

OCT 22 1948

RADIO MANUFACTURERS ASSOCIATION

SUITE 701-4 AMERICAN BUILDING
1317 F STREET, N.W.
WASHINGTON, D. C.



R.M.A. DATA BUREAU
90 West Street
New York, N. Y.

L. I. A.
REGISTRATION
FILE

Release No. 703

October 19, 1948

To
Tube Engineers:

Registration has been made by the RMA
Data Bureau of the vacuum tube type designations

3J21	(	Registration No.	1545)
4J21	{	"	1546}
4J22	{	"	1547}
4J23	{	"	1548}
4J24	{	"	1549}
4J25	{	"	1550}
4J26	{	"	1551}
4J27	{	"	1552}
4J28	{	"	1553}
4J29	{	"	1554}
4J30	{	"	1555}
4J52	{	"	1556}
5J21	{	"	1557}
5J22	{	"	1558}
5J23	{	"	1559}
5J24	{	"	1560}
5J25	{	"	1561}
5J26	{	"	1562}

as defined by the characteristics and ratings given in
the attached data on application of

Western Electric Company
New York, N. Y.

Respectfully yours,

RMA DATA BUREAU

By

LCFHorle/cap
Enc.

WESTERN ELECTRIC 3J21 ELECTRON TUBE

TYPE DESIGNATION REGISTRATION

Reservation No.: 5222 Manufacturers Designation: 1456
Reservation Date: 10/2/44 Data Bureau Designation: 3J21

U.H.F. MAGNETRON - PACKAGED TYPE

Electrical Data - General

Heater Voltage	12.6 volts
Heater Current	1.6 amperes
Cathode Heating Time	3 minutes
Frequency	23,746-24,226 megacycles
Frequency Pulling (max.)	18 megacycles
Frequency Change with Anode Temperature (max.)	0.45 megacycle per degree C

Mechanical Data - See Outline Drawing

Maximum Ratings, Absolute Values

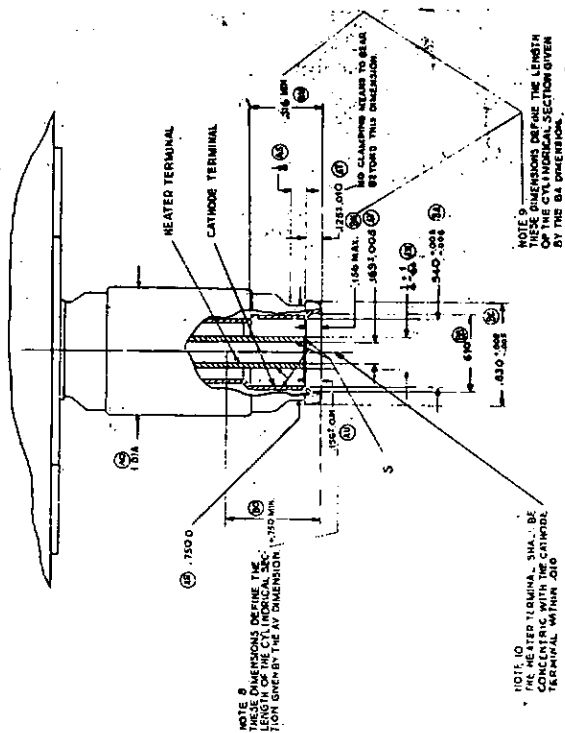
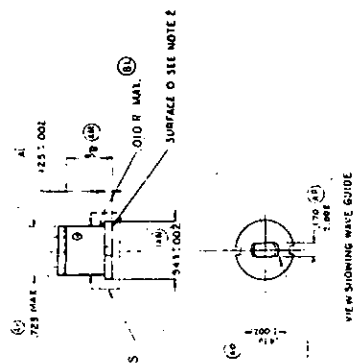
Peak Anode Voltage	15	16 kilovolts
Peak Anode Current	10	16 amperes
Peak Power Input	150	225 kilowatts
Average Power Input	150	110 watts
Duty Cycle	.001	.0006
Pulse Duration	0.55	0.55 microseconds
Anode Temperature	150°	150° Centigrade
Operation Time in 100 Microsecond Interval	0.6	0.6 microsecond

Typical Operation

Heater Voltage *		
Magnetic Field	Integral Magnet	
Peak Anode Voltage	15	15 kilovolts
Peak Anode Current	15	15 amperes
Pulse Repetition Rate	1000	2000 pulses/second
Pulse Duration	0.5	0.25 microseconds
Peak Power Output	60	60 kilowatts
Maximum R.F. Bandwidth	6	12 megacycles

*During high voltage operation the heater voltage must be reduced so that the cathode operates at approximately 820°C.

Note: This sheet does not imply commercial availability of the tube.



ENLARGED VIEW OF INPUT

NOTE 9
THESE DIMENSIONS DEFINE THE LENGTH
OF THE CYLINDRICAL SECTION GIVEN
BY THE RA DIMENSIONS.

NOTE: DO NOT HEATER TERMINAL SHALL BE CONCENTRIC WITH THE CATHODE TERMINAL WITHIN .010

NOTE 1: ALL METAL SURFACES COVERED BY BLACK FINISH EXCEPT THOSE MARKED S AND D WHICH SHALL BE STAINLESS ADJUSTABLE PLATED

SHALL BE SILVER OR WHITE PLATES
CONNECTIONS CAN BE MADE TO SURFACES Q

NOTE 3: THE AXIS OF THE CATODE-TERMINAL SHALL BE WITHIN A RADIUS OF 3/64

OF THE SPECIFIED LOCATION LIMIT INCLUDES ANGULAR DEVIATION.

NOTE 4: THIS SURFACE SHALL BE COPLANAR WITH REFERENCE PLANE WITHIN $\pm 1^\circ$.

THE DIRECTION OF A PLANT SURFACE. A 300 THICKNESS GAUGE.

1 8 WIDE SHALL NOT ENTER.

NOTE 6: DIMENSIONS WITHOUT LIMITS ARE FOR EQUIPMENT DESIGN PURPOSES ONLY, AND NEED NOT BE CHECKED.

NOTE 12: ON GOVERNMENT ORDERS THE INITIAL ISSUE OF THIS DRAWING AND ALL SUBSEQUENT REVISIONS ARE SUBJECT TO APPROVAL BY THE SERVICES

NOTE 13: THE OPENING IN THE WAVEGUIDE SHALL BE ENCLOSED BY DUST COVER WHEN TUBE IS NOT.

WESTERN ELECTRIC 4J21 to 4J25 ELECTRON TUBES

TYPE DESIGNATION REGISTRATION

Reservation Nos.: 5077 to 5081 Manufacturers Designation: 1402M
Reservation Date: 7/2/43 Data Bureau Designation: 4J21 to 4J25

U.H.F. MAGNETRONS

Electrical Data - General

Heater Voltage	20.5 volts
Heater Current	2.2 amperes
Cathode Heating Time	3 minutes
Frequency	4J21 = 1336-1350 megacycles
	4J22 = 1322-1336 megacycles
	4J23 = 1308-1322 megacycles
	4J24 = 1294-1308 megacycles
	4J25 = 1280-1294 megacycles
Frequency Pulling (Max.)	6.0 megacycles
Frequency Change with Anode Temperature (Max.)	.03 megacycles per degree C

Mechanical Data - See Outlint Drawing

Maximum Ratings, Absolute Values

Peak Anode Voltage	30 kilovolts
Peak Anode Current	60 amperes
Peak Power Input	1500 kilowatts
Average Power Input	1500 watts
Duty Cycle	0.002
Pulse Duration	6.0 microseconds
Anode Temperature	100° Centigrade
Operation Time in 100 Microsecond Interval	8 microseconds

Typical Operation

Heater Voltage *	
Magnetic Field	1400 gauss
Peak Anode Voltage	26.5 kilovolts
Peak Anode Current	48 amperes
Pulse Repetition Rate	200 pulses/second
Pulse Duration	5 microseconds
Peak Power Output	640 kilowatts
Maximum R.F. Bandwidth	4 megacycles

* During high voltage operation, the heater voltage must be reduced so that the cathode operates at approximately 820°C.

Note: This sheet does not imply commercial availability of the tube.

NOTE: THE CONCENTRICITY OF THESE DIMENSIONS WITH RESPECT TO EACH OTHER SHALL BE CONSIDERED SATISFIED IF THEY MEET THE FOLLOWING CONDITIONS: CONCENTRIC TUB AND PUMP MEASURING 2.315" I.D., 1.924" O.D. X 1.600" I.D. AND .530 O.D. MUST PASS FREELY INTO OR OVER THESE PARTS TO THE DISTANCES INDICATED. IN NOTES 2 AND 5.

-REFERENCE: PLANE FOR ELECTRICAL TESTS

0:17... THE
1.226... X 1.000...
FUE IN NOT 1 4.51
PENETRATE.

NOTE 3: A-4 MUST BE CAPABLE OF BEING
70-55 A-4
INCRESED BETWEEN TWO COLLATERAL PLANES
3,540 A-4, WHICH ARE EQUIDISTANT
FROM THE AXIS OF A 2,315-DIA. TUBE
1-10 LOCATION PIN SUPPORT TUBING IS INSERED
THE TOPPING PIN MUST FALL BETWEEN
PARALLEL PLATES 150 APART EQUIDISTANT
FROM THE Y AXIS AND NORMAL TO THE
ABOVE NOTED PLATES 3,540 APART.

NOTE 4
THE CONE TENSILE SHALL BE CAPABLE OF
ACCEPTING A CONE HAVING A 60° INCLUDED
ANGLE AND A BASE DIAMETER OF .234
IN. SHALL REJECT A SIMILAR CONE
HAVING A BASE DIAMETER OF .254

NOTE 5
DEPTH TO WHICH THE .530" DIA
PLUG IN HOLE MUST PENETRATE

NOTE 7
OUTCROP OF GRASS MAY
VARY FROM THAT SHOWN
WITHIN LIMITING BOUNDS
OF NOTE.

NOTE D
PROTECTIVE CAP SHALL BE IN PLACE WHEN
TUBE IS NOT IN USE.

12 1/2 MA

CA 92-4FAT;K TKMINA

JACK HOLE\$- .169 L .005 DIA
19/32 DEEL MIN.

HEATING TERMINAL

NOTE 12
ALL NOTES IN THIS AREA
TO HAVE A BLACK FLAME.

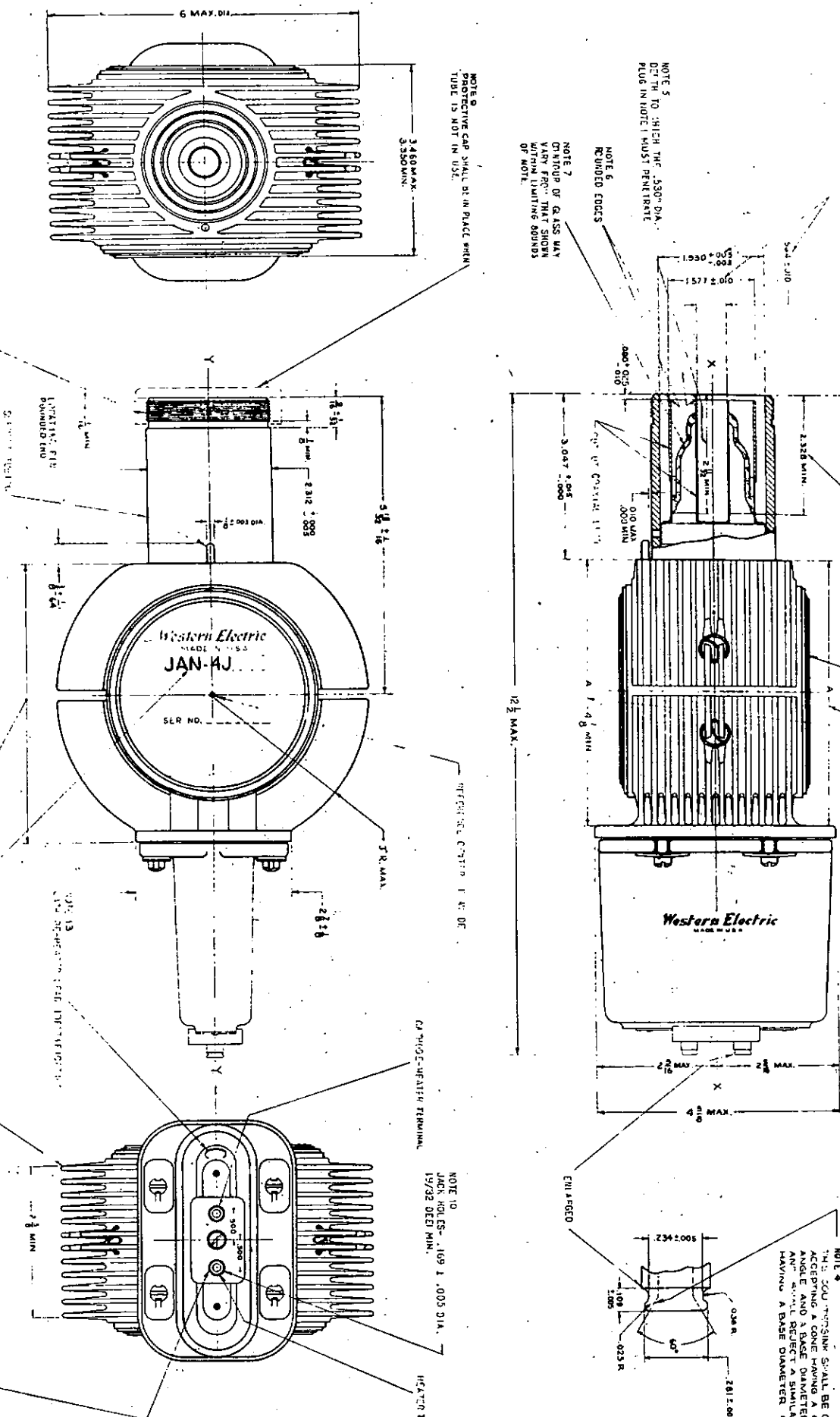
JAN - J 24	
JAN - J 27	CODF NUMBER TO CORRESPOND TO
JAN - J 28	TUBE TYPE.

NOTE 14
RADIATORS
NUMBER OF RADIATOR
FINS MAY VARY

NOTE 16:
THE JACK HOLES SHALL BE WITHIN A
RADIUS OF .250 OF THE SPECIFIED LOCATIONS BUT SHALL BE SITED TO MAINTAIN WITH RESPECT TO EACH OTHER, THE CENTER LINES OF THE JACK HOLES SHALL BE PARALLEL TO ONE ANOTHER WITHIN 3°.

NOTE 15
"X" AND "Y" SHALL BE CONSIDERED AS
AXIS OF SUPPORT.

