833A

Power Triode

THORIATED-TUNGSTEN FILAMENT — **RUGGED STRUCTURE**
ZIRCONIUM-COATED ANODE — **POST TERMINALS**
1250 WATTS CW INPUT (CCS) TO 30 Mc WITH NATURAL COOLING
1800 WATTS CW INPUT (CCS) TO 20 Mc WITH FORCED-AIR COOLING

GENERAL DATA

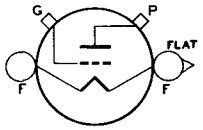
Electrical:

Filament, Thoriated Tungsten:		
Voltage (AC or DC)	10 ± 5%	volts
Current at heater volts = 10	10	amp
Amplification Factor, for grid volts = −10 and plate ma. = 200	35	
Direct Interelectrode Capacitances:		
Grid to plate	6.3	μμf
Grid to filament	12.3	μμf
Plate to filament	8.5	μμf

Mechanical:

Operating Position . . . . . Vertical, with filament posts up or down; Horizontal, with plane of electrodes vertical (on edge) ←
Overall Length . . . . . 8-5/8" ± 3/16"
Maximum Diameter . . . . . 4-19/32"
Bulb T36
Weight (Approx.) . . . . . 1 lb
Terminal Connections (See *Dimensional Outline*):

F – Filament
G – Grid



P – Plate

Thermal:

Cooling:

Natural or *forced air*—depending on the operating conditions. *Natural Cooling* means that adequate free circulation of air around the tube is necessary. *Forced-Air Cooling* means that an air flow of 40 cfm from a 2"-diameter nozzle directed vertically on bulb between grid and plate seals is required to limit temperature between these seals to 145° C.

Fittings: ←

Johnson (E.F. Johnson Company, Waseca, Minn.) Assembly Cat. No.124-212 consisting of ceramic mounting for filament end and two heat-radiating connectors for grid and plate terminals.

•,••,*: See next page.

← Indicates a change.

AF POWER AMPLIFIER & MODULATOR — Class B

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute-Maximum Values:*			
DC PLATE VOLTAGE	3000 max.	3300 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	500 max.	500 max.	ma
MAX.-SIGNAL PLATE INPUT*	1125 max.	1300 max.	watts
PLATE DISSIPATION*	300 max.	350 max.	watts
Typical Operation with Natural Cooling:			
Values are for 2 tubes			
DC Plate Voltage	3000	3300	volts
DC Grid Voltage#	−70	−80	volts
Peak AF Grid-to-Grid Voltage	400	440	volts
Zero-Signal DC Plate Current	100	100	ma
Max.-Signal DC Plate Current	750	780	ma
Effective Load Resistance (Plate to plate)	9500	10500	ohms
Max.-Signal Driving Power (Approx.)	20	30	watts
Max.-Signal Power Output (Approx.)	1650	1900	watts

FORCED-AIR COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute-Maximum Values:*			
DC PLATE VOLTAGE	4000 max.	4000 max.	volts
MAX.-SIGNAL DC PLATE CURRENT*	500 max.	500 max.	ma
MAX.-SIGNAL PLATE INPUT*	1600 max.	1800 max.	watts
PLATE DISSIPATION*	400 max.	450 max.	watts
Typical Operation with Forced-Air Cooling:			
Values are for 2 tubes			
DC Plate Voltage	4000	4000	volts
DC Grid Voltage#	−100	−100	volts
Peak AF Grid-to-Grid Voltage	480	510	volts
Zero-Signal DC Plate Current	100	100	ma
Max.-Signal DC Plate Current	800	900	ma
Effective Load Resistance (Plate to plate)	12000	11000	ohms
Max.-Signal Driving Power (Approx.)	29	38	watts
Max.-Signal Power Output (Approx.)	2400	2700	watts

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

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POWER TRIODE

RF POWER AMPLIFIER - Class B Telephony

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

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	3000 max.	3300 max.	volts
DC PLATE CURRENT	300 max.	300 max.	ma
PLATE INPUT	450 max.	525 max.	watts
PLATE DISSIPATION	300 max.	350 max.	watts
Typical Operation with Natural Cooling:			
DC Plate Voltage	3000	3300	volts
DC Grid Voltage#	-70	-100	volts
Peak RF Grid Voltage	90	110	volts
DC Plate Current	150	150	ma
DC Grid Current (Approx.)	2	2	ma
Driving Power (Approx.)▲	10	11	watts
Power Output (Approx.)	150	200	watts

