TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL

CONVERTER, TELEPHONE SIGNAL CV-1918/G

(NSN 5805-00-252-5767)

H E A D Q U A R T E R S , D E P A R T M E N T O F T H E A R M Y

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OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL CONVERTER, TELEPHONE SIGNAL CV-1918/G (NSN 5805-00-252-5767)

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This technical manual is an authentication of the Instruction Manual literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

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CHAPTER 1
INTRODUCTION

1.0. Scope

This maintenance manual describes and covers operation, installation, theory of operation, and organizational maintenance of the Telephone Signal Converter CV-1918/G. The Telephone Signal Converter CV-1918/G, commonly referred to as the Converter within this manual, has been designed for use with the Seventh Army Tactical Switching System (SATSS).

2.0. Forms and Records

2.1. Indexes of Publications

a. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. Refer to the latest issue of DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the system.

2.2. Reports

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR4145.8.

c. Discrepancy in Shipment Report (DISREP) (SF361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33A/AFR 75-18/MCO P4610.19B, and DSAR 4500.15.

2.3. Reporting of Errors

Report of errors, omissions, and recommendations for improving this publication is authorized and encouraged. Report should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to Commander, US Army Electronics Command, ATTN: DRSEL-MA-Q Fort Monmouth, NJ 07703.

2.4. Administrative Storage

For procedures, forms and records, and inspections required during administrative storage of this equipment, refer to TM 740-90-1.

2.5. Destruction of Army Materiel.

Demolition and destruction of electronic equipment will be under the direction of the commander and in accordance with TM 750-244-2.

3.0. Purpose and Use

3.1. The Telephone Signal Converter CV-1918/G is an eight-channel transistorized, two-four wire telephone signal converter designed to function within, and in conjunction with, the Tactical Automatic Switching Network (TAS). The Converter is designed for use with the following listed equipments.

Central Office, Telephone, Automatic ANITTC-25137 (TAS).
Central Office, Telephone, Manual ANITTC-15 ( ).
Communications Center AN/TSC-41 ( ).
Switchboard, Manual ANITTC-7.
Cable, Telephone WF-16 ( )/U.
Cable, Telephone WM- 130 ( )/[U.

3.2. The Converter interfaces telephone signals between the AN/TTC-25137 Central Office, Telephone, Automatic and the AN/TTC-7 Central Office, Telephone, Manual.

4.0. Technical Characteristics

Power Requirements	48 volts dc, (supplied from AN/TTC-7)
Number of Channels	8
Frequency Range	300 to 3500 Hz
Insertion Loss	Less than 5 db
Channel Crosstalk	-50db maximum
Four-Wire: Impedance	600 ohms ± 10%
Harmonic Distortion	Maximum of 30 db below a fundamental within the frequency range of 300 to 3500 Hz transmitted at zero dbm level
Noise Level	23 dba or less
Signaling Level	-14 dbm ±2 db
Receiving Sensitivity	Down to - 25 dbm
Hybrid Transhybrid Loss	Shall not exceed 30 db with two wire port terminated in a 600 ohm resistive load.
Longitudinal Balance	40 db minimum
Digit Frequencies (Hz)	
1	697/1209
2	697/1336
3	697/1477
4	770/1209
5	770/1336
6	770/1477
7	852/1209
8	852/1336
9	852/1477
0	941/1336
C	941/1477
R	941/1209

Supervisory Frequencies (Hz) (generated by Converter unless otherwise noted)

Release 2600
Seize 2250
Ring Back ..... 425 interrupted at two seconds on, four seconds off
Release/Seize Acknowledge 570
Busy from Switching Center ..... 425 interrupted at one-half second on, one-half second off
Test Tone from Switching Center 1050
Operating Temperature ..... -0° F. to + 125° F.

4.1. Additional Equipments Required for AN/MTC-1 Central Office Installation

Installation Kit CV-1918/G-AN/MTC-1 - NEC P/N 111155

An installation kit is shipped with each Converter. The installation kit furnished with the AN/MTC-1 is not the same as the one furnished with the AN/MTC-9. Check to make certain the kit furnished coincides with the particular installation.

NEC P/N

3 Interconnect Cables, 5' long (54 conductor) 111061
1 Power Interconnect Cable 12'long(48 volt) 111064
6 Interconnect Cables, 8' long (54 conductor)
1 Mounting Board, and Hardware 111131
1 Converter, Part II, Mounting Strap 109527
3 Receptacle Mounting Brackets 111081-111083
3 Terminating Plugs

NOTE

Cable identification is in the form of tags secured to the cables. The identification of each cable is very important and should be carefully observed when installing the cables. Reference paragraph 6.5. Cable identification is listed below. 3 Interconnect Cables, 5' long. NEC Part No. 111061. 6 Interconnect Cables, 8' long, each identified with 3 tags as follows:

Cable No.	*Qty*	One *end*	*Center*	*Opposite end*
1	2	P101	P/N 111109	P201
2	1	P102	P/N 111119	P202
4	2	P201	P/N 111110	P301
5	1	P202	P/N 111120	P302

1 Power Cable, 12' long, NEC Part No. 111064
3 Terminating Receptacles are identified as follows:

1. NEC Part No. 111129
2. NECPartNo.111130
3. NEC Part No. 117086

4.2. Additional Equipment Required for AN/MTC-9 Central Office Installation

NEC P/N

Installation Kit for CV-19181G ANIMTC-9 111156
24 Interconnect Cables, 8' long (54 conductor) listed below
3 Interconnect Cables, 5' long (54 conductor) 111061
1 Power Interconnect Cable, 25' Long 111065
1 Mounting Board and Hardware 111131
1 Converter, Part II, Mounting Strap 109527
1 Terminating Connector Plug 111129
1 Terminating Connector Plug 111130
1 Terminating Connector Plug 117086
1 Connector Mounting Bracket 111081
1 Connector Mounting Bracket 111082
1 Connector Mounting Bracket 111083
1 Connector Mounting Bracket 111084
1 Connector Mounting Bracket 111085
1 Connector Mounting Bracket 111086
1 Connector Mounting Bracket 111087
1 Connector Mounting Bracket 111088
1 Connector Mounting Bracket 111089

NOTE

Cable identification is in the form of tags secured to the cables. The identification of each cable is very important and should be carefully observed when installing the cables. Reference paragraph 6.6. Cable identification is listed below. 24 of the 8' interconnect cables are identified in three places on the cables as indicated.

3 Interconnect cables, 5' long- NEC Part No. 111061

Cable No.	*Qty*	One *end*	*Center*	*Opposite end*
1	2	P101	PIN 111111	P201
2	1	P102	PIN 111121	P202
3	2	P201	PIN 111112	P301
4	1	P202	PIN 111122	P302
5	2	P301	PIN 111113	P401
6	1	P302	PIN 111123	P402
7	2	P401	PIN 111114	P501
8.	1	P402	PIN 111124	P502
9.	2	P51	PIN 111115	P601
10.	1	P502	PIN 111125	P602
11	2	P601	PIN 111116	P701
12	1	P602	P/N 111126	P702
13	2	P701	PIN 111117	P801
14	1	P702	PIN 111127	P802
15	2	P801	P/N 111118	P901
16	1	P802	PIN 111128	P902

1 Power Cable, 25' long- NEC P/N 111065
1 Mounting Board-NECP/N 111131; 1 Mounting Strap-NEC PIN 109527;
3 Terminating Plugs are identified as follows: 1. NECP/N 111129; 2. NECP/N111130; 3. NEC P/N 117086

CHAPTER 2

INSTALLATION

5.0 UNPACKAGING

5.1 Packaging Data. When packed for shipment, the Converter is placed in sealed wooden cartons. Removal will require the use of basic hand tools, such as crowbar, claw hammer, etc.

