

ALTERNATOR CONTROL UNIT

28-VOLT ALTERNATOR CONTROL UNIT & LOW VOLTAGE WARNING LIGHT (C611005-0101, C611005-0102 & C611005-0103)

GENERAL

An Alternator Control Unit (ACU) as shown in Figure 26, has been incorporated in all 1979 & on 152, 172, R172, 180, 182, R182, 185, U206, 207, 210 & P210 Series aircraft. The Alternator Control Unit, consists of a combination voltage regulator and high-low voltage sensing devices. The ACU is installed on the forward side of the firewall on some models or is installed on the aft side of the firewall on other models. Refer to the appropriate airplane Parts Catalog for specific locations. The Low Voltage warning light (Red) is installed on the instrument panel close to the ammeter. The warning light will illuminate upon a signal from the Alternator Control Unit, to alert the pilot of a low voltage on the main bus.

The following information will provide the service technician with service/parts information necessary to maintain and test the new Alternator Control Unit and the ACU Tester. The following information only outlines testing procedures to enable the technician to isolate malfunctions to either the Alternator Control Unit or the Alternator. If malfunctions are traced to the Alternator, refer to the Alternator Bench Tests and Alternator Trouble Shooting Sections in this manual for isolation of alternator malfunctions.

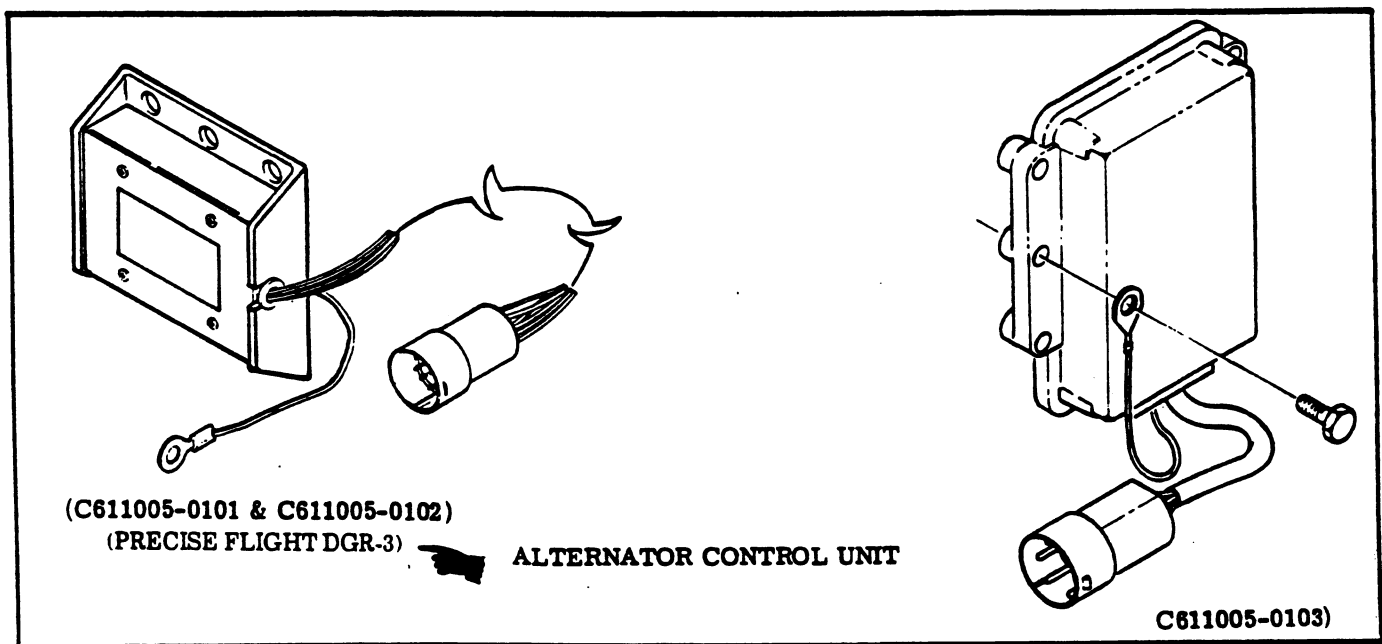


FIGURE 26

OPERATION

The Alternator Control Unit will provide high voltage protection by removing the excitation voltage from the alternator field when a high bus voltage is sensed. After a high voltage condition, the sensor can be reset by cycling the ALT half of the Master Switch, OFF and back ON again when the C611005 ACU is installed. When the PFT DGR-3 ACU is installed an overvoltage condition will cause the regulator 5 amp circuit breaker to open. The circuit breaker must be reset to restore operation. When a low bus voltage is sensed, the Low Voltage warning light will illuminate (Red) and will be extinguished automatically when the condition is corrected.

