Can Start   | Running  |
| 2   | OFF                            | OFF                           | ON / OFF  | ON                          | ON                                      | Can not Start   | Running  |
| 3   | ON                             | OFF                           | ON / OFF  | ON                          | OFF                                     | Can not Start   | Running  |
| 4   | OFF                            | OFF                           | ON / OFF  | ON                          | OFF                                     | Can not Start   | Running  |
| 5   | ON                             | OFF                           | ON / OFF  | OFF                         | ON                                      | Can Start   | Running  |
| 6   | OFF                            | OFF                           | ON / OFF  | OFF                         | ON                                      | Can not Start   | One second delay engine shut off   |
| 7   | ON                             | OFF                           | ON / OFF  | OFF                         | OFF                                     | Can not Start   | One second delay engine shut off   |
| 8   | OFF                            | OFF                           | ON / OFF  | OFF                         | OFF                                     | Can not Start   | One second delay engine shut off   |
| 9   | ON                             | ON                            | ON / OFF  | OFF                         | ON                                      | Can Start   | Running  |
| 10  | OFF                            | ON                            | ON  | OFF                         | ON                                      | Can not Start   | Running  |
| 11  | OFF                            | ON                            | OFF   | OFF                         | ON                                      | Can not Start   | One second delay engine shut off   |
| 12  | ON                             | ON                            | ON / OFF  | OFF                         | OFF                                     | Can not Start   | One second delay engine shut off   |
| 13  | OFF                            | ON                            | ON / OFF  | OFF                         | OFF                                     | Can not Start   | One second delay engine shut off   |

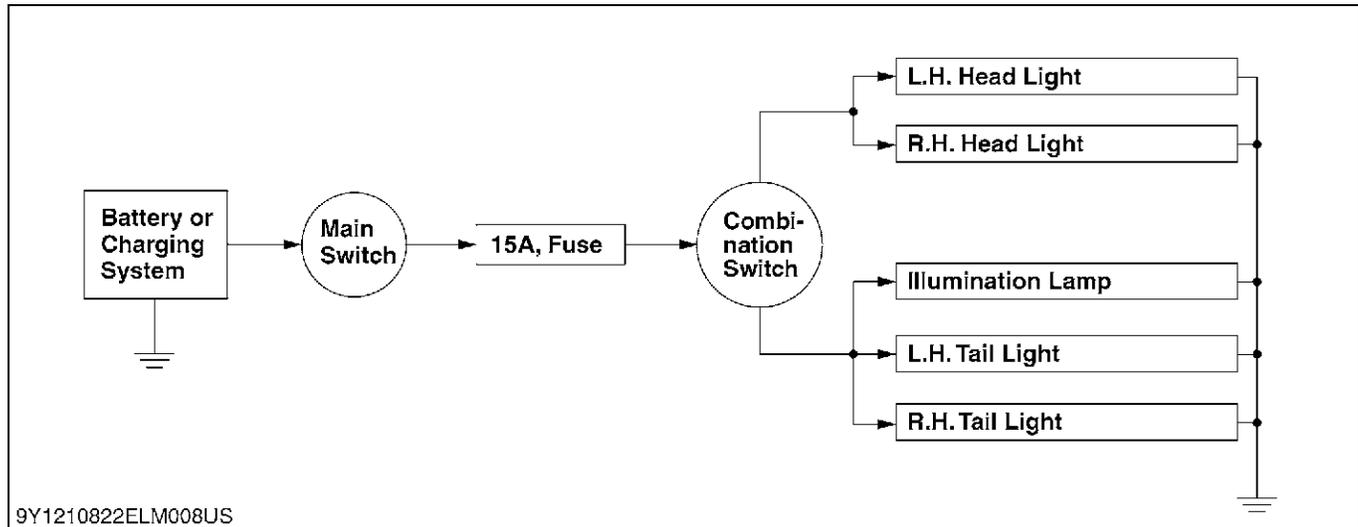
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### 3. LIGHTING SYSTEM

The lighting system consists of combination switch for head light, illumination lamp, tail light and hazard switches for tail lights etc..

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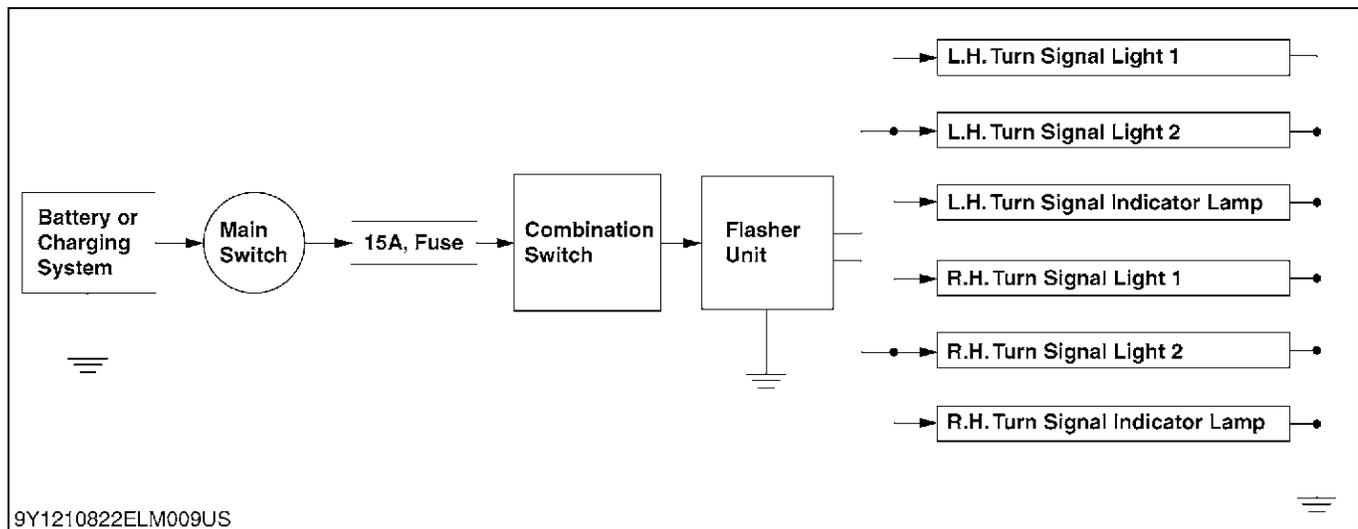
#### [1] LIGHT AND TAIL LIGHT



Combination switch has three types of switches for head lights, illumination lamps and tail lights. Current passes through the light circuit as shown in the figure above.

9Y1210972ELM0018US0

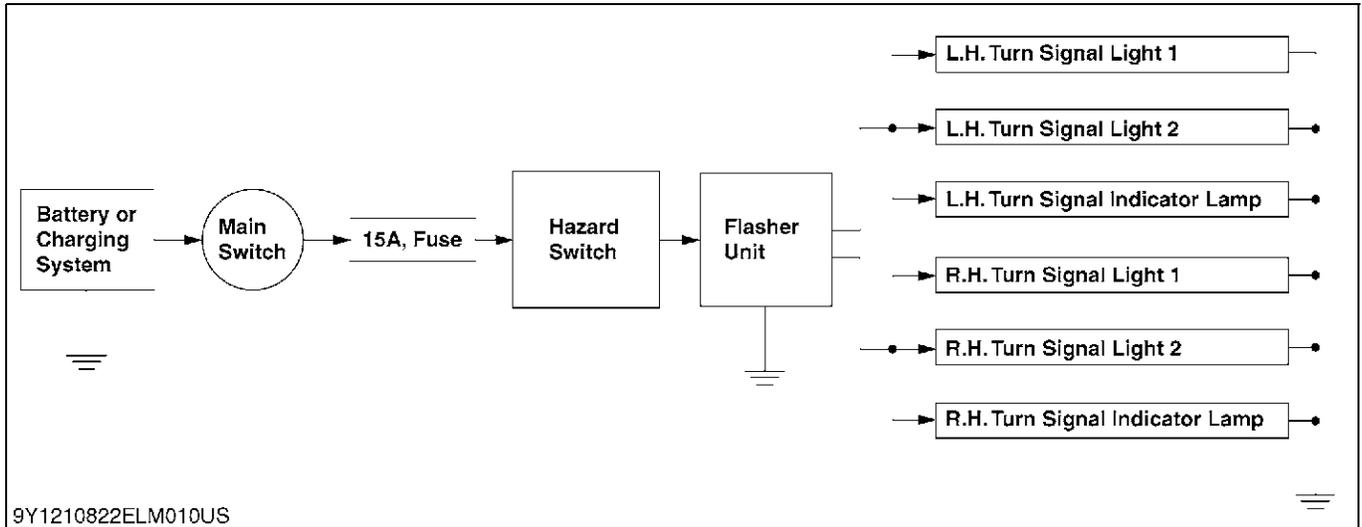
#### [2] TURNING LIGHT



The turning light which, switch forms a combination switch with the light switch, has three positions; **OFF**, **1.**, **2.**. When turning, only one side light blinks and other one stays on. Priority is given to the turning light when the hazard switch and the turn signal light switch are turned on at the same time.

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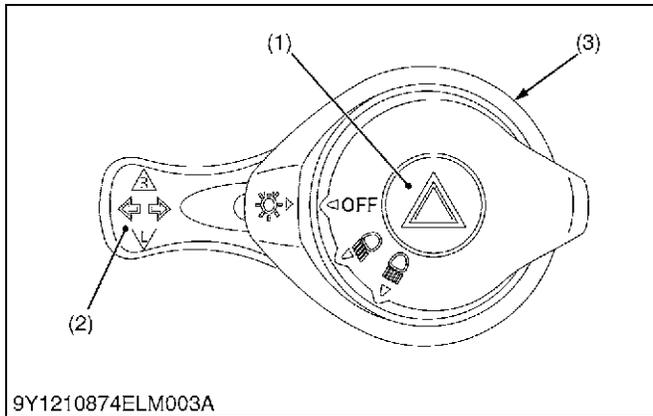
### [3] HAZARD LIGHT



Hazard switch has two positions: **ON** and **OFF**. Turn signal lights 1 and 2 are used as hazard lights. Turn signal lights 1 and 2 and indicator lamps are shown in the figure above. The hazard light is operative when the key switch is in either the **ON** or **OFF** position.

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### [4] TURN SIGNAL LIGHT AND HAZARD LIGHT



#### Combination Switch

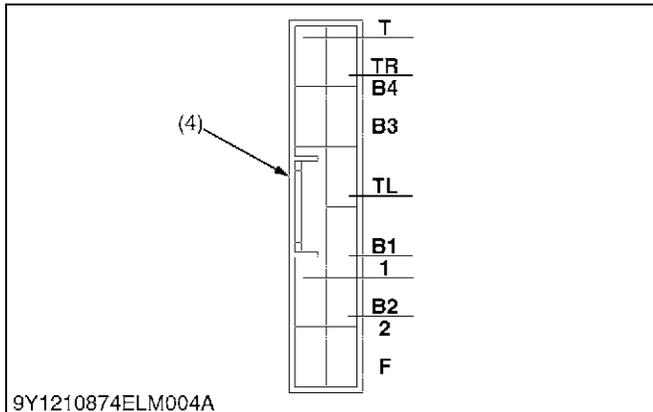
Combination switch consist of head light switch, turn signal lamp switch and hazard switch.

|        |     | B4 | T | 1 | 2 | B3 | TR | TL | F | B1 | B2 |
|--------|-----|----|---|---|---|----|----|----|---|----|----|
| Hazard | OFF |    |   |   |   |    |    |    | ● | ●  |    |
|        | ON  |    |   |   |   | ●  | ●  | ●  | ● | ●  | ●  |
| Turn   | R   |    |   |   |   | ●  | ●  |    |   |    |    |
|        | OFF |    |   |   |   |    |    |    |   |    |    |
|        | L   |    |   |   |   | ●  |    | ●  |   |    |    |

9Y1210874ELM005US

- (1) Hazard Switch
- (2) Turn Signal Lamp Switch
- (3) Combination Switch
- (4) Combination Switch Connector

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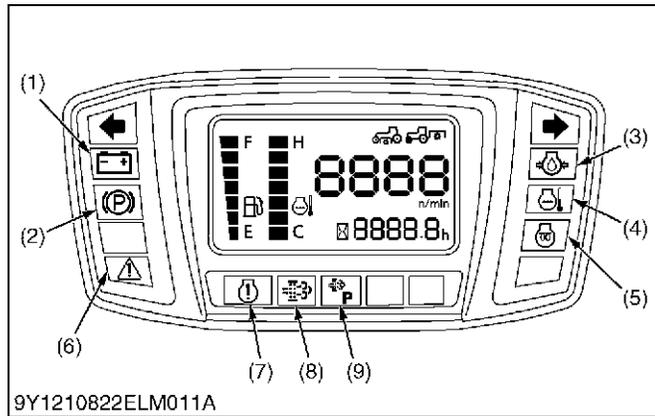


## 4. EASY CHECKER™

To check the conditions of tractor easily before and during operation, Easy Checker™ combination of lamps on the Easy Checker™ board is provided.

9Y1210972ELM0022US0

### [1] INDICATION ITEMS



#### ■ Master Warning

When trouble should occur at the engine, transmission or other control parts, this lamp illuminates.

#### ■ Engine Overheat Lamp

When the water temperature gauge reads an unusual level, this lamp illuminates.

#### ■ DPF Warning Lamp

When the regeneration of the DPF has problem, this lamp illuminates.

#### ■ Parking Brake Lamp

When the parking brake is set, this lamp illuminates.

#### ■ Oil Pressure Lamp

When the engine oil pressure is low, this lamp illuminates.

#### ■ Charge Lamp

When the charging system does not function properly, this lamp illuminates.

#### ■ Glow Plug Indicator Lamp

When the key switch is in the "Pre-heat" position, the pre-heat indicator lamp illuminates.

- |   |  |
|---|--|
| (1) Electrical Charge Warning Indicator   | (6) Master Warning Indicator                             |
| (2) Parking Brake Warning Indicator       | (7) DPF Warning Indicator (B3350 / B3350SU Only)         |
| (3) Engine Oil Pressure Warning Indicator | (8) Regeneration Indicator (B3350 / B3350SU Only)        |
| (4) Engine Overheat Warning Indicator     | (9) Parked Regeneration Indicator (B3350 / B3350SU Only) |
| (5) Glow Plug Indicator                   |  |

9Y1210972ELM0023US0

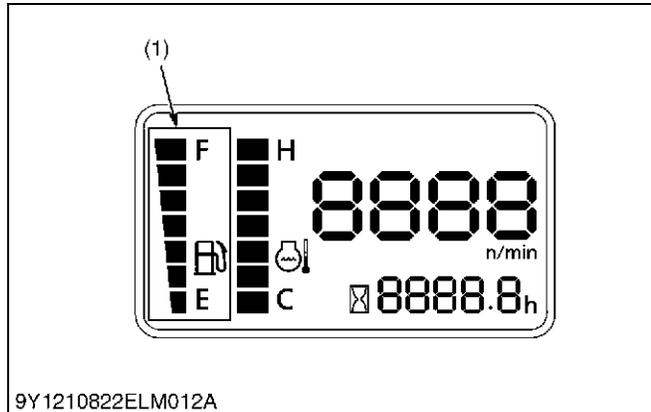
## 5. DIGITAL DISPLAY

This display shows the following information.

- Tractor information, such as engine speed, PTO rpm, hours the tractor has been operated and error code can be displayed.

9Y1210972ELM0024US0

### [1] LCD MONITOR INDICATOR

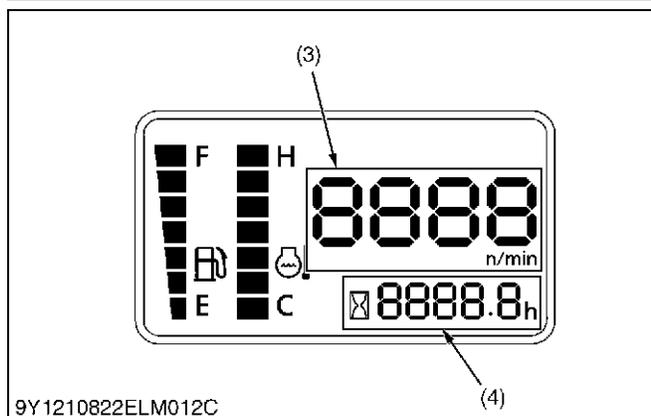
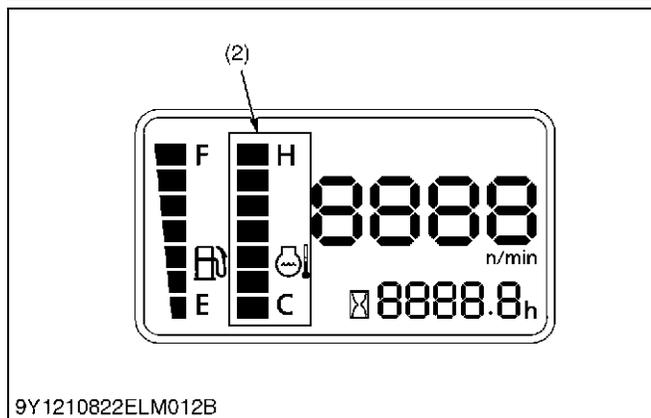


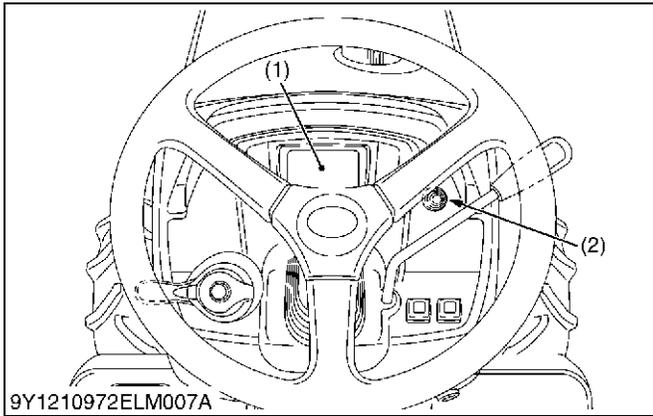
#### Fuel Gauge, Coolant Temperature Gauge, Hourmeter and Tachometer

- With key switch at "ON", the fuel gauge and coolant temperature gauge indicate the fuel level and temperature of the coolant.
- The tachometer indicates the engine speed and the PTO shift speed location on the dial.
- The hourmeter indicates in five digits the hours the tractor has been used; the last digit indicates 1/10 of an hour.

- |                               |  |
|-------------------------------|--|
| (1) Fuel Gauge                | (3) Engine Revolution / PTO<br>Speed Indicator |
| (2) Coolant Temperature Gauge | (4) Hours Used Indicator                       |

9Y1210972ELM0025US0





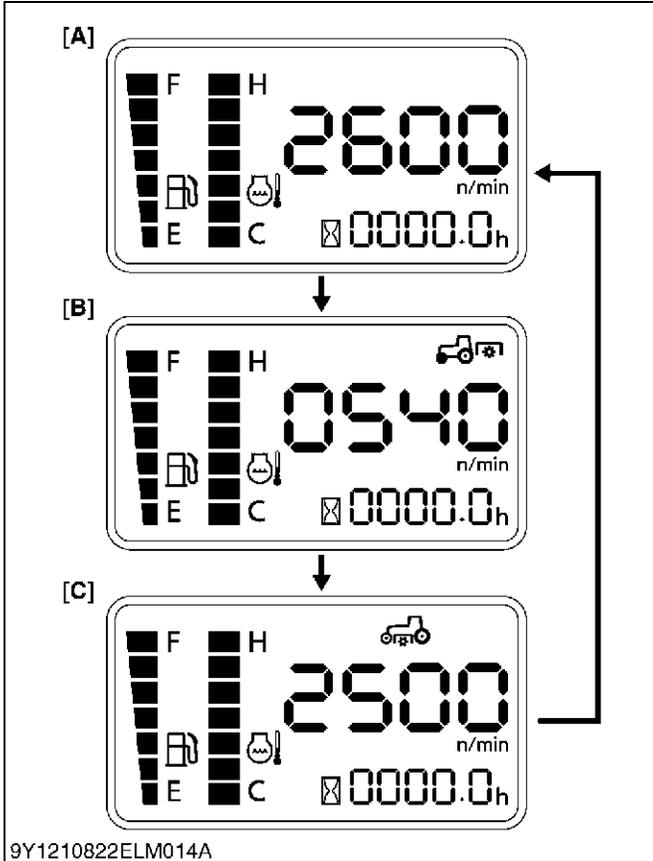
**Engine Revolution and PTO Speed**

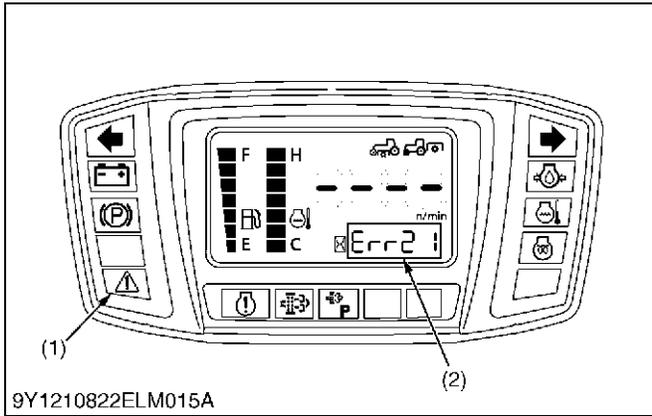
1. The LCD monitor (1) gives several different displays.
2. The LCD monitor (1) displays "Engine rpm" normally.
3. The display switch (2) is pressed, the display is switched to "Rear PTO Speed", "Mid PTO Speed", "Engine rpm".

