



TRANS WORLD COMMUNICATIONS, INC.

**TW5800
TELEPHONE COUPLER**

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**240 Pauma Place
Escondido, CA 92025, U.S.A.
Phone (619) 747-1079, Telex 695-433**

WARRANTY

Trans World Communications, Inc. (TWC) warrants that new TWC equipment has been manufactured free of defects in design, material and workmanship. If the equipment does not give satisfactory service due to defects covered by this warranty, TWC will, at its option, replace or repair the equipment free of charge.

The warranty is for a period of 90 days from the date of installation. In the event that the equipment is not installed within 90 days of factory shipment, satisfactory evidence of the installation date must be submitted.

LIMITATIONS:

This warranty does not cover physical damage caused by impact, liquids or gases. Defects caused by lightning, static discharge, voltage transients, or application of incorrect supply voltages are specifically excluded from this warranty.

RETURN OF EQUIPMENT - USA:

The equipment shall be returned freight prepaid to the Service Department, Trans World Communications, Inc., 240 Pauma Place, Escondido, California 92025. The equipment should be packed securely, as TWC will not be responsible for damage incurred in transit. Please include a letter containing the following information:

1. Model, serial number, and date of installation.
2. Name of dealer or supplier of equipment.
3. Detailed explanation of problem.
4. Return shipping instructions.

TWC will return the equipment prepaid by United Parcel Service, Parcel Post or truck. If alternate shipping is specified, freight charges will be made collect.

RETURN OF EQUIPMENT - FOREIGN:

Write for specific instructions. Do not return equipment without authorization. It is usually not possible to clear equipment through U.S. Customs without the correct documentation. If equipment is returned without authorization, the sender is responsible for all taxes, customs duties and clearance charges.

LIMITED PARTS WARRANTY:

This warranty shall cover all parts in the equipment for a period of 12 months from the date of installation, subject to the previous conditions and limitations. The parts will be replaced free of cost. The labor charges will be made at the current TWC hourly service rate.

PARTS REPLACEMENT:

If it is not practical, or the purchaser does not want to return the equipment to the factory, this warranty is limited to the supply of replacement parts for a period of 12 months from the date of equipment installation. The following instructions for the supply of replacement parts should be followed:

1. Return defective parts prepaid to: Parts Replacement, Trans World Communications, Inc., 240 Pauma Place, Escondido, California 92025.
2. Include a letter with the following information:
 - a) Part number(s).
 - b) Serial number and model of equipment.
 - c) Date of installation.

Parts returned without this information will not be replaced. In the event of a dispute over the age of the replacement part, components date coded over 24 months prior will be considered out of warranty.

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FIGURE 1. Telephone Coupler.

SECTION 1 INTRODUCTION

1.1 MANUAL CONTENTS

This manual contains information describing the installation, operation, theory, maintenance and service of the TW5800 telephone coupler. This instruction manual is divided into the following sections:

Section 1	.....	Introduction
Section 2	.....	Installation
Section 3	.....	Operation
Section 4	.....	Maintenance
Section 5	.....	Service
Section 6	.....	Theory of Operation

1.2 EQUIPMENT DESCRIPTION

The TW5800 telephone coupler is designed as an accessory for use with two-way radio systems to function as an interface for remote users of the radio facility. It provides automatic switching of radio systems, and allows the radio dispatcher to control the system manually when required.

1.3 TECHNICAL SPECIFICATIONS

The technical specifications for the telephone coupler are defined in Table 1.

TABLE 1. Technical Specifications.

POWER INPUT:	12-15 Vdc, at 100 mA, negative ground, or 115/230 Vac at 1/4 A.
SENSITIVITY:	
Telephone to transmitter:	-25 dBm will provide 0 dBm to the transmitter input.
Receiver to Telephone:	0 dBm will provide 0 dBm on the telephone line.
VOX:	Pull-in at -25 dBm.
AUDIO RESPONSE:	300 to 3000 Hz (nominal).
VU METER:	
Monitors:	Receive line level. Transmit line level.
MOUNTING:	Desk-top or rack.
SIZE:	Height 8.25 cm, width 19.4 cm, depth 25.4 cm.
WEIGHT:	1.35 kg.

SECTION 2 INSTALLATION

2.1 UNPACKING AND INSPECTION

Carefully open the carton and check the contents against the packing list secured to the outside of the container. Inspect all items for signs of damage. If any damage is noted, immediately notify the carrier. Save all packing material for possible reshipment.

2.2 POWER REQUIREMENTS

The TW5800 can be powered from either 110/220 Vac or +12 Vdc power. An ac power cord is provided with the equipment. A slide switch on the rear panel of the TW100 is used to select either 110 Vac or 220 Vac.

+12 Vdc is also available through pin 5 of rear panel connector J1. This is automatically provided if the telephone coupler is used with the TW100 series of transceivers. The interface cable connections are shown in Figure 2. Internal diode protection is provided in the TW100 so that the ac power cord can be plugged in even if +12 Vdc is being provided through J1.

2.3 SET-UP

A block diagram showing how to install the TW5800 in the field is shown in Figure 3. The transceiver shown is the TW100, but any transceiver providing line levels described in this manual may be used with the TW5800.