NOTE

Illumination of the Low Voltage warning light and ammeter discharge indications may occur during low RPM conditions with an electrical load on the system (such as during a low RPM taxi). Under these conditions, the light will go out at a higher RPM. The master switch need not be recycled since an over-voltage condition has not occurred to de-activate the alternator system.

The field voltage will automatically be removed from the alternator anytime a high voltage is sensed causing the Low Voltage warning light to illuminate. With the warning light illuminated and the alternator shut down, the battery will then supply system current, as shown by a discharge rate on the ammeter.

ALTERNATOR CONTROL UNIT

To determine if the Low Voltage warning light illumination is caused by a high or low voltage condition (during normal RPM operation), the Low Voltage warning light and ACU may be tested by turning the alternator switch OFF and back ON again. If the warning light does not illuminate again, normal alternator charging has resumed; however, if the light does illuminate again, a malfunction has occurred, and the ACU system should be checked out as outlined in the "On Aircraft ACU Test Procedures" Section of this manual, using the ACU Tester Assembly.

SERVICE REQUIREMENTS

The Alternator Control Unit has been designed to provide a long lasting and trouble free voltage regulator with high-low voltage sensors. The Alternator Control Unit is a non-repairable item, and if found to be faulty in test procedures, the unit must be replaced with a new one.

ON AIRCRAFT ACU TEST PROCEDURES

28-VOLT ACU/ALTERNATOR FIELD TESTER

A Cessna Alternator Charging System Test Box Assembly (PN 9870005-1) is available through the Cessna Service Parts Center for use in isolating failures in Alternator Control Unit (C611005-0101, C611005-0102 & C611005-0103) and 28-Volt Alternators used on Cessna aircraft. The Test Box Assembly is designed to provide field personnel with the capability of performing on-aircraft checks of malfunctioning alternator/regulator systems without engine running. Refer to the ACU Test Box Assy parts list, for spare parts of the ACU Tester.

NOTE

The 9870005-1 Cessna Alternator Control Unit Test Box Assembly is available for use on 1979 & on Models 152, 172, R172, 180, 182, R182, 185, U206, 207, 210 and P210 Series aircraft.

ALTERNATOR CONTROL UNIT ISOLATION TESTS

The ACU Tester Assembly will detect the following faults:

1. No aircraft battery power to the ACU.
2. A shorted regulator (overvoltage condition) in the ACU.
3. An open regulator (no alternator output) in the ACU.
4. A shorted alternator field winding or wiring.
5. An open alternator field winding or wiring.
6. An inoperative (failed) low-voltage circuit in the ACU.

SHOP NOTES:

ACU/ALTERNATOR FIELD TESTER

TEST SET-UP PROCEDURES

- Hook-up the ACU Tester Assembly between the ACU and aircraft connector, connect ground lead (alligator clip) to aircraft frame as shown on the wiring diagram in Figure 27.