- (1) LCD Monitor
- (2) Display Switch

- [A] Engine rpm
- [B] Rear PTO Speed
- [C] Mid PTO Speed

9Y1210972ELM0026US0





**Power Train Error Code**

1. If something is wrong with the power train, the master warning indicator (1) starts blinking and the error code is displayed on the LCD (2), indicating the location of the trouble.

**[B2650]**

| Displayed error code | Trouble                            |
|----------------------|------------------------------------|
| ERROR-1              | Water temperature sensor trouble   |
| ERROR-2              | Fuel sensor trouble                |
| ERROR-3              | Meter panel memory reading trouble |

**[B3350 / B3350SU]**

| Displayed error code | Trouble                            |
|----------------------|------------------------------------|
| ERROR-2              | Fuel sensor trouble                |
| ERROR-3              | Meter panel memory reading trouble |
| ERROR-21             | CAN communication trouble          |

- (1) Master Warning Indicator      (2) LCD

9Y1210972ELM0027US0

# SERVICING

## CONTENTS

|    |  |       |
|----|--|-------|
| 1. | TROUBLESHOOTING.....   | 8-S1  |
| 2. | SERVICING SPECIFICATIONS.....                                  | 8-S6  |
| 3. | TIGHTENING TORQUES.....  | 8-S7  |
| 4. | CHECKING AND ADJUSTING.....                                    | 8-S8  |
|    | [1] BATTERY.....   | 8-S8  |
|    | [2] FUSE.....  | 8-S10 |
|    | [3] ECU AND METER PANEL.....                                   | 8-S11 |
|    | (1) Engine ECU (B3350 / B3350SU).....                          | 8-S11 |
|    | (2) Meter Panel.....   | 8-S13 |
|    | [4] STARTING SYSTEM.....                                       | 8-S16 |
|    | (1) Main Switch.....   | 8-S16 |
|    | (2) Safety Switches.....                                       | 8-S19 |
|    | (3) Starter.....   | 8-S23 |
|    | (4) Glow Plug.....   | 8-S23 |
|    | (5) OPC Controller (for B2650).....                            | 8-S25 |
|    | [5] ENGINE CONTROL SYSTEM.....                                 | 8-S26 |
|    | (1) Fuel Pump (for B3350 / B3350SU).....                       | 8-S26 |
|    | (2) Fuel Pump (for Reformer).....                              | 8-S27 |
|    | (3) Exhaust Temperature Sensor (for B3350 / B3350SU).....      | 8-S28 |
|    | (4) Differential Pressure Sensor.....                          | 8-S29 |
|    | (5) Accelerator Lever Sensor.....                              | 8-S30 |
|    | (6) Parked Regeneration Switch.....                            | 8-S31 |
|    | (7) DPF INHIBIT Switch.....                                    | 8-S32 |
|    | (8) Blower Motor (Engine).....                                 | 8-S33 |
|    | (9) Rack Sensor.....   | 8-S34 |
|    | [6] CHARGING SYSTEM.....                                       | 8-S34 |
|    | (1) Alternator (B3350 / B3350SU).....                          | 8-S34 |
|    | (2) AC Dynamo (B2650).....                                     | 8-S35 |
|    | (3) Regulator (B2650).....                                     | 8-S36 |
|    | [7] LIGHTING SYSTEM.....                                       | 8-S37 |
|    | (1) Combination Switch.....                                    | 8-S37 |
|    | (2) Flasher Unit.....  | 8-S39 |
|    | [8] WARNING LAMP, INDICATOR LAMP AND GAUGE.....                | 8-S40 |
|    | (1) Engine Oil Pressure Switch.....                            | 8-S40 |
|    | (2) Coolant Temperature Sensor.....                            | 8-S40 |
|    | (3) Fuel Sensor.....   | 8-S41 |
|    | (4) Easy Checker™.....   | 8-S42 |
|    | [9] RELAY.....   | 8-S43 |
|    | [10] OTHER SWITCHES.....                                       | 8-S45 |
|    | (1) Panel Mode Switch.....                                     | 8-S45 |
|    | [11] ACCELERATOR SENSOR CALIBRATION (for B3350 / B3350SU)..... | 8-S46 |
| 5. | DISASSEMBLING AND ASSEMBLING.....                              | 8-S47 |
|    | [1] STARTER.....   | 8-S47 |
|    | [2] ALTERNATOR.....  | 8-S48 |
| 6. | SERVICING.....   | 8-S50 |
|    | [1] STARTER.....   | 8-S50 |
|    | [2] ALTERNATOR.....  | 8-S51 |

# 1. TROUBLESHOOTING

## FUSE AND WIRING

| Symptom  | Probable Cause and Checking Procedure                          | Solution                                 | Reference Page |
|--|--|--|----------------|
| <b>All Electrical Equipment Do Not Operate</b> | 1. Battery discharged or damaged                               | Check or recharge battery                | 8-S9           |
|  | 2. Battery positive cable disconnected or improperly connected | Repair or replace battery positive cable | 8-S8           |
|  | 3. Battery negative cable disconnected or improperly connected | Repair or replace battery negative cable | 8-S8           |
|  | 4. Slow blow fuse blown  | Repair main harness or glow, ECU harness | 8-M1 to 8-M3   |

## BATTERY

| Symptom                               | Probable Cause and Checking Procedure                  | Solution                                     | Reference Page |
|---------------------------------------|--|--|----------------|
| <b>Battery Discharges Too Quickly</b> | 1. Battery damaged                                     | Replace or recharge battery                  | 8-S9           |
|                                       | 2. Regulator damaged                                   | Replace regulator                            | 8-S36          |
|                                       | 3. Alternator damaged                                  | Repair or replace alternator                 | 8-S48          |
|                                       | 4. Wiring harness disconnected or improperly connected | Repair or replace connector and wire harness | 8-M1 to 8-M3   |
|                                       | 5. Cooling fan belt slipping                           | Adjust fan belt                              | G-26           |

**STARTING SYSTEM**

| <b>Symptom</b>  | <b>Probable Cause and Checking Procedure</b>           | <b>Solution</b>                               | <b>Reference Page</b> |
|---|--|---|-----------------------|
| <b>Starter Motor Does Not Operate</b>   | 1. Battery discharged or damaged                       | Replace or recharge battery                   | 8-S9                  |
|   | 2. Slow blow fuse blown                                | Repair main harness or other                  | 8-M1 to 8-M3          |
|   | 3. Safety switch improperly adjusted or damaged        | Repair or replace safety switch               | 8-S19                 |
|   | 4. Wiring harness disconnected or improperly connected | Repair or replace connector                   | 8-M1 to 8-M3          |
|   | 5. Operator presence controller damaged                | Check or replace operator presence controller | 8-S25                 |
|   | 6. Starter relay damaged                               | Replace starter relay                         | 8-S45                 |
|   | 7. Starter motor damaged                               | Solution order<br>1. Check starter motor      | 8-S23                 |
|   | 8. Main switch damaged                                 | 2. Replace starter                            | 8-S16                 |
| <b>Glow plug indicator Lamp Does Not Light When Main Switch Is in Pre-heat Position</b> | 1. Battery discharged or damaged                       | Replace or recharge battery                   | 8-S9                  |
|   | 2. Slow blow fuse blown                                | Re pair glow harness or other                 | 8-M1 to 8-M3          |
|   | 3. Wiring harness disconnected or improperly connected | Repair or replace connector and wire harness  | 8-M1 to 8-M3          |
|   | 4. Main switch damaged                                 | Check or replace main switch                  | 8-S16                 |
|   | 5. Glow plug indicator damaged                         | Replace meter panel                           | 8-S13                 |

**OPERATOR PRESENCE CONTROL (OPC)**

| Symptom                     | Probable Cause and Checking Procedure  | Solution                                      | Reference Page |
|-----------------------------|--|---|----------------|
| <b>Engine Does Not Stop</b> | 1. Engine stop solenoid damaged  | Check or replace engine stop solenoid         | 1-S27          |
|                             | 2. Engine stop solenoid relay damaged  | Replace engine stop solenoid relay            | 8-S43          |
|                             | 3. Seat switch damaged   | Replace seat switch                           | 8-S20          |
|                             | 4. PTO ON / OFF Switch   | Check or replace PTO ON/OFF switch            | 8-S22          |
|                             | 5. HST pedal switch damaged  | Check or replace HST pedal switch             | 8-S21          |
|                             | 6. Operator presence controller damaged  | Check or replace operator presence controller | 8-S25          |
|                             | 7. Wiring harness disconnected or improperly connected (between engine stop solenoid relay and engine stop solenoid, between engine stop solenoid relay and battery positive terminal) | Repair or replace connector and wire harness  | 8-M1 to 8-M3   |
|                             | 8. Wiring harness disconnected or improperly connected (between operator presence controller and engine stop solenoid relay)   | Repair or replace connector and wire harness  | 8-M1 to 8-M3   |

**CHARGING SYSTEM**

| Symptom   | Probable Cause and Checking Procedure                  | Solution                                     | Reference Page |
|---|--|--|----------------|
| <b>Charging Lamp Does Not Light When Main Switch Is Turned ON</b> | 1. Fuse blown (5A)                                     | Repair wire harness or other                 | 8-M1 to 8-M3   |
|   | 2. Wiring harness disconnected or improperly connected | Repair or replace connector and wire harness | 8-M1 to 8-M3   |
|   | 3. Regulator damaged                                   | Replace regulator                            | 8-S36          |
|   | 4. Alternator damaged                                  | Repair or replace alternator                 | 8-S48          |
| <b>Charging Lamp Does Not Go Off When Engine Is Running</b>       | 1. Wiring harness disconnected or improperly connected | Repair or replace connector and wire harness | 8-M1 to 8-M3   |
|   | 2. Regulator damaged                                   | Replace regulator                            | 8-S36          |
|   | 3. Alternator damaged                                  | Repair or replace alternator                 | 8-S48          |

**LIGHTING SYSTEM**

| <b>Symptom</b>   | <b>Probable Cause and Checking Procedure</b>           | <b>Solution</b>                              | <b>Reference Page</b> |
|--|--|--|-----------------------|
| <b>Head Light Does Not Light</b>                               | 1. Fuse blown (10A)                                    | Repair wire harness or other                 | 8-M1 to 8-M3          |
|  | 2. Bulb blown  | Repair bulb                                  | G-36                  |
|  | 3. Wiring harness disconnected or improperly connected | Repair or replace connector and wire harness | 8-M1 to 8-M3          |
|  | 4. Flasher unit damaged                                | Repair flasher unit                          | 8-S39                 |
|  | 5. Combination switch damaged                          | Check or replace combination switch          | 8-S37                 |
| <b>Tail Light Does Not Light</b>                               | 1. Fuse blown (10A)                                    | Repair wire harness or other                 | 8-M1 to 8-M3          |
|  | 2. Bulb blown  | Repair bulb                                  | G-36                  |
|  | 3. Wiring harness disconnected or improperly connected | Repair or replace connector and wire harness | 8-M1 to 8-M3          |
|  | 4. Combination switch damaged                          | Check or replace Combination switch          | 8-S37                 |
| <b>Hazard Light (Tail Light) Does Not Light</b>                | 1. Fuse blown (15A)                                    | Repair wire harness or other                 | 8-M1 to 8-M3          |
|  | 2. Bulb blown  | Repair bulb                                  | G-36                  |
|  | 3. Wiring harness disconnected or improperly connected | Repair or replace connector and wire harness | 8-M1 to 8-M3          |
|  | 4. Flasher unit damaged                                | Repair flasher unit                          | 8-S39                 |
|  | 5. Combination switch damaged                          | Check or replace combination switch          | 8-S37                 |
| <b>Hazard Indicator Lamp (Turn Signal Lamp) Does Not Light</b> | 1. Wiring harness disconnected or improperly connected | Repair or replace connector and wire harness | 8-M1 to 8-M3          |
|  | 2. Meter panel damaged                                 | Replace meter panel                          | 8-S13                 |
| <b>Hazard Light (Tail Light) Does Not Flicker</b>              | 1. Flasher unit damaged                                | Repair flasher unit                          | 8-S39                 |
| <b>Turn Signal Light Does Not Light</b>                        | 1. Fuse blown (10A)                                    | Repair wire harness or other                 | 8-M1 to 8-M3          |
|  | 2. Bulb blown  | Repair bulb                                  | G-36                  |
|  | 3. Wiring harness disconnected or improperly connected | Repair or replace connector and wire harness | 8-M1 to 8-M3          |
|  | 4. Flasher unit damaged                                | Repair flasher unit                          | 8-S39                 |
|  | 5. Combination switch damaged                          | Check or replace Combination switch          | 8-S37                 |
| <b>Turn Signal Light Indicator Lamp Does Not Light</b>         | 1. Wiring harness disconnected or improperly connected | Repair or replace connector and wire harness | 8-M1 to 8-M3          |
|  | 2. Meter panel damaged                                 | Replace meter panel                          | 8-S13                 |

| Symptom                                   | Probable Cause and Checking Procedure | Solution            | Reference Page |
|---|---------------------------------------|---------------------|----------------|
| <b>Turn Signal Light Does Not Flicker</b> | 1. Flasher unit damaged               | Repair flasher unit | 8-S39          |

**EASY CHECKER™**

| Symptom   | Probable Cause and Checking Procedure                         | Solution                                       | Reference Page |
|---|---|--|----------------|
| <b>Oil Pressure Lamp Lights Up When Engine Is Running</b>                                       | 1. Engine oil insufficient                                    | Check engine oil                               | G-15           |
|   | 2. Engine oil pressure too low                                | Solution order<br>1. Check engine oil pressure | 1-S18          |
|   |   | 2. Check or change engine oil                  | G-9            |
|   |   | 3. Check or replace oil filter                 | G-19           |
|   |   | 4. Check or replace oil pump                   | 1-S71          |
|   | 3. Oil pressure switch damaged                                | Check or replace oil pressure switch           | 1-S18          |
|   | 4. Short circuit between oil pressure switch lead and chassis | Repair or replace connector and wire harness   | 8-M1 to 8-M3   |
| 5. Circuit in panel board damaged   | Replace meter panel   | 8-S13  |                |
| <b>Oil Pressure Lamp Does Not Light When Main Switch Is Turned On and Engine Is Not Running</b> | 1. Oil pressure switch damaged                                | Check or replace oil pressure switch           | 1-S18          |
|   | 2. Wiring harness disconnected or improperly connected        | Repair or replace connector and wire harness   | 8-M1 to 8-M3   |
|   | 3. Circuit in panel board damaged                             | Replace meter panel                            | 8-S13          |

9Y1210972ELS0001US0

## 2. SERVICING SPECIFICATIONS

### STARTER

| Item       |                      | Factory Specification              | Allowable Limit       |
|------------|----------------------|------------------------------------|-----------------------|
| Commutator | O.D.                 | 28.0 mm<br>1.102 in.               | 27.0 mm<br>1.063 in.  |
|            | Difference of O.D.'s | Less than<br>0.02 mm<br>0.0008 in. | 0.05 mm<br>0.0020 in. |
| Mica       | Undercut             | 0.60 mm<br>0.0236 in.              | 0.20 mm<br>0.0079 in. |
| Brush      | Length               | 14.0 mm<br>0.551 in.               | 9.0 mm<br>0.354 in.   |

### GLOW PLUG

| Item               |            | Factory Specification | Allowable Limit |
|--------------------|------------|-----------------------|-----------------|
| Glow Plug          | Resistance | Approx. 1.1 $\Omega$  | –               |
| Glow Plug (Burner) | Resistance | Approx. 0.8 $\Omega$  | –               |
| Glow Plug (Heater) | Resistance | Approx. 3.0 $\Omega$  | –               |

### EXHAUST TEMPERATURE SENSOR (B3350)

| Item        |            | Factory Specification | Allowable Limit |
|-------------|------------|-----------------------|-----------------|
| Rack Sensor | Resistance | 470 k $\Omega$        | –               |

### ALTERNATOR

| Item   |            | Factory Specification     | Allowable Limit |
|--------|------------|---------------------------|-----------------|
| Stator | Resistance | Less than<br>1.0 $\Omega$ | –               |
| Rotor  | Resistance | 2.9 $\Omega$              | –               |

9Y1210972ELS0002US0

### 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-11.)

| Item                       | N·m               | kgf·m             | lbf·ft            |
|----------------------------|-------------------|-------------------|-------------------|
| Coolant temperature sensor | Less than<br>19.6 | Less than<br>2.00 | Less than<br>14.5 |
| Pulley nut                 | 58.4 to 78.9      | 5.95 to 8.05      | 43.1 to 58.2      |

9Y1210972ELS0003US0

# 4. CHECKING AND ADJUSTING

## ⚠ CAUTION

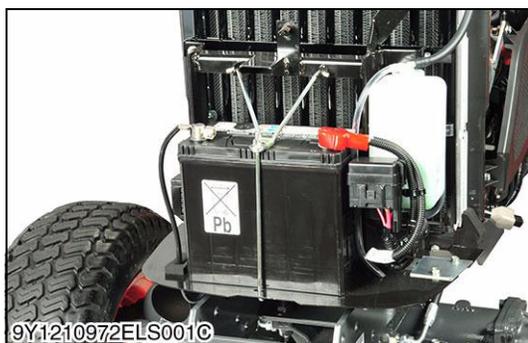
- To avoid accidental short circuit, be sure to attach the positive cable to the positive terminal before the negative cable is attached to the negative terminal.
- Never remove the battery cap while the engine is running.
- Keep electrolyte away from eyes, hands and clothes. If you are spattered with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

9Y1210972ELS0004US0

## [1] BATTERY

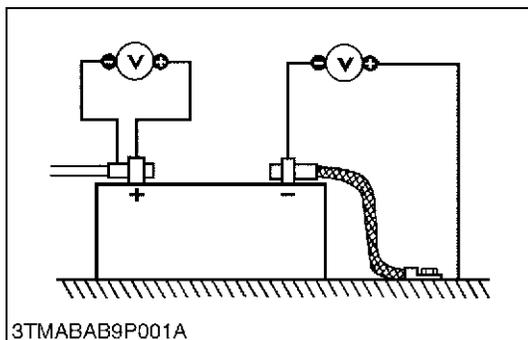


### Battery Voltage

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 |
|-----------------|-----------------------|----------------|

9Y1210972ELS0005US0

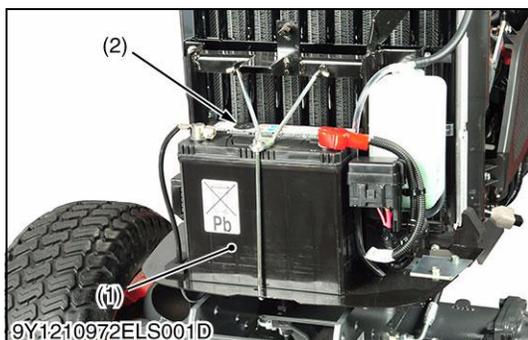


### Battery Terminal Connection

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 |
|----------------------|-----------------------|-----------------|

9Y1210972ELS0006US0



### Battery Condition Indicator

1. Check the battery condition by reading the indicator (2).

| State of indicator display |  |
|----------------------------|--|
| Green                      | Specific gravity of electrolyte and quality of electrolyte are both in good condition. |
| Black                      | Needs charging battery   |
| White                      | Needs replacing battery  |

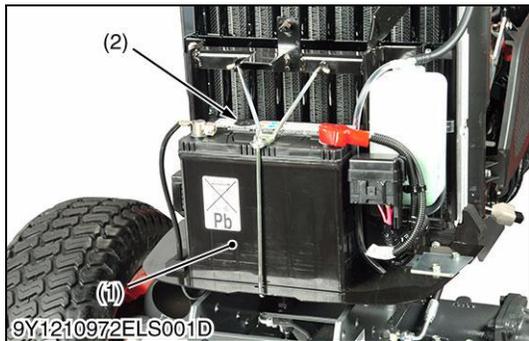
## ■ IMPORTANT

- The factory installed battery is of non-refillable type. If the indicator turns white, do not charge the battery but replace it with new one.

(1) Battery

(2) Indicator

9Y1210972ELS0007US0



**Recharging**

**⚠ CAUTION**

- When the battery is being activated, hydrogen and oxygen gases in the battery are extremely explosive. Keep open sparks and flames away from the battery at all times, especially when charging the battery.
- When disconnecting the cable from the battery, start with the negative terminal first. When connecting the cable to the battery, start with the positive terminal first.
- Never check battery charge by placing a metal object across the posts.

