

TUNG-SOL

PRODUCT BULLETIN

INDUSTRIAL ELECTRON TUBE TYPE 6360

FEBRUARY 1963

TWIN BEAM POWER TUBE

DESCRIPTION — The 6300 is a twin beam tetrode for service as a Class C amplifier, oscillator, or frequency multiplier, for frequencies to 200 mc. This type is also rated for A.F. modulator service. The 6360 is capable of producing 16 watts of power output at 200 mc under ICAS conditions.

The two sections of the tube share a common cathode and a common screen grid which reduce the effects of lead inductance in push pull VHF service. The 6360 also has internal neutralization for push pull operation. The two sections may be used for separate functions, e.g. section 1 may be used as an oscillator and section 2 as a frequency multiplier. The Center-tapped heater is designed for satisfactory operation from either 6.3 or 12.6 volt supplier.

ELECTRICAL DATA

Cathode — Oxide coated, indirectly heated

	Parallel	Series
Heater Voltage	6.3	12.6 Volts
Heater Current	0.82	0.41 Amperes
Interelectrode Capacitance	Push-Pull	Per Unit
Output	1.4	2.6 Picofarads
Input	5.1	6.2 Picofarads
Plate to Grid No. 1 — Maximum		0.1 Picofarads
Mu — Grid No. 2 to Grid No. 1		
$I_b = 30$ mA		7.5
Transconductance — $I_b = 30$ mA		3300 Micromhos

MECHANICAL DATA

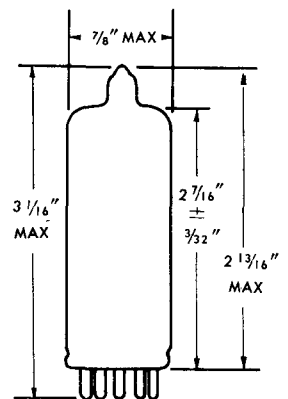
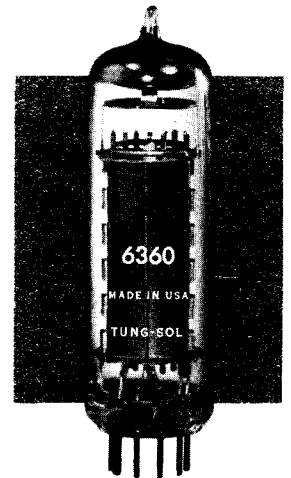
Bulb	T6½
Base	Small button, 9 pin, E9-1
Mounting Position	Any — Note 1
Cooling	Convection — Note 2
Maximum Pin Temperature	120 °C
Maximum Bulb Temperature	225 °C
Net Weight — Approximate	0.6 ounce

Note 1: If a horizontal mounting position is used it is recommended that pins No. 2 and No. 7 be in a vertical plane.

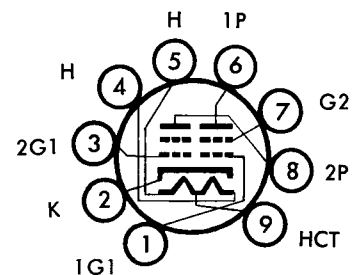
Note 2: Use of a closed metal shield can is not allowed unless it is used with heat dissipating type of inner liner in contact with the bulb walls.

TYPICAL POWER OUTPUT WITH PUSH PULL OPERATION

	ICS	ICAS
Class C — CW Telegraphy — FM Telephony — to 200 mc	12.0	16.0 Watts
Class C — Frequency Multiplier — to 200 mc	3.5	4.8 Watts
Class C — Plate and Screen Grid AM Modulation — to 200 mc	7.1	8.8 Watts
AF Amplifier and Modulator	Class AB ₁ 12.0	Class AB ₂ 17.5 Watts



