DC GRID CURRENT	0.3 max.	amp
PLATE INPUT	10000 max.	watts
PLATE DISSIPATION	6600 max.	watts

Typical Operation:

DC Plate Voltage	6000	8000	10000	volts
DC Grid Voltage	−1000	−1300	−1600	volts
From a grid resistor of	3570	5420	6960	ohms
Peak RF Grid Voltage	1650	1950	2250	volts
DC Plate Current	0.83	0.82	0.78	amp
DC Grid Current (Approx.)	0.28	0.24	0.23	amp
Driving Power (Approx.)	420	430	460	watts
Power Output (Approx.)	3500	5000	6000	watts

RF POWER AMPLIFIER & OSCILLATOR—Class C Telegraphy

Key-down conditions per tube without amplitude modulation##

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	15000 max.	volts
DC GRID VOLTAGE	−3000 max.	volts
DC PLATE CURRENT	2.0 max.	amp
DC GRID CURRENT	0.4 max.	amp
PLATE INPUT	30000 max.	watts
PLATE DISSIPATION	10000 max.	watts

Typical Operation:

DC Plate Voltage	8000	10000	12000	volts
DC Grid Voltage	−1000	−1300	−1600	volts
From a grid resistor of	4540	5420	6960	ohms
From a cathode resistor of	720	790	900	ohms
Peak RF Grid Voltage	1700	2150	2550	volts
DC Plate Current	1.17	1.4	1.55	amp
DC Grid Current (Approx.)	0.22	0.24	0.23	amp
Driving Power (Approx.)	330	495	565	watts
Power Output (Approx.)	6500	10000	14000	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	57	62	amp
Amplification Factor	1,2	42.5	57.5	
Grid-Plate Capacitance	–	27	33	μμf
Grid-Filament Capacitance	–	15	24	μμf
Plate-Filament Capacitance	–	0.5	2.5	μμf
Plate Voltage	1,3	7500	11000	volts
Plate Voltage	1,4	12000	16500	volts
Grid Voltage	1,5	−240	−400	volts
Grid Voltage	1,6	–	925	volts
Peak Cathode Current	7	90	–	amp
Grid Current	1,8	–	1.75	amp
Useful Power Output	1,9	20000	–	watts

Note 1: With 22 volts ac on filament.
Note 2: With dc grid voltage of −50 volts, and plate voltage adjusted to give dc plate current of 0.75 ampere.
Note 3: With dc grid voltage of 0 volts, and plate voltage adjusted to give dc plate current of 0.75 ampere.
Note 4: With dc grid voltage of −100 volts, and plate voltage adjusted to give dc plate current of 0.75 ampere.
Note 5: With dc plate voltage of 15000 volts, and grid voltage adjusted to give dc plate current of 20 ma.
Note 6: With dc plate voltage of 1500 volts, and grid voltage adjusted to give a dc plate current of 6.0 amperes.
Note 7: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.
Note 8: With dc plate voltage of 1500 volts, and grid voltage adjusted to give dc plate current of 6.0 amperes.
Note 9: With dc plate voltage of 15000 volts, dc plate current of 2.0 amperes, dc grid current of 0.25 ampere, grid resistor of 5000 ± 10% ohms, and frequency of 1.5 megacycles.

• RCA-892-R •

GENERAL DATA

Filament – Same as for Type 892

Amplification Factor	50	
Direct Interelectrode Capacitances (Approx.):		
Grid to Plate	31	μμf
Grid to Filament	20	μμf
Plate to Filament	2	μμf

Mechanical:

Mounting Position	Vertical, filament end up
Maximum Overall Length	22"
Maximum Radius	6-1/2"
Terminal Connections	See Outline Drawing
Radiator	Integral Part of Tube

Air Flow:

Through Radiator – The specified air flow for various values of plate dissipation as indicated below should be delivered by a blower before and during the application of any voltages. Filament power, plate power, and air may be removed simultaneously.

Plate Dissipation	2400	3200	4000	. . .	watts
Air Flow	300	380	450	. . .	cfm
Static Pressure	0.20	0.36	0.5	inches of water	

Incoming Air Temperature	45 max.	°C
Radiator Temperature (Measured in thermometer well)	180 max.	°C
Bulb Temperature	150 max.	°C

Components:

Air Jacket	RCA MI-19422-A
Air Manifold	RCA MI-27017-A
Bracelet (For canvas boot)	RCA MI-27016-A
Filament Connector (2 required)	RCA MI-7422-A
Filament-Section Junction Connector	RCA MI-7432
Filament Terminal Block	RCA MI-19422-7
Grid Connector	RCA MI-7422-A

AF POWER AMPLIFIER & MODULATOR—Class B

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	12500 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	2.0 max.	amp
MAX.-SIGNAL PLATE INPUT*	12000 max.	watts
PLATE DISSIPATION*	4000 max.	watts

Typical Operation:

Values are for 2 tubes

DC Plate Voltage	6000	8000	volts
DC Grid Voltage	0	−60	volts
Peak AF Grid-to-Grid Voltage	1200	1000	volts
Zero-Signal DC Plate Current	0.5	0.5	amp
Max.-Signal DC Plate Current	2.6	2.3	amp
Effective Load Resistance (Plate to plate)	4200	6800	ohms
Max.-Signal Driving Power (Approx.)#	135	84	watts
Max.-Signal Power Output (Approx.)	8000	10500	watts

RF POWER AMPLIFIER — Class B Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	12500 max.	volts
DC PLATE CURRENT	1.0 max.	amp
PLATE INPUT	6000 max.	watts
PLATE DISSIPATION	4000 max.	watts

Typical Operation:

