

HINS 325 MHz CAVITY TEST CAVE OPERATIONS

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I. PURPOSE AND SCOPE

The purpose of this document is to describe the specific procedures used to safely and effectively route RF power into the HINS 325 MHz Cavity Test Cave. This document acts as an addendum to the HINS Klystron Operation document.

Routing of RF power to the cavity test cave is controlled by two coaxial switches downstream of the 10dB waveguide coupler off of the klystron output. Both switches must be positioned correctly to send RF power to the cave. Downstream of the switches is a 10dB coaxial coupler that routes RF power to the room temperature cavity line (25 kW nominal) and the superconducting cavity line (250 kW nominal). The distribution is configured so that a maximum of 400 kW is routed to the superconducting cavity line when the klystron is at maximum power (2.5 MW). This operations document assumes that each cave line is either connected to an appropriate cavity or connected to a suitable matched power termination.

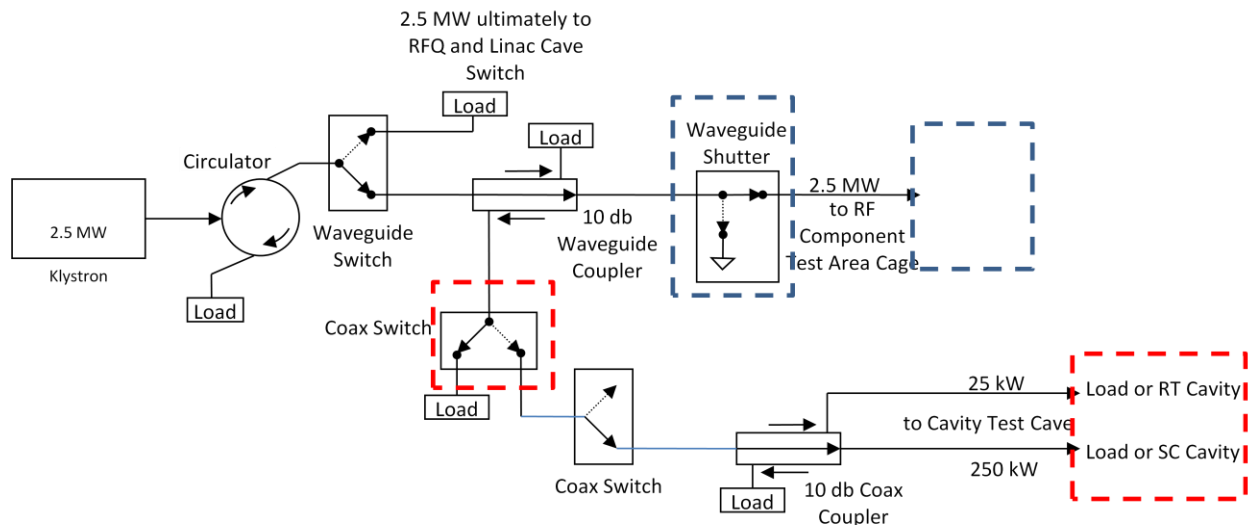


Figure 1: Block diagram of HINS high level RF distribution.

II. QUALIFICATIONS

The training requirements for a klystron operator to route RF power to the cavity test cave are:

- Klystron Operations
- Test Cave Search and Secure
- HINS Cavity Test Cave Operations (this document)

These are also the training requirements for checking out the test cave access key and the search and secure key.

III. TEST CAVE CONFIGURATION

There are four possible test cave configurations that are valid for RF operations: both cavity lines end in matched power terminations, the RT cavity line is connected to a cavity and the SC cavity line is terminated, the SC cavity line is connected to a cavity and the RF cavity line is terminated, and both cavity lines could be connected to their respective cavities. Operation when both cavity lines are terminated does not require any extra documentation and can be performed at the discretion of the klystron operator. Operation into any RF cavity requires the existence of an appropriate cavity test plan. It is the responsibility of the operator to insure that the operating limits specified by the cavity test plan are not exceeded and that the appropriate cavity interlocks are active.

IV. SWITCH SETTINGS AND SAFETY SYSTEM INTERLOCKS

The following conditions must be met to route RF power to the cavity test cave:

- Waveguide switch points toward test area.
- Coaxial switches point toward test cave.

The following conditions **MUST** be met for the safety system to allow RF to the cavity test cave:

- Waveguide shutter is closed.
- Test cave is search and secured.
- Test cave safety system interlock chassis is enabled.
- Positive air pressure is maintained in coaxial RF distribution lines.

Without all of the above conditions being met simultaneously, the RF path to the cave will be blocked or the modulator will be disabled.

V. PROCEDURE FOR DIRECTING RF POWER TO TEST CAVE

- A. If modulator is running, follow “HINS Klystron Operation” document to turn off modulator charging supplies.
- B. Enter the cavity test cave and inspect the RF connections.
 - 1. Note if any of the RF power lines are connected to cavities. Connection to a cavity requires the existence of a cavity test procedure before RF power can be run to the cave.
 - 2. Examine the water lines to the RF loads and any connected cavities. Verify that the water lines are valved on.
 - 3. If there are any open RF connections, resolve the problem before continuing. (See “Test Cave Configuration” above.)
- C. Search and secure the cavity test cave.
- D. Insert cave enter key into the test cave rack mount safety system module located in rack PD-R6. Turn key to enable permit.
- E. Set the RF power switches to direct power to the coaxial load upstream of the cave..
 - 1. The waveguide switch should be set to test area.
 - 2. The shutter should be closed.
 - 3. The coaxial switches should be set to load.
- F. Set modulator rep-rate and pulse length.
 - 1. If any cavity is connected to the RF power lines in the cave, follow the guidelines defined in the appropriate cavity test procedure.
 - 2. If all lines are terminated in matched loads only, use the limits specified by the “HINS Klystron Operation” document.
- G. Follow “HINS Klystron Operation” document to turn on klystron.
- H. Set RF power level.
 - 1. Examine the power level in the forward power coupler upstream of the coaxial switch (USWFWD), using the RF monitor or the diode detected signal.
 - 2. The power into the room temperature cavity line will be 10% of the power measured on USWFWD.

3. The power into the superconducting cavity line will be 90% of the power measured on USWFWD.
 4. If a cavity is connected to either RF power line in the cave, set the power to a level within the guidelines defined in the appropriate cavity test procedure.
 5. If no cavity is connected, the power is limited by the klystron only as specified by the "HINS Klystron Operation" document.
- I. Send Power to Cave
 1. Follow "HINS Klystron Operation" document to turn off modulator charging supplies.
 2. Move coaxial switch to the test cave position.
 3. Re-enable the RF permit and verify that the safety system is sending a valid permit to the modulator.
 4. Turn on the klystron.
 5. Follow proper procedures for the purposes of operation.

VI. TEST CAVE ACCESS PROCEDURE

- A. Turn off modulator charging supplies according to "HINS Klystron Operation" document.
- B. Set coaxial switch to load position.
- C. Enter test cave.