INSTRUCTION MANUAL

TYPE 1330-A

BRIDGE OSCILLATOR

1330-A

GENERAL RADIO COMPANY

J

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GENERAL RADIO COMPANY
WEST CONCORD, MASSACHUSETTS, USA

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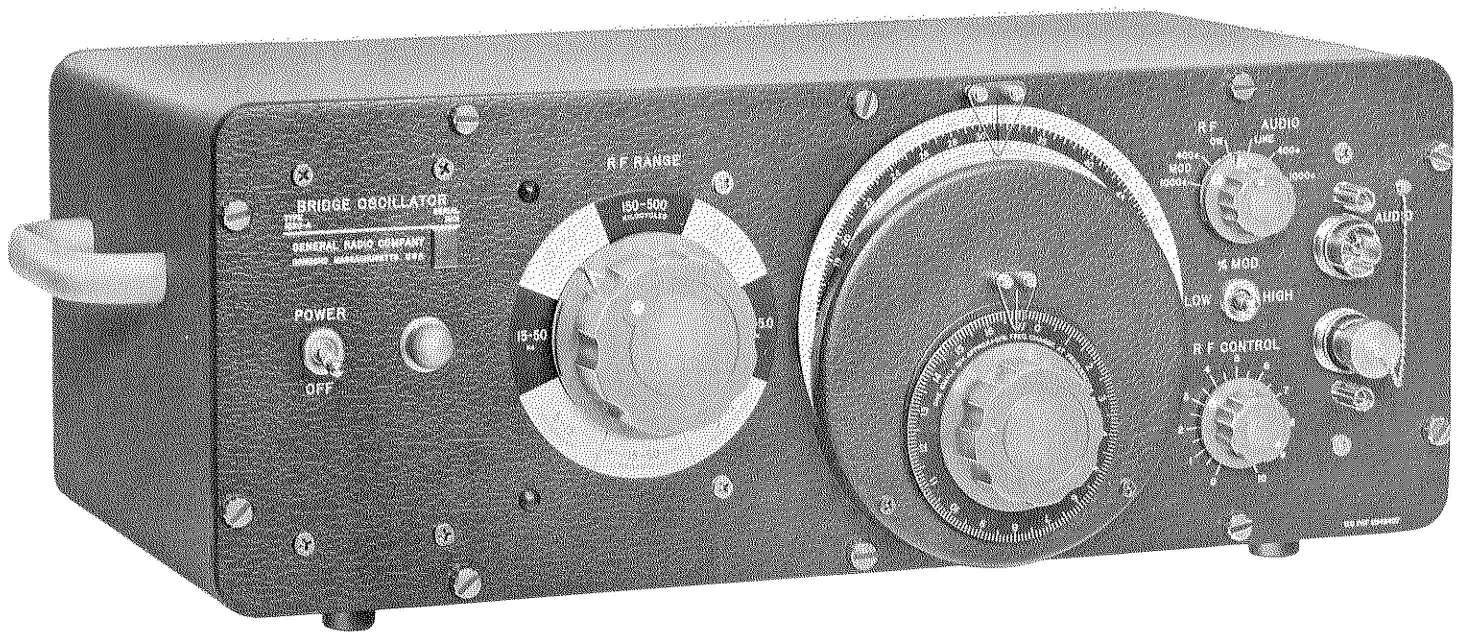


Figure 1. Type 1330-A Bridge Oscillator.

TYPE 1330-A BRIDGE OSCILLATOR

Section 1
INTRODUCTION

1.1 PURPOSE. The Type 1330-A Bridge Oscillator (Figure 1) is a stable, variable-frequency power source for bridge and other measurements at audio and radio frequencies. It supplies three fixed audio frequencies (power-line frequency, 400 and 1000 cps) and a continuous range of radio frequencies from 5 kc to 50 Mc, with a power output high enough for most laboratory measurements.

1.2 DESCRIPTION.

1.2.1 GENERAL. The Bridge Oscillator is housed in an aluminum cabinet, which can be removed for relay-rack mounting. To reduce leakage and stray fields, the radio- and audio-frequency circuits are enclosed in a completely shielded compartment within the main cabinet. The two leads for plate and heater power are carefully filtered. The shafts that extend from the compartment through the panel are shielded by the grounding of the knob inserts that enclose the shafts. The cover of the r-f compartment is of double construction with spring contacts bearing on both the inside and outside walls of the compartment.

1.2.2 CONTROLS. The following controls are on the panel of the Bridge Oscillator:

Name	Type	Function
POWER	2-pos toggle switch	Energizes instrument.
RF RANGE	8-pos selector switch	Selects any of 8 r-f ranges.
None	Continuous rotary control with slow-motion dial	Main frequency control.
RF-AUDIO	6-pos selector switch	Determines mode of operation (refer to paragraph 3.2.1).
% MOD	2-pos toggle switch	Selects either 25% (LOW) or 50% (HIGH) modulation.
RF CONTROL	Continuous rotary control	Controls r-f output power.

1.2.3 CONNECTIONS. The following connections are on the panel of the Bridge Oscillator:

Name	Type	Function
AUDIO	Type 874 Locking Coaxial Connector and jack-top binding post (ground)	Audio output connection.
RF	Type 874 Locking Coaxial Connector and jack-top binding post (ground)	R-f output connection.