DC Plate Voltage	6000	8000	volts
DC Grid Voltage	0	−60	volts
Peak RF Grid Voltage	230	320	volts
DC Plate Current	0.64	0.67	amp
DC Grid Current (Approx.)	0.03	0.04	amp
Driving Power (Approx.)▲	77	150	watts
Power Output (Approx.)	1000	1800	watts

PLATE-MODULATED RF POWER AMPLIFIER—Class C Telephony

Carrier conditions per tube for use with a maximum modulation factor of 1.0

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	10000 max.	volts
DC GRID VOLTAGE	−3000 max.	volts
DC PLATE CURRENT	1.0 max.	amp
DC GRID CURRENT	0.3 max.	amp
PLATE INPUT	10000 max.	watts
PLATE DISSIPATION	2500 max.	watts

Typical Operation:

DC Plate Voltage	6000	8000	volts
DC Grid Voltage	−1000	−1300	volts
From a grid resistor of	3570	5420	ohms
Peak RF Grid Voltage	1650	1950	volts
DC Plate Current	0.83	0.82	amp
DC Grid Current (Approx.)	0.28	0.24	amp
Driving Power (Approx.)	420	430	watts
Power Output (Approx.)	3500	5000	watts

RF POWER AMPLIFIER & OSCILLATOR-- Class C Telegraphy

Key-down conditions per tube without amplitude modulation##

Maximum CCS● Ratings, ***Absolute Values:***

DC PLATE VOLTAGE	12500 max.	volts
DC GRID VOLTAGE	−3000 max.	volts
DC PLATE CURRENT	2.0 max.	amp
DC GRID CURRENT	0.4 max.	amp
PLATE INPUT	18000 max.	watts
PLATE DISSIPATION	4000 max.	watts

Typical Operation:

DC Plate Voltage	8000	10000	volts
DC Grid Voltage	−1000	−1300	volts
From a grid resistor of	4540	5420	ohms
From a cathode resistor of	720	790	ohms
Peak RF Grid Voltage	1700	2150	volts
DC Plate Current	1.17	1.40	amp
DC Grid Current (Approx.)	0.22	0.24	amp
Driving Power (Approx.)	330	495	watts
Power Output (Approx.)	6500	10000	watts

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	*Min.*	*Max.*	
Filament Current	1	57	62	amp
Amplification Factor	1,2	42.5	57.5	
Grid-Plate Capacitance	−	28	34	μμf
Grid-Filament Capacitance	−	15	24	μμf
Plate-Filament Capacitance	−	1.0	3.0	μμf
Plate Voltage	1,3	5000	7400	volts
Plate Voltage	1,4	9200	13200	volts
Grid Voltage	1,5	−240	−400	volts
Grid Voltage	1,6	−	925	volts
Peak Cathode Current	7	9	−	amp
Grid Current	1,8	−	1.75	amp
Useful Power Output	1,9	10000	−	watts

Note 1: With 22 volts ac on filament.
Note 2: With dc grid voltage of −50 volts and plate voltage adjusted to give dc plate current of 0.42 amp.
Note 3: With dc grid voltage of 0 volts, and plate voltage adjusted to give plate current of 0.42 ampere.
Note 4: With dc grid voltage of −100 volts, and plate voltage adjusted to give plate current of 0.42 ampere.
Note 5: With dc plate voltage of 15000 volts, and grid voltage adjusted to give a dc plate current of 20 ma.
Note 6: With dc plate voltage of 1500 volts, and grid voltage adjusted to give dc plate current of 6.0 amperes.
Note 7: Represents the maximum usable cathode current (plate current and grid current) for the tube under any condition of operation.
Note 8: With dc plate voltage of 1500 volts and grid voltage adjusted to give a dc plate current of 6.0 amperes.
Note 9: With dc plate voltage of 10000 volts, dc plate current of 1.4 amperes, dc grid current of 0.25 ampere, grid resistor of 5000 ± 10% ohms, and frequency of 1.5 megacycles.

● Continuous Commercial Service.

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

\# The driving stage should have good regulation and should be capable of supplying considerably more than the required driving power.

\## Modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

▲ At crest of audio-frequency cycle with modulation factor of 1.0.

INSTALLATION — General

In *transportation and storage* of the 892 and 892-R, care should be taken to protect the tubes from rough handling that would damage the metal-to-glass seals or other parts. The tubes are suspended within their shipping crates so that they will not come in contact with the sides of the crates during shipment. The tubes should be stored in the crates with the filament end up and should be protected from moisture and extreme temperature changes. Under no circumstances should crated tubes be piled one on top of another. Furthermore, while the tubes are being handled, they should be kept in a vertical position with the filament end up. The approximate weight of the 892 is: packed for shipment, 10-3/4 pounds, and unpacked, 3.6 pounds; the approximate weight of the 892-R is: crated for shipment, 93 pounds, and uncrated, 46 pounds.

It is recommended that the tubes be tested upon receipt in the equipment in which they are to be used. Before the tubes are placed in operation, care should be taken that no foreign matter is lodged in the entrant glass area around the filament leads. An air blast is recommended for removing such material.

