INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE KR VOICE ADAPTER
STYLE 202C970G03 – 125 V.D.C.
STYLE 202C970G04 – 48 V.D.C.

CAUTION: It is recommended that the user of this equipment become thoroughly familiar with the information in this instruction leaflet before energizing the carrier assembly. Failure to observe this precaution may result in damage to the equipment.

APPLICATION

The type KR Voice Adapter is used to provide a voice channel between type KR power-line carrier sets at different locations. Push-to-talk operation is provided using a handset which can be plugged into a jack on the voice adapter, or a remote located jack which is wired to the voice adapter. The voltage rating of the Voice Adapter must match that of the KR carrier set with which it is used.

Voice Adapter Style 202C970G03 - 125 V.D.C.
Voice Adapter Style 202C970G04 – 48 V.D.C.

✪ NOTE: For a 250 V.D.C. KR carrier set style 202C970G03 Voice Adapter is used.

CHARACTERISTICS

When using the voice adapter for transmitting, the KR carrier transmitter operates at a reduced power output level than is used for relaying operation. This level is adjustable by a control marked CARRIER on the voice adapter. This adjustment should be set so that the carrier output level for voice transmission is – 6db below the relaying output level.

The voice adapter is designed to provide sufficient amplitude modulation of carrier. A modulation level control, marked MODULATION, is provided and should be set so that overmodulation does not occur.

The received audio signal level is adjustable, by a volume control located above the handset jack.

The voice adapter is designed to operate with a 3-wire handset with specifications as follows:

Style	Type	Transmitter	Receiver
✪ 203C206H01	Noise-Cancelling	Carbon	Magnetic-150 Ω
203C206G01	Non/Noise Cancelling	Carbon	Magnetic-150 Ω

For handset wiring diagram see Fig. 5

Power Requirements

Voltage	125 V.D.C.	48 V.D.C.
Current Drain		
Transmit	70 ma.	70 ma.
Receive	25 ma.	25 ma.

CONSTRUCTION

The unit is mounted in a black lacquered steel chassis which forms a box consisting of a cover and frame. The cover has two holes drilled in it for access to the carrier level and modulation level controls. The voice adapter components are mounted on a pair of double-decked printed circuit boards. The lower board is mounted to the case on four insulated posts. The top board is mounted to the lower board on four similar posts. The jack block assembly and the octal plug are mounted, beneath the lower board, on the case. The top board contains the adjustable resistors used for carrier and modulation level controls. The receiver volume control is mounted on the lower board. This control is operated using a knob which is projected through the cover, located above the handset jack. Buckle-type straps are

All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding his particular installation, operation or maintenance of his equipment, the local Westinghouse Electric Corporation representative should be contacted.

SUPERSEDES I.L. 41-942.11, dated November 1971
✪Denotes change from superseded issue.

EFFECTIVE JUNE 1976

provided to secure the voice adapter to the socket assembly on the KR carrier set. See Fig. 2 for outline demensions.

ACCESSORIES

1. Handsets

   Style 203C206H01 - noise cancelling microphone

   ✪ Style 203C206G01 - non/noise cancelling microphone

2. Remote telephone jack style 715B674G01

3. Patch-cord assembly (For style see Fig. 4)

   When it is desired to have a telephone handset jack mounted in a remote location from the KR carrier set, as in switchboard applications, items 2 and 3 above may be used. See Fig. 3 and 4.

4. Voice adapter mounting assembly. (See Table 1 for style numbers.)

   This device is required when it is desired to permanently mount the voice adapter to the KR set and the dimensions of the area surrounding the KR set do not permit this. See Fig. 1.

5. Remote telephone hookswitch - handset assembly.

   ✪ a. For Wall mounting

   Style 205C162G03 - with noise cancelling handset

   Style 205C162G04 - with non/noise cancelling handset

   b. For panel mounting

   Style 204C845G03 - with noise cancelling handset

   Style 204C845G04 - with non/noise cancelling handset

   When it is desired to have a telephone handset permanently mounted at a remote location, i.e. switchboard or side of desk, any of the above hookswitch - handset assemblies may be used.

NOTE: Item (3) Patch-cord assembly is used for making the connections from the voice adapter to the hookswitch-handset assembly.

See Fig. 10, 11 and 12 for wiring and mounting details.

OPERATION

The Voice Adapter circuitry consists of three common emitter transistor stages performing as an r-f amplifier, detector and audio amplifier.

The r-f input signal, coming from the voice coil ✪ winding of FL-1 in the KR carrier set is present at pin 1 on the voice adapter circuit board. From there it is fed through volume control R1, R2 and C2 to the base of Q1. Q1 amplifies the modulated carrier signal which is then applied through T1 to drive the detector stage Q2. Q2 is biased to operate as a power detector, whereby its output signal (junction of R9 and Q6) is rectified and amplified. C5 filters out the carrier frequency and the remaining audio signal is fed through C6 and contact K1-A to Q3 which serves as an audio amplifier to drive the telephone handset receiver. The output of Q3 is transformer coupled through T2 to the handset receiver. There is no automatic volume control in this receiver circuitry. Therefore, it is necessary to adjust the input control R1 for a comfortable listening level while receiving.

The audio output stage Q-3 serves two functions. It is the output stage for the receiver section previously explained and it also serves as the modulating amplifier when transmitting. Pressing the pushbutton on the telephone handset energizes relay K-1 and also closes the circuit which provides microphone current. The microphone output is applied through C14 to the modulation level control R25. Then it is coupled through C7 to the base of Q3 when relay K-1 is energized. Contact K-1A is switched to select the speech input signal at capacitor C-7 and opens the receiver circuit from ✪ capacitor C-6. Transistor Q-3 again serves as an amplifier and its output is applied to the KR Transmitter modulator circuitry. T2 serves to couple the signal at the proper impedance level required by the modulator circuitry. Contact K1-B closes the circuit to the modulator to permit modulation of carrier when the handset pushbutton is pressed.

The handset receiver is, at all times, connected to the center-tapped secondary of T2. This means that someone operating the voice adapter should hear their own voice while they are transmitting, and hear the person, with whom they are communicating, while receiving. RF input control R1 should be adjusted for a comfortable listening level when receiving.

The carrier transmitter must be unblocked before it is possible to transmit the modulated carrier signal. This is accomplished by applying carrier start current to the transmitter through the Voice Adapter. Energizing relay K-1 in the adapter closes contact K-1D which supplies carrier start current to the KR transmitter. By adjusting this current, using R20, the proper reduced carrier level for voice communication can be obtained. If a relaying operation occurs during voice transmission the relaying carrier start voltage applied to the KR carrier set will cause the carrier output power to increase to its normal level. This carrier-start ✪ voltage will also be present at circuit board terminal 4 on the voice adapter and will be greater than the zener voltage of Z1 causing current to flow through

Z1, R23 and D1 which will reverse bias Q3 and prevent modulation of carrier during the relaying operation. Under these conditions Q3 would cut off rapidly, and the magnetic field built up in T2 will collapse causing a large transient voltage to be present in its windings. To prevent this transient voltage from affecting the operation of the carrier set during the relay operation, diodes D4 and Z3 are connected across the primary winding to short out this transient voltage. Diode D2 is connected across the secondary winding for the same purpose.

When used with supervisory equipment, audio block is performed through supervisory preference contacts. The jumper normally connecting terminals 13 and 19 on the KR transmitter-receiver is removed and in its place is connected these contacts. These contacts open, removing the pos. DC supplied to the adapter unit when a supervisory function is initiated. Voice communication is interrupted when this occurs.

INSTALLATION

Voltage Rating

The voice adapter, as received, is wired for either 48 VDC or 125 VDC operation, as ordered. The supply voltage is clearly indicated on the nameplate. Severe damage will result to the voice adapter if a 48 VDC unit is plugged into 125 VDC relaying equipment. The voltage rating of the adapter must correspond with the rating of the KR Transmitter-Receiver.

Connections for Relaying Channels

The adapter will perform satisfactorily with any of the relaying systems used to key the KR Transmitter-Receiver Unit. No internal wiring modifications are necessary in the adapter. However, the external wiring to the KR transmitter-receiver for any particular system must be exactly as shown in the KR Transmitter-Receiver Unit Instruction Leaflet I.L. 41-941.1.

Pushing the button on the telephone handset unblocks the local transmitter which will result in an alarm signal at the remote terminal. This alarm will continue to ring until the operator at the receiving terminal inserts his telephone handset into J1 or the transmitting telephone pushbutton is released. The two stations are then ready to carry on a conversation. Because of the reduced RF output of the transmitter when unblocked by the adapter, it may, in some cases be necessary to use the carrier test button for ringing. Plugging in the telephone short circuits the local alarm coil provided a connection has been made between terminal 16, on the KR carrier unit and the junction point of the RRH and alarm coils. The B+ return for the RRH coil is then returned through the Voice Adapter Unit directly to B+. This short circuits the alarm coil. Make certain the RRH and alarm coils are arranged as shown on the Schematic Diagram in the KR Carrier Set instruction leaflet or the connection will short the RRH coil instead of the alarm coil.

With the Voice Adapter plugged into the relaying equipment on a permanent basis and a remote handset jack or hookswitch assembly is used, it is best to eliminate the connection to terminal 16 of the KR set and to wire the alarm cut-off contact of the remote assembly in series with the alarm relay contact. With these connections the alarm relay will operate whenever a signal is received but the circuit to the alarm device will be broken when the handset is inserted into the remote jack or lifted off the hookswitch.

