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 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
202C206H01	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 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 203C206H02 - 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 205C162G01 - with noise cancelling handset

      Style 205C162G02 - 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-201 in the TC 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 aapacitor 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 term. 4 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 build up in T2 will colapse 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 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

carrier output power level of the KR set is 6 db below the normal relaying output level when the handset pushbutton is pressed. For the procedure of making this measurement please refer in the KR Carrier Set instructions I.L. 41-941.1, to the section titled adjustments.

Modulation level control R25 should be adjusted after the carrier level control has been set as follows:

With an oscilloscope connected across terminals 11 and 12 on the KR set, press handset pushbutton, speak directly into microphone and adjust oscilloscope to view modulation of carrier. The modulation level should not be adjusted at R25 so that over-modulation (cutting off of carrier) will only occur on loud peaks of voice power. Bright lines along the center (zero line) of the oscilloscope trace indicate over-modulation.

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 1. 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 DC voltage measurements are recorded in Table 2. The Adapter Unit is plugged into a KR set and telephone handset into the adapter. The cover of the adapter must be removed in order to make These measurements.

Removal of Printed Circuit Boards

1. Loosen the screw securing the shaft support plate and allow the plate to swing clear.
2. Remove the 4 self-tapping screws holding the cover.
3. Lift cover off.
4. To remove top board, remove the 4 screws that hold top board to mounting posts on lower board.
5. Similarly to remove lower board (with or without top board mounted), remove 4 screws holding lower board to mounting posts on the case.

Assembly of Printed-Circuit Boards

For complete reassembly, reverse the steps described in the removal procedure.

TABLE 1 (See Figure 6)

Voice Adapter Mounting Assemblies

Style	Cable Length	Cable Entrance Into Mounting Box
757D650G02	4 ft.	Back
757D650G03	6 ft.	Back
757D650G04	15 in.	Back
757D650G06	2 ft.	Back
757D650G08	4 ft.	Bottom
757D650G09	6 ft.	Bottom
757D650G10	15 in.	Bottom
757D650G011	2 ft.	Bottom

TABLE 2

Resistance Measurements *

Test Point	Resistance (ohms)	
	125 VDC unit	48 VDC unit
P1-1	2.5K	2.5K
P1-3	9K	5K
P1-4	Open	Open
P1-5	Open	Open
P1-6	Open	Open
P1-7	Open	Open
P1-8	Open	Open
TP-1	4.5K	4.5K
TP-2	4K	4K
TP-3	5K	5K
TP-4	9K	5K
TP-5	10.5K	5K
TP-6	19K	12K
TP-7	31K	12K

*These measurements are taken with respect to the DC negative terminal P1-2 or terminal number 6 on the circuit board. In all cases the negative lead of the ohmmeter was connected to this point. The voice adapter is removed from the KR Carrier Set and the telephone handset is not plugged in. All controls are set to maximum CW position.

TABLE 3

Typical D.C. Voltage Measurements *

These measurements were taken under the following conditions.

1) Receive: Handset plugged in but pushbutton not pressed.

2) Transmit: Handset plugged in with pushbutton pressed.

3) Unblock: Handset plugged in with pushbutton pressed and Transmitter operating at full power.

Note: All measurements are taken with respect to d.c. negative (circuit board terminal no. 6).

TEST POINT CKT. BD. TERM. NO.	D.C. VOLTAGE (VOLTS)					
	RECEIVE		TRANSMIT		UNBLOCK	
	125VDC	48VDC	125VDC	48VDC	125VDC	48VDC
1	0	0	0	0	0	0
2	.1	.05	.6	.5	1.0	.6
3	125	48	3.5	3.5	3.5	3.5
4 (R20 max. cw)	0	0	73	27.5	101	39.9
4 (R20 max. ccw)	0	0	37	19.8	99	39.5
5	0	0	0	0	0	0
7	.1	.05	.4	.4	.65	.5
8	125	48	125	48	125	48
TP-1	19.5	19.5	19.5	19.5	21	20.5
TP-2	20	20	20	20	20	20
TP-3	41	48	41	48	41	48
TP-4	125	48	125	48	125	48
TP-5	125	48	60	48	60	48
TP-6 (R20 max. cw)	125	48	73	27.5	101	39.9
TP-6 (R20 max. ccw)	125	48	37	19.8	99	39.5
TP-7	125	48	125	See TP6	125	See TP6
Q1-Emitter	17.5	17.5				
Q1-Base	17.0	17.0				
Q1-Collector	.004	.004				
Q2-Emitter	19.7	19.7				
Q2-Base	19.1	19.1				
Q2-Collector	.25	.25				
Q3-Emitter	20	20	20	20	20	20
Q3-Base	19.5	19.5	19.5	19.5	21	20.5
Q3-Collector	4.7	4.7	4.7	4.7	0	0

*Please note: These voltage measurements are typical and may vary for each unit.

ELECTRICAL PARTS LIST

SYMBOL	DESCRIPTION	STYLE
C1	.25 mf ±20% 200V.D.C. Paper	187A624H02
C2	.1 mf ±20% 200V.D.C. Paper	187A624H01
C3	.25 mf ±20% 200V.D.C. Paper	187A624H02
C4	12 mf ±10% 35V.D.C. Tantalum	862A530H05
C5	.1 mf ±20% 200V.D.C. Paper	187A624H01
C6	12 mf ±10% 35V.D.C. Tantalum	862A530H05
C7	.01 mf ±10% 200V.D.C. Paper	764A278H10
C9	.01 mf ±10% 200V.D.C. Paper	764A278H10
C10	22 mf ±10% 35V.D.C. Tantalum	184A661H16
C11	47 mf ±10% 50V.D.C. Tantalum	863A530H01
C12	22 mf ±10% 35V.D.C. Tantalum	184A661H16
C14	1.0 mf ±20% 200V.D.C. Paper	187A624H04
R1	2.5K ±30% ¼W Pot	330C598H01
R2	1K ±5% ½W	184A763H27
R3	3.9K ±4% ½W	184A763H41
R4	820 ohms ±5% ½W	184A763H25
R5	2.2K ±10% ½W	187A641H35
R6	39K ±5% ½W	184A763H65
R7	2.2K ±5% ½W	184A763H35
R8	2.2K ±10% ½W	187A641H35
R9	270 ohms ±5% ½W	184A763H13
R10	1K ±5% ½W	184A763H27
R11	22K ±10% ½W	187A641H59
R12	820 ohms ±2% ½W	629A531H30
R14	1.5K ±5% 10W	187A281H01
R15	620 ohms ±2% ½W	629A531H27
R16	1K ±5% 5W	763A129H07
R17	4K ±5% 5W	763A129H13
R18	10K ±5% 1W	187A643H51
R19	22K ±10% ½W	187A641H59
R20	25K ±20% ¼W Pot	629A430H09
R21	470 ohms ±10% ½W	187A641H19
R22	1K Thermistor	182A879H01
R23	2.4K ±5% ½W	184A763H36
R25	1K ±20% ¼W Pot.	629A430H11
R26	33 ohms ±10% ½W	187A640H13
Q1, Q2, Q3	2N4356	849A441H02
T1	10K/400 ohms	205C043G04
T2	25K/600 ohms C.T.	879A875H01
D1, D2, D3, D4	1N457A	184A855H07
Z1	1N4761A 75V ±5%	849A487H05
Z1	1N4746 18V ±10%	849A487H05
Z2	1N3027B 20V ±5%	188A302H07
Z3	1N965B 15V ±5%	186A797H08
K1	48V 1K Coil Relay	330C588H01
P1	Octal Plug	330C580H02
J1	Jack Block Assembly	861A790G04

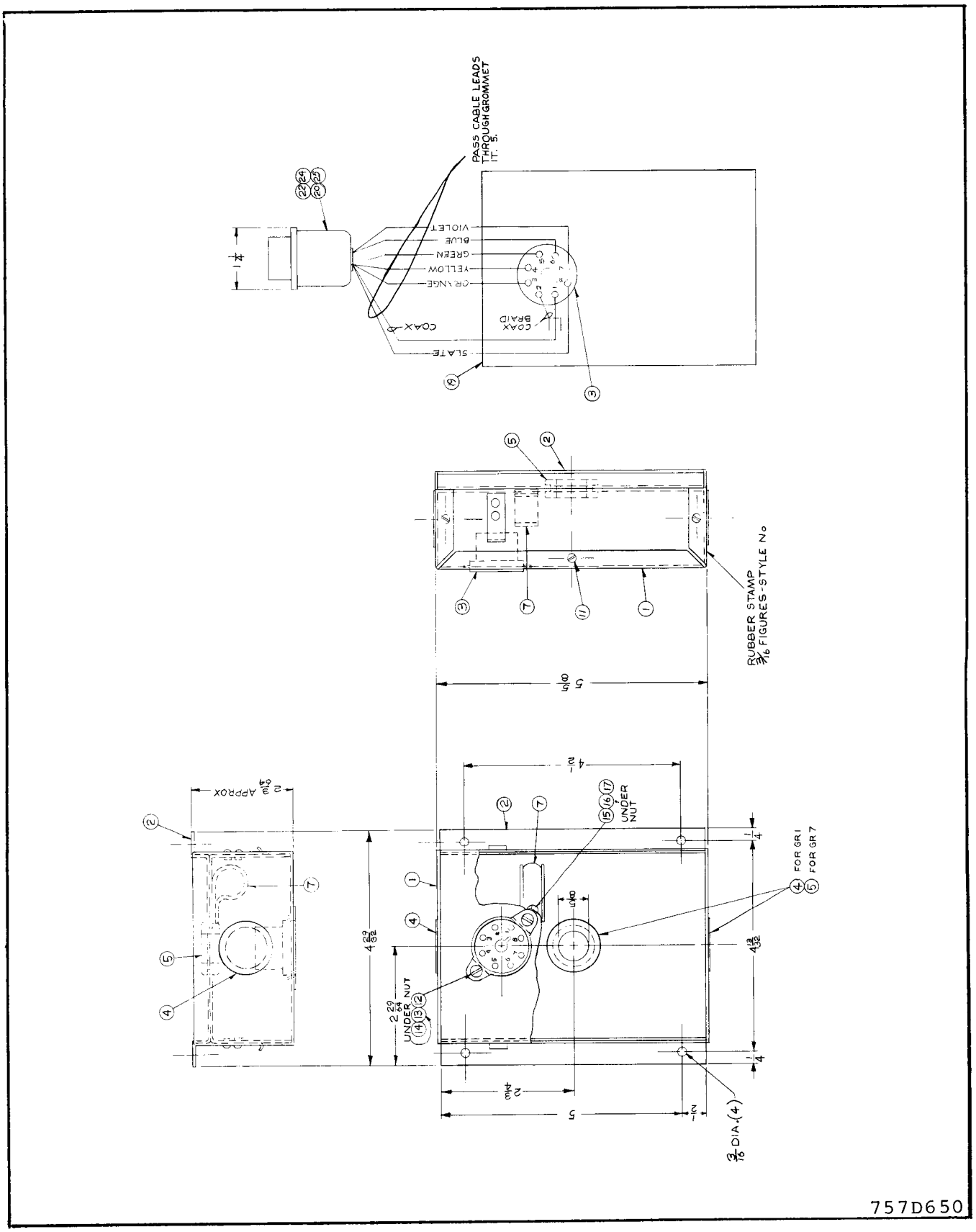

Fig. 1. Voice Adapter Mounting Assembly with 6 ft. Cable, S# 757D650G03. See Table 1