FORCED-AIR COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	4000 max.	4000 max.	volts
DC PLATE CURRENT	300 max.	300 max.	ma
PLATE INPUT	600 max.	675 max.	watts
PLATE DISSIPATION	400 max.	450 max.	watts
Typical Operation with Forced-Air Cooling:			
DC Plate Voltage	4000	4000	volts
DC Grid Voltage#	-120	-120	volts
Peak RF Grid Voltage	120	130	volts
DC Plate Current	150	150	ma
DC Grid Current (Approx.)	2	3	ma
Driving Power (Approx.)▲	14	21	watts
Power Output (Approx.)	225	250	watts

PLATE-MODULATED RF POWER AMPLIFIER - Class C Telephony

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

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	2500 max.	3000 max.	volts
DC GRID VOLTAGE	-500 max.	-500 max.	volts
DC PLATE CURRENT	400 max.	400 max.	ma

For ac filament supply.

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

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	CCS●	ICAS●●	
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT	835 max.	1000 max.	watts
PLATE DISSIPATION	200 max.	250 max.	watts
Typical Operation with Natural Cooling:			
DC Plate Voltage	2500	3000	volts
DC Grid Voltage✱	−300	−240	volts
From a grid resistor of	4000	3400	ohms
Peak RF Grid Voltage	460	410	volts
DC Plate Current	335	335	ma
DC Grid Current (Approx.)⊕	75	70	ma
Driving Power (Approx.)⊕	30	26	watts
Power Output (Approx.)	635	800	watts

FORCED-AIR COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	3000 max.	4000 max.	volts
DC GRID VOLTAGE	−500 max.	−500 max.	volts
DC PLATE CURRENT	450 max.	450 max.	ma
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT	1250 max.	1800 max.	watts
PLATE DISSIPATION	270 max.	350 max.	watts
Typical Operation with Forced-Air Cooling:			
DC Plate Voltage	3000	4000	volts
DC Grid Voltage✱	−300	−325	volts
From a grid resistor of	3600	3600	ohms
Peak RF Grid Voltage	490	520	volts
DC Plate Current	415	450	ma
DC Grid Current (Approx.)⊕	85	90	ma
Driving Power (Approx.)⊕	37	42	watts
Power Output (Approx.)	1000	1500	watts

RF POWER AMPLIFIER & OSCILLATOR--Class C Telegraphy□□ and RF POWER AMPLIFIER--Class C FM Telephony

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	3000 max.	3300 max.	volts
DC GRID VOLTAGE	−500 max.	−500 max.	volts
DC PLATE CURRENT	500 max.	500 max.	ma

✱ Obtained by grid resistor, or from a combination of grid resistor with either fixed supply or cathode resistor.

□□ Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115% of the carrier conditions.

●, ●●, ⊕: See next page.

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POWER TRIODE

	CCS●		*ICAS*●●		
DC GRID CURRENT	100 max.		100 max.		ma
PLATE INPUT	1250 max.		1500 max.		watts
PLATE DISSIPATION	300 max.		350 max.		watts
Typical Operation with Natural Cooling:					
DC Plate Voltage	2250	3000	3000	3000	volts
DC Grid Voltage	−125	−200	−160	−155	volts
From a grid resistor of	1500	3600	2300	2150	ohms
From a cathode resistor of	235	425	400	270	ohms
Peak RF Grid Voltage	300	360	310	350	volts
DC Plate Current	445	415	335	500	ma
DC Grid Current (Approx.)●	85	55	70	70	ma
Driving Power (Approx.)●	23	20	20	25	watts
Power Output (Approx.)	780	1000	800	1150	watts

FORCED-AIR COOLING

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	4000 max.	4000 max.	volts
DC GRID VOLTAGE	−500 max.	−500 max.	volts
DC PLATE CURRENT	500 max.	500 max.	ma
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT	1800 max.	2000 max.	watts
PLATE DISSIPATION	400 max.	450 max.	watts
Typical Operation with Forced-Air Cooling:			
DC Plate Voltage	4000	4000	volts
DC Grid Voltage▲▲	−200	−225	volts
From a grid resistor of	2650	2400	ohms
From a cathode resistor of	380	380	ohms
Peak RF Grid Voltage	375	415	volts
DC Plate Current	450	500	ma
DC Grid Current●	75	95	ma
Driving Power (Approx.)●	26	35	watts
Power Output (Approx.)	1440	1600	watts

● Subject to wide variation 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 load circuits need less grid current and driving power, but plate-circuit efficiency is sacrificed. The driver stage should have good regulation and should be capable of delivering considerably more than the required driving power.