1.2.4 ACCESSORIES. The following accessories are supplied with the Bridge Oscillator:

Item	Qty	Part No.
Adjustment wrench (mounted on oscillator cover)	1	TO-44
Power Cord	1	CAP-22
Coaxial patch cord	1	874-R22LA
Adaptor	1	874-Q2
0.50-amp Slo-Blo fuse (for 115-v)	2	5330-1000
0.25-amp Slo-Blo fuse (for 230-v)	2	5330-0700

Section 2
PRINCIPLES OF OPERATION

2.1 R-F OSCILLATOR. A Hartley-type r-f oscillator is used in the instrument. The r-f frequency range is determined by the setting of a turret which carries the eight coils and some associated components. To obtain a compact turret assembly, the coils are mounted alternately on either side of a disc that carries 48 contacts. Each of the eight ranges covers a frequency ratio of 3.33 to one (4.8 to 16 and 15 to 50).

The capacitance change of the main tuning capacitor (C1) is about 750 μμf. The plates are especially shaped to yield a logarithmic frequency calibration. The 15-50 Mc range does not use the entire capacitance span of the main tuning capacitor. The calibration for this range is not logarithmic, and the "percent frequency change" calibration on the slow-motion dial does not apply.

The voltage at the load is controlled by the RF CONTROL voltage divider. When this control is set for full output, load variations may affect the frequency. Maximum power output is obtained with a load of about 50 ohms.

With the RF-AUDIO switch at AUDIO, the r-f oscillator cathode circuit is opened, and the r-f oscillator does not function.

2.2 AUDIO OSCILLATOR AND MODULATOR. The tuned-plate-type audio oscillator uses a 6AQ5 miniature beam-power tube, with the 0.25-μf r-f oscillator plate-supply bypass capacitor serving as audio-oscillator tuning capacitor. The frequency of the audio oscillator can be either 400 or 1000 cycles. The inductor of the audio tuned circuit is tapped to change frequency, and additional capacitance (C8) is switched in for 400-cycle operation.

The heaters of the two oscillator tubes are connected in series, and the total heater-winding voltage (12.6 volts) is brought out at the AUDIO jack when the RF-AUDIO switch is in the LINE position.

The AUDIO jack is coupled directly to the audio oscillator or through a 51-ohm resistor to the heater winding. There is no provision for controlling the audio amplitude.

When the RF-AUDIO switch is in either of the MOD positions, the full swing of the audio oscillator is applied to plate-modulate and screen-modulate the r-f oscillator. The depth of modulation is about 25 percent with the % MOD switch at LOW, about 50% with the switch at HIGH, for both MOD settings of the RF-AUDIO switch.

When the RF-AUDIO switch is at one of the AUDIO positions, the plate supply is loaded by the audio oscillator tube V2 and by the resistance load R4. When the switch is at one of the R-F positions, the plate supply is loaded by the r-f oscillator and by the audio oscillator tube.

2.3 OUTPUT CHARACTERISTICS. Output characteristics of the Bridge Oscillator are as shown in Figure 2.

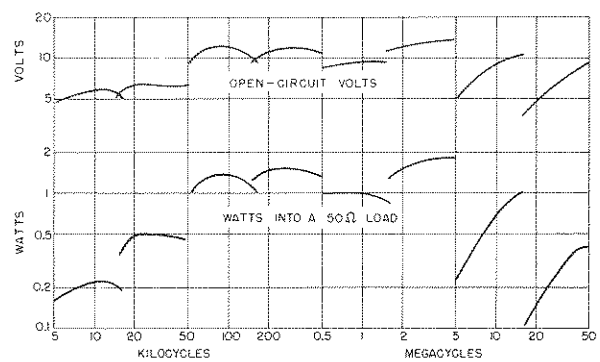


Figure 2. Typical Output Characteristics of Bridge Oscillator.

Section 3
OPERATING PROCEDURE

3.1 INSTALLATION.

3.1.1 POWER INPUT. Connect the Bridge Oscillator to a source of power as specified on the plate near the power input receptacle. Power-line frequency is 40 to 60 cycles, and voltage is either 115 or 230 volts. If you desire to change from one input voltage to the other, change the power-transformer connections as shown in Figure 4, reverse the plate near the power input receptacle, and replace the fuses (at the rear of the cabinet) with those of proper rating (refer to paragraph 1.2.4). For access to power-transformer connections, remove the instrument from the cabinet and remove the left side shield, attached by three screws.

3.1.2 OUTPUT CONNECTIONS. If shielded connections are not required (e.g. at lower frequencies), you can plug the Type 874-Q2 Adaptor into either the RF or AUDIO panel connection. Similarly, a Type 274-MB Plug can be inserted into either output connector and its associated ground terminal.

At higher frequencies, a shielded output cable should be used. The Type 874-R22LA 50-ohm coaxial patch cord can be plugged directly into either output jack. A comprehensive line of low-leakage plug or jack type coaxial adaptors, from GR874 to other leading 50-ohm connector series, are available, if required.

Proper cable termination is important only at frequencies above the broadcast band and only if it is desirable to avoid standing waves and hence variations in output voltage with frequency. With the RF CONTROL set for full output (fully clockwise), the 50-ohm patch cord is approximately terminated at the oscillator end.

3.2 CONTROL SETTINGS.

3.2.1 MODE SELECTION. Set the RF-AUDIO switch to the desired mode of operation. There are three r-f positions for operation from 5 kc to 50 Mc, either unmodulated (CW) or modulated (MOD). The modulating frequency can be either 400 or 1000 cycles.

