



NATIONAL

NL15245

The **NL15245** is a fixed frequency CW magnetron of metal-ceramic construction designed for industrial microwave heating. The operating magnetic field is provided by an external electro-magnet and the microwave energy is radiated by an axial probe, which is inserted into an appropriate launching section.

SPECIFICATIONS

Frequency	2450 \pm 30 MHz
Output power	15 kW
Magnet	Separate Electromagnet
Output	Output transition to WR430 waveguide. (Note 1)
Cooling-Anode	Water (note 2)
Dome	Forced-Air
Cathode	Forced-Air
Circulator	The use of a circulator/isolator is required

ELECTRICAL

Cathode	Directly heated
Heater voltage	10V
Heater current	50A
Heater Surge Current	100A (max.)
Cathode pre-heating time	1 minute (min.)

MECHANICAL

Dimensions	See outline drawing (fig.1)
Weight	3.5 lbs.
Mounting Position	Vertical with R.F. gasket
Support	magnetic pole piece (note 1)

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MAXIMUM AND MINIMUM RATINGS (ABSOLUTE VALUES)

These ratings cannot be used simultaneously, and no individual rating should be exceeded.

	<u>Min.</u>	<u>Max.</u>	
Heater current	40	55	A
Heater surge current	-	100	
Anode voltage (note 4)	-	12	kV
Anode current	1	2	A
Input power	-	26	kW
Outlet water temperature	-	50°	C
VSWR at output of waveguide Transition (note 5)	-	1.5:1	
Pressurizing of waveguide	14	-	lbs./sq.in

TYPICAL OPERATION

Operating Conditions

Electromagnet current (note 5)	3.6 A
Heater voltage	As per Filament Backdown Schedule curve
Heater current	As per Filament Backdown Schedule curve
Anode Current	1.8 A

TYPICAL PERFORMANCE

Anode voltage	12kV
Output power	15kW

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NOTES

1. The tube must be mounted in the standard waveguide/electromagnet.
2. A water flow of at least 2.5gmp must be used to cool the anode of this tube. Cooling air flow of 10 CFM for the cathode and 20 CFM for the dome must also be applied. All cooling must be interlocked to shut the tube down in case of failure.
3. The anode voltage ripple should be less than 0.5%
4. For optimum operation and life, the tube should be protected from high VSWR by the use of a circulator.
5. The electromagnet current is adjusted for correct anode current.

INSTALLATION AND OPERATING INSTRUCTIONS

Introduction:

The NL15245 is designed to produce 15 kW of CW S-band power for industrial heating applications.

The tube must be used with the waveguide transition/electromagnet that is recommended in the specification.

Electromagnet:

The magnetic field required for cutoff depends on the type of smoothing used in the power supply. A power supply, which is unsmoothed with 3-phase ripple, will actually have much higher peak voltages than a smoothed supply. Under these conditions, higher than normal magnetic field power is required.

It is recommended that a separate electromagnet power supply be used. In some applications the magnetrons beam current flows through the electromagnet windings. This can lead to moding condition and is not recommended.

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Magnetron

1. The magnetron should be installed in the test set with all the usual precautions observed.
2. Water connections should be made and the pipes bent away from the high voltage connector for a minimum gap of 1 inch.
3. Turn on the water flow, which should be 2.5 gpm.
4. Turn on the cooling airflow, which should be 10 CFM on the filament stem and 20-CFM on the output dome.
5. Apply filament power as specified on the data sheet. For constant operating conditions, a step function filament schedule may be adapted. For varying output power or large varying VSWR's a linear or constant impedance filament will result when the tube is operated at the lowest filament current that will allow stable operation.
6. Select open circuit voltage.

Example: 13.0 kW open circuit will result in 15.0 kW at 1.8 amps and 12.0 kV.

This "load line" information will vary depending on the design of the supply. However, output power and operating impedance do not.

7. Apply full electromagnet power (above cutoff)
8. Apply high voltage. No beam current should be drawn.
9. Reduce electromagnet power. The high voltage will drop and beam current will increase. At the same time filament power must be reduced to the specified value.

NOTE: As the supply and tube warm up, the operating point may drift if automatic controls are not used.