**Use a voltmeter or hydrometer.**

1. To slow charge the battery (1), connect the battery positive terminal to the charge positive terminal and the negative to the negative, then recharge in the standard fashion.
2. A boost charge is only for emergencies. It will partially charge the battery at a high rate and in a short time. When using a boost-charged battery, it is necessary to recharge the battery as early as possible. Failure to do this will shorten the battery's service life.
3. The battery is charge if the indicator display turns green from black.
4. When exchanging an old battery for a new one, use battery of equal specification shown in table.

**Table**

| Battery Type  | Volt (V) | Capacity at 5 H.R. | Reserve at (min.) | Cold Cranking Amps | Normal Charging Rate (A) |
|---------------|----------|--------------------|-------------------|--------------------|--------------------------|
| 55B24L (S)-MF | 12       | 36                 | 80                | 430                | 4.5                      |

(1) Battery

(2) Indicator

9Y1210972ELS0008US0

**Directions for Storage**

1. When shutting down the tractor for long periods of time, remove the battery from the tractor, store the battery in a well ventilated placed where it is not exposed to direct sunlight.
2. Since the battery self-discharges by approx. 0.5 % per day even in storage, it must be once every two months in cold season.
3. When storing the battery mounted on the tractor, disconnect the ground cable from the battery's negative terminal post.

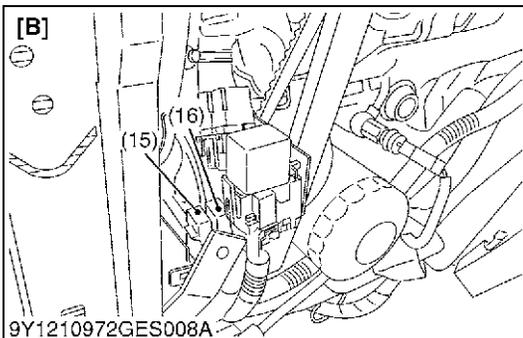
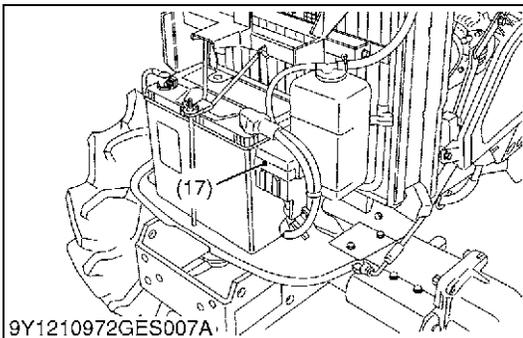
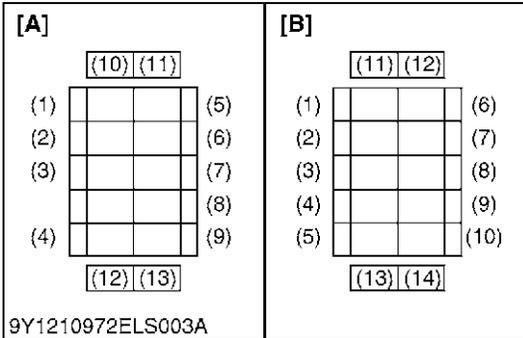
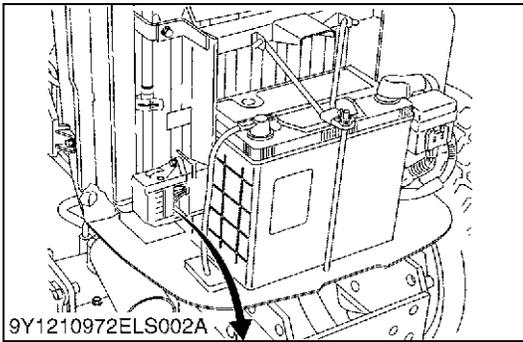
**(Reference)**

- Self-discharge Rate

| Temperature   | Self-discharge rate    |
|---------------|------------------------|
| 30 °C (86 °F) | Approx. 1.0 % per day  |
| 20 °C (68 °F) | Approx. 0.5 % per day  |
| 10 °C (50 °F) | Approx. 0.25 % per day |

9Y1210972ELS0009US0

## [2] FUSE



### Checking Fuse

1. Check the fuse.
2. If any of the fuses is blown, replace it with the one having same capacity.

#### ■ IMPORTANT

- If a fuse is blown, check the cause and be sure to replace it with the one having same capacity.

#### [B2650]

| Fuse No. | Capacity (A)   | Protected circuit                              |
|----------|----------------|--|
| (1)      | 30             | Key Stop                                       |
| (2)      | 15             | Flasher / Hazard                               |
| (3)      | 5              | Panel  |
| (4)      | 5              | Glow Relay                                     |
| (5)      | 10             | Head light                                     |
| (6)      | 5              | Panel / OPC                                    |
| (7)      | 5              | Dynamo / ACC Relay                             |
| (8)      | 10             | Outlet (Right Side)                            |
| (9)      | 10             | Outlet (Rear)                                  |
| (10)     | 5              | Spare Fuse                                     |
| (11)     | 10             | Spare Fuse                                     |
| (12)     | 15             | Spare Fuse                                     |
| (13)     | 30             | Spare Fuse                                     |
| (17)     | Slow blow fuse | Check circuit against wrong battery connection |

#### [B3350 / B3350SU]

| Fuse No. | Capacity (A)   | Protected circuit                              |
|----------|----------------|--|
| (1)      | 10             | ECU  |
| (2)      | 5              | Panel / OPC                                    |
| (3)      | 10             | Alternator / Fuel Pump / Governor              |
| (4)      | 10             | Head Light                                     |
| (5)      | 5              | Glow Relay                                     |
| (6)      | 5              | Starter / ECU                                  |
| (7)      | 10             | Outlet (Rear)                                  |
| (8)      | 10             | Outlet (Right Side)                            |
| (9)      | 5              | Panel  |
| (10)     | 15             | Flasher / Hazard                               |
| (11)     | 5              | Spare Fuse                                     |
| (12)     | 10             | Spare Fuse                                     |
| (13)     | 15             | Spare Fuse                                     |
| (14)     | 30             | Spare Fuse                                     |
| (15)     | 30             | Starter Relay                                  |
| (16)     | 15             | Reforming Glow                                 |
| (17)     | Slow blow fuse | Check circuit against wrong battery connection |

[A] B2650

[B] B3350 / B3350SU

9Y1210972ELS0010US0

### [3] ECU AND METER PANEL

#### (1) Engine ECU (B3350 / B3350SU)



#### Checking ECU Connector

1. Disconnect the connector (1), and check their terminals for contamination and deformation.
2. Check to see that cable does not broken or terminals are not shelled off.
3. If any damaged parts are found, repair or replace them.

#### ■ IMPORTANT

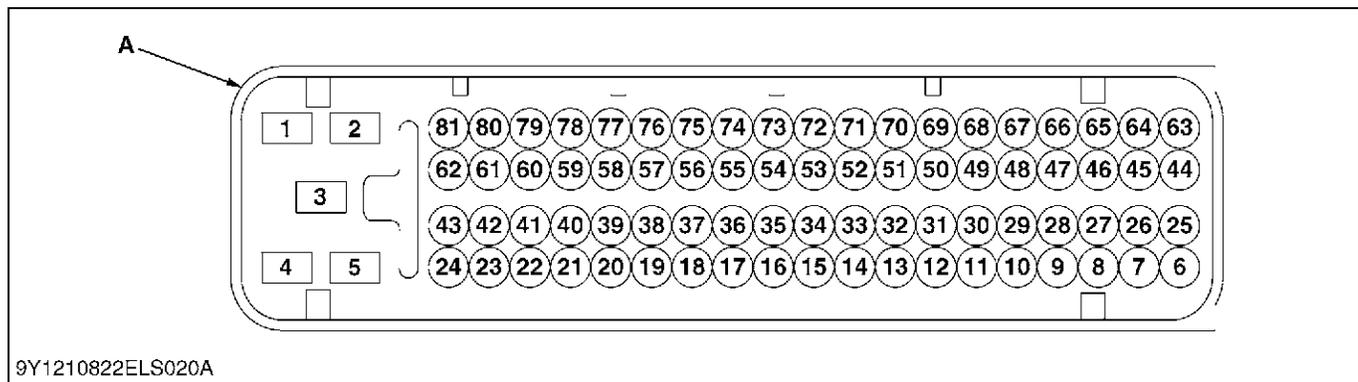
- **Connect connectors surely after checked.**

(1) ECU Connector

(2) ECU

9Y1210972ELS0011US0

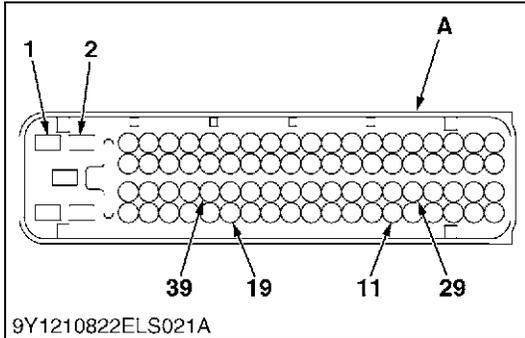
**Checking by Electric Control Unit (ECU)**



|    |                                   |    |                              |    |                              |
|----|-----------------------------------|----|------------------------------|----|------------------------------|
| 1  | Battery (+B)                      | 28 | Analog GND                   | 55 | Analog Input 1-5             |
| 2  | Battery (+B)                      | 29 | 5 V Supply (Signal)          | 56 | Analog Input 1-6             |
| 3  | Motor Output 1                    | 30 | 5 V Supply (Signal)          | 57 | Analog Input 1-1             |
| 4  | Motor Output 1                    | 31 | GND                          | 58 | Analog Input 1-3             |
| 5  | Motor Output 2                    | 32 | GND                          | 59 | Switch Input 7 (High Active) |
| 6  | Analog Input 2-3                  | 33 | GND                          | 60 | Switch Input 9 (High Active) |
| 7  | Analog Input 2-5                  | 34 | Lamp Output 5 (Low Side)     | 61 | Solenoid Output              |
| 8  | Analog Input 2-7                  | 35 | Lamp Output 2 (Low Side)     | 62 | Solenoid Output              |
| 9  | Analog GND                        | 36 | Lamp Output 3 (Low Side)     | 63 | CAN 1 (L)                    |
| 10 | Analog GND                        | 37 | Lamp Output 4 (Low Side)     | 64 | CAN 1 (L)                    |
| 11 | 5 V Supply (Signal)               | 38 | GND                          | 65 | CAN 1 (H)                    |
| 12 | Solenoid Current Feedback Input   | 39 | Switch Input B (High Active) | 66 | CAN 1 (H)                    |
| 13 | Solenoid Current Feedback Input   | 40 | Key Switch Terminal (START)  | 67 | Analog GND                   |
| 14 | GND (Engine Speed Sensor)         | 41 | Key Switch Terminal (ACC)    | 68 | Key Switch Terminal (GLOW)   |
| 15 | Lamp Output (Low Side)            | 42 | Key Switch Terminal (ACC)    | 69 | Switch Input 1 (High Active) |
| 16 | 12 V Supply (Engine Speed Sensor) | 43 | Key Switch Terminal (ACC)    | 70 | Switch Input 5 (Low Active)  |
| 17 | PWN Output 1 (Low Side)           | 44 | CAN 2 (H)                    | 71 | Switch Input 4 (Low Active)  |
| 18 | PWN Output 1 (Low Side)           | 45 | CAN 2 (H)                    | 72 | Switch Input 6 (High Active) |
| 19 | GND                               | 46 | CAN 2 (L)                    | 73 | Switch Input 3 (Low Active)  |
| 20 | PWN Output 2 (Low Side)           | 47 | CAN 2 (L)                    | 74 | Switch Input 2 (Low Active)  |
| 21 | PWN Output 3 (Low Side)           | 48 | Analog GND                   | 75 | Analog Input 1-7             |
| 22 | Relay Output 2 (Low Side)         | 49 | Not Connect (System Reserve) | 76 | Analog Input 1-4             |
| 23 | Relay Output 1 (High Side)        | 50 | Not Connect (System Reserve) | 77 | Analog Input 1-2             |
| 24 | Relay Output 1 (High Side)        | 51 | Analog GND                   | 78 | Analog Input 2-1             |
| 25 | Analog input 2-2                  | 52 | Not Connect (System Reserve) | 79 | Relay Output 4 (Low Side)    |
| 26 | Analog input 2-4                  | 53 | Analog GND                   | 80 | Relay Output 5 (High Side)   |
| 27 | Analog input 2-6                  | 54 | Engine Speed Sensor Input    | 81 | Relay Output 3 (High Side)   |

**A: ECU Connector of Wire Harness Side**

9Y1210972ELS0012US0



**Connector Voltage**

**(Main Circuit)**

1. Turn on the main switch. (Do not start engine.)
2. Measure the voltage between terminal 1 or 2 (+) and terminal 19 (-).
3. It is OK if the voltage equals to the battery voltage.

**(Voltage)**

1. Turn on the main switch. (Do not start engine.)
2. Measure the voltage between terminal 11 or 29 or 39 (+) and terminal 19 (-).
3. It is OK if the voltage is approx. 5 V.

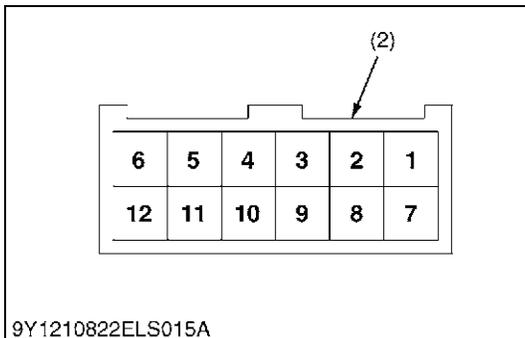
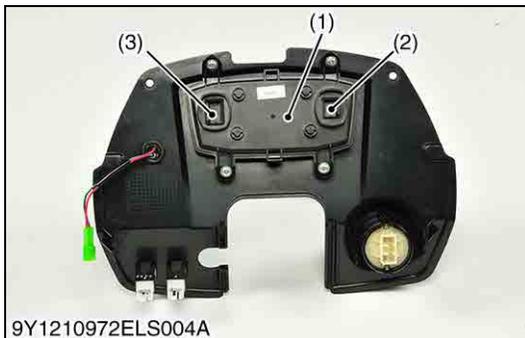
|         |                               |                         |
|---------|-------------------------------|-------------------------|
| Voltage | Terminal 1 or 2 to 19         | Approx. battery voltage |
|         | Terminal 11 or 29 or 39 to 19 | Approx. 5 V             |

- (1) ECU Connector  
(2) ECU

**A: ECU Connector of Wire Harness Side**

9Y1210972ELS0013US0

**(2) Meter Panel**



**Arrangement of Digital Display Connector Pin**

**■ B2650**

**[Connector 1]**

| Terminal No. | Item               | Color of wiring |
|--------------|--------------------|-----------------|
| 1 to 5       | Blank              | -               |
| 6            | L Terminal         | L/R             |
| 7 to 10      | Blank              | -               |
| 11           | PTO ON/OFF         | Lg              |
| 12           | Turn Signal (Left) | Sb              |

**[Connector 2]**

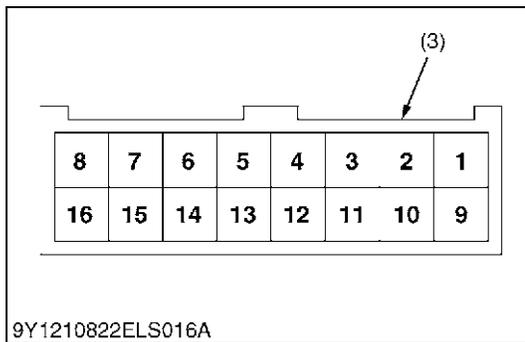
| Terminal No. | Item                    | Color of wiring |
|--------------|-------------------------|-----------------|
| 1            | Turn Signal (Right)     | V               |
| 2            | Glow Plug               | W               |
| 3            | Oil Switch              | W/R             |
| 4 to 8       | Blank                   | -               |
| 9            | Fuel Gauge              | V               |
| 10           | Water Temperature Gauge | L               |
| 11           | GND                     | B               |
| 12           | Panel Meter Switch      | P/W             |
| 13           | Engine Revolution       | Sb              |
| 14           | Blank                   | -               |
| 15           | Battery                 | Y/L             |
| 16           | Main Switch             | Br              |

- (1) Digital Display  
(2) Connector 1 (Display Side)

(3) Connector 2 (Display Side)

**(To be continued)**

(Continued)



### ■ B3350 / B3350SU

#### [Connector 1]

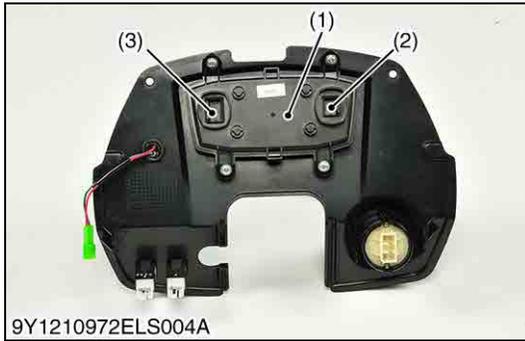
| Terminal No. | Item               | Color of wiring |
|--------------|--------------------|-----------------|
| 1 to 5       | Blank              | –               |
| 6            | Turn Signal (Left) | Sb              |
| 7 to 12      | Blank              | –               |

#### [Connector 2]

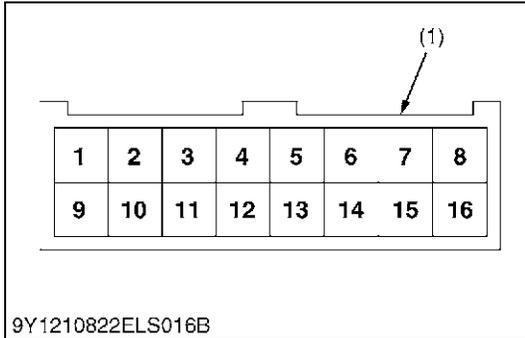
| Terminal No. | Item                 | Color of wiring |
|--------------|----------------------|-----------------|
| 1            | PTO ON/OFF           | W/Y             |
| 2            | Panel Mode Switch    | P/W             |
| 3            | Parking Brake Switch | G/B             |
| 4            | Turn Signal (Right)  | V               |
| 5            | Glow Lamp            | Or/L            |
| 6            | Oil Switch           | Or/B            |
| 7            | Blank                | –               |
| 8            | Engine Warning       | W/R             |
| 9            | CAN (Left)           | L               |
| 10           | CAN (Right)          | V/R             |
| 11           | Blank                | –               |
| 12           | GND                  | B               |
| 13           | Fuel Gauge           | V/Y             |
| 14           | L Terminal           | Y/W             |
| 15           | Battery              | Y/L             |
| 16           | Main Switch          | L/R             |

(3) Connector 2 (Display Side)

9Y1210972ELS0014US0



9Y1210972ELS004A



9Y1210822ELS016B

**Battery Voltage**

■ **B2650**

1. Disconnect the connector of connector 2 side.
2. Measure the voltage between terminal **15 (+)** (Yellow/Blue) and terminal **11 (-)** (Black).
3. Turn the main key switch **ON**.
4. Measure the voltage between terminal **16 (+)** (Brown) and terminal **11 (-)** (Black).
5. If the measure is not approximately battery voltage, check the relating electric circuit.

|         |                         |                         |
|---------|-------------------------|-------------------------|
| Voltage | Terminal <b>15 – 11</b> | Approx. battery voltage |
|         | Terminal <b>16 – 11</b> | Approx. battery voltage |

■ **B3350 / B3350SU**

1. Disconnect the connector of connector 2 side.
2. Measure the voltage between terminal **15 (+)** (Yellow/Blue) and terminal **12 (-)** (Black).
3. Turn the main key switch **ON**.
4. Measure the voltage between terminal **16 (+)** (Blue/Red) and terminal **12 (-)** (Black).
5. If the measure is not approximately battery voltage, check the relating electric circuit.

