



## PILOTRON

### DESCRIPTION

GL-833-A is a three-electrode transmitting tube of the high- $\mu$  type for use as a radio-frequency amplifier, oscillator, and Class B modulator. Because of its high perveance, the 833-A can be operated at high plate efficiency with low driving power.

Designed in a new way with post terminals which provide a sturdy structure and make bases unnecessary, the 833-A has a minimum amount of insulation within the tube. The anode is supported directly from its post terminal at the top of the

tube. Short, heavy-current leads are used to connect the anode and the grid to their respective terminals in order to carry the high circulating r-f current at the high frequencies and to minimize internal lead inductance.

As a result of its construction, the 833-A provides exceptional efficiency at high frequencies. It can be operated in Class C telegraph service with maximum input of 2000 watts at frequencies as high as 30 megacycles, and with reduced input at frequencies as high as 75 megacycles.

### TECHNICAL INFORMATION

*These data are for reference only. For design information refer to specifications.*

### GENERAL CHARACTERISTICS

Number of electrodes . . . . . 3

#### Electrical

Filament voltage . . . . . 10 volts

Filament current . . . . . 10 amperes

  
*Electronic*  
TUBE

**GENERAL  ELECTRIC**

## TECHNICAL INFORMATION (CONT'D)

### Average characteristics

|                                    |                       |
|------------------------------------|-----------------------|
| Amplification factor               | 35                    |
| Direct interelectrode capacitances |                       |
| Grid-plate                         | 6.3 micromicrofarads  |
| Grid-filament                      | 12.3 micromicrofarads |
| Plate-filament                     | 8.5 micromicrofarads  |
| Frequency for maximum ratings      | 30 megacycles         |

### Mechanical

|                                                |                                                                                           |
|------------------------------------------------|-------------------------------------------------------------------------------------------|
| Type of cooling                                | Convection or forced air                                                                  |
| Maximum ambient temperature, convection-cooled | 60 centigrade                                                                             |
| Net weight, approx                             | 1 pound                                                                                   |
| Shipping weight, approx                        | 3 pounds                                                                                  |
| Operating position                             | Vertical with filament terminals down or<br>horizontal with plane of electrodes vertical. |

## MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

### CLASS B AUDIO-FREQUENCY POWER AMPLIFIER (TWO TUBES)

|                                           | Typical<br>Operation |       |       | Maximum<br>Ratings |      |      |              |
|-------------------------------------------|----------------------|-------|-------|--------------------|------|------|--------------|
|                                           | CCS                  | *     | ICAS  | CCS                | *    | ICAS |              |
| D-c plate voltage                         | 3000                 | 4000  | 4000  | 3000               | 4000 | 4000 | volts        |
| Max signal plate current, per tube†       |                      |       |       | 500                | 500  | 500  | milliamperes |
| D-c max signal plate input, per tube†     |                      |       |       | 1125               | 1600 | 1800 | watts        |
| Plate dissipation†                        |                      |       |       | 300                | 400  | 450  | watts        |
| D-c grid voltage‡                         | -70                  | -100  | -100  |                    |      |      | volts        |
| Peak a-f grid input voltage               | 400                  | 480   | 510   |                    |      |      | volts        |
| Zero signal plate current                 | 100                  | 100   | 100   |                    |      |      | milliamperes |
| Max signal plate current                  | 750                  | 800   | 900   |                    |      |      | milliamperes |
| Max signal driving power, approx          | 20                   | 29    | 38    |                    |      |      | watts        |
| Effective load, plate to plate            | 9500                 | 12000 | 11000 |                    |      |      | ohms         |
| Maximum signal plate power output, approx | 1650                 | 2400  | 2700  |                    |      |      | watts        |
| Load resistance, per tube                 | 2375                 | 3000  | 2750  |                    |      |      | ohms         |

