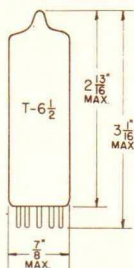


## TUNG-SOL

## PENTODE



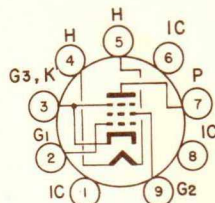
GLASS BULB  
MINIATURE BUTTON  
9 PIN BASE E9-1  
OUTLINE DRAWING  
JEDEC 6-4

COATED UNIPOTENTIAL CATHODE

HEATER

10.6<sup>D</sup> VOLTS 0.45<sup>E</sup> AMP.

ANY MOUNTING POSITION



BOTTOM VIEW

BASING DIAGRAM

JEDEC 9CV

THE 10BQ5 IS AN OUTPUT PENTODE DESIGNED FOR APPLICATION IN MEDIUM POWER HI-FI AMPLIFIERS. A PAIR OF TUBES IN CLASS AB, PUSH-PULL CONVENTIONAL OPERATION YIELDS AN OUTPUT OF UP TO 17 WATTS AT 4% DISTORTION (WITHOUT FEEDBACK). IN SINGLE-ENDED OPERATION A POWER OUTPUT OF 5.7 WATTS CAN BE OBTAINED. EXCEPT FOR HEATER CHARACTERISTICS AND HEATER WARM-UP TIME, THE 10BQ5 IS IDENTICAL TO THE 6BQ5.

## DIRECT INTERELECTRODE CAPACITANCES

|                               |      |    |
|-------------------------------|------|----|
| GRID #1 TO ALL OTHER ELEMENTS | 10.8 | pf |
| PLATE TO ALL OTHER ELEMENTS   | 6.5  | pf |
| PLATE TO GRID #1 (MAX.)       | 0.5  | pf |
| GRID #1 TO HEATER (MAX.)      | 0.25 | pf |

## RATINGS

INTERPRETED ACCORDING TO DESIGN CENTER SYSTEM

|                                                           |        |         |
|-----------------------------------------------------------|--------|---------|
| HEATER CURRENT <sup>F</sup>                               | 450±30 | MA.     |
| MAXIMUM PLATE VOLTAGE <sup>A</sup>                        | 300    | VOLTS   |
| MAXIMUM PLATE VOLTAGE WITHOUT PLATE CURRENT               | 550    | VOLTS   |
| MAXIMUM PLATE DISSIPATION <sup>A</sup>                    | 12     | WATTS   |
| MAXIMUM GRID #2 VOLTAGE <sup>A</sup>                      | 300    | VOLTS   |
| MAXIMUM GRID #2 VOLTAGE WITHOUT CURRENT                   | 550    | VOLTS   |
| MAXIMUM GRID #2 DISSIPATION                               | 2      | WATTS   |
| MAXIMUM GRID #2 PEAK DISSIPATION                          | 4      | WATTS   |
| MAXIMUM NEGATIVE GRID #1 VOLTAGE                          | 100    | VOLTS   |
| MAXIMUM GRID CURRENT STARTING POINT                       |        |         |
| MAXIMUM GRID #1 VOLTAGE WHEN GRID #1 CURRENT IS 0.3 μAMP. | -1.3   | VOLTS   |
| MAXIMUM GRID #1 CIRCUIT RESISTANCE WITH AUTOMATIC BIAS    | 1      | MEGOHM  |
| MAXIMUM GRID #1 CIRCUIT RESISTANCE WITH FIXED BIAS        | 0.3    | MEGOHM  |
| MAXIMUM CATHODE CURRENT                                   | 65     | MA.     |
| MAXIMUM VOLTAGE BETWEEN HEATER AND CATHODE                | 100    | VOLTS   |
| MAXIMUM HEATER-CATHODE VOLTAGE                            |        |         |
| HEATER NEGATIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK | 100    | VOLTS   |
| HEATER POSITIVE WITH RESPECT TO CATHODE TOTAL DC AND PEAK | 100    | VOLTS   |
| HEATER WARM-UP TIME*                                      | 11     | SECONDS |

## TUNG-SOL

CONTINUED FROM PRECEDING PAGE

## TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A, ONE TUBE

|                                                               |       |      |     |      |                  |         |
|---------------------------------------------------------------|-------|------|-----|------|------------------|---------|
| PLATE VOLTAGE                                                 | 250   |      |     |      |                  | VOLTS   |
| GRID #2 VOLTAGE                                               | 250   |      |     |      |                  | VOLTS   |
| GRID #1 BIAS                                                  | -7.3  |      |     |      |                  | VOLTS   |
| CATHODE RESISTOR                                              | 135   |      |     |      |                  | OHMS    |
| PLATE LOAD RESISTANCE                                         | 5200  |      |     |      |                  | OHMS    |
| INPUT A.F. VOLTAGE (RMS)                                      | 0     | 0.3  | 3.4 | 4.3  | 4.7              | VOLTS   |
| PLATE CURRENT                                                 | 48    | ---  | --- | 49.5 | 49.2             | MA.     |
| GRID #2 CURRENT                                               | 5.5   | ---  | --- | 10.8 | 11.6             | MA.     |
| TRANSCONDUCTANCE                                              | 11300 | ---  | --- | ---  | ---              | μMHOS   |
| PLATE RESISTANCE                                              | 38000 | ---  | --- | ---  | ---              | OHMS    |
| AMPLIFICATION FACTOR OF<br>GRID #2 WITH RESPECT<br>TO GRID #1 | 19    | ---  | --- | ---  | ---              |         |
| MAX. SIGNAL POWER OUTPUT <sup>B</sup>                         | 0     | 0.05 | 4.5 | 5.7  | 6.0 <sup>C</sup> | WATTS   |
| TOTAL HARMONIC DISTORTION <sup>B</sup>                        | ---   | ---  | 6.8 | 10   | ---              | PERCENT |
| SECOND HARMONIC <sup>B</sup>                                  | ---   | ---  | 3.0 | 2.0  | ---              | PERCENT |
| THIRD HARMONIC <sup>B</sup>                                   | ---   | ---  | 5.8 | 9.5  | ---              | PERCENT |

