1982 DATSUN PICK-UP
SERVICEMANUAL

1982 DATSUN PICK-UP

SERVICEMANUAL

NISSAN
# Quick Reference Index

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Information</td>
<td>GI</td>
</tr>
<tr>
<td>Maintenance</td>
<td>MA</td>
</tr>
<tr>
<td>Engine Mechanical</td>
<td>EM</td>
</tr>
<tr>
<td>Engine Lubrication &amp; Cooling Systems</td>
<td>LC</td>
</tr>
<tr>
<td>Engine Fuel</td>
<td>EF</td>
</tr>
<tr>
<td>Emission Control System</td>
<td>EC</td>
</tr>
<tr>
<td>Engine Removal &amp; Installation</td>
<td>ER</td>
</tr>
<tr>
<td>Engine Control, Fuel &amp; Exhaust Systems</td>
<td>FE</td>
</tr>
<tr>
<td>Clutch</td>
<td>CL</td>
</tr>
<tr>
<td>Manual Transmission</td>
<td>MT</td>
</tr>
<tr>
<td>Automatic Transmission</td>
<td>AT</td>
</tr>
<tr>
<td>Transfer</td>
<td>TF</td>
</tr>
<tr>
<td>Propeller Shaft &amp; Differential Carrier</td>
<td>PD</td>
</tr>
<tr>
<td>Front Axle &amp; Front Suspension</td>
<td>FA</td>
</tr>
<tr>
<td>Rear Axle &amp; Rear Suspension</td>
<td>RA</td>
</tr>
<tr>
<td>Brake System</td>
<td>BR</td>
</tr>
<tr>
<td>Steering System</td>
<td>ST</td>
</tr>
<tr>
<td>Body &amp; Frame</td>
<td>BF</td>
</tr>
<tr>
<td>Heater &amp; Air Conditioner</td>
<td>HA</td>
</tr>
<tr>
<td>Electrical System</td>
<td>EL</td>
</tr>
</tbody>
</table>

**Foreword**

This service manual has been prepared primarily for the purpose of assisting service personnel in providing effective service and maintenance of the 1982 Datsun Pick-Up.

This manual includes procedures for maintenance, adjustments, removal and installation, disassembly and assembly of components, and trouble-shooting.

All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication. If your Datsun model differs from the specifications contained in this manual, consult your Nissan/Datsun dealer for information.

The right is reserved to make changes in specifications and methods at any time without notice.
HOW TO USE THIS MANUAL

► This Service Manual is designed as a guide for servicing vehicles.

► This manual deals with the engine, chassis, body and electrical system.

► A QUICK REFERENCE INDEX is provided on the first page. Refer to this index along with the index of the particular section you wish to consult.

► The first page of each section lists the contents and gives the page numbers for the respective topics.

► SERVICE DATA AND SPECIFICATIONS are contained in each section.

► TROUBLE DIAGNOSES AND CORRECTIONS are also included in each section. This feature of the manual lists the likely causes of trouble and recommends the appropriate corrective actions to be taken.

► A list of SPECIAL SERVICE TOOLS is included in each section. The special service tools are designed to assist you in performing repair safely, accurately and quickly. For information concerning how to obtain special service tools, write to the following address:

  Kent-Moore Corporation
  29784 Little Mack
  Roseville, Michigan 48066

  Kent-Moore of Canada, Ltd.
  5466 Timberlea Blvd.,
  Unit 2
  Mississauga, Ontario
  Canada L4W2T7

► The measurements given in this manual are primarily expressed with the SI unit (International System of Unit), and alternately expressed in the metric system and in the yard/pound system.

► The back cover of the manual provides maintenance data for quick reference.

► In the text, the following abbreviations are used:

  S.D.S.: Service Data and Specifications
  " : Tightening Torque
  L.H., R.H.: Left Hand, Right Hand

  2WD, 4WD: 2-wheel drive vehicle, 4-wheel drive vehicle
  SST: Special Service Tools

► The captions CAUTION and WARNING warn you of steps that must be followed to prevent personal injury and/or damage to some part of the vehicle.

IMPORTANT SAFETY NOTICE

The proper performance of service is essential for both the safety of the mechanic and the efficient functioning of the vehicle.

The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately.

Special service tools have been designed to permit safe and proper performance of service. Be sure to use them.

Service varies with the procedures used, the skills of the mechanic and the tools and parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first completely satisfy himself that neither his safety nor the vehicle's safety will be jeopardized by the service method selected.
CONTENTS

GENERAL VIEWS .................. GI-2
MODEL VARIATION ................ GI-4
IDENTIFICATION NUMBER .......... GI-6
LIFTING POINTS AND TOWING ...... GI-7
SCREW JACK ........................ GI-7
GARAGE JACK AND SAFETY STAND .. GI-7

TIE-DOWN .......................... GI-7
TOWING ............................. GI-7
SPECIAL SERVICE TOOLS .......... GI-8
TIGHTENING TORQUE OF
STANDARD BOLT .................... GI-8
GENERAL VIEWS

Regular Bed

Unit: mm (in)  4WD  For models equipped with standard bumper

Long Bed and Heavy Duty

Unit: mm (in)  4WD
ENGINE COMPONENTS (Outer parts)

For California model

Oil cooler
Bracket
V.V.T. valve
Termal vacuum valve
Check valve

Spill tube
① 39 - 49
(4 - 5 , 29 - 36)
Nozzle

① 13 - 19
(1.3 - 1.9
9 - 14)

Engine slinger
① 14 - 18
(1.4 - 1.8, 10 - 13)

Timer
① 59 - 69 (6 - 7, 43 - 51)
Timer cover
① 10 - 13
(1.0 - 1.3,
7 - 9)

Injection pump
Bracket

Diesel pump controller
① 45 - 61 (4.6 - 6.2, 33 - 45)

① : N-m (kg-m, ft-lb)

For California model

Venturi
e.G.R.
control valve

e.G.R. pipe
Intake manifold

Intake manifold

Thermostat housing

Always replace

Exhaust manifold

Always replace

Fan

Always replace

Water pump
Fan pulley
Tem-coupling

Alternator

① 4 - 6 (0.4 - 0.6, 2.9 - 4.3)
① 26 - 36 (2.7 - 3.7, 20 - 27)

① 26 - 36 (2.7 - 3.7, 20 - 27)

① 10 - 13
(1.0 - 1.3, 7 - 9)

Venturi

Dash pot

① 20 - 25
(2.0 - 2.5,
14 - 18)

① 15 - 18
(1.5 - 1.8, 11 - 13)

Breather

① 8 - 11
(0.8 - 1.1,
5.8 - 8.0)

① : N-m (kg-m, ft-lb)
4. Measure camshaft cam height. If beyond the specified limit, replace camshaft.

Cam height limit:
Less than 36.8 mm (1.449 in)

---

**CYLINDER BLOCK**

1. Check cylinder block for cracks or flaws.
2. Check cylinder block warpage with cylinder liner removed. If beyond the limit, correct with a surface grinder.

Warpage of cylinder block surface (Without cylinder liner):

- Shaft direction
  - Less than 0.10 mm (0.0039 in)
  - Right angle direction
  - Less than 0.02 mm (0.0008 in)

---

**CYLINDER LINER**

1. Check cylinder liner wear by means of bore diameter.

- Cylinder liner bore wear limit:
  - Less than 0.3 mm (0.012 in)
- Bore standard:
  - 82.990 - 83.030 mm (3.2673 - 3.2699 in)

2. Measure cylinder liner bore for out-of-round and taper with a bore gauge. If beyond the limit, replace cylinder liner.

- Out-of-round \((X-Y)\):
  - Standard: 0.02 mm (0.0008 in)
  - Taper \((A-B)\):
  - Standard: 0.03 mm (0.0012 in)

---

3. Check amount of projection of cylinder liner.

**PISTON, PISTON PIN AND PISTON RINGS**

1. Check for damage, scratches and wear. Replace if such a fault is detected.
EXHAUST EMISSION CONTROL SYSTEM

DESCRIPTION

The exhaust emission control system is made up of the following.

<table>
<thead>
<tr>
<th>Item</th>
<th>SD22</th>
<th>Destination</th>
<th>California</th>
<th>Transmission</th>
<th>M/T</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.G.R. control valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thermal vacuum valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Venturi Vacuum Transducer (V.V.T.) valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Vacuum amplifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Check valve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

EXHAUST GAS RECIRCULATION (E.G.R.) CONTROL SYSTEM

DESCRIPTION

The E.G.R. system is designed to control the formation of NOx emission by recirculating the exhaust gas into the intake manifold passage through the control valve.

The E.G.R. system is composed of the E.G.R. control valve, thermal vacuum valve, V.V.T. valve, check valve and vacuum amplifier.
OPERATION

The flow rate of the recirculating exhaust gas is controlled continuously by means of a vacuum amplifier, which functions in response to the engine load and engine speed. When the engine is under light load, the flow rate increases; when it is under heavy load, the flow rate decreases.

<table>
<thead>
<tr>
<th>Water temperature °C (°F)</th>
<th>Thermal vacuum valve</th>
<th>V.V.T. Valve</th>
<th>Operation</th>
<th>E.G.R. Control System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 25 - 30 (77 - 86)</td>
<td>Closed</td>
<td>High</td>
<td>Low</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>†</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>†</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Above 25 - 30 (77 - 86)</td>
<td>Open</td>
<td>High</td>
<td>Low</td>
<td>Closed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>†</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>†</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

E.G.R. CONTROL VALVE

The E.G.R. control valve, which is connected to diaphragm, is designed to move vertically in order to control the amount of exhaust gas admitted to intake manifold.

The vacuum that activates diaphragm is created in response to a sub-venturi vacuum signal that is amplified by vacuum amplifier.

VENTURI VACUUM TRANSDUCER (V.V.T.) VALVE

The V.V.T. valve monitors the pressure of the sub-venturi vacuum which actuates the diaphragm ①, ③, and the venturi-ported vacuum which in turn activates the diaphragm ①, ②. This valve is actuated when the sub-venturi vacuum and venturi-ported vacuum are in equilibrium. It controls the vacuum signal that operates E.G.R. control valve.

In other words, the amount of recirculated exhaust gas varies with the position of the E.G.R. valve regulated by the operating condition of the engine.

THERMAL VACUUM VALVE

The thermal vacuum valve, which is attached to the oil cooler housing, monitors the temperature of the engine cooling water. The valve shaft is propelled by the thermal expansion force of wax which depends on the temperature. This action opens and closes the valve, which causes the E.G.R. control vacuum line to be exposed or closed. When the valve opens, sub-venturi vacuum activates the vacuum amplifier and V.V.T. valve, which in turn causes the E.G.R. system to operate.
VACUUM AMPLIFIER

The vacuum amplifier, which receives a weak vacuum signal produced in sub-venturi, activates venturi diaphragm and vacuum regulator diaphragm. This in turn controls the output vacuum admitted to E.G.R. control valve.

CHECK VALVE

The check valve is located on V.V.T. valve bracket in the venturi-ported vacuum line. This valve prevents the vacuum acting on V.V.T. valve from increasing excessively and activates E.G.R. system properly.

2. Disconnect vacuum hose. The E.G.R. control valve can then be taken out.

CAUTION:
Be careful not to damage packing of E.G.R. control valve.

3. Installation is in the reverse sequence of removal.

4. Installation is in the reverse sequence of removal.

When replacing the V.V.T. valve with a new one, verify that the type number on the new part is the same as that on the former one.

REMOVAL AND INSTALLATION

E.G.R. control valve and E.G.R. tube


Thermal vacuum valve

The thermal vacuum valve is made of plastic. Consequently care should be taken to avoid damaging it. This valve is located on the oil cooler housing.

1. Drain engine coolant until its level is lower than the cooler.
2. Disconnect vacuum hoses and unscrew the thermal vacuum valve. Then, the valve can be removed.
3. Installation is in the reverse sequence of removal.

Be sure to apply sealer to threads of the valve prior to installing a new valve.

V.V.T. valve

1. Disconnect vacuum hoses on the V.V.T. valve.
2. Disconnect screws which secure V.V.T. valve to bracket.
3. The V.V.T. valve can then be removed.
**INSPECTION**

**Entire system**

1. Make a thorough visual check of E.G.R. control system. If necessary, wipe away oil to facilitate inspection. If any hoses are cracked or broken, replace.
2. With engine stopped, inspect E.G.R. control valve for any indication of binding or sticking by using vacuum gauge, and check control valve upwards and downwards.

1) Make sure that E.G.R. control valve operates when engine speed is increased.
2) If E.G.R. control valve does not operate properly, check it as follows:
   - Disconnect one end (E.G.R. control valve side) of vacuum hose which connects to the vacuum amplifier.
   - Make sure that thermal vacuum valve is open, and that sub-venturi vacuum is present at the end (vacuum amplifier side) of the vacuum hose by using vacuum gauge.
   - If vacuum pressure is nonexistent, replace thermal vacuum valve.
   - If vacuum pressure is existent, replace vacuum amplifier.
   - If any difficulty is encountered in judging the condition of any component during above inspection, check the questionable component independently as follows:

**E.G.R. control valve**

Dismount E.G.R. control valve from engine.

1. Apply vacuum to E.G.R. control valve, referring to the following figure. If the valve moves to full position, it is normal.

E.G.R. control valve will remain open for more than 30 seconds after vacuum has cut off.

---

**Check valve**

1. Disconnect venturi-ported vacuum hose.
2. Remove check valve from V.V.T. valve bracket.

3. Installation is in the reverse sequence of removal.

**CAUTION:**
Ensure that vacuum hoses are connected to their proper positions on vacuum amplifier.

---

**Vacuum amplifier**

1. Disconnect vacuum hoses on the amplifier.
2. Remove the amplifier assembly.

3. Installation is in the reverse sequence of removal.

---

**Check valve mounting screw**

3.4 - 5.4 N·m

(0.35 - 0.55 kg·m,

2.5 - 4.0 ft·lb)
ELECTRICAL SYSTEM

SECTION EL

CONTENTS

ELECTRICAL DIAGNOSIS
INTRODUCTION ............................................... EL-3
BASIC RULE OF ELECTRICITY .......................... EL-3
WIRING DIAGRAMS ........................................ EL-3
HARNESS LAYOUT .......................................... EL-3
TESTING .................................................. EL-4
TEST INSTRUMENTS ....................................... EL-4
TROUBLE-SHOOTING APPROACH ....................... EL-4

POWER SUPPLY ROUTING
SCHEMATIC/POWER SUPPLY ROUTING ............... EL-5
FUSE ..................................................... EL-6
FUSIBLE LINK ............................................ EL-6
IGNITION SWITCH ........................................ EL-6

BATTERY
VISUAL INSPECTION .................................... EL-7
CLEANING ............................................... EL-7
CONDITION CHECK ...................................... EL-7
TEST ..................................................... EL-8
CHARGING ............................................... EL-9
REPLACEMENT .......................................... EL-9
SERVICE DATA AND SPECIFICATIONS (S.D.S.) .... EL-9

STARTING SYSTEM ........................................ EL-10
SCHEMATIC (Gasoline engine models) ............. EL-10
WIRING DIAGRAM (Gasoline engine models) ....... EL-10
SCHEMATIC (Diesel engine models) ................ EL-11
WIRING DIAGRAM (Diesel engine models) ......... EL-11
STARTING SYSTEM ...................................... EL-12
TROUBLE-SHOOTING ................................... EL-12
STARTER MOTOR ......................................... EL-13
SERVICE DATA AND SPECIFICATIONS (S.D.S.) .... EL-21

CHARGING SYSTEM ........................................ EL-22
SCHEMATIC (Gasoline engine models) ............. EL-22
WIRING DIAGRAM (Gasoline engine models) ....... EL-22
SCHEMATIC (Diesel engine models) ................ EL-23
WIRING DIAGRAM (Diesel engine models) ......... EL-23
CHARGING SYSTEM ...................................... EL-24
TROUBLE-SHOOTING ................................... EL-24
ALTERNATOR ............................................ EL-25
IC VOLTAGE REGULATOR ............................... EL-30
SERVICE DATA AND SPECIFICATIONS (S.D.S.) .... EL-31

IGNITION SYSTEM
(Gasoline engine model) ............................... EL-32
SCHEMATIC .............................................. EL-32
WIRING DIAGRAM ........................................ EL-32
IC IGNITION SYSTEM .................................. EL-33
TROUBLE-SHOOTING ................................... EL-33
DISTRIBUTOR (IC types) ............................... EL-36
SERVICE DATA AND SPECIFICATIONS (S.D.S.) .... EL-39

AUTO-GLOW SYSTEM .................................... EL-41
SCHEMATIC .............................................. EL-41
WIRING DIAGRAM ........................................ EL-41
TROUBLE DIAGNOSES AND CORRECTIONS ........ EL-42
AUTO-GLOW SYSTEM INSPECTION .................... EL-44

INJECTION PUMP CONTROL SYSTEM .................... EL-46
DESCRIPTION ........................................... EL-46
SCHEMATIC .............................................. EL-48
WIRING DIAGRAM ........................................ EL-48
TROUBLE DIAGNOSES AND CORRECTIONS ........ EL-49
INJECTION PUMP CONTROL SYSTEM INSPECTION .. EL-52

LIGHTING SYSTEM ....................................... EL-54
BULBS ..................................................... EL-54
COMBINATION SWITCH ................................ EL-54
HEADLAMP .............................................. EL-55
TAIL, CLEARANCE, SIDE MARKER AND LICENSE PLATE LAMPS EL-58
ILLUMINATION LAMPS ................................ EL-60
STOP AND BACK-UP LAMPS ......................... EL-61
TURN SIGNAL AND HAZARD ......................... EL-61
WARNING LAMPS ....................................... EL-63
ROOM LAMP .............................................. EL-66

METERS, GAUGES AND WARNING SYSTEM .......... EL-67
COMBINATION METER ................................ EL-67
4-WHEEL DRIVE INDICATOR LAMP .................. EL-69
VOLTMETER AND OIL PRESSURE ...................... EL-70
GAUGE .................................................. EL-70
GAUGES AND METERS ................................ EL-71
WARNING SYSTEM ..................................... EL-72
TROUBLE DIAGNOSES AND CORRECTIONS .......... EL-73
Contents – ELECTRICAL SYSTEM

WIPER AND WASHER ............... EL-78
WINDSHIELD WIPER AND WASHER ...... EL-78
ELECTRICAL ACCESSORIES ........ EL-84
  HORN AND CLOCK ............... EL-84
  REAR WINDOW DEFOGGER,
  CIGARETTE LIGHTER AND RADIO ...... EL-86

LOCATION OF ELECTRICAL UNITS .................................................. EL-89
WIRING HARNESS ................................................................. EL-90
  CABLE COLORS .......................................................... EL-90
  WIRING HARNESS LAYOUT ........................................... EL-90

Refer to Section EC (Emission Control System) for:
  ● EMISSION CONTROL SYSTEM

Refer to Section HA (Heater & Air Conditioner) for:
  ● HEATER
  ● AIR CONDITIONER
ELECTRICAL DIAGNOSIS INTRODUCTION

CAUTION: Before starting to work, be sure to turn ignition switch “OFF” and then disconnect battery ground cable.