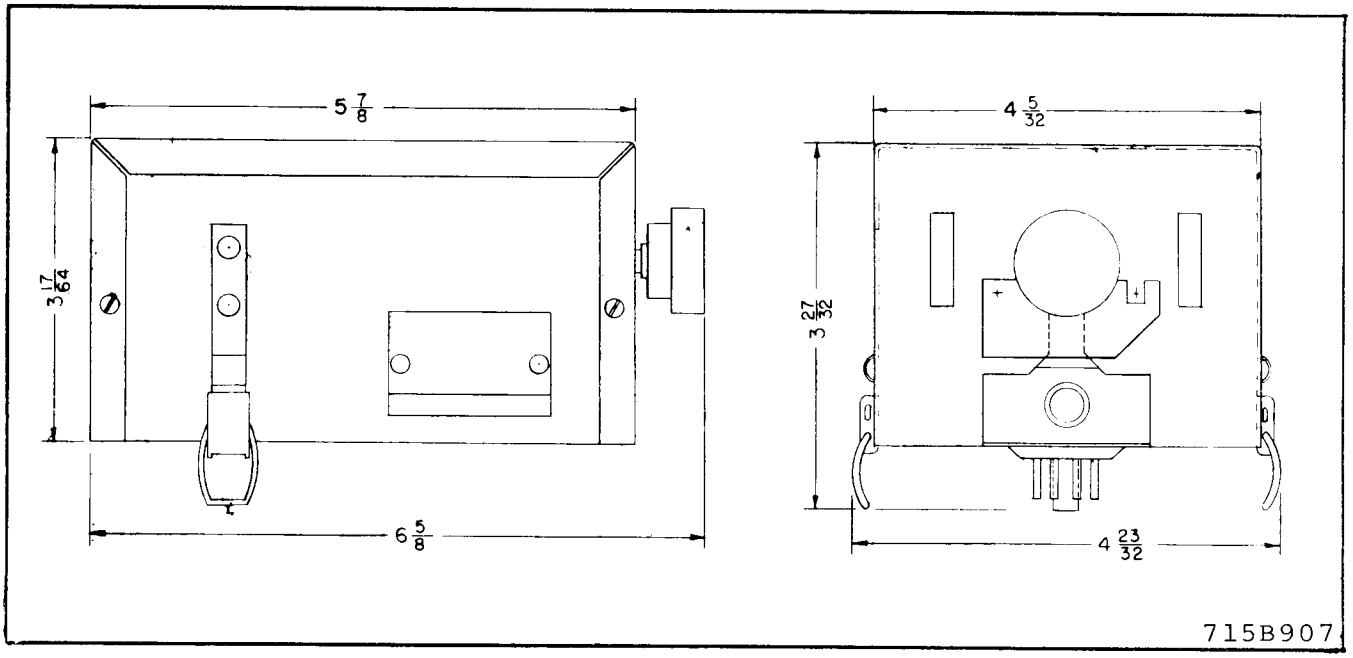

Fig. 2 Outline Dimension

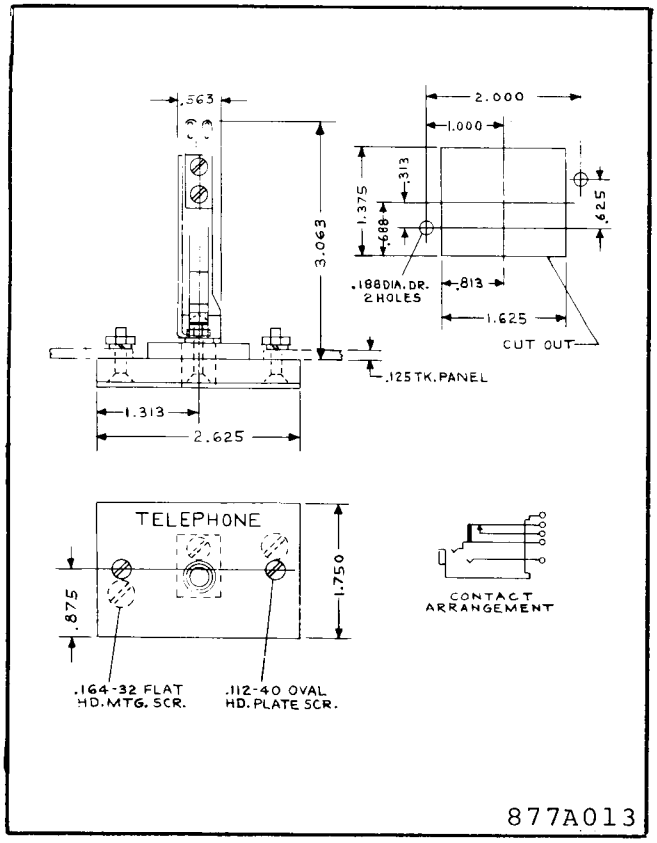

Fig. 3. Remote Telephone Jack Assembly

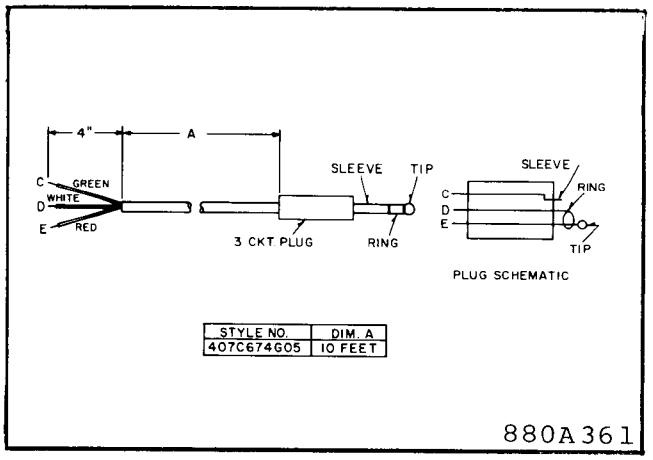

Fig. 4. Patch Cord Assembly

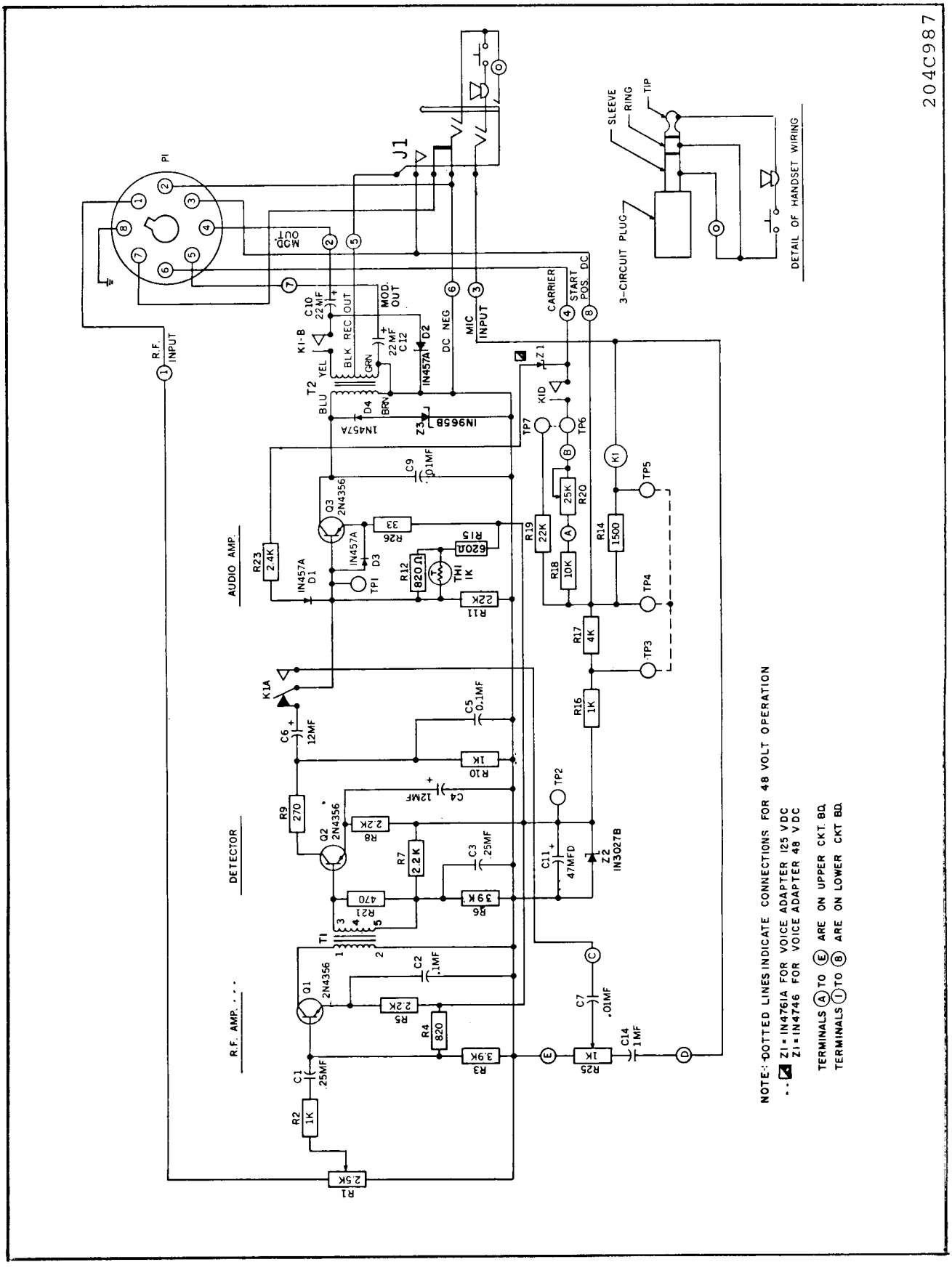

Fig. 5. Internal Schematic

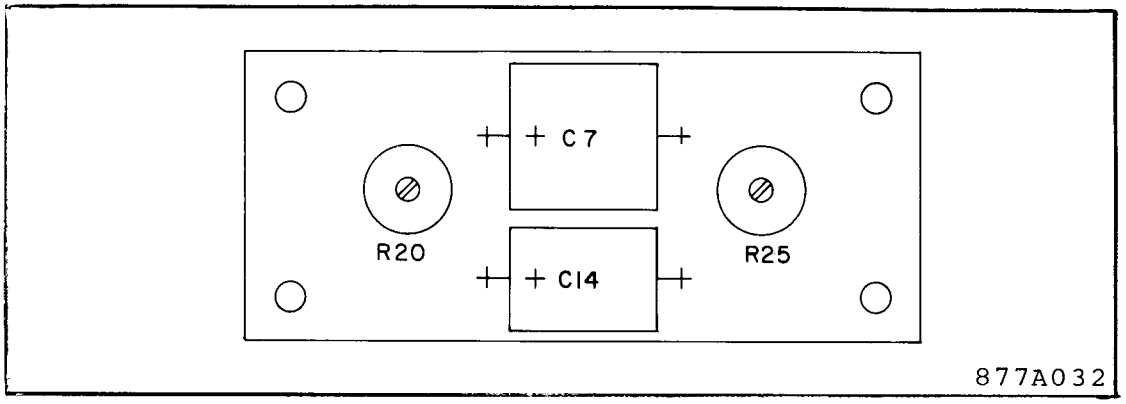

Fig. 6. Component Location (Upper Board)

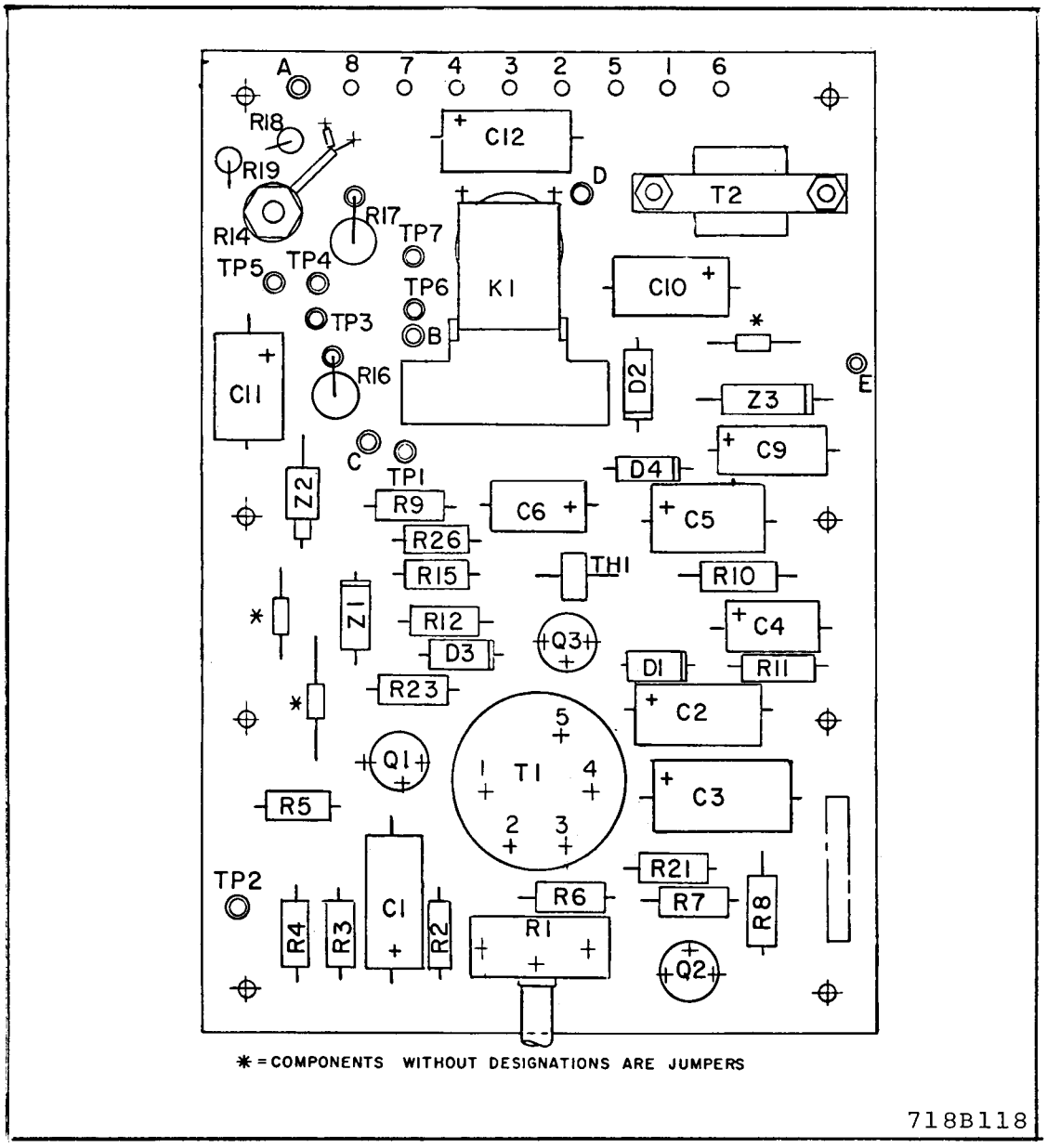

Fig. 7. Component Location (Lower Board)

