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This file was not scanned to deprive Mazda of any money - it was scanned due to the rareness of the original manuals and the overwhelming need of the RX-7 owner to have this information so that they can accurately troubleshoot problems. Perhaps if Mazda’s dealerships could support the Rotary Engine it wouldn’t be so necessary for the owners to do so.

Many thanks to Lenny Terris for scanning this.
ENGINE ELECTRICAL SYSTEM

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# OUTLINE

## SPECIFICATIONS

<table>
<thead>
<tr>
<th>Item</th>
<th>Transmission</th>
<th>MT</th>
<th>AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery</td>
<td></td>
<td>12, negative ground</td>
<td></td>
</tr>
<tr>
<td>Voltage</td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type and Capacity (5-hour rate)</td>
<td>65D23L (43Ah)</td>
<td>75D22L (52Ah)</td>
<td></td>
</tr>
<tr>
<td>Dark current*¹</td>
<td>mA</td>
<td>20 or less</td>
<td></td>
</tr>
<tr>
<td>Ignition system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spark timing (TEN terminal grounded)</td>
<td>Leading : ATDC 5° (BTDC -5°)</td>
<td>Trailing : ATDC 20° (BTDC -20°) at idle (AT : P range)</td>
<td></td>
</tr>
<tr>
<td>Spark advance</td>
<td></td>
<td>Electronic spark advance (ESA)</td>
<td></td>
</tr>
<tr>
<td>Spark plug</td>
<td>Type</td>
<td>Leading : NGK : BUR7EQP², BUR8EQP, BUR7EQ, BUR6EQ</td>
<td>Trailing : NGK : BUR9EQ², BUR8EQP, BUR8EQ</td>
</tr>
<tr>
<td></td>
<td>Plug gap</td>
<td>mm (in)</td>
<td>1.1–1.7 (0.044–0.066)</td>
</tr>
<tr>
<td>Alternator</td>
<td>Output</td>
<td>V-A</td>
<td>12–100</td>
</tr>
<tr>
<td>Regulated voltage</td>
<td>V</td>
<td>14.1–14.7 (with temperature gradient characteristics)</td>
<td></td>
</tr>
<tr>
<td>Brush length</td>
<td>Standard</td>
<td>mm (in)</td>
<td>21.5 (0.846)</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>mm (in)</td>
<td>8.0 (0.32)</td>
</tr>
<tr>
<td>Stater</td>
<td>Type</td>
<td>Direct</td>
<td>Reduction</td>
</tr>
<tr>
<td>Output (no load)</td>
<td>Voltage</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Current</td>
<td>A</td>
<td>Max 90</td>
</tr>
<tr>
<td></td>
<td>Speed</td>
<td>rpm</td>
<td>Min 3000</td>
</tr>
<tr>
<td></td>
<td>Minimum</td>
<td>mm (in)</td>
<td>12 (0.47)</td>
</tr>
</tbody>
</table>

*¹ Dark current is the constant flow of current while the ignition is OFF (i.e., audio unit, clock, etc)

*² Standard plug
## TROUBLESHOOTING GUIDE

### DIAGNOSTIC INDEX

<table>
<thead>
<tr>
<th>No.</th>
<th>Troubleshooting Items</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Will not crank-starter motor does not operate</td>
<td>Below</td>
</tr>
<tr>
<td>2</td>
<td>Will not crank-starter motor spins</td>
<td>Below</td>
</tr>
<tr>
<td>3</td>
<td>Cranks slowly</td>
<td>G-5</td>
</tr>
<tr>
<td>4</td>
<td>Alternator warning light illuminates while engine running</td>
<td>G-5</td>
</tr>
<tr>
<td>5</td>
<td>Discharged battery</td>
<td>G-5</td>
</tr>
<tr>
<td>6</td>
<td>Misfire</td>
<td>G-5</td>
</tr>
</tbody>
</table>