The *tungsten filament* of the 892 and the 892-R is of the double-section type. One end of each section is brought out to a common terminal and the other two ends are brought out to separate terminals. The common terminal is the largest of the three filament posts. This arrangement makes possible the operation of the filament from single-phase or two-phase alternating cur-

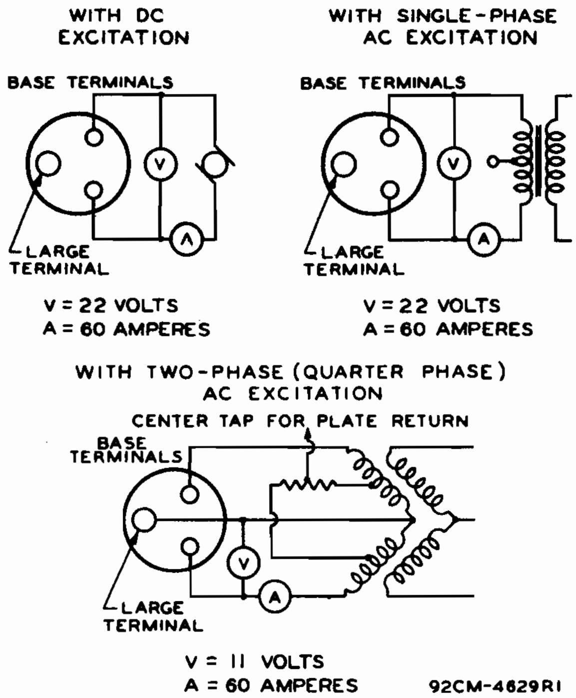


Fig. 1-Filament Connections and Excitation Circuits.

rent or from direct current. For normal operation, each filament section requires a voltage of 11 volts at a current of 60 amperes.

When a single-phase or a dc supply is used, do not connect the two filament sections in parallel. Doing so will overheat the lead joining the two filament sections and damage the tube. The filament-connection arrangements and excitation currents employing dc, single-phase ac, and two-phase ac operation are shown in Fig. 1. The filament connections should make firm, large surface-contact with the filament terminal posts in order to prevent overheating by the high filament current. The filament connection leads should not be taut, but should allow for some movement in order to prevent placing any strain on the filament seals.

The filament should be operated at constant voltage rather than constant current and must be allowed to reach normal operating temperature before plate voltage is applied. A suitable voltmeter should be permanently connected directly across the filament terminals as shown in Fig. 2 so that the filament voltage will always be known. If the tubes are to be used at less than rated maximum input and with reduced plate current, the lower value of plate current will not require the full emission capability of the filament operated at rated voltage. Operation of the filament at reduced voltage may, therefore, be permissible to provide longer life. If a reduction of the filament voltage is made, care must be taken that sufficient emission is provided; otherwise, inefficient operation and excessive dis-

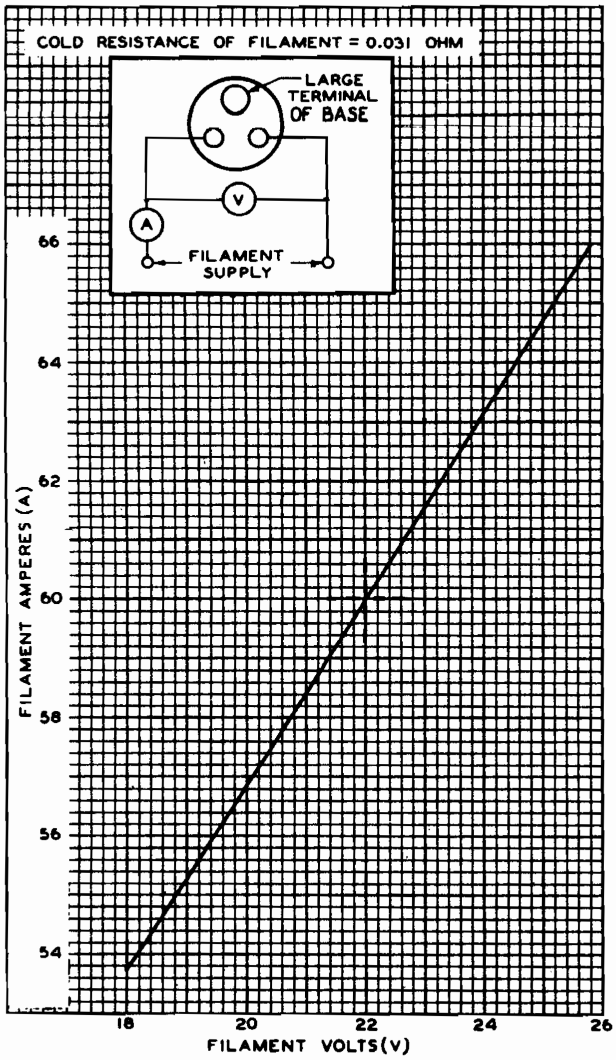


Fig. 2 - Average Filament Characteristic.

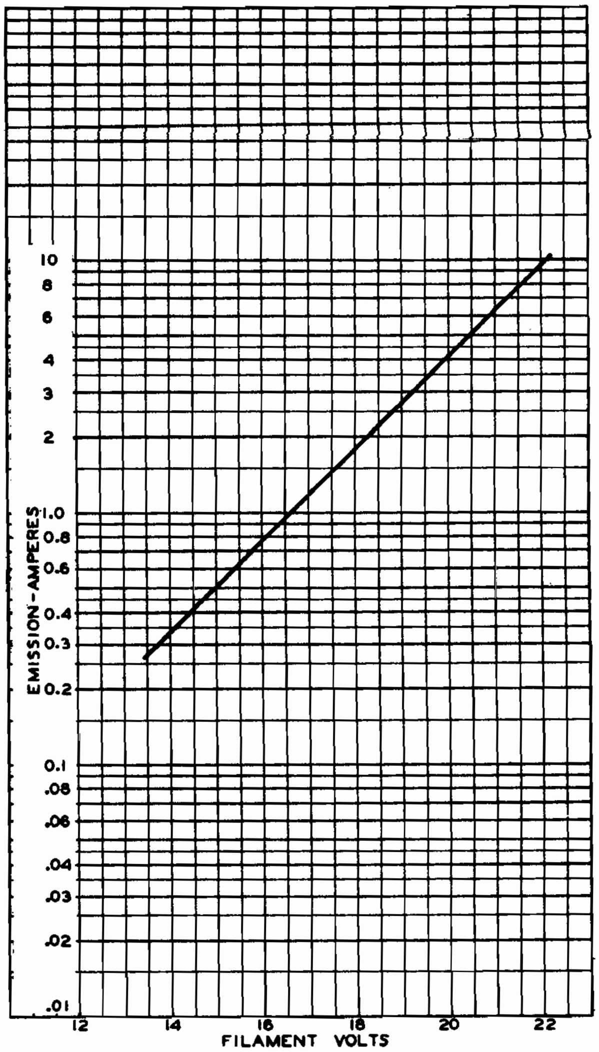


Fig. 3 - Average Filament-Emission Characteristic.

