

KPS 2007'

Status of 84 GHz KSTAR ECH System*

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2007년도 한국물리학회 춘계 학술논문발표회

Apr. 20, 2007

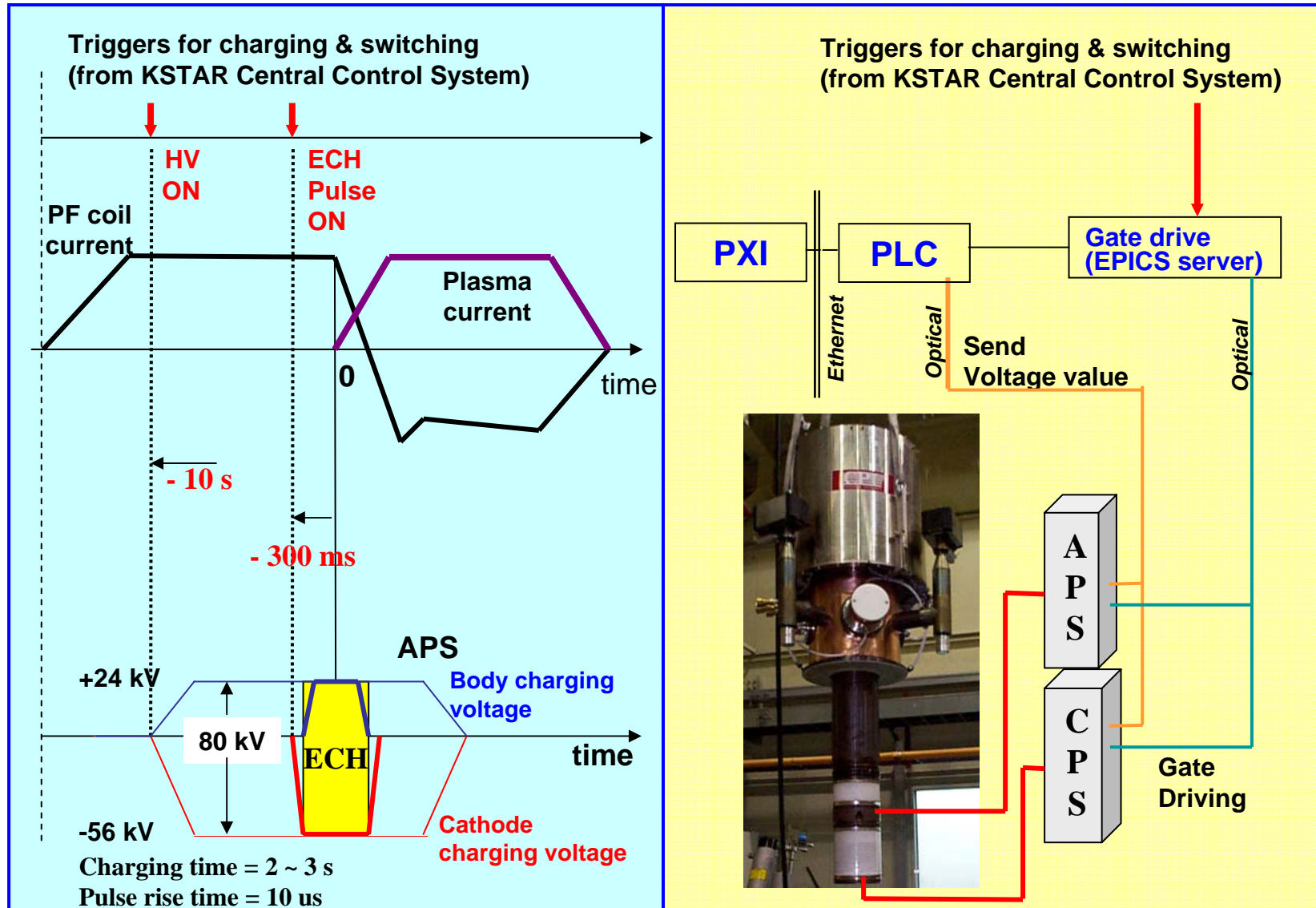
보광 휘닉스 파크 (강원도 평창)