### SYMPTOM TROUBLESHOOTING

**B+: Battery positive voltage**

#### Will not crank-starter motor does not operate

<table>
<thead>
<tr>
<th>STEP</th>
<th>INSPECTION</th>
<th>ACTION</th>
</tr>
</thead>
</table>
| 1    | Does engine crank with fully charged battery? | Yes: Check charging system [page G-8]  
|      |            | No: Go to next step |
| 2    | Is B+ present at terminal B? TERMINAL B      | Yes: Go to next step  
|      | AT MT     | No: Check wiring harness |
| 3    | Is B+ present at terminal S with ignition switch in START position? TERMINAL S | Yes: Check magnetic switch  
|      | AT MT     | Check armature [page G-30]  
|      |            | No: Check park/neutral switch  
|      |            | Check ignition switch  
|      |            | Check wiring harness Section K  
|      |            | 1994 RX-7 Body Electrical Troubleshooting Manual Section Z4 |

#### Will not crank-starter motor spins

<table>
<thead>
<tr>
<th>STEP</th>
<th>INSPECTION</th>
<th>ACTION</th>
</tr>
</thead>
</table>
| 1    | Is drive pinion pushed out when energized? (Is click heard?) | Yes: Remove starter and check ring gear teeth and starter drive pinion teeth  
|      |            | No: Check magnetic switch [page G-30] |
## TROUBLESHOOTING GUIDE

### Cranks Slowly

<table>
<thead>
<tr>
<th>STEP</th>
<th>INSPECTION</th>
<th>ACTION</th>
</tr>
</thead>
</table>
|     | 1 | Does engine crank normally with fully charged battery? | Yes: Check charging system [<sup>G</sup> page G-8]  
No: Go to next step |
|     | 2 | Are starter cable connections loose or corroded? | Yes: Repair connection  
No: Check starter for binding (brush, armature, etc.) [<sup>G</sup> page G-30] |

### Alternator Warning Light Illuminates While Engine Running

<table>
<thead>
<tr>
<th>STEP</th>
<th>INSPECTION</th>
<th>ACTION</th>
</tr>
</thead>
</table>
|     | 1 | Is B+ correct at idle?  
**Specification:** 14.1–14.7V | Yes: Check wiring harness (Alternator terminal L–Alternator warning light)  
No: Check charging system [<sup>G</sup> page G-8] |

### Discharged Battery

<table>
<thead>
<tr>
<th>STEP</th>
<th>INSPECTION</th>
<th>ACTION</th>
</tr>
</thead>
</table>
|     | 1 | Is charging system OK? [<sup>G</sup> page G-8] | Yes: Turn ignition switch OFF and measure dark current as shown  
**Dark current:** 20 mA max  
No: Repair or replace parts as necessary |
<table>
<thead>
<tr>
<th>STEP</th>
<th>INSPECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Are &quot;02&quot; or &quot;03&quot; displayed on SST while ignition switch ON?</td>
</tr>
<tr>
<td>2</td>
<td>Are connector and wiring harness connections OK? (High-tension leads, igniter, ignition coils, PCME)</td>
</tr>
<tr>
<td>3</td>
<td>Remove each High-tension lead; is there strong blue spark while engine is cranking?</td>
</tr>
<tr>
<td>4</td>
<td>Is resistance of High-tension leads OK? Specification: 16 kΩ per 1m (3.28 ft) (at 20°C [68°F])</td>
</tr>
<tr>
<td>5</td>
<td>Is there B+ at ignition coils terminal A and igniter terminal D with ignition switch in ON position? (Disconnect each connection)</td>
</tr>
<tr>
<td>6</td>
<td>Are ignition coils OK?</td>
</tr>
<tr>
<td>7</td>
<td>Is wiring harness from ignition coils to igniter OK?</td>
</tr>
<tr>
<td>8</td>
<td>Is igniter OK?</td>
</tr>
<tr>
<td>9</td>
<td>Is wiring harness from igniter to PCME terminals OK?</td>
</tr>
<tr>
<td>10</td>
<td>Is input sensor OK? ● Crankshaft position sensor ● Manifold absolute pressure sensor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Yes</td>
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<tr>
<td>Yes</td>
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<td>Yes</td>
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<td>Yes</td>
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<td>Yes</td>
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<tr>
<td>Yes</td>
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<tr>
<td>No</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>No</td>
</tr>
</tbody>
</table>
The alternator has a self-diagnosis function to warn of the following problems in the charging system. If a problem arises, the alternator warning light illuminates.