Preference for Supervisory Channels

Supervisory preference may be obtained by removing the jumper which connects terminals 13 and 19 on the KR transmitter-receiving unit, and connecting in its place the supervisory preference contacts.

Telephone Usage

A telephone jack is provided as an integral part of the adapter to accommodate a Westinghouse handset. This telephone is auxiliary and is not an integral part of the unit. It employes a push-to-talk button which must be pushed when transmitting and released when receiving. If the telephone has a noise cancelling microphone, it is necessary to speak directly into the microphone. Talking over, or under the mouthpiece will result in severe attenuation of the speech signal. Optimum results can be achieved only by speaking directly into the telephone. See Figure 9.

Settings and Adjustments

The rf input control R1 should be adjusted for a comfortable level when receiving voice transmission. Clockwise rotation will increase volume.

Carrier level control R20 should be set so that the

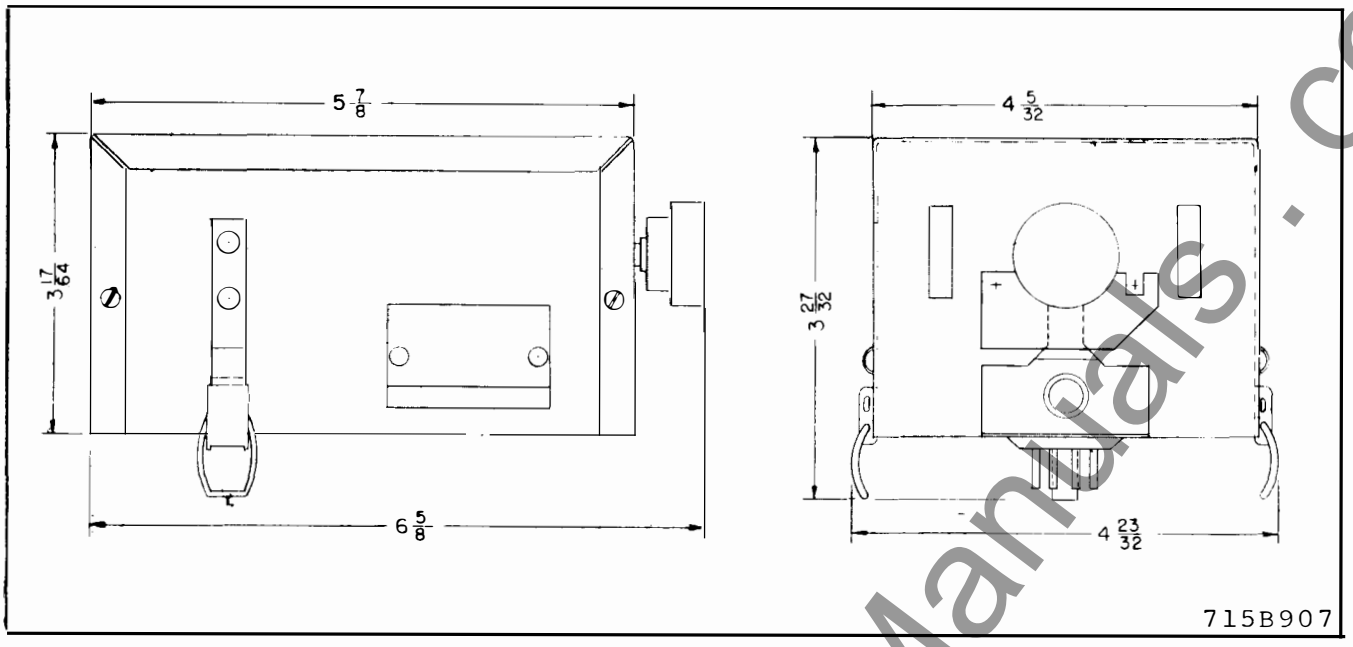


Fig. 2 Outline Dimension

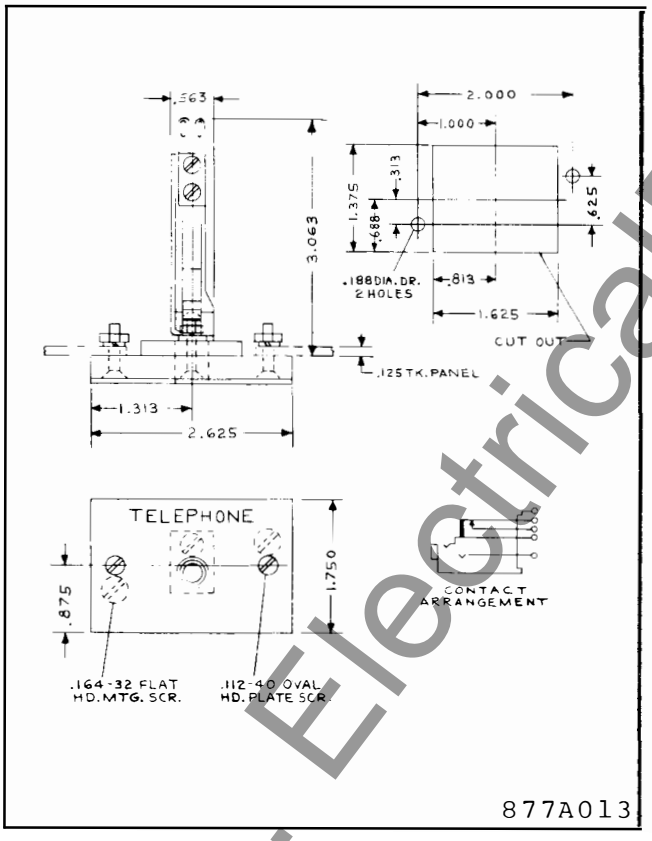


Fig. 3. Remote Telephone Jack Assembly

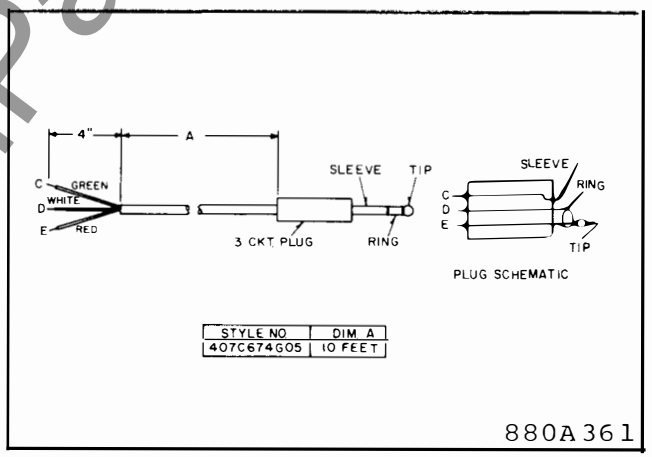


Fig. 4. Patch Cord Assembly

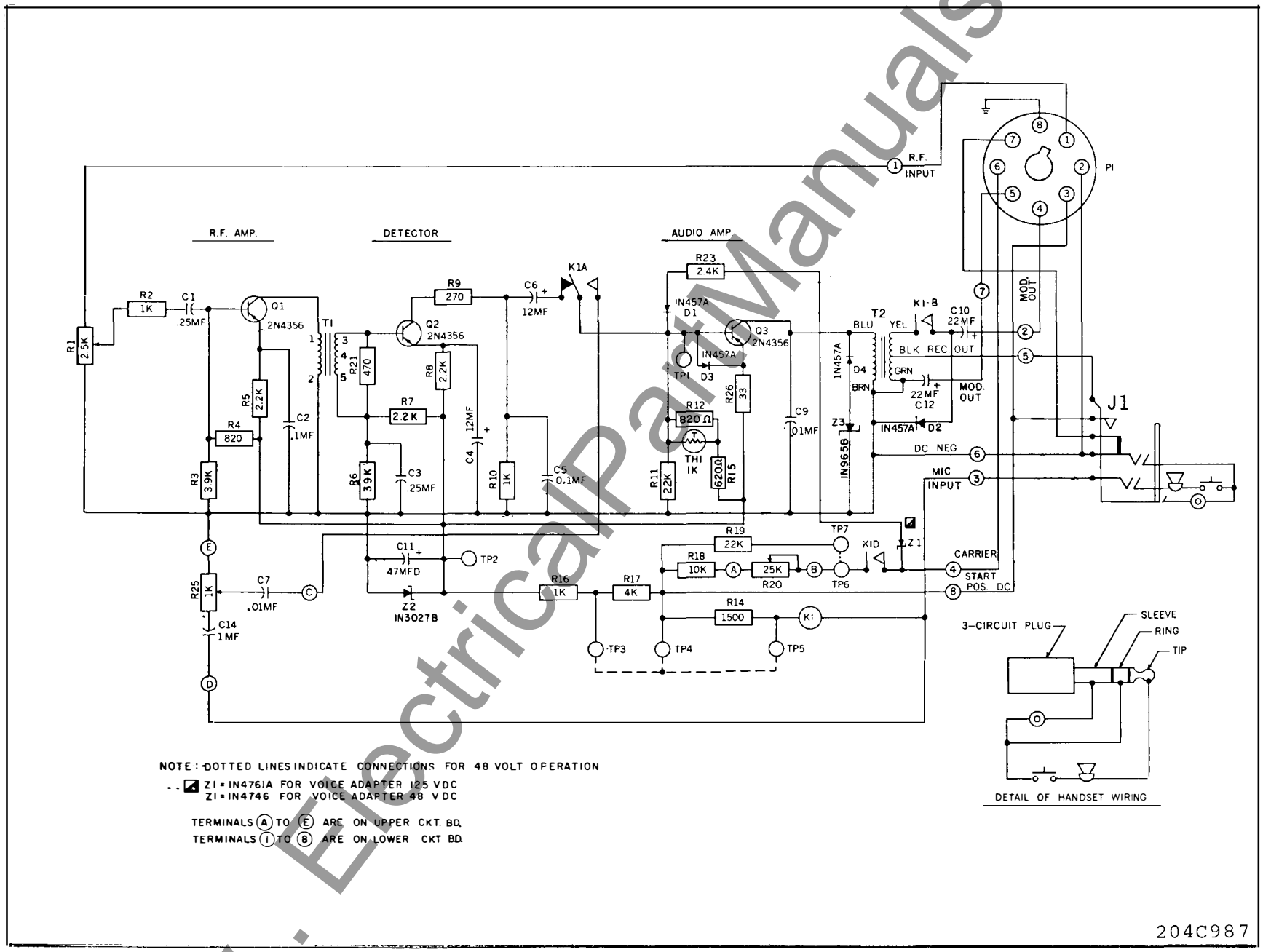


Fig. 5. Internal Schematic

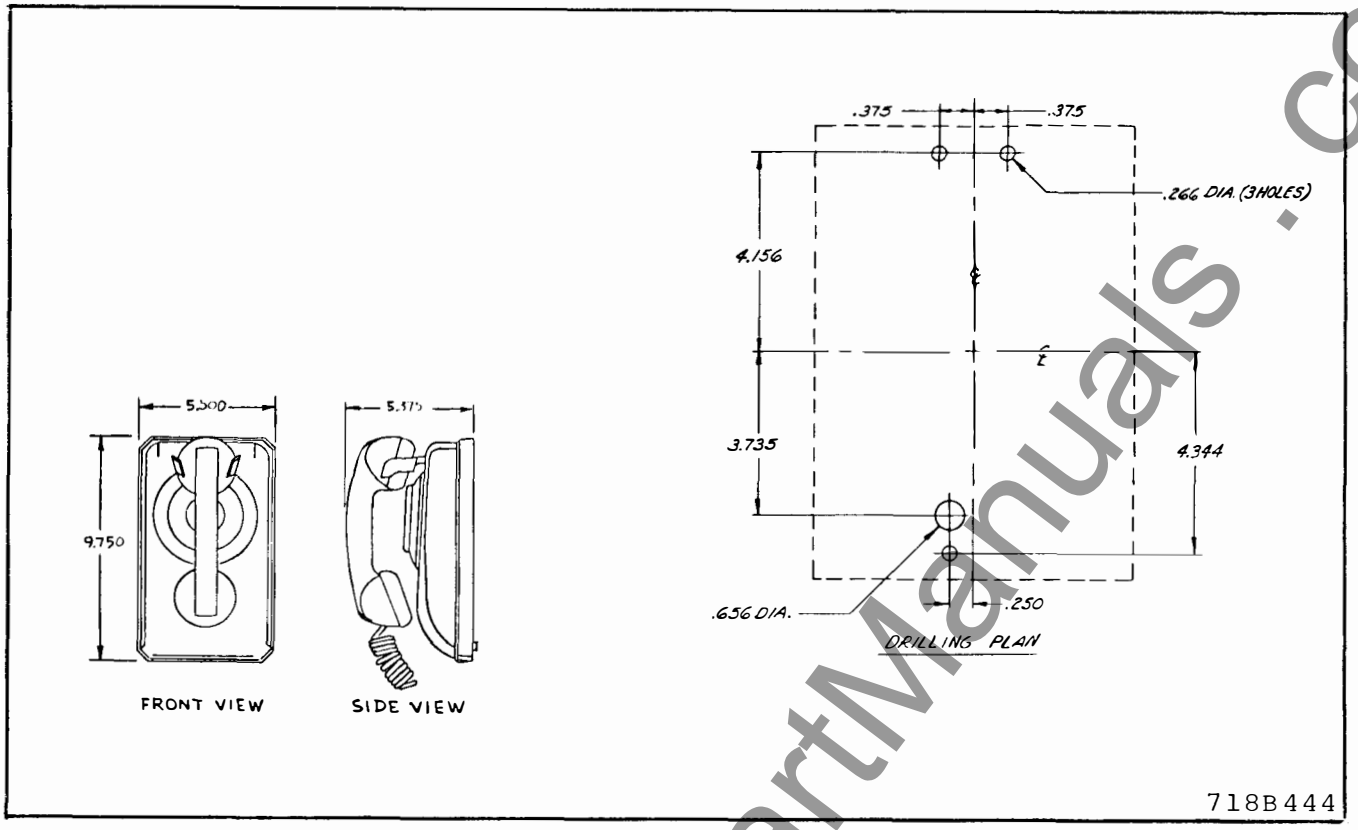


Fig. 10. Mounting Dimensions for wall mounted Hookswitch- Handset Assembly

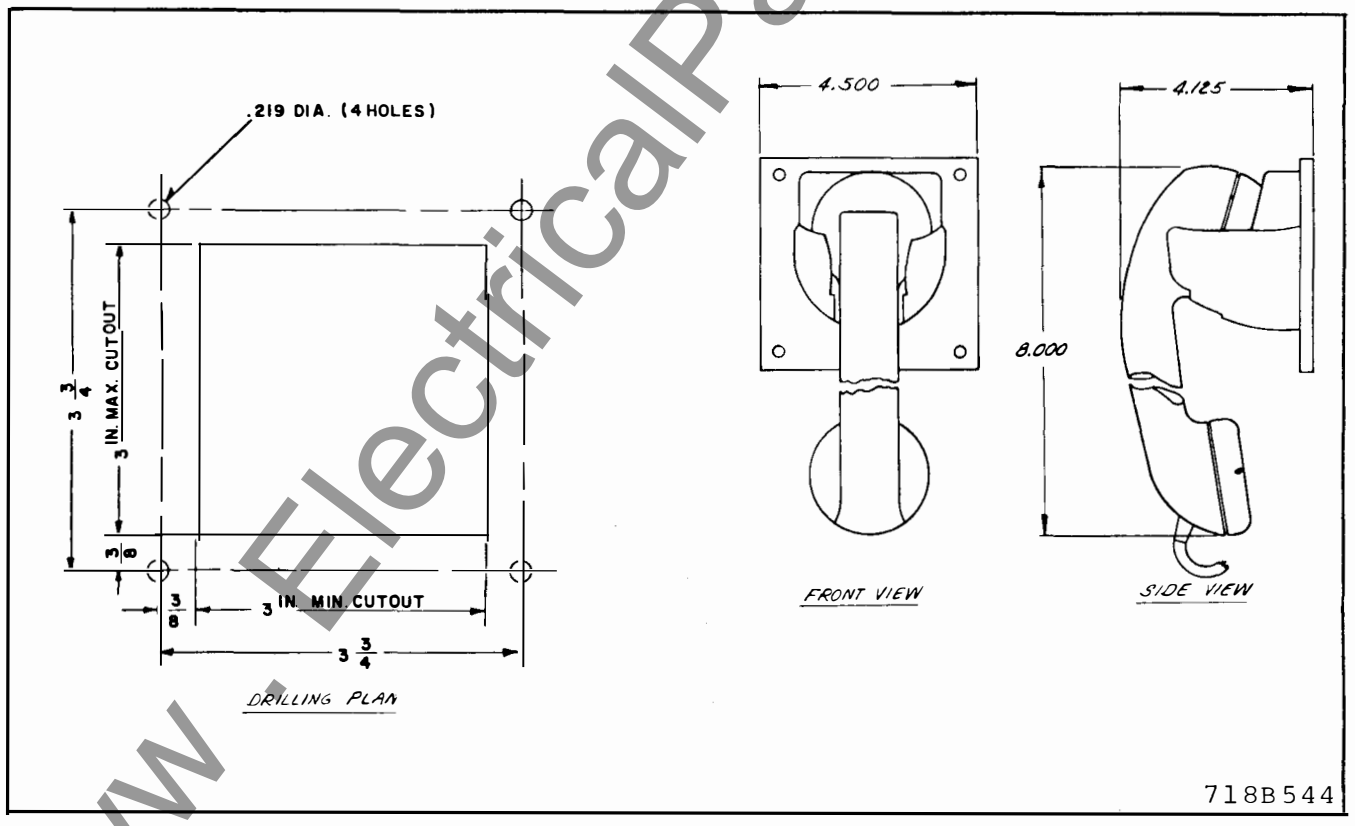


Fig. 11. Mounting Dimensions for Panel Mounted Hookswitch- Handset Assembly

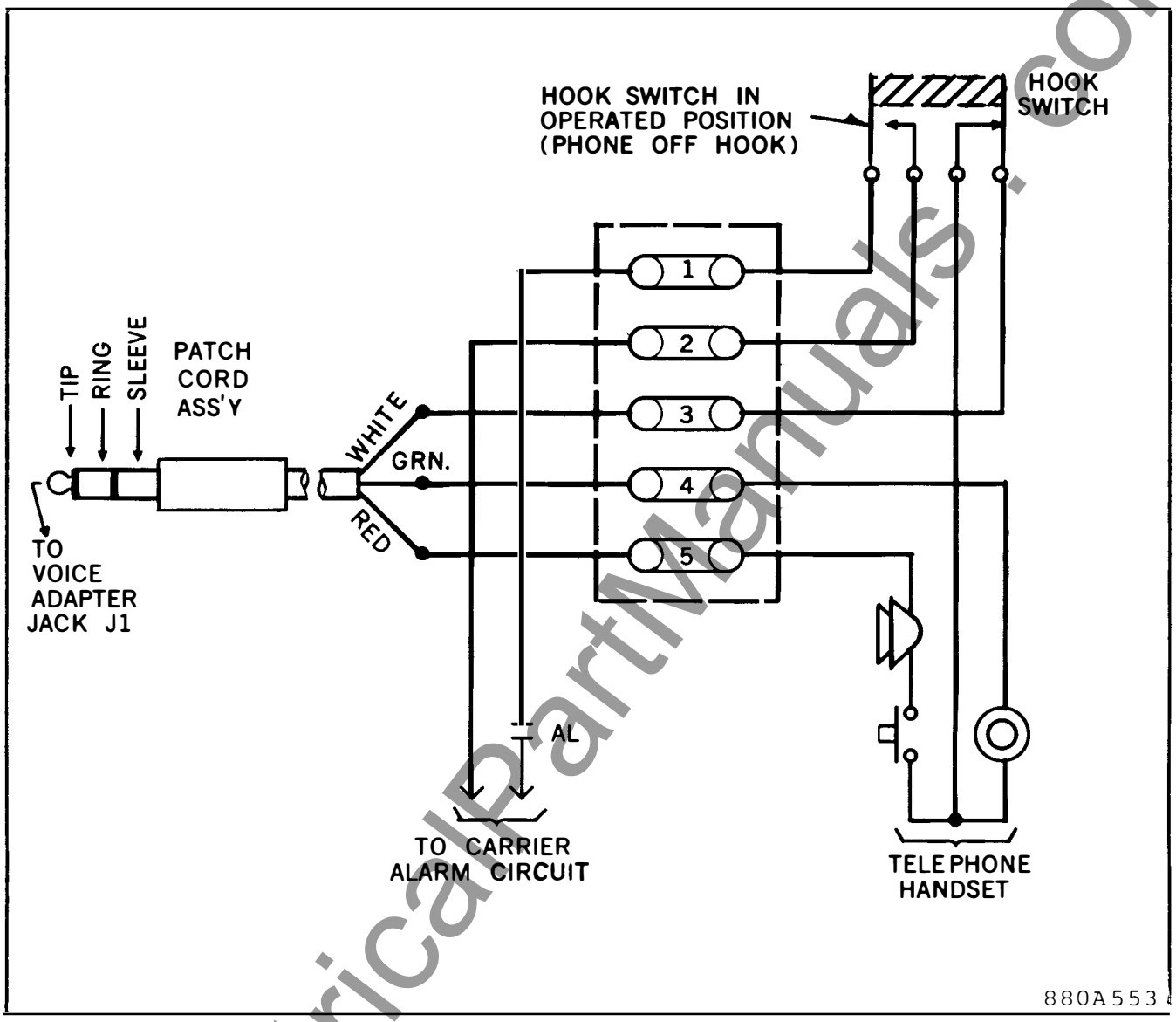
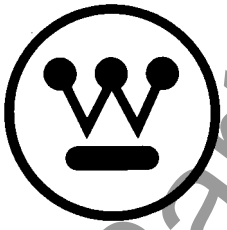


Fig. 12. Telephone Hookswitch - Handset Assembly Internal Schematic and Wiring Diagram.



WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**

Printed in U.S.A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE KR VOICE ADAPTER

WARNING: Do not plug a 48 volt adapter into a 125 volt KR set.

APPLICATION

These instructions apply to the voice adapter used with the type KR carrier set to provide voice communications. Two styles are available:

S#148A431G01	125 V.D.C.
S#148A431G02	48 V.D.C.

The S#330C191H01 resistor unit used with the KR set for 250 V.D.C. applications also provides 125 volts to the voice adapter. Accordingly use the 125 V.D.C. style voice adapter for 250 volt applications.

One portable voice adapter suffices for each station; however, one adapter per KR carrier set can be permanently mounted. Table 1 summarizes the the various arrangements. An explanation of this table appears under "Construction — Mechanical."

When the KR set is used for relaying, the relays shut off the transmitter should someone be talking when an internal fault occurs.