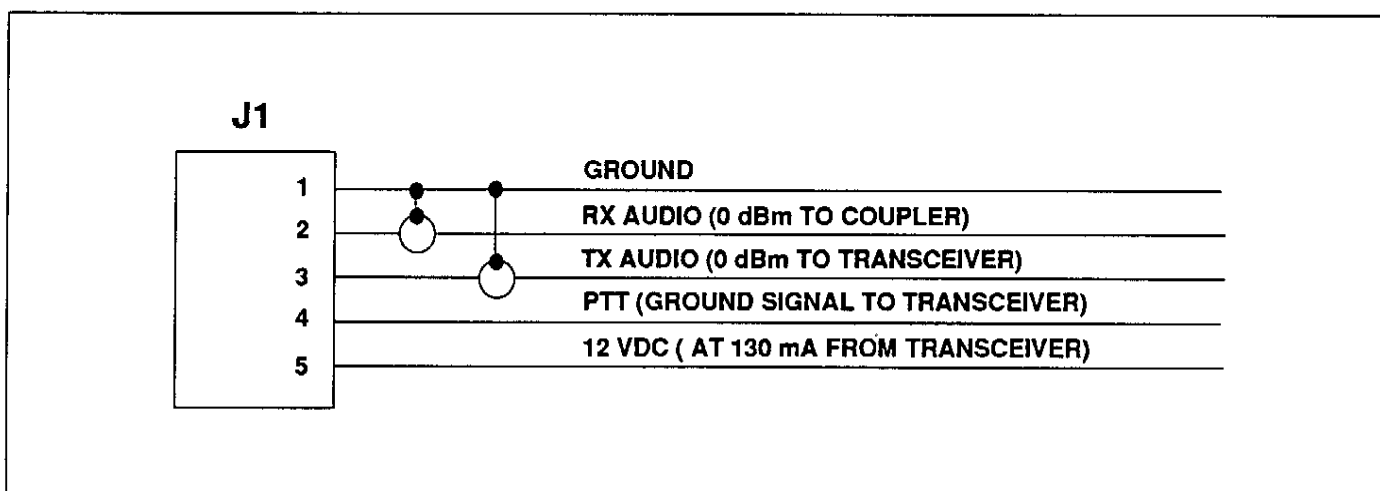


FIGURE 2. Telephone Coupler Connector J1.

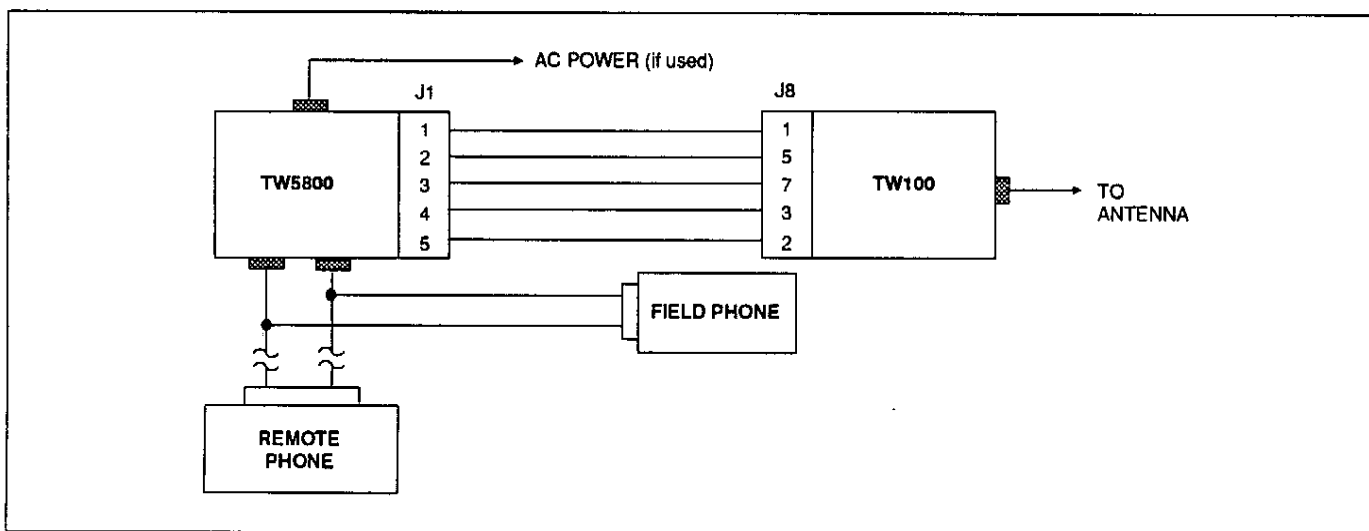


FIGURE 3. Telephone Coupler/Transceiver Installation.

SECTION 3 OPERATION

3.1 FRONT PANEL CONTROLS

Figure 4 shows the telephone coupler front panel controls and indicators. These are described below:

3.1.1 INDICATORS

A. Receive level VU meter—indicates audio level of receive signal.

B. Transmit level VU meter—indicates audio level of transmit signal.

C. Transmit key LED—when lit it indicates the transmitter is keyed.

3.1.2 CONTROLS

A. Receive level—adjusts level of receive audio into phone lines.

B. Transmit level—adjusts level of transmit signal to the transceiver.

C. VOX level—adjusts sensitivity of VOX function.

D. Transmit switch—allows manual keying of the transceiver (when the mode switch is in "MAN" position).

E. Mode switch—three-position rotary switch providing following functions:

a) OFF—Removes input primary power to the telephone coupler. Disconnects the unit from the phone lines.

b) VOX—Allows voice-operated keying of the transceiver.

c) MAN—Allows manual PTT keying of the transceiver.

3.2 REAR PANEL CONNECTORS

Rear panel connectors are shown in Figure 5. Descriptions of the connectors are given below.

A. Ac power connector—3-prong ac power plug; ac power cord provided with equipment.

B. Ac fuse—1/4 A fuse; provided with equipment.

C. 110/220-Vac switch—provided with equipment; selects appropriate ac voltage input.

D. Transceiver connector—5-pin connector connecting all telephone coupler audio, PTT, and power lines to the transceiver.