tortion may be experienced. Furthermore, the rated plate dissipation may be exceeded. If the percentage regulation and the peak emission requirements are known, the correct operating filament voltage may be calculated from the filament-emission curve. The permissible regulation may be checked by reducing the filament voltage with the transmitter under normal operation to a value where reduction in output or excessive distortion can be detected. The filament voltage must then be increased by an amount equivalent to the maximum percentage regulation of the filament-supply voltage and then further increased by approximately 2% to allow for minor variations in individual tubes. From the viewpoint of tube life, it is usually economically advantageous to provide good regulation of the filament voltage.

A *filament starter* should be used to raise the filament voltage gradually and to limit the high initial rush of current through the filament when the circuit is first closed. The starter may be either a system of time-delay relays cutting resistance out of the circuit, a high-reactance filament transformer, or a simple rheostat. Regardless of the method of control, it is important that the filament current in each section never exceed, even momentarily, a value of 120 amperes

When direct current is used, the polarity of the filament leads should be reversed every 500 hours of operation.

During long or frequent standby periods, the 892 and 892-R may be operated at decreased filament voltage to conserve life. It is recommended that the filament voltage be reduced to 80 per cent of normal during standby operation up to 2 hours; for longer periods, the filament power should be turned off.

The *grid return and the plate return* should be connected to the center point of the filament voltage supply when single-phase ac is used. When dc is used, the grid and the plate return should be connected to the negative filament terminal and should still be connected to the negative filament terminal whenever the filament polarity is reversed. When two-phase excitation is employed, the grid return and the plate return should be made as indicated in Fig. 1.

The *plate connection* for the 892 is provided automatically through the clamping mechanism of the water jacket which is connected electrically to the high-voltage supply. Similarly, the plate connection for the 892-R is provided automatically by proper seating of the tube in its mounting sleeve which is connected electrically to the high-voltage supply.

The plate circuit should be provided with a time-delay relay to delay the application of plate voltage until the filament has reached normal operating temperature. The plate circuit must also be provided with protective devices to prevent the tube from drawing a heavy overload. In order to prevent excessive plate-current flow and resultant overheating of the tube, the ground lead of the plate circuit should be connected in series with the coil of an instantaneous overload relay. This relay should be adjusted to open the circuit breakers in the primary of the rectifier transformer at slightly higher than normal plate current. The time required for the

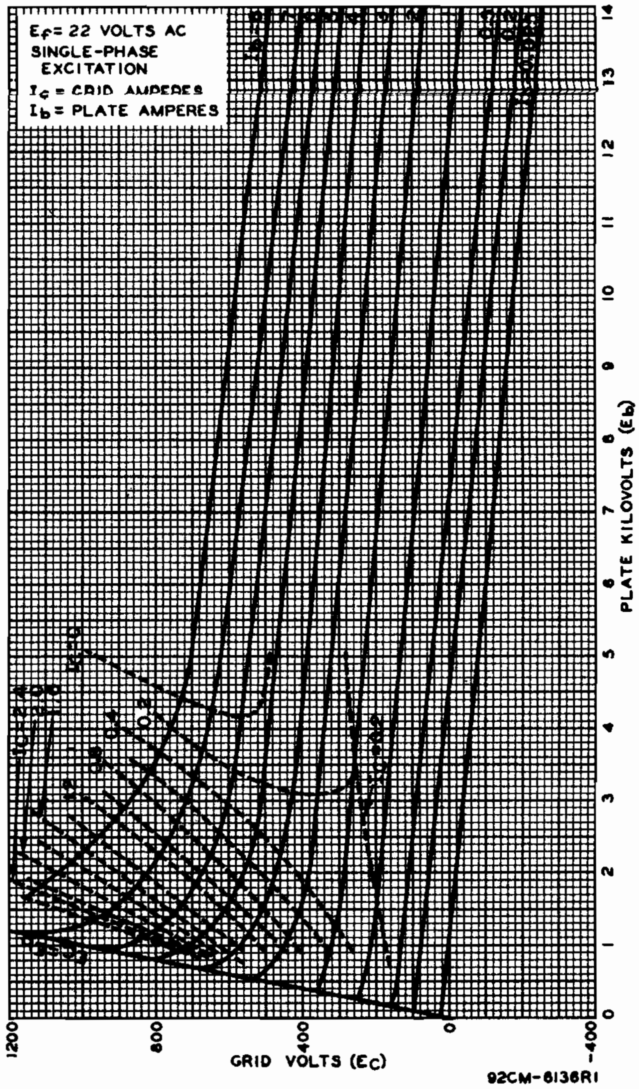


Fig. 4 - Average Constant-Current Characteristics.

operation of the relay and circuit breakers should be about one-tenth second and not more than one-sixth second. A voltage-dropping resistor should be connected permanently in series with the plate lead of each tube for protection of the tube during the time required for the circuit breakers to act. The minimum value of this resistor which will give adequate protection with minimum power loss is as follows:

SERIES RESISTOR	25	50	200	250	275	300	ohms
MAXIMUM POWER OUTPUT OF RECTIFIER	16	40	100	250	640	1600	kw

When the tubes are first placed in service, care should be taken to see that the water- and air-cooling systems are functioning properly. The tubes should then be operated without plate voltage for 5 minutes at rated filament voltage. After this initial preheating schedule, the tubes should be operated at approximately one-half the usual plate voltage for 15 minutes. Full plate voltage may then be applied and the tube operated for an hour or more under normal load conditions. It is recommended that spare tubes be given the preheating and initial-operation treatment every three months. This procedure will insure that only good tubes are carried in stock.