### CLASS B RADIO-FREQUENCY POWER AMPLIFIER

| Carrier conditions per tube for use with a max modulation factor of 1.0 | *    | *    | *    | *    | *    | *                |
|-------------------------------------------------------------------------|------|------|------|------|------|------------------|
| D-c plate voltage                                                       | 3000 | 4000 | 4000 | 3000 | 4000 | 4000 volts       |
| D-c grid voltage‡                                                       | -70  | -120 | -120 |      |      | volts            |
| D-c plate current                                                       | 150  | 150  | 150  | 300  | 300  | 300 milliamperes |
| Plate input                                                             |      |      |      | 450  | 600  | 675 watts        |
| Plate dissipation                                                       |      |      |      | 300  | 400  | 450 watts        |
| Peak r-f grid input voltage                                             | 90   | 120  | 130  |      |      | volts            |
| Driving power§ $\Delta$ , approx                                        | 10   | 14   | 21   |      |      | watts            |
| Plate power output, approx                                              | 150  | 225  | 250  |      |      | watts            |
| D-c grid current, approx $\Delta$                                       | 2    | 2    | 3    |      |      | milliamperes     |

### CLASS C RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR—PLATE-MODULATED

| Carrier conditions per tube for use with a max modulation factor of 1.0 | *           | *           | *           | *    | *    | *                |
|-------------------------------------------------------------------------|-------------|-------------|-------------|------|------|------------------|
| D-c plate voltage                                                       | 2500        | 3000        | 4000        | 2500 | 3000 | 4000 volts       |
| D-c grid voltage $\pi$                                                  | -300        | -300        | -325        | -500 | -500 | -500 volts       |
|                                                                         | 4000        | 3600        | 3600        |      |      | ohms             |
| D-c plate current                                                       | 335         | 415         | 450         | 400  | 450  | 450 milliamperes |
| D-c grid current, approx                                                | 75 $\Delta$ | 85 $\Delta$ | 90 $\Delta$ | 100  | 100  | 100 milliamperes |
| Plate input                                                             |             |             |             | 835  | 1250 | 1800 watts       |
| Plate dissipation                                                       |             |             |             | 200  | 270  | 350 watts        |
| Driving power $\Delta$ , approx                                         | 30          | 37          | 42          |      |      | watts            |
| Plate power output, approx                                              | 635         | 1000        | 1500        |      |      | watts            |
| Peak r-f grid voltage                                                   | 460         | 490         | 520         |      |      | volts            |

# MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS (CONT'D) CLASS C RADIO-FREQUENCY POWER AMPLIFIER AND OSCILLATOR

Key-down conditions per tube without modulation □

|                                          | Typical<br>Operation |      |      | Maximum<br>Ratings |      |      |              |
|------------------------------------------|----------------------|------|------|--------------------|------|------|--------------|
|                                          | CCS                  | *    | ICAS | CCS                | *    | CAS  |              |
| D-c plate voltage.....                   | 3000                 | 4000 | 4000 | 3000               | 4000 | 4000 | volts        |
| D-c grid voltage #.....                  | -200                 | -200 | -225 | -500               | -500 | -500 | volts        |
|                                          | 3500                 | 2650 | 2400 |                    |      |      | ohms         |
|                                          | 425                  | 380  | 380  |                    |      |      | ohms         |
| D-c plate current.....                   | 415                  | 450  | 500  | 500                | 500  | 500  | milliamperes |
| D-c grid current, approx.....            | 55 △                 | 75 △ | 95 △ | 100                | 100  | 100  | milliamperes |
| Plate input.....                         |                      |      |      | 1250               | 1800 | 2000 | watts        |
| Plate dissipation.....                   |                      |      |      | 300                | 400  | 450  | watts        |
| Peak r-f grid input voltage, approx..... | 360                  | 375  | 415  |                    |      |      | volts        |
| Driving power △, approx.....             | 20                   | 26   | 35   |                    |      |      | watts        |
| Plate power output, approx.....          | 1000                 | 1440 | 1600 |                    |      |      | watts        |

\*Forced-air cooling required at these conditions of operation. When forced-air cooling is required an air flow of 40 cfm from a two-inch diameter nozzle directed vertically downward on bulb between grid and plate seals is required. Bulb temperature between grid and plate seals must not exceed 145 C. For conditions of operation where forced-air cooling is not required, adequate free circulation of air around the tube is necessary for satisfactory operation.

†Averaged over any audio-frequency cycle of sine-wave form.

‡For a-c filament supply.