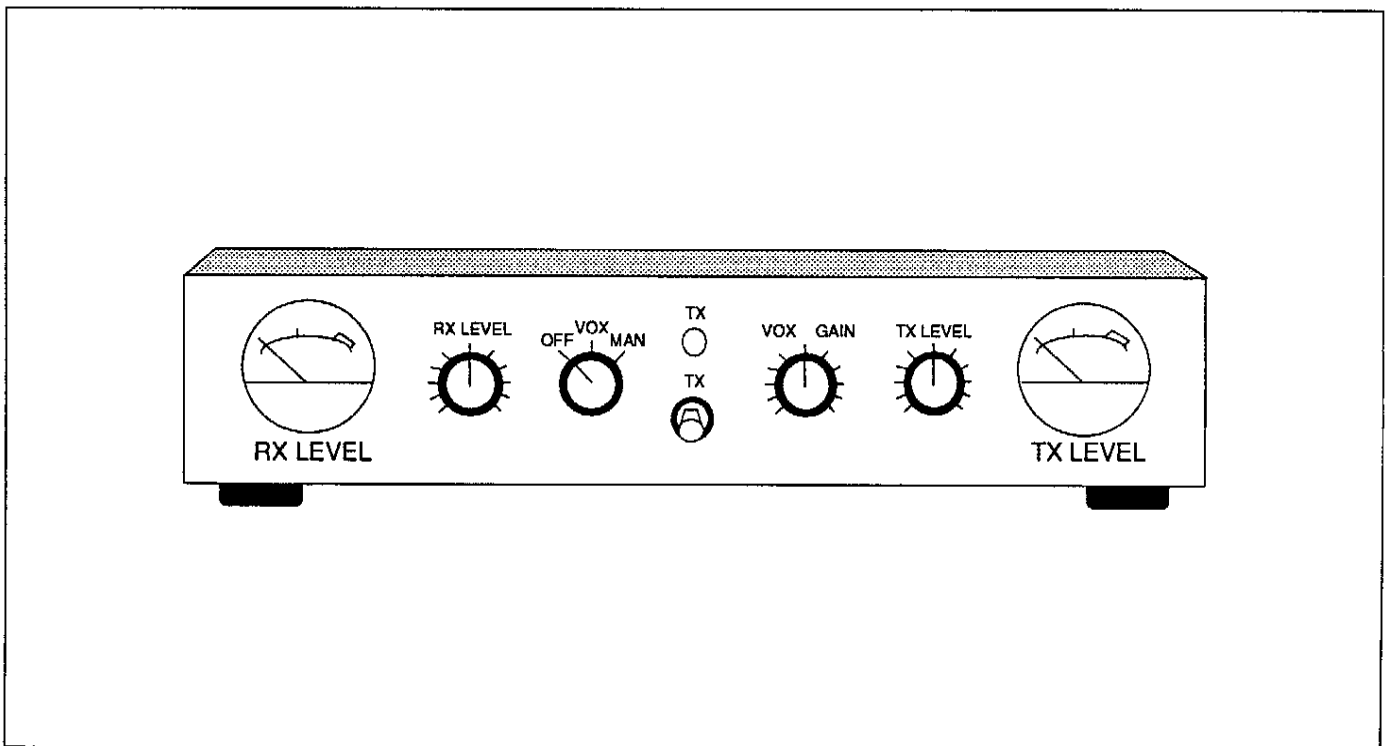


FIGURE 4. Telephone Coupler Front Panel Controls.

E. Phone line terminals—balanced 600-ohm telephone line connections.

F. Headphone jack—connects external headphones to telephone coupler circuits.

G. Balance—phone line balance adjustment.

3.3 OPERATION

3.3.1 OPERATING INSTRUCTIONS - VOX MODE

To operate the telephone coupler in VOX mode follow these steps:

3.3.1.1

Ensure that the telephone coupler is connected as illustrated in Figure 3.

3.3.1.2

Set the OFF/VOX/MANUAL switch to VOX.

3.3.1.3

Adjust RECEIVE LEVEL control for -3 dBm on voice peaks on the VU METER while a signal is being received from the transceiver.

3.3.1.4

Adjust BALANCE control for null on TX VU Meter.

3.3.1.5

Adjust TRANSMIT LEVEL control for 0 dBm on voice peaks on the VU METER while a signal is being received from the phone lines.

3.3.1.6

Rotate VOX control clockwise until transceiver keys while a signal is being received from the phone lines.

3.3.1.7

No further adjustments are required for telephone coupler operation. The incoming and outgoing signals may be monitored at the headphone jack on the Telephone Coupler.

3.3.2 OPERATING INSTRUCTIONS - MANUAL MODE

All operating instructions of paragraph 3.3.1 apply except the VOX circuit is inoperative, and the transceiver must be keyed with the telephone coupler TX/RX switch.