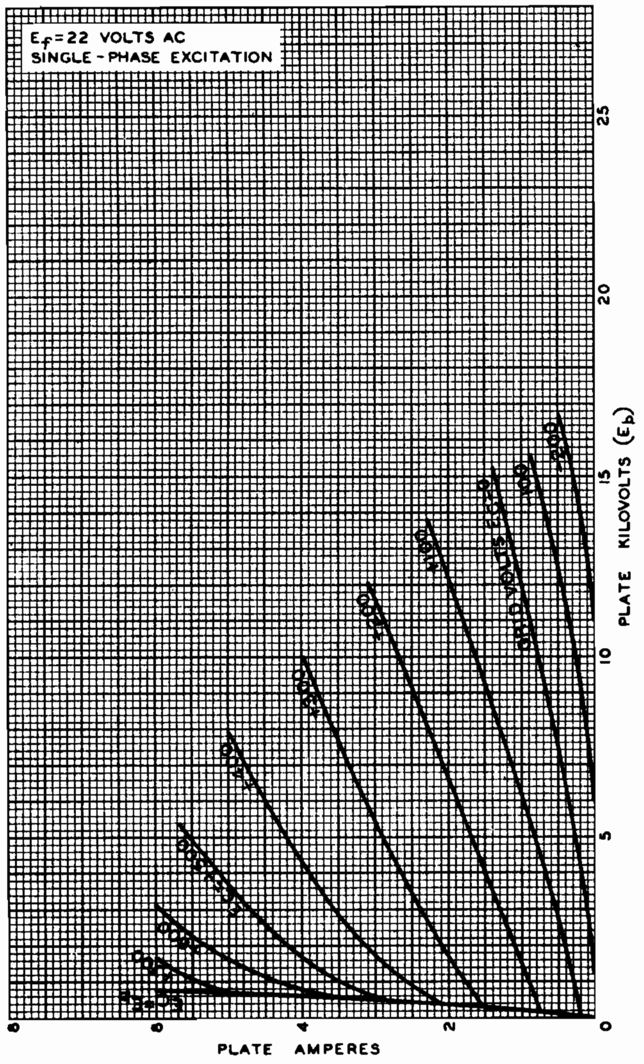


Fig. 5 - Average Plate Characteristics.

When a new circuit is tried or when adjustments are made, the plate voltage should be reduced to approximately one-half the rated value to prevent damage to the tube and associated apparatus. After correct adjustment has been made with the tube operating smoothly and without excessive heating, the plate voltage may be raised in steps to the desired value. Adjustments should be made at each step for optimum operation.

The rated plate voltage of these tubes is extremely dangerous to the user. Great care should be taken during the adjustment of circuits. The tube and its associated apparatus, especially all parts which may be at high potential above ground, should be housed in a grounded protective enclosure. The protective housing should be designed with interlocks so that personnel cannot possibly come in contact with any high-potential point in the electrical system. The interlocking devices should function to break the primary circuit of the plate supply when any gate or door on the protective housing is opened and should prevent the closing of this primary circuit until the door is again locked. The bias supply may also be dangerous and it should be provided with interlocks as in the case of the plate supply.

Overheating of the tubes by severe overload may impair the vacuum. When the quantity of released gas is not too great, it is often possible to degassify the tubes by operation at reduced plate voltage. The first step in the process should be a short period of operation at a plate voltage of one-half the rated value. The plate voltage may then be increased to the normal value and the tube allowed to operate for an hour or more. In severe cases, it may be necessary to degassify the tube by increasing the plate voltage in small steps until the normal voltage is reached. At each new voltage, the tube should be allowed to operate long enough to insure the attainment of stable conditions. The voltage may be varied by means of a tapped transformer or a voltage regulator.

INSTALLATION—Type 892

Mounting of the 892 requires the use of water jacket RCA MI-7415 and gasket RCA MI-7440. The water jacket should support the 892 in a vertical position with the filament end up. If the 892 is subjected to appreciable vibration in service, it is advisable to support the water jacket by springs. When concrete basework is provided for the transmitter and when machines and other sources of vibration are absent, it is unnecessary to use a spring suspension. The installation of all wires and connections must be made so that they will not be close to or touch the bulb. This precaution is necessary to avoid almost certain puncture of the glass from corona discharge.