The key to timely and accurate diagnosis of electrical problems is to:
1. Have a basic understanding of electrical principles and electrical component operation.
2. Be able to interpret wiring diagrams and schematics.
3. Know the various test methods and when to use each.
4. Have a systematic approach to identify the specific cause of an electrical problem.

BASIC RULE OF ELECTRICITY

A complete electrical circuit must have:
1. A Source (battery, alternator)
2. A Load (lights, coil, amplifiers, motor, etc.)
3. Electrical Pathway (connecting from the source to the load and back to the source); (wires, switches, body of vehicle (ground).)

Remembering this basic rule will make it a lot easier to troubleshoot electrical problems.

WIRING DIAGRAMS

There are several wiring diagrams and schematics illustrating each electrical circuit. Accurate diagnosis of electrical problems requires that you effectively use and interpret these diagrams. Since they have a special language, i.e., symbols, codes and abbreviations, let's review the following chart.

<table>
<thead>
<tr>
<th>SYMBOLS</th>
<th>WIRE COLOR CODING</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Symbol" /> Single filament bulb</td>
<td><img src="image2" alt="Symbol" /> or <img src="image3" alt="Symbol" /> Switch (Normally open)</td>
</tr>
<tr>
<td><img src="image4" alt="Symbol" /> Dual filament bulb</td>
<td><img src="image5" alt="Symbol" /> or <img src="image6" alt="Symbol" /> Switch (Normally closed)</td>
</tr>
<tr>
<td><img src="image7" alt="Symbol" /> Fuse</td>
<td><img src="image8" alt="Symbol" /> Ground</td>
</tr>
<tr>
<td><img src="image9" alt="Symbol" /> Fusible link</td>
<td><img src="image10" alt="Symbol" /> No connection between wires</td>
</tr>
<tr>
<td><img src="image11" alt="Symbol" /> Diode</td>
<td><img src="image12" alt="Symbol" /> Connection between wires</td>
</tr>
<tr>
<td><img src="image13" alt="Symbol" /> Motor</td>
<td><img src="image14" alt="Symbol" /> Resistor</td>
</tr>
<tr>
<td><img src="image15" alt="Symbol" /> Transistor</td>
<td><img src="image16" alt="Symbol" /> Pin-type connector (Male)</td>
</tr>
<tr>
<td><img src="image17" alt="Symbol" /> Coil</td>
<td><img src="image18" alt="Symbol" /> Pin-type connector (Female)</td>
</tr>
<tr>
<td><img src="image19" alt="Symbol" /> Variable resistor</td>
<td><img src="image20" alt="Symbol" /> Plain-type connector (Male)</td>
</tr>
<tr>
<td><img src="image21" alt="Symbol" /> Thermistor</td>
<td><img src="image22" alt="Symbol" /> Plain-type connector (Female)</td>
</tr>
<tr>
<td><img src="image23" alt="Symbol" /> Reed switch</td>
<td><img src="image24" alt="Symbol" /> Bullet connector (Female and male)</td>
</tr>
<tr>
<td><img src="image25" alt="Symbol" /> Circuit breaker</td>
<td><img src="image26" alt="Symbol" /> Plain connector (Female and male)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONNECTORS</th>
<th>ABBREVIATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image27" alt="Connector" /></td>
<td><img src="image28" alt="Connector" /></td>
</tr>
<tr>
<td><img src="image30" alt="Connector" /></td>
<td><img src="image31" alt="Connector" /></td>
</tr>
<tr>
<td><img src="image33" alt="Connector" /></td>
<td><img src="image34" alt="Connector" /></td>
</tr>
<tr>
<td><img src="image36" alt="Connector" /></td>
<td><img src="image37" alt="Connector" /></td>
</tr>
</tbody>
</table>

In case of color coding with Tracers, Base Color is given first, followed by the Tracer Color:

Example: LW = Blue w/White Tracers

<table>
<thead>
<tr>
<th>ABBREVIATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image39" alt="Abbreviation" /></td>
</tr>
<tr>
<td><img src="image40" alt="Abbreviation" /></td>
</tr>
</tbody>
</table>

HARNESS LAYOUT

For easy identification, connectors indicated in the system wiring diagram have the same numbers as those used in the harness layout schematic. (Refer to page EL-90)
To trace a problem in any electrical circuit, several types of diagrams can be used.

1. **Power Supply Routing** (Refer to page EL-5). This diagram is helpful in identifying specific problems in the power supply portion of the electrical circuits. For example, let's say a vehicle has inoperative instrument meter lights. A quick check proves that all other lights in the vehicle are operative. The power supply diagram shows that there cannot be a problem between the battery, ignition relay, ignition switch or fuse since the power supply circuit for the instrument meter lights is common with the clearance, tail, side marker, and license plate lights. Therefore, the cause of this specific problem must lie past the fuse, such as in the wiring, meter lights, or ground.

2. **Schematic** (Refer to Headlamp Circuit page EL-55). A schematic is a very simplified wiring diagram useful for tracing electrical current flow and studying the operation of an electrical circuit.

3. **Circuit Wiring Diagram** (Refer to Headlamp Circuit page EL-55). This diagram is a more "true to life" layout of a complete circuit than the schematic. It identifies types and number of connectors, electrical terminal positions in the connector, color coding of wires, and connector codes. In order to quickly find the exact location of a connector, the connector codes can be cross-referenced to the harness layout illustrations in the back of this section.

4. **Complete Wiring Diagram** (Fold-out page). The complete wiring diagram will assist in locating interrelated circuits i.e., circuits which share common ground circuits, power circuits, etc.

**TEST INSTRUMENTS**

Problems that cannot be solved through sight, sound, or substitution can be solved by using the appropriate test instrument. The charts on the back of the vehicle wiring diagram, illustrates how and when these instruments should be used.

A general rule to follow while trouble-shooting is to perform the easiest and least expensive checks first. This often means giving some careful thought to a trouble-shooting plan. Some of the most frustrating and confusing electrical problems begin with a haphazard and planless start. Make sure the checks you have selected are going to give the answers you need. If you test the wrong circuit, use the wrong meter, or forget to check the meter scale and calibration, you just can't diagnose the problem.

**TROUBLE-SHOOTING APPROACH**

You should have a routine procedure or approach when trouble-shooting a problem, a method you are familiar with which gives you the maximum amount of information at minimum expense and effort. Sometimes it is helpful to ask yourself some questions first. For example:

**WHAT IS THE PROBLEM?** While this may seem a foolish question at first glance, the problem involved may not be the same as stated on the repair order or even as observed by the customer. Sometimes, other problems or symptoms have been overlooked. Do not forget to identify the problem and controls involved. Check to see what electrical components work and what components do not work. This is an opportune time to use sight and sound testing methods.

**HOW DOES THE CIRCUIT WORK?** Once the electrical problem has been identified, consult the various wiring diagrams in the service manual.

Study the simplified schematic to develop an understanding of how the circuit is supposed to work. Then use the circuit wiring diagram, harness layout illustration, power supply routing diagram, and vehicle wiring diagram. Get an idea of how the circuit is laid out in the car and how it interrelates with other circuits.

**WHICH TEST IS BEST?** Stop and think of exactly what information you need to reach a proper solution. Decide which test will give you the most information. Do not forget to think of where you are going to make your test connections. Make sure you are performing your test at the most advantageous point. You do not want to dismantle a dash assembly to check a component which could be tested at a more accessible location. For instance, it is much easier to check terminal connectors and plugs than to break into a harness.

Once the tests have been performed, you should have the information you need to reach a logical conclusion and solve the problem but, if not, then review your testing procedure. Be certain that you are performing the test correctly and your procedure is valid.

Remember the most complex circuits are constructed from combinations and/or variations of the basic circuit: Source, Conductors, and Load. If you keep this in mind, use the service manual, and follow a logical trouble-shooting sequence, you can effectively trouble-shoot electrical problems.
POWER SUPPLY ROUTING

CAUTION: Before starting to work, be sure to turn ignition switch “OFF” and then disconnect battery ground cable.

SCHEMATIC/POWER SUPPLY ROUTING

[Diagram showing electrical system diagram with labels for various components such as Headlamp, Ignition, Battery, Accessories, and fuse block.]
**FUSE**

Left side dash panel

- Fuse block

**FUSIBLE LINK**

- With steering lock
- Without steering lock

**CAUTION:**

a. If fusible link should melt, it is possible that a critical circuit (power supply or large current carrying circuit) is shorted. In such a case, carefully check and eliminate the cause of the problem.

b. Never wrap periphery of fusible link with vinyl tape. Extreme care should be taken with this link to ensure that it does not come into contact with any other wiring harness or vinyl or rubber parts.

**INSPECTION**

Test continuity through switch with an ohmmeter.

A melted fusible link can be detected either by visual inspection or by feeling with finger-tip. If its condition is questionable, use circuit tester or test lamp, as required, to conduct continuity test. This continuity test can be performed in the same manner as for any conventional fuse.

**IGNITION SWITCH**

**REMOVAL AND INSTALLATION**

1. Disconnect battery ground cable.
2. Remove steering column cover.
3. Disconnect ignition switch harness connector.
4. Remove ignition switch.
5. Installation is in the reverse order of removal.
BATTERY

CAUTION: Before starting to work, be sure to turn ignition switch “OFF” and then disconnect battery ground cable.

WARNING: Never touch positive and negative terminals at the same time with bare hands. This could result in injury.

CAUTION: 

a. If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.

b. If the battery cables are disconnected, they should be tightly clamped to the battery terminals to secure a good contact.

CONDITION CHECK

Battery condition can be checked using indicator on battery.

VISUAL INSPECTION

1. Check battery rating against that of original factory equipment.
2. Check for cracks and warpage of the case.
3. Make sure cables are clean and tight.
4. Check acid level.
5. Make sure vents are not clogged.
6. Make sure top of battery is clean.

CLEANING

Use a stiff brush and a common baking soda and water solution to clean the battery surface, terminals and cable ends.

TEST

BATTERY CAPACITY TEST

1. Check battery rating against that of original factory equipment.
2. With battery connected to tester as shown, turn load knob until a draw of 3 times the battery rating is shown. (Example: Battery rating 60AH Turn load to 180A draw.)
3. Hold this draw for 15 seconds, then look at voltage. If voltage remains at 9.6 volts or above, THE BATTERY IS GOOD. You need not perform any further tests. If voltage drops below 9.6 volts, then proceed to next test.

THREE-MINUTE CHARGE TEST

This test identifies a battery as being sulfated and should only be performed if the battery has failed the capacity test.
1. Connect a good quality battery charger.
2. Turn charger to a fast rate not over 40A.
3. After three minutes, check voltmeter reading. If it is over 16.5 volts, battery should be replaced.

**BATTERY LEAKAGE TEST**

Check to make sure battery is not discharging across top, between two posts.

1. Set voltmeter to low range.
2. Touch negative lead of voltmeter to negative battery post.
3. Touch positive lead of voltmeter to top of battery, and move it around.
   If reading goes over 0.5 volts, then clean off top of battery and retest.

**BATTERY DRAW TEST**

For discharging problems after other battery tests show that the battery is good and capable of holding a charge perform the battery draw test.
1. Disconnect battery ground cable.
2. Insert test light in series between cable end and the negative battery post.
3. With all switches and systems off the test light should not be lit.
4. If the light is lit begin disconnecting fuses and units until the light goes out. The clock is designed to run at all times. Be sure it is not the cause of the light being on.
5. Repair the circuit causing the draw.

**CHARGING**

**DESCRIPTION**

**Charging rate and specific gravity of battery electrolyte**

The relationship between the charged condition of the battery and the specific gravity of battery electrolyte differs, as shown in figures below, when the battery is discharging and when it is being charged.

**WARNING:**

a. Keep battery away from open flame while it is being charged.
b. When connecting charger, connect leads first, then turn on charger. Do not turn on charger first, as this may cause a spark.
c. Do not allow electrolyte temperature to go over 45°C (113°F).

**Standard method**

Charge the battery at 1/10 the current of battery capacity. When the indicator turns from transparent to blue, continue to charge the battery for an additional two hours, then stop charging.

**Quick charge**

Charge the battery at a current of 40 amperes for approximately 45 minutes. Never charge more than 45 minutes.

**CAUTION:**

Charging the battery at a current of more than 10 amperes will shorten the service life of the battery. Use the standard method to charge the battery unless circumstances requires otherwise.

**Charging current and time required for charging**

<table>
<thead>
<tr>
<th>Charging current</th>
<th>Time required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/6 of battery capacity</td>
<td>Approx. 4 - 5 hours</td>
</tr>
<tr>
<td>1/10 of battery capacity</td>
<td>Approx. 8 - 10 hours</td>
</tr>
</tbody>
</table>

As can be seen from these figures, the battery has the following features:
- The specific gravity of battery electrolyte increases very slowly while the battery is being charged.
- The smaller the charging current, the slower the specific gravity of the electrolyte increases.

**Indicator**

- The indicator will turn from blue to transparent when the battery charge drops to 20 to 30%.
- The indicator will turn blue when the battery charge is between 65 and 90% under charging.
If the battery is run down and has not been used for a long period of time, it will be hard to charge and it will require a longer time to charge than under normal circumstances. In such a case, extend the charging time as required while observing the indicator.

**REPLACEMENT**

If battery indicator shows lack of charge condition, and it is recharged and does not crank engine, replace battery.

---

**SERVICE DATA AND SPECIFICATIONS (S.D.S.)**

**BATTERY**

<table>
<thead>
<tr>
<th>Type</th>
<th>Maintenance free</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied model</td>
<td></td>
</tr>
<tr>
<td>Gasoline engine</td>
<td>U.S.A.</td>
</tr>
<tr>
<td>Diesel engine</td>
<td>U.S.A. option</td>
</tr>
<tr>
<td></td>
<td>Canada</td>
</tr>
<tr>
<td>Capacity V.AH</td>
<td>12 - 60</td>
</tr>
<tr>
<td></td>
<td>12 - 65</td>
</tr>
<tr>
<td></td>
<td>12 - 80</td>
</tr>
</tbody>
</table>

---

**ELECTRICAL SYSTEM – Battery**
CAUTION: Before starting to work, be sure to turn ignition switch “OFF” and then disconnect battery ground cable.

SCHEMATIC (Gasoline engine models)

WIRING DIAGRAM (Gasoline engine models)
STARTER MOTOR
S114-229F and -295 (Gasoline engine model for U.S.A.)