1. Terminal S circuit open
2. No voltage output
3. Field coil circuit open
4. Terminal B circuit open
5. Voltage output too high (above 16.2V)
CHARGING SYSTEM

TROUBLESHOOTING

<table>
<thead>
<tr>
<th>STEP</th>
<th>INSPECTION</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Check battery positive voltage, is it correct? Specification: Above 12.4V</td>
<td>Yes Go to next step</td>
</tr>
<tr>
<td></td>
<td>No Check battery</td>
<td>&amp; page G-9</td>
</tr>
<tr>
<td>2</td>
<td>Does alternator warning light illuminate with ignition switch ON?</td>
<td>Yes Go to next step</td>
</tr>
<tr>
<td></td>
<td>No Check warning light bulb and wiring harness (Alternator warning light – Terminal L)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Does alternator warning light go out after engine started?</td>
<td>Yes Go to step 5</td>
</tr>
<tr>
<td></td>
<td>No Go to next step</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Is voltage at alternator terminals correct? Specification:</td>
<td>Yes Check wiring harness (Battery–Terminal L)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Terminal</td>
<td>Ign. ON (V)</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>B+</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>Approx. 1</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>B+</td>
</tr>
<tr>
<td></td>
<td>No • Check and repair wiring harness as necessary • Replace or repair alternator</td>
<td>&amp; page G-12</td>
</tr>
<tr>
<td>5</td>
<td>1. Connect ammeter (100A min) between terminal B and harness 2. Start engine 3. Turn all electrical loads ON and depress brake pedal 4. Is output current 100A or more at 2,500–3,000 rpm? Caution • Do not ground terminal B</td>
<td>Yes Charging system normal</td>
</tr>
<tr>
<td></td>
<td>No Go to next step</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Is drive belt tension OK?</td>
<td>Yes Replace or repair alternator &amp; page G-12</td>
</tr>
<tr>
<td></td>
<td>No • Adjust drive belt tension • Replace drive belt</td>
<td>&amp; page G-15</td>
</tr>
</tbody>
</table>
BATTERY
Removal / Installation
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.

1. Battery negative cable
2. Battery positive cable
3. Battery clamp
4. Battery box
5. Battery

Inspection
Electrolyte level
Warning
- Hydrogen gas is produced during normal battery operation. A battery-related explosion can cause serious injury. Keep all flames (including cigarettes), heat, and sparks away from the top and surrounding area of open battery cells.

Caution
- To prevent damage to electrical components or the battery, turn all accessories off and stop the engine before performing maintenance or recharging the battery.

- When disconnecting the battery, remove the negative cable first and install it last to prevent damage to electrical components or the battery.

Electrolyte level and specific gravity
1. Verify that the electrolyte level is between the "Upper" and "Lower" level marks.
2. Add distilled water if necessary, but do not over fill.
3. Check the specific gravity with a hydrometer.
Specific Gravity: 1.27–1.29 (at 20°C (68°F))
Battery Discharge Test

Measure voltage of battery (with digital voltmeter capable of reading 0.01V)

Below 12.4V
- Quick charge for 30 minutes and recheck voltage

Above 12.4V
- Apply test load (see test load chart) to battery using battery load tester
- Record battery positive voltage at end of 15 seconds; is voltage more than specification?