5.2 Removing Contents

5.2.1 Open the sealed cartons and remove the cushioning material. Be careful not to damage contents.

5.2.2 Remove Part I, Part II, and Part III of the CV-1918/G Converter.

5.2.3 Unpack the material in the installation kit.

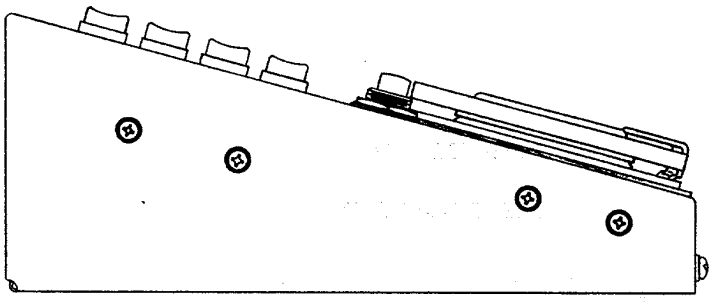
5.3 Check Unpacked Equipment

5.3.1 Check the equipment against packing list.

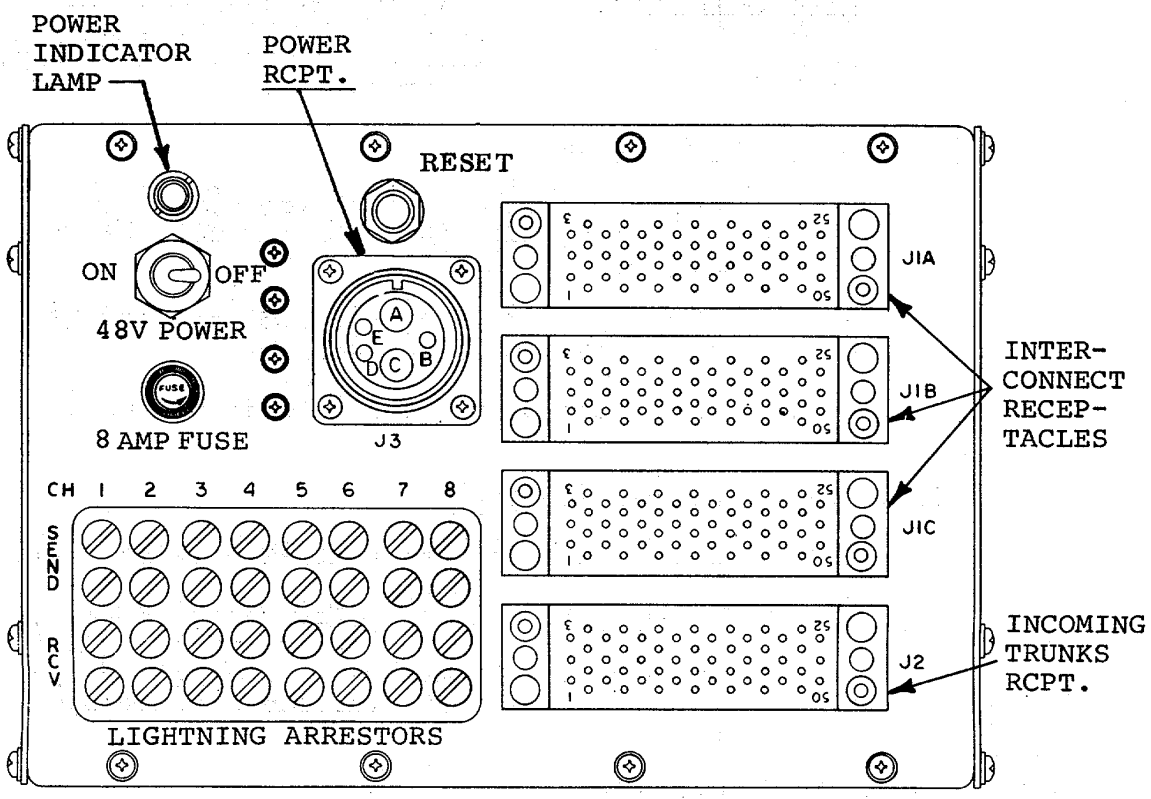
5.3.2 Inspect the Converter for damage that may have occurred during shipment. Fill out a report of damage or improper shipment, if necessary (reference paragraph 2.O)*

6.0 INSTALLATION (See Figure 1)

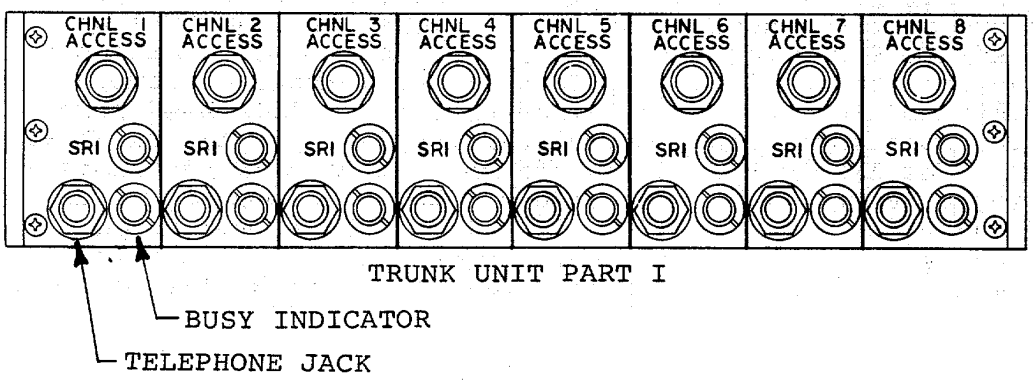
The CV-1918/G Converter is comprised of three separate units: Part I, Part II, and Part III. Part I is the operator's trunk unit and is installed in the front panel of each of the operator's consoles located in either the AN/MTC-1 or the AN/MTC-9 Central Offices. Part II of the Converter contains the channel module, preempt module, and the common circuit module, and is installed on the top left-hand side of the operator's console (nearest the door) in the AN/MTC-1 and/or the AN/MTC-9 Central Offices (one Part II per installation). Part III of the Converter contain-s the keyswitch and the electronic circuitry for digit, seize, and release frequency selection. This unit comes equipped with a telephone dial, which replaces the telephone dial on the keyshelf



KEY CALL PEDESTAL PART III



CONVERTER PART II



TRUNK UNIT PART I

FIGURE 1 Major Units of the Telephone Signal Converter, CV-1918/G

of the operator's console. Part III of the Converter is installed on the top right-hand surface of the keyshelf on each of the operator's consoles in either the AN/MTC-1 or the AN/MTC-9 Central Office. The following preliminary preparation procedure contains instructions for installing cable connectors and the night alarm control in the AN/MTC-1 or the AN/MTC-9 Central Offices.

6.1 Preliminary Preparation of the Switchboard.

The following preparation instructions are applicable to the AN/MTC-1 and/or the AN/MTC-9 Central Offices for installation of the CV-1918/G Converter. Preliminary preparation should be accomplished in the sequence recommended below and should be completed before attempting to install the CV-1918/G Converter units. The dimensional differences between the AN/MTC-9 and AN/MTC-1 Central Offices have been considered and this installation procedure is flexible enough to accommodate these variations. The AN/TTC-7 Central Office, Telephone, Manual (or operator's console, as it is referred to in this manual) closest to the door of the shelter in the AN/MTC-1 is referenced as position one. The operator's console furthest from the door in the AN/MTC-9 is referenced as position 1.

6.1.1 Locate the two bolts and nuts fastening the spacer board to the framework on the back of the position closest to the door in the AN/MTC-1 or AN/MTC-9 (see Figure 2). Remove the two bolts and nuts securing the spacer board into place.

6.1.2 Locate the mounting board and hardware furnished with the Converter. (Installation Kit).

6.1.3 Place the mounting board on top of the frame from which the two nuts and bolts were removed (step 6.1.1) and slide towards the front of the operator's console. Make certain the tapered end slides under the steel storage bin on the top of the operator's console.

6.1.4 Slide the board into position until the two holes in the mounting board line up with the holes in the frame from which

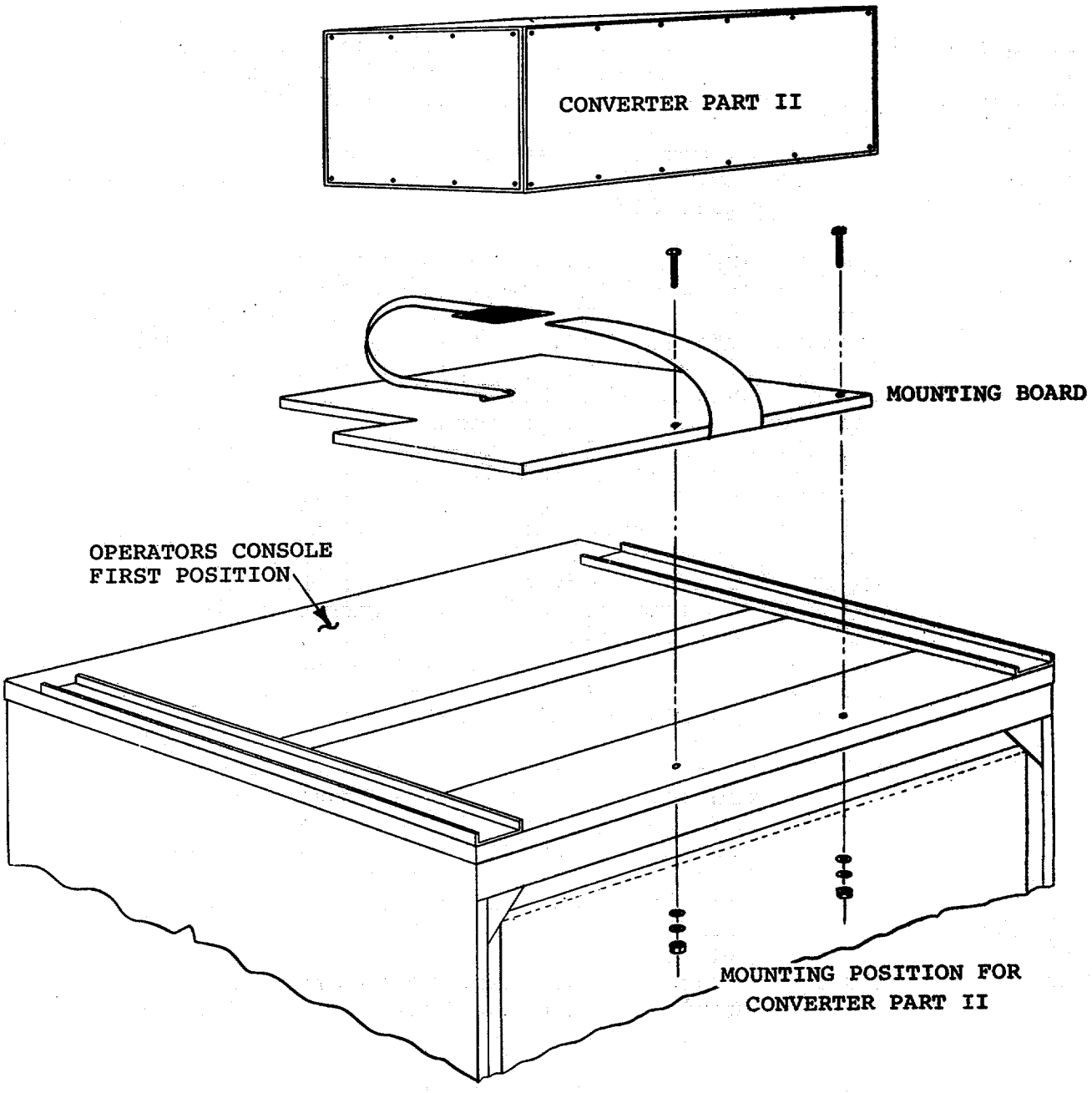


FIGURE 2 Mounting Position of Converter Part II, CV-1918/G

the two bolts and nuts were removed (step 6.1.1).