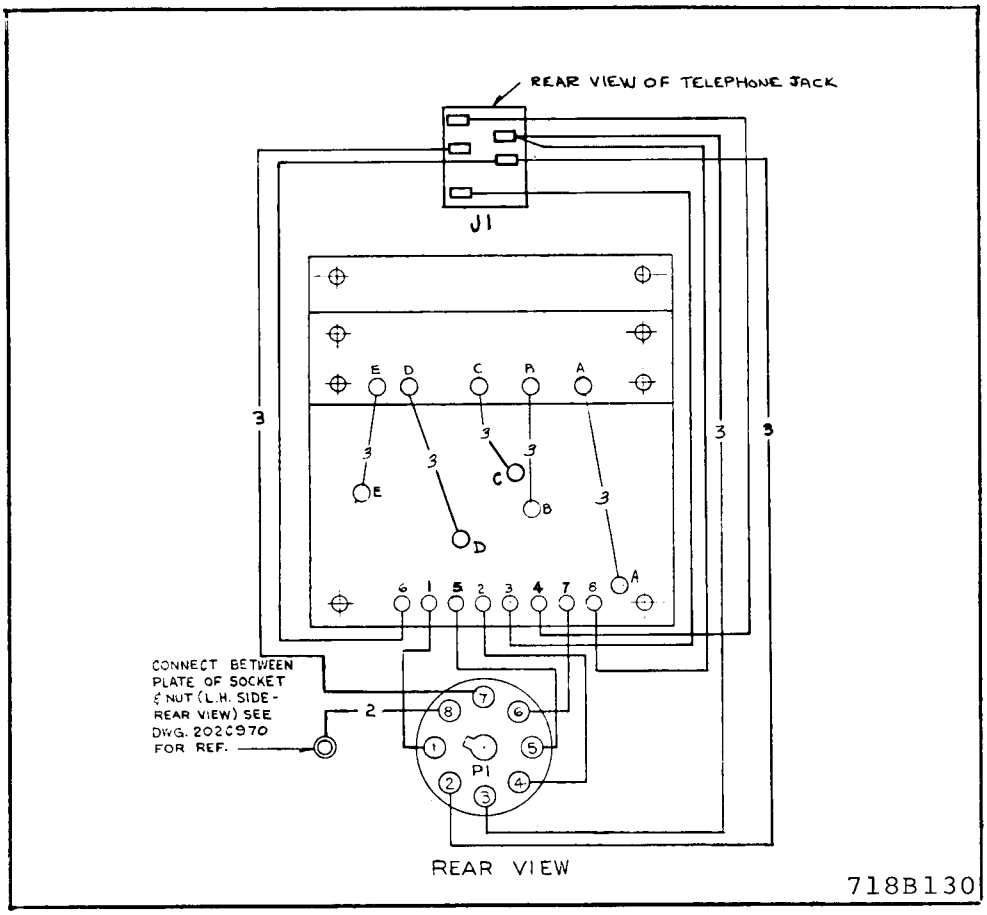

Fig. 8. Wiring Diagram

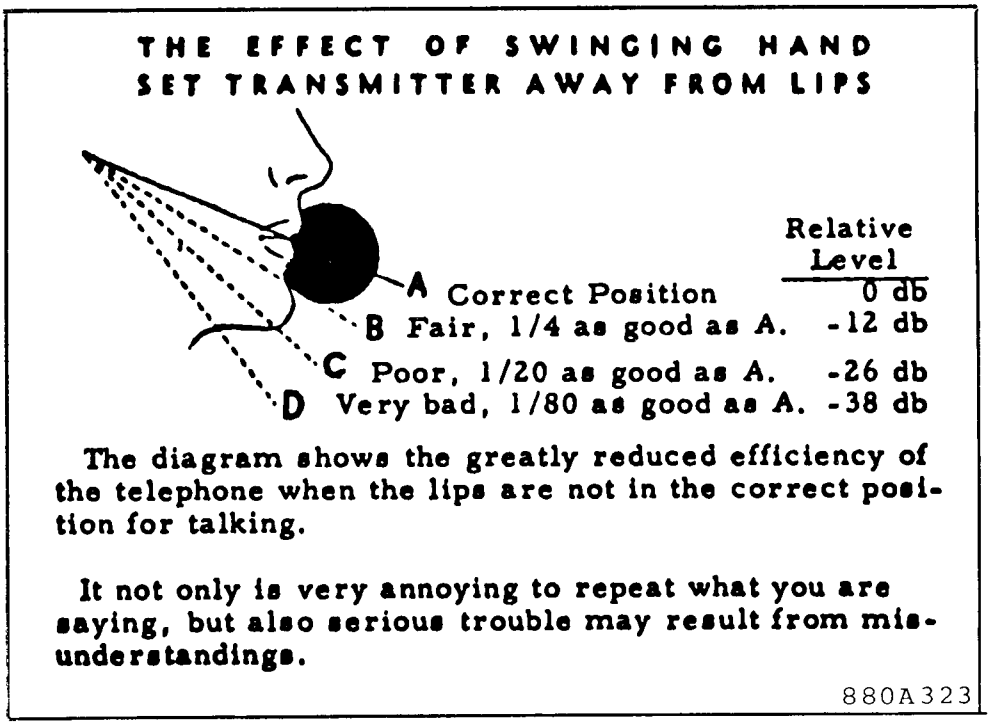

Fig. 9. Proper Usage of Noise Cancelling Telephone Handset

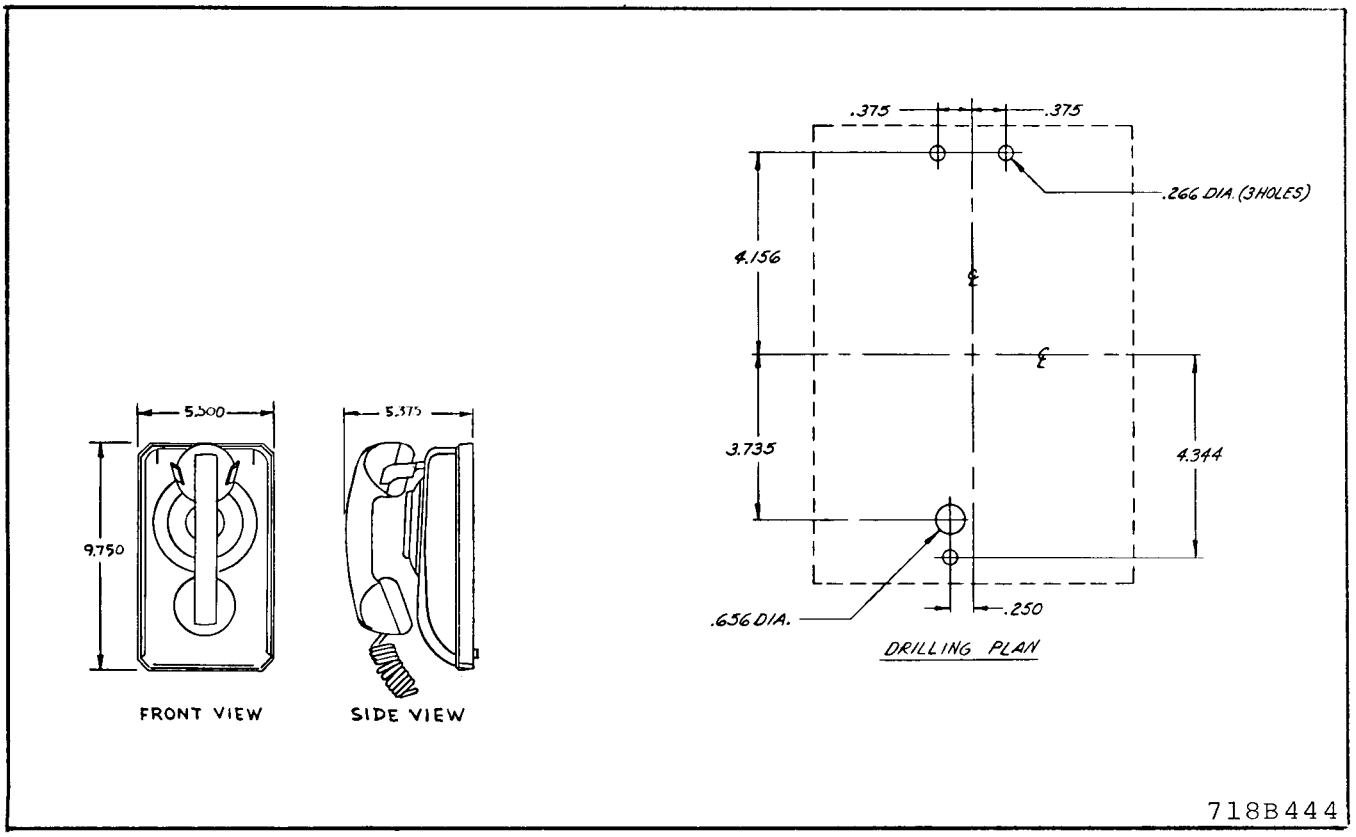

Fig. 10. Mounting Dimensions for wall mounted Hookswitch- Handset Assembly

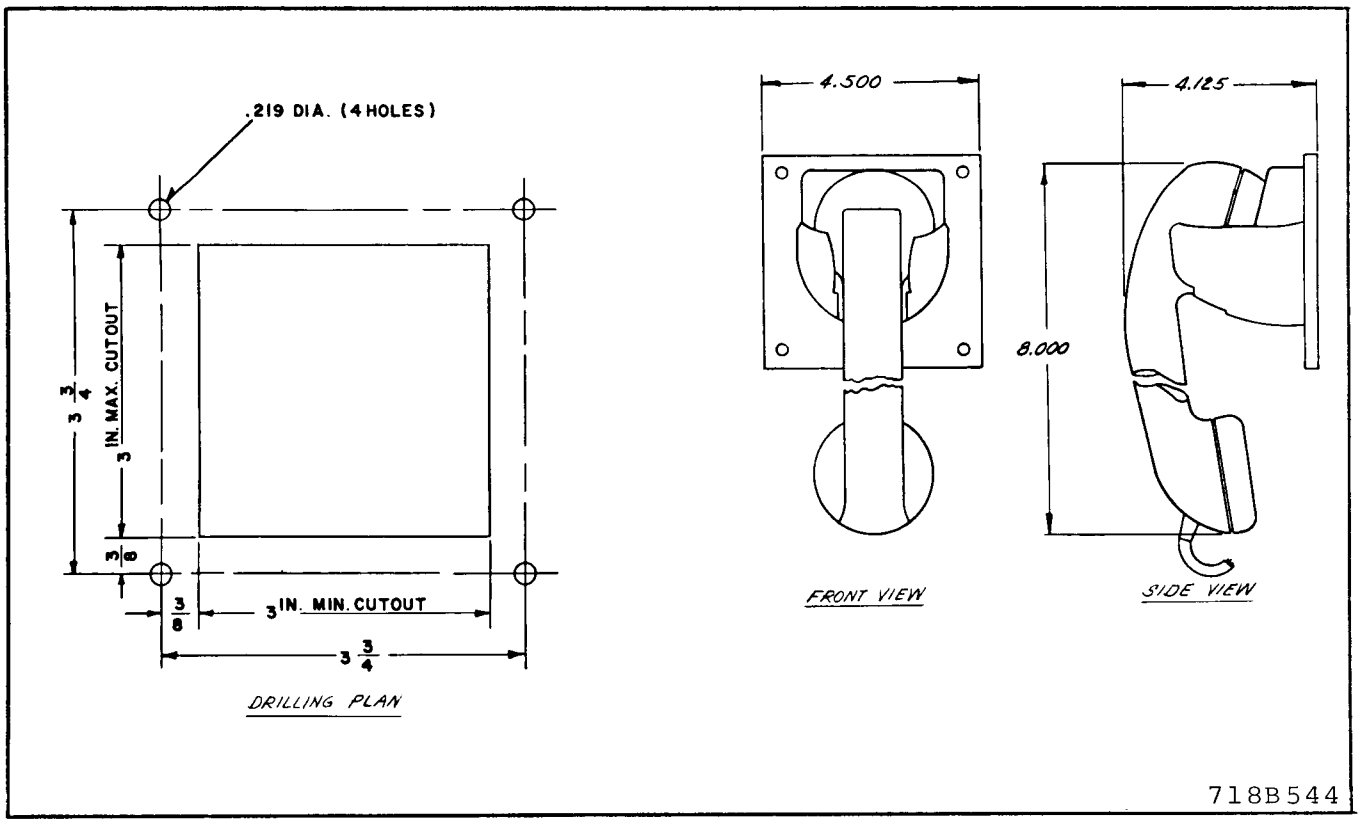

Fig. 11. Mounting Dimensions for Panel Mounted Hookswitch- Handset Assembly

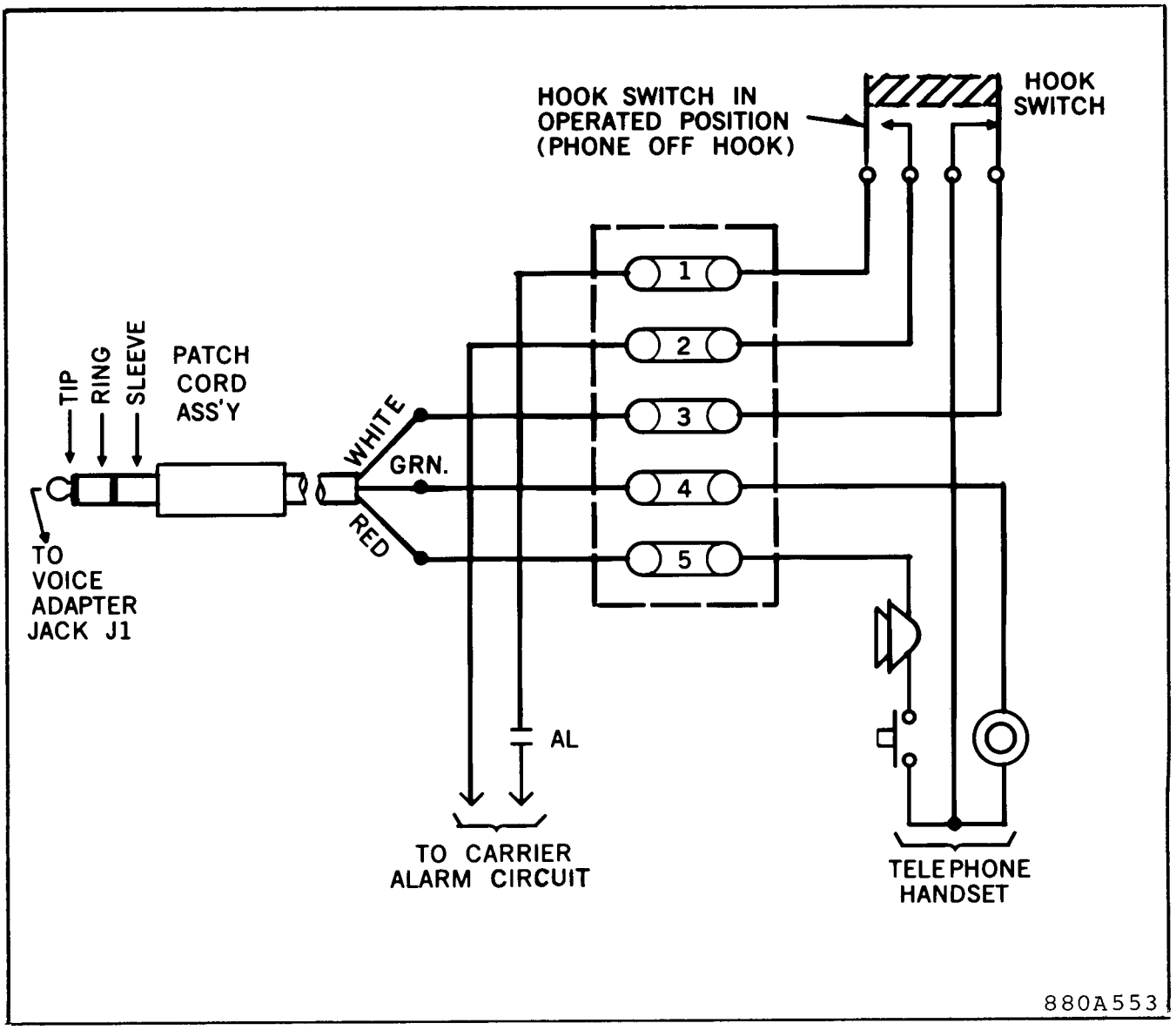

Fig. 12. Telephone Hookswitch - Handset Assembly Internal Schematic and Wiring Diagram.

WESTINGHOUSE ELECTRIC CORPORATION

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

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INSTRUCTIONS

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STYLE 202C970G04 – 48 V.D.C.

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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.

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NOTE: For a 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.

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

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

ACCESSORIES

1. Handsets

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   Style 203C206H02 - 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.

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   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.

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      Style 205C162G02 - with non/noise cancelling handset

   b. For panel mounting

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   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-201 in the TC 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 term. 4 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 build up in T2 will colapse 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 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

carrier output power level of the KR set is 6 db below the normal relaying output level when the handset pushbutton is pressed. For the procedure of making this measurement please refer in the KR Carrier Set instructions I.L. 41-941.1, to the section titled adjustments.

Modulation level control R25 should be adjusted after the carrier level control has been set as follows:

With an oscilloscope connected across terminals 11 and 12 on the KR set, press handset pushbutton, speak directly into microphone and adjust oscilloscope to view modulation of carrier. The modulation level should not be adjusted at R25 so that over-modulation (cutting off of carrier) will only occur on loud peaks of voice power. Bright lines along the center (zero line) of the oscilloscope trace indicate over-modulation.

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 1. 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 DC voltage measurements are recorded in Table 2. The Adapter Unit is plugged into a KR set and telephone handset into the adapter. The cover of the adapter must be removed in order to make These measurements.

Removal of Printed Circuit Boards

1. Loosen the screw securing the shaft support plate and allow the plate to swing clear.
2. Remove the 4 self-tapping screws holding the cover.
3. Lift cover off.
4. To remove top board, remove the 4 screws that hold top board to mounting posts on lower board.
5. Similarly to remove lower board (with or without top board mounted), remove 4 screws holding lower board to mounting posts on the case.

Assembly of Printed-Circuit Boards

For complete reassembly, reverse the steps described in the removal procedure.

TABLE 1 (See Figure 6)
Voice Adapter Mounting Assemblies

Style	Cable Length	Cable Entrance Into Mounting Box
757D650G02	4 ft.	Back
757D650G03	6 ft.	Back
757D650G04	15 in.	Back
757D650G06	2 ft.	Back
757D650G08	4 ft.	Bottom
757D650G09	6 ft.	Bottom
757D650G10	15 in.	Bottom
757D650G011	2 ft.	Bottom

TABLE 2
Resistance Measurements *

Test Point	Resistance (ohms)	
	125 VDC unit	48 VDC unit
P1-1	2.5K	2.5K
P1-3	9K	5K
P1-4	Open	Open
P1-5	Open	Open
P1-6	Open	Open
P1-7	Open	Open
P1-8	Open	Open
TP-1	4.5K	4.5K
TP-2	4K	4K
TP-3	5K	5K
TP-4	9K	5K
TP-5	10.5K	5K
TP-6	19K	12K
TP-7	31K	12K

*These measurements are taken with respect to the DC negative terminal P1-2 or terminal number 6 on the circuit board. In all cases the negative lead of the ohmmeter was connected to this point. The voice adapter is removed from the KR Carrier Set and the telephone handset is not plugged in. All controls are set to maximum CW position.

TABLE 3

Typical D.C. Voltage Measurements *

These measurements were taken under the following conditions.

1) Receive: Handset plugged in but pushbutton not pressed.

2) Transmit: Handset plugged in with pushbutton pressed.

3) Unblock: Handset plugged in with pushbutton pressed and Transmitter operating at full power.

Note: All measurements are taken with respect to d.c. negative (circuit board terminal no. 6).

TEST POINT CKT. BD. TERM. NO.	D.C. VOLTAGE (VOLTS)					
	RECEIVE		TRANSMIT		UNBLOCK	
	125VDC	48VDC	125VDC	48VDC	125VDC	48VDC
1	0	0	0	0	0	0
2	.1	.05	.6	.5	1.0	.6
3	125	48	3.5	3.5	3.5	3.5
4 (R20 max. cw)	0	0	73	27.5	101	39.9
4 (R20 max. ccw)	0	0	37	19.8	99	39.5
5	0	0	0	0	0	0
7	.1	.05	.4	.4	.65	.5
8	125	48	125	48	125	48
TP-1	19.5	19.5	19.5	19.5	21	20.5
TP-2	20	20	20	20	20	20
TP-3	41	48	41	48	41	48
TP-4	125	48	125	48	125	48
TP-5	125	48	60	48	60	48
TP-6 (R20 max. cw)	125	48	73	27.5	101	39.9
TP-6 (R20 max. ccw)	125	48	37	19.8	99	39.5
TP-7	125	48	125	See TP6	125	See TP6
Q1-Emitter	17.5	17.5				
Q1-Base	17.0	17.0				
Q1-Collector	.004	.004				
Q2-Emitter	19.7	19.7				
Q2-Base	19.1	19.1				
Q2-Collector	.25	.25				
Q3-Emitter	20	20	20	20	20	20
Q3-Base	19.5	19.5	19.5	19.5	21	20.5
Q3-Collector	4.7	4.7	4.7	4.7	0	0

*Please note: These voltage measurements are typical and may vary for each unit.