When the KR set is used for supervisory control a break contact from the supervisory equipment is needed to remove supply voltage from the voice adapter when the supervisory-control equipment is functioning. This arrangement gives supervisory-control preference over voice use.

CHARACTERISTICS

Volume Control

Control is obtained through a potentiometer. There is no AVC circuit in the Voice Adapter.

RF Carrier Output (for voice communication)

The KR transmitter RF output will vary between 1.5 volts minimum and 3.4 volts nominal when the pushbutton on the test telephone is pressed. This level is the unmodulated carrier signal developed across a 60-ohm load.

Power Requirements

70 milliamperes at 125 VDC. 70 milliamperes at 48 VDC. (Supplied by the KR Relaying Transmitter-Receiver Unit.)

Insulation Level

All electrical circuits, normally connected to station batteries, are insulated for 2000 VDC to ground.

Temperature Range

Operating Range (external ambient) −20°C to +50°C. Non-Operating Range −40°C to +70°C.

Mechanical Specifications

a. Dimensions 5-5/8" x 4-1/32" x 3-11/16" b. Weight 2-1/2 lbs. c. Projection 3" in addition to projection of KR Transmitter-Receiver.

CONSTRUCTION

Mechanical

The unit is mounted in a black lacquered steel chassis which forms a box consisting of a cover and frame. Buckle-type straps secure the adapter to the socket assembly. See Fig. 1. The adapter plug may be inserted into octal socket X3 on the top front of the KR set (Group A of Table 1). Another portable adapter setup (Group B of Table 1) avoids the need to remove the cover of the KR set; here the voice adapter plugs into the socket on the voice adapter mounting assembly shown in Fig. 6. The S#757D650G03 assembly mounts on the switchboard panel; a six foot cable is included to connect to socket X4 on the rear of the KR set.

Supersedes I.B. 41-942
*Denotes Change from Superseded Issue

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The voice adapter may also be permanently mounted and connected to a switchboard-mounted telephone jack. Where the KR set is mounted on the switchboard (Group C of Table 1), the adapter is permanently plugged into the rear socket x4 of the KR set; the patch cord assembly then interconnects the voice adapter and the S#1276346 telephone jack.

When the KR set mounts in a swing rack cabinet (Group D of Table 1) the voice adapter plugs into S#757D650G04 mounting assembly. The adapter and assembly mount on the swing rack under the KR set. The 15 inch cable interconnects the adapter and socket X4 of the KR set. The patch cord interconnects the adapter and the cabinet assembly terminal blocks.

S#330C678H04 telephone with plug is inserted into the jacks in the voice adapter with portable setups (Group A and B of Table 1). Otherwise the plug on the S#585C700H01 patch cord inserts in the voice adapter jacks; the telephone jack on the other end of this patch cord then accommodates the telephone plug.

