



ELECTROLUMINOUS PANELS

I often receive requests for troubleshooting assistance with the electroluminescent subpanel lights. These are the backlighting for the subpanel CB and switch labels and are found on the 1970-and-later aircraft. The system consists of three or more subpanels with a built-in back lighting similar to fluorescent lighting. They require AC voltage to excite the lighting material sandwiched in the middle of the panel to produce light. The AC is generated by an inverter that produces up to 120 volts at 400 Hz.

There are several variations of the wiring diagrams, so before you start, make sure you locate the one that applies to your aircraft serial number.

The panels each have two leads: a power (red) and a ground (black), all connected together in parallel. The output of the inverter is connected to the power leads.

On the 1970 thru 1975 the inverter is located on the inside of the console trim piece under the power controls near the pilot's right leg and the power transistors are located under the pilot seat, behind the front spar carry thru.

Starting with the 1976 models, the inverter was moved to a printed circuit board (transistor dimming bracket) that contains the power transistors and is located under the pilot seat, behind the spar carry-thru. The inverter is connected to a power transistor whose output is controlled by the rheostat labeled *Sub Panel Lighting*. See Figures 1 and 2.

To troubleshoot, first darken the cabin to simulate night conditions. Turn on the subpanel lights and verify if any of the subpanels are illuminated. Over the years, the lights dim and they may illuminate, but with an unsatisfactory light output. They can be repaired, or restored to like-new performance and can even be updated to reflect the changes in circuit breakers and switches that may have occurred over the years.

If there are one or more panels satisfactorily illuminated, the ones not illuminated will most likely need to be sent out for repair or replacement. Repair is much less expensive than replacement.

There are several companies that can repair and restore subpanels. I have had great results from Air Capital Dial in Wichita (www.aircapitaldial.com - 877-269-2483). Two companies in California providing repair and restoration service are: E.D.N. Inc., Van Nuys, (www.ednaviaion.com - 818-988-8826); and Paramount Panels, Inc. in Ontario (www.paramountpanels.com - 909 947-8008).

If none of the panels light up, turn the master switch off and disconnect all of them from each other and from the wire coming from the inverter. With the inverter unloaded, turn the system back on and measure the unloaded output with the rheostat turned up full. The voltage output should be nominally 120 volts AC at 400 HZ. The voltage can vary between 110 and 140 volts AC when unloaded. If the unloaded inverter output is OK, then the inverter, power transistor and rheostat are good.

Next turn off the master switch and connect each of the panels individually and retest if the individual panels will light up when the master is turned back on. If you have one or more panels that do not light, the problem is likely in the associated panel. You should test the panels individually because a bad panel will often create a load on the inverter to prevent sufficient voltage to illuminate a good panel.

If you did not get the required output from the inverter when it was unloaded, it is time to check the power transistor and the controlling rheostat. As stated before, the power transistor is located below the pilot's seat. Locate the one that is attached to the inverter; refer to your wiring diagram for your aircraft serial number to help you determine which transistor is yours.

