

TROUBLE SHOOTING THE MODEL T303

TROUBLE SHOOTING THE MODEL T303 DUAL ALTERNATOR SYSTEM

The dual alternator system can be monitored by the aircraft's annunciator lights and volt-ammeter. The malfunctioning system can be isolated by observation of the annunciator lights and volt-ammeter during engine run-up.

Table 6-1 shows the indications for normal operation and seven situations caused by open circuit breakers or Master switches (L ALT, BAT, R ALT).

NOTE

The circuit breakers and switches associated with an inoperative alternator or battery system should be checked. If possible, the circuit breakers and switches should be set to restore normal operation.

TABLE 6-1. ALTERNATOR MONITORING SYSTEM INDICATIONS
(Indications During Engine Run-up at 1700 RPM With
30 Amps or More Load)

ANNUNCIATOR LIGHTS			VOLT-AMMETER				REMARKS
L. ALT OFF	LOW V.	R. ALT OFF	L. CHG	R. CHG	BAT	VOLTS	
OFF	OFF	OFF	+	+	+	28.8	Normal Operation
ON	OFF	OFF	0	+	+	28.8	Left Alt. Shut OFF.
OFF	OFF	ON	+	0	+	28.8	Right Alt. Shut OFF.
OFF	ON	OFF	+	+	(0 or -)	24.5 or less	Both Alt's ON Battery Not Charging.
ON	ON	ON	0	0	(-)	24.5 or less	Battery Supplying Power Both Alt's OFF.
ON	ON	OFF	0	+	(0 or -)	24.5 or less	Right Alt. ON Bat. Not Charging.
OFF	ON	ON	+	0	(0 or -)	24.5 or less	Left Alt. ON. Bat. Not Charging.
ON	OFF	ON	0	0	(0 or -)	Above 24	Neither Alt. Charging. Bat. Supplying Power

Abnormal Indications For The Situations In Table 6-1, Include the Following

1. "ALT OFF" lights, ON when the charge rate is +.
2. "ALT OFF" lights OFF when the charge rate is 0.
3. "LOW V" light ON when the voltage is greater than 25.0-volts.
4. "LOW V" light OFF when the voltage is less than 24.0-volts.

If the abnormal indications appear, a malfunction of the associated system has occurred. Also, if normal operation cannot be restored by circuit breakers and switches, a malfunction of the inoperative alternator system should be checked by the following procedures.

Equalization Circuit

Each alternator control unit has an equalization (paralleling) circuit which senses alternator output and field excitation to provide alternator paralleling. Failure of the equalization circuit in one alternator control unit (ACU) can result in the other "ALT OFF" light illuminating, unless the total load exceeds the output of one alternator. Each alternator system should be tested independently.

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If both alternators function correctly independently, but one "ALT OFF" light illuminates when both alternators are turned on, the equalization circuit is suspect. Operation of both alternators may be restored by adding electrical load. If both alternators operate correctly with a load exceeding the capacity of one alternator, the equalization unbalance is too large, but the alternator systems are basically functional. Due to low signal levels from the shunts, it may be normal for one "ALT OFF" light to be illuminated under light load (less than 30 amps total) conditions.

Test of Aircraft Wiring

1. With engines stopped, disconnect both alternator control unit (ACU) connectors.
2. Shut OFF alternator switches and master switch.
3. Check for abnormal continuity in aircraft wiring harness for both left and right connectors. (Refer to Figure 33 , Item 6.)

PIN	ABNORMAL CONTINUITY	CAUSES	REMEDY
2 to 10	Greater than 1 OHM.	Open Circuit or Fuse Blown.	Repair Wire From Plug to Shunt. Replace Fuses.
5	Resistance to GND	Open or Poor Connection in Circuit.	Repair Wire.
7	Other than 100±20 OHMS Between Pin and Alt. Stator	Short, Open Wire or Defective Resistor.	Repair Wire or Replace Resistor.
9	Other than 72±15 OHMS to Ground.	Short, Open Wire or Defective Line Contactor Coil.	Repair Wire or Replace Replace Contactor.
12	Resistance to Ground.	Open or Poor Connection in Circuit.	Repair Wire.

4. Turn ON master and alternator switches for the side being tested.

NOTE

If external power is used, set no higher than 24.0-volts.

