

**GENERAL RADIO COMPANY**  
CAMBRIDGE, MASSACHUSETTS, U. S. A.

100 printed  
by Sp-Moss  
7-12-43  
No. 66337

**OPERATING INSTRUCTIONS**  
**FOR**  
**TYPE 614-C**  
**SELECTIVE AMPLIFIER**

**PART 1**  
**DESCRIPTION**

**PURPOSE** The Type 614-C Selective Amplifier is designed for producing and selecting the first ten harmonics of a distorted 1000-cycle voltage applied to its input terminals. The instrument is particularly useful in connection with the Class C-21-HLD Primary Frequency Standard as it permits comparisons to be made at each multiple of 1 kc with the same accuracy as that of the primary standard. The instrument is also very useful in connection with calibrations made with a cathode-ray oscillograph.

**PRINCIPLE OF OPERATION** The applied 1-kc voltage is impressed on a harmonic-producing tube. The

output circuit of this tube is provided with ten fixed tuned circuits; any one of which may be placed in circuit by means of the FREQUENCY switch. A stage of amplification follows the tuned circuits, arranged so as to provide regeneration for sharpening the tuning. An output amplifier, with an output meter, not only raises the level of the output, but provides for essentially isolating the regenerative tube from effects of changes in load impedance.

**POWER SUPPLY** The Type 614-C Selective Amplifier is completely a-c operated from 115-230 volt 50-60 cycle mains.

**PART 2**  
**INSTALLATION**

**CONNECTIONS** Connections for the 115-230 volt 50-60 cycle supply should be made through the attachment plug provided for the purpose. The 1-kc input and the harmonic output terminals are available on the front panel for temporary connections; these also appear on the multipoint connector at the rear of the instrument for permanent connections.

**VACUUM TUBES**

Install as follows:

<u>Type</u>	<u>Location (Seen from rear)</u>
6X5G	Left socket
6J5G	3 Right sockets

**PART 3**  
**OPERATION**

Throw the FIL-PLATE switch to "ON". The panel bull's-eye should light, showing that power is on. Set FREQUENCY switch on the point corresponding to the multiple of 1 kc desired. Advance INPUT control from minimum (at left) until the first maximum reading is obtained on output meter. Next advance REGENERATION control toward the right, reducing the input, if necessary, until the point of oscillation is almost reached. If these instructions are followed, the maximum output, consistent with the best waveform, will be obtained.

Where the best waveform is not re-

quired, considerably more output may be obtained by advancing the input control or the regeneration control, or both, for maximum output voltage.

The presence of beats on the meter, or an abnormally high output meter reading, are indications that the amplifier is oscillating and that the regeneration should be reduced by moving the regeneration control to the left.

Some readjustment of both input control and regeneration control will be required for each setting of the FREQUENCY switch.

# GENERAL RADIO COMPANY

## PART 4 SPECIFICATIONS

**Frequency Range:** Each multiple of 1 kc from 1 to 10 inclusive.      **Mounting:** Standard 19-inch relay-rack mounting. Unit fitted with dust cover.

**Power Supply:** 115-230 volts, 50-60 cycles.      **Accessories Supplied:** See packing list.

**Power Input:** 25 watts.      **Additional Accessories Required:** None.

**Controls:** Power supply ON-OFF switch; input voltage control; regeneration control; frequency selector switch.      **Dimensions:** Panel (width) 19 x (height) 8-3/4 x (depth) 11 inches, over-all.

**Meters:** Output meter.      **Net Weight:** 38 pounds.

**Tubes:** Supplied with instrument.

1 - 6X5G Rectifier  
3 - 6J5G Amplifiers

### VACUUM-TUBE DATA

These data were measured on a stock model of the Type 614-C Selective Amplifier using a Weston Model 772 Analyzer. Where operating voltages and currents are obviously not critical, variations of as much as 20% from these values may be expected. The measurements were made with regeneration and input controls set at minimum, no input signal and no external load.

