5876A

High-Mu Triode

GLASS-METAL PENCIL TYPE

FAST WARM-UP TIME **STURDY COAXIAL-ELECTRODE STRUCTURE**

For Use in Cathode-Drive Service at Frequencies up to 3000 Mc. The 5876A is Unilaterally Interchangeable with Type 5876.

GENERAL DATA

Electrical:

Heater, for Unipotential Cathode:		
Voltage (AC or DC)	6.3 ± 10%	volts
Current at 6.3 volts	0.135	amp
Amplification Factor	56	
Transconductance, for dc plate ma. = 18, dc plate volts = 250	6500	μmhos
Direct Interelectrode Capacitances:[a]		
Grid to plate	1.4	μμf
Grid to cathode	2.4	μμf
Plate to cathode	0.035 max.	μμf

Mechanical:

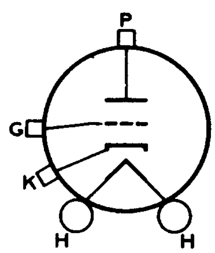
Operating Position . . . . Any

Dimensions and Terminal Connections . . . . See *Dimensional Outline*

Socket for Heater Pins . . Grayhill No.22-3[b], Cinch 54A16325[c], or equivalent

Terminal Connections (See *Dimensional Outline*):

H - Heater
K - Cathode



G - Grid
P - Plate

Thermal:

Plate-Seal Temperature (Measured on plate seal)	175 max.	°C

RF AMPLIFIER — Class A_1

Maximum CCS[d] Ratings, *Absolute-Maximum Values:*

For altitudes up to 100,000 feet and frequencies up to 1700 Mc

DC PLATE VOLTAGE	300 max.	volts
DC GRID VOLTAGE	-100 max.	volts
DC PLATE CURRENT	25 max.	ma
PLATE DISSIPATION[e]	6.25 max.	watts

PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance	0.5 max.	megohm

RF POWER AMPLIFIER AND OSCILLATOR — Class C Telegraphy

Key-down conditions per tube without amplitude modulation[f]

Maximum CCS[d] Ratings, *Absolute-Maximum Values:*

For altitudes up to 100,000 feet and frequencies up to 1700 Mc

DC PLATE VOLTAGE	360 max.	volts
DC GRID VOLTAGE	-100 max.	volts
DC PLATE CURRENT	25 max.	ma
DC GRID CURRENT	8 max.	ma
PLATE INPUT	9 max.	watts
PLATE DISSIPATION[e]	6.25 max.	watts
PEAK HEATER-CATHODE VOLTAGE:		
Heater negative with respect to cathode	90 max.	volts
Heater positive with respect to cathode	90 max.	volts

Typical Operation in Cathode-Drive Circuit:

As oscillator

At frequency of	*500*	*1700*	*3000*	*Mc*
DC Plate-to-Grid Voltage	262	252	252	volts
DC Cathode-to-Grid Voltage[g]	12	2	2	volts
DC Plate Current	23	23	25	ma
DC Grid Current (Approx.)	6	3	4	ma
Useful Power Output (Approx.)	3	0.75	0.1	watts

As rf power amplifier at 500 Mc

DC Plate-to-Grid Voltage	326	volts
DC Cathode-to-Grid Voltage[g]	51	volts
DC Plate Current	23	ma
DC Grid Current (Approx.)	7	ma
Driver Power Output (Approx.)	2	watts
Useful Power Output (Approx.)	5	watts

Maximum Circuit Values:

Grid-Circuit Resistance	0.1 max.	megohm

PLATE-MODULATED RF POWER AMPLIFIER — Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1

Maximum CCS[d] Ratings, *Absolute-Maximum Values:*

For altitudes up to 100,000 feet and frequencies up to 1700 Mc

DC PLATE VOLTAGE	275	max.	volts
DC GRID VOLTAGE	-100	max.	volts
DC PLATE CURRENT	22	max.	ma
DC GRID CURRENT	8	max.	ma
PLATE INPUT	6	max.	watts
PLATE DISSIPATION[e]	4.25	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	90	max.	volts
Heater positive with respect to cathode	90	max.	volts