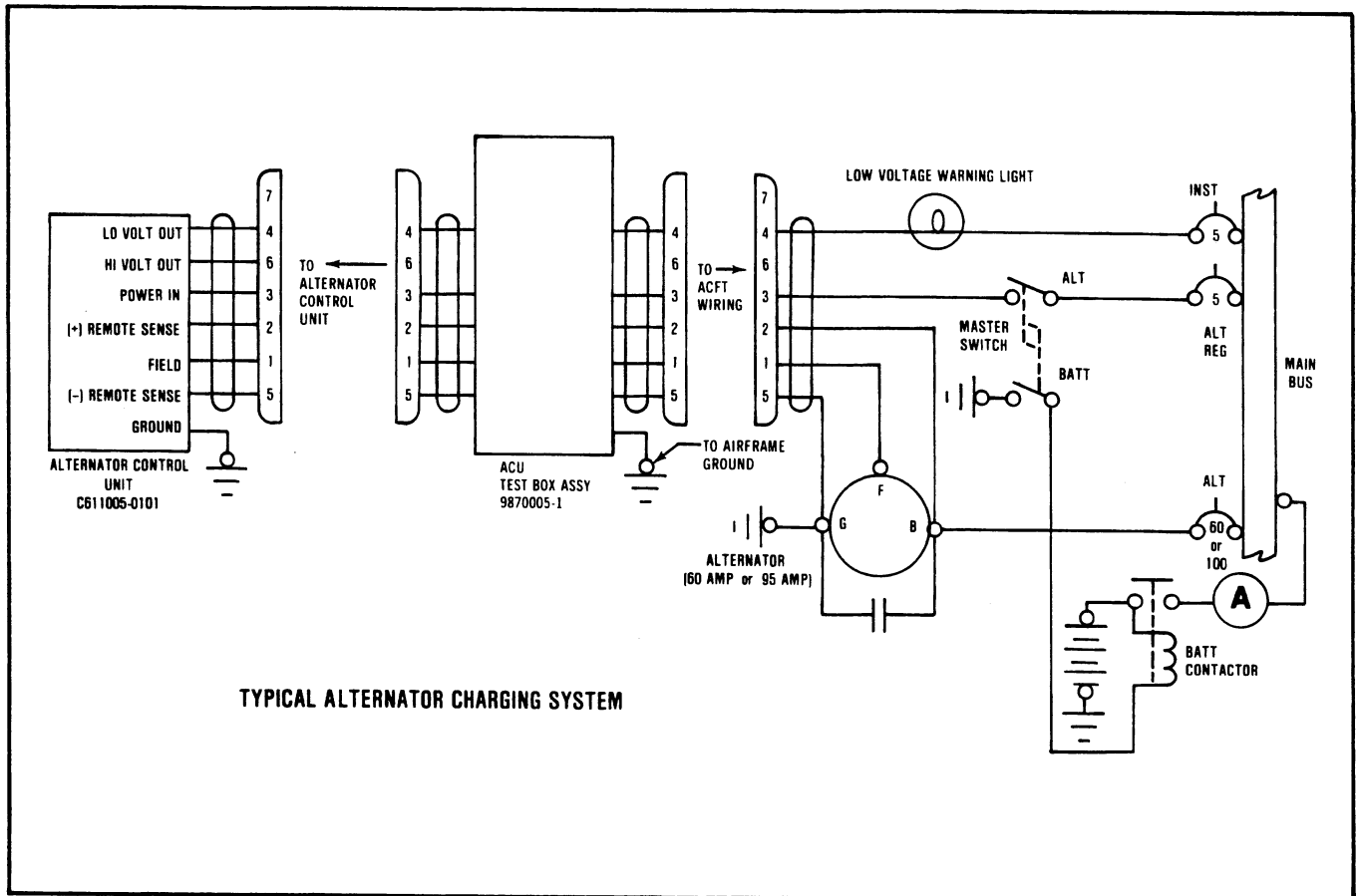


FIGURE 27

- Place ALT and BAT (Master Switch) to ON (AVIONICS POWER SWITCH should be OFF):

ACTION	RESULTS
a. AIRCRAFT POWER, REGULATOR and SENSE VOLTAGE OUTPUT lights come ON.	Alt, Batt & Gnd Wiring OK - Not Open. Regulator OK - Not Open. Alternator Field OK - Not Open. Power Check OK - Go to Step 4.
b. AIRCRAFT POWER and SENSE VOLTAGE lights come ON, REGULATOR OUTPUT light stays OFF.	Regulator Field - Open or Alternator Winding - Open or Aircraft Wiring - Open. Go to Step 3.
c. AIRCRAFT POWER and REGULATOR OUTPUT lights stay OFF.	No power to ACU - Check Master ALT, BAT Switch, ALT Reg. Breaker, and Aircraft Wiring. Correct and go back to Step 2.
d. AIRCRAFT POWER light comes ON, SENSE VOLTAGE and REGULATOR OUTPUT lights stay OFF.	Alt Wiring - Open. Check circuit breaker, Alt Batt wiring, and Alt ground wiring. Go back to Step 2.