ELECTRICAL PARTS LIST

SYMBOL	DESCRIPTION	STYLE
C1	.25 mf ±20% 200V.D.C. Paper	187A624H02
C2	.1 mf ±20% 200V.D.C. Paper	187A624H01
C3	.25 mf ±20% 200V.D.C. Paper	187A624H02
C4	12 mf ±10% 35V.D.C. Tantalum	862A530H05
C5	.1 mf ±20% 200V.D.C. Paper	187A624H01
C6	12 mf ±10% 35V.D.C. Tantalum	862A530H05
C7	.01 mf ±10% 200V.D.C. Paper	764A278H10
C9	.01 mf ±10% 200V.D.C. Paper	764A278H10
C10	22 mf ±10% 35V.D.C. Tantalum	184A661H16
C11	47 mf ±10% 50V.D.C. Tantalum	863A530H01
C12	22 mf ±10% 35V.D.C. Tantalum	184A661H16
C14	1.0 mf ±20% 200V.D.C. Paper	187A624H04
R1	2.5K ±30% ¼W Pot	330C598H01
R2	1K ±5% ½W	184A763H27
R3	3.9K ±4% ½W	184A763H41
R4	820 ohms ±5% ½W	184A763H25
R5	2.2K ±10% ½W	187A641H35
R6	39K ±5% ½W	184A763H65
R7	2.2K ±5% ½W	184A763H35
R8	2.2K ±10% ½W	187A641H35
R9	270 ohms ±5% ½W	184A763H13
R10	1K ±5% ½W	184A763H27
R11	22K ±10% ½W	187A641H59
R12	820 ohms ±2% ½W	629A531H30
R14	1.5K ±5% 10W	187A281H01
R15	620 ohms ±2% ½W	629A531H27
R16	1K ±5% 5W	763A129H07
R17	4K ±5% 5W	763A129H13
R18	10K ±5% 1W	187A643H51
R19	22K ±10% ½W	187A641H59
R20	25K ±20% ¼W Pot	629A430H09
R21	470 ohms ±10% ½W	187A641H19
R22	1K Thermistor	182A879H01
R23	2.4K ±5% ½W	184A763H36
R25	1K ±20% ¼W Pot.	629A430H11
R26	33 ohms ±10% ½W	187A640H13
Q1, Q2, Q3	2N4356	849A441H02
T1	10K/400 ohms	205C043G04
T2	25K/600 ohms C.T.	879A875H01
D1, D2, D3, D4	1N457A	184A855H07
Z1	1N4761A 75V ±5%	849A487H05
Z1	1N4746 18V ±10%	849A487H05
Z2	1N3027B 20V ±5%	188A302H07
Z3	1N965B 15V ±5%	186A797H08
K1	48V 1K Coil Relay	330C588H01
P1	Octal Plug	330C580H02
J1	Jack Block Assembly	861A790G04

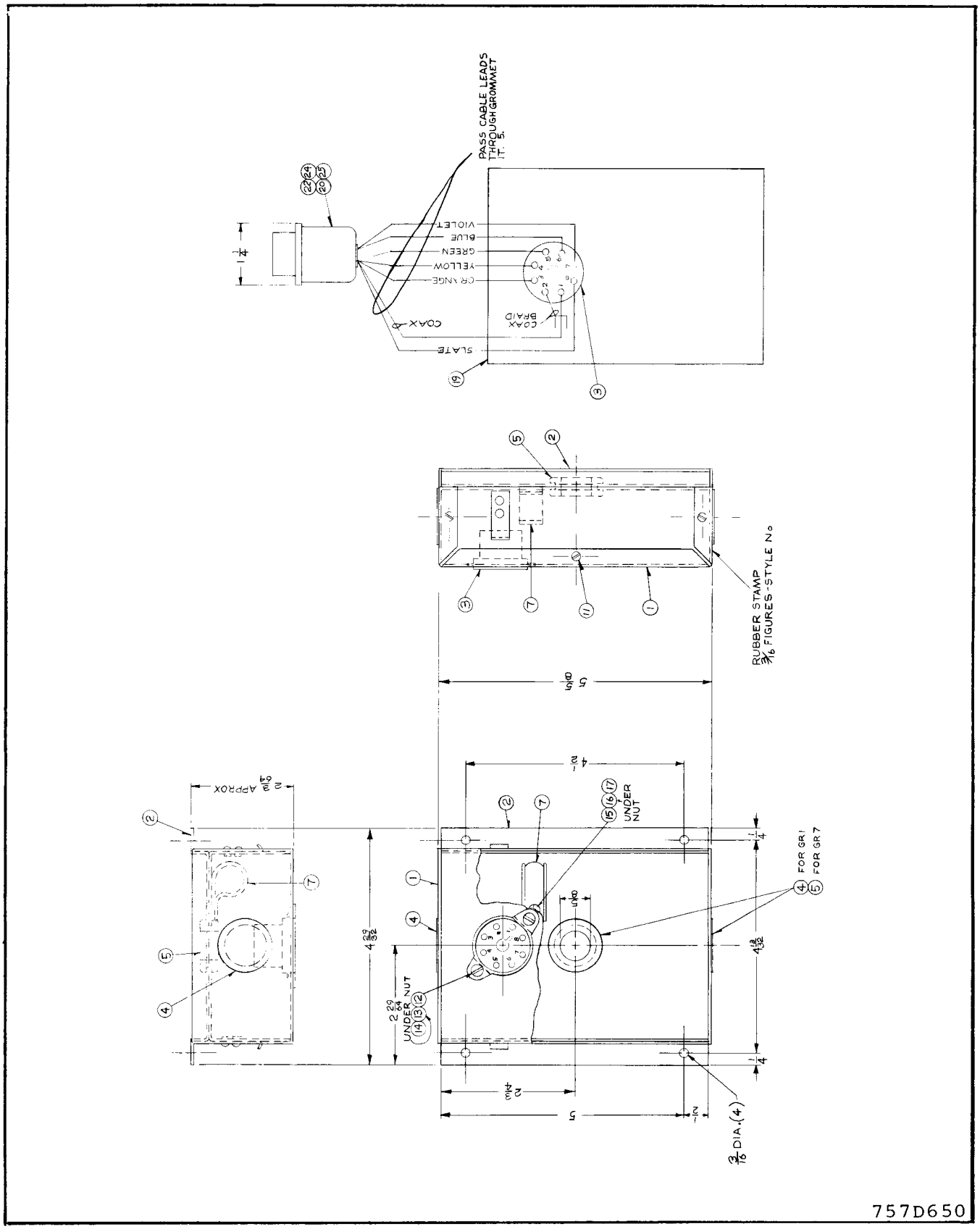


Fig. 1. Voice Adapter Mounting Assembly with 6 ft. Cable, S# 757D650G03. See Table 1

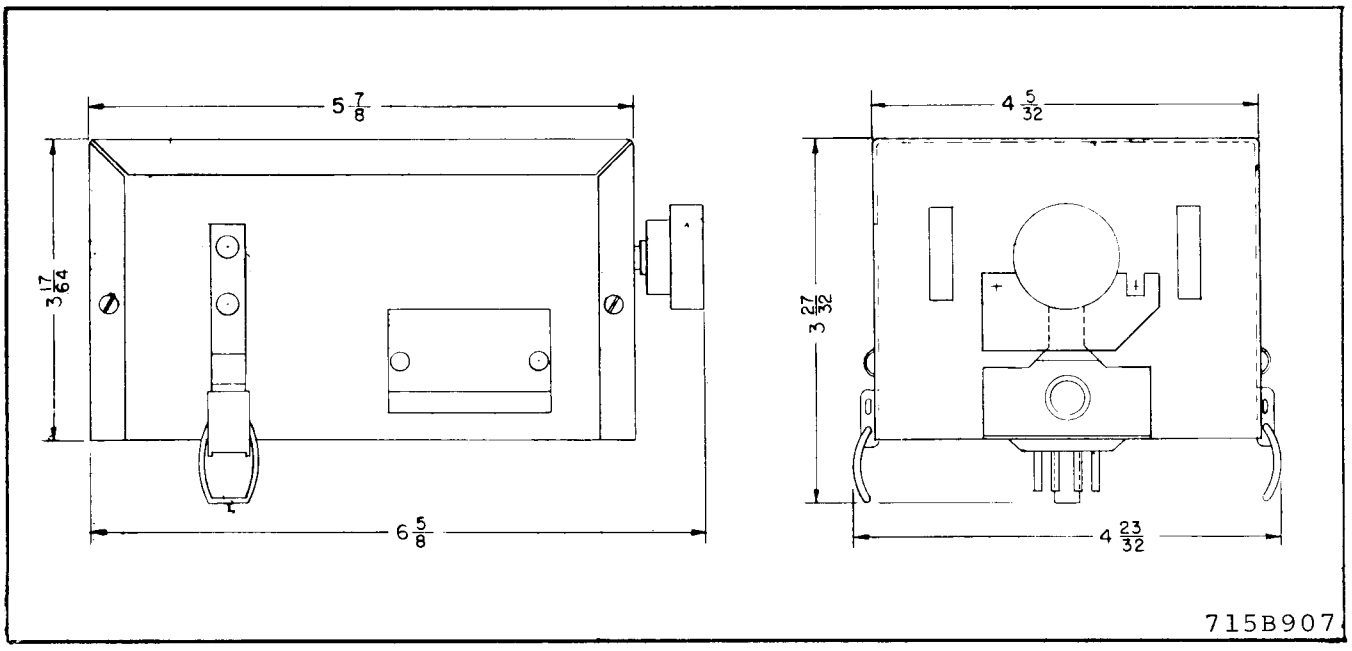


Fig. 2 Outline Dimension

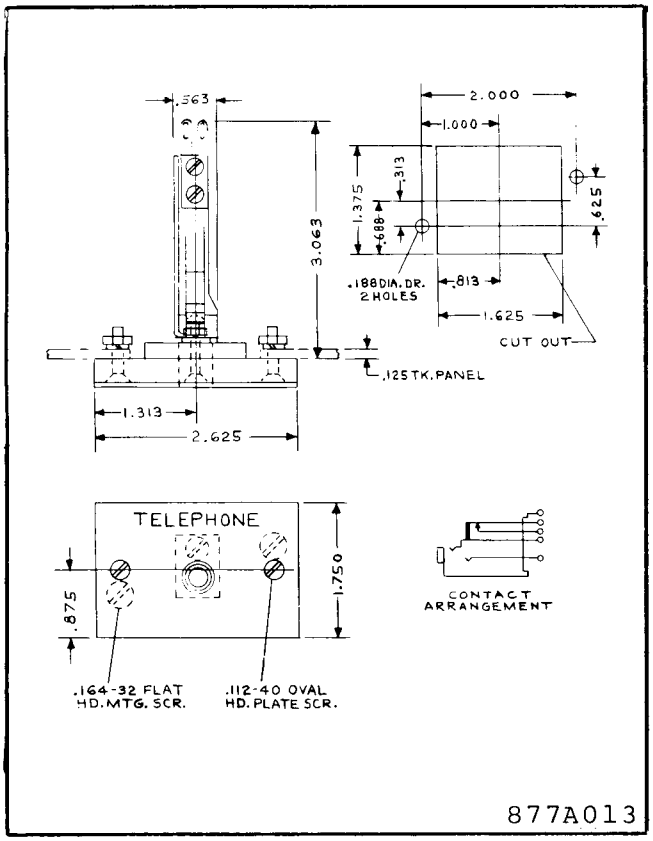


Fig. 3. Remote Telephone Jack Assembly

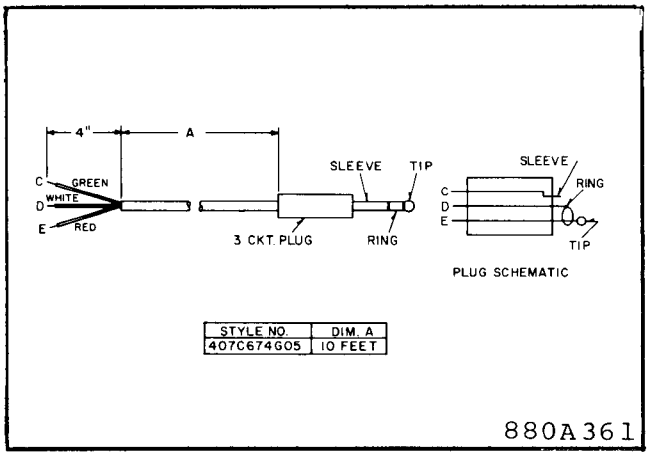


Fig. 4. Patch Cord Assembly

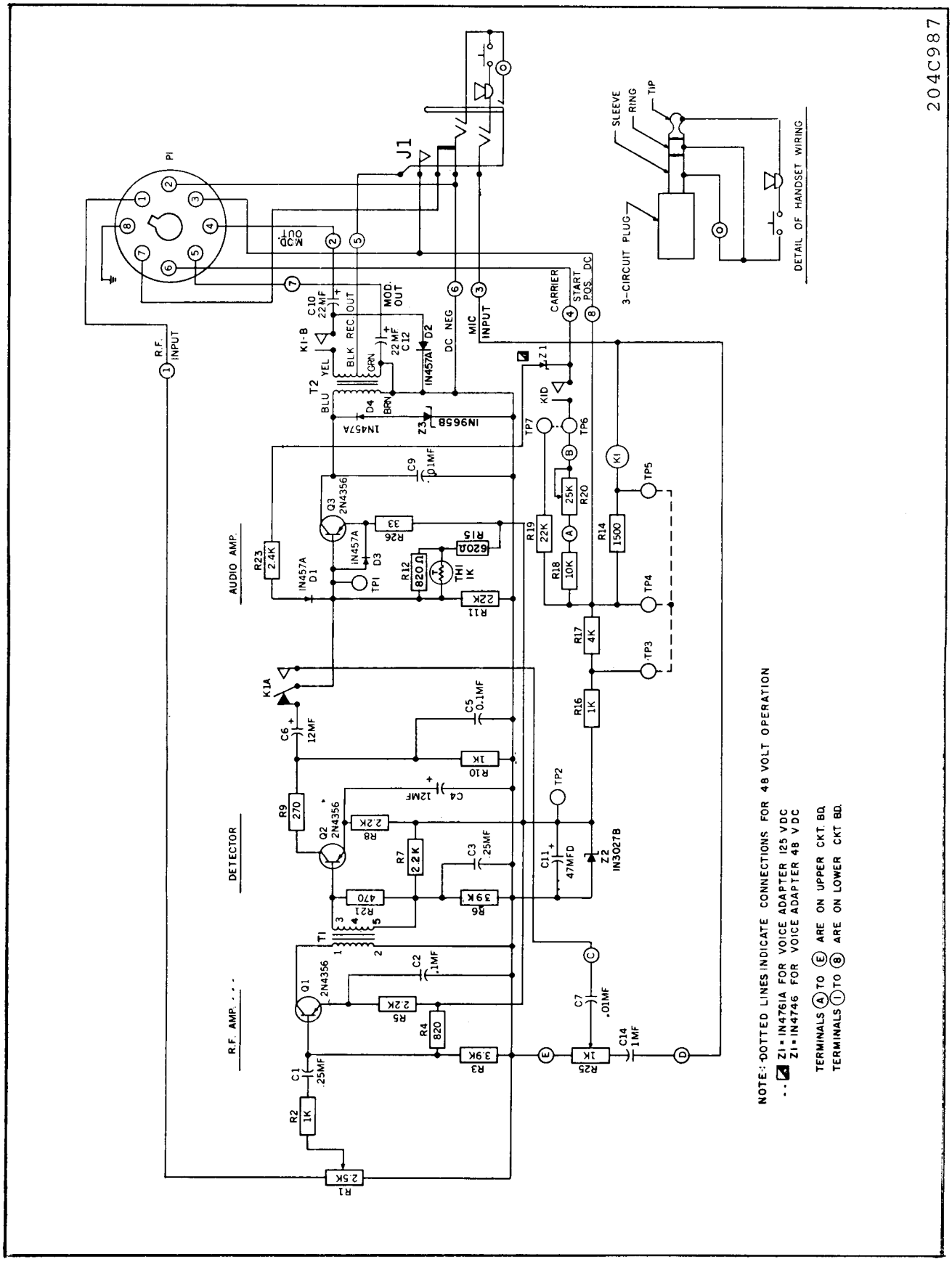


Fig. 5. Internal Schematic

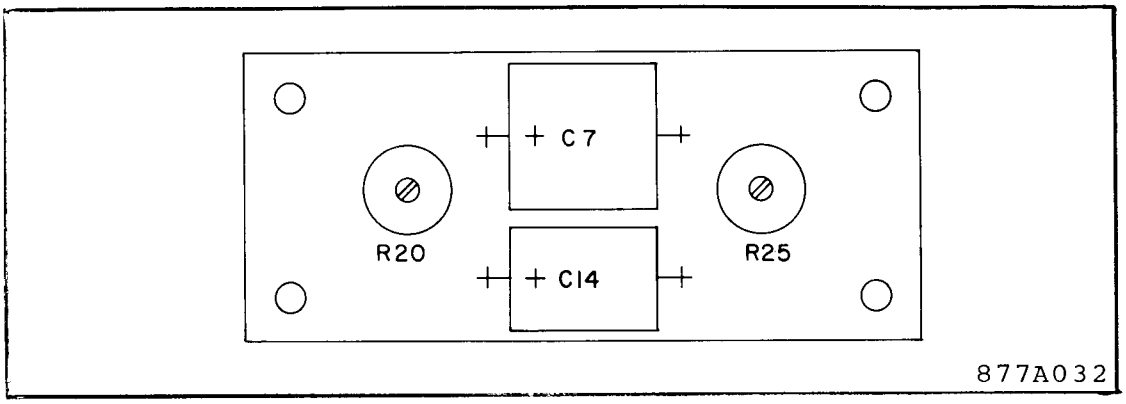


Fig. 6. Component Location (Upper Board)