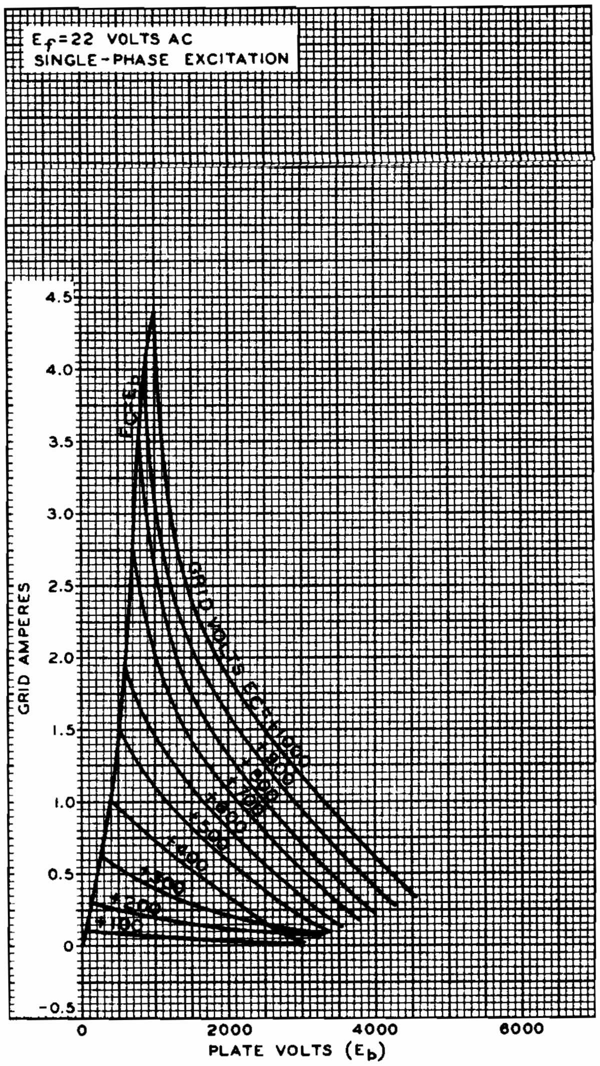
Connections to the filament and grid terminals must be kept flexible in order not to put strain on the glass-to-metal seals. None of the terminals should be used to support circuit parts.

RCA-892 should be placed in its water jacket very carefully and then firmly fastened. It is advisable to fasten the tube in its jacket securely before making the electrical connections. Before the jacket-clamping device is tightened, care must be taken to see that the contacts seat properly on top of the flange. This prevents possible strain at the plate seal, caused by improper seating of the flange on the jacket. When this preliminary adjustment indicates that the tube is properly seated, the jacket ring can be tightened gently. Do not tighten it more than is required to seat the flange properly on the gasket. If these precautions are not taken, the tube may be ruined by a glass crack caused by uneven pressure on the flange. The standard gasket is supplied with each tube. It is recommended that the gasket be coated with a thin film of Prodag* to prevent sticking. The grid and filament leads should not be taut, but should allow for some movement without placing a strain on the glass bulb. Before readjustment of either the tube or the jacket is made, the leads should be disconnected. The moving parts of the jacket should be kept free from rusting and sticking by coating them with a thin film of oil or Oil-dag*. Do not use adhesive to seal the jacket against leaks because any sticking of the plate in the jacket may cause damage to the tube during its removal.

When the 892 is removed from its jacket, first be sure that the temperature of the grid and filament is below red heat. Next remove the filament and grid connections. Then completely release the locking device and carefully remove the tube from the jacket. Should sticking occur, twist the tube gently back and forth and, at the same time, gently raise. Never use force to remove the tube.

The *water-cooling system* consists, in general, of a source of cooling water, a water jacket, and a feed-pipe system which carries the water to and from the jacket. When the plate is at high potential above ground, the feed-pipe system should have good insulation qualities and proper design to reduce the leakage current to a negligible value. The piping system must be arranged to avoid air traps in the water jacket.

Distilled water is recommended for cooling because it greatly reduces the probability of scale formation. Scale is usually very hard and appears as a light-colored deposit on the plate during life. Scale prevents adequate cooling of the tube because it hinders proper transfer of heat from the plate to the water. The mineral content, flow, heat dissipation, temperature, etc., of undistilled water is so varied that no specific recommendations to prevent scale can be made. In any case, a sample of the cooling water should be analyzed before plans are made for the water system. In general, water which shows a hardness greater than 10 grains per gallon should not be used. Regardless of the kind of water used, the system should be kept free of an accumulation of foreign matter. A 10 per cent solution of hydrochloric acid will dissolve scale in emergency cases. No acid should be allowed to reach the plate-seal area above the flange. After such treatment, the plate should be carefully and thoroughly rinsed in running water. Since the tube must be removed from its jacket for this treatment, and since frequent removals are objectionable because of danger of accidental breakage, the best insurance against tube failure due



92CM-4644R3

Fig. 6 - Typical Grid Characteristics.

* Made by Acheson Colloids Corporation, Port Huron, Mich.

to scale is the complete elimination of the cause of scale.

Proper functioning of the water-cooling system is of the utmost importance. Even a momentary failure of the water will damage the tube. In fact, without cooling water, the heat of the filament alone is sufficient to cause serious harm. It is, therefore, necessary to provide a method of preventing operation of the tube in case the water supply should fail. This may be done by the use of water-flow circuit breakers or interlocks which open the filament and plate supplies when the flow is insufficient or ceases. The water flow must start before the application of any voltages. It may be removed simultaneously with the removal of filament and plate power.

A water flow of 3 to 8 gallons per minute, depending on the type of service, is required to cool the plate. Under abnormal conditions, an increased rate of flow may be necessary to prevent overheating. The use of an outlet water thermometer and a water flow meter is recommended. *The water must not be allowed to boil and the flow must be great enough to prevent the formation of steam bubbles on the plate. The temperature of the water at the outlet must not exceed 70°C.*

The formation of steam may be detected by the use of an improvised stethoscope which may consist of six feet of high-grade insulating tubing. This stethoscope is pressed against the jacket at various points while listening tests are made. Because of the danger involved in this test, care should be taken to ground the testing device at some point between the observer and the jacket. The test for boiling water should be made each time the tube is adjusted.

An approximate value of the plate dissipation which should not exceed the values shown under Maximum Ratings in the tabulated data, may be calculated from the following equation:

$$P_{kilowatts} = \frac{n(t_o - t_i)}{4}$$

in which t_i is the temperature of the cooling water at the inlet in degrees Centigrade, t_o is the temperature of the water at the outlet in degrees Centigrade, and n is the number of gallons per minute of flow.