|                                                               |       |      |     |      |                  |         |
|---------------------------------------------------------------|-------|------|-----|------|------------------|---------|
| PLATE VOLTAGE                                                 | 250   |      |     |      |                  | VOLTS   |
| GRID #2 VOLTAGE                                               | 250   |      |     |      |                  | VOLTS   |
| GRID #1 BIAS                                                  | -7.3  |      |     |      |                  | VOLTS   |
| CATHODE RESISTOR                                              | 135   |      |     |      |                  | OHMS    |
| PLATE LOAD RESISTANCE                                         | 4500  |      |     |      |                  | OHMS    |
| INPUT A.F. VOLTAGE (RMS)                                      | 0     | 0.3  | 3.5 | 4.4  | 4.8              | VOLTS   |
| PLATE CURRENT                                                 | 48    | ---  | --- | 50.6 | 50.5             | MA.     |
| GRID #2 CURRENT                                               | 5.5   | ---  | --- | 10   | 11               | MA.     |
| TRANSCONDUCTANCE                                              | 11300 | ---  | --- | ---  | ---              | μMHOS   |
| PLATE RESISTANCE                                              | 38000 | ---  | --- | ---  | ---              | OHMS    |
| AMPLIFICATION FACTOR OF<br>GRID #2 WITH RESPECT<br>TO GRID #1 | 19    | ---  | --- | ---  | ---              |         |
| MAX. SIGNAL POWER OUTPUT <sup>B</sup>                         | 0     | 0.05 | 4.5 | 5.7  | 6.0 <sup>C</sup> | WATTS   |
| TOTAL HARMONIC DISTORTION <sup>B</sup>                        | ---   | ---  | 7.5 | 10   | ---              | PERCENT |
| SECOND HARMONIC <sup>B</sup>                                  | ---   | ---  | 5.7 | 5.0  | ---              | PERCENT |
| THIRD HARMONIC <sup>B</sup>                                   | ---   | ---  | 4.5 | 8    | ---              | PERCENT |

|                                                               |       |      |      |                  |     |         |
|---------------------------------------------------------------|-------|------|------|------------------|-----|---------|
| PLATE VOLTAGE                                                 | 250   |      |      |                  |     | VOLTS   |
| GRID #2 VOLTAGE                                               | 250   |      |      |                  |     | VOLTS   |
| GRID #1 BIAS                                                  | -8.4  |      |      |                  |     | VOLTS   |
| CATHODE RESISTOR                                              | 210   |      |      |                  |     | OHMS    |
| PLATE LOAD RESISTANCE                                         | 7000  |      |      |                  |     | OHMS    |
| INPUT A.F. VOLTAGE (RMS)                                      | 0     | 0.3  | 3.5  | 5.5              | --- | VOLTS   |
| PLATE CURRENT                                                 | 36    | ---  | 36.8 | 36               | --- | MA.     |
| GRID #2 CURRENT                                               | 4.1   | ---  | 8.5  | 14.6             | --- | MA.     |
| TRANSCONDUCTANCE                                              | 10000 | ---  | ---  | ---              | --- | μMHOS   |
| PLATE RESISTANCE                                              | 40000 | ---  | ---  | ---              | --- | OHMS    |
| AMPLIFICATION FACTOR OF<br>GRID #2 WITH RESPECT<br>TO GRID #1 | 19    | ---  | ---  | ---              | --- |         |
| MAX. SIGNAL POWER OUTPUT <sup>B</sup>                         | 0     | 0.05 | 4.2  | 5.6 <sup>C</sup> | --- | WATTS   |
| TOTAL HARMONIC DISTORTION <sup>B</sup>                        | ---   | ---  | 10   | ---              | --- | PERCENT |
| SECOND HARMONIC <sup>B</sup>                                  | ---   | ---  | 1.7  | ---              | --- | PERCENT |
| THIRD HARMONIC <sup>B</sup>                                   | ---   | ---  | 8.7  | ---              | --- | PERCENT |

## TUNG-SOL

CONTINUED FROM PRECEDING PAGE

## TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - cont'd.

## CLASS A, ONE TUBE - CONT'D.

|                                                               |       |      |      |                  |         |
|---------------------------------------------------------------|-------|------|------|------------------|---------|
| PLATE VOLTAGE                                                 | 250   |      |      |                  | VOLTS   |
| GRID #2 VOLTAGE                                               | 210   |      |      |                  | VOLTS   |
| GRID #1 BIAS                                                  | -6.4  |      |      |                  | VOLTS   |
| CATHODE RESISTOR                                              | 160   |      |      |                  | OHMS    |
| PLATE LOAD RESISTANCE                                         | 7000  |      |      |                  | OHMS    |
| INPUT A.F. VOLTAGE(RMS.)                                      | 0     | 0.3  | 3.4  | 3.8              | VOLTS   |
| PLATE CURRENT                                                 | 36    | ---  | 36.6 | 36.5             | MA.     |
| GRID #2 CURRENT                                               | 3.9   | ---  | 7.3  | 8.0              | MA.     |
| TRANSCONDUCTANCE                                              | 10400 | ---  | ---  | ---              | μMHOS   |
| PLATE RESISTANCE                                              | 40000 | ---  | ---  | ---              | OHMS    |
| AMPLIFICATION FACTOR OF<br>GRID #2 WITH RESPECT TO<br>GRID #1 | 19    | ---  | ---  | ---              | OHMS    |
| MAX. SIGNAL POWER OUTPUT <sup>B</sup>                         | 0     | 0.05 | 4.3  | 4.7 <sup>C</sup> | WATTS   |
| TOTAL HARMONIC DISTORTION <sup>B</sup>                        | ---   | ---  | .10  | ---              | PERCENT |
| SECOND HARMONIC <sup>B</sup>                                  | ---   | ---  | 1.8  | ---              | PERCENT |
| THIRD HARMONIC <sup>B</sup>                                   | ---   | ---  | 9.3  | ---              | PERCENT |

