

Breaker Panel Reference Guide

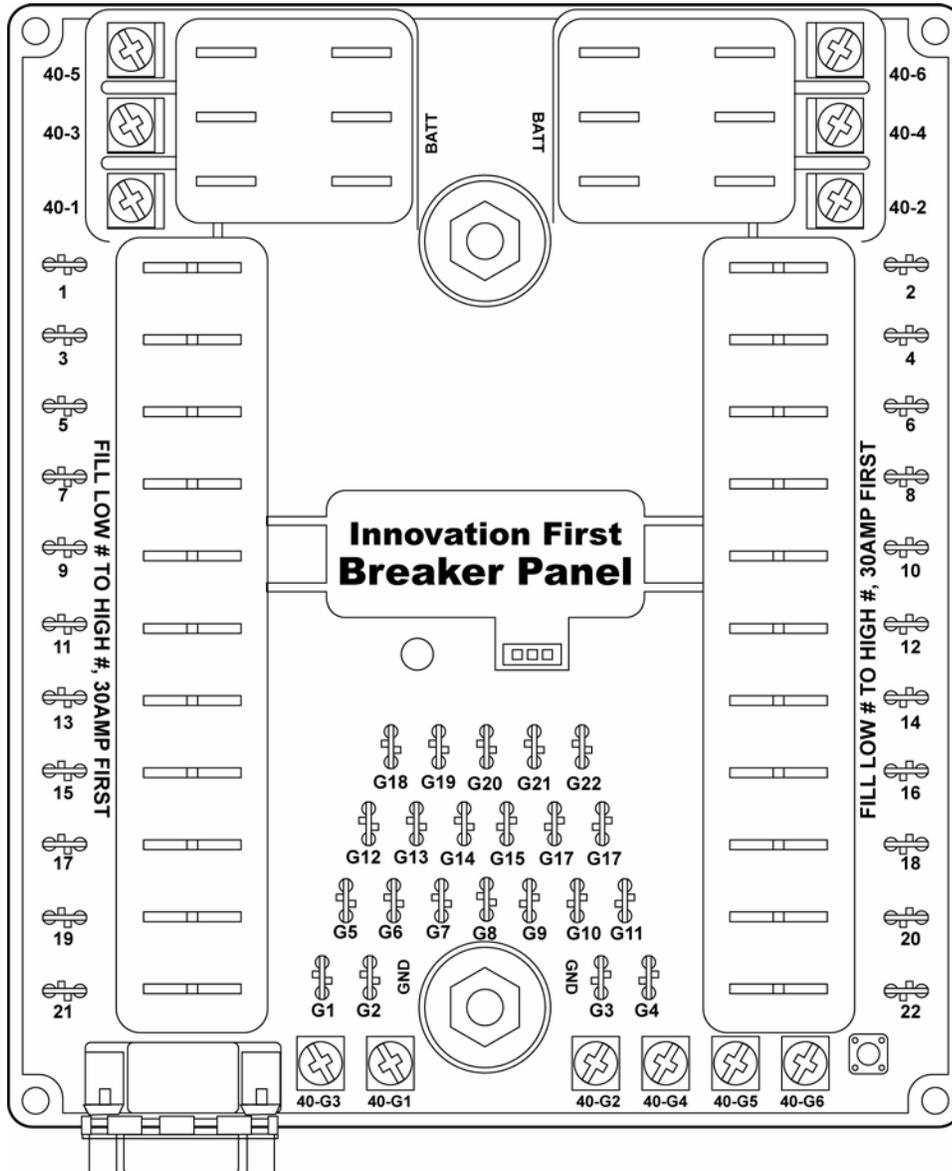


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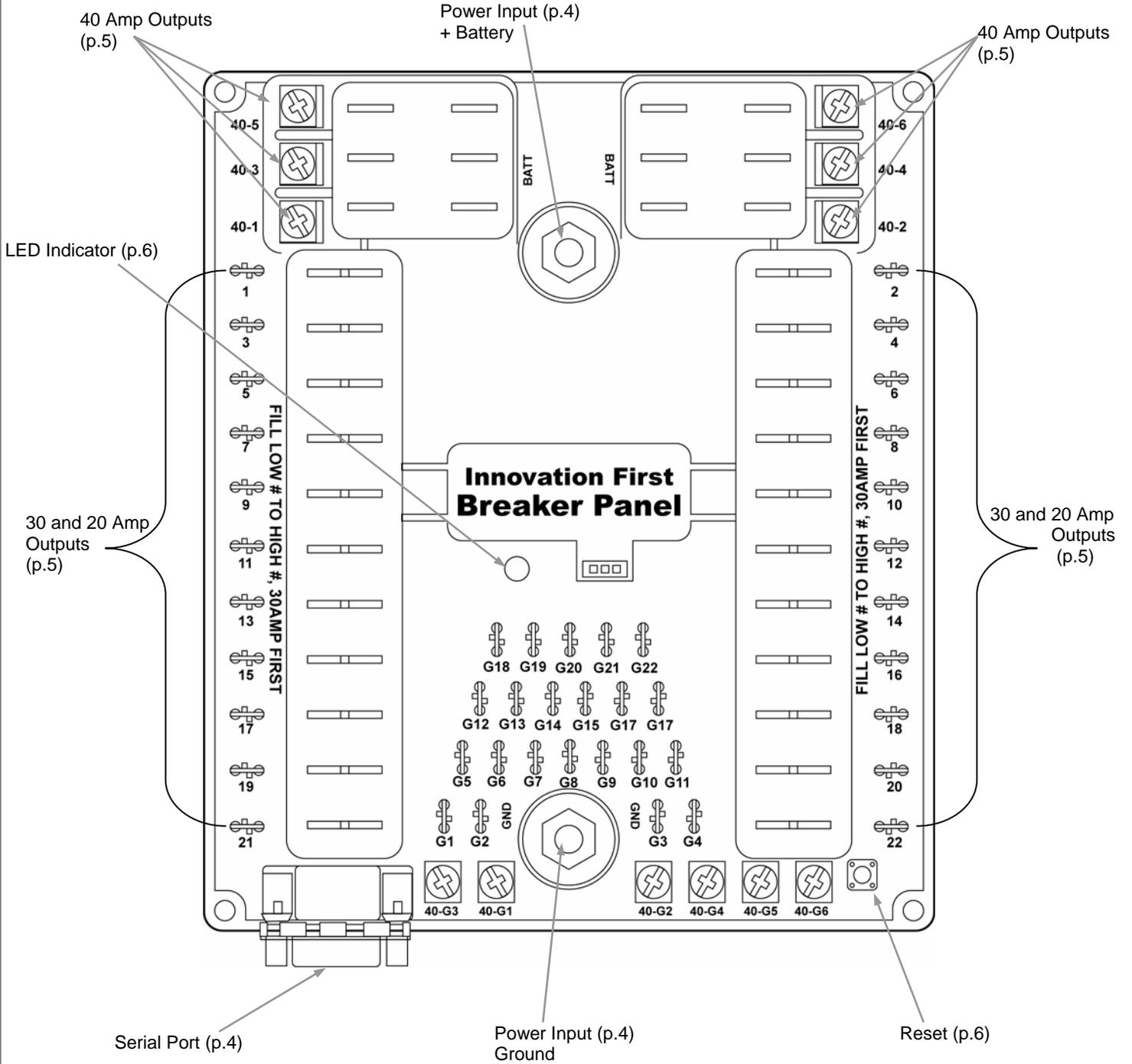
1. Overview

The Innovation First Breaker Panel is new for the 2005 FIRST Robotics Competition. The Breaker Panel is used as a power distribution unit. Main power is applied to the input of the Breaker Panel and is routed to various outputs via removable auto-resetting breakers. The removable auto-resetting breakers are not supplied with the Breaker Panel. The auto-resetting breakers are available from Innovation First in sizes of 20, 30, and 40 Amps.