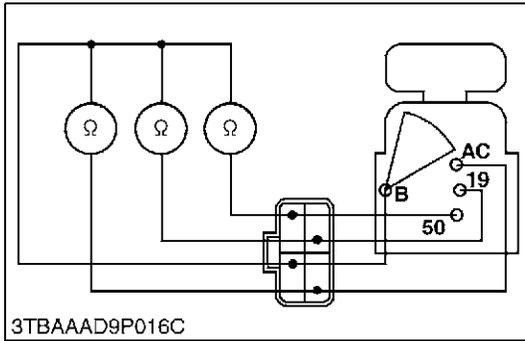
|         |                         |                         |
|---------|-------------------------|-------------------------|
| Voltage | Terminal <b>15 – 12</b> | Approx. battery voltage |
|         | Terminal <b>16 – 12</b> | Approx. battery voltage |

(1) Connector (Harness Side)

**A: Connector 1**  
**B: Connector 2**

9Y1210972ELS0015US0





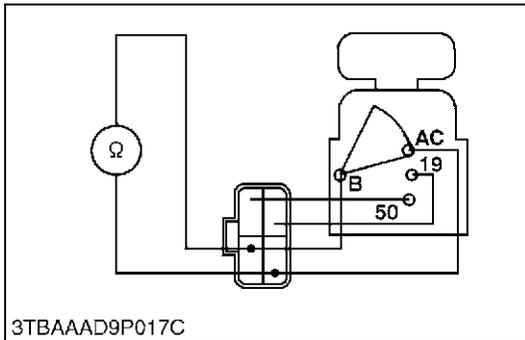
### Main Switch Continuity

#### 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 **AC** terminal, **B** terminal and **50** terminal, **B** terminal and **19** terminal.
3. If infinity is not indicated, the contacts of the main switch are faulty.

|            |  |          |
|------------|--|----------|
| Resistance | <b>B</b> terminal – <b>AC</b> terminal | Infinity |
|            | <b>B</b> terminal – <b>50</b> terminal | Infinity |
|            | <b>B</b> terminal – <b>19</b> terminal | Infinity |

9Y1210972ELS0018US0

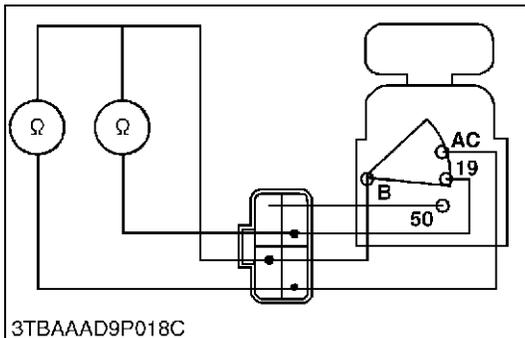


#### 2) Main Switch Key at ON Position

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

|            |  |     |
|------------|--|-----|
| Resistance | <b>B</b> terminal – <b>AC</b> terminal | 0 Ω |
|------------|--|-----|

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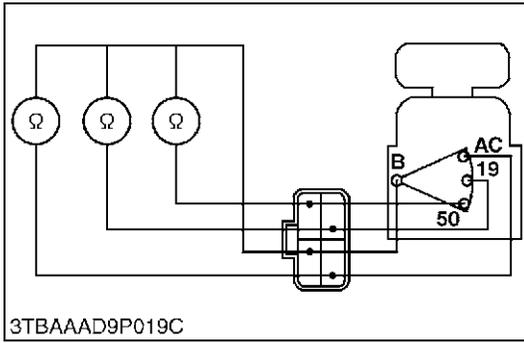


#### 3) Main Switch Key at PREHEAT Position

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 **19** terminal, and measure the resistance across the **B** terminal and the **AC** terminal.
3. If 0 Ω is not indicated, these contacts of the main switch are faulty.

|            |  |     |
|------------|--|-----|
| Resistance | <b>B</b> terminal – <b>19</b> terminal | 0 Ω |
|            | <b>B</b> terminal – <b>AC</b> terminal | 0 Ω |

9Y1210972ELS0020US0



**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 **19** terminal, across the **B** terminal and the **50** terminal, and across the **B** terminal and the **AC** terminal.
3. If 0 Ω is not indicated, these contacts of the main switch are faulty.

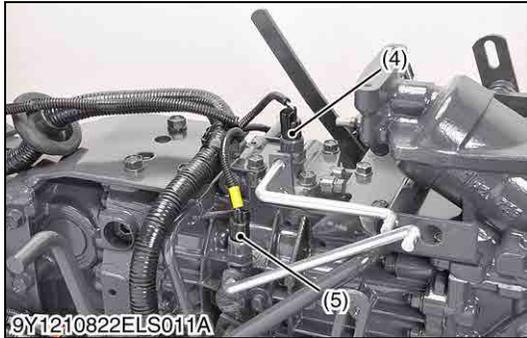
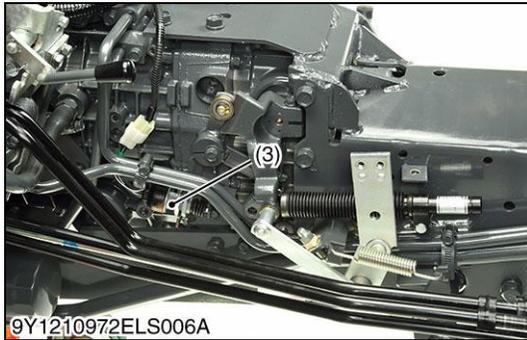
|            |                          |     |
|------------|--------------------------|-----|
| Resistance | B terminal – 19 terminal | 0 Ω |
|            | B terminal – 50 terminal | 0 Ω |
|            | B terminal – AC terminal | 0 Ω |

| Key Position | Terminal |    |    |    |
|--------------|----------|----|----|----|
|              | B        | AC | 19 | 50 |
| OFF          | ●        |    |    |    |
| ON           | ●        | ●  |    |    |
| PREHEAT      | ●        | ●  | ●  |    |
| START        | ●        | ●  | ●  | ●  |

9Y1210822ELS025US

9Y1210972ELS0021US0

## (2) Safety Switches



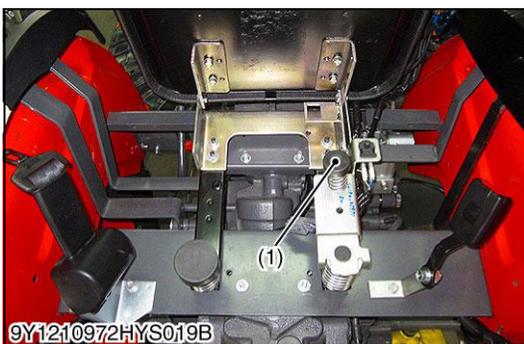
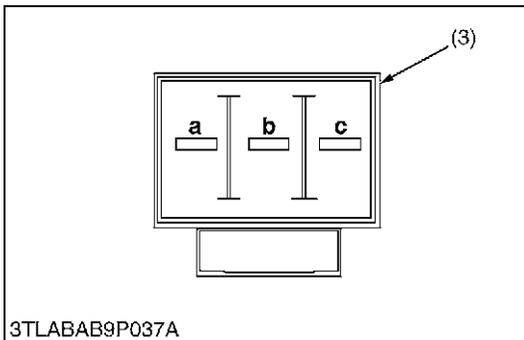
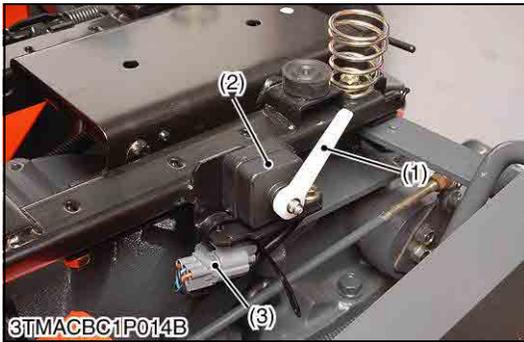
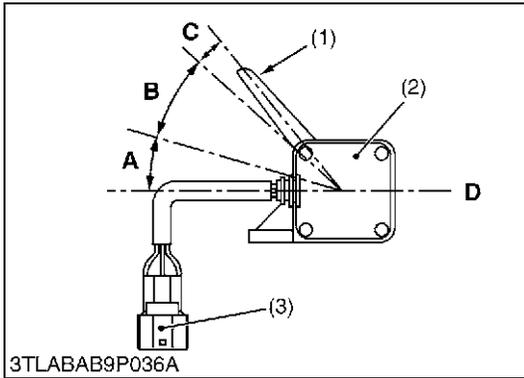
### Safety Switch Continuity

1. Disconnect the safety switch leads.
2. Connect the circuit tester to the safety switch leads.
3. Measure the resistance between leads.
4. If the safety switch is damaged, replace it.

| Safety Switch                               | State   | Resistance |
|---|---|------------|
| Seat switch                                 | Operator on the seat                                      | 0 Ω        |
|   | Vacant  | Infinity   |
| Parking brake switch                        | Parking lock  | 0 Ω        |
|   | Free  | Infinity   |
| HST pedal switch                            | HST pedal in neutral (pushed in)                          | 0 Ω        |
|   | HST pedal in forward or reverse                           | Infinity   |
| Independent PTO lever switch                | Independent PTO lever in neutral                          | Infinity   |
|   | Independent PTO lever engaged                             | 0 Ω        |
| PTO shift lever switch (B2650 / B3350 Only) | PTO shift lever in Rear PTO / Mid PTO or Mid PTO position | Infinity   |
|   | PTO shift lever in Rear PTO position                      | 0 Ω        |

- |                          |   |
|--------------------------|---|
| (1) Seat Switch          | (4) Independent PTO Lever Switch                |
| (2) Parking Brake Switch | (5) PTO Shift Lever Switch (B2650 / B3350 Only) |
| (3) HST Pedal Switch     |   |

9Y1210972ELS0022US0



**Checking Seat Switch (B2650 / B3350)**

1. Remove the seat.
2. Disconnect the seat switch connector (3).
3. Change the angle of the seat switch lever (1) and measure the resistance between connector terminals, referring to the table below.
4. If resistance is not correct, switch is faulty.

| Sensor bar angle       | Measuring terminal  | Resistance |
|------------------------|---------------------|------------|
| Approx. 18 ° (Angle A) | a – c               | 0 Ω        |
|                        | a – b, b – c        | Infinity   |
| Approx. 25 ° (Angle B) | a – b, a – c, b – c | Infinity   |
| Approx. 5 ° (Angle C)  | b – c               | 0 Ω        |
|                        | a – b, a – c        | Infinity   |

- (1) Seat Switch Lever
- (2) Seat Switch
- (3) Seat Switch Connector
- (4) Seat

- A: Angle approx. 18 °
- B: Angle approx. 25 °
- C: Angle approx. 5 °
- D: Seat Suspension Plate Line (Reference Line)
- a: Terminal (Orange)
- b: Terminal (Blue)
- c: Terminal (Black)

9Y1210972ELS0023US0

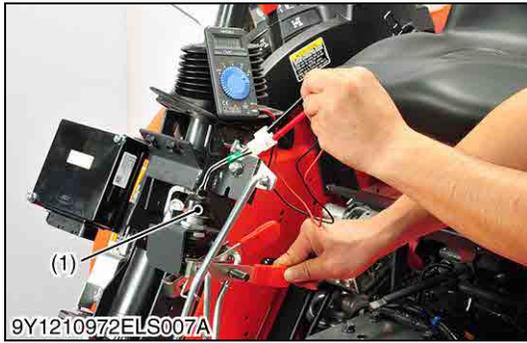
**Seat Switch Continuity Check (B3350SU)**

1. Disconnect the safety switch leads.
2. Connect the circuit tester to the seat switch terminal.
  - (When switch is not pushed)**
    1. Measure the resistance between terminals.
    2. If continuity is not infinity, the switch is faulty. Replace it.
  - (When switch is pushed)**
    1. Measure the resistance between terminals.
    2. If continuity is not 0 Ω, the switch is faulty. Replace it.

|            |                                |          |
|------------|--------------------------------|----------|
| Resistance | When seat switch is not pushed | Infinity |
|            | When seat switch is pushed     | 0 Ω      |

- (1) Seat Switch

9Y1210972ELS0024US0



**Parking Brake Switch Check**

1. Disconnect the parking brake switch connector (1).
2. Connect the circuit tester leads to the parking brake switch terminals.

**(When switch is not pushed)**

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

**(When switch is pushed)**

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

|            |   |          |
|------------|---|----------|
| Resistance | When parking brake switch is not pushed | Infinity |
|            | When parking brake switch is pushed     | 0 Ω      |

(1) Parking Brake Switch

9Y1210972ELS0025US0



**HST Pedal Switch Check**

1. Disconnect the HST pedal switch connector (1).
2. Connect the circuit tester leads to the HST 2P connector.

**(When the HST pedal is in "NEUTRAL" position)**

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

**(When the HST pedal is in "FORWARD" position)**

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

**(When the HST pedal is in "REVERSE" position)**

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

|            |   |          |
|------------|---|----------|
| Resistance | When the HST pedal is in "NEUTRAL" position | 0 Ω      |
|            | When the HST pedal is in "FORWARD" position | Infinity |
|            | When the HST pedal is in "REVERSE" position | Infinity |

(1) HST Pedal Switch Connector

**A: FORWARD**  
**B: REVERSE**

9Y1210972ELS0026US0



**Independent PTO Lever Switch Check**

1. Disconnect the **2P** connector from the independent PTO lever switch (1).
2. Connect the circuit tester leads to the independent PTO lever switch terminals.

**(When independent PTO lever is in "DISENGAGED" position)**

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

**(When independent PTO lever is in "ENGAGED" position)**

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

|            |  |          |
|------------|--|----------|
| Resistance | When independent PTO lever is in "DISENGAGED" position | Infinity |
|            | When independent PTO lever is in "ENGAGED" position    | 0 Ω      |

(1) Independent PTO Lever Switch      (2) Control Rod

9Y1210972ELS0027US0



**PTO Shift Lever Switch Check (B2650 / B3350)**

1. Disconnect the **2P** connector from the PTO shift lever switch (1).
2. Connect the circuit tester leads to the PTO shift lever switch terminals.

**(When the PTO shift lever is in "REAR PTO" position)**

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

**(When the PTO shift lever is in "REAR PTO / MID PTO" position)**

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

**(When the PTO shift lever is in "MID PTO" position)**

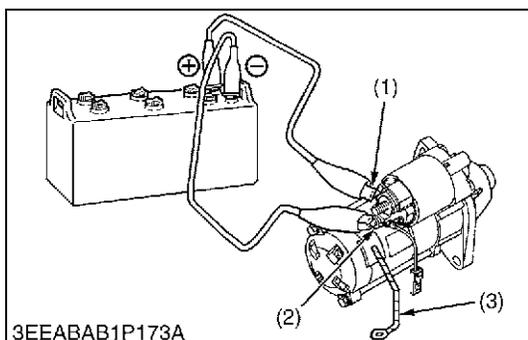
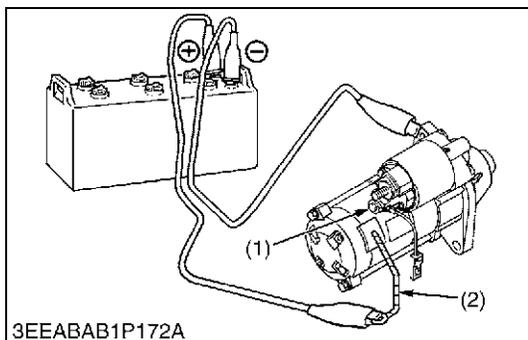
1. Measure the resistance between terminals.
2. If continuity is not infinity, the switch is faulty. Replace it.

|            |  |          |
|------------|--|----------|
| Resistance | When the PTO shift lever is in "REAR PTO" position           | 0 Ω      |
|            | When the PTO shift lever is in "REAR PTO / MID PTO" position | Infinity |
|            | When the PTO shift lever is in "MID PTO" position            | Infinity |

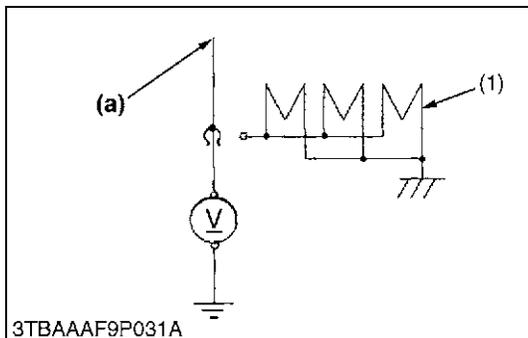
(1) PTO Shift Lever Switch      (3) Control Rod  
(2) PTO Shift Arm

9Y1210972ELS0028US0

### (3) Starter



### (4) Glow Plug



#### Motor Test



#### CAUTION

- **Secure the starter to prevent it 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 **M** terminal.
  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

9Y1210972ELS0029US0

#### Magnetic Switch Test

1. Disconnect the battery negative cable from the battery.
2. Disconnect the battery positive cable and the leads from the starter **M** terminal.
3. Remove the starter from the engine.
4. Disconnect the connecting lead (3) from the starter **C** terminal (2).
5. Connect a jumper lead from the starter **S** terminal (1) to the battery positive terminal post.
6. Connect a jumper lead momentarily between the starter **C** terminal (2) and the battery negative terminal post.
7. If the pinion gear does not pop out, check the magnetic switch.

#### NOTE

- **This test should be done for a short time, about 3 to 5 seconds.**

(1) **S** Terminal

(3) Connecting Lead

(2) **C** Terminal

9Y1210972ELS0030US0

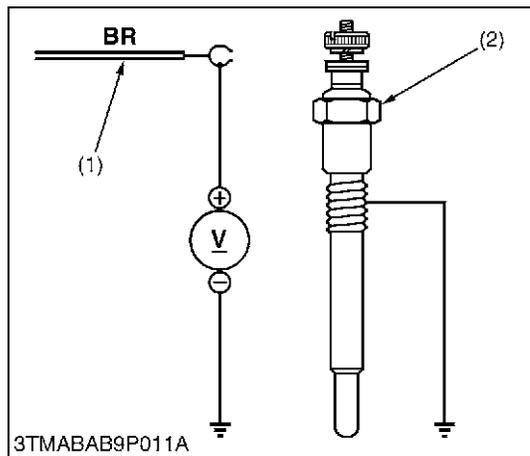
#### Glow Plug

1. Disconnect the lead from the glow plug.
2. Connect the tester positive cable to the glow plug lead and negative one to the chassis.
3. Measure its voltage with a voltmeter, after turning the main switch to the preheating or starting position.
4. If its voltage is not approximately the battery one, check the main switch or wiring harness.

(1) Glow Plug

(a) From Main Switch 19 and Pre-heat Indicator Lamp

9Y1210972ELS0031US0



**Lead Terminal Voltage**

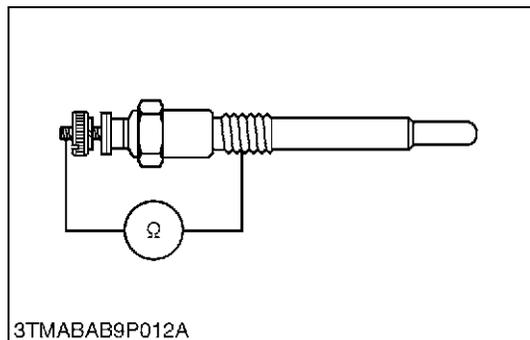
1. Disconnect the wiring lead (1) from the glow plug (2) after turning the main switch off.
2. Turn the main switch key to the "PREHEAT" position, and measure the voltage between the lead terminal and the chassis.
3. Turn the main switch key to the "START" position, and measure the voltage with a voltmeter 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) Wiring Lead

(2) Glow Plug

9Y1210972ELS0032US0

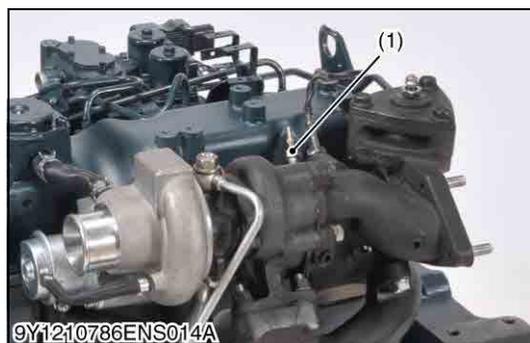


**Glow Plug Continuity**

1. Disconnect the leads from the glow plugs.
2. Measure the resistance with an ohmmeter between the glow plug terminal and chassis.
3. If 0 Ω 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 resistance | Factory specification | Approx. 1.1 Ω |
|----------------------|-----------------------|---------------|

9Y1210972ELS0033US0



**Glow Plug (Burner) Continuity**

1. Remove the glow plug.
2. Measure the resistance with a circuit tester between the glow plug terminal and the glow plug housing.
3. If the factory specification is not indicated, glow plug is faulty.

|            |                       |               |
|------------|-----------------------|---------------|
| Resistance | Factory specification | Approx. 0.8 Ω |
|------------|-----------------------|---------------|

(1) Glow Plug (Burner)

9Y1210972ELS0034US0



**Glow Plug (Heater) Continuity**

1. Remove the glow plug.
2. Measure the resistance with a circuit tester between the glow plug terminal and the glow plug housing.
3. If the factory specification is not indicated, glow plug is faulty.

|            |                       |               |
|------------|-----------------------|---------------|
| Resistance | Factory specification | Approx. 3.0 Ω |
|------------|-----------------------|---------------|

(1) Glow Plug (Heater)

9Y1210972ELS0035US0

## (5) OPC Controller (for B2650)

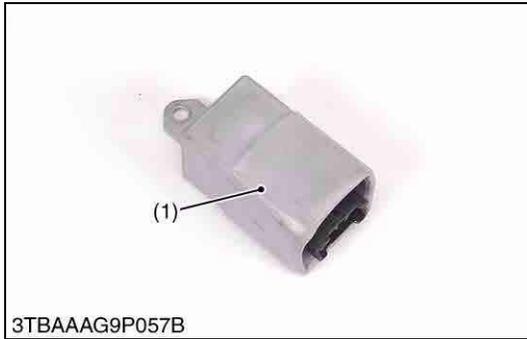


### OPC Controller

1. Check the "Engine Starting Conditions" and "Automatic Engine Stop Conditions" (See page 8-M12).
2. If the tractor does not operate appropriately, check all parts according to the "1. TROUBLESHOOTING" section.
3. If all parts except the OPC controller (1) is not damaged, replace the OPC controller (1).