NOTE II	MAX. VAL. DIA.	-2.3120
2.312"-16 U.S.F.	MIN. VAL. DIA.	-2.2950
THREAD	MAX. PITCH DIA.	-2.2714
3 FULL THREADS MIN	MIN. FITCH DIA.	-2.2622
	MAX. MINOR DIA.	-2.2355



WESTERN ELECTRIC 4J26 to 4J30 ELECTRON TUBES
TYPE DESIGNATION REGISTRATION

Reservation Nos.: 5083 to 5087 Manufacturers Designation: 1402M
Reservation Date: 7/16/43 Data Bureau Designation: 4J26 to 4J30

U.H.F. MAGNETRONS

Electrical Data - General

Heater Voltage	23.5 volts
Heater Current	2.2 amperes
Cathode Heating Time	3 minutes
Frequency	4J26 = 1268-1280 megacycles
	4J27 = 1256-1268 megacycles
	4J28 = 1244-1256 megacycles
	4J29 = 1232-1244 megacycles
	4J30 = 1220-1232 megacycles
Frequency Pulling (Max.)	5.5 megacycles
Frequency Change with Anode Temperature (Max.)	.03 megacycles per degree C

Mechanical Data - See Outline Drawing

Maximum Ratings, Absolute Values

Peak Anode Voltage	30 kilovolts
Peak Anode Current	60 amperes
Peak Power Input	1500 kilowatts
Average Power Input	1500 watts
Duty Cycle	.002
Pulse Duration	6.0 microseconds
Anode Temperature	100° Centigrade
Operation Time in 100 Microsecond Interval	8 microseconds

Typical Operation

Heater Voltage *	
Magnetic Field	1400 gauss
Peak Anode Voltage	27 kilovolts
Peak Anode Current	46 amperes
Pulse Repetition Rate	200 pulses/second
Pulse Duration	5 microseconds
Peak Power Output	700 kilowatts
Maximum R.F. Bandwidth	4 megacycles

* During high voltage operation, the heater voltage must be reduced so that the cathode operates at approximately 820°C.

Note: This sheet does not imply commercial availability of the tube.

WESTERN ELECTRIC 4J52 ELECTRON TUBE

TYPE DESIGNATION REGISTRATION

Reservation No.: 5233 Manufacturers Designation: 1471
Reservation Date: 11/6/44 Data Bureau Designation: 4J52

U.H.F. MAGNETRON - PACKAGED TYPE

Electrical Data - General

Heater Voltage	12.6 volts
Heater Current	2.1 amperes
Cathode Heating Time	4 minutes
Frequency	9345-9405 megacycles
Frequency Pulling (Max.)	15 megacycles
Frequency Change with Anode Temperature (Max.)	.25 megacycles per degree C

Mechanical Data - See Outline Drawing

Maximum Ratings, Absolute Values

Peak Anode Voltage	16	16 kilovolts
Peak Anode Current	20	30 amperes
Peak Power Input *	300	450 kilowatts
Average Power Input	300	450 watts
Duty Cycle	.002	.002
Pulse Duration	6.0	1.2 microseconds
Anode Temperature	150	150° Centigrade
Operation Time in 100 Microsecond Interval	6	6 microseconds

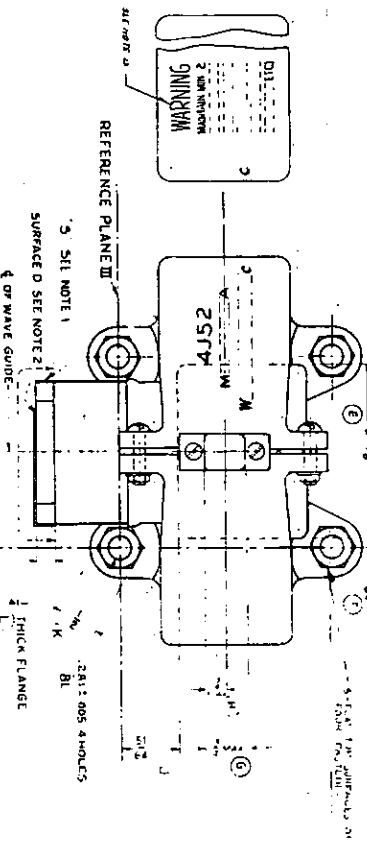
Typical Operation

Heater Voltage **		
Magnetic Field	Integral Magnet	
Peak Anode Voltage	15	15 kilovolts
Peak Anode Current	15	15 amperes
Pulse Repetition Rate	1000	200 pulses/second
Pulse Duration	1	5.5 microseconds
Peak Power Output	100	100 kilowatts
Maximum R.F. Bandwidth	3	3 megacycles

* Tube shall not be operated at maximum peak input power at pressure of less than 60 cm Hg.

** During high voltage operation, the heater voltage must be reduced so that the cathode operates at approximately 820°C.

Note: This sheet does not imply commercial availability of the tube.



WESTERN ELECTRIC 5J21 to 5J25 ELECTRON TUBES

TYPE DESIGNATION REGISTRATION

Reservation Nos.: 5038 to 5042 Manufacturers Designation: 1382M
Reservation Date: 1/22/43 Data Bureau Designation: 5J21 to 5J25

U.H.F. MAGNETRONS

Electrical Data - General

Heater Voltage	20.5 volts
Heater Current	3.4 amperes
Cathode Heating Time	3 minutes
Frequency	5J21 = 1098-1110 megacycles
	5J22 = 1086-1098 megacycles
	5J23 = 1074-1086 megacycles
	5J24 = 1062-1074 megacycles
	5J25 = 1050-1062 megacycles
Frequency Pulling (Max.)	5.5 megacycles
Frequency Change with Anode Temperature (Max.)	.03 megacycles per degree C

Mechanical Data - See Tube Outline

Maximum Ratings, Absolute Values

Peak Anode Voltage	25 kilovolts
Peak Anode Current	30 amperes
Peak Power Input	750 kilowatts
Average Power Input	750 watts
Duty Cycle	.001
Pulse Duration	2.0 microseconds
Anode Temperature	100° Centigrade
Operation Time in 100 Microsecond Interval	5 microseconds

Typical Operation

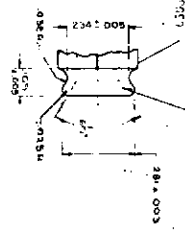
Heater Voltage *	
Magnetic Field	900 gauss
Peak Anode Voltage	19 kilovolts
Peak Anode Current	24 amperes
Pulse Repetition Rate	1000 pulses/second
Pulse Duration	1.5 microseconds
Peak Power Output	250 kilowatts
Maximum R. F. Bandwidth	4 megacycles

* During high voltage operation, the heater voltage must be reduced so that the cathode operates at approximately 820°C.

Note: This tube is obsolete and manufacturing facilities are no longer available.

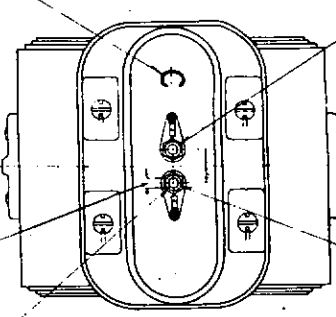
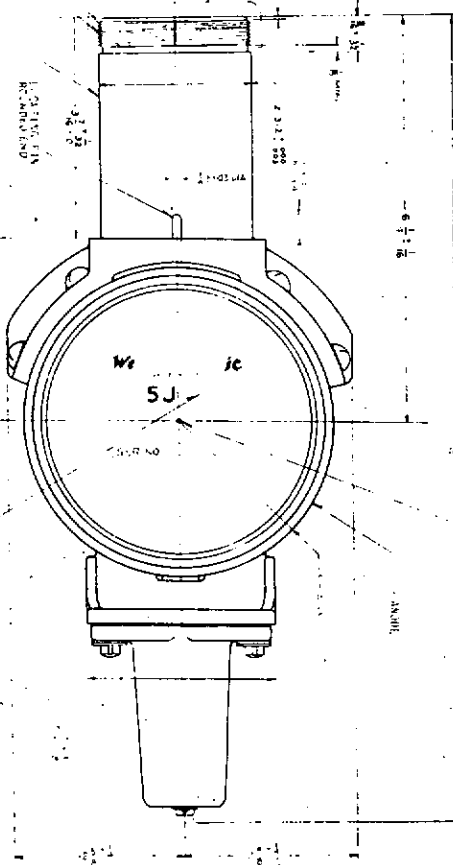
Exhibit 10-1: *Continued*

THIS COUNTERSINK SHALL BE CAPABLE OF ACCEPTING A CONE HAVING A 60° INCLUDED ANGLE AND A BASE DIAMETER OF .234 AND SHALL REJECT A SIMILAR CONE HAVING A BASE DIAMETER OF .254.



REF ID: A66101

■



THE JACK HOLES SHALL BE WITHIN A TOLERANCE OF .020 OF THE SPECIFIED LOCATION BUT SHALL BE SPACED .005 ± .005 WITH RESPECT TO EACH OTHER. THE CENTER OF EACH HOLE SHALL BE WITHIN .005 OF THE CENTER OF THE MOUNTING SURFACE.

THE UNIVERSITY OF CHICAGO

WESTERN ELECTRIC 5J26 ELECTRON TUBE
TYPE DESIGNATION REGISTRATION

Reservation No.: 5290 Manufacturers Designation: 1475M
Reservation Date: 3/14/45 Data Bureau Designation: 5J26

U.H.F. MAGNETRON

Electrical Data - General

Heater Voltage	23.5 volts
Heater Current	2.2 amperes
Cathode Heating Time	3 minutes
Frequency	1220-1350 megacycles

Mechanical Data - See Outline Drawing

Maximum Ratings, Absolute Values

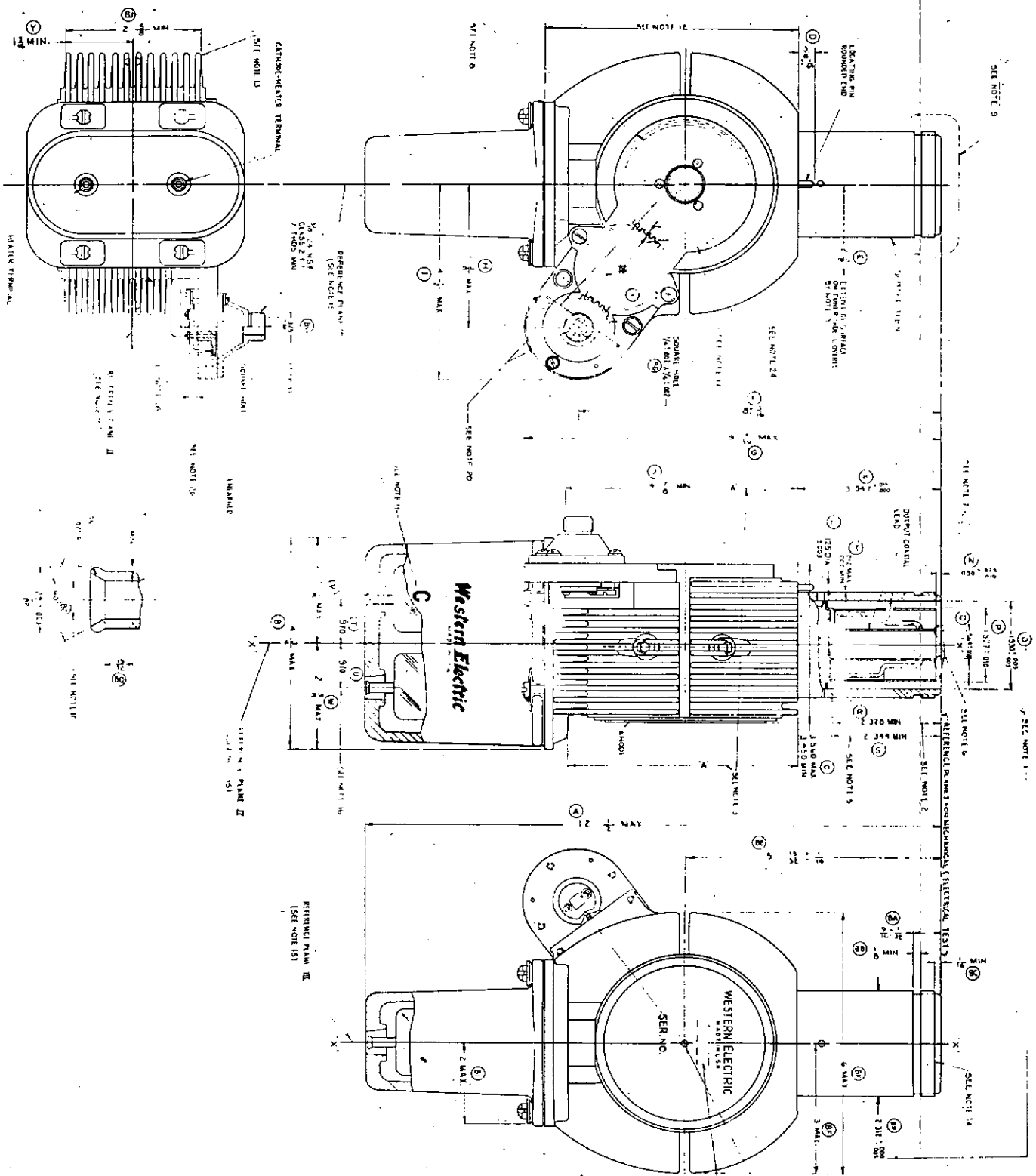
Peak Anode Voltage	31 kilovolts
Peak Anode Current	60 amperes
Peak Power Input	1800 kilowatts
Average Power Input	1800 watts
Duty Cycle	.002
Pulse Duration	6.0 microseconds
Anode Temperature	125° Centigrade
Operation Time in 100 Microsecond Interval	8 microseconds

Typical Operation

Heater Voltage *	
Magnetic Field	1400 gauss
Peak Anode Voltage	27 kilovolts
Peak Anode Current	46 amperes
Pulse Repetition Rate	1000 pulses/second
Pulse Duration	1 microsecond
Peak Power Output	600 kilowatts

* During high voltage operation the heater voltage must be reduced so that the cathode operates at approximately 820°C.

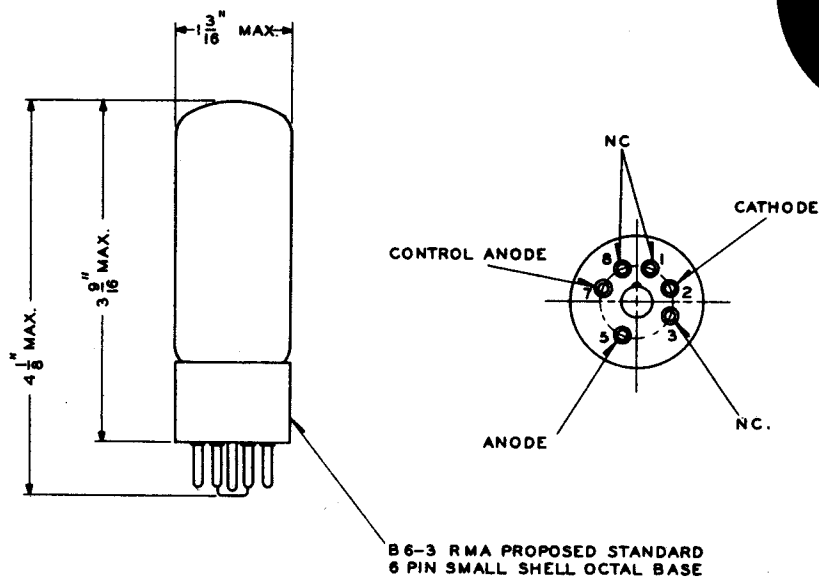
Note: This sheet does not imply
commercaill availability of the tube.



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ADVANCE ELECTRON TUBE DATA SHEET
 WESTERN ELECTRIC 5589* ELECTRON TUBE

5589
 COLD CATHODE
 3 ELECTRODE



CLASSIFICATION

Three-electrode, inert-gas-filled, cold cathode tube.

MOUNTING

The tube may be mounted in any position.

