



## Tying a Power Supply to Multiple Boards in a Panel

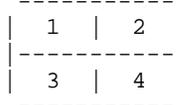
If you have a situation with multiple boards on a panel, and you need to wire one or more power supplies to each board, you often can wind up with problems wiring power and ground. Usually, you'll see warnings of the type FXT66.

The 3070 system may not automatically wire the power supplies for this situation - it tries to put them all together, but runs out of room on the pins required to distribute power. You can only have three wraps per pin, and the software tries to put too many wraps on a single pin, and doesn't wire more pins. In fact, when you run the fixturing software, you're likely to get power supplies wired to some boards, but not others. In addition, power supplies need to be switched off to PC boards selectively if one PC board has a shorts failure, but others pass.

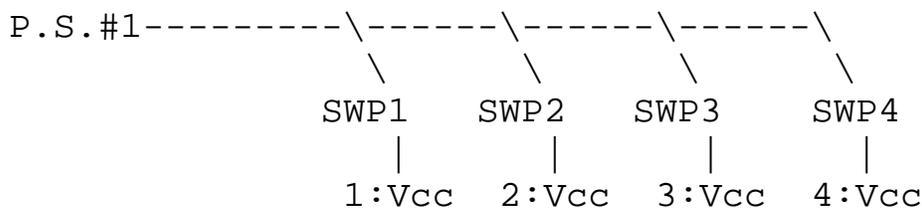
This paper outlines a process for setting up power and ground on panelized boards so that you don't run into these problems. You will have to do the setup manually in Fixture Consultant. The process just shows you how to wire one power supply. If you have multiple power supplies, you'll have to repeat the processes in parts 2 and 3 for all of them.

Assume that your panel looks like this:

A panel of four identical boards.  
Consider 1 Power node one each board



The fixture wiring will reflect the following diagram (or something similar):



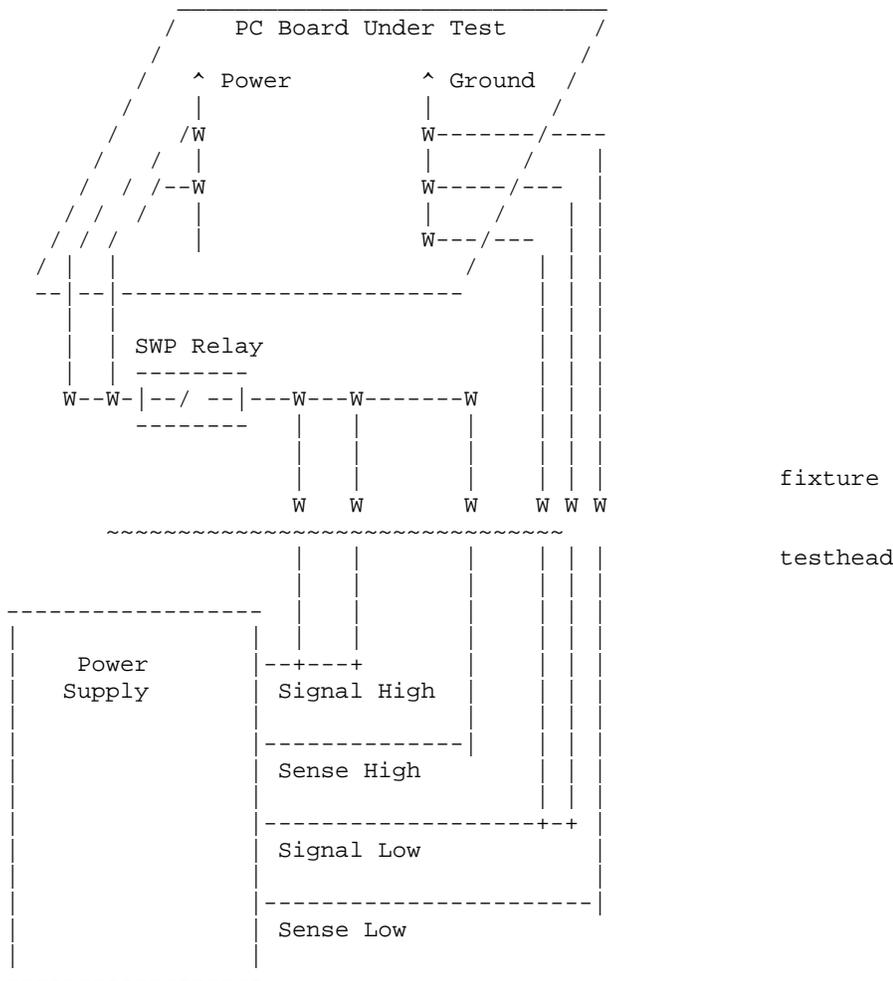
Where "SWP#" is a Switched Power Relay. You may use a latching relay mounted in the fixture, or you can also use General Purpose (GP) Relays in some situations. You will need to wire the Bank Row Column (BRC) which controls fixture relays if you use relays in the fixture.