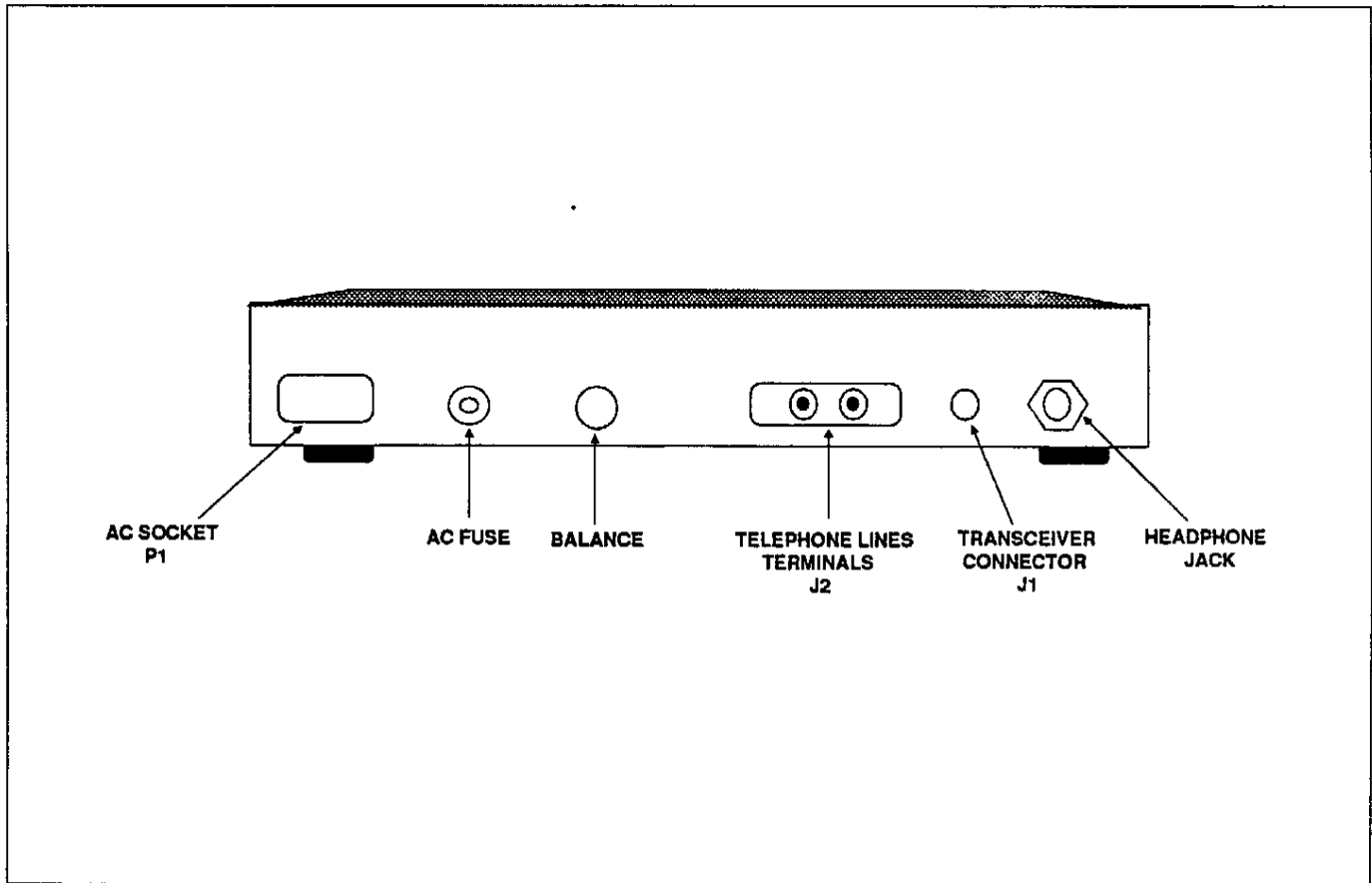


FIGURE 5. Telephone Coupler Rear Panel Connectors.

SECTION 4 MAINTENANCE

4.1 ROUTINE MAINTENANCE

The telephone coupler is designed to require a minimum amount of preventive maintenance. Periodically, however, the dust cover should be removed from the chassis, and the parts and wiring should be visually inspected for deterioration. Loose hardware should be tightened. Accumulated dust and dirt should be removed. Connections should be secure and cables should be inspected for damage.

All external controls, indicators, and connectors should be checked for looseness and retightened.

4.2 FUSE REPLACEMENT

The fuse on the rear panel should be replaced with the type and rating given in the parts list. Damage to the equipment can occur if this recommendation is not followed.

SECTION 5 SERVICING

NOTE

Servicing of the equipment should normally be done only by trained technicians. If the occasion should arise, all of the necessary troubleshooting aids are contained in this manual, e.g., parts lists, detailed schematics, and component location diagrams.

5.1 ALIGNMENT

Should it become necessary to realign the telephone coupler, the procedure detailed in this manual should be followed. Each step of this alignment is meant to be followed in the order given.

5.1.1 TEST EQUIPMENT

The following test equipment is required:

1. Audio signal generator
2. Multimeter
3. Audio voltmeter/dBm meter
4. Dc power supply - 150 mA
5. Telephone coupler test cable (shown in Figure 6.)

5.1.2 INITIAL TEST SET-UP

The initial test set-up for the Telephone Coupler is:

1. Using an ohmmeter, check the +12-V line for the presence of shorts (the top of C33).
2. Connect the equipment as depicted in Figure 7. All front panel potentiometer controls should be at "5" (mid-scale). The mode switch should be "OFF".

- a) Turn the dc power supply on.
- b) Turn the mode switch to "VOX" position; the dc current should read $130 \text{ mA} \pm 10 \text{ mA}$.
- c) Turn the mode switch to the "MANUAL" position; the dc current should read $100 \text{ mA} \pm 10 \text{ mA}$.

5.1.3 TX METER ADJUSTMENT AND VOX TEST

1. Connect the equipment as shown in Figure 8.
2. Inject a 1-kHz tone on J2, the telephone line terminals.
3. Connect dBm meter to J2.
4. Adjust the amplitude of the 1-kHz tone input until the dBm meter reads -25 dBm (0.07 V).
5. Reconnect dBm meter to J1, pin 3.
6. Turn the TX LEVEL control until the dBm meter reads 0 dBm (0.7 V).
7. Adjust R20 for 0 dBm on TX LEVEL meter.
8. Turn the VOX GAIN control until the TX LED comes on.
9. Check that J1, pin 4, goes to a ground condition.

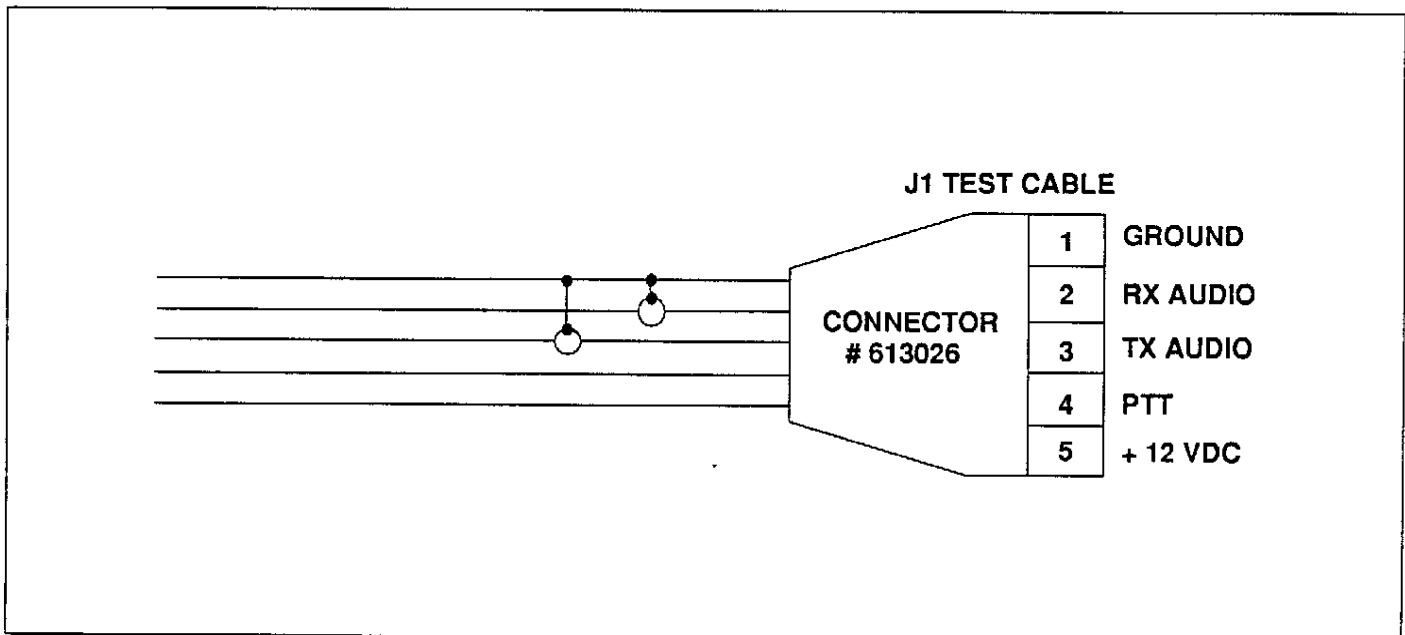


FIGURE 6. Telephone Coupler Test Cable.