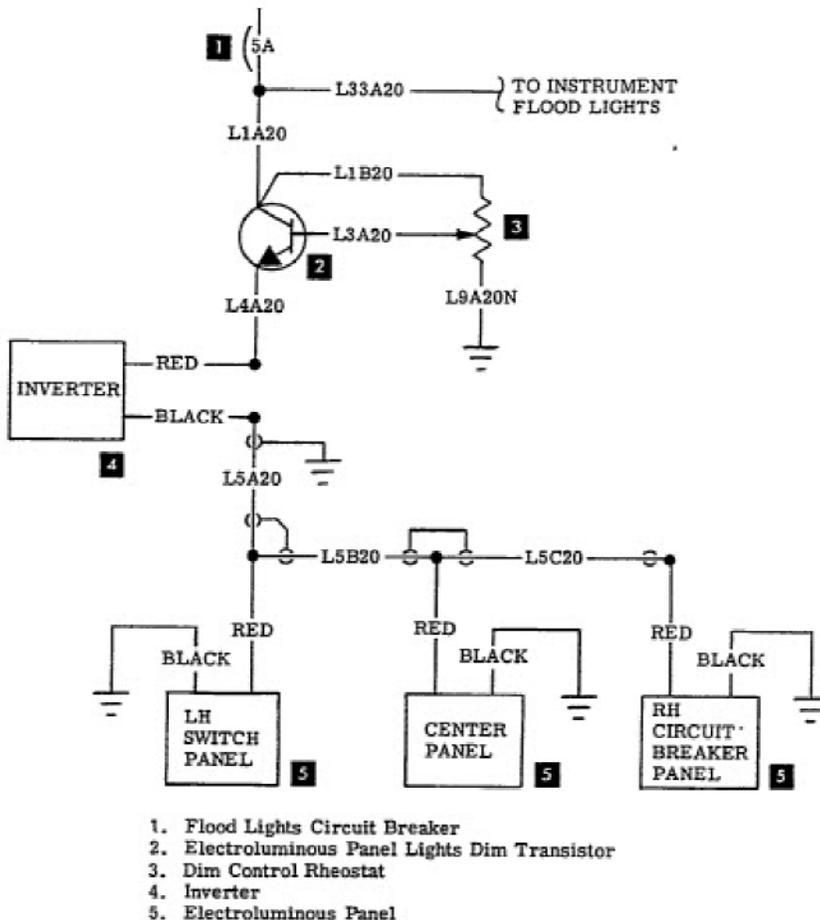


Figure 1

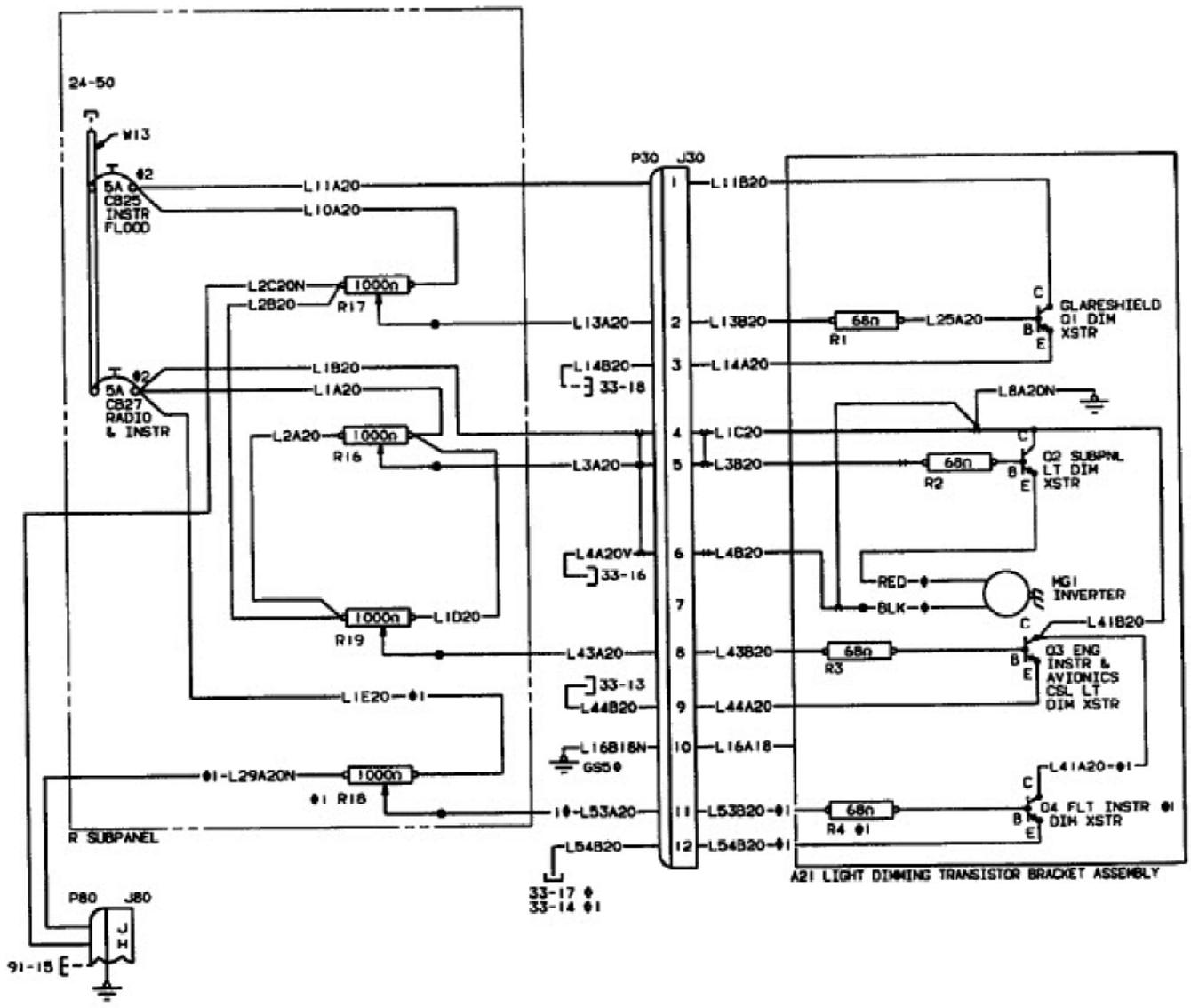


Figure 2

The transistor collector (labeled C) is electrically connected to the transistor case and should be at battery voltage for your aircraft. The transistor base (labeled B) should follow the voltage of the rheostat between battery voltage when full on and zero when full off. The transistor emitter (labeled E) is attached to the inverter circuit and should follow the base voltage less about a half a volt. See Figure 3 to determine which transistor lead is the base and which is the emitter.

If the transistor checks out, the problem is in the inverter. The 14-volt inverter is P/N 71254-7, \$850 list at RAPID. The 28-volt inverter is P/N 58-380101-1, \$503.23 list at RAPID. The transistor-dimming bracket originally had the inverter mounted on it, but later the board was changed from using the inverter box to one that uses discrete components. Unfortunately, the part number for the board did not change. If your aircraft does not have the small box-shaped inverter and has the discrete components, you will have to return it to RAPID if it needs to be repaired.

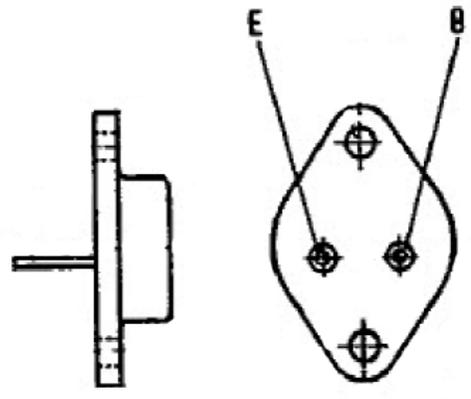


Figure 3

If the transistor is the problem, you are in luck because it is easily and cheaply replaced. The original transistor (2N3055 or 2N3055H) and the replacement transistor (132404-11) can be purchased locally or from RAPID for \$2.46. If you order a transistor, order a few extras in case the first one fails when the inverter is hooked up.

Repairing the electroluminous panels used for the sub-panels can be an expensive repair, so I always check their correct operation on a prepurchase inspection and insist on them being repaired by the seller if they don't work. There is nothing worse than an unexpected several-thousand-dollar repair at your first annual.

I received advice and counsel from Hawker Beechcraft expert Bob Leewright in assembling the information in this article. If you have a problem with the electrical system on a Bonanza or Baron, he wants to hear from you (316-676-8027). Since Bob has been doing his job for more than 40 years, I'm sure he has it figured out.

John Collins, Charlotte, North Carolina, owns a 1968 V35A. He is a commercial pilot with more than 4,000 hours, has a BS in electrical engineering and has worked as an engineer and software developer for IBM and for his own technical business. John owned and operated an FBO, with avionics shop, for six years.