

CW Klystron Amplifier

High Power Output	Easy to Install and Operate
Very High Gain	Modulating Anode — permits
Long Life, High Reliability	both visual and aural
Integral Cavity Construction	application with
Water/Vapor Cooled	a single beam supply
Electromagnet Focusing	

Electrical

Frequency Range	470-566 MHz
Cathode Type	Indirectly heated, tungsten dispenser cathode
Heater (dc or 50-60 Hz):	
Voltage ^a	6.0 ± 0.5 V
Current @ 6.0 V, typical	16.4 A
Surge current, maximum	30.0 A
Warm-up time, minimum	180 sec
Focusing	RCA-AJ2166 Electromagnet

Mechanical

Mounting Position	Vertical, cathode down
Dimensions, Maximum:	
Height	(1485.9 mm) 58.5 in
Width	(381.0 mm) 15.0 in
Weight, Approximate:	
Uncrated	(90.7 kg) 200 lbs
Crated	(213.1 kg) 470 lbs
Inlet Coolant Connector	Mates with Hansen B2-H16
Outlet Coolant Connector	Mates with Hansen LL3-H21
Steam Outlet	See Dimensional Outline

Electrical Connections

RF Input	UG-22B/U jack mates with UG-21D/U plug
RF Output	See Dimensional Outline
Collector ^b	Pins F and G, Cannon Rec. ^c
Thermocouple:	
Chromel	Pin H Cannon Rec. ^c
Alumel	Pin J Cannon Rec. ^c
Body	Pin E Cannon Rec. ^c

Modulating Anode	See Dimensional Outline
Heater-Cathode	See Dimensional Outline
Heater	See Dimensional Outline
Interlock #1	Pins A and B, Cannon Rec. ^c
Interlock #2	Pins C and D, Cannon Rec. ^c

Thermal

Collector Temperature	145	max.	°C
Body Temperature	100	max.	°C
Electron Gun Insulator Temperature	250	max.	°C
Storage Temperature	-65	min.	°C

Coolant Requirements

Collector and Body

Water flow	(7.5 l/m)	2.0	min.	gpm
Inlet water temperature		70	max.	°C

Electron Gun

Forced air flow	(24 l/s)	50	min.	cfm
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Water Pressure Differential for

Typical Flow of 2.1 gpm	(3.5 kg/cm ²)	50	max.	psi
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Water Pressure at any Inlet	(4.2 kg/cm ²)	60	max.	psi
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Maximum Ratings, Absolute-Maximum Values

Beam Voltage, DC	20	max.	kV
Beam Current, DC	5.5	max.	A
Body Current, DC	250	max.	mA
Modulating Anode Voltage, DC	20	max.	kV
Load VSWR	1.5:1.0		

**Typical Operation, UHF Television Service
(Visual 471.25 MHz, Aural 475.75 MHz)**

	Visual	Aural	
Collector Voltage, DC ^f	0	0	V
Body Voltage, DC	0	0	V
Beam Current, DC	4.7	2.4	A
Body Current, DC ^g	70	15	mA

Modulating Anode Voltage, DC	0	-6	kV
Modulating Anode Current, DC	1.5	1.0	mA
Cathode Voltage, DC	-18	-18	kV
Focusing Current, DC (Typical with RCA-AJ2166 Electromagnet)	28	28	A
Load VSWR	1.1:1	1.1:1	—
Drive Power, for Visual Peak-of- Sync or Aural CW	10	1.1	W
Output, for Visual Peak-of-Sync or Aural CW	31	12	kW
Gain	35	40	dB
Efficiency	37	28	%

- a Careful attention to maintaining the minimum value of filament voltage consistent with adequate emission will result in conserving the life of the tube.
- b Pins F and G must always be used in parallel.
- c Type CA22365-2729 Cannon Receptacle.
- d All water must be removed from the water course during storage.
- e Cooling air blower must be directed toward the electron gun and located within a distance of 24 inches.
- f A DC ammeter make the connection between the collector and ground.
- g The body is connected directly to ground. Body current is measured in the ground leg of the beam power supply.

