

## Catalog: Amperex-HF656 (Hi-Fi and Audio tubes)



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**AMPEREX**

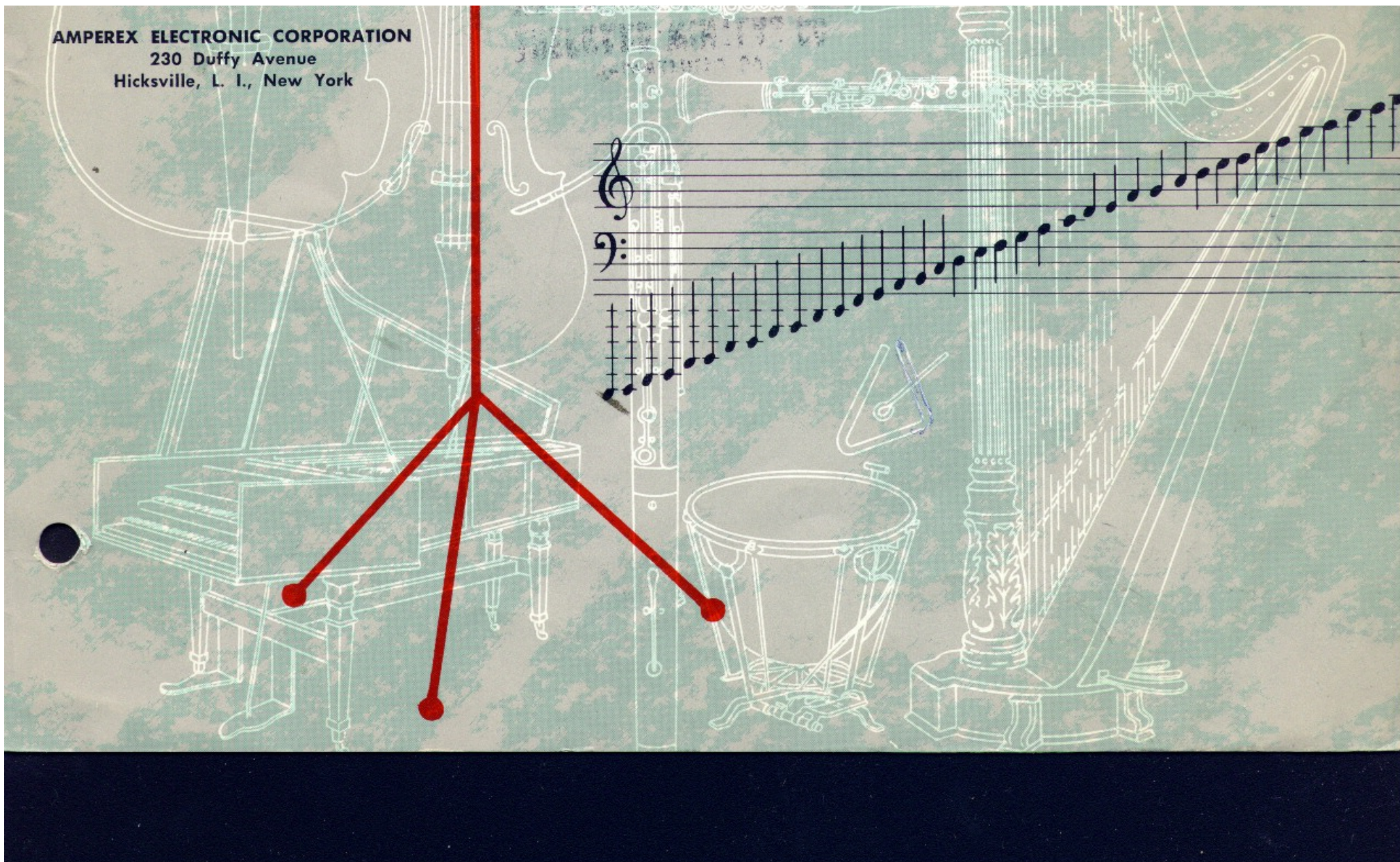
*complete series  
of tubes for*

**Hi Fi**

*audio equipment*

Represented by  
**SHEPARD-WINTERS CO.**  
7559 Melrose Ave., L. A. 46, Calif.  
WE. 8-2996

**AMPEREX ELECTRONIC CORPORATION**  
230 Duffy Avenue  
Hicksville, L. I., New York



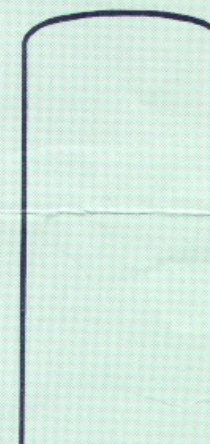
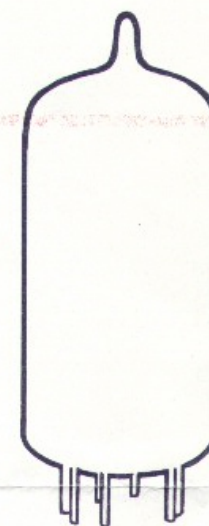
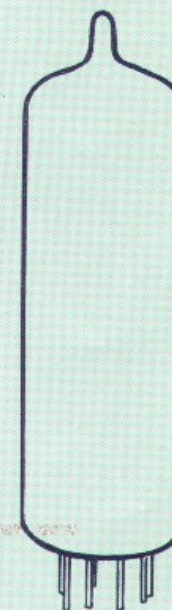
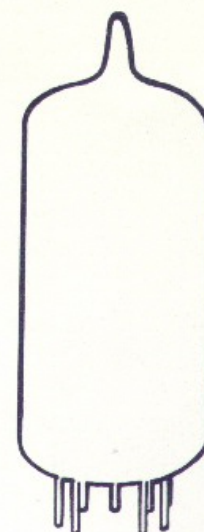


**Amperex** ELECTRONIC CORPORATION is proud to offer to its customers the unique developments of its affiliate, one of the largest tube manufacturers in the world, PHILIPS of the Netherlands.

We are pleased to introduce this line of tubes specifically designed for use in high quality audio equipment. Some of the design features of these tubes and performance possibilities are described in this folder.