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Application Notes

Starting Procedure

1. Start cooling air and water flow
2. Switch on electro-magnet supply and increase the solenoid current I_b up to 4 A.
3. Pre-Heating:
Adjust heater current to 47 A, maintain for at least 15 seconds after stabilization.
4. As soon as average anode current is between 0.4 to 1.6 A, apply anode voltage and keep anode voltage at 10 kV.
5. Reduce electro-magnet solenoid current sufficiently to maintain anode average current I_a at 1.6 A, reduce heater current to 36 A.

Shut Down Procedure

1. Switch off high-voltage supply, then switch off heater supply.
2. Switch off electro-magnet supply.
3. maintain cooling air and water flow for minimum of 3 minutes after removal of high voltage.

Mounting

1. Insert NL15245 magnetron into launching section shown in Figure 2. The axis of the magnetron must be in the vertical plane.
2. Use the supplied RF gasket when mounting the magnetron (see Figure 2), and tighten the attaching screws evenly to obtain a good contact. CAUTION: Over tightening the mounting screws can cause leakage. When replacing the magnetron, the RF gasket should also be replaced.
3. Water pipes should be checked to avoid leakage after mounting the magnetron.

Cooling

1. Prior to pre-heat cycle, insure water flow is smooth and continuous.
2. Anode cooling water flow depends on outlet water temperature. If the cooling water is stopped, or its flow is insufficient, interlock protection must be provided to switch off the high voltage.
3. The output ceramic window and heater terminals must be cooled by forced air to keep their temperature within the specified limits.