## CLASS B, TWO TUBES

|                                    |       |        |       |      |         |
|------------------------------------|-------|--------|-------|------|---------|
| PLATE VOLTAGE                      | 250   | 300    | VOLTS |      |         |
| GRID #2 VOLTAGE                    | 250   | 300    | VOLTS |      |         |
| GRID #1 BIAS                       | -11.6 | -14.7  | VOLTS |      |         |
| LOAD RESISTANCE,<br>PLATE TO PLATE | 8000  | 8000   |       |      |         |
| INPUT A.F. VOLTAGE (RMS)           | 0     | 8      | 0     | 10   | VOLTS   |
| PLATE CURRENT                      | 2x10  | 2x37.5 | 2x7.5 | 2x46 | MA.     |
| GRID #2 CURRENT                    | 2x1.1 | 2x7.5  | 2x0.8 | 2x11 | MA.     |
| MAX. SIGNAL POWER OUTPUT           | 0     | 11     | 0     | 17   | WATTS   |
| TOTAL HARMONIC DISTORTION          | ---   | 3      | ---   | 4    | PERCENT |

## CLASS AB, TWO TUBES

|                                    |       |        |       |      |          |
|------------------------------------|-------|--------|-------|------|----------|
| PLATE VOLTAGE                      | 250   | 300    | VOLTS |      |          |
| GRID #2 VOLTAGE                    | 250   | 300    | VOLTS |      |          |
| COMMON CATHODE RESISTOR            | 130   | 130    | OHMS  |      |          |
| LOAD RESISTANCE,<br>PLATE TO PLATE | 8000  | 8000   | OHMS  |      |          |
| INPUT A.F. VOLTAGE (RMS)           | 0     | 8      | 0     | 10   | VOLTS    |
| PLATE CURRENT                      | 2x31  | 2x37.5 | 2x36  | 2x46 | MA.      |
| GRID #2 CURRENT                    | 2x3.5 | 2x7.5  | 2x4   | 2x11 | MA.      |
| MAX. SIGNAL POWER OUTPUT           | 0     | 11     | 0     | 17   | WATTS    |
| TOTAL HARMONIC DISTORTION          | ---   | 3      | ---   | 4    | PERCENTS |

CONTINUED ON FOLLOWING PAGE

## TUNG-SOL

CONTINUED FROM PRECEDING PAGE

## TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS - cont'd.

## CLASS A IN TRIODE CONNECTION

(GRID #2 CONNECTED TO PLATE)

|                                                         |      |          |
|---------------------------------------------------------|------|----------|
| PLATE VOLTAGE                                           | 250  | VOLTS    |
| CATHODE RESISTOR                                        | 270  | OHMS     |
| PLATE LOAD RESISTANCE                                   | 3500 | OHMS     |
| ZERO-SIGNAL PLATE CURRENT                               | 34   | MA.      |
| INPUT A.F. VOLTAGE (RMS)                                | 6.7  | VOLTS    |
| MAX. SIGNAL PLATE CURRENT                               | 36   | MA.      |
| MAX. SIGNAL POWER OUTPUT                                | 1.95 | WATTS    |
| TOTAL HARMONIC DISTORTION                               | 9    | PERCENTS |
| INPUT A.F. VOLTAGE AT A POWER OUTPUT OF 50 MWATTS (RMS) | 1.0  | VOLT     |