An RF input control is at the same end of the chassis as the telephone jacks, permitting control of the received audio level. One reversible nameplate is provided. It is secured to the chassis and identifies the operating voltage; the reverse side identifies the alternate operating voltage. The word "TOP" stencilled on the chassis cover refers to the positioning of the telephone jacks (refer to Telephone Usage) and does not designate the top of the Voice Adapter Unit.

The chassis may be serviced by releasing the shaft support plate and removing the cover which is secured to the frame by self-tapping screws.

Ventilating holes are provided in the cover to permit operation where high ambient temperatures exist.

The majority of components are located on the printed wiring board. The telephone jacks, the 8-pin octal plug and the printed board connector are fastened to the bottom of the frame assembly. Test points are also provided on the printed board to facilitate servicing the unit.

Electrical

The circuit consists of three grounded emitter transistor stages which include an RF amplifier, a power detector and an audio amplifier (see Figures 2 and 3). When receiving, the RF input signal passes from the coaxial cable connection at "D" on the KR Transmitter-Receiver, through a portion of the input filter FL-1, into the receiver section of the Voice Adapter. The signal is then fed through the level control R-1 to the RF amplifier Q-1. This stage is transformer coupled to the power detector circuit Q-2 which in turn drives the base of the audio output stage Q-3. This base drive is applied through capacitor C-6 and relay contacts K-1A. The signal is amplified by transistor Q-3 and then transformer coupled through T-2 to the telephone receiver line. This connection is made through relay contacts K-1B and K-1C. There is no AVC action in these receiver circuits, so it is necessary to adjust the input control R-1 for the best listening level.

The audio output stage Q-3 serves two functions. It is the output stage for the receiver section previously explained and it also serves as the modulator when transmitting. This is accomplished by relay K-1. Pressing the pushbutton on the test telephone energizes this relay and also closes the circuit which provides microphone current. The microphone output is applied to the base of amplifier Q-3 through capacitor C-7 and relay contacts K-1A (see Figures 2 and 3). When relay K-1 is energized, contact K-1A is switched to select the speech input signal at capacitor C-7 and opens the receiver circuits from capacitor C-6. Transistor Q-3 again serves as an amplifier and its output eventually reaches resistor R-50 and capacitor C-14 in the transmitter-receiver through relay contacts K-1B and K-1C. These same contacts disconnect the telephone receiver. Signal applied to the R-50 and C-14 combination will modulate the transmitter.