Cathode

1. The cathode is directly heated tungsten. Maintain external temperature within the specified range.

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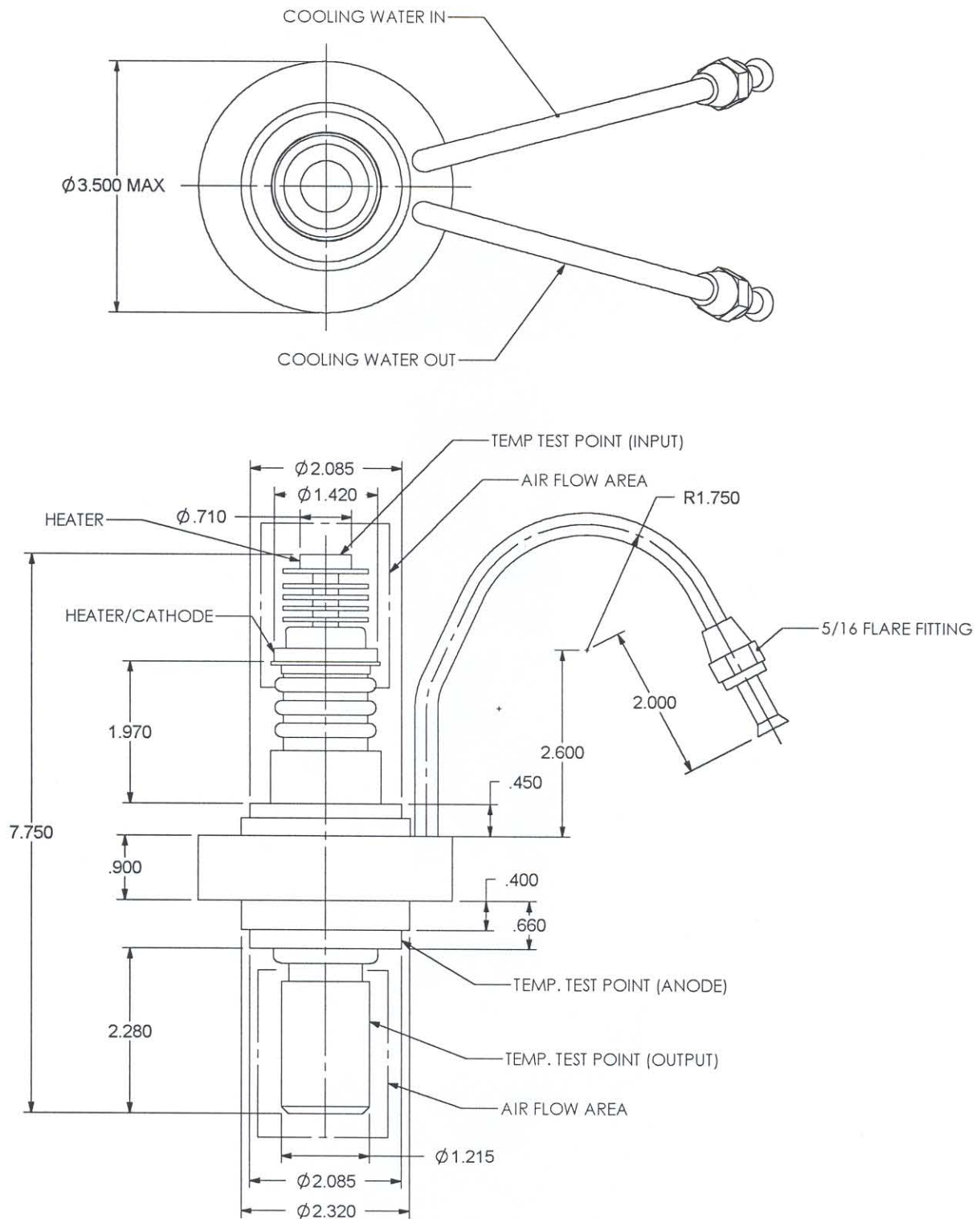
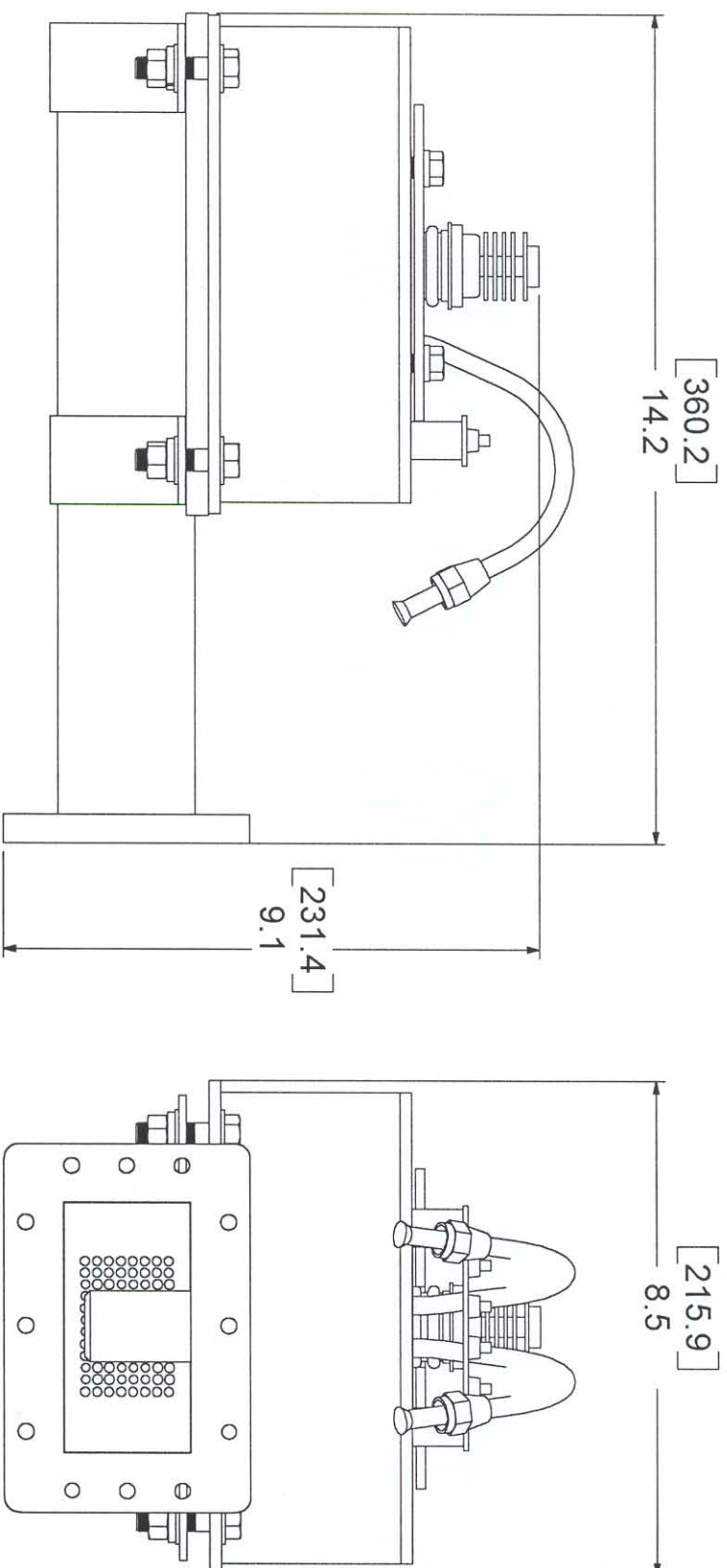


