

## Power Pentode

## 9-PIN MINIATURE TYPE

For Mobile-Communications Equipment Operating from 6-Cell Storage-Battery Systems. Useful as a Class-C RF-Power-Amplifier, Oscillator, and Frequency-Multiplier Tube up to 40 Mc, and as a Modulator and AF-Power-Amplifier Tube.

## GENERAL DATA

## Electrical:

Heater Characteristics and Ratings ( <i>Absolute-Maximum Values</i> ):		
Voltage (AC or DC) <sup>a</sup> . . . . .	13.5 ± 1.5	volts
Current at heater volts = 13.5. . . . .	0.275	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode. . . . .	120 max.	volts
Heater positive with respect to cathode. . . . .	120 max.	volts
Direct Interelectrode Capacitances (Approx.): <sup>b</sup>		
Grid No.1 to plate. . . . .	0.063	μf
Grid No.1 to all other electrodes except plate. . . . .	10.2	μf
Plate to all other electrodes except grid No.1. . . . .	3.5	μf

Characteristics, Class A<sub>1</sub> Amplifier:

Heater Voltage. . . . .	13.5	volts
Plate Supply Voltage. . . . .	250	volts
Grid No.3 . . . . .	.Connected to cathode at socket	
Grid No.2 Supply Voltage. . . . .	150	volts
Cathode Resistor. . . . .	120	ohms
Plate Resistance (Approx.). . . . .	0.1	megohm
Transconductance. . . . .	11500	μmhos
Plate Current . . . . .	19	ma
Grid-No.2 Current . . . . .	3.5	ma
Grid-No.1 Voltage (Approx.) for plate $\mu a = 20$ . . . . .	-10	volts

## Mechanical:

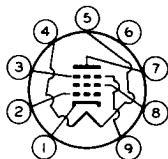
Operating Position. . . . .	Any
Type of Cathode . . . . .	Coated Unipotential
Maximum Overall Length. . . . .	2-3/16"
Maximum Seated Length . . . . .	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	1-9/16" ± 3/32"
Diameter. . . . .	0.750" to 0.875"
Dimensional Outline . . . . .	See <i>General Section</i>
Bulb. . . . .	T6-1/2
Base. . . . .	Small-Button Noval 9-Pin (JEDEC No.E9-1)



# 8077/7054

Basing Designation for BOTTOM VIEW. . . . . 9GK

- Pin 1 - Cathode
- Pin 2 - Grid No.1
- Pin 3 - Grid No.3,  
Internal  
Shield
- Pin 4 - Heater
- Pin 5 - Heater



- Pin 6 - No Internal  
Connection
- Pin 7 - Plate
- Pin 8 - Grid No.2
- Pin 9 - Grid No.3,  
Internal  
Shield

## AF POWER AMPLIFIER — Class A<sub>1</sub>

### Maximum Ratings, Absolute-Maximum Values:

PLATE VOLTAGE . . . . .	330 max.	volts
GRID No.3 (SUPPRESSOR GRID) . . . . .	<i>Connect to cathode at socket</i>	
GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . .	180 max.	volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value . . . . .	55 max.	volts
Positive-bias value . . . . .	0 max.	volts
GRID-No.2 INPUT . . . . .	1 max.	watt
PLATE DISSIPATION . . . . .	5 max.	watts

### Maximum Circuit Values:

Grid-No.1-Circuit Resistance:		
For fixed-bias operation. . . . .	0.1 max.	megohm
For cathode-bias operation. . . . .	0.25 max.	megohm

## RF POWER AMPLIFIER & OSCILLATOR — Class C Telegraphy<sup>c</sup> and

## RF POWER AMPLIFIER — Class C FM Telephony

### Maximum CCS<sup>d</sup> Ratings, Absolute-Maximum Values:

DC PLATE VOLTAGE . . . . .	300 max.	volts
DC GRID No.3 (SUPPRESSOR GRID). . . . .	<i>Connect to cathode at socket</i>	
DC GRID-No.2 (SCREEN-GRID) VOLTAGE. . . . .	175 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE:		
Negative-bias value . . . . .	50 max.	volts
DC PLATE CURRENT. . . . .	33 max.	ma
DC GRID-No.2 CURRENT. . . . .	5.5 max.	ma
DC GRID-No.1 CURRENT. . . . .	3 max.	ma
GRID-No.2 INPUT . . . . .	1 max.	watt
PLATE DISSIPATION . . . . .	5 max.	watts

