DEVELOPMENT OF THE INR LINAC DTL RF SYSTEM

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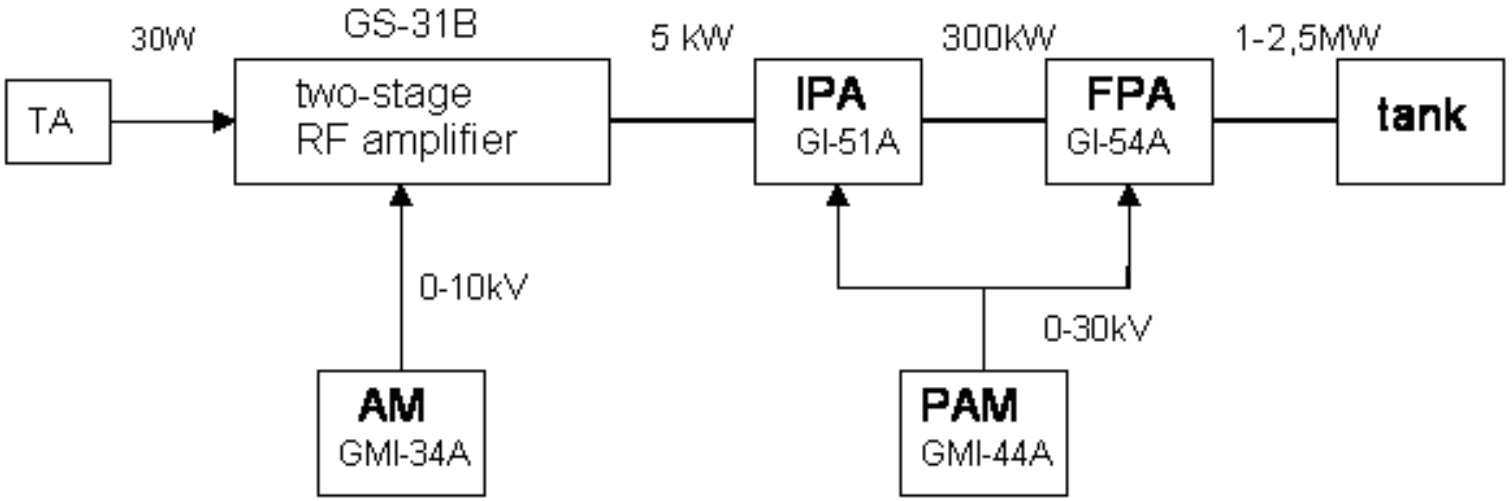
Brief reference.

INR linear accelerator is in regular operation since 1993. The accelerator consists of two parts. The low energy part operates at the frequency of 198.2 MHz and includes RFQ, five Alvarez tanks and seven RF amplifier channels including a spare one. The second part operates at 991MHz and includes 28 disk and washer cavities. At present, the accelerator operates with beam pulse length up to 200 μs, repletion rate up to 50Hz and beam pulse current up to 15 mA.

Simplified structure of the DTL RF channel

TA – solid state RF amplifier, IPA - intermediate power RF amplifier, FPA - final RF power amplifier, AM – anode modulator, PAM – powerful anode modulator