CAUTION

Do not use either MOD position if the operating frequency is to be in the 5-15-kc range. With modulation, the r-f voltage across the tuning capacitor may be high enough to arc over. This is most likely at high modulation levels and at high line voltages.

There are three audio positions for operation at either the line frequency, 400 cycles, or 1000 cycles. The amplitude of the audio output voltage at the AUDIO output jack cannot be adjusted. Output impedance at the AUDIO jack is about 50 ohms.

3.2.2 PERCENT MODULATION. With the % MOD toggle switch at LOW, the degree of modulation is about 25 percent; at HIGH, about 50 percent. There are no provisions for external modulation.

3.2.3 FREQUENCY CONTROLS. The two radio-frequency controls are the RF RANGE switch and the frequency tuning dial. Set the RF RANGE switch to the desired frequency range (refer to CAUTION in paragraph 3.2.1) and set the frequency tuning dial to the desired frequency. Use that portion of the large dial corresponding in color to the RF RANGE switch position used. Note that the 15-50 Mc position of the RF RANGE switch is identified by a double line, corresponding to the inner scale on the frequency tuning dial.

The smaller frequency-tuning dial is calibrated to indicate directly small percentage increments in frequency. Each division of this dial corresponds to a 0.1-percent change in frequency except at the ends of the main frequency dial.

Section 4
SERVICE AND MAINTENANCE

4.1 WARRANTY.

We warrant that each new instrument sold by us is free from defects in material and workmanship, and that, properly used, it will perform in full accordance with applicable specifications for a period of two years after original shipment. Any instrument or component that is found within the two-year period not to meet these standards after examination by our factory, district office, or authorized repair agency personnel, will be repaired, or, at our option, replaced without charge, except for tubes or batteries that have given normal service.

4.2 SERVICE.

The two-year warranty stated above attests the quality of materials and workmanship in our products. When difficulties do occur, our service engineers will assist in any way possible. If the difficulty cannot be eliminated by use of the following service instructions, please write or phone our Service Department (see rear cover), giving full information of the trouble and of steps taken to remedy it. Be sure to mention the serial and type numbers of the instrument.

Before returning an instrument to General Radio for service, please write to our Service Department or nearest district office, requesting a Returned Material Tag. Use of this tag will ensure proper handling and identification. For instruments not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay.

4.3 R-F SECTION.

4.3.1 REMOVAL PROCEDURE. All tubes and many components can be serviced without removal of the r-f section from its compartment. If it does become necessary to remove this section, proceed as follows, being careful not to lose the various spring washers, spacers, phenolic sleeves, etc., since they provide the means for shielding the shafts and grounding the knob inserts:

a. Remove the 10 slotted thumb screws along the edges of the front panel and pull the instrument out of the cabinet.

b. Remove the two black-nickeled screws that attach the cover plate of the main tuning dial to the panel. This allows removal of the cover plate, and with it the slow-motion dial assembly.

c. Remove the main tuning dial index assembly, which consists of two No. 4-40 screws, two plain washers, two lock washers, two 11/32 spacers and the plastic index.

d. Remove the RF RANGE switch knob after loosening its two setscrews. Be sure to recover the 3/8 by 3/16 by 3/32 in. rectangular phenolic "slab" that fits onto the shaft flat, the 1/4-in.-long by 3/8-in. ID metal spacer, the 1-1/16-in. OD by 3/8-in. ID metal spacer, the 1-1/16-in. OD by 3/8-in. ID by 0.01-in. phosphor bronze washer, and the 3/8-in. OD split phenolic sleeve.

e. Remove the RF - AUDIO switch knob and recover the 3/16-in.-long by 3/8-in. ID spacer and the 9/16-in. OD by 3/8-in. ID by 0.01-in. phosphor bronze washer.

f. Remove the RF CONTROL knob after loosening its setscrews, and recover the 3/16-in.-long by 1/4-in. ID spacer and the 1/2-in. OD by 1/4-in. ID by 0.008-in. phosphor bronze washer.

g. Using a long, thin-bladed screwdriver, remove the main tuning dial by loosening the two setscrews at the shaft between the dial and the panel. Recover the 7/8-in. OD by 15/32-in. ID by 0.005-in. phosphor bronze washer and the 3/8-in. ID split phenolic sleeve.

h. Using a Phillips-head screw driver, remove the four bright nickel screws from the front panel near the output jacks and the R-F RANGE SWITCH.

i. At the rear of the instrument, remove the r-f compartment cover by prying it off. It is held quite securely in place by spring pressure.

j. Unplug the Type 874 Connector inside the compartment.

k. Firmly grasping the rear end-plate of the main tuning capacitor, pull the entire r-f unit out of the shielded compartment.

4.3.2 OPERATION WITH R-F SECTION REMOVED FROM COMPARTMENT. To operate the instrument with the r-f unit completely removed from its compartment, remove the two No. 6-32 screws that attach the nine-jack terminal plate to the subpanel. The shaft of the main tuning capacitor goes through this plate. Note how the cable attached to the plate is stored on the subpanel. This jack plate and its cable can be used to connect the r-f section to the corresponding plug plate, which is mounted inside the main instrument.