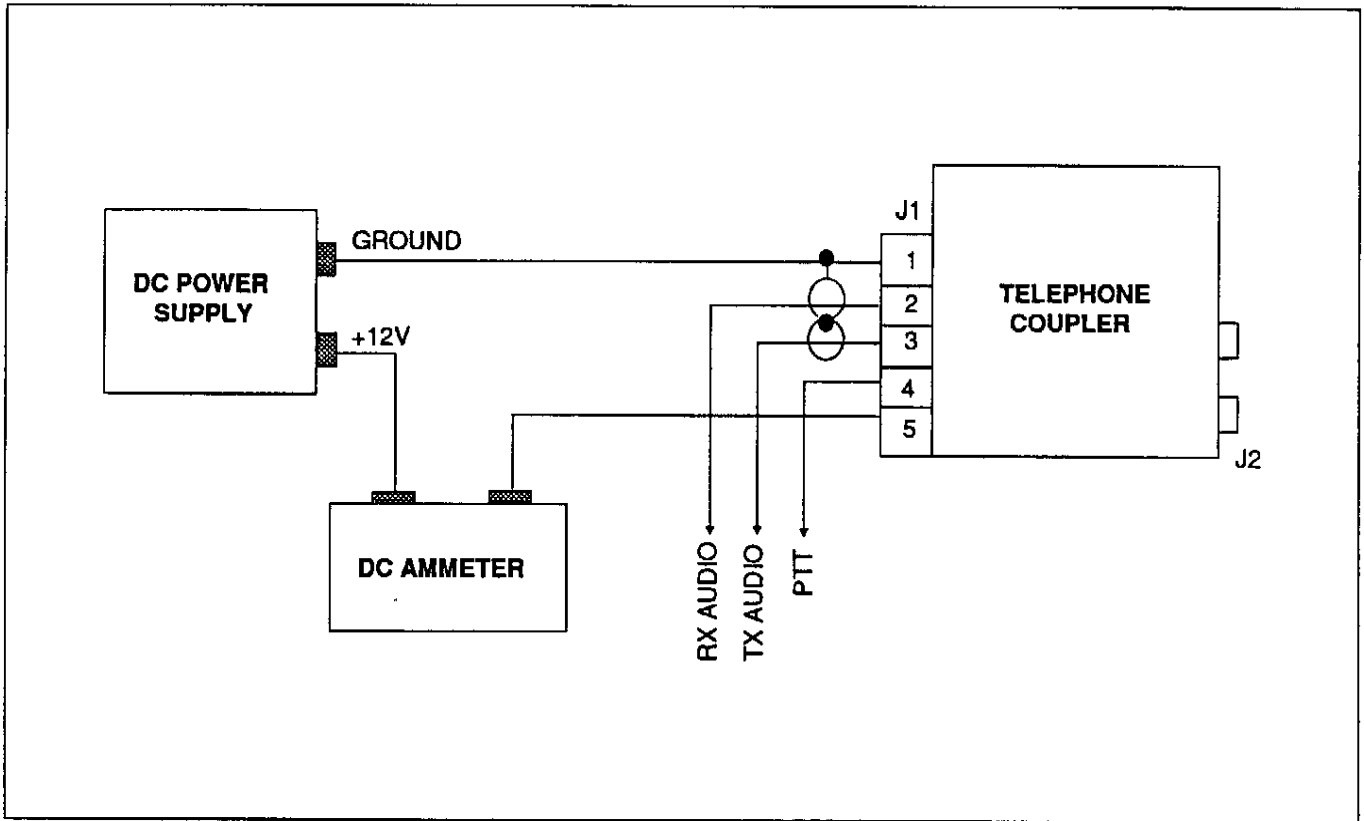


FIGURE 7. Dc Current Check.