Replace battery

YES
- Measure voltage of battery

NO
- Replace battery

Below 12.4V
- Charge battery

Above 12.4V
- Battery OK

Test load

<table>
<thead>
<tr>
<th>Battery</th>
<th>Load (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>65D23L</td>
<td>165</td>
</tr>
<tr>
<td>75D26L</td>
<td>195</td>
</tr>
</tbody>
</table>

Battery positive voltage with load

<table>
<thead>
<tr>
<th>Approximate battery temp</th>
<th>Minimum voltage (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>21°C (70°F)</td>
<td>9.6</td>
</tr>
<tr>
<td>15°C (60°F)</td>
<td>9.5</td>
</tr>
<tr>
<td>10°C (50°F)</td>
<td>9.4</td>
</tr>
<tr>
<td>5°C (41°F)</td>
<td>9.3</td>
</tr>
<tr>
<td>-1°C (30°F)</td>
<td>9.1</td>
</tr>
<tr>
<td>-7°C (20°F)</td>
<td>8.9</td>
</tr>
<tr>
<td>-12°C (10°F)</td>
<td>8.7</td>
</tr>
<tr>
<td>-18°C (0°F)</td>
<td>8.5</td>
</tr>
</tbody>
</table>

Terminal and cable
1. Remove any corrosion on the clamps or battery posts, and coat them with grease.
2. Verify that the battery top is clean. If necessary, clean with baking soda and water.
3. Verify that cables are not frayed or corroded. Repair or replace if necessary.
4. Verify that cable clamps are tight.
5. Verify that the rubber protector completely covers the positive terminal and clamp.

Recharging

<table>
<thead>
<tr>
<th>Battery</th>
<th>Slow charge (A)</th>
<th>Quick charge (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>65D23L</td>
<td>Under 5</td>
<td>Max. 25</td>
</tr>
<tr>
<td>75D26L</td>
<td>Under 8</td>
<td>Max. 30</td>
</tr>
</tbody>
</table>

Slow charging
It is not necessary to remove the vent caps to perform a slow charge.
Quick charging
1. Remove the battery from the vehicle and remove the vent caps to perform a quick charge.

Caution
• Obtain the code number and deactivate the audio anti-theft system before disconnecting the battery. (Refer to the 1994 RX-7 Body Electrical Troubleshooting Manual section J1)

Caution
• To avoid damaging the battery, do not quick charge for over 30 minutes.

2. Place the battery in a pan of water to prevent it from overheating, but keep water away from the top of the battery.
ALTERNATOR

Caution
- Reversing the battery connections or using high-voltage testers will damage the rectifier.

Caution
- Do not start the engine while the connector is disconnected from terminals L and S. It can damage the alternator.

Note
- Positive voltage is always present at alternator terminal B.

Removal / Installation
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.
CHARGING SYSTEM

Disassembly / Assembly
1. Disassemble in the order shown in the figure, referring to Disassembly Note.
2. Inspect all parts and repair or replace as necessary.
3. Assembly in the reverse order of disassembly, referring to Assembly Note.

Disassembly / Assembly Note
Rear bracket, stator wire
Melt the solder quickly, the diodes (rectifier) and regulator will be damaged by excessive heat.

Brush holder, regulator assembly and rectifier
Melt the solder quickly, the diodes (rectifier) and regulator will be damaged by excessive heat.
CHARGING SYSTEM

Inspection

Rotor
Check the continuity as shown.

<table>
<thead>
<tr>
<th>Inspection point</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core-Slip ring</td>
<td>No</td>
</tr>
<tr>
<td>Slip ring-Slip ring</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Stator
Check the continuity as shown.

<table>
<thead>
<tr>
<th>Inspection point</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core-Stator coil leads</td>
<td>No</td>
</tr>
<tr>
<td>Between leads</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Rectifier
Check the continuity as shown.

<table>
<thead>
<tr>
<th>Negative</th>
<th>Positive</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>B</td>
<td>E, P_n, P_1, P_2, P_3</td>
<td>No</td>
</tr>
<tr>
<td>T</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>P_n, P_1, P_2, P_3</td>
<td>E</td>
<td>No</td>
</tr>
<tr>
<td>P_1, P_2, P_3</td>
<td>B</td>
<td>Yes</td>
</tr>
<tr>
<td>P_n</td>
<td>T</td>
<td>No</td>
</tr>
</tbody>
</table>

Brush
If a brush is worn almost to or beyond the limit, replace the brushes.