▲▲ Obtained from fixed supply, by grid resistor, by cathode resistor, or by combination methods.

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← Indicates a change.

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POWER TRIODE

NOTE: When the 833-A is 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 at a safe value. With a plate voltage of 4000 volts, a fixed bias of at least -90 volts should be used.

SELF-RECTIFYING OSCILLATOR OR AMPLIFIER - Class C

NATURAL COOLING

	CCS●	*ICAS*●●	
Maximum Ratings, *Absolute Values:*			
AC PLATE VOLTAGE (RMS). . .	4250 max.	4650 max.	volts
DC GRID VOLTAGE	-315 max.	-315 max.	volts
DC PLATE CURRENT.	250 max.	250 max.	ma
DC GRID CURRENT	50 max.	50 max.	ma
PLATE INPUT★★	1180 max.	1290 max.	watts
PLATE DISSIPATION	300 max.	350 max.	watts
Typical Operation with Natural Cooling:			
AC Plate Voltage (RMS). . .	4000	4400	volts
DC Grid Voltage◆.	-80	-85	volts
From a grid resistor of	2200	2400	ohms
DC Plate Current.	240	240	ma
DC Grid Current (Approx.) .	37	36	ma
Driving Power (Approx.)## .	13	13.5	watts
Output-Circuit Efficiency (Approx.). . . .	85	85	%
Useful Power Output (Approx.)	710□	800□	watts

FORCED-AIR COOLING

	CCS●	
Maximum Ratings, *Absolute Values:*		
AC PLATE VOLTAGE (RMS).	5650 max.	volts
DC GRID VOLTAGE	-315 max.	volts
DC PLATE CURRENT.	250 max.	ma
DC GRID CURRENT	50 max.	ma
PLATE INPUT	1570 max.	watts
PLATE DISSIPATION	400 max.	watts
Typical Operation with Forced-Air Cooling:		
AC Plate Voltage (RMS).	5300	volts
DC Grid Voltage◆.	-97	volts
From a grid resistor of	2700	ohms
DC Plate Current.	240	ma
DC Grid Current (Approx.)	35	ma
Driving Power (Approx.)##	14	watts
Output-Circuit Efficiency (Approx.) . . .	85	%
Useful Power Output (Approx.)	975□	watts

★★ Power input to plate is 1.11 times the product of ac plate voltage (rms) and the dc plate current.

From a self-rectified driver.

●, ●●, ◆, □: See next page. → Indicates a change.

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POWER TRIODE

AMPLIFIER or OSCILLATOR — Class C

With Separate, Rectified, Unfiltered, Single-Phase, Full-Wave Plate Supply

NATURAL COOLING

	CCS●	ICAS●●	
Maximum Ratings, *Absolute Values:*			
DC PLATE VOLTAGE	2700 max.	3000 max.	volts
DC GRID VOLTAGE	-450 max.	-450 max.	volts
DC PLATE CURRENT	500 max.	500 max.	ma
DC GRID CURRENT	100 max.	100 max.	ma
PLATE INPUT†	1250 max.	1500 max.	watts
PLATE DISSIPATION	300 max.	350 max.	watts
Typical Operation with Natural Cooling:			
DC Plate Voltage	2500	2750	volts
DC Grid Voltage♦	-130	-135	volts
From a grid resistor of	1560	1770	ohms
DC Plate Current	450	450	ma
DC Grid Current (Approx.)	83	76	ma
Driving Power (Approx.)††	27	25	watts
Output-Circuit Efficiency (Approx.)	85	85	%
Useful Power Output (Approx.)	935□	1020□	watts ←

FORCED-AIR COOLING

	CCS●	
Maximum Ratings, *Absolute Values:*		
DC PLATE VOLTAGE	3600 max.	volts
DC GRID VOLTAGE	-450 max.	volts
DC PLATE CURRENT	500 max.	ma
DC GRID CURRENT	100 max.	ma
PLATE INPUT†	1800 max.	watts
PLATE DISSIPATION	400 max.	watts
Typical Operation with Forced-Air Cooling:		
DC Plate Voltage	3300	volts
DC Grid Voltage♦	-155	volts
From a grid resistor of	2100	ohms
DC Plate Current	450	ma
DC Grid Current (Approx.)	73	ma
Driving Power (Approx.)††	26	watts
Output-Circuit Efficiency (Approx.)	85	%
Useful Power Output (Approx.)	1240□	watts ←

● Continuous Commercial Service.

