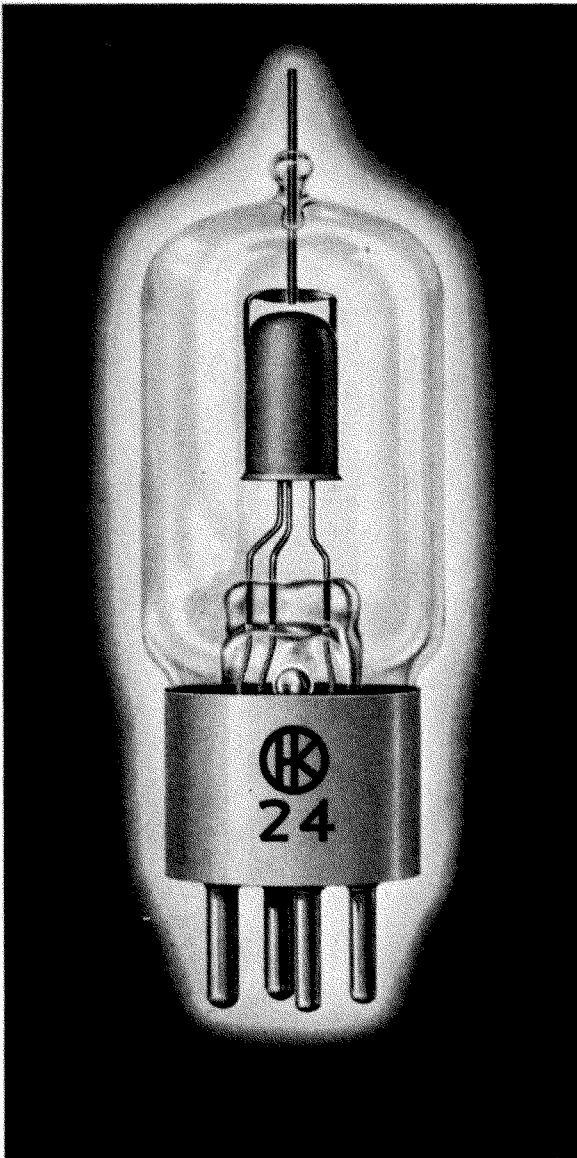


# GAMMATRON TYPE 24



## GENERAL PURPOSE TRIODE

Medium mu universal triode, 25 watt radiation cooled tantalum plate. Special design permits high voltage operation and unusual VHF efficiency.

### PHYSICAL DATA

Plate . . . . .	Cylindrical Tantalum
Grid . . . . .	Braced Vertical Bar Tantalum
Filament . . . . .	Thoriated Tungsten
Base . . . . .	Small Four Pin Ceramic
Net Weight . . . . .	1¼ Ounces
Shipping Weight . . . . .	1¼ Pounds
Maximum Height . . . . .	4¾ Inches
Maximum Diameter . . . . .	1-7/16 Inches

### ELECTRICAL DATA

Filament Voltage . . . . .	6.3 Volts
Filament Current . . . . .	3.0 Amps
Normal Plate Dissipation . . . . .	25 Watts
Maximum Average Plate Current . . . . .	75 MA.
Maximum Average Grid Current . . . . .	25 MA.
Maximum Plate Voltage . . . . .	2000 Volts
Average Amplification Constant . . . . .	25

### INTERELECTRODE CAPACITANCES

Grid-Plate . . . . .	1.3 Mmfd.
Grid-Filament . . . . .	2.1 Mmfd.
Plate-Filament . . . . .	0.2 Mmfd.

The type 24 Gammatron is a tube of unusual capabilities. The use of a long capped tantalum plate helps to confine all of the electron stream for useful power output. Its uniquely designed tantalum grid is closely spaced to the filament providing short electron time flight thus reducing losses at very high frequencies. Internal insulators are not required while at the same time perfect alignment is maintained. Thus the interelectrode capacities are low enabling the tube to operate free of parasitic oscillations.

With the use of tantalum and the elimination of unnecessary internal structures, it is possible to completely outgas

Gammatron tubes without the use of the usual "getter." This excellent vacuum is retained throughout the full life of the tube, thus insuring you against failures caused by gas release due to overloads. The filament may then be operated in a manner consistent with high thermionic efficiency and long life.