Two-stage RF amplifier

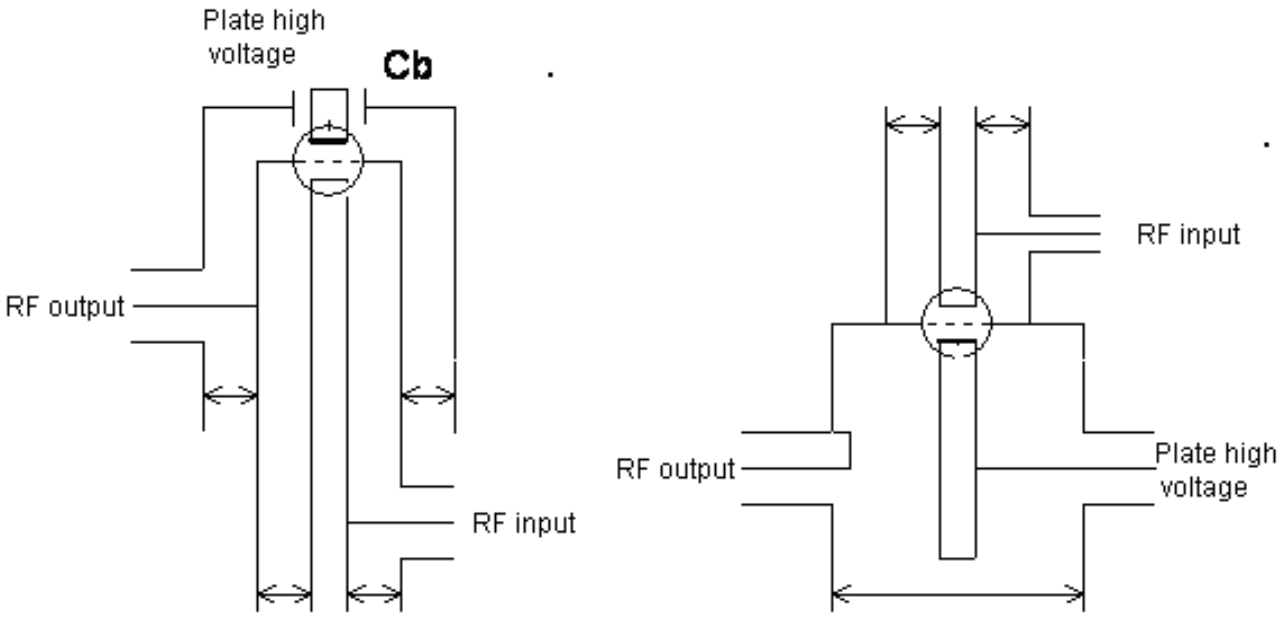
Intermediate power RF amplifier

Final RF power amplifier

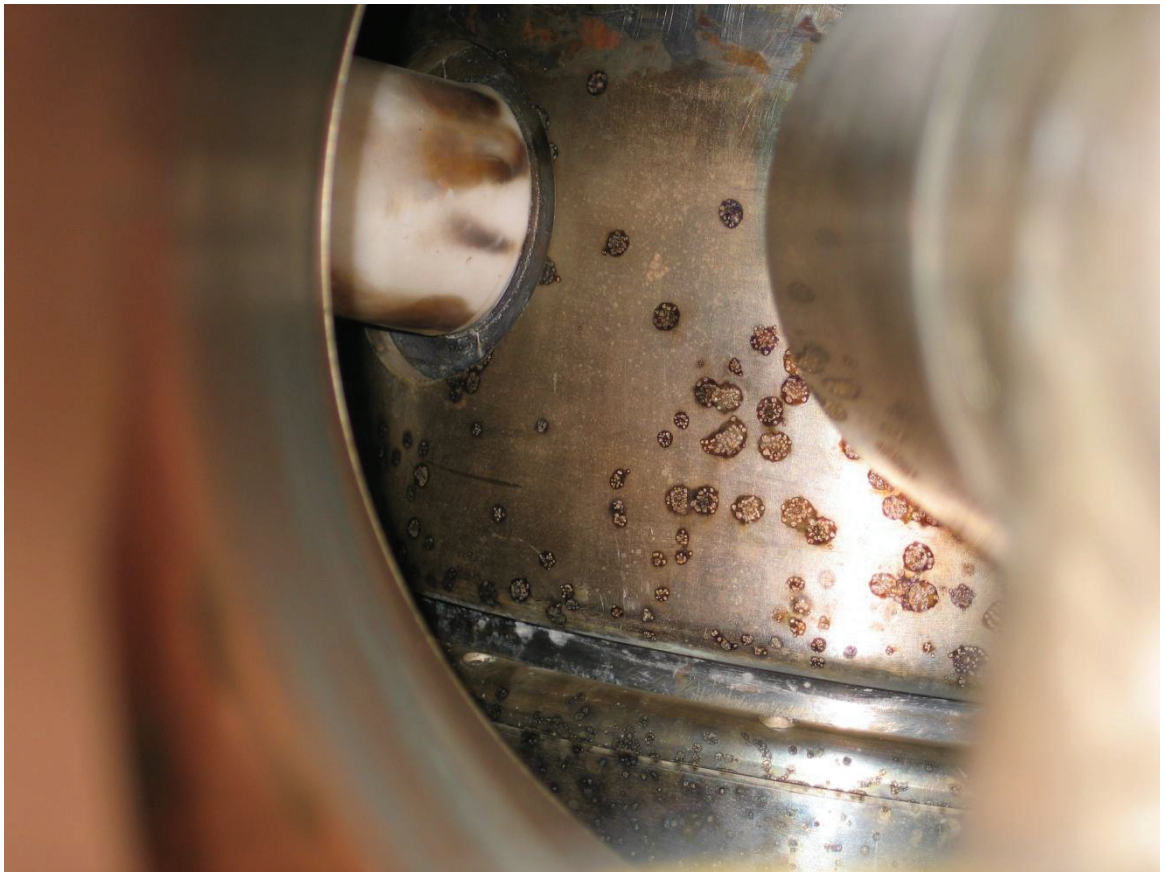
Powerful phase shifter at output of FPA