Manufactured and tested under the highest standards, the complete series of Hi-Fi tubes have gained a world-wide reputation for superior performance under the most exacting conditions.

In addition to maintaining adequate stocks of these tubes in our Hicksville plant, the services and extensive experience of the Amperex Application Engineering Laboratory are available to the users of these tubes.



For further information communicate with AMPEREX  
ELECTRONIC CORPORATION, Semiconductor and Special Purpose  
Tube Department.

In addition to the AMPEREX tube types  
listed in this brochure, the following are  
also available. (Detailed data on request.)

**VOLTAGE AMPLIFIER TYPES**

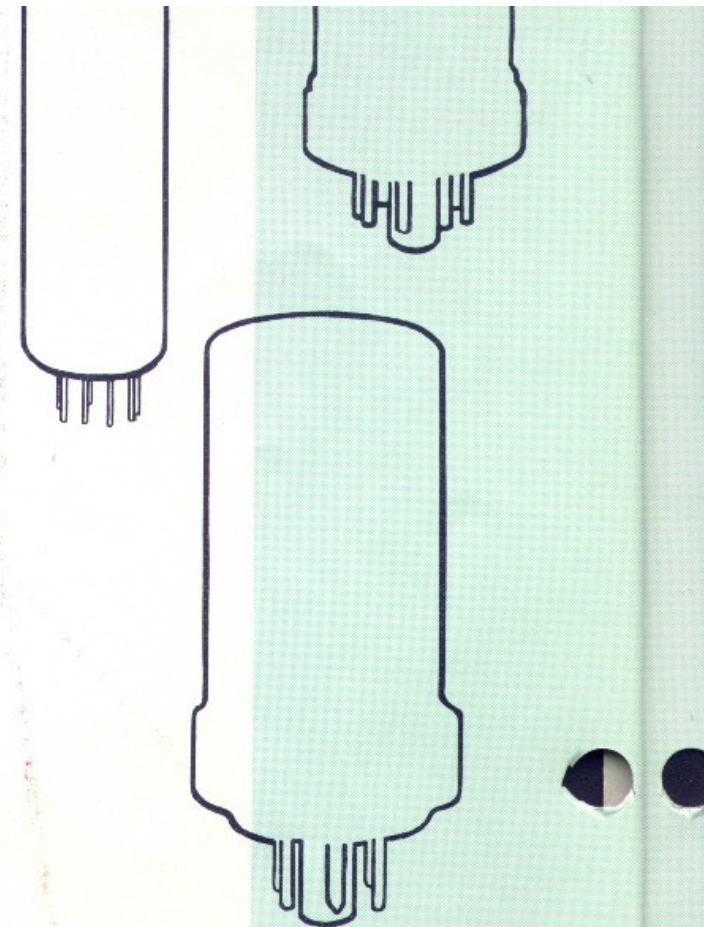
**ECC 81**—Medium-gain dual triode with low hum,  
noise and microphonics. Replaces the 12AT7 with-  
out circuit changes.

**ECC 82**—Low-gain dual triode with low hum, noise  
and microphonics.\* Replaces the 12AU7 without  
circuit changes.

*\*Maximum levels specified and guaranteed.*

**RECTIFIER TYPE**

**EZ 80**—Indirectly heated, full-wave rectifier with  
6.3 v., 0.6 amp. heater, 90 ma. output capacity and  
9-pin miniature construction.



NOV 19 1956

A high-gain pentode of special design, the EF 86 is particularly suitable for preamplifier and input stages, in which hum, noise and microphony must be kept to a minimum. The low-frequency noise generated by the tube is equivalent to a voltage of  $2 \mu\text{V}$  on the control grid for a bandwidth from 25 to 10,000 c/s. The electrode structure has been made particularly rigid to keep the microphony of the tube at a very low level. There are no appreciable internal resonances below 1000 c/s, the vibration at higher frequencies being effectively damped out by the chassis and the tube holder.

Hum is kept to a minimum by winding the heater as a bifilar twisted pair of wires, with the magnetic field of the one wire opposed to that of the other. Effective internal screening reduces the internal tube capacitances through which hum can be transferred to the output. The screening also shields the electrode structure from the alternating fields set up by transformers, etc., which otherwise would induce a.c. line frequency voltages in them.

#### HEATER

|                                                                           |     |   |
|---------------------------------------------------------------------------|-----|---|
| Filament Voltage                                                          | 6.3 | V |
| Filament Current                                                          | 0.2 | A |
| Can operate with other tube filaments in series or parallel, A.C. or D.C. |     |   |

#### CHARACTERISTICS

|                            |      |            |
|----------------------------|------|------------|
| Plate Voltage              | 250  | V          |
| Grid No. 3 Voltage         | 0    | V          |
| Grid No. 2 Voltage         | 140  | V          |
| Plate Current              | 3    | mA         |
| Grid No. 2 Current         | 0.6  | mA         |
| Grid No. 1 Voltage         | -2   | V          |
| Transconductance           | 2000 | micromhos  |
| Plate Resistance           | 2.5  | M $\Omega$ |
| Amplification Factor       |      |            |
| (Grid No. 1 to Grid No. 2) | 38   |            |

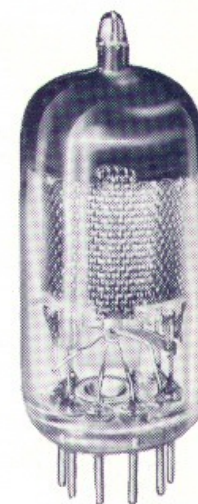
#### DESIGN CENTER MAXIMUM

|                                          |     |            |
|------------------------------------------|-----|------------|
| Plate Voltage                            | 300 | V          |
| Plate Dissipation                        | 1.0 | W          |
| Screen Dissipation                       | 0.2 | W          |
| Screen Voltage                           | 200 | V          |
| Cathode Current                          | 6.0 | mA         |
| Grid Resistance                          |     |            |
| (Plate Diss. > 0.2W)                     | 3.0 | M $\Omega$ |
| Grid Resistance                          |     |            |
| (Plate Diss. < 0.2W)                     | 10  | M $\Omega$ |
| Filament to Cathode Voltage (cath. pos.) | 100 | V          |
| Filament to Cathode Voltage (cath. neg.) | 50  | V          |
| Filament to Cathode Resistance max.**    | 20  | K $\Omega$ |

\*\*When used as a phase inverter immediately preceding the output stage, filament to cathode resistance max. may be 120 K $\Omega$ .