## CLASS AB, TWO TUBES IN TRIODE CONNECTION

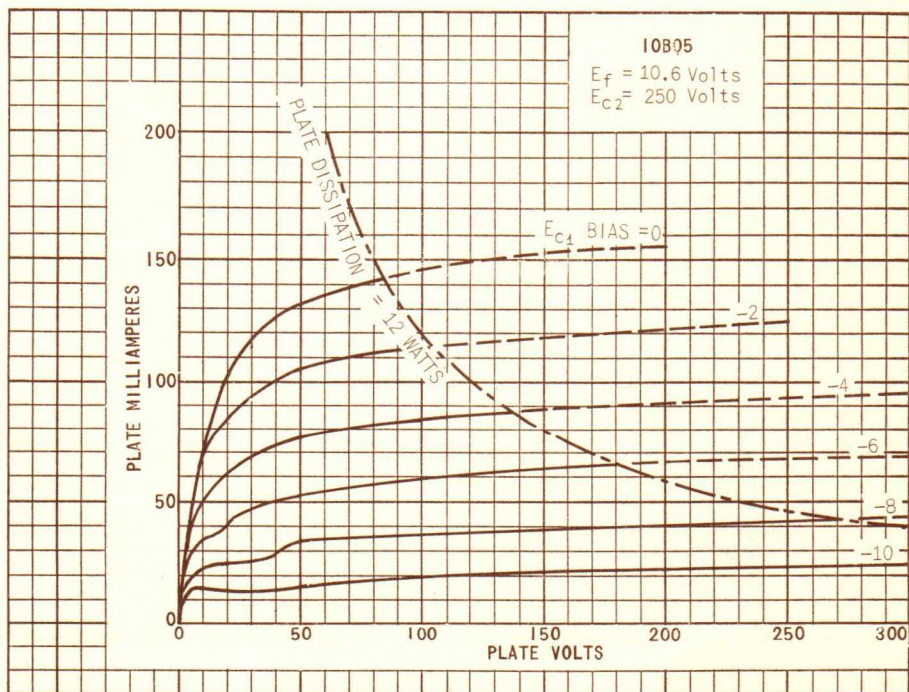
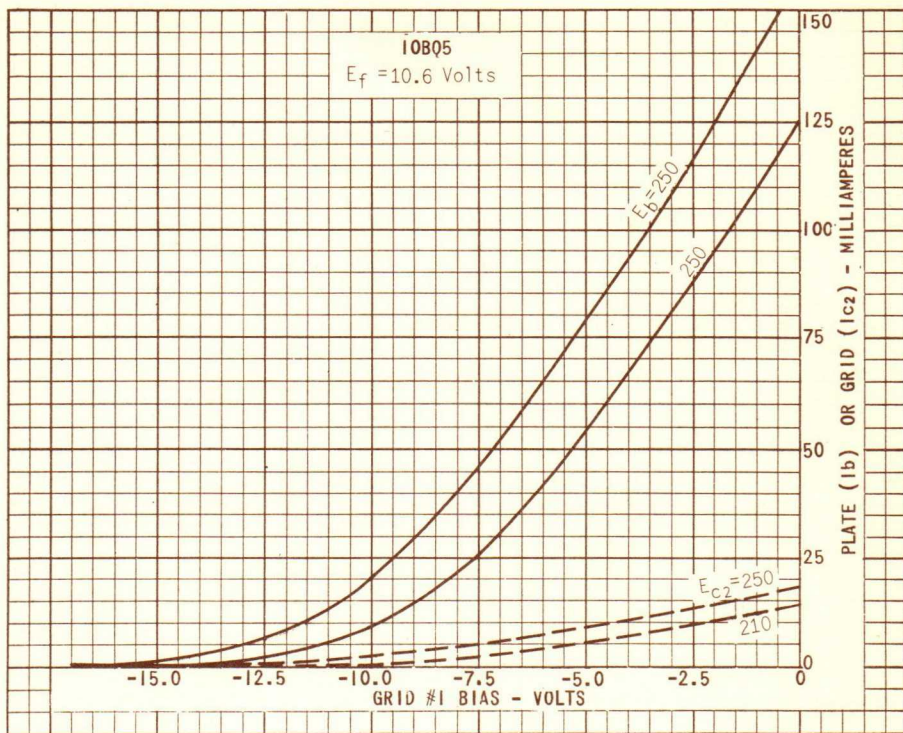
(GRID #2 CONNECTED TO PLATES)

|                                                          |        |        |          |
|----------------------------------------------------------|--------|--------|----------|
| PLATE VOLTAGE                                            | 250    | 300    | VOLTS    |
| COMMON CATHODE RESISTOR                                  | 270    | 270    | OHMS     |
| LOAD RESISTANCE (PLATE TO PLATE)                         | 10 000 | 10 000 | OHMS     |
| ZERO-SIGNAL PLATE CURRENT                                | 2x20   | 2x24   | MA.      |
| INPUT A.F. VOLTAGE (RMS)                                 | 8.3    | 10     | VOLTS    |
| MAX. SIGNAL PLATE CURRENT                                | 2x21.7 | 2x26   | MA.      |
| MAX. SIGNAL POWER OUTPUT                                 | 3.4    | 5.2    | WATTS    |
| TOTAL HARMONIC DISTORTION                                | 2.5    | 2.5    | PERCENTS |
| INPUT A.F. VOLTAGE AT A POWER OUTPUT OF 50 MWATTS (RMS.) | 0.95   | 0.9    | VOLTS    |

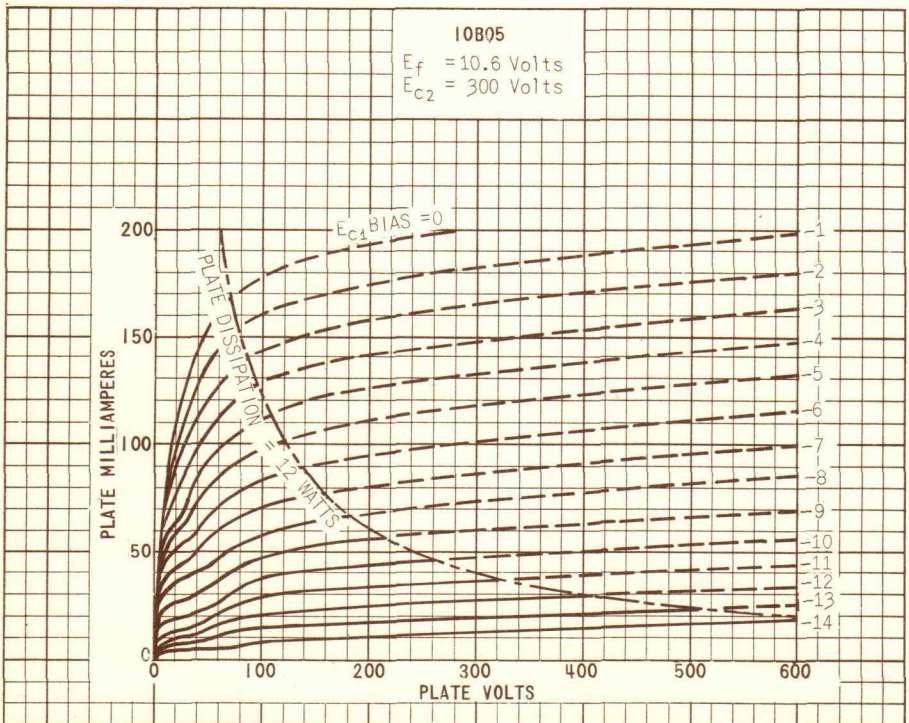
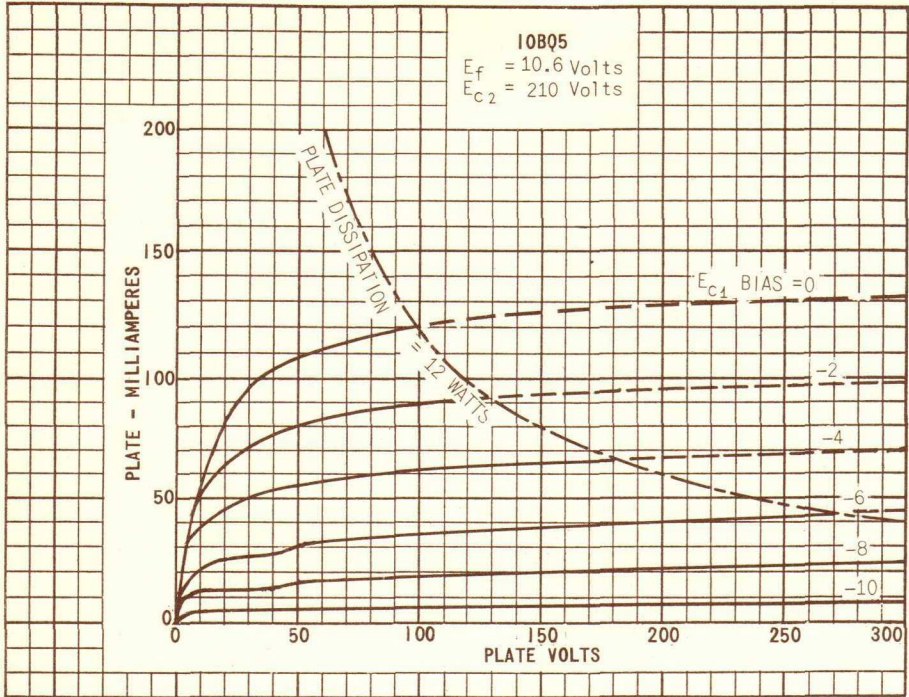
<sup>A</sup> WHEN THE HEATER AND POSITIVE VOLTAGES ARE OBTAINED FROM A STORAGE BATTERY BY MEANS OF A VIBRATOR, THE MAX. VALUES OF THE PLATE AND GRID #2 VOLTAGES ARE 250 VOLTS AND THAT OF THE PLATE DISSIPATION 9 WATTS.

