

ALTERNATOR & REGULATOR

1996 Toyota Supra

1995-96 STARTING & CHARGING SYSTEMS
Toyota Alternator & Regulators

Supra

DESCRIPTION & OPERATION

The generator is a small, high RPM, high performance type with an internal Integrated Circuit (IC) voltage regulator which controls charging system voltage. A transistor inside IC regulator controls generator voltage output to maintain a constant voltage. Charging system voltage is maintained within an operating range of 13.2-15.0 volts. See GENERATOR REGULATED OUTPUT SPECIFICATIONS table under ON-VEHICLE TESTING for specific model operating ranges.

When ignition is turned on, battery voltage flows from generator terminal "L" through IC regulator to terminal "E" and to ground, causing discharge warning light to come on. When engine starts, generator RPM increases, which increases generator output voltage. When generator output voltage is greater than battery voltage, voltage to recharge battery flows from terminal "B". At the same time voltage at terminal "L" increases and the potential difference between battery and terminal "L" ceases, causing discharge warning light to go off.

ADJUSTMENTS

NOTE: New belt refers to a belt which has been used 5 minutes or less on a running engine. Used belt refers to a belt which has been used more than 5 minutes on a running engine. After installing new belt(s), run engine for at least 5 minutes and recheck tension.

BELT TENSION

Supra uses an automatic belt tensioner. No adjustment is necessary.

TROUBLE SHOOTING

NOTE: See TROUBLE SHOOTING - BASIC PROCEDURES article in GENERAL INFORMATION.

Check all fuses, fusible links, ignition switch, and appropriate relays (if equipped). Check generator output. See NO-LOAD TEST under ON-VEHICLE TESTING.

ON-VEHICLE TESTING

NO-LOAD TEST

1) Disconnect battery-to-generator terminal "B" wire. See Fig. 1. Using an ammeter and voltmeter, connect negative ammeter lead to disconnected generator terminal "B" wire end, and connect positive ammeter lead to generator terminal "B".

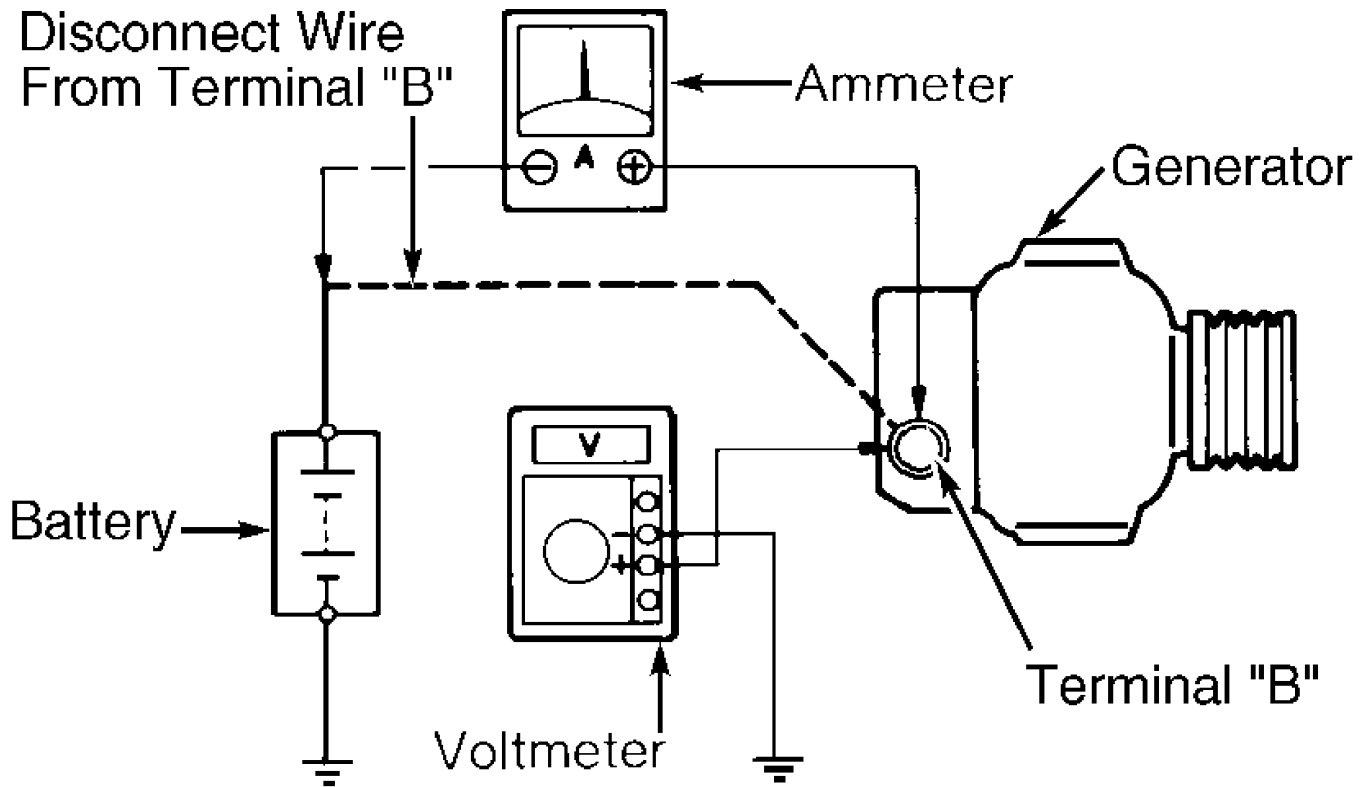
2) Connect voltmeter positive lead to generator terminal "B" and negative lead to ground. See Fig. 1. Start engine and increase engine speed to 2000 RPM. Both meters should read within