* Work supported by KSTAR Project and NFRC

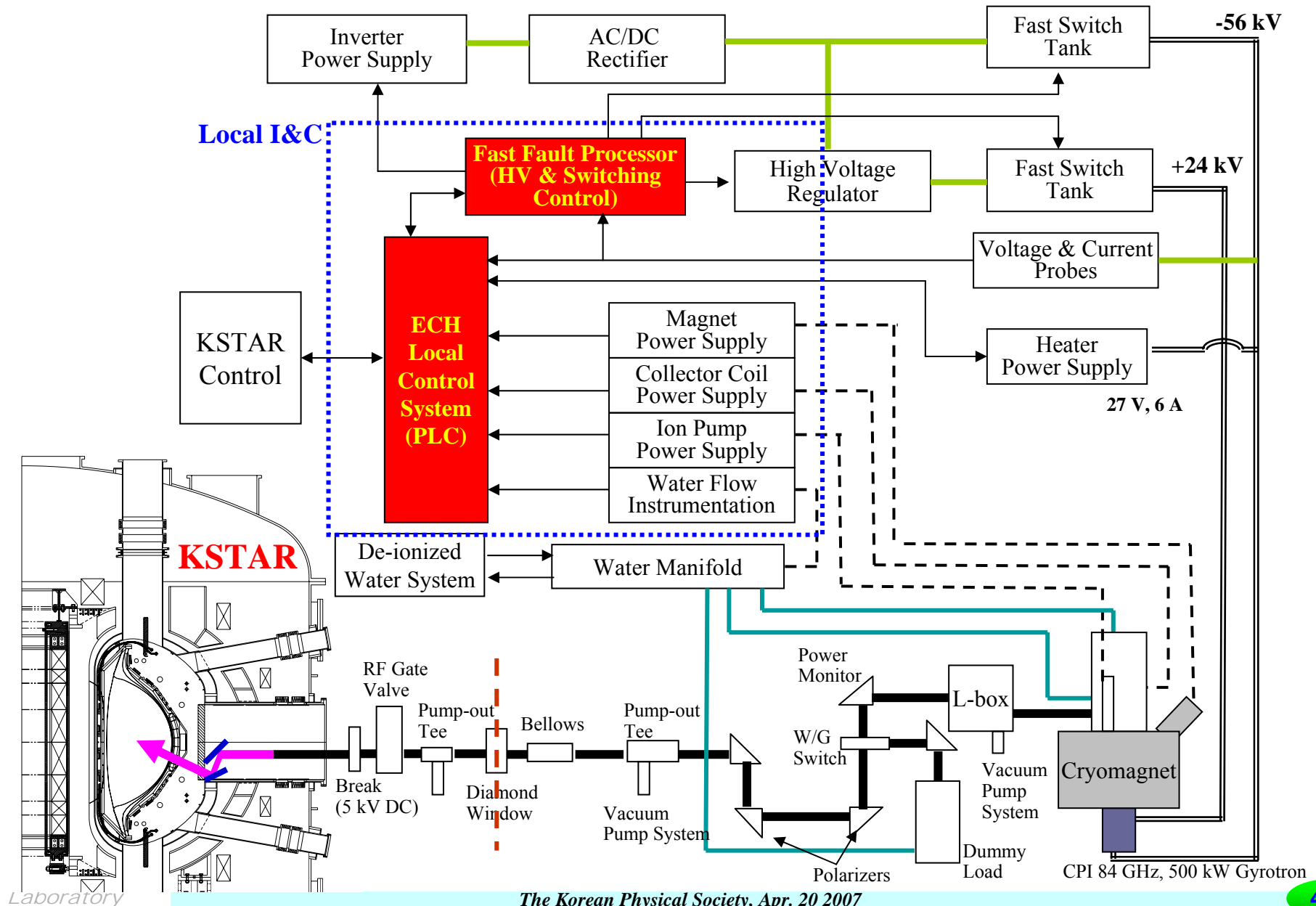
Abstract

- The KSTAR electron cyclotron heating (ECH) system is now under installation for pre-ionization and start-up assist for the KSTAR.
- An 84-GHz, 500-kW of 2-s, collector potential depression (CPD) gyrotron and its power supply system were installed at the KSTAR-site. The overall test of 1.5 MVA (60 kV, 25 A) power supply system using dummy resistors has been carried out to confirm the reliability and the protection of the gyrotron.
- With dummy resistors, the CPS (Collector Power Supply) is operated at 60 kV, 25A, and 2 s, and the APS (Accelerating Power Supply) provides a stable acceleration voltage of 80 kV with respect to the cathode.
- It is confirmed that the fast interlock unit turns off the high-voltage switch and turns on the crowbar switch within 10 μ s under any fault condition. In this paper, we present an overview of the KSTAR ECH system and recent test results.

Objective of ECH System (Pre-ionization for KSTAR)