- Standard: 21.5 mm (0.846 in)
- Minimum: 8.0 mm (0.32 in)

Bearing
1. Check for abnormal noise, looseness, and sticking.
2. Replace the bearing(s) as necessary.
DRIVE BELT

Inspection
1. Check the drive belts and pulleys for wear, cracks and fraying. Replace as necessary.
2. Measure the drive belt tension by using a tension gauge, and measure the deflection by applying moderate pressure midway between the pulleys. Adjust the belt if necessary.

Specification

Tension

| Drive belt | New       | Used       | Limit
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternator</td>
<td>690-780</td>
<td>590-680</td>
<td>320</td>
</tr>
<tr>
<td></td>
<td>[70-80, 160-170]</td>
<td>[60-70, 140-150]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm [in]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drive belt</th>
<th>New</th>
<th>Used</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternator</td>
<td>6.0-7.0</td>
<td>7.0-7.5</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td>[0.24-0.27]</td>
<td>[0.28-0.29]</td>
<td></td>
</tr>
</tbody>
</table>

Adjustment
1. Loosen the alternator mounting bolts and turn the adjusting bolt.
2. Move the alternator to set the specified deflection.
3. Tighten all bolts and recheck the tension.

Tightening torque:
- Mounting bolt: 38–51N·m [3.8–5.3kgf·m, 28–38 ft·lbf]
- Adjusting bolt: 19–25N·m [1.9–2.6kgf·m, 14–18 ft·lbf]
IGNITION SYSTEM

PREPARATION SST

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>49 B019 9A0</td>
<td>System selector</td>
</tr>
<tr>
<td>49 F018 002</td>
<td>Igniter Checker</td>
</tr>
<tr>
<td>49 F018 003</td>
<td>Adapter Harness</td>
</tr>
<tr>
<td>49 H018 9A1</td>
<td>Self-Diagnosis Checker</td>
</tr>
</tbody>
</table>

CIRCUIT DIAGRAM

[Diagram showing electrical connections and components such as NE SIGNAL, G SIGNAL, CRANKSHAFT POSITION SENSOR, IGNITION COIL, DRIVER, IGNITER, SPARK PLUG, etc.]
IGNITION SYSTEM

IGNITION TIMING

The ignition timing is set at the factory and must not be adjusted. Any adjustment will negatively affect the engine performance.

Preparation
1. Warm up the engine to normal operating temperature.
2. Run the engine at idle and verify the following:
   • Shift selector lever to P range (AT) / Neutral (MT).
   • Set steering wheel straight ahead.
   • Turn all electrical loads OFF.
   • Wait for electric coolant fan to stop.

Inspection
1. Connect a timing light to the high-tension lead of the front trailing side.
2. Connect a tachometer.

Note
• Some timing lights will not illuminate even if the ignition is working properly.

3. Connect the SST to the data link connector.
4. Set switch A to position 1.
5. Set TEST SW to SELF-TEST.
6. Verify that the idle speed is within specification.

Idle speed: 550–950 rpm

7. Verify that the timing mark (white) on the crankshaft position sensor plate is aligned with the indicator pin.

Ignition timing: 
   Trailing side: 20°ATDC (-20°BTDC)
   Leading side: 5°ATDC (-5°BTDC)

8. If the timing is incorrect, check the following:
   • Verify that no diagnostic trouble code number is present. If present, check for the cause referring to the specified check sequence. (Refer to Section F)
     • 05 Knock sensor
     • 13 Manifold absolute pressure sensor

Input devices
• E/L, P/S, A/C, electric coolant fan
• Crankshaft position sensor (NE, G-Signal)
• Manifold absolute pressure sensor
• Throttle position sensor
• Neutral SW / Clutch SW (MT)
• Park/neutral signal (AT)

Others
• PCME terminal 3I voltage

8. Disconnect the SST.
9. Verify that the ignition timing advances when the engine is above 1,500 rpm.
SPARK PLUGS

Removal / Installation
1. Remove and install the high-tension leads carefully.