#### TYPICAL OPERATING CONDITIONS

Operating Conditions as R.C. Coupled A. F. Amplifier  
PENTODE CONNECTION



**EF86**  
(6267)

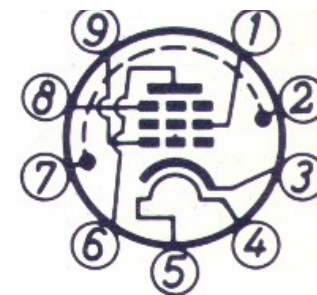
| $E_b$<br>(V) | $R_1$<br>(k $\Omega$ ) | $I_k$<br>(mA) | $R_{g2}$<br>(M $\Omega$ ) | $R_k$<br>(k $\Omega$ ) | Voltage<br>Gain | $E_o$<br>(V <sub>r m s</sub> ) | $d_{tot}$<br>(%) | $R_{g1}^\ddagger$<br>(k $\Omega$ ) |
|--------------|------------------------|---------------|---------------------------|------------------------|-----------------|--------------------------------|------------------|------------------------------------|
| 400          | 100                    | 3.3           | 0.39                      | 1.0                    | 124             | 87                             | 5.0              | 330                                |
| 350          | 100                    | 2.85          | 0.39                      | 1.0                    | 120             | 75                             | 5.0              | 330                                |
| 300          | 100                    | 2.45          | 0.39                      | 1.0                    | 116             | 64                             | 5.0              | 330                                |
| 250          | 100                    | 2.05          | 0.39                      | 1.0                    | 112             | 50                             | 5.0              | 330                                |
| 200          | 100                    | 1.65          | 0.39                      | 1.0                    | 106             | 40                             | 5.0              | 330                                |
| 100          | 100                    | 1.0           | 0.47                      | 1.5                    | 95              | 22                             | 5.0              | 330                                |
| 400          | 220                    | 1.55          | 1.0                       | 2.2                    | 200             | 73                             | 5.0              | 680                                |
| 350          | 220                    | 1.4           | 1.0                       | 2.2                    | 196             | 63                             | 5.0              | 680                                |
| 300          | 220                    | 1.1           | 1.0                       | 2.2                    | 188             | 54                             | 5.0              | 680                                |
| 250          | 220                    | 0.9           | 1.0                       | 2.2                    | 180             | 46                             | 5.0              | 680                                |
| 200          | 220                    | 0.75          | 1.0                       | 2.2                    | 170             | 36                             | 5.0              | 680                                |
| 100          | 220                    | 0.55          | 1.0                       | 2.7                    | 150             | 24.5                           | 5.0              | 680                                |

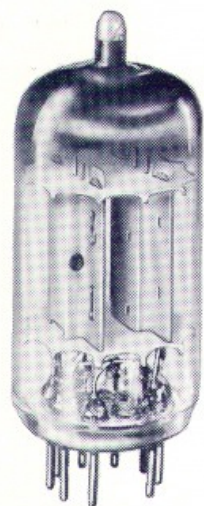
TRIODE CONNECTION ( $g_2$  to pl:  $g_3$  to k)

| $E_b$<br>(V) | $R_p$<br>(k $\Omega$ ) | $I_p$<br>(mA) | $R_k$<br>(k $\Omega$ ) | Voltage<br>Gain | $E_o^*$<br>(V <sub>r m s</sub> ) | $d_{tot}^*$<br>(%) | $R_{g1}^\ddagger$<br>(k $\Omega$ ) |
|--------------|------------------------|---------------|------------------------|-----------------|----------------------------------|--------------------|------------------------------------|
| 400          | 220                    | 1.05          | 3.9                    | 32              | 74                               | 3.8                | 680                                |
| 350          | 220                    | 0.9           | 3.9                    | 31.5            | 62                               | 3.7                | 680                                |
| 300          | 220                    | 0.8           | 3.9                    | 31              | 51                               | 3.7                | 680                                |
| 250          | 220                    | 0.65          | 3.9                    | 30.5            | 39                               | 3.5                | 680                                |
| 200          | 220                    | 0.5           | 3.9                    | 30.5            | 28                               | 3.1                | 680                                |

\*Output voltage and distortion at start of positive grid current. At lower output voltages the distortion is approximately proportional to the voltage.

$^\ddagger$ Grid resistor of following tube.





**ECC83**  
(12AX7)



R.C. coupled amplifiers or phase splitters can conveniently be built around a high- $\mu$  double triode with separate cathodes such as the ECC 83. The amplification factor of this tube is 100, so that adequate gain can be obtained in the cathode-coupled type of phase splitter used for the AMPEREX-designed 5-tube 10-W amplifier and the 20-W amplifier using 6CA7 output tubes.

### HEATER

Can operate with other tube filaments in series or parallel, A.C. or D.C.

The heater is center-tapped and the two sections may be operated in series or in parallel.

*Series:* Filament voltage applied between pins 4 and 5.

*Parallel:* Filament voltage applied between pin 9 and pins 4 and 5 connected together.

|                  | <i>Series</i> | <i>Parallel</i> |   |
|------------------|---------------|-----------------|---|
| Filament Voltage | 12.6          | 6.3             | V |
| Filament Current | 0.15          | 0.3             | A |

### CHARACTERISTICS (each section)

|                      |      |      |            |
|----------------------|------|------|------------|
| Plate Voltage        | 100  | 250  | V          |
| Plate Current        | 0.5  | 1.2  | mA         |
| Grid No. 1 Voltage   | -1.0 | -2.0 | V          |
| Transconductance     | 1250 | 1600 | micromhos  |
| Amplification Factor | 100  | 100  |            |
| Plate Resistance     | 80   | 62.5 | K $\Omega$ |