6.1.5 Secure' the mounting board into place by inserting the two bolts, furnished with the board, through the holes in the board and frame on the console. Turn the nuts on the bolts and tighten securely.

6.1.6 Locate the line cable connector for the last group of incoming line positions on the back of the first position in the AN/MTC-1 Central Office and position eight in the AN/MTC-9 Central Office and remove it from the receptacle. Tag or mark it for future use. This cable will be used as the special trunks cable for Part II of the Converter.

6.1.7 Locate the wire channel raceway (on the ceiling and right side of either the AN/MTC-1 or the AN/MTC-9 Central Office) which contains the wiring for the night alarm.

6.1.8 Remove the cover from this raceway. This raceway will be utilized when installing Part II of the Converter.

6.1.9 Locate the 48 volt power receptacle on the last operator's console (position farthest from door). See Figure 3.

6.1.10 Locate the 48 volt power cable furnished for this installation.

NOTE

The power cables furnished with the Converters that are to be installed in the AN/MTC-1 Central Office are 12 feet in length. The power cables furnished for the AN/MTC-9 Central Office installation are 25 feet in length.

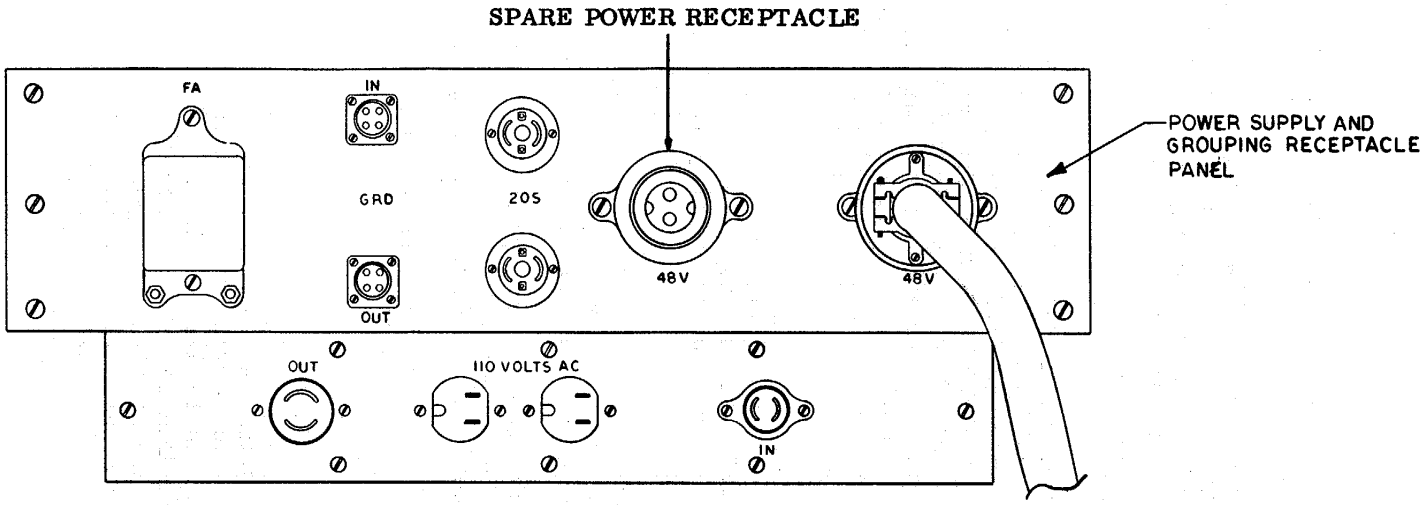


FIGURE 3 Power Panel, AN/TTC-7

6.1.11 Carefully dress the power cable into position, running the cable across the back of all the operator's consoles except for the one farthest from the door. Dress the cable up the back right-hand side of the first position to the Converter unit located on the top of the operator's console. (See Figure 4.) Do not plug cable into the Converter power receptacle at this time.

6.2 Instructions for Installing Part I of the Converter. Part I of the Converter is commonly referred to as the operator's trunk unit. To install this unit, it is first necessary to dismantle part of the SB-249/TTC-7 Switchboard, Telephone, Manual, located in either the AN/-MTC-1 or the AN/MTC-9 Central Offices. The face equipment of the SB-249/TTC-7 Switchboard is shown in Figure 5. First, the spacer strip between the dial or manual trunk jacks and lamps and the ringing key and lamp strip must be removed. The spacer strip is a one inch wide phenolic strip utilized as a spacer between the other two strips. The spacer strip directly below the ringing key and lamp strip must also be removed and the ringing key and lamp strip displaced downward into the position left vacant by the key and lamp spacer strip. The following procedure should be followed during the removal of the spacer strips, the displacement of the ringing indicator strip, and the installation of Part I of the Converter.

6.2.1 Locate the three strips mentioned in paragraph 6.1 in Figure 5.

6.2.2 Locate the jack fasteners and jack fastener screws associated with these particular strips on the rear of the SB-249/TTC-7 Switchboard. (See Figure 6.)

