TUNG-SOL

PRODUCT BULLETIN

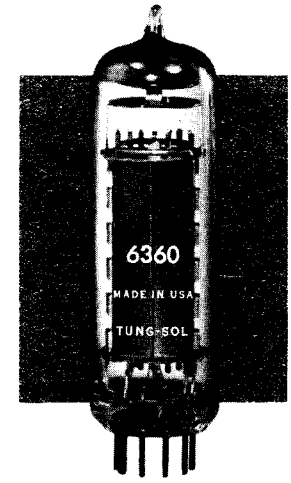
INDUSTRIAL ELECTRON TUBE TYPE 6360

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.

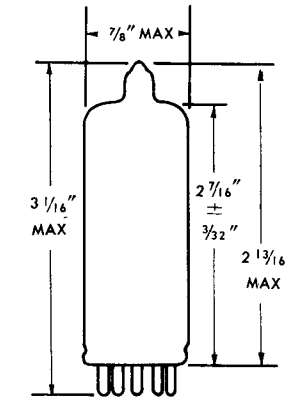
The two sections of the tube share a common cathode and a common screen grid which reduce the effects of lead inductance in push pull VHF service. The 6360 also has internal neutralization for push pull operation. The two sections may be used for separate functions, e.g. section 1 may be used as an oscillator 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



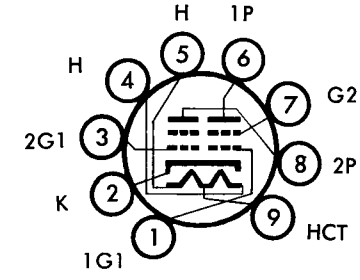
OUTLINE DRAWING

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.



BOTTOM VIEW

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
	Class AB_1	**Class AB_2**	
AF Amplifier and Modulator	12.0	17.5	Watts

TYPE 6360

R.F. POWER AMPLIFIER & MODULATOR — CLASS AB$_2$ 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)[3]	−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	%

A.F. POWER AMPLIFIER & MODULATOR CLASS AB$_2$ 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 TRIPLER - 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	175	Volts
Grid No. 2 Resistor	—	47	15	—	—	18	4.7	Kohms
D.C. Grid No. 1 Voltage—Fixed	−100	—	—	−100	−100	—	—	Volts
or from Common Resistor of	—	47	33	—	—	27	22	Kohms
Peak RF Grid No. 1 to Grid No. 1 Voltage	230	230	230	240	230	230	230	Volts
D.C. Plate Current	2x24	2x25	2x28.5	2x32.5	2x32.5	2x36	2x39	Ma
D.C. Grid No. 2 Current	2.0	1.9	3.0	3.5	2.7	4.1	5.2	mA
D.C. Grid No. 1 Current (approx.)	2x1	2x1	2x1.6	2x1.9	2x1.2	2x1.9	2x2.3	mA
Driving Power (approx.)	0.23	0.23	0.35	0.45	0.28	0.43	0.52	Watts
Power Output (approx.)	6.5	5	3.8	7.8	7.2	6.2	4.5	Watts
Efficiency	45	40	33.5	40	37	34.5	29	%
Useful Power Output	3.5	3.0	2.8	4.8	4.2	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	Volts
D.C. Grid No. 2 Voltage	Figure 1	Figure 2	
D.C. Grid No. 1 Voltage from Common Resistor of	33	15	Kohms
Peak R.F. Grid No. 1 to Grid No. 1 Volts	130	130	Volts
D.C. Plate Current	2x33.5	2x43	mA
D.C. Grid No. 2 Current	2.6	3.1	mA
D.C. Grid No. 1 Current (approx.)	1.5	3.3	mA
Driving Power (approx.)	0.1	0.2	Watts
Power Output (approx.)	8.1	9.8	Watts
Efficiency	60	57	%
Useful Output Power	7.1	8.8	Watts
Modulation Power (for 100% modulation)	6.7	8.6	Watts

FIGURE 1

TO TUBE PLATES & CENTER TAP OF RF COIL

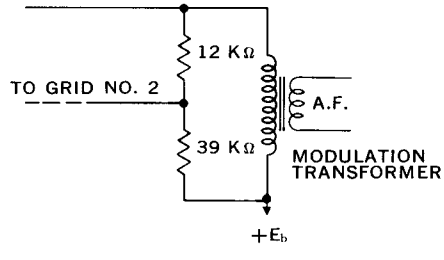
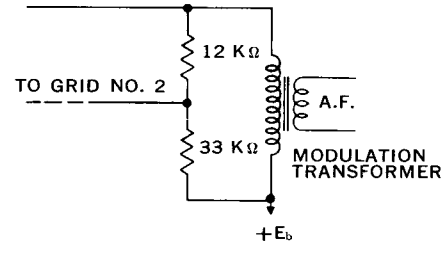