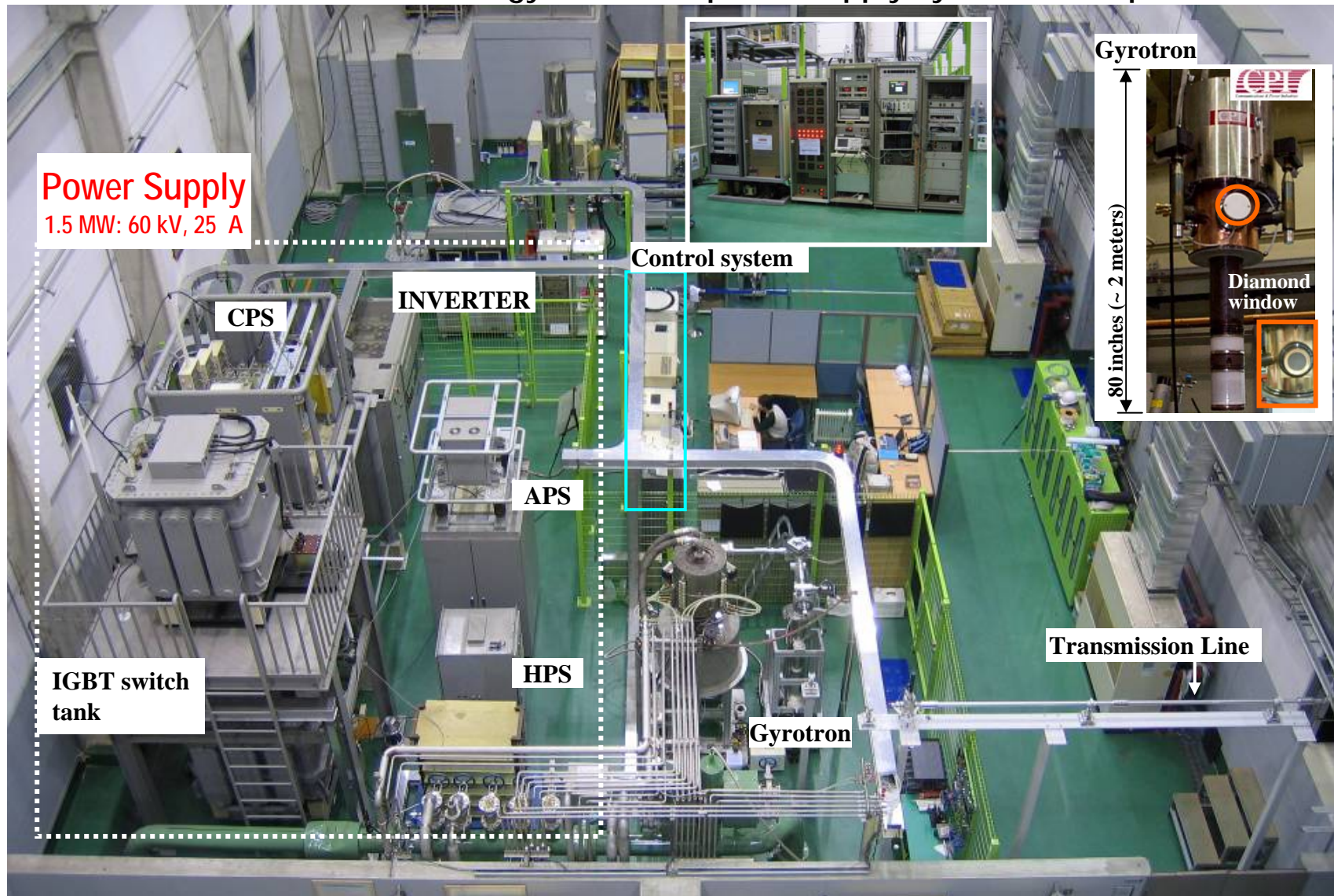


Schematic of 84 GHz, 500 kW ECH System

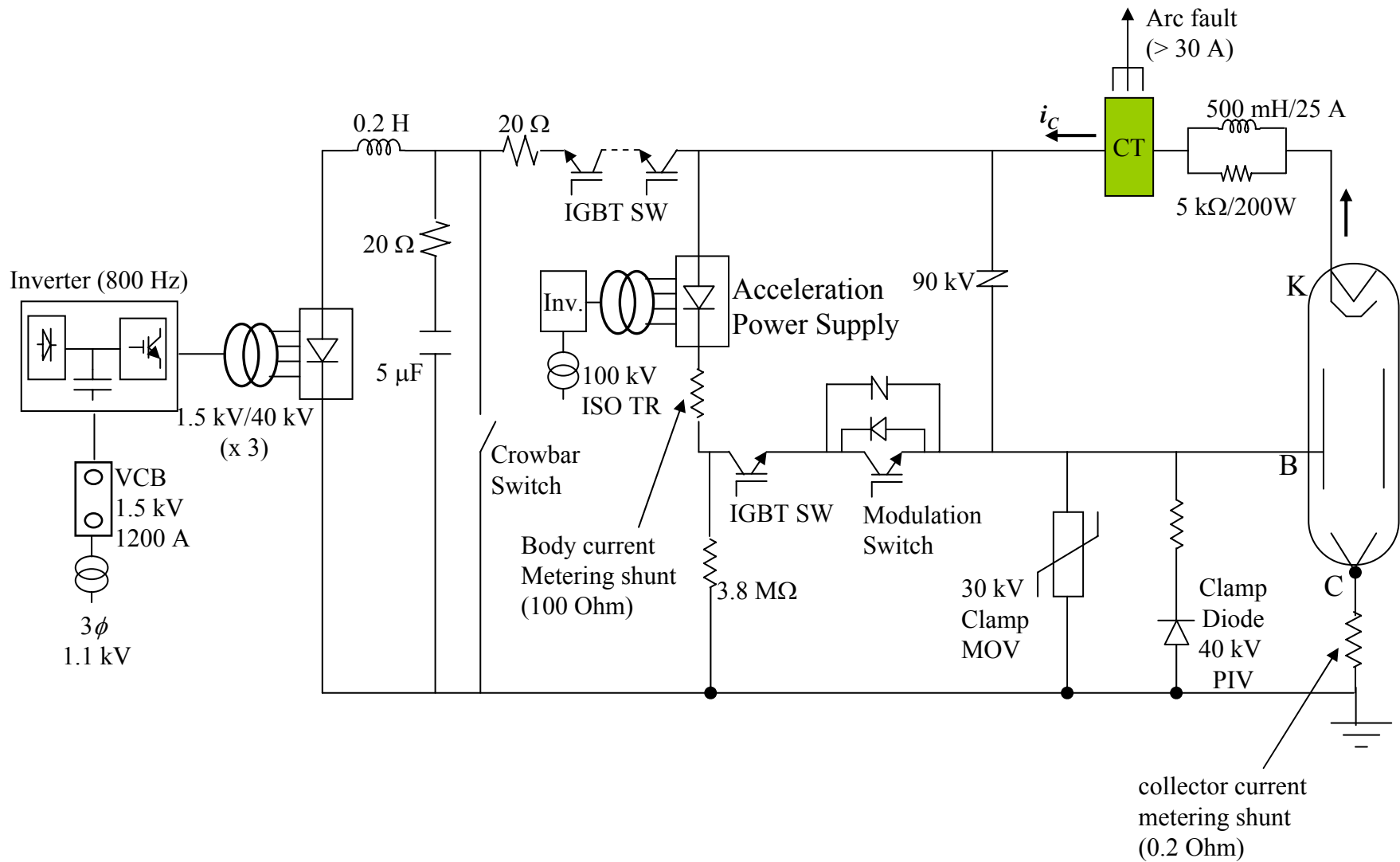