MAXIMUM RATINGS (ABSOLUTE VALUES)

Peak Anode Voltage		
Inverse	200	volts
Forward	275	volts
Cathode Current		
Peak	200	milliamperes
Direct Current for life of 1,000 hours	35	milliamperes
Direct Current for life of 10,000 hours	20	milliamperes
Frequency	60	cycles/second
Ambient Temperature Limits	-40 to +80°	centigrade
Peak Starter Current		
Starter Voltage, Positive	100	milliamperes
Starter Voltage, Negative	1.0	milliamperes

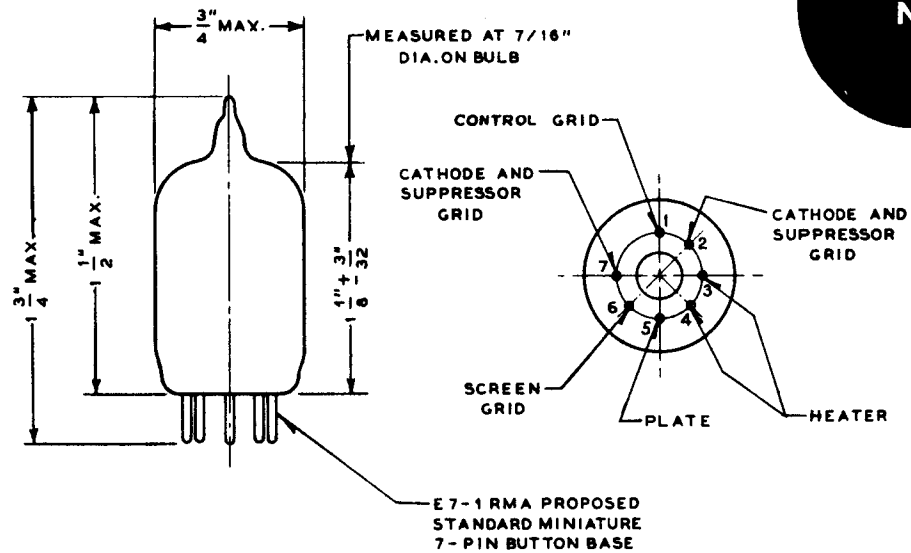
ELECTRICAL DATA

	MIN.	BOGEY	MAX.	
Anode Voltage Drop	55	65	70	volts
Starter Voltage Drop	55	60	70	volts
Starter Breakdown Voltage	70	80	90	volts
Required Transfer Current,				
Anode at 130 volts	200	---	---	microamperes
Deionization Time, approx.	---	2000	---	microseconds

ADVANCE ELECTRON TUBE DATA SHEET

WESTERN ELECTRIC 5590* ELECTRON TUBE

5590
MINIATURE
PENTODE



CLASSIFICATION

Miniature Pentode

MOUNTING

Tube may be mounted in any position.

MAXIMUM RATINGS (DESIGN - CENTER VALUES)

Plate Voltage	180 volts
Plate Dissipation	1.7 watts
Screen Voltage	140 volts
Screen Dissipation	0.5 watts
Cathode Current	18 milliamperes
Heater - Cathode Voltage	90 volts
Bulb Temperature	120°C

OPERATING CONDITIONS AND CHARACTERISTICS

Heater Voltage	6.3 volts
Heater Current	0.150 amperes
Plate Voltage	90 volts
Plate Current	3.9 milliamperes
Screen Voltage	90 volts
Screen Current	1.4 milliamperes
Cathode - Bias Resistor	820 ohms
Amplification Factor	600
Plate Resistance	300,000 ohms
Transconductance	2,000 micromhos
Cut-off Grid Voltage	-15 volts

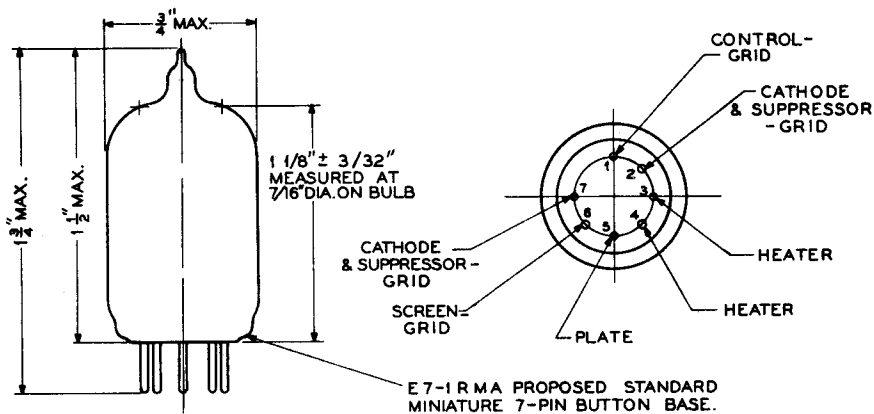
INTERELECTRODE CAPACITANCE (WITH JAN 1A NO. 314 SHIELD CONNECTED TO CATHODE)

Control - Grid to Heater, Cathode, Screen-Grid and Suppressor-Grid	3.4 puf
Plate to Control-Grid	0.01 puf
Plate to Heater, Cathode, Screen-Grid and Suppressor-Grid	2.9 puf

ADVANCE ELECTRON TUBE DATA SHEET

WESTERN ELECTRIC 5591* ELECTRON TUBE

5591
MINIATURE
PENTODE
UHF



CLASSIFICATION

Miniature Pentode

MOUNTING

The tube may be mounted in any position

MAXIMUM RATINGS (DESIGN - CENTER VALUES)

Plate Voltage	180	Volts
Plate Dissipation	1.7	Watts
Screen Voltage	140	Volts
Screen Dissipation	0.5	Watts
Cathode Current	18	Milliamperes
Heater - Cathode Voltage	90	Volts
Bulb Temperature	120°	Centigrade

OPERATING CONDITIONS AND CHARACTERISTICS

Heater Voltage	6.3	6.3	6.3	Volts
Heater Current	0.150	0.150	0.150	Amps
Plate Voltage	120	150	180	Volts
Screen Voltage	120	140	120	Volts
Cathode-bias resistor	200	330	200	Ohms
Plate Current	7.5	7.0	7.7	Milliamperes
Screen Current	2.5	2.2	2.4	Milliamperes
Amplification Factor	1700	1800	3500	
Plate Resistance	0.34	0.42	0.69	Megohms
Transconductance	5000	4300	5100	Microamhos

INTERELECTRODE CAPACITANCE (WITH JAN 1A NO. 314 SHIELD CONNECTED TO CATHODE)

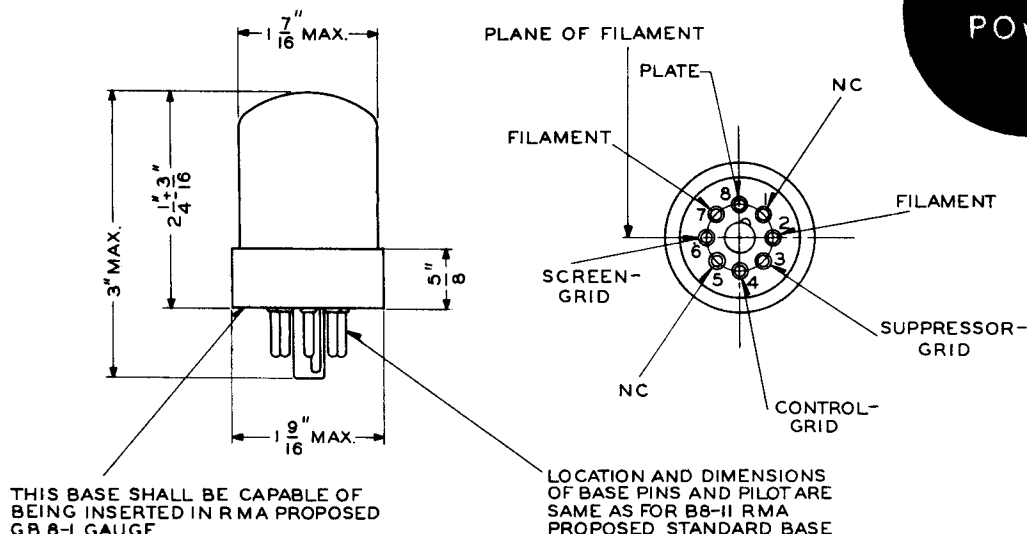
Control - Grid to Heater, Cathode, Screen -		
Grid and Suppressor-Grid	3.90	pF
Plate to Control-Grid	0.01	pF
Plate to Heater, Cathode, Screen-Grid and Suppressor-Grid	2.85	pF

ADVANCE ELECTRON TUBE DATA SHEET

WESTERN ELECTRIC 5603* ELECTRON TUBE

5603

POWER PENTODE
AMPLIFIER



CLASSIFICATION

Filamentary Power Pentode Amplifier

MOUNTING

The tube should be mounted preferably in a vertical position. If mounted in a horizontal position, the plane through contact pins 2 and 6 must be vertical.

MAXIMUM RATINGS (DESIGN-CENTER VALUES)

Plate Voltage	150 volts
Plate Dissipation	8.0 watts
Screen Voltage	150 volts
Screen Dissipation	2.5 watts
Cathode Current	75 milliamperes

OPERATING CONDITIONS AND CHARACTERISTICS

Filament Voltage	6.3 volts
Filament Current	0.5 amp.
Plate Voltage	135 volts
Plate Current	50 milliamperes
Screen Voltage	135 volts
Screen Current	4 milliamperes
Suppressor-Grid Voltage	0 volts
Cathode Bias Resistor	230 ohms
Amplification Factor	92
Plate Resistance	17000 ohms
Transconductance	5400 micromhos
Signal Grid Voltage	8.5 volts a-c
Load Resistance	2500 ohms
Power Output	2.2 watts

INTERELECTRODE CAPACITANCES (NO SHIELD)

Control-grid to filament, screen-grid and suppressor-grid	9.5 μ f
Plate to control-grid	0.3 μ f
Plate to filament, screen-grid and suppressor-grid	7.5 μ f

WESTERN ELECTRIC 6784 ELECTRON TUBE
TYPE DESIGNATION REGISTRATION

Reservation Date: 6-22-55

Manufacturers Designation: A-1939
JEDEC Designation: 6784

General Characteristics

The 6784 traveling wave tube employing a helix type wave propagating structure is a low noise amplifier in the 3100 to 3500 mc frequency range. The saturated power output is approximately 2 milliwatts and the tube is convection cooled. It is designed for CW service. The matching circuit is not integral with the tube. A uniform magnetic field is used to control the electron beam. This is not integral with the tube. The focusing field is provided by a permanent magnet.

Electrical Ratings, Absolute Values (Note 1)

Heater Voltage	6.3 ± 5%	Vac
Heater Current	0.37	Aac
Maximum Heater-Cathode Voltage	± 45	Vdc
Maximum Helix Voltage	700	Vdc
Maximum Helix Current	10	μAdc
Maximum Collector Voltage	1500	Vdc
Maximum Collector Current	0.70	mAdc
Maximum Collector Dissipation	1	watt
Maximum Grid #1 Voltage		
Negative Value	100	Vdc
Positive Value	0	Vdc
Maximum Grid #1 Current	1	μAdc
Maximum Grid #2 Voltage	200	Vdc
Maximum Grid #2 Current	10	μAdc
Maximum Grid #3 Voltage	200	Vdc
Maximum Grid #3 Current	10	μAdc
Maximum Grid #4 Voltage	400	Vdc
Maximum Grid #4 Current	10	μAdc
Maximum Helix Voltage to Ground	-	-
Maximum Cathode Voltage to Ground	1000	Vdc

Electrical Information

Maximum Frequency	3500	Mc
Minimum Frequency	3100	Mc
Minimum Cold Transmission Loss	50	db

TYPE DESIGNATION REGISTRATIONMechanical Information

Type of Cathode	Oxide, unipotential
Base	Cable
Type of Envelope	Glass
Magnetic Field Strength (Note 2)	500 oersteds
Length of Magnetic Field	8.5 inches
Mounting Position	Any
Weight	0.4 pounds
RF Input and Output Impedance	50 ohms
Type of Cooling	Convection
Maximum Bulb Temperature	125°C

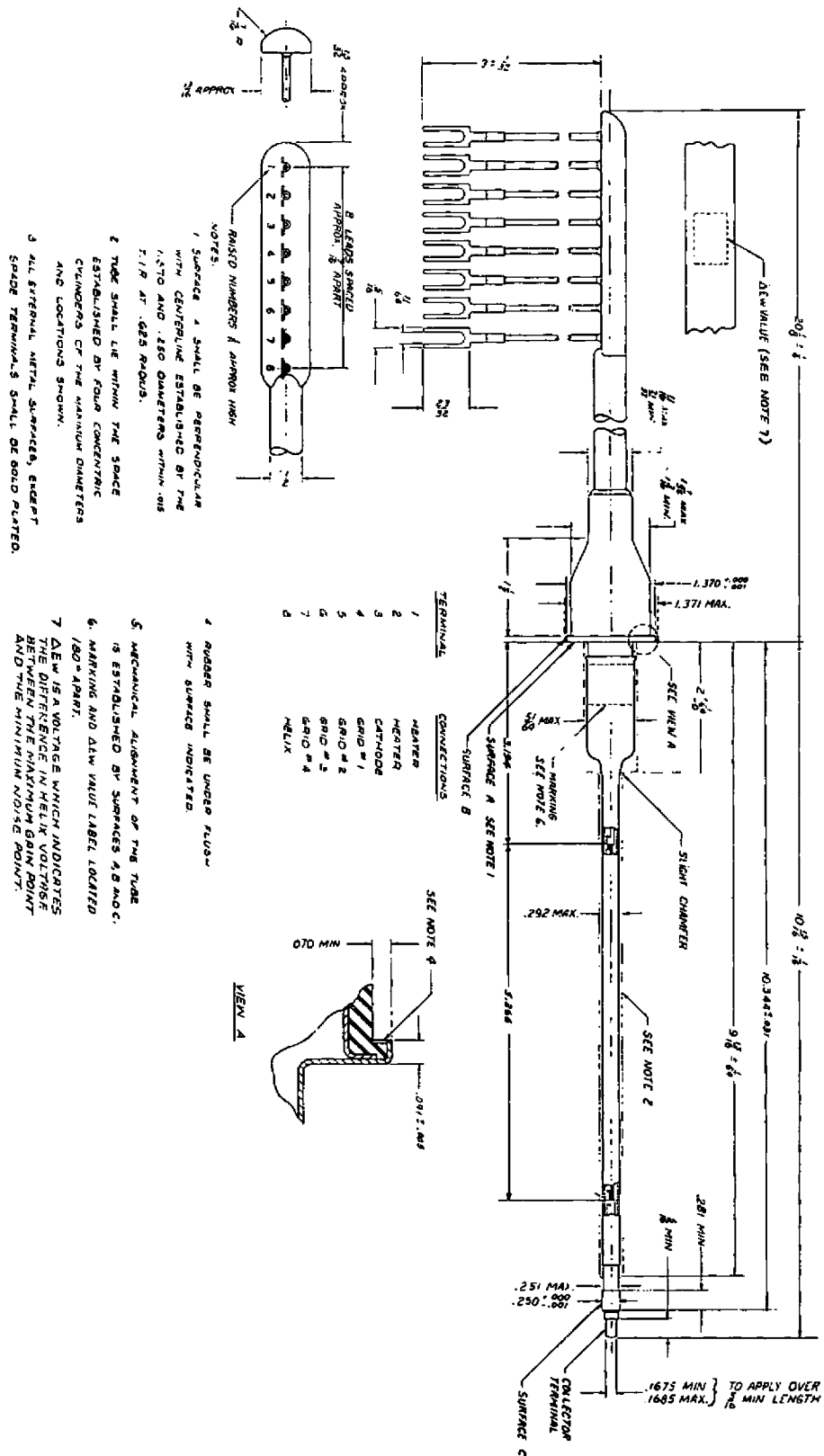
Typical Operation (Note 1)

Center Frequency	Between 3100 & 3500 Mc
Helix Voltage	572 Vdc
Helix Current	10^{-4} mAdc
Collector Voltage	725 Vdc
Collector Current	0.5 mAdc
Grid #1 Voltage	-20 Vdc
" #1 Current	$< 10^{-4}$ mAdc
" #2 Voltage	+46 Vdc
" #2 Current	$< 10^{-4}$ mAdc
" #3 Voltage	+76 Vdc
" #3 Current	$< 10^{-4}$ mAdc
" #4 Voltage	+285 Vdc
" #4 Current	$< 10^{-4}$ mAdc
Power Output, Saturated	2 milliwatts
Gain	18 db
Noise Figure, AM	5.9 db

Note 1: Reference point for d-c voltages is the cathode.