4.3.3 REPLACEMENT OF R-F SECTION. To reinstall the r-f section in its compartment, proceed as follows:

a. Unplug the nine-pin plug-and-jack assemblies. Carefully wind the two-foot cable about the cable supports and attach the jack plate to the subpanel by means of the two No. 6-32 screws.

b. Replace the r-f section in its shielded compartment. Fasten the unit to the panel by means of the four bright-nickel No. 10-32 screws. The subpanel spacers must bottom properly at the panel and the shafts must not bind at the panel. If there is any tendency to bind, loosen slightly and then retighten the screws (at the panel) that attach the four shaft bearing plates (behind the panel). If the plug-and-jack plates do not seem to line up properly, loosen and then retighten the two screws that attach the plug-plate.

c. Reconnect the Type 874 Connectors inside the r-f section.

d. Make sure all the panel screws are tight.

e. The RF RANGE and main tuning capacitor shafts are metal, and must not be grounded to the outside of the panel, since circulating currents would cause excessive leakage. To prevent this, the insulated shaft ends are enclosed by a grounded knob insert or disc hub.

f. To replace the main tuning dial, slip the 3/8-in. ID split phenolic sleeve onto the shaft, put on the 7/8-in. OD by 15/32-in. ID by 0.005-in. phosphor bronze washer and place the dial on the shaft. Replace the plastic index with its two 11/32-in. spacers, two plain washers, two lock washers, and two No. 4-40 screws. Orient the dial so that it indicates at the reference line with the tuning capacitor fully meshed. The accuracy of frequency calibration depends on how carefully this is done. The reference line on the main frequency dial is six degrees below the lowest calibrated frequency mark. To obtain full mesh, butt the rotor plates against a straight-edge held across the stator plates. When everything is properly lined up, press the dial firmly against the panel and tighten the two dial setscrews (between dial and panel), using a long, thin-bladed screwdriver. Make sure that the reference line is indexed for exact full-mesh. If it is not, loosen the index screws and reset the index for exact register. Then retighten the index screws.

g. Attach the dial cover plate, using the two No. 6-32 black-nickeled screws. Make sure that the slow-motion dial gear teeth properly engage the teeth of the internal gear on the main dial.

h. The RF RANGE shaft is insulated from the knob insert by a thin phenolic sleeve. A phenolic "slab" at the flat on the shaft insulates the knob's setscrew. A metal spacer and a spring washer complete the shielding and grounding.

i. Set the RF RANGE switch so that the flat of its shaft faces up (toward the 150-500 kc division). Slip the 3/8-in. OD split phenolic sleeve over the shaft, put on the 1-1/16-in. OD by 3/8-in. ID by 0.01-in. phosphor bronze washer and the 1/4-in.-long by 3/8-in. ID brass spacer. Place the 3/8 by 3/16 by 3/32-in. "slab" on the shaft flat and carefully put on the large knob, with the arrow pointing to the 150-500 kc division. Press the knob against the panel and tighten the two setscrews.

j. Replace the 1/4-in. ID washer and the 3/16-in.-long by 1/4-in. ID spacer on the shaft of the RF CONTROL, press the 1/4-in. ID small knob against the panel and tighten the two setscrews, taking care that the knob arrow points in the correct direction.

k. Replace the 9/16-in. OD by 3/8-in. ID by 0.01-in. washer and the 3/16-in.-long by 3/8-in. ID spacer on the RF-AUDIO switch shaft. Press the 3/8-in. ID small knob against the panel and tighten the two setscrews, taking care that the knob arrow points to the correct switch position.

l. Connect power and check that the instrument functions properly.

m. Replace the double-shielded cover, in such a way that the hex wrench is mounted near the bottom of the cabinet.

n. If the instrument is not to be relay-rack mounted, replace it in its cabinet with the 10 No. 10-32 panel screws.

4.4 CALIBRATION PROCEDURE.

4.4.1 EQUIPMENT REQUIRED. The following equipment is required to calibrate the Type 1330-A Bridge Oscillator:

Type 1144-A Digital Frequency Meter—a device capable of measuring frequencies of 400 cps, 1 kc and 5 kc to 50 Mc, with an accuracy of 0.3%

An alternate approach to measuring the output frequency of the Type 1330-A directly is to compare it to an accurate (± 0.3%) frequency source. The comparison device can be either a mixer with a method of beat detection (earphones, meter, etc.) or an oscilloscope using the Lissajous technique.

Type 1806-A Electronic Voltmeter — or a device capable of measuring 0 to 55Ω with an accuracy of ±20% and 1 to 13 volts rms at 60 cps, 400 cps, 1 kc and 5 kc to 50 mc with an accuracy of ±3%.

Type 1932-A Distortion and Noise Meter — or a device capable of measuring second- and third-harmonic distortion from 0 to 10% on fundamental frequencies of 400 cps, 1 kc, 8 kc and 15 kc, 1 to 10 volts, rms, with an accuracy of ±5%.

Oscilloscope capable of observing a 1- to 10-volt rms, 1-Mc signal.

50-ohm termination consisting of a 50-Ω, 2-watt, non-inductive resistor.

4.4.2 RESISTANCE CHECKS. These resistance measurements need not be made if the unit appears to be operating properly and is being recalibrated during a routine maintenance program and not because of a major failure.

Connect an ohmmeter to the AUDIO output connector and measure the resistance as follows:

RF-AUDIO switch setting	resistance
MOD 1000 C	∞
MOD 400 C	∞
CW	∞
LINE	51Ω, ±2.6Ω (±5%)
400 C	1Ω, approximately
1000 C	1Ω, approximately

4.4.3 FREQUENCY.

4.4.3.1 General. Frequency readjustment is necessary to compensate for aging or replacement of the rf tube or its associated circuit components.

