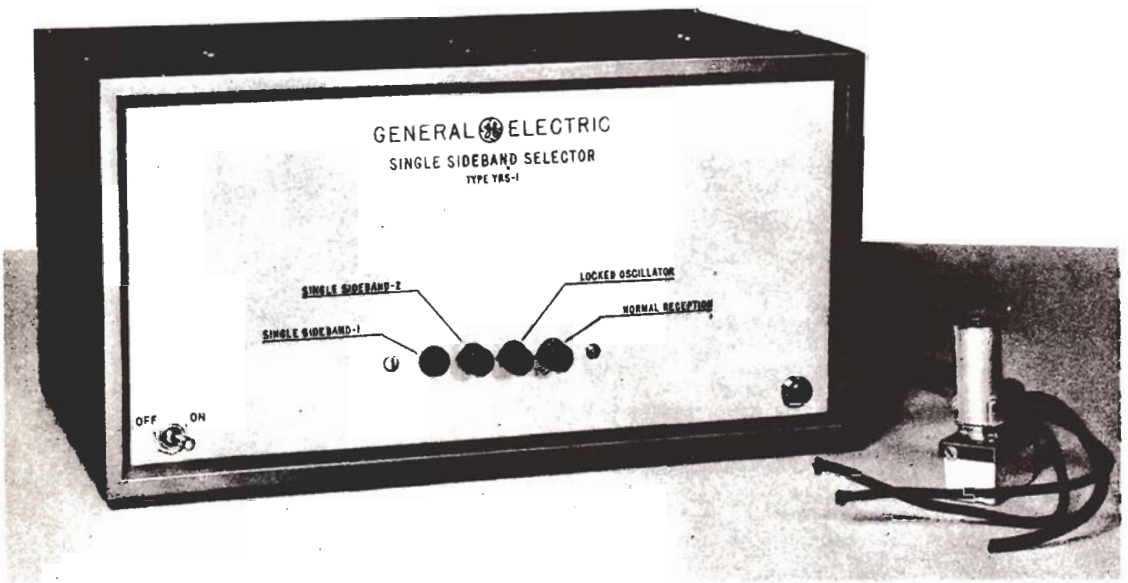
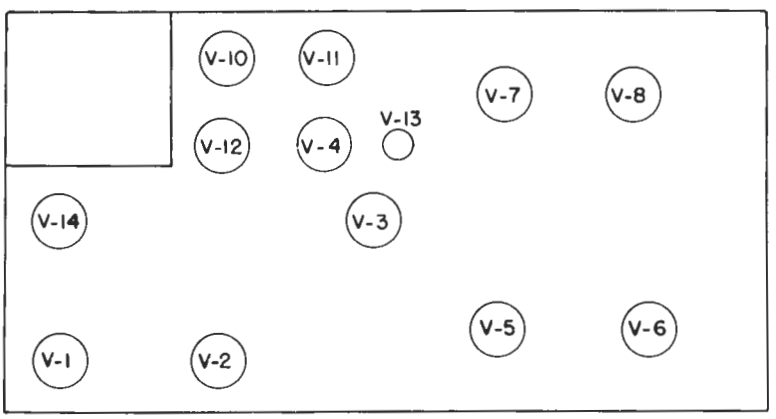
THE G-E MODEL YRS-1 ADAPTER