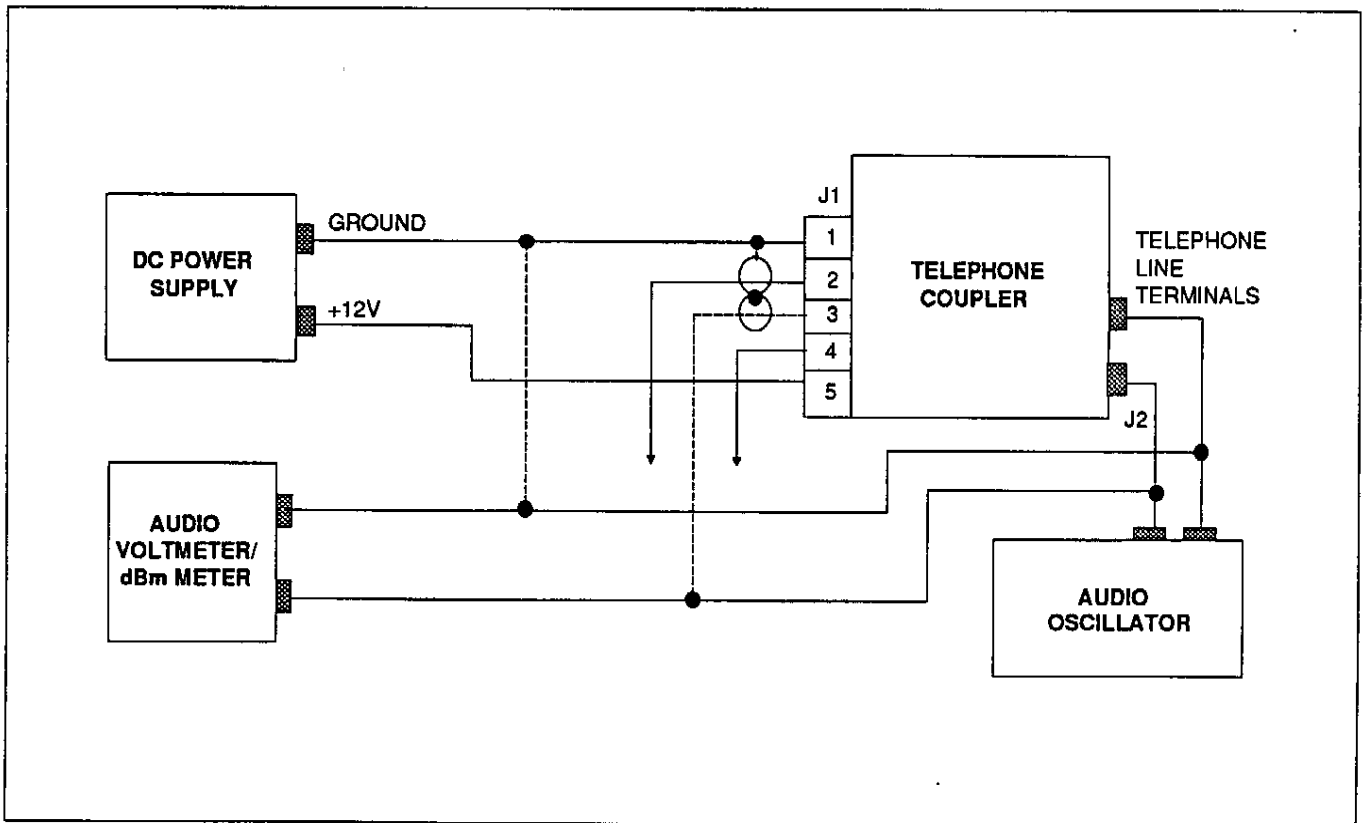


FIGURE 8. Transmit Check.

5.1.4 MANUAL OPERATION TEST

1. Turn the Mode Switch to the "MAN" position.
2. Place the TX/RX Switch in the "TX" position.
3. Check that the TX LED comes on.
4. Check that J1, pin 4, goes to a ground condition.

5.1.5 RX METER ADJUSTMENT

1. Connect the equipment as shown in Figure 9.
2. Inject a 1-kHz tone on J1, pin 2.
3. Connect dBm meter to J1, pin 2.
4. Adjust the amplitude of the 1-kHz tone input until the dBm meter reads 0 dBm (0.7 V).
5. Reconnect dBm meter to J2.
6. Turn the RX LEVEL control until the dBm meter reads 0 dBm (0.7 V).
7. Adjust R16 for 0 dBm on RX LEVEL meter.

5.1.6 BALANCE ADJUSTMENT

1. Disconnect dBm meter from J2.
2. Connect a 600-ohm resistor across J2.

3. Turn TX LEVEL control to "5".

4. Turn BALANCE control on rear panel until TX LEVEL meter is nulled (-20 dBm).

5.1.7 ANTI-VOX ADJUSTMENT

1. Disconnect 600 ohm resistor from across J2.
2. Turn RX LEVEL control until -6 dBm is measured on RX LEVEL meter.
3. Turn VOX GAIN and TX LEVEL controls to "10".
4. Turn MODE switch to VOX.
5. Adjust R4 until TX LED goes off.
6. Readjust R4 slowly until TX LED comes on.
7. Turn RX LEVEL control; TX LED should go off at -5dBm and come on at -6 dBm as measured on RX LEVEL meter.

5.1.8 HEADPHONE TEST

1. Plug in headphone on rear panel.
2. Turn RX LEVEL control; volume in headphone should increase and decrease with RX LEVEL meter.

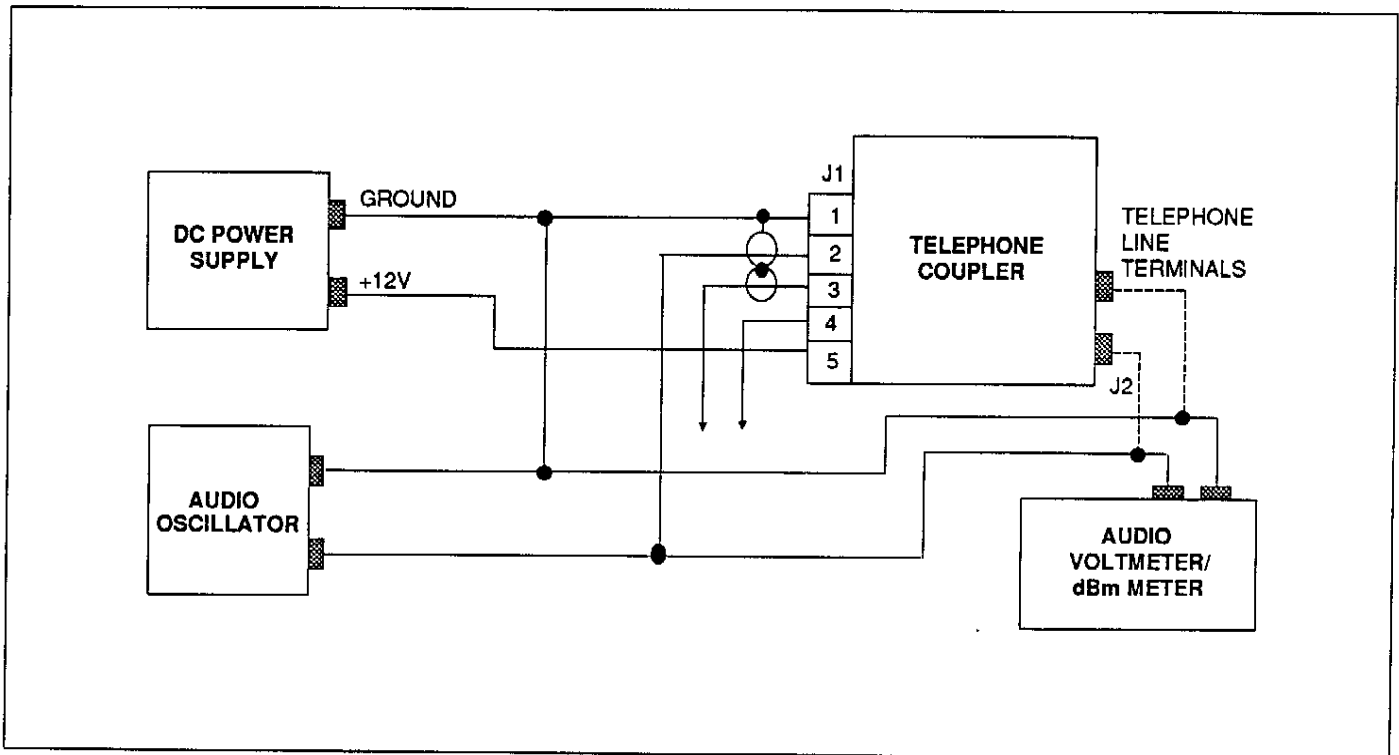
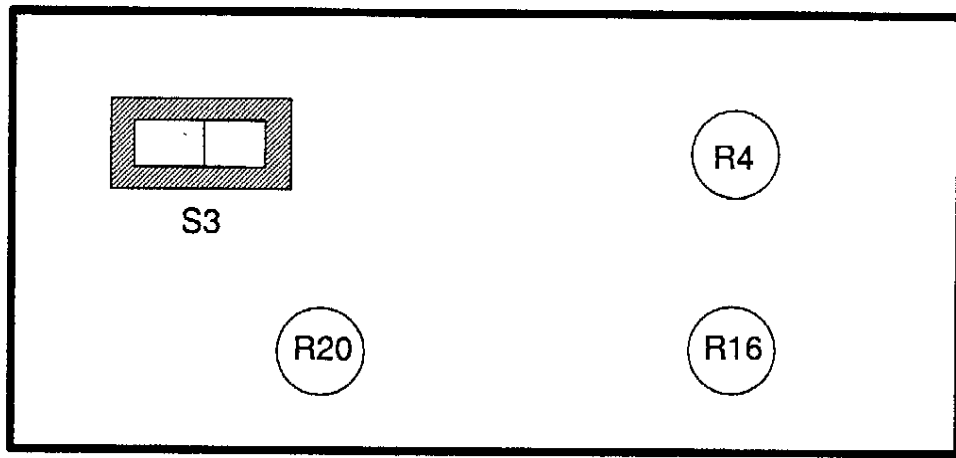


