

# ALTERNATOR & REGULATOR - NIPPONDENSO

1988 Toyota Celica

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)

Application	New Belt	Used Belt
Camry & Celica		
Alternator (Without A/C) .	125 (57)	95 (43)
Alternator (With A/C) ....	175 (79)	130 (59)
Power Steering .....	125 (57)	80 (36)
Corolla		
A/C .....	160 (73)	100 (45)
Alternator .....	160 (73)	125 (57)
Power Steering .....	125 (57)	80 (36)
MR2		
Alternator .....	175 (79)	115 (52)
A/C .....	160 (73)	105 (48)
Pickup & 4Runner		
"V" Ribbed (With A/C) ....	160 (73)	100 (45)
"V" Ribbed (Without A/C) .	105 (48)	85 (39)
Conventional .....	125 (57)	80 (36)
Tercel		
Alternator .....	160 (73)	100 (45)
A/C .....	165 (75)	110 (50)
Power Steering .....	175 (79)	115 (52)
Van		
"V" Ribbed .....	175 (79)	115 (52)
Conventional .....	125 (57)	80 (36)

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

#### 6-CYLINDER BELT ADJUSTMENT (1)

Application	New Belt	Used Belt
-------------	----------	-----------

Cressida			
Alternator .....	175 (79)	.....	115 (52)
A/C .....	160 (73)	.....	105 (48)
P/S .....	160 (73)	.....	100 (45)
Land Cruiser			
A/C Belt .....	125 (57)	.....	80 (36)
All Others .....	145 (66)	.....	100 (45)
Supra			
Alternator .....	175 (79)	.....	115 (52)
A/C & P/S .....	160 (73)	.....	105 (48)

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

V6 BELT ADJUSTMENT TABLE (1)

Application	New Belt	Used Belt
Camry		
Alternator .....	175 (79)	..... 115 (52)
Power Steering .....	125 (57)	..... 80 (36)
Pickup & 4Runner		
Alternator .....	160 (73)	..... 100 (45)
All Others .....	125 (57)	..... 80 (36)

(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.

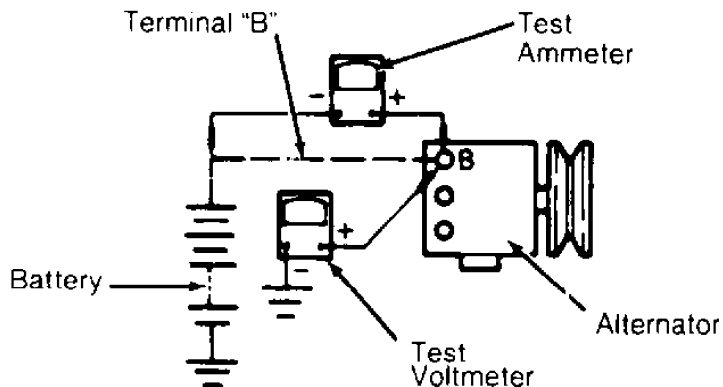


Fig. 1: Charging Circuit Testing  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

2) Start engine and increase engine speed to 2000 RPM. Voltmeter and ammeter should read according to specification. See

ALTERNATOR OUTPUT SPECIFICATIONS table.

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)

Application	Amps	Volts
Cressida .....	10 .....	14.0-15.0
Land Cruiser .....	10 .....	13.8-14.4
All Others .....	10 .....	13.9-15.1

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

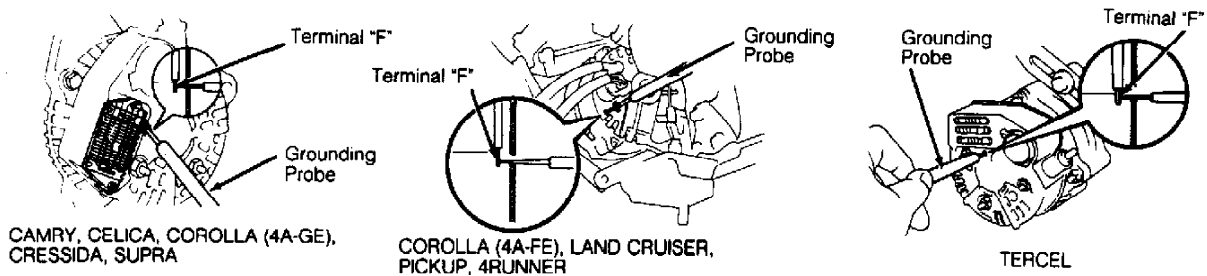


Fig. 2: Alt Full Field Output Test (Camry, Celica, Corolla 4A-GE, Cressida, MR2, Supra)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

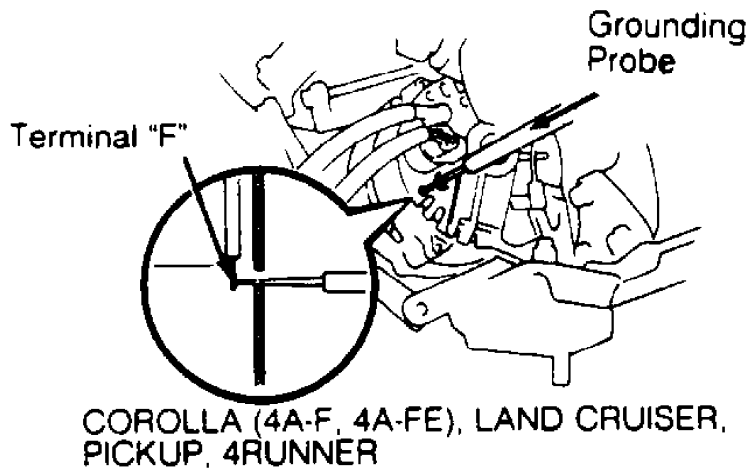


Fig. 3: Alt Full Field Output Test (Corolla 4A-F 4A-FE, Land Cruiser, Pickup, 4Runner)  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