ACU/ALTERNATOR FIELD TESTER

3. If REGULATOR OUTPUT Light is OFF in 2b, depress REGULATOR OUTPUT Switch:

ACTION	RESULTS
a. REGULATOR OUTPUT lamp LIGHTS.	Alternator Field Wiring or Aircraft Wiring - Open. Check and Correct. Go back to Step 2.
b. REGULATOR OUTPUT light stays OFF.	Regulator is Open - Replace ACU. Go back to Step 2.

4. Operate and hold ALTERNATOR FIELD TEST Switch:

ACTION	RESULTS
a. REGULATOR OUTPUT light goes OUT, AIRCRAFT POWER light stays ON.	Alternator Field OK. (Not Shorted) Go to Step 5.
b. REGULATOR OUTPUT light and AIRCRAFT POWER lights go OUT and FIELD SHORT Breaker OPENS.	Alternator Field/Wiring Shorted - Check (Also reset airplane ALT breaker if necessary). Correct and go back to Step 4.

WARNING

Do not replace ACU until short is cleared.

5. Operate and hold OVERVOLTAGE TEST Switch:

ACTION	RESULTS
a. REGULATOR OUTPUT light goes OUT, OVER-VOLTAGE lights stays OFF (when Switch is released only when testing the VR515G Regulator).	Regulator OK (Not Shorted) - Go to Step 6.
b. REGULATOR OUTPUT light goes OUT, OVER-VOLTAGE light comes ON (Light stays on until test switch is released).	Regulator Shorted - Replace ACU and go back to Step 2.

WARNING

Do not replace ACU if Alternator Field Short is present.

6. Activate Taxi and Landing Lights, Nav Lights, Beacon and Strobes. Observe LOW-VOLTAGE Light on Instrument Panel.

ACU/ALTERNATOR FIELD TESTER

ACTION	RESULTS
<p>a. Light is ON</p> <p align="center">NOTE</p> <p>If low-voltage light on Instrument panel is on, the ACU is supposed to be operating correctly. However, the failure could be a shorted transistor in the low voltage circuit and the light would also be on. The tester could assume the system is operating correctly. Yet, in flight, low voltage light, would always be on, therefore, causing pilot to check charging system. To ensure the low voltage circuit in the ACU is working properly, perform the following test:</p>	<p>ACU OK - End of test.</p> <p>Remove test box. Reconnect plug of ACU to aircraft. Start engine, switch alternator ON and observe. If ammeter shows + charge and low voltage light is still on, then ACU low voltage circuit is defective and the ACU should be replaced.</p>
<p>b. Light is OFF</p>	<p>Go to Step 7.</p>