6.2.3 Loosen the jack fastener screw at each end of the strips to be removed. Use an 18 inch lonq screwdriver.

6.2.4 Turn the jack fasteners so that the strip being removed is clear and slide

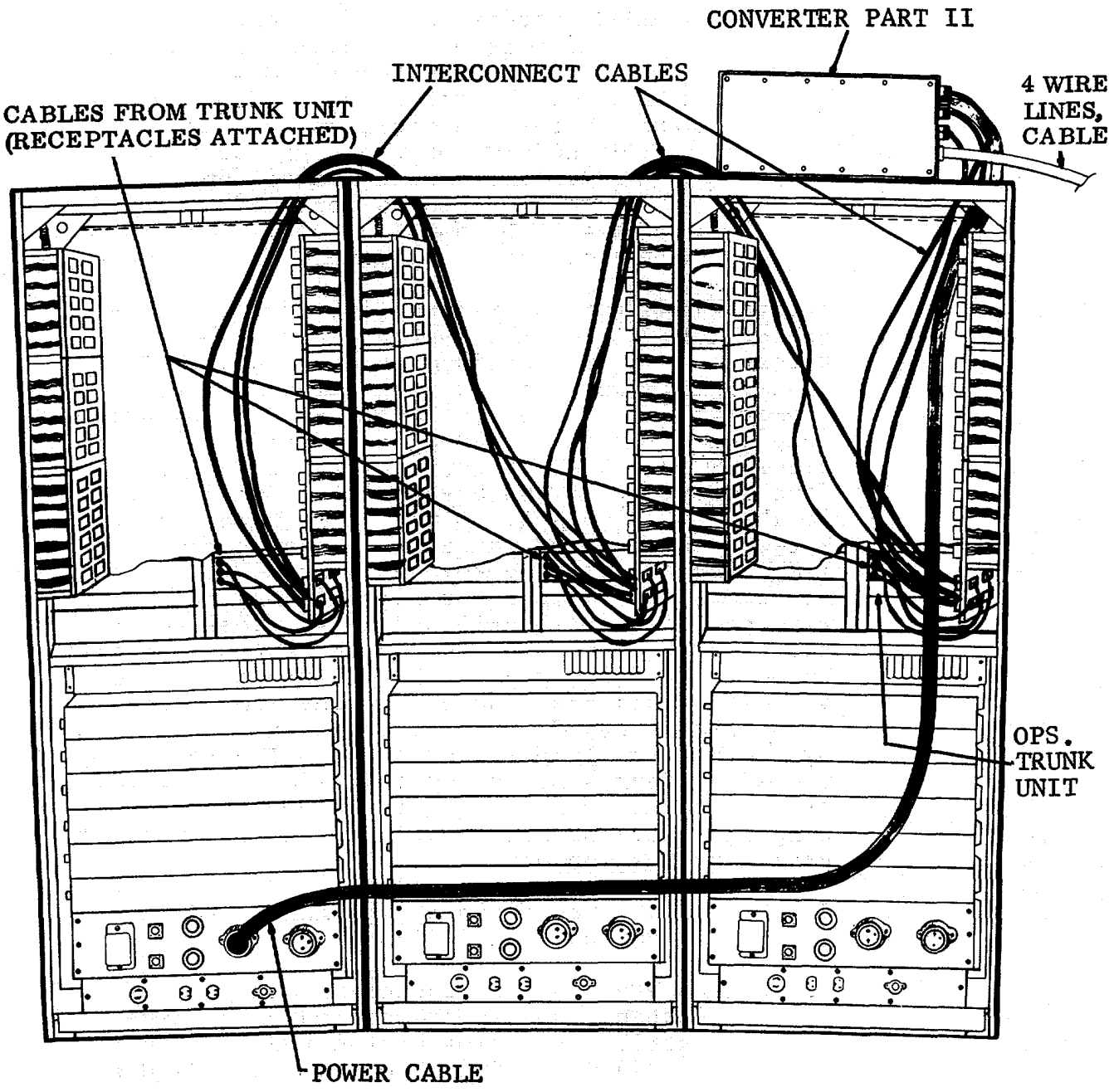


FIGURE 4 Operators Console, AN/TTC-7, Rear View

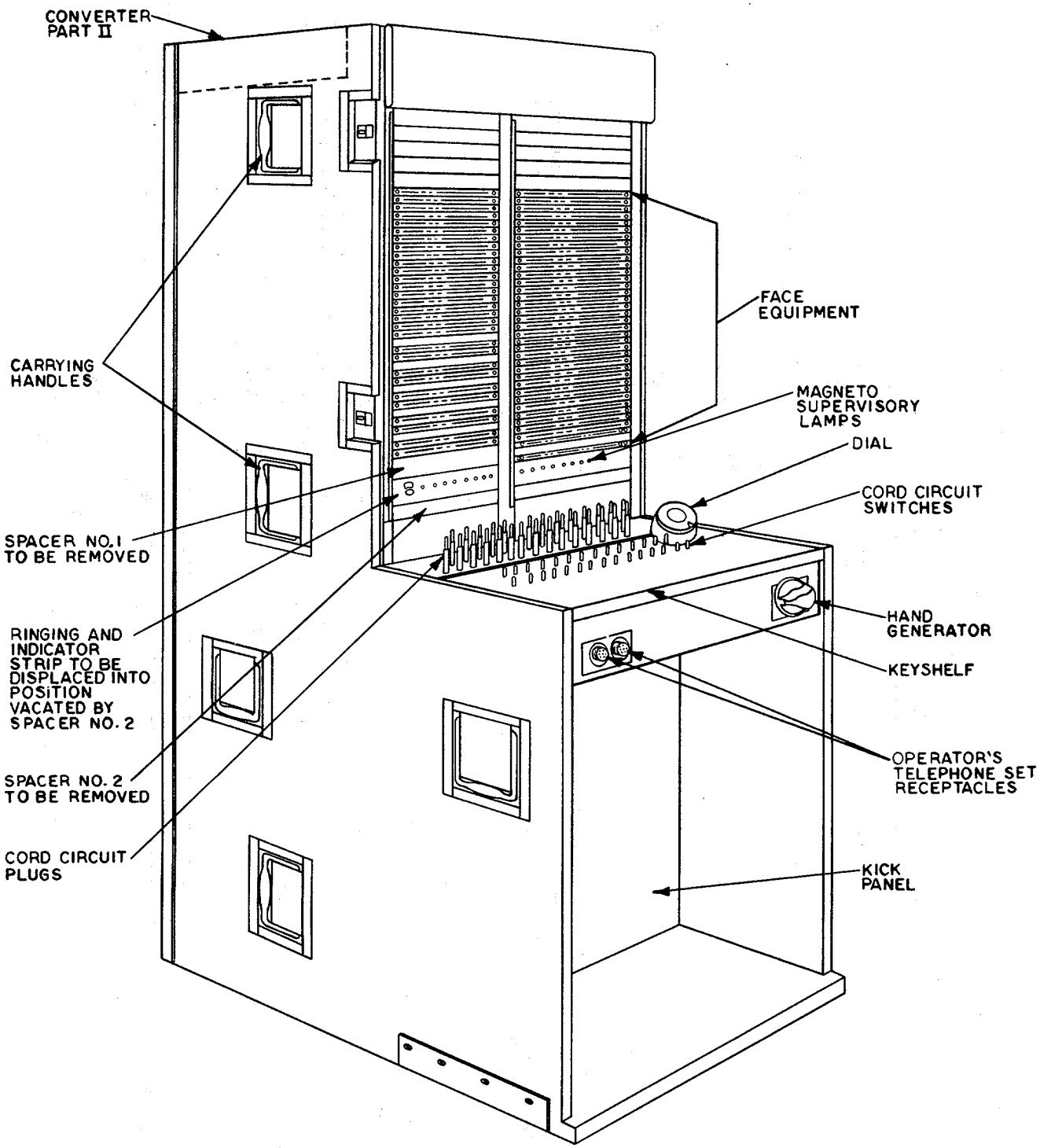


FIGURE 5 Operators Console, AN/TTC-7, Front View

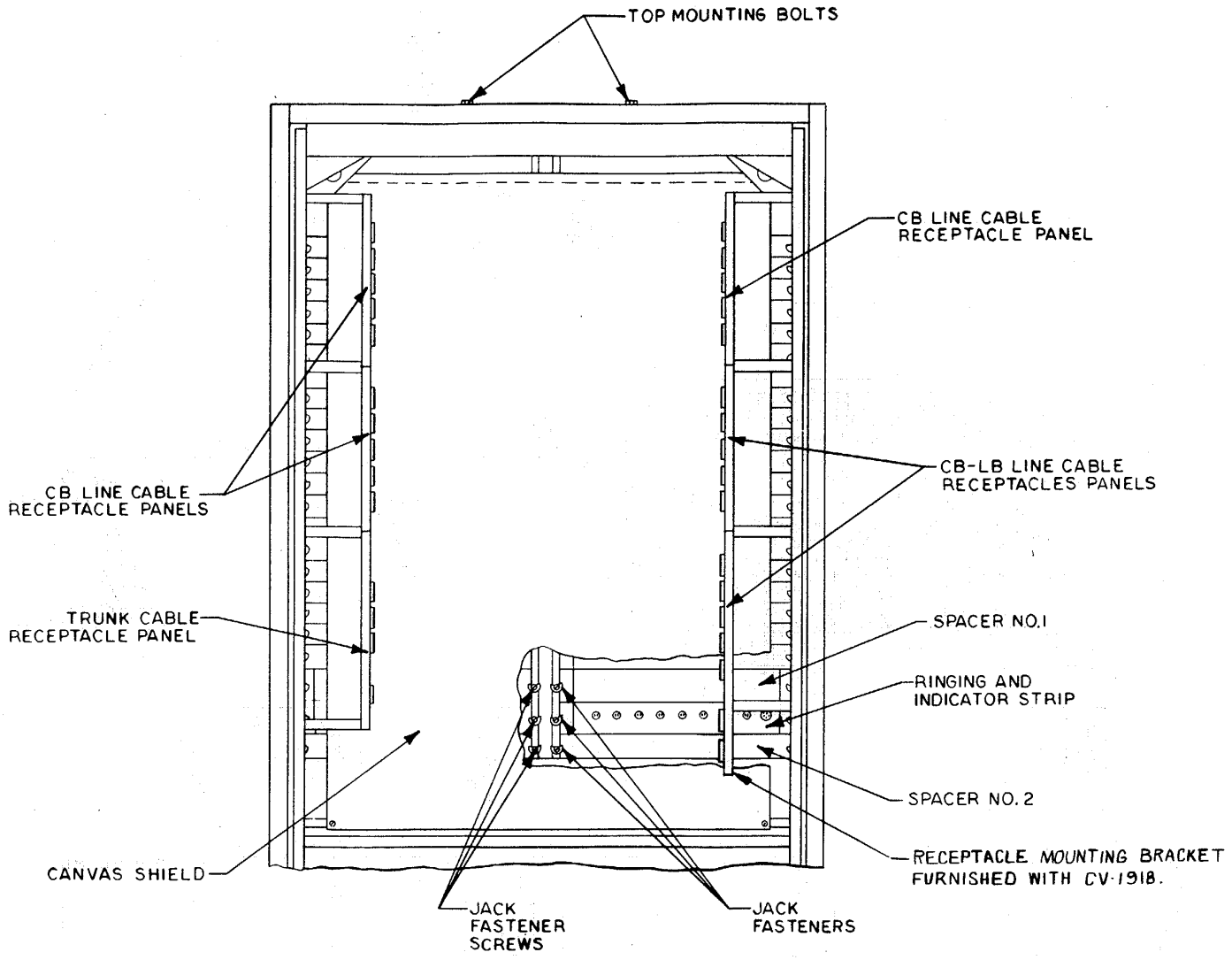


FIGURE 6 Operators Console, SB-249/TTC, Rear View

it toward the rear of the SB-249/TTC-7 Switchboard about one-half inch.

NOTE

Strips to be removed are designated 1 and 2 in Figure 5 and should be removed in that sequence. The strips may fit tightly into the front panel, therefore, if necessary, place a small blunt tool against the strip to be removed and tap gently with the heel of the hand.

6.2.5 Slide the spacer strips out of the face equipment by pulling the end (toward the center of the position) out first and then swinging the other end out of the face equipment.

6.2.6 After both spacer strips have been removed, slide the ringing indicator strip down into the space left by the number 2 spacer strip. This leaves space above the ring indicator strip for Part I of the Converter.

6.2.7 Insert Part I of the Converter into the empty space above the ring indicator strip by carefully working the unit into position through the rear of the manual telephone switchboard.

6.2.8 Turn the jack fasteners so they are seated into the face equipment.

6.2.9 Tighten the jack fastener screws so the jack fasteners secure the ringing indicator strip and Part I of the Converter into the face equipment.

6.3 Instructions for Installing Part II of the Converter. The Converter, Part II, contains the common circuitry and the channel control circuitry. Part II of the Converter is installed on the top left corner of the operator's console, position nearest the door of the van or shelter (as viewed

from the front). (See Figure 5.) The following instructions should be followed in sequence to avoid any unnecessary installation problems.

6.3.1 Remove Part II of the Converter from the packing case (reference paragraph 5.0). Check the pins on the connectors to make certain they are free from dust, dirt, etc., and have not been damaged in shipment.

6.3.2 With a clean cloth, wipe the outer surface of Part II of the Converter and all surfaces of the mounting board (reference paragraph 6.1) upon which Part II of the Converter will be installed.

6.3.3 Place Part II of the Converter on the top surface of the mounting board with the control panel facing the door of shelter. Be extremely careful not to break any wires or damage any of the wiring associated with the SB-249/TTC-7 Switchboard.

6.3.4 Secure Part II of the Converter to the top of the mounting board by cinching down the strap which is furnished with the mounting board.

