1988 ELECTRICAL
Alternators & Regulators - Nippondenso

Camry, Celica, Corolla, Cressida, Land Cruiser, MR2, Pickup, Supra, Tercel, Van, 4Runner

DESCRIPTION

Nippondenso 3-phase alternators utilize 3 positive and 3 negative diodes to rectify current. Charging system voltage is controlled by an internal Integrated Circuit (IC) voltage regulator. Some models use engine, ignition, and charging light relays.

TROUBLE SHOOTING

See TROUBLE SHOOTING - BASIC PROCEDURES article in GENERAL TROUBLE SHOOTING.

ADJUSTMENTS

BELT TENSION

See appropriate BELT ADJUSTMENT table.

4-CYLINDER BELT ADJUSTMENT (1)

<table>
<thead>
<tr>
<th>Application</th>
<th>New Belt</th>
<th>Used Belt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camry &amp; Celica</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternator (Without A/C)</td>
<td>125 (57)</td>
<td>95 (43)</td>
</tr>
<tr>
<td>Alternator (With A/C)</td>
<td>175 (79)</td>
<td>130 (59)</td>
</tr>
<tr>
<td>Power Steering</td>
<td>125 (57)</td>
<td>80 (36)</td>
</tr>
<tr>
<td>Corolla</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/C</td>
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<td></td>
</tr>
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<td>175 (79)</td>
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</tr>
<tr>
<td>A/C</td>
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<td>105 (48)</td>
</tr>
<tr>
<td>Pickup &amp; 4Runner</td>
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<td></td>
</tr>
<tr>
<td>“V” Ribbed (With A/C)</td>
<td>160 (73)</td>
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</tr>
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<td>“V” Ribbed (Without A/C)</td>
<td>105 (48)</td>
<td>85 (39)</td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Alternator</td>
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<td>100 (45)</td>
</tr>
<tr>
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(1) - Tension in Lbs. (Kg) Using Burroughs Tension Gauge.

6-CYLINDER BELT ADJUSTMENT (1)

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(1) - Tension in Lbs. (Kg) Using Burroughs Tension Gauge.

**TESTING (ON VEHICLE)**

**NO LOAD TEST**

1) Disconnect alternator terminal "B" wire. Using an ammeter and voltmeter, connect negative ammeter lead to disconnected alternator terminal "B" wire and positive lead to alternator terminal "B". Connect voltmeter positive lead to alternator terminal "B" and negative lead to ground. See Fig. 1.

![Fig. 1: Charging Circuit Testing](image)

2) Start engine and increase engine speed to 2000 RPM. Voltmeter and ammeter should read according to specification. See
3) If voltage is more than specified, replace IC regulator. If voltage is less than specified, ground "F" (full field) terminal. See Fig. 2, 3 or 4.

4) If voltage now climbs above specified range, replace IC regulator. If voltage remains below specified range, repair or replace alternator.

ALTERNATOR OUTPUT SPECIFICATIONS (1)

<table>
<thead>
<tr>
<th>Application</th>
<th>Amps</th>
<th>Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cressida</td>
<td>10</td>
<td>14.0-15.0</td>
</tr>
<tr>
<td>Land Cruiser</td>
<td>10</td>
<td>13.8-14.4</td>
</tr>
<tr>
<td>All Others</td>
<td>10</td>
<td>13.9-15.1</td>
</tr>
</tbody>
</table>

(1) - At 2000 RPM with temperature at 77°F (25°C).

Fig. 2: Alt Full Field Output Test (Camry, Celica, Corolla 4A-GE, Cressida, MR2, Supra)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

Fig. 3: Alt Full Field Output Test (Corolla 4A-F 4A-FE, Land Cruiser, Pickup, 4Runner)
Courtesy of Toyota Motor Sales, U.S.A., Inc.
LOAD TEST

NOTE: During load test procedure, if voltage reading is low due to a fully charged battery, it may be necessary to disable ignition system and crank engine for about 15 seconds to partially discharge battery.

1) Connect an ammeter as described in NO LOAD TEST step 1). Start engine. Turn on high beam headlights and place heater control on "HI".
2) Increase engine speed to 2000 RPM and check ammeter reading. Ammeter should read more than 30 amps. If amperage is less than specified, repair or replace alternator.