5. Check for abnormal voltages on aircraft wiring harnesses.

PIN	ABNORMAL CONDITION	CAUSES	REMEDY
1 Field	More than 0 Volts	Field wire shorted to Voltage Source.	Repair Wire.
2 Sense	More than 0 Volts	Wiring Shorted to Voltage Source. Line Contactor Failed Closed	Repair Wiring or Replace Line Contactor.
2 Power	Zero (0) Volts	Open Circuit to Bus Defective Switch or Circuit Breaker	Repair Wire or Replace Switch or Circuit Breaker
4 LV Out	Zero (0) Volts	Open Circuit Through LV Bulb.	Repair Wire or Replace LV Bulb.

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PIN	ABNORMAL CONDITION	CAUSES	REMEDY
5 Remote Sense (-)	More than 0 Volts	A+ Short to Wire & Open Circuit to Ground	Repair Wire
6 Alt. Out	Zero (0) Volts	Open Circuit Through HV Bulb	Repair Wire or Replace HV Bulb
7 Aux Sense	More than 3 Volts	Wire Shorted to Voltage Source.	Repair Wiring.
8 LV Sense	Zero (0) Volts	Open Circuit to Battery Bus	Repair Wiring.
9 Line Cont	More than 0 Volts	Wiring Shorted to Voltage Source A+ Short to Line Contactor Wiring	Remove Short.
10 Neg Current Sense	More than 0 Volts	Short to Voltage Source	Remove Short.
11 EQ. Bus	More than 0 Volts	Wiring Shorted to Voltage Source	Remove Short
12 Pwr Gnd	More than 0 Volts	Short to Voltage Source	Repair Wiring

6. The aircraft's wiring should be correct now. If wiring defects have been located and repaired, reconnect the alternator control units and retest.

Test of Alternator Control Units

1. If abnormal operations persist, note the systems and identify the malfunctioning system.
2. With engines stopped, master switch off and alternator switches off, connect the ACU from the abnormal system to the alternator system operating correctly.
3. Run the engine for the abnormal ACU and correct alternator system. Observe the lights and volt-ammeter.
4. If the system under test has an abnormal behavior, the ACU should be replaced with a new unit.
5. Re-test the system to verify correct operation. If the test system functions correctly, the ACU is good. However, a component of the malfunction alternator system may be bad.

Tests of Alternator System Components

NOTE

The other components of an alternator system include; the field and alternator circuit breakers, the line contactor, the fuses, the shunt, the annunciator lamps or the alternator itself.

1. Connect a good ACU to the malfunctioning circuit.
2. Turn on the master switch and alternator switches, but do not start the engine.

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ABNORMAL SYSTEM	CAUSE AND REMEDY
Field Circuit Breaker	If Field Circuit Breaker (5-amps) Continues to Open (After Testing the Wiring and the ACU), Replace the Alternator Field Circuit Breaker
Alternator Circuit Breaker	If the Circuit Breaker Opens at this Time, Check for Short to Ground Between the Bus and the Alternator Output Terminal. NOTE The Alternator Circuit Breaker is Best Tested Later When the Engine is Running.
The Line Contactor	The Line Contactor Should Close Putting Battery Voltage on the Shunt Terminals. Check for Battery Voltage on the Shunt Terminals. If None, Check for Battery Voltage on the Bus Side of the Line Contactor and on the Line Contactor Field. If These Conditions Exist, Replace the Contactor. If Battery Voltage is not Evident Check the Wiring to the Bus and to Pin #9 of the ACU.
The Fuses (From Shunt)	The Fuses Were Checked Along With the Wiring.
The Shunt	The Shunt Connections to the Fuses Were Checked Along With the Wiring. The Power Connection Will be Checked With the Engine Running.
The Annunciator Lamps	The Annunciator Lamps can be Tested by the Test Switch on the Annunciator Panel. Replace Burned Out Lamps Before Continuing.
The Alternator	The Alternator May Have Defective Field or Stator Windings. Check the Voltage at the Field Terminal. If the Voltage is Battery Voltage, the Wiring to the Terminal is Good. If the Voltage is Nearly Zero, Separate the Wiring From the Terminal. If the Voltage on the Wiring Returns to Battery Voltage, the Alternator is Defective. If not, Check the Wiring to the ACU. If the Annunciator Light for the "Alt Out" Remains Off, Check the Voltage at the Stator Terminals. A Voltage Greater Than 3.0 Volts Indicates the Alternator is Defective.