OUTLINE DRAWING



BOTTOM VIEW

TYPE 6360

RF POWER AMPLIFIER & MODULATOR CLASS AB PUSH-PULL

MAXIMUM RATINGS, ABSOLUTE VALUES

	CCS	
D.C. Plate Voltage.....	300	Volts
D.C. Grid No. 2 Voltage.....	200	Volts
Max. Signal D.C. Plate Current.....	2x50	mA
Max. Signal Plate Input.....	2x15	Watts
Plate Dissipation.....	2x7	Watts
Grid No. 2 Dissipation.....	2x1	Watts
Peak Grid No. 2 Dissipation.....	2x2	Watts
D.C. Grid No. 1 Voltage.....	-150	Volts
Grid Resistor.....	100	Kohms
Peak Heater-Cathode Voltage.....	100	Volts

TYPICAL OPERATION, 2 UNITS OF ONE TUBE

	CCS	CCS	CCS	
D.C. Plate Voltage.....	300	250	200	Volts
D.C. Grid No. 2 Voltage.....	200	200	200	Volts
D.C. Grid No. 1 Voltage (Fixed Bias).....	-21.5	-21.5	-21.5	Volts
Peak A.F. Grid No. 1 to Grid No. 1 Voltage.....	43.5	44.5	43.5	Volts
Zero Signal D.C. Plate Current.....	30	30	30	mA
Max. Signal D.C. Plate Current.....	72	69	66	mA
Zero Signal D.C. Grid No. 2 Current.....	1.2	1.4	2.4	mA
Max. Signal D.C. Grid No. 2 Current.....	12.6	12.4	14.0	mA
Effective Load Resistance Plate-to-Plate.....	10,000	8,000	6,500	Ohms
Max. Signal Output (approx.).....	12	9.3	7.0	Watts
Total Distortion.....	2.5	2.7	3.2	%
Efficiency.....	56	54	53	%

RF POWER AMPLIFIER & MODULATOR CLASS AB PUSH-PULL

MAXIMUM RATINGS, ABSOLUTE VALUES

	CCS	
D.C. Plate Voltage.....	300	Volts
D.C. Grid No. 2 Voltage.....	200	Volts
Max. Signal D.C. Plate Current.....	2x50	mA
Max. Signal Plate Input.....	2x15	Watts
Plate Dissipation.....	2x7	Watts
Grid No. 2 Dissipation.....	2x1	Watts
Peak Grid No. 2 Dissipation.....	2x2	Watts
D.C. Grid No. 1 Voltage.....	-150	Volts
Grid No. 1 Dissipation.....	2x0.2	Watts
Grid No. 1 Current.....	2x4	mA
Grid No. 1 Resistor.....	100	Kohms
Cathode Current.....	2x60	mA
Peak Cathode Current.....	2x300	mA
Peak Heater-Cathode Voltage.....	100	Volts

TYPICAL OPERATION, 2 UNITS OF ONE TUBE

	CCS	CCS	CCS	
D.C. Plate Voltage.....	300	250	200	Volts
D.C. Grid No. 2 Voltage.....	200	200	200	Volts
D.C. Grid No. 1 Voltage (Fixed Bias) Note 1.....	-21.5	-21.5	-21.5	Volts
Peak A.F. Grid No. 1 to Grid No. 1 Voltage.....	64	67	54	Volts
Zero Signal D.C. Plate Current.....	30	30	30	mA
Max. Signal D.C. Plate Current.....	100	100	82.2	mA
Zero Signal D.C. Grid No. 2 Current.....	1.2	1.4	2.4	mA
Max. Signal D.C. Grid No. 2 Current.....	11.4	13	19	mA
Effective Load Resistance Plate-to-Plate.....	6,500	5,000	5,000	Ohms
Max. Signal Grid No. 1 Current.....	2x0.56	2x0.62	2x0.22	mA
Driving Power.....	0.04	0.04	0.02	Watts
Max. Signal Power Output (approx.).....	17.5	14.0	8.7	Watts
Total Distortion.....	5	5.5	6	%
Efficiency.....	58	56	53	%

Note 1 Individual adjustment of the grid bias of each unit is recommended.