CONTROL RELAYS

NOTE: Charge light relay is located above right kick panel.

CHARGE LIGHT RELAY
Land Cruiser
1) Using an ohmmeter, connect ohmmeter positive lead to charge light relay terminal No. 4 and negative lead to terminal No. 3. See Fig. 5 "STEP 1".
2) Ohmmeter should indicate continuity. Reverse ohmmeter leads. Ohmmeter should now indicate no continuity.
3) Connect ohmmeter between terminals No. 1 and 2. Ohmmeter should indicate no continuity. If charge light relay does not test as indicated, replace relay.
4) Check charge light relay operation. Connect positive side of battery to terminal No. 3. Connect negative side of battery to terminal No. 4. See Fig. 5 "STEP 2". Check for continuity between charge light relay terminals No. 1 and 2. If relay does not test as indicated, replace relay.

Fig. 5: Testing Charge Light Relay (Land Cruiser)
Courtesy of Toyota Motor Sales, U.S.A., Inc.

ENGINE MAIN RELAY
Camry, Celica, Corolla, MR2 & Tercel

1) Using an ohmmeter, check for continuity between engine main relay terminals No. 3 and 5 and between terminals No. 1 and 2. Check that continuity does not exist between terminals No. 3 and 4. See Fig. 6 "STEP 1". If engine main relay does not test as indicated, replace relay.

NOTE: For location of engine main relay, see ENGINE MAIN RELAY LOCATION table.

2) Check engine main relay operation. Apply battery voltage between terminals No. 1 and 2. Using an ohmmeter, check that continuity exists between terminals No. 3 and 4. Check that continuity does not exist between terminals No. 3 and 5. See Fig. 6 "STEP 2". If main relay does not test as indicated, replace relay.

ENGINE MAIN RELAY LOCATION

<table>
<thead>
<tr>
<th>Application</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camry (2VZ-FE)</td>
<td>Left Rear Fender Panel</td>
</tr>
<tr>
<td>MR2</td>
<td>Engine Compartment No. 2 Junction Block</td>
</tr>
<tr>
<td>All Others</td>
<td>Engine Compartment Relay Box</td>
</tr>
</tbody>
</table>

Fig. 6: Testing Engine Main Relay
Courtesy of Toyota Motor Sales, U.S.A., Inc.

IGNITION RELAY
Land Cruiser & Van

1) Using an ohmmeter, check for continuity between ignition relay terminals No. 1 and 3. Check that continuity does not exist between terminals No. 2 and 4. See Fig. 7 "STEP 1".

2) On Land Cruiser, also check that continuity does not exist between terminals No. 3 and 4. If ignition relay does not test as indicated, replace relay.

NOTE: On Van, ignition relay is located under instrument panel, in relay box. On Land Cruiser, ignition relay is located in relay box, above left kick panel.

3) Check ignition relay operation. Apply battery voltage across terminals No. 1 and 3. Using an ohmmeter, check that continuity exists between terminals No. 2 and 4. See Fig. 7 "STEP 2".

4) On Land Cruiser, also check that continuity does not exist between terminals No. 3 and 4. If ignition relay does not test as indicated, replace relay.

Fig. 7: Testing Ignition Relay
Courtesy of Toyota Motor Sales, U.S.A., Inc.

BENCH TESTING
BRUSHES

1) Check for cracks and minimum brush length of .18-.22" (4.5-5.5 mm). Replace brushes if damaged or worn. Brushes should slide smoothly in holders. Install new springs when replacing brushes. Solder brush wire.

2) New brush exposed length should be .413" (10.5 mm). Old brush minimum exposed length not be less than .059" (1.5 mm).

ROTOR

1) Check rotor for open field windings by using an ohmmeter across slip rings. Rotor resistance should be 2.8-3.0 ohms.

2) Check rotor for shorts to ground by connecting ohmmeter between slip ring and rotor shaft. Ohmmeter should indicate no continuity. Check slip rings for wear or pitting.

