

17-33. REMOVAL AND INSTALLATION. (Refer to figure 17-3).

- a. Open the battery box and disconnect the ground cable from the negative terminal of the battery and pull the cable free of the box.
- b. Remove the nuts, washers, ground strap, bus bar and diode board from the studs of the receptacle and remove battery cable.
- c. Remove the screws and nuts holding the receptacle; ground strap will then be free from the bracket.
- d. To install a ground service receptacle, reverse this procedure.

17-34. ALTERNATOR POWER SYSTEM.

17-35. DESCRIPTION. The alternator system consists of an engine driven alternator, a voltage regulator and a circuit breaker located on the instrument panel. The system is controlled by the left hand portion of the split rocker, master switch labeled ALT. Beginning with 1972 Models an over-voltage sensor switch and red warning light, labeled HIGH VOLTAGE are incorporated to protect the system. The aircraft battery supplies the source of power for excitation of the alternator.

17-36. ALTERNATOR.

17-37. DESCRIPTION. The 60-ampere alternators are three phase, delta connected with integral silicon diode rectifiers. The alternator is rated at 14-volts

at 60-amperes (thru 21059502) and 28-volts at 60-amperes (beginning with 21059503) continuous output. The moving center part of the alternator (rotor) consists of an axial winding with radial interlocking poles which surround the winding. With excitation applied to the winding through slip rings the pole pieces assume magnetic polarity. The rotor is mounted in bearings and rotates inside the stator which contains the windings in which the ac current is generated. The stator windings are three-phase, delta connected and are attached to two diode plates, each of which contains three silicon diodes.

The diode plates are connected to accomplish full-wave, rectification of the ac. The resulting dc output is applied to the aircraft bus and sensed by the voltage regulator. The regulator controls the excitation applied to the alternator field thus controlling the output voltage of the alternator.

17-38. ALTERNATOR REVERSE VOLTAGE DAMAGE. The alternator is very susceptible to reverse polarity damage due to the very low resistance of the output windings and the low resistance of the silicon diodes in the output. If a high current source, such as a battery or heavy duty ground power cart is attached to the aircraft with the polarity inadvertently reversed, the current through the alternator will flow almost without limit and the alternator will be immediately damaged.

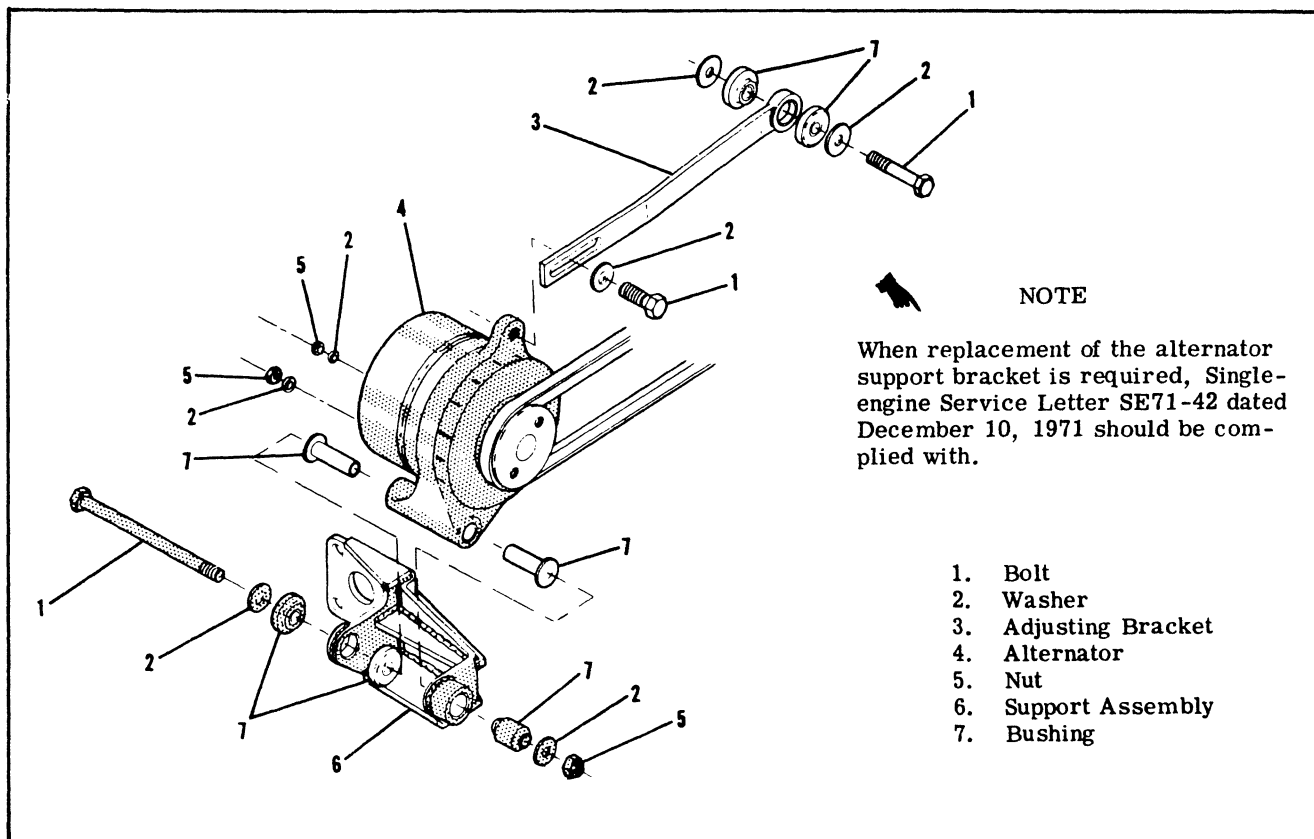


Figure 17-4. Alternator Installation

17-40. REMOVAL AND INSTALLATION. (Refer to figure 17-4).