Caution
• Pulling on the wire part of the spark plug lead may break it. To remove the lead, pull only on the boot.

2. Remove and install the spark plugs by using a plug socket.

Caution
• To avoid breaking the spark plug, be sure to fit the socket squarely over it.

3. Apply anti-seize compound or molybdenum-based lubricant to the spark plug threads before installing.
4. Tighten the spark plugs to the specified torque.

Tightening torque:
13–17 N·m {1.3–1.8 kgf·m, 9.5–13 ft·lbf}

Spark test
1. Remove the spark plug.
2. Connect the spark plug to a high-tension lead.
3. Hold the high-tension lead and spark plug with insulated pliers 5–10 mm {0.20–0.39 in} from a ground.
4. Check the engine and verify that there is a strong blue spark.
5. Replace the spark plug or high tension lead as necessary if not as specified.
IGNITION SYSTEM

Inspection
Check the following points. If a problem is found, replace the spark plug.
• Damaged insulation
• Worn electrodes
• Carbon deposits
  If cleaning is necessary, use a plug cleaner. Clean the upper insulator, also.
• Damaged gasket
• Burnt

Plug gap: 1.1–1.7 mm (0.044–0.066 in)

<table>
<thead>
<tr>
<th>Plug position</th>
<th>NGK</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leading side</td>
<td>BUR7EQP*, (BUR7EQ)</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>(BUR6EQP) (BUR6EQ)</td>
<td></td>
</tr>
<tr>
<td>Trailing side</td>
<td>BUR9EQ*, (BUR9EQP)</td>
<td>Blue</td>
</tr>
<tr>
<td></td>
<td>(BUR9EQP) (BUR9EQ)</td>
<td></td>
</tr>
</tbody>
</table>

* Standard plug

Caution
• The electrode is platinum coated. The following can scratch its platinum coating and impair its performance.
  1. Adjusting the plug gap.
  2. Using a wire brush to clean the electrode.
  3. Using a plug cleaner for more than twenty (20) seconds, or at more than 588 kPa (6 kgf/cm², 85 psi)
IGNITION COIL

Removal / Installation
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.

1. Battery negative cable
2. Pressure chamber
3. Accelerator cable
4. Extension manihold
5. High-tension lead
   Inspection .... page G-21
6. Connector
7. Ignition coil bracket
8. Ignition coil (Trailing No.1)
   Inspection .... page G-21
9. Ignition coil (Leading)
   Inspection .... page G-21
10. Ignition coil (Trailing No.2)
    Inspection .... page G-21
IGNITION SYSTEM

**Inspection**

**T (Trailing) side**

1. Measure resistance of the coil.

<table>
<thead>
<tr>
<th>Inspection point</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A–B (primary coil winding)</td>
<td>below 1.0 Ω</td>
</tr>
<tr>
<td>A–T (secondary coil winding)</td>
<td>∞ (infinity)</td>
</tr>
</tbody>
</table>

2. If not within specification, replace the ignition coil.

**L (Leading) side**

1. Measure resistance of the coil.

<table>
<thead>
<tr>
<th>Inspection point</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A–B (primary coil winding)</td>
<td>below 1.0 Ω</td>
</tr>
<tr>
<td>L1–L2 (secondary coil winding)</td>
<td>9.6–16.0 kΩ</td>
</tr>
</tbody>
</table>

2. If not within specification, replace the ignition coil.

**HIGH-TENSION LEAD**

**Removal / Installation**

**Caution**

- Reinstall the high-tension leads to their original positions.
- Incorrect installation can damage the leads and cause power loss, and negatively effect electronic components.

**Inspection**

1. Measure resistance of the high-tension leads.

   **Specification:** 16 kΩ per 1m (3.28 ft)

2. If not as specified, replace the high-tension leads.
IGNITER

Removal / Installation
1. Remove in the order shown in the figure.
2. Install in the reverse order of removal.

