



# 8077/7054

## POWER PENTODE

For Use in Mobile Communications Equipment  
Operating from 6-Cell Storage-Battery Systems  
9-Pin Miniature Type

RCA-8077/7054 is a power pentode of the 9-pin miniature type intended to provide reliable service in mobile communications equipment operating from 6-cell storage battery systems. It is like the 7054 except that it has a shorter bulb for compact equipment designs. In such equipment, the 8077/7054 is particularly useful in class C radio-frequency power amplifier, oscillator, and frequency-multiplier service at frequencies up to 40 Mc. It may also be used in modulator and audio-frequency power amplifier applications.



The heater of this tube is designed to operate over a voltage range of 12 to 15 volts and will take momentary excursions from 11 to 16 volts. The heater

design insures dependable performance in mobile equipment under operating conditions encountered during battery charging and discharging.

During manufacture, the 8077/7054 is subjected to rigid controls and rigorous tests for heater-cathode leakage, interelectrode leakage, intermittent shorts, heater-cycling, low frequency vibration performance, and 500-hour intermittent life performance.

### GENERAL DATA

#### Electrical:

Heater, for Unipotential Cathode:	
Voltage Range (AC or DC) . . . . .	12 to 15 volts
Current (Approx.) at 13.5 volts . . . . .	0.275 amp
Direct Interelectrode Capacitances (Approx., without external shield):	
Grid No.1 to plate . . . . .	0.063 $\mu$ mf
Grid No.1 to all other electrodes except plate . . . . .	10.2 $\mu$ mf
Plate to all other electrodes except grid No.1 . . . . .	3.5 $\mu$ mf

#### 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 Voltage . . . . .	150 volts
Cathode Resistor . . . . .	120 ohms
Plate Resistance (Approx.) . . . . .	0.1 megohm

Transconductance . . . . .	11500 $\mu$ mhos
Plate Current . . . . .	19 ma
Grid-No.2 Current . . . . .	3.5 ma
Grid-No.1 Voltage (Approx.) for plate current of 20 $\mu$ a . . . . .	-10 volts

#### Mechanical:

Operating Position . . . . .	Any
Maximum Overall Length . . . . .	2-3/16"
Maximum Seated Length . . . . .	1-15/16"
Length, Base Seat to Bulb Top (Excluding tip) . . . . .	1-9/16" $\pm$ 3/32"
Diameter . . . . .	0.750" to 0.875"
Bulb . . . . .	T6-1/2
Base . . . . .	Small-Button Noval 9-Pin (JEDEC No. E9-1)

### AMPLIFIER — Class A<sub>1</sub>

#### Maximum Ratings, Absolute-Maximum Values:

PLATE VOLTAGE . . . . .	330 max. volts
GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE . . . . .	0 max. volts
GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . .	180 max. volts
GRID-No.1 (CONTROL-GRID) VOLTAGE:	
Positive-bias value . . . . .	0 max. volts
Negative-bias value . . . . .	55 max. volts
GRID-No.2 INPUT . . . . .	1 max. watt
PLATE DISSIPATION . . . . .	5 max. watts
PEAK HEATER-CATHODE VOLTAGE:	
Heater negative with respect to cathode . . . . .	120 max. volts
Heater positive with respect to cathode . . . . .	120 max. volts

#### 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>a</sup> and

### RF POWER AMPLIFIER — Class C FM Telephony

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

DC PLATE VOLTAGE . . . . .	300 max. volts
DC GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE . . . . .	0 max. volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE . . . . .	175 max. volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . . . . .	-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



**PEAK HEATER-CATHODE VOLTAGE:**

Heater negative with respect to cathode. . . . .	120 max.	volts
Heater positive with respect to cathode. . . . .	120 max.	volts

**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 . . . . .	Connected to cathode at socket			
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>b</sup> Ratings, Absolute-Maximum Values:**

DC PLATE VOLTAGE. . . . .	300 max.	volts
DC GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE. . .	0 max.	volts
DC GRID-No.2 (SCREEN-GRID) VOLTAGE. . .	175 max.	volts
DC GRID-No.1 (CONTROL-GRID) VOLTAGE . .	-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

**PEAK HEATER-CATHODE VOLTAGE:**

Heater negative with respect to cathode. . . . .	120 max.	volts
Heater positive with respect to cathode. . . . .	120 max.	volts

**Typical Operation as Doubler to 40 Mc:**

DC Plate Voltage. . . . .	200	250	300	volts
Grid No.3 . . . . .	Connected to cathode at socket			
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> 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% of the carrier conditions.