6.3.5 Remove the dust cover from Part II of the Converter and expose the circuit cards. Check all circuit cards to insure they are seated firmly in their associated connectors. Part II of the Converter is normally operated with the dust cover removed. Leave the dust cover off and store it in a convenient place for future use.

6.3.6 Check that the power ON-OFF switch on the front panel of the Converter (Part II) is in the OFF position.

NOTE

Part II of the Converter mounts on its side within the AN/MTC-9 Central Office.

The dust cover should be removed before installation. The printed circuit cards will protrude towards the ceiling of the van when the Converter is mounted in this position.

6.4 Instructions for Installing Part III of the Converter. (Key Call Pedestal). Part III of the Converter, hereinafter called Key Call Pedestal, (see Figure 1) contains the DTMF oscillator circuitry, as well as the seize and release frequency control pushbuttons and the keysender. Figure 7 is a drawing of the key-shelf used in the AN/MTC-1 and AN/MTC-9 Central Offices, which illustrates the location of the Key Call Pedestal. Figure 8 is a bottom view of the Key Call Pedestal (with the hinged bottom plate open) showing the circuitry and the terminal blocks to be utilized in this installation. The following installation instructions should be followed in sequence when installing the Key Call Pedestal to avoid any unnecessary problems. Figure 9 is a view of the underside of the keyshelf (on the operator's console) showing the location of the wires to be utilized in this installation.

6.4.1 Locate the telephone dial on the keyshelf..

6.4.2 Loosen the screw on the side of the dial housing that secures the dial to the housing.

6.4.3 Lift the dial from the dial housing.

6.4.4 Remove the two screws from the dial housing cap; then remove the terminal post housing that secures the dial to the dial housing cap.