FREQUENCY MULTIPLIER TO 200 MC

MAXIMUM RATINGS, ABSOLUTE VALUES

	CCS	ICAS	
D.C. Plate Voltage.....	300	300	Volts
D.C. Grid No. 2 Voltage.....	200	200	Volts
D.C. Grid No. 1 Voltage.....	-150	-150	Volts
D.C. Plate Current.....	2x30	2x42	mA
D.C. Grid No. 1 Current.....	2x2	2x3	mA
Plate Input.....	2x7.5	2x10	Watts
Grid No. 2 Input.....	2x1	2x1	Watts
Plate Dissipation.....	2x5	2x7	Watts
Peak Heater Voltage.....	100	100	Volts
D.C. Cathode Current.....	2x35	2x45	mA
Peak Cathode Current.....	2x225	2x300	mA

TYPICAL OPERATION, 2 UNITS OF ONE TUBE IN PUSH-PULL

	CCS			ICAS			
D.C. Plate Voltage.....	300	250	200	300	250	200	Volts
D.C. Grid No. 2 Voltage.....	150	160	155	150	175	175	Volts
Grid No. 2 Resistor.....	—	47	15	—	18	4.7	Kohms
D.C. Grid No. 1 Voltage—Fixed or from Common Resistor of Peak RF Grid No. 1 to Grid No. 1 Voltage.....	-100	—	33	-100	—	27	Kohms
D.C. Plate Current.....	230	230	230	240	230	230	Volts
D.C. Grid No. 2 Current.....	2x24	2x25	2x28.5	2x32.5	2x36	2x39	mA
D.C. Grid No. 1 Current (approx.).....	2.0	1.9	3.0	3.5	2.7	4.1	mA
Driving Power (approx.).....	0.23	0.23	0.35	0.45	0.28	0.43	Watts
Power Output (approx.).....	6.5	5	3.8	7.8	7.2	6.2	Watts
Efficiency.....	45	40	33.5	40	37	34.5	%
Useful Power Output.....	3.5	3.0	2.8	4.8	4.2	3.5	Watts

PLATE AND SCREEN GRID MODULATOR, PUSH-PULL, R.F. POWER AMPLIFIER — CLASS C TELEPHONY

Carrier conditions per tube for use with a max. modulation factor of 1.0 — to 200 mc.

MAXIMUM RATINGS, ABSOLUTE VALUES

	CCS	ICAS	
D.C. Plate Voltage.....	240	240	Volts
D.C. Grid No. 2 (Screen) Volts.....	200	200	Volts
D.C. Grid No. 1 (Control Grid) Volts.....	-150	-150	Volts
D.C. Plate Current.....	2x37.5	2x46	mA
D.C. Grid No. 1 Current.....	2x3	2x4	mA
Plate Input.....	2x7.5	2x10	Watts
Grid No. 2 Input.....	2x0.65	2x0.65	Watts
Plate Dissipation.....	2x3.3	2x4.6	Watts
Peak Heater Cathode Voltage.....	100	100	Volts
D.C. Cathode Current.....	2x40	2x52	mA
Peak Cathode Current.....	2x180	2x240	mA

TYPICAL OPERATION, 2 UNITS OF ONE TUBE

	CCS		ICAS		
D.C. Plate Voltage.....	200	200	Figure 1	Figure 2	Volts
D.C. Grid No. 2 Voltage.....	33	33	33	15	Kohms
D.C. Grid No. 1 Voltage from Common Resistor of.....					
Peak R.F. Grid No. 1 to Grid No. 1 Volts.....	130	130	130	130	Volts
D.C. Plate Current.....	2x33.5	2x33.5	2x33.5	2x33.5	mA
D.C. Grid No. 2 Current.....	2.6	2.6	2.6	3.1	mA
D.C. Grid No. 1 Current (approx.).....	1.5	1.5	1.5	3.3	mA
Driving Power (approx.).....	0.1	0.1	0.1	0.2	Watts
Power Output (approx.).....	8.1	8.1	8.1	9.8	Watts
Efficiency.....	60	60	60	57	%
Useful Output Power.....	7.1	7.1	7.1	8.8	Watts
Modulation Power (for 100% modulation).....	6.7	6.7	6.7	8.6	Watts