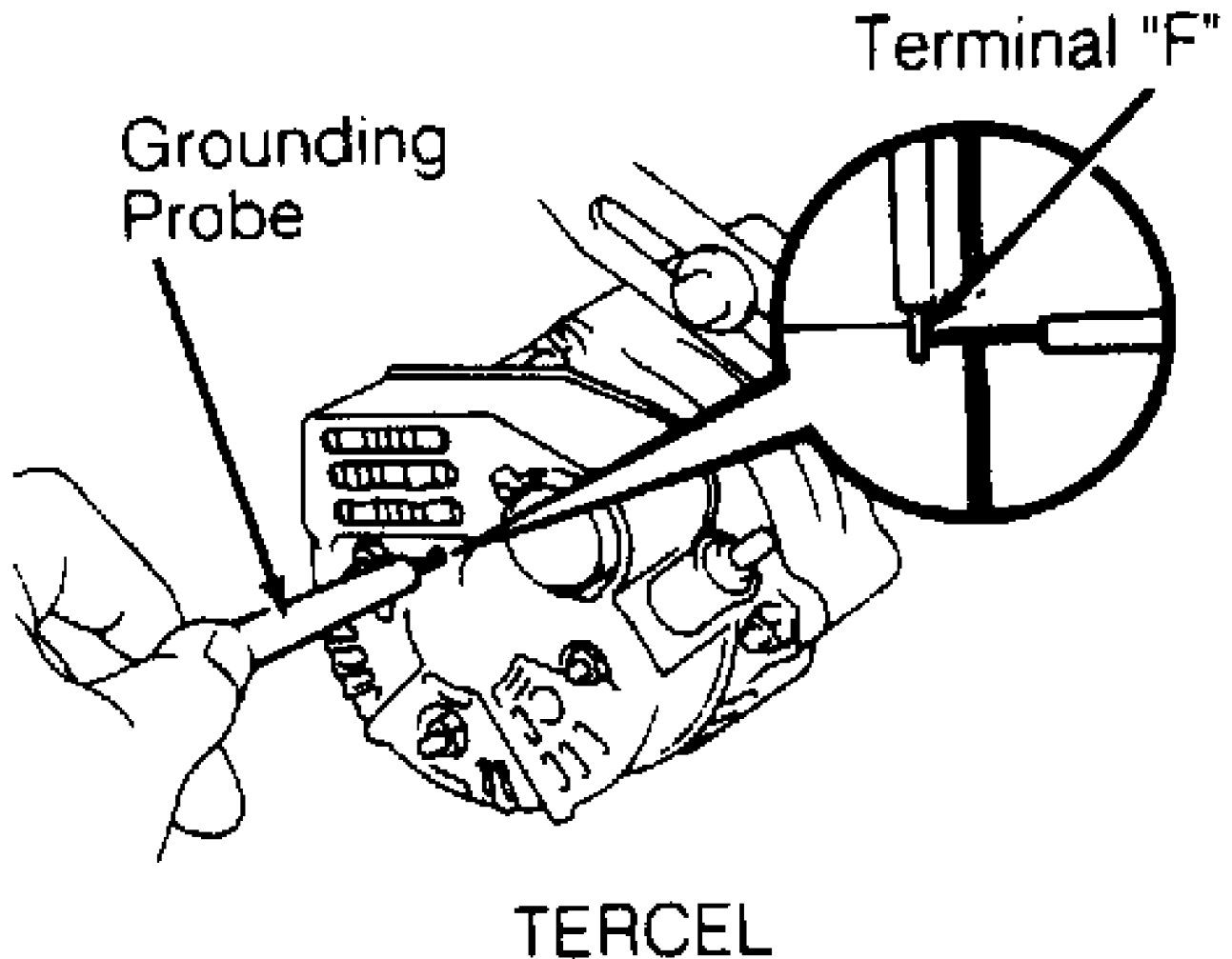


Fig. 4: Tercel Alternator Full Field Output Test  
Courtesy of Toyota Motor Sales, U.S.A., Inc.

### 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.

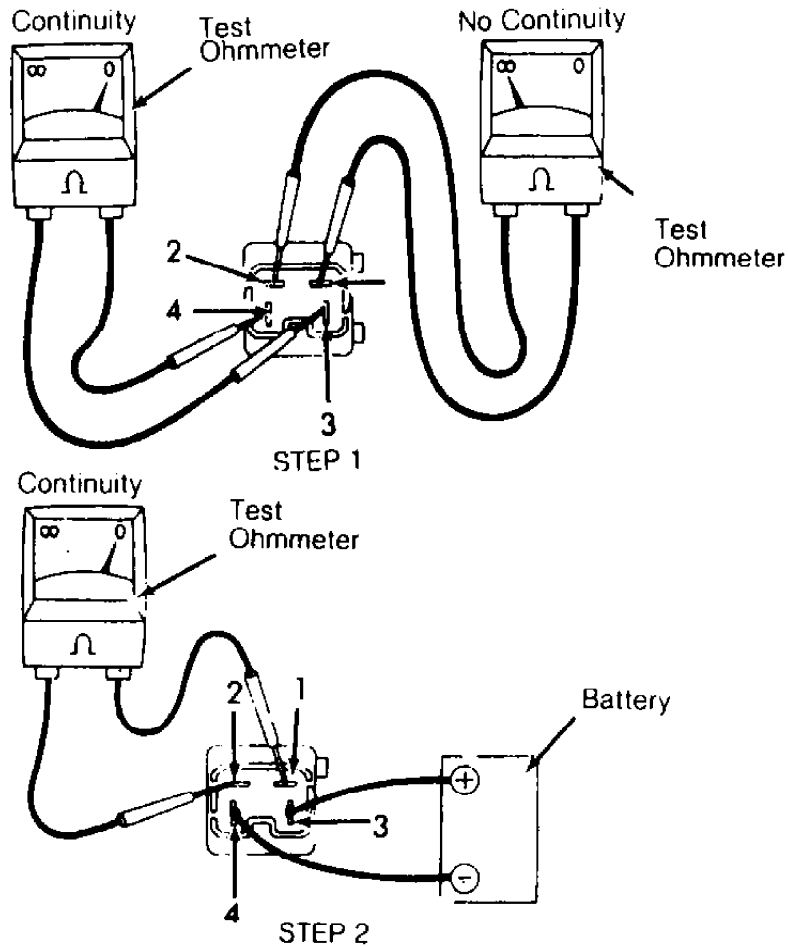


Fig. 5: Testing Charge Light Relay (Land Cruiser)  
Courtesy of Toyota Motor Sales, U.S.A., Inc.