KSTAR 84 GHz, 500 kW ECH System

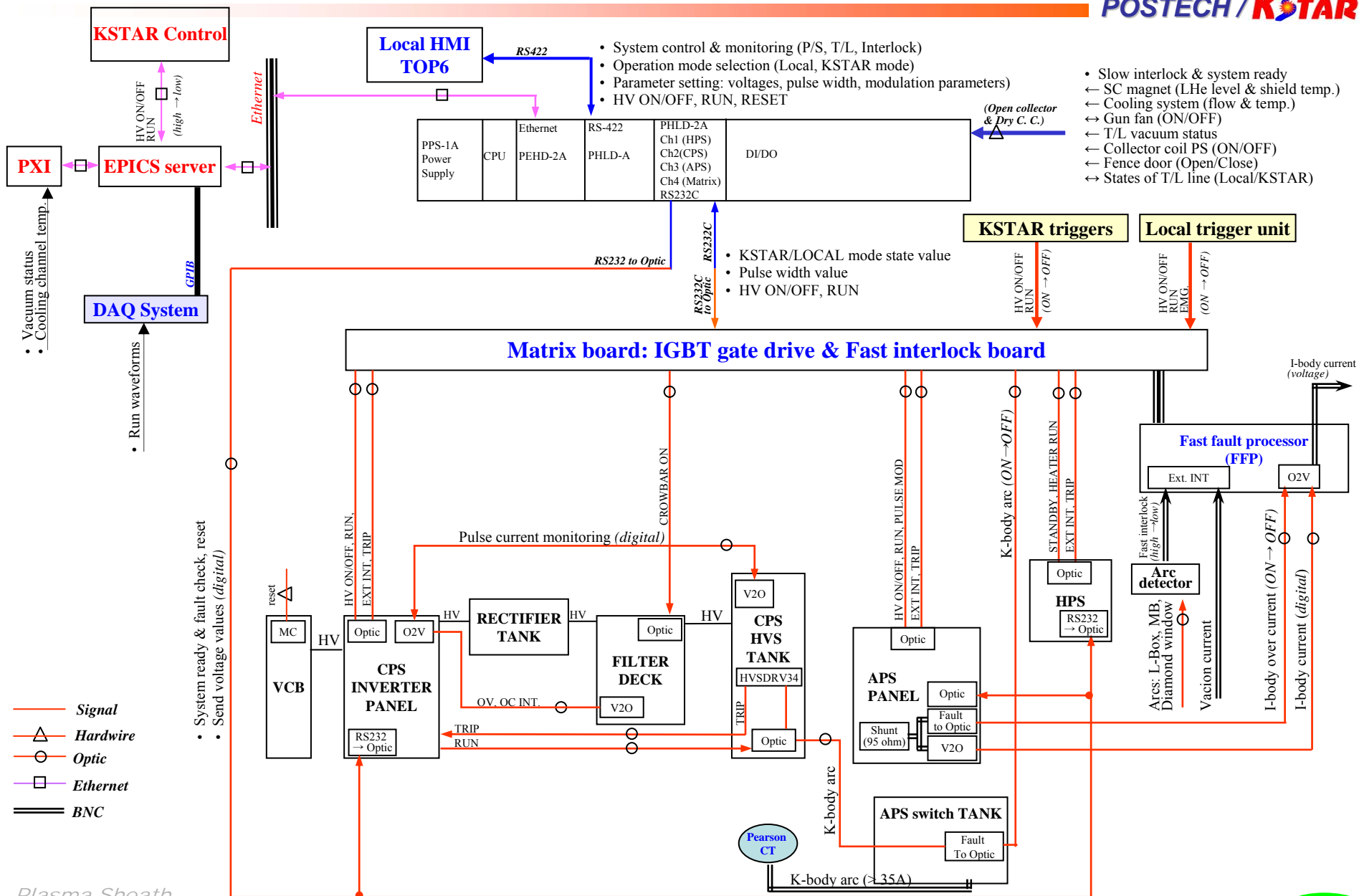
- ◆ Installation of 84 GHz, 500 kW gyrotron and power supply system is completed.