Maximum Circuit Values:

Grid-Circuit Resistance	0.1	max.	megohm

FREQUENCY MULTIPLIER

Maximum CCS[d] Ratings, *Absolute-Maximum Values:*

For altitudes up to 100,000 feet and frequencies up to 1700 Mc

DC PLATE VOLTAGE	330	max.	volts
DC GRID VOLTAGE	-100	max.	volts
DC PLATE CURRENT	22	max.	ma
DC GRID CURRENT	8	max.	ma
PLATE INPUT	7.5	max.	watts
PLATE DISSIPATION	6.25	max.	watts
PEAK HEATER-CATHODE VOLTAGE:			
Heater negative with respect to cathode	90	max.	volts
Heater positive with respect to cathode	90	max.	volts

Typical CCS Operation in Cathode-Drive Circuit:

	Tripler to 480 Mc	*Doubler to 960 Mc*	
DC Plate-to-Grid Voltage	390	370	volts
DC Cathode-to-Grid Voltage[g]	90	70	volts
DC Plate Current	18	17.3	ma
DC Grid Current (Approx.)	6	7	ma
Driver Power Output (Approx.)	2.1	2	watts
Useful Power Output (Approx.)	2.1	2	watts

Maximum Circuit Values:

Grid-Circuit Resistance	0.1 max.	0.1 max.	megohm

[a] Without external shield.
[b] Grayhill, Inc., 561 Hillgrove Avenue, LaGrange, Illinois.
[c] Cinch Manufacturing Company, 1026 South Homan Avenue, Chicago, Illinois.
[d] Continuous Commercial Service.
[e] In applications where the plate dissipation exceeds 2.5 watts, it is important that a large area of contact be provided between the plate cylinder and the connector to provide adequate heat conduction.
[f] Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115 per cent of the carrier conditions.
[g] Obtained from grid resistor.

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Heater Current	1	0.127	0.143	amp
Direct Interelectrode Capacitances:				
Grid to plate	-	1.2	1.6	μμf
Grid to cathode	-	2.1	2.7	μμf
Plate to cathode	-	-	0.035	μμf
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,2	-	50	μa
Heater positive with respect to cathode	1,2	-	50	μa
Leakage Resistance:				
From grid to plate and cathode connected together	1,3	25	-	megohms
From plate to grid and cathode connected together	1,4	25	-	megohms
Reverse Grid Current	1,5	-	1	μa
Emission Voltage	6	-	10	volts
Amplification Factor	1,7	41	71	
Transconductance	1,7	5150	7850	μmhos
Plate Current (1)	1,7	12.5	23.5	ma
Plate Current (2)	1,8	-	55	μa
Plate Current (3)	1,9	0.5	-	ma
Power Output	1,10	0.285	-	watt

Note 1: With 6.3 volts ac or dc on heater.
Note 2: With 100 volts dc between heater and cathode.
Note 3: With grid 100 volts negative with respect to plate and cathode which are connected together.
Note 4: With plate 300 volts negative with respect to grid and cathode which are connected together.
Note 5: With dc plate voltage of 250 volts, dc grid voltage of -2.5 volts, grid resistor of 0.5 megohm.
Note 6: With dc voltage on grid and plate which are connected together adjusted to produce a cathode current of 30 ma., and with 5.5 volts on heater.
Note 7: With dc plate-supply voltage of 250 volts, cathode resistor of 75 ohms, and cathode bypass capacitor of 1000 μf.
Note 8: With dc plate voltage of 250 volts and dc grid voltage of -12 volts.
Note 9: With dc plate voltage of 250 volts and dc grid voltage of -5 volts.
Note 10: With dc plate voltage of 200 volts, grid resistor adjusted to give a dc plate current of 18 milliamperes in a cavity-type oscillator operating at 1700 ± 15 Mc.