ENGINE MAIN RELAY

Camry, Celica, Corolla, MR2 & Tercel

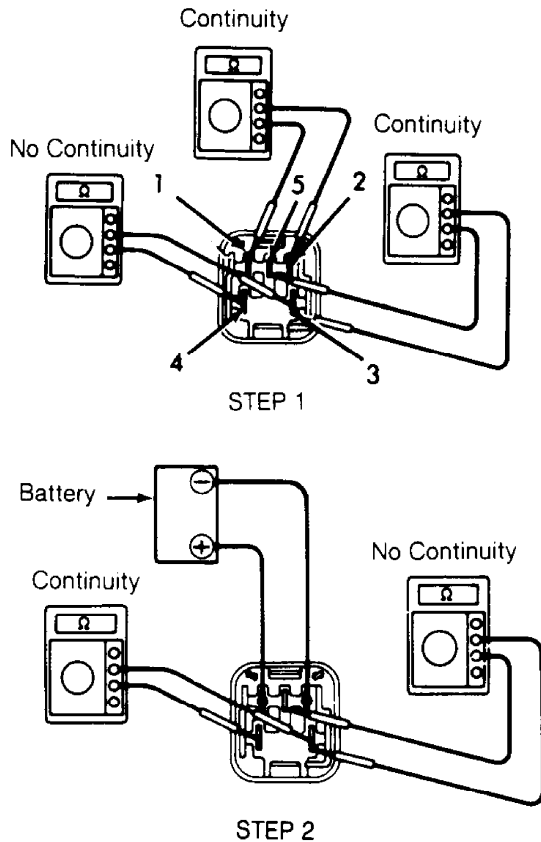
1) Using an ohmmeter, check for continuity between engine main relay terminals No. 3 and 5 and between terminals No. 1 and 2. Check that continuity does not exist between terminals No. 3 and 4. See Fig. 6 "STEP 1". If engine main relay does not test as indicated, replace relay.

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

Application	Location
Camry (2VZ-FE)	Left Rear Fender Panel
MR2	Engine Compartment No. 2 Junction Block
All Others	Engine Compartment Relay Box



90C03014

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.

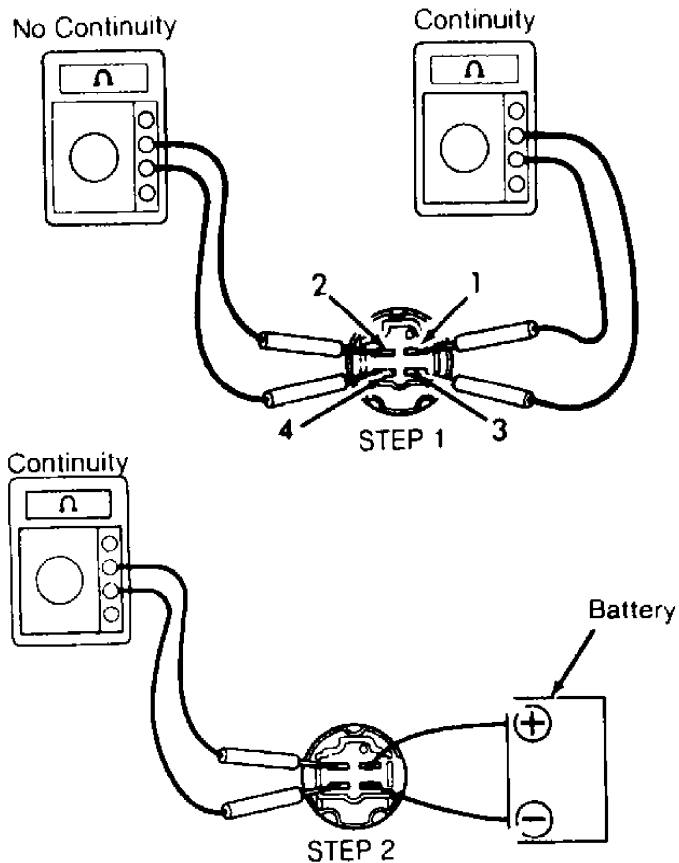


Fig. 7: Testing Ignition Relay  
Courtesy of Toyota Motor Sales, U.S.A., Inc.

## 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

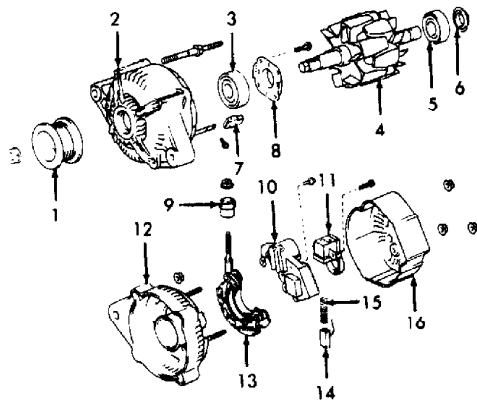
Connect ohmmeter between 2 stator leads. Continuity should exist between all stator leads. Connect ohmmeter between each stator lead and metal core. Continuity should not exist. If stator does not test as indicated, replace stator.