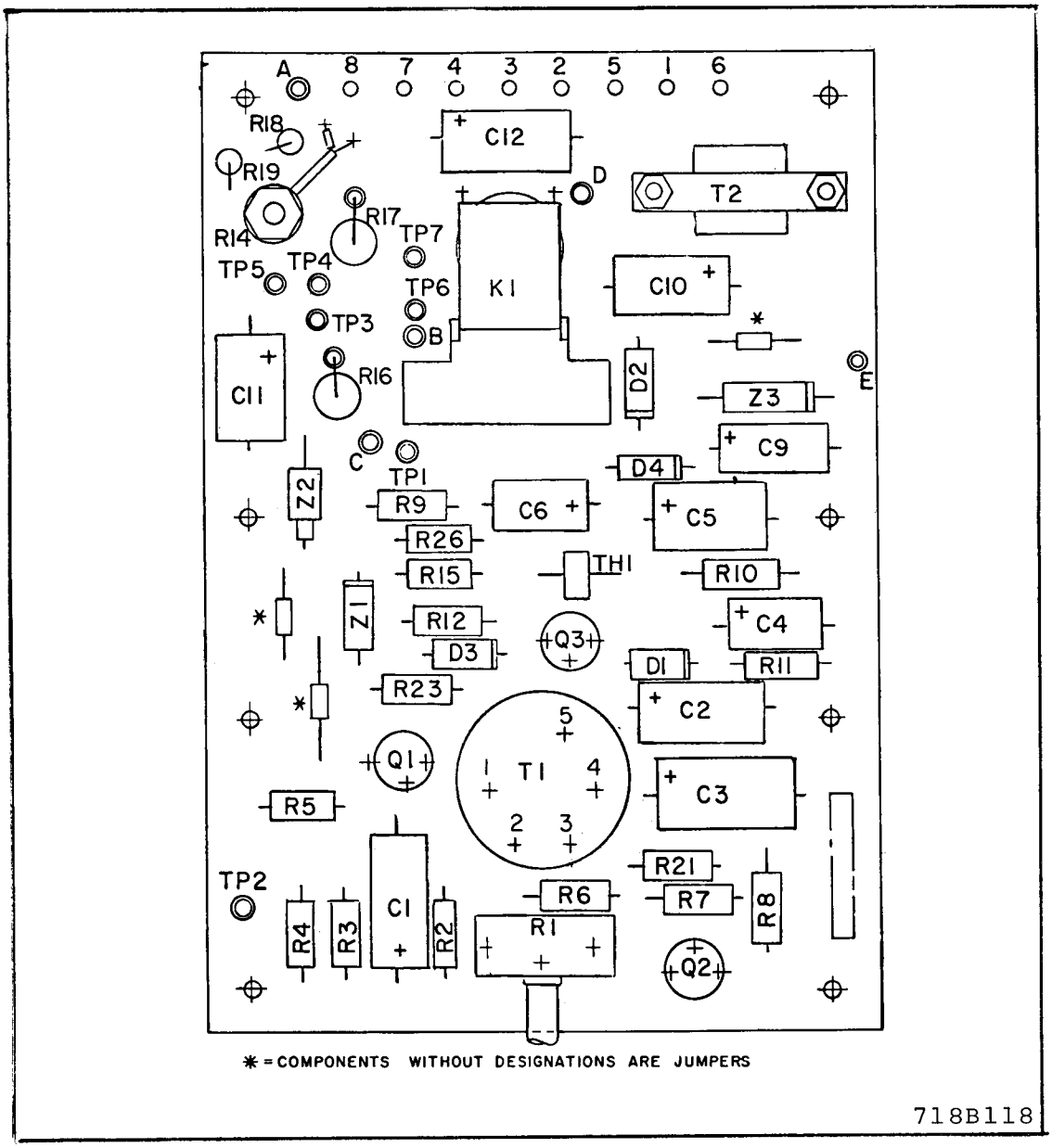


Fig. 7. Component Location (Lower Board)