Magnetic switch assembly
Clearance "R" between
Pinion front edge and pinion stopper:
0.3 - 2.5 (0.012 - 0.098)

Dust cover (Adjusting washer)
Adjust clearance "R"
Washer thickness
0.5 (0.020)
0.8 (0.031)

Brush (-)
Brush min. length
12 (0.47)

Tension: 13.7 - 17.7 N
(1.4 - 1.8 kg, 3.1 - 4.0 lb)

Commutator min. dia.:
32 (1.25)

Depth of insulating mica:
0.5 - 0.8 (0.020 - 0.031)

Armature shaft bend:
Less than 0.08 (0.0031)

表彰 N/(kg-m, ft-lb)
Unit: mm (in)
**Diagram of Starting System**

**Unit:** mm (in)

- **N·m (kg-m, ft-lb)**
- **High-temperature grease point**

**Part Details:**

- **Pinion shaft**
  - Difference "x" in height of pinion: 0.3 - 1.5 (0.012 - 0.059)

- **Gear case**

- **Torsion spring**

- **Dust cover**

- **Return spring**

- **Follower stopper**

- **Clutch assembly**

- **Stopper clip**

- **Shift lever**

- **Dust cover (Adjusting plate)**
  - Adjust difference "x"
  - Washer thickness:
    - 0.5 (0.020)
    - 0.8 (0.031)

- **Magnetic switch assembly**

- **Rear cover**

- **Yoke**

- **Field coil**

- **Brush (+)**
  - Wear limit length: 11 (0.43)

- **Armature assembly**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commutator min. dia.</td>
<td>29 (1.14)</td>
</tr>
<tr>
<td>Depth of insulating mica</td>
<td>0.5 - 0.8 (0.020 - 0.031)</td>
</tr>
</tbody>
</table>

**Notes:**

- Torque values: 6.4 - 7.8 (0.65 - 0.80, 4.7 - 5.8)
- Torque values: 7.4 - 9.8 (0.75 - 1.00, 5.4 - 7.2)
- Torque values: 4.9 - 6.4 (0.50 - 0.65, 3.6 - 4.7)
**S13-45B (Diesel engine model)**

- **Magnetic switch assembly**
  - Clearance "q" between pinion front edge and pinion stopper:
  - 0.3 - 1.5 (0.012 - 0.059)

- **Dust cover (Adjusting washer)**
  - Adjust clearance "q"
  - Washer thickness:
  - 0.5 (0.020)
  - 0.8 (0.031)

- **Through-bolt**
- **Rear cover**
- **Brush holder**
- **Brush**
  - Brush length "A":
  - More than 7 (0.28)

- **Shift lever**
- **Ball bearing**
- **Thrust washer**
- **Ball bearing**
- **O-ring**

- **Center bearing assembly**
- **Oil seal**

- **Brush spring**
  - Tension: 30.4 - 40.2 N
  - (3.1 - 4.1 kg, 6.8 - 9.0 lb)

- **Field coil**
- **Armature**

- **Commutator min. dia.**
  - 56.6 (1.441)

- **Depth of insulating mica:**
  - 0.5 - 0.8 (0.020 - 0.031)

- **7.4 - 9.8 (0.75 - 1.00, 5.4 - 7.2)**

- **Needle bearing**
- **Thrust washer**
- **Gear shaft assembly**
- **Pinion assembly**
  - Clearance "s" between pinion front edge and pinion stopper:
  - 0.3 - 1.5 (0.012 - 0.059)

- **Stopper clip**
- **Gear case**
- **Gear case metal**

- **Dust cover**

---

N.m (kg-m, ft-lb)

Unit: mm (in)
Disassembly S114-229F and -295

1. Remove magnetic switch.

2. Remove rear cover.
   (1) Remove dust cover, E-ring and thrust washer(s).
   (2) Remove brush holder setscrews.
   (3) Remove through bolts.

3. Lift up brush springs.

4. Remove brush holder

5. Remove yoke.

6. Withdraw armature and shift lever.

7. Remove overrunning clutch.
   - Remove pinion stopper clip, pushing pinion stopper toward clutch side.

S114-304

1. Loosen nut from “M” terminal and remove lead wire.

2. Remove through bolts.

3. Draw out rear cover and motor assembly.

4. Remove brush holder.
   (1) Lift brush spring and hold it against side surface of brush (−). This causes the brush (−) to separate from commutator.

   (2) Remove brush (+) from brush holder by lifting the brush spring.
5. Draw out armature assembly from yoke.

6. Remove magnetic switch assembly from gear case.

7. Remove dust cover and shift lever.

8. Remove bearing retainer and draw out pinion assembly.

9. Remove pinion stopper clip.
   Move pinion stopper toward pinion, and remove pinion stopper clip with a flat-bladed screwdriver.

10. Remove pinion shaft from clutch assembly.

S13-45B
1. Remove switch cover.
2. Remove nut from terminal M and separate lead wire.

3. Remove bolts.

4. Remove magnetic switch assembly and dust cover.

5. Remove screws and through-bolts.

6. Remove rear cover assembly by prying carefully with screwdriver.
7. Lift up brush spring with wire and separate brush.

8. Remove brush holder and separate yoke, armature and center bracket.

CAUTION:
Be careful not to knock brush, commutator or coil against any adjacent part.

9. Separate gear case and center bearing.

10. Remove shift lever pin.

11. Remove dust cover, shift lever and gear shaft with pinion assembly.

12. Remove dust cover from tip of gear case.


INSPECTION
Armature assembly
1. Check commutator surface.
   - Rough ... Sand lightly with No. 500 sandpaper.

2. Check diameter of commutator.
   - Commutator minimum diameter:
     - Less than specified value ... Replace.
3. Check depth of insulating mica from commutator surface.
   - Less than 0.2 mm (0.008 in) ...
     Undercut to 0.5 to 0.8 mm (0.020 to 0.031 in).

4. Continuity test (between two segments side by side).

5. Insulation test (between each commutator bar and shaft).

- Continuity exists ... Replace.

Field coil
1. Continuity test (between field coil positive terminal and positive brushes).

   Positive brush
   Positive terminal
   Ohmmeter

   - No continuity ... Replace field coil.

2. Ground test (between field coil positive terminal and yoke).

   Yoke
   Positive terminal

   - Continuity exists ... Replace field coil.

Brush holder
1. Perform insulation test between brush holder (positive side) and its base (negative side).

   Ohmmeter

   S114-229F and -295
   SEL627B

   S114-304 and S13-45B
   SEL66B

   - Continuity exists ... Replace.

2. Check brush holder to see if it moves smoothly.
   - If brush holder is bent, replace it; if sliding surface is dirty, clean.

Brush
Check wear of brush.

Wear limit length:
Refer to S.D.S.

   Vernier caliper
   Brush

   - Excessive wear ... Replace.

Magnetic switch
1. Continuity test (between “S” terminal and switch body).

   Ohmmeter

   S114-229F and -295
   SEL627B

   S114-304 and S13-45B
   SEL66B

   - No continuity ... Replace.
2. Continuity test (between "S" terminal and "M" terminal).

- If it is hard to move, apply grease or, if necessary, replace.

3. Inspect pinion teeth.
- If pinion teeth are worn or damaged, replace pinion. (Also check for condition of ring gear teeth.)

4. Inspect ball bearing (S114-304 unit only).
   Spin outer race of ball bearing to ensure that it turns smoothly without binding.

- Abnormal resistance ... Replace.

ASSEMBLY
To assemble, reverse order of disassembly. Note the following:

a. Apply grease to portions indicated in table below.

<table>
<thead>
<tr>
<th>Grease point</th>
<th>S114-229F and -295</th>
<th>S114-304 and S13-45B</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rear cover metal</td>
<td>Reduction gear</td>
</tr>
<tr>
<td></td>
<td>Gear case metal</td>
<td>Rear cover metal</td>
</tr>
<tr>
<td></td>
<td>Frictional surface of pinion</td>
<td>Gear case metal</td>
</tr>
<tr>
<td></td>
<td>Functional area of shift lever</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sliding surface of magnetic switch plunger</td>
<td></td>
</tr>
</tbody>
</table>

b. Check pinion to see if its protruded length is correct.

S114-229F, -295 and S13-45B
With pinion forced out by magnetic switch, push pinion back to remove slack and measure clearance "q" between the front edge of the pinion and the pinion stopper.

Clearance "q": Refer to S.D.S.

- Not in the specified value ... Adjust by dust cover (adjusting plate).

S114-304
Compare difference "q" in height of pinion when it is pushed out with magnetic switch energized and when it is pulled out by hand until it touches stopper.
**SERVICE DATA AND SPECIFICATIONS (S.D.S.)**

**STARTER MOTOR**

<table>
<thead>
<tr>
<th>Type</th>
<th>S114-295</th>
<th>S114-229F</th>
<th>S114-304</th>
<th>S13-458</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applied model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-reduction gear type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gasoline engine models</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S.A. (A/T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S.A. (M/T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada (A/T, M/T)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction gear type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diesel engine model</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>System voltage</strong></td>
<td></td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>No load</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal voltage</td>
<td></td>
<td>11.5</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td></td>
<td>Less than 60</td>
<td>Less than 100</td>
<td>Less than 150</td>
</tr>
<tr>
<td>Revolution</td>
<td></td>
<td>More than 7,000</td>
<td>More than 5,000</td>
<td>More than 3,900</td>
</tr>
<tr>
<td>rpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer diameter of commutator</td>
<td>More than 32 (1.26)</td>
<td>More than 29 (1.14)</td>
<td>More than 36.6 (1.441)</td>
<td></td>
</tr>
<tr>
<td>mm (in)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum length of brush</td>
<td>12 (0.47)</td>
<td>11 (0.43)</td>
<td>7 (0.28)</td>
<td></td>
</tr>
<tr>
<td>mm (in)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brush spring tension</td>
<td>13.7 - 17.7 (1.4 - 1.8, 3.1 - 4.0)</td>
<td>15.7 - 19.6 (1.6 - 2.0, 3.5 - 4.4)</td>
<td>30.4 - 40.2 (3.1 - 4.1, 6.8 - 9.0)</td>
<td></td>
</tr>
<tr>
<td>N (kg, lb)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearance between bearing and armature shaft</td>
<td>Less than 0.2 (0.008)</td>
<td>–</td>
<td>Less than 0.2 (0.008)</td>
<td></td>
</tr>
<tr>
<td>mm (in)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearance &quot;O&quot; between pinion front edge and pinion stopper</td>
<td>0.3 - 2.5 (0.012 - 0.099)</td>
<td>–</td>
<td>0.3 - 1.5 (0.012 - 0.059)</td>
<td></td>
</tr>
<tr>
<td>mm (in)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference &quot;O&quot; in height of pinion</td>
<td>–</td>
<td>–</td>
<td>0.3 - 1.5 (0.012 - 0.059)</td>
<td>–</td>
</tr>
</tbody>
</table>
CHARGING SYSTEM

CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

SCHEMATIC (Gasoline engine models)

WIRING DIAGRAM (Gasoline engine models)
ELECTRICAL SYSTEM – Charging System

SCHEMATIC (Diesel engine models)

WIRING DIAGRAM (Diesel engine models)
CHARGING SYSTEM TROUBLE-SHOOTING

Before conducting an alternator test, make sure that the battery is fully charged.

A 30-Volt voltmeter and suitable test probes are necessary for the test.

The alternator can be checked easily by referring to the Inspection Table.

1) Use fully charged battery
2) Light: Charge warning light
   A.C.G.: Alternator parts except IC regulator
   IC-RG: IC regulator
   O.K.: IC-alternator is in good condition
3) When reaching "Faulty A.C.G.", remove alternator from car and disassemble, inspect and correct or replace faulty parts.
4) * Method of grounding F terminal

Diesel engine model
Contact tip of brush and attach screw driver to alternator body.

Gasoline engine model
Contact tip of wire with brush and attach wire to alternator body.

5) Terminals “S”, “L”, “BAT” and “E” are marked on rear cover of alternator.

SEL597A

SEL026B
ALTERNATOR

LR150-98B: Gasoline engine model
LR160-78 LR160-78B: Gasoline engine model option

Slip ring dia.: more than 30 (1.18 in)
Resistance [at 20°C (68°F)]: 3.8Ω
Resistance per phase [at 20°C (68°F)]: 0.057Ω

Rear bearing
Once removed, bearing cannot be reused.
Replace with a new one.

Front cover
Front bearing retainer
Pulley assembly
Stator
Front bearing
Rotor
IC voltage regulator
Through bolt
Diode (set plate) assembly

39 - 59
(4.0 - 6.0, 29 - 43)
3.1 - 3.9
(0.32 - 0.40, 2.3 - 2.9)
3.1 - 3.9
(0.32 - 0.40, 2.3 - 2.9)
3.1 - 3.9
(0.32 - 0.40, 2.3 - 2.9)
3.1 - 3.9
(0.32 - 0.40, 2.3 - 2.9)

Brush assembly
Wear limit length of brush: 7.0 (0.276 in)
Spring pressure: 2.501 - 3.383 N
(225 - 345 g, 8.99 - 12.17 oz)

Unit: mm (in)
1 N·m (kg-m, ft-lb)

LR160-97B: Diesel engine model

Slip ring dia.: more than 30 (1.18 in)

Rear bearing
Once removed, bearing cannot be reused.
Replace with a new one.

Pulley assembly
Stator
Front bearing retainer
Rotor
Through bolt
Diode assembly
Vacuum pump

44 - 59 (4.5 - 6.0, 33 - 43)
3.1 - 3.9
(0.32 - 0.40, 2.3 - 2.9)

Unit: mm (in)
1 N·m (kg-m, ft-lb)

Spring pressure: 3.001 - 4.060 N
(306 - 414 g, 10.79 - 14.60 oz)

Min. length: 6.0 (0.236 in)
DISASSEMBLY

Gasoline engine model
(LR150-98B, LR160-78, LR160-78B)
1. Remove through bolts.
2. Separate front cover from rear cover.

Diesel engine model
(LR160-97B)

CAUTION:
Place packings and insulators in order so that they can be placed back in their original places or locations from which they were removed.

3. Remove pulley and fan.
   (1) Place rear cover side of rotor in a vice.
   (2) Remove pulley nut.

4. Remove setscrews from bearing retainer.

5. Remove attaching nuts and take out stator assembly.

6. Remove setscrews from bearing retainer and front bearing.

4. Separate front cover from rear cover. Use serration cap (Attach vinyl tape) to prevent scratching oil seal.

1. Remove vacuum pump assembly.
   Refer to Section BR for vacuum pump.

2. Remove through bolts.

3. Remove brushes from brush holder.

5. Remove pulley and fan.
   (1) Place rear cover side of rotor in a vice.
   (2) Remove pulley nut.
7. Remove brush holder fixing screws and diode assembly attaching nuts.
   Take out stator assembly together with diode assembly.

   **Stator**
   Disconnect stator coil lead wires from diode terminals.

3. Remove brush from brush holder.

   **Rotor**
   Pull rear bearing off from rotor assembly with a press or bearing puller.
   Once removed, bearing cannot be reused. Replace with a new one.

   **Replacement of oil seal:**
   **Only diesel engine model**
   If oil leaks from oil seal or any abnormalities are found after inspection, replace oil seal.
   1. Pry off oil seal.

   **Application**
   2. Apply engine oil to seal and install oil seal in position.

   **Replacement of brush (On vehicle):**
   **Only diesel engine model**
   1. Disconnect battery ground cable.
   2. Remove brush cover.
   - No continuity ... Replace rotor.

   **INSPECTION**
   **Rotor**
2. Insulation test

- Continuity exists ... Replace rotor.

3. Check slip ring for wear.
   Slip ring outer diameter:
   More than 30 mm (1.18 in)
   If necessary, replace rotor assembly.

Diode

Perform a continuity test on diodes in both directions, using an ohmmeter.

<table>
<thead>
<tr>
<th>Circuit tester terminal</th>
<th>Conduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Negative</td>
</tr>
<tr>
<td>(+) plate Holder plate</td>
<td>Diode terminal</td>
</tr>
<tr>
<td>Diode terminal</td>
<td>(+) plate Holder plate</td>
</tr>
<tr>
<td>(-) plate Rear cover</td>
<td>Diode terminal</td>
</tr>
<tr>
<td>Diode terminal</td>
<td>(-) plate Rear cover</td>
</tr>
</tbody>
</table>

Some ohmmeters use a reverse polarity, in which case continuity will be observed exactly opposite from the chart above.

Sub-diode

- Conduction test is N.G. ... Replace diode assembly.

Brush

1. Check smooth movement of brush.
   - Not smooth ... Check brush holder and clean.
2. Check brush for wear.

Positive diode

- Conduction test is N.G. ... Replace diode assembly.

Gasoline engine model

Wear limit line

Diesel engine model

Wear limit line

3. Check brush pig tail for damage.
   - Damaged ... Replace.
4. Check brush spring pressure.
   Measure brush spring pressure with brush projected approximately 2 mm (0.08 in) from brush holder.

Stator

1. Continuity test

- No continuity ... Replace stator.

2. Ground test

- Continuity exists ... Replace stator.
Spring pressure:
Gasoline engine model
2.501 - 3.383 N
(256 - 345 g,
8.99 - 12.17 oz)
Diesel engine model
3.001 - 4.060 N
(306 - 414 g,
10.79 - 14.60 oz)

When brush is worn, pressure decreases approximately 0.196 N (20 g,
0.71 oz) per 1 mm (0.04 in) wear.