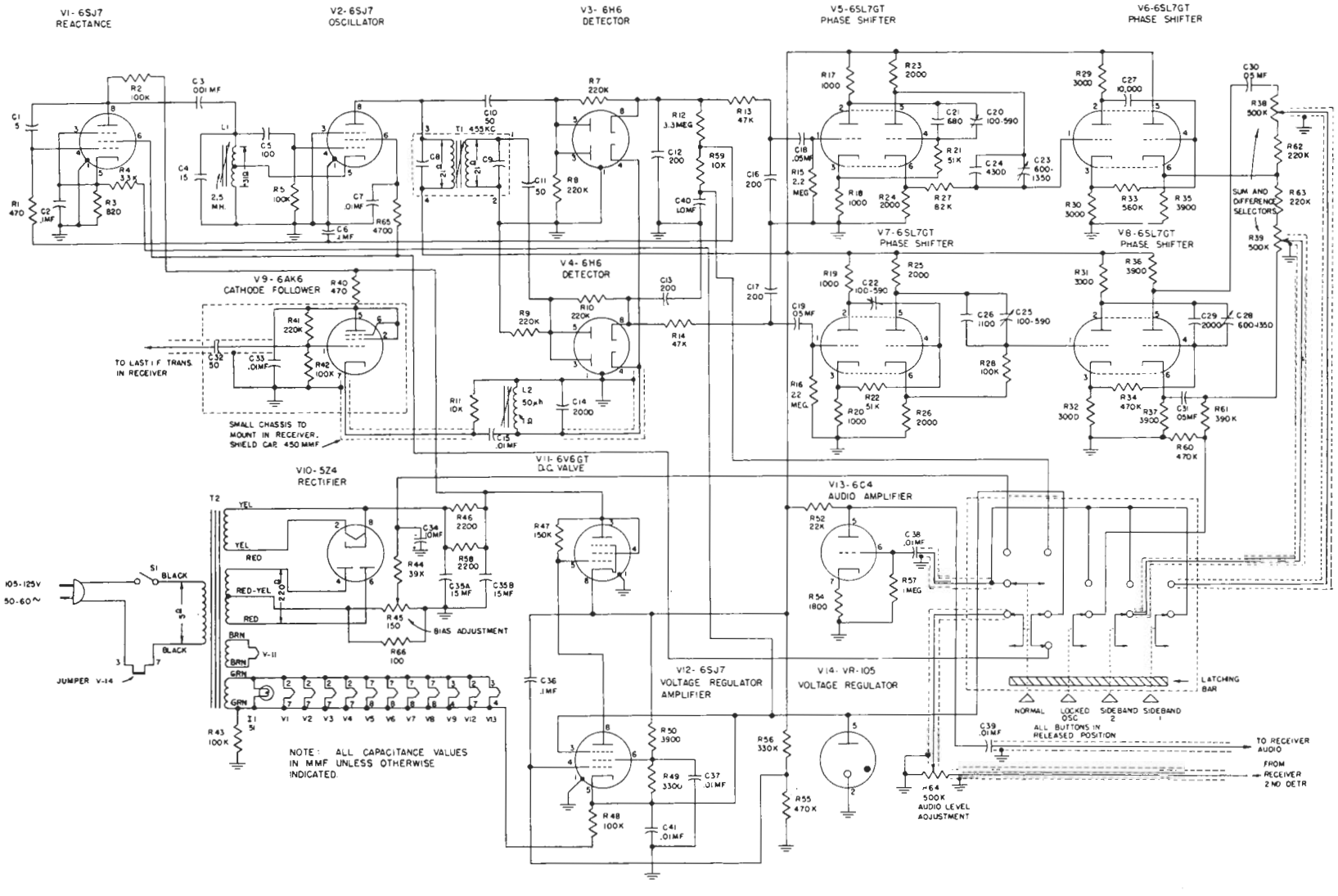
FOR SINGLE SIDEBAND RECEPTION

The General Electric YRS-1 Single Sideband Adapter is a 14-tube unit which permits the single sideband reception of either modulated or unmodulated signals. It is designed to be used with any receiver having an intermediate frequency of approximately 455 kilocycles.

The YRS-1 functions essentially similar to the 12-tube single sideband adapter described in the November-December, 1948 issue of G-E HAM NEWS, which is repeated in this chapter on pages V-28 to V-35. The YRS-1 adapter has an additional 2-tube voltage regulating circuit to improve stability. Since instruction books for the YRS-1 are no longer available, the circuit and other essential details are repeated here.