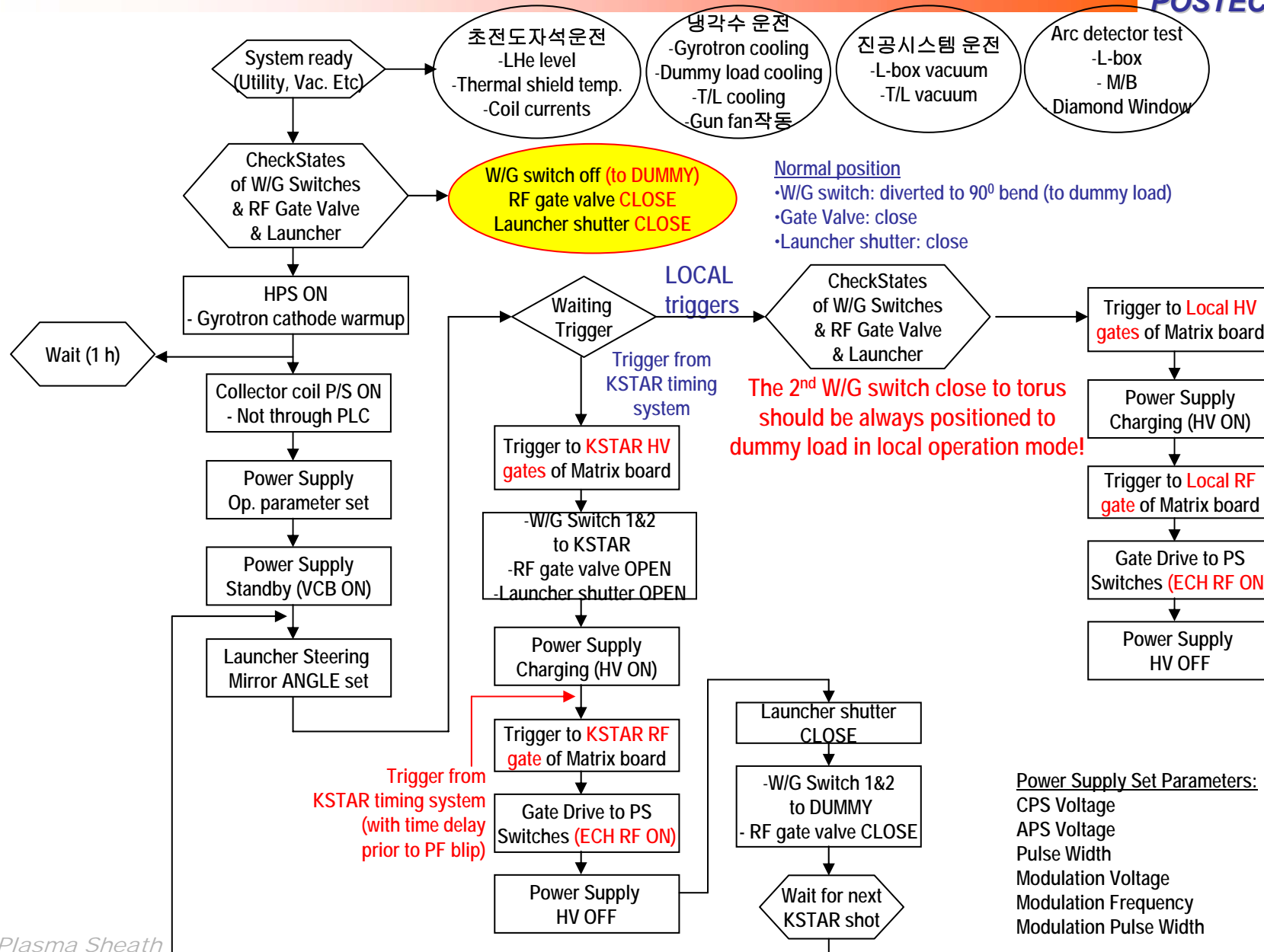
Schematic of 84 GHz Gyrotron Power Supply



