

March 15, 1955

## Medium-Mu Twin Triode Type 4BQ7-A

The 4BQ7-A is a 9-pin miniature, medium-mu, twin triode designed for use as the first amplifier in tuners of UHF television receivers. It is also intended for service in other applications that require a high-gain, low-noise amplifier.

The 4BQ7-A has been designed for use in receivers which employ series-connected heaters, especially in television receivers where the picture-tube heater is in series with other heaters. When it is employed in this type of circuit with other tubes having a heater current rating of 600 ma., heater voltage surges across individual tubes are minimized inasmuch as the heater warm-up characteristic is controlled.

### GENERAL DATA

#### Electrical:

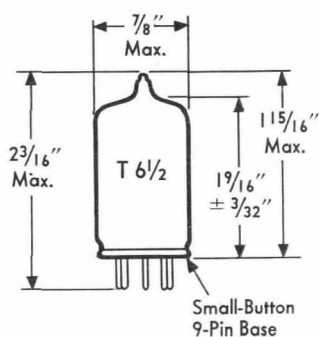
|                                                               |                          |           |                |
|---------------------------------------------------------------|--------------------------|-----------|----------------|
| Cathodes                                                      | Two, Coated Unipotential |           |                |
| Heater:                                                       |                          |           |                |
| Voltage                                                       | 4.2 ac or dc             | Volts     |                |
| Current                                                       | 0.6                      | Ampere    |                |
| Warm-Up Time **                                               | 11                       | Seconds   |                |
| Direct Interelectrode Capacitances (external shield No. 315): |                          |           |                |
|                                                               | Unit 1                   | Unit 2    |                |
| Grid to Plate                                                 | 1.15                     | 1.15      | $\mu\text{mf}$ |
| Plate to Cathode                                              | 0.15 max.                | 0.15 max. | $\mu\text{mf}$ |
| Heater to Cathode                                             | 2.65                     | 2.70      | $\mu\text{mf}$ |
| Input                                                         | 2.85                     | 4.95 *    | $\mu\text{mf}$ |
| Output                                                        | 1.35                     | 2.27 *    | $\mu\text{mf}$ |
| Plate, Unit 1 to Plate, Unit 2                                | 0.010 max.               |           | $\mu\text{mf}$ |
| Plate, Unit 2 to Plate and Grid, Unit 1                       | 0.024 max.               |           | $\mu\text{mf}$ |

\*With grounded grid.

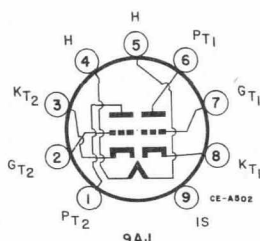
\*\*See Page 3.

#### Mechanical:

|                   |                                 |
|-------------------|---------------------------------|
| Bulb              | T-6 1/2                         |
| Base              | Small Button 9-pin (JETEC E9-1) |
| Basing            | 9AJ                             |
| Mounting Position | Any                             |



CE-A554



Bottom View

### AMPLIFIER — CLASS A<sub>1</sub> Each Unit

#### Maximum Ratings

##### Design Center Values

|                   |      |      |       |
|-------------------|------|------|-------|
| Plate Voltage     | 250† | max. | Volts |
| Cathode Current   | 20   | max. | Ma.   |
| Plate Dissipation | 2    | max. | Watts |

##### Peak-Heater Cathode Voltage:

|                                            |      |      |       |
|--------------------------------------------|------|------|-------|
| Heater Positive<br>with Respect to Cathode | 200  | max. | Volts |
| Heater Negative<br>with Respect to Cathode | 200† | max. | Volts |

† Under cutoff conditions in r-f grounded-grid circuit with direct-coupled drive, it is permissible for this voltage to be as high as 300 volts.

#### Characteristics

|                                                                |      |                  |
|----------------------------------------------------------------|------|------------------|
| Plate Voltage                                                  | 150  | Volts            |
| Cathode-Bias Resistor                                          | 220  | Ohms             |
| Plate Current                                                  | 9    | Ma.              |
| Transconductance                                               | 6400 | $\mu\text{mhos}$ |
| Plate Resistance                                               | 6100 | Ohms             |
| Amplification Factor                                           | 39   |                  |
| Grid Bias (Approx.) for Plate<br>Current of 10 $\mu\text{amp}$ | -10  | Volts            |

#### Typical Operation—Grounded Grid Circuit with Direct-Coupled Drive

Unit No. 1 (driver-tube) is directly coupled to Unit No. 2 (driven rf-grounded-grid amplifier tube.)

|                                                                   | Unit 1 | Unit 2    |
|-------------------------------------------------------------------|--------|-----------|
| Plate Supply Voltage                                              | 250    | 250 Volts |
| Plate Voltage                                                     | 135    | 115 Volts |
| Grid Voltage                                                      | -1     | — Volt    |
| Cathode Bias Resistor                                             | 100    | — Ohms    |
| Plate Current                                                     | 10     | 10 Ma.    |
| Grid Current                                                      | 0      | 0 Ma.     |
| Grid Voltage (Approx.) for<br>Plate Current of 10 $\mu\text{amp}$ | -14    | — Volts   |