Note 2: A permanent magnet with plug-in matching device is available.

TYPE DESIGNATION REGISTRATION



WESTERN ELECTRIC 6891 ELECTRON TUBE

TYPE DESIGNATION REGISTRATION

JUL 7 1958

Reservation No.: 6891
Reservation Date: April 12, 1956

Manufacturers Designation: M-1958
Data Bureau Designation: 6891

DESCRIPTION

The 6891 traveling wave tube employs a helix-type wave propagating structure. The tube is used for low-level gain in the 8500 to 9600 megacycles frequency range. The power output is approximately +17 dbm. The input and output circuits employ matching waveguides. A uniform axial magnetic field is provided by a permanent magnet which is an integral part of the tube.

ELECTRICAL RATINGS, ABSOLUTE VALUES

Heater Voltage	5.5	volts
Heater Current	0.53	ampere
Maximum Collector Voltage	1500	volts
Maximum Helix Voltage	1500	volts
Maximum Anode Voltage	1500	volts
Maximum Beam Forming Electrode Voltage:		
Negative Value	100	volts
Positive Value	0	volts
Maximum Collector Current	5	milliamperes
Maximum Helix Current	0.6	milliamperes
Maximum Anode Current	0.1	milliampere
Maximum Beam Forming Current	10	microamperes
Maximum Power Dissipation	7.5	watts

MECHANICAL DATA

Dimensions	See outline drawing
Type of Cathode	Oxide Impregnated Unipotential
Mounting Position	Any
Weight (including magnet)	6-3/4 pounds
Type of Cooling	Convection

Continued on Page 2

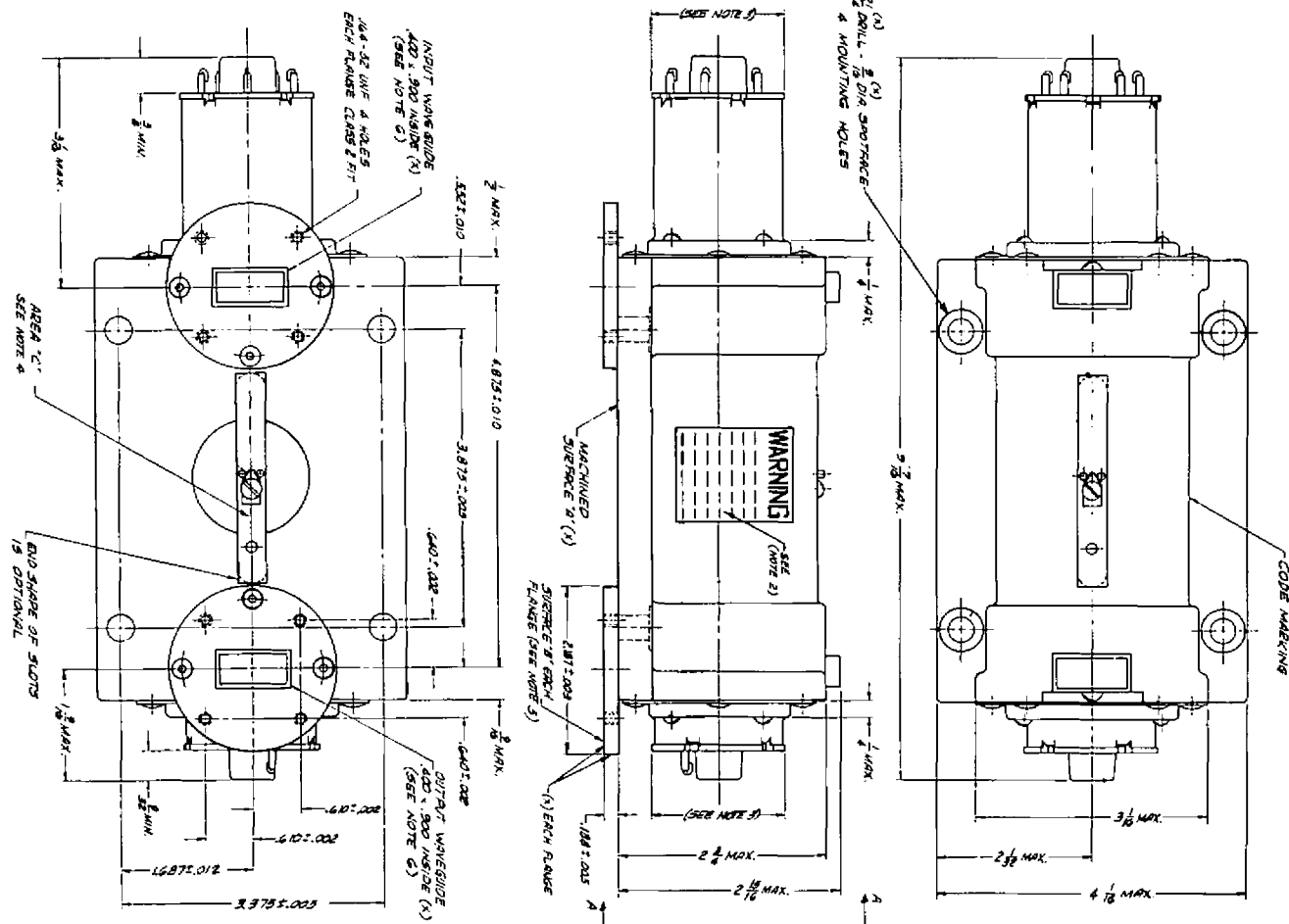
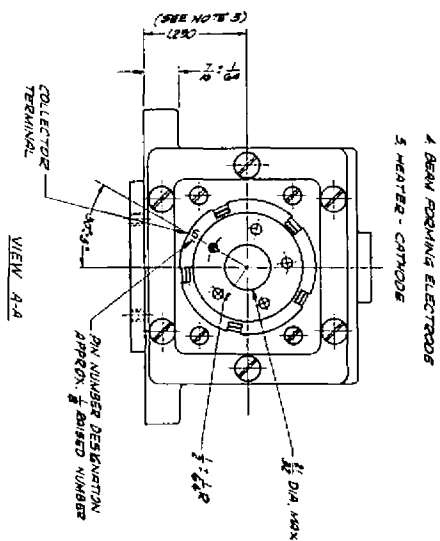
WESTERN ELECTRIC 6891 ELECTRON TUBETYPE DESIGNATION REGISTRATIONTYPICAL OPERATION

Frequency Band	8500-9600 megacycles
Collector Voltage	1200 volts
Collector Current	4 milliamperes
Helix Voltage	1180 volts
Helix Current	0.24 milliampere
Anode Voltage	1450 volts
Anode Current	3 microamperes
Power Output	20 dbm
Gain	44 db
Noise Figure	21 db
Magnetic Field	500 gauss

Note: Manufacture of this type has been discontinued by Western Electric Company.
This sheet is for information only and does not imply continuing availability of the device.

TYPE DESIGNATION REGISTRATION

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WESTERN ELECTRIC 7116 ELECTRON TUBE
TYPE DESIGNATION REGISTRATION

Reservation Date: 10-2-57

Manufacturers Designation: 1958
JEDEC Designation: 7116

General Characteristics

The 7116 traveling wave tube employs a helix-type wave propagating structure. The tube is used for low-level gain in the 8500 to 9600 megacycles per second frequency range. The power output is approximately +20 dbm. The input and output circuits employ x-band waveguides. A uniform axial magnetic field is provided by a permanent magnet which is an integral part of the tube. It has been specifically designed as a light-weight package for use in a high vibrational environment.

Electrical Ratings, Absolute Values (Note 1)

Heater Voltage	3.5 ± 5%	Vac
Heater Current	0.86	Aac
Maximum Heater-Cathode Voltage	0	Vdc
Maximum Helix Voltage	1500	Vdc
Maximum Helix Current	0.6	mAdc
Maximum Collector Voltage	1500	Vdc
Maximum Collector Current	0.5	mAdc
Maximum Collector Dissipation	7.5	watt
Maximum Grid #1 Voltage		
Negative Value	100	Vdc
Positive Value	0	Vdc
Maximum Grid #1 Current	10	μAdc
Maximum Grid #2 Voltage	1600	Vdc
Maximum Grid #2 Current	200	μAdc
Maximum Cathode Voltage to Ground	{ -100 +0	Vdc

Electrical Information

Maximum Frequency	9600	Mc
Minimum Frequency	8500	Mc
Minimum Cold Transmission Loss	70	db

WESTERN ELECTRIC 7116 ELECTRON TUBETYPE DESIGNATION REGISTRATIONMechanical Information

Type of Cathode	Oxide, unipotential
Base	Special
Mounting Position	Any
Weight	7 pounds
Type of Cooling	Convection
Maximum Ambient Temperature	85°C

Typical Operating Conditions and Characteristics (Note 1)

Center Frequency	9000	9000	Mc
Helix Voltage	1130	1130	Vdc
Collector Voltage	1130	1130	Vdc
Grid #1 Voltage (Note 3)	0	-10	Vdc
Collector Current	4.2	2.6	mAdc
Grid #1 Current	0.7	0.9	μAdc
Grid #2 Voltage	1440	1440	Vdc
Grid #2 Current	16	13	μAdc
Helix Current	0.10	0.13	mAdc
Cathode Current	4.3	2.7	mAdc
Gain (Note 2)	43	31	db
Power Output, Saturated	+22	-	dbm
Noise Figure, AM	20	-	db
Vibrational Environment	20G at 5 to 2000 cycles		
Input Match	1.4	1.4	VSWR
Output Match	1.6	1.6	VSWR

Note 1: Reference point for d-c voltages is the cathode.

Note 2: Short circuit stable under all conditions.

Note 3: Typical operating conditions for two values of grid #1 voltage are shown.

[illegible]

WESTERN ELECTRIC 7208 ELECTRON TUBE

TYPE DESIGNATION REGISTRATION

Manufacturer's Designation:
JEDEC Designation: 7208
Manufacturer: Western Electric Company

GENERAL CHARACTERISTICS

The 7208 is a pulsed magnetron oscillator tube which operates at a tunable frequency of 15800 to 17200 Mc. The power output is approximately 100 kilowatts and the tube is forced air cooled. The tube uses an integral magnet.

GENERAL ELECTRICAL DATA

Pre-heat Heater Voltage.	12 $\pm$ 5% volts
Pre-heat Heater Current at 12.6 Volts.	3.25 $\pm$ 0.25 amperes
Minimum Pre-heat Time.	270 seconds
Heater Cold Resistance	0.4 ohm approximately
Anode-Cathode Capacitance.	14 μ f (nominal)

ABSOLUTE MAXIMUM RATINGS

Heater Voltage	13.9 volts
Heater Current	3.5 amperes
Heater Surge Current	13.6 amperes
Peak Anode Voltage	20 kilovolts
Peak Anode Current	20 amperes
Average Power Input.	350 watts
Duty Cycle	0.001
Pulse Duration	3.3 microseconds
Rate of Rise of Anode Voltage (above 85% point).	120 KV μ s/max.
Output Circuit Pressurization.	15 psia min., 45 psia max.
Maximum Altitude without Pressurization	
Output Circuit.	sea level
Input Terminals	sea level
Body Temperature	150°C
Cathode Stem Temperature	300°C
VSWR (Magnetron Load).	1.5:1 max.

TYPICAL OPERATING RATINGS

Frequency.	15800 to 17200 Mc.
Peak Anode Voltage at 17.0 kmc	17.5 $\pm$ 1.5 kv
Pulling Figure (VSWR 1.5/1).	6 Mc.
Pushing Factor	- Mc/a
Magnetic Field for External Magnet	-

TYPICAL OPERATING RATINGS (Continued)

Current Pulse Duration	Duty Factor	Peak Anode Current	Stability	Peak Power Output	Voltage Pulse Rate-of-Rise	RF Band Width at 1/4 po pts.	Heater Voltage
μsec		Amperes	% Missing Pulses	Kilo-watts	KV per μsec (above 85 % point)	(state VSWR & phase of load) Mc	Volts $\pm 5\%$
1/4	0.0007	17	1% max.	100	100 KV/ μs	$\sigma' = 1.5:1^*$ 4.5 Mc	8.8
3	0.001	17	1% max.	100	100 KV/ μs	0.6 Mc * = Worst Phase)	7.6

GENERAL MECHANICAL CHARACTERISTICS

Mounting Position. any
 Mounting Support See 4 hole
 Mounting Plate in
 outline drawing
 Weight 14 lbs. Max.

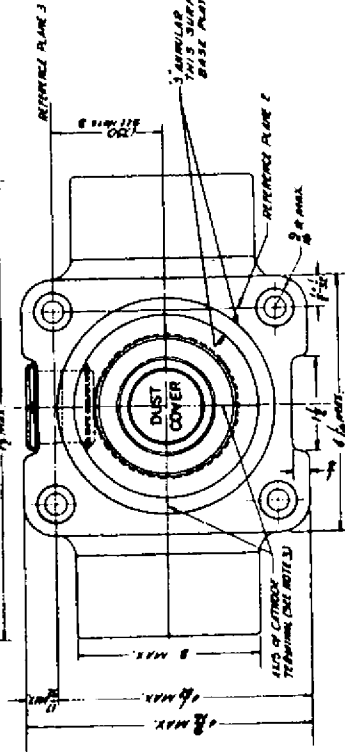
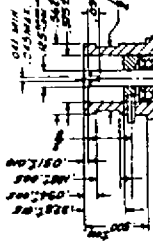
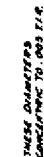
Coupling between Tube and Load

The tube is coupled to RG 91/U waveguide by means of an UG419/U cover flange or a modified UG541/U (Clearance holes instead of tapped 6-32 holes) choke flange.