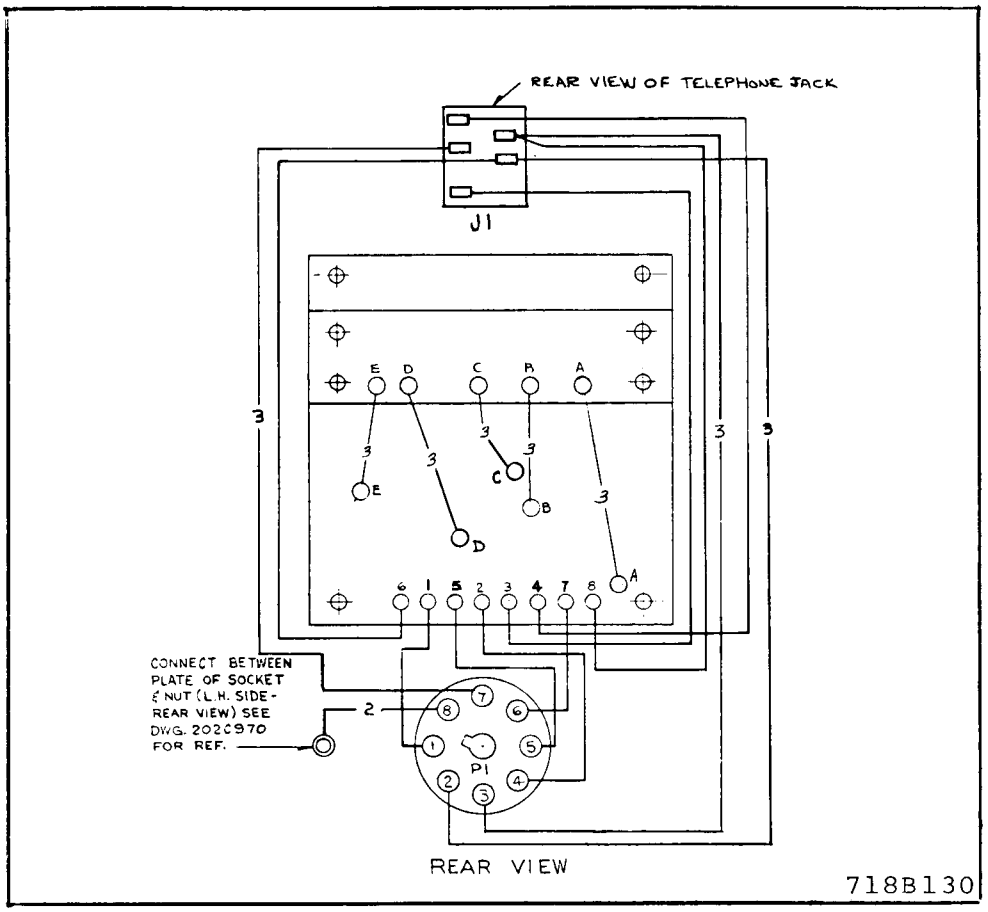


Fig. 8. Wiring Diagram

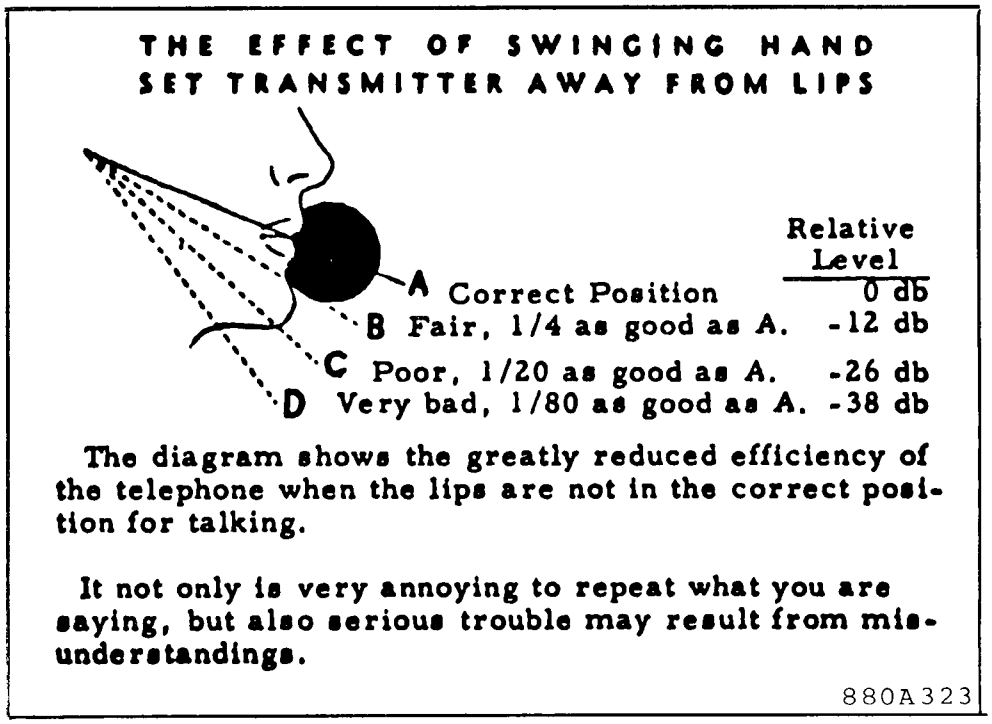


Fig. 9. Proper Usage of Noise Cancelling Telephone Handset

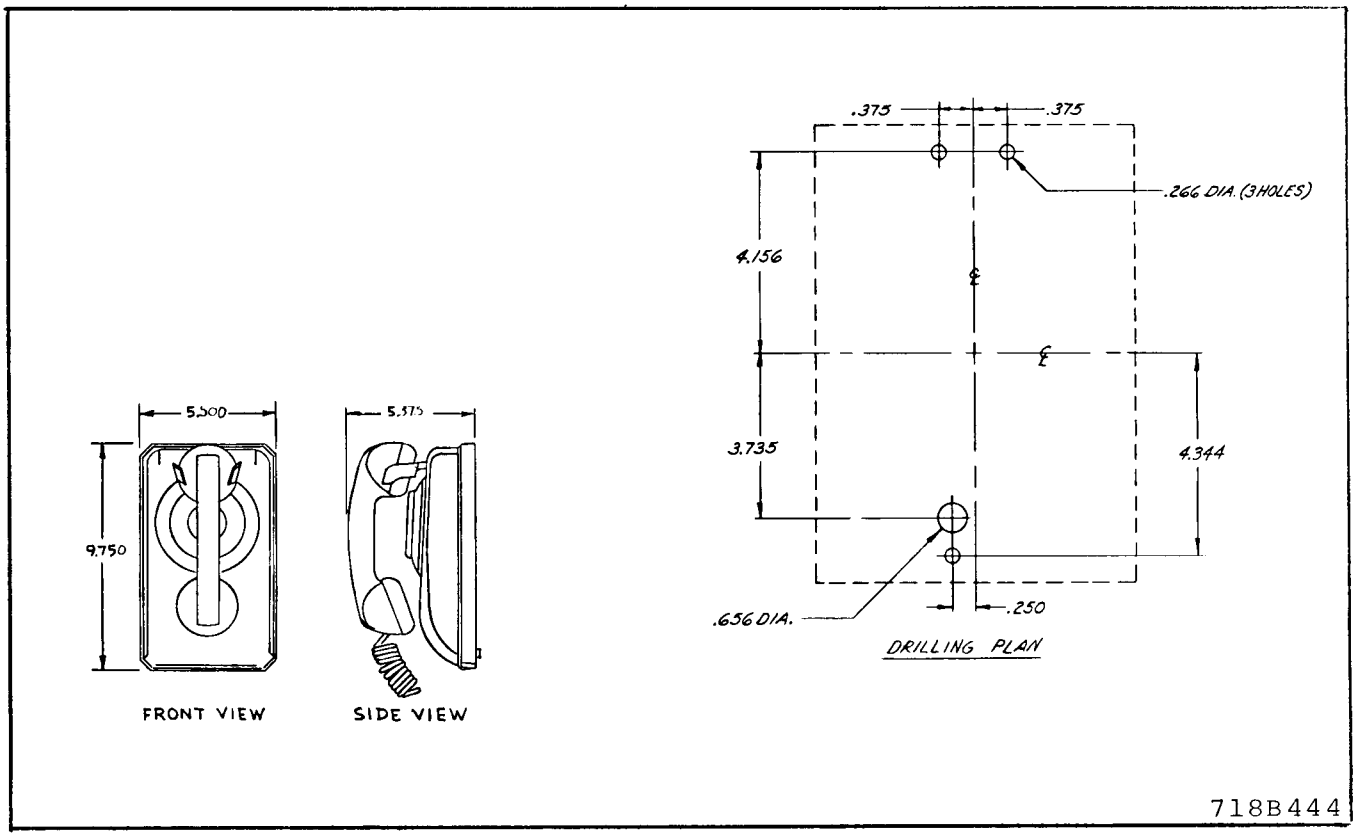


Fig. 10. Mounting Dimensions for wall mounted Hookswitch- Handset Assembly

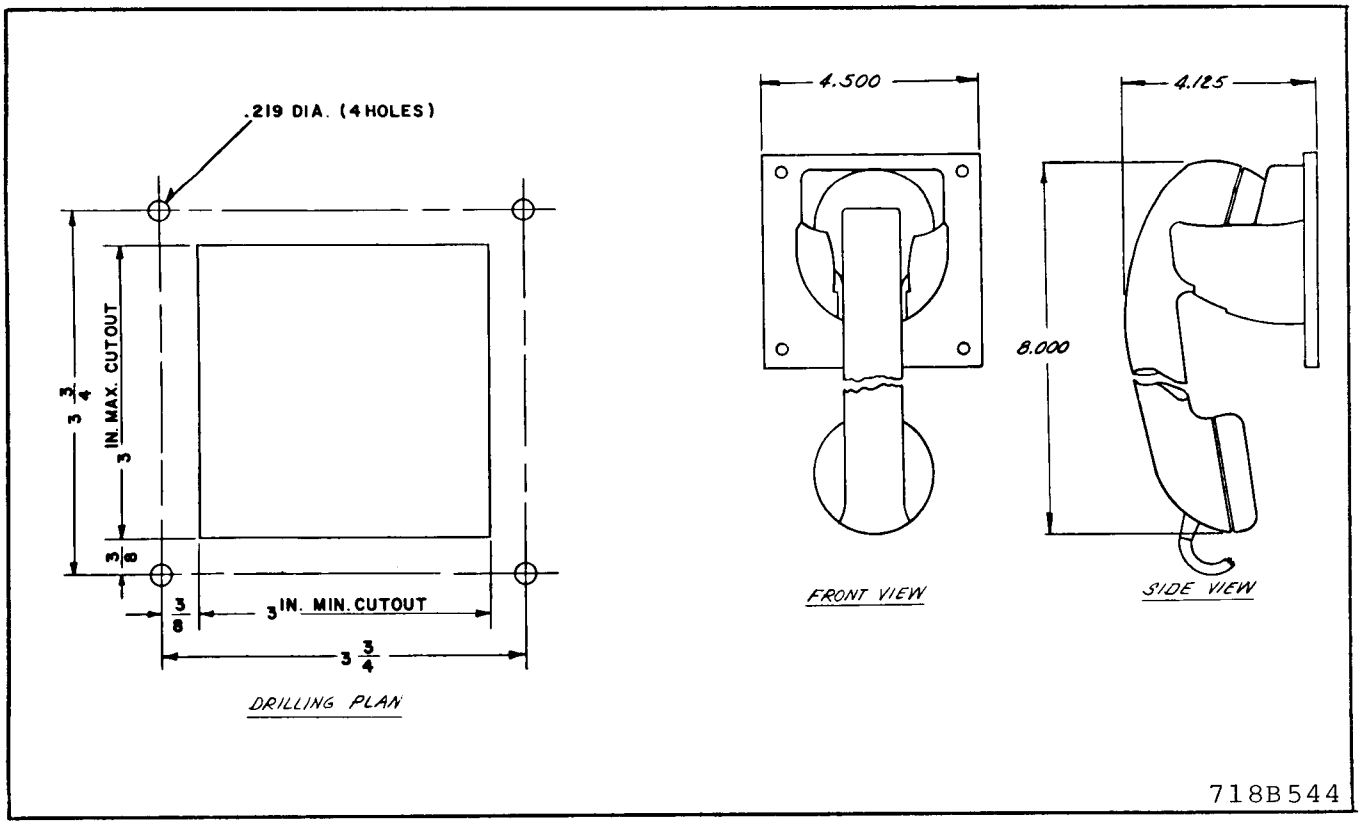


Fig. 11. Mounting Dimensions for Panel Mounted Hookswitch- Handset Assembly

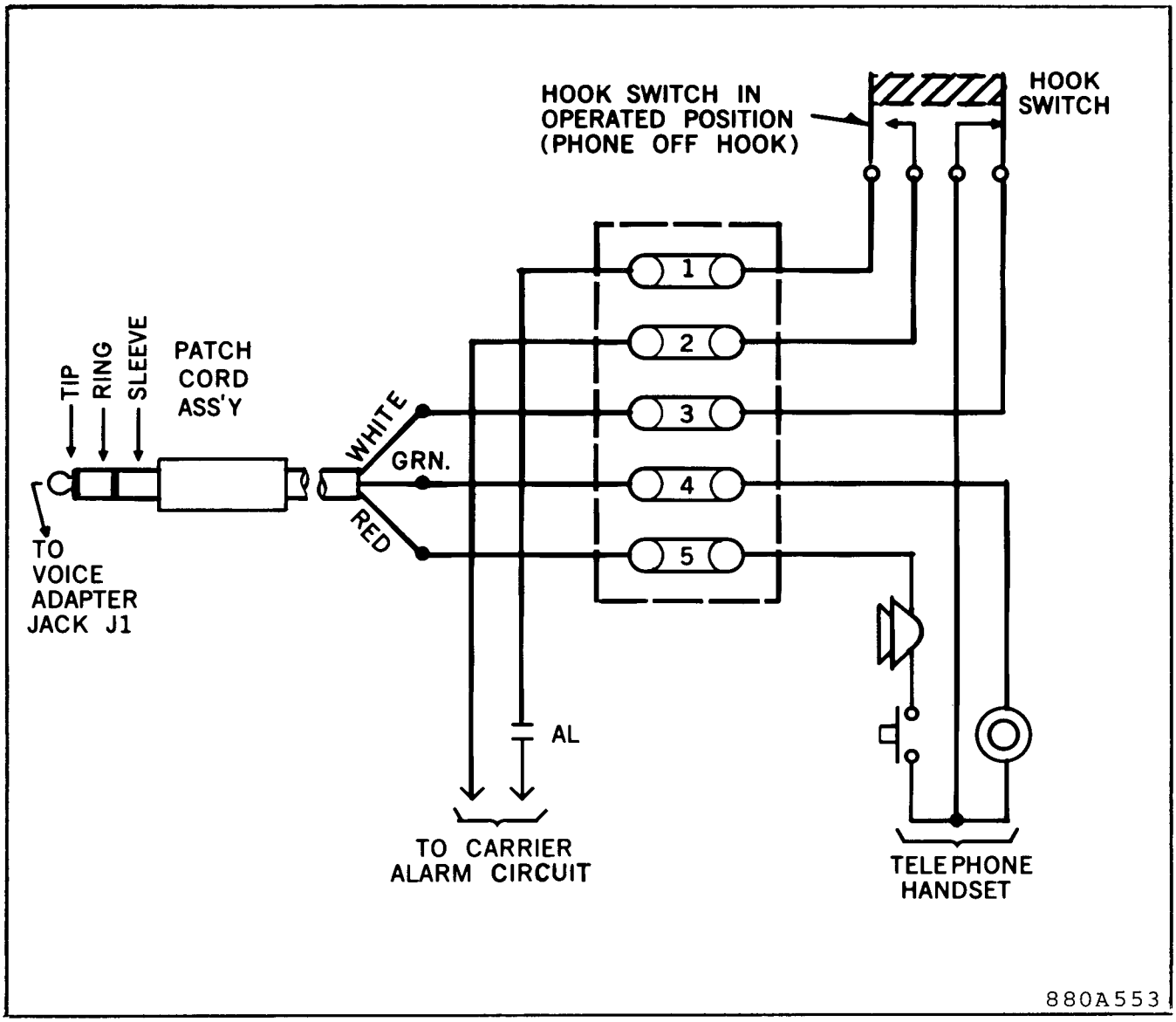


Fig. 12. Telephone Hookswitch - Handset Assembly Internal Schematic and Wiring Diagram.

WESTINGHOUSE ELECTRIC CORPORATION

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

Printed in U.S.A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE KR VOICE ADAPTER
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 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

SUPERSEDES I.L. 41-942.11, dated November 1971

✪Denotes change from superseded issue.

EFFECTIVE JUNE 1976

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

carrier output power level of the KR set is 6 db below the normal relaying output level when the handset pushbutton is pressed. For the procedure of making this measurement please refer in the KR Carrier Set instructions I.L. 41-941.1, to the section titled adjustments.

Modulation level control R25 should be adjusted after the carrier level control has been set as follows:

With an oscilloscope connected across terminals 11 and 12 on the KR set, press handset pushbutton, speak directly into microphone and adjust oscilloscope to view modulation of carrier. The modulation level should now be adjusted at R25 so that over-modulation (cutting off of carrier) will only occur on loud peaks of voice power. Bright lines along the center (zero line) of the oscilloscope trace indicate over-modulation.

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 1. 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 DC voltage measurements are recorded in Table 2. The Adapter Unit is plugged into a KR set and telephone handset into the adapter. The cover of the adapter must be removed in order to make these measurements.

Removal of Printed Circuit Boards

1. Loosen the screw securing the shaft support plate and allow the plate to swing clear.
2. Remove the 4 self-tapping screws holding the cover.
3. Lift cover off.
4. To remove top board, remove the 4 screws that hold top board to mounting posts on lower board.
5. Similarly to remove lower board (with or without top board mounted), remove 4 screws holding lower board to mounting posts on the case.

Assembly of Printed-Circuit Boards

For complete reassembly, reverse the steps described in the removal procedure.

TABLE 1 (See Figure 1)

Voice Adapter Mounting Assemblies

Style	Cable Length	Cable Entrance Into Mounting Box
757D650G02	4 ft.	Back
757D650G03	6 ft.	Back
757D650G04	15 in.	Back
757D650G06	2 ft.	Back
757D650G08	4 ft.	Bottom
757D650G09	6 ft.	Bottom
757D650G10	15 in.	Bottom
757D650G011	2 ft.	Bottom

TABLE 2

Resistance Measurements *

Test Point	Resistance (ohms)	
	125 VDC unit	48 VDC unit
P1-1	2.5K	2.5K
P1-3	9K	5K
P1-4	Open	Open
P1-5	Open	Open
P1-6	Open	Open
P1-7	Open	Open
P1-8	Open	Open
TP-1	4.5K	4.5K
TP-2	4K	4K
TP-3	5K	5K
TP-4	9K	5K
TP-5	10.5K	5K
TP-6	19K	12K
TP-7	31K	12K

*These measurements are taken with respect to the DC negative terminal P1-2 or terminal number 6 on the circuit board. In all cases the negative lead of the ohmmeter was connected to this point. The voice adapter is removed from the KR Carrier Set and the telephone handset is not plugged in. All controls are set to maximum CW position.

TABLE 3

Typical D.C. Voltage Measurements *

These measurements were taken under the following conditions.

1) Receive: Handset plugged in but pushbutton not pressed.

2) Transmit: Handset plugged in with pushbutton pressed.

3) Unblock: Handset plugged in with pushbutton pressed and Transmitter operating at full power.

Note: All measurements are taken with respect to d.c. negative (circuit board terminal no. 6).

TEST POINT CKT. BD. TERM. NO.	D.C. VOLTAGE (VOLTS)					
	RECEIVE		TRANSMIT		UNBLOCK	
	125VDC	48VDC	125VDC	48VDC	125VDC	48VDC
1	0	0	0	0	0	0
2	.1	.05	.6	.5	1.0	.6
3	125	48	3.5	3.5	3.5	3.5
4 (R20 max. cw)	0	0	73	27.5	101	39.9
4 (R20 max. ccw)	0	0	37	19.8	99	39.5
5	0	0	0	0	0	0
7	.1	.05	.4	.4	.65	.5
8	125	48	125	48	125	48
TP-1	19.5	19.5	19.5	19.5	21	20.5
TP-2	20	20	20	20	20	20
TP-3	41	48	41	48	41	48
TP-4	125	48	125	48	125	48
TP-5	125	48	60	48	60	48
TP-6 (R20 max. cw)	125	48	73	27.5	101	39.9
TP-6 (R20 max. ccw)	125	48	37	19.8	99	39.5
TP-7	125	48	125	See TP6	125	See TP6
Q1-Emitter	17.5	17.5				
Q1-Base	17.0	17.0				
Q1-Collector	.004	.004				
Q2-Emitter	19.7	19.7				
Q2-Base	19.1	19.1				
Q2-Collector	.25	.25				
Q3-Emitter	20	20	20	20	20	20
Q3-Base	19.5	19.5	19.5	19.5	21	20.5
Q3-Collector	4.7	4.7	4.7	4.7	0	0

*Please note: These voltage measurements are typical and may vary for each unit.

✪ ELECTRICAL PARTS LIST

SYMBOL	DESCRIPTION	STYLE
C1	.25 mf ±20% 200V.D.C. Paper	187A624H02
C2	.1 mf ±20% 200V.D.C. Paper	187A624H01
C3	.25 mf ±20% 200V.D.C. Paper	187A624H02
C4	12 mf ±10% 35V.D.C. Tantalum	862A530H05
C5	.1 mf ±20% 200V.D.C. Paper	187A624H01
C6	12 mf ±10% 35V.D.C. Tantalum	862A530H05
C7	.01 mf ±10% 200V.D.C. Paper	764A278H10
C9	.01 mf ±10% 200V.D.C. Paper	764A278H10
C10	22 mf ±10% 35V.D.C. Tantalum	184A661H16
C11	47 mf ±10% 50V.D.C. Tantalum	863A530H01
C12	22 mf ±10% 35V.D.C. Tantalum	184A661H16
C14	1.0 mf ±20% 200V.D.C. Paper	187A624H04
R1	2.5K ±30% ¼W Pot	330C598H01
R2	1K ±5% ½W	184A763H27
R3	3.9K ±4% ½W	184A763H41
R4	820 ohms ±5% ½W	184A763H25
R5	2.2K ±10% ½W	187A641H35
R6	39K ±5% ½W	184A763H65
R7	2.2K ±5% ½W	184A763H35
R8	2.2K ±10% ½W	187A641H35
R9	270 ohms ±5% ½W	184A763H13
R10	1K ±5% ½W	184A763H27
R11	22K ±10% ½W	187A641H59
R12	820 ohms ±2% ½W	629A531H30
R14	1.5K ±5% 10W	187A281H01
R15	620 ohms ±2% ½W	629A531H27
R16	1K ±5% 5W	763A129H07
R17	4K ±5% 5W	763A129H13
R18	10K ±5% 1W	187A643H51
R19	22K ±10% ½W	187A641H59
R20	25K ±20% ¼W Pot	629A430H09
R21	470 ohms ±10% ½W	187A641H19
R22	1K Thermistor	182A879H01
R23	2.4K ±5% ½W	184A763H36
R25	1K ±20% ¼W Pot.	629A430H11
R26	33 ohms ±10% ½W	187A640H13
TH1	1K Thermistor	182A879H01
Q1, Q2, Q3	2N4356	849A441H02
T1	10K/400 ohms	714B666G01
T2	25K/600 ohms C.T.	879A875H01
D1, D2, D3, D4	1N457A	184A855H07
Z1	1N4761A 75V ±5%	849A487H05
Z1	1N4746 18V ±10%	849A487H03
Z2	1N3027B 20V ±5%	188A302H07
Z3	1N965B 15V ±5%	186A797H08
K1	48V 1K Coil Relay	330C588H01
P1	Octal Plug	330C580H02
J1	Jack Block Assembly	861A790G04