Typically these Switched Power Relays (or GP relays) can be opened and closed using an analog source or digital driver. The reason for doing this is to control the power supplies to each board individually. If one of the boards has failed prior to setting up the power supplies, you don't want to power up that board.

There are some significant limitations if you'd prefer to use GP relays. The number of GP Relays that you have to work with is limited: you will only have 8 per module unless you have an Access Plus card. They are also limited to 750mA of current, with a maximum power of 30W.

There are three main parts to the process, with several steps to each part. In the following discussion, we refer to the "signal" side and the "sense" side of a power connection - both of these are connected to the same side of a power supply. This "signal" side is the wire that carries the current to power the PC boards under test. The "sense" side provides a feedback loop so that the power supply can regulate its output voltage correctly. Each power supply used will have both signal and sense wires. Both the power and ground sides of each supply will have both signal and sense wires.

Here is a diagram of what you're building ('W' represents a Wirewrap connection):



This diagram shows a positive voltage power supply; a negative voltage power supply would swap the highs and lows.

### Part 1: Connect all PC board grounds to the power supply

- A. Verify the connection of the signal side of each power supply to the ground on each PC board. You will probably find some boards wired and others that aren't wired.
- B. Wire the signal side of each power supply to all PC board grounds which were missing in the

previous step. Use Fixture Consultant to do this wiring.

- C. If you have a high-current situation, you will need multiple probes for the grounds.
- D. Verify the connection of the sense side of each power supply to the ground on each PC board.
- E. Wire the sense side of each power supply to all PC board grounds which were missing in the previous step using Fixture Consultant. These will only require one wire per sense on each PC board, regardless of the supplied current.

Part 2: Connect the other side of the power supply to X relays, where X is the number of PC boards on the panel requiring this power supply. (In the example shown above, X=4.)

- A. Verify the connection of the other signal side of each power supply to one end of each of the relays. You need to make sure that power to each of the boards is switched, so that you don't power up boards with shorts or other problems inappropriately. The Switched Power (SWP) relays used could either be GP Relays in the tester or fixture latching relays.
- B. Wire the signal side of each power supply to all PC board relays which were missing in the previous step. Do this wiring using Fixture Consultant.
- C. If the current drawn by each board for this power supply is greater than the current you can put through an individual wire, you will need to use a second wire on each relay. (Typically X amps for W gage wires or Y amps for 2 gage wires). Depending on the current requirements, you may also need additional relays.
- D. Wire the sense side of each power supply to all SWP relays. (Do not wire the sense to each board directly, but instead to each SWP relay). Do this wiring using Fixture Consultant.

This will only require one wire per sense on each SWP relay, regardless of the supplied current.

Part 3: Connect the relays to the power nodes on each PC board

- A. Wire the other side of each SWP relay to the power node on each PC board using Fixture Consultant.
- B. You will find some relays wired by the fixturing software, if GP Relays are specified in the board file or fixture relays are specified in Fixture Consultant, but others won't be wired.
- C. If the current drawn by each board for this power supply is greater than the current you can put through an individual wire, you will need to use a second wire on each relay. Depending on the current requirements, you may also need additional relays.
- D. This wiring will take care of both the signal and sense connections, since they were both wired to the other side of each relay.

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That's all there is to the main process. You may find yourself in a situation where you need to wire the power supplies as though they were different signals. This occurs when you're connecting a power supply to a number of boards, you need to distribute the power to each of them, and you run out of wirewraps. A comb device is physically just several probes that are connected together, but each probe is seen by the system as though it was a separate signal.

Here is a short process to make a comb device. You may want to do this for either power or ground; an example using ground is shown in the process.

1. Make a "comb" device in fixture electronics. Any time you have to describe it to the system, make

each tooth on the comb a single node. Don't tell the 3070 software that all these nodes are shorted together.

2. Wire each ground to a tooth on the comb, in Fixture Consultant, like this:

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1:GND to comb.1  
2:GND to comb.2  
etc.
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Fixture Consultant should see these as different nodes and accept them. You probably won't have enough grounds to overflow the individual pins on the comb.

3. For throughput multiplier, you don't need a separate comb for each module that you use. Power supplies are programmed serially and can cross module boundaries with throughput multiplier.

To make the documentation consistent, the existing ground wires to the first X boards could be removed and wired to comb pins. X will depend both on the number of boards that you have, and the number of ground wires that you need.

After you've done all this, you will need to write subroutines in your testplan to cover the situations where you want the SWP relays to open and close.