The tantalum plate is designed to run hot. A cherry red color is an indication of normal operation and no damage will result at this temperature. The convenience of the use of the plate color as an indication of proper circuit efficiency and tuning will be appreciated immediately after trying the 24 GAMMATRON.

3500 8-45

**HEINTZ AND KAUFMAN LTD.**

SOUTH SAN FRANCISCO, CALIFORNIA, U · S · A

## TYPE HK-24

The information on this page does not represent exact conditions of operation to be imposed for any particular situation. Because tubes are used under many widely different conditions, Heintz and Kaufman will gladly furnish information for applications which differ appreciably from the illustrative examples given.

### RADIO FREQUENCY POWER AMPLIFIER— CLASS "C" UNMODULATED

	Maximum Rating Per Tube	Typical Operation, 1 Tube			
		2000	1500	1000	Volts
D.C. Plate Voltage	2000	2000	1500	1000	Volts
D.C. Plate Current	75	56	75	75	M. A.
D.C. Grid Current	20	18	18	18	M. A.
D.C. Grid Voltage	-250	-140	-120	-100	Volts
Peak R.F. Grid Voltage		250	240	220	Volts
Grid Driving Power		4.0	3.8	3.6	Watts
Plate Dissipation	25	25	25	18	Watts
Plate Efficiency		81	80	76	Percent
Power Output		90	90	57	Watts
Plate Input	112	Watts			

### RADIO FREQUENCY POWER AMPLIFIER— CLASS "C" PLATE MODULATED

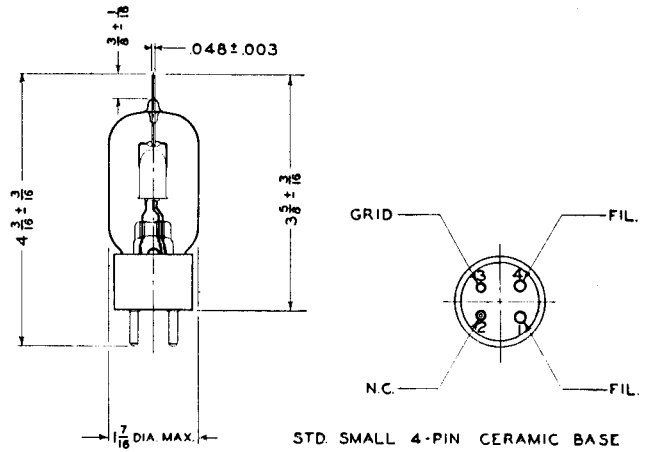
(Carrier Conditions for use with 100% Modulation)

	Maximum Rating Per Tube	Typical Operation, 1 Tube			
		1500	1250	1000	Volts
D.C. Plate Voltage	1500	1500	1250	1000	Volts
D.C. Plate Current	60	50	60	60	M. A.
D.C. Grid Current	20	20	20	20	M. A.
D.C. Grid Voltage	-250	-145	-125	-105	Volts
Peak R.F. Grid Voltage		245	230	210	Volts
Grid Driving Power		4.5	4.1	3.8	Watts
Plate Dissipation	17	15	15	13	Watts
Plate Efficiency		80	80	78	Percent
Power Output		60	60	47	Watts
Plate Input	75	Watts			

### RADIO FREQUENCY DOUBLER AMPLIFIER

(Feedback Voltage Neutralized by  
Conventional Methods)

	Maximum Rating Per Tube	Typical Operation, 1 Tube			
		1500	1250	1000	Volts
D.C. Plate Voltage	1500	1500	1250	1000	Volts
D.C. Plate Current	70	50	58	70	M. A.
D.C. Grid Voltage	-250	-240	-250	-250	Volts
D.C. Grid Current	18	12	14	18	M. A.
Peak R.F. Grid Voltage		345	365	380	Volts
Driving Power		3.9	4.7	6.4	Watts
Plate Dissipation	25	24	24	25	Watts
Tube Efficiency		68	67	64	Percent
Power Output		51	49	45	Watts