### Typical Operation:

*At frequencies up to 40 Mc*

Heater Voltage. . . . .	13.5	13.5	13.5	volts
DC Plate Voltage. . . . .	200	250	300	volts
Grid No.3 . . . . .	<i>Connected to cathode at socket</i>			
DC Grid-No.2 Voltage. . . . .	115	145	175	volts
DC Grid-No.1 Voltage. . . . .	-7	-9	-12	volts
Peak RF Grid-No.1 Voltage . . . . .	9	11	16	volts
DC Plate Current. . . . .	14.5	20	26	ma
DC Grid-No.2 Current. . . . .	3	4.1	5.5	ma
DC Grid-No.1 Current (Approx.). . . . .	0.6	0.85	1	ma



Driving Power (Approx.) . . . . .	10	12	15	mw
Power Output (Approx.) . . . . .	1.5	2.7	4	watts

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance. . . . .	0.1 max.		megohm
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### FREQUENCY MULTIPLIER

**Maximum CCS<sup>d</sup> Ratings, Absolute-Maximum Values:**

*Same as for RF POWER AMPLIFIER & OSCILLATOR*

**Typical Operation:**

*As doubler up to 40 Mc*

DC Plate Voltage. . . . .	200	250	300	volts
Grid No.3 . . . . .	<i>Connected to cathode at socket</i>			
DC Grid-No.2 Voltage. . . . .	115	145	175	volts
DC Grid-No.1 Voltage. . . . .	-16	-20	-25	volts
Peak RF Grid-No.1 Voltage . . . . .	19	24	31	volts
DC Plate Current. . . . .	11	15	20	ma
DC Grid-No.2 Current. . . . .	2	3	4	ma
DC Grid-No.1 Current (Approx.) . . .	0.3	0.45	0.6	ma
Driving Power (Approx.) . . . . .	5	9	13	mw
Useful Power Output (Approx.) . . .	1.4	1.9	2.5	watts

**Maximum Circuit Values:**

Grid-No.1-Circuit Resistance. . . . .	0.1 max.		megohm
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- <sup>a</sup> The heater will take momentary excursions of 11.0 to 16.0 volts.
- <sup>b</sup> without external shield.
- <sup>c</sup> Key-down conditions per tube without amplitude modulation. Amplitude 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.
- <sup>d</sup> Continuous Commercial Service.

### CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	<i>Note</i>	<i>Min.</i>	<i>Max.</i>	
Heater Current. . . . .	1	0.260	0.290	amp
Transconductance. . . . .	1,2	8500	14500	$\mu$ mhos
Plate Current . . . . .	1,3	13	25	ma
Grid-No.2 Current . . . . .	1,3	2	5	ma
Reverse Grid-No.1 Current . . . . .	1,4	-	1.5	$\mu$ a
<b>Heater-Cathode Leakage Current:</b>				
Heater negative with respect to cathode. . . . .	1,5	-	20	$\mu$ a
Heater positive with respect to cathode. . . . .	1,5	-	20	$\mu$ a
<b>Leakage Resistance:</b>				
Between grid-No.1 and all other electrodes tied together. . .	1,6	50	-	megohms
Between plate and all other electrodes tied together. . .	1,7	50	-	megohms



- Note 1: With ac or dc heater volts = 13.5.
- Note 2: With dc-plate-supply volts = 250, grid-No.2 volts = 150, grid No.3 connected to cathode at socket, cathode resistor (ohms) = 120, and cathode-bypass capacitor ( $\mu f$ ) = 1000.
- Note 3: With dc plate-supply volts = 250, grid-No.2 supply volts = 150, grid No.3 connected to cathode at socket, and cathode resistor (ohms) = 120.
- Note 4: With dc plate-supply volts = 250, grid-No.2 supply volts = 150, grid No.3 connected to cathode at socket, cathode resistor (ohms) = 120, and grid-No.1 resistor (megohms) = 1.
- Note 5: With 100 volts dc between heater and cathode.
- Note 6: With grid No.1 100 volts negative with respect to all other electrodes tied together.
- Note 7: With plate 300 volts negative with respect to all other electrodes tied together.

## SPECIAL RATINGS & PERFORMANCE DATA

### Heater-Cycling Life Performance:

This test is performed on a sample lot of tubes from each production run. A minimum of 2000 cycles of intermittent operation is applied under the following conditions: heater volts = 19.5 cycled one minute on and two minutes off, heater 135 volts negative with respect to cathode, and all other elements connected to ground. At the end of this test, tubes are checked for heater-cathode shorts and open circuits.