(2) Coil lead wire 1.5 times around terminal groove. Solder outside of terminal.
When soldering, be careful not to let solder adhere to insulating tube as it will weaken the tube and cause it to break.

Oil seals (Only diesel engine model)
Check oil seal for wear, cracks or deformation. Replace if necessary.

ASSEMBLY
Gasoline engine model
(LR150-98B, LR160-78,
LR160-78B)
Assemble alternator in the reverse order of disassembly, noting the following:
1. When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.
2. When soldering brush lead wire, observe the following:
   (1) Position brush so that it extends 11 mm (0.43 in) from brush holder.
   (2) Before installing front and rear sides of alternator, push brush up with fingers and retain brush, by inserting brush lift wire into brush lift hole from outside.

5. After installing front and rear sides of alternator, pull brush lift wire by pushing toward center.
Do not pull brush lift by pushing toward outside of cover as it will damage slip ring sliding surface.

6. Tighten through bolts.

Diesel engine model
(LR160-97B)
Assemble alternator in the reverse order of disassembly, noting the following:
1. When soldering each stator coil lead wire to diode assembly terminal, carry out the operation as fast as possible.
2. After assembling front and rear sides of covers, install brushes.

\[
\begin{align*}
\text{t: Brush holder} & \quad 3.1 \text{ to } 3.9 \text{ N-m} \\
& \quad (0.32 \text{ to } 0.40 \text{ kg-m, } \\
& \quad 2.3 \text{ to } 2.9 \text{ ft-lb}) \\
\text{Brush holder and IC regulator} & \quad 3.1 \text{ to } 3.9 \text{ N-m} \\
& \quad (0.32 \text{ to } 0.40 \text{ kg-m, } \\
& \quad 2.3 \text{ to } 2.9 \text{ ft-lb}) \\
\text{Bearing retainer} & \quad 3.1 \text{ to } 3.9 \text{ N-m} \\
& \quad (0.32 \text{ to } 0.40 \text{ kg-m, } \\
& \quad 2.3 \text{ to } 2.9 \text{ ft-lb}) \\
\text{Pulley nut} & \quad 44 \text{ to } 59 \text{ N-m} \\
& \quad (4.5 \text{ to } 6.0 \text{ kg-m, } \\
& \quad 33 \text{ to } 43 \text{ ft-lb}) \\
\text{V-groove deflection: } & \quad 0.3 \text{ mm (0.012 in)} \\
\text{Through bolts} & \quad 3.1 \text{ to } 3.9 \text{ N-m} \\
& \quad (0.32 \text{ to } 0.40 \text{ kg-m, } \\
& \quad 2.3 \text{ to } 2.9 \text{ ft-lb}) \\
\text{Vacuum pump fixing bolt} & \quad 6 \text{ to } 7 \text{ N-m} \\
& \quad (0.6 \text{ to } 0.7 \text{ kg-m, } \\
& \quad 4.3 \text{ to } 5.1 \text{ ft-lb})
\end{align*}
\]

3. When installing the regulator, reverse order of removal, noting the following:
(1) Put IC regulator on brush holder and press-fit bolts using hand press.
(2) Stake rivets using Tool.

**REPLACEMENT**

Gasoline engine model (LR150-98B, LR160-78, LR160-78B)

Removal should be done only when IC regulator is being replaced.
1. Remove rivet and solder.
2. Remove the terminal's solder and take out bolts.

Diesel engine model (LR160-97B)
1. Disconnect terminal block from diode assembly.

**IC VOLTAGE REGULATOR**

**DESCRIPTION**

The regulator consists essentially of integrated circuits incorporating transistors. These transistors interrupt and admit current flow to the alternator rotor coil, thus maintaining its output voltage at a constant value. Unlike in a mechanical type regulator, an electronic relay employing transistors is utilized. These transistors are enclosed in a very compact, sealed case. On the charge warning lamp circuit, a diode monitors generating voltage at the stator so that when the monitored voltage and charging voltage are equal during re-charging, the charge warning lamp is turned off. Accordingly, a charge warning relay is not employed in this circuit.
3. Solder the terminal of regulator and terminal block connection.
4. Install terminal block (IC regulator).

### SERVICE DATA AND SPECIFICATIONS (S.D.S.)

#### ALTERNATOR

<table>
<thead>
<tr>
<th></th>
<th>LR150-98B</th>
<th>LR160-78, LR160-78B</th>
<th>LR160-97B, LR150-133E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Applied model</strong></td>
<td>Gasoline engine model</td>
<td>Diesel engine model</td>
<td></td>
</tr>
<tr>
<td></td>
<td>U.S.A.</td>
<td>Canada, Camper and U.S.A. option</td>
<td></td>
</tr>
<tr>
<td>Nominal rating</td>
<td>V·A</td>
<td>12·50</td>
<td>12·60</td>
</tr>
<tr>
<td>Ground polarity</td>
<td></td>
<td>Negative</td>
<td></td>
</tr>
<tr>
<td>Minimum revolution under no-load (When 14 volts is applied) rpm</td>
<td>Less than 1,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hot output current A/rpm</td>
<td>More than 40/2,500</td>
<td>More than 50/5,000</td>
<td>More than 16/1,300</td>
</tr>
<tr>
<td>Regulated output voltage V</td>
<td>14.4 - 15.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wear limit length of brush mm (in)</td>
<td>More than 7 (0.28)</td>
<td>More than 6 (0.24)</td>
<td></td>
</tr>
<tr>
<td>Brush spring pressure N (g, oz)</td>
<td>2.501 - 3.383 (255 - 345, 8.99 - 12.17)</td>
<td>3.001 - 4.060 (306 - 414, 10.79 - 14.63)</td>
<td></td>
</tr>
<tr>
<td>Slip ring outer diameter mm (in)</td>
<td>More than 30 (1.18)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CAUTION: Before starting to work, be sure to turn ignition switch “OFF” and then disconnect battery ground cable.

SCHEMATIC

WIRING DIAGRAM
IC IGNITION SYSTEM TROUBLE-SHOOTING

ELECTRICAL SYSTEM – Ignition System (Gasoline engine model)

Engine turns erratically.
- Check ignition timing.
  - N.G.
    - Adjust.
  - O.K.

Engine turns but does not start.
- Check air gap between reductor and stator.
  - N.G.
    - Check for burned or fouled spark plug.
      - N.G.
        - Clean or replace.
      - O.K.
        - Check fuel system.
    - O.K.

Attach adapter *1 to high tension cable and position tip of adapter approx. 6 mm (0.24 in) away from cylinder block. With adapter held in that position, crank engine to see if spark jumps across gaps between tip and cylinder block at regular intervals.

Before cranking, disconnect harness connector to anti-dieseling solenoid. Before operation, make sure there is no inflammable.

Check IC ignition system.
IC Ignition System is best checked using J-26350 Transistor Ignition Analyzer. However, if an analyzer is not available, a volt-ohm-milliammeter (V.O.M.) may be used to diagnose transistor ignition malfunctions. While this method requires more time, it can nevertheless provide accurate results. Follow the steps in the sequence indicated. If a fault is found, correct the problem before continuing. If all tests indicate “O.K.” replace the IC Ignition Unit. DO NOT REPLACE THE UNIT UNTIL ALL TESTS HAVE BEEN COMPLETED AND INDICATE “O.K.”.

WARNING:
When current is flowing, never touch with bare hand high tension cables or any other parts with high voltage. If parts are moist, touching them could cause an electric shock, even if they are insulated. Always wear dry, well-insulated gloves or wrap affected parts with dry cloth before handling.

*1:
Preparation of spark plug for checking
Many things can be utilized as an adapter. However, it is recommended that a used spark plug whose threaded portion has been half cut off as shown in the figure be utilized.

NOTE:
1. When performing the following tests, use a multimeter which can measure accurately in the following ranges; 0 to 20V. D.C.; 0 to 1000Ω; 0 to 10V A.C.; 0 to 50,000Ω.
2. If possible, start the vehicles and let it run for 5 to 15 minutes with the hood closed. This will bring all components to normal operating temperature, and will make it easier to diagnose intermittent problems.
3. It is not necessary to disconnect the harness connectors when performing the tests which follow. Simply insert the meter probes into the back of appropriate connector cavity.

Go to Test Table.
# TEST TABLE

<table>
<thead>
<tr>
<th>TEST</th>
<th>TEST METHOD</th>
<th>CONDITIONS</th>
<th>RESULT</th>
<th>ACTION</th>
</tr>
</thead>
</table>
| 1. Battery Voltage (no load) | Reading 12 volts | 1. Ignition key in "OFF" position.  
2. Connect voltmeter as illustrated and set to appropriate scale.  
3. Read and record battery voltage reading.  
Battery voltage | 11.5 - 12.5 volts | Battery charging system or starting system – Faulty. Refer to applicable sections in Service Manual to correct the situation. |
| 2. Battery Cranking Voltage | Voltage reading greater than 9.6 volts | Battery O.K. Proceed to Step 3. |
| 3. Secondary Wiring | Resistance readings greater than 30,000 ohms | Batteries charging system or starting system – Faulty. Refer to applicable sections in Service Manual to correct the situation. |
| 4. Ignition Coil Secondary Circuit | Resistance readings less than 30,000 ohms | Distributor cap and high tension cables – O.K. Proceed to Step 4. |
| 5. Power Supply Circuit | Check both coils. | Replace high tension cable(s) and/or distributor cap as required. |

(Continued next page)
### ELECTRICAL SYSTEM – Ignition System (Gasoline engine model)

<table>
<thead>
<tr>
<th>TEST</th>
<th>TEST METHOD</th>
<th>CONDITIONS</th>
<th>RESULT</th>
<th>ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Power Supply Circuit</td>
<td>I.C. ignition unit</td>
<td>1. Connect voltmeter as illustrated and set to appropriate scale.</td>
<td>Voltage reading is less than 1 volt below battery cranking voltage and is greater than 8.6 volts.</td>
<td>Proceed to Step 7-A.</td>
</tr>
<tr>
<td>(Cranking)</td>
<td>“B” terminal</td>
<td>2. Pull out coil wire from distributor cap and ground it.</td>
<td>Voltage reading is more than 1 volt below battery cranking voltage and/or is below 8.6 volts.</td>
<td>Check ignition switch and wiring from switch to I.C. unit.</td>
</tr>
<tr>
<td></td>
<td>Housing</td>
<td>3. Turn key to &quot;START&quot; position and observe voltmeter while engine is cranking.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7-A. Ignition Primary Circuit</td>
<td>“I” terminal</td>
<td>1. Connect voltmeter as illustrated and set to appropriate scale.</td>
<td>11.5 - 12.5 volts</td>
<td>Proceed to Step 7-B.</td>
</tr>
<tr>
<td></td>
<td>I.C. ignition unit</td>
<td>2. Ignition key in “ON” position.</td>
<td>Below 11.5 volts</td>
<td>Proceed to Step 8.</td>
</tr>
<tr>
<td>7-B. Ignition Primary Circuit</td>
<td>“E” terminal</td>
<td>1. Connect voltmeter as illustrated and set to appropriate scale.</td>
<td>11.5 - 12.5 volts</td>
<td>Proceed to Step 9.</td>
</tr>
<tr>
<td></td>
<td>I.C. ignition unit</td>
<td>2. Ignition key in “ON” position.</td>
<td>Below 11.5 volts</td>
<td>Proceed to Step 8.</td>
</tr>
<tr>
<td>8. Ignition Coil Primary Circuit</td>
<td>Resistance: x 1 range</td>
<td>1. Ignition key in &quot;OFF&quot; position.</td>
<td>1.04 - 1.27 ohms</td>
<td>Ignition coil primary winding O.K.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Coil wire removed from coil.</td>
<td></td>
<td>Check ignition switch and wiring from ignition switch to coil and I.C. unit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Connect ohmmeter as illustrated.</td>
<td></td>
<td>Resistance reading not between 1.04 - 1.27 ohms |</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Check both coils.</td>
<td></td>
<td>Faulty ignition coil – replace.</td>
</tr>
<tr>
<td>9. I.C. Unit Ground Circuit</td>
<td>I.C. ignition unit</td>
<td>1. Connect voltmeter as illustrated and set to appropriate scale.</td>
<td>0.5 volts or less</td>
<td>Replace I.C. ignition unit assembly.</td>
</tr>
<tr>
<td></td>
<td>Housing</td>
<td>2. Pull out coil wire from distributor cap and ground it.</td>
<td></td>
<td>More than 0.5 volts |</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Turn key to &quot;START&quot; position and observe voltmeter while engine is cranking.</td>
<td></td>
<td>Check distributor ground, wiring from chassis ground to battery including battery cable connections.</td>
</tr>
</tbody>
</table>
CHECKING AND ADJUSTMENT

Cap and rotor head
Check cap and rotor head for dust, carbon deposits and cracks.

Advance mechanisms
Specifications
Refer to S.D.S.

Vacuum advance mechanism mechanical parts
1. Check vacuum inlet for signs of leakages at its connection.
2. Check vacuum diaphragm for air leak.
   If leak is found, replace vacuum controller assembly.
3. Inspect breaker plate for smooth moving.
   If plate does not move smoothly, this condition could be due to sticky steel balls or pivot. Apply grease to steel balls or, if necessary, replace breaker plate as an assembly.

Centrifugal advance mechanical parts
When cause of engine malfunction is traced to centrifugal advance mechanical parts, use distributor tester to check its characteristics.
If nothing is wrong with its characteristics, conceivable causes are faulty or abnormal wear of driving part or others. So do not disassemble it.
In the event of improper characteristics, check closely rotor shaft assembly, governor weight and shaft.
If any of the above parts are malfunctioning, replace the parts.

CAUTION:
When removing reluctor, be careful not to distort or damage the teeth.
3. Remove IC ignition unit and unit setter.
4. Remove stator and magnet.

5. Remove vacuum control assembly.
6. Remove breaker plate.
   Before disassembling, be sure to mark housing and fixing plate.

7. Remove fixing plate.
   Mark housing and fixing plate.

8. Remove collar.
9. Remove bearing retainer attaching bolts.

10. Remove rotor shaft and drive shaft.

DISASSEMBLY
1. Take off cap and remove rotor head.
2. Pry reluctor from shaft.
11. Mark rotor shaft and drive shaft. Remove packing from the top of rotor shaft and remove rotor shaft.

CAUTION:
Before installing IC ignition unit, make sure mating surfaces of IC ignition unit and distributor are clean and free from dust, sand and moisture.

1. Align match marks so that parts are assembled to their original positions.
2. Ensure that reluctor is properly oriented when installing on shaft. Always drive in new roll pin as shown in Figure.

12. Mark one of the governor springs and its bracket. Also mark one of the governor weights and its pivot pins.
13. Carefully unhook and remove governor springs.
14. Remove governor weights. Apply grease to governor weights, after disassembling.

ASSEMBLY
To assembly, reverse the order of disassembly. Carefully observe the following instruction.

4. Check the operation of governor before installing distributor on engine.
5. Properly center stator and reluctor before tightening.