### DESIGN CENTER MAXIMUM (each section)

|                                  |     |            |
|----------------------------------|-----|------------|
| Plate Voltage                    | 300 | V          |
| Plate Dissipation                | 1.0 | W          |
| Cathode Current                  | 8.0 | mA         |
| Grid Resistance**                | 2   | M $\Omega$ |
| Filament to Cathode Voltage      | 180 | V          |
| Filament to Cathode Resistance†† | 20  | K $\Omega$ |

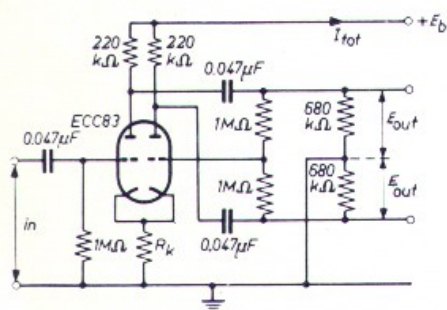
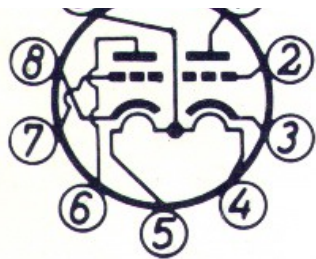
\*\*With grid current biasing max. grid resistance = 22 M $\Omega$ .

††When used as a phase inverter immediately preceding the output stage, filament to cathode resistance max. may be 150 K $\Omega$ .

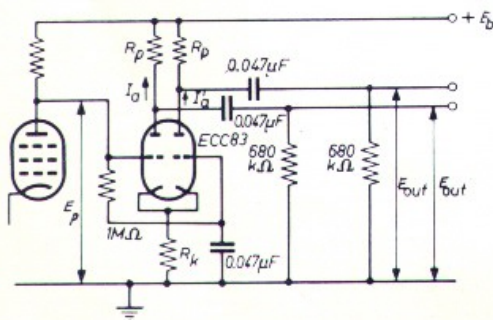
### TYPICAL OPERATING CONDITIONS

Operating Conditions as R. C. Coupled A. F. Amplifier  
(with cathode bias)

| $E_b$<br>(V) | $R_p$<br>(k $\Omega$ ) | $I_k$<br>(mA) | $R_k$<br>( $\Omega$ ) | Voltage<br>Gain | $E_o^*$<br>(V <sub>rms</sub> ) | $d_{tot}^*$<br>(%) | $R_{g1}^\ddagger$<br>(k $\Omega$ ) |
|--------------|------------------------|---------------|-----------------------|-----------------|--------------------------------|--------------------|------------------------------------|
| 400          | 47                     | 2.45          | 680                   | 44              | 37                             | 3.6                | 150                                |
| 350          | 47                     | 1.98          | 820                   | 42.5            | 33                             | 4.4                | 150                                |
| 300          | 47                     | 1.55          | 1000                  | 40              | 26                             | 5.0                | 150                                |
| 250          | 47                     | 1.18          | 1200                  | 37.5            | 23                             | 7.0                | 150                                |
| 200          | 47                     | 0.86          | 1500                  | 34              | 18                             | 8.5                | 150                                |
| 400          | 100                    | 1.72          | 820                   | 63              | 38                             | 1.7                | 330                                |
| 350          | 100                    | 1.40          | 1000                  | 61              | 36                             | 2.2                | 330                                |
| 300          | 100                    | 1.11          | 1200                  | 57              | 30                             | 2.7                | 330                                |
| 250          | 100                    | 0.86          | 1500                  | 54.5            | 26                             | 3.9                | 330                                |
| 200          | 100                    | 0.65          | 1800                  | 50              | 20                             | 4.8                | 330                                |
| 400          | 220                    | 1.02          | 1200                  | 76.5            | 38                             | 1.1                | 680                                |
| 350          | 220                    | 0.85          | 1500                  | 75.5            | 37                             | 1.6                | 680                                |
| 300          | 220                    | 0.63          | 2200                  | 72              | 36                             | 2.6                | 680                                |
| 250          | 220                    | 0.48          | 2700                  | 66.5            | 28                             | 3.4                | 680                                |
| 200          | 220                    | 0.36          | 3300                  | 56              | 24                             | 4.6                | 680                                |



Circuit A



Circuit B

\*Output voltage and distortion at start of positive grid current. At lower output voltages the distortion is approximately proportional to the voltage.

‡Grid resistor of following tube.

### Typical Operating Conditions as a Phase Inverter

#### CIRCUIT A

| $E_b$<br>(V) | $I_{tot}$<br>(mA) | $R_k$<br>(Ω) | $E_o^*$<br>(V <sub>r m s</sub> ) | Voltage<br>Gain | $d_{tot}^*$<br>(%) |
|--------------|-------------------|--------------|----------------------------------|-----------------|--------------------|
| 250          | 1.08              | 1200         | 35                               | 58              | 5.5                |
| 250          | 1.08              | 1200         | 7                                | 58              | 1.1                |
| 350          | 1.7               | 820          | 45                               | 62              | 3.5                |
| 350          | 1.7               | 820          | 7                                | 62              | 0.7                |

#### CIRCUIT B

| $E_b$ ‡ $E_p$ (approx.)<br>(V) | $I_p + I_p$<br>(mA) | $R_k$<br>(k $\Omega$ ) | $R_p$<br>(k $\Omega$ ) | $E_o^*$<br>( $V_{r\ m\ s}$ ) | Voltage<br>Gain | $d_{tot}^*$<br>(%) |
|--------------------------------|---------------------|------------------------|------------------------|------------------------------|-----------------|--------------------|
| 250                            | 65                  | 1.0                    | 68                     | 100                          | 20              | 25                 |
| 250                            | 65                  | 1.0                    | 68                     | 100                          | 9               | 25                 |
| 350                            | 90                  | 1.2                    | 82                     | 150                          | 35              | 27                 |
| 350                            | 90                  | 1.2                    | 82                     | 150                          | 10              | 27                 |

\*Output voltage and distortion at start of positive grid current. At lower output voltages the distortion is approximately proportional to the voltage.

‡(Approx)  $E_p$  should be adjusted so that  $I_p + I_p' = 1.0\text{mA}$  at  $E_b = 250\text{ V}$  and  $1.2\text{mA}$  at  $E_b = 350\text{ V}$ .