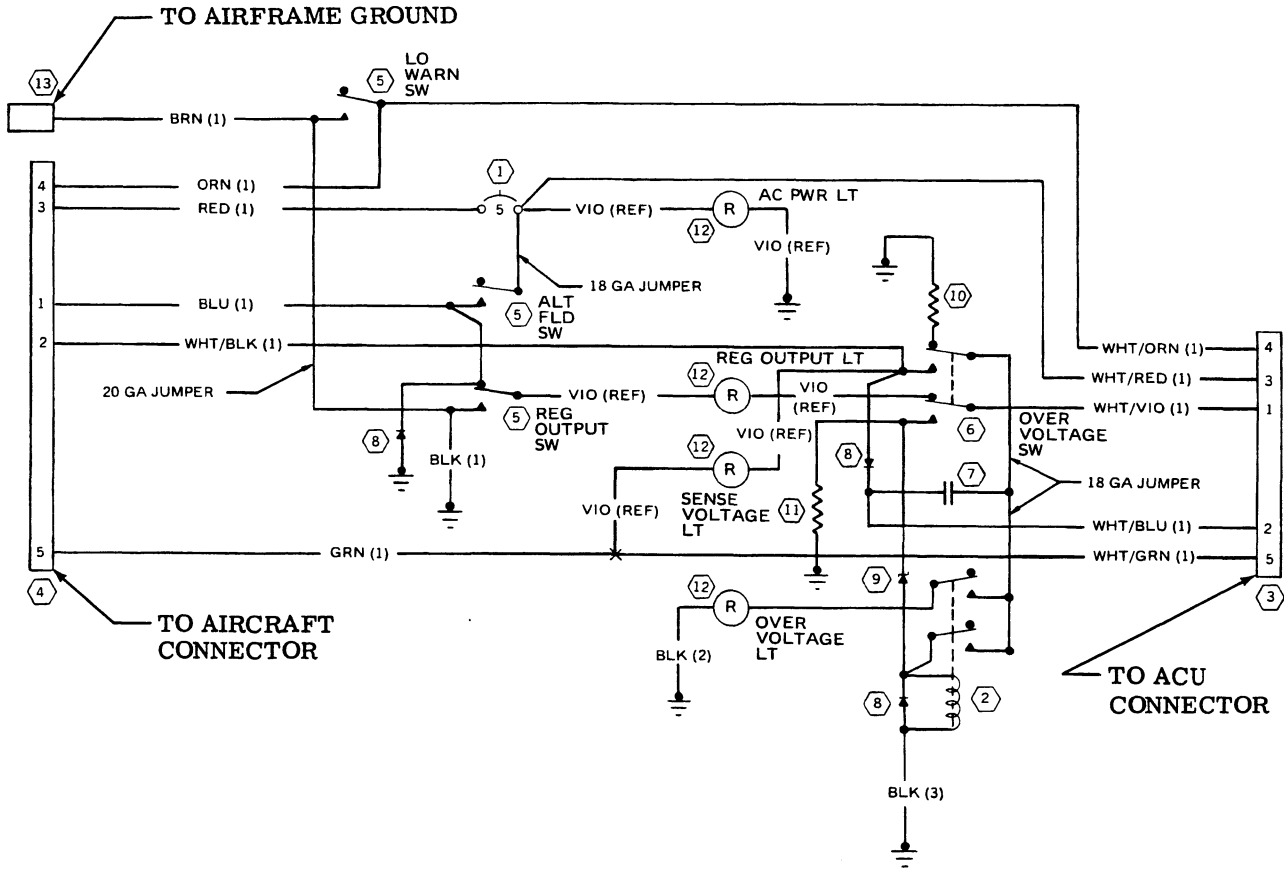
7. Press **LOW-VOLTAGE** button on ACU Tester and observe **LOW-VOLTAGE** light on Instrument Panel.

ACTION	RESULTS
<p>a. Light is ON.</p>	<p>Wiring - Open or ACU low-voltage circuit no good. Check wiring from ACU Tester to ACU. Go to Step 8.</p>
<p>b. Light is OFF.</p>	<p>Wiring - Open or Low-Voltage bulb no good. Check that ACU tester is grounded. Check wiring from bus through bulb to ACU Tester. Check bulb. Go back to Step 6.</p>

8. Activate Taxi and Landing Lights, Nav Lights, Beacon and Strobes. Observe **LOW-VOLTAGE** Light on Instrument Panel.

ACTION	RESULTS
<p>a. Light is ON.</p>	<p>ACU OK - End of Test.</p>
<p>b. Light is OFF.</p>	<p>ACU Faulty - Replace.</p>

ACU/ALTERNATOR FIELD TESTER



BLK (3)	20	-20-0		SOLDER	SOLDER				
BLK (2)	↑	-0		SOLDER	↑				
BLK (1)	↑	-0		SOLDER			13	366	BATTERY CLIP
WHT/VIO (1)		-9-7	36	S-2099-6			12	S-2135-2	LAMP
WHT/BLU (1)		-6	↑		SOLDER		11	S-2000B102J	RESISTOR
WHT/GRN (1)		-5	↑		SEE GRN (1)		10	S-2000B270J	RESISTOR
WHT/ORN (1)		-3	↓		SOLDER		9	1N4110	DIODE
WHT/RED (1)		-2		S-2099-6	S-1367-2-6		8	1N4004	DIODE
WHT/BLK (1)		-9-0		66103-1	SOLDER		7	TVA-1315	CAPACITOR 500 μ F 50VDC
BLU (1)		-6	↑		SOLDER		6	S-1890-1	SWITCH
GRN (1)		-5	↑		S-1370-1		5	S-1889-1	SWITCH
ORN (1)		-3	↓		SOLDER		4	S-2373-1	HOUSING
RED (1)		-2	↓		SOLDER		3	S-2373-2	HOUSING
BRN (1)	20	-20-1	36	66103-1	SOLDER		2	S-1813-1	RELAY
CODE	GA	MATERIAL	LG	TERMINALS			1	S-1360-5L	CIRCUIT BKR
WIRE TABLE					EQUIPMENT TABLE				