<sup>b</sup> Continuous Commercial Service.

**CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN**

	Note	Min.	Max.	
Heater Current. . . . .	1	0.260	0.290	amp
Transconductance. . . . .	1,2	8500	14500	μmhos
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	μa
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode. . . . .	1,5	-	20	μa
Heater positive with respect to cathode. . . . .	1,5	-	20	μa

**Leakage Resistance:**

Between grid 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 13.5 volts ac or dc on heater.

Note 2: With dc plate-supply voltage of 250 volts, grid-No.2 supply voltage of 150 volts, grid No.3 connected to cathode at socket, cathode resistor of 120 ohms, and cathode-bypass capacitor of 1000 μf.

Note 3: With dc plate-supply voltage of 250 volts, grid-No.2 voltage of 150 volts, grid No.3 connected to cathode at socket, and cathode resistor of 120 ohms.

Note 4: With dc plate-supply voltage of 250 volts, grid-No.2 voltage of 150 volts, grid No.3 connected to cathode at socket, cathode resistor of 120 ohms, and grid-No.1 resistor of 1 megohm.

Note 5: With 100 volts dc between heater and cathode.

Note 6: With grid No.1 120 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 AND PERFORMANCE DATA**

**Heater-Cycling Life Performance:**

This test is performed on a sample lot of tubes from each production run. Tubes will withstand a minimum of 2000 cycles of intermittent operation under the following conditions: Heater voltage of 17 volts cycled one minute on-two minutes off, heater 135 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 voltage of 13.5 volts, plate-supply voltage of 250 volts, grid No.3 connected to cathode, grid-No.2 supply voltage of 150 volts, cathode resistor of 120 ohms, cathode-bypass capacitor of 1000 μf, plate load resistor of 2000 ohms, 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 voltage of 15 volts and maximum-rated plate dissipation and grid-No.2 input.

**OPERATING CONSIDERATIONS**

The *maximum ratings* in the tabulated data are established in accordance with the following definition of the *Absolute-Maximum Rating System* for rating electron devices:

Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

The device manufacturer chooses these values to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environment variations, and the effects of changes in operating conditions due to variations in device characteristics.

The equipment manufacturer should design so that initially and throughout life



no absolute-maximum value for the intended service is exceeded with any device under the worst probable operating conditions with respect to supply-voltage variation, equip-

ment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in device characteristics.

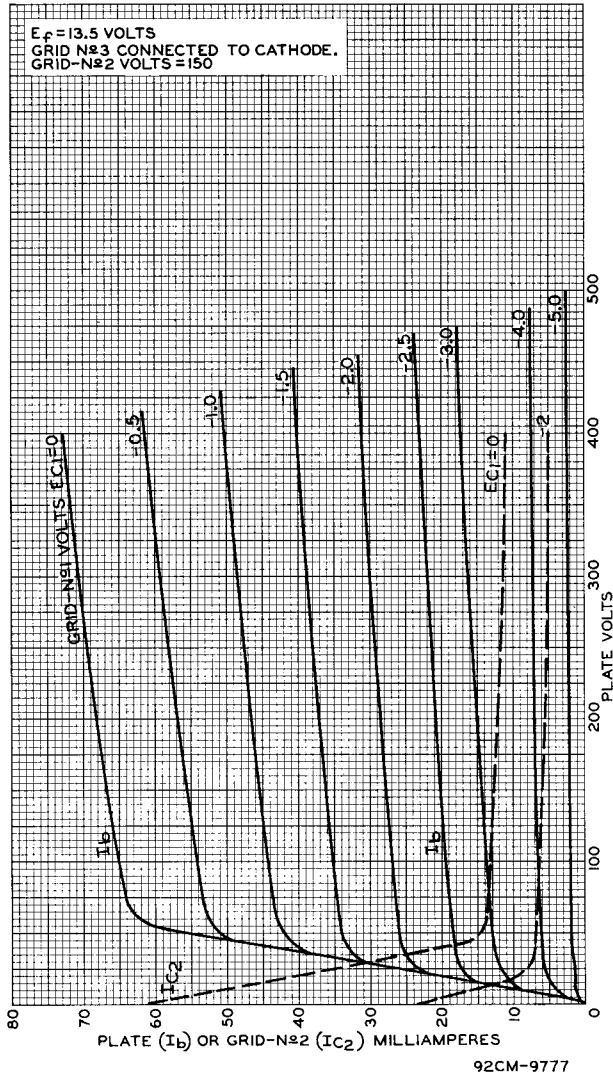


Fig. 1 - Average Characteristics of Type 8077/7054.