7.9-10.7 N·m (80-110 kgf·cm, 70-85.4 in·lb)

1. Battery negative cable
2. Connector
3. igniter inspection

page G-23
IGNITION SYSTEM

Inspection

Before this inspection, check the specific gravity of the battery, and that it is at or near full charge.

1. Disconnect the negative battery cable.
2. Disconnect the igniter connector.
3. Connect the SST.
4. Reconnect the negative battery cable.
5. Turn the ON ignition switch.

Note
- Switch 1 may be in either position.

Trailing side
1. Insert the voltmeter probe into the brown (Front rotor trailing) or gray (Rear rotor trailing) lead of the SST (adapter harness) and verify that the voltage is as specified.

Voltage: Battery positive voltage

2. Press switch 2 to ON when certify to shake a hand of voltmeter.
3. Replace the igniter, if necessary.

Leading side
1. Insert the voltmeter probe into the black lead of the SST (adapter harness) and verify that the voltage is as specified.

Voltage: Battery positive voltage

2. Press switch 2 to ON when certify to shake a hand of voltmeter.
3. Replace the igniter, if necessary.
STARTING SYSTEM

PREPARATION SST

<table>
<thead>
<tr>
<th>49 E301 144</th>
<th>For installation of overrunning clutch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate, removing</td>
<td></td>
</tr>
</tbody>
</table>

CIRCUIT DIAGRAM

STARTER

Inspection (on-vehicle)
1. Measure the battery positive voltage.

Specification: Above 12.4V
2. Crank the engine, and verify that the starter turns smoothly.
3. If the starter does not turn, measure the voltage at terminal S.
4. If the voltage is more than 8V, remove and inspect the starter. If the voltage is less than 8V, check the wiring harness, ignition switch, and park/neutral switch (AT).
Removal / Installation
1. Remove in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Install in the reverse order of removal.

MT

1. Battery negative cable
2. Under cover
3. Terminal S and B wire

4. Stater
   Performance inspection .............. page G-27
   Disassembly / Assembly ............. page G-28
   Inspection .......................... page G-30
1. Battery negative cable
2. Under cover
3. Terminal S and B wire

4. Stater
   Performance inspection ........ page G-27
   Disassembly / Assembly ......... page G-29
   Inspection .................... page G-30

N·m (kgf·m, ft·lbf)

9.9–11.7 N·m
(100–120 kgf·cm)
(86.9–104 in·lbf)

19–24 [1.9–2.5, 14–18]
STARTING SYSTEM

Performance Inspection
Magnetic switch
   Disconnect terminal M wire, and perform the following tests. Replace the magnetic switch if necessary.

Pull-in test
   Connect battery positive voltage as shown and verify that the pinion is ejected.

Caution
   • Applying power for more than 10 seconds can damage the starter.

Hold-in test
   After completing the pull-in test, disconnect the wire from terminal M (with pinion ejected) and verify that the pinion does not return.

Adjustment of pinion gap
1. Disconnect the wire from terminal M.
2. Apply battery positive voltage between terminal S and the starter body.
3. Measure the clearance (pinion gap) between the pinion and the stopper.

Caution
   • Applying power for more than 10 seconds can damage the starter.

Pinion gap: 0.5–2.0 mm (0.020–0.078 in)

4. If the pinion gap is not within specification, increase or decrease the number of washers between the magnetic switch and the drive housing.

Note
   • The gap becomes smaller as the number of washers is increased.

No load test
1. Connect a circuit as shown.
2. Measure voltage, current, and speed as shown below.

| Voltage (V) | 11.0 |
| Current (A) | Max 90 |
| Speed (rpm) | Min 2,200 (AT), Min 3,000 (MT) |
Disassembly / Assembly
1. Disassemble in the order shown in the figure.
2. Inspect all parts and repair or replace as necessary.
3. Assemble in the reverse order of disassembly.