The Breaker Panel contains a micro-processor which gives “smarts” to the unit. The unit can identify which breaker(s) is tripping and which breaker(s) has tripped at least one time since the last reset. When the Breaker Panel is properly connected and “linked” with an Innovation First Control system, the trip data can be seen on the Innovation First Dashboard Viewer. The Dashboard Viewer will show the user when a breaker is tripping or if a breaker has tripped at least once. You can now easily decide if you need to make adjustments (gearing, motor selection, code modifications ...etc.) by being able to see which breakers are tripping.

The Default Code will have an example on how to determine which breaker has been tripped. Since the trip data passes through the user processor, the user can easily modify the Default Code to react to this data.

2. Breaker Panel Layout



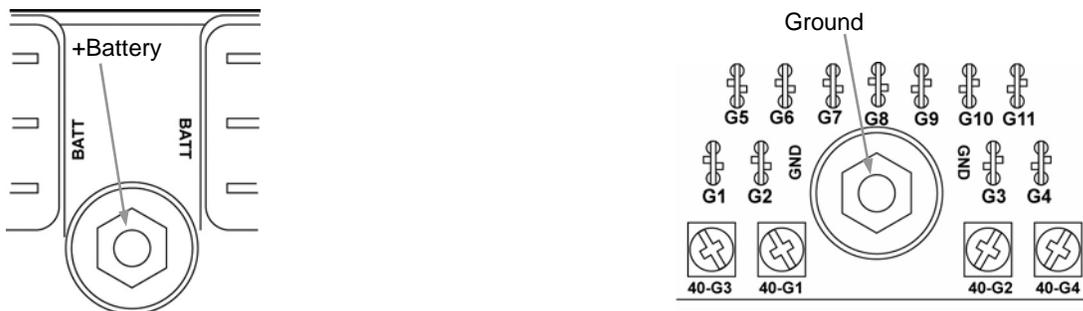
3. Power Input

The Power post on the Breaker Panel is intended to accept power from a 12V battery. The current draw for the Breaker Panel electronics is typically about 25 mA. The maximum voltage allowable is 20.0V. Exceeding the 20.0V limit may damage the voltage regulator in the Breaker Panel and will void the warranty. The minimum required voltage is 5.2V. A Connector/Lug to connect power to the Breaker Panel is available from FIRST, www.usfirst.org. Use the largest wire possible to minimize voltage drop to the Breaker Panel. A minimum wire size of 6GA is recommended.

Connect Positive(+) side of the Battery to the center post contact labeled BATT. Connect Negative(-) side of the battery or Ground to the center post contact labeled GND. For FIRST Robotics Competition, the positive side of the battery may not connect directly to the battery, but connect after required fuses or breakers on the positive side of the battery. Always follow competition wiring rules.

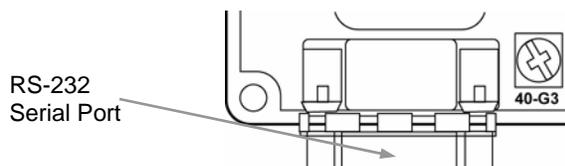
The Breaker Panel is internally protected from reverse polarity and will not be damaged. It does not provide reverse polarity protection to externally connected devices. Example: A Victor speed controller will be damaged if it is connected to the Breaker Panel and a reverse polarity connection is made to the Breaker Panel.

Caution: Always use care when connecting devices to the Breaker Panel, a reverse polarity connection may damage the connected device and is not covered under warranty.



4. Serial Port

The RS-232 Serial Port on the Breaker Panel is used to transfer breaker status data from the unit. Use a DB9 Male-Female Pin-to-Pin cable (maximum length 25 ft.) to connect the Breaker Panel to the Innovation First Robot Controller Program Port. When the Robot Controller is “linked” with an Operator Interface, the breaker status data can be viewed using the Innovation First Dashboard Viewer. The status data is transmitted to the Dashboard Viewer via User Bytes 3, 4, 5, and 6, refer to the dashboard-spec.pdf for more details. The data packet structure as the data leaves the Breaker Panel consist of 4 main bytes, Breaker Byte 3, 4, 5, and 6. The break down on the Dashboard Viewer User Bytes and Breaker Bytes are the same, refer to the breaker-panel-packet-definitions.pdf for more details.