#### NOTES

**MICROPHONICS** The tube can be used without special precautions against microphonic effect in amplifiers in which the input voltage is higher than 50 millivolts when the tube is mounted in the near vicinity of a 5 watt loud speaker with an acoustical efficiency of 5%.

**HUM** The hum and noise level will be better than -60 db when the grid circuit impedance is less than 0.5 megohms (at 60 cps), the center tap of the heater is grounded and the cathode resistor is decoupled by a capacitor of at least 100 uf.

When operated in a single-ended output stage, the EL84 can deliver an output of up to 5.7 watts at 10% total harmonic distortion, and two EL84's in pentode push-pull yield an output of up to 17 watts at 4% distortion. As these figures suggest, this tube makes available the higher peak powers and low distortion required in medium power amplifiers used as present day high-fidelity phonograph components.

The true pentode characteristics of this tube reduce distortion at low instantaneous plate voltages which allow larger A.C. swings and increased undistorted output as compared with beam power tubes in the same power class.

#### HEATER

|                  |      |   |
|------------------|------|---|
| Filament Voltage | 6.3  | V |
| Filament Current | 0.76 | A |

#### CHARACTERISTICS

|                                                       |        |            |
|-------------------------------------------------------|--------|------------|
| Plate Voltage                                         | 250    | V          |
| Grid No. 2 Voltage                                    | 250    | V          |
| Plate Current                                         | 48     | mA         |
| Grid No. 2 Current                                    | 5.5    | mA         |
| Grid No. 1 Voltage                                    | -7.3   | V          |
| Transconductance                                      | 11,300 | micromhos  |
| Plate Resistance                                      | 38     | K $\Omega$ |
| Amplification Factor<br>(Grid No. 1 to<br>Grid No. 2) | 19     |            |

#### DESIGN CENTER MAXIMUM

|                                         |     |            |
|-----------------------------------------|-----|------------|
| Plate Voltage                           | 300 | V          |
| Plate Dissipation                       | 12  | W          |
| Grid No. 2 Voltage                      | 300 | V          |
| Grid No. 2 Dissipation<br>(zero signal) | 2.0 | W          |
| Grid No. 2 Dissipation<br>(max. signal) | 4.0 | W          |
| Cathode Current                         | 65  | mA         |
| Grid Resistance<br>(cathode bias)       | 1.0 | M $\Omega$ |
| Grid Resistance<br>(fixed bias)         | 300 | K $\Omega$ |
| Filament to<br>Cathode Voltage          | 100 | V          |

#### TYPICAL OPERATING CONDITIONS

Operating conditions as single tube Class "A" Amplifier

|                                                      |      |      |            |
|------------------------------------------------------|------|------|------------|
| Plate Voltage                                        | 250  | 250  | V          |
| Grid No. 2 Voltage                                   | 250  | 250  | V          |
| Plate Load Resistance                                | 5.2  | 4.5  | K $\Omega$ |
| Cathode Resistor                                     | 135  | 135  | $\Omega$   |
| Grid No. 1 Voltage                                   | -7.3 | -7.3 | V          |
| Plate Current                                        | 48   | 48   | mA         |
| Grid No. 2 Current                                   | 5.5  | 5.5  | mA         |
| Input (rms) Signal Voltage<br>(output power = 50 mW) | 0.3  | 0.3  | V          |
| Output Power ( $d_{tot} = 10\%$ ) $\dagger$          | 5.7  | 5.7  | W          |
| Input (rms) Signal Voltage ( $d_{tot} = 10\%$ )      | 4.2  | 4.4  | V          |



**EL84**  
(6BQ5)

i.c.

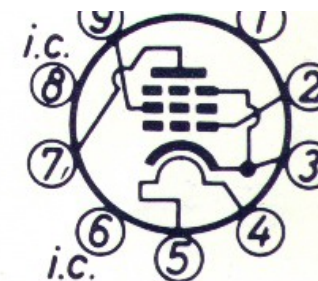
|                                                 |     |     |   |
|-------------------------------------------------|-----|-----|---|
| Input (rms) Signal Voltage ( $d_{tot} = 10\%$ ) | 4.5 | 4.4 | V |
| Percent 3rd Harmonic Distortion                 | 9.5 | 8.0 | % |
| Percent 2nd Harmonic Distortion                 | 2.0 | 5.0 | % |

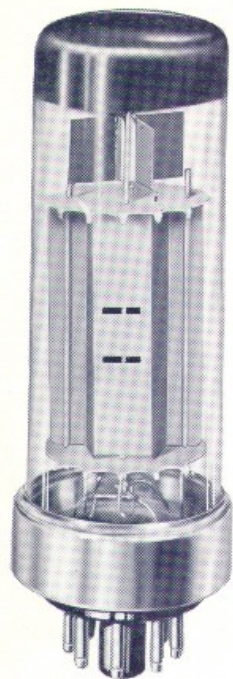
‡Output power and  $d_{tot}$  are measured at fixed bias and therefore represent the power output available during the reproduction of speech and music. When a sustained sine wave is applied to the control grid, the bias across the cathode resistor will readjust itself as a result of the increased plate and screen-grid currents. This will result in approximately 10% reduction in power output.

### Operating conditions for two tubes in class "AB" Push-Pull

(See Figs. 2 and 3)

|                                |          |         |            |
|--------------------------------|----------|---------|------------|
| Plate Voltage                  | 250      | 300     | V          |
| Grid No. 2 Voltage             | 250      | 300     | V          |
| Common Cathode Resistance      | 130      | 130     | $\Omega$   |
| Plate to Plate Load Resistance | 8.0      | 8.0     | K $\Omega$ |
| Zero Signal Plate Current      | 2 x 31   | 2 x 36  | mA         |
| Max. Signal Plate Current      | 2 x 37.5 | 2 x 46  | mA         |
| Zero Signal Grid No. 2 Current | 2 x 3.5  | 2 x 4.0 | mA         |
| Max. Signal Grid No. 2 Current | 2 x 7.5  | 2 x 11  | mA         |
| Input Signal Voltage (rms)     | 8        | 10      | V          |
| Power Output                   | 11       | 17      | W          |
| Percent Distortion             | 3.0      | 4.0     | %          |





# 6CA7

(EL34)

Amplifiers which provide a nominal output of 20 W to handle music with high reserve peak powers or even higher powers for public address equipment, can include an output stage equipped with two 6CA7's in push-pull.