The carrier transmitter must be unblocked before it is possible to transmit the modulated carrier signal. This is accomplished by applying carrier start voltage to the transmitter through contacts K-1D in the Voice Adapter. Energizing relay K-1 in the adapter closes contacts K-1D which supply carrier start voltage to the transmitter-receiver bleeder circuit made up of resistors R-41, R-47 and R-48. This unblocks the emitter circuit of Q-10 in the transmitter which then permits transmission of carrier. The D-C voltage applied to this bleeder circuit by the adapter is less than 1/2 the voltage supplied when a relaying function occurs. Therefore, the unmodulated transmitter output when unblocked by the Voice Adapter is from 7.5 db to 14.5 db less than the output when unblocked for a relaying operation. This differential is necessary to provide proper blocking of speech when a relaying function occurs.

TABLE I

Voice Circuit Arrangements

Material	PORTABLE ADAPTER		FIXED ADAPTER	
	GROUP A	GROUP B	GROUP C	GROUP D
	KR on Swbd. Using Front KR Socket	KR on Swbd. Using Separate Socket	KR on Swbd. Adapter in Rear KR Socket	KR & Adapter In Swing-Rack Cabinet
KR Set	1/Term.	1/Term.	1/Term.	1/Term.
Voice Adapter	1/Sta.	1/Sta.	1/Term.	1/Term.
S#330C678H04 Telephone	1/Sta.	1/Sta.	1/Sta.	1/Sta.
S#585C700H01 Patch-Cord Assy. (10 Ft. Cable)	–	–	1/Term.	1/Term.
S#1276346 Swbd. Telephone Jack	–	–	1/Term.	1/Term.
S#757D650G03 Voice Adapter Mounting Assy. (6 Ft. Cable)	–	1/Term. (†)	–	–
S#757D650G04 Voice Adapter Mounting Assy. (15 In. Cable)	–	–	–	1/Term.
S#757D654G01 19 In. Rack Panel	–	–	–	1/Two Term.

† The lead between the adapter and KR Set should not exceed six feet.

As previously mentioned, voice communication is a secondary function and does not interfere with the primary function of relaying. To accomplish this, it is necessary to block the audio output stage Q-3 on the adapter whenever a relaying function occurs. The D-C voltage which unblocks the carrier transmitter at terminal 15 is also applied to pin 6 on plug P-1 in the adapter. The return of this circuit to B- in the adapter is through bleeder resistors R-20, R-24 and R-22. The junction of resistors R-24 and R-22 is connected through diode CR-1 to the base of transistor Q-3. When a relaying function occurs, the voltage developed across resistor R-22 is sufficiently high to make diode CR-1 conduct. This drives the base of stage Q-3 positive with respect to the emitter and therefore, blocks the circuit. This action greatly reduces the speech modulation of the carrier signal. Effectively, a voice conversation carried on over a relaying channel will be interrupted instantly when a relaying operation occurs.

On the other hand, as previously explained, the start voltage supplied by the adapter at pin 6, plug P-1, is less than half the start voltage supplied by the transmitter-receiver when a relaying operation occurs. Because of this difference in carrier start voltages, the Voice Adapter, when modulating, does not block stage Q-3. The voltage developed across resistor R-22 is not great enough to make diode CR-1 conduct.

When used with supervisory equipment, audio block is performed through supervisory preference contacts. The jumper normally connecting terminals 13 and 19 on the transmitter-receiver is removed and in its place is connected these contacts. These contacts open, removing the B+ supplied to the adapter unit when a supervisory function is initiated. Voice communication is interrupted when this occurs.

INSTALLATION

Voltage Rating

The adapter, as received, is wired for either 48 VDC or 125 VDC operation, as ordered. The supply voltage is clearly indicated on a rating nameplate. As indicated in the WARNING note, severe damage will result to the Voice Adapter if a 48 VDC unit is plugged into 125 VDC relaying equipment. The voltage rating of the adapter must correspond with the rating of the Transmitter-Receiver.

Telephone Usage

Telephone jacks are provided as an integral part of the adapter to accommodate a Westinghouse S#330C678H04 noise cancelling handset. This telephone is an auxiliary and is not an integral part of the unit. It employs a push-to-talk button which must be pushed when transmitting and released when receiving. The side of the telephone plug marked "TOP" must be inserted into the corresponding socket marked "TOP" on the chassis of the adapter. Since this telephone has a noise cancelling handset, it is necessary to speak directly into the microphone. Talking over, or under the mouthpiece will result in severe attenuation of the speech signal. Optimum results can be achieved only by speaking directly into the telephone. See Figure 5.

Connections for Relaying Channels

The adapter will perform satisfactorily with any of the relaying systems used to key the KR Transmitter-Receiver Unit. No internal wiring modifications are necessary in the adapter. However, the external wiring to the relaying transmitter-receiver for any particular system must be exactly as shown in the KR Transmitter-Receiver Unit Instruction Leaflet I.L. 41-941.

Signaling over a relaying channel is readily accomplished. Plugging in the test telephone short circuits the local alarm coil provided a connection has been made between terminal 16, on the KR carrier unit and the junction point of the RRH and alarm coils. The B+ return for the RRH coil is then returned through the Voice Adapter Unit directly to B+. This short circuits the alarm coil. Make certain the RRH and alarm coils are arranged as shown on the Schematic Diagrams or the connection will short the RRH coil instead of the alarm coil. Pushing the button on the telephone unblocks the local transmitter which will result in an alarm signal at the remote terminal. This alarm will continue to ring until the operator at the receiving terminal inserts his telephone or the transmitting telephone pushbutton is released. The two stations are then ready to carry on a conversation. Because of the reduced RF output of the transmitter when unblocked by the adapter, it may, in some cases of extreme channel attenuations, be necessary to use the carrier test button for ringing.

With the Voice Adapter plugged into the relaying equipment on a permanent basis, the external relaying scheme will not be altered. However, eliminate

the connection to terminal 16 of the carrier set. Instead the alarm should be disabled by connecting the cut-off contact of the telephone jack in series with the alarm contact.

Preference for Supervisory Channels

Supervisory preference may be obtained by removing the jumper which connects terminals 13 and 19 on the transmitter-receiver unit, and connecting in its place the supervisory preference contacts.

Adjustments

There are no adjustments to make on this unit other than the adjustment of the input control, R-1, to a comfortable listening level. No control is provided for modulation. Adjustment of the relaying transmitter-receiver is not required.

MAINTENANCE

General

Voltage and resistance values should be recorded in order to establish reference values which will be useful when checking the apparatus. In cases where a single adapter unit is used with more than one set of relaying equipment, the voltage readings will vary depending upon the characteristics of the relaying unit.

Typical resistance measurements are recorded in Table 2. These measurements are referenced to the pins of plug P-1. Do not plug the unit into the transmitter-receiver when making these measurements.

Typical voltage measurements are recorded in Tables 3 and 4. The Adapter Unit is plugged into a KR Set and a test telephone into the adapter. The cover of the adapter must be removed in order to make these measurements.

TABLE 2

RESISTANCE MEASUREMENTS IN OHMS

Measurement on Plug P-1	Typical Reading in Ohms		Limits
	125 VDC Unit	48 VDC Unit	
Conditions – Adapter Unit not plugged into Relaying Unit. Test telephone plugged into adapter. Push-to-start button pressed. Potentiometer R-1 in maximum CCW position.			
1 to 2	2500	2500	± 30%
3 to 2	2000	800	± 20%
4 to 2	Open	Open	
5 to 2	Open	Open	
6 to 2	500 K	500 K	± 20%
2 to 6	130 K	60 K	± 20% (†)
7 to 2	2000	800	± 20%
7 to 2	Open	Open	Phone Removed
8 to 2	Open	Open	