### Low-Frequency Vibration Performance:

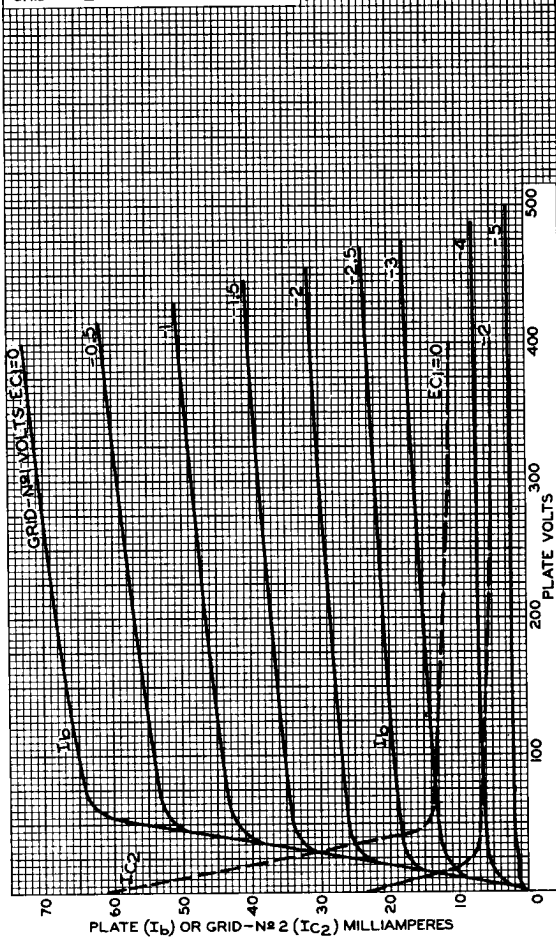
This test is performed on a sample lot of tubes from each production run under the following conditions: heater volts = 13.5, plate-supply volts = 250, grid No.3 connected to cathode, grid-No.2 supply volts = 150, cathode resistor (ohms) = 120, cathode-bypass capacitor ( $\mu f$ ) = 1000, plate load resistor (ohms) = 2000, and vibrational acceleration of 2.5 g at 25 cps. In this test, the rms output voltage must not exceed 150 millivolts.

### 500-Hour Intermittent Life Performance:

This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tube and to guard against epidemic failures. Life testing is conducted under the following conditions: heater volts = 15 and maximum-rated plate dissipation and grid-No.2 input.

## AVERAGE CHARACTERISTICS

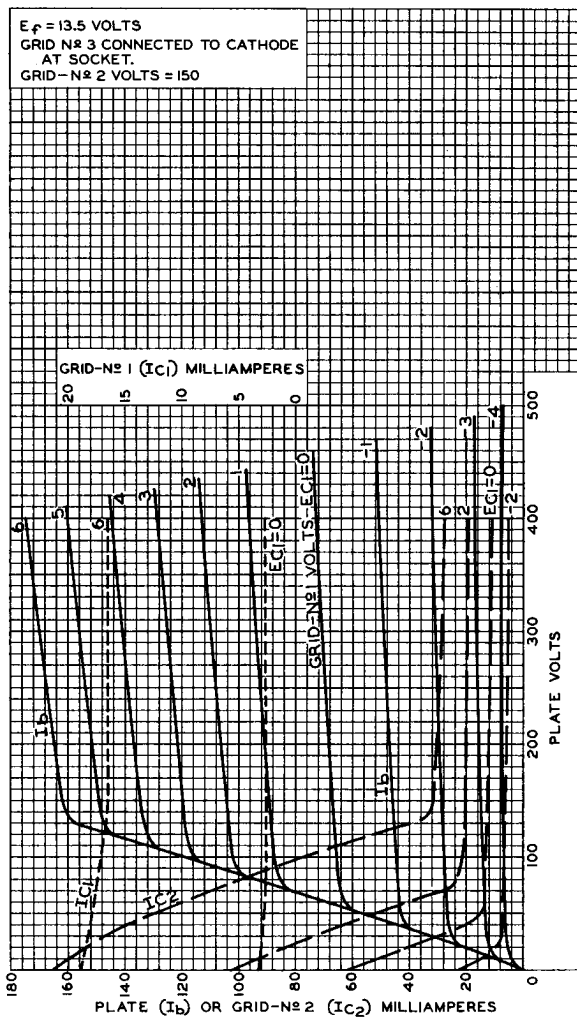
$E_f = 13.5$  VOLTS  
 GRID N $\circ$  3 CONNECTED TO CATHODE  
 AT SOCKET.  
 GRID-N $\circ$  2 VOLTS = 150