Test of Total System

1. Connect the ACU's.
2. Start one engine, turn the battery switch ON, idle engine at 1000 RPM's.
3. Adjust the aircraft electrical load to less than 20-amps. Monitor alternator output on volt-ammeter.
4. If the alternator indicates no output, check the alternator circuit breaker. If still no output, check the wiring between the alternator and bus and if wiring is good, replace the alternator.
5. The "Alt Out" light should go out if the alternator indicates output. If not replace or repair the alternator.
6. Monitor the voltage as the engine is run up to 1700 RPM. The voltage should hold steady at about 28.0 volts.
7. Turn on equipment to provide electrical load of approximately 40 amps for 60 amp alternators or 80 amps for 95 amp alternators and the, increase engine speed to 2000 RPM. The alternator should continue to carry the load with the voltage steady at 28.0-volts. If not, repair or replace alternator.
8. Repeat the procedures in items 2 through 7 with the other engine.
9. Start both engines, set battery and both alternators ON, run engines at 2000 RPM with an electrical load between 40 to 80-amps.

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10. Check left and right alternator output. If they are within 10-amps, the system is operating correctly. If not, determine the engine putting out the most current. Slowly recycle the alternator switch. The other alternator should carry all the load when the first alternator is off and remain the high output engine when both are on again. If it does not, the equalization wiring (from pin #11 on either ACU to pin #11 on the other ACU) may be open. Stop the engines and check for continuity.

11. If equalization is not working, the equalizer bus problems may not be simply and accurately traced to the faulty ACU. Replace the ACU on the consistently high alternator. If the equalizer problem still occurs, reinstall the original ACU on the opposite side.

SHOP NOTES:

