



TYPE 813

TRANSMITTING BEAM POWER AMPLIFIER ENGINEERING INFORMATION

GENERAL RATINGS

Number of Electrodes.....	4
Filament Voltage	10.0 volts
Current	5.0 amperes
Type	Thoriated Tungsten
Average Characteristic Values Calculated at: 50 ma. Plate Current	
Amplification Factor	100
Plate Resistance	27,000 ohms
Mutual Conductance	3750 micromhos
Average Direct Interelectrode Capacities:	
Grid to Plate (with external shielding).....	0.2 uuf
Grid to Filament.....	16.3 uuf
Plate to Filament.....	14.0 uuf
Maximum Overall Dimensions:	
Length	7 1/2 inches
Diameter	2 9/16 inches
Bulb	T-20
Cap	Medium Metal
Base	Giant 7-Pin, Bayonet
Type of Cooling.....	Air
Net Weight	7 5/8 oz.

MAXIMUM RATINGS

Maximum D-C Plate Voltage Modulated	2000 volts
Maximum D-C Plate Voltage Unmodulated	2000 volts
Maximum D-C Plate Current Modulated	100 ma.
Maximum D-C Plate Current Unmodulated	180 ma.
Maximum Plate Dissipation	100 watts
Maximum D-C Grid Current	25 ma.
Frequency Rating for Operating Conditions with Maximum Rated Power Input and Nominal Output:	
Below	30 megacycles
Above	10 meters
*Maximum Frequency Rating with Reduced Power Input and Output:	
Below	120 megacycles
Above	2.5 meters

*For operation at the higher frequencies, the plate voltage, plate current, plate dissipation, and d-c grid current should not exceed 50% of the Maximum Ratings. The R-F grid current should never exceed the maximum rated value.

INSTALLATION

The base of the UNITED 813 is designed for mounting in a special 7-contact transmitting socket. The tube may be mounted either vertically, in the base-down or base-up position with filament axis vertical, or horizontally, with the filament base pins mounted in the vertical plane so that the plate will also be vertical (on edge). Ample air space should be provided for ventilation.

The beam forming plates of the 813 should always be operated at zero potential with respect to the filament. The beam forming plates should be connected to the midpoint of the filament circuit when an A-C filament supply is used, and to the negative end of the filament when a D-C filament supply is used.

A protective device, such as a high-voltage fuse, should be used to protect both the plate and screen against overloads. Shielding and isolation of the input and output circuits are necessary for stable operation. If an external shield is used with the 813, it should be designed to enclose the base end of the tube and extend up to a position level with the internal circular shield disc located below the plate.

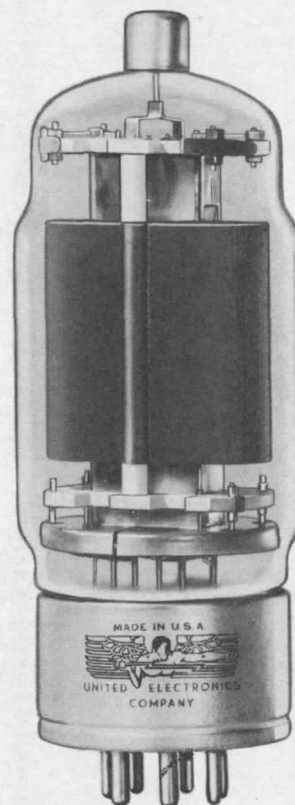
Neutralization is unnecessary in adequately shielded circuits.

GRAPHITE ANODE

A graphite anode is used in this type because of several specific advantages over metals such as tantalum, molybdenum and nickel. The radiating area of graphite is approximately twice the projected area due to its surface porosity. Moreover, because of the black body principle, it will dissipate four times more heat than metal.

Graphite, being infusible, will not warp or twist. Therefore, it maintains its exact form under all temperatures, the result being constant inter-element relationship. The low operating temperature of the graphite anode tends to keep the grid cool, reduces overload hazards, and prevents gas current. The inherent qualities of graphite over metal as outlined above, are advantages of primary importance in designing tubes of this type for long and satisfactory service life.

All ratings given are for continuous service. Higher ratings are permissible for intermittent operation. Additional data will be furnished upon request.



Extremely high power sensitivity and low driving power requirements make this rugged UNITED 813 a popular choice for final stage power amplification and high-power frequency multiplier service.