FIGURE 2

TO TUBE PLATES & CENTER TAP OF RF COIL



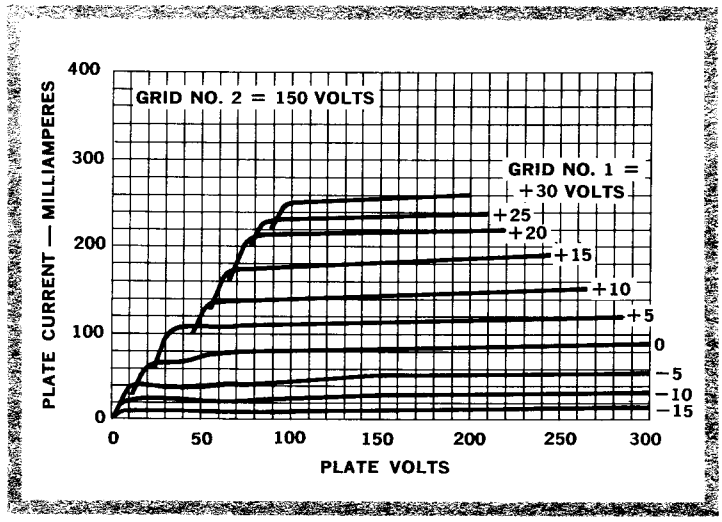
MAXIMUM RATINGS, ABSOLUTE VALUES

	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

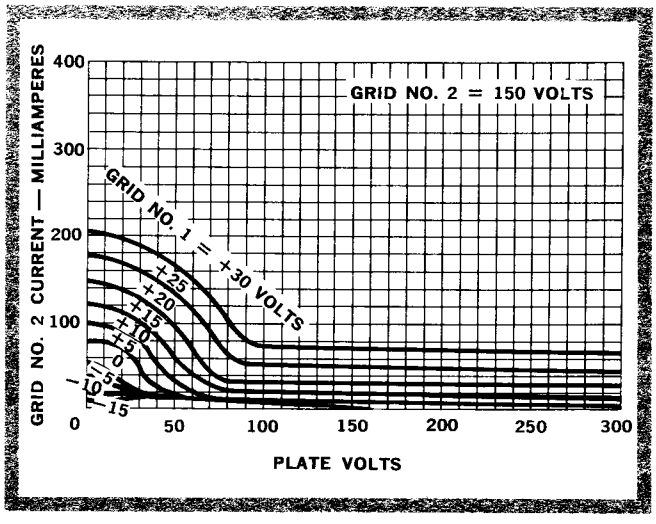
TYPICAL OPERATION, 2 UNITS OF ONE TUBE IN PUSH-PULL

	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	−40	—	—	−45	—	—	Volts
or from Common Resistor of	—	18	15	—	18	15	Kohms
Peak R.F. Grid No. 1 to Grid No. 1 Voltage	110	110	115	130	120	130	Volts
D.C. Plate Current	2x37.5	2x33.5	2x35	2x50	2x40	2x42	mA
D.C. Grid No. 2 Current	2.3	1.8	2.2	3.0	2.4	3.1	mA
D.C. Grid No. 1 Current (approx.)	1.8	2.2	2.7	3.0	2.5	3.0	mA
Driving Power (approx.)	0.10	0.12	0.14	0.20	0.15	0.18	Watts
Plate Dissipation	2x4	2x2.9	2x2.8	2x6	2x3.5	2x3.4	Watts
Grid No. 2 Dissipation	0.4	0.3	0.33	0.6	0.45	0.55	Watts
Grid No. 1 Dissipation	2x0.05	2x0.12	2x0.14	2x0.1	2x0.15	2x0.18	Watts
Power Output (approx.)	14.5	11	8.4	18.5	13	10	Watts
Efficiency	65	65	60	62	60	65	%
Useful Output Power	12	9	7.4	16	11.2	9.0	Watts

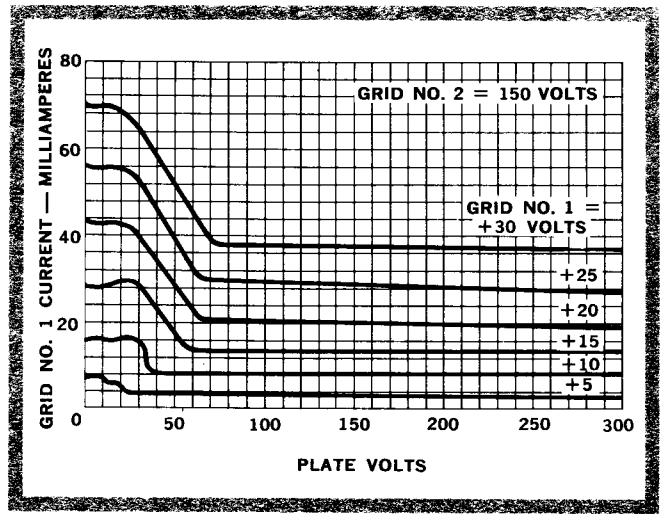
PLATE CURRENT CHARACTERISTIC — PER UNIT



SCREEN CURRENT CHARACTERISTIC — PER UNIT



GRID CURRENT CHARACTERISTIC — PER UNIT



CONSTANT CURRENT CHARACTERISTICS
SCREEN VOLTAGE = 200 VOLTS