SPECIAL TESTS & PERFORMANCE DATA

Low-Pressure Voltage Breakdown Test:

This test (similar to MIL-E-1D, paragraph 4.9.12.1) is performed on a sample lot of tubes from each production run. Tubes are tested in a chamber at an air pressure equivalent to an altitude of 100,000 feet. Breakdown will not occur when a 60-cycle rms voltage of 500 volts is applied between the plate cylinder and grid flange.

Low-Frequency Vibration Performance:

This test (similar to MIL-E-1D, paragraph 4.9.19.1) is performed on a sample lot of tubes from each production run under the following conditions:

Heater voltage of 6.3 volts, dc plate supply voltage of 250 volts, grid voltage of -2.5 volts, and plate load resistor of 10,000 ohms. The tubes are vibrated in a plane perpendicular to the tube axis at 25 cps at an acceleration of 2.5 g. The rms output voltage across the plate load resistor as a result of vibration of the tube will not exceed 100 millivolts.

High-Frequency Vibration Performance:

This test (similar to MIL-E-1D, paragraph 4.9.19.2) is performed on a sample lot of tubes from each production run. The tube is vibrated perpendicular to its axis, with no voltages applied to the tube. Vibration frequency is 40 to 60 cps and acceleration is 10 g. At the end of this test, tubes will not show temporary or permanent shorts or open circuits and will meet the following limits:

Heater-Cathode Leakage Current. . . . . . 50 max. μa
For conditions shown under *Characteristics Range Values Notes 1,2.*

Low-Frequency Vibration (rms) . . . . . . 100 max. mv
For conditions shown above under *Low-Frequency Vibration Performance.*

Transconductance. . . . . 5150 min. μmhos
For conditions shown under *Characteristics Range Values Notes 1,7.*

Plate Current (2) . . . . 55 max. μa
For conditions shown under *Characteristics Range Values Notes 1,8.*

Shorts and Continuity Test:

This test (similar to MIL-E-1D, paragraph 4.7.3) is performed on all tubes from each production run. Voltage applied between adjacent elements of the tube under test will be between 20 and 70 volts dc or peak ac. Plate and cathode terminals are tied together and connected to the grid terminal through the shorts test equipment. Tubes are tapped with a rubber tapper three times in each of three mutually perpendicular directions. If a short indication is obtained, the tapping cycle is repeated two times for verification. Acceptance criteria is based on the "Resistance vs. Time Duration" curve shown in paragraph 4.7.7 of MIL-I-D, Amendment 5.

Glass-Seal-Fracture Test:

This test is performed on a sample lot of tubes from each production run. Tubes are placed on supports spaced 15/16" ± 1/64" apart with the grid flange centered between these supports. Tubes will withstand gradual application, perpendicular to tube axis, of a force of 30 pounds upon the grid flange without causing fracture of the glass insulation.

Heater Cycling Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.7) is performed on a sample lot of tubes from each production run. With 6.3 volts on heater and no voltage on plate and grid, the heater is cycled three minutes on and three minutes off for at least 2000 cycles. At the end of this test, tubes will not show temporary or permanent shorts or open circuits, and will meet the following limits:

Grid-Plate and Cathode
Leakage Resistance. . . . . 25 min. megohms
For conditions shown under *Characteristics Range Values Notes 1,3*.

Heater-Cathode Leakage Current. . . . . 100 max. μa
For conditions shown under *Characteristics Range Values Notes 1,2*.

1-Hour Stability Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.3.1.a) is performed on a sample lot of tubes from each production run to insure that the tubes have been properly stabilized. Tubes are operated under the following conditions:

Heater voltage of 6.3 volts, plate dissipation of 2 to 2.5 watts. At the end of 1 hour, the change in transconductance value for each tube, referred to its initial transconductance reading, will not exceed 15% of the initial value, for conditions shown under *Characteristics Range Values Notes 1,7*.

50-Hour Survival Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.3.1.b) is performed on a sample lot of tubes from each production run to insure a low percentage of early inoperatives. Life-test conditions are the same as those specified for *1-Hour Stability Life Performance* except that all voltages are cycled at the rate of 110 minutes on and 10 minutes off. At the end of 50 hours, the tubes are required to meet the following limits:

Power Output . . . . 0.2 min. watt
For conditions shown under *Characteristics Range Values Notes 1,10*.