- a. Make sure that the master switch remains in the off position or disconnect the negative lead from the battery.
- b. Disconnect the wiring from the alternator.
- c. Remove the safety wire from the upper adjusting bolt and remove the bolt from the alternator.
- d. Remove the nut and washer from the lower mounting bolt.
- e. Remove the alternator drive belt and lower mounting bolt to remove the alternator.
- f. To replace the alternator, reverse this procedure.
- g. Adjust belt tension to obtain 3/8" deflection at the center of the belt when applying 12 pounds of pressure to the belt. After the belt is adjusted and the bolt is safety wired, tighten the bottom bolt to 100-140 lb.-in. torque to remove any play between the alternator mounting foot and the U-shaped support assembly.

CAUTION

Whenever a new belt is installed, belt tension should be checked within 10 to 25 hours of operation.

NOTE

When tightening the alternator belt, apply pry bar pressure only to the end of the alternator nearest to the belt pulley.

17-41. ALTERNATOR VOLTAGE REGULATOR. (12-VOLT AIRCRAFT).

17-42. DESCRIPTION. The alternator voltage regulator contains two relays. One relay is actuated by the aircraft master switch and connects the regulator to the battery. The second relay is a two-stage, voltage sensitive device which is used to control the current applied to the field winding of the alternator. When the upper set of contacts on the voltage regulator relay are closed, full bus voltage is applied to the field. This condition will exist when the battery is being heavily charged or when a very heavy load is applied to the system. When the upper contacts open, as the voltage begins to rise toward normal bus voltage, the voltage at the alternator field is reduced through a resistor network in the base of the regulator thus reducing the output from the alternator. As the voltage continues to rise, assuming a very light load on the system, the lower contacts will close and ground the alternator field and shut the alternator completely off. Under lightly loaded conditions the voltage relay will vibrate between the intermediate charge rate and the lower (completely off) contacts. Under a moderate load, the relay will vibrate between the intermediate charge rate and the upper (full output) contacts.

The voltage relay is temperature compensated so that the battery is supplied with the proper charging voltage for all operating temperatures. With the battery fully charged (ship's ammeter indicating at

or near zero) and a moderate load applied to the system (a taxi light turned on) the voltage at the bus bar should be within the range shown according to the air temperature on the following chart:

TEMPERATURE	BUS VOLTAGE
60 - 74°F	13.8 - 14.1
75 - 90°F	13.7 - 14.0
91 - 100°F	13.6 - 13.9

The voltage regulator is adjustable but adjustments on the airplane is not recommended. A bench adjustment procedure is outlined in the Cessna Alternator Charging Systems Service/Parts Manual.

17-43. TROUBLE SHOOTING THE VOLTAGE REGULATOR. For trouble shooting the voltage regulator, refer to paragraph 17-39.

17-44. REMOVAL AND INSTALLATION OF VOLTAGE REGULATOR. (Refer to figure 17-5).

- a. Make sure that the master switch is off or disconnect the negative lead from the battery.
- b. Remove the connector plug from the regulator.
- c. Remove two screws holding the regulator on the firewall.
- d. To reinstall the regulator, reverse this procedure. Be sure that the connections for grounding the alternator, wiring shields and the base of the regulator are clean and bright before assembly. Otherwise, poor voltage regulation and/or excessive radio noise may result.

17-45. VOLTAGE REGULATOR (TRANSISTORIZED) (24-VOLT AIRCRAFT). The transistorized voltage regulator controls the alternator output in a similar manner to a mechanical voltage regulator; by regulating the alternator field current. The regulation is accomplished electronically with the use of transistors and diodes rather than by a vibrating armature relay. The voltage sensing component is a zener diode which has the characteristic of suddenly changing its resistance when a specified voltage is reached.

When the engine is started, battery current is supplied to the field through a "bias" diode, and power transistor. The bias diode aids high temperature stability of the power transistor. A second diode, connected from the field terminal to common ground, absorbs undesirable field voltage peaks more efficiently than the resistor used in electro-mechanical regulators. As the alternator begins to supply current, battery voltage will increase. When battery voltage reaches approximately 28 volts, the zener diode suddenly reduced its resistance and turns on the driver transistor. When the driver transistor turns on, the power transistor is caused to turn off. Battery voltage is reduced slightly because the alternator output was reduced when the power transistor turned off the field current. Zener diode voltage is reduced at the same time as battery voltage, causing the zener diode to increase its resistance and turn off the driver transistor. The power transistor is