92CM-9777RI

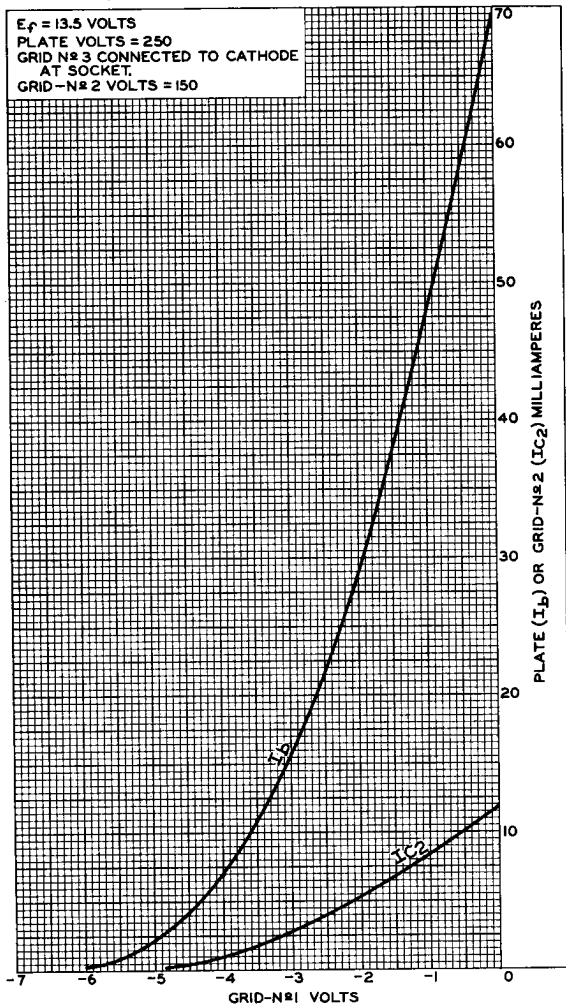


## AVERAGE CHARACTERISTICS



92CM-9778RI

## AVERAGE CHARACTERISTICS

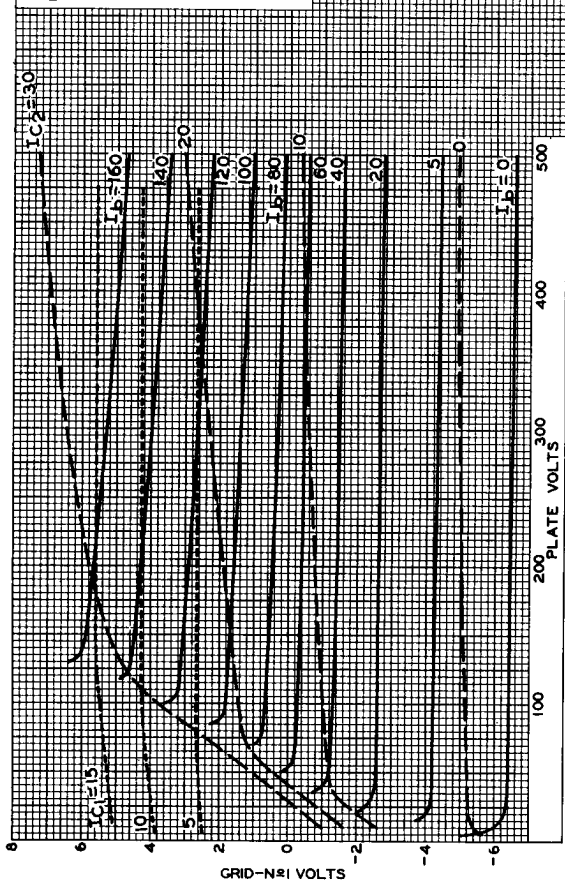


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## AVERAGE CONSTANT-CURRENT CHARACTERISTICS

$E_f = 13.5$  VOLTS  
 GRID-N $\#$  3 CONNECTED TO CATHODE  
 AT SOCKET.  
 GRID-N $\#$  2 VOLTS = 150  
 $I_b$  = PLATE MILLIAMPERES  
 $I_{C1}$  = GRID-N $\#$  1 MILLIAMPERES  
 $I_{C2}$  = GRID-N $\#$  2 MILLIAMPERES



92CM-9776R1