Cooling Data

To limit rise in body temperature to 100°C for a dissipation of 200 watts - 10 cfm

Recommended cathode stem temperature 225°C $\pm$ 25°C



1. THE FREQUENCY INCREASED WHEN DRIVE SHAFT IS DRIVEN IN DIRECTION INDICATED BY ARROW.
2. THE TUNING MECHANISM COMPONENTS REMAINING OVER THE ENTIRE MECHANICAL RANGE WHEN SUBJECTED TO A DYNAMIC TUNING OF 10 DEGREES MAY BE USED FOR THE DRIVE SHAFT AS DRIVEN MECHANICAL RANGE.
3. THE AXIAL AND RADIAL FORCE APPLIED TO THE COILING SHALL NOT EXCEED ONE POUND THE BEARS MUST BE SHIRT SIZED, NOT TIGHTER ONE AROUND THE BEARS, MUST BE FREE FROM COMPRESSION PLANT AND OTHER IMPERFECTIONS.
4. THE AXIS OF THE CATHODE TERMINAL IS WITHIN A TOLERANCE OF $\frac{1}{16}$ OF SPECIFIED LOCATION. (NOTE 4 AND 5)
5. THE LIMITS OF LOCATION OF THE DRIVE SHAFT OUTPUT AND CATHODE TERMINAL INCLUDE ANGULAR AS WELL AS LATERAL DEVIATIONS.
6. NO CLAMPING ON THIS DIAMETER.
7. THE HEATED TERMINAL IS CONCENTRIC WITH THE CATHODE TERMINAL WITHIN .002.
8. WELDING MAINTAIN MINIMUM CLEARANCE OF 2 INCHES BETWEEN THIS PLATES, ETC.)
9. THE OPENING OF THE WAVE GUIDE AND THE INPUT SHALL BE ENCLOSED BY A DUST COVER WHEN IN USE IS NOT IN USE.
10. ALL METAL SURFACES COVERED BY GRAY FINISH EXCEPT THOSE MARKED "S".
11. PROTECTIVE COVER OVER TUNING HEAD MUST BE REMOVED BEFORE TUBE IS USED.
12. THE SEAL FORMED BY CLAMPING THE WAVE GUIDE OUTPUT TUNING HEAD TO THE COILING OF THE DRIVE SHAFT USING GASKET, SIN METAL, RUBBER PART NO. 80004, IS MECHANICALLY TIGHT FOR TUBE WITH THE SPECIFIED AIR PRESSURE APPLIED INTERNALLY TO THE WAVE GUIDE.
13. THE SEAL FORMED BY CLAMPING THE DRIVE SHAFT WITH THE TUNING PLATE CATHODE OF AN AMPLIFIER USING GASKET IS MECHANICALLY TIGHT FOR TUBE WITH THE SPECIFIED AIR PRESSURE APPLIED INTERNALLY TO THE DRIVE SHAFT.
14. THE ENTIRE TUBE MUST BE REMOVED FROM THE DRIVE SHAFT FOR A MAX. OF 50 IMPACTS.
15. TUBE IS PROVIDED WITH INTERNAL STOP FOR IMPACT CAUSED BY UNDESIRABLE IMPACTS DURING OPERATION.
16. THE INNER LAMINATIONS OF THE COILING FINE ARE PAINTED, INSULATING THERE MUST BE A SLIGHT GROUND OF ENAMEL.

WESTERN ELECTRIC 7208A ELECTRON TUBE

TYPE DESIGNATION REGISTRATION

September 20, 1960

Manufacturer's Designation:
JEDEC Designation: 7208A
Manufacturer: Western Electric Company

GENERAL CHARACTERISTICS

The 7208A is a pulsed magnetron oscillator tube which operates at a tunable frequency of 15500 to 17500 Mc. The peak power output is approximately 125 kilowatts and the tube is forced-air cooled. The tube uses an integral magnet.

GENERAL ELECTRICAL DATA

Pre-heat Heater Voltage.	12.6 $\pm$ 5% volts
Pre-heat Heater Current at 12.6 Volts.	3.25 $\pm$ 0.25 amperes
Minimum Pre-heat Time.	270 seconds
Heater Cold Resistance	0.4 ohm (approximately)
Anode-Cathode Capacitance	14 μ f (approximately)

ABSOLUTE MAXIMUM RATINGS

Heater Voltage	13.0 volts
Heater Current	3.5 amperes
Heater Surge Current	13.6 amperes
Peak Anode Current	20 amperes
Peak Anode Voltage	20 kilovolts
Average Power Input.	350 watts
Duty Cycle	0.001
Pulse Duration	3.3 microseconds
Rate of Rise of Anode Voltage (above 50% point). . .	120 KV/ μ sec
Output Circuit Pressurization.	15 psia min., 45 psia max.
Maximum Altitude without Pressurization	
Output Circuit.	sea level
Input Terminals	sea level
Body Temperature	150°C
Cathode Stem Temperature	300°C
VSWR (Magnetron Load)	1.5:1 max.

TYPICAL OPERATING RATINGS

Frequency.	15500 to 17500 Mc.
Peak Anode Voltage at 17.5 kmc	17.5 $\pm$ 1.5 kv - 1.0 kv
Pulling Figure (VSWR 1.5/1).	6 Mc.
Pushing Factor	-Mc/a

TYPICAL OPERATING RATINGS (Continued)

Current Pulse Duration	Duty Factor	Peak Anode Current	Stability	Peak Power Output	Voltage Pulse Rate-of-Rise	RF Band Width at 1/4 po pts.	Heater Voltage
μsec		Amperes	% Missing Pulses	Kilo-watts	KV per μsec (above 50 % point)	$\sigma' = 1.5:1$ worst phase K: Mc	Volts $\pm 5\%$
0.25	0.0007	19	1% max.	125 min.	100	4.5 Mc	8.5
3	0.001	19	1% max.	125 min.	100	0.6 Mc	6.8

GENERAL MECHANICAL CHARACTERISTICS

Mounting Position. any
 Mounting Support See 4 hole
 Mounting Plate in
 outline drawing
 Weight 14 lbs. Max.

Coupling between Tube and Load:

Waveguide (RG91/U) per outline drawing. The mating flange may be UG419/U cover flange or a modified (clearance holes instead of tapped 6-32) UG541/U choke flange.

Cooling Data

To limit rise in body temperature to 100°C for a dissipation 200 watts - 10 cfm.

Recommended cathode stem temperature 225°C $\pm$ 25°C.

TYPE DESIGNATION REGISTRATION

from JEDEC release #3260, May 8, 1961

TYPICAL OPERATING VALUES

Frequency 15500 to 17500 Mc
 Peak Anode Voltage at 17.5 kmc. 17.5 kv
 Pulling Figure (VSWR 1.5/1) 6 Mc

Current Pulse Duration	Duty Factor	Peak Anode Current	Stability	Peak Power Output	Voltage Pulse Rate-of-Rise	RF Band width at 1/4 po pts.	Heater Voltage
μsec		Amperes	% Missing Pulses	Kilo-watts	KV per μsec (above 50 % point)	6' = 1.5:1 worst phase Mc	Volts±5%
0.25	0.0007	17	0.01%	105	100	4.5 Mc	8.8
0.25	0.0007	19	0.01%	130	100	4.5 Mc	8.6
3	0.001	19	0.01%	130	100	0.6 Mc	6.8

GENERAL MECHANICAL CHARACTERISTICS

Mounting Position. any
 Mounting Support See 4 hole
 Mounting Plate in outline drawing
 Weight 14 lbs. Max.

Coupling between Tube and Load:

Waveguide (RG91/U) per outline drawing. The mating flange may be UG419/U cover flange or a modified (clearance holes instead of tapped 6-32) UG541/U choke flange.

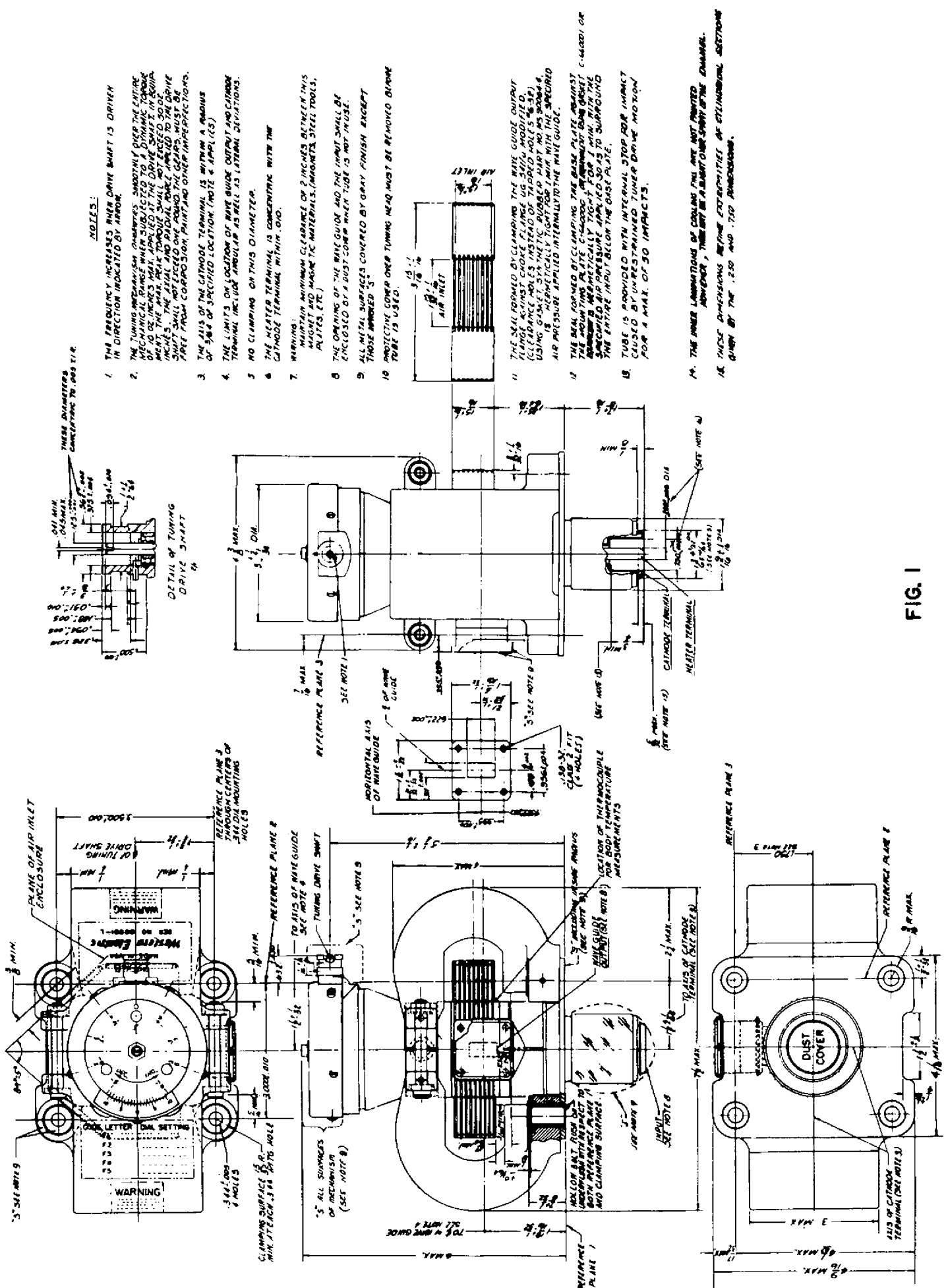
Cooling Data

To limit rise in body temperature to 100°C for a dissipation of 200 watts - 10 cfm, min.

Recommended cathode stem temperature 225°C ± 25°C.

Pressurization of Output Circuit

The need for pressurization depends on the particular components used in the output circuit and on the pulse width. In general, it is recommended that the output circuit be pressurized for peak anode currents greater than 15 amperes.



JETEC TYPE DESIGNATION REGISTRATION FOR PULSED MAGNETRONS

May 2, 1960

Manufacturer's Designation: 4012
JETEC Designation: 7535
Manufacturer: Western Electric Co.

GENERAL CHARACTERISTICS

The 7535 is a pulsed magnetron oscillator tube which operates at a tunable frequency of 8500 to 9600 megacycles. The peak power output is approximately 550 kilowatts and the tube is air cooled. The tube uses an integral magnet.

GENERAL ELECTRICAL DATA

Pre-heat Heater Voltage	20 $\pm$ 5% volts
Pre-heat Heater Current at 20 volts	4.0 $\pm$ 0.2 amp.
Minimum Pre-heat Time	180 sec.
Heater Cold Resistance.	0.5 ohm
Anode-Cathode Capacitance	14 $\pm$ 1.5 μ f

Tuner Readings:

Tuner readings for the following frequencies on oscillation #1 conditions are marked on the body of the tube.

<u>Frequency</u>	<u>Code Letter Designation</u>
8500 $\pm$ 10 Mc.	F1
9000 $\pm$ 10 Mc.	F2
9275 $\pm$ 10 Mc.	F3
9600 $\pm$ 10 Mc.	F4

ABSOLUTE MAXIMUM RATINGS

Heater Voltage.	22 volts
Heater Current.	4.5 amp.
Heater Surge Current.	16 amp.
Peak Anode Voltage.	42 KV
Peak Anode Current.	45 amp.
Average Power Input	950 watts
Duty Cycle.	.0015
Pulse Duration.	3.0 μ sec.
Rate of Rise of Anode Voltage (above 85% point) . . .	325 KV/ μ s
Output Circuit Pressurization	45 PSI (Absolute)
Max. Altitude without Pressurization	
Open Circuit	Sea Level
Input Terminals.	Sea Level
Anode Temperature	
(See outline Drawing - page 3)	125°C
Cathode Stem Temperature	
(See outline Drawing - page 3)	300°C
VSWR (Magnetron Load)	1.5:1

TYPICAL OPERATING RATINGS

Frequency. 8500 to 9600 Mc
 Peak Anode Voltage at 8500 Mc. 33.5 ± 1.0 KV
 Pulling Figure (VSWR 1.5/1). 13 Mc

Current Pulse Duration	Duty Factor	Peak Anode Current	Stability	Peak Power Output	Voltage Pulse Rate-of-Rise	RF Band Width at 1/4 po pts.	Heater (Current)
μsec		Amperes	% Missing Pulses	Kilo-watts (1.05 VSWR Max.)	KV per μsec (above 85 % point)	1.5 VSWR min. at worst phase of load	Amps $\pm 5\%$
0.24	.00031	42.5	2% Max.	550	300	6	2.7
2.5 ± 0.1	.00125	16.0	1% Max.	180	230	0.5	2.2

GENERAL MECHANICAL CHARACTERISTICS

Mounting Position. any
 Mounting Support See Outline Drawing - page 3
 Weight 16 pounds
 Coupling - Load to Tube. RG 51/U Wave guide flange

#2115
2832A

BELL TELEPHONE LABORATORIES

INCORPORATED

555 UNION BOULEVARD
ALLENTOWN, PENNSYLVANIA
HEMLOCK 3-7581

December 23, 1960

MR. G. F. HOHN
E.I.A. Standards Laboratory
32 Green Street
Newark 2, New Jersey

Dear Mr. Hohn:

On June 6, 1960 registration data on the 7535 tube was circulated on release #2832.

We now wish to modify the original data as follows:

Under "Absolute Max. Ratings"

	<u>Was</u>	<u>Proposed</u>	
"Average Power Input"-----	950	600	watts
"Duty Cycle"-----	.0015	.001	

Table under "Typical Operating Ratings", Page 2

The entire last line in the table starting with current pulse duration of 2.5 ± 0.1 usec and ending with 2.2 amps should be deleted from the data.

We are making the request in behalf of the sponsor; Western Electric Co., Laureldale, Pennsylvania.

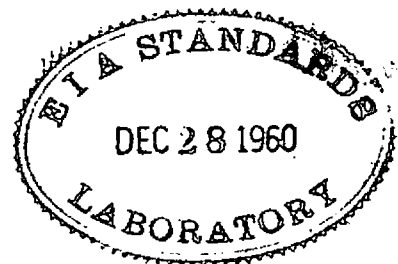
Yours truly,

J. G. Whytock
J. G. WHYTOCK

HL-2833-EHC-EMF

Copy to:
Messrs. M. L. Embree - LD
H. M. Olson

Copy to: EIA Engineering Office, New York City



JEDEC TYPE DESIGNATION REGISTRATION FOR PULSED MAGNETRONS

Manufacturer's Designation: 7589
JEDEC Designation: 7589
Manufacturer: Western Electric Co.

GENERAL CHARACTERISTICS

The 7589 is a pulsed magnetron oscillator tube which operates at a tunable frequency of 8500 to 9600 megacycles. The peak power output is approximately 425 kilowatts and the tube is air cooled. The tube uses an integral magnet and incorporates a high-speed mechanical tuning mechanism.