FIGURE 9. Receive Check.



**COMPONENT SIDE OF
735143 PCB**

FRONT PANEL

FIGURE 10. Telephone Coupler PCB Controls.

SECTION 6 THEORY OF OPERATION

6.1 RECEIVE AND TRANSMIT

The telephone line is connected across a hybrid circuit with one side coupled to the transmitter input and the other side connected to the receiver output. The input signal from the telephone is applied, via relay K1 in the VOX or MAN positions, to transformer T1. It then goes to the transmit level control R101 and to pin 5 of operational amplifier U1. The output of U1 (pin 7) goes via Q2 and transmit meter control potentiometer R20 to the transmit VU meter M2; the transmit output at U1-7 also goes through the VOX level control potentiometer R3 to the VOX circuit (U2-2); finally U1-7 is coupled via transformer T3 to pin 3 of output connector J1.

The receive signal from the transceiver comes in J1-2 and goes through transformer T2 to the RCV level control potentiometer R102. From there it goes to operational amplifier U1, pin 3. The output of U1 is pin 1 and it goes to three places: through Q1 and receive meter control potentiometer R16 to the receive VU meter M1; through anti-VOX control R4 to the anti-VOX circuit; and through hybrid transformer T1 to the telephone output terminals.

6.2 VOX

The transmit output at U1, pin 7, is fed through the VOX level control R3 to the VOX amplifier U2. The output is coupled through D5 to timer U3. When the level at U2-2 exceeds that at U2-3, then U2-6 will exceed U2-5 and the timer will be activated. Ordinarily, U2-7 is held high by the positive bias at pin 5. When the voltage at pin 6 exceeds that at pin 5, pin 7 will drop to 0 and the timer will fire. This applies a voltage at U3-3 and energizes relay K2, which grounds the PTT line going to output connector J1-4.

6.3 ANTI-VOX

The feed-through of receiver audio is capable of activating the VOX circuit under some circumstances. The anti-VOX circuit is incorporated to prevent this. Receiver audio is fed through control R4 to the anti-VOX circuit transistor Q3. Increasing values of receive audio will tend to turn Q3 on and reduce the voltage to timer U3, which makes it more difficult to trigger the output at pin 3.

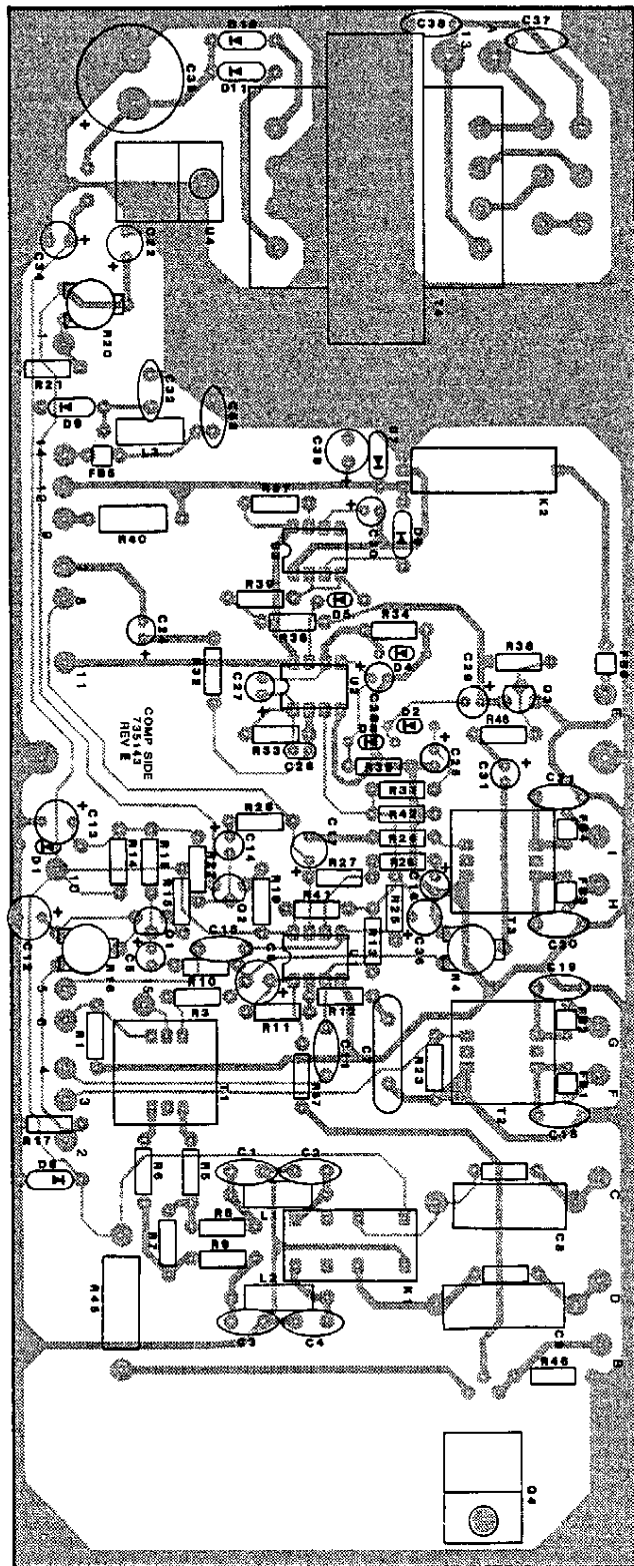


FIGURE 11.
Component Locations, Telephone Coupler.