V1- 6SJ7
REACTANCE
V2- 6SJ7
OSCILLATOR
V3- 6H6
DETECTOR
V5-6SL7GT
PHASE SHIFTER
V6-6SL7GT
PHASE SHIFTER
V7-6SL7GT
PHASE SHIFTER
V8-6SL7GT
PHASE SHIFTER
V4- 6H6
DETECTOR
V9- 6AK6
CATHODE FOLLOWER
V10- 5Z4
RECTIFIER
V11- 6V6GT
O.C. VALVE
V12- 6SJ7
VOLTAGE REGULATOR
AMPLIFIER
V13- 6C4
AUDIO AMPLIFIER
V14- VR-105
VOLTAGE REGULATOR
TO LAST I.F. TRANS. IN RECEIVER
SMALL CHASSIS TO MOUNT IN RECEIVER. SHIELD CAR. 450 MMF
105-125V
50-60~
JUMPER V-14
BIAS ADJUSTMENT
SUM AND DIFFERENCE SELECTORS
LATCHING BAR
NORMAL
LOCKED OSC
SIDEBAND 2
SIDEBAND 1
ALL BUTTONS IN RELEASED POSITION
TO RECEIVER AUDIO
FROM RECEIVER 2ND DETR
AUDIO LEVEL ADJUSTMENT
NOTE: ALL CAPACITANCE VALUES IN MMF UNLESS OTHERWISE INDICATED.

Parts List for YRS-1 SSB Adapter

GE ELECTRONICS

PART	DESCRIPTION
C_1	Capacitor, ceramic, 5 mmf., 500v., 10%
C_2	Capacitor, paper, .1 mf., 200v.
C_3	Capacitor, paper, .001 mf., 600v.
C_4	Capacitor, ceramic, 15 mmf., 500v. 10%
C_5	Capacitor, ceramic, 100 mmf., 500v., 20%
C_6	Capacitor, paper, .1 mf., 200v.
C_7	Capacitor, paper, .01 mf., 600v.
C_{10}, C_{11}	Capacitor, ceramic, 50 mmf., 500v., 10%
C_{12}, C_{13}	Capacitor, ceramic, 200 mmf., 500v., 10%
C_{14}	Capacitor, mica, 2000 mmf., 500v., 5%
C_{15}	Capacitor, paper .01 mf., 600v.
C_{16}, C_{17}	Capacitor, ceramic, 200 mmf., 500v., 10%
C_{18}, C_{19}	Capacitor, paper, .05 mf., 200v.
C_{20}	Capacitor, trimmer, 100-590 mmf.
C_{21}	Capacitor, mica, 680 mmf., 500v., 10%
C_{22}	Capacitor, trimmer, 100-590 mmf.
C_{23}	Capacitor, trimmer, 600-1350 mmf.
C_{24}	Capacitor, mica, 4300 mmf., 500v., 5%
C_{25}	Capacitor, trimmer, 100-590 mmf.
C_{26}	Capacitor, mica, 1100 mmf., 500v., 5%
C_{27}	Capacitor, mica, 10000 mmf., 300v., 5%
C_{28}	Capacitor, trimmer, 600-1350 mmf.
C_{29}	Capacitor, mica, 2000 mmf., 500v., 5%
C_{30}	Capacitor, paper, .05 mf., 600v.
C_{31}	Capacitor, paper, .05 mmf., 200v.
C_{34}	Capacitor, electrolytic, 10 mf., +100%, -10%, 25 WVDC
C_{35}	Capacitor, electrolytic, 15 mf., + 100%, -10%, 450WVDC
C_{36}	Capacitor, paper, .1 mf., 200v.
$C_{37, 38, 39}$	Capacitor, paper, .01 mf., 600v.
C_{40}	Capacitor, paper, 1.0 mf., 200v.
C_{41}	Capacitor, paper, .01 mf., 600v.
I_1	Lamp, GE51 6-8v., .2 amp.
L_1	Coil, oscillator
L_2	Coil, choke
R_1	Resistor, carbon, 470 ohms, 1/2w., 10%
R_2	Resistor, carbon, 100K., 1/2w., 20%
R_3	Resistor, carbon, 820 ohms, 1/2w., 10%
R_4	Resistor, carbon, 33K, 1/2w., 10%
R_5	Resistor, carbon, 100K, 1/2w., 20%
$R_{7, 8, 9, 10}$	Resistor, carbon, 220K, 1/2w., 20%
R_{11}	Resistor, carbon, 10K, 1/2w., 20%
R_{12}	Resistor, carbon, 3.3 meg., 1/2w., 20%
$R_{13, 14}$	Resistor, carbon, 47K, 1/2w., 20%
$R_{15, 16}$	Resistor, carbon, 2.2 meg., 1/2w., 20%
$R_{17, 18, 19, 20}$	Resistor, precision, 1000 ohms, 1/2w., 1%
$R_{21, 22}$	Resistor, precision, 51K, 1/2w., 1%
$R_{23, 24, 25, 26}$	Resistor, precision, 2000 ohms, 1/2w., 1%
R_{27}	Resistor, precision, 82K, 1/2w., 5%
R_{28}	Resistor, precision, 100K, 1/2w., 5%
$R_{29, 30, 31, 32}$	Resistor, precision, 3000 ohms, 1/2w., 1%
R_{33}	Resistor, precision, 470K, 1/2w., 5%