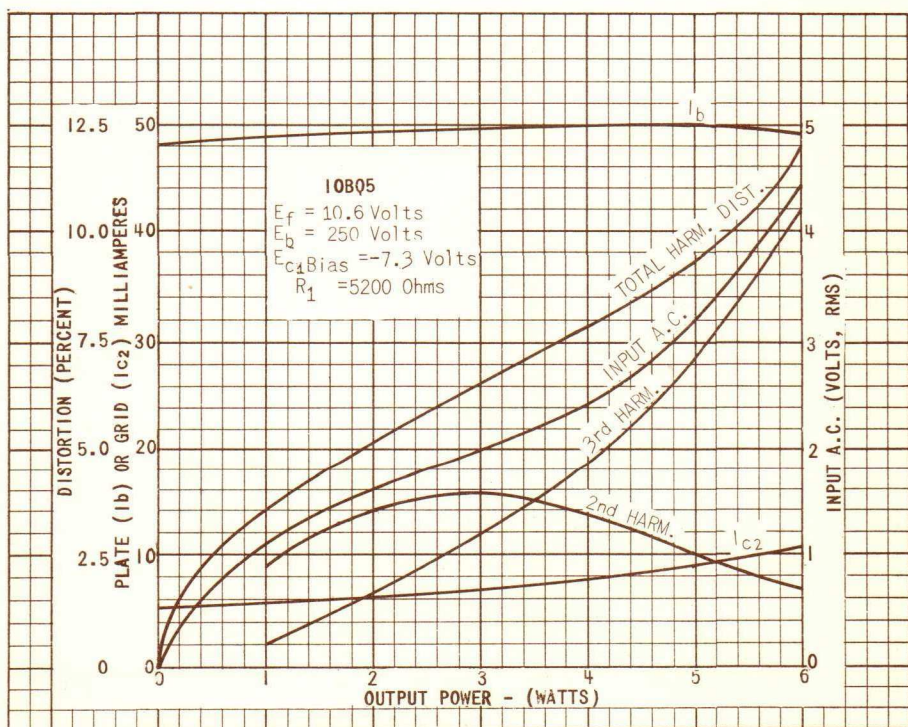
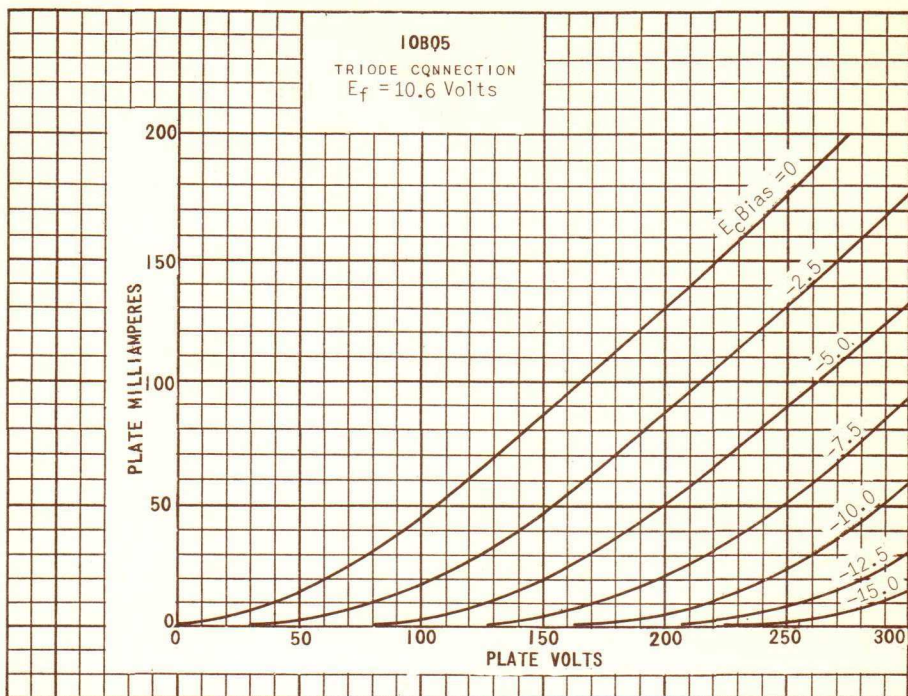
<sup>B</sup> MEASURED WITH FIXED BIAS.