FIGURE 1
TO TUBE PLATES & CENTER TAP OF RF COIL

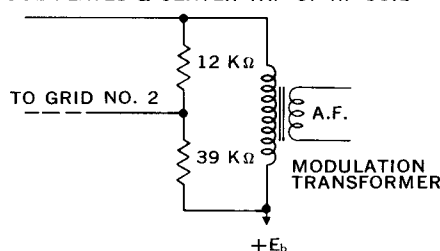
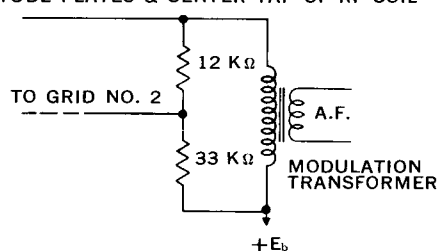


FIGURE 2
TO TUBE PLATES & CENTER TAP OF RF COIL



TYPE 6360 AMPLIFIER & MODULATOR PLATE TELEGRAPHY & FM TELEPHONE TO 200 MC

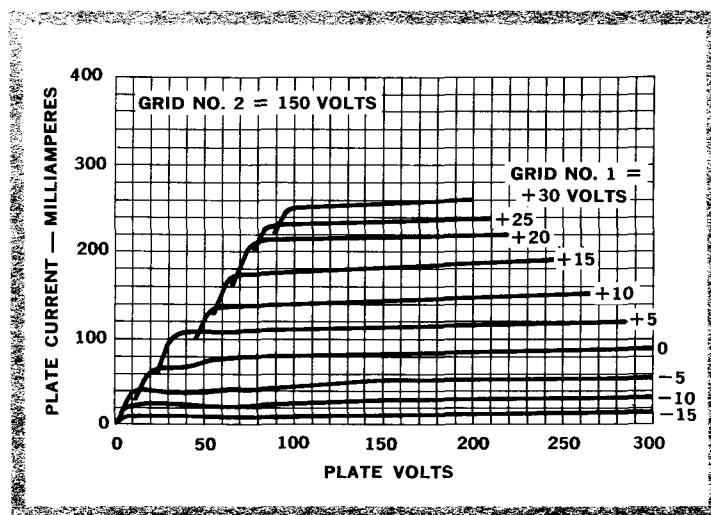
MAXIMUM RATINGS, ABSOLUTE VALUES

	CCS	ICAS	
D.C. Plate Voltage.....	300	300	Volts
D.C. Plate Current.....	2x45	2x55	mA
D.C. Grid No. 2 Voltage.....	200	200	Volts
D.C. Grid No. 1 Voltage.....	-150	-150	Volts
D.C. Grid No. 1 Current.....	2x3	2x4	mA
D.C. Cathode Current.....	2x50	2x65	mA
Peak Cathode Current.....	2x225	2x300	mA
Plate Input.....	2x11.25	2x15	Watts
Plate Dissipation.....	2x5	2x7	Watts
Grid No. 2 Dissipation.....	2x1	2x1	Watts
Grid No. 1 Dissipation.....	2x0.2	2x0.2	Watts
Peak Heater-Cathode Voltage.....	100	100	Volts