●● Intermittent Commercial and Amateur Service.

† Power input to plate is 1.23 times the product of dc plate voltage times dc plate current.

□ This value of useful power is measured at load of output circuit having the indicated efficiency.

♦, ††: See next page. ← Indicates a change.

ELECTRON TUBE DIVISION
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POWER TRIODE

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

	Note	Min.	Max.	
Filament Current.	1	9.4	10.6	amp
Direct Interelectrode Capacitances:				
Grid to plate	–	5.5	7.1	μμf
Grid to filament. . . .	–	10.1	14.5	μμf
Plate to filament . . .	–	6.4	10.6	μμf
Amplification Factor. . .	2	31.5	38.5	
Grid Current.	3	160	380	ma
Plate Current (1)	3	490	810	ma
Plate Current (2)	4	60	140	ma
Power Output.	5	1150	–	watts

Note 1: With 10 volts dc on filament.

Note 2: With 10 volts ac on filament, dc grid voltage of −10 volts, and dc plate voltage adjusted to give dc plate current of 200 ma.

Note 3: With 10 volts ac on filament, dc plate voltage of 100 volts, and dc grid voltage of +100 volts.

Note 4: With 10 volts ac on filament, dc plate voltage of 2500 volts, and dc grid voltage of −50 volts.

Note 5: In self-excited oscillator circuit, and with 10 volts ac on filament, dc plate voltage of 4000 volts, dc plate current of 450 ma., dc grid current of 80 to 120 ma., grid resistor of 5000 ohms, and frequency of 30 Mc.

♦ Obtained from a grid resistor of the value shown or from a combination of grid resistor and cathode resistor. Fixed bias operation is not recommended. The bias resistor should not be bypassed for the plate and grid voltage supply frequency.

†† From a driver with a rectified, unfiltered, single-phase, full wave plate supply.

RATINGS vs FREQUENCY WITH NATURAL COOLING

FREQUENCY	30	50	75	Mc
MAXIMUM PERMISSIBLE PERCENTAGE of MAXIMUM RATED PLATE VOLTAGE and PLATE INPUT:				
Class B telephony	100	98	94	%
Class C telephony	100	90	72	%
Class C telegraphy	100	90	72	%

RATINGS vs FREQUENCY WITH FORCED-AIR COOLING

FREQUENCY	20	50	75	Mc
MAXIMUM PERMISSIBLE PERCENTAGE of MAXIMUM RATED PLATE VOLTAGE and PLATE INPUT:				
Class B telephony	100	97	93	%
Class C telephony	100	83	65	%
Class C telegraphy	100	83	65	%

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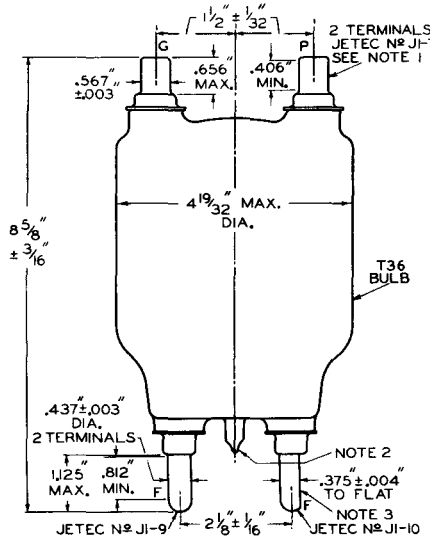

92CM-4786R5

NOTE 1: THE ANGLE FORMED ON A PLANE NORMAL TO THE TUBE AXIS BY THE INTERSECTION OF THE PLANE DETERMINED BY THE AXIS OF THE FILAMENT TERMINALS WITH THE PLANE DETERMINED BY THE AXIS OF THE GRID AND PLATE TERMINALS IS NOT MORE THAN 5°.

NOTE 2: THE MOUNTING SHOULD PROVIDE LIBERAL CLEARANCE FOR THIS TIP.

NOTE 3: THE PLANE THROUGH THE FLAT SIDE OF THE FILAMENT TERMINAL IS 90° ±7° WITH RESPECT TO THE PLANE THROUGH THE AXES OF THE FILAMENT TERMINALS.