FIGURE #1

LAUNCHER & ELECTROMAGNET ASSEMBLY



NOTE
1. LOWER POLE PIECE AND SUPPORT
RAILS ARE ATTACHED TO THE BOTTOM
OF THE ELECTRO-MAGNET

FIGURE #3

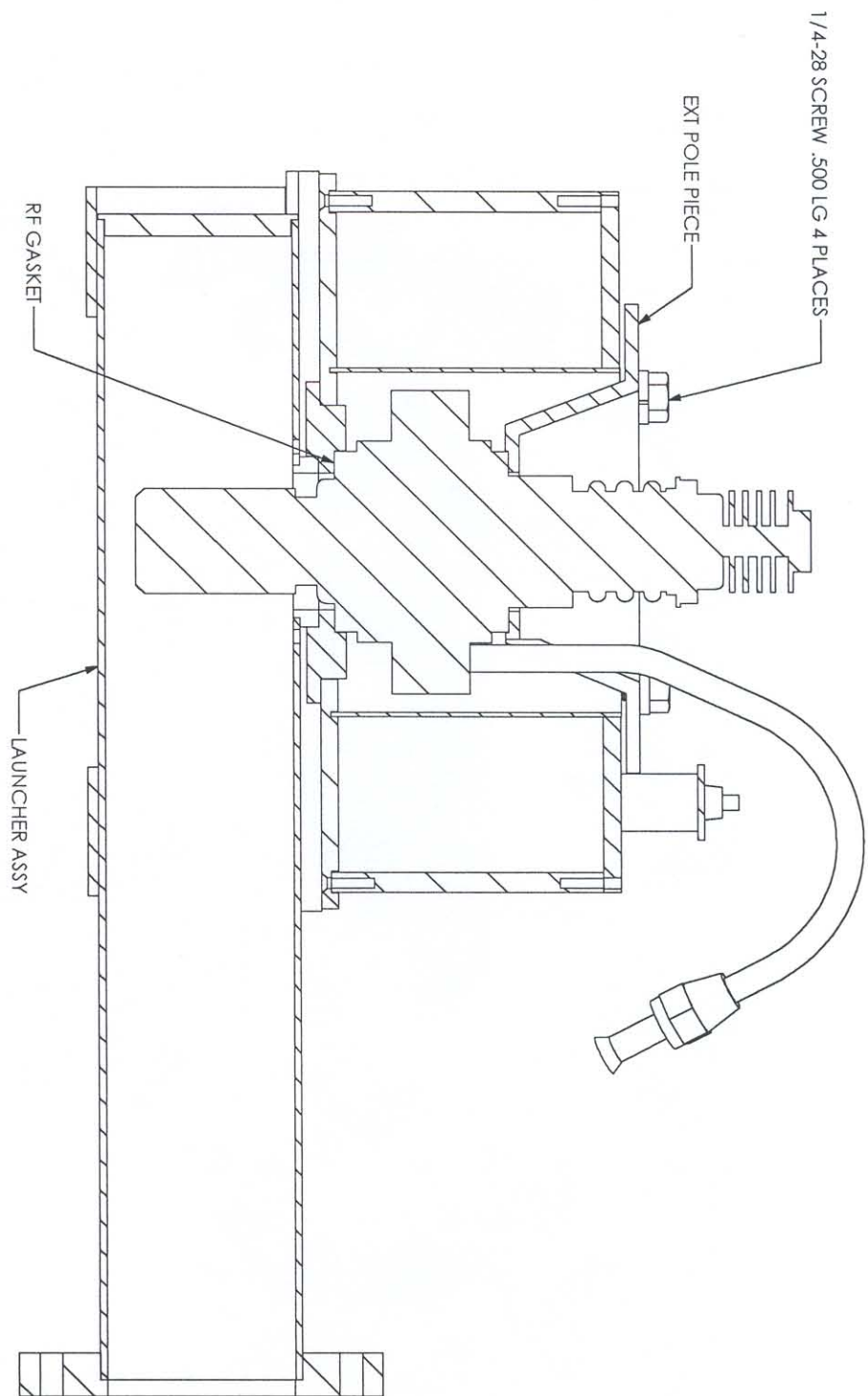