INSTALLATION—Type 892-R

Mounting of the 892-R requires the use of air jacket RCA MI-19422-A. The tube should be supported in a vertical position with the filament end up. If the tube is subjected in service to considerable vibration, it is advisable to support the mounting by means of a spring suspension. When concrete basework is provided for the transmitter and when machines and other sources of vibration are not present, it is unnecessary to use a spring suspension. The installation of all wires and connections must be made so that they will not be close to or touch the bulb. This precaution is necessary to prevent almost certain puncture of the glass from corona discharge.

The 892-R should be placed in the air jacket carefully and the radiator must be seated properly. The need for clamping the radiator is obviated by the weight of the tube, but correct seating is necessary for good electrical connection to the plate.

Connections to the filament and grid terminals must be kept flexible in order not to put strain on the glass-to-metal seals. None of the terminals should be used to support circuit parts.

Cooling of the 892-R is accomplished by passing a stream of clean air through the radiator toward the filament end. A suitable air filter is required in the air supply for the radiator. Care should be given to cleaning or replacing the filter at intervals in order that accumulated dirt will not obstruct the required air flow through the radiator. The required air flow through the radiator for various plate dissipations is shown in the tabulated data for this type.

The air-cooling system should be properly installed to insure safe operation of the tube under all conditions and for this reason should be electrically interconnected with the filament and plate power supplies. This arrangement is necessary to make sure that the tube is supplied with air before any voltages are applied. Air pressure interlocks which open the power transformer primaries are desirable for protecting the tube when the air flow is insufficient or ceases.

The maximum bulb temperature and the maximum radiator temperature as shown in the tabulated data are tube ratings and are to be observed in the same manner as other ratings. The temperature of the radiator should be measured in the thermometer well. The temperature of the bulb should be measured at a sufficient number of places to insure that the maximum bulb-temperature rating is not exceeded. The measurements on the bulb may be made either with a thermocouple or with temperature-sensitive paint, such as Tempilaq. The latter is made by the Tempil Corporation, 132 W. 22nd Street, New York 11, N.Y. in the form of liquid and stick and is stated by the maker to have an accuracy of 1 per cent.

APPLICATION—Types 892 and 892-R

The ***maximum ratings*** in the tabulated data for the 892 and 892-R are limiting values above which the serviceability of these tubes may be impaired from the viewpoint of life and satisfactory performance. Therefore, in order not to exceed these absolute ratings, the equipment designer has the responsibility of determining an average design value for each rating below the absolute value of that rating by an amount such that the absolute values will never be exceeded under any usual condition of supply-voltage variation, load variation, or manufacturing variation in the equipment itself.

In *class B modulator or af service*, the 892 and 892-R should be operated with grid bias obtained from a dc voltage source of good regulation. It should not be obtained from a high-resistance supply such as a grid resistor, nor from a rectifier-filter type power supply unless the latter has exceptionally good voltage regulation. Each grid circuit should be provided with a separate bias adjustment to balance the grid and plate currents.

In *class B rf power amplifier service*, the 892 and 892-R plates are supplied with unmodulated dc voltage. The grid is excited by rf voltage modulated at audio frequency in one of the preceding stages and power output is proportional to the square of the grid-excitation voltage. Under these conditions, the plate dissipation is greatest when the carrier is unmodulated. Grid bias should be obtained from a dc voltage source of good regulation.

In *plate-modulated class C rf amplifier service*, these tubes should be supplied with bias from a grid resistor, or from a suitable combination of grid resistor and fixed supply, or grid resistor and cathode resistor. The cathode resistor should be by-passed for both audio and radio frequencies. The combination method of grid resistor and fixed supply has the advantage of not only protecting the tube from damage through loss of excitation but also of minimizing distortion by bias-supply voltage compensation. Grid-bias voltage is not particularly critical so that correct adjustment may be obtained with values differing widely from the calculated values.

In *class C rf telegraph service*, the 892 and 892-R may be supplied with bias from a cathode resistor, grid resistor, or suitable combination of grid resistor and fixed supply or grid resistor and cathode resistor. When the tubes are used in the final amplifier or a preceding stage of a transmitter designed for break-in operation and oscillator keying, a small amount of fixed bias must be used to maintain the plate current and, therefore, the plate dissipation at a safe value. With plate voltage of 15000 volts applied to the 892, a fixed bias of -140 volts should be used; similarly, with a plate voltage of 12500 volts applied to the 892-R, a fixed bias of -200 volts is required.

When the 892 and 892-R are used in *class B rf service or class C service*, the grid current and driving power required to obtain the desired power output will vary with the plate loading. If the plate circuit presents a relatively low resistance to the tube, the desired output can be obtained with relatively low grid current and driving power, but plate-circuit efficiency is sacrificed. Conversely, if the tube operates into a relatively high load resistance, relatively high current and driving power are required to obtain the desired output and the plate-circuit efficiency will be high. In practice, a compromise must be made between these extremes. The typical operating conditions given in the tabulated data represent compromise conditions which will give good plate-circuit efficiency with reasonable driving power.

In order to permit considerable range of adjustment, and also to provide for losses in the grid circuit and the coupling circuits, the driver stage should have considerably more output capability than the typical driving power shown in the tabulated data. This recommendation is particularly important near the maximum rated frequency where there are other losses of driving power, such as those caused by radiation and transit-time effects.

The 892 and 892-R may be operated at maximum ratings in all classes of rf service at frequencies as high as 1.6 megacycles. They may be operated at higher frequencies provided the maximum values of plate voltage and plate input are reduced as the frequency is raised (other maximum ratings are the same as shown under Maximum Ratings in the tabulated data). The table below shows the highest percentage of maximum plate voltage and plate input that can be used up to 20 megacycles. Special attention should be given to adequate cooling at the higher frequencies.