#### Type 614-C Selective Amplifier

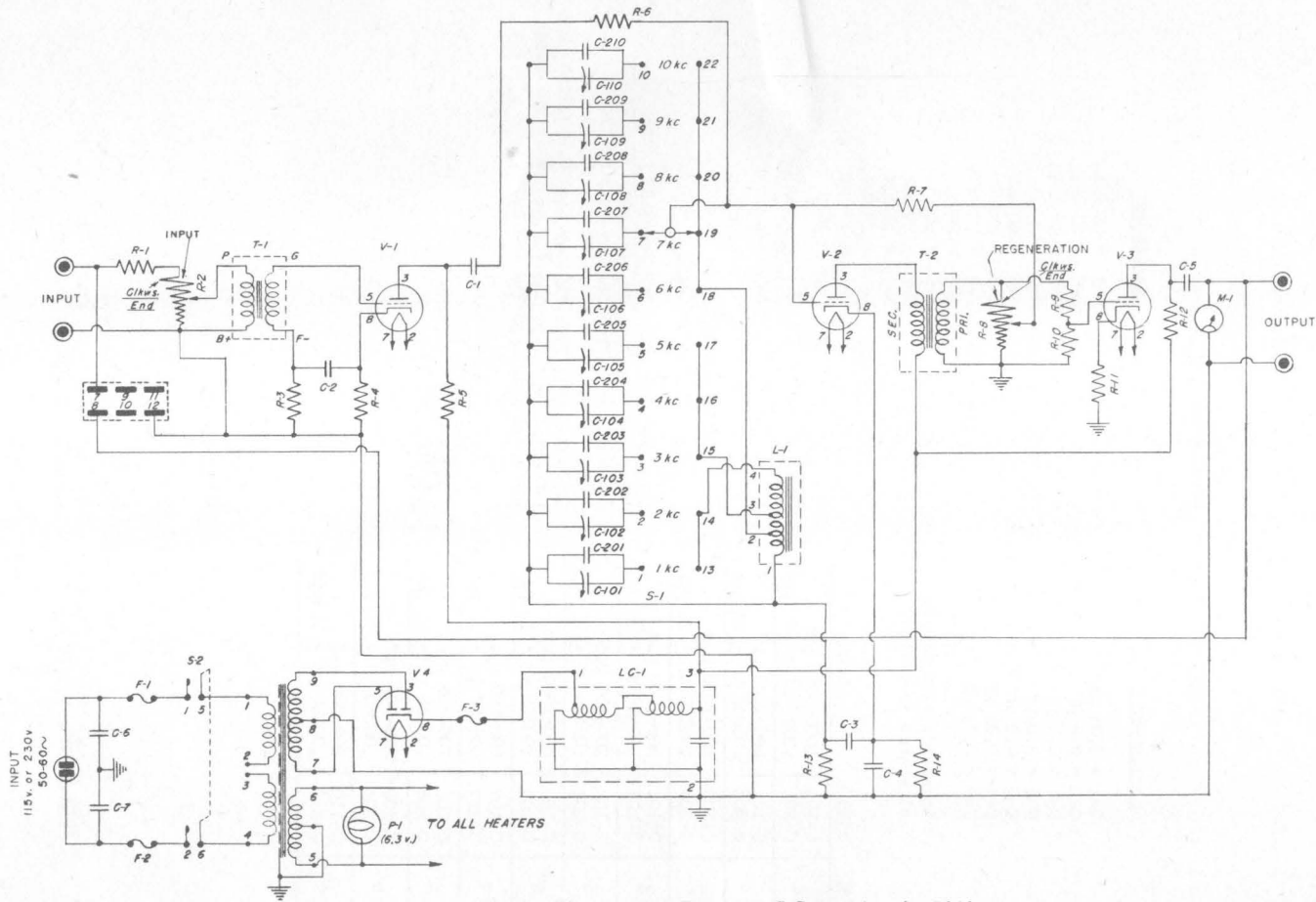
Tube	Type	Function	Heaters (AC)	Plate Volts	Plate Current	Grid Bias
V-1	6J5G	Amplifier	6.2 volts	115 volts	3.0 ma	6.0 volts
V-2	6J5G	Amplifier	6.2 volts	205 volts	6.0 ma	7.2 volts
V-3	6J5G	Amplifier	6.2 volts (#2 - #7)	190 volts (#3 - #8)	1.1 ma (#3)	10.0 volts (#8 - Gnd.)
			(AC)	Plate to Plate (AC)		(D.C.) Cathode
V-4	6X5G	Rectifier	6.2 volts (#2 - #7)	350 volts (#5 - #3)		225 volts (#8 - Gnd.)