GENERAL ELECTRICAL DATA

Pre-heat Heater Voltage	20 $\pm$ 0.3 volts
Pre-heat Heater Current at 20 volts	4.0 $\pm$ 0.2 amp.
Minimum Pre-heat Time	180 sec.
Heater Cold Resistance	0.5 ohm approximate
Anode-Cathode Capacitance	14 μ f approximate

ABSOLUTE MAXIMUM RATINGS

Heater Voltage	22 volts
Heater Current	4.5 amp.
Heater Surge Current	16 amp.
Peak Anode Voltage	40 kv
Peak Anode Current	40 amp.
Average Power Input	500 watts
Duty Cycle	.0005
Pulse Duration	3.0 μ sec.
Rate of Rise of Anode Voltage (above 80% point).	325 kv/ μ s
Output Circuit Pressurization	45 PSIA
Max. Altitude without Pressurization	
Output Circuit	Sea Level
Input Terminals	Sea Level
Anode Temperature	150°C
Cathode Stem Temperature	250°C
VSWR (Magnetron Load)	1.3:1

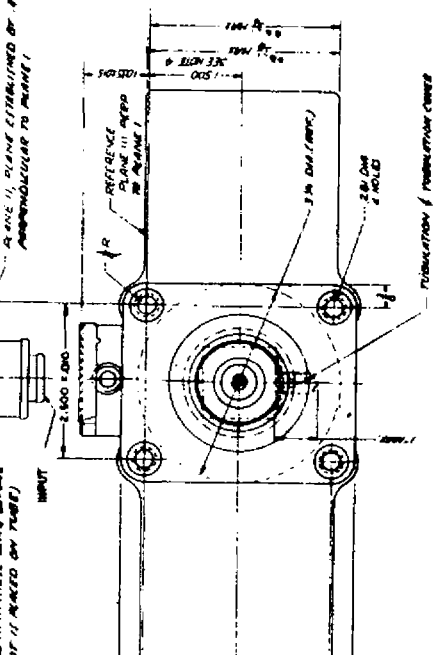
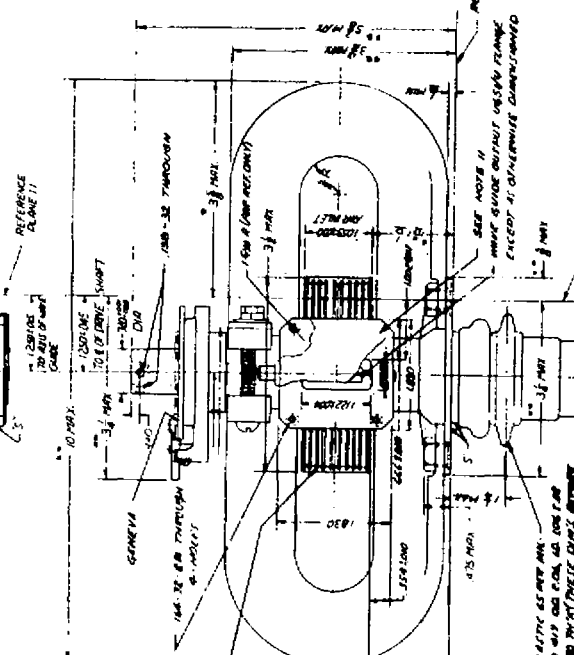
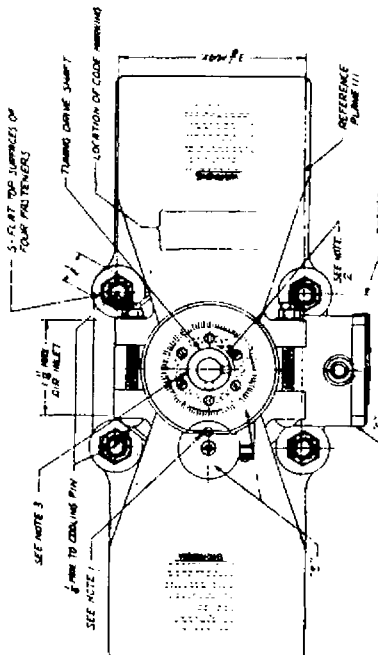
TYPICAL OPERATING RATINGS

Frequency 8500 to 9600 Mc
 Peak Anode Voltage at 8500 Mc 33.5 $\pm$ 1.0 kv
 Pulling Figure (VSWR 1.2:1) 13 Mc

Current Pulse Duration	Duty Factor	Peak Anode Current	Stability	Peak Power Output	Voltage Pulse Rate-of- Rise	RF Band Width at 1/4 po pts.	Heater Current
μ sec		Amperes	% Missing Pulses (1.2 VSWR)	Kilo- watts (1.05 VSWR Max.)	kv per μ sec (above 80 % point)	Mc (1.2 VSWR at worst phase of load)	Amps $\pm$ 5.0%
0.24 $\pm$.02	.00031	32.2	2% Max.	425	290	6	2.9

GENERAL MECHANICAL CHARACTERISTICS

Mounting Position Any
 Mounting Support See four hole mounting plate on
 Outline Drawing - page 3
 Weight 16 pounds approximate
 Coupling - Load to Tube ... RG 51/U waveguide with UG 51/U cover
 flange or modified (clearance holes
 instead of #8-32 tapped holes)
 UG 52A/U choke flange (or the equiva-
 lent aluminum waveguide and flanges).
 Cooling data 10 cfm min. required through cooling
 fins to limit the rise in body
 temperature to a maximum of 100°C
 for a dissipation of 270 watts.
 Recommended input temperature.. The input temperature, measured on
 the cathode terminal immediately
 adjacent to the input glass to
 metal seal, should be 160°C $\pm$ 15°C
 with 0 anode voltage applied to the
 magnetron and with a filament current
 of 3.6 amperes.



NOTES:

1. THE NUMBER ON THE GENERA INDICATES THE VALUE IN THE GENERA CODE INDICATES THE VALUE IN THE GENERA CODE.
2. THE FREQUENCY INCREASES WHEN THE GENERA IS DRIVEN IN THE DIRECTION INDICATED BY THE ARROW IN THE GENERA.
3. THE TUNING MECHANISM SHALL BE SUBJECT TO TUNING OF 10 INCHES QUARTER WAVE LENGTH AT THE TUNING DRIVE SHAFT.
4. THE AXIS OF THE HEATER TERMINAL SHALL BE WITHIN A RADIUS OF 0.001 INCHES OF CONCENTRIC WITH THE AXIS WHEN IT IS ADJUSTED TO THE 2.500 INCHES AND THE AXIS 1 AND CENTERED WITH RESPECT TO THE 2.500 INCHES AND THE 3.000 INCHES.
5. WITH A PRECISION OF 0.001 INCHES APPLIED AT THE HEATER GUIDE OUTPUT, THE HEATER TERMINAL SHALL BE NOT EXCEED 0.1 CUBIC INCHES PER MINUTE.
6. THE HEATER TERMINAL (1.00 DIA.) SHALL BE CONCENTRIC WITH THE CATHODE TERMINAL (1.00 DIA.) WITHIN 0.001 INCHES.
7. HEATING
8. THE HEATER TERMINAL (1.00 DIA.) SHALL BE CONCENTRIC WITH THE CATHODE TERMINAL (1.00 DIA.) WITHIN 0.001 INCHES.
9. ALL METAL SURFACES COVERED BY GRAY PAINT, EXCEPT THOSE MARKED 3 WITHIN 1.00 INCHES OF THE 3.00 DIA. SHALL BE PAINTED WITHIN 1.00 INCHES OF THE 3.00 DIA.
10. DIMENSIONS WITH A SINGLE ATTEMPT (N) DENOTES DESIGN WITH DIMENSIONAL WITH A DOUBLE ATTEMPT (N+1) DENOTES QUALIFICATION MATERIAL.
11. THE DRAWING OF THE HEATER GUIDE SHALL BE ENCLOSED BY A BOLT CONE!

1.5 INCHES GOLD PLATED ON SURFACE OF HEATER TERMINAL CONNECTION

REFERENCE PLANE (SEE NOTE 9)

PLANE II, PLANE ESTABLISHED BY THE HEATER TERMINAL TO HEATER 1

CATHODE TERMINAL
HEATER TERMINAL

PLACEMENT OF THERMISTOR CABLE

JEDEC TYPE DESIGNATION REGISTRATION FOR PULSED MAGNETRONS

Manufacturer's Designation: 7950
JEDEC Designation: 7950
Manufacturer: Western Electric Co.

GENERAL CHARACTERISTICS

The 7950 is a pulsed magnetron oscillator tube which operates at a tunable frequency of 8500 to 9600 megacycles. The peak power output is approximately 265 kilowatts and the tube is air cooled. The tube uses an integral magnet.

GENERAL ELECTRICAL DATA

Pre-heat Heater Voltage 20 $\pm$ 0.3 volts
Pre-heat Heater Current at 20 volts . . . 4.0 $\pm$ 0.2 amp.
Minimum Pre-heat Time 180 sec.
Heater Cold Resistance 0.5 ohm approximate
Anode-Cathode Capacitance 14 μ f approximate

Tuner Readings:

Tuner readings for the following frequencies are marked on the body of the tube.

<u>Frequency</u>	<u>Code Letter Designation</u>
8500 $\pm$ 10 Mc.	F1
9000 $\pm$ 10 Mc.	F2
9275 $\pm$ 10 Mc.	F3
9600 $\pm$ 10 Mc.	F4

ABSOLUTE MAXIMUM RATINGS

Heater Voltage 22 volts
Heater Current 4.5 amp.
Heater Surge Current 16 amp.
Peak Anode Voltage 40 kv.
Peak Anode Current 30 amp.
Average Power Input 800 watts
Duty Cycle 0015
Pulse Duration 3.0 μ sec.
Rate of Rise of Anode Voltage (above 80% point)... 290 kv/ μ s
Output Circuit Pressurization 45 PSIA
Max. Altitude without Pressurization
 Output Circuit Sea Level
 Input Terminals Sea Level
Anode Temperature 150°C
Cathode Stem Temperature 250°C
VSWR (Magnetron Load) 1.5:1

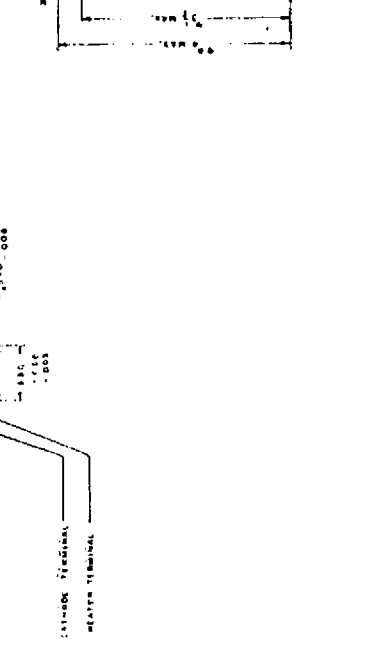
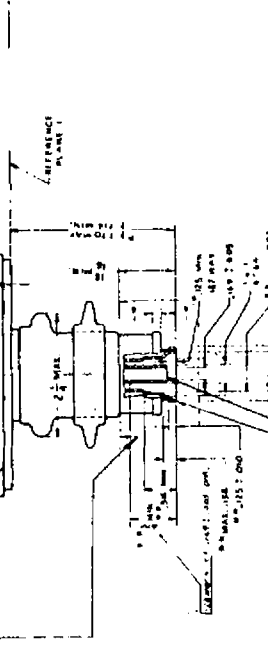
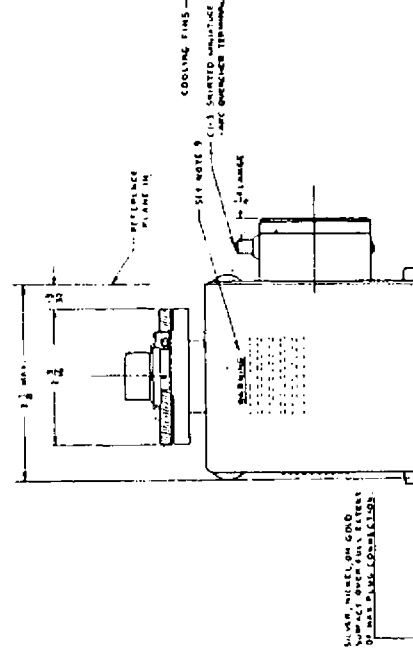
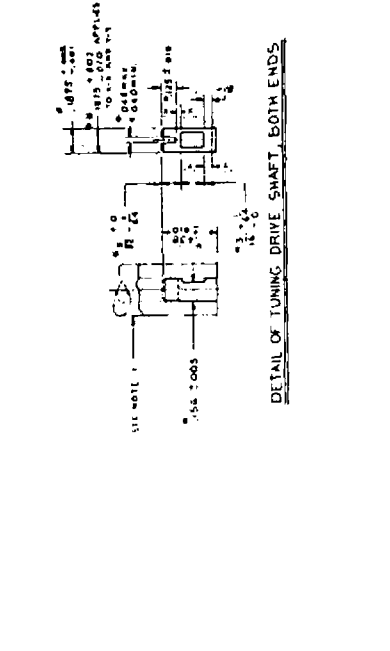
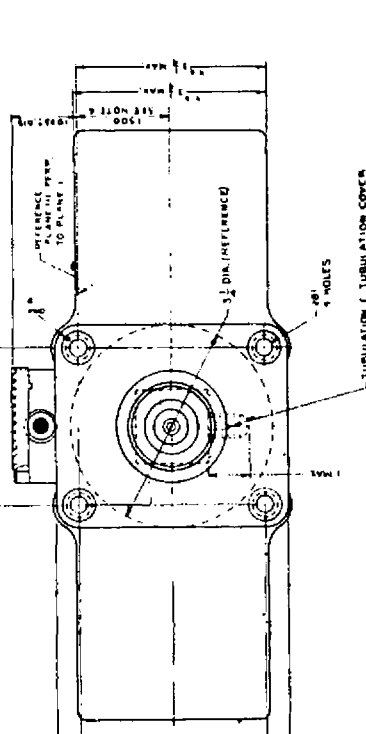
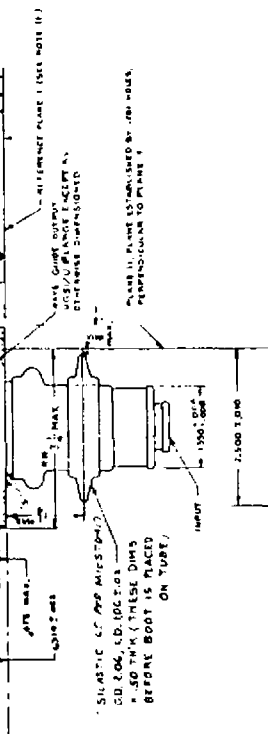
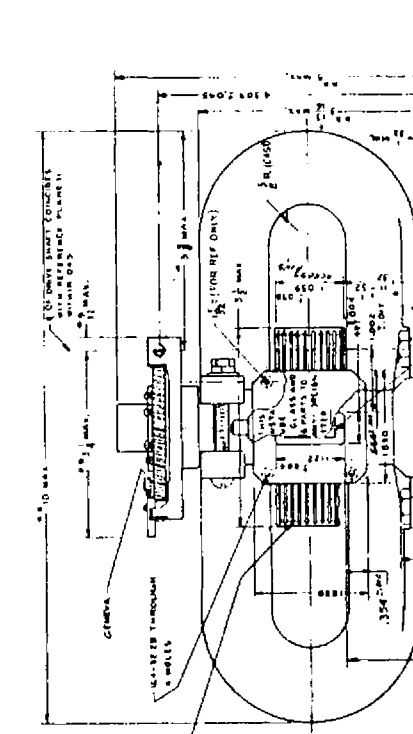
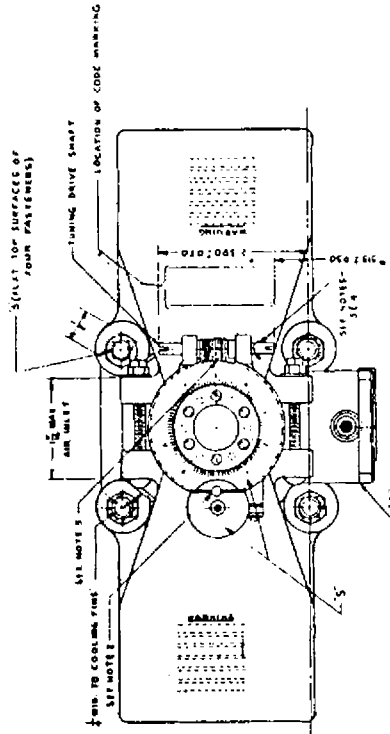
TYPICAL OPERATING RATINGS