An interesting method of connecting the push-pull output stage (Fig. 1) has been used in a recently published amplifier design. The screen grids of the 6CA7 are connected to taps on the primary of the output transformer, so that the operating conditions lie somewhere between those of a triode ("tap" connected to plate) and those of a pentode (screen grid connected to primary centertap). Thus the low distortion of a triode is combined with the high sensitivity of a pentode. The tubes are said to be operated with distributed load. Two 6CA7's in the output stage illustrated can yield an output of 20 W at 0.8% total harmonic distortion, or 37 W at 1.3% distortion, with 430 V between each plate and ground.

For public address equipment, line voltages of up to 800 V can be used, and two 6CA7's in pentode push-pull with fixed bias give an output of up to 100 W.

The maximum plate dissipation of the 6CA7 is 25 W, and it has a high mutual conductance of 11,000 micromhos.

## HEATER

|                  |     |   |
|------------------|-----|---|
| Filament Voltage | 6.3 | V |
| Filament Current | 1.5 | A |

## CHARACTERISTICS

|                      |        |            |
|----------------------|--------|------------|
| Plate Voltage        | 250    | V          |
| Grid No. 2 Voltage   | 250    | V          |
| Grid No. 3 Voltage   | 0      | V          |
| Plate Current        | 100    | mA         |
| Grid No. 2 Current   | 14.9   | mA         |
| Grid No. 1 Voltage   | -13.5  | V          |
| Transconductance     | 11,000 | micromhos  |
| Plate Resistance     | 15     | K $\Omega$ |
| Amplification Factor |        |            |
| (Grid No. 1 to       |        |            |
| Grid No. 2)          | 11     |            |

## DESIGN CENTER MAXIMUM

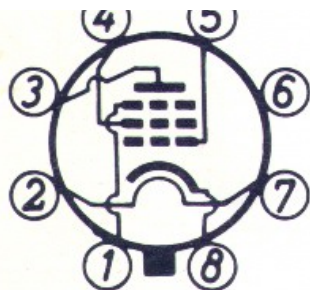
|                        |      |            |
|------------------------|------|------------|
| Plate Voltage          | 800  | V          |
| Plate Dissipation      | 25   | W          |
| Plate Dissipation      |      |            |
| (max. signal speech    |      |            |
| & music)               | 27.5 | W          |
| Grid No. 2 Voltage     | 425  | V          |
| Grid No. 2 Dissipation | 8.0  | W          |
| Cathode Current        | 150  | mA         |
| Grid Resistance        |      |            |
| (cathode bias)         | 700  | K $\Omega$ |
| Grid Resistance        |      |            |
| (fixed bias)           | 500  | K $\Omega$ |
| Filament to            |      |            |
| Cathode Voltage        | 100  | V          |

## TYPICAL OPERATING CONDITIONS

### Operating Conditions for Two Tubes in Push-Pull

Distributed load conditions with screen-grid tapping at 43% of primary turn (see fig. 1)

|                                             |          |          |            |
|---------------------------------------------|----------|----------|------------|
| Plate Voltage ( $V_p + V_{Rk}$ )            | 430      | 430      | V          |
| Grid No. 2 Resistor ( $R_{g2}$ ) (per tube) | 1        | 1        | K $\Omega$ |
| Screen Voltage ( $V_{g2} + V_{Rk}$ )        | 425      | 425      | V          |
| Plate Current (zero signal)                 | 2 x 62.5 | 2 x 62.5 | mA         |
| Plate Current (max. signal)                 | 2 x 65   | 2 x 70   | mA         |
| Grid No. 2 Current (zero signal)            | 2 x 5.0  | 2 x 5.0  | mA         |



|                                       |         |         |            |
|---------------------------------------|---------|---------|------------|
| Grid No. 2 Current (zero signal)      | 2 x 5.0 | 2 x 5.0 | mA         |
| Grid No. 2 Current (max. signal)      | 2 x 5.1 | 2 x 7.5 | mA         |
| Cathode Resistor ( $R_k$ ) (per tube) | 470     | 470     | $\Omega$   |
| Signal Input Voltage (rms)            | 16      | 26      | V          |
| Plate to Plate Load Resistance        | 6.6     | 6.6     | K $\Omega$ |
| Power Output                          | 20      | 37      | W          |
| Percent Distortion                    | 0.8     | 1.3     | %          |

These operating conditions $\ddagger$  apply with stabilized line voltages and allow for a 25 V drop in the primary winding of the output transformer at maximum signal. If there is an additional drop of 25 V in the line voltages at maximum signal, power output = 90 W. The optimum plate-to-plate load under these conditions is 11 K $\Omega$ .

|                                   |         |            |
|-----------------------------------|---------|------------|
| Plate Supply Voltage              | 800     | V          |
| Grid No. 2 Supply Voltage         | 400     | V          |
| Grid No. 2 Resistor ( $R_{g2}$ )* | 750     | $\Omega$   |
| Grid No. 3 Voltage                | 0       | V          |
| Zero Signal Plate Current         | 2 x 25  | mA         |
| Max. Signal Plate Current         | 2 x 91  | mA         |
| Zero Signal Grid No. 2 Current    | 2 x 3.0 | mA         |
| Max. Signal Grid No. 2 Current    | 2 x 19  | mA         |
| Grid No. 1 Voltage                | -39     | V          |
| Plate to Plate Load Resistance    | 11      | K $\Omega$ |
| Input Signal Voltage (rms)        | 23.4    | V          |
| Power Output                      | 100     | W          |
| Percent Distortion                | 5.0     | %          |

\*Common to both tubes.

$\ddagger$ With separate screen-grid supply and fixed bias.