TABLE 2.
Parts List, Telephone Coupler.

C1-4	211103	Capacitor, Disc 500 V 0.01 μ F
C5	275104	Capacitor, Monolithic 50 V 0.1 μ F
C6	231101	Capacitor, Electrolytic 16 V 100 μ F
C7	241020	Capacitor, Tantalum 2.2 μ F
C8-C9	255105	Capacitor, Mylar 1 μ F
C10		Not Used.
C11	241020	Capacitor, Tantalum 2.2 μ F
C12-C13	231500	Capacitor, Electrolytic 16 V 47 μ F
C14	214103	Capacitor, Monolithic 50 V 0.01 μ F
C15	241020	Capacitor, Tantalum 2.2 μ F
C16	241010	Capacitor, Tantalum 1 μ F
C17	231100	Capacitor, Electrolytic 16 V 10 μ F
C18-C21	211103	Capacitor, Disc 500 V 0.01 μ F
C22	231500	Capacitor, Electrolytic 16 V 47 μ F
C23		Not Used.
C24	214103	Capacitor, Monolithic 50 V 0.01 μ F
C25	231100	Capacitor, Electrolytic 16 V 10 μ F
C26	210102	Capacitor, Disc 25 V 0.001 μ F
C27	231100	Capacitor, Electrolytic 16 V 10 μ F
C28-C31	241010	Capacitor, Tantalum 1 μ F
C32,C33	210103	Capacitor, Disc 0.01 μ F
C34	231100	Capacitor, Electrolytic 16 V 10 μ F
C35	232222	Capacitor, Electrolytic 35 V 2200 μ F
C36	231101	Capacitor, Electrolytic 16 V 100 μ F
C37,C38	211103	Capacitor, Disc 500 V 0.01 μ F
C39	231100	Capacitor, Electrolytic 16 V 10 μ F
D1-D5	320002	Diode, 1N4148
D6-D11	320101	Diode, 1N4005
K1	540020	Relay, 12 V DPDT 1 A
K2	540203	Relay, 12 V SPDT
L1-L3	430014	Inductor, Molded 100 μ H
Q1-Q3	310006	Transistor, NPN 2N3565
Q4	310044	Transistor, FET VN46AF
R1	124101	Resistor, Film 1/4 W 5% 100 Ω
R2		Not Used.
R3	124101	Resistor, Film 1/4 W 5% 100 Ω
R4	170111	Resistor, Trimmer 5 k Ω
R5,R6	124330	Resistor, Film 1/4 W 5% 33 Ω
R7	124272	Resistor, Film 1/4 W 5% 2.7 k Ω
R8,R9	124270	Resistor, Film 1/4 W 5% 27 Ω
R10	124103	Resistor, Film 1/4 W 5% 10 k Ω
R11	124224	Resistor, Film 1/4 W 5% 220 k Ω
R12,R13	124472	Resistor, Film 1/4 W 5% 4.7 k Ω
R14	124224	Resistor, Film 1/4 W 5% 220 k Ω
R15	124101	Resistor, Film 1/4 W 5% 100 Ω
R16	170109	Resistor, Trimmer 50 k Ω

TABLE 2.
Parts List, Telephone Coupler, Continued.

R17	124104	Resistor, Film 1/4 W 5% 100 k Ω
R18	124473	Resistor, Film 1/4 W 5% 47 k Ω
R19	124101	Resistor, Film 1/4 W 5% 100 Ω
R20	170109	Resistor, Trimmer 50 k Ω
R21	124104	Resistor, Film 1/4 W 5% 100 k Ω
R22	124473	Resistor, Film 1/4 W 5% 47 k Ω
R23	124621	Resistor, Film 1/4 W 5% 620 Ω
R24	124561	Resistor, Film 1/4 W 5% 560 Ω
R25	124473	Resistor, Film 1/4 W 5% 47 k Ω
R26	124102	Resistor, Film 1/4 W 5% 1 k Ω
R27	124224	Resistor, Film 1/4 W 5% 220 k Ω
R28	124103	Resistor, Film 1/4 W 5% 10 k Ω
R29,R30		Not Used.
R31,R32	124103	Resistor, Film 1/4 W 5% 10 k Ω
R33	124224	Resistor, Film 1/4 W 5% 220 k Ω
R34	124473	Resistor, Film 1/4 W 5% 47 k Ω
R35	124105	Resistor, Film 1/4 W 5% 1 Ω
R36	124472	Resistor, Film 1/4 W 5% 4.7 k Ω
R37,R38	124105	Resistor, Film 1/4 W 5% 1 Ω
R39	124472	Resistor, Film 1/4 W 5% 4.7 k Ω
R40	134471	Resistor, Film 1/2 W 5% 470 Ω
R41,R42	124102	Resistor, Film 1/4 W 5% 1 k Ω
R43,R44		Not Used.
R45	144100	Resistor, Film 1 W 5% 10 Ω
R46	124221	Resistor, Film 1/4 W 5% 220 Ω
R47	124103	Resistor, Film 1/4 W 5% 10 k Ω
R48	124104	Resistor, Film 1/4 W 5% 100 k Ω
SW1,SW2		See Mainframe Parts List.
SW3	530401	Switch, DPDT
T1-T3	410019	Transformer, 600 Ω
T4	410020	Transformer, 28 V 400 mA
U1,U2	330019	IC, RC1458CP-1
U3	330094	IC, NE555N
U4	330007	IC, 7812CP

TABLE 3.
Parts List, Mainframe.

D101	320407	Diode, LED
F101	550016	Fuse, 1/4 A 3 AG
M101,M102	740007	Meter
R101-R103	170001	Resistor, Control Audio 10 k Ω
R104*	170020	Potentiometer, Linear 1 k Ω

*Located on rear panel.