<sup>C</sup> POWER OUTPUT AT START OF POSITIVE GRID CURRENT.

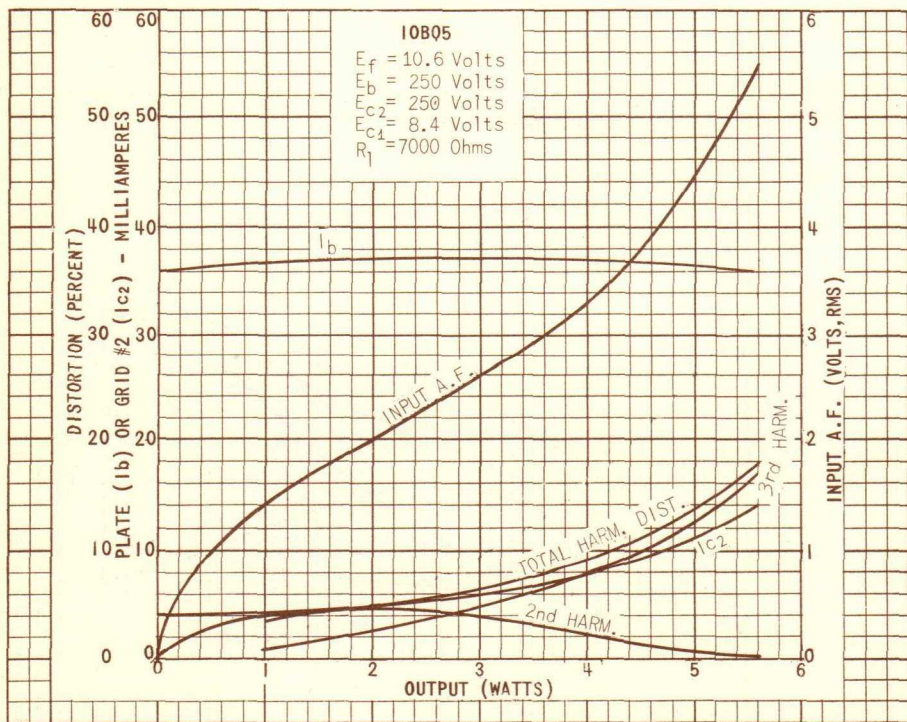
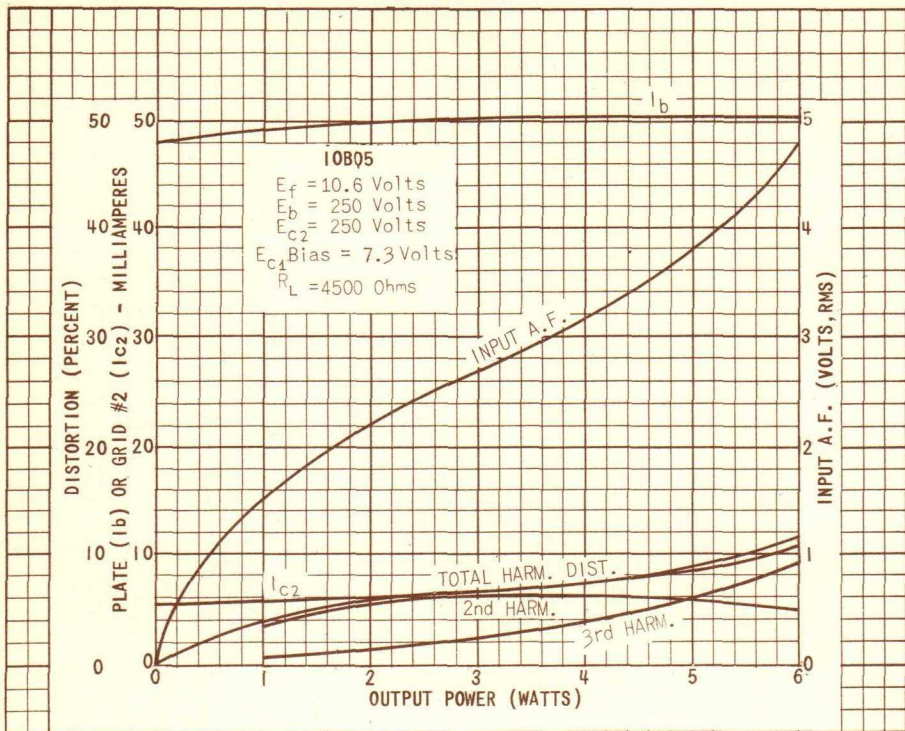