§At crest of audio-frequency cycle.

△Subject to wide variations depending on the impedance of the load circuit. High-impedance load circuits require more grid current and driving power to obtain the desired output. Low-impedance circuits need less grid current and driving power, but plate circuit efficiency is sacrificed. The driving stage should have a tank circuit of good regulation and should be capable of delivering considerably more than the required driving power.

πObtained by grid resistor of value shown or by partial self-bias methods.

□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.

#Obtained from fixed supply, by grid resistor (3500, 2650, 2400), or by cathode resistor (425, 380, 380).

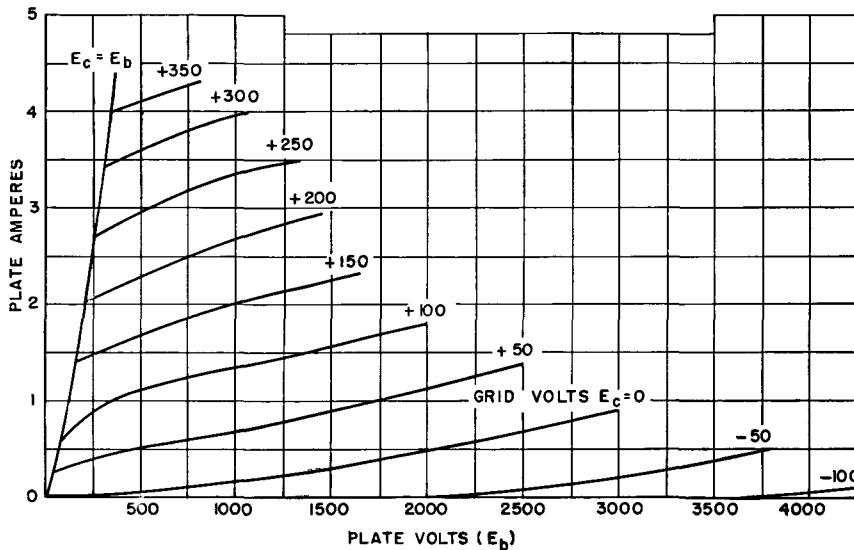
## APPLICATION NOTES

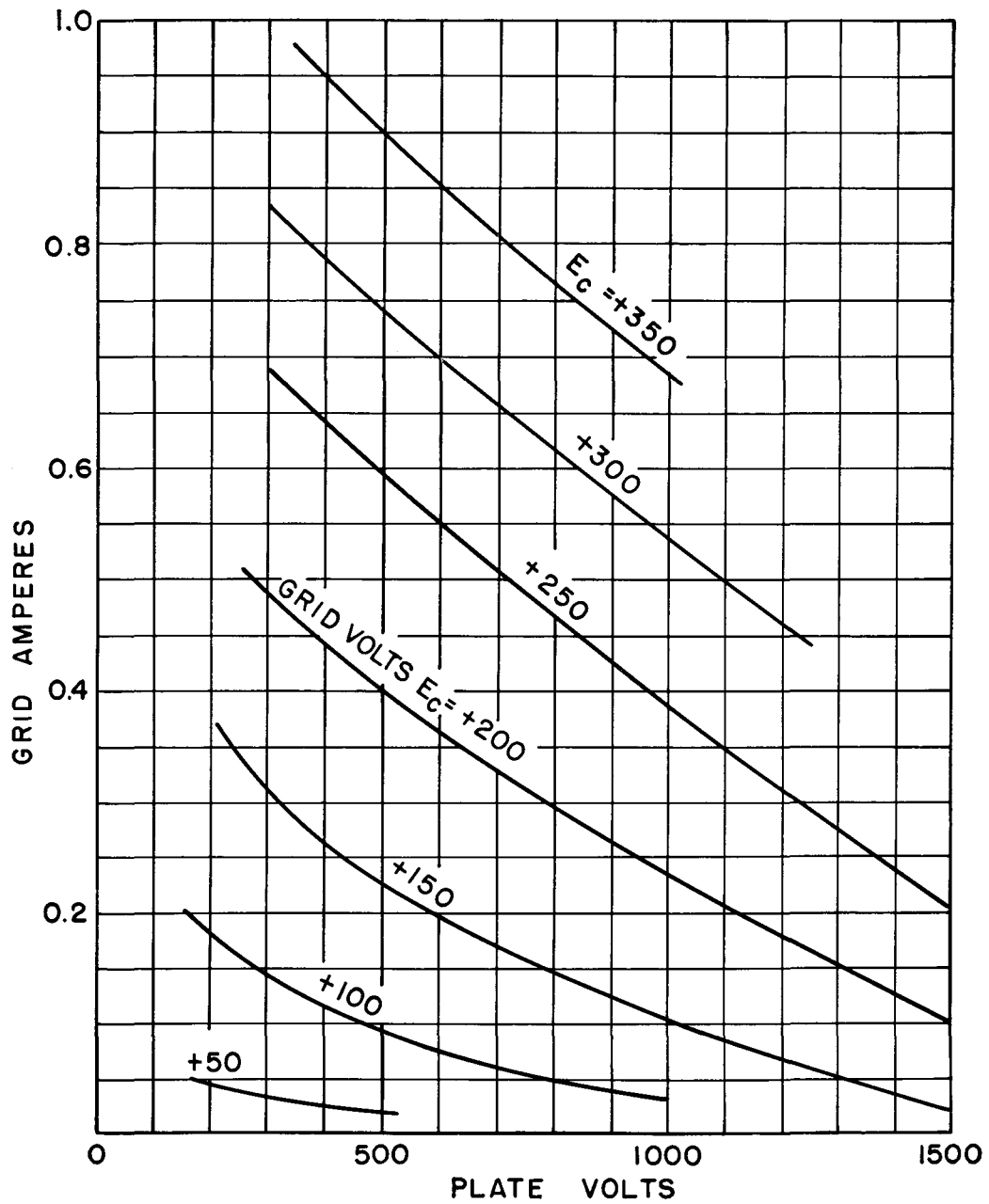
The GL-833-A can be operated at frequencies as high as 30 megacycles. The tube may be operated at higher frequencies provided the maximum values of plate voltage and power input are reduced as the frequency is raised (other maximum ratings are the same as shown above).

The tabulation below shows the highest percentage of maximum plate voltage and power input that can be used up to 100 megacycles for the various classes of service. Special attention should be given to adequate ventilation of the bulb at these frequencies.