### AUDIO FREQUENCY POWER AMPLIFIER— CLASS "B" MODULATOR

	Maximum Rating Per Tube	Typical Operation, 2 Tubes			
		1500	1250	1000	500
D.C. Plate Voltage	1500	1250	1000	500	Volts
D.C. Plate Current— Maximum Signal	75	136	150	150	M. A.
D.C. Plate Current— Zero Signal		24	30	70	M. A.
D.C. Grid Voltage	-250	-42	-29	0	
Peak A. F. Grid-to- Grid Voltage		256	248	190	Volts
Load Resistance (Plate to Plate)		21200	15000	6400	Ohms
Plate Dissipation	25	50	45	30	Watts
Plate Efficiency		70	69	60	Percent
Driving Power— (Nominal)		4.2	4.5	3.5	Watts
Power Output		120	105	45	Watts

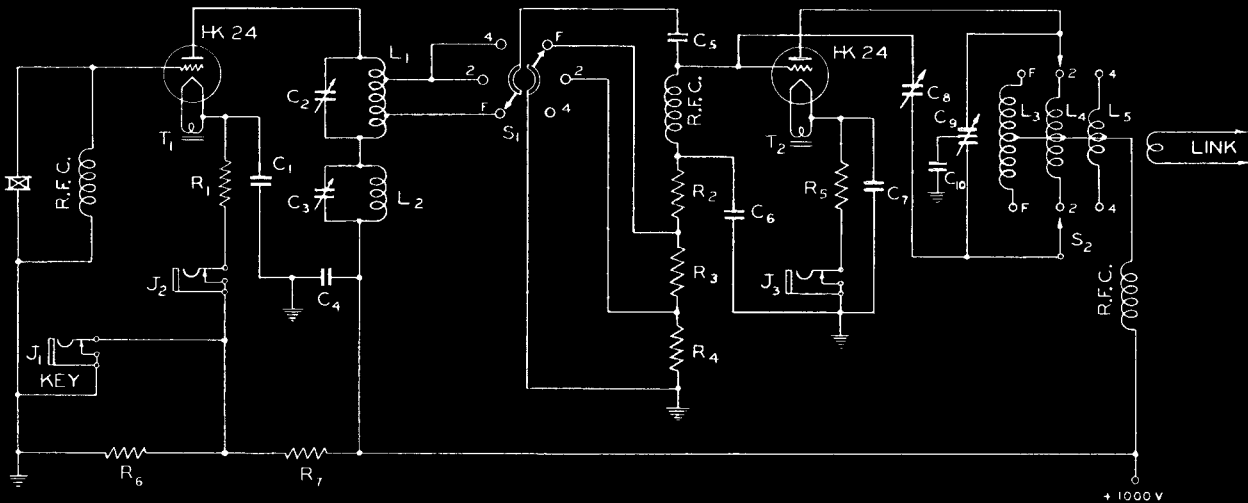
### RADIO FREQUENCY TRIPLER AMPLIFIER

(Feedback Voltage Neutralized by  
Conventional Methods)

	Maximum Rating Per Tube	Typical Operation, 1 Tube			
		1500	1250	1000	Volts
D.C. Plate Voltage	1500	1500	1250	1000	Volts
D.C. Plate Current	60	31	36	45	M. A.
D.C. Grid Voltage	-250	-220	-230	-250	Volts
D.C. Grid Current	15	7	9	11	M. A.
Peak R.F. Grid Voltage		295	315	350	Volts
Driving Power		1.9	2.5	3.5	Watts
Plate Dissipation	25	25	25	25	Watts
Tube Efficiency		47	45	45	Percent
Power Output		22	20	20	Watts

# Gammatron Tubes

# HK-3 BAND EXCITER OR TRANSMITTER



## HK-3 BAND EXCITER OR TRANSMITTER

There is a universal need for an exciter or low power transmitter that is inexpensive, easy to build, easy to adjust, and requires a minimum of crystals. The exciter shown on this page has these features and will operate on three bands with a single crystal. It will give sufficient power output to excite a pair of 24 or 54 GAMMATRONS or a single 254 GAMMATRON on 10 meters and does not depend on regenerative action for its operation. Thus, it is not unstable and hard to tune as many of the previously published harmonic amplifiers have been. If desired, high speed keying of the crystal oscillator may be employed. A 160, 80 or 40 meter crystal may be used to give outputs on the fundamental, second and fourth harmonics with approximate respective powers of 50, 35 and 20 watts. The high fourth harmonic output is due to the circuit  $C_3 - L_2$  which accentuates this voltage, giving a peaked wave form.