Common view of the artificial forming line

Drawings of two main decisions of FPA design

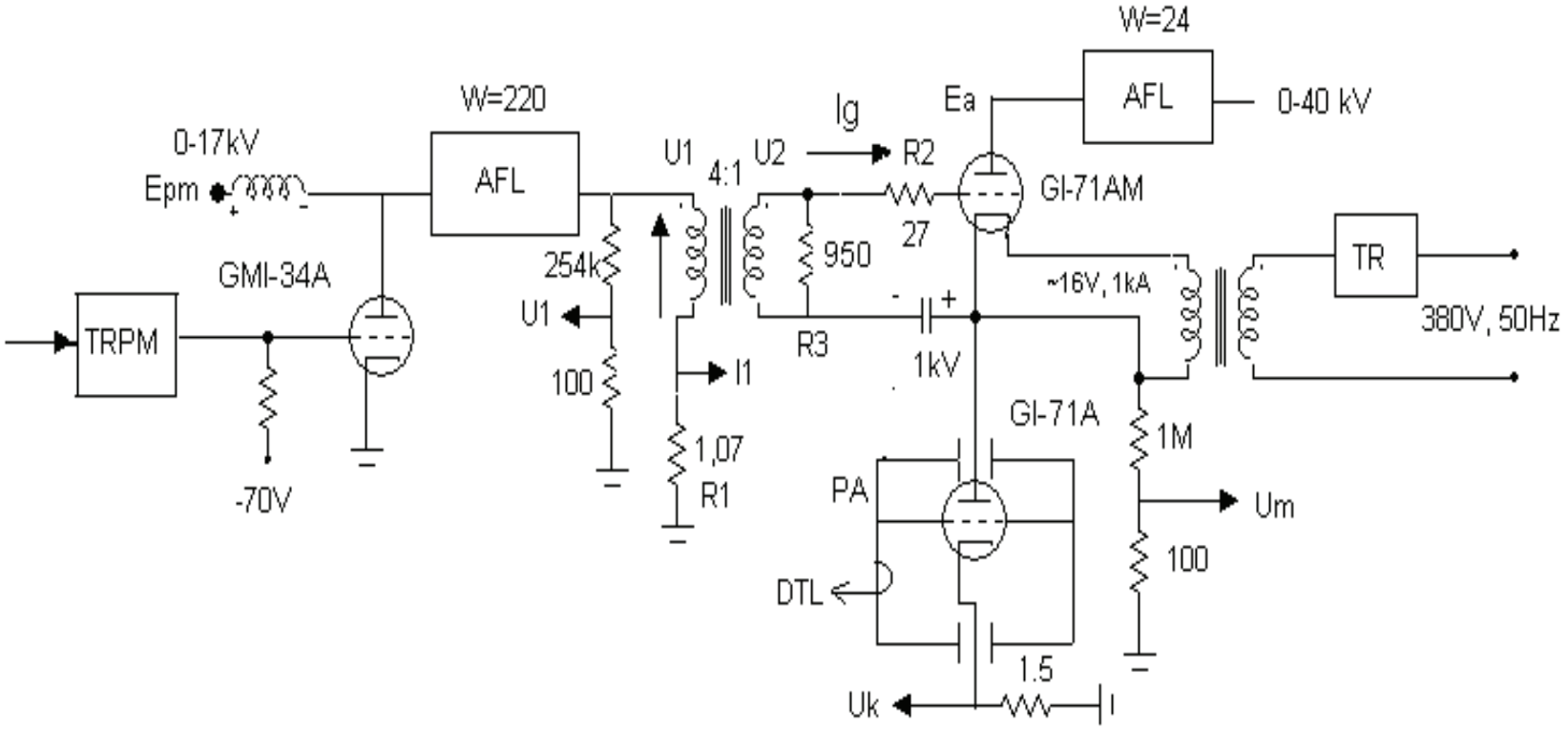


Traces of breakdowns in FPA plate-grid cavity.