† – Minimum

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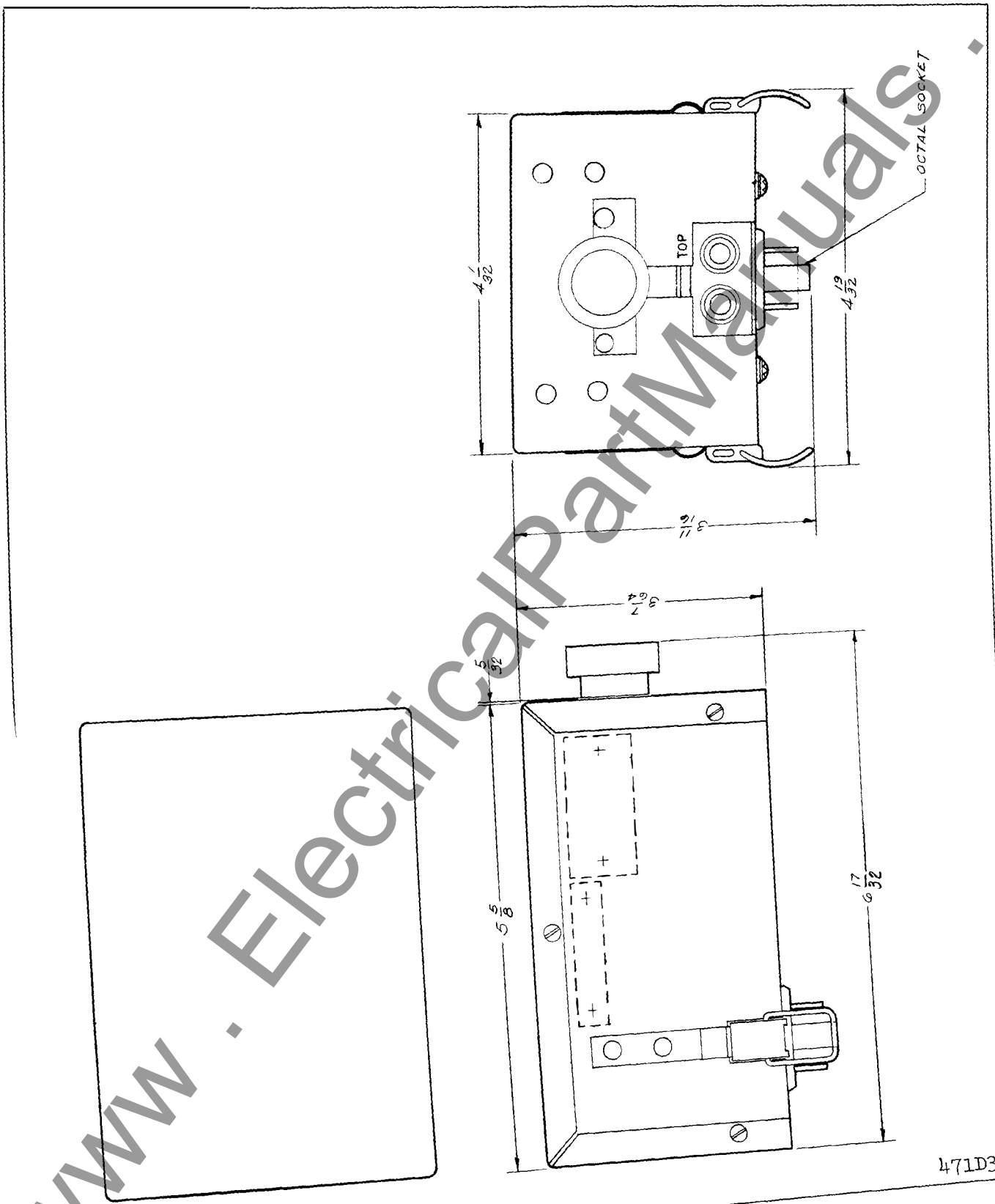

Fig. 1. Outline Drawing.

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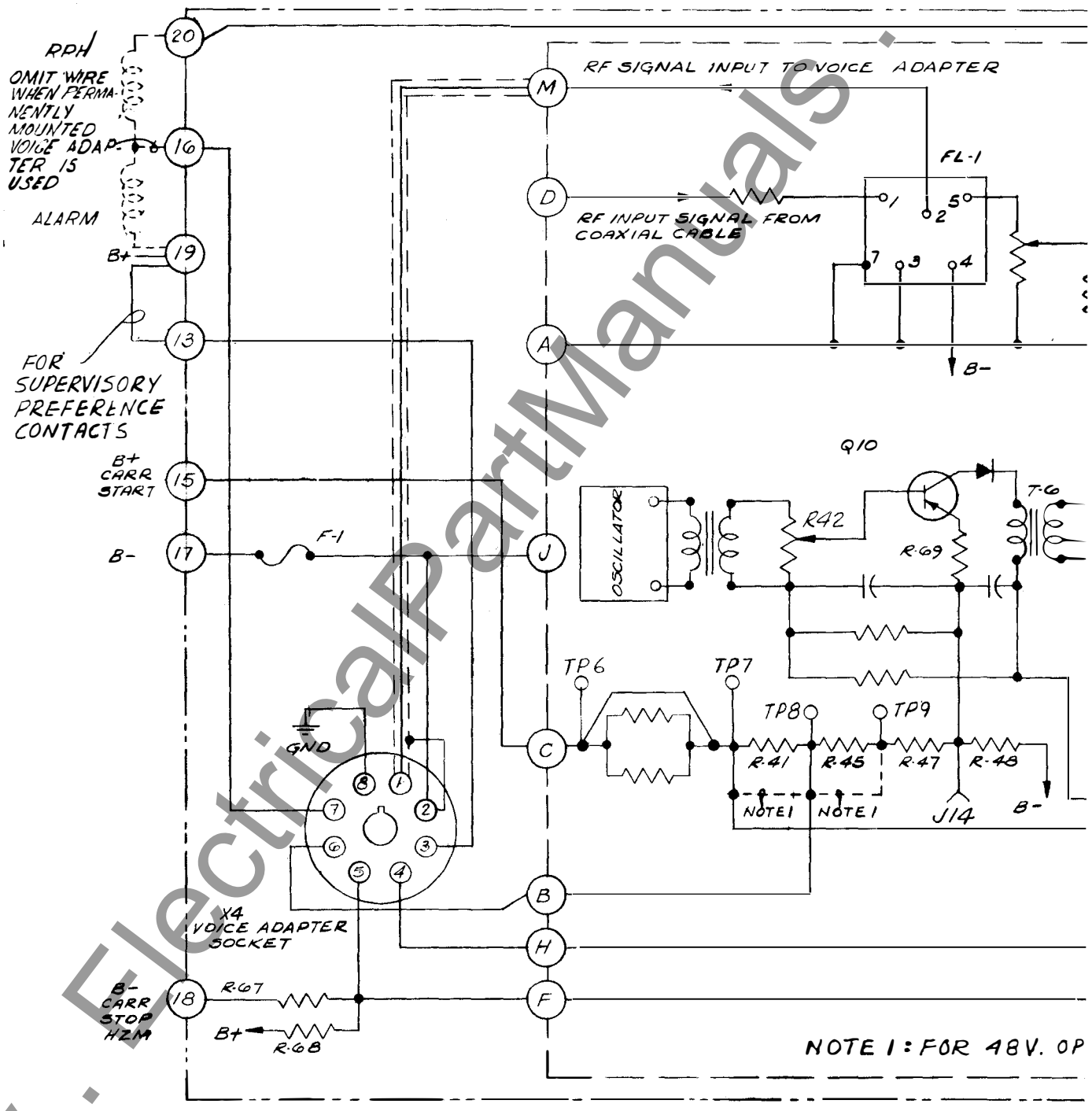
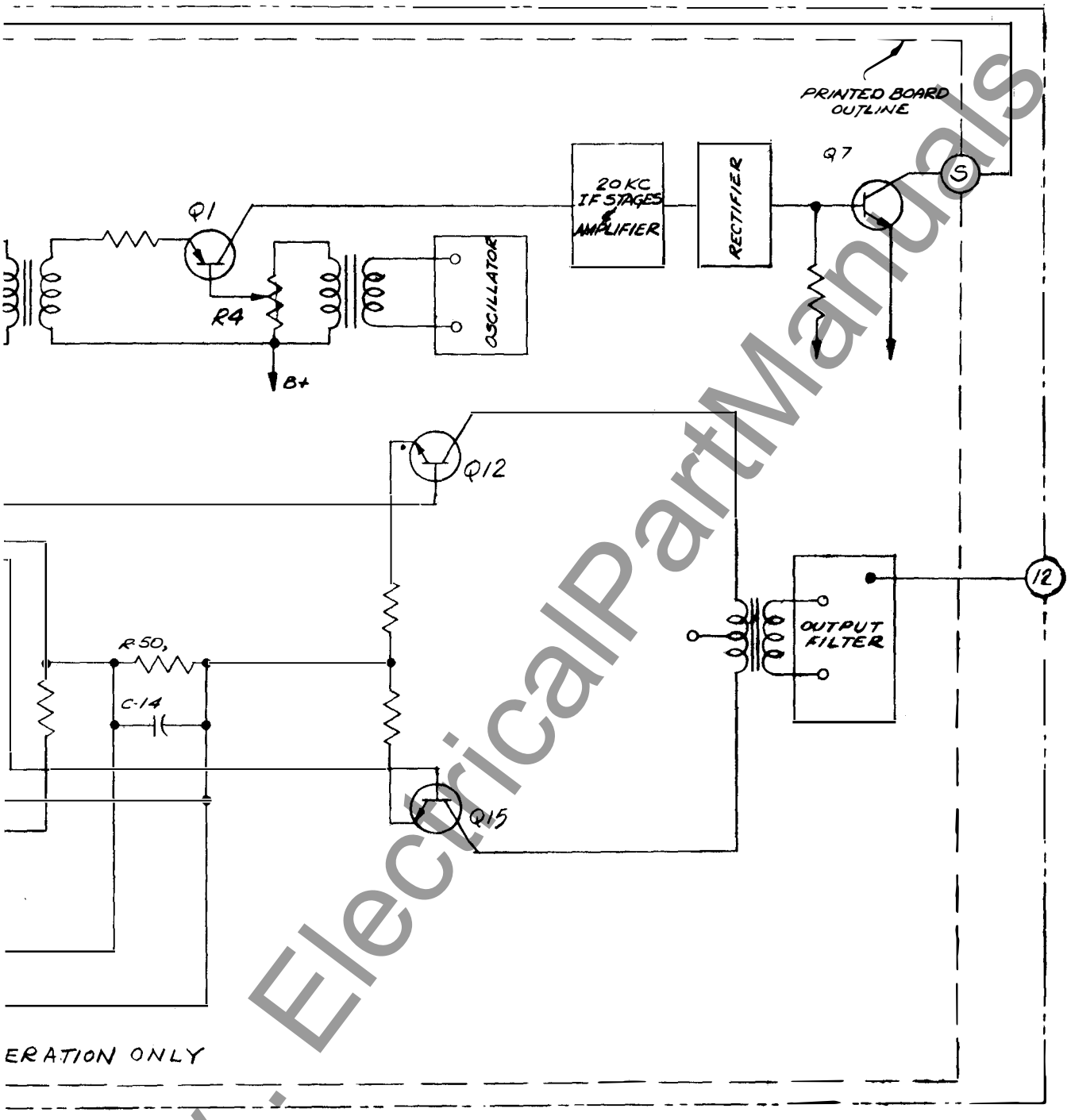


Fig. 2. (b.) Partial Schema



ic Diagram of KR Set.