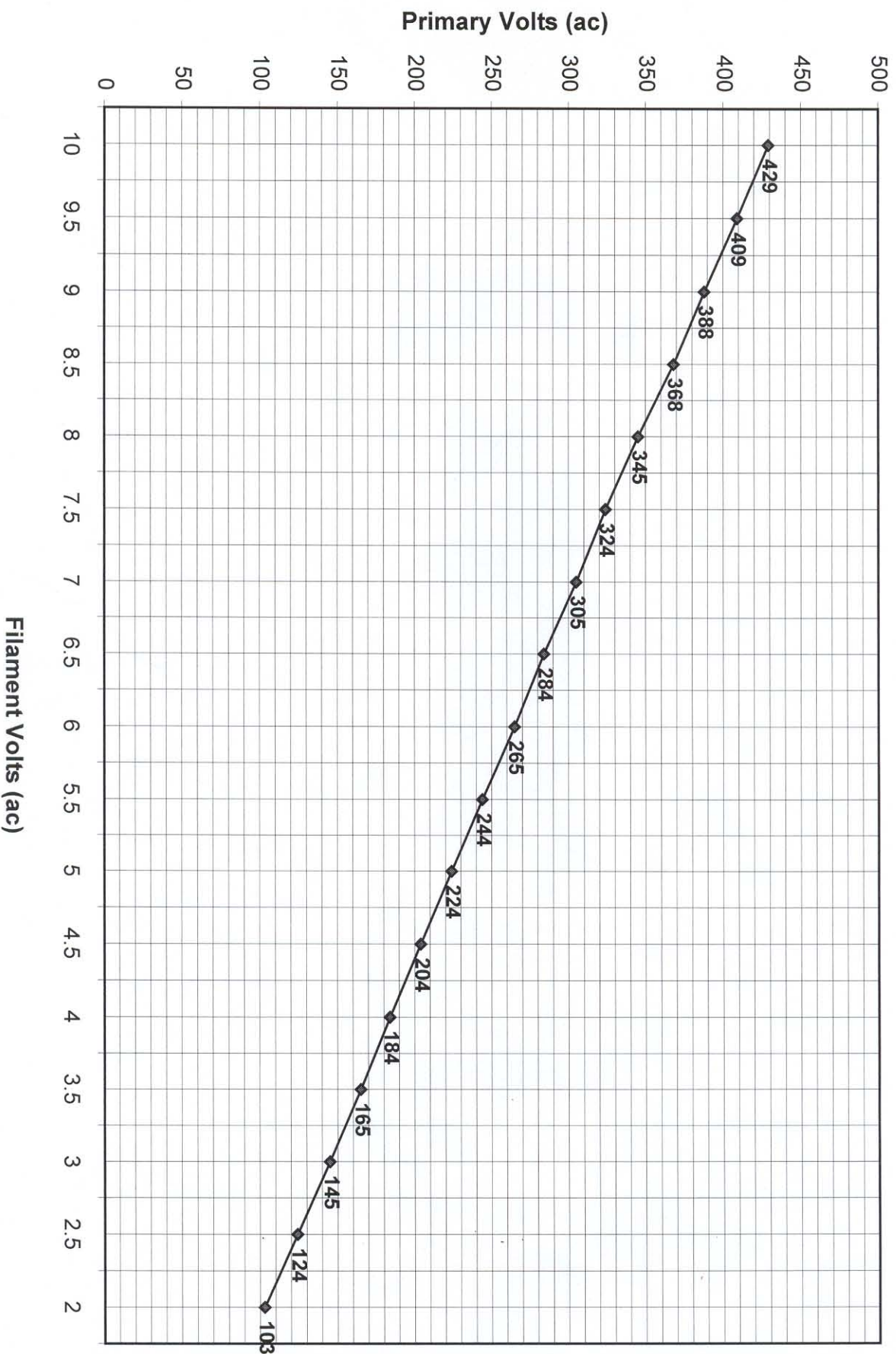
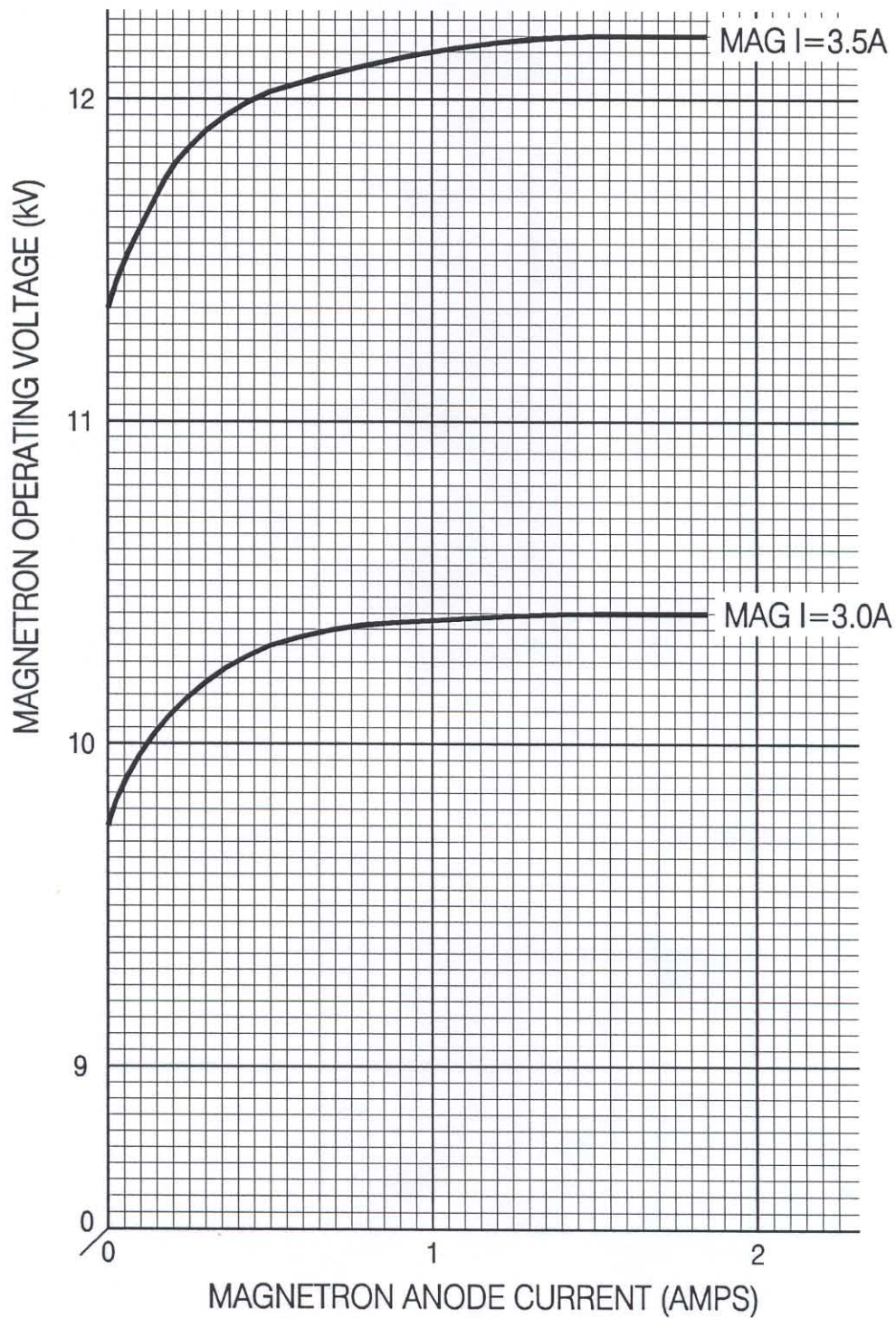