## HEATER

|                  |     |   |
|------------------|-----|---|
| Filament Voltage | 6.3 | V |
| Filament Current | 1.0 | A |

## DESIGN CENTER MAXIMUM

|                               |     |         |
|-------------------------------|-----|---------|
| A. C. Supply (plate to plate) |     |         |
| Voltage (rms)                 | 700 | V       |
| Peak Inverse Voltage          | 1.0 | KV      |
| Peak Plate Current            | 450 | mA      |
| D. C. Output Current          | 150 | mA      |
| Max. Capacity                 |     |         |
| (condenser input filter)      | 50  | $\mu$ f |
| Cathode to Filament Voltage*  | 500 | V       |

\*Heater negative

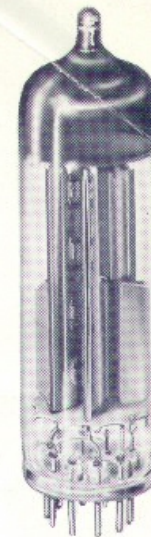
## TYPICAL OPERATION

|                                             |     |     |     |          |
|---------------------------------------------|-----|-----|-----|----------|
| A. C. Supply (plate to plate) Voltage (rms) | 500 | 600 | 700 | V        |
| D. C. Output Current                        | 150 | 150 | 150 | mA       |
| Max. Capacity (condenser input filter)      | 50  | 50  | 50  | $\mu$ f  |
| Limiting Resistor (min.) <sup>‡</sup>       | 150 | 200 | 240 | $\Omega$ |
| D. C. Output Voltage                        | 245 | 293 | 347 | V        |

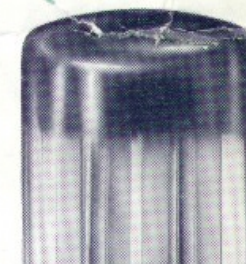
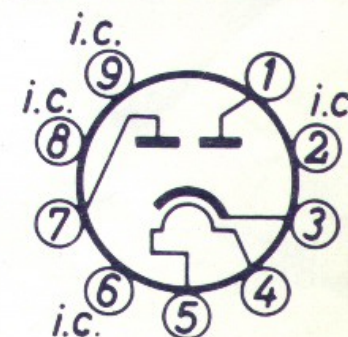
<sup>‡</sup> Per plate

These two tubes are full-wave rectifiers. The EZ 81 has a noval base and a 6.3 volt, 1 amp heater. It can supply output currents of up to 150 milliamps, and is therefore suitable for the AMPEREX 5-tube 10-watt amplifier circuit when the circuit is arranged for normal or low loading (plate to plate load 8000  $\Omega$  or 6000  $\Omega$ ), with or without a radio feeder unit.

The GZ 34 is mounted on an octal base and has a 5 volt, 1.9 amp heater. It can supply output currents of up to 250 milliamps.



# EZ81



## HEATER

|                  |     |   |
|------------------|-----|---|
| Filament Voltage | 5.0 | V |
| Filament Current | 1.9 | A |

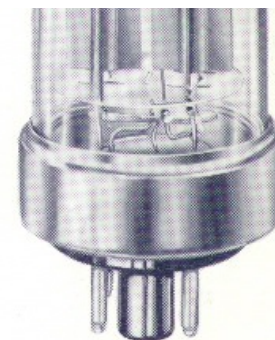
## DESIGN CENTER MAXIMUM

|                                                |      |         |
|------------------------------------------------|------|---------|
| A. C. Supply (plate to plate)<br>Voltage (rms) | 1100 | V       |
| Peak Inverse Voltage                           | 1.5  | KV      |
| Peak Plate Current                             | 750  | mA      |
| D. C. Output Current                           | 250  | mA      |
| Max. Capacity<br>(condenser input filter)      | 60   | $\mu$ f |

## TYPICAL OPERATION

|                                             |     |     |      |          |
|---------------------------------------------|-----|-----|------|----------|
| A. C. Supply (plate to plate) Voltage (rms) | 600 | 900 | 1100 | V        |
| D. C. Output Current                        | 250 | 250 | 160  | mA       |
| Max. Capacity (condenser input filter)      | 60  | 60  | 60   | $\mu$ f  |
| Limiting Resistor (min.) $\ddagger$         | 50  | 125 | 175  | $\Omega$ |
| D. C. Output Voltage                        | 300 | 450 | 610  | V        |

$\ddagger$  Per Plate



# GZ34

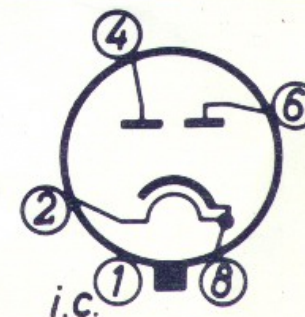
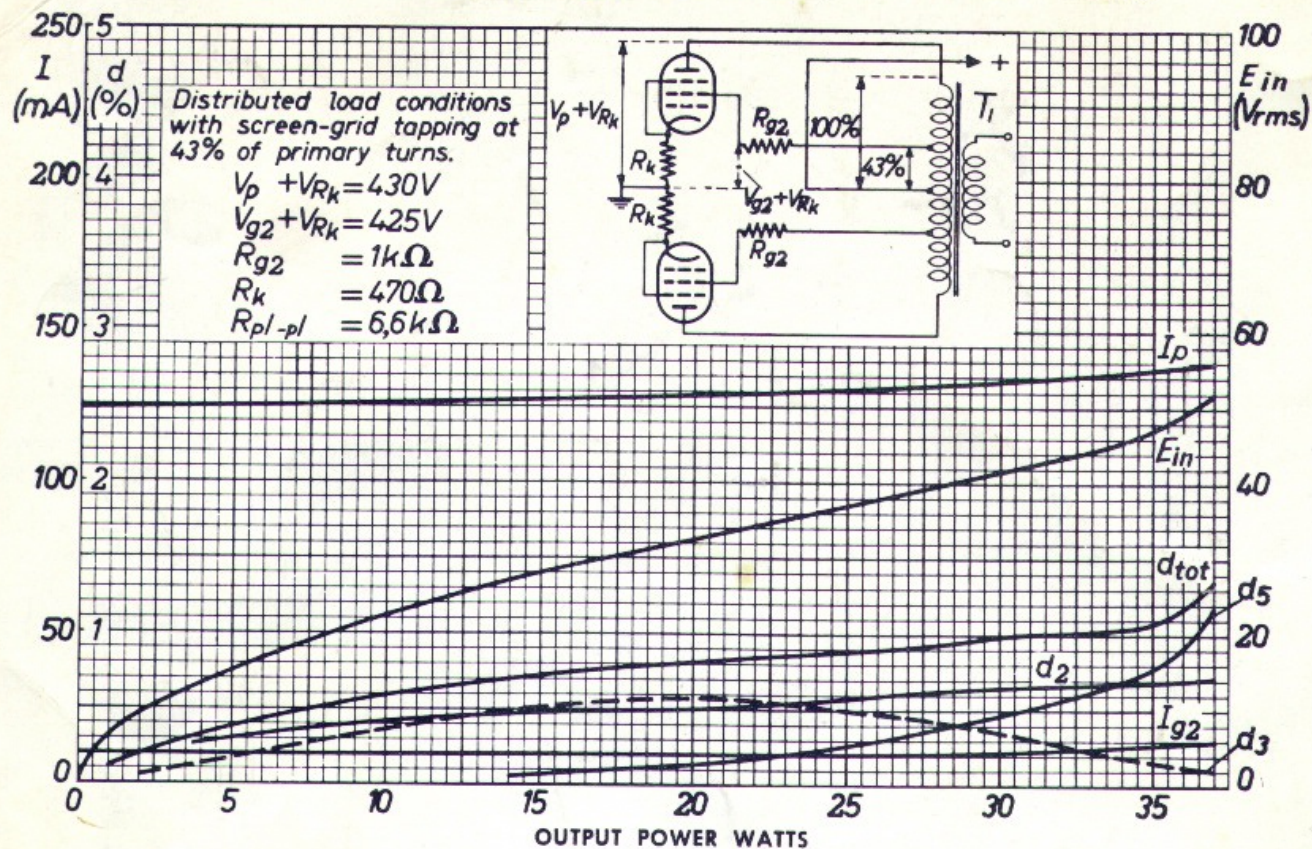


