Linac Quad Power Supplies
P.C. Card Main Functions and Trouble Shooting Aid

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There are eight P.C. cards in each quad power supply. Seven are located in the front and one in the back of the supply. These cards and their main functions are listed below.

P1 card — The + and – 15 volt power supply.
This card supplies voltage to all the other cards except the P6 card

P2 card — Phase control for the transformer primary.
This card controls the firing time of the SCR's which feed the primary of the high voltage transformer. In turn, this controls the bulk DC voltage level.

P3 card — Voltage control of the DC output.
This card controls the P2 card. It also supplies a trigger to the P8 card to reverse the output connections (via SCR's) so that the output capacitor is recharged to the original polarity by the discharging load.

P4 card — Peak reader.
This card reads and stores the peek output current of each pulse. This value is then compared to the desired peak current (analog input level) and the resultant error signal is then sent to the P3 card.

P5 card — Pulse timing control.
The P5 card sets the time when the output capacitor starts to discharge into the load. This time is adjusted so that the peak of the current waveform occurs at beam time.
The P5 card is also responsible for recharging the output capacitor to its original value after the load (quadrupole magnet) is fully discharged.

P6 card — Circuit protection.
The P6 card is a system of relays for monitoring various interlock functions. It can shut the supply off on an overload or fault condition until the fault is cleared and the supply is reset.

P7 card — Input card (level and trigger).
The P7 card buffers the input analog level (0 to 8 volts) and it also stretches the input trigger pulse from 5 microseconds to 10 milliseconds.

P8 card — The P8 card controls the output switch. When SCR's 3 and 4 are fired, the output capacitor is connected to the load in the discharge direction.
When SCR's 5 and 6 are fired, the output leads are effectively reversed. This is the output capacitor charge direction.

Although it will not always be true, most P.C. card failures can be diagnosed from the symptom of the failure. The chart below is meant to assist in this. The most probable card(s) known to cause this symptom is (are) given, and in some cases less probable possibilities are given in square brackets [P3].

Breaker trips:	1. Blows breaker immediately.	P2, P3, [P1]
	2. Blows breaker during run-up.	P3, P8
	3 Intermittant breaker trips.	P8, P3, [P1]
Supply will not come up to value:	4 Supply will not trigger.	P7
	5 Does not come up to 120 volts at turn on.	P2, (blown fuse)
	6 Supply will not run up.	P3, P7, P2, P8
Output jitters:	7 Output drops to zero.	P6
	8 Output jumps around.	P3, P6
	9 Output slowly drifts.	P4, P7
	10 Time jitter (small output jitter). Sometimes stops when door is opened.	P5, (P8)
Other:	11 Numerous overloads.	P6, (P3)

If changing the cards listed above does not solve the problem, one can certainly try changing the rest of the cards in this supply before deciding to replace the supply itself.