Frequency 8500 to 9600 Mc
 Peak Anode Voltage at 8500 Mc 33.0 $\pm$ 1.0 kv
 Pulling Figure (VSWR 1.5/1) 16 Mc

Current Pulse Duration	Duty Factor	Peak Anode Current	Stability	Peak Power Output	Voltage Pulse Rate-of Rise	RF Band Width at 1/4 po pts.	Heater Current
μ sec		Amperes	% Missing Pulses	Kilo- watts (1.05 VSWR Max.)	kv per μ sec (above 80 % point)	(1.5VSWR at worst phase of load) Mc	Amps $\pm$ 5.0%
0.24 $\pm$ 0.02	.000125	24.0	1% Max.	265	270	6	3.6
2.5 $\pm$ 0.1	.00125	16.0	1% Max.	195	200	0.7	2.0

GENERAL MECHANICAL CHARACTERISTICS

Mounting Position any
 Mounting Support See four hole mounting plate
 on Outline Drawing - page 3
 Weight 16 pounds approximate
 Coupling - Load to Tube RG 51/U waveguide with
 UG 51/U cover flange or
 modified (clearance holes
 instead of #8-32 tapped holes)
 UG 52A/U choke flange (or
 the equivalent aluminum wave-
 guide and flanges).
 Cooling data 20 cfm min. required through
 cooling fins to limit the rise
 in body temperature to a maxi-
 mum of 100°C for a dissipation
 of 550 watts.
 Recommended input temperature The input temperature, measured
 on the cathode terminal imme-
 diately adjacent to the input
 glass to metal seal, should be
 160°C $\pm$ 15°C with 0 anode
 voltage applied to the magnetron
 and with a filament current of
 3.6 amperes.



- NOTES:
1. SLEEVE 0.5 I.D. 1 INCH LONG SHALL PASS OVER ENDS OF DRIVE SHAFT AS FAR AS FACE OF WORM BRACKET, BOTH ENDS.
 2. THE NUMBER ON THE GENEVA APPEARING THROUGH THE HOLE IN THE GENEVA COVER INDICATES REVOLUTIONS FROM ZERO TO 5/4.
 3. THE FREQUENCY INCREASES WHEN DRIVE SHAFT IS DRIVEN IN DIRECTION INDICATED BY ARROW SHOWN IN TOP VIEW.
 4. COMPLETE FREQUENCY RANGE IS COVERED IN NOT MORE THAN 188 TURNS OF DRIVE SHAFT.
 5. THE TUNING MECHANISM SHALL OPERATE SMOOTHLY OVER THE ENTIRE MECHANICAL RANGE WHEN SUBJECTED TO TORQUE OF 6 INCH-OUNCES MAX. APPLIED AT THE TUNING DRIVE SHAFT.
 6. THE AXIS OF THE HEATER TERMINAL SHALL BE WITHIN A RADIUS OF 5/64 OF CONCORDANCE WITH THE AXIS WHICH IS PERPENDICULAR TO PLANE 1 AND CENTERED WITH RESPECT TO THE 2500 DIM AND THE 3000 DIM.
 7. WITH A PRESSURE OF 30 PSIA APPLIED AT THE WAVE GUIDE OUTPUT, THE INTERNAL TO EXTERNAL LEAK RATE SHALL NOT EXCEED 51 MICRIC INCHES PER MINUTE.
 8. THE HEATER TERMINAL (0.125 DIA) SHALL BE CONCENTRIC WITH THE CATHODE TERMINAL (5/16 DIA) WITHIN .010.
 9. WARNING: MAINTAIN MINIMUM CLEARANCE OF 2 INCHES BETWEEN THIS MAGNET AND MAGNETIC MATERIALS (MAGNETS, STEEL TOOLS, PLATES, ETC.)
 10. ALL METAL SURFACES COVERED BY GRAY EXCEPT THOSE MARKED S.
 11. PLANE 1 (SURFACE OF BASEPLATE OUTSIDE THE 3/4 DIA) SHALL BE FLAT WITHIN .010 OUTSIDE THE 3/4 DIA.
 12. DIMENSIONS WITH A SINGLE ASTERISK (*) DENOTE DESIGN TEST DIMENSIONS WITH A DOUBLE ASTERISK (**) DENOTE QUALIFICATION APPROVAL.
 13. THE OPENING OF THE WAVE GUIDE SHALL BE ENCLOSED BY A DUST COVER.

7950 MAGNETRON

JEDEC TYPE DESIGNATION
REGISTRATION FOR PULSED MAGNETRON

GENERAL CHARACTERISTICS

The 7976 is a pulsed magnetron oscillator tube which operates at a tunable frequency of 13600 to 15600 Mc. The peak power output is approximately 135 kilowatts and the tube is forced-air cooled. The tube uses an integral magnet. Special vibration resistant design features minimize vibration induced frequency modulation.

GENERAL ELECTRICAL DATA

Pre-heat Heater Voltage	12.6 ± 5% volts
Pre-heat Heater Current at 12.6 Volts	3.25 ± 0.25 amperes
Minimum Pre-heat Time	270 seconds
Heater Cold Resistance (approx.)	0.4 ohm
Anode-Cathode Capacitance (nominal)	14 μμf

RATINGS, ABSOLUTE SYSTEM

Heater Voltage (max)	13.9 volts
Heater Current (max)	3.5 amperes
Heater Surge Current (max)	13.6 amperes
Peak Anode Current (max)	20 amperes
(min)	5 amperes
Peak Anode Voltage (max)	20 kilovolts
Average Power Input (max)	350 watts
Duty Cycle (max)	0.001
Pulse Duration (max)	3.3 microseconds
(min)	0.20 microseconds
Rate of Rise of Anode Voltage	
Above 50% Point. (max)	120 KV/ μ sec
(min)	60 KV/ μ sec
Output and Input Circuit	
Pressurization (max)	45 psia
(min)	15 psia
Maximum Altitude without pressurization:	
Output Circuit	sea level
Input Terminals	sea level
Body Temperature (max)	150°C
Cathode Stem Temperature (max)	300°C
VSWR (Magnetron Load) (max)	1.5:1
Tuner Torque (max)	50 in. oz.

TYPICAL OPERATING VALUES

Frequency	13600 to 15600 Mc
Peak Anode Voltage at 15.6 kmc	17.5 kv
Pulling Figure (VSWR 1.5/1)	6 Mc

Current Pulse Duration	Duty Factor	Peak Anode Current	Stability	Peak Power Output	Voltage Pulse Rate-of-Rise	RF Band width at 1/4 po pts.	Heater Voltage
μsec		Amperes	% Missing Pulses	Kilo-watts	KV per μsec (above 50 % point)	6'-1.5:1 worst phase Mc	Volts $\pm 5\%$
0.25 3	0.0007 0.001	19 19	0.01% 0.01%	135 135	100 100	4.5 Mc 0.45 Mc	8.6 6.8

GENERAL MECHANICAL CHARACTERISTICS

Mounting Position any
 Mounting Support See 4 hole
 Mounting Plate in
 outline drawing
 Weight 14 lbs. Max.

Coupling between Tube and Load:

Waveguide (RG91/U) per outline drawing. The mating flange may be UG419/U cover flange or a modified (clearance holes instead of tapped 6-32) UG541/U choke flange.

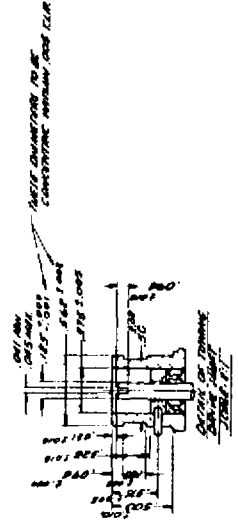
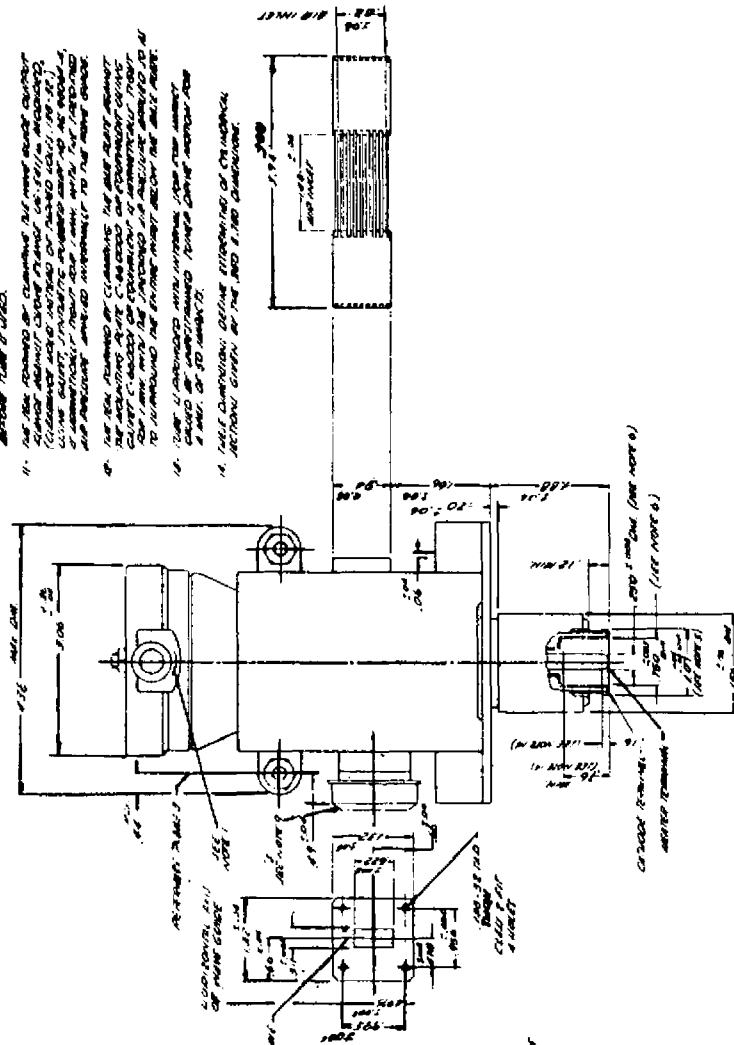
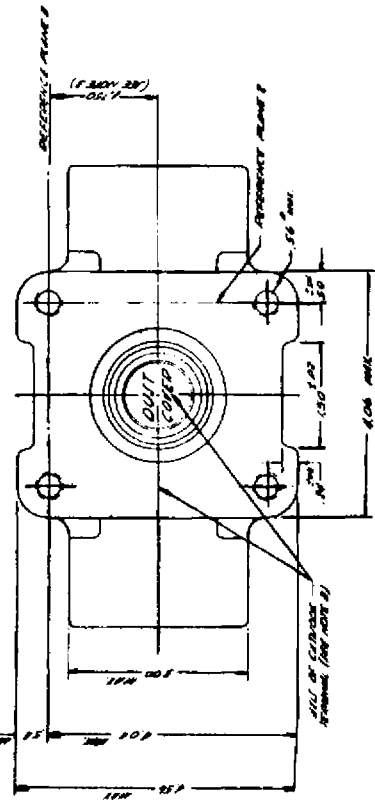
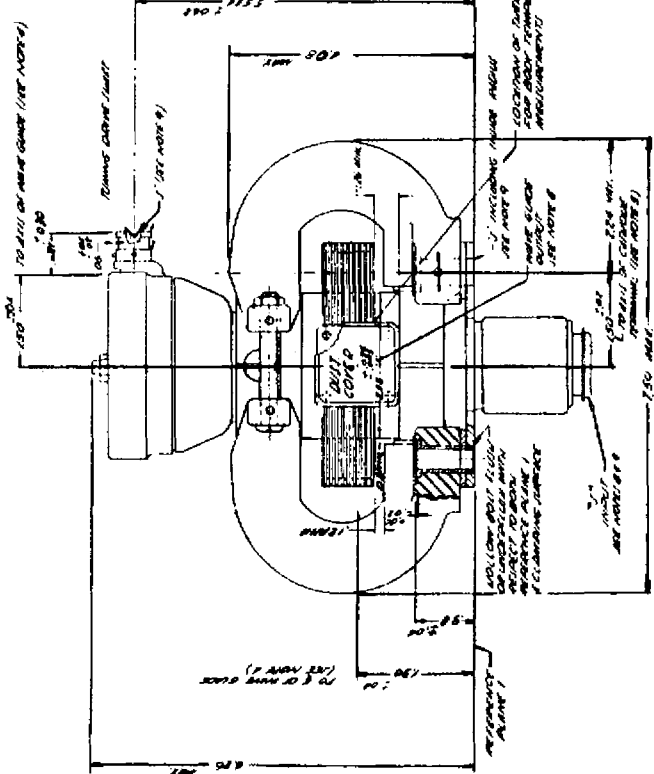
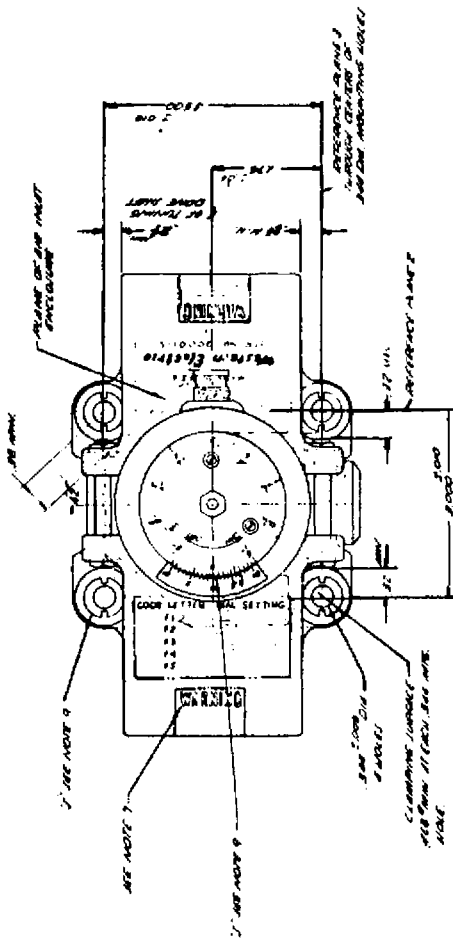
Cooling Data

To limit rise in body temperature to 100°C for a dissipation of 200 watts - 10 cfm, min.

Recommended cathode stem temperature 225°C $\pm$ 25°C.

Pressurization of Output Circuit:

The need for pressurization depends on the particular components used in the output circuit and on the pulse width. In general, it is recommended that the output circuit be pressurized for peak anode currents greater than 15 amperes.