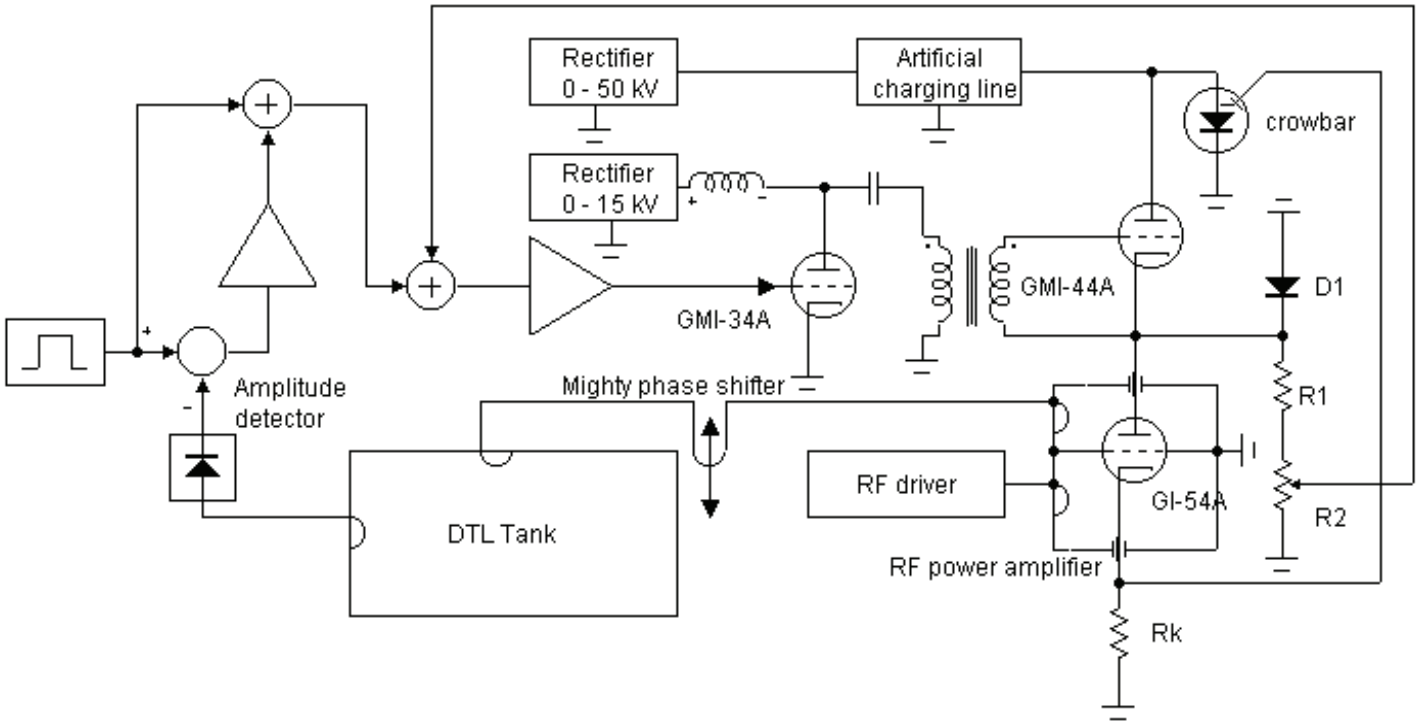


Intermediate power amplifier after revision

Simplified scheme of powerful modulator

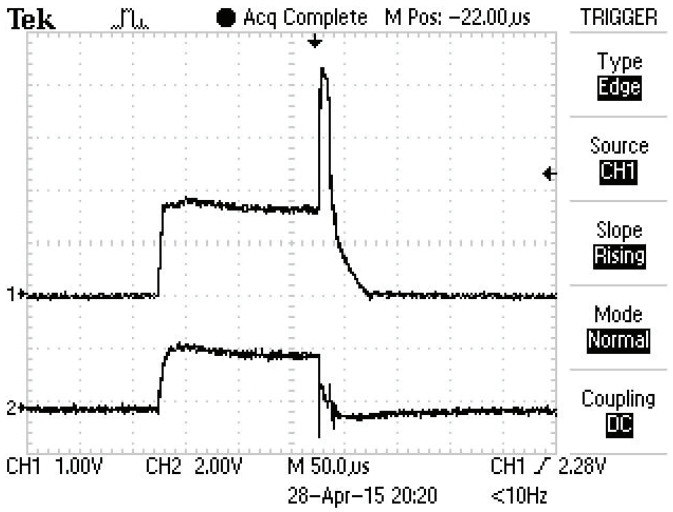


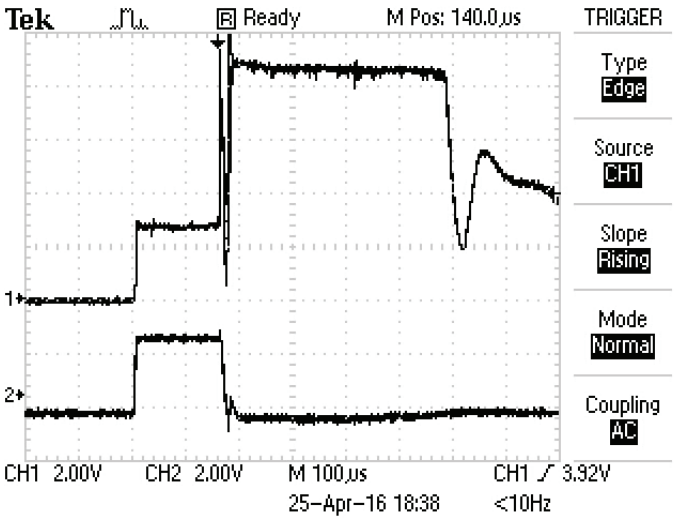
Simplified scheme of the powerful anode modulator with amplitude feedback and crowbar



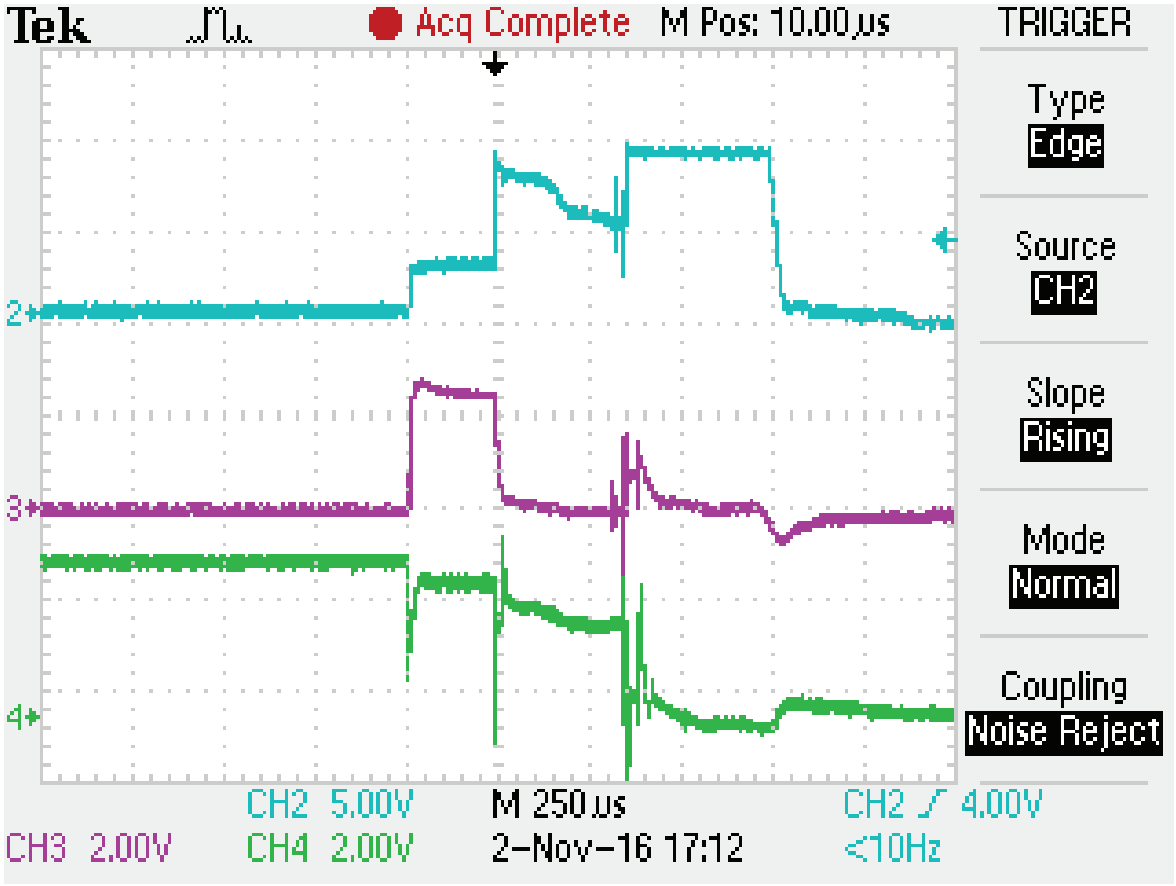
Former (GMI-44A) and new (GI-71A) modulator vacuum tubes

Snapshots of the series crowbar operation with GMI-44A and GI-71A





Snapshot of processes in powerful anode modulator during breakdown in FPA.
Upper trace – plate current, middle trace – GI-71A plate HV pulse, lower trace – GI-71AM plate voltage



Many thanks for your attention