(1) OPC Controller

9Y1210972ELS0036US0



# [5] ENGINE CONTROL SYSTEM

## (1) Fuel Pump (for B3350 / B3350SU)

■ **NOTE**

- **Firstly check the connector voltage, secondly check the other wires continuity, then finally check the pump resistance.**

9Y1210972ELS0037US0



### Connector Voltage

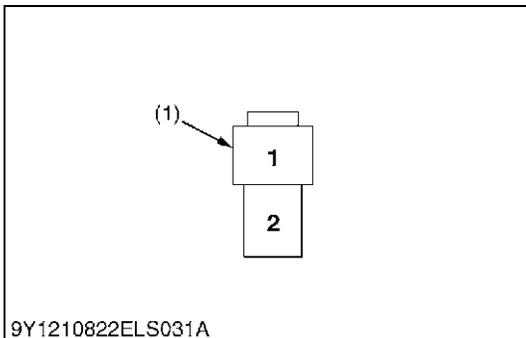
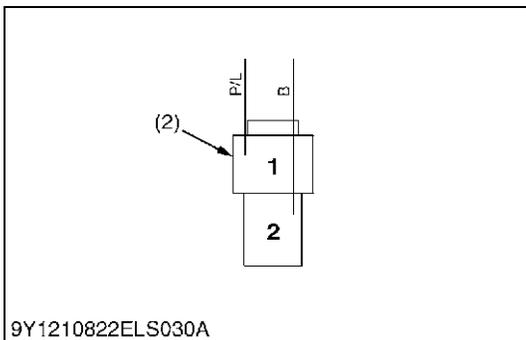
1. Disconnect the connector, and turn the main key switch "**ON**" position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

| Voltage | Main switch at " <b>ON</b> " | Terminal 1 – chassis | Approx. battery voltage |
|---------|------------------------------|----------------------|-------------------------|
|---------|------------------------------|----------------------|-------------------------|

(1) Fuel Pump

(2) Connector (Harness Side)

9Y1210972ELS0038US0



### Pump Actuation Test

1. Connect a jumper lead from the terminal **1** to the battery positive terminal post.
2. Connect a jumper lead from the terminal **2** to the battery negative terminal post.
3. If the pump does not work, pump is faulty.

(1) Connector (Pump Side)

9Y1210972ELS0039US0

## (2) Fuel Pump (for Reformer)

■ **NOTE**

- Firstly check the connector voltage, secondly check the other wires continuity, then finally check the pump resistance.

9Y1210972ELS0040US0



### Connector Voltage

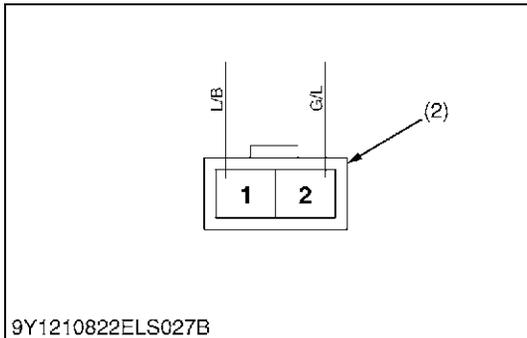
1. Disconnect the connector, and turn the main key switch "ON" position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

| Voltage | Main switch at "ON" | Terminal 2 – chassis | Approx. battery voltage |
|---------|---------------------|----------------------|-------------------------|
|---------|---------------------|----------------------|-------------------------|

(1) Fuel Pump

(2) Connector (Harness Side)

9Y1210972ELS0041US0



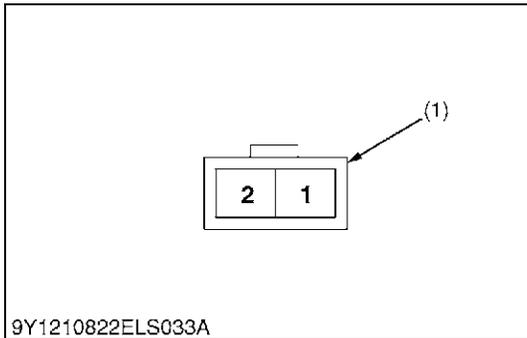
### Sensor Resistance

1. Measure the resistance with an ohmmeter across the terminals shown in the table below.
2. If the reference value is not indicated, the fuel pump (for reformer) is faulty.

| Resistance | at 20 °C (68 °F) | Terminal 1 – 2 | Approx. 2.5 Ω |
|------------|------------------|----------------|---------------|
|------------|------------------|----------------|---------------|

(1) Connector (Sensor Side)

9Y1210972ELS0042US0

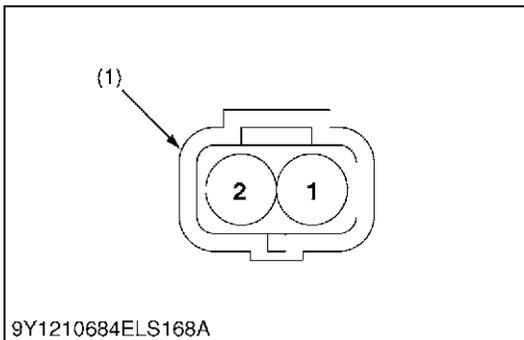
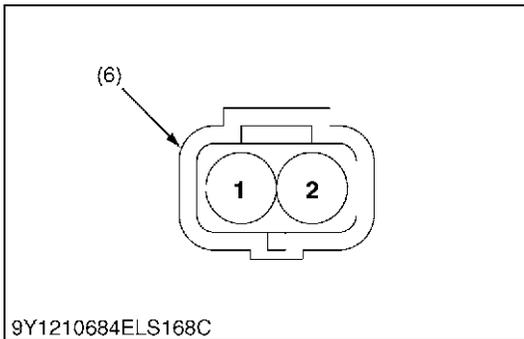
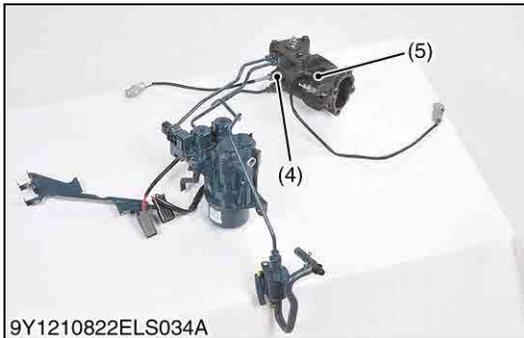
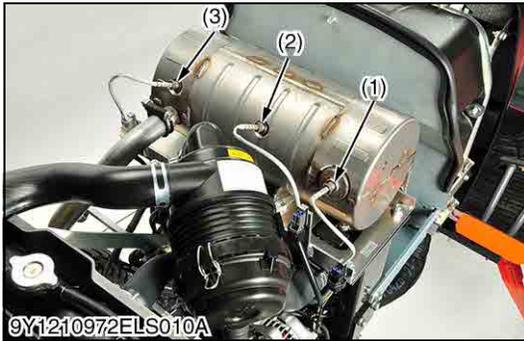


### (3) Exhaust Temperature Sensor (for B3350 / B3350SU)

■ **NOTE**

- Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.

9Y1210972ELS0043US0



#### Connector Voltage

1. Disconnect the connector, and turn the main key switch "ON" position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

| Item                          | Terminal   | Color of wiring |
|-------------------------------|------------|-----------------|
| Exhaust temperature sensor T0 | Terminal 1 | Y/B             |
|                               | Terminal 2 | G/R             |
| Exhaust temperature sensor T1 | Terminal 1 | Y/B             |
|                               | Terminal 2 | L/B             |
| Exhaust temperature sensor T2 | Terminal 1 | Y/B             |
|                               | Terminal 2 | V               |
| Exhaust temperature sensor T3 | Terminal 1 | Y/B             |
|                               | Terminal 2 | Y/Br            |
| Exhaust temperature sensor T4 | Terminal 1 | Y/B             |
|                               | Terminal 2 | Gr/R            |

|         |                     |                      |             |
|---------|---------------------|----------------------|-------------|
| Voltage | Main switch at "ON" | Terminal 2 – chassis | Approx. 5 V |
|---------|---------------------|----------------------|-------------|

- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| (1) Exhaust Temperature Sensor T0 | (4) Exhaust Temperature Sensor T3 |
| (2) Exhaust Temperature Sensor T1 | (5) Exhaust Temperature Sensor T4 |
| (3) Exhaust Temperature Sensor T2 | (6) Connector (Harness Side)      |

9Y1210972ELS0044US0

#### Sensor Resistance (for Reference)

1. Measure the resistance with an ohmmeter across the terminals shown in the table below.
2. If the reference value is not indicated, the exhaust temperature sensor is faulty.

|            |                    |                 |
|------------|--------------------|-----------------|
| Resistance | at 200 °C (140 °F) | Approx. 4.00 kΩ |
|            | at 650 °C (212 °F) | Approx. 205.6 Ω |

- (1) Connector (Sensor Side)

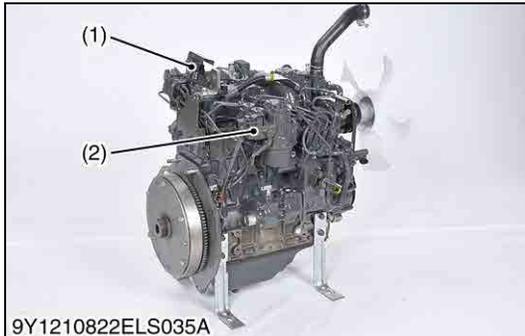
9Y1210972ELS0045US0

## (4) Differential Pressure Sensor

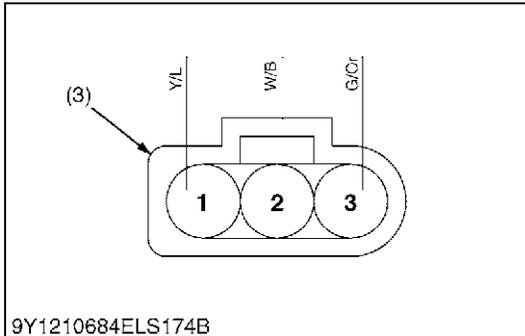
■ **NOTE**

- Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.

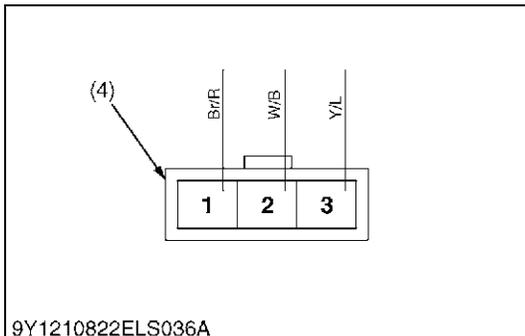
9Y1210972ELS0046US0



9Y1210822ELS035A



9Y1210684ELS174B



9Y1210822ELS036A

### Connector Voltage

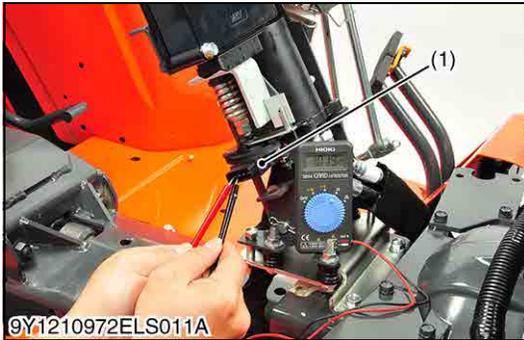
1. Disconnect the connector, and turn the main key switch "ON" position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

|         |                     |                      |             |
|---------|---------------------|----------------------|-------------|
| Voltage | Main switch at "ON" | Terminal 1 – chassis | Approx. 5 V |
|         |                     | Terminal 3 – chassis |             |

- |   |   |
|---|---|
| (1) Differential Pressure Sensor (DPF)          | (3) Connector (Harness Side-DPF)          |
| (2) Differential Pressure Sensor (Blower Motor) | (3) Connector (Harness Side-Blower Motor) |

9Y1210972ELS0047US0

## (5) Accelerator Lever Sensor



9Y1210972ELS011A

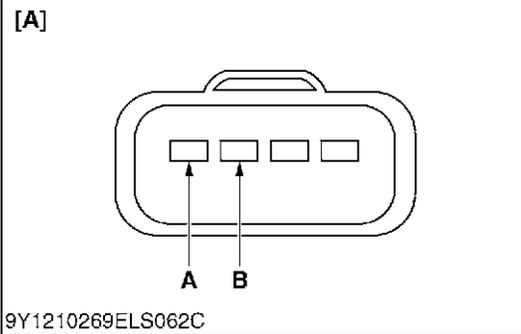
### Accelerator Lever Sensor Input Voltage

1. Remove the accelerator lever sensor connector.
2. Turn the main key switch **ON**.
3. Check the voltage between terminal **A (+)** and terminal **B (-)** of the wire harness side.

|         |                                       |     |
|---------|---------------------------------------|-----|
| Voltage | Terminal <b>A</b> – Terminal <b>B</b> | 5 V |
|---------|---------------------------------------|-----|

- (1) Accelerator Lever Sensor
- [A] Connector (Harness)**  
**A: Terminal A**  
**B: Terminal B**

9Y1210972ELS0048US0



9Y1210269ELS062C

### Accelerator Lever Sensor Resistance

1. Measure the resistance between terminal **A** and **C** while slowly turning the sensor lever (1).
2. Then, check resistance between terminal **B** and **C** while slowly turning the sensor lever (1).
3. It is OK if the resistance value is approximate to the value shown in the table below.

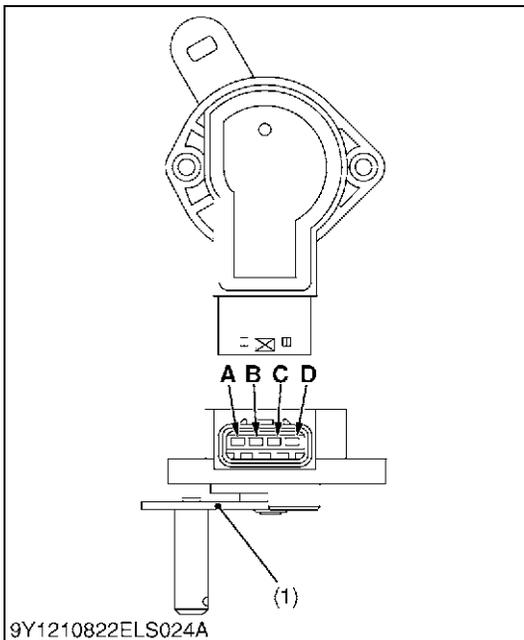
**(Reference)**

- The change of resistance can be checking easily when an analog tester is employed.

|            |                                       |           |
|------------|---------------------------------------|-----------|
| Resistance | Terminal <b>A</b> – Terminal <b>C</b> | 0 to 1 kΩ |
|            | Terminal <b>B</b> – Terminal <b>C</b> | 0 to 1 kΩ |

- (1) Sensor Lever
- A: Terminal A**  
**B: Terminal B**  
**C: Terminal C**  
**D: Terminal D**

9Y1210972ELS0049US0



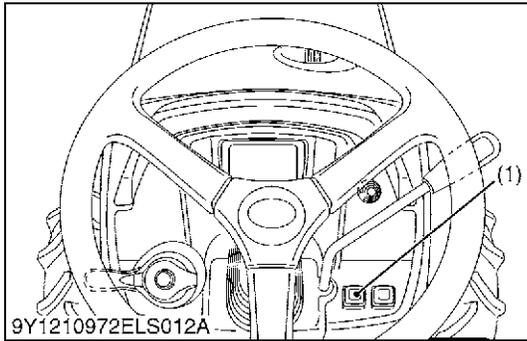
9Y1210822ELS024A

## (6) Parked Regeneration Switch

■ **NOTE**

- Firstly check the connector voltage, secondly check the other wires continuity, then finally check the switch continuity.

9Y1210972ELS0050US0



### Connector Voltage

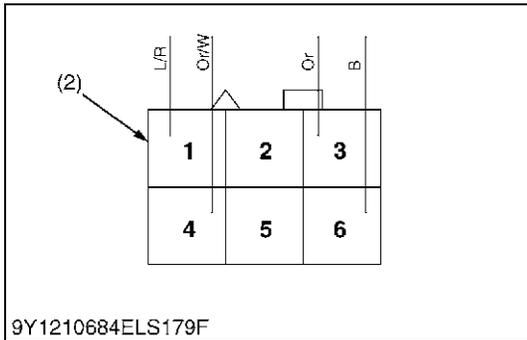
1. Disconnect the connector, and turn the main key switch "ON" position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

|         |                     |                      |                         |
|---------|---------------------|----------------------|-------------------------|
| Voltage | Main switch at "ON" | Terminal 1 – chassis | Approx. battery voltage |
|         |                     | Terminal 3 – chassis |                         |

(1) Parked Regeneration Switch

(2) Connector (Harness Side)

9Y1210972ELS0051US0



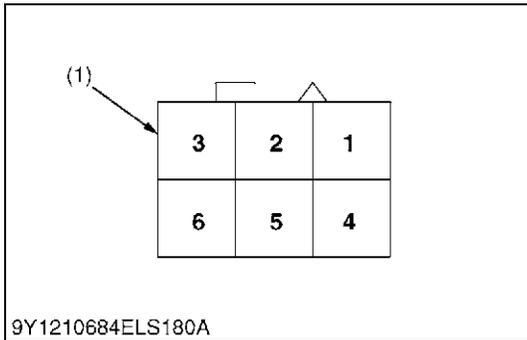
### Switch Continuity

1. Check the continuity across the terminals shown in the table below.
2. If the continuity specified below is not indicated, the parked regeneration switch is faulty.

|                  |                |            |
|------------------|----------------|------------|
| Continuity Check | Terminal 1 – 4 | Continuity |
|                  | Terminal 3 – 6 |            |

(1) Connector (Switch Side)

9Y1210972ELS0052US0

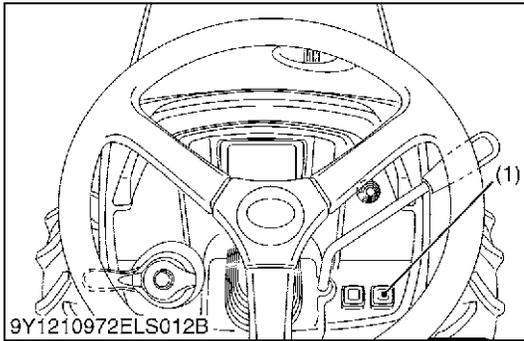


## (7) DPF INHIBIT Switch

### ■ NOTE

- Firstly check the connector voltage, secondly check the other wires continuity, then finally check the switch continuity.

9Y1210972ELS0053US0



### Connector Voltage

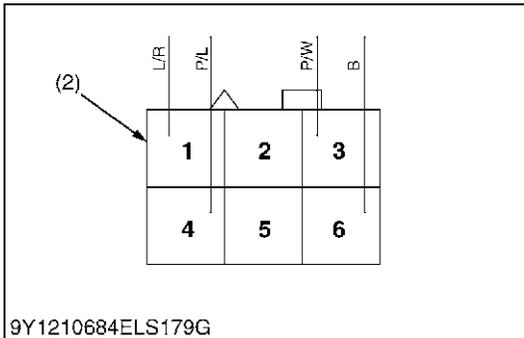
1. Disconnect the connector, and turn the main key switch "ON" position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

| Voltage | Main switch at "ON" | Terminal 1 – chassis | Approx. battery voltage |
|---------|---------------------|----------------------|-------------------------|
|         |                     | Terminal 3 – chassis |                         |

(1) DPF INHIBIT Switch

(2) Connector (Harness Side)

9Y1210972ELS0054US0



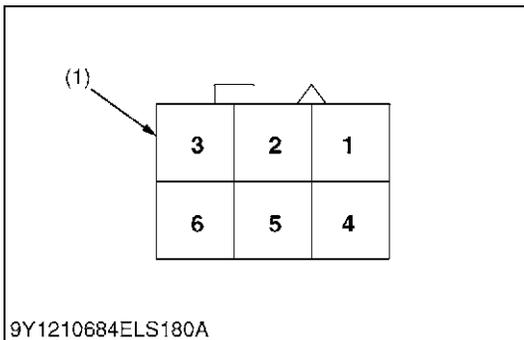
### Switch Continuity

1. Check the continuity across the terminals shown in the table below.
2. If the continuity specified below is not indicated, the auto regeneration switch is faulty.

| Continuity Check | Terminal 1 – 4 | Continuity |
|------------------|----------------|------------|
|                  | Terminal 3 – 6 |            |

(1) Connector (Switch Side)

9Y1210972ELS0055US0

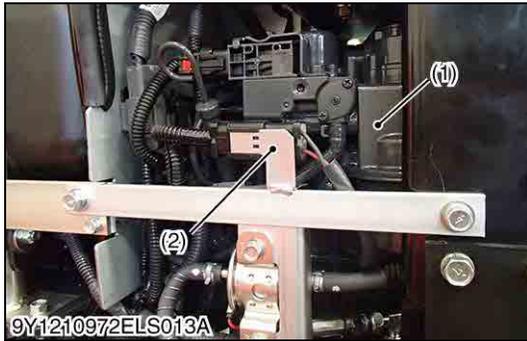


## (8) Blower Motor (Engine)

### NOTE

- Since it is not possible to do unit checking for this sensor, judge the sensor is faulty if the relating electric circuit is normal.