## 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



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

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



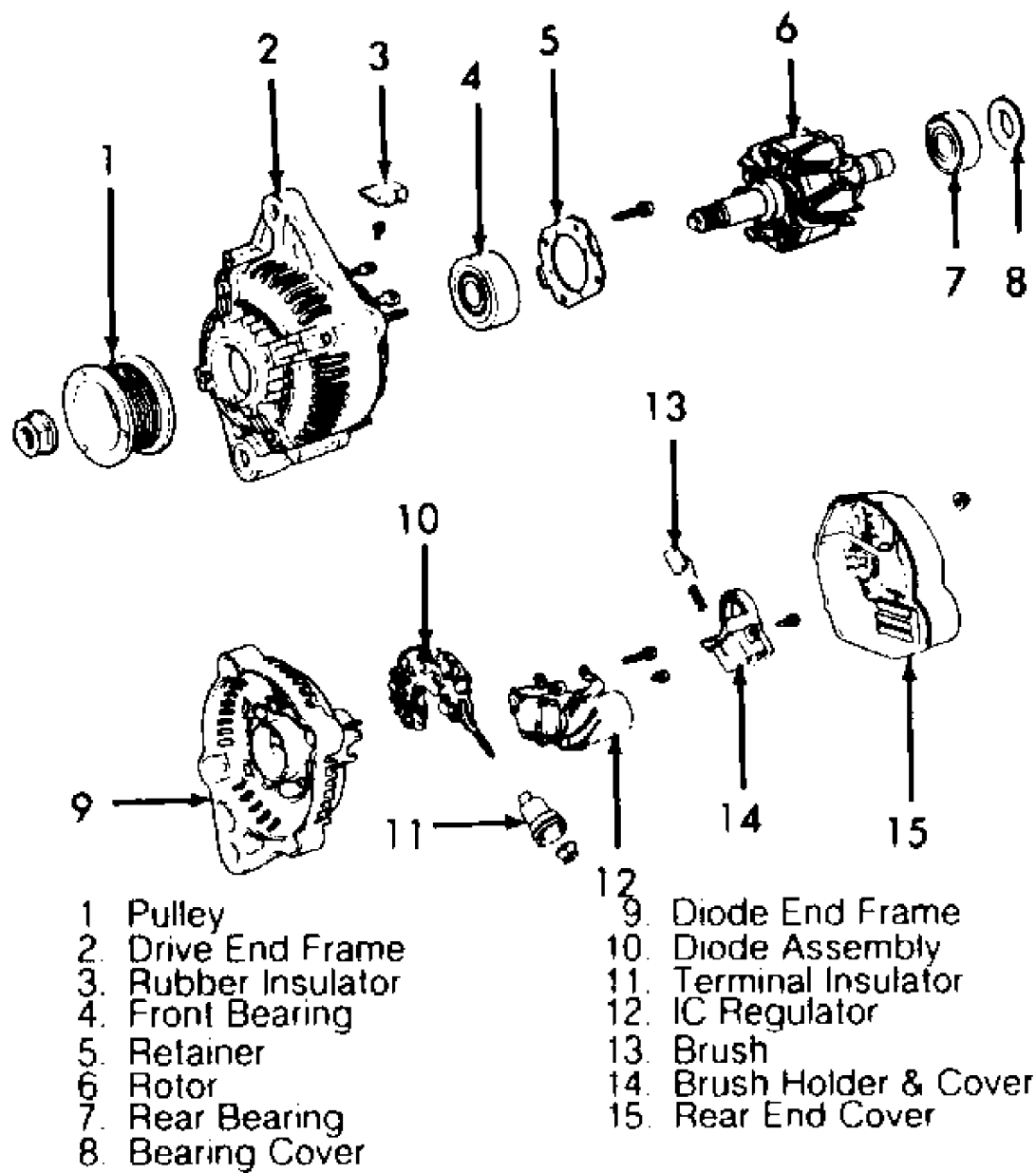
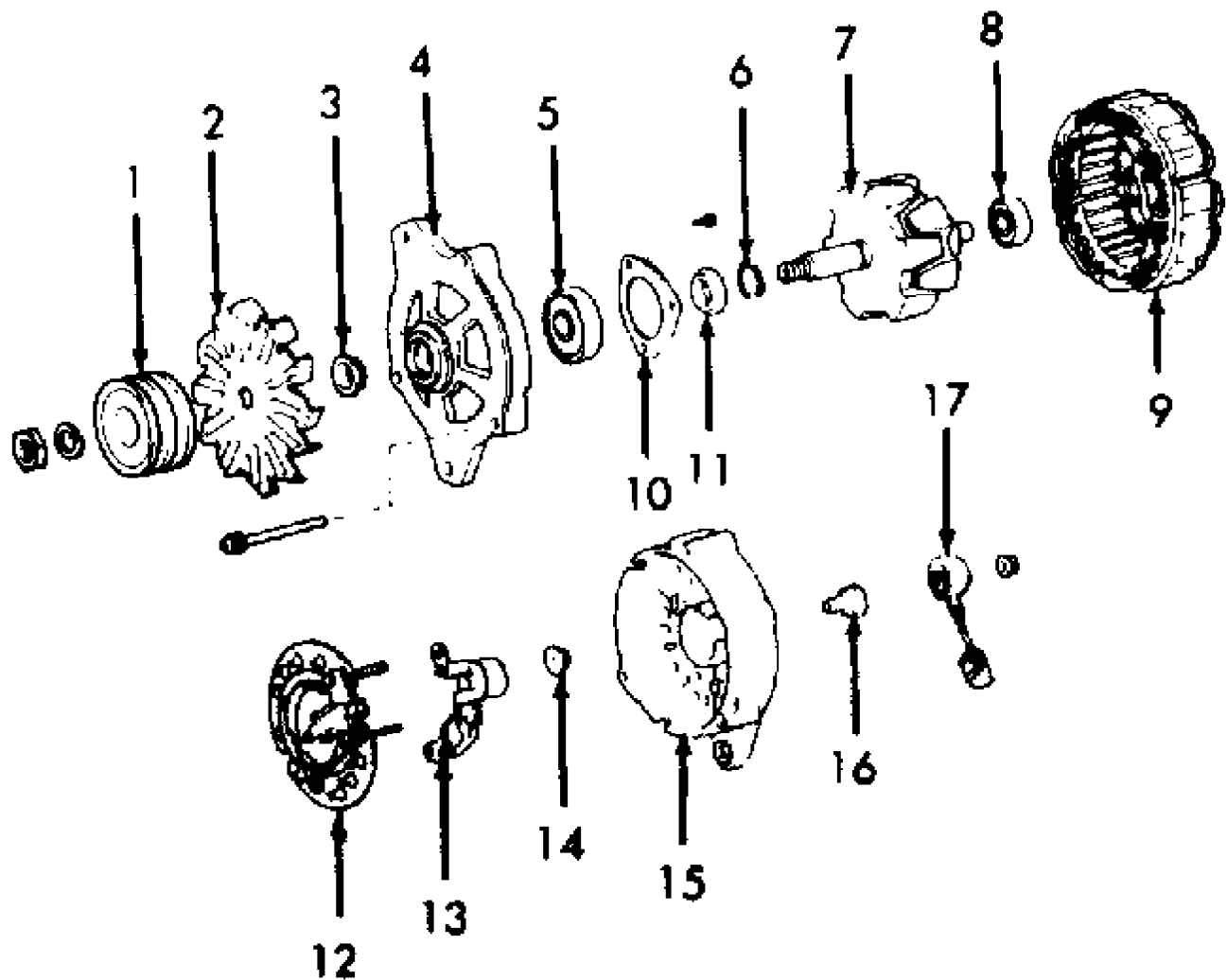
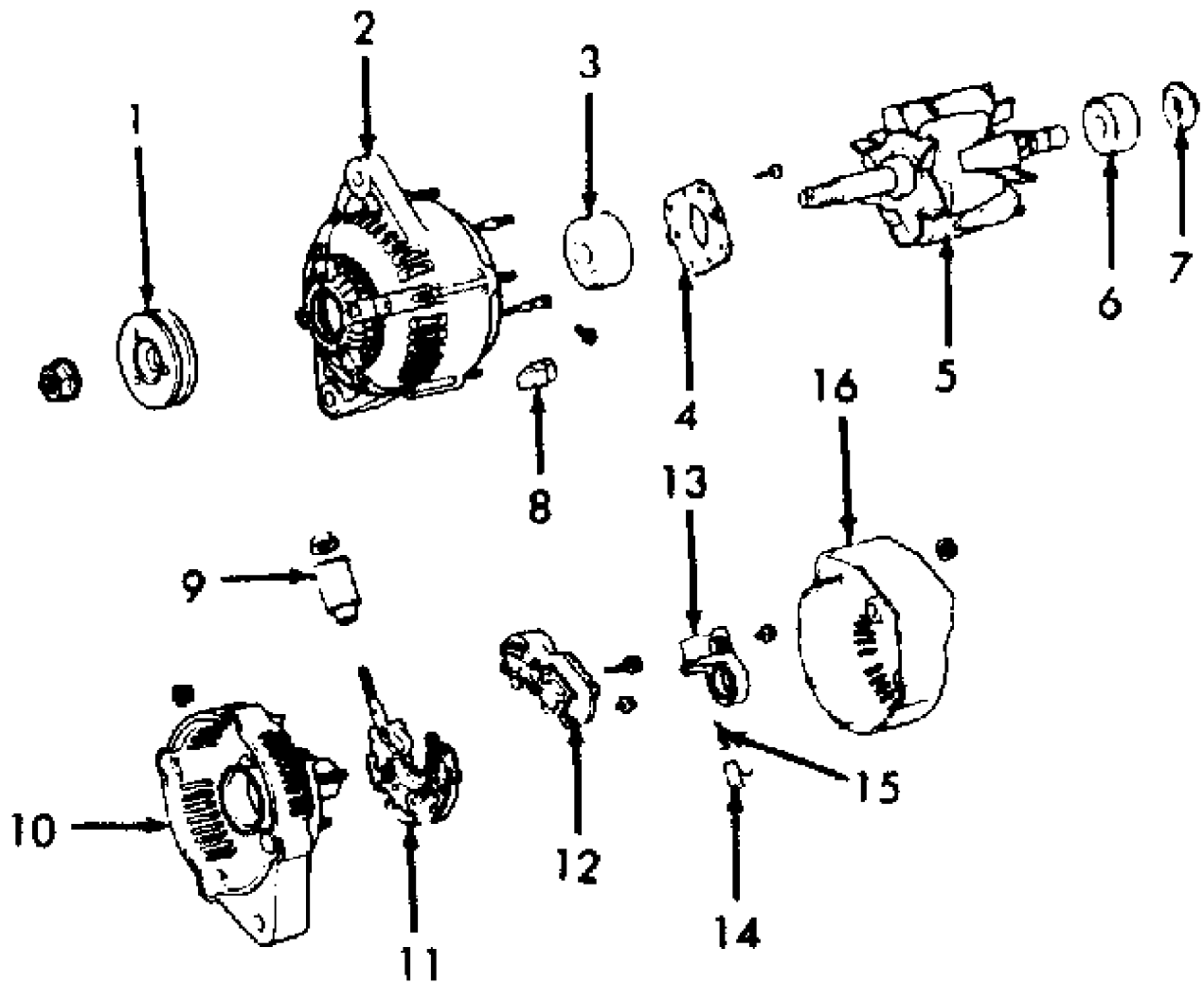