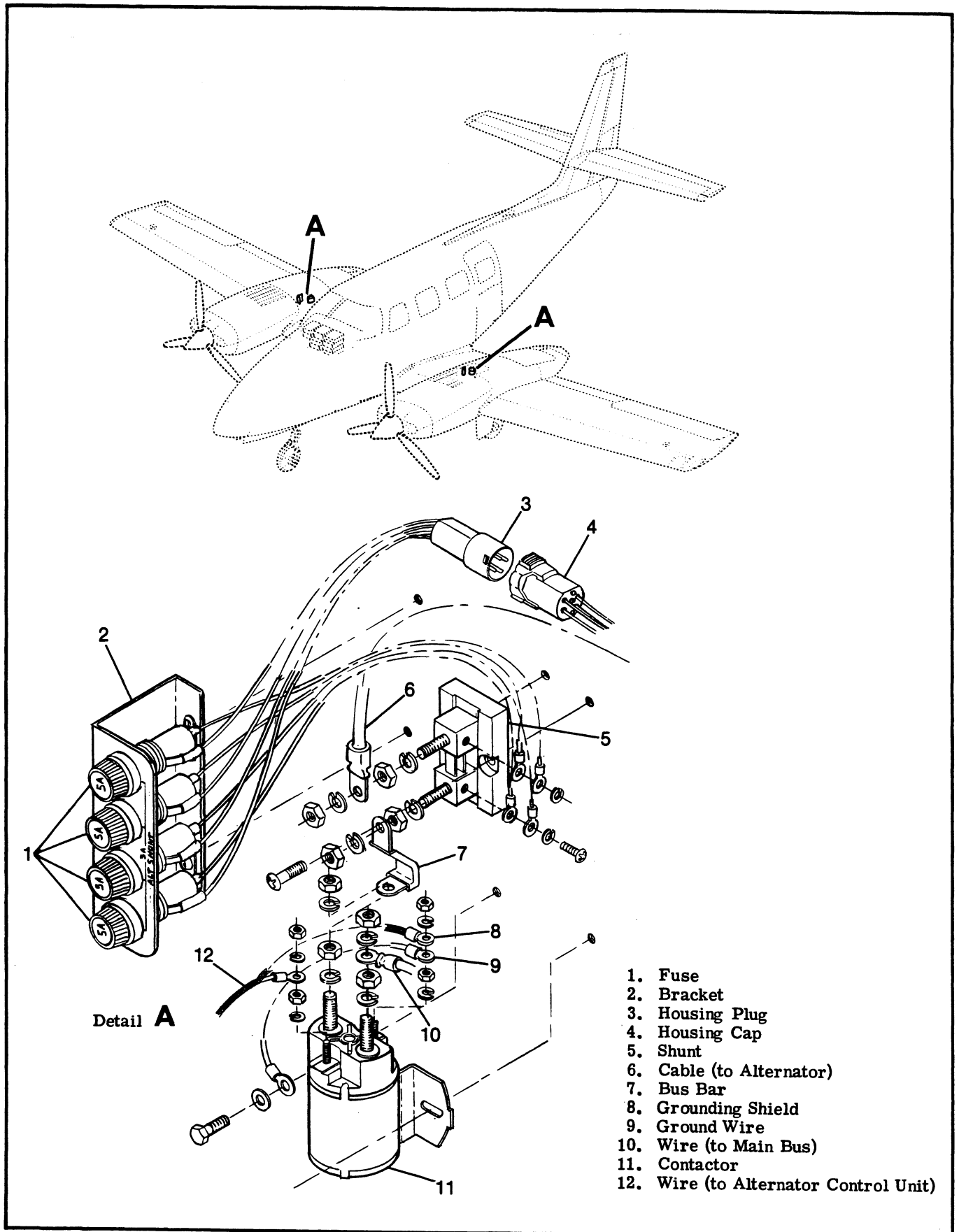


FIGURE 31. ALTERNATOR CONTACTOR and SHUNT INSTALLATION - 1982 & ON T303 MODELS ONLY

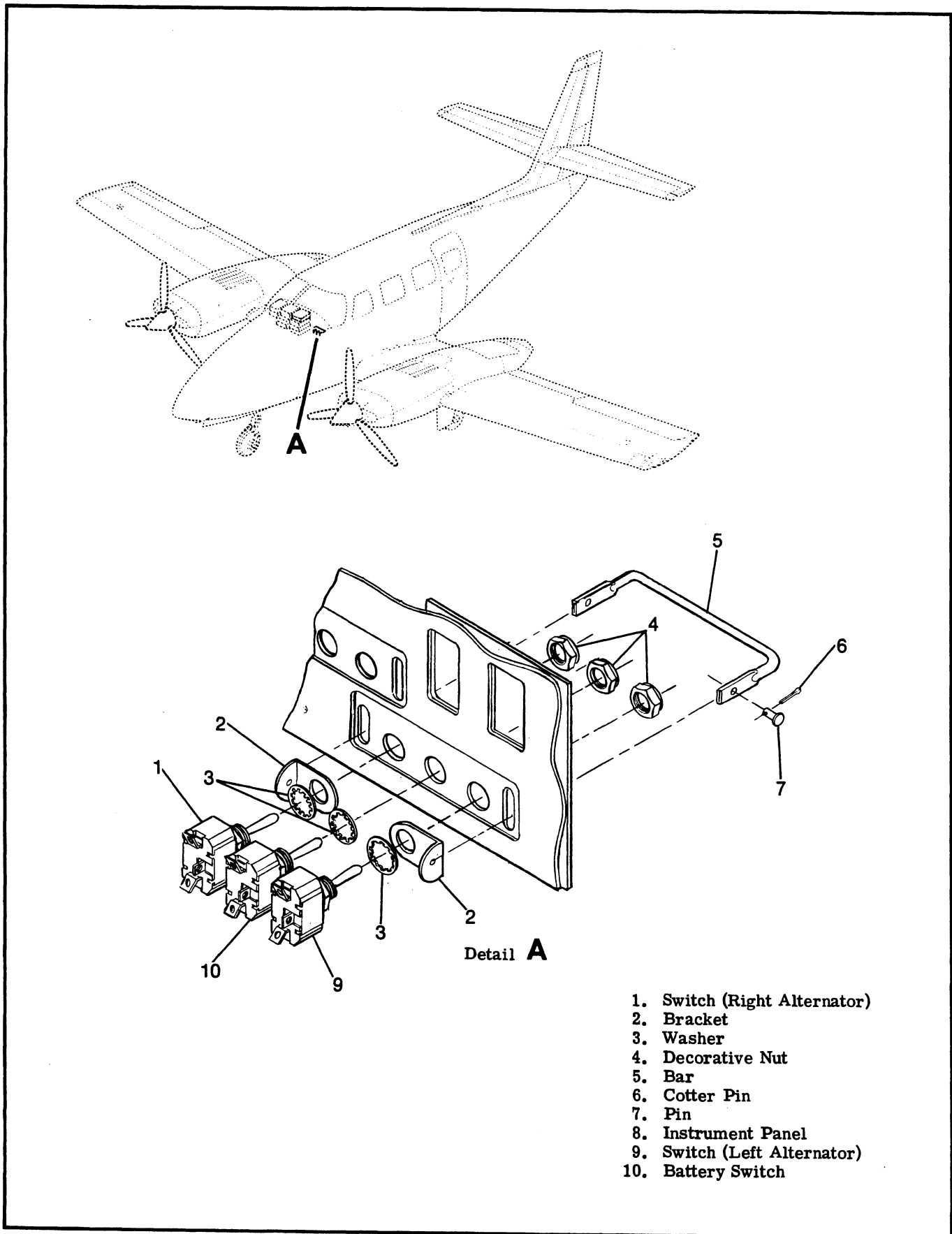
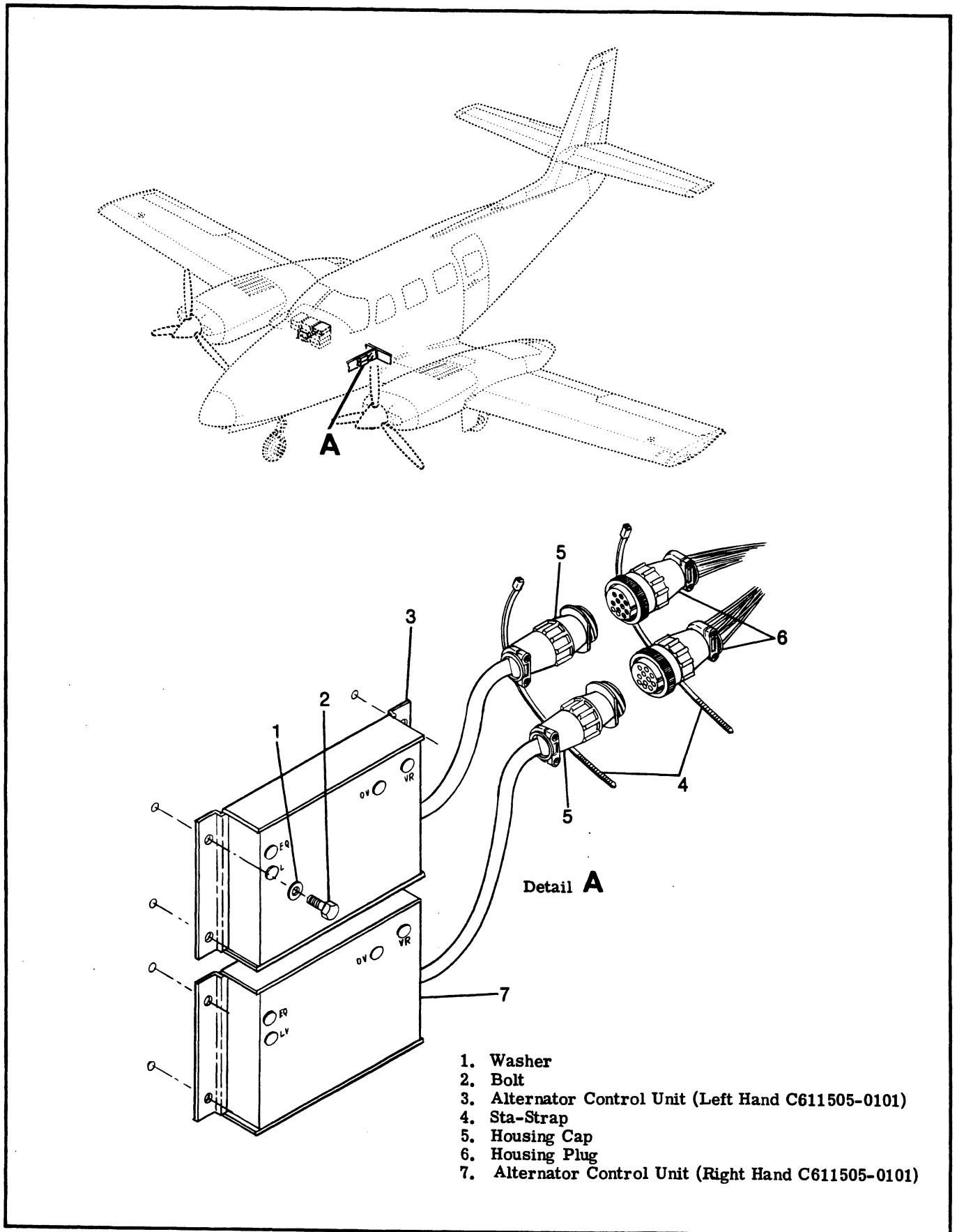


FIGURE 32. ALTERNATOR FIELD SWITCHES INSTALLATION - 1982 & ON T303 MODELS ONLY

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- 1. Washer
- 2. Bolt
- 3. Alternator Control Unit (Left Hand C611505-0101)
- 4. Sta-Strap
- 5. Housing Cap
- 6. Housing Plug
- 7. Alternator Control Unit (Right Hand C611505-0101)

FIGURE 33. ALTERNATOR CONTROL UNIT - 1982 & ON T303 MODELS ONLY