Plate Current (2) . . . . 100 max. μa
For conditions shown under *Characteristics Range Values Notes 1,8.*

Shorts and Continuity Test specified above.

Intermittent Dynamic Life Performance:

This test (similar to MIL-E-1D, paragraph 4.11.3.2) is performed on a sample lot of tubes from each production run to insure high quality of rf performance. Each tube is life-tested in a cavity-type oscillator at 500 ± 15 Mc under the following conditions:

Heater voltage of 6.3 volts, plate supply voltage of 300 volts, cathode resistor is adjusted to give a dc plate current of 25 ma. and value is recorded, plate-circuit load resistance of zero ohms, heater positive with respect to cathode by 100 volts, and plate-seal temperature of 175° C minimum. Heater voltage is cycled at a rate of 110 minutes on and 10 minutes off. At the end of 500 hours, the tube will not show permanent shorts or open circuits and will be criticized for the total number of defects in the sample lot and for the number of tubes failing to meet the following limits:

Power Output. . . . . 0.2 min. watt
For conditions shown under *Characteristics Range Values Notes 1,10.*

Plate Current (2) . . . . 150 max. μa
For conditions shown under *Characteristics Range Values Notes 1,8.*

Shorts and Continuity Test specified above.

OPERATING CONSIDERATIONS

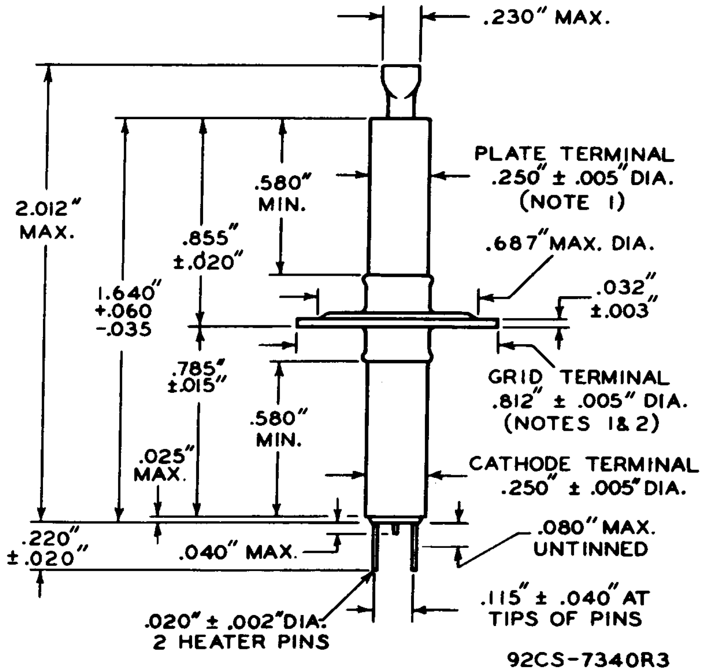
The *mounting* for this type in coaxial-line, parallel-line, or lumped circuits may support the tube securely by any one of the three terminals. Connections to the other two terminals must be made by contacts with flexible leads.

The *mounting* for this type in cavity-type circuits should preferably support the tube by the grid flange which should make firm contact to the cavity surface.

The *heater* pins of this type should not be soldered to circuit elements. The heat of the soldering operation may crack the glass seals of the heater pins and damage the tube.

The *cathode* should preferably be connected to one side of the heater. When, in some circuit designs, the heater is not connected directly to the cathode, precautions must be taken to hold the peak heater-cathode voltage to the maximum values shown in the tabulated data.