Fig. 9: Exploded View of Corolla Alternator  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



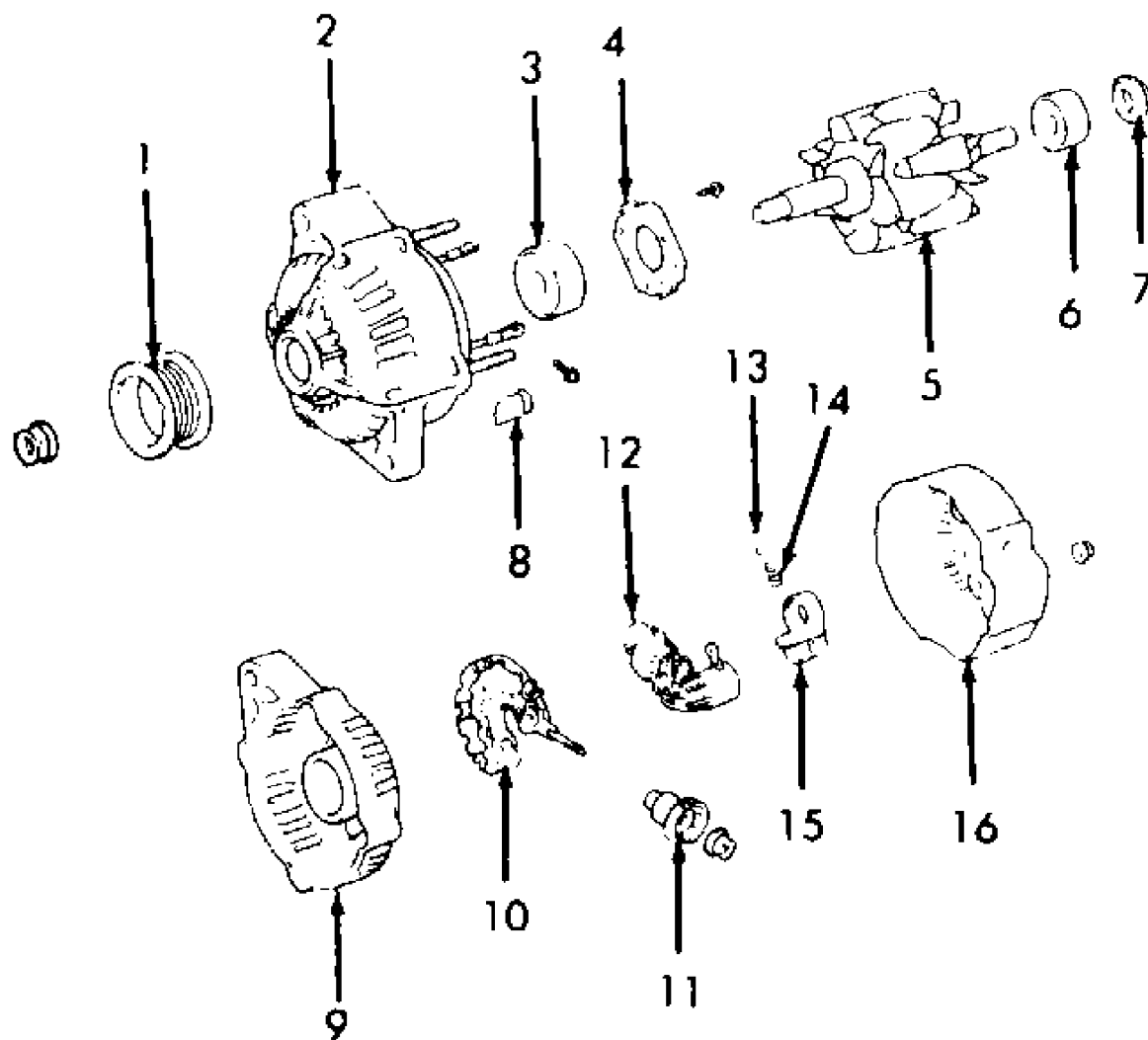
- |                    |                        |
|--------------------|------------------------|
| 1. Pulley          | 10. Bearing Retainer   |
| 2. Fan             | 11. Spacer Ring        |
| 3. Space Collar    | 12. Diode Assembly     |
| 4. Drive End Frame | 13. IC Regulator       |
| 5. Front Bearing   | 14. Insulator Washer   |
| 6. Snap Ring       | 15. Diode End Frame    |
| 7. Rotor           | 16. Terminal Insulator |
| 8. Rear Bearing    | 17. Condenser          |
| 9. Stator          |                        |