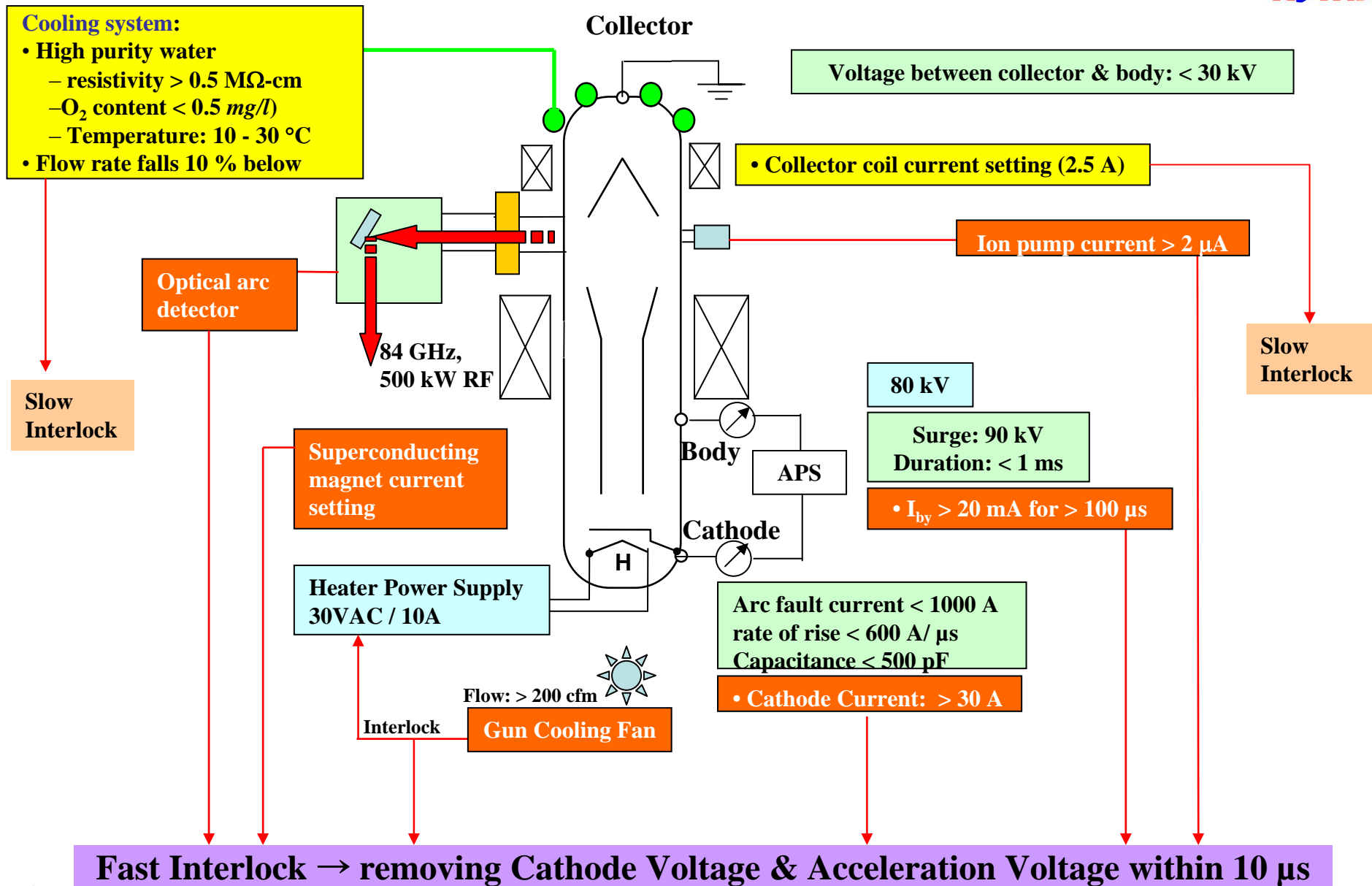
Signal Lines for ECH System



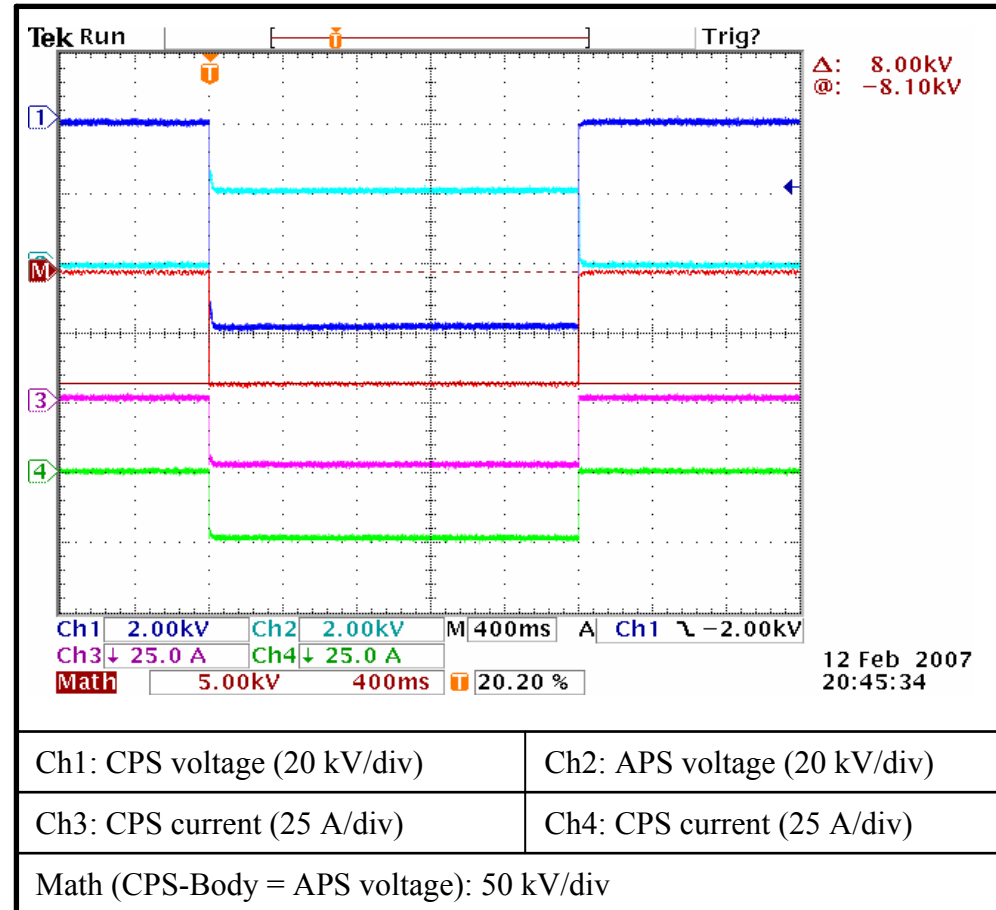