For each RF RANGE, the high-frequency end is adjusted first, by means of a trimmer capacitor. The low-frequency end is adjusted next, by means of an adjustable powdered iron core. A screwdriver is required for adjustment of the trimmers. A hex wrench, clipped inside of the rf compartment, is provided for adjustment of the cores.

4.4.3.2 Access to Adjustments. Four holes in the top of the rf compartment (see Figure 3) provide access to most of the cores and trimmers. Except where otherwise noted, the RF RANGE switch must be set to the appropriate range for access to the adjustments.

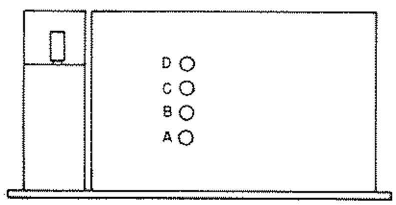


Figure 3. Locations of Dust Core and Trimmer Adjustments.

4.4.3.3 Audio-Frequency Measurements. Connect the frequency-measuring equipment to the AUDIO output connector and check the frequency as follows:

RF-AUDIO switch setting	check for	tolerance
400 C	400 cps	±20cps (±5%)
1000 C	1000 cps	±50cps (±5%)

4.4.3.4 Radio-Frequency Measurements. Do not terminate the RF connector. Set the RF-AUDIO switch to CW and set the RF CONTROL for a usable output. Connect the frequency-measuring equipment to the RF output connector and check (or adjust, if necessary) the frequency as follows:

RF RANGE	location of adjustment: core	location of adjustment: trimmer	tolerance
5-15 KC	Rear of instrument, rf compartment cover off	hole B	±3%
15-50 KC	hole A, with RF RANGE switch set to 5-15 KC	hole C	±3%
50-150 KC	hole A	hole B	±3%
150-500 KC	hole D	hole C	±2%
0.5-1.5 MC	hole A	hole B	±2%
1.5-5 MC	hole D	hole C	±2%
5-15 MC	hole A	hole B	±2%
15-50 MC	hole D	hole C	±2%

4.4.4 AMPLITUDE AND DISTORTION. Check the rf amplitude at all frequencies of each RF RANGE setting, first with the output terminated in 50Ω and then with the output unterminated. The amplitude must not dip below the minimum given for each range and the distortion must not exceed the maximum limits, where given.

Use an electronic voltmeter to monitor amplitude and a distortion meter to monitor distortion.

RF AMPLITUDE AND DISTORTION

RF RANGE	minimum amplitude (volts, rms)	maximum distortion (%)
15-50 MC	1.7	—
5-15 MC	2.9	—
1.5-5 MC	6.5	—
0.5-1.5 MC	6.8	—
150-500 KC	6.5	—
50-150 KC	5.5	—
15-50 KC	3.2	7 (at 15 kc)
5-15 KC	2.7	7 (at 8 kc)

AUDIO AMPLITUDE

RF-AUDIO switch setting	amplitude (volts, rms)
LINE	12 to 13, typical
400 C	12 to 13, typical
1000 C	12 to 13, typical

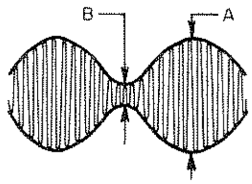
Trouble-shooting notes

Rf amplitude and distortion are determined, in part, by the physical location of the pickoff coils (L102, L202, etc.) in relation to their respective primary coils (L101, L201, etc.).

Do not attempt to solve amplitude or distortion problems by repositioning the pickoff coils, however, without first trouble-shooting the other components in the rf circuit (especially V1) or the power supply (especially V3). This is particularly important if all or several RF RANGES, rather than just one range, exhibit problems. The pickoff coils are positioned at the factory and ordinarily do not require repositioning unless the coil assembly has been replaced. They are cemented in place (except those for the three highest RF RANGES: 15-50, 5-15, and 1.5-5 MC), and repositioning usually requires removal of the entire rf section (see paragraph 4.3.1).

4.4.5 DISTORTION AND PERCENT MODULATION. The percent modulation can be determined by the following equation:

$$\% \text{ modulation} = \frac{A-B}{A+B} \times 100$$



If A = 4 divisions of oscilloscope deflection, then:

B = 2.4 divisions for 25% modulation
B = 1.33 divisions for 50% modulation

To measure percent modulation, set the RF RANGE switch to 0.5-1.5 MC and set the frequency control for 1 Mc. Use an oscilloscope to monitor percent modulation and a distortion meter to monitor distortion as follows:

RF AUDIO switch setting	% MOD switch setting	approximate modulation	maximum distortion
MOD 400 C	LOW	25%	4%
MOD 400 C	HIGH	50%	6%
MOD 1000 C	HIGH	50%	6%
MOD 1000 C	LOW	25%	4%

4.5 TEST VOLTAGES. The Table of Voltages (below) lists test voltages at tube socket pins as an aid in trouble-shooting. Voltages, d-c to ground except as otherwise noted, were measured with a 20,000-ohm-per-volt multimeter with full-scale ranges of 10, 50, 250, and 1000 volts. Variations of up to ±20% should not be considered abnormal for d-c voltages. Switch settings for the test voltages are:

RF-AUDIO at 400c MOD
frequency at 1 Mc
% MOD at LOW
RF CONTROL fully counterclockwise
input voltage: 115 volts, 60 cycles