FIGURE #2

Filament Voltage vs. Primary Voltage



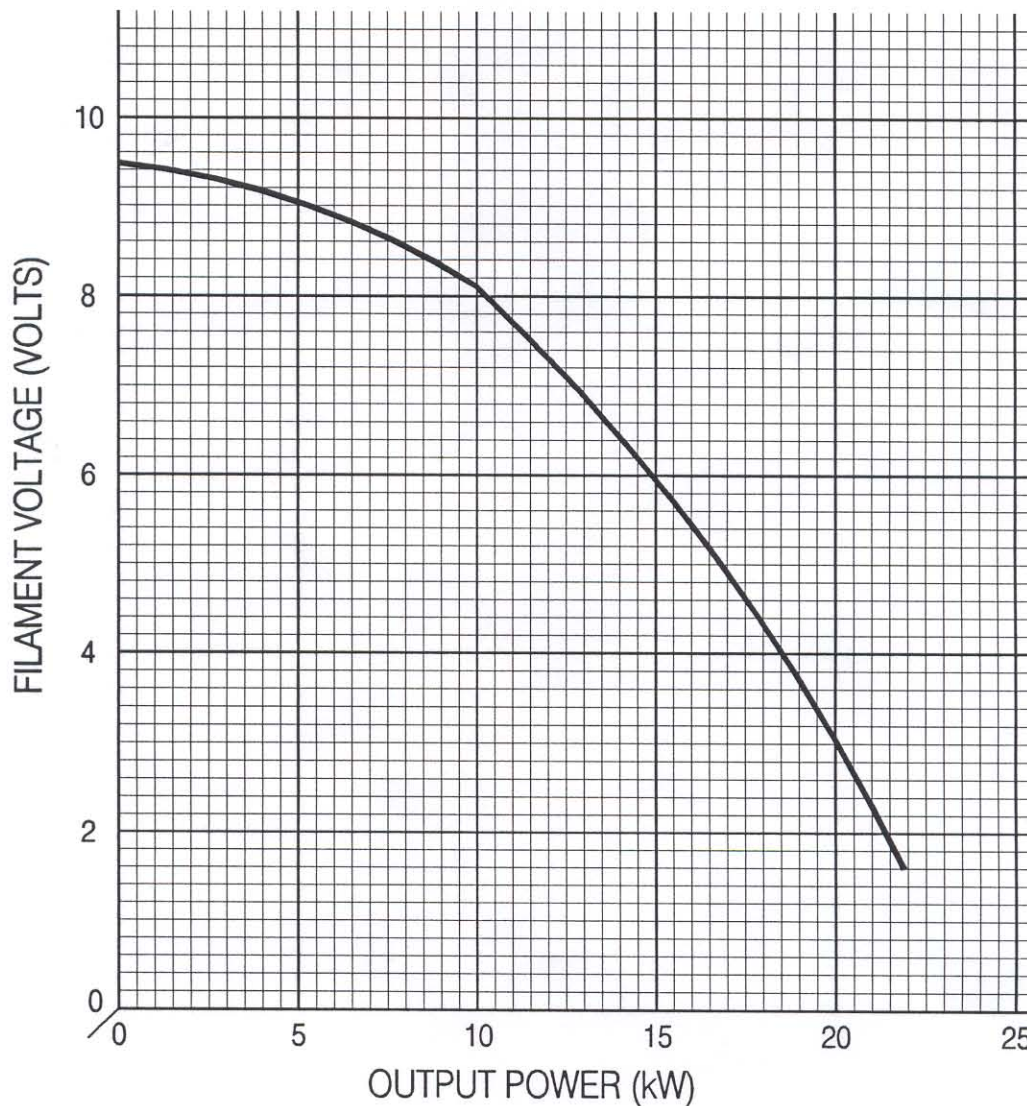
VOLTAGE vs CURRENT FOR CONSTANT MAGNET CURRENT



FILAMENT BACKDOWN SCHEDULE

FOR NL15245

- NOTE: 1. FILAMENT VOLTAGE IS MEASURED AT THE MAGNETRON WITH A FLOATING VOLT METER. THESE FIGURES MAY BE TRANSPOSED TO THE PRIMARY OF THE FILAMENT TRANSFORMER AFTER INITIAL CALIBRATION.
2. FILAMENT VOLTAGE SHOULD BE SET TO WITHIN 1 0.5 VOLTS OF INDICATED VALUE.



TYPICAL LOAD LINES FOR NL15245

NOTE: THE SLOPE OF THESE CURVES
WILL VARY DEPENDING ON THE
IMPEDANCE OF THE HIGH VOLTAGE
TRANSFORMER.