#### Maximum Circuit Values (Each Unit)

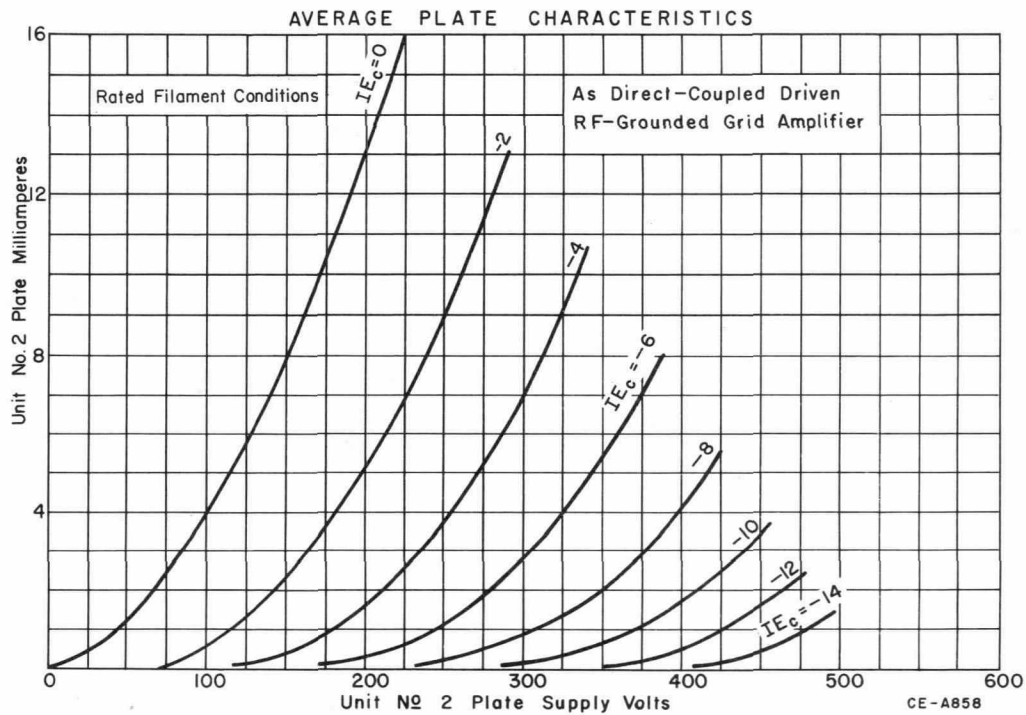
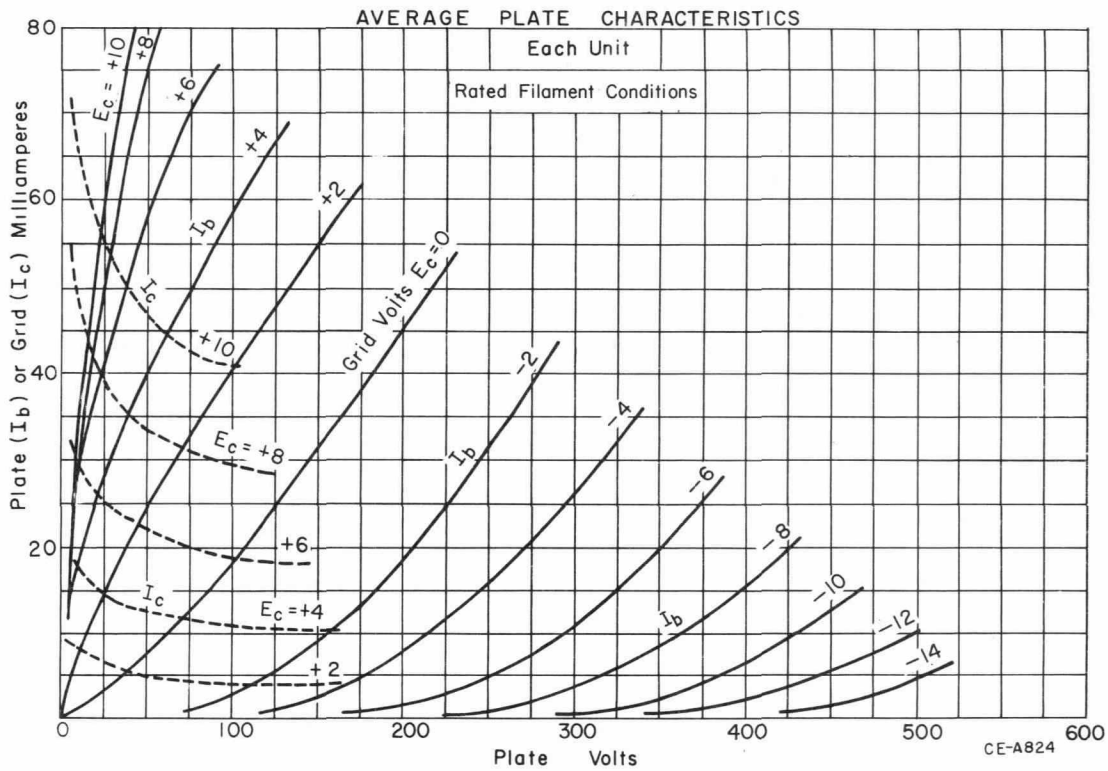
|                         |         |        |
|-------------------------|---------|--------|
| Grid Circuit Resistance | .5 max. | Megohm |
|-------------------------|---------|--------|