FIG. 1 PERFORMANCE OF TWO 6CA7 IN PUSH-PULL WITH DISTRIBUTED LOAD CONDITIONS. SCREEN-GRID TAPPING AT 43% OF PRIMARY TURNS



\*Ti— DYNACO MODEL A-430  
ACRO MODEL TO-300

**6CA7**

**EL84**

# IN CLASS "AB" PUSH-PULL

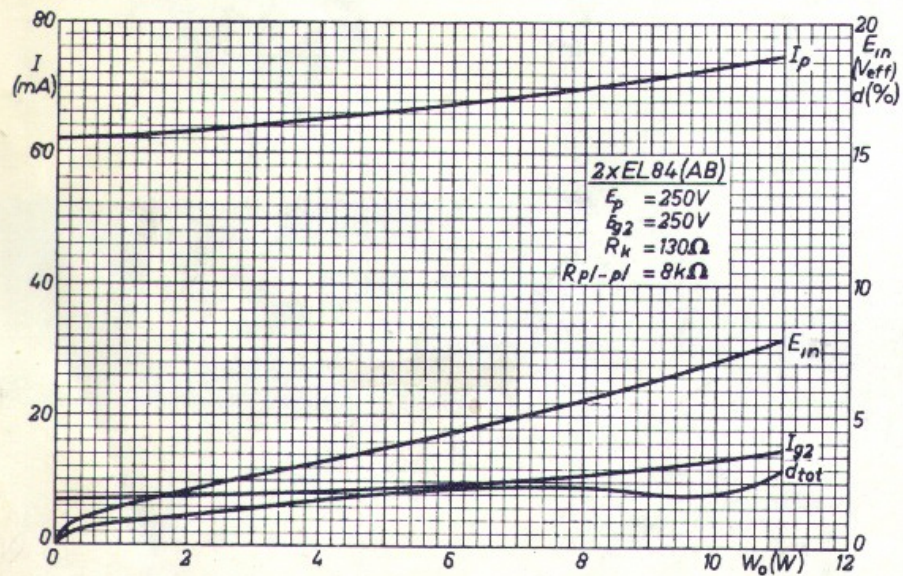


Fig. 2

OUTPUT POWER WATTS

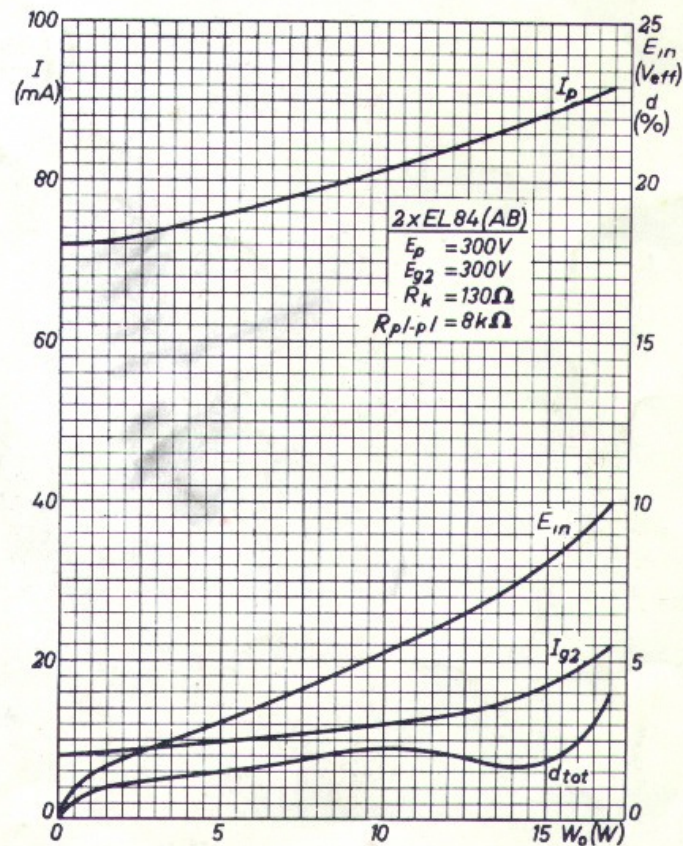


Fig. 3

OUTPUT POWER WATTS

AMPEREX  
LITHO IN U.S.A.  
CAT. #HF656