1. THE FOLLOWING INFORMATION IS FOR THE 7976 MAGNETRON. THE FOLLOWING INFORMATION IS FOR THE 7976 MAGNETRON.
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JEDEC TYPE DESIGNATION
REGISTRATION FOR PULSED MAGNETRON

GENERAL CHARACTERISTICS

The 8079 is a pulsed magnetron oscillator tube which operates at a tunable frequency of 17400 to 19500 Mc. The peak power output is approximately 135 kilowatts and the tube is forced-air cooled. The tube uses an integral magnet. Special vibration resistant design features minimized vibration induced frequency modulation.

GENERAL ELECTRICAL DATA

Pre-heat Heater Voltage	12.6 $\pm$ 5% volts
Pre-heat Heater Current at 12.6 Volts	3.25 $\pm$ 0.25 amperes
Minimum Pre-heat Time	270 seconds
Heater Cold Resistance (approx.)	0.4 ohm
Anode-Cathode Capacitance (nominal)	14 μ f

RATINGS, ABSOLUTE SYSTEM

Heater Voltage (max.)	13.9 volts
Heater Current (max.)	3.5 amperes
Heater Surge Current (max.)	13.6 amperes
Peak Anode Current {max.}	20 amperes
{min.}	5 amperes
Peak Anode Voltage (max.)	20 kilovolts
Average Power Input (max.)	350 watts
Duty Cycle (max.)	0.001
Pulse Duration {max.}	3.3 microseconds
{min.}	0.20 microseconds
Rate of Rise of Anode Voltage	
Above 50% Point {max.}	120 KV/ μ sec
{min.}	60 KV/ μ sec
Output and Input Circuit	
Pressurization {max.}	60 psia
{min.}	15 psia
Maximum Altitude without Pressurization:	
Output Circuit	sea level
Input Terminals	sea level
Body Temperature (max.)	150°C
Cathode Stem Temperature (max.)	300°C
VSWR (Magnetron Load) (max.)	1.5:1
Tuner Torque (max.)	50 in. oz.

TYPICAL OPERATING VALUES

Frequency	17400 to 19500 Mc
Peak Anode Voltage at 19.5 kmc	17.5 kv
Pulling Figure (VSWR 1.5:1)	6 Mc

Current Pulse Duration	Duty Factor	Peak Anode Current	Stability	Peak Power Output	Voltage Pulse Rate-of-Rise	RF Band Width at 1/4 po pts.	Heater Voltage
μsec		Amperes	% Missing Pulses	Kilo-watts	KV per μsec (above 50 % point)	$\sigma'=1.5:1$ worst phase Mc	Volts $\pm 5\%$
0.25	0.0007	19	0.01%	135	100	4.5 Mc	8.6
3	0.001	19	0.01%	135	100	0.45 Mc	6.8

GENERAL MECHANICAL CHARACTERISTICS

Mounting Position any
 Mounting Support See 4 hole
 Mounting Plate in
 outline drawing
 Weight 14 lbs. Max.

Coupling between Tube and Load:

Waveguide (WR51) per outline drawing. The mating flange may be WR51 cover flange or a modified (clearance holes instead of tapped 6-32) WR51 choke flange.

Cooling Data

To limit rise in body temperature to 100°C for a dissipation of 200 watts - 10 cfm, min.

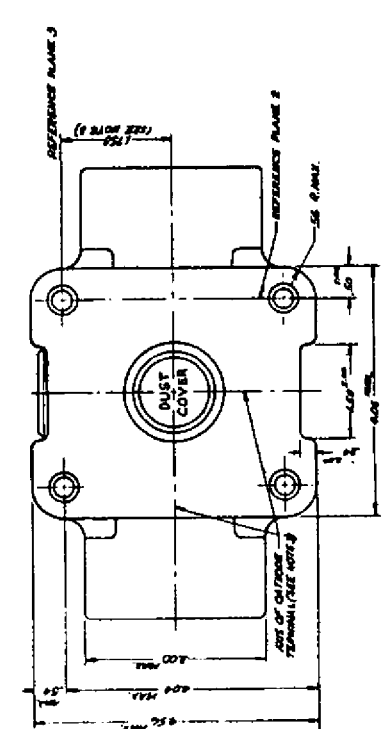
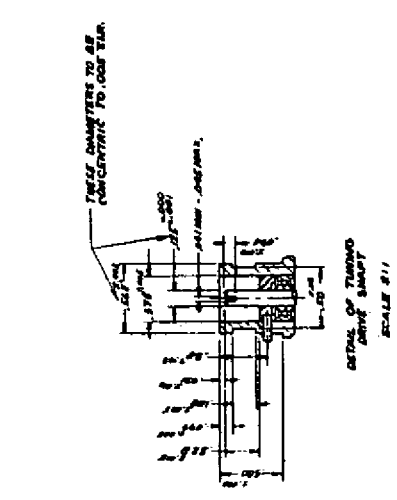
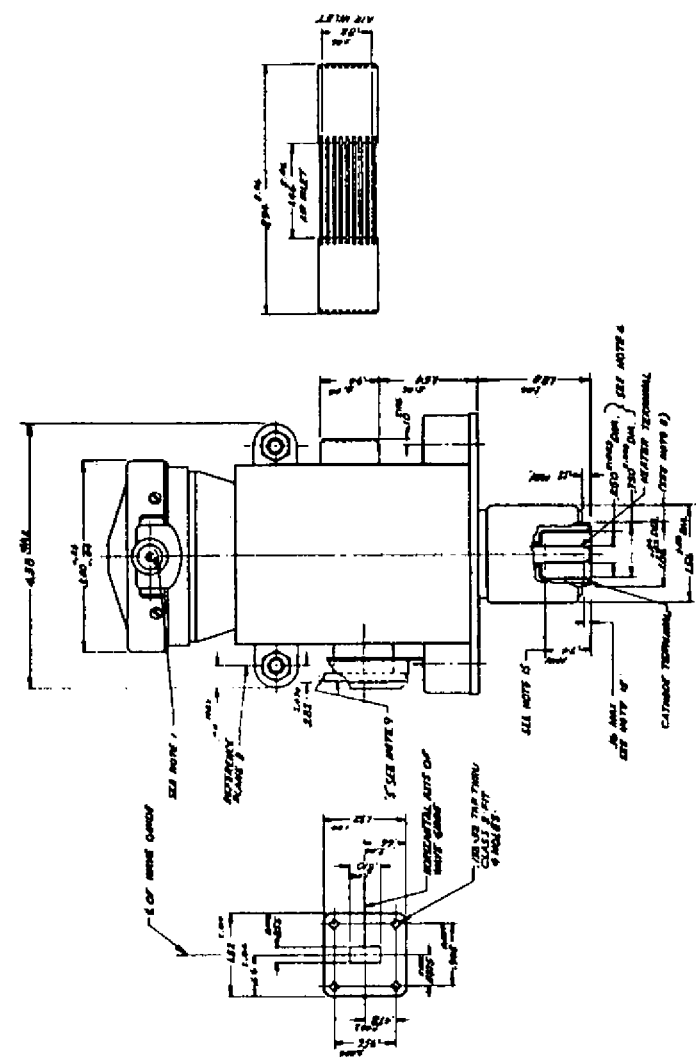
Recommended cathode stem temperature 225°C $\pm$ 25°C.

Pressurization of Output Circuit:

The need for pressurization depends on the particular components used in the output circuit and on the pulse width. In general, it is recommended that the output circuit be pressurized for peak anode currents greater than 15 amperes.

[illegible]

1. THE FREQUENCY INCREASES WHEN THE SWART IS DRIVEN IN A DIRECTION UNOBTAINED BY ARROW.
2. THE TUNING MECHANISM OPERATES SMOOTHLY OVER THE ENTIRE OPERATIONAL RANGE WHEN SUBJECTED TO A DYNAMIC TORQUE OF 10 OZ. INCHES HZ. APPLIED AT THE DRIVE SHAFT IN A CLOCKWISE DIRECTION.
3. THE DRIVE SHAFT IS APPLIED TO THE DRIVE SHAFT AT THE AXIAL AND RADIAL FORCE APPLIED TO THE DRIVE SHAFT SMALL NOT EXCEED ONE POUND. THE GEAR MUST BE FREE FROM CORROSION, PAINT AND OTHER IMPURITIES.
4. THE AXIS OF THE CATHODE TERMINAL IS WITHIN A RADIUS OF 0.4 OF SPECIFIED LOCATION. (NOTE: 6 APPLIES)
5. THE LIMITS ON LOCATION OF WAVE ORDER OUTPUT AND OUTSIDE TERMINAL INCLUDE ANGULAR AS WELL AS LATERAL DEVIATIONS.
6. NO CLAMPING ON THIS DRAWER.
7. THE WAVE ORDER OUTPUT IS CONCENTRIC WITH THE CATHODE TERMINAL WITHIN .001".
8. THE MINIMUM CLEARANCE OF 3 INCHES BETWEEN THE MAGNET AND MAGNETIC MATERIALS (ALUMINUM, STEEL RODS, PLATES, ETC.)
9. THE ORIGIN OF THE WAVE ORDER AND THE UNIT SHALL BE ENCLOSED BY A RUST COVER WHEN TUBE IS NOT IN USE.
10. ALL METAL SURFACES COVERED BY GRAY OR BLACK PRESH EIGHTY THOUS SANDPAPER.



JEDEC TYPE 8123
 SPONSOR Western Electric Co.

JEDEC TYPE DESIGNATION
 REGISTRATION FOR PULSED MAGNETRON

GENERAL CHARACTERISTICS

The 8123 is a pulsed magnetron oscillator tube which operates over the tunable frequency range of 16000 to 17000 Mc. The peak power output is approximately 70 kilowatts and the tube is forced-air cooled. The tube uses an integral magnet. Special vibration resistant design features minimized vibration induced frequency modulation.

GENERAL ELECTRICAL DATA

Pre-heat Heater Voltage	12.6 $\pm$ 5% volts
Pre-heat Heater Current at 12.6 Volts	3.25 $\pm$ 0.25 amperes
Minimum Pre-heat Time	270 seconds
Heater Cold Resistance (approx.)	0.4 ohm
Anode-Cathode Capacitance (nominal)	14 μ f

RATINGS, ABSOLUTE SYSTEM

Heater Voltage {max.}	13.9 volts
Heater Current {max.}	3.5 amperes
Heater Surge Current {max.}	13.6 amperes
Peak Anode Current {max.}	14 amperes
Peak Anode Current {min.}	5 amperes
Peak Anode Voltage {max.}	16 kilovolts
Average Power Input {max.}	225 watts
Duty Cycle {max.}	0.001
Pulse Duration {max.}	3.3 microseconds
Pulse Duration {min.}	0.20 microseconds
Rate of Rise of Anode Voltage	
Above 50% Point {max.}	120 KV/ μ sec
Above 50% Point {min.}	40 KV/ μ sec
Output and Input Circuit	
Pressurization {max.}	45 psia
Pressurization {min.}	15 psia
Maximum Altitude without Pressurization:	
Output Circuit	sea level
Input Terminals	10,000 ft.
Body Temperature {max.}	100°C
Cathode Stem Temperature {max.}	275°C
VSWR (Magnetron Load) {max.}	1.5:1
Tuner Torque {max.}	50 in. oz.

TYPICAL OPERATING VALUES

Frequency	16000 to 17000 Mc
Peak Anode Voltage at 17.0 kmc	15.0 kv
Pulling Figure (VSWR 1.5:1)	6 Mc
Pushing Figure (VSWR 1.5:1)	0.06 Mc/AMP
Atmospheric Frequency Shift	
(sea level to 75,000 ft.)	3 Mc

TYPICAL OPERATING VALUES (CONT'D.)

Duty Factor 0.001
 Peak Anode Current 12 amperes
 Stability (% Missing Pulses) <0.001 %
 Peak Power Output 70 kw
 Heater Voltage $8.8 \pm 5\%$ volts

Current Pulse Duration	Voltage Pulse Rate-of- Rise	RF Band Width at 1/4 po pts.	R.M.S. Jitter		
			F _J	V _J	T _J
μsec	KV per μsec (above 50% point)	σ'=1.5:1 worst phase Mc	kc	db	ns
0.25 2.0	60 60	4.0 .50	- 13	- .02	1.5 -

GENERAL MECHANICAL CHARACTERISTICS

Mounting Position Any
 Mounting Support See 4 hole
 Mounting Plate in
 outline drawing
 Weight 7.94 lbs. Max.

Coupling between Tube and Load:

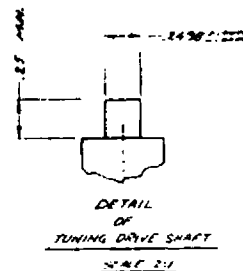
RG 91/U waveguide mates with modified UG 541/U choke flange with clearance holes instead of 6-32 tapped holes.

Cooling Data

To limit rise in body temperature to 50°C for a dissipation of 115 watts - 10 cfm, min.

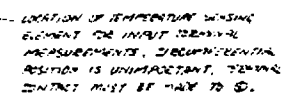
Pressurization of Output Circuit:

The need for pressurization depends on the particular components used in the output circuit and on the pulse width. In general, pressurization above 15 psia should not be necessary.



1. THE TORSIONARY STRESSSES WHEN DRIVE SHAFT IS DRIVEN IN THE DIRECTION INDICATED BY ARROW.
2. THE TUNING MECHANISM OPERATES SMOOTHLY OVER THE ENTIRE MECHANICAL RANGE WHEN SUBJECTED TO A DYNAMIC TORQUE OF 10 QZ. INCHES MAX. APPLIED AT THE DRIVE SHAFT. IN EQUIPMENT THE MAX. KIN TORQUE SHALL NOT EXCEED 50 QZ. INCHES. THE AXIAL AND RADIAL FORCE APPLIED TO THE DRIVE SHAFT SHALL NOT EXCEED ONE POUND. THE GEAR MUST BE FREE FROM COMPRESSION, ABUSE, AND OTHER MISFECTIONS.

1. THE AXIS OF THE CATHODE TERMINAL IS WITHIN A RADIUS OF $3/16$ " OF SPECIFIED LOCATION. (NOTE 4 & 11a) (1)
2. THE LIMITS ON LOCATION IN X-RAY GUIDE INPUT AND OUTPUT TERMINAL MEASURE ANGULARLY AS WELL AS LINEAR EXTENTIONS.
3. NO CHAMFER ON THIS DIAMETER.
4. THE CATHODE TERMINAL IS SYMMETRIC WITH THE CATHODE TERMINAL WITHIN .110".
5. PRECISION: MAINTAIN MINIMUM CLEARANCE OF 2 INCHES BETWEEN THIS MAGNET AND MAGNETIC MATERIALS. (MAGNETS, STEEL TOOLS, PLATES, ETC.)
6. THE OPENING OF THE X-RAY GUIDE AND THE INPUT SHALL BE ENCLOSED BY A DUST COVER WHEN USED IS NOT IN USE.
7. ALL METAL SURFACES COVERED BY GLOSS FINISH EXCEPT THOSE MARKED "S".
8. "S" IS PROVIDED WITH INTERNAL STOP FOR IMPACT SHALL BE STRENGTHENED TOWER DRIVE MATHON FOR 4 MILS. OF (SD) IMPACTS.
9. THESE DIMENSIONS DEFINE EXTREMITIES OF CYLINDRICAL SECTIONS GIVEN BY .350 AND .750 DIMENSIONS.
10. BASE PLATE CAN BE SEPARATED WITH GASKET C-660001 SEPARATED IN ORDER AS SHOWN ON C-660000. WHEN SEPARATED IN THIS MANNER, THE LIFTING RATE SHALL NOT EXCEED 0.1 CM/HR FOR MINUTE AT 45 PSIA.



8/23 MAGNETRON