3) Turn slip rings on lathe if necessary. Minimum slip ring diameter should not be less than .504" (12.8 mm). Check bearing and replace if necessary.

STATOR

Connect ohmmeter between 2 stator leads. Continuity should exist between all stator leads. Connect ohmmeter between each stator lead and metal core. Continuity should not exist. If stator does not test as indicated, replace stator.

DIODES

1) With diode assembly on bench, contact diode plate with one probe and each of the 3 diode leads with other probe. Note ohmmeter reading. Reverse probes and repeat test for all diodes.

2) All diodes should show a low reading in one direction and NO reading in opposite direction. If any diode is defective, replace diode assembly.

OVERHAUL

Fig. 8: Exploded View of Camry, Celica, Cressida & Supra (7M-GE) Alt Courtesy of Toyota Motor Sales, U.S.A., Inc.
Fig. 9: Exploded View of Corolla Alternator
Courtesy of Toyota Motor Sales, U.S.A., Inc.

1. Pulley
2. Drive End Frame
3. Rubber Insulator
4. Front Bearing
5. Retainer
6. Rotor
7. Rear Bearing
8. Bearing Cover
9. Diode End Frame
10. Diode Assembly
11. Terminal Insulator
12. IC Regulator
13. Brush
14. Brush Holder & Cover
15. Rear End Cover
Fig. 10: Exploded View of Land Cruiser Alternator
Courtesy of Toyota Motor Sales, U.S.A., Inc.

1. Pulley
2. Fan
3. Space Collar
4. Drive End Frame
5. Front Bearing
6. Snap Ring
7. Rotor
8. Rear Bearing
9. Stator
10. Bearing Retainer
11. Spacer Ring
12. Diode Assembly
13. IC Regulator
14. Insulator Washer
15. Diode End Frame
16. Terminal Insulator
17. Condenser
Fig. 11: Exploded View of Pickup & 4Runner Alternator

1. Pulley
2. Drive End Frame
3. Front Bearing
4. Retainer
5. Rotor
6. Rear Bearing
7. Bearing Cover
8. Terminal Insulator
9. Terminal Insulator
10. Rear End Frame
11. Diode Assembly
12. IC Regulator
13. Brush Holder & Cover
14. Brush
15. Spring
16. Rear End Cover

Courtesy of Toyota Motor Sales, U.S.A., Inc.
Fig. 12: Exploded View of Pickup (3VZ-E) & 4Runner (3VZ-E) Alternator
Courtesy of Toyota Motor Sales, U.S.A., Inc.
Fig. 13: Exploded View of Tercel (50-Amp) Alternator  
Courtesy of Toyota Motor Sales, U.S.A., Inc.

1. Pulley  
2. Drive End Frame  
3. Front Bearing  
4. Retainer  
5. Rotor  
6. Rear Bearing  
7. Bearing Cover  
8. Rear End Frame  
9. Terminal Insulator  
10. Diode Assembly  
11. IC Regulator  
12. Brush Holder & Cover  
13. Rear End Cover  
14. Brush
1. Pulley
2. Drive End Frame
3. Retainer
4. Rotor
5. Wave Washer
6. Rubber Insulator
7. Front Bearing
8. Rear Bearing
9. Bearing Cover
10. Diode End Cover
11. Terminal Insulator
12. IC Regulator
13. Brush Holder & Cover
14. Rear End Cover
15. Diode Assembly
16. Brush
17. Spring

Fig. 14: Exploded View of Tercel (55-Amp) & Van Alternator
Courtesy of Toyota Motor Sales, U.S.A., Inc.
Fig. 15: Exploded View of MR2 (4A-GE) Alternator
Courtesy of Toyota Motor Sales, U.S.A., Inc.

1. Pulley
2. Drive End Frame
3. Front Bearing
4. Retainer
5. Rotor
6. Rear Bearing
7. Bearing Cover
8. Rear End Frame
9. Diode Assembly
10. IC Regulator
11. Spring
12. Brush
13. Nut
14. Rear Cover Plate
15. Rear End Cover
Fig. 16: Exploded View of Supra (7M-GTE) Alternator
Courtesy of Toyota Motor Sales, U.S.A., Inc.