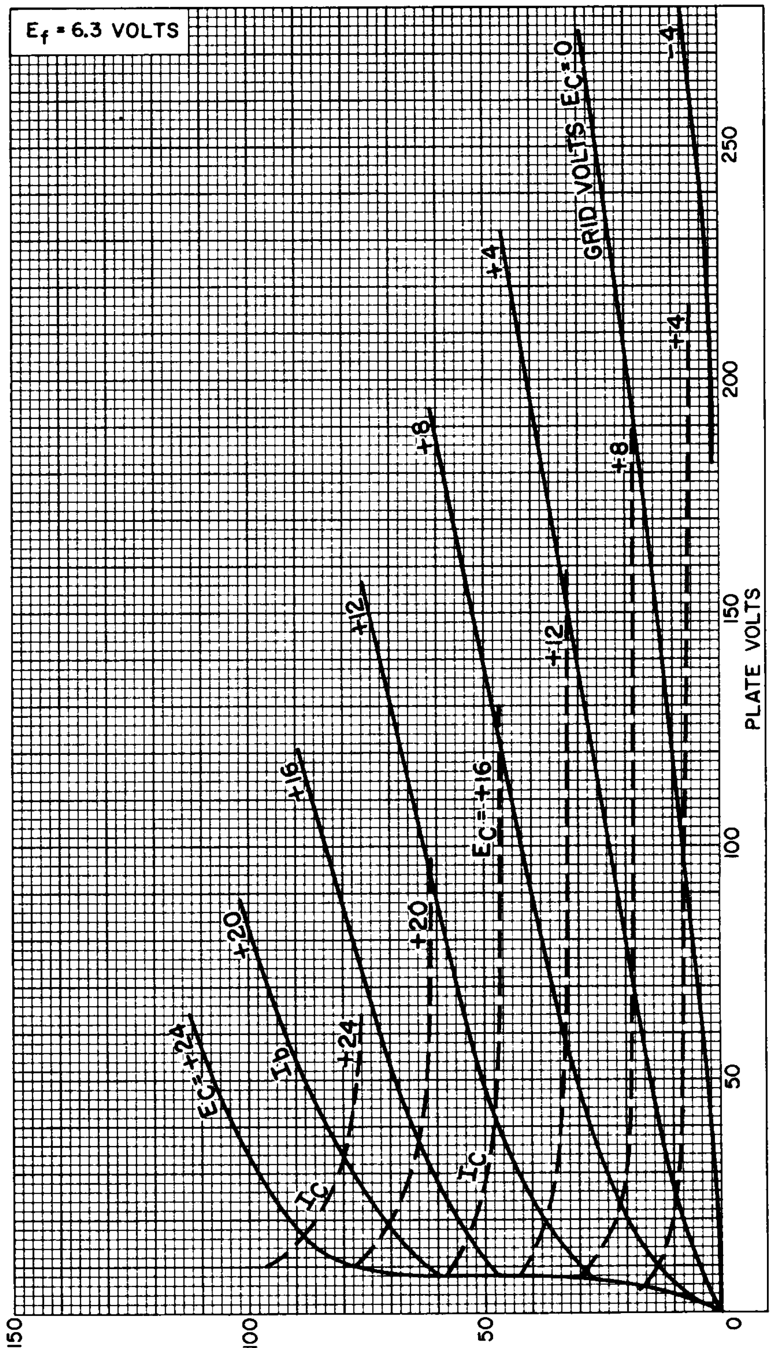
5876A



NOTE 1: MAXIMUM ECCENTRICITY OF CENTER LINE (AXIS) OF PLATE TERMINAL OR GRID-TERMINAL FLANGE WITH RESPECT TO THE CENTER LINE (AXIS) OF THE CATHODE TERMINAL IS 0.010".

NOTE 2: TILT OF GRID-TERMINAL FLANGE WITH RESPECT TO ROTATIONAL AXIS OF CATHODE TERMINAL IS DETERMINED BY CHUCKING THE CATHODE TERMINAL, ROTATING THE TUBE, AND GAUGING THE TOTAL TRAVEL DISTANCE OF THE GRID-TERMINAL FLANGE PARALLEL TO THE AXIS AT A POINT APPROXIMATELY 0.020" INWARD FROM ITS EDGE FOR ONE COMPLETE ROTATION. THE TOTAL DISTANCE WILL NOT EXCEED 0.020".

AVERAGE CHARACTERISTICS



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