Type 892

FREQUENCY	1.6	7.5	20	MC
MAX. PERMISSIBLE PERCENTAGE OF MAX. RATED PLATE VOLTAGE AND PLATE INPUT:				
Class B telephony	100	85	76	Per cent
Class C telephony	100	85	75	Per cent
Class C telegraphy	100	75	50	Per cent

Type 892-R

FREQUENCY	1.6	7.5	20	MC
MAX. PERMISSIBLE PERCENTAGE OF MAX. RATED PLATE VOLTAGE AND PLATE INPUT:				
Class B telephony	100	85	76	Per cent
Class C telephony	100	75	50	Per cent
Class C telegraphy	100	75	50	Per cent

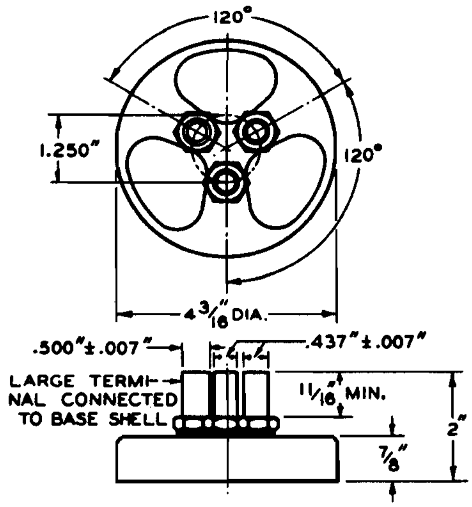
Circuit considerations pertaining to operation of the 892 and 892-R are given in the following paragraphs.

Because of the large high-frequency currents carried by the grid and plate terminals, heavy conductors should be used to make the circuit connections.

When more radio-frequency power is required than can be obtained from a single tube, push-pull or parallel circuit arrangements may be used. Two tubes in parallel or push-pull will give approximately twice the power output of one tube. The parallel connection requires no increase in exciting voltage necessary to drive a single tube. With either connection, the driving power required is approximately twice that for a single tube. The push-pull arrangement has the advantage of simplifying the balancing of high-frequency circuits. When two or more tubes are used in the circuit, precautions should be taken to balance the plate currents.

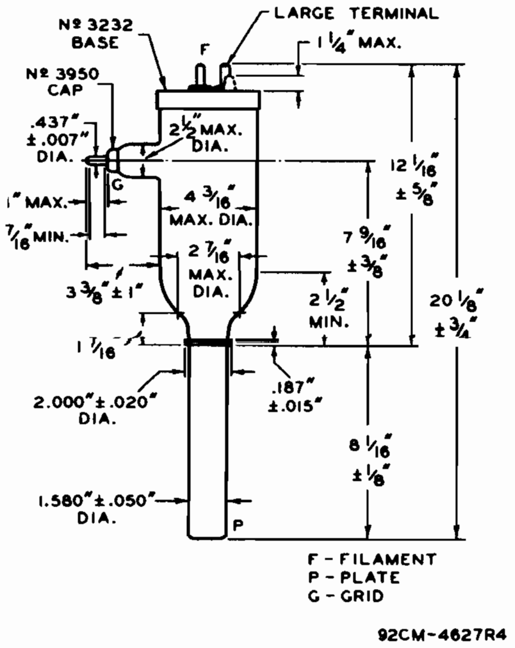
If parasitic oscillations occur in the parallel or push-pull circuits, non-inductive resistors of about 10 to 100 ohms connected in series with each grid lead as close to the tube as possible will often prevent the oscillations.

No. 3232 BASE OUTLINE

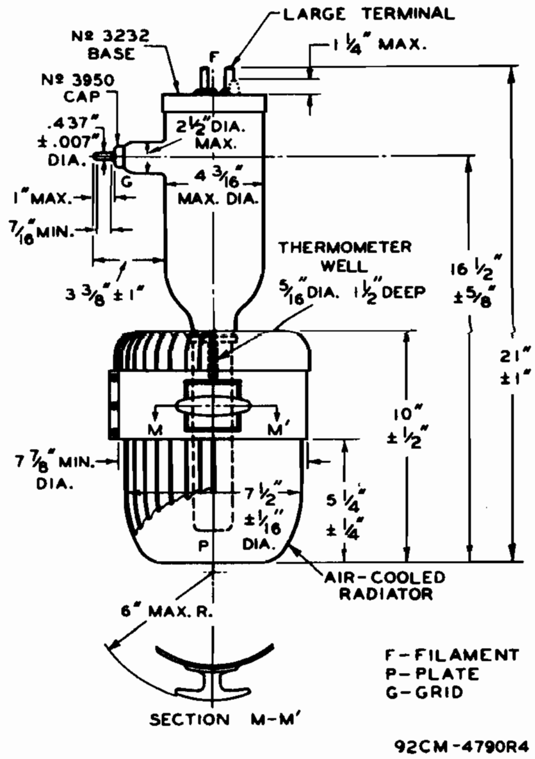


92CS-4792R2

DIMENSIONAL OUTLINE RCA-892

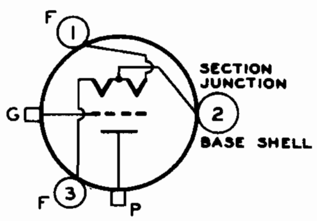


DIMENSIONAL OUTLINE RCA-892-R



TERMINAL CONNECTIONS FOR TYPES 892 and 892-R

Top View



DO NOT CONNECT TWO SECTIONS IN PARALLEL

TERMINAL 1 - FILAMENT
TERMINAL 2 - JUNCTION OF FILAMENT SECTIONS, BASE SHELL
TERMINAL 3 - FILAMENT
G - GRID (SIDE ARM)
P { TYPE 892: WATER-COOLED PLATE TERMINAL
TYPE 892-R: RADIATOR-COOLED PLATE TERMINAL

RCA