Standard air gap:
0.3 - 0.5 mm
(0.012 - 0.020 in)

6. Adjust ignition timing after distributor is installed on engine.

3. Apply grease to the top of rotor shaft as required.
## ELECTRICAL SYSTEM – Ignition System (Gasoline engine model)

<table>
<thead>
<tr>
<th>DISTRIBUTOR</th>
<th>Type</th>
<th>Rotor head type</th>
<th>Firing order</th>
<th>Air gap (mm)</th>
<th>Cap insul. resistance (MΩ)</th>
<th>Rotor head insulation resistance (MΩ)</th>
<th>Cap carbon point length (mm)</th>
<th>Cap carbon point (°)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M/T except heavy duty and 4WD</td>
<td>4WD</td>
<td>Heavy duty</td>
<td>0.3 – 0.5 (0.012 – 0.020)</td>
<td>More than 50</td>
<td>More than 50</td>
<td>10 (0.38)</td>
<td>More than 50</td>
</tr>
<tr>
<td></td>
<td>California model</td>
<td>Heavy duty and 4WD</td>
<td>C-34-2</td>
<td>0°/10.7</td>
<td>0°/12.7</td>
<td>0°/19.7</td>
<td>0°/10.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>US model</td>
<td>4WD</td>
<td>Heavy duty</td>
<td>0°/12.7</td>
<td>0°/12.7</td>
<td>0°/19.7</td>
<td>0°/10.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Canada model</td>
<td>4WD</td>
<td>Heavy duty</td>
<td>0°/12.7</td>
<td>0°/12.7</td>
<td>0°/19.7</td>
<td>0°/10.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-California model</td>
<td>4WD</td>
<td>Heavy duty</td>
<td>0°/12.7</td>
<td>0°/12.7</td>
<td>0°/19.7</td>
<td>0°/10.7</td>
<td></td>
</tr>
</tbody>
</table>

### Relevant Information
- **Rotor head type**: 4WD
- **Firing order**: C-34-2
- **Air gap**: 0.3 – 0.5 (0.012 – 0.020)
- **Cap insul. resistance**: More than 50
- **Rotor head insulation resistance**: More than 50
- **Cap carbon point length**: 10 (0.38)
- **Cap carbon point**: More than 50

**Vacuum advance**
- **Distributor degree**: 19.3° (25°)
- **KPa (mmHg, inHg)**: 15°/6 (2°/1.6)
- **Cap carbon point (°)**: 0°/19.7

**Centrifugal advance**
- **Distributor degree**: 15°/15.7° (2°/2.04°)
- **Cap carbon point (°)**: 0°/19.7

---

**Notes**
- The table provides specifications for the ignition system of a gasoline engine model.
- The table includes details on rotor head type, firing order, air gap, cap insulation resistance, rotor head insulation resistance, cap carbon point length, and cap carbon point.
- Vacuum and centrifugal advance specifications are also included.
### Ignition System (Gasoline engine model) — Electrical System

#### Ignition Coil

<table>
<thead>
<tr>
<th>Type</th>
<th>CIT-46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied model</td>
<td>All gasoline engine model</td>
</tr>
<tr>
<td>Primary voltage</td>
<td>V</td>
</tr>
<tr>
<td>Primary resistance</td>
<td>Ω</td>
</tr>
<tr>
<td>Secondary resistance</td>
<td>kΩ</td>
</tr>
</tbody>
</table>

#### Spark Plug

<table>
<thead>
<tr>
<th>Applied model</th>
<th>All gasoline engine models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intake side</td>
<td>Exhaust side</td>
</tr>
<tr>
<td>Standard</td>
<td>BPR6ES</td>
</tr>
<tr>
<td>Hot</td>
<td>BPR5ES</td>
</tr>
<tr>
<td>Cold</td>
<td>BPR7ES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Intake side</th>
<th>Exhaust side</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BPR6ES</td>
<td>BPR5ES</td>
</tr>
<tr>
<td></td>
<td>BPR7ES</td>
<td>BPR7ES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size (Screw dia. x reach)</th>
<th>Intake side</th>
<th>Exhaust side</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm (in)</td>
<td>14 x 19 (0.55 x 0.75)</td>
<td>14 x 19 (0.55 x 0.75)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Plug gap</th>
<th>Intake side</th>
<th>Exhaust side</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm (in)</td>
<td>0.8 - 0.9 (0.031 - 0.036)</td>
<td>0.8 - 0.9 (0.031 - 0.036)</td>
</tr>
</tbody>
</table>
AUTO-GLOW SYSTEM

CAUTION: Before starting to work, be sure to turn ignition switch “OFF” and then disconnect battery ground cable.

SCHEMATIC

IGNITION SWITCH
GREEN
BLACK
FUSIBLE LINK
BATTERY
GLOW PLUG RELAY
GLOW PLUGS
AFTER-
GLow TIMER
WATER
TEMPERATURE
SENSOR
AUTO-GLOW
INDICATOR LAMP
To alternator (L)

WIRING DIAGRAM

IGNITION SWITCH
FUSIBLE LINK
WATER TEMPERATURE SENSOR
AFTER-
GLOW TIMER
GLOW PLUG RELAY
GLOW PLUGS
ALTERNATOR
AUTO-GLOW
INDICATOR LAMP

SEL1358
SELB668

EL 41
TROUBLE DIAGNOSES AND CORRECTIONS

TROUBLE-SHOOTING CHART

- When the ignition switch is turned "ON", the auto-glow indicator lamp should come on immediately.

From 1 to 48 seconds later (approx.), it should go out.
- The engine should start when the ignition switch is turned to "START" immediately after the indicator lamp has gone out.
- If any abnormalities are noticed, the starting system should be checked first. If the starting system is functioning properly, other parts or units which may be faulty should be checked.

The following charts depict various symptoms of faulty parts or units. However, they assume that the engine and fuel injection pump are both functioning properly.

When engine starts easily, bulb is burned out.

Auto-glow indicator lamp does not come on.

Check bulb.

NOT O.K. → Replace.

O.K. →

Check after-glow timer.

NOT O.K. → Replace.

O.K. →

Test lamp 3.4W

Check harness.
ELECTRICAL SYSTEM – Auto-glow System

Engine does not start.

Check supply voltage to glow plug.

More than 9 volts

Check glow plug.

Less than 9 volts

Does glow plug glow after approx. 15 seconds?

Check glow plug relay (1).

Replace.

Check after-glow timer.

Continuity exists.

Test lamp 3.4 W

Check harness.

Continuity does not exist.

Check glow plug relay (2).

Replace.

Continuity exists.

O.K.

Continuity does not exist.
GLOW PLUG

1. Remove each glow plug and apply a dc, 12-volt battery voltage to it. It should glow within 15 seconds after the voltage is applied.

2. Replace any glow plug that does not glow within 15 seconds.
   a. Do not continue to apply voltage to glow plug after it has glowed.
   b. Be careful not to burn yourself while applying voltage.
   c. Do not scratch glow plug pipe end.

GLOW PLUG RELAY

Remove glow plug relay and apply a 12-volt battery voltage to it in order to ensure that continuity exists between terminals ① and ②.

There must be continuity between terminals ③ and ④ when 12 volts dc is applied between ① and ②.
WATER TEMPERATURE SENSOR

Before checking after-glow timer, make sure that all of the other circuits are in good working order.

1. With after-glow timer connector securely connected, turn ignition switch from “OFF” to “ON”.
   (1) Auto-glow indicator lamp should illuminate. If it doesn’t, find out if voltage is being produced between terminals shown in Figure below.

2. Check length of time required to preheat glow plug. If the output voltage measured as described above corresponds approximately to “pre-heating time characteristics” indicated in Figure below, then system is normal.

   “Preheating time” refers to the minimum length of time required for glow plugs to preheat. Consequently, after-glow timer may be considered “in good order” if the output voltage measured as described above is produced within this minimum period of time.

   ![](chart)

   * Water temperature
   ** Resistance (Approx.)

3. Check the after-glow function. To do this, measure both voltage produced between terminals (indicated in Figure below) and the length of time required to produce the output voltage, when key switch is returned to “ON” from “START”.

   Lead wire should be disconnected from “S” terminal of starter motor while measurements are being made.

AFTER-GLOW TIMER

<table>
<thead>
<tr>
<th>Temperature °C (°F)</th>
<th>Resistance kΩ</th>
</tr>
</thead>
<tbody>
<tr>
<td>-10 (14)</td>
<td>7.0 - 11.4</td>
</tr>
<tr>
<td>20 (68)</td>
<td>2.1 - 2.9</td>
</tr>
<tr>
<td>50 (122)</td>
<td>0.68 - 1.00</td>
</tr>
</tbody>
</table>

(2) Connect terminals (shown in Figure below) and measure the output voltage using a voltmeter.
When the ignition switch is turned to “START”, the fuel injection control unit activates. This permits an electrical current to flow in sequence via rotor A of the fuel injection pump controller, from terminal 0 to rotor A and terminal C, causing the fuel injection controller motor to run.

As the motor runs, rotor A rotates and, when it reaches its start position, current flow between terminal 0 and C is broken, which stops the motor’s operation. The controller is thus brought to its [START] position.

When the starting switch is turned to “ON” position, the fuel injection pump controller will activate and is then set at its [DRIVE] position.
When the ignition switch is turned to “OFF” or when the oil pressure switch turns “ON”, the fuel injection pump control unit will activate. When this happens, current flows in sequence through terminal S, rotor A and terminal C, causing the controller’s motor to rotate as well as rotor A. As the rotor reaches the stop position, current flow between terminals S and C is broken and the motor will then stop. The controller is thus set at its STOP position.
ENGINE DOES NOT START.

Turn ignition switch to START to ensure that injection pump control lever moves to START position.

Yes: Check fuel system, glow plugs, etc.

No: Check whether connecting rod is disengaged.

Yes: Connect.

No: Check injection pump controller for any irregularities.

Yes: Replace.

No: Check injection pump control unit (D.P.C. module) for any irregularities.

Yes: Replace injection pump control unit (D.P.C. module).

No: Check wiring harness, ignition switch and oil pressure switch.

*1: Whenever injection pump controller is replaced, disconnect 6-pin connector from injection pump control unit (D.P.C. module) and connect again, then check operation of injection pump controller.
Case 2

**ENGINE STARTS BUT SOON STOPS.**

- **After engine starts, turn ignition switch to ON to ensure that injection pump control lever moves to DRIVE position.**
  - **Yes** → Check fuel system, venturi, etc.
  - **No**
    - **With ignition switch ON, disconnect oil pressure switch connector to see if injection pump control lever remains in DRIVE position.**
      - **Yes** → Check oil pressure lines and oil pressure switch.
      - **No**
        - **Check injection pump controller for any irregularities.**
          - **Yes** → *1 Replace injection pump controller.*
          - **No**
            - **Check injection pump control unit (D.P.C. module) for any irregularities.**
              - **Yes** → Replace injection pump control unit (D.P.C. module).
              - **No**
                - **Check wiring harness and ignition switch.**

*1: Whenever injection pump controller is replaced, disconnect 6-pin connector from injection pump control unit (D.P.C. module) and connect again, then check operation of injection pump controller.*
**Case 3**

ENGINE CONTINUES TO RUN WHEN IGNITION SWITCH IS TURNED OFF.

Check whether connecting rod is disengaged.

- Yes → Connect.
- No →
  
  Check injection pump controller for any irregularities.
  
  - Yes → *1 Replace injection pump controller.
  - No →
    
    Check injection pump control unit (D.P.C. module) for any irregularities.
    
    - Yes → Replace injection pump control unit (D.P.C. module).
    - No → Check wiring harness and ignition switch.

*1: Whenever injection pump controller is replaced, disconnect 6-pin connector from injection pump control unit (D.P.C. module) and connect again, then check operation of injection pump controller.

**Case 4**

ENGINE CONTINUES TO RUN IN REVERSE DIRECTION.

Turn ignition switch off to see if engine stops.

- Yes →
  
  Disconnect and ground oil pressure switch connector with a suitable lead wire to see if engine stops.
  
  - Yes → Check oil pressure switch, oil pressure lines, etc.
  - No → Check harness and ignition switch.
- No → Refer to Case 3 above.
INJECTION PUMP CONTROL SYSTEM INSPECTION

ENTIRE SYSTEM
Inspect entire system for any irregularities. If any are found, refer to Trouble Diagnoses and Corrections chart in order to locate problems' cause and eliminate them as required.

(1) "START" operation
Turn ignition key to "START" in order to ensure that injection pump control lever moves to the start position.

(2) "DRIVE" operation
Turn ignition key to "ON" in order to ensure that injection pump control lever moves to the drive position.

(3) "STOP" operation
1. Turn ignition switch to "OFF" in order to ensure that injection pump control lever moves to the stop position.
2. Start engine. Disconnect and ground oil pressure switch connector with a suitable lead wire to see if injection pump control lever moves to the stop position. Failure to observe the order of these test procedures may lead to incorrect test results.
If results of the following tests are satisfactory as indicated below, injection pump control unit (D.P.C. module) is functioning properly.

Be careful not to connect lead wires to the wrong terminals as this will damage injection pump control unit (D.P.C. module).

Test A
When lead wire is connected between:
Terminals 12 and 10, or 12 and 8: Test lamp comes on and goes out in about 15 seconds.
Terminals 2 and 11, or 12 and 9: Test lamp should not come on.

INJECTION PUMP CONTROL UNIT (D.P.C. module)
Injection pump control unit (D.P.C. module) is installed on the right side of hood ledge. To check injection pump control unit (D.P.C. module), fabricate adapters as shown in the following illustration, and utilize the following procedures in the order listed.
**Test B**

Connect positive lead wire to terminals 2 and 3, and connect negative lead wire to terminal 4.

When lead wire is connected between:
Terminals 12 and 9, or 12 and 8:
Test lamp comes on and goes out in about 15 seconds.
Terminals 12 and 11, or 12 and 10:
Test lamp should not come on.

**Test C**

Connect lead wire between 12 and 9, and then disconnect lead wire from terminal 3.
Test lamp should go out in 10 seconds.

**Test D**

When lead wire is connected between:
Terminals 12 and 10, or 12 and 8:
Test lamp comes on and goes out in about 15 seconds.
Terminals 12 and 11, or 12 and 9:
Test lamp should not come on.

**Test E**

Disconnect lead wire from terminal 4.
When lead wire is connected between:
Terminals 12 and 11, or 12 and 8:
Test lamp comes on and goes out in about 15 seconds.
Terminals 12 and 10, or 12 and 9:
Test lamp should not come on.

**Injection Pump Controller**

**Test A**

Connect positive lead wire to terminal 13, and negative lead wire to terminal 14.
Injection pump controller motor should run.

<table>
<thead>
<tr>
<th>Connect terminal A to:</th>
<th>Corresponding position of injection pump control lever</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 9</td>
<td>START</td>
</tr>
<tr>
<td>Terminal 10</td>
<td>STOP</td>
</tr>
<tr>
<td>Terminal 11</td>
<td>DRIVE</td>
</tr>
</tbody>
</table>

Be careful not to connect lead wire to the wrong terminals as this will damage injection pump controller.
LIGHTING SYSTEM

CAUTION: Before starting to work, be sure to turn ignition switch “OFF” and then disconnect battery ground cable.

BULBS

BULB SPECIFICATION

Do not touch the glass surface of the halogen bulb with bare hands or dirty gloves, etc.

<table>
<thead>
<tr>
<th>Item</th>
<th>Wattage (W)</th>
<th>SAE trade number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headlamp (Sealed beam)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inner—High</td>
<td>50</td>
<td>4651</td>
</tr>
<tr>
<td>Outer—High/Low</td>
<td>40/60</td>
<td>4652</td>
</tr>
<tr>
<td>Halogen headlamp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Sealed beam)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inner (Type 1)—High</td>
<td>50</td>
<td>H4651</td>
</tr>
<tr>
<td>Outer (Type 2)—High/Low</td>
<td>35/35</td>
<td>H4656</td>
</tr>
<tr>
<td>Front combination lamp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turn signal</td>
<td>27</td>
<td>1156</td>
</tr>
<tr>
<td>Clearance</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Side marker lamp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Rear</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Rear combination lamp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stop/Tail</td>
<td>27/8</td>
<td>1157</td>
</tr>
<tr>
<td>Turn signal</td>
<td>27</td>
<td>1156</td>
</tr>
<tr>
<td>Back-up</td>
<td>27</td>
<td>1156</td>
</tr>
<tr>
<td>License plate lamp</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Room lamp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Except King Cab</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>King Cab</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Combination meter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illumination lamp</td>
<td>3.4</td>
<td></td>
</tr>
<tr>
<td>Warning lamp</td>
<td>3.4</td>
<td>158</td>
</tr>
<tr>
<td>Cigarette lighter illumination lamp</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>4WD oil pressure gauge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>illumination lamp</td>
<td>3.4</td>
<td>158</td>
</tr>
<tr>
<td>4WD voltmeter illumination lamp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.4</td>
<td>158</td>
<td></td>
</tr>
<tr>
<td>4WD indicator lamp</td>
<td>3.4</td>
<td>158</td>
</tr>
<tr>
<td>Heater (Air-con.) control</td>
<td>3.4</td>
<td>158</td>
</tr>
<tr>
<td>panel illumination lamp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radio illumination lamp</td>
<td>3.4</td>
<td>158</td>
</tr>
<tr>
<td>Selector lever illumination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>lamp (A/T models)</td>
<td>3.4</td>
<td>158</td>
</tr>
<tr>
<td>Rear window defogger switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>indicator lamp</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Rear window defogger switch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>illumination lamp</td>
<td>3.4</td>
<td>158</td>
</tr>
</tbody>
</table>

REPLACING BULB

COMBINATION SWITCH

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove horn pad.
3. Remove steering wheel.
4. Remove steering column cover.
5. Disconnect combination switch wires at connector.
7. Install combination switch in the reverse order of removal.
## TROUBLE DIAGNOSES AND CORRECTIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headlamps do not come on, either high or low beams.</td>
<td>Blown out fusible link (Green) or fuse (10A or 10A). Loose connection or open circuit. Faulty lighting switch. [High (low) beam comes on when 1 and 2 (1, 2 and 3) terminals of harness connector to combination switch are connected with test lead including 10A and 10A fuse].</td>
<td>Correct cause and replace fusible link or fuse. Check wiring and/or repair connection. Replace if necessary.</td>
</tr>
<tr>
<td>High beam cannot be switched to low beam or vice versa.</td>
<td>Faulty lighting switch. [High (low) beam comes on when 1 and 2 (1, 2 and 3) terminals of harness connector to combination switch are connected with test lead including 10A and 10A fuse].</td>
<td>Replace if necessary.</td>
</tr>
<tr>
<td>Headlamps dim.</td>
<td>Partly discharged or run-down battery. Inoperative charging system. Poor ground or loose connection.</td>
<td>Measure specific gravity of electrolyte and recharge or replace battery if necessary. Measure voltage at headlamp terminals with engine running. If it is less than 12.8V, check charging system for proper operation. Clean and/or tighten.</td>
</tr>
<tr>
<td>Headlamp lights on only one side.</td>
<td>Loose headlamp connection. Faulty headlamp beam.</td>
<td>Repair. Replace.</td>
</tr>
</tbody>
</table>

## LIGHTING SWITCH

**Inspection**

Test continuity through switch with an ohmmeter.
AIMING ADJUSTMENT

To adjust vertical aim, use adjusting screw on upper side of headlamp; and to adjust horizontal aim, use adjusting screw on side of headlamp.