General Information

Cooling

The electron gun is cooled by forced-air directed at the cathode-seal area. Air flow must be at least 50 cfm. (24.0 l/sec) The remainder of the tube is cooled by water/vapor system with water cooling the resonators and drift-tube sections and vapor cooling the collector.

The use of distilled water is essential. The liquid flow must start before application of any voltages and preferably should continue for five minutes after removal of voltages. Interlocking of the liquid flow through each of the cooled elements with the beam supply is recommended to prevent damage in case of cooling failure.

A steam exhaust sleeve must be provided for the top of the klystron boiler. A flexible, neoprene type is recommended. The sleeve is placed over the lip provided at the top of the boiler (see Dimensional Outline) and clamped securely in place for a water-tight connection.

Electrical Connections to Tube Terminals

Connections to the Heater, Heater-Cathode and Modulating Anode Terminals (see Dimensional Outline) are made with preformed finger stock or knife blade type fuse clips. Care should be taken when making these connections not to place excessive stress on the ceramic-to-metal seals.

Protection Circuits

Protection circuits serve a threefold purpose: safety of personnel, protection of the tube and protection of tube circuits. Consult Application Note AN4206 for complete information on protection circuits required.

RF Output Coaxial Adapter

The RF output coaxial adapter shown in the klystron Outline Drawing is shipped as a separate item within the tube crate. It must be screwed on after the tube is installed within the electromagnet.

Installation and Operation

RCA reference publications required for the installation and operation of this device include the following:

- Data Sheet – RCA-8824
- Application Note AN4206
- Application Guide 1CE-279A

These publications are available as a complete packet – request PWR-537, "Applications Information for the RCA-8824 Super-Power Klystron,"

Personnel Safety

The high voltages and microwave radiations from this device can be dangerous to life. High voltage shielding and interlock precautions must be taken and all rf connections must be tightly closed and rf terminals adequately shielded.

This device, in operation, may produce X-radiation which can constitute a health hazard. Shielding or other precautions may be required.

Packaging

The klystron is shipped in a specially designed shipping crate featuring steel tracks for receiving the rollers on the tube sides. Unpacking instructions are attached to the crate.

RCA AJ2166 Electromagnet

The RCA 8824 klystron is designed to be mounted in and its beam focused by the water-cooled, single-coil electromagnet, RCA-AJ2166. The exposed surfaces of the electromagnet are treated by painting or plating to resist corrosion.

General Data

Voltage, DC	125 max. V
Current, DC	30 max. A
Dimensions	See Outline Drawing
Weight (approx.)	(158.7 kg) 350 lbs
Cooling:	
Water flow, minimum	(3.8 l/m) 1 gpm
Inlet temperature, maximum	70° C
Maximum water pressure differential for typical flow	(3.5 kg/cm ²) 50 psig
Maximum water pressure at any inlet	(4.2 kg/cm ²) 60 psig

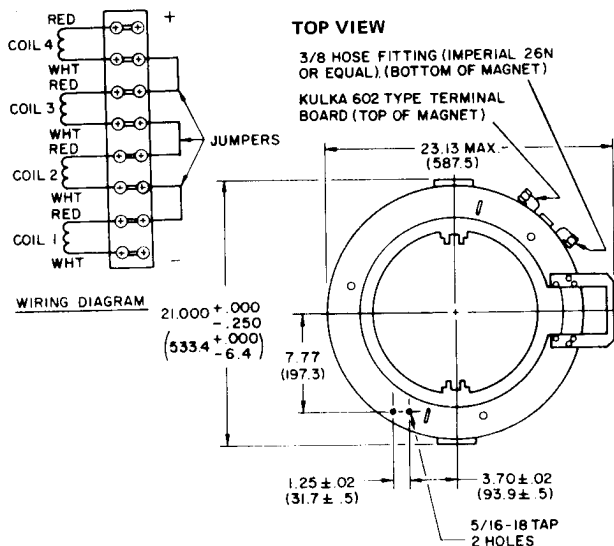
Operating Considerations

Typical operating coil currents are noted under "Typical Operation" data section.