Line voltage 115 - 60 cycles.

### PATENT NOTICE

This instrument is manufactured under the following U. S. Patents and license agreements:

Patents of the American Telephone and Telegraph Company, solely for utilization in research, investigation, measurement, testing, instruction and development work in pure and applied science.



Wiring Diagram for Type 614-C Selective Amplifier

# GENERAL RADIO COMPANY

---

## PARTS LIST

### Condensers

C-1 = 0.01  $\mu$ f  
 C-2 = 0.8  $\mu$ f  
 C-3 = 0.8  $\mu$ f  
 C-4 = 0.8  $\mu$ f  
 C-5 = 0.8  $\mu$ f  
 C-6 = 0.01  $\mu$ f  
 C-7 = 0.01  $\mu$ f

Tolerance  $\pm 10\%$  unless  
 otherwise specified.

### Resistors

R-1 = 50  $k\Omega$   
 R-2 = 25  $k\Omega$   
 R-3 = 10  $k\Omega$   
 R-4 = 2  $k\Omega$   
 R-5 = 20  $k\Omega$   
 R-6 = 2  $M\Omega$   
 R-7 = .25  $M\Omega$   
 R-8 = 25  $k\Omega$   
 R-9 = 100  $k\Omega$   
 R-10 = 50  $k\Omega$   
 R-11 = 10  $k\Omega$   
 R-12 = 20  $k\Omega$   
 R-13 = 50  $k\Omega$   
 R-14 = 1200  $\Omega$

Tolerance  $\pm 10\%$  unless  
 otherwise specified.

KC	COND.	VALUE
1	C-101	1000-3000 $\mu$ f
	C-201	.0140 uf $\pm$ 100 $\mu$ f
2	C-102	500-1000 $\mu$ f
	C-202	.00325 uf $\pm$ 25 $\mu$ f
3	C-103	500-1000 $\mu$ f
	C-203	.00500 uf $\pm$ 25 $\mu$ f
4	C-104	500-1000 $\mu$ f
	C-204	.00245 $\mu$ f $\pm$ 25 $\mu$ f
5	C-105	200-500 $\mu$ f
	C-205	.00165 $\mu$ f $\pm$ 15 $\mu$ f
6	C-106	500-1000 $\mu$ f
	C-206	.00205 $\mu$ f $\pm$ 25 $\mu$ f
7	C-107	200-500 $\mu$ f
	C-207	.00150 $\mu$ f $\pm$ 15 $\mu$ f
8	C-108	200-500 $\mu$ f
	C-208	.00095 $\mu$ f $\pm$ 15 $\mu$ f
9	C-109	200-500 $\mu$ f
	C-209	.00060 $\mu$ f $\pm$ 15 $\mu$ f
10	C-110	200-500 $\mu$ f
	C-210	.00030 $\mu$ f $\pm$ 15 $\mu$ f

### Fuses

F-1 = 1.0 amp. Type 7AG (or 8AG) F-2 = 1.0 amp. Type 7AG (or 8AG) F-3 = 0.1 amp. Type 7AG (or 8AG)	}	for 115-volt operation
F-1 = 0.5 amp. Type 7AG (or 8AG) F-2 = 0.5 amp. Type 7AG (or 8AG) F-3 = 0.1 amp. Type 7AG (or 8AG)	}	for 230-volt operation