Before making headlamp aiming adjustment, observe the following instructions.

a. Keep all tires inflated to correct pressures.

b. Place vehicle and tester on one and same flat surface.

c. See that there is no load in vehicle (coolant, engine oil filled up to correct level and full fuel tank) other than the driver (or equivalent weight placed in driver's position).

When performing headlamp aiming adjustment, use an aiming machine, aiming wall screen or headlamp tester. For operating instructions of any aimer, it should be in good repair, calibrated and used according to respective operation manuals supplied with the unit.

If any aimer is not available, aiming adjustment can be done as follows:

Low beam

Turn headlamp low beam on.

High beam

With type II unit lamps (outer lamps) covered, turn headlamps to high beam.
TAIL, CLEARANCE, SIDE MARKER AND LICENSE PLATE LAMPS

SCHEMATIC

FRONT SIDE MARKER LAMP

Removal and installation
1. Disconnect battery ground cable.
2. Remove front combination lamp.

3. Disconnect harness connector to side marker lamp.
4. Remove front side marker lamp.
5. Installation is in the reverse order of removal.

Connector to side marker lamp

SEL624

SEL625

SEL615A
TROUBLE DIAGNOSES AND CORRECTIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neither left nor right lamp lights.</td>
<td>Blown out fusible link (Black) or fuse (13 15A).</td>
<td>Correct cause and replace.</td>
</tr>
<tr>
<td></td>
<td>Loose connection or open circuit.</td>
<td>Check wiring and/or repair connection.</td>
</tr>
<tr>
<td></td>
<td>Faulty lighting switch.</td>
<td>Replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>[Lamps light when 4 and 5 terminals of harness connector to combination switch are connected with test lead including 13 15A fuse].</td>
<td></td>
</tr>
<tr>
<td>Lamp on only one side lights.</td>
<td>Burned out bulb.</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Loose bulb.</td>
<td>Correct.</td>
</tr>
<tr>
<td></td>
<td>Loose connection to lamp.</td>
<td>Correct.</td>
</tr>
</tbody>
</table>
ILLUMINATION LAMPS
SCHEMATIC

WIRING DIAGRAM

ILLUMINATION CONTROL UNIT

Removal and installation
1. Disconnect battery ground cable.
2. Pull out knob of switch.
3. Remove ring nut and disconnect harness connector.
4. Switch body can be taken out from behind instrument panel.
5. Installation is in the reverse order of removal.

Inspection
1. Connect test lamp between terminal 1 and positive (+) terminal.
2. Connect terminal 3 to positive (+) terminal, and terminal 2 to negative (−) terminal.
3. Turn control knob right or left, and brightness of test lamp will vary.

Be careful not to connect lead wires to incorrect terminals as this will damage the unit.
STOP AND BACK-UP LAMPS

SCHEMATIC

WIRING DIAGRAM


**TROUBLE DIAGNOSES AND CORRECTIONS**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stop lamp</strong></td>
<td>Blown out fusible link (Black or fuse (12 15A). Faulty stop lamp switch. Loose connection or open circuit.</td>
<td>Correct cause and replace. Conduct continuity test and replace if necessary. Check wiring and/or repair connection.</td>
</tr>
<tr>
<td>Lamp on only one side lights.</td>
<td>Burned out bulb. Loose bulb. Loose connection or open circuit.</td>
<td>Replace. Repair lamp socket. Check wiring and/or repair connection.</td>
</tr>
<tr>
<td><strong>Back-up lamp</strong></td>
<td>Faulty back-up lamp switch (M/T) or inhibitor switch (A/T). Blown out fusible link (Green) or fuse (4 15A). Loose connection or open circuit.</td>
<td>Conduct continuity test and replace if necessary. Correct cause and replace. Check wiring and/or repair connection.</td>
</tr>
<tr>
<td>Lamp on only one side lights.</td>
<td>Burned out bulb. Loose bulb. Loose connection or open circuit.</td>
<td>Replace. Repair lamp socket. Check wiring and/or repair connection.</td>
</tr>
</tbody>
</table>

**STOP LAMP SWITCH**

**Inspection**

Test continuity through stop lamp switch with a test lamp or ohmmeter. When plunger is pressed into switch assembly, stop lamp switch contacts are open. Contacts are closed when plunger is projected.

**BACK-UP LAMP SWITCH (M/T)**

Back-up lamp switch is installed on transmission.

**Inspection**

When transmission lever is in “R” position, there should be continuity between two terminals.

**INHIBITOR SWITCH (A/T)**

Refer to A/T section.

EL-62
## TROUBLE DIAGNOSES AND CORRECTIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn signals do not operate. (Hazard warning lamps operate).</td>
<td>Blown out fusible link (Green) or fuse (4 15A).</td>
<td>Correct cause and replace.</td>
</tr>
<tr>
<td></td>
<td>Loose connection or open circuit.</td>
<td>Check wiring and/or repair connection.</td>
</tr>
<tr>
<td></td>
<td>Faulty flasher unit.</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Faulty turn signal switch.</td>
<td>Conduct continuity test and replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>Faulty hazard switch.</td>
<td>Replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>[Turn signals operate when 1 and 2 terminals of harness connector to hazard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>switch are connected with test lead including 4 15A fuse].</td>
<td></td>
</tr>
<tr>
<td>Hazard warning lamps do not operate. (Turn signals operate).</td>
<td>Blown out fusible link (Black) or fuse (17 15A).</td>
<td>Correct cause and replace.</td>
</tr>
<tr>
<td></td>
<td>Faulty hazard warning flasher unit.</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Faulty hazard switch.</td>
<td>Replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>[Left (Right) side lamps operate when 3 and 4 (3 and 5) terminals of harness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>connector to hazard switch are connected with test lead including 2 15A fuse].</td>
<td></td>
</tr>
<tr>
<td>No flasher click is heard.</td>
<td>Burned out bulb.</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Loose connection.</td>
<td>Reconnect firmly.</td>
</tr>
<tr>
<td>Flasher cycle is too slow (Pilot lamp does not go out), or too fast.</td>
<td>Bulb other than specified wattage being used.</td>
<td>Replace with one specified.</td>
</tr>
<tr>
<td></td>
<td>Burned out bulbs.</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Loose connections.</td>
<td>Repair.</td>
</tr>
<tr>
<td></td>
<td>Faulty flasher unit.</td>
<td>Replace.</td>
</tr>
<tr>
<td>Flashing cycle is irregular.</td>
<td>Burned out bulb.</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Loose connection.</td>
<td>Repair.</td>
</tr>
<tr>
<td></td>
<td>Bulbs other than specified wattage being used.</td>
<td>Replace with one specified.</td>
</tr>
</tbody>
</table>

EL-84
TURN SIGNAL SWITCH

Removal and installation
Refer to Combination Switch.

Inspection
Test continuity through switch with a test lamp or ohmmeter.

HAZARD WARNING SWITCH

Removal and installation
1. Disconnect battery ground cable.
2. Remove steering column cover.
3. Remove hazard warning switch.
4. Installation is in the reverse order of removal.

Inspection
Test continuity through switch with an ohmmeter.
**(Room Lamp)**

**Schematic**

- **Battery**
- **Fuse 15A**
- **Room Lamp (Except King Cab)**
- **Door Switch (R.H.) (Except Standard)**
- **Door Switch L.H.**
- **Door Switch (L.H.)**

**Wiring Diagram**

- **Battery**
- **Fuse Block**
- **Room Lamp (Except King Cab)**
- **Room Lamp (King Cab)**
- **Door Switch (R.H.) (Except Standard)**

**Trouble Diagnoses and Corrections**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Correction action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamp does not light when door is opened.</td>
<td>Blown out fusible link (Black) or fuse (15A).</td>
<td>Correct cause and replace.</td>
</tr>
<tr>
<td></td>
<td>Burned out bulb.</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Loose bulb.</td>
<td>Correct.</td>
</tr>
<tr>
<td></td>
<td>Loose connection to lamp.</td>
<td>Correct.</td>
</tr>
<tr>
<td></td>
<td>Faulty door switch.</td>
<td>Replace if necessary.</td>
</tr>
<tr>
<td></td>
<td>Faulty room lamp switch.</td>
<td>Replace if necessary.</td>
</tr>
</tbody>
</table>

*EL-68*
COMBINATION METER

- Turn signal indicator lamp
- Speedometer
- Water temperature gauge
- Tachometer
- Parking brake warning lamp
- Seat belt warning lamp
- Glow indicator and sedimentor warning lamp (Diesel)
- High beam indicator lamp
- Oil pressure warning lamp
- Charge warning lamp
- Illumination lamp
- Turn signal indicator lamp (R.H.)
- Charge warning lamp
- Parking brake warning lamp
- Seat belt warning lamp
- Glow indicator and sedimentor warning lamp (Diesel)
- 4-wheel drive indicator lamp (4WD)
- Oil pressure warning lamp
- High beam indicator lamp

SCHEMATIC

[Diagram showing circuit connections and labels for each component as described in the text]
Meters, Gauges and Warning System — ELECTRICAL SYSTEM

REMOVAL AND INSTALLATION

1. Disconnect battery ground cable.
2. Remove cluster lid.
3. Remove combination meter assembly. Carefully pull out combination meter and disconnect connectors.
4. Install combination meter in the reverse order of removal.

DISASSEMBLY AND ASSEMBLY

- Fuel level gauge
- Clock
- Printed circuit board
- Lower housing
- Water temperature gauge
- Tachometer
- Speedometer
- Upper housing
- Cluster lid
4-WHEEL DRIVE INDICATOR LAMP

SCHEMATIC

WIRING DIAGRAM
**TROUBLE DIAGNOSES AND CORRECTIONS**

**4-WHEEL DRIVE INDICATOR LAMP**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator lamp does not glow when transfer shift lever is set in 4-wheel drive position.</td>
<td>Burned out indicator lamp bulb. Faulty transfer switch. Blown out fuse (4 15A).</td>
<td>Replace. Replace if necessary. Replace.</td>
</tr>
</tbody>
</table>
## VOLTMETER AND OIL PRESSURE GAUGE

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil pressure gauge</td>
<td>Faulty oil pressure sending unit or loose terminal connection.</td>
<td>Replace oil pressure sending unit or correct terminal connection.</td>
</tr>
<tr>
<td>Oil pressure gauge does not operate.</td>
<td>Faulty oil pressure gauge unit. (Gauge pointer returns to original position when ignition switch is turned off.)</td>
<td>Replace.</td>
</tr>
<tr>
<td>Gauge indicates only maximum pressure.</td>
<td>Faulty oil pressure gauge. (Gauge pointer indicates maximum pressure even after ignition switch is turned off.)</td>
<td>Replace.</td>
</tr>
<tr>
<td>Voltmeter</td>
<td>Faulty voltmeter. Loose or poor connection.</td>
<td>Replace. Check wiring and/or repair connection.</td>
</tr>
</tbody>
</table>

## SPEEDOMETER

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unusual sound occurs in response to increase in driving speed.</td>
<td>Excessively bent or twisted speedometer cable inner wire or lack of lubrication. Faulty speedometer.</td>
<td>Replace or lubricate. Replace.</td>
</tr>
<tr>
<td>Inaccurate speedometer indication.</td>
<td>Faulty speedometer.</td>
<td>Replace.</td>
</tr>
<tr>
<td>Inaccurate odometer operation.</td>
<td>Improperly meshed second and third gear or worn gears. Faulty feeding due to deformed odometer and pinion carrier.</td>
<td>Replace speedometer. Replace speedometer.</td>
</tr>
</tbody>
</table>
# Fuel Level Gauge

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel level gauge does not operate.</td>
<td>Faulty fuel tank gauge unit. (Pointer deflects when fuel tank gauge unit YW wire is grounded.) Faulty fuel level gauge. Loose connection or open circuit. Faulty voltage regulator built into water temperature gauge.</td>
<td>Replace fuel tank gauge unit. Replace. Check wiring and/or repair connection. Replace water temperature gauge.</td>
</tr>
<tr>
<td>Pointer indicates only “F” position.</td>
<td>Faulty fuel tank gauge unit. (Gauge pointer returns to original position when ignition switch is turned off.) Faulty fuel level gauge. (Gauge pointer indicates “F” position even after ignition switch has been turned off.)</td>
<td>Replace. Replace.</td>
</tr>
<tr>
<td>Fuel level gauge does not operate accurately.</td>
<td>Faulty fuel tank gauge unit. Faulty fuel level gauge. Poor or loose connection.</td>
<td>Replace. Replace fuel level gauge. Correct connector terminal contact.</td>
</tr>
</tbody>
</table>

# Water Temperature Gauge

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gauge does not operate.</td>
<td>Faulty thermal transmitter or loose terminal connection. (When wire to thermal transmitter is grounded, gauge pointer fluctuates.) Faulty water temperature gauge. Faulty voltage regulator built into water temperature gauge.</td>
<td>Replace thermal transmitter or correct terminal connection. Replace water temperature gauge. Replace water temperature gauge.</td>
</tr>
<tr>
<td>Gauge indicates only maximum temperature.</td>
<td>Faulty thermal transmitter. (Gauge pointer returns to original position when ignition switch is turned off.) Faulty water temperature gauge. (Gauge pointer indicates maximum temperature even after ignition switch is turned off.)</td>
<td>Replace thermal transmitter. Replace water temperature gauge.</td>
</tr>
<tr>
<td>Gauge does not operate accurately.</td>
<td>Faulty water temperature gauge. Loose or poor connection.</td>
<td>Replace water temperature gauge. Correct connector terminal contact.</td>
</tr>
</tbody>
</table>
# WARNING LAMPS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change warning lamp</td>
<td>Faulty charging system.</td>
<td>Inspect charging system.</td>
</tr>
<tr>
<td>Lamp does not go out when engine is started.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil pressure warning lamp</td>
<td>Faulty oil pressure switch or loose switch terminal connection.</td>
<td>Replace or correct connection.</td>
</tr>
<tr>
<td>Lamp does not light when ignition switch is set to “ON”.</td>
<td>(When lead wire connected to switch is grounded, warning lamp lights.)</td>
<td></td>
</tr>
<tr>
<td>Lamp does not go out while engine is being operated.</td>
<td>Lack of engine oil.</td>
<td>Check oil level and add oil as required.</td>
</tr>
<tr>
<td></td>
<td>Oil pressure too low.</td>
<td>Inspect engine oil pressure system.</td>
</tr>
<tr>
<td></td>
<td>Faulty oil pressure switch.</td>
<td>Replace.</td>
</tr>
<tr>
<td>Parking brake warning lamp</td>
<td>Faulty parking brake switch (When parking brake lever is released).</td>
<td>Replace.</td>
</tr>
<tr>
<td>Lamp does not go out.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glow indicator and sedimentor warning lamp</td>
<td>Faulty auto-glow system.</td>
<td>Inspect auto-glow system.</td>
</tr>
<tr>
<td>Glow indicator lamp has not come on.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto-glow indicator lamp does not come on.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sedimentor warning lamp</td>
<td>Burned out bulb.</td>
<td>Replace.</td>
</tr>
<tr>
<td>Lamp does not come on when water is mixed in fuel filter.</td>
<td>Faulty detector.</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Faulty sedimentor.</td>
<td>Replace.</td>
</tr>
</tbody>
</table>

# TACHOMETER

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tachometer pointer deflects.</td>
<td>Loose or poor connection.</td>
<td>Repair.</td>
</tr>
<tr>
<td></td>
<td>Faulty resistor.</td>
<td>Replace resistor.</td>
</tr>
<tr>
<td></td>
<td>Faulty tachometer.</td>
<td>Repair or replace tachometer.</td>
</tr>
<tr>
<td>Tachometer pointer will not move.</td>
<td>Loose or poor connection.</td>
<td>Repair.</td>
</tr>
<tr>
<td></td>
<td>Faulty tachometer.</td>
<td>Repair or replace tachometer.</td>
</tr>
<tr>
<td>Condition</td>
<td>Probable cause</td>
<td>Corrective action</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Buzzer does not sound and warning lamp does not glow with ignition switch on.</td>
<td>Faulty seat belt switch.</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Faulty seat belt warning unit.</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Loose connection or open circuit.</td>
<td>Correct connector terminal contacts.</td>
</tr>
<tr>
<td>Either buzzer or warning lamp does not operate with proper condition.</td>
<td>Loose connection or open circuit.</td>
<td>Correct connector terminal contacts.</td>
</tr>
<tr>
<td></td>
<td>Burnt bulb.</td>
<td>Replace.</td>
</tr>
<tr>
<td></td>
<td>Faulty seat belt warning unit (Built-in buzzer).</td>
<td>Replace.</td>
</tr>
</tbody>
</table>
WIPER AND WASHER

CAUTION: Before starting to work, be sure to turn ignition switch “OFF” and then disconnect battery ground cable.