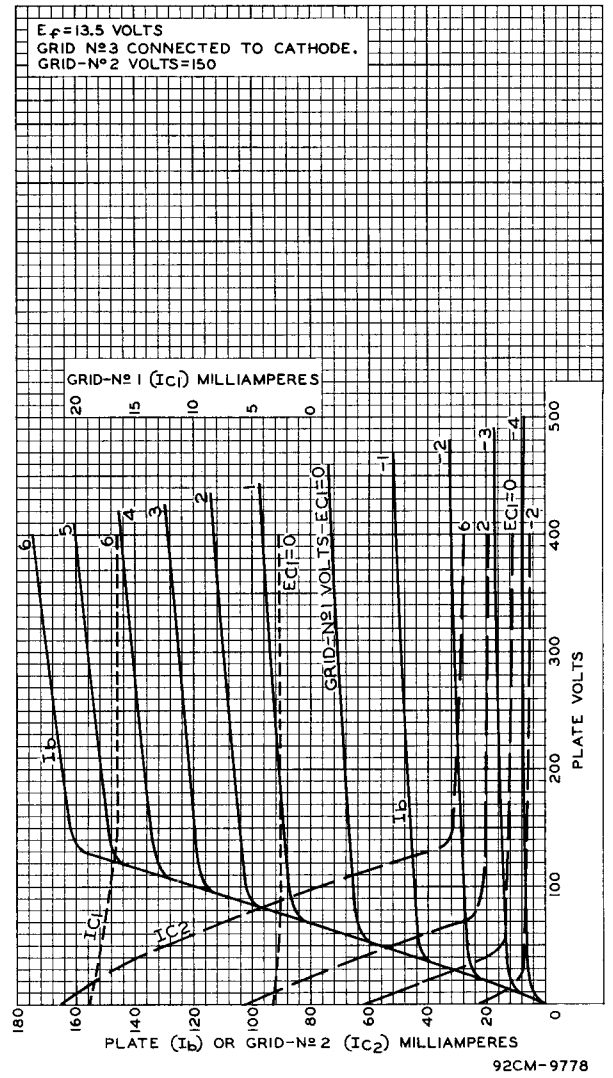
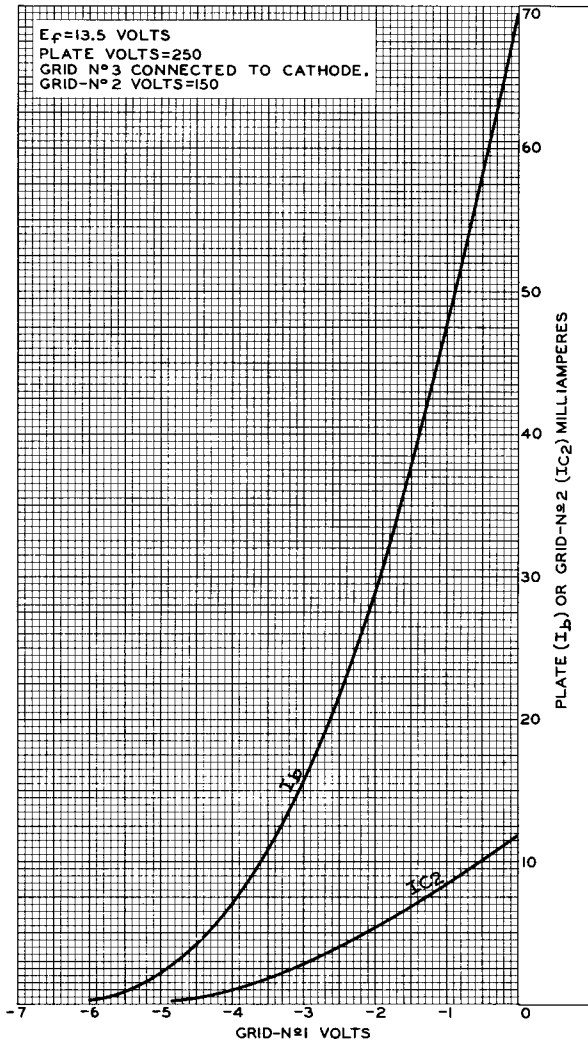