MT

1. Magnetic switch
   Performance inspection .......... page G-27
   Inspection ...................... page G-30
2. Front bracket
3. Drive pinion
   Inspection ...................... page G-31
4. Armature
   Inspection ........................ page G-30
5. Field coil
   Inspection ........................ page G-30
6. Brush and Brush holder
   Inspection ........................ page G-31
7. Rear bracket
1. Magnetic switch
   Performance
   Inspection .... page G-27

2. Spring set
3. Lever set
4. Rear bracket

5. Field coil
   Inspection .... page G-30

6. Brush and Brush holder
   Inspection .... page G-31

7. Armature
   Inspection .... page G-30

8. Cover

9. Center bracket

10. Reduction gear

11. Pinion shaft assembly
   (Overrunning clutch)
   Inspection .... page G-31

12. Bearing

13. Front bracket
STARTING SYSTEM

**Inspection**

**Magnetic switch**
Check the continuity as shown.

<table>
<thead>
<tr>
<th>Inspection point</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal S-M</td>
<td>Yes</td>
</tr>
<tr>
<td>Terminal M-B</td>
<td>No</td>
</tr>
<tr>
<td>Terminal S-Body</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Field coil**
Check the continuity as shown.

<table>
<thead>
<tr>
<th>Inspection point</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brush – Connector</td>
<td>Yes</td>
</tr>
<tr>
<td>Body – Connector</td>
<td>No</td>
</tr>
</tbody>
</table>

**Armature**

1. Check the continuity as shown.

<table>
<thead>
<tr>
<th>Inspection point</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commutator – Core</td>
<td>Yes</td>
</tr>
<tr>
<td>Commutator – Shaft</td>
<td>No</td>
</tr>
<tr>
<td>Core – Shaft</td>
<td>No</td>
</tr>
</tbody>
</table>

2. Replace the armature if the outer diameter of the commutator is almost at or less than the minimum.
3. If the commutator surface is dirty, wipe it with a cloth; if it is rough, repair it with a lathe or fine sandpaper.

**Minimum diameter**
32.0 mm [1.26 in]

4. Place the armature on V-blocks, and measure the runout by using a dial indicator.
5. If the runout is not within specification, repair the armature by using a lathe or replace it.

**Runout:** 0.05 mm [0.002 in]
Starting System

**Brush and Brush Holder**

1. Check for continuity between the insulated brush and the plate. Repair or replace if there is continuity. Also check that the brush slides smoothly inside the brush holder.

2. Measure the force of the brush spring by using a spring balance.

   **Standard:** 18.6–22.6 N (1.89–2.31 kgf, 4.16–5.08 lbf)
   **Maximum:** 6.9 N (0.7 kgf, 1.5 lbf)

3. Replace the spring if not as specified.

4. If a brush is worn almost to or beyond the wear limit, replace all of the brushes.

<table>
<thead>
<tr>
<th>Specification</th>
<th>MT</th>
<th>AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>17 (0.67)</td>
<td>18 (0.71)</td>
</tr>
<tr>
<td>Minimum</td>
<td>11 (0.43)</td>
<td>11 (0.43)</td>
</tr>
</tbody>
</table>

**Overrunning Clutch**

1. Turn the pinion shaft by hand while holding the overrunning clutch.

2. Replace the overrunning clutch if the pinion turns in both or in neither direction.

**Caution**

- Using cleaning fluids or a steam cleaner to clean the overrunning clutch can dissolve the grease inside it.

G–31
This system is similar to that of the park/neutral switch on an AT vehicle. If the clutch pedal is not depressed during starting, battery power will not be supplied to the starter and the starter will not operate.

**Inspection**

1. Disconnect the interlock switch connector.
2. Connect a circuit tester to the switch.
3. Check the continuity.

<table>
<thead>
<tr>
<th>Pedal</th>
<th>Continuity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressed</td>
<td>Yes</td>
</tr>
<tr>
<td>Released</td>
<td>No</td>
</tr>
</tbody>
</table>

4. If not as specified, replace the switch.