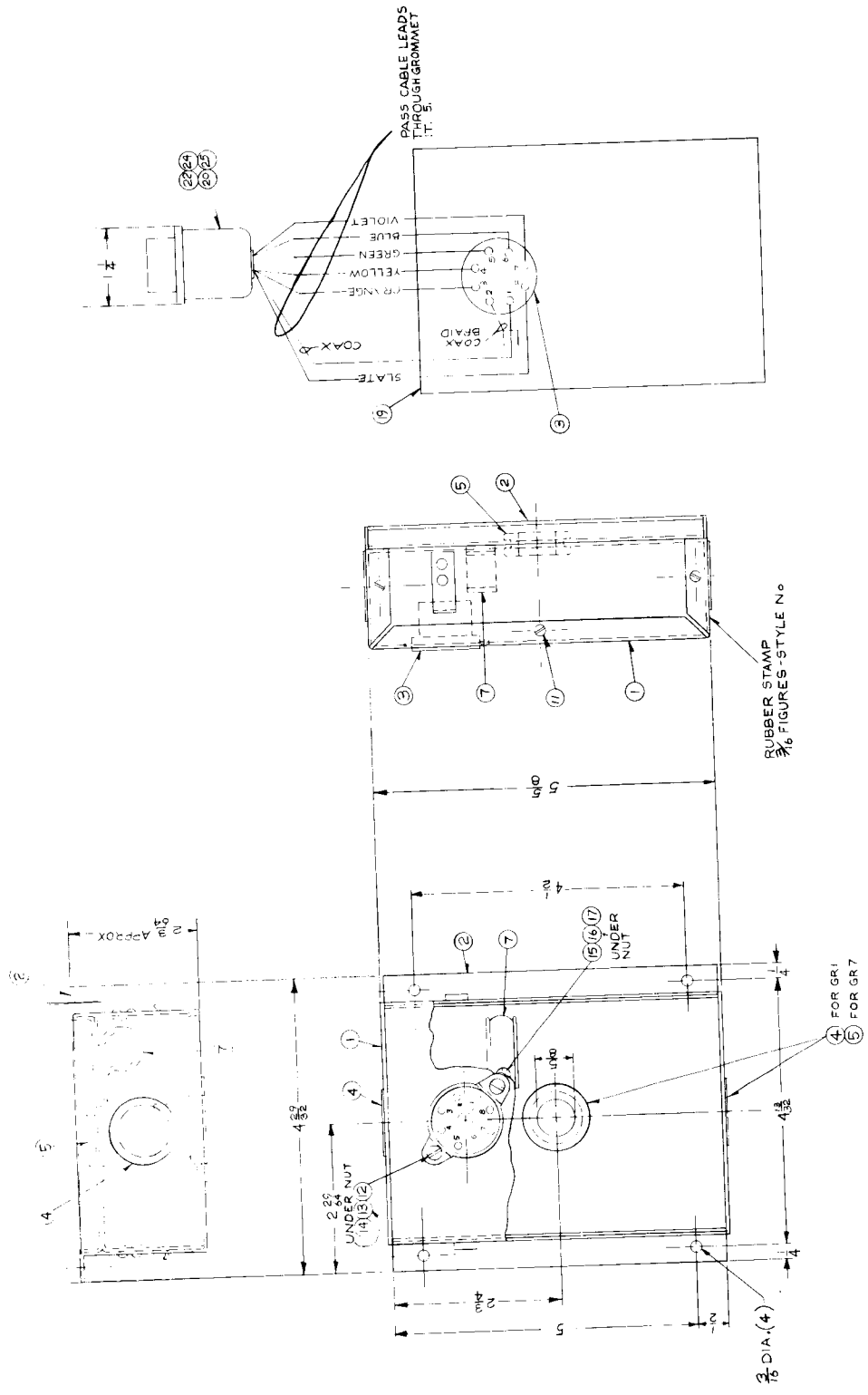


Fig. 1. Voice Adapter Mounting Assembly See Table 1

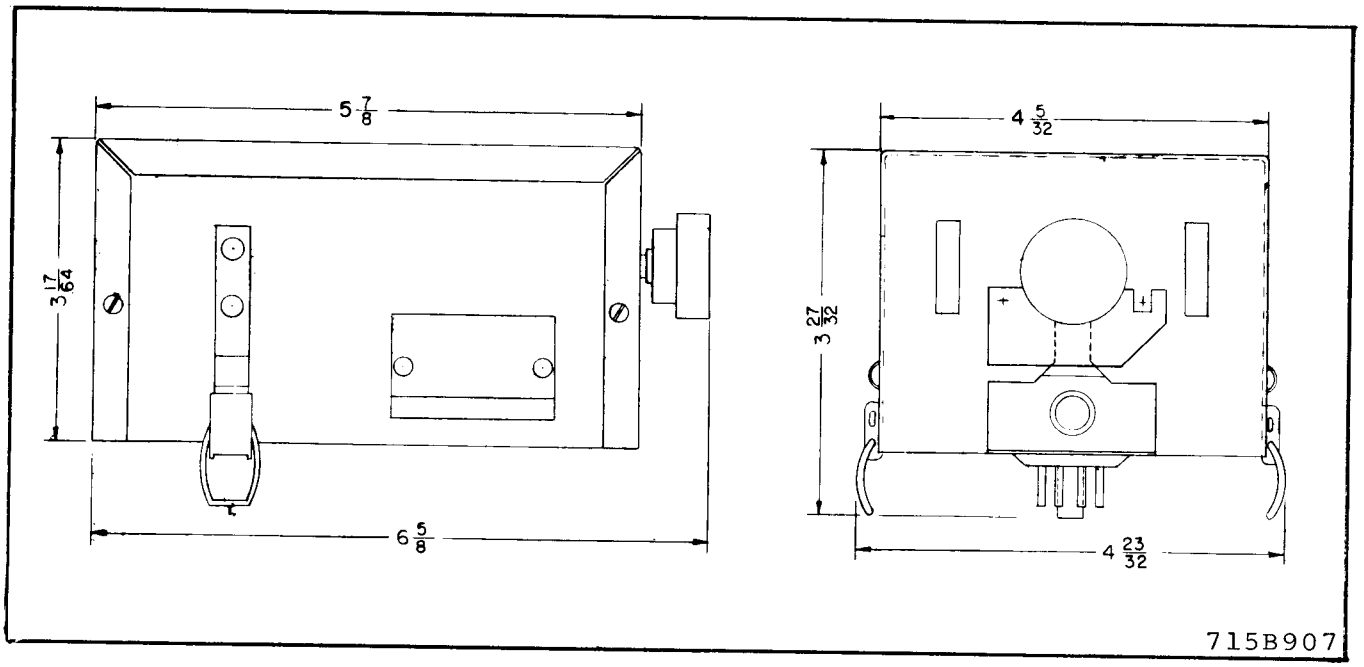


Fig. 2 Outline Dimension

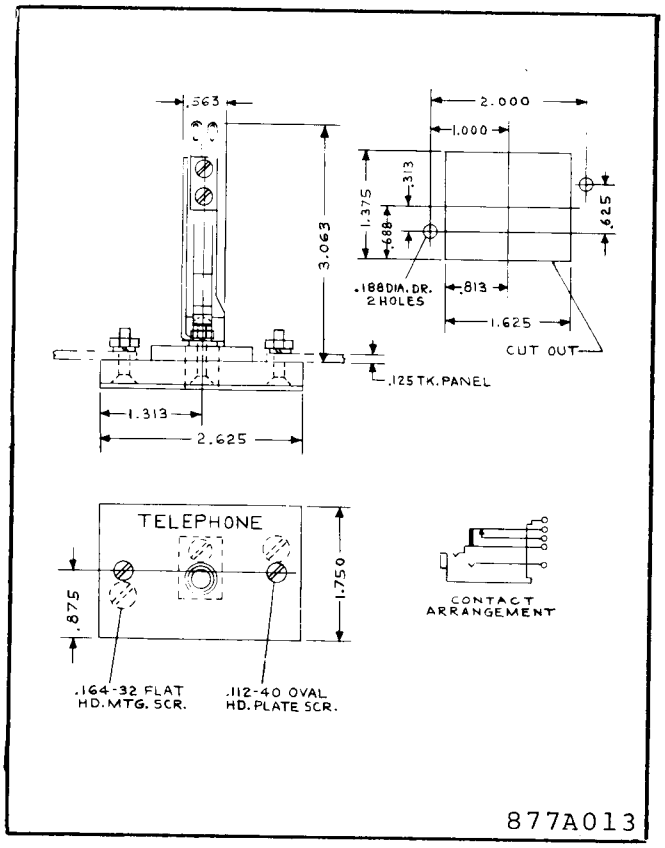


Fig. 3. Remote Telephone Jack Assembly

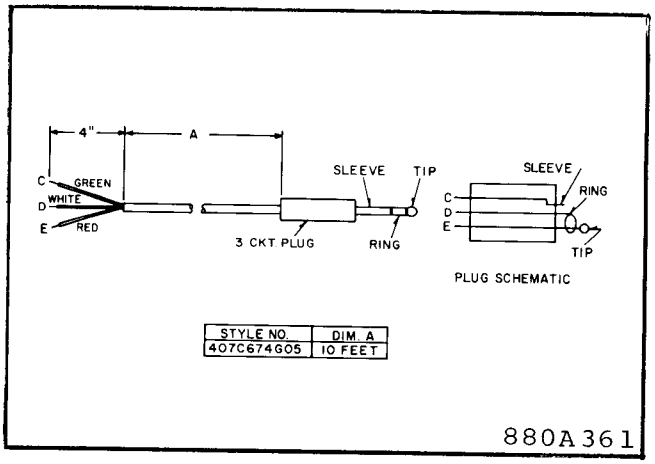


Fig. 4. Patch Cord Assembly

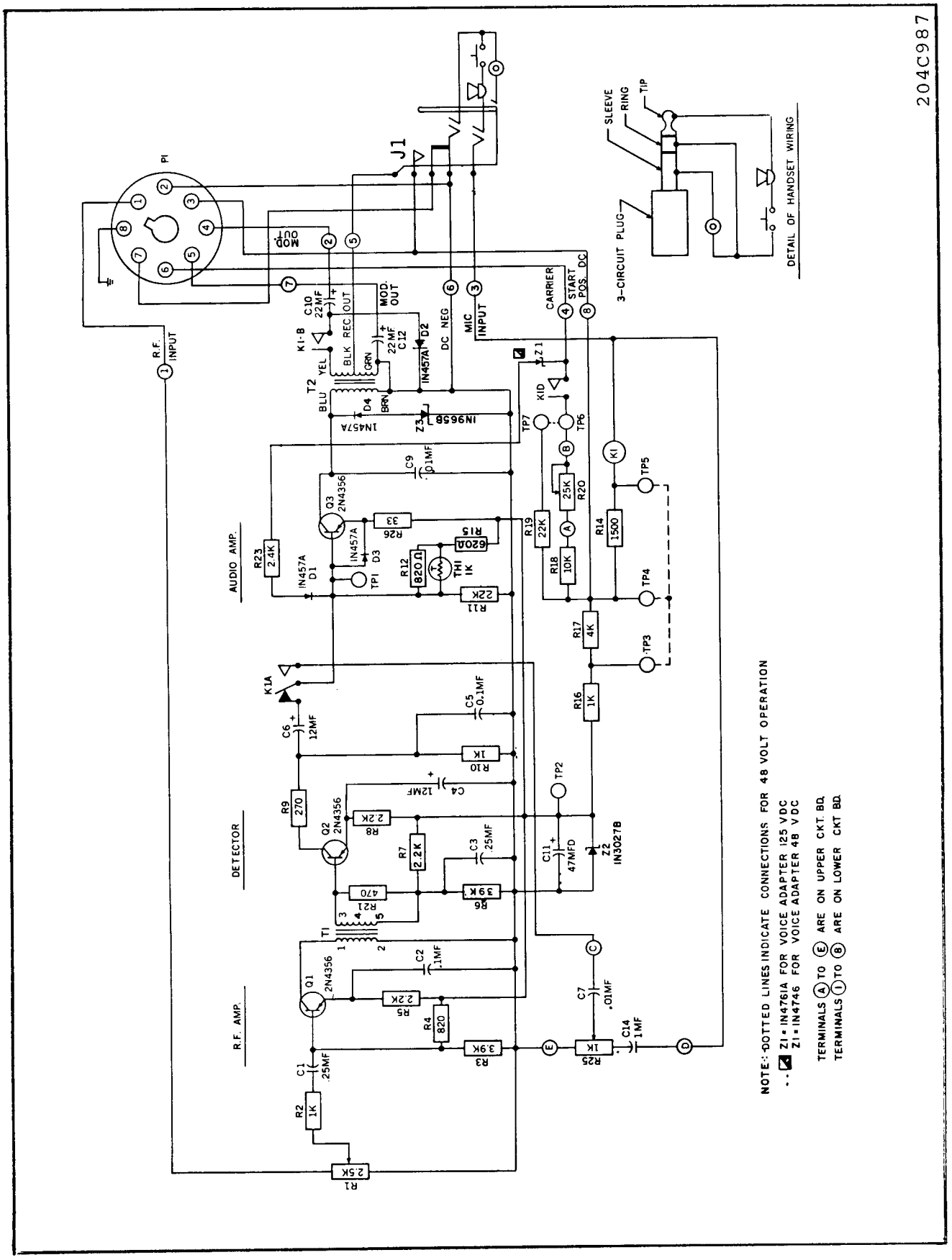


Fig. 5. Internal Schematic

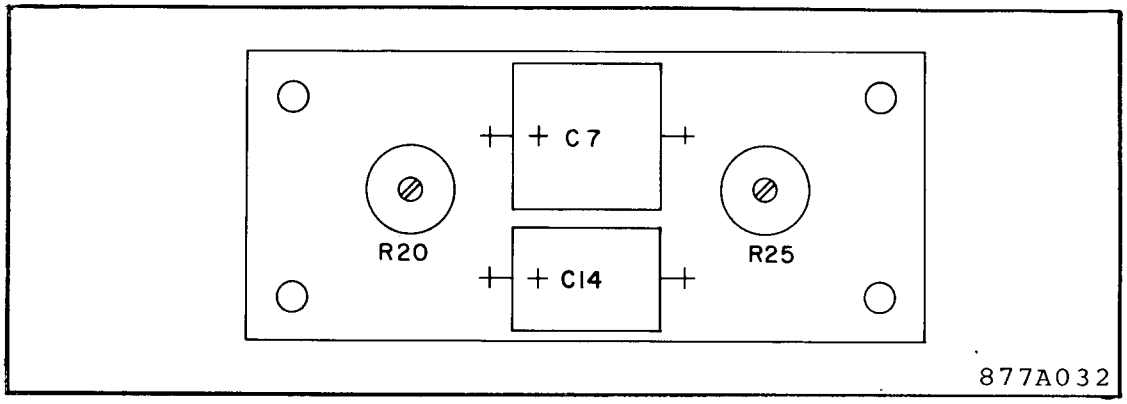


Fig. 6. Component Location (Upper Board)

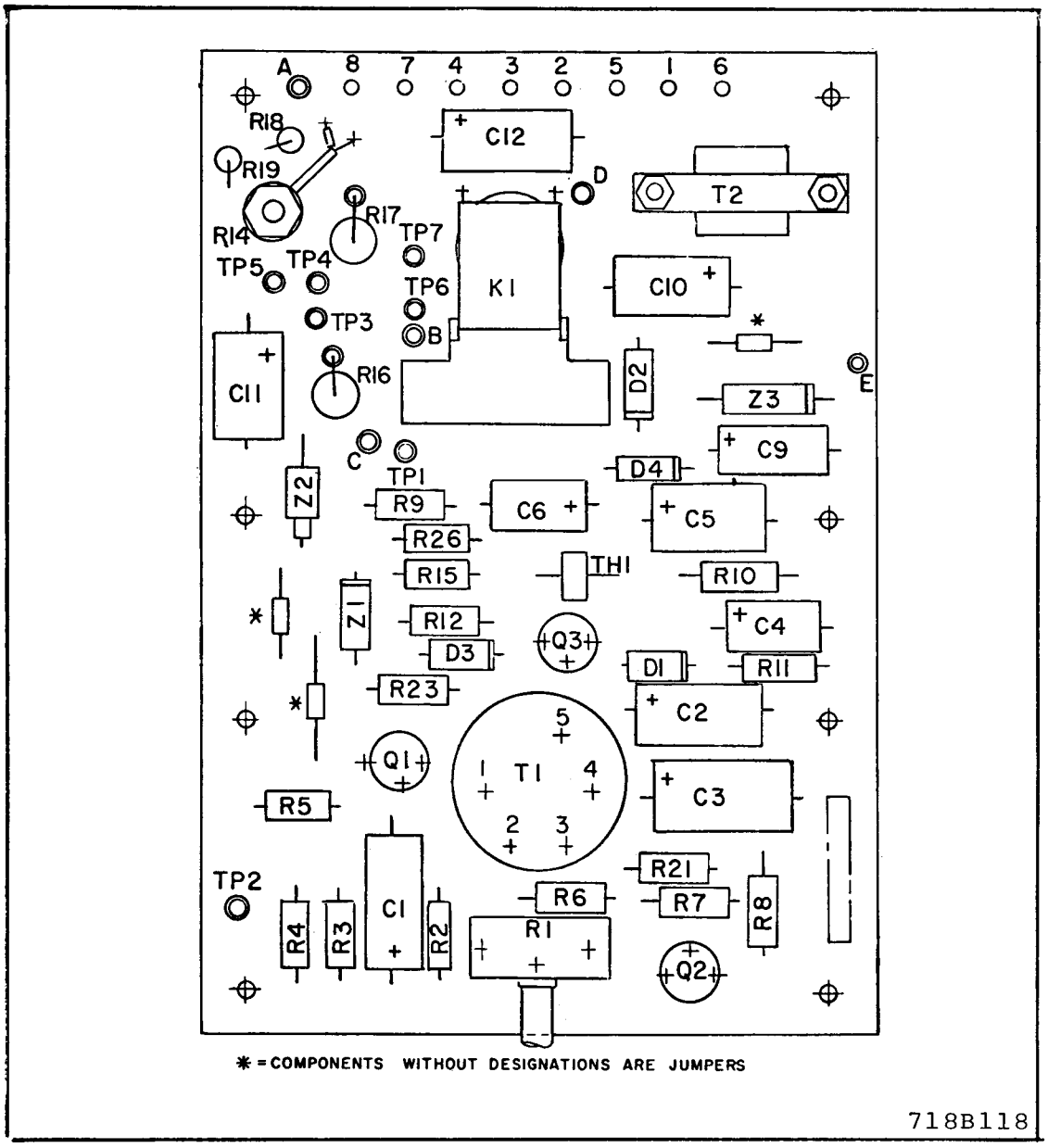


Fig. 7. Component Location (Lower Board)

