Low Energy Linac RF System Monitor Inhibitor
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Paraphrased From Sharon Whelchel's Original Notes

The monitor Inhibitor has three functions

1. Protect the Modulator from problems in the Power Amplifier.
2. Provide readbacks of the Modulator output voltage and current.
3. Provide a way to shut down the H.V. Power Supply in case of a PA Crowbar.

Protecting the Modulator is done by way of the "MOD BLOCK" and PERM INHIBIT". The MOD BLOCK affects the modulator for one pulse. The PERM INHIBIT, as its name implies inhibits the modulator until one resets it.. Both are designed to minimize the damage from a breakdown outside of the modulator.

The signal from a toroid on the line between the cap bank and switch tubes is fed to the Monitor Inhibitor. If this current exceeds a preset value, usually 400 A., the Monitor Inhibitor removes the permit for the Mod Input signal causing the switchtubes to stop conducting for the remainder of that RF pulse. This is a MOD BLOCK and the system pulses normally on the next RF pulse.

If the system MOD BLOCKs on four consecutive pulses the Monitor Inhibitor removes the permit until a manual reset is done. This is a PERM INHIBIT. The reset can be done via the blue button or the computer. Current protocol requires that someone come and look at the station while it is reset and brought back into operation.

The sequence of events leading up to a MOD BLOCK and PERM INHIBIT are as follows. The modulator current signal is sent to a differential amplifier with a gain of two. The output of this amplifier is sent to a comparator where it is where it is compared to a DC voltage, set by R43. If the amplifier signal exceeds this voltage it triggers a MOD BLOCK.

The comparator output goes high triggering the one shot U17. The U17 output goes high for 1msec. triggering two one shots U13 and U18 and causing U14 to count. U13 goes high for 20 msec and triggers ½ of U9, which is the output to the Pulse Interlock Module that removes the Modulator permit. The output of U18 goes high for 300 msec. and is the gate for the counter U14.

If U14 counts to 4 before the gate goes low then U14 triggers the other half of U13, ½ U7 and the other half of U9. These outputs trigger the fast shutdown board in the HV SCR Controller, the Perm Inhibit Relay and Light and the Perm Inhibit line to the Pulse Interlock Module. These stay high until a manual reset is done.

Voltage and current readbacks are provided to the peak meters, computer system and the patch panel at the A5 Rack. The signals from the modulator current toroid and voltage Ross Divider are fed to buffers in the Monitor Inhibitor. The current signal has an extra buffer because of the trip circuits described above. The outputs of the buffers go to the back plane and to a comparator/sample and hold combination. The output of the S/H is fed back to the neg. input to the Comparator. When the input begins to drop the output of the sample and hold exceeds the input and the comparator output goes high and triggers the S/H. The held output is fed to the Peak Meters. The Scope Trigger Pulse resets both S/Hs just before a new cycle begins

A PA Crowbar occurs for two reasons. Either a modulator current toroid saw 600A. during the RF pulse or 150A. outside of the pulse. In either case the capacitor bank is crowbared, through an ignitron to ground. The H.V. Power Supply must be shut down so that it doesn't continue to push current through the ignitron causing a breaker trip or damage to the system. To do this the PA Crowbar circuit sends a pulse to the Monitor Inhibitor that triggers U15 causing a PERM INHIBIT. This triggers the Fast Shutdown Board in the HV SCR Controller. This is why there is always a PERM INHIBIT associated with a PA Crowbar.