



TYPE KU-23

MODULATOR, A-F AND R-F POWER AMPLIFIER, U.H.F. OSCILLATOR

ENGINEERING INFORMATION

GENERAL RATINGS

Number of Electrodes	3
Filament Voltage	11.0 volts
Current	4.0 amperes
Type	Thoriated Tungsten
Average Characteristic Values Calculated at:	
150 ma. Plate Current	
Amplification Factor	23
Plate Resistance	4100 ohms
Mutual Conductance	5600 micromhos
Average Direct Interelectrode Capacities:	
Grid to Plate	6.5 uuf
Grid to Filament	6.0 uuf
Plate to Filament	1.4 uuf
Maximum Overall Dimensions:	
Length	10 1/4 inches
Diameter (excluding Grid Arm)	3 inches
Bulb	T-24
Cap	Standard 250-Watt
Base	Jumbo 4-large Pin
Type of Cooling	Air
Net weight	10 1/8 oz.

MAXIMUM RATINGS

Maximum D-C Plate Voltage Modulated	2200 volts
Maximum D-C Plate Voltage Unmodulated	3000 volts
Maximum D-C Plate Current Modulated	275 ma.
Maximum D-C Plate Current Unmodulated	275 ma.
Maximum Plate Dissipation	200 watts
Maximum D-C Grid Current	60 ma.
Maximum R-F-Grid Current	12 amp.
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	60 megacycles
Above	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 KU-23 is designed for mounting in a standard "50-Watt" socket of the four-pin, bayonet type. The tube should always be mounted vertically with ample air space provided for ventilation.

The filament of the KU-23 should be operated at the rated value of 11 volts. Operation at other than rated value may result in loss of filament emission and short life. The filament of the KU-23 should be operated preferably from an a-c source.

The plate dissipation of the KU-23 should never exceed the values given under Maximum Ratings and Typical Operation Conditions.

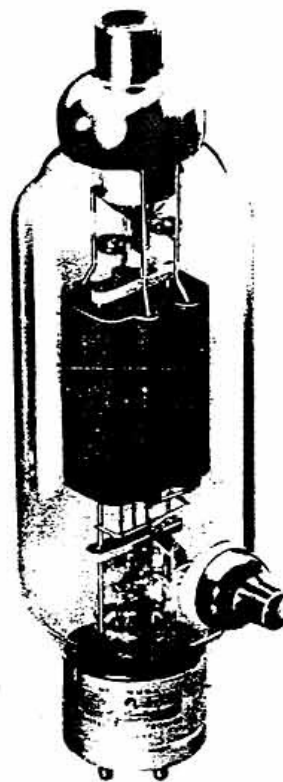
When the KU-23 is subjected during operation to external high voltage or high frequency fields, shielding and r-f filter circuits should be provided.

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.



Typical UNITED ELECTRONICS refinements of design are revealed in the above illustration of type KU-23. Individually supported and isolated grid-filament assembly gives this tube the necessary separation between elements for its heavy input ratings. The large anode and wide spacing are design features contributing to the modern efficiency standards which this tube exemplifies.

A-F POWER AMPLIFIER AND MODULATOR—CLASS B

Maximum D-C Plate Voltage.....	3000	volts
Maximum D-C Plate Current.....	275	ma.
Maximum Plate Input.....	600	watts
Maximum Plate Dissipation.....	200	watts

Averaged over..... any audio..... freq. cycle.....

Typical Operation (2 tubes):

A-C Filament Voltage.....	11	11	11	a-c volts
D-C Plate Voltage.....	2000	2500	3000	volts
D-C Grid Voltage.....	-85	-100	-125	volts
Peak A-F Grid to Grid Voltage.....	420	430	450	volts
Zero-Sig. D-C Plate Cur.....	60	60	60	ma.
Max.-Sig. D-C Plate Cur.....	500	440	400	ma.
Load Resistance (per tube).....	2150	3000	4000	ohms
Effective Load Res.(plate to plate).....	8600	12000	16000	ohms
Max.-Six. Driving Power approx.....	11.3	7.3	5.4	watts
Power Output.....	approx. 665	740	800	watts

R-F POWER AMPLIFIER—CLASS B TELEPHONY

(Carrier Conditions—Modulation Factor = 1.0)

Maximum D-C Plate Voltage.....	2500	volts
Maximum D-C Plate Current.....	275	ma.
Maximum Plate Input.....	320	watts
Maximum Plate Dissipation.....	200	watts
Maximum R-F Grid Current.....	10	amp.

Typical Operation:

A-C Filament Voltage.....	11	11	a-c volts
D-C Plate Voltage.....	2000	2500	volts
D-C Grid Voltage.....	-90	-105	volts
Peak R-F Grid Voltage.....	182	175	volts
D-C Plate Current.....	145	130	ma.
D-C Grid Current†.....	approx. 20	5	ma.
Driving Power.....	approx. 4	2	watts
Power Output.....	approx. 101	106	watts

**PLATE MODULATED R-F POWER AMPLIFIER
CLASS C TELEPHONY**

(Carrier Conditions—Modulation Factor = 1.0)

Maximum D-C Plate Voltage.....	2200	volts
Maximum D-C Plate Current.....	275	ma.
Maximum Plate Input.....	600	watts
Maximum Plate Dissipation.....	200	watts
Maximum D-C Grid Voltage.....	-500	volts
Maximum D-C Grid Current.....	60	ma.
Maximum R-F Grid Current.....	10	amp.

Typical Operation:

A-C Filament Voltage.....	11	11	volts
D-C Plate Voltage.....	1500	2000	volts
D-C Grid Voltage.....	-150	-200	volts
Peak R-F Grid Voltage.....	334	382	volts
D-C Plate Current.....	275	275	ma.
D-C Grid Current†.....	approx. 47	37	ma.
Driving Power.....	approx. 14.5	13.4	watts
Power Output.....	approx. 298	405	watts

**R-F POWER AMPLIFIER AND OSCILLATOR
CLASS C TELEGRAPHY**

(Key Down Conditions)

Maximum D-C Plate Voltage.....	3000	volts
Maximum D-C Plate Current.....	275	ma.
Maximum Plate Input.....	750	watts
Maximum Plate Dissipation.....	200	watts
Maximum D-C Grid Voltage.....	-500	volts
Maximum D-C Grid Current.....	60	ma.
Maximum R-F Grid Current.....	12	amp.

Typical Operation:

A-C Filament Voltage.....	11	11	11	volts
D-C Plate Voltage.....	2000	2500	3000	volts
D-C Grid Voltage.....	-200	-250	-300	volts
Peak R-F Grid Voltage.....	474	435	378	volts
D-C Plate Current.....	273	270	250	ma.
D-C Grid Current.....	approx. 35	29	21	ma.
Driving Power.....	approx. 12.3	11.7	9.5	watts
Power Output†.....	approx. 400	510	570	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.