It is recommended that the coil coolant flow start before the application of any coil voltage and preferably continue for five minutes after the removal of voltages. Interlocking of the coolant flow with the klystron beam and modulating-anode voltages and coil voltages is highly recommended to prevent tube and coil damage in the event of inadequate coolant flow.

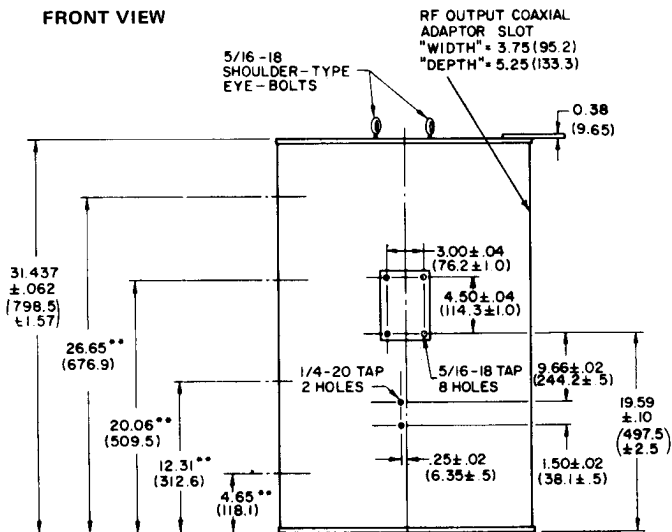
The use of a solid-state diode connected in parallel with the electromagnet is recommended to prevent excessive transient voltage build-up in the event of coil current interruptions. Connections should be made so the coil current will flow through the diode when the polarity of the normal coil voltage becomes reversed.

ELECTROMAGNET DIMENSIONAL OUTLINE



ELECTROMAGNET DIMENSIONAL OUTLINE

FRONT VIEW

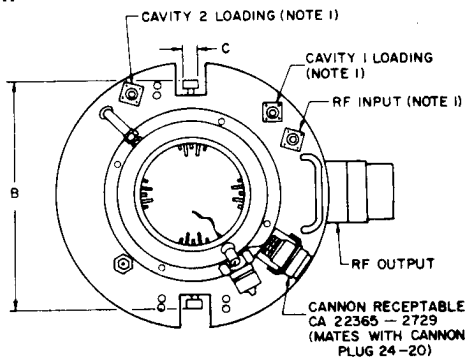


**LOCATION OF 1" DIAMETER TUNING PORTS

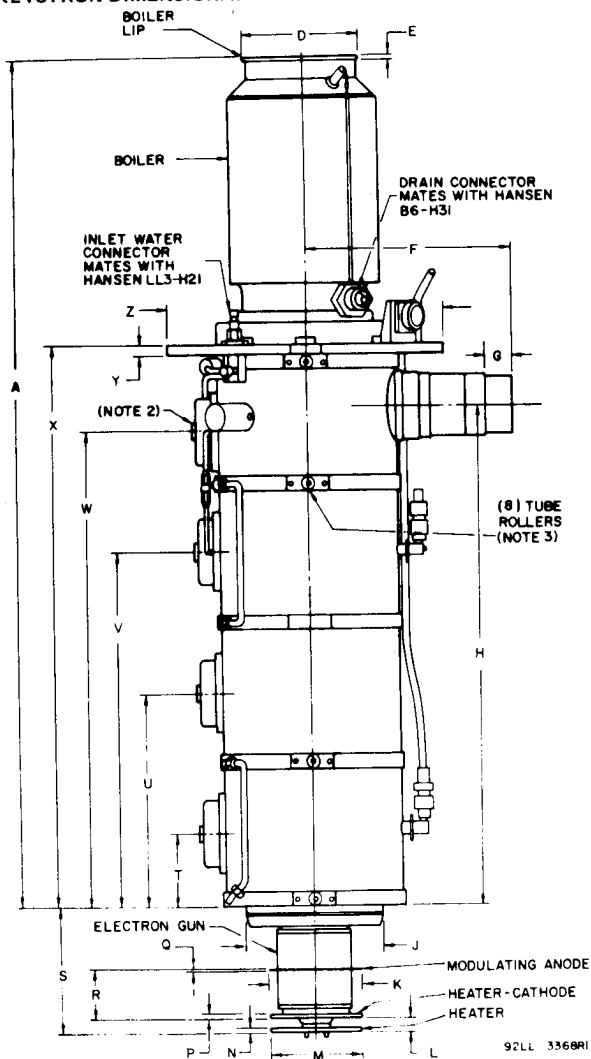
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KLYSTRON DIMENSIONAL OUTLINE