TABLE OF VOLTAGES

TUBE (TYPE)	PIN	VOLTS	TUBE (TYPE)	PIN	VOLTS	TUBE (TYPE)	PIN	VOLTS
V1 (6AQ5)	1	-21.5	V2 (6AQ5)	1	-9.3	V3 (6X4)	1	285 ac
	2	3.5		2	7.3		3	6.1ac
	3	0		3	5.9ac		4	0
	4	5.9ac		4	11.9ac		6	285 ac
	5	225		5	180		7	310
	6	157		6	180			
	7	-21.5		7	-9.3			

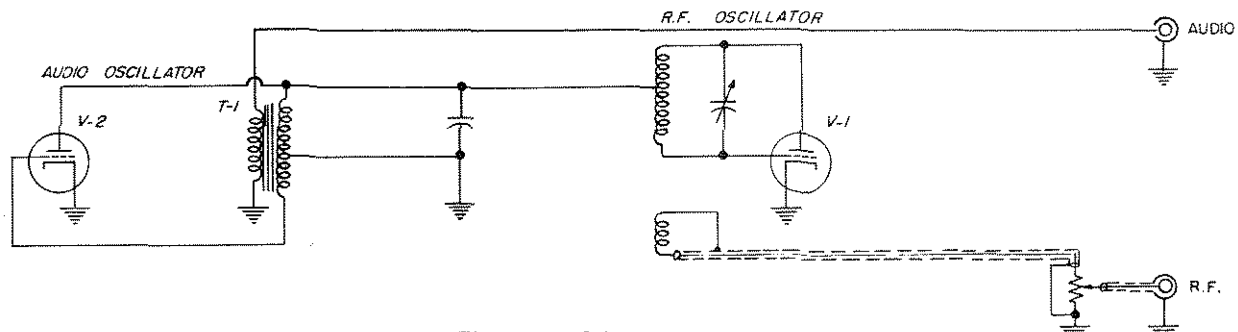
PARTS LIST

	REF DES					GR NO. (NOTE A)
RESISTORS (NOTE B)	R1	47	k	±10%	1/2w	6100-3475
	R2	15	k	±10%	1w	6110-3159
	R3	18	k	±10%	1w	6110-3189
	R4	6.8	k	±10%	2w	6120-2689
	R5	18	k	±10%	2w	6120-3189
	R6	27	k	±10%	1w	6110-3279
	R7	470		± 5%	1/2w	6100-1475
	R8	330		±10%	1/2w	6100-1335
	R9	51		± 5%	2w	6120-0515
	R10	250		±10%		6020-0100
	R12	220		± 5%	1/2w	6100-1225
	R13	390		±10%	1/2w	6100-1395
	R14	18	k	±10%	2w	6120-3189
	R15	22	k	±10%	2w	6120-3229
	R16	3.3	k	±10%	2w	6120-2339
	R17	1		±10%	1w	6760-9109
	R19	560		±10%	2w	6120-1569
	R20	560		±10%	2w	6120-1569
	R21	620		± 5%	2w	6120-1625
	R22	15		±10%	1/2w	7510-1930
	R101	750		± 5%	1w	6110-1755
	R102	75	k	± 5%	2w	6120-3755
	R201	47	k	±10%	2w	6120-3479
	R202	47	k	±10%	2w	6120-3479
CAPACITORS (NOTE C)	C1	820 μμf				0848-4042
	C2	35 μμf		± 5%		4660-1500
	C3	0.22		± 5%		4514-4255
	C4	0.47		±20%		4512-4479
	C5	0.002		+30%-10%		4920-2500
	C6	0.02		±10%		4510-2400
	C7	0.05		±10%		4510-2000
	C8	0.25		± 5%		4510-3600
	C9	20		450dcwv		4450-0300
	C10	0.47		±20%		4514-4479
	C11	0.47		±20%		4514-4479
	C12	20		450dcwv (C12–C15)		4460-0900
	C13	20				4460-0900
	C14	20				4460-0900
	C15	20				4460-0900
	C16	0.01		±10%		4760-0100
	C17	0.01		±10%		4760-0100
	C18	0.0022μf		±10%	400dcwv	4863-3229

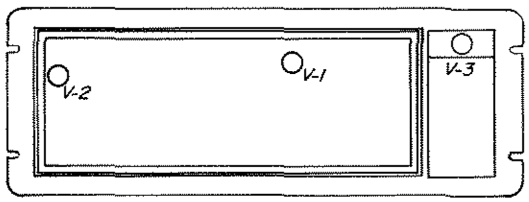
	REF DES		GR NO. (NOTE A)
	C101	7-45μμf	4910-0100
	C201	7-45μμf	4910-0100
	C301	7-45μμf	4910-0100
	C401	7-45μμf	4910-0100
	C501	7-45μμf	4910-0100
	C601	7-45μμf	4910-0100
	C701	7-45μμf	4910-0100
	C801	7-45μμf	4910-0100
MISCELLANEOUS	F1	FUSE, 0.5 amp Slo-Blo Type 3AG (for 115v)	5330-1000
	F1	FUSE, 0.25 amp Slo-Blo Type 3AG (for 230v)	5330-0700
	F2	FUSE, 0.5 amp Slo-Blo Type 3AG (for 115v)	5330-1000
	F2	FUSE, 0.25 amp Slo-Blo Type 3AG (for 230v)	5330-0700
	L101	INDUCTOR (L101, L102)	1330-0280
	L102		1330-0280
	L201	INDUCTOR (L201, L202)	1330-0290
	L202		1330-0290
	L301	INDUCTOR (L301, L302)	1330-2010
	L302		1330-2010
	L401	INDUCTOR (L401, L402)	1330-2020
	L402		1330-2020
	L501	INDUCTOR (L501, L502)	1330-2030
	L502		1330-2030
	L601	INDUCTOR	1330-2040
	L602	INDUCTOR	1330-2050
	L701	INDUCTOR	1330-2060
	L702	INDUCTOR	1330-2070
	L801	INDUCTOR	1330-0270
	L802	INDUCTOR	1330-2080
	L803	INDUCTOR, 0.47μH±15%	4300-0400
	P1	LAMP, 6.3v Mazda 44	5600-0700
	S1	SWITCH, 8 pos.	1330-0370
	S2	SWITCH	7890-0550
	S3	SWITCH, dpst	7910-1300
	S4	SWITCH, dpdt	7910-1500
	T1	TRANSFORMER	0345-4540
	T2	TRANSFORMER	0485-4650