FIGURE 28

ACU/ALTERNATOR FIELD TESTER

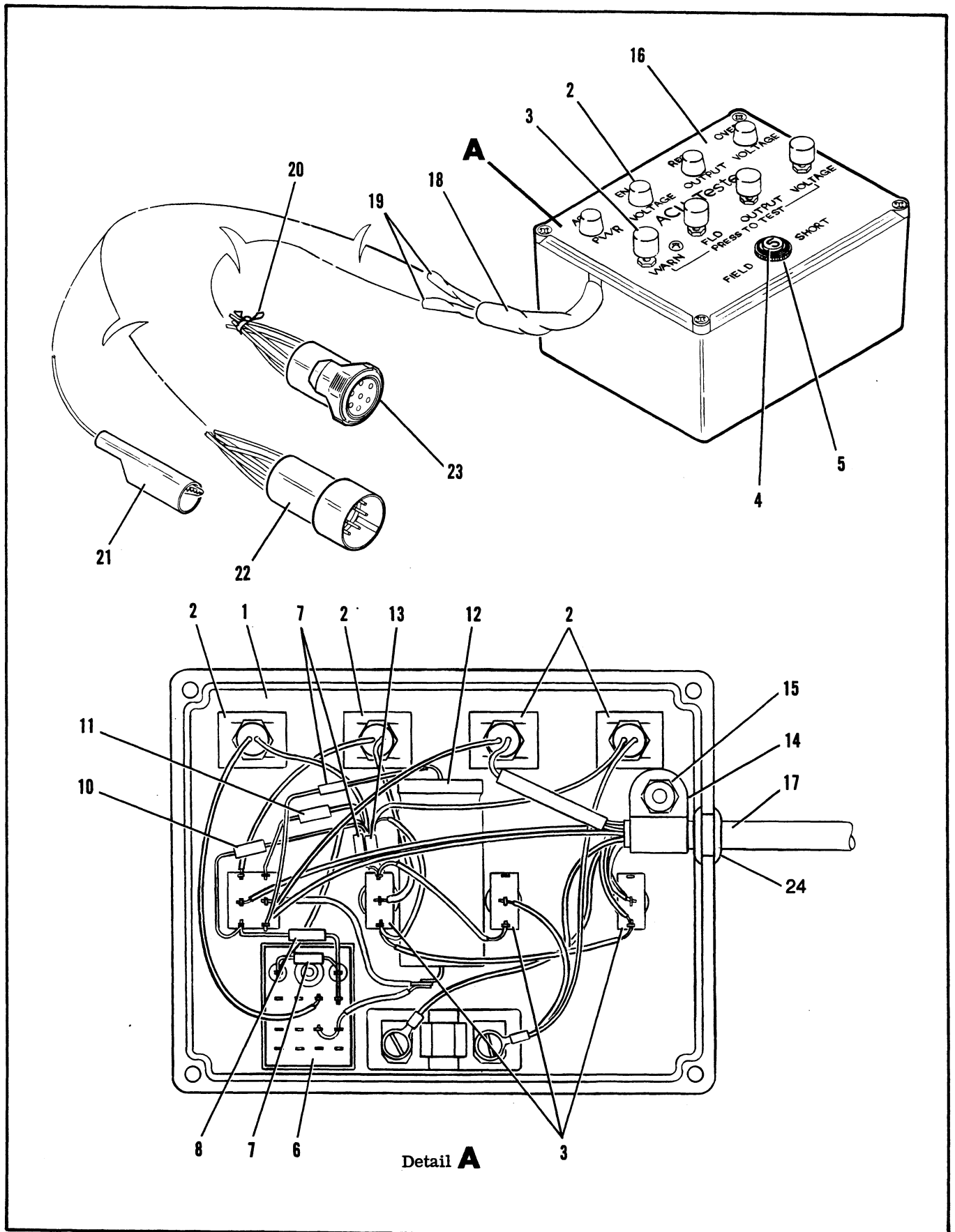


FIGURE 29