9Y1210972ELS0056US0



### Connector Voltage

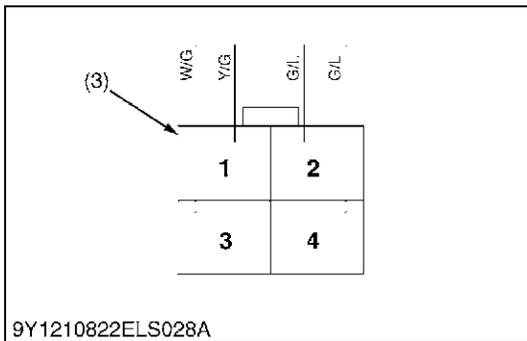
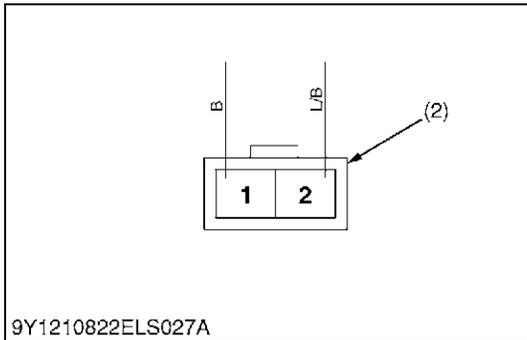
- Disconnect the connector, and turn the main key switch "ON" position.
- Measure the voltage with a voltmeter across the terminals shown in the table below.
- If the reference value is not indicated as shown in the table below, check the relating electric circuit.

|                                    |                     |                           |                         |
|------------------------------------|---------------------|---------------------------|-------------------------|
| Voltage (Blower motor connector)   | Main switch at "ON" | Terminal 2 – chassis      | Approx. battery voltage |
| Voltage (Solenoid valve connector) | Main switch at "ON" | Terminal 2 or 4 – chassis | Approx. battery voltage |

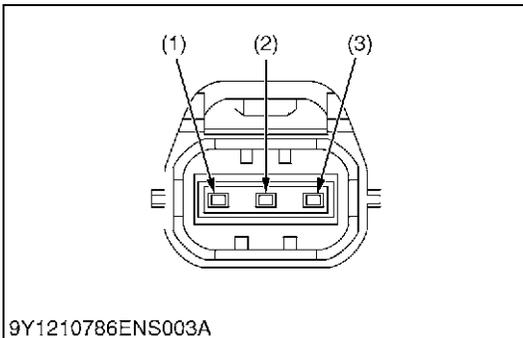
- (1) Blower Motor
- (2) Blower Motor Connector (Harness Side)

- (3) Solenoid Valve Connector (Harness Side)

9Y1210972ELS0057US0



## (9) Rack Sensor



### Rack Sensor

1. Disconnect the connector.
2. Remove the rack sensor.
3. Measure the resistance between terminal 2 and terminal 3 with an ohmmeter.
4. If the resistance is not within the factory specifications, replace it.

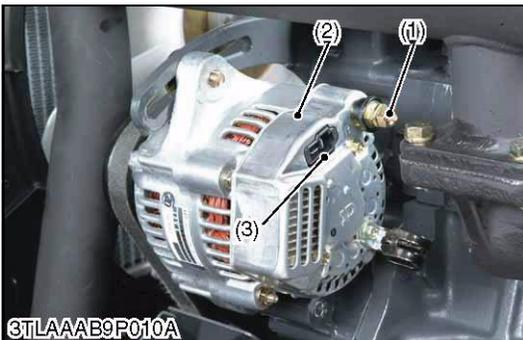
|            |                       |        |
|------------|-----------------------|--------|
| Resistance | Factory specification | 470 kΩ |
|------------|-----------------------|--------|

- |                      |                         |
|----------------------|-------------------------|
| (1) Terminal 1 (Vcc) | (3) Terminal 3 (Output) |
| (2) Terminal 2 (GND) |                         |

9Y1210972ELS0058US0

## [6] CHARGING SYSTEM

### (1) Alternator (B3350 / B3350SU)

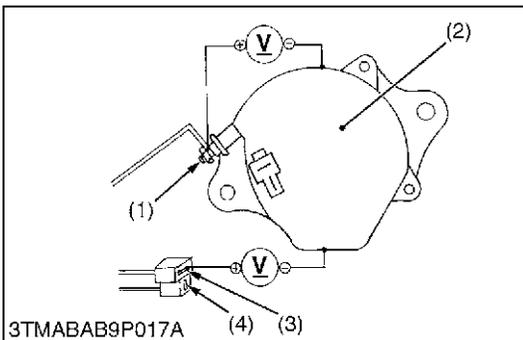


### Alternator

1. Disconnect the 2P connector (3) from alternator after turning the main switch OFF.
2. Perform the following checks.

- |                |                  |
|----------------|------------------|
| (1) B Terminal | (3) 2P Connector |
| (2) Alternator |                  |

9Y1210972ELS0059US0



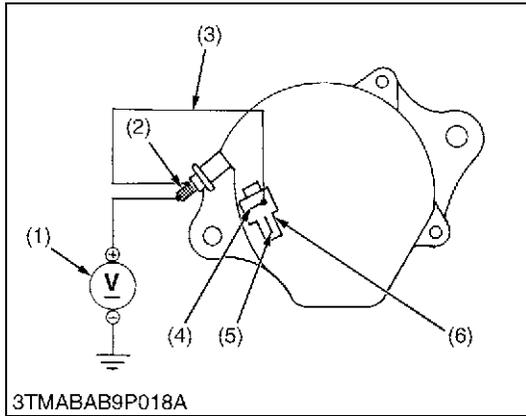
### Connector Voltage

1. Turn the main switch OFF. Measure the voltage between the B terminal (1) and the chassis.
2. Turn the main switch ON. Measure the voltage between the IG terminal (3) and the chassis.

|                              |                      |                         |
|------------------------------|----------------------|-------------------------|
| Voltage (Main switch at OFF) | B terminal – Chassis | Approx. battery voltage |
| Voltage (Main switch at ON)  | B terminal – Chassis | Approx. battery voltage |

- |                |                 |
|----------------|-----------------|
| (1) B Terminal | (3) IG Terminal |
| (2) Alternator | (4) L Terminal  |

9Y1210972ELS0060US0



### No-Load Test

1. Connect the **2P** connector (6) to previous positions of the alternator after turning the main switch **OFF**.
2. Connect the jumper lead (3) between **IG** terminal (4) and **B** terminal (2).
3. Start the engine and then set at idling speed.
4. Disconnect the negative cable from the battery.
5. Measure the voltage between the **B** terminal (2) and the chassis.
6. If the measurement is less than the factory specifications, disassemble the alternator and check the IC regulator.

| Voltage | Factory specification | More than 14 V |
|---------|-----------------------|----------------|
|---------|-----------------------|----------------|

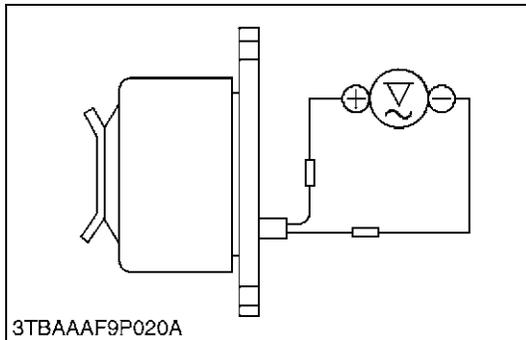
### (Reference)

- Once the engine has started, the alternator temperature rises quickly up to an ambient temperature of 70 to 90 °C (158 to 194 °F). As the temperature goes higher than 50 °C (122 °F), the alternator voltage slowly drops; at higher than 100 °C (212 °F), it drops by about 1 V.

- |                       |                         |
|-----------------------|-------------------------|
| (1) Voltmeter         | (4) <b>IG</b> Terminal  |
| (2) <b>B</b> Terminal | (5) <b>L</b> Terminal   |
| (3) Jumper Lead       | (6) <b>2P</b> Connector |

9Y1210972ELS0061US0

## (2) AC Dynamo (B2650)



### Dynamo No-load Voltage

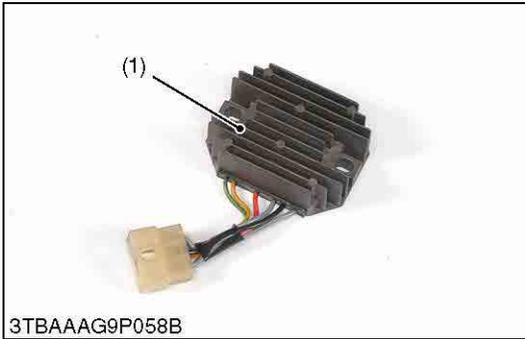
1. Disconnect lead wires from dynamo.
2. Start the engine, and check the generating voltage of the dynamo.

9Y1210972ELS0062US0

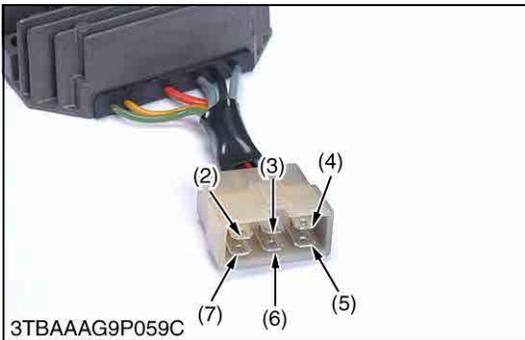
### (3) Regulator (B2650)



9Y1210972ELS022A



3TBAAAG9P058B



3TBAAAG9P059C

#### Continuity Across Regulator's Terminals

1. Remove the regulator (1).
2. Check with a tester whether the regulator is in optimum condition or not.

■ **Check Table**

■ **NOTE**

- Type to use a high-resistance tester as far as possible.
- The judgement should be as below table. "ON" if the indicator moves, other side "OFF".

| Tester (+) terminal |             | Cord colors |             |     |        |       |       |
|---------------------|-------------|-------------|-------------|-----|--------|-------|-------|
|                     |             | Light Green | Light Green | Red | Yellow | Green | Black |
| Cord colors         | Light Green | OFF         | ON          | OFF | ON     | OFF   | OFF   |
|                     | Light Green | OFF         | ON          | OFF | OFF    | OFF   | OFF   |
|                     | Red         | OFF         | OFF         | ON  | OFF    | OFF   | OFF   |
|                     | Yellow      | ON          | ON          | ON  | OFF    | OFF   | ON    |
|                     | Green       | OFF         | OFF         | OFF | OFF    | OFF   | OFF   |
|                     | Black       | OFF         | OFF         | OFF | OFF    | OFF   | OFF   |

9Y1210972ELS019US

- |                 |            |
|-----------------|------------|
| (1) Regulator   | (5) Red    |
| (2) Light Green | (6) Yellow |
| (3) Black       | (7) Green  |
| (4) Light Green |            |

9Y1210972ELS0063US0

# [7] LIGHTING SYSTEM

## (1) Combination Switch

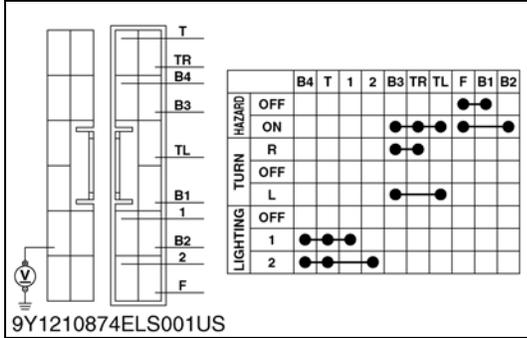


### Combination Switch

1. Remove the steering wheel and panel lower cover.
2. Disconnect the combination switch connector.
3. Remove the combination switch (1) and perform the following checks **1) to 8)**.

(1) Combination Switch

9Y1210972ELS0064US0



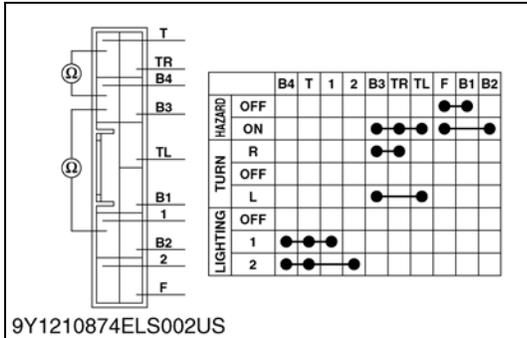
9Y1210874ELS001US

### 1) Connector Voltage

1. Measure the voltage with a voltmeter across the connector **B2** terminal and chassis when the main switch is **ON** position.
2. If the voltage differs from the battery voltage, the wiring harness and main switch is faulty.

|         |                                   |                              |                 |
|---------|-----------------------------------|------------------------------|-----------------|
| Voltage | Main switch at <b>ON</b> position | <b>B2</b> terminal – Chassis | Battery voltage |
|---------|-----------------------------------|------------------------------|-----------------|

9Y1210972ELS0065US0



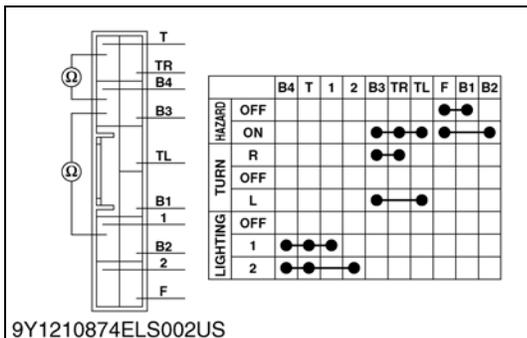
9Y1210874ELS002US

### 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 **B4** terminal to the **T** terminal, the **B4** terminal to the terminal **1** and **2**.
3. If infinity is not indicated, the head light switch is faulty.

|  |   |          |
|--|---|----------|
| Resistance (Switch at <b>OFF</b> position) | <b>B4</b> terminal – <b>T</b> terminal              | Infinity |
|  | <b>B4</b> terminal – <b>1</b> and <b>2</b> terminal |          |

9Y1210972ELS0066US0



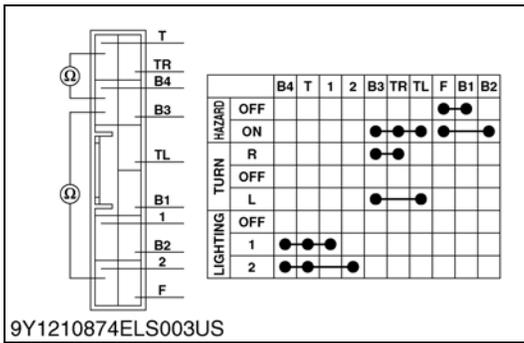
9Y1210874ELS002US

### 3) Head Light Switch Continuity When Setting Switch at Low Beam Position

1. Set the light switch to the **low beam** position.
2. Measure the resistance with an ohmmeter across the **B4** terminal to the **T** terminal and the **B4** terminal to the terminal **1**.
3. If 0 Ω is not indicated, the head light switch is faulty.

|   |  |     |
|---|--|-----|
| Resistance (Switch at <b>low beam</b> position) | <b>B4</b> terminal – <b>T</b> terminal | 0 Ω |
|   | <b>B4</b> terminal – <b>1</b> terminal |     |

9Y1210972ELS0067US0

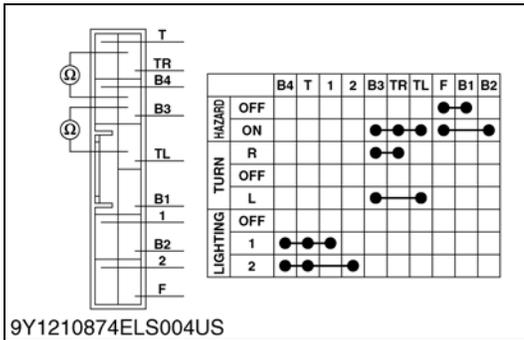


#### 4) Head Light Switch Continuity When Setting Switch at High Beam Position

1. Set the light switch to the **high beam** position.
2. Measure the resistance with an ohmmeter across the **B4** terminal to the **T** terminal and the **B4** terminal to the terminal **2**.
3. If 0 Ω is not indicated, the head light switch is faulty.

|   |                          |     |
|---|--------------------------|-----|
| Resistance<br>(Switch at <b>high beam</b> position) | B4 terminal – T terminal | 0 Ω |
|   | B4 terminal – 2 terminal |     |

9Y1210972ELS0068US0

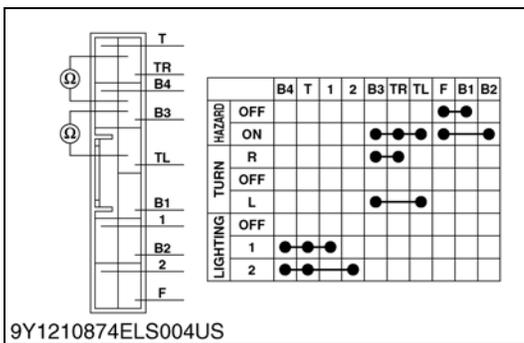


#### 5) Turn Signal Light Switch Continuity When Setting Switch Knob OFF Position

1. Set the turn signal light switch to the **OFF** position.
2. Measure the resistance with an ohmmeter across the **B3** terminal and **TL** terminal, the **B3** terminal and **TR** terminal.
3. If infinity is not indicated, the combination switch is faulty.

|  |                           |          |
|--|---------------------------|----------|
| Resistance<br>(Switch knob at <b>OFF</b> position) | B3 terminal – TL terminal | Infinity |
|  | B3 terminal – TR terminal |          |

9Y1210972ELS0069US0

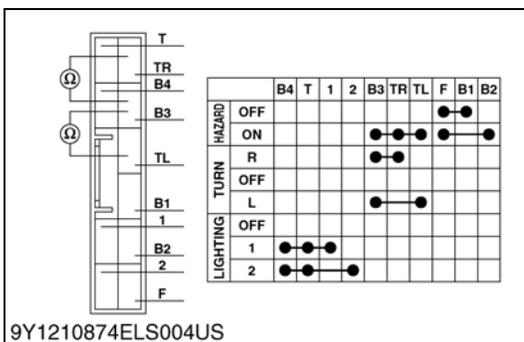


#### 6) Turn Signal Light Switch Continuity When Setting Switch Knob at L Position

1. Set the turn signal light switch to the **L** position.
2. Measure the resistance with an ohmmeter across the **B3** terminal and **TL** terminal.
3. If 0 Ω is not indicated, the combination switch is faulty.

|  |                           |          |
|--|---------------------------|----------|
| Resistance<br>(Switch knob at left position) | B3 terminal – TL terminal | 0 Ω      |
|  | B3 terminal – TR terminal | Infinity |

9Y1210972ELS0070US0

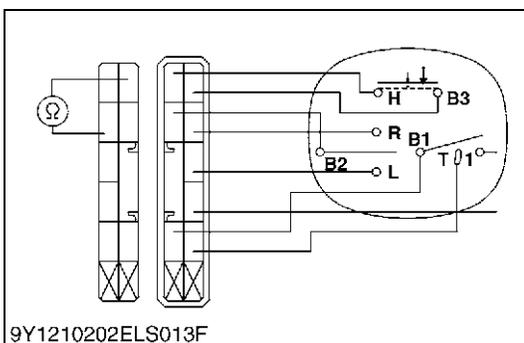


#### 7) Turn Signal Light Switch Continuity When Setting Switch Knob at R Position

1. Set the turn signal light switch to the **R** position.
2. Measure the resistance with an ohmmeter across the **B3** terminal and **TR** terminal.
3. If 0 Ω is not indicated, the combination switch is faulty.

|   |                           |          |
|---|---------------------------|----------|
| Resistance<br>(Switch knob at right position) | B3 terminal – TR terminal | 0 Ω      |
|   | B3 terminal – TL terminal | Infinity |