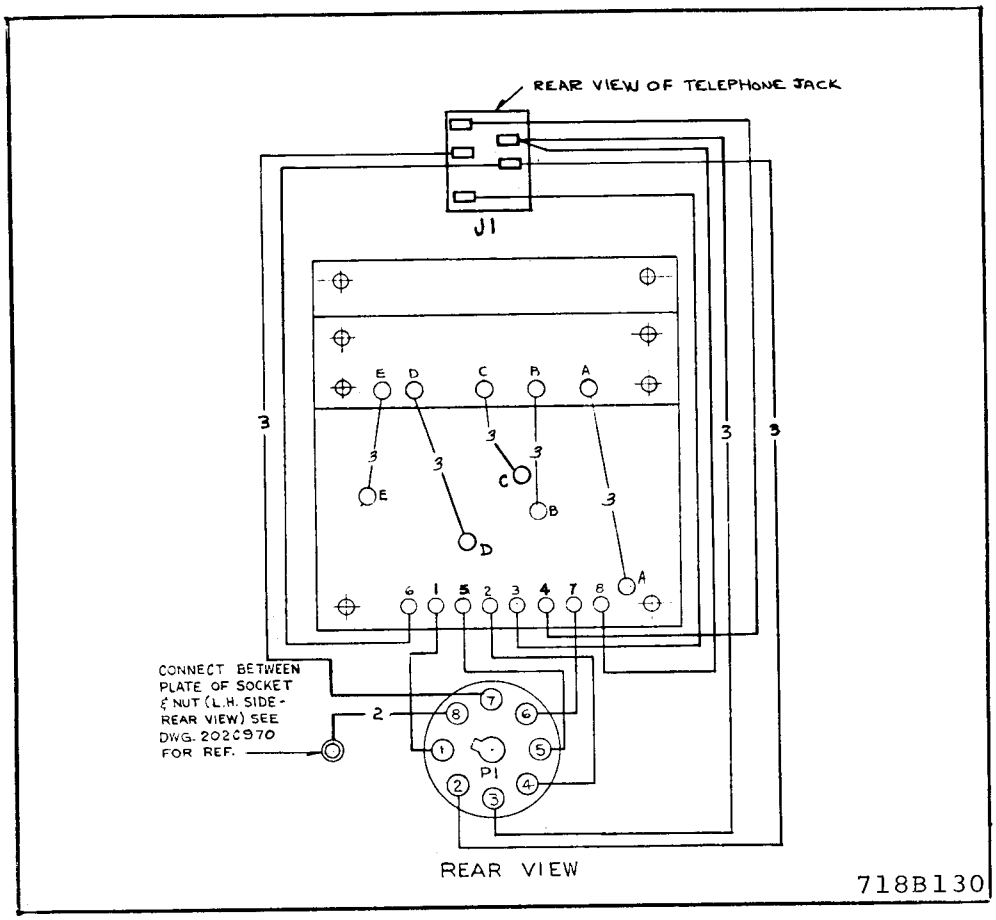


Fig. 8. Wiring Diagram

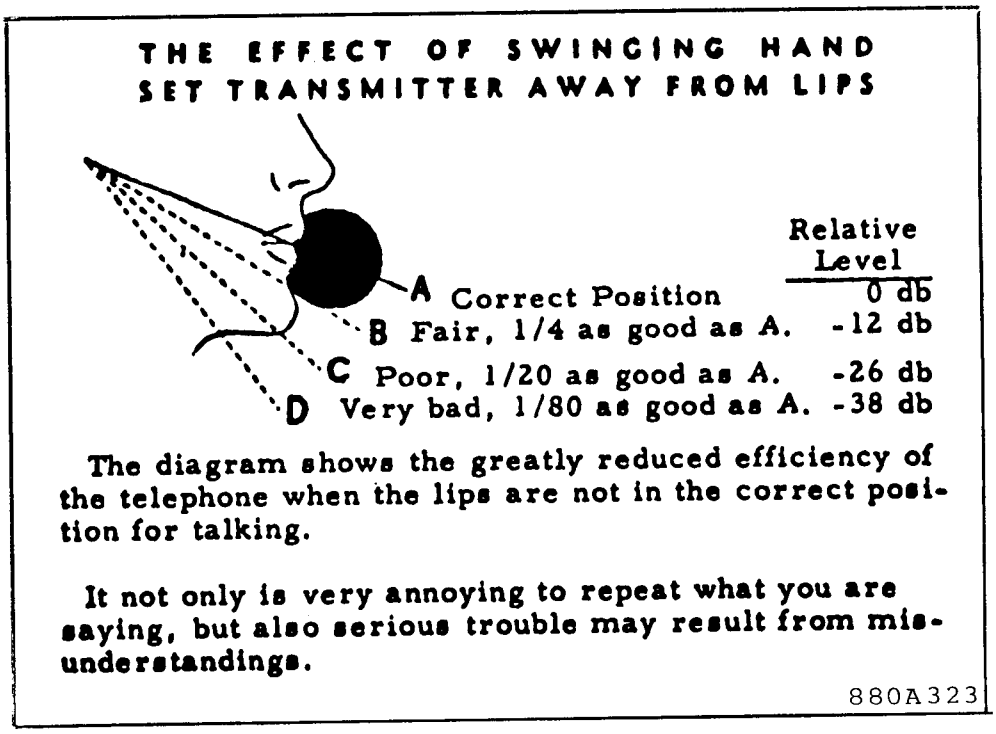


Fig. 9. Proper Usage of Noise Cancelling Telephone Handset

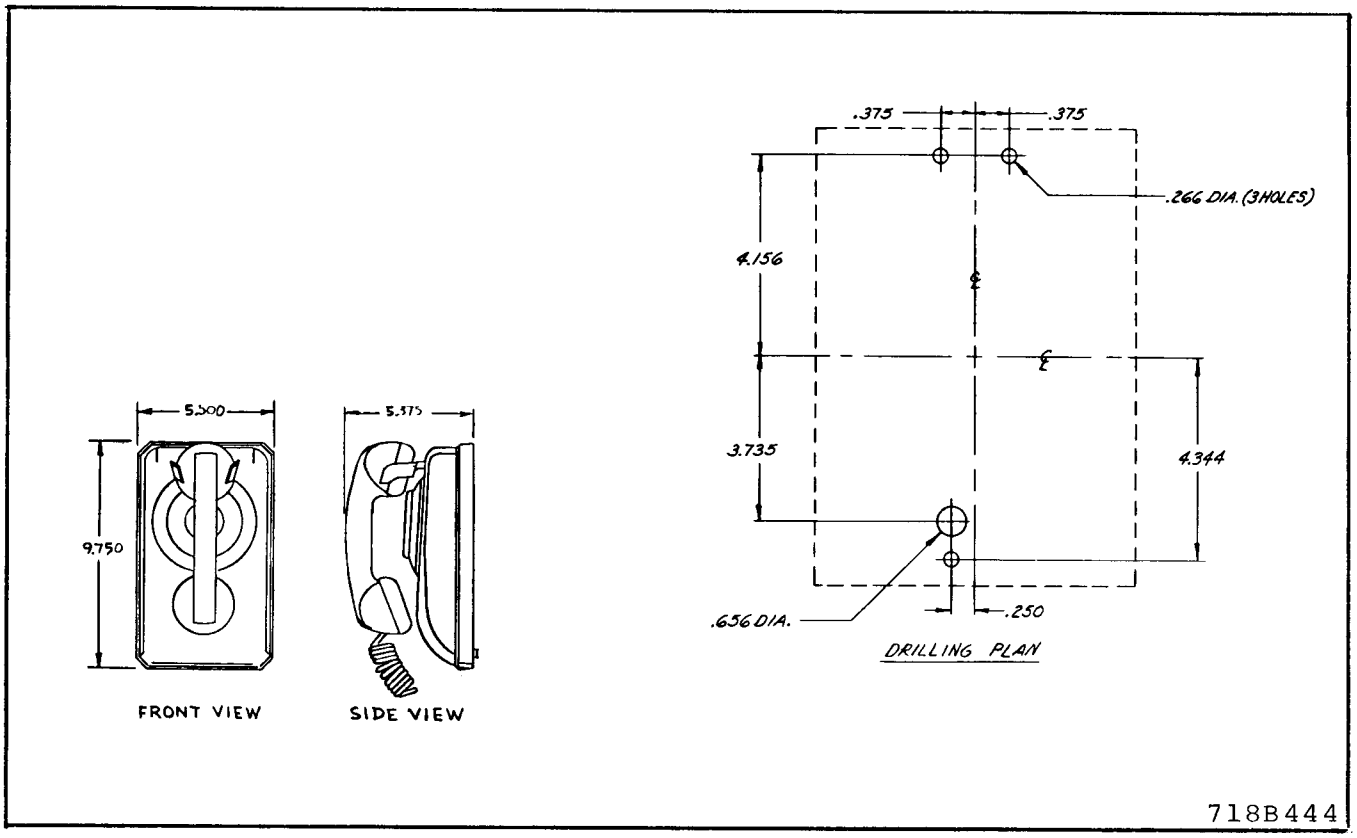


Fig. 10. Mounting Dimensions for wall mounted Hookswitch- Handset Assembly

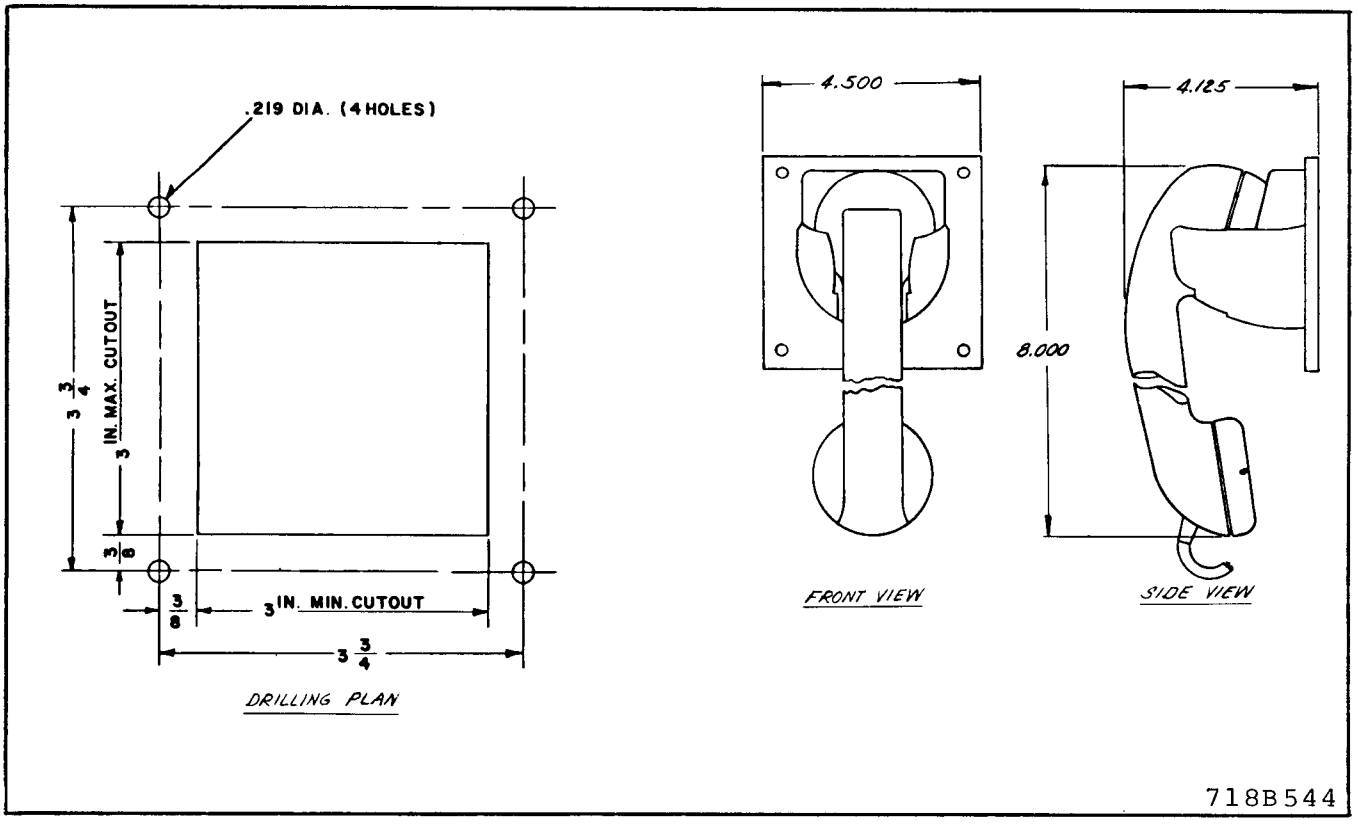


Fig. 11. Mounting Dimensions for Panel Mounted Hookswitch- Handset Assembly

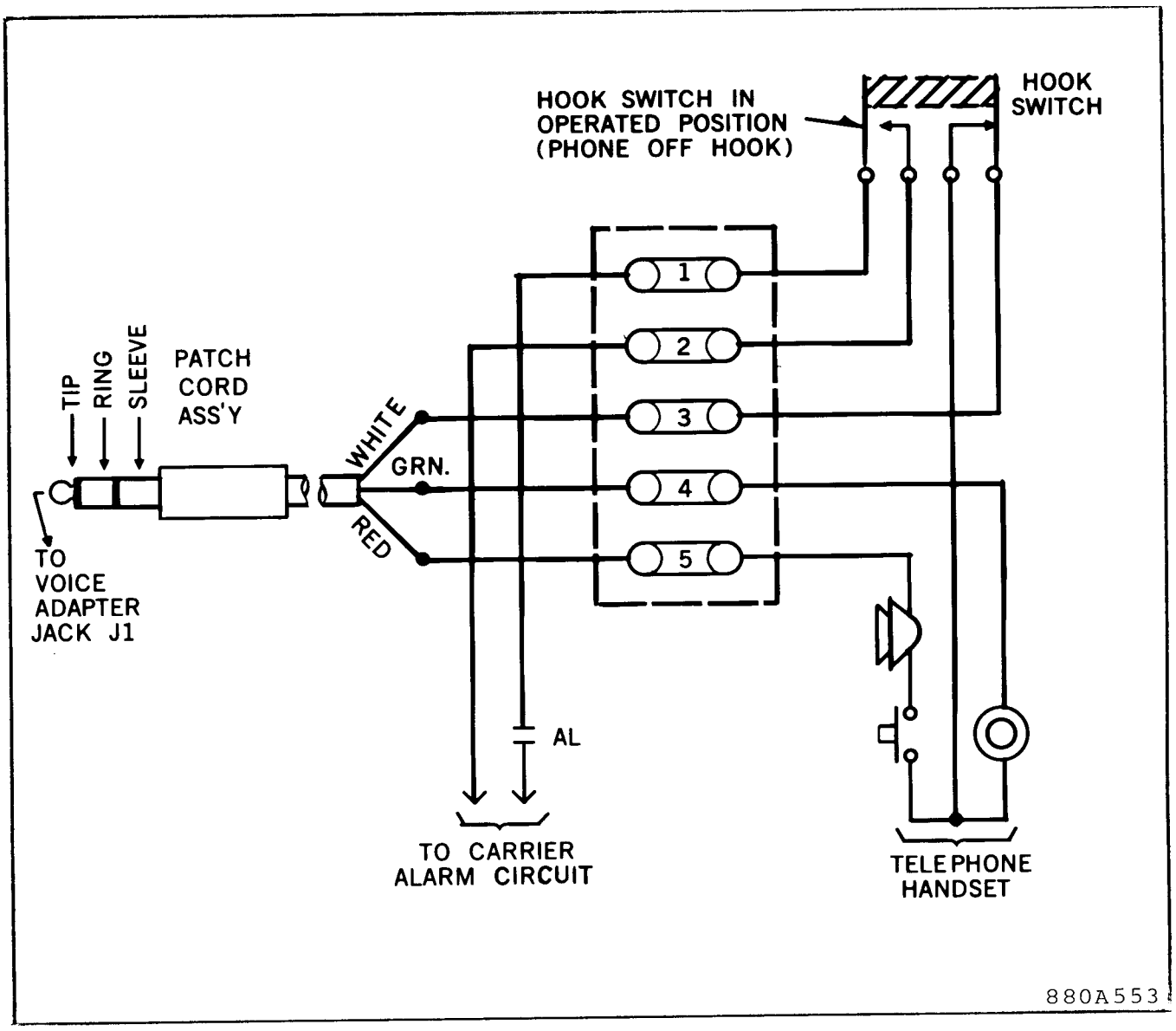
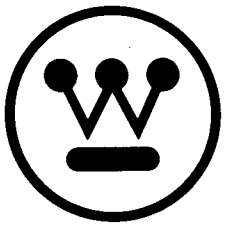


Fig. 12. Telephone Hookswitch - Handset Assembly Internal Schematic and Wiring Diagram.



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