Fig. 10: Exploded View of Land Cruiser Alternator  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



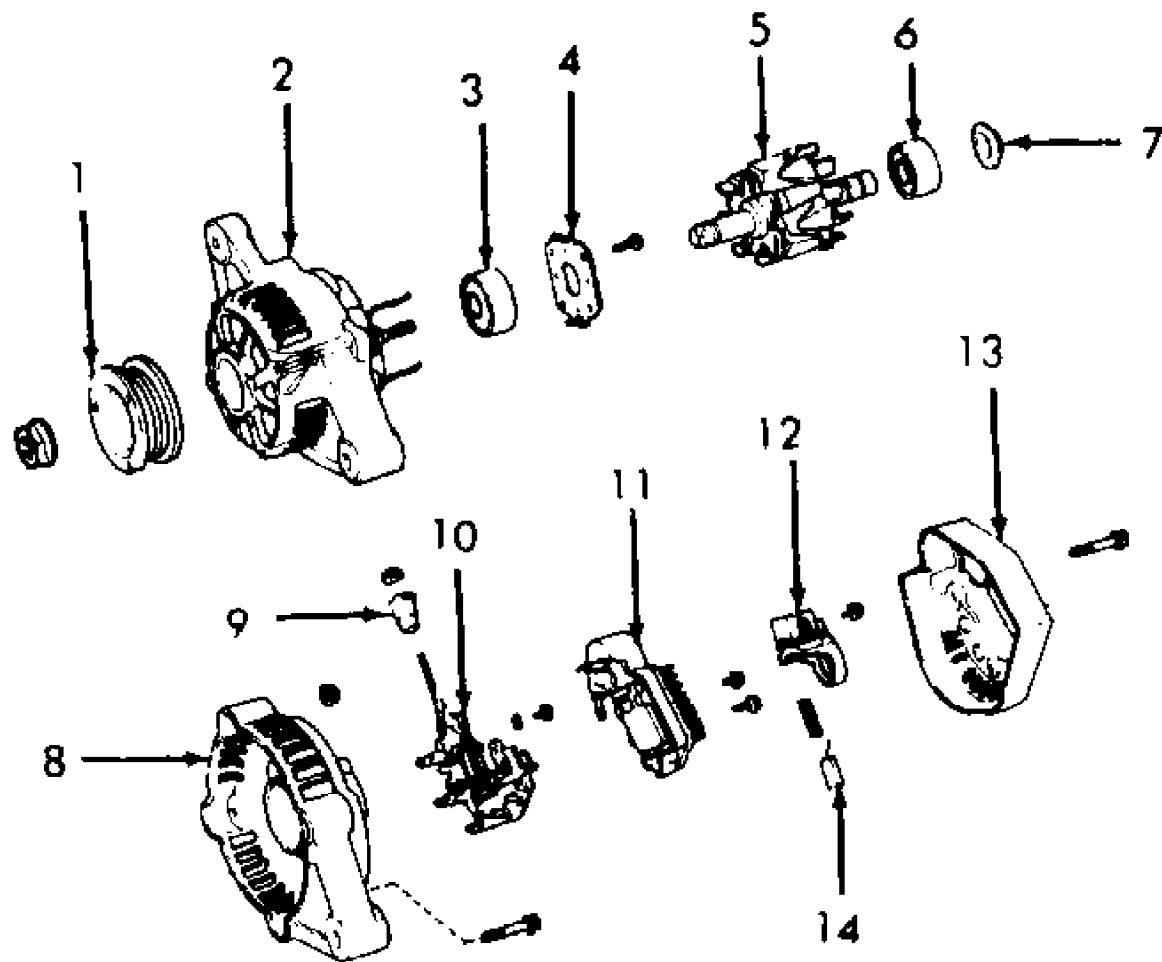
- |                       |                          |
|-----------------------|--------------------------|
| 1. Pulley             | 9. Terminal Insulator    |
| 2. Drive End Frame    | 10. Rear End Frame       |
| 3. Front Bearing      | 11. Diode Assembly       |
| 4. Retainer           | 12. IC Regulator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

Fig. 11: Exploded View of Pickup & 4Runner Alternator  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