9Y1210972ELS0071US0



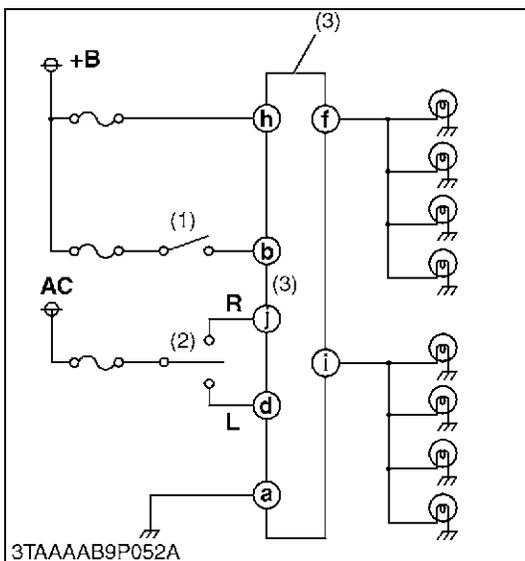
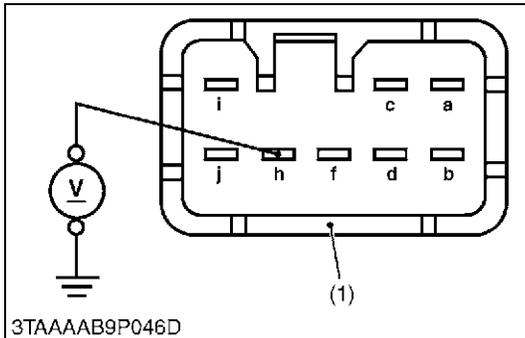
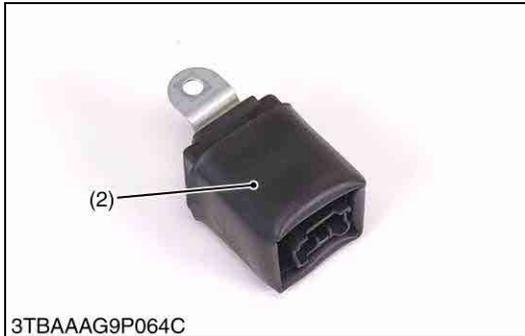
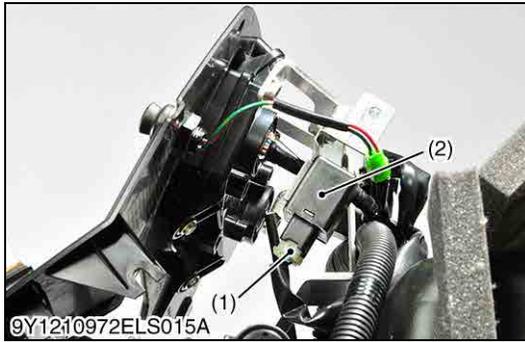
#### 8) Horn Button at "ON" Position

1. Set the horn button to the **ON** position.
2. Measure the resistance with an ohmmeter across the **B3** terminal and the **H** terminal.
3. If infinity is not indicated, the combination switch is faulty.

|   |                          |     |
|---|--------------------------|-----|
| Resistance<br>(Horn button at <b>ON</b> position) | B3 terminal – H terminal | 0 Ω |
|---|--------------------------|-----|

9Y1210972ELS0072US0

## (2) Flasher Unit



### Flasher Unit Connector Voltage

1. Remove the instrument panel.
2. Disconnect the connector (1) from the flasher unit (2).
3. Measure the voltage with a voltmeter across the h terminal and chassis.
4. If the voltage differ from the battery voltage, the wiring harness is faulty.

| Voltage | h terminal – Chassis | Approx. battery voltage |
|---------|----------------------|-------------------------|
|---------|----------------------|-------------------------|

- (1) Connector  
(2) Flasher Unit

- a: **Frame Earth**  
 b: **Hazard Input**  
 c: **Vacant**  
 d: **Turn Signal (Left) Input**  
 f: **Turn Signal (Right) Output**  
 h: **Battery**  
 i: **Turn Signal (Left) Output**  
 j: **Turn Signal (Right) Input**

9Y1210972ELS0073US0

### Flasher Unit Actuation Test

1. Set the hazard switch to the **ON** position, and make sure the hazard light gives 60 to 85 flashes for a minute.
2. With the main switch and the hazard switch respectively at the **ON** positions, move the turn signal 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 switch to the right and make sure the corresponding actions take place.
3. Now set the main switch to the **ON** position and move the turn signal switch. Make sure the same action is as above.
4. If both the hazard switch and the turn signal switch function but the above actions do not take place, replace the flasher unit with new one.

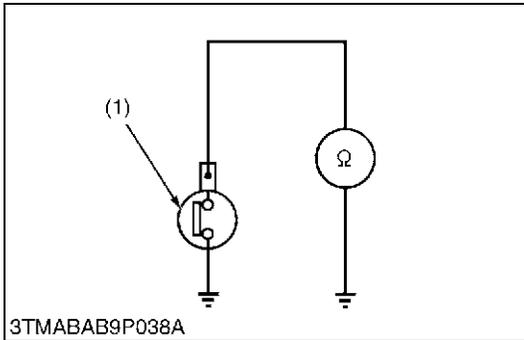
- (1) Hazard Switch  
(2) Turn Signal Switch

(3) Flasher Unit

9Y1210972ELS0074US0

## [8] WARNING LAMP, INDICATOR LAMP AND GAUGE

### (1) Engine Oil Pressure Switch



#### Engine Oil Pressure Switch Continuity

1. Measure the resistance with an ohmmeter across the switch terminal and the chassis.
2. If 0 Ω is not indicated in the normal state, the switch is faulty.
3. If infinity is not indicated at pressure over 49 kPa (0.50 kgf/cm<sup>2</sup>, 7.1 psi), the switch is faulty.

|  |  |          |
|--|--|----------|
| Resistance (Switch terminal – Chassis) | In normal state  | 0 Ω      |
|  | At pressure over approx. 49 kPa (0.50 kgf/cm <sup>2</sup> , 7.1 psi) | Infinity |

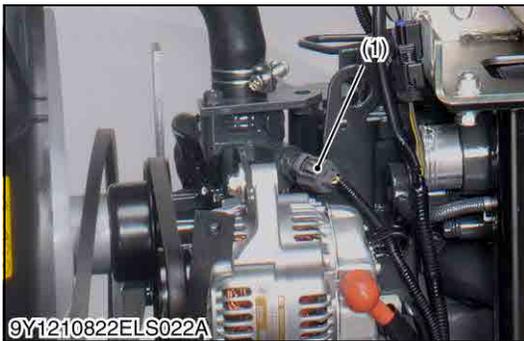
(1) Engine Oil Pressure Switch

9Y1210972ELS0075US0

### (2) Coolant Temperature Sensor

#### ■ NOTE

- **Firstly check the connector voltage, secondly check the other wires continuity, then finally check the sensor resistance.**



#### Connector Voltage

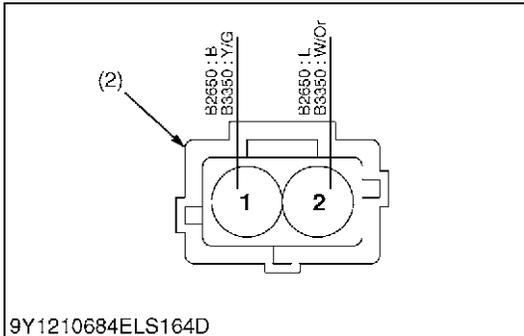
1. Disconnect the connector and turn the main key switch "ON" position.
2. Measure the voltage with a voltmeter across the terminals shown in the table below.
3. If the reference value is not indicated as shown in the table below, check the relating electric circuit.

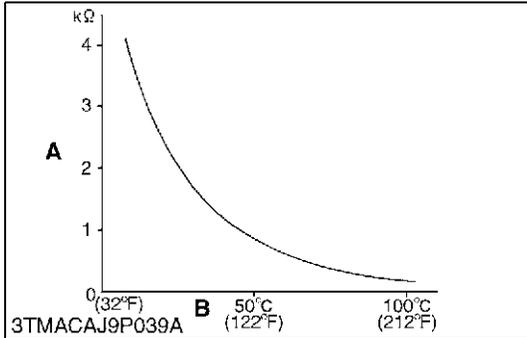
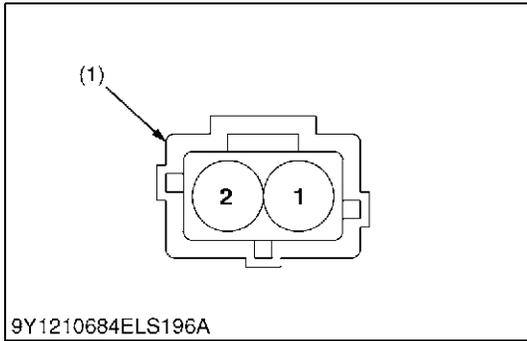
|         |                     |                      |             |
|---------|---------------------|----------------------|-------------|
| Voltage | Main switch at "ON" | Terminal 2 – chassis | Approx. 5 V |
|---------|---------------------|----------------------|-------------|

(1) Coolant Temperature Sensor

(2) Connector (Harness Side)

9Y1210972ELS0077US0





**Sensor Resistance**

1. Measure the resistance with an ohmmeter across the terminals shown in the table below.
2. If the reference value is not indicated, the intake air temperature sensor is faulty.

|            |                   |                |                  |
|------------|-------------------|----------------|------------------|
| Resistance | at -20 °C (-4 °F) | Terminal 1 – 2 | Approx. 15.0 kΩ  |
|            | at 20 °C (68 °F)  |                | Approx. 2.45 kΩ  |
|            | at 80 °C (176 °F) |                | Approx. 0.318 kΩ |

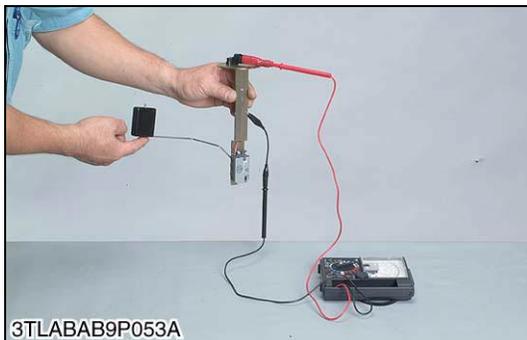
|                   |                            |  |
|-------------------|----------------------------|--|
| Tightening torque | Coolant temperature sensor | Less than<br>19.6 N·m<br>2.00 kgf·m<br>14.5 lbf·ft |
|-------------------|----------------------------|--|

(1) Connector (Sensor Side)

**A: Resistance**  
**B: Temperature**

9Y1210972ELS0078US0

**(3) Fuel Sensor**



**Fuel Lever Sensor**

**1) Sensor Continuity**

1. Remove the fuel lever sensor from the fuel tank.
2. Measure the resistance across the sensor terminal and its body.
3. If the reference value 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 |

9Y1210972ELS0079US0

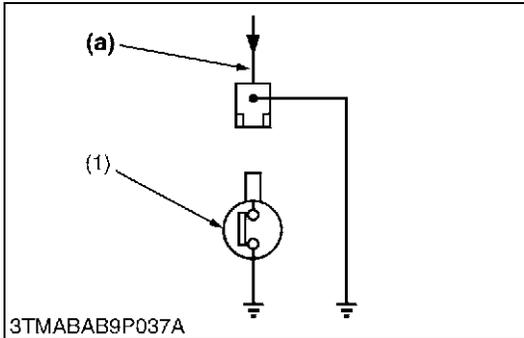
**(4) Easy Checker™****Engine Oil Pressure Switch, Panel Board and Wiring Harness**

1. Disconnect the lead 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 panel board circuit or the wiring harness is faulty.

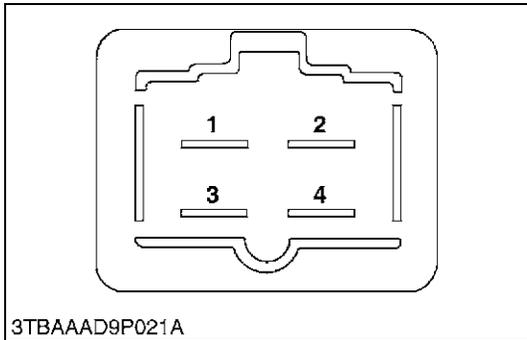
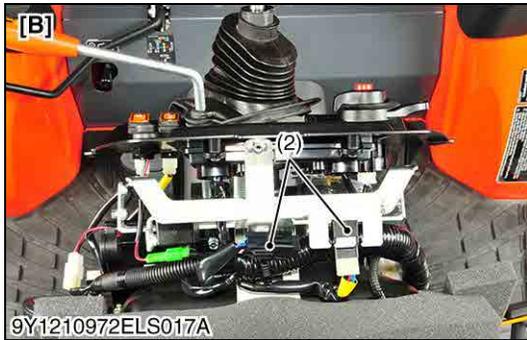
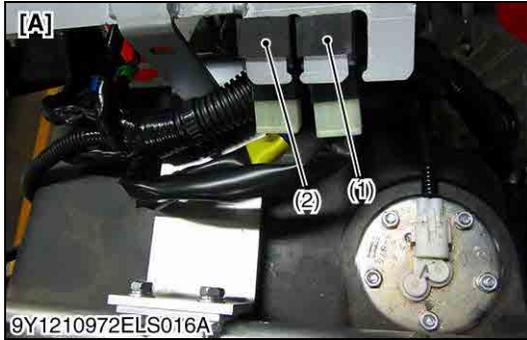
(1) Engine Oil Pressure Switch

(a) From Oil Pressure Lamp

9Y1210972ELSO080US0



# [9] RELAY



## Engine Stop Solenoid Relay and ACC Relay

1. Open the bonnet and remove the engine stop solenoid relay (1). (B2650 Only)
2. Remove the panel lower cover and remove the ACC relay (2).
3. Apply battery voltage across **2** terminal and **4** terminal, and check for continuity across **1** terminal and **3** terminal.
4. If 0 Ω is not indicated, renew the relay (1), (2).

|            |                         |   |     |
|------------|-------------------------|---|-----|
| Resistance | 1 terminal – 3 terminal | Battery voltage is applied across 2 terminal and 4 terminal | 0 Ω |
|------------|-------------------------|---|-----|

- (1) Engine Stop Solenoid Relay
- (2) ACC Relay

- [A] B2650
- [B] B3350 / B3350SU

9Y1210972ELS0081US0



**Glow Relay**

1. Open the bonnet and remove the glow relay (1).
2. Check for continuity across **1** terminal and **4** terminal, and across **2** terminal and **3** terminal.

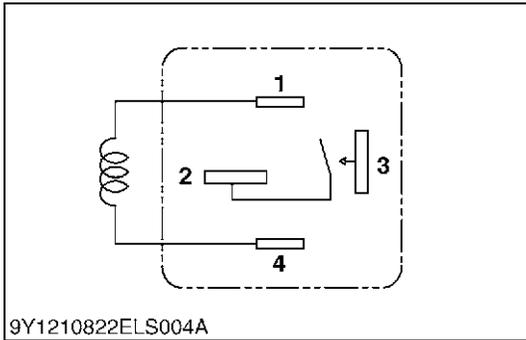
|            |                         |             |
|------------|-------------------------|-------------|
| Resistance | 1 terminal – 4 terminal | 93 to 113 Ω |
|            | 2 terminal – 3 terminal | Not conduct |

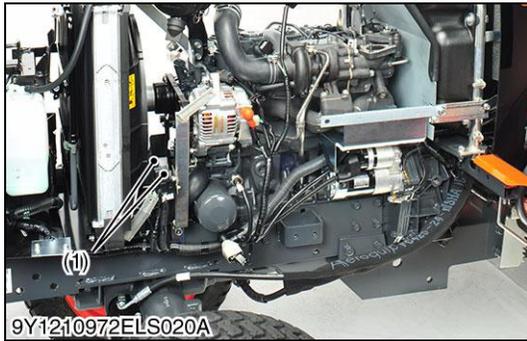
(1) Glow Relay

[A] B2650

[B] B3350 / B3350SU

9Y1210972ELS0082US0





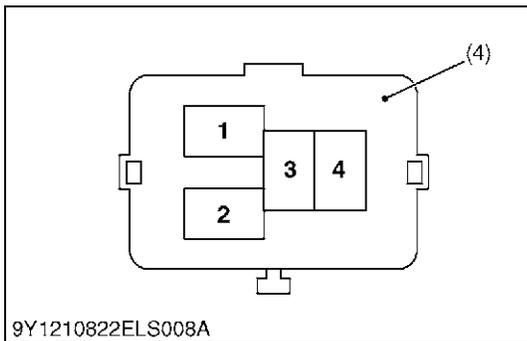
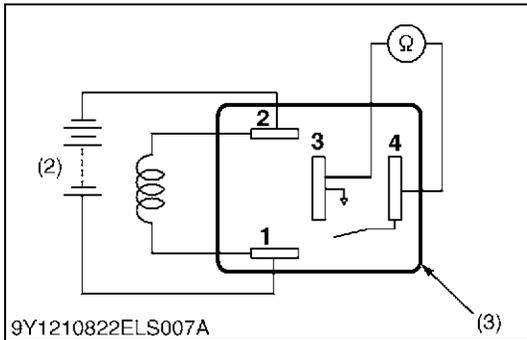
**Other Relays**

1. Remove the relays (1).
2. Apply battery voltage across **1** terminal and **2** terminal, and check for continuity across the **3** terminal and **4** terminal.
3. If 0 Ω is not indicated, renew the relays (1).

|            |                                       |   |     |
|------------|---------------------------------------|---|-----|
| Resistance | <b>3</b> terminal – <b>4</b> terminal | Battery voltage is applied across <b>1</b> terminal and <b>2</b> terminal | 0 Ω |
|------------|---------------------------------------|---|-----|

**Color of wiring**  
**[B3350]**

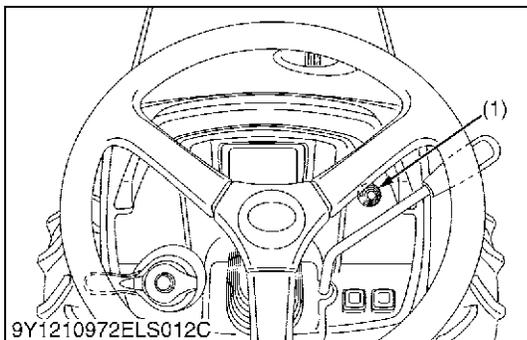
| Item                  | Terminal No. | Color of Wiring |
|-----------------------|--------------|-----------------|
| Reform and Glow Relay | 1            | P/L             |
|                       | 2            | B               |
|                       | 3            | G               |
|                       | 4            | R/G             |
| Starter Relay         | 1            | W/L             |
|                       | 2            | V/W             |
|                       | 3            | W               |
|                       | 4            | R/W             |



- (1) Relay
  - (2) Battery
  - (3) Connector (Relay)
  - (4) Connector (Wire Harness)
- 9Y1210972ELS0083US0

**[10] OTHER SWITCHES**

**(1) Panel Mode Switch**



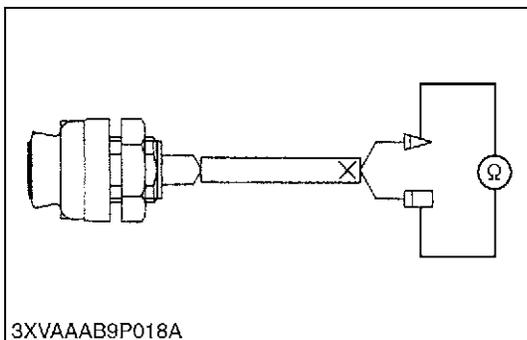
**Panel Mode Switch Continuity**

1. Disconnect the wiring leads from panel mode switch and remove it.
2. Measure the resistance with an ohmmeter across the panel mode switch terminals in each position.
3. If the resistance differs from the factory specifications, the panel mode switch is faulty.

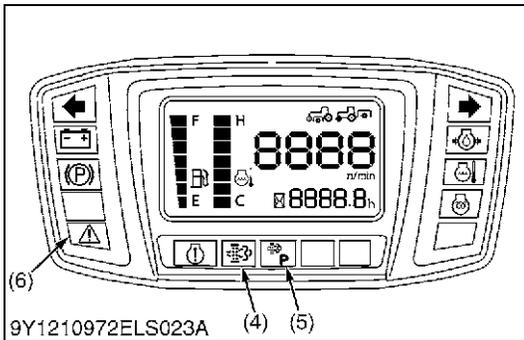
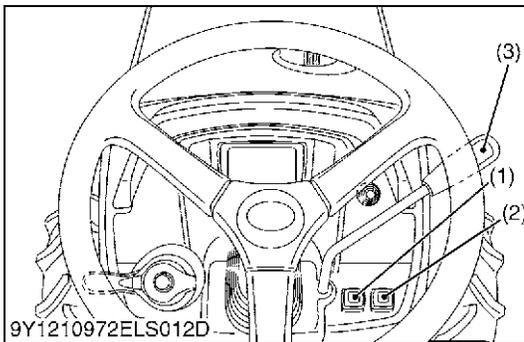
|            |                       |            |          |
|------------|-----------------------|------------|----------|
| Resistance | Factory specification | <b>OFF</b> | Infinity |
|            |                       | <b>ON</b>  | 0 Ω      |

- (1) Panel Mode Switch

9Y1210972ELS0084US0



## [11] ACCELERATOR SENSOR CALIBRATION (for B3350 / B3350SU)



### ■ NOTE

- When the engine ECU or throttle sensor is replaced, this calibration is required.

### (Tractor condition)

- Parking Brake: Engaged position (Parking brake switch **ON**)
  - HST Pedal: Neutral position
  - Range Gear Shift Lever: Neutral position
  - Accelerator Lever: idling position
1. While pressing both the parked regeneration switch (1) and DPF INHIBIT switch (2), turn the key switch to **ON** position.
  2. Release the both switches.
  3. Parked regeneration switch (1) and regeneration indicator flashes (4).
  4. Press and hold the parked regeneration switch longer than 1 second.