WINDSHIELD WIPER AND WASHER

SCHEMATIC (Equipped with intermittent wiper)

WIRING DIAGRAM (Equipped with intermittent wiper)
## TROUBLE DIAGNOSES AND CORRECTIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windshield wiper does not operate.</td>
<td>Motor: Broken armature, worn motor brush or seized motor shaft.&lt;br&gt;Power supply and cable: Blown out fusible link (Green) or fuse (6 15A).&lt;br&gt;Switch: Improper switch contact.&lt;br&gt;Link: Foreign material interrupts movement of link mechanism.&lt;br&gt;Link: Disconnect link rod.&lt;br&gt;Link: Seized or rusted arm shaft.&lt;br&gt;</td>
<td>Motor: Replace motor.&lt;br&gt;Power supply and cable: Check short-circuit, burnt component inside motor or other part for operation, and correct problem.&lt;br&gt;Switch: Correct.&lt;br&gt;Link: Correct.&lt;br&gt;Link: Lubricate or replace arm shaft.</td>
</tr>
<tr>
<td>Windshield wiper operating speed is too slow.</td>
<td>Motor: Short-circuit of motor armature, worn motor brush or seized motor shaft.&lt;br&gt;Power supply and cable: Low source voltage.&lt;br&gt;Link: Humming occurs on motor in arm operating cycle due to seized arm shaft.&lt;br&gt;Switch: Improper switch contact.</td>
<td>Motor: Replace motor or lubricate bearing with engine oil.&lt;br&gt;Power supply and cable: Measure voltage, check other electrical parts for operation, and take corrective action for power supply if necessary.&lt;br&gt;Link: Lubricate or replace.&lt;br&gt;Switch: Conduct continuity test, and replace if necessary.</td>
</tr>
<tr>
<td>Windshield wiper speed cannot be adjusted correctly.</td>
<td>Motor: Motor brush for either low or high speed is worn.</td>
<td>Motor: Replace motor.</td>
</tr>
<tr>
<td>Windshield wiper does not stop correctly.</td>
<td>Stops anywhere.&lt;br&gt;Motor: Contaminated auto-return device contacts or improper contact due to foreign matter.</td>
<td>Motor: Remove auto-return device cover, and clean contacts carefully so as not to deform contacts plate.</td>
</tr>
<tr>
<td></td>
<td>Does not stop.&lt;br&gt;Motor: Incomplete auto-return device operation (Contact is not interrupted.)</td>
<td>Motor: Remove auto-return device cover, and correct contacts plate bending.</td>
</tr>
<tr>
<td>Washer motor does not operate when pushing washer switch on.</td>
<td>Blown out fusible link (Green) or fuse (6 15A).&lt;br&gt;Faulty switch.&lt;br&gt;Faulty washer motor.&lt;br&gt;Loose or poor connection contact at motor or switch.</td>
<td>Correct cause and replace fuse.&lt;br&gt;Replace.&lt;br&gt;Replace.&lt;br&gt;Repair.</td>
</tr>
<tr>
<td>Washer motor operate but washer fluid is not ejected.</td>
<td>Clogged washer nozzle.</td>
<td>Clean nozzle or replace.</td>
</tr>
</tbody>
</table>
## Intermittent windshield wiper

**The sign for corrective action**

A. Measure voltage across positive (+) and negative (−) terminals of intermittent amplifier with a circuit tester.

B. Check continuity of all wiper switch positions.

C. Check continuity of terminals of wiper motor, wiper switch and intermittent amplifier.

D. Check continuity in wiper motor circuit.

E. Alternator or battery is faulty.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wipers do not operate intermittently but operates at Low and High speeds.</td>
<td>• Line voltage below 10 volts&lt;br&gt;• Wiper switch faulty&lt;br&gt;• Wiring faulty&lt;br&gt;• Intermittent amplifier faulty</td>
<td>A: Replace if necessary.&lt;br&gt;B: Correct or replace if necessary.&lt;br&gt;A,C: Repair or replace if necessary. Replace.</td>
</tr>
<tr>
<td>Intermittent speed is too short for proper wiping.</td>
<td>• Line voltage too high&lt;br&gt;• Wiper motor (auto-return device) faulty&lt;br&gt;• Intermittent amplifier faulty</td>
<td>A: Replace if necessary.&lt;br&gt;D: Replace if necessary. Replace.</td>
</tr>
<tr>
<td>Intermittent speed is too long for proper wiping.</td>
<td>• Line voltage below 10 volts&lt;br&gt;• Wiper switch faulty&lt;br&gt;• Wiring faulty&lt;br&gt;• Intermittent amplifier faulty</td>
<td>A: Replace if necessary.&lt;br&gt;B: Correct or replace if necessary.&lt;br&gt;A,C: Repair or replace if necessary. Replace.</td>
</tr>
<tr>
<td>Wipers do not shut off.</td>
<td>• Wiper motor faulty&lt;br&gt;• Intermittent amplifier faulty</td>
<td>D: Replace if necessary. Replace.</td>
</tr>
<tr>
<td>Wipers operate intermittently with wiper switch OFF.</td>
<td>• Wiper switch faulty&lt;br&gt;• Wiring faulty&lt;br&gt;• Intermittent amplifier faulty</td>
<td>B: Correct or replace if necessary.&lt;br&gt;A,C: Repair or replace if necessary. Replace.</td>
</tr>
<tr>
<td>Intermittent speed is erratic.</td>
<td>• Line voltage fluctuation excessive&lt;br&gt;• Wiper switch faulty&lt;br&gt;• Wiring faulty&lt;br&gt;• Wiper motor faulty&lt;br&gt;• Intermittent amplifier faulty</td>
<td>E: Correct or replace if necessary.&lt;br&gt;B: Correct or replace if necessary.&lt;br&gt;A,C: Repair or replace if necessary. Replace.</td>
</tr>
<tr>
<td>Wipers make a complete wiping stroke only one time with wiper switch ON but do not continue operation.</td>
<td>• Line voltage below 10 volts&lt;br&gt;• Intermittent amplifier faulty</td>
<td>A: Replace if necessary. Replace.</td>
</tr>
<tr>
<td>Wiper motor is not interconnected when washer switch is depressed, but intermittent operation is normal.</td>
<td>• Connections poor&lt;br&gt;• Intermittent amplifier faulty</td>
<td>C: Repair or replace if necessary. Replace.</td>
</tr>
<tr>
<td>Wiper motor simultaneously operates (or: does not delay) when washer switch is depressed.</td>
<td>• Intermittent amplifier faulty</td>
<td>Replace.</td>
</tr>
<tr>
<td>Wipers do not make a complete wiping stroke when washer switch is first turned on and is quickly turned off.</td>
<td>• Intermittent amplifier faulty</td>
<td>Replace.</td>
</tr>
</tbody>
</table>
WINDSHIELD WIPER

WIPER AND WASHER SWITCH

Removal and installation
Refer to Combination Switch.

Inspection
Test continuity through switch with a test lamp or ohmmeter.
WASHER NOZZLE ADJUSTMENT

2. Connect positive lead wire to terminal ①, and ground lead wire to terminal ④. The motor should be run at low speed.

CAUTION:

a. Be sure to use only windshield washing solution. Never mix soap powder or detergent with solution.
b. To avoid improper windshield washer operation, do not operate windshield washer continuously for more than 30 seconds or without washer fluid. Normally, windshield washer should be operated for 10 seconds or less at one time.

2. Disconnect lead wire from terminal ②. Test lamp should go out and comes on in about 6 seconds.

3. Keep the motor running. Check continuity between terminals ② and ③. Continuity should repeat “ON” and “OFF” periodically.

WINDSHIELD WIPER MOTOR Inspection

1. There should be continuity between terminals ① and ④, and ① and ⑤.

INTERMITTENT AMPLIFIER Inspection

To check intermittent amplifier for proper operation, fabricate adapters shown in the following illustration, and utilize the following procedures in the order enumerated.
CAUTION: Before starting to work, be sure to turn ignition switch "OFF" and then disconnect battery ground cable.

HORN AND CLOCK
SCHEMATIC

WIRING DIAGRAM
# TROUBLE DIAGNOSES AND CORRECTIONS

## Horn

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neither high nor low horn operates.</td>
<td>Burnt fuse. (11 10A) Faulty horn button contact. [Horn sounds when 4 terminal of harness connector to combination switch is grounded.] Faulty horn relay. [Horn sounds when 1 and 5 terminals of main harness to horn relay are connected with a test lead including 10A fuse.] Loose connection or open circuit.</td>
<td>Correct cause and replace fuse. Repair horn button.</td>
</tr>
<tr>
<td>High (Low) horn does not operate.</td>
<td>Faulty horn or loose horn terminal connection. Break in wire to horn.</td>
<td>Correct horn terminal connection or replace horn. Repair.</td>
</tr>
<tr>
<td>Horn does not stop to sound.</td>
<td>Short-circuited horn button and/or horn button lead wire. [When harness connector is disconnected from combination switch, horn stops sounding.] Faulty horn relay.</td>
<td>Repair horn button or its wiring.</td>
</tr>
<tr>
<td>Reduce volume and/or tone quality.</td>
<td>Loose or poor connector contact. (Fuse, relay, horn and/or horn button.) Faulty horn.</td>
<td>Repair.</td>
</tr>
</tbody>
</table>

## HORN

**Removal and installation**

1. Disconnect battery ground cable.
2. Remove front combination light.
3. Remove horn.

![Horn diagram](SEL657)

4. Installation is in the reverse order of removal.

## HORN RELAY

**Inspection**

![Horn relay diagram](SEL668)

## CLOCK

**Removal and installation**

1. Disconnect battery ground cable.
2. Remove cluster lid and combination meter. Refer to Combination Meter.
3. Disassemble combination meter and then remove clock. Refer to Combination meter.
4. Installation is in the reverse order of removal.
TROUBLE DIAGNOSES AND CORRECTIONS (Radio)

Noise prevention chart

Position vehicle in an open area away from steel buildings, run engine, extend antenna to its maximum length, set volume control to maximum and set dial at a median point where no broadcasting wave is received.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Probable cause</th>
<th>Corrective action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition system</td>
<td>High tension cable,</td>
<td>Install new high tension cable.</td>
</tr>
<tr>
<td>Noise occurs when engine</td>
<td>Ignition coil.</td>
<td>Replace 0.5 μF capacitor installed to primary side terminal of ignition coil with new ones.</td>
</tr>
<tr>
<td>is operated.</td>
<td></td>
<td>Be careful not to install capacitor to secondary or primary terminal side. This will result in improper engine operation.</td>
</tr>
</tbody>
</table>

Charging system

Sound of alternating current present.

Alternator.

Replace 0.5 μF capacitor installed to charging terminal B.

Do not use a larger capacitor.

REAR WINDOW DEFOGGER SWITCH

Removal and installation

1. Disconnect battery ground cable.
2. Remove defogger switch by prying it off with a screwdriver and pull it out.
3. Disconnect harness connector.
4. Install defogger switch in the reverse order of removal.

Inspection

Test continuity through switch with ohmmeter or test lamp.

REAR WINDOW DEFOGGER FILAMENTS

Inspection

1. Connect probe of circuit tester (in Volt range) to middle portion of each filament. Engine should run.

2. Tester indicates 0 or 12 volts if a filament is burned out.

3. Burned out point can be detected by an abrupt deflection of tester pointer while moving probe to left and right along filament.
FILAMENT MAINTENANCE

Repair equipment
1. Conductive silver composition (Dupont No. 4817) or equivalent
2. Ruler, 30 cm (12 in) long
3. Drawing pen
4. Heat gun
5. Alcohol
6. Cloth

Repair procedure
1. Wipe broken heat wire and its surrounding area clean with a cloth dampened in alcohol.
2. Apply a small amount of conductive silver composition to tip of drawing pen.

Shake silver composition container before use.
3. Place ruler on glass along broken line. Deposit conductive silver composition on break with drawing pen. Slightly overlap existing heat wire on both sides [preferably 5 mm (0.20 in)] of the break.

4. Wipe clean silver composition from tip of drawing pen.
5. After repair has been completed, check repaired wire for continuity. This check should be conducted 10 minutes after silver composition is deposited.

Do not touch repaired area while test is being conducted.
6. Apply a constant stream of hot air directly to the repaired area for approximately 20 minutes with a heat gun. A minimum distance of 3 cm (1.2 in) should be kept between repaired area and hot air outlet. If a heat gun is not available, let the repaired area dry for 24 hours.

5. Installation is in the reverse order of removal.

Install plug securely.

CIGARETTE LIGHTER

Removal and installation
1. Disconnect battery ground cable.
2. Disconnect cigarette lighter connectors.
3. Remove lighter mounting nut and then remove cigarette lighter assembly.
4. Installation is in the reverse order of removal.

Antenna trimmer adjustment
The antenna trimmer should be adjusted in the following cases:
- Fading and weak AM reception.
- After installation of new antenna, feeder cable or radio receiver.

Before adjusting, be sure to check harness and antenna feeder cable connectors for proper connection.
1. Extend antenna completely.
2. Turn radio on, and turn volume control to increase speaker volume.
3. Push the AM selector button.
4. Tune in the weakest station (barely audible) on dial at the range around 14 (1,400 kHz).
5. Turn antenna trimmer to left or right slowly, and set it in the position where reception is strongest.

RADIO

Removal and installation
1. Disconnect battery ground cable.
2. Remove ash tray and heater/air conditioner control panel.
3. Remove plug and then remove radio mounting screws.

4. Draw out radio and disconnect radio harness connector and antenna cable.

CAUTION:
Do not turn antenna trimmer more than one-half turn.
CAUTION: Before starting to work, be sure to turn ignition switch “OFF” and then disconnect battery ground cable.
CAUTION: Before starting to work, be sure to turn ignition switch “OFF” and then disconnect battery ground cable.

CABLE COLORS

Cable colors are generally used as shown in the following table.

<table>
<thead>
<tr>
<th>Circuit system</th>
<th>Base color</th>
<th>Circuit system</th>
<th>Base color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting and ignition system</td>
<td>B (Black)</td>
<td>Instrument system</td>
<td>Y (Yellow)</td>
</tr>
<tr>
<td>Changing system</td>
<td>W (White)</td>
<td>Others</td>
<td>L (Blue)</td>
</tr>
<tr>
<td>Lighting system</td>
<td>R (Red)</td>
<td></td>
<td>Br (Brown)</td>
</tr>
<tr>
<td>Signal system</td>
<td>G (Green)</td>
<td>Grounding circuit</td>
<td>B (Black)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lg (Light green)</td>
</tr>
</tbody>
</table>

The main cable of each system is generally coded with a single color. These colors are represented by such letters as G, W, or Br. Minor items of each circuit's terminal are coded with a two-tone color as follows:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BW</td>
<td>Black with white stripe</td>
</tr>
<tr>
<td>LgR</td>
<td>Light green with red stripe</td>
</tr>
</tbody>
</table>

WIRING HARNESS LAYOUT
MAIN HARNESS (Passenger compartment side-B), ROOM LAMP CABLE, REAR WINDOW DEFOGGER CABLE AND CONSOLE HARNESS

Passenger compartment side - B

101M : To A/T selector illumination lamp (A/T models)
102M : To chassis harness
103M : To door switch R.H.
104M : To seat belt switch
105M : To door switch L.H.