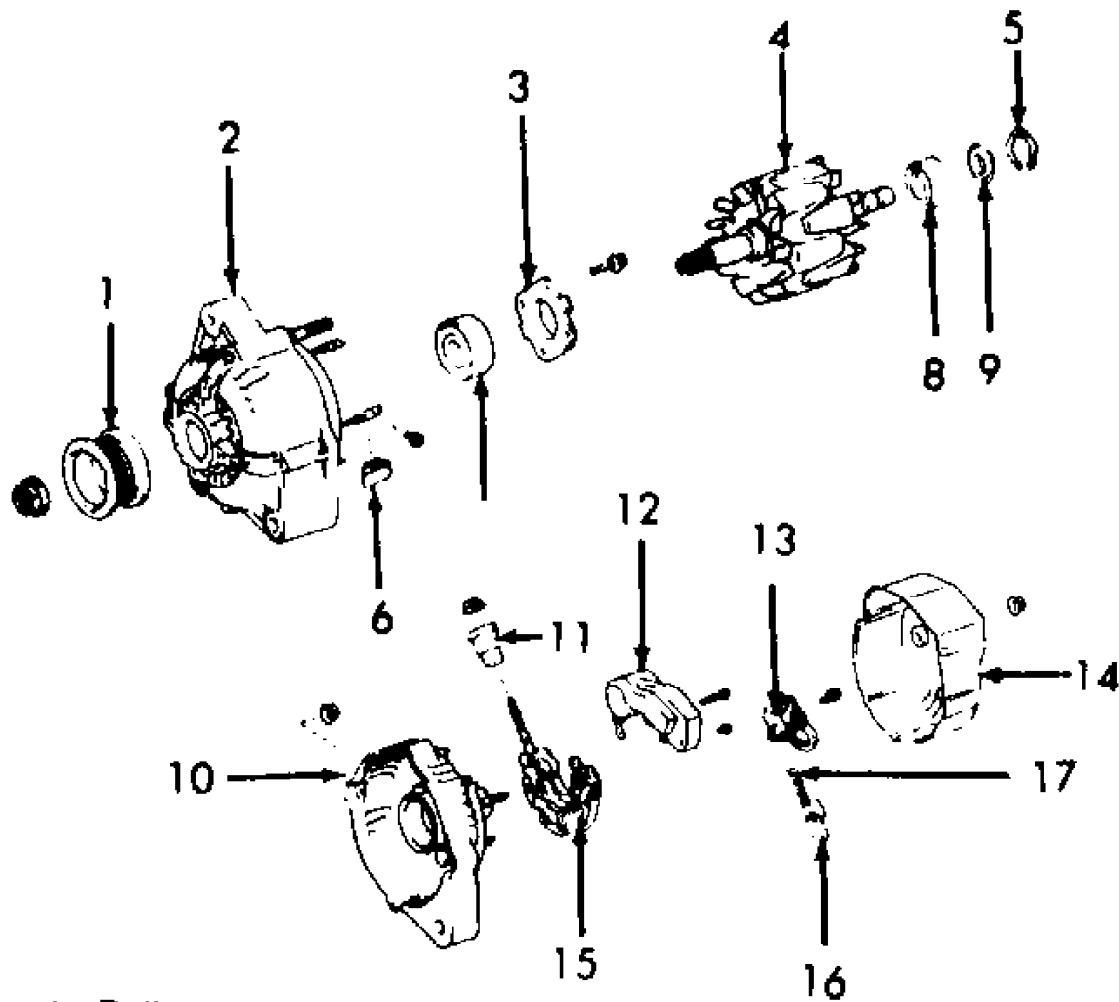
- |                     |                          |
|---------------------|--------------------------|
| 1. Pulley           | 9. Rear End Cover        |
| 2. Drive End Frame  | 10. Diode Assembly       |
| 3. Front Bearing    | 11. Terminal Insulator   |
| 4. Bearing Retainer | 12. IC Regulator   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

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



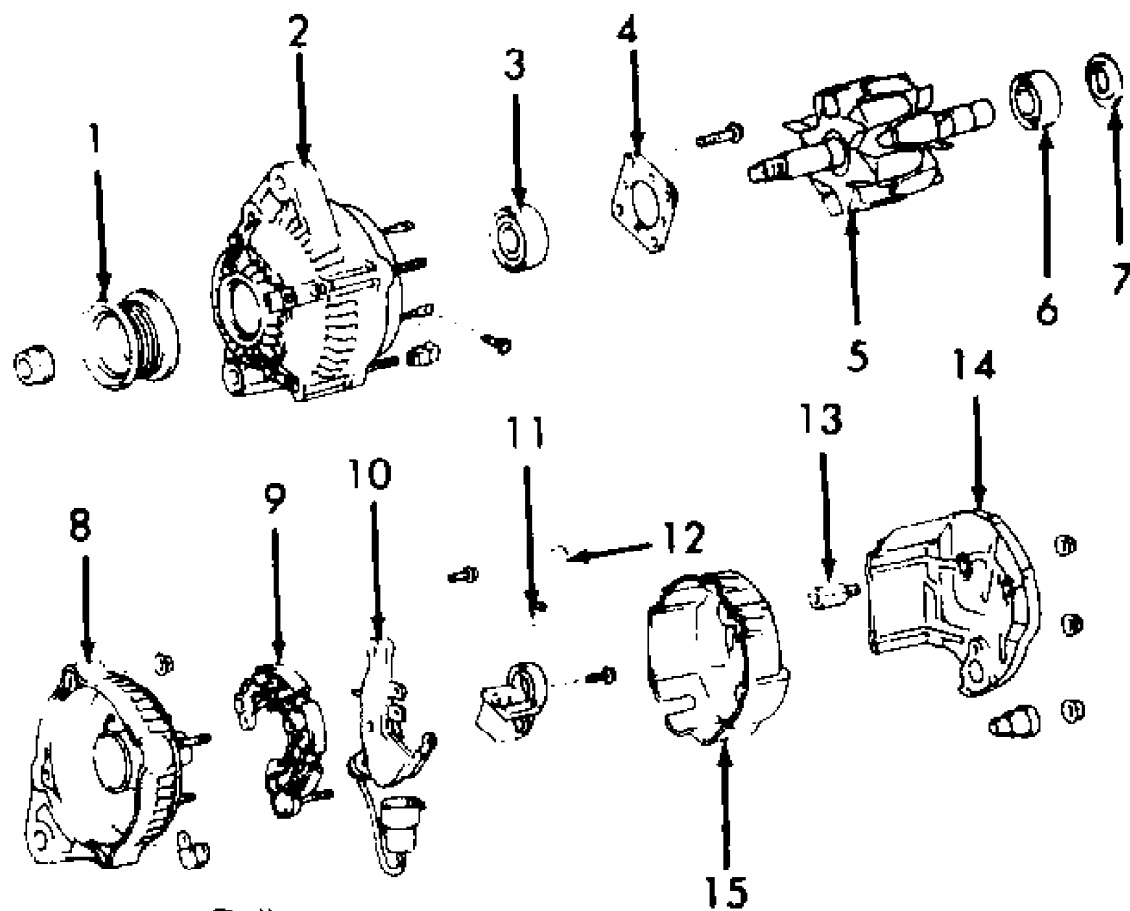
- |                    |                          |
|--------------------|--------------------------|
| 1. Pulley          | 8. Rear End Frame        |
| 2. Drive End Frame | 9. Terminal Insulator    |
| 3. Front Bearing   | 10. Diode Assembly       |
| 4. Retainer        | 11. IC Regulator         |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