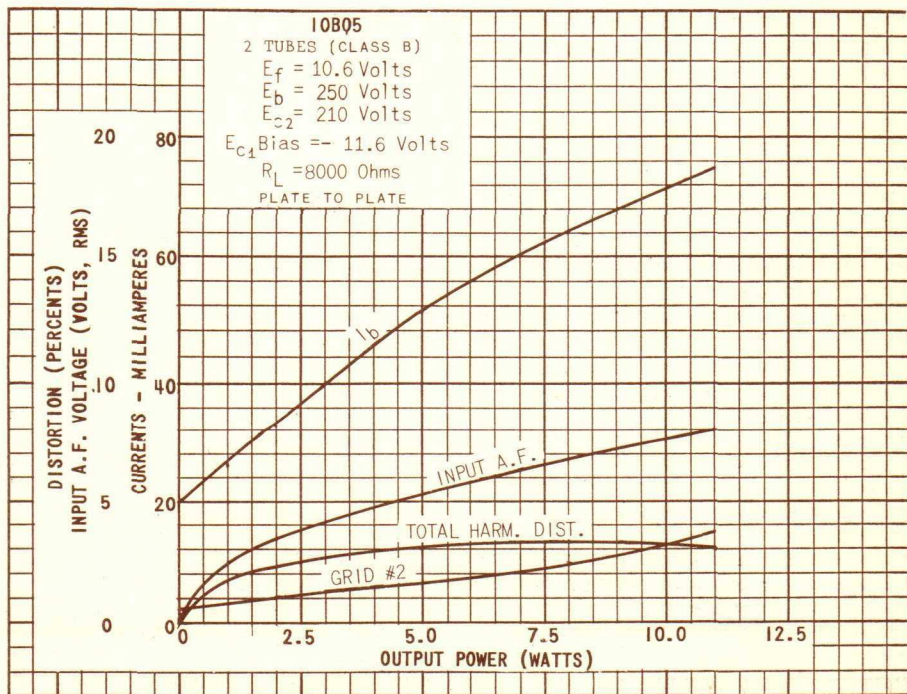
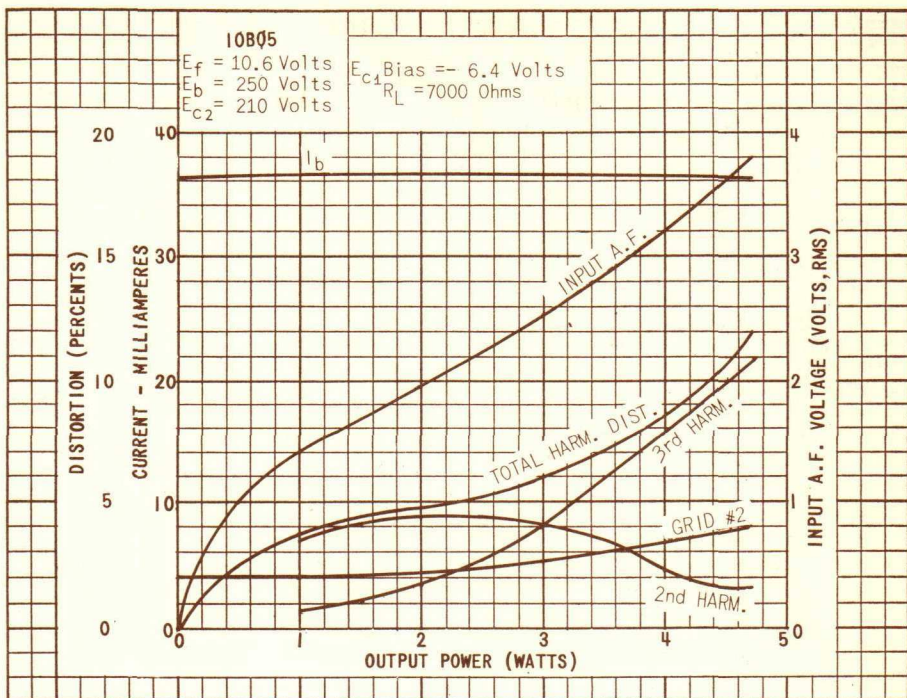
# 10BQ5



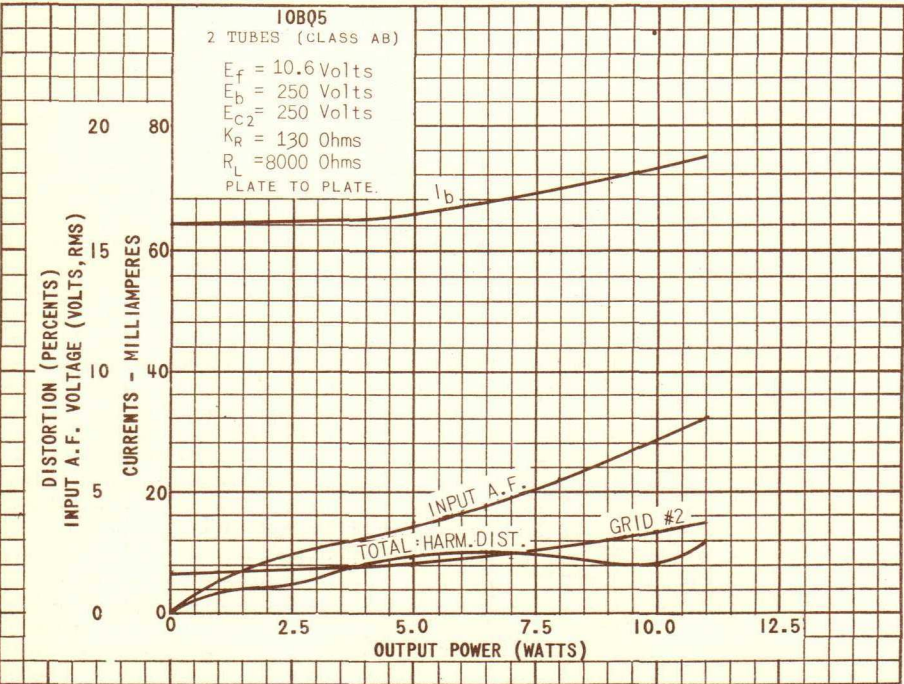
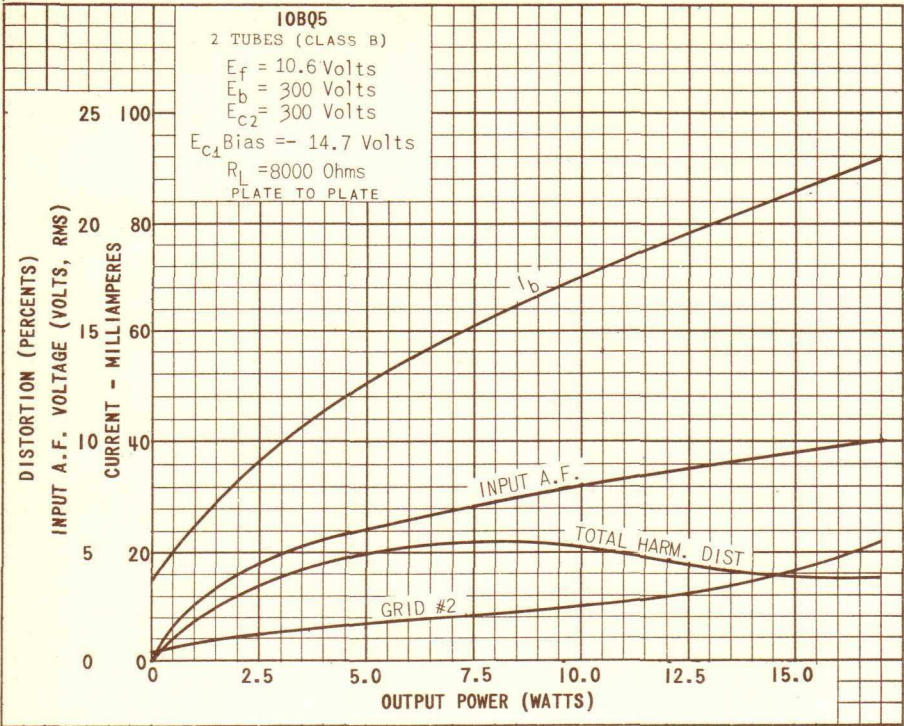