Console harness

15 : To main harness (4WD)
20 : To oil pressure gauge (4WD)
25 : To voltmeter (4WD)
26 : To ground

Room lamp cable

16 : To main harness
26 : To room lamp (King Cab)
34 : To room lamp (Except King Cab)

Rear window defogger cable

36 : To main harness
37 : To rear window defogger switch
40 : To rear window defogger
50 : To ground

INSTRUMENT HARNESS

1 : To main harness 3W
   : (Connector color: White)
2 : To main harness 3W
   : (Connector color: Blue)
3 : To clock
4 : To combination meter
5 : To combination meter
6 : To tachometer
7 : To illumination control unit

10 : To cigarette lighter
11 : To cigarette lighter illumination lamp
12 : To radio

FM stereo (King Cab GL)

13 : To speaker harness
14 : To instrument harness
15 : To radio
16 : To radio
17 : To speaker L.H.
18 : To main harness

SEL830B
TRANSMISSION HARNESS

Manual transmission models

Gasoline engine

- (15) : To main harness
- (16) : To main harness
- (17) : To main harness
- (18) : To ground
- (21) : To alternator “E” terminal
- (22) : To alternator “L” and “S” terminal
- (23) : To alternator “B” terminal
- (24) : To oil pressure switch (2WD)
- (25) : To starter motor “S” terminal
- (26) : To back-up lamp switch
- (27) : To neutral switch
- (28) : To thermal transmitter
- (29) : To oil pressure sending unit
  (Models equipped with oil pressure gauge) (4WD)

Diesel engine

- (30) : To main harness
- (31) : To oil pressure switch
- (32) : To back-up lamp switch

Automatic transmission models

- (33) : To main harness
- (34) : To main harness
- (35) : To main harness
- (36) : To ground
- (37) : To alternator “E” terminal
- (38) : To alternator “L” and “S” terminal
- (39) : To alternator “B” terminal
- (40) : To oil pressure switch
- (41) : To starter motor “S” terminal
- (42) : To thermal transmitter
- (43) : To inhibitor switch
- (44) : To kickdown solenoid
CHASSIS HARNESS

16 : To main harness 157B
17 : To fuel tank gauge unit
18 : To tail harness 17
19 : To transfer switch (4WD)
20 : To electric fuel pump

TAIL HARNESS

17 : To chassis harness 15
18 : To rear combination lamp R.H.
19 : To ground
20 : To license plate lamp
21 : To rear combination lamp L.H.
22 : To license plate lamp L.H. (with step bumper)
23 : To license plate lamp R.H. (with step bumper)
### INCH TO METRIC CONVERSION TABLE
(Rounded-off for automotive use)

<table>
<thead>
<tr>
<th>inches</th>
<th>mm</th>
<th>inches</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>.100</td>
<td>2.54</td>
<td>.610</td>
<td>15.49</td>
</tr>
<tr>
<td>.110</td>
<td>2.79</td>
<td>.620</td>
<td>15.75</td>
</tr>
<tr>
<td>.120</td>
<td>3.05</td>
<td>.630</td>
<td>16.00</td>
</tr>
<tr>
<td>.130</td>
<td>3.30</td>
<td>.640</td>
<td>16.26</td>
</tr>
<tr>
<td>.140</td>
<td>3.56</td>
<td>.650</td>
<td>16.51</td>
</tr>
<tr>
<td>.150</td>
<td>3.81</td>
<td>.660</td>
<td>16.76</td>
</tr>
<tr>
<td>.160</td>
<td>4.06</td>
<td>.670</td>
<td>17.02</td>
</tr>
<tr>
<td>.170</td>
<td>4.32</td>
<td>.680</td>
<td>17.27</td>
</tr>
<tr>
<td>.180</td>
<td>4.57</td>
<td>.690</td>
<td>17.53</td>
</tr>
<tr>
<td>.190</td>
<td>4.83</td>
<td>.700</td>
<td>17.78</td>
</tr>
<tr>
<td>.200</td>
<td>5.08</td>
<td>.710</td>
<td>18.03</td>
</tr>
<tr>
<td>.210</td>
<td>5.33</td>
<td>.720</td>
<td>18.29</td>
</tr>
<tr>
<td>.220</td>
<td>5.59</td>
<td>.730</td>
<td>18.54</td>
</tr>
<tr>
<td>.230</td>
<td>5.84</td>
<td>.740</td>
<td>18.80</td>
</tr>
<tr>
<td>.240</td>
<td>6.10</td>
<td>.750</td>
<td>19.05</td>
</tr>
<tr>
<td>.250</td>
<td>6.35</td>
<td>.760</td>
<td>19.30</td>
</tr>
<tr>
<td>.260</td>
<td>6.60</td>
<td>.770</td>
<td>19.56</td>
</tr>
<tr>
<td>.270</td>
<td>6.86</td>
<td>.780</td>
<td>19.81</td>
</tr>
<tr>
<td>.280</td>
<td>7.11</td>
<td>.790</td>
<td>20.07</td>
</tr>
<tr>
<td>.290</td>
<td>7.37</td>
<td>.800</td>
<td>20.32</td>
</tr>
<tr>
<td>.300</td>
<td>7.62</td>
<td>.810</td>
<td>20.57</td>
</tr>
<tr>
<td>.310</td>
<td>7.87</td>
<td>.820</td>
<td>20.83</td>
</tr>
<tr>
<td>.320</td>
<td>8.13</td>
<td>.830</td>
<td>21.08</td>
</tr>
<tr>
<td>.330</td>
<td>8.38</td>
<td>.840</td>
<td>21.34</td>
</tr>
<tr>
<td>.340</td>
<td>8.64</td>
<td>.850</td>
<td>21.59</td>
</tr>
<tr>
<td>.350</td>
<td>8.89</td>
<td>.860</td>
<td>21.84</td>
</tr>
<tr>
<td>.360</td>
<td>9.14</td>
<td>.870</td>
<td>22.10</td>
</tr>
<tr>
<td>.370</td>
<td>9.40</td>
<td>.880</td>
<td>22.35</td>
</tr>
<tr>
<td>.380</td>
<td>9.65</td>
<td>.890</td>
<td>22.61</td>
</tr>
<tr>
<td>.390</td>
<td>9.91</td>
<td>.900</td>
<td>22.86</td>
</tr>
<tr>
<td>.400</td>
<td>10.16</td>
<td>.910</td>
<td>23.11</td>
</tr>
<tr>
<td>.410</td>
<td>10.41</td>
<td>.920</td>
<td>23.37</td>
</tr>
<tr>
<td>.420</td>
<td>10.67</td>
<td>.930</td>
<td>23.62</td>
</tr>
<tr>
<td>.430</td>
<td>10.92</td>
<td>.940</td>
<td>23.88</td>
</tr>
<tr>
<td>.440</td>
<td>11.18</td>
<td>.950</td>
<td>24.11</td>
</tr>
<tr>
<td>.450</td>
<td>11.43</td>
<td>.960</td>
<td>24.38</td>
</tr>
<tr>
<td>.460</td>
<td>11.68</td>
<td>.970</td>
<td>24.64</td>
</tr>
<tr>
<td>.470</td>
<td>11.94</td>
<td>.980</td>
<td>24.90</td>
</tr>
<tr>
<td>.480</td>
<td>12.19</td>
<td>.990</td>
<td>25.15</td>
</tr>
<tr>
<td>.490</td>
<td>12.45</td>
<td>1.000</td>
<td>25.40</td>
</tr>
<tr>
<td>.500</td>
<td>12.70</td>
<td>2.000</td>
<td>50.80</td>
</tr>
<tr>
<td>.510</td>
<td>12.95</td>
<td>3.000</td>
<td>76.20</td>
</tr>
<tr>
<td>.520</td>
<td>13.21</td>
<td>4.000</td>
<td>101.60</td>
</tr>
<tr>
<td>.530</td>
<td>13.46</td>
<td>5.000</td>
<td>127.00</td>
</tr>
<tr>
<td>.540</td>
<td>13.72</td>
<td>6.000</td>
<td>152.40</td>
</tr>
<tr>
<td>.550</td>
<td>13.97</td>
<td>7.000</td>
<td>177.80</td>
</tr>
<tr>
<td>.560</td>
<td>14.22</td>
<td>8.000</td>
<td>203.20</td>
</tr>
<tr>
<td>.570</td>
<td>14.48</td>
<td>9.000</td>
<td>228.60</td>
</tr>
<tr>
<td>.580</td>
<td>14.73</td>
<td>10.000</td>
<td>254.00</td>
</tr>
<tr>
<td>.590</td>
<td>14.99</td>
<td>20.000</td>
<td>508.00</td>
</tr>
<tr>
<td>.600</td>
<td>15.24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### METRIC TO INCH CONVERSION TABLE
(Rounded-off for automotive use)

<table>
<thead>
<tr>
<th>mm</th>
<th>inches</th>
<th>mm</th>
<th>inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.0394</td>
<td>51</td>
<td>2.008</td>
</tr>
<tr>
<td>2</td>
<td>.079</td>
<td>52</td>
<td>2.047</td>
</tr>
<tr>
<td>3</td>
<td>.118</td>
<td>53</td>
<td>2.087</td>
</tr>
<tr>
<td>4</td>
<td>.157</td>
<td>54</td>
<td>2.126</td>
</tr>
<tr>
<td>5</td>
<td>.197</td>
<td>55</td>
<td>2.165</td>
</tr>
<tr>
<td>6</td>
<td>.236</td>
<td>56</td>
<td>2.205</td>
</tr>
<tr>
<td>7</td>
<td>.276</td>
<td>57</td>
<td>2.244</td>
</tr>
<tr>
<td>8</td>
<td>.315</td>
<td>58</td>
<td>2.283</td>
</tr>
<tr>
<td>9</td>
<td>.354</td>
<td>59</td>
<td>2.323</td>
</tr>
<tr>
<td>10</td>
<td>.394</td>
<td>60</td>
<td>2.362</td>
</tr>
<tr>
<td>11</td>
<td>.433</td>
<td>61</td>
<td>2.402</td>
</tr>
<tr>
<td>12</td>
<td>.472</td>
<td>62</td>
<td>2.441</td>
</tr>
<tr>
<td>13</td>
<td>.512</td>
<td>63</td>
<td>2.480</td>
</tr>
<tr>
<td>14</td>
<td>.551</td>
<td>64</td>
<td>2.520</td>
</tr>
<tr>
<td>15</td>
<td>.591</td>
<td>65</td>
<td>2.559</td>
</tr>
<tr>
<td>16</td>
<td>.630</td>
<td>66</td>
<td>2.598</td>
</tr>
<tr>
<td>17</td>
<td>.669</td>
<td>67</td>
<td>2.638</td>
</tr>
<tr>
<td>18</td>
<td>.709</td>
<td>68</td>
<td>2.677</td>
</tr>
<tr>
<td>19</td>
<td>.748</td>
<td>69</td>
<td>2.717</td>
</tr>
<tr>
<td>20</td>
<td>.787</td>
<td>70</td>
<td>2.756</td>
</tr>
<tr>
<td>21</td>
<td>.827</td>
<td>71</td>
<td>2.795</td>
</tr>
<tr>
<td>22</td>
<td>.866</td>
<td>72</td>
<td>2.835</td>
</tr>
<tr>
<td>23</td>
<td>.906</td>
<td>73</td>
<td>2.874</td>
</tr>
<tr>
<td>24</td>
<td>.945</td>
<td>74</td>
<td>2.913</td>
</tr>
<tr>
<td>25</td>
<td>.984</td>
<td>75</td>
<td>2.953</td>
</tr>
<tr>
<td>26</td>
<td>1.024</td>
<td>76</td>
<td>2.992</td>
</tr>
<tr>
<td>27</td>
<td>1.063</td>
<td>77</td>
<td>3.031</td>
</tr>
<tr>
<td>28</td>
<td>1.102</td>
<td>78</td>
<td>3.071</td>
</tr>
<tr>
<td>29</td>
<td>1.142</td>
<td>79</td>
<td>3.110</td>
</tr>
<tr>
<td>30</td>
<td>1.181</td>
<td>80</td>
<td>3.150</td>
</tr>
<tr>
<td>31</td>
<td>1.220</td>
<td>81</td>
<td>3.189</td>
</tr>
<tr>
<td>32</td>
<td>1.260</td>
<td>82</td>
<td>3.228</td>
</tr>
<tr>
<td>33</td>
<td>1.299</td>
<td>83</td>
<td>3.268</td>
</tr>
<tr>
<td>34</td>
<td>1.339</td>
<td>84</td>
<td>3.307</td>
</tr>
<tr>
<td>35</td>
<td>1.378</td>
<td>85</td>
<td>3.346</td>
</tr>
<tr>
<td>36</td>
<td>1.417</td>
<td>86</td>
<td>3.386</td>
</tr>
<tr>
<td>37</td>
<td>1.457</td>
<td>87</td>
<td>3.425</td>
</tr>
<tr>
<td>38</td>
<td>1.496</td>
<td>88</td>
<td>3.465</td>
</tr>
<tr>
<td>39</td>
<td>1.535</td>
<td>89</td>
<td>3.504</td>
</tr>
<tr>
<td>40</td>
<td>1.575</td>
<td>90</td>
<td>3.543</td>
</tr>
<tr>
<td>41</td>
<td>1.614</td>
<td>91</td>
<td>3.583</td>
</tr>
<tr>
<td>42</td>
<td>1.654</td>
<td>92</td>
<td>3.622</td>
</tr>
<tr>
<td>43</td>
<td>1.693</td>
<td>93</td>
<td>3.661</td>
</tr>
<tr>
<td>44</td>
<td>1.732</td>
<td>94</td>
<td>3.701</td>
</tr>
<tr>
<td>45</td>
<td>1.772</td>
<td>95</td>
<td>3.740</td>
</tr>
<tr>
<td>46</td>
<td>1.811</td>
<td>96</td>
<td>3.780</td>
</tr>
<tr>
<td>47</td>
<td>1.850</td>
<td>97</td>
<td>3.819</td>
</tr>
<tr>
<td>48</td>
<td>1.890</td>
<td>98</td>
<td>3.858</td>
</tr>
<tr>
<td>49</td>
<td>1.929</td>
<td>99</td>
<td>3.898</td>
</tr>
<tr>
<td>50</td>
<td>1.969</td>
<td>100</td>
<td>3.937</td>
</tr>
</tbody>
</table>
**ENGINE TUNE-UP DATA**

<table>
<thead>
<tr>
<th>Item</th>
<th>U.S.A.</th>
<th>California</th>
<th>Non-California</th>
<th>Model</th>
<th>2WD</th>
<th>4WD</th>
<th>2WD</th>
<th>4WD</th>
<th>2WD</th>
<th>4WD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine model</td>
<td>222</td>
<td>222</td>
<td>222</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timing order</td>
<td>1.2-1.4</td>
<td>1.2-1.4</td>
<td>1.2-1.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idle speed</td>
<td>rpm</td>
<td>650-1000</td>
<td>650-1000</td>
<td>650-1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum rpm</td>
<td>rpm</td>
<td>650-1000</td>
<td>650-1000</td>
<td>650-1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ignition timing</td>
<td>degree</td>
<td>30°</td>
<td>30°</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idle setting</td>
<td>rpm</td>
<td>650-1000</td>
<td>650-1000</td>
<td>650-1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R.D.C. (at idle)</td>
<td>rpm</td>
<td>650-1000</td>
<td>650-1000</td>
<td>650-1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>booster adjustment</td>
<td>rpm</td>
<td>650-1000</td>
<td>650-1000</td>
<td>650-1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel pressure</td>
<td>kPa</td>
<td>80 - 100</td>
<td>80 - 100</td>
<td>80 - 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil pressure</td>
<td>kPa</td>
<td>80 - 100</td>
<td>80 - 100</td>
<td>80 - 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coolant pressure</td>
<td>kPa</td>
<td>80 - 100</td>
<td>80 - 100</td>
<td>80 - 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air pressure</td>
<td>kPa</td>
<td>80 - 100</td>
<td>80 - 100</td>
<td>80 - 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gear pressure</td>
<td>kPa</td>
<td>80 - 100</td>
<td>80 - 100</td>
<td>80 - 100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BRAKE**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit: mm (in)</th>
<th>4WD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disc brake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum thickness</td>
<td>2.0 (0.079)</td>
<td></td>
</tr>
<tr>
<td>Friction material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pad material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>Less than 0.055</td>
<td></td>
</tr>
<tr>
<td>Thickness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>Less than 0.95</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drum brake</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum thickness</td>
<td>1.0 (0.004)</td>
<td></td>
</tr>
<tr>
<td>Friction material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>Less than 0.5</td>
<td></td>
</tr>
<tr>
<td>Thickness</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CLUTCH PEDAL**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit: mm (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>170 (6.7)</td>
</tr>
<tr>
<td>Travel</td>
<td>1.3 (0.047)</td>
</tr>
</tbody>
</table>

**WHEEL ALIGNMENT (Unladen)**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit: mm (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toe-in</td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td></td>
</tr>
<tr>
<td>Wheelbase</td>
<td></td>
</tr>
<tr>
<td>Tire pressure</td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td></td>
</tr>
</tbody>
</table>

**ENGINE TUNE-UP DATA**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit: mm (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battery size</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td></td>
</tr>
<tr>
<td>Depth</td>
<td></td>
</tr>
</tbody>
</table>

**FRONT WHEEL BEARING**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit: mm (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner diameter</td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td></td>
</tr>
<tr>
<td>Outer diameter</td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td></td>
</tr>
</tbody>
</table>

**WHEEL AND TIRE**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit: mm (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tire pressure</td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td></td>
</tr>
<tr>
<td>Rim diameter</td>
<td></td>
</tr>
<tr>
<td>Value</td>
<td></td>
</tr>
</tbody>
</table>

**EXPORT SERVICE DEPARTMENT**

**NISSAN MOTOR CO., LTD.**

17-1, Ginza 6-Chome, Chuo-ku, Tokyo 104, Japan

Printed in Japan

**Edition:** August 1981

**Printing:** February 1982 (900663)

**Publication No.: SM2E-0720U0**