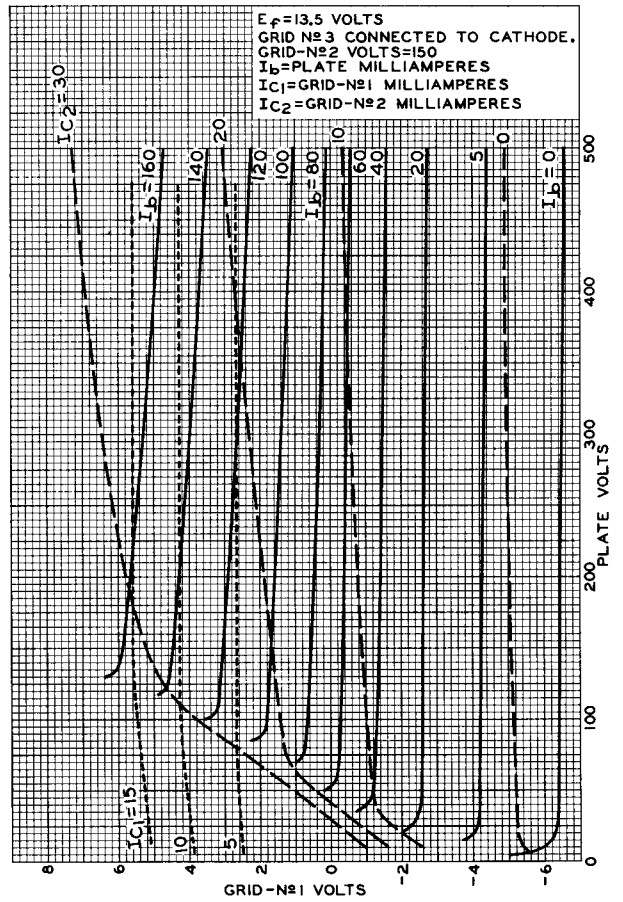
Fig. 2 - Average Characteristics of Type 8077/7054.

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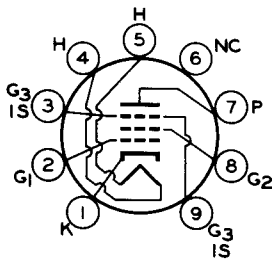
Fig.3 - Average Characteristics of Type 8077/7054.



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Fig.4 - Average Constant-Current Characteristics of Type 8077/7054.

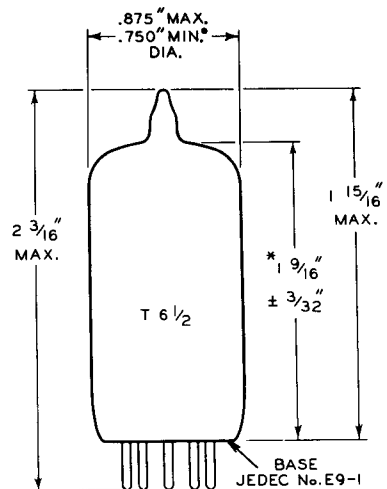
**BASING DIAGRAM**  
Bottom View



96K

- |                                    |                                    |
|------------------------------------|------------------------------------|
| PIN 1 - CATHODE                    | PIN 6 - NO CONNECTION              |
| PIN 2 - GRID No.1                  | PIN 7 - PLATE                      |
| PIN 3 - GRID No.3, INTERNAL SHIELD | PIN 8 - GRID No.2                  |
| PIN 4 - HEATER                     | PIN 9 - GRID No.3, INTERNAL SHIELD |
| PIN 5 - HEATER                     |                                    |

**DIMENSIONAL OUTLINE**



- APPLIES IN ZONE STARTING 0.375" FROM BASE SEAT.
- \* MEASURED FROM BASE SEAT TO BULB-TOP LINE AS DETERMINED BY RING GAUGE OF 7/16" I.D.