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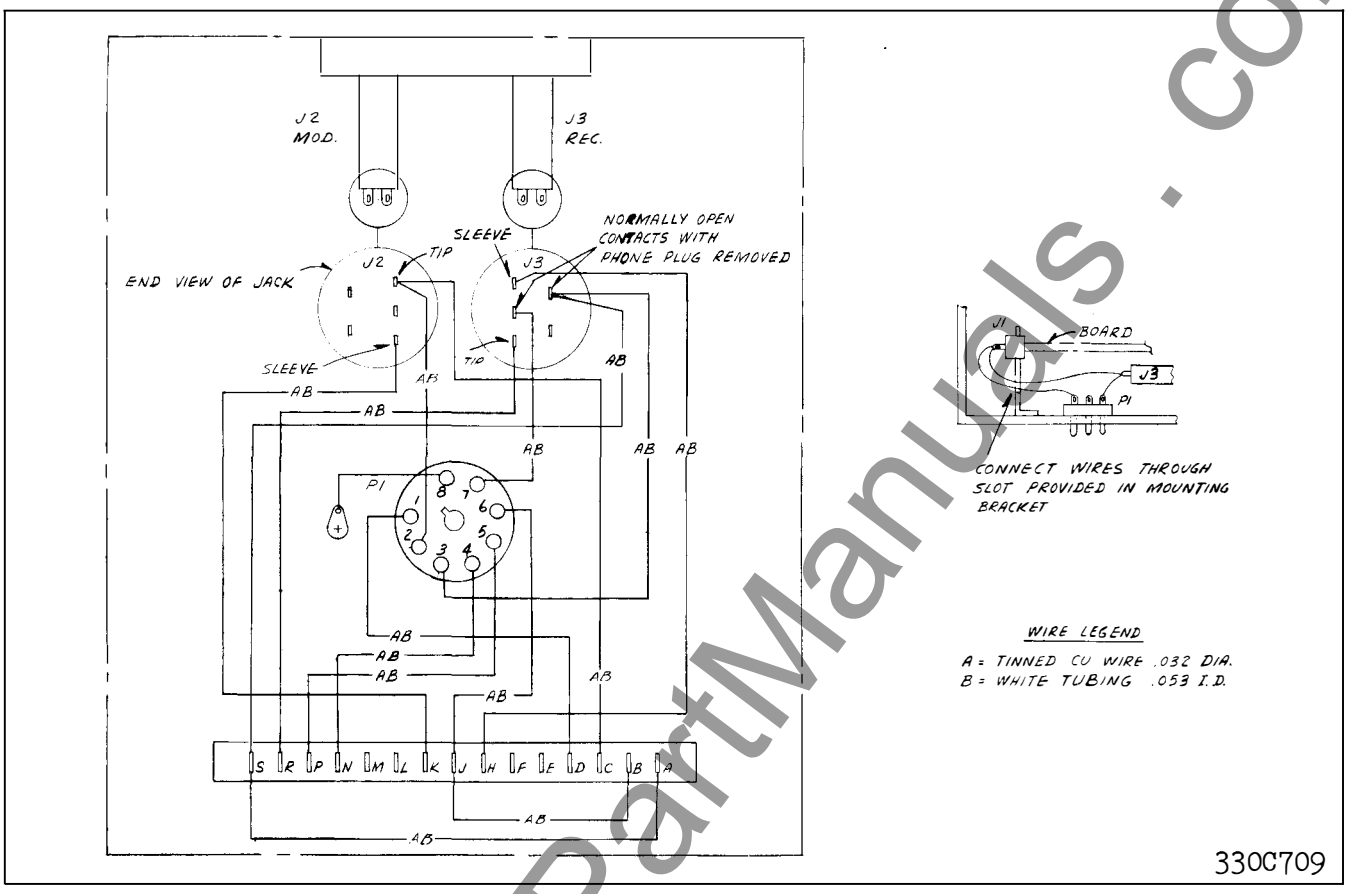
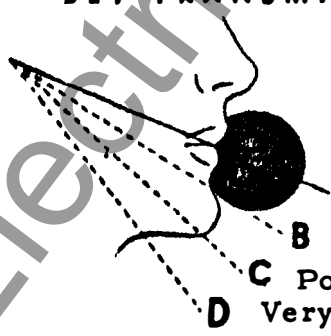


Fig. 4. Wiring Diagram of Major Components.

LET'S TALK PROPERLY OVER THE TELEPHONE

THE EFFECT OF SWINGING HAND SET TRANSMITTER AWAY FROM LIPS



		Relative Level
A	Correct Position	0 db
B	Fair, 1/4 as good as A.	-12 db
C	Poor, 1/20 as good as A.	-26 db
D	Very bad, 1/80 as good as A.	-38 db

The diagram shows the greatly reduced efficiency of the telephone when the lips are not in the correct position for talking.

It not only is very annoying to repeat what you are saying, but also serious trouble may result from misunderstandings.

345A989

Fig. 5. Proper Usage of Noise-Cancelling Telephone Handset.

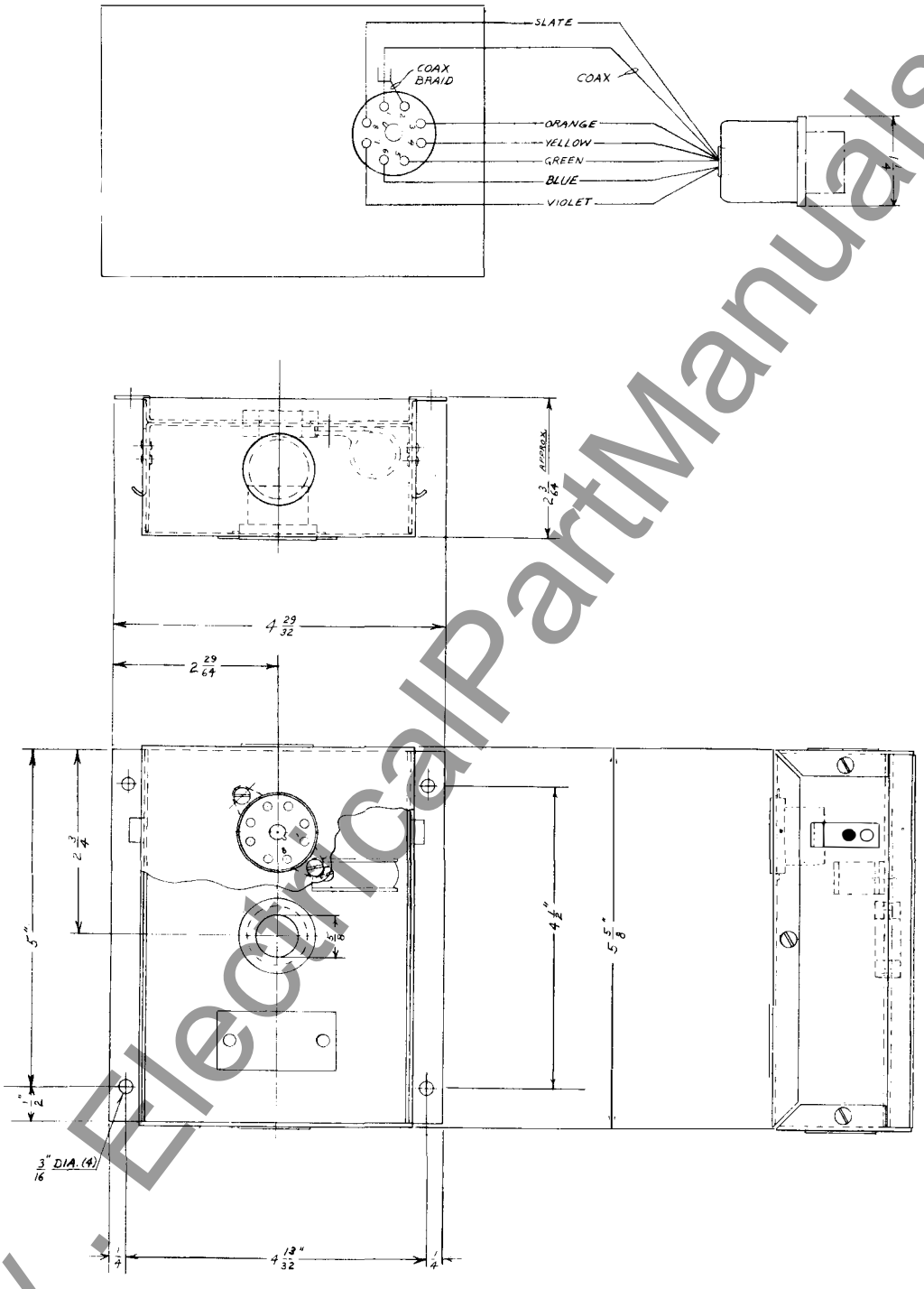


Fig. 6. Voice Adapter Mounting Assembly with 6 ft. Cable, S#757D650G03.