TOP VIEW



KLYSTRON DIMENSIONAL OUTLINE (Cont'd)



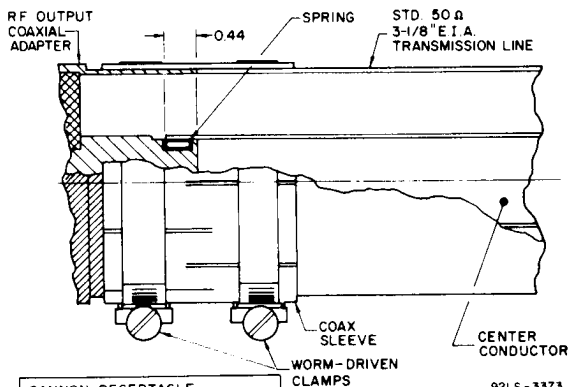
KLYSTRON OUTLINE DIMENSIONS

Ref.	Inches	Millimeters
A	50.83 ± 0.25	1290.0 ± 6.3
B	12.40 Max.	314.9 Max.
C Dia.	0.75 Ref.	19.05
D Dia.	6.40 ± 0.04	162.56 ± 1.0
E	0.23 ± 0.04	5.84 ± 1.0
F	11.00 ± 0.12	279.4 ± 3.0
G	1.51 ± 0.01	38.35 ± 0.25
H	27.52 ± 0.06	699.0 ± 1.5
J Dia.	7.50 Max.	190.5 Max.
K Dia.	5.00 ± 0.01	127.00 ± 0.25
L	0.69 ± 0.05	17.53 ± 1.2
M Dia.	5.00 ± 0.03	127.00 ± 0.76
N	0.19 ± 0.01	4.82 ± 0.25
P	0.19 ± 0.01	4.82 ± 0.25
Q	0.04	1.0
R	2.79 ± 0.05	70.86 ± 1.2
S	6.89 ± 0.07	175.0 ± 1.7
T	4.16 ± 0.03	105.66 ± 0.76
U	11.80 ± 0.04	299.72 ± 1.0
V	19.60 ± 0.05	497.8 ± 1.3
W	26.20 ± 0.06	665.5 ± 1.5
X	30.82 ± 0.09	782.8 ± 2.2
Y	0.50 ± 0.02	12.70 ± 0.5
Z Dia.	15.00 Max.	381.0 Max.

Notes:

1. UG-22 B/U jack mates with UG-21 D/U
2. Channel tuning screws 5/16" hex socket head.
3. Tube rollers mate with RCA AJ2166 electromagnet.

DETAIL RF OUTPUT CONNECTOR



92LS-3373

CANNON RECEPTACLE
CA 22365 - 2729

PIN CONNECTIONS

A	JUMPER, #16 AWG
B	
C	JUMPER, #16 AWG
D	
E	BODY (GROUND)
F	COLLECTOR *
G	COLLECTOR
H	CHROMEL } THERMOCOUPLE
J	ALUMEL } CONNECTIONS

*ALWAYS USE PINS F AND G IN PARALLEL

More complete information covering the handling, installation, safety and operation of this type may be obtained through an RCA Field Representative or by writing RCA Super Power Tube Marketing, Lancaster, PA. 17604.