specification. See GENERATOR REGULATED 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 Figs. 1-2. If voltage is more than specified range, replace IC
 regulator. If voltage is less than specified range, repair or replace
 generator.

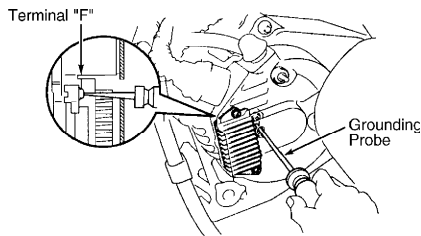
GENERATOR REGULATED OUTPUT SPECIFICATIONS (AT 2000 RPM)

Temperature	Amps	Volts
77°F (25°C)	10 Or Less	13.6-14.8
239°F (115°C)	10 Or Less	13.2-14.0



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



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Fig. 2: Testing Generator Full Field Output
 Courtesy of Toyota Motor Sales, U.S.A., Inc.

LOAD TEST

NOTE: If battery is fully charged, disable ignition system. Crank engine for about 15 seconds to partially discharge battery.

1) Connect an ammeter as described in NO-LOAD TEST, step 1). See Fig. 1. Start engine. Turn on high beam headlights and place heater blower control on HI. Increase engine speed to 2000 RPM.

2) Check ammeter reading. Ammeter should read 30 amps or more. If amperage is less than specified, repair or replace generator.

GENERATOR RATED AMPERE OUTPUT SPECIFICATIONS

Application	(1) Amperes
Supra	80
Supra Turbo	
A/T	100
M/T	90

(1) - Rated output is measured with 12 volts supplied to generator.

BENCH TESTING

BRUSHES

Brushes should slide smoothly in holders. Replace brushes if damaged or worn. New brush exposed length should be .413" (10.5 mm). Minimum exposed length should be more than .059" (1.5 mm). There are 2 different brush holders used. One brush holder is replaced as an assembly, and the other has replaceable brushes. If exposed brush length is less than minimum, replace brushes or brush holder assembly. Install new brush springs when replacing brushes.

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. Standard slip ring diameter is .559-.567" (14.2-14.4 mm). Turn slip rings on lathe if necessary. Minimum slip ring diameter is .504" (12.8 mm).

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/rectifier assembly removed and on bench, contact positive diode plate terminal with one ohmmeter probe. Using other ohmmeter probe, contact each diode lead in same plate. Note ohmmeter reading. Reverse ohmmeter probes, and repeat tests for all diodes.

2) All diodes should show continuity in one direction and no continuity in opposite direction. If any diode is defective, replace diode/rectifier assembly.

OVERHAUL

DISASSEMBLY

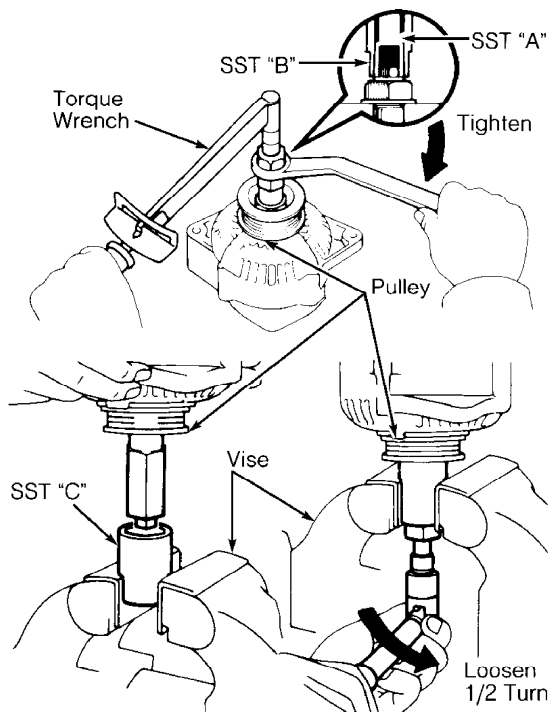
1) Remove dust cover (if equipped). Remove brush holder and IC regulator. Remove diode assembly. Remove rubber insulators or seal plate (if equipped). Use generator Pulley Set Nut Wrench Set (SST 09820-63010) to remove generator pulley.