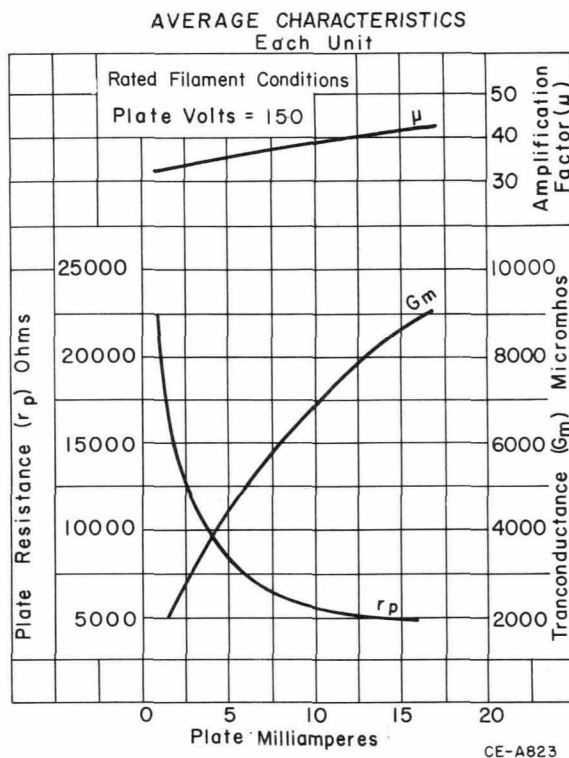
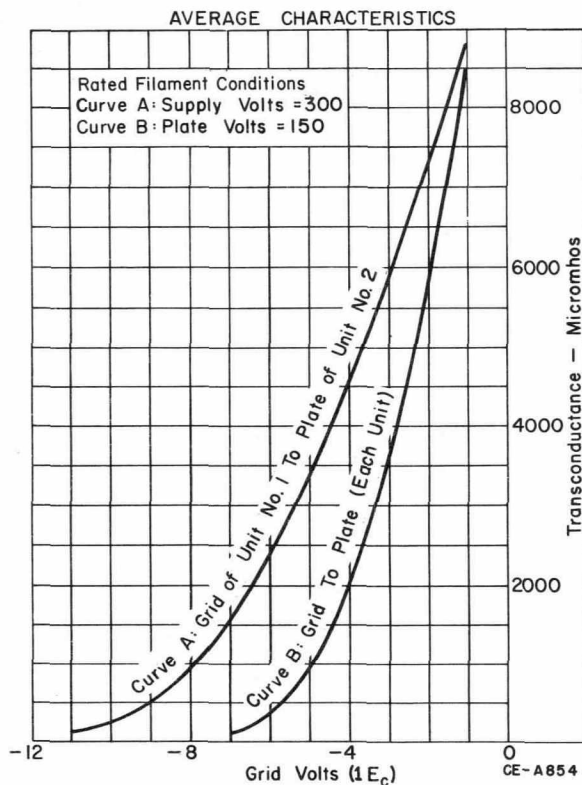
#### Typical Operation—Push-Pull Grounded Grid Circuit

|                  |     |       |
|------------------|-----|-------|
| Plate Voltage    | 150 | Volts |
| Grid Voltage     | -2‡ | Volts |
| Cathode Resistor | 100 | Ohms  |
| Plate Current    | 10  | Ma.   |

‡Obtained from cathode resistor.

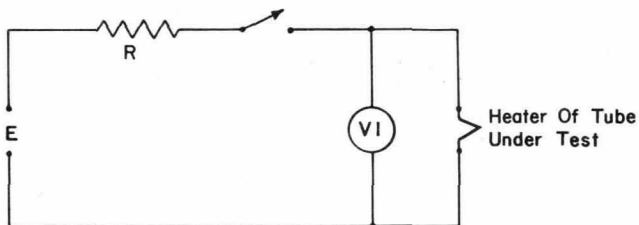
Receiving Tube Section





## HEATER WARM-UP TIME MEASUREMENTS

Heater warm-up time is defined as the time required for the voltage across the heater terminals to increase from zero to the heater test voltage ( $V_1$ ) in the circuit shown below. The conditions used in conjunction with the test circuit depend upon the rated heater voltage and current of the tube under test.



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|                                   |      |        |
|-----------------------------------|------|--------|
| E — Applied Voltage, RMS or DC    | 16.7 | Volts  |
| R — Total Series Resistance       | 21   | Ohms   |
| $V_1$ — Heater Voltage, RMS or DC | 3.33 | Volts  |
| $E_r$ — Rated Heater Voltage      | 4.2  | Volts  |
| $I_r$ — Rated Heater Current      | 0.6  | Ampere |