### ■ NOTE

- If the voltage is not within 2.4 V to 3.0 V while the parked regeneration switch is being pushed, accelerator sensor calibration will not be performed.
5. Buzzer sounds for 0.5 seconds, regeneration indicator (4) turns **ON**, parked regeneration indicator (5) flashes and parked regeneration switch (1) flashes.
  6. Set the accelerator lever (3) maximum position.
  7. Press and hold the DPF INHIBIT switch longer than 1 second.

### ■ NOTE

- If the voltage is not within 4.0 V to 4.6 V while the DPF INHIBIT switch is being pushed, accelerator sensor calibration will not be performed.
8. Buzzer sounds for 0.5 seconds, regeneration indicator (4) turns **ON**, parked regeneration indicator (5) turns **ON** and parked regeneration switch (1) turns **OFF**.

### ■ NOTE

- If the ECU reading fails, the buzzer sound intermittently for 5 seconds, regeneration indicator (4) flashes, parked regeneration indicator (5) flashes and master warning indicator (6) flashes. In this case, try the calibration again. If trying the calibration sometimes and still ECU reading fails, replace the engine ECU.
9. Turn the key switch to **OFF** position to exit.

### ■ NOTE

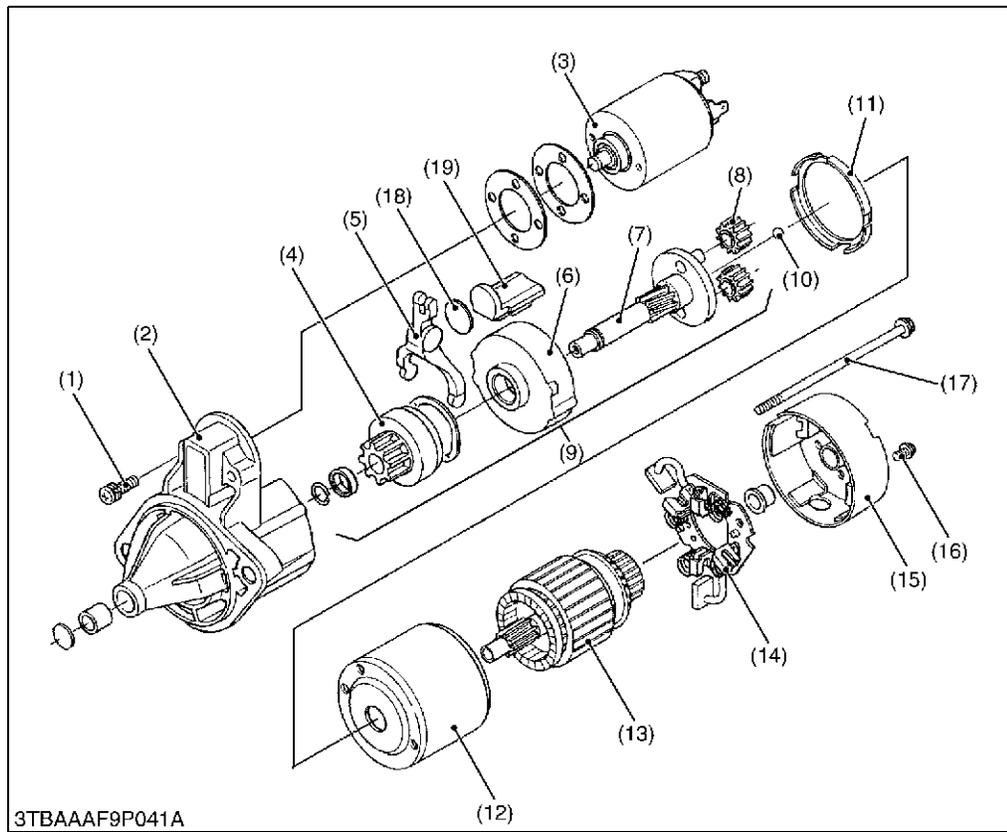
- If the parking brake is released while in accelerator sensor calibration mode, processing exits the accelerator sensor calibration mode and returns to normal key ON status.

- |                                |                                   |
|--------------------------------|-----------------------------------|
| (1) Parked Regeneration Switch | (4) Regeneration Indicator        |
| (2) DPF INHIBIT Switch         | (5) Parked Regeneration Indicator |
| (3) Accelerator Lever          | (6) Master Warning Indicator      |

9Y1210972ELS0089US0

## 5. DISASSEMBLING AND ASSEMBLING

### [1] STARTER



- (1) Screw
- (2) Front Bracket
- (3) Magnetic Switch
- (4) Overrunning Clutch
- (5) Drive Lever
- (6) Internal Gear
- (7) Shaft
- (8) Planetary Gear
- (9) Shaft Assembly
- (10) Ball
- (11) Gasket
- (12) Yoke
- (13) Armature
- (14) Brush Holder
- (15) Rear End Frame
- (16) Screw
- (17) Through Bolt
- (18) Plate
- (19) Gasket

3TBAAAF9P041A

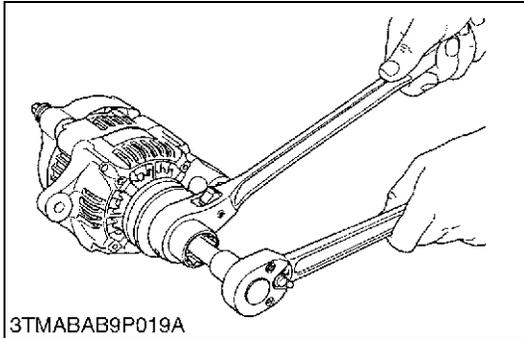
1. Disconnect the connecting lead from the magnetic switch (3).
2. Remove the screw (1) and remove the magnetic switch (3).
3. Remove the screw (16) and through bolt (17), and separate the rear end frame (15).
4. Remove the brush holder (14).
5. Draw out the armature (13) and yoke (12).
6. Remove the gasket (11), gasket (19) and plate (18).
7. Draw out the shaft assembly (9) with the drive lever (5).

#### ■ NOTE

- Do not damage the brush and commutator.
- Do not miss the ball (10).

9Y1210972ELS0085US0

## [2] ALTERNATOR



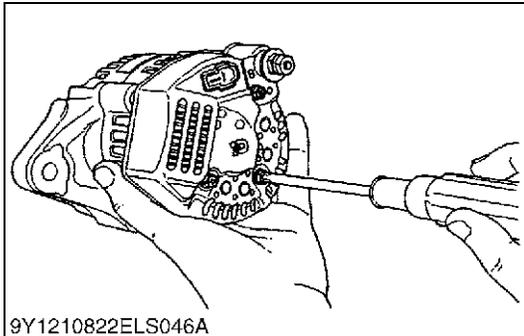
### Pulley

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

### **(When reassembling)**

|                   |            |   |
|-------------------|------------|---|
| Tightening torque | Pulley nut | 58.4 to 78.9 N·m<br>5.95 to 8.05 kgf·m<br>43.1 to 58.2 lbf·ft |
|-------------------|------------|---|

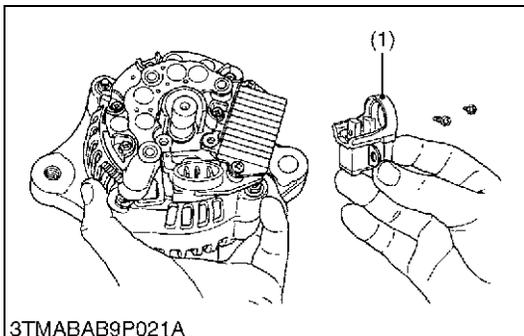
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### Rear End Cover

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

9Y1210972ELS0086US0

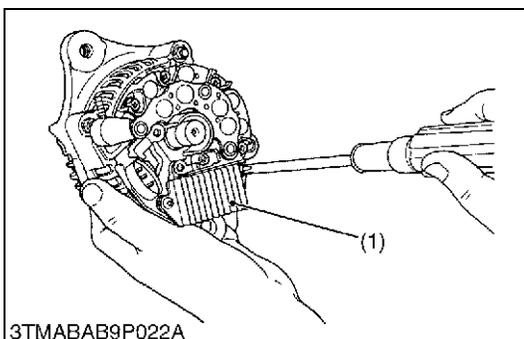


### Brush Holder

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

(1) Brush Holder

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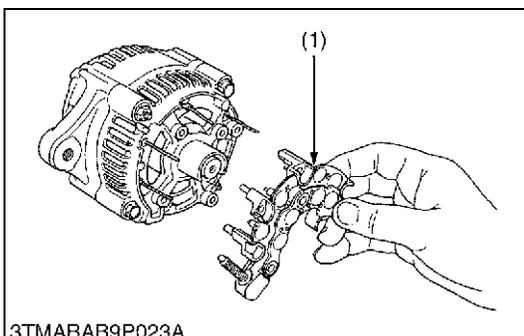


### IC Regulator

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

(1) IC Regulator

WSM000001ELS0026US0

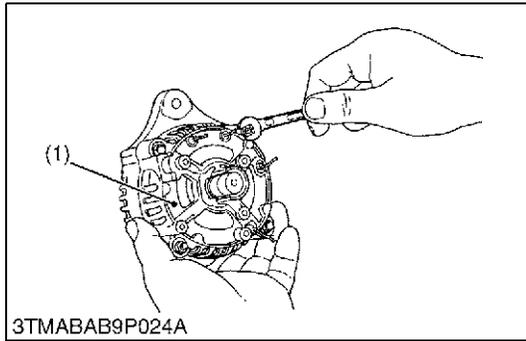


### Rectifier

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

(1) Rectifier

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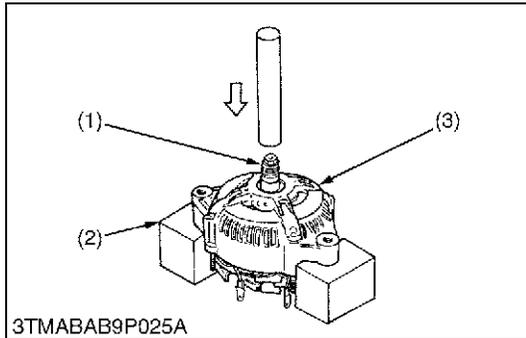


### Rear End Frame

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

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### Rotor

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

#### ■ IMPORTANT

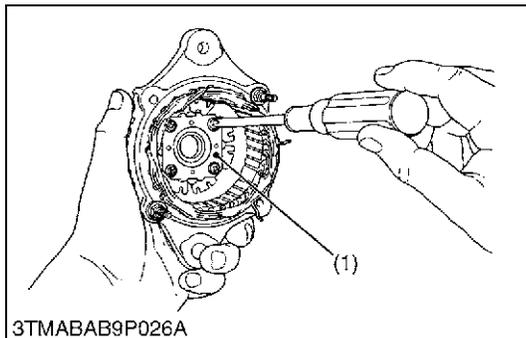
- Be very careful not to drop the rotor and damage the slip ring or fan, etc..

(1) Rotor

(3) Drive End Frame

(2) Block

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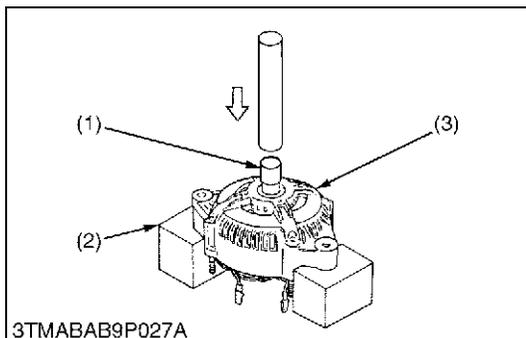


### Retainer Plate

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

(1) Retainer Plate

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### Bearing on Drive End Side

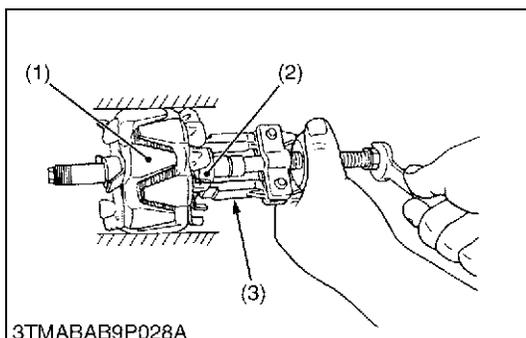
1. Press out the bearing from drive end frame (3) with a press and jig (1).

(1) Jig

(3) Drive End Frame

(2) Block

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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

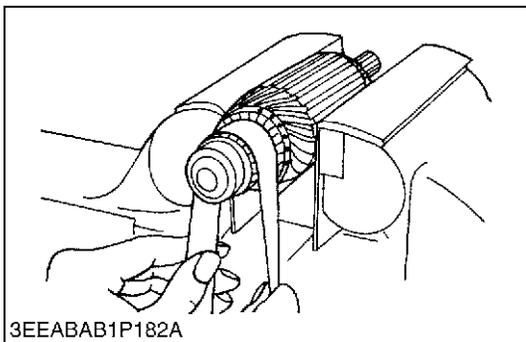
(3) Puller

(2) Bearing

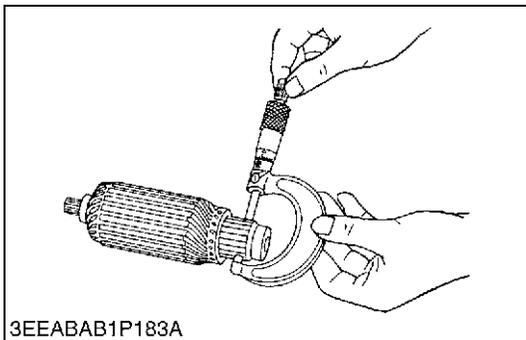
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# 6. SERVICING

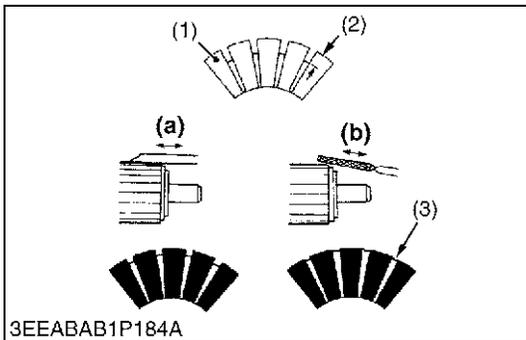
## [1] STARTER



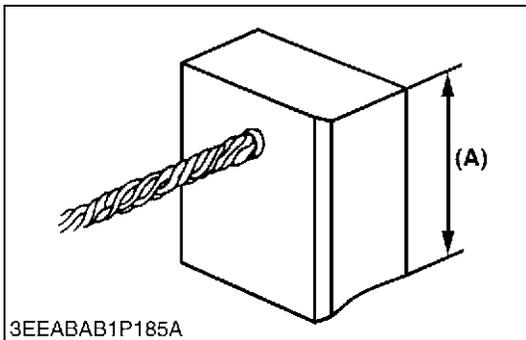
3EEABAB1P182A



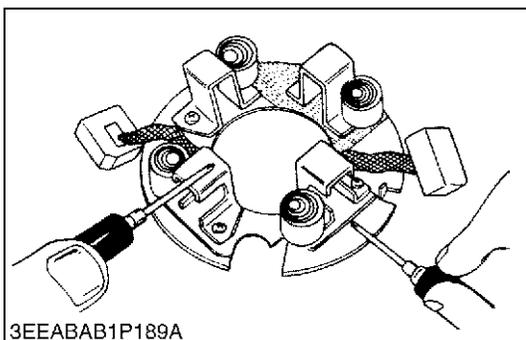
3EEABAB1P183A



3EEABAB1P184A



3EEABAB1P185A



3EEABAB1P189A

### Commutator and Mica

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

|                 |                       |                      |
|-----------------|-----------------------|----------------------|
| Commutator O.D. | Factory specification | 28.0 mm<br>1.102 in. |
|                 | Allowable limit       | 27.0 mm<br>1.063 in. |

|                      |                       |                                    |
|----------------------|-----------------------|------------------------------------|
| Difference of O.D.'s | Factory specification | Less than<br>0.02 mm<br>0.0008 in. |
|                      | Allowable limit       | 0.05 mm<br>0.0020 in.              |

|               |                       |                       |
|---------------|-----------------------|-----------------------|
| Mica undercut | Factory specification | 0.60 mm<br>0.0236 in. |
|               | Allowable limit       | 0.20 mm<br>0.0079 in. |

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

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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<br>0.551 in. |
|                  | Allowable limit       | 9.0 mm<br>0.354 in.  |

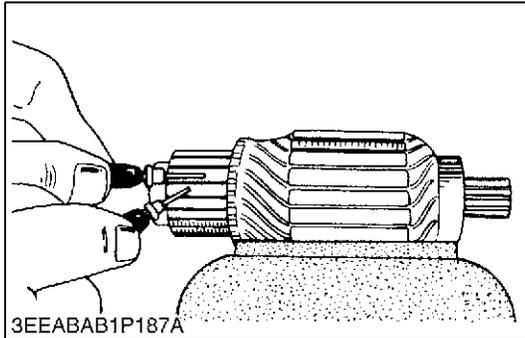
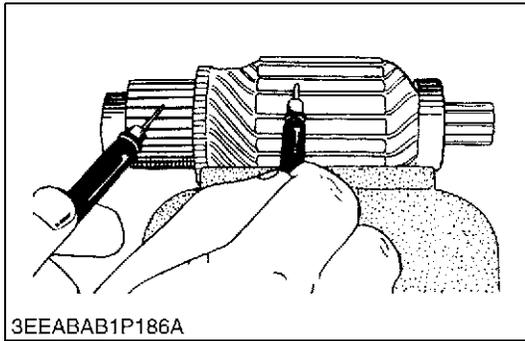
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### Brush Holder

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

|            |                                  |          |
|------------|----------------------------------|----------|
| Resistance | Brush holder –<br>Holder support | Infinity |
|------------|----------------------------------|----------|

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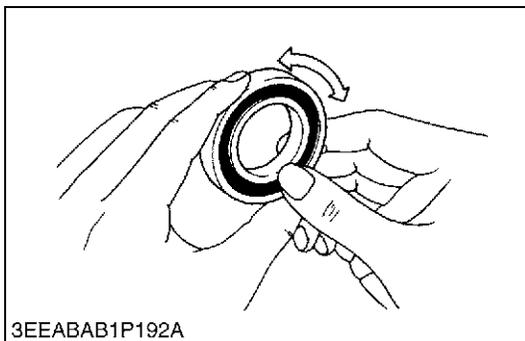


**Armature Coil**

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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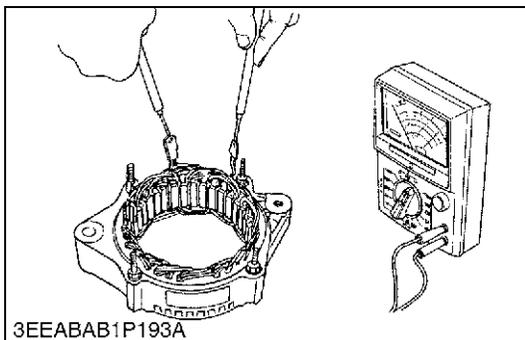
**[2] ALTERNATOR**



**Bearing**

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

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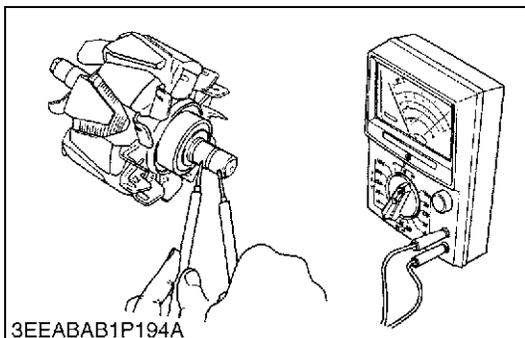


**Stator**

1. Measure the resistance across each lead of the stator coil with an ohmmeter.
2. If the measurement is not within factory specification, replace it.
3. Check the continuity across each stator coil lead and core with an ohmmeter.
4. If the measurement is not within the factory specifications, replace it.

|            |                       |                 |
|------------|-----------------------|-----------------|
| Resistance | Factory specification | Less than 1.0 Ω |
|------------|-----------------------|-----------------|

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**Rotor**

1. Measure the resistance across the slip rings with an ohmmeter.
2. If the resistance is not the factory specification, replace it.
3. Check the continuity across the slip ring and core with an ohmmeter.
4. If the measurement is not within the factory specifications, replace it.

|            |                       |       |
|------------|-----------------------|-------|
| Resistance | Factory specification | 2.9 Ω |
|------------|-----------------------|-------|

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**EDITOR:**

KUBOTA FARM & INDUSTRIAL MACHINERY SERVICE, LTD.

64, ISHIZU-KITAMACHI, SAKAI-KU, SAKAI-CITY, OSAKA, 590-0823, JAPAN

PHONE : (81)72-241-1129

FAX : (81)72-245-2484

E-mail : [ks\\_g.ksos-pub@kubota.com](mailto:ks_g.ksos-pub@kubota.com)

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