All resistances are in ohms except as otherwise indicated by k (kilohms).

All capacitances are in microfarads, except as otherwise indicated by μμf (micromicrofarads).



Elementary Schematic Diagram



Tube Layout-Rear View

Rotary switch sections are shown as viewed from the panel end of the shaft. The first digit of the contact number refers to the section. The section nearest the panel is 1, the next section back is 2, etc. The next two digits refer to the contact. Contact 01 is the first position clockwise from a strut screw (usually the screw above the locating key), and the other contacts are numbered sequentially (02, 03, 04, etc), proceeding clockwise around the section. A suffix F or R indicates that the contact is on the front or rear of the section, respectively.

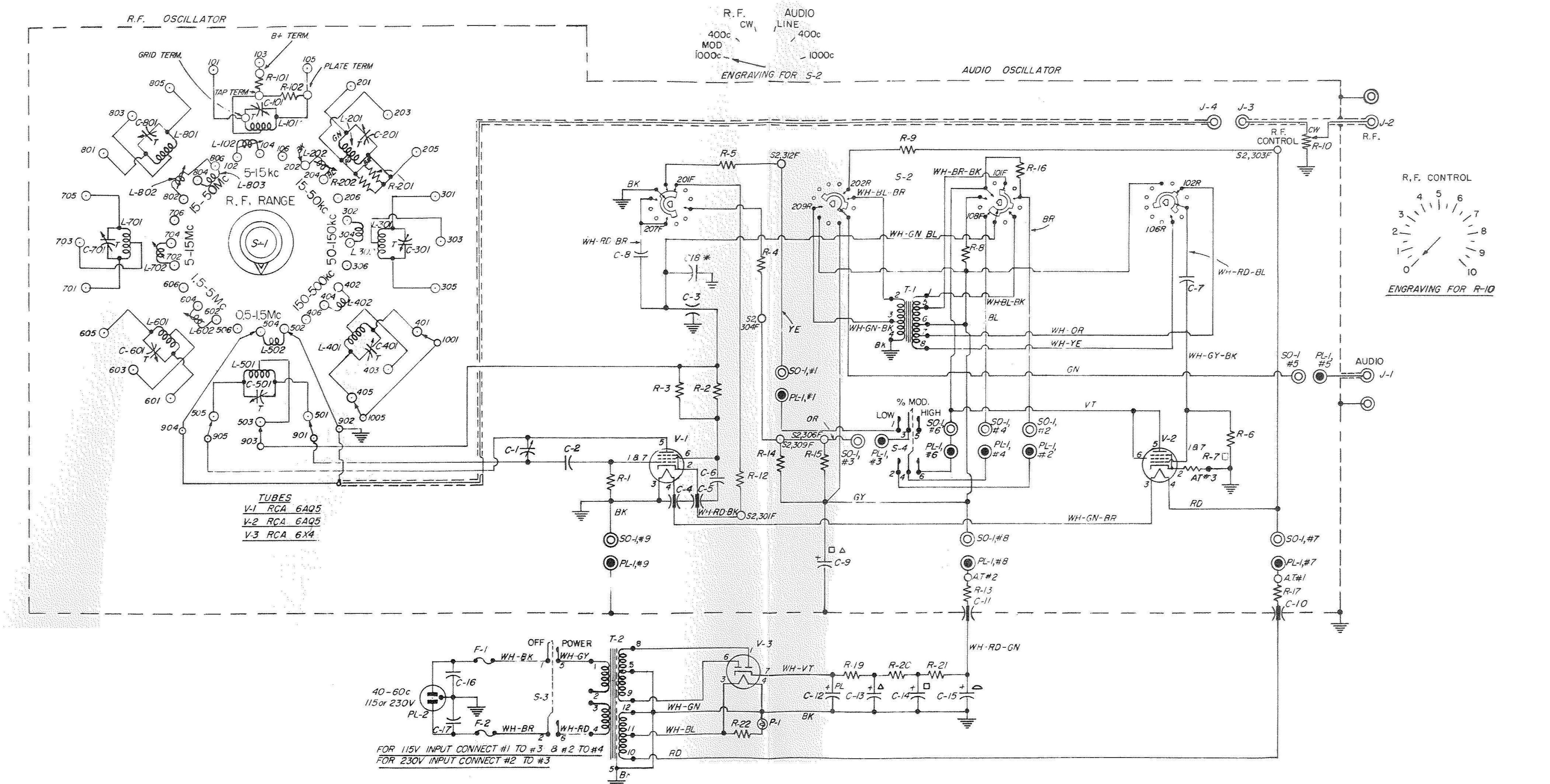


Figure 4. Schematic Diagram.