2) To remove pulley, install SST "A" and "B" to rotor shaft and tighten SST "B" clockwise to 29 ft. lbs. (39 N.m). Place SST "C" securely into a vise. Verify that SST "A" is secured to rotor shaft and install SST "A" and "B" and generator into SST "C". See Fig. 3. Turn SST "A" in correct direction to loosen pulley nut. See Fig. 3. To prevent damage to rotor shaft, DO NOT loosen pulley nut more than 1/2 turn. Remove SST "A" and "B", and generator from SST "C". Remove SST "A" and "B" from rotor shaft and remove pulley nut and pulley.

3) Remove rectifier and frame using appropriate puller. Remove generator washer (if equipped). Remove rotor from drive end frame (stator).

REASSEMBLY

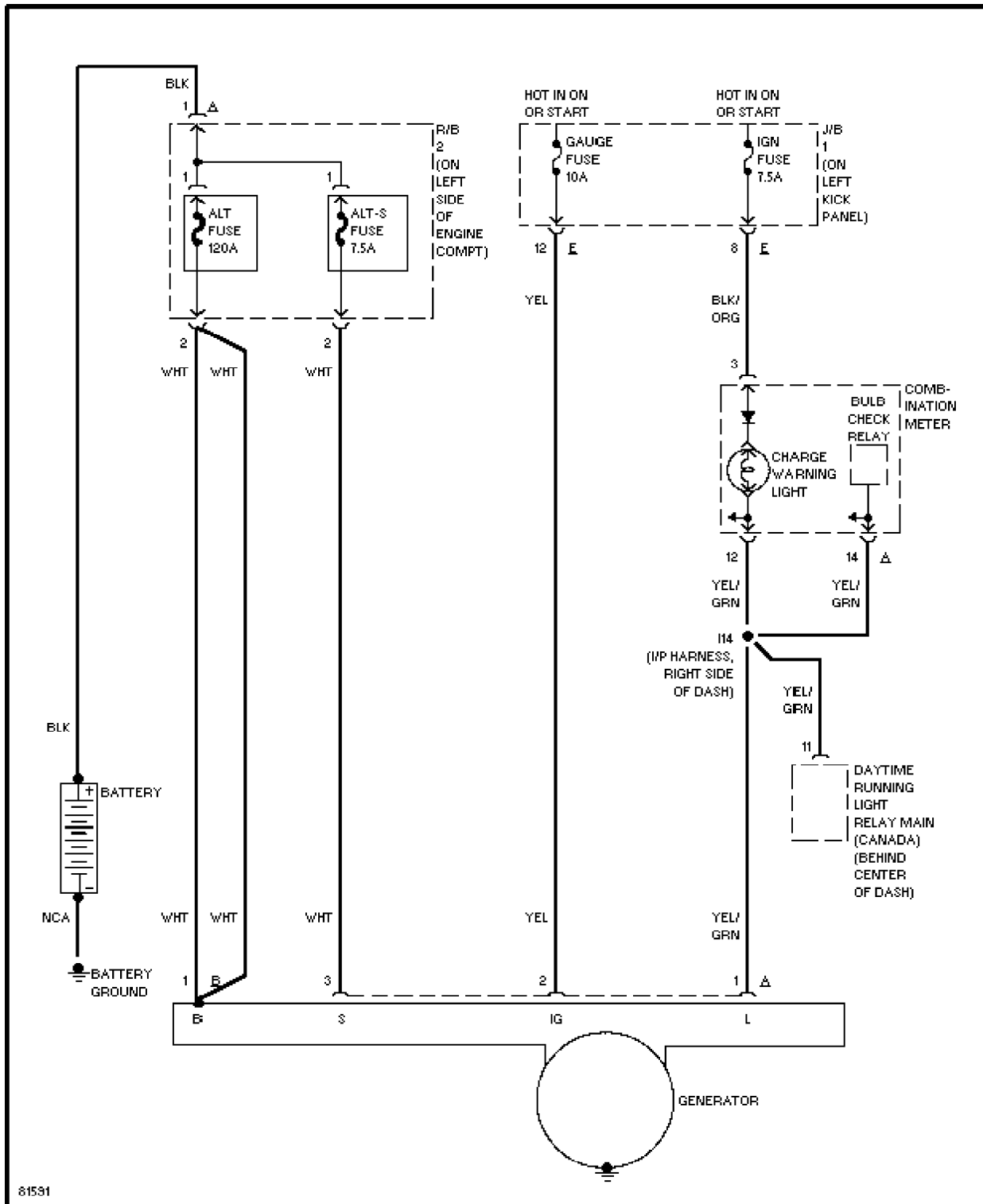
To assemble, reverse disassembly procedure. Use generator Pulley Set Nut Wrench Set (SST 09820-63010) to install generator pulley. Place SST "C" securely into a vise. Install SST "A" and "B" and generator into SST "C". See Fig. 3. Tighten pulley nut to 81 ft. lbs. (110 N.m) in the opposite direction of disassembly. See Fig. 3. After completing assembly, verify rotor turns smoothly.



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Fig. 3: Removing Generator Pulley
Courtesy of Toyota Motor Sales, U.S.A., Inc.

WIRING DIAGRAMS



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Fig. 4: Charging System Wiring Diagram (1995-96)