PART	DESCRIPTION
$R_{35,\ 36,\ 37}$	Resistor, carbon, 3900 ohms, 1/2w., 5%
$R_{38,\ 39}$	Potentiometer, carbon, 500K 1/2w., 10%
R_{40}	Resistor, carbon, 470 ohms, 1/2w., 10%
R_{43}	Resistor, carbon, 100K, 1/2w., 20%
R_{44}	Resistor, carbon, 39K, 1/2w., 10%
R_{45}	Potentiometer, carbon, 150 ohms
R_{46}	Resistor, carbon, 2200 ohms, 2w., 10%
R_{47}	Resistor, carbon, 150K, 1/2w., 10%
R_{48}	Resistor, carbon, 100K, 1/2w., 20%
R_{49}	Resistor, carbon, 300 ohms, 2w., 20%
R_{50}	Resistor, carbon, 3900 ohms, 2w., 10%
R_{52}	Resistor, carbon, 22K, 1/2w., 10%
R_{53}	Resistor, carbon, 100 ohms, 1/2w., 20%
R_{54}	Resistor, carbon, 1800 ohms, 1/2w., 10%
R_{55}	Resistor, carbon, 470K, 1/2w., 10%
R_{56}	Resistor, carbon, 330K, 1/2w., 10%
R_{57}	Resistor, carbon, 1 meg., 1/2w., 20%
R_{58}	Resistor, carbon, 2200 ohms, 2w., 10%
R_{59}	Resistor, carbon, 10K, 1/2w., 20%
R_{60}	Resistor, carbon, 470K, 1/2w., 10%
R_{61}	Resistor, carbon, 390K, 1/2w., 10%
$R_{62,\ 63}$	Resistor, carbon, 220K, 1/2w., 20%
R_{64}	Potentiometer, carbon, 500K, 1/2w., 20%
R_{65}	Resistor, carbon, 4700 ohms, 1/2w., 20%
R_{66}	Resistor, carbon, 100 ohms, 1/2w., 20%
S_1	Switch, toggle, SPST
S_2	Switch, pushbutton
T_1	Transformer, I. F., with trimmer capacitors, 455Kc.
T_2	Transformer, power

* Universal obtainable from any radio parts jobber.

All percentages shown are plus and minus.

Modifications to the YRS-1

I HAVE BEEN modifying my YRS-1 single-sideband adapter,[1] and some may be interested in certain changes I have made in this truly wonderful gimmick.

First, I replaced the toggle-type power switch on the panel with a gain-control-and-rotary-switch combination. The variable resistance is connected into the cathode circuit of the reactance modulator to control the frequency of the

[1] The YRS-1 is the commercial adaptation of the selectable-sideband adapter designed by W2KUJ. See Norgaard, "Practical S.S.B. Reception," *QST*, July, 1948.

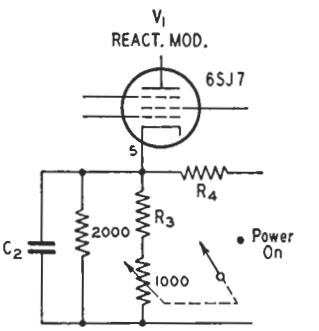


Fig. 1 — Wiring diagram of the modified YRS-1 reactance modulator to allow panel control. C_2, R_3 and R_4 refer to original components that are unchanged.

reinserted carrier (Fig. 1). This provides panel control for oscillator readjustment and for tuning s.s.b. stations, but, more important, it allows for compensation of warm-up drifts. After initial alignment, any drift in either the receiver or the adapter requires (otherwise) that the receiver be detuned. Oscillator frequency control further permits deliberate detuning of the receiver when desired, in order to favor the outer sideband frequencies or as an aid in avoiding interference.