6.4.5 Remove all the wires from the terminal posts on the dial housing cap.

6.4.6 Lift the dial from the cap and remove the wires from the dial.

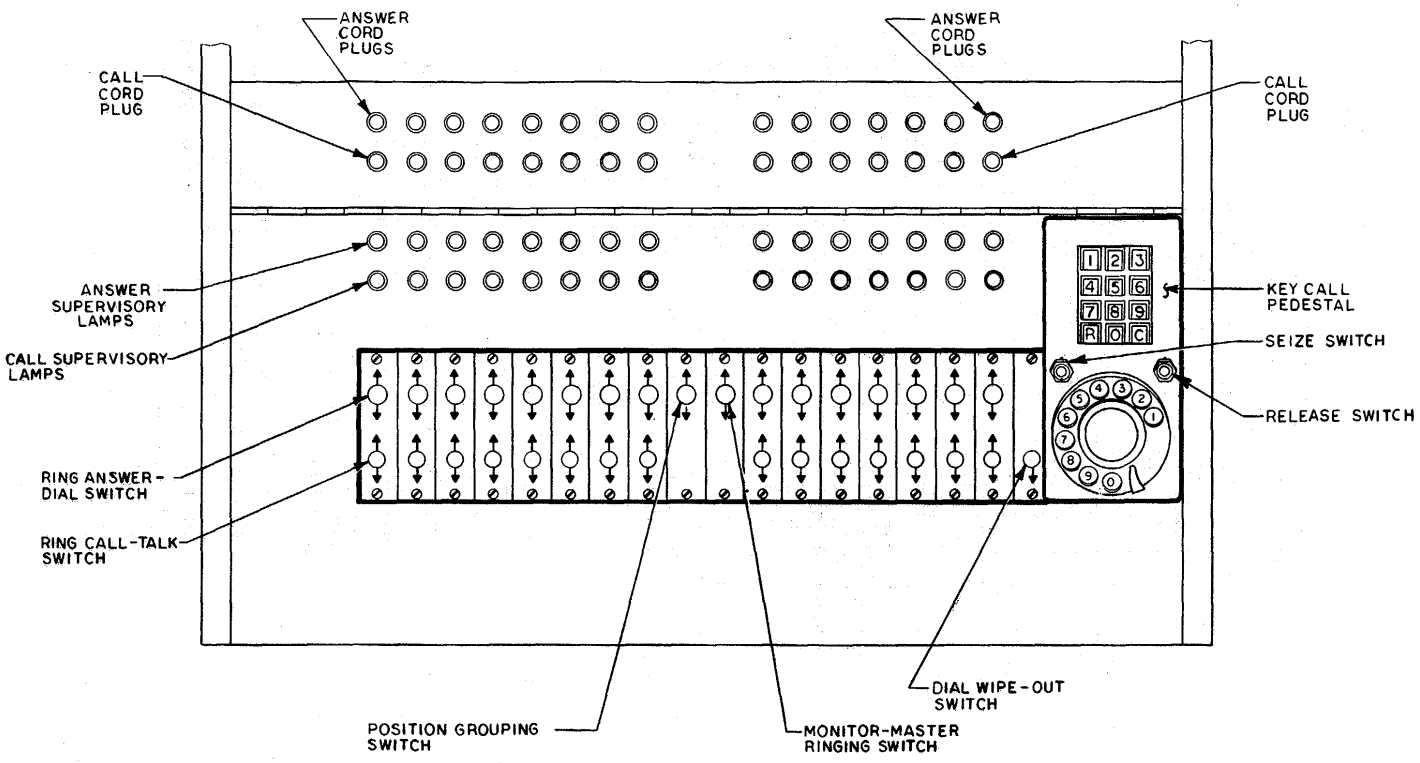


FIGURE 7 Operators Keyshelf, AN/TTC-7, Pedestal Installed

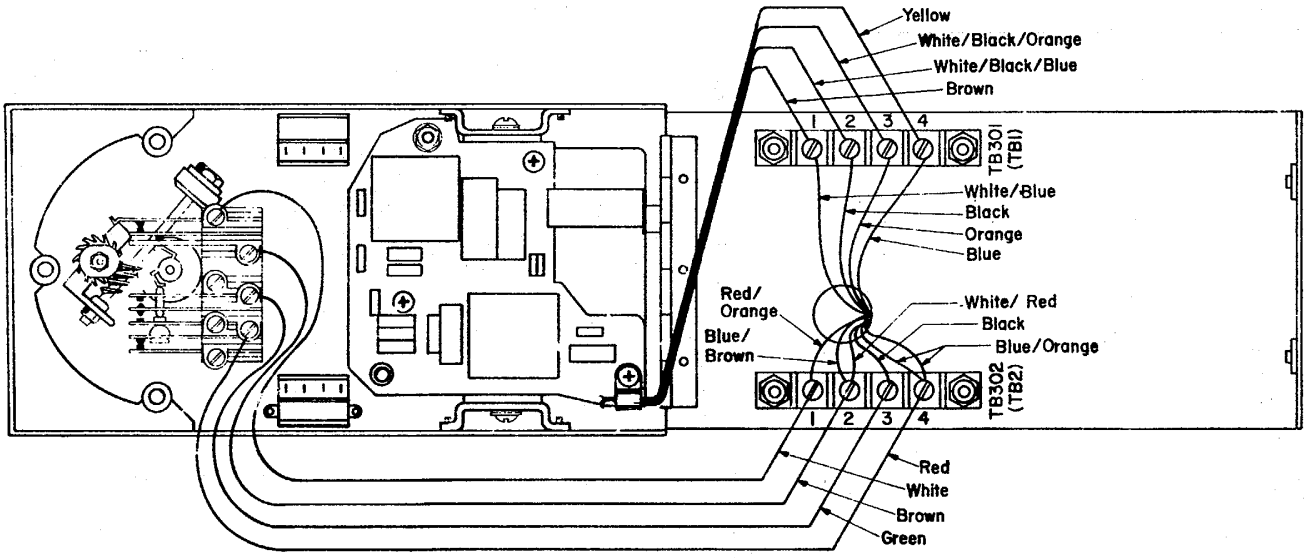


FIGURE 8 Keycall Pedestal, CV-1918/G, Open

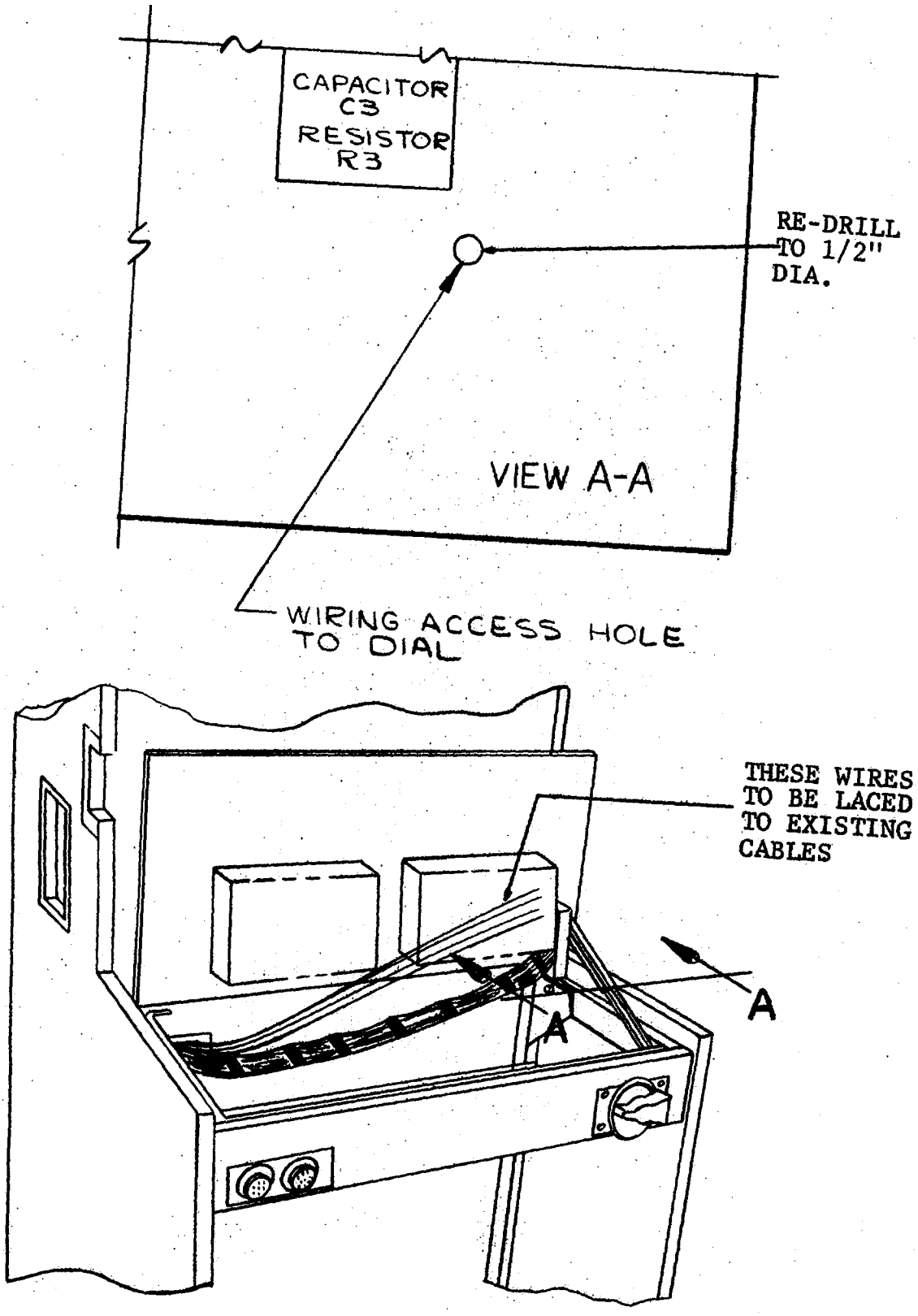


FIGURE 9 Operators Keyshelf, AN/TTC-7, Bottom View

6.4.7 Remove the terminal screws in the dial housing base (which is still attached to the keyshelf) and free the wires protruding through the keyshelf and housing base.

6.4.8 Remove the two wood screws that secure the dial housing base to the keyshelf. Do not discard the screws.

6.4.9 Remove the dial and housing from the keyshelf and store for future use. Be careful not to damage the wires protruding through the keyshelf.

6.4.10 Lift the keyshelf into the vertical position. Carefully pull the six wires, protruding through the hole, downwards, removing them from the hole in the key-shelf.

6.4.11 Using an electric drill, select a one-half inch bit and redrill the hole in the keyshelf to one-half inch diameter. (See Figure 9.)

6.4.12 Thread the six wires removed in step 6.4.10 through the enlarged hole in the keyshelf.

6.4.13 Feed the four wires from Converter, Part I, through the same hole in the keyshelf.

6.4.14 Using lacing cord, lace the four wires from Converter, Part I, to the existing cable on the underside of the keyshelf. (See Figure 9.)

6.4.15 Lower the keyshelf into the normal position.

6.4.16 Locate the Key Call Pedestal and remove the two screws in the hinged bottom plate that secures the plate to the case.

6.4.17 Lay the Key Call Pedestal on its side to expose the terminal strips and internal circuitry.

6.4.18 Thread the 10 wires which protrude through the hole in the keyshelf through the large hole in the Key Call Pedestal bottom plate.

6.4.19 Utilizing the two wood screws removed in step 6.4.8, secure the Key Call Pedestal to the keyshelf. Align the two screw holes in the hinged plate of the Key Call Pedestal with the holes in the keyshelf.

6.4.20 Loosen the screws of both terminal blocks located on the Key Call Pedestal.

6.4.21 Attach six of the wires protruding through the opening in the Key Call Pedestal to TB302. These wires are the four wires that were removed from the dial housing in step 6.4.6. See Figure 8 for proper connection.

6.4.22 Attach the four wires from Part I of the Converter to TB301. Observe color codes referenced in Figure 8.

6.4.23 Double check all wiring against Figure 8 to insure that the wires are terminated in the proper place. Insure that all connections are tight.

6.4.24 Close the top of the Key Call Pedestal on the hinged plate and secure with the two screws removed in step 6.4.16. The Key Call Pedestal is now ready for operation.

6.5 Interconnect Cabling Instructions (CV-1918/G -AN/MTC-1).

6.5.1 The interconnect cables supplied for the installation of the Converter into the AN/MTC-1 and AN/MTC-9 are special cables and cannot be randomly interchanged. The connector receptacle panels furnished for this installation are stenciled to agree with the marker tag on the cable. For example, the connector receptacle panel for position one is stenciled J101, J102 and J103. The

connector receptacle panel for position two is stenciled J201, J202 and J203, for position three, J301, J302 and J303, etc. The interconnect cable polarity is identified by the cable tags. The cables must be connected in the proper polarity. The following procedures must be followed when installing the cables to assure that the cables are installed correctly. An installation chart is included to help clarify the installation procedures. The chart should be used in conjunction with the following instructions.

6.5.2 AN/MTC-1 - Installation

a. Locate and identify all the cables supplied for this particular Converter installation.

b. Locate the three receptacle panels supplied with this installation. Each panel is identified as to the operator's position on which it has to be installed. (See Figure 10.)

c. The receptacle panels will be installed onto existing panels containing line receptacles for CB/LB lines 00 through 99 on the back of each operator's console.

d. Install the panel for position one (marked on panel) to the bottom of existing panel.

e. Locate the three cables protruding from the Converter, Part I, (installed as per paragraph 6.2 of this manual). These cables are identified as JX01, JX02 and JX03. Insert the receptacle on the end of Cable No. 1 into the position identified as J101 in the new receptacle panel. Insert the receptacle on Cable No. 2 into the position identified as J102 and Cable No. 3 into the position identified as J103.

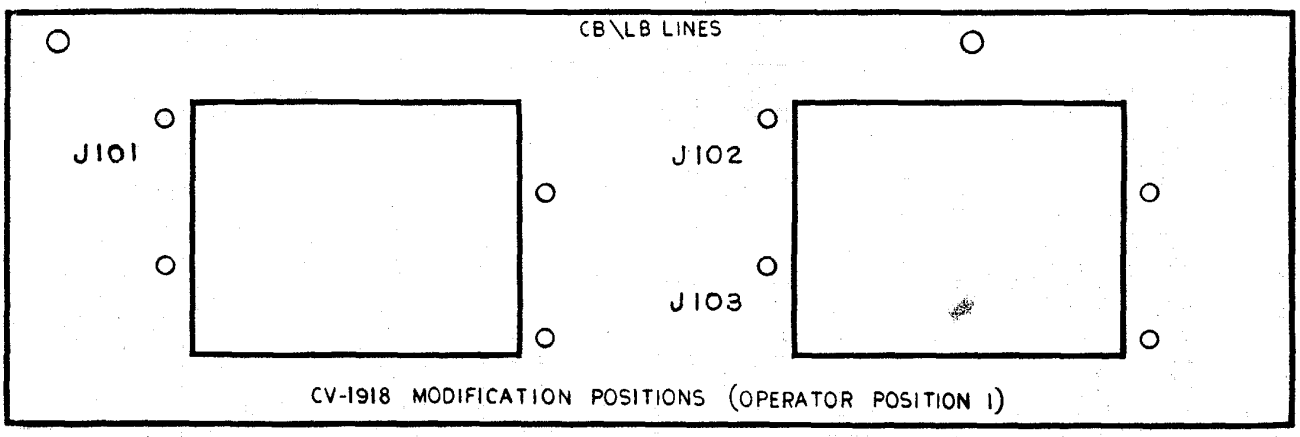


FIGURE 10 Receptacle Panel, CV-1918/G

f. Repeat step e above for each position making certain that on Position 2 the receptacles from the cables from Converter, Part I, identified as JXO1, JXO2 and JX03 are installed into positions J201, J202 and J203, respectively, and the cable receptacles for Position 3 are installed in J301, J302 and J303, respectively.

g. Locate the three 5' interconnect cables identified as Part No. 111061. These cables are identical and interchangeable with each other. Connect one of the cables from Converter, Part II, J1A to the receptacle on Position 1 identified as J101. Connect the second cable between J1B on Converter, Part II, to J102 receptacle. Connect the third cable between J1C on the Converter, Part II, to J103 receptacle. See Figure 4 when dressing cables into place.

h. Locate the six 8' interconnect cables furnished with the Converter. Connect these cables between consoles. (See Figure 4.)

NOTE

These cables are not interchangeable and must be connected in conjunction with the identification markers on the cables and the stenciling on the new receptacle panels on the back of the three consoles.