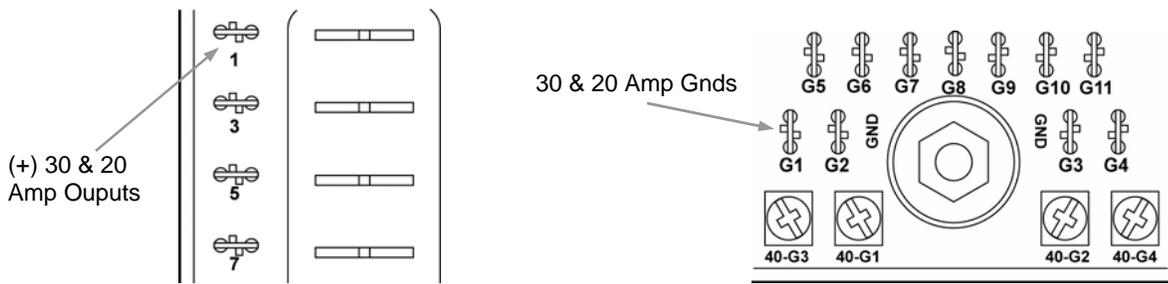
5. 40 Amp Outputs

The 40 Amp Outputs on the Breaker Panel are located at the top of the unit. There are 6 outputs and they are labeled 40-1 through 40-6. When a 40 Amp auto-resetting breaker is installed next to the output, the corresponding output will have Input BATT voltage present. For optimum power distribution, the auto-resetting breakers should be installed from the lowest number to the highest number. Thus a corresponding breaker should be installed in 40-1 first, then 40-2 ...etc. The return path or Ground for these outputs are located at the bottom of the unit and are labeled 40-G1 through 40-G6. All 12 connectors, positive and ground, are a "Screw" type.



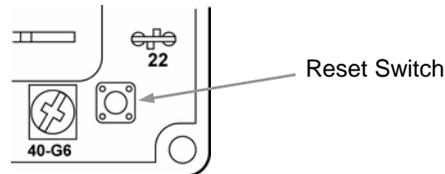
6. 30 and 20 Amp Outputs

The 30 and 20 Amp Outputs on the Breaker Panel are located on the sides of the unit. There are 22 outputs and they are labeled 1 through 22. When a 30 or 20 Amp auto-resetting breaker is installed next to the output, the corresponding output will have Input BATT voltage present. For optimum power distribution, the auto-resetting breakers should be installed from the lowest number to the highest number. Thus a corresponding breaker should be installed in 1 first, then 2 ...etc. The return path or Ground for these outputs are located at the bottom of the unit and are labeled G1 through G22. All 44 connectors, positive and ground, are a "Blade" type.



7. Reset

The Breaker Panel has a reset switch located at the bottom right corner. On power-up or after the reset button has been pushed, the Breaker Panel will initialize and determine which auto-resetting breakers have been installed. After this initialization (power-up or reset), only the breaker positions that had breakers installed will be monitored. If the initial breaker utilization is changed, the Breaker Panel must be reset for the changed breakers (added or removed) to be properly monitored.



8. LED Indicator

The Led Indicator is located near the center of the Breaker Panel. The indicator should always be green, yellow, or red. The following table describes the possible states of the LED indicator and their meaning.

State	Meaning
Green Solid	An initialization is in progress.
Green Blinking	Normal, no monitored breaker is currently tripped or has ever tripped since the last reset.
Yellow Blinking	At least one monitored breaker has tripped since the last reset. To clear, reset the unit.
Red Blinking	At least one monitored breaker is currently tripped.
No Light	Check wiring and proper input voltage.