Secondly, I provided a panel switch in the audio circuitry to permit normal operation of the receiver without turning on the 14 tubes in the YRS-1. This switch merely connects the audio from the receiver detector directly back into the receiver audio system.

Most interesting of all, I have rewired the 6C4 audio output stage to take a 6J6, with the grids connected to the phasing networks, and the plates connected to two 'phone jacks (Fig. 2). This enables one to hear the sidebands separately on headphones, in addition to the operation through the receiver. With separate cords connected to each of the 'phones, the left ear hears the upper sideband, and the right ear hears the lower sideband.

This modification not only aids reception, but provides a certain "sense of direction." A heterodyne and the accompanying monkey-chatter associated with an interfering signal which appears on the right side of the panoramic adapter is heard in the right ear. Another interference on the left side may reach only the left ear. The brain tends to ignore the one-ear signals and favors the information from both ears. (Don Norgaard has mentioned this psychological effect.) With exalted-carrier reception, as you tune across a signal, the heterodynes seem to move right straight through your head. You know by "feel" which way to turn the tuning knob for oscillator lock-in.

With this binaural system, there seems to be a new realism. Voices (and music, too) seem to come to life. It is almost like walking into a broadcasting studio. Friends concur with me on this. I cannot understand why the difference should be so great nor why the binaural way is more pleasant. Adjusting the level of the 'phones independently proves nothing. Tests made with both 'phones on show a marked difference in "realism" when one 'phone is switched from one sideband to the other, yet tests with only one 'phone show no difference when that 'phone is switched in the same manner.

Properly operated, the YRS-1 with exalted carrier greatly reduces the harmonic distortion normally heard on foreign 'phones, and makes listening to music from such stations much more pleasant. However, the selective fades on such stations, which affect the sidebands separately and produce dissimilarities between them, give a very interesting "three-dimensional effect" when heard this new way. It is very difficult to describe. Perhaps you have heard it. I don't mean to convey the impression that I am a dramatic type, but there is something mesmerizing about it. I have observed some interesting reactions and comments. Some people can't get enough of it; others seem to be a little frightened by the eerie sounds.

This new venture into "three-dimensional music" is startling, at first. The sound seems to flow around inside your head. There is a tendency at times to turn as though looking for the source of music. Choral music is weirdly beautiful and exciting. Pipe organ recitals reverberate mysteriously, and make you feel you are sitting high up in the belfry of a cathedral. To quote E.T. Canby,[2] switching from one to both sidebands gives "an impression of a tremendous bursting-outward into space." Sound suddenly "jumps away in all directions as though the performers had leaped into the air. Suddenly they are more than room distance away and fully sized, alive."

The usual question is, will it work with two loudspeakers? The answer is "yes and no." The effect is not nearly so interesting with speakers because both ears hear both speakers. However, I do often use the receiver speaker on the left side and a separate amplifier and speaker on the right side, and find it an improvement. I would like to get some more opinions and expressions from others who have tried dual single-sideband reception, or can be induced to make the simple changes (it took about half an hour) to add one more feature to the YRS-1.

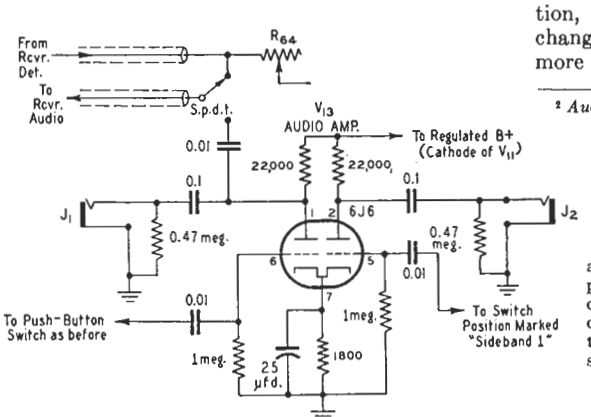


Fig. 2 — Wiring diagram of the modified audio amplifier to allow the use of split headphones. V_{13} is a 6C4 in the original unit — the connections to Pin 6 of the socket remain unchanged. With most receivers, J_2 will provide the upper sideband. The sideband from J_1 is selectable.

[2] *Audio Engineering*, January, 1952.