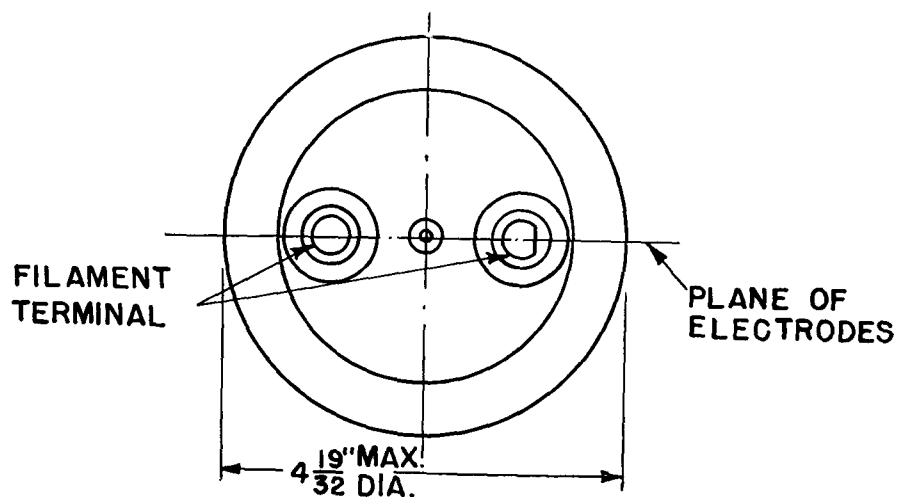
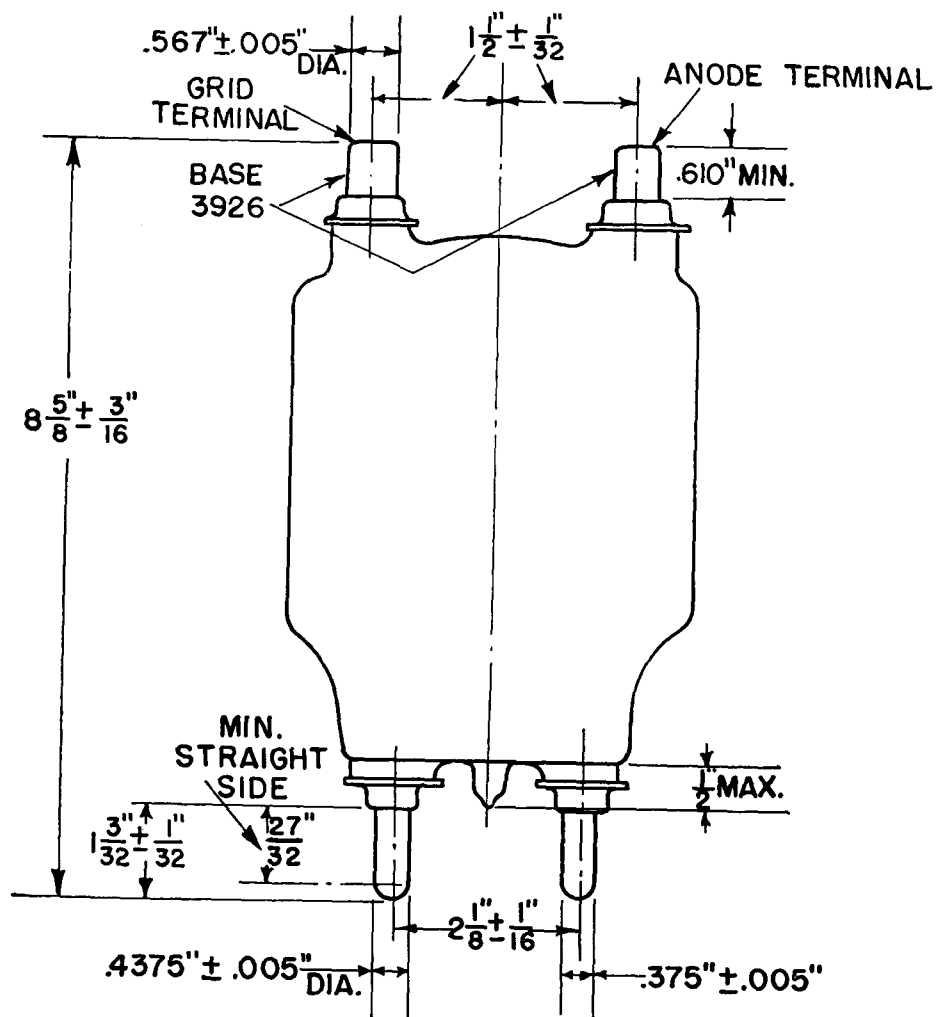
| Frequency.....                                                                | Natural Cooling |    |    | Forced-air Cooling |    |    |          |
|-------------------------------------------------------------------------------|-----------------|----|----|--------------------|----|----|----------|
|                                                                               | 30              | 50 | 75 | 20                 | 50 | 75 |          |
| Maximum permissible percentage of maximum rated plate voltage and plate input |                 |    |    |                    |    |    |          |
| Class B, r-f.....                                                             | 100             | 98 | 94 | 100                | 97 | 93 | per cent |
| Class C, plate-modulated.....                                                 | 100             | 90 | 72 | 100                | 83 | 65 | per cent |
| Class C.....                                                                  | 100             | 90 | 72 | 100                | 83 | 65 | per cent |

GL-833-A  
AVERAGE PLATE CHARACTERISTICS,  $E_i=10.0$  VOLTS A-C





GL-833-A TYPICAL CHARACTERISTICS ( $E_i = 10$  VOLTS A-C)



OUTLINE  
GL-833-A PIOTRON

NOTE: THE HORIZONTAL ANGLE BETWEEN THE PLANE DETERMINED BY THE AXIS OF THE FILAMENT TERMINALS AND THE PLANE DETERMINED BY THE AXIS OF THE GRID AND ANODE CAPS IS NOT MORE THAN 5 DEGREES