TABLE 3

D-C MEASUREMENTS

Adapter Plugged Into KR Set

Measurement	Typical Readings		Limits
	125 VDC Unit	48 VDC Unit	
Condition #1 — No received signals — Test telephone not plugged in.			
Supply Current	20 ma	24 ma	± 20%
TP-4 (B+) to TP-1 (B−)	129 VDC	51 VDC	* +10% −20%
Ter. J to B−	1.0 VDC	0.0 VDC	± 20%
Ter. 16 on relaying unit to B−	0.0 VDC	0.0 VDC	—
TP-2 to B−	17 VDC	17 VDC	± 20%
Condition #2 — Test telephone plugged in with test button pushed.			
Supply Current	70 ma	69 ma	± 20%
TP-4 (B+) to TP-1 (B−)	129 VDC	51 VDC	* +10% −20%
Ter. J to B−	50 VDC	21 VDC	± 10%
Ter. 16 on relaying unit to B−	129 VDC	51 VDC	± 10%
Relaying transmitter RF output on coaxial cable	3.5 VAC	2.0 VAC	1.5 VAC †

† — Minimum

TABLE 4

TRANSISTOR D-C MEASUREMENTS

Adapter Plugged Into KR Set

Measurements (with respect to B-)	Typical Readings		Limit
	125 VDC Unit	48 VDC Unit	
Condition #1 — Test telephone not plugged in.			
Transistor Q-1			
Emitter	15.1 VDC	15.5 VDC	± 20%
Base	15.1 VDC	15.3 VDC	± 20%
Collector	0.0 VDC	0.0 VDC	—
Transistor Q-2			
Emitter	16.9 VDC	17.1 VDC	± 20%
Base	16.9 VDC	17.1 VDC	± 20%
Collector	.24 VDC	0.25 VDC	± 20%
Transistor Q-3			
Emitter	16.9 VDC	17.1 VDC	± 20%
Base	16.9 VDC	17.1 VDC	± 20%
Collector	3.6 VDC	3.5 VDC	± 20%
Condition #2 — Test telephone inserted and push-to-start button pressed.			
Transistor Q-3			
Emitter	16.2 VDC	17.0 VDC	± 20%
Base	16.1 VDC	16.9 VDC	± 20%
Collector	3.2 VDC	3.5 VDC	± 20%
Condition #3 — 129 VDC HZM carrier start volts applied to Ter. 15 on relaying unit.			
Ter. J to B -	100 VDC	51 VDC	± 10%
Transistor Q-3 (Audio Block)			
Emitter	19 VDC	19.3 VDC	± 20%
Base	19 VDC	19.3 VDC	± 20%
Collector	0.7 VDC	0.0 VDC	± 20%

Removal of Printed Wiring Board

1. Loosen the screw securing the shaft support plate and allow the plate to swing clear.
2. Remove the 6 self-tapping screws holding the cover.
3. Lift cover off.
4. Remove the 2 screws securing the printed board to the jack block — do not misplace the insulating washers under the screw heads.

NOTE: DO NOT EXERT ANY PRESSURE ON POTENTIOMETER ASSEMBLY OR OTHER COMPONENTS MOUNTED ON THE BOARD.

5. Using a wide blade screwdriver as a wedge, insert between board and one side of plug mounting and gently twist screwdriver in a clockwise direction until board is clear of plug.
6. Lift board out of chassis.

Assembly of Printed Wiring Board

1. Position board so that it aligns with the slot in the plug.
2. Grip both sides of board with thumbs and gently, but firmly, exert pressure so board is engaged by the springloads in the plug. Secure the board with the two screws provided, making sure the insulating washers are in place under the screw heads.
3. Completely re-assembly by executing in reverse steps 1, 2 and 3 of removal procedure.

Test Equipment Required for Installation

No test equipment is required other than two test telephones, two adapter units and a working KR Relaying Channel. Control R-1 on the adapter is adjusted to a comfortable listening level.

Test Equipment Required for Rountine Measurements

The data outlined in Tables 3 and 4 are considered routine measurements.

1. Test telephone.
2. D-C voltmeter (20 K ohms/volt)
   Voltage Ranges: 0 to 3 V
   0 to 15 V
   0 to 50 V
   0 to 150 V

Desirable Test Equipment for Troubleshooting

1. Items listed previously.
2. Ohmmeter
3. Audio Signal Generator
   Frequency Range: 0.3 KC to 5 KC
   Output voltage into 600 ohms: 1.0 volt
4. A-C VTVM
   Ranges: 0 to 0.01 V
   0 to 0.1 V
   0 to 1.0 V
   0 to 10.0 V

   Frequency Range: 60 cycles/sec. to 230 KC

   Input Impedance: 7.5 megohms
5. Oscilloscope
6. Adapter Cable — Approximately 4 feet long equipped with an octal socket and octal plug.
7. Milliammeters — 0-100 ma
   0-5 ma

ELECTRICAL PARTS LIST

Circuit Symbol	Function	Description	Mfr. Code	Manufacturer's Designation
		CAPACITORS		
C-1	Coupling	0.25μf, ±20%, 200VDC, Paper	1	330C567H05
C-2	Bypass	0.1μf, ±20%, 200VDC	1	330C567H02
C-3	Bypass	Same as C-1		
C-4	Bypass	* 10μf, −10%, +100%, 50VDC	1	330C556H42
C-5	Bypass	Same as C-2		
C-6	Coupling	Same as C-4		
C-7	Coupling	.01μf, ±10%, 300VDC	1	330C661H36
C-8	Bypass	Same as C-4		
C-9	Bypass	Same as C-7		
* C-10	Blocking	Same as C-4		
C-11	Bypass	100μf, −10%, +100%, 25VDC	1	330C556H19
C-12	Bypass	50μf, −10%, +100%, 50VDC	1	330C556H21
C-13	Bypass	Same as C-4		
		DIODES		
CR-1	Crystal	IN63	1	584C433H02
CR-2	Crystal	Same as CR-1		
		JACKS		
J-1	Printed Wir. Board	Printed Board Recp.	1	330C589H01
J-2	Telephone	Jack Block Assembly	1	7421907G03
J-3	Telephone	Part of J-2 Assembly		
		RELAY		
K-1	Relay	48V, 1000-Ohm Coil, 4 Transfer Contacts	1	330C588H01

ELECTRICAL PARTS LIST

Circuit Symbol	Function	Description	Mfr. Code	Manufacturer's Designation
		PLUG		
P-1	Plug	Octal Plug	1	330C580H02
		TRANSISTORS		
Q-1	RF Amplifier	* 2N247 or 2N274	1	330C587H05
Q-2	Detector	Same as Q-1		
Q-3	AF Amplifier	* 2N43 or 2N525	1	330C587H02 or H07
		RESISTORS		
R-1	Input	2.5K, ±30%, 1/4 W, Pot.	1	330C598H01
R-2	Q-1 Base	1K, ±10%, 1/2 W	1	330C595H25
R-3	Q-1 Base	3.9K, ±5%, 1/2 W	1	330C664H63
R-4	Q-1 Base	560 Ohms, ±10%, 1/2 W	1	330C595H22
R-5	Q-1 Emitter	2.2K, ±10%, 1/2 W	1	330C595H29
R-6	Q-2 Base	39K, ±5%, 1/2 W	1	330C664H87
R-7	Q-2 Base	Same as R-2		
R-8	Q-2 Emitter	Same as R-5		
R-9	Q-2 Collector	270 ohms, ±5%, 1/2 W	1	330C664H35
R-10	Q-2 Collector	Same as R-2		
R-11	Q-3 Base	22K, ±10%, 1/2 W	1	330C595H41
R-12	Q-3 Base	820 Ohms, ±5%, 1/2 W	1	330C664H47
R-13	Q-3 Emitter	150 Ohms, ±10%, 1/2 W	1	330C595H15
R-14	Microphone Current Bleeder	1.5K, ±5%, 10 W	1	330C577H03
R-15	Voltage Divider	1K, ±10%, 2 W	1	330C597H25

ELECTRICAL PARTS LIST

Circuit Symbol	Function	Description	Mfr. Code	Manufacturer's Designation
		RESISTORS (Concluded)		
R-16	Voltage Divider	750 Ohms, ± 5%, 1 W	1	330C666H46
R-17	Voltage Divider	* 4K, ± 5%, 10W	1	330C577H02
R-18	Voltage Divider	20K, ± 5%, 1 W	1	330C666H80
R-19	Voltage Divider	Same as R-11		
R-20	Q-3 Base Blocking	68K, ± 10%, 1/2 W	1	330C595H47
R-21	Q-2 Base	470 Ohms, ± 10%, 1/2 W	1	330C595H21
R-22	Q-3 Base Blocking	56K, ± 5%, 1/2 W	1	330C664H91
R-23	Voltage Divider	Same as R-16		
R-24	Q-3 Base Blocking	15K, ± 10%, 1/2 W	1	330C595H39
R-25	Q-3 Base Blocking	560 Ohms, ± 10%, 1/2 W	1	330C595H22
		TRANSFORMERS		
T-1	RF Coupling	Impedance Ratio 25 K/300 Ohms	1	L592171
T-2	AF Output	25K/600 Ohms	1	330C590H01
		TEST POINTS		
TP-1	B-	Terminal Stud	1	330C592H01
TP-2	Transistor B+	Same as TP-1		
TP-3	Test Point R-16	Same as TP-1		
TP-4	Test Point B+	Same as TP-1		
TP-5	Test Point R-14	Same as TP-1		
TP-6	Test Point R-18	Same as TP-1		
TP-7	Test Point R-19	Same as TP-1		
TP-8	Test Point R-20	Same as TP-1		
TP-9	Test Point R-20	Same as TP-1		

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