Example: Connect the end of the cable marked P101 into the tack of the connector plugged into the J101 receptacle on the first position. The other end of this cable is identified as P201 and should be connected into the receptacle for J201 on Position 2. Connect the

cable identified as P201 and P301 in the same manner making certain that the end marked P201 gets connected into the back of the cable marked P201 on the second position and the end marked P301 gets connected into the receptacle on Position 3 marked J301.

i. Repeat step h for the remaining four cables. Be extremely careful to observe that the cables get connected according to the procedure outlined in step h.

j. Locate the three terminating connectors furnished with this Converter Installation Kit. Connect the terminating connector identified as NECO P/N 111129 into the back of the connector identified as P301 in the third position. Connect the terminating connector identified as NECO P/N 111130 into the back of the cable connector identified as P302 on the third position. Connect the terminating connector identified as NECO P/N 117086 into the back of the cable connector identified as P303 on the third position.

k. Double check all screws in the connectors installed in steps a through d above for tightness. These screws are an integral part of the connectors and should be tightened securely to assure proper contact within the connectors and receptacles.

l. Locate the 12' power cable (NECO P/N 111064) furnished with this Converter Installation Kit. Dress into place as per Figure 4.

m. Plug one end of the power cable into the spare power receptacle on the bottom rear of Position 3. See Figure 3. Plug the other end of the power cable into the receptacle on Converter, Part II, located on the

top rear of the first operator's position. (See Figure 1 and Figure 5.) Make certain the power ON-OFF switch on Converter, Part II, is in the OFF position before making the above connection. (See Figure 1.)

n. Connect the line cable removed in step 6.1.6 from the SB-249/TTC-7 going to the signal entry panel to the receptacle in Converter, Part II, identified as J2 (see Figure 1).

This completes the cable installation for the CV-1918/G Converter and the AN/MTC-1. The following paragraphs cover the installation for the AN/MTC-9.

CABLE INSTALLATION CHART AN/MTC-1

Converter, Part I Position 1			Converter, Part I Position 2			Converter, Part I Position 3		
Cable No.		Receptacle No.	Cable No.		Receptacle No.	Cable No.		Receptacle No.
JX01	to	J101	JX01	to	J201	JX01	to	J301
JX02	to	J102	JX02	to	J202	JX02	to	J302
JX03	to	J103	JX03	to	J203	JX03	to	J303

Converter, Part II Receptacle No.	Position 1 Cable No.		Receptacle No.	
From J1A	111061	to	J101	
From J1B	111061	to	J102	
From J1C	111061	to	J103	
J2	Incoming Lines			
J3	111064			Spare Power Receptacle

Interconnecting Cables		
From	To	Part Number
Position 1 - J101	Position 2 - J201	111109
Position 2 - J201	Position 3 - J301	111110
Termination Plug	On Position 3 - J301	111129
Position 1 - J102	Position 2 - J202	111119
Position 2 - J202	Position 3 - J302	11112u
Termination Plug	On Position 3 - J302	111130
Position 1 - J103	Position 2 - J203	111109
Position 2 - J203	Position 3 - J303	111110
Termination Plug	On Position 3 - J303	117086

6.6 Interconnect Cabling Instructions (CV-1918/G - AN/MTC-9)

6.6.1 The interconnect cables supplied for installation of the CV-1918/G Converter into the AN/MTC-'9 are packed in the Installation Kit furnished for this installation. ' Check to make certain the kit is labeled "'CV-1918/G - AN/MTC-9 Installation Kit" before attempting to use for this installation. The connector receptacle panels furnished with this installation are identified as to 'the proper position on which they get installed. Position number 1 in the AN/MTC-9 is the position furthest from the door of the van. There are nine receptacle panels furnished with this kit. (See Figure 10.) The receptacle panels are stenciled J101, J102, J103 for Position 1; J201, J202, J203 for Position 2; J301, J302, J303 for Position 3, etc. for the remaining positions. The cables must be connected in the proper polarity. 'The following procedures should be followed when installing the cables to assure the cables are properly installed. An installation chart is included to help clarify the installation procedures. The chart should be used in conjunction with the following instructions.

6.6.2 AN/MTC-9 Installation

a. Locate and identify all the cables supplied for this particular Converter installation.

b. Locate the nine receptacle- panels supplied with this installation. Each panel is identified as to the operator's position on which it has to be installed. (See Figure 10.)

c. The receptacle panels will be installed onto existing panels containing line receptacles for CB/LB lines 00 through 99 on the back of each operator's console.

d. Install the panel for position one (marked on panel) to the bottom of existing panel.

e. Locate the three cables protruding from the Converter, Part I. These cables are identified as JXO1, JXO2 and JX03. Insert the receptacle on the end of Cable JXO1 into the position identified as J101 in the new receptacle panel. Insert the receptacle on Cable JXO2 into the position identified as J102 and Cable JXO3 into the position identified as J103.

f. Repeat step e above for all nine positions making certain that on Position 2 the receptacles from the cables from Converter, Part I, identified as JXO1, JXO2 and JXO3 are installed into positions J201, J202 and J203, respectively, and the cable receptacles for Position 3 are installed J301, J302 and J303, respectively.

g. Locate the three 5' interconnect cables identified as Part No. 111061. These cables are identical and interchangeable with each other. Connect one of the cables from Converter, Part II, J1A to the receptacle on Position 9 identified as J901. Connect the second cable between J1B on Converter, Part II, to the J902 receptacle. Connect the third cable between J1C on the Converter, Part II, to J903 receptacle. See Figure 4 when dressing cables into place.

h. Locate the twenty-four 8' interconnect cables furnished with the Converter. Connect these cables between consoles (See Figure 6.)

NOTE

These cables are not interchangeable and must be

connected in conjunction with the identification markers on the cables and the stenciling on the new receptacle panels.

Example: Connect the end of the cable marked P101 into the back of the connector plugged into the J101 receptacle on the first position. The other end of this cable is identified as P201 and should be connected into the receptacle J201 on Position 2. Connect the cable identified as P201 and P301 in the same manner making certain that the end marked P201 gets connected into the back of the cable marked P201 on the second position and the end marked P301 is connected into the receptacle on Position 3 marked J301 and so on for all nine positions.

i. Repeat step h for the remaining cables. Be extremely careful to observe that the cables are connected according to the procedure outlined in step h.

j. Locate the three terminating connectors furnished with this Converter Installation Kit. Connect the terminating connector identified as NECO P/N 111129 into the back of the connector identified as J101 in the first position. Connect the terminating connector identified as NECO P/N 111130 into the back of the cable connector for J102 on the first position. Connect plug NECO P/N 117086 into back of the connector identified as J103.

k. Double check all screws in the connectors installed in steps a through d above for tightness. These screws are an integral part of the connectors and should be tightened securely to assure proper contact within the connectors and receptacles.

l. Locate the 25' power cable (NECO P/N 111065) furnished with this Converter Installation Kit. Dress into place as per Figure 4.

m. Plug one end of the power cable into the spare power receptacle on the bottom rear of Position 1. See Figure 3. Plug the other end of the power cable into the receptacle on Converter, Part II, located on the top rear of the ninth operator's position. (See Figures 1 and 5.) CAUTION: Make certain the power ON-OFF switch on Converter, Part II, is in the OFF position before making the above connection (see Figure 1).

n. Connect the line cable removed from the SB-249/TTC-7 going to the signal entry panel in step 6.1.6 above to the receptacle in Converter, Part II, identified as J2 (see Figure 1).

This completes the cable installation for the CV-1918/G and the AN/MTC-9.

CABLE INSTALLATION CHART AN/MTC-9

CONVERTER, PART I, OPERATOR'S TRUNK UNIT

POSITION	CABLE NO.		RECEPTACLE NO.
1	JX01 JX02 JX03	To To To	J101 J102 J103
2	JX01 JX02 JX03	To To To	J201 J202 J203
3	JX01 JX02 JX03	To To To	J301 J302 J303
4	JX01 JX02 JX03	To To To	J401 J402 J403
5	JX01 JX02 JX03	To To To	J501 J502 J503
6	JX01 JX02 JX03	To To To	J601 J602 J603
7	JX01 JX02 JX03	To To To	J701 J702 J703
8	JX01 JX02 JX03	To To To	J801 J802 J803
9	JX01 JX02 JX03	To To To	J901 J902 J903

CABLE INSTALLATION CHART AN/MTC-9 (Continued)

CONVERTER, PART II RECEPTACLE NO.	POSITION 9 CABLE NO.		RECEPTACLE NO.
From J1A	111061	To	J901
From J1B	111061	To	J902
From J1C	111061	To	J903

From J2 Incoming Lines

From J3	Cable No. 111065	Spare Power Receptacle Position 1

CABLE NO.	FROM		TO	
NEC PART NUMBER	OPERATOR'S POSITION	RECEPTACLE NUMBER	OPERATOR'S POSITION	RECEPTACLE NUMBER
111111	1	J101	2	J201
111112	2	J201	3	J301
111113	3	J301	4	J401
111114	4	J401	5	J501
111115	5	J501	6	J601
111116	6	J601	7	J701
111117	7	J701	8	J801
111118	8	J801	9	J901

Terminating Plug No. 111129 on J101

111121	1	J102	2	J202
111122	2	J202	3	J302
111123	3	J302	4	J402
111124	4	J402	5	J502
111125	5	J502	6	J602
111126	6	J602	7	J702
111127	7	J702	8	J802
111128	8	J802	9	J902

Terminating Plug No. 111130 on J102

CABLE INSTALLATION CHART AN/MTC-9 (Continued)

CABLE NO.	FROM		TO	
NEC PART NUMBER	OPERATOR'S POSITION	RECEPTACLE NUMBER	OPERATOR'S POSITION	RECEPTACLE NUMBER
111111	1	J103	2	J203
111112	2	J203	3	J303
111113	3	J303	4	J403
111114	4	J403	5	J503
111115	5	J503	6	J603
111116	6	J603	7	J703
111117	7	J703	8	J803
111118	8	J803	9	J903

Terminating Plug No. 117086 on J103

7.0 INITIAL CHECKOUT PROCEDURE

7.1 Visual

7.1.1 Check all connectors and plugs previously installed to insure they are properly connected. (See Figures 1, 3, and 4.)

7.1.2 Set the power ON-OFF switch to the ON position.

NOTE

This is a locking, bat-handle toggle switch located on the front panel of Part II of the Converter and is accessible at the front panel of Converter, Part II. To switch the power on, pull out on the knob of the bat-handle and move to the ON position.

