communications
Electron Devices

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M1220[1]
Description of Operation

Upon application of prime power, the low voltage supply is enabled. This generates the SSA power supply, internal logic supplies, the heater supply, and the grid bias voltages. The heater timer is initiated, and the Vacuum Power Booster (VPB) is biased off. The heater voltage is present but no high voltage is applied. The Warm-Up indicator is active. While in the warm-up state, the MPM ignores the High Voltage On/Off and RF On/Off Input commands.

All circuits exposed directly to prime power are rated to withstand transient voltages per MIL-STD-704E and voltage spikes per MIL-E-6051. The power supply senses the prime power voltage. If this voltage is below proper operational levels, the VPB will be biased off, high voltage will be removed, and the heater timer circuit will discharge.

Once the TWT warms up to the operating temperature, the Warm-up indicator becomes inactive and the MPM reacts to the High Voltage On/Off and RF On/Off Input commands. Application of a High Voltage On command results in the high voltage being applied to the VPB and the HV On indicator going active, however, the VPB remains biased off and therefore no RF amplification occurs. Once the High Voltage On command has been applied, a RF On command can be applied to bias the VPB on for RF amplification.

When in the fault mode, the High Voltage On indicator is inactive and the Fault indicator is active. For helix over current fault, prime power over current fault and temperature fault, the MPM immediately reverts to the fault state for approximately one second and then automatically recycles back into the state defined by the High Voltage On and RF On/Off Input commands. If approximately four successive faults are detected, the MPM latches in the fault state and the unit must be reset to clear the fault. The MPM can be reset by cycling the HV On/Off command from On to Off and then back On. The line voltage fault causes the MPM to remain in the fault mode until the fault disappears.

A helix current monitor is also provided at the MPM interface connector. The helix current monitor is a voltage proportional to the helix current. The helix current of the VPB is sensed through a 56 ohm resistor in the power supply. Under normal operation the voltage across the resistor should not exceed 0.6 volts.

The synchronization input is used for pulse-mode operation where the electron beam of the VPB is switched on and off by using the focus-electrode modulator within the MPM. In response to a TTL-level pulse input signal, the switching frequency of the power conditioner is synchronized to an external clock. The TTL signal must be within the range of 400 KHz ±5% with a nominal pulse width of 200 nsec. This mode of operation, generally used in radar applications, allows the power supply added noise to fall under the PRF lines of the resulting RF spectrum thereby reducing the noise floor of the MPM.

The M1220 is configured for conduction cooling with baseplate temperatures between -55°C and +85°C. Maintaining a +85°C baseplate will generally require active cooling, such as using a finned-extrusion and forced air cooling. An example fin configuration is .125" wide, .75" long with .2" spacing, covering the entire M1220 baseplate. The fan should be capable of approximately 100 CFM.

[1]This Description of Operation also applies to M1200, M760 and M761

M 1220 - Interface Signals

Input Connector: D-subminiature 15 pin male

Pin Number	Function	Signal Format	Note
1	+270 VDC	Power	
2	Spare		
3	+270 VDC Return	Power Return	
4	Spare		
5	Synchronization	TTL	200 nsec Pulse - Positive Edge Triggered (400KHz±5%)
6	Warmup Indicator	TTL	Logic 1 = Warmup Mode (HV Disabled)
7	High Voltage Indicator	TTL	Logic 1 = High Voltage OK
8	High Voltage On/Off	TTL	Logic 1 = High Voltage On
9	+270 VDC	Power	
10	Spare		
11	+270 VDC Return	Power Return	
12	Helix Current	Analog	56 mV/mA
13	Signal Return	Ground	
14	Fault Indicator	TTL	Logic 1 = Fault
15	RF On/Off	TTL	Logic 1 = FE Biased On

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