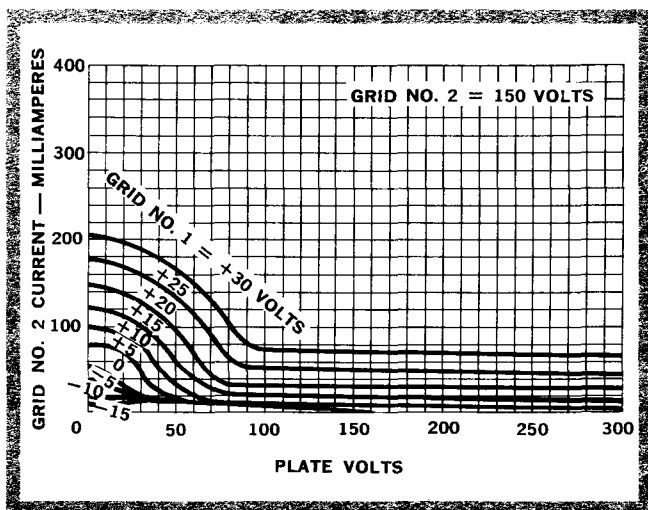
TYPICAL OPERATION, 2 UNITS OF ONE TUBE IN PUSH-PULL

	CCS			ICAS			
D.C. Plate Voltage.....	300	250	200	300	250	200	Volts
D.C. Grid No. 2 Voltage.....	175	—	—	200	—	—	Volts
Grid No. 2 Resistor.....	—	47	22	—	27	8.2	Kohms
D.C. Grid No. 1 Voltage—Fixed, or from Common Resistor of Peak R.F. Grid No. 1 to Grid No. 1 Voltage.....	—40	18	15	—45	18	15	Kohms
D.C. Plate Current.....	110	110	115	130	120	130	Volts
D.C. Grid No. 2 Current.....	2x37.5	2x33.5	2x35	2x50	2x40	2x42	mA
D.C. Grid No. 1 Current (approx.).....	2.3	1.8	2.2	3.0	2.4	3.1	mA
Driving Power (approx.).....	1.8	2.2	2.7	3.0	2.5	3.0	mA
Plate Dissipation.....	0.10	0.12	0.14	0.20	0.15	0.18	Watts
Grid No. 2 Dissipation.....	2x4	2x2.9	2x2.8	2x6	2x3.5	2x3.4	Watts
Grid No. 1 Dissipation.....	0.4	0.3	0.33	0.6	0.45	0.55	Watts
Power Output (approx.).....	2x0.05	2x0.12	2x0.14	2x0.1	2x0.15	2x0.18	Watts
Efficiency.....	14.5	11	8.4	18.5	13	10	Watts
Useful Output Power.....	65	65	60	60	65	65	%
	12	9	7.4	16	11.2	9.0	Watts

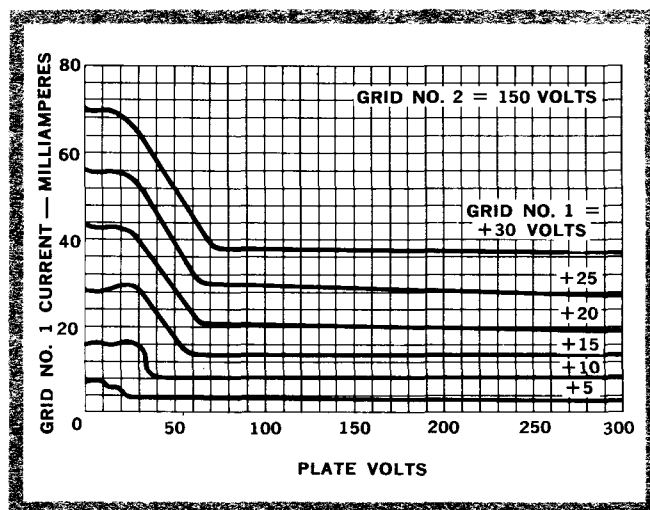
PLATE CURRENT CHARACTERISTIC — PER UNIT



SCREEN CURRENT CHARACTERISTIC — PER UNIT



GRID CURRENT CHARACTERISTIC — PER UNIT



CONSTANT CURRENT CHARACTERISTICS SCREEN VOLTAGE = 200 VOLTS