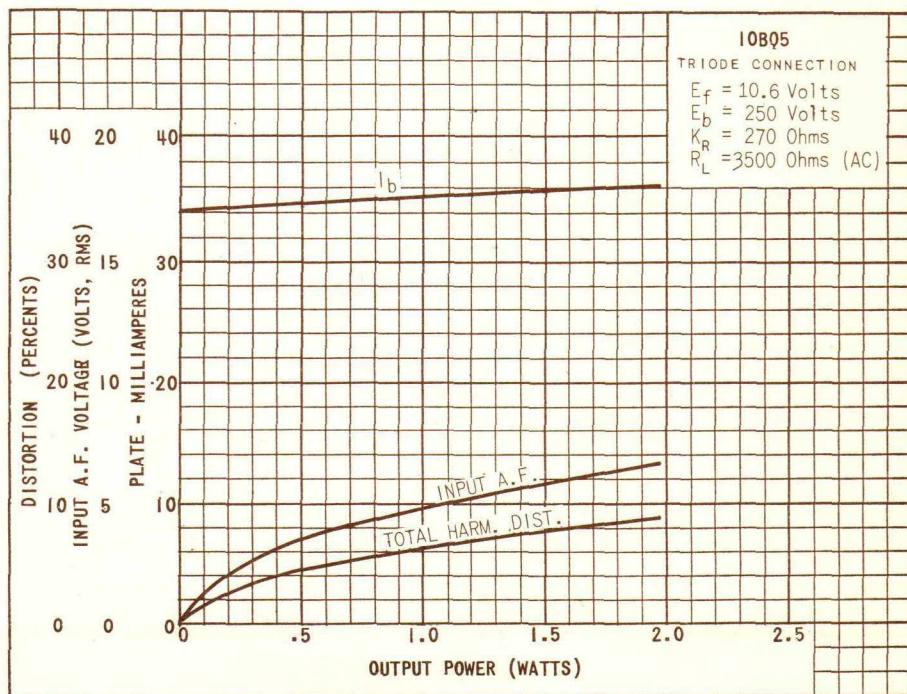
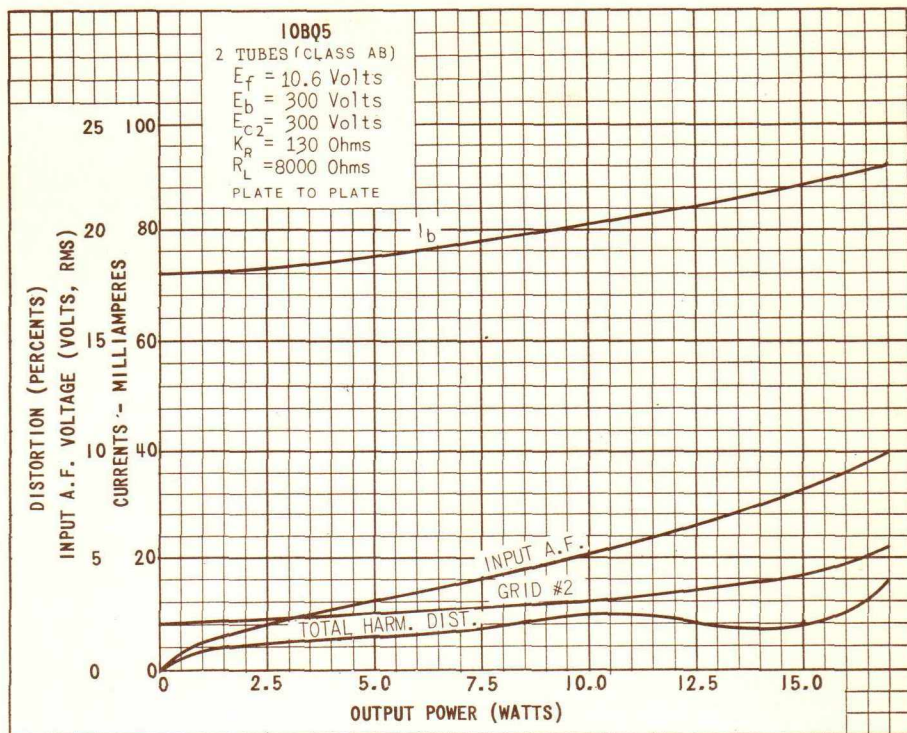
# 10BQ5





10BQ5





10BQ5