Fig. 13: Exploded View of Tercel (50-Amp) Alternator  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



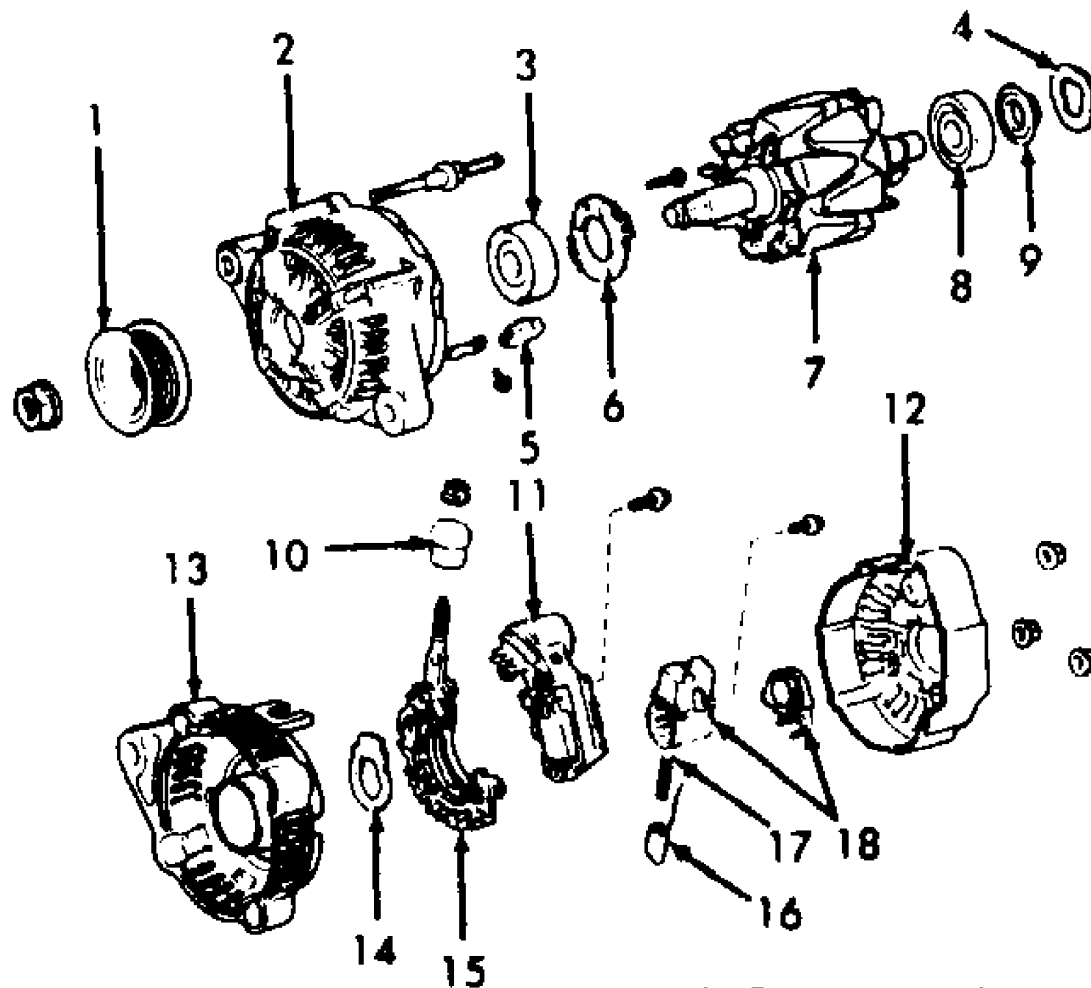
- |                     |                          |
|---------------------|--------------------------|
| 1. Pulley           | 10. Diode End Cover      |
| 2. Drive End Frame  | 11. Terminal Insulator   |
| 3. Retainer         | 12. IC Regulator         |
| 4. Rotor            | 13. Brush Holder & Cover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

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



- |                    |                      |
|--------------------|----------------------|
| 1. Pulley          | 9. Diode Assembly    |
| 2. Drive End Frame | 10. IC Regulator     |
| 3. Front Bearing   | 11. Spring           |
| 4. Retainer        | 12. Brush            |
| 5. Rotor           | 13. Nut              |
| 6. Rear Bearing    | 14. Rear Cover Plate |
| 7. Bearing Cover   | 15. Rear End Cover   |
| 8. Rear End Frame  |                      |

Fig. 15: Exploded View of MR2 (4A-GE) Alternator  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.



- |                     |                        |
|---------------------|------------------------|
| 1. Pulley           | 10. Terminal Insulator |
| 2. Drive End Frame  | 11. IC Regulator       |
| 3. Front Bearing    | 12. Rear End Cover     |
| 4. Wave Washer      | 13. Diode End Frame    |
| 5. Rubber Insulator | 14. Seal Plate         |
| 6. Retainer         | 15. Diode Assembly     |
| 7. Rotor            | 16. Brush              |
| 8. Rear Bearing     | 17. Spring             |
| 9. Bearing Cover    | 18. Brush Holder       |

Fig. 16: Exploded View of Supra (7M-GTE) Alternator  
 Courtesy of Toyota Motor Sales, U.S.A., Inc.