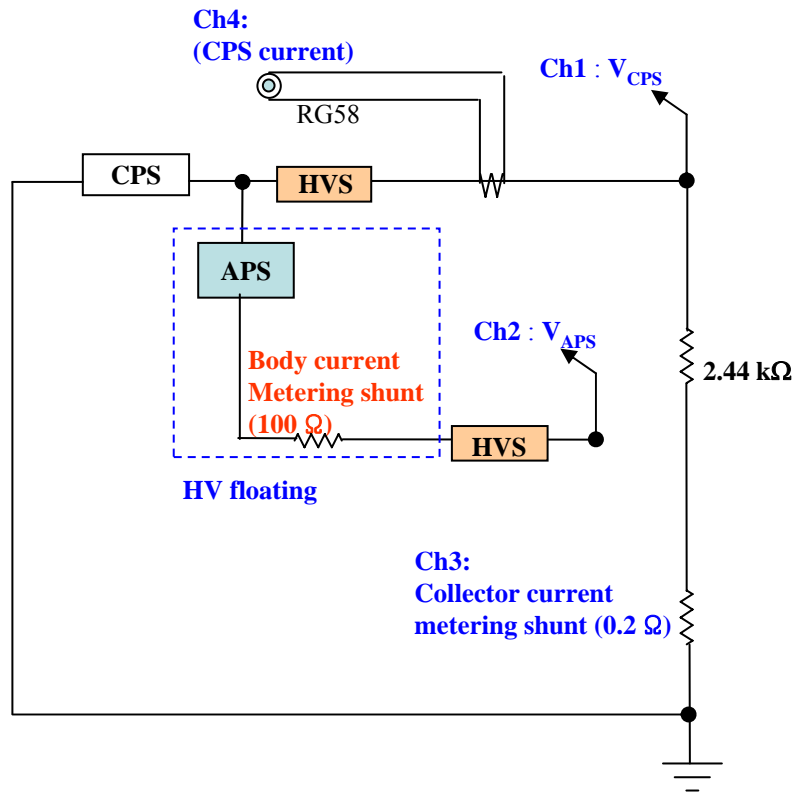
Operation flow chart of KSTAR 84 GHz ECH system