GR874 COAXIAL COMPONENTS

APPLICABLE CABLE TYPES	GR874 CABLE CONNECTORS CONNECTOR TYPE	CABLE	CABLE LOCKING	PANEL FLANGED	PANEL LOCKING	PANEL LOCKING RECESSED	PANEL LOCKING (KEYED)
	874-A2	-CA	-CLA	-PBA	-PLA	-PRLA	-PBRLA
50-OHM	RG-8A/U RG-9B/U RG-10A/U RG-87A/U RG-116/U RG-156/U RG-165/U RG-166/U RG-213/U RG-214/U RG-215/U RG-225/U RG-227/U	-C8A	-CL8A	-PB8A	-PL8A	-PRL8A	-PBRL8A
NON-50-OHM	RG-11A/U RG-12A/U RG-13A/U RG-63B/U RG-79B/U RG-89/U RG-144/U RG-146/U RG-149/U RG-216/U						
50-OHM	874-A3 RG-29/U RG-55/U (Series) RG-58/U (Series) RG-141A/U RG-142A/U RG-159/U RG-223/U	-C58A	-CL58A	-PB58A	-PL58A	-PRL58A	-PBRL58A
NON-50-OHM	RG-59/U RG-62/U (Series) RG-71B/U RG-140/U RG-210/U	-C62A	-CL62A	-PB62A	-PL62A	-PRL62A	-PBRL62A
50-OHM	RG-174/U RG-188/U RG-316/U	-C174A	-CL174A	-PB174A	-PL174A	-PRL174A	-PBRL174A
NON 50-OHM	RG-161/U RG-187/U RG-179/U						

Example: For a locking cable connector for RG-8A/U, order Type 874-CL8A.

GR874 ADAPTORS TO TYPE		TYPE 874-
APC-7		QAP7L*
BNC	plug	QBJA QBJL*
	jack	QBPA
C	plug	QCJA QCJL*
	jack	QCP
GR900		Q900L*
HN	plug jack	QHJA QHPA
LC	plug	QLJA QLPA
LT	plug jack	QLPT QLTJ
Microdot	plug	QMDJ QMDJL*
	jack	QMDP
N	plug	QNJA QNJL*
	jack	QNP QNPL*
OSM/BRM**	plug	QMMJ QMMJL*
	jack	QMMP QMMPL*
SC (Sandia)	plug	QSCJ QSCJL*
	jack	QSCP
TNC	plug	QTNJ QTNJL*
	jack	QTNP
UHF	plug	QUJ QUJL*
	jack	QUP
UHF 50-Ω Air Line	7/8-in. 1-5/8-in. 3-1/8-in.	QU1A QU2 QU3A

*Locking GR874 Connector

Example: To connect Type 874 to a type-N jack, order Type 874-QNP

**Reg. T.M. Omni Spectra, Inc.

OTHER COAXIAL ELEMENTS TYPE 874-	DESCRIPTION	TYPE 874-	DESCRIPTION
A2	50-Ω cable (low loss)	MB	coupling mount
A3	50-Ω cable	MR, MRL, MRAL	mixer-rectifier
D20L, D50L	20-, 50-cm adjustable stubs	R20A, R20LA	patch cord, double shield
EL, EL-L	90° ell	R22A, R22LA	patch cord, double shield
F185L	185-MHz low-pass filter	R33, R34	patch cord, single shield
F500L	500-MHz low-pass filter	T, TL	tee
F1000L	1000-MHz low-pass filter	TPD, TPDL	power divider
F2000L	2000-MHz low-pass filter	U	U-line section
F4000L	4000-MHz low-pass filter	UBL	balun
FBL	bias insertion unit	VCL	variable capacitor
G3, G3L, G6, G6L G10, G10L, G14, G14L G20, G20L	3-, 6-, 10-, 14-, and 20-dB attenuators	VI VQ, VQL VR, VRL	voltmeter indicator voltmeter detector voltmeter rectifier
GAL	adjustable attenuator	W100	100-Ω termination
JR	rotary joint	W200	200-Ω termination
K, KL	coupling capacitor	W50B, W50BL	50-Ω termination
L10, L10L L20, L20L L30, L30L	10-, 20-, and 30-cm rigid air lines	WN, WN3, WNL WO, WO3, WOL X	short-circuit terminations open-circuit terminations insertion unit
LAL	35-58 cm adjustable line	XL	series inductor
LK10L, LK20L	constant-Z adjustable lines	Y	cliplock
LR	radiating line	Z	stand
LTL	trombone constant-Z line	-9508	air line inner conductor
ML	component mount	-9509	air line outer conductor

CONNECTOR ASSEMBLY TOOLS TYPE 874-	FUNCTION
TOK	Tool Kit
TO58	Crimping Tool
TO8	Crimping Tool

MISCELLANEOUS COAXIAL CONNECTORS CONNECTOR TYPE	TYPE NO.	USED WITH
Basic	874-B	50-ohm air line
Basic Locking	874-BBL	50-ohm air line
Panel Locking	874-PLT	Wire lead
Panel Locking Recessed	874-PRLT	Wire lead
Panel Locking Feedthrough	874-PFL	Type 874 patch cords

L suffix indicates locking Type 874 Connector.

FOR COMPLETE DETAILS, REFER TO THE GENERAL RADIO CATALOG.

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General Radio Company (Overseas), 8008 Zurich, Switzerland
General Radio Company (U.K.) Limited, Bourne End, Buckinghamshire, England
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