### CRYSTAL OSCILLATOR

The crystal oscillator may be safely operated at 1000 volts with a 40 meter crystal, and 160 or 80 meter crystal may be safely operated with 1250 volts on the plate. The power output of the crystal stage is approximately 20 watts. This value depends greatly on the crystal activity. The tank condenser  $C_1$  is tuned slightly to the low capacity side of resonance for best output and least crystal duty. The condenser  $C_3$  is tuned to maximum capacity for operation on the fundamental and second harmonics and for resonance or maximum output of the harmonic amplifier when operated on the fourth harmonic. The oscillator will key excellently with crystals from 1.5 to 4 Mc., and 7 Mc. crystals key well, but are somewhat chirpy. If keying is not desired the resistors  $R_6$  and  $R_7$  may be eliminated and  $J_2$  tied directly to ground.

### HARMONIC AMPLIFIER

The excitation to the amplifier is adjusted with the taps on  $L_1$ . For fundamental operation the grid current should be 20 M. A. and the inductance  $L_1$  tapped approximately 28% from the cold end. For second and fourth harmonic operation the coil tap should be approximately 55% from the cold end, and grid currents should be 11 and 4 M. A., respectively. Total cathode current should not exceed on the fundamental, 100 M. A., second, 80 M. A., and fourth har-

monic, 60 M. A. The neutralization should be adjusted with  $C_8$  while operating on the fundamental.

### COMPONENTS

$R_1$ — 1500 Ohm, 10 Watt resistor.  $R_3$ — 1000 Ohm, 10 Watt resistor.  
 $R_2$ — 2500 Ohm, 5 Watt resistor.  $R_4$ — 10000 Ohm, 10 Watt resistor.  
 $R_3$ — 17500 Ohm, 5 Watt resistor.  $R_7$ — 100000 Ohm, 20 Watt resistor.  
 $R_4$ — 20000 Ohm, 1 Watt resistor.

$C_1$ — .01 mf. 500 Volt mica condenser.  
 $C_2$ — 50 mmf. Receiving condenser.  
 $C_3$ — 35 mmf. Midget condenser.  
 $C_4$ — .005 mf. 1500 Volt mica condenser.  
 $C_5$ — .000250 mf. 1500 Volt mica condenser.  
 $C_6$ — .01 mf. 500 Volt mica condenser.  
 $C_7$ — .01 mf. 500 Volt mica condenser.  
 $C_8$ — 1.4 mmf. neutralizing condenser.  
 $C_9$ — 50-50 mm. split stator 2000 Volt condenser  
 $C_{10}$ — .005 mf. 1500 Volt mica condenser.  
 $J_1, J_2, J_3$ — Single circuit closing jacks.  
 $S_1, S_2$ — 2 pole, 3 point ceramic switches (ganged if desired).  
 $T_1, T_2$ — 6.3 Volt, 3 Ampere filament transformers.

### COIL DATA

BAND		$L_1$	$L_2$	$L_3, L_4, L_5$
160	Diameter	1 1/2		2
	Length	2		2 1/4
	Turns	80		58
	Wire	24 DSC		22 DSC
80	Diameter	1 1/2		2
	Length	1 1/2		2
	Turns	36		24
	Wire	20 DSC		16 DSC
40	Diameter	1 1/2	1 1/2	2
	Length	1 1/2	1 1/2	2
	Turns	18	26	14
	Wire	18	20	16
20	Diameter		1	2
	Length		1 1/2	2
	Turns		22	9
	Wire		18	14
10	Diameter		1	2
	Length		1	2
	Turns		10	7
	Wire		18	14

# Gammatron Tubes