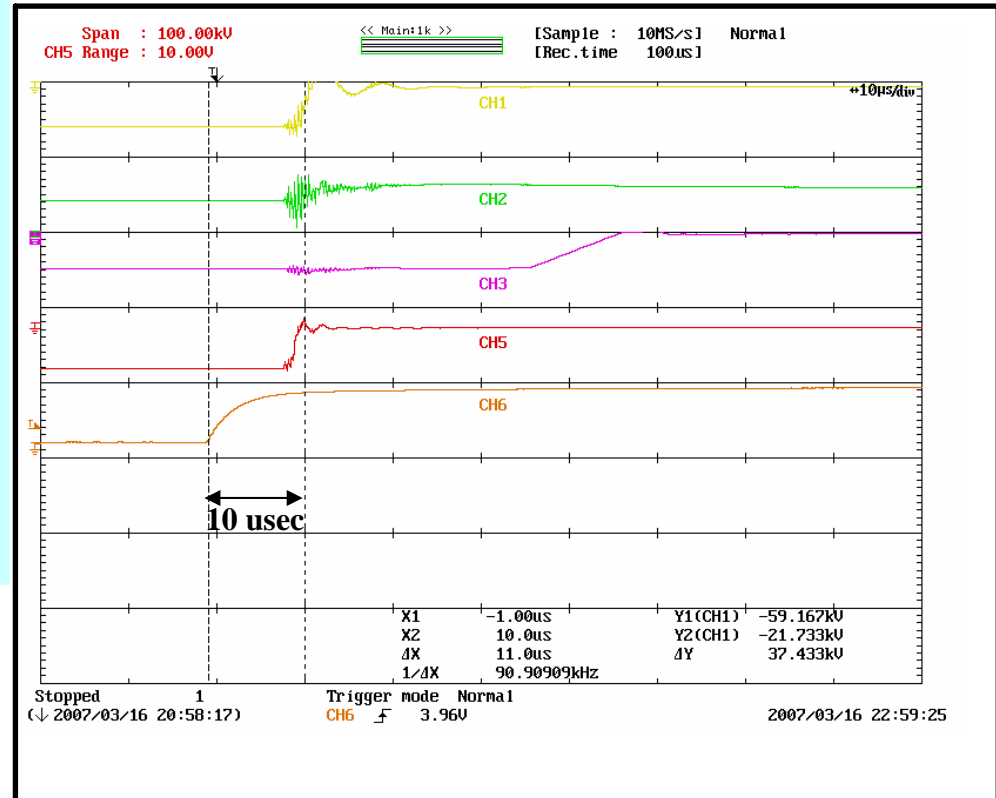
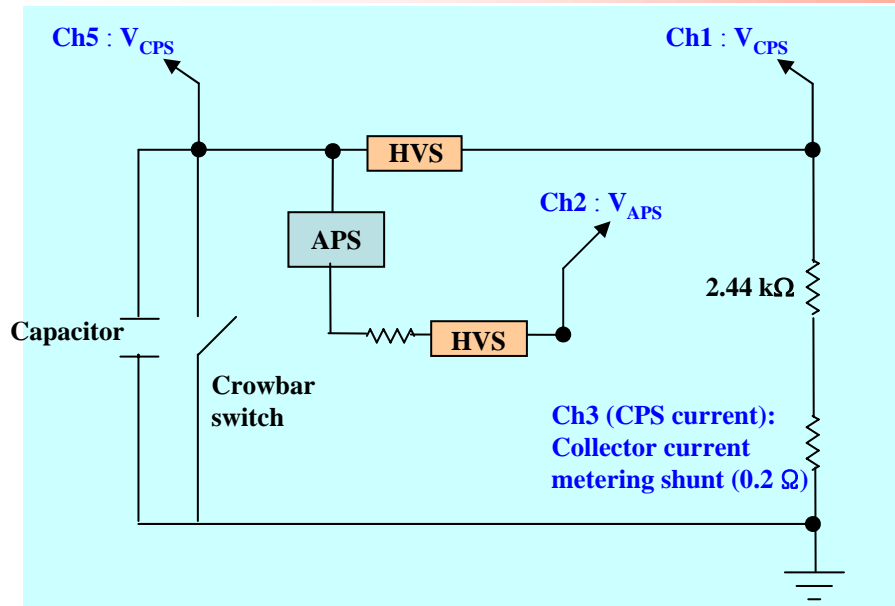
84 GHz Gyrotron Interlock Lists



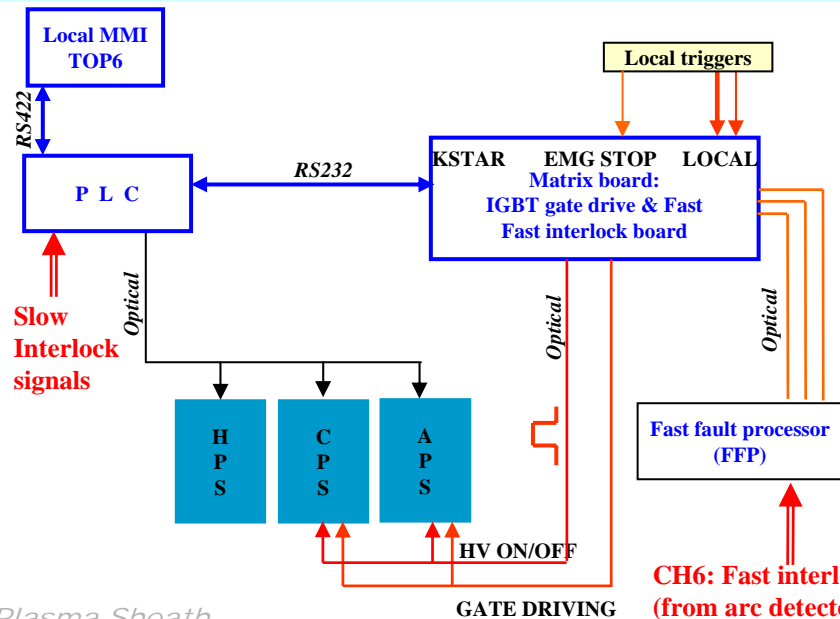
Test Waveforms for Gyrotron Power Supply - I



Test Waveforms for Gyrotron Power Supply - II



Ch1: CPS voltage (10 kV/div)	Ch2: APS voltage (20 kV/div)
Ch3: CPS current (5 A/div)	Ch5: Capacitor DC volt. (10 kV/div)
Ch6: Fast interlock signal (from L-Box arc detector)	



CH6: Fast interlock signals (from arc detector)

Summary

- The KSTAR ECH system is installed and the full power test of 1.5-MW power supply system is carried out using dummy resistors.
- The overall test of 1.5 MVA (60 kV, 25 A) power supply system using dummy resistors has been carried out to confirm the reliability and the protection of the gyrotron.
- With dummy resistors, the CPS (Collector Power Supply) is operated at 60 kV, 25A, and 2 s, and the APS (Accelerating Power Supply) provides a stable acceleration voltage of 80 kV with respect to the cathode.
- It is confirmed that the fast interlock unit turns off the high-voltage switch and turns on the crowbar switch within 10 μ s under any fault condition.