RCA

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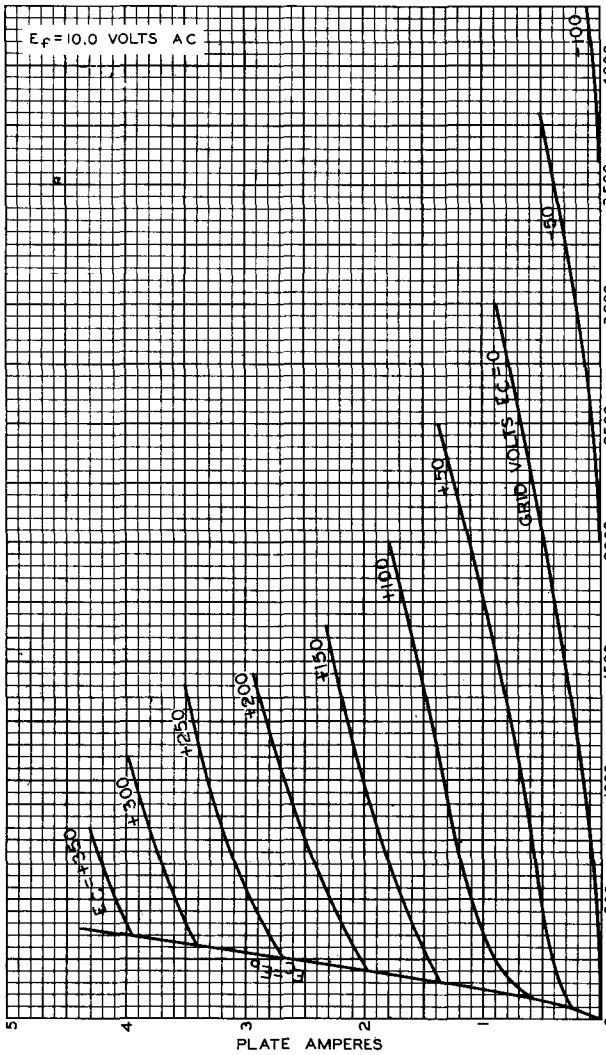
AVERAGE PLATE CHARACTERISTICS



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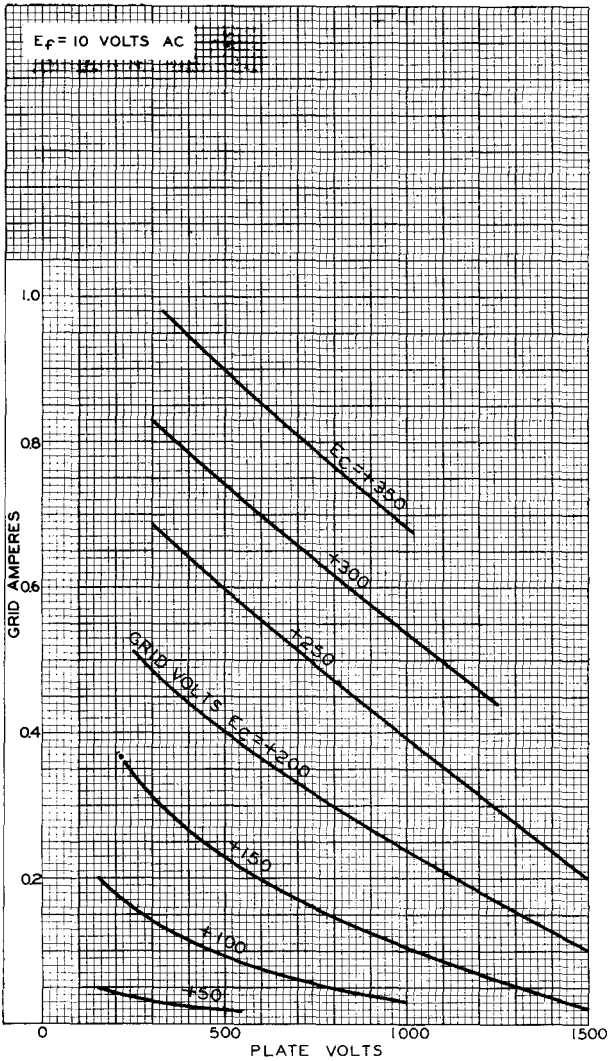
TYPICAL CHARACTERISTICS