R-F POWER AMPLIFIER—CLASS B TELEPHONY
(Carrier Conditions—Modulation Factor = 1.0)

Maximum D-C Plate Voltage	2000	volts
Maximum D-C Plate Current	100	ma.
Maximum Plate Input	150	watts
Maximum Screen Input	15	watts
Maximum Plate Dissipation	100	watts

Typical Operation:

A-C Filament Voltage	10	10	volts
D-C Plate Voltage	1500	2000	volts
D-C Screen Voltage	400	400	volts
D-C Grid Voltage	-60	-75	volts
Peak R-F Grid Voltage	70	80	volts
Beam Forming Plate Voltage	0	0	volts
D-C Plate Current	100	75	ma.
D-C Screen Current	4	3	ma.
Power Output	approx. 50	50	watts

GRID MODULATED R-F POWER AMPLIFIER
CLASS C TELEPHONY

(Carrier Conditions—Modulation Factor = 1.0)

Maximum D-C Plate Voltage	2000	volts
Maximum D-C Plate Current	100	ma.
Maximum Plate Input	150	watts
Maximum Screen Input	15	watts
Maximum Plate Dissipation	100	watts
Maximum D-C Screen Voltage	400	volts
Maximum D-C Grid Voltage	-200	volts
Maximum D-C Grid Current	25	ma.

Typical Operation:

A-C Filament Voltage	10	10	volts
D-C Plate Voltage	1500	2000	volts
D-C Screen Voltage	400	400	volts
D-C Grid Voltage	-140	-120	volts
Peak R-F Grid Voltage	145	120	volts
Peak A-F Grid Voltage	60	60	volts
Beam Forming Plate Voltage	0	0	volts
D-C Plate Current	70	75	ma.
D-C Screen Current	16	20	ma.
D-C Grid Current	approx.	—	—
Driving Power †	approx.	—	—
Power Output	approx. 40	50	watts

PLATE MODULATED R-F POWER AMPLIFIER
CLASS C TELEPHONY

(Carrier Conditions—Modulation Factor = 1.0)

Maximum D-C Plate Voltage	1600	volts
Maximum D-C Plate Current	150	ma.
Maximum Plate Input	240	watts
Maximum Screen Input	15	watts
Maximum Plate Dissipation	67	watts
Maximum D-C Screen Voltage	400	volts
Maximum D-C Grid Voltage	-300	volts
Maximum D-C Grid Current	25	ma.

Typical Operation:

A-C Filament Voltage	10	10	volts
D-C Plate Voltage	1250	1600	volts
D-C Screen Voltage	400	400	volts
D-C Grid Voltage	-120	-130	volts
Peak R-F Grid Voltage	195	210	volts
Beam Forming Plate Voltage	0	0	volts
D-C Plate Current	150	150	ma.
D-C Screen Current	16	20	ma.
D-C Grid Current †	approx. 4	6	ma.
Driving Power †	approx. .7	1.2	watts
Power Output	approx. 135	175	watts

R-F POWER AMPLIFIER AND OSCILLATOR
CLASS C TELEGRAPHY

(Key Down Conditions)

Maximum D-C Plate Voltage	2000	volts
Maximum D-C Plate Current	180	ma.
Maximum Plate Input	360	watts
Maximum Screen Input	22	watts
Maximum Plate Dissipation	100	watts
Maximum D-C Screen Voltage	400	volts
Maximum D-C Grid Voltage	-300	volts
Maximum D-C Grid Current	25	ma.

Typical Operation:

A-C Filament Voltage	10	10	10	volts
D-C Plate Voltage	1250	1500	2000	volts
D-C Screen Voltage	300	300	400	volts
D-C Grid Voltage	-60	-70	-90	volts
Peak R-F Grid Voltage	145	150	160	volts
Beam Forming Plate Voltage	0	0	0	volts
D-C Plate Current	180	180	180	ma.
D-C Screen Current	23	20	15	ma.
D-C Grid Current †	approx. 7	6	3	ma.
Driving Power †	approx. 1	0.8	0.5	watts
Power Output	approx. 155	190	260	watts

†Subject to wide variations depending on the impedance of the load circuit. The driver stage should have a tank circuit of good regulation and should be capable of delivering considerably more than the required driving power.