7.1.3 Observe that the power indicator lamp located on the front panel of the Converter illuminates. If the lamp does not light, check the fuse on the front panel of the Converter. If the fuse is good, check the power cable for proper seating of the connectors. If fuse is bad, replace it with a new fuse of the same type.

NOTE

If SRI lamps illuminate when power is first applied, extinguish by depressing the reset switch. Upon release of the reset switch, all the various logic circuits are reset to their proper idle state and the SRI lamps are extinguished.

7.2 Operational

7.2.1 Insert the cord from the operator's cord circuit on TTC-7 position. Note

that the channel 1 busy lamps illuminate for all positions. Unplug the cord and repeat for all remaining positions. If lamps do not illuminate, check the applicable paragraph in the maintenance section of this manual.

7.2.2 Repeat step 7.2.1 for all channels.

7.2.3 With the cord in the channel 1 jack, and the talk-listen switch in the TALK position, depress the access pushbutton and the seize pushbutton. Hold these pushbuttons depressed until 570 Hz acknowledge signal is heard in the headset. This sound indicates that the Central Office has received the seize signal and is returning an acknowledge signal to the Converter. Release the access and seize pushbuttons and listen in the headset for dial tone. When dial tone is received, depress the access pushbutton and digit 5 on the keysender. Dial tone will be inhibited. With the access pushbutton depressed, sequentially depress the second digit 4 and the third digit 8. Release the access pushbutton. Listen in the headset for a 1050 Hz test tone from the Central Office. After receiving the test tone, simultaneously depress the access pushbutton and the release pushbutton. After release of both pushbuttons, remove cord and observe the busy lamp. This lamp will stay illuminated while the release signal is being transmitted. After the release sequence is complete, restore the talk-listen switch to the NORMAL position.

7.2.4 Repeat the same procedure as outlined in step 7.2.3 with the exception that when dial tone is received, depress seven digits for pre-determined TA-341/TT and listen for ringback tone or answer. After the connection to the TA-341/TT Telephone Set subscriber has been established, extend the call to a two-wire subscriber using the manual ring circuit and the mechanical dial on the operator's console.

After the call has been established, explain to the TA-341/TT Telephone Set subscriber that you are going to drop out of the call. Ask him to check conversation with the two-wire subscriber and then terminate the call by placing the handset of the TA-341/TT Telephone Set on the cradle. Tell the two-wire subscriber- to remain off-hook. Depress the access pushbutton and drop out of the call by restoring the talk-listen switch to the NORMAL position. Watch for the supervisory-cord lamp to illuminate. Illumination is an indication that the telephone center has transmitted a release signal to the Converter. Set the talk-listen switch to the TALK-LISTEN position. Challenge the call and release the two-wire subscriber. Pull the call-answer cord from the jack. This channel has now been checked. If any malfunction should occur, check the maintenance section for troubleshooting procedures. Repeat operational tests in this section for all channels on all positions.

7.2.5 Place a call to the automatic telephone central office operator by depressing the 0 pushbutton on the DTMF keysender. Ask the operator to terminate the call and then place a call to the Converter. Remove the cord from the jack on the Converter. Observe the service request indicator (SRI) lamps. When the operator places the call, the SRI lamps should light for a particular channel on all operator's consoles. Answer the call by plugging the cord in the jack for that particular channel. Observe that the SRI lamp extinguishes and the busy lamp illuminates for that channel on all positions. Also note that the cord supervisory lamp illuminates. Place the talk-answer switch in the TALK position and depress the access pushbutton. Observe that the cord supervisory lamp extinguishes. Release the access pushbutton and establish conversation with the operator. Ask the

operator to restore talk-answer switch to its normal position. Observe that the cord supervisory lamp illuminates when the release signal is received from the automatic telephone central office. Operate talk-answer switch to talk and challenge the call. Depress the access pushbutton, but do not remove the cord. Repeat the above test for each subsequent channel and leave each channel busy by leaving the cord in the jack until all channels have been checked.

NOTE

In this test, the night alarm on the AN/TTC-7 should be activated and be audible until the cord from the operator's cord circuit is inserted into the jack and the channel ACCESS button is depressed, at which time it should extinguish.

CHAPTER 3

FUNCTIONING OF EQUIPMENT

8.0 GENERAL

NOTE

The operator should be familiar with the operation of the AN/TTC-7, Manual Switchboard. It is beyond the scope of this document to include the operational instruction for the Manual Switchboard. Consult the manual on the AN/MTC-1 or AN/MTC-9 for proper operating procedures concerning the Manual Switchboard.

The CV-1918/G is an eight-channel transistorized, two/four wire telephone signal converter designed to function as part of the Seventh Army Tactical Switching System (SATSS). This Converter is powered from a -48 volt battery supply. A voltage converter, designed as an integral part of the CV-1918/G, converts the -48 volts to a nominal -5.6 volts DC which supplies power to the Converter circuitry. The Converter is designed to function properly over a temperature range of 0°F to +1250F. This two-to-four wire Converter is designed to interface telephone signals between the AN/TTC-25 or the AN/TTC-37 Automatic Central Office and the AN/TTC-7 Manual Telephone Central Office (part of AN/MTC-1 or AN/MTC-9 Central Offices). The CV-1918/G Converter contains eight modular interfacing channels and other common equipment to provide tones required to operate the automatic telephone central office mentioned above. Each channel is terminated through a four-wire trunk connection to an automatic telephone central office. This Converter automatically accepts calls from an automatic telephone central office and alerts the two-wire manual switchboard operator to a request-for-service while signaling an automatic telephone central office that the request-for-service has been made. The operator of this two-wire manual switchboard responds to the request-for-service by inserting a cord plug from the manual switchboard into the jack provided for the channel displaying the request-for-service and then, momentarily, depresses the access push-button provided for that channel. These actions by the operator of the manual switchboard resets the service request

indicator, stops signals being sent by the Converter to the automatic telephone central office, and establishes the voice path between the manual switchboard operator and the automatic telephone central office. The two-wire connection is made by the manual switchboard operator inserting the cord plug from the two-wire position on a manual switchboard that is either being called or is requesting service into the converter jack for a four-wire trunk. With these provisions, this Converter can interface eight separate two-wire subscribers to eight four-wire trunk connections at any one time. The electronic processing of a call from an automatic telephone central office will be described and a functional block diagram is included for clarification.

8.1 Incoming Call. Refer to the block diagram presented in Figure 11 for a better understanding of the following description.

a. **Call originated by 4-wire subscriber. The 4W** telephone central office **transmits a seize signal** of 2250 Hz which originated at an automatic telephone central office and appears on the four-wire receive port of the Converter. The seize signal is inductively coupled to the input amplifier, amplified, and coupled from the output stage of this amplifier to the input to the squaring amplifier. This amplifier accepts the sinusoidal signals from the input amplifier and produces a square wave output. In this case, the 2250 Hz seize signal is transposed into a square wave and coupled to the seize detector circuit. The signal is detected and coupled from the detector output to the turn-on delay circuit. This circuit changes the 2250 Hz signal into a DC potential or logic output. The turn-on delay circuit provides protection against false hits on the four-wire port from being recognized as legitimate signals. Basically, this is a transistor switching circuit, controlled from the common Zener output taken from the detectors, and an RC network in the collector of the first stage. The output of the turn-on delay circuit is coupled to the turn-off delay circuit. This also is a transistor switching circuit designed to respond to the logic levels provided to it by the previous stages and is utilized to provide a turnoff delay to insure that a hit or momentary interruption of the seize signal on the four

wire receive port will not interrupt the call sequence. A logic output is obtained from the turn-off delay circuit and is coupled to the detector output stage. The detector output circuitry is a transistor switching circuit designed to accept the logic output from the turnoff delay circuit and provide a logic output to the latch circuit, and to the 570 Hz tone gate circuit. This logic output activates the latch circuit which, in turn, illuminates the service request indicator lamps for that particular channel on all operator positions. The logic output from the detector also enables the 570 Hz tone gate circuit. The common circuit oscillators in the Converter are free running (with the exception of the 425 Hz oscillator) and are controlled by switching on the various associated tone gates. The 570 Hz tone gate, which is now enabled, gates the 570 Hz seize acknowledge signal out on the four-wire send port to an automatic telephone central office. The automatic telephone central office recognizes this signal as an acknowledge signal from the Converter and stops sending the 2250 Hz seize signal. After a period of time (determined by the turn-off delay circuit in the Converter), the detector returns to the quiescent state. This disables the 570 Hz tone gate and removes the acknowledge signal from the four-wire send port. The latch circuit now enables the 425 Hz tone gate and a 425 Hz interrupted ringback signal is returned to the automatic telephone central office via the four-wire send port. The operator recognizing the request-for-service (when the SRI indicator lamp is illuminated), plugs the cord into the jack for that channel. This extinguishes the SRI lamp and illuminates his cord supervisory and busy lamps. The operator then depresses the access pushbutton which clears the latch, extinguishes the cord supervisory lamp, and enables the voice gate circuit in the Converter. The latch, being deactivated, removes the enable condition from the 425 Hz tone gate, removes the inhibit from the voice gate circuit, and removes the ringback tone from the four-wire send port. The manual switchboard operator is now ready to talk to the subscriber who placed the call through the automatic telephone central office to the Converter. When the manual switchboard operator gets the necessary

information, regarding the two-wire subscriber's number, he extends the call to the subscriber and drops out of the call.

b. Call terminated by 4-wire subscriber. **The automatic** telephone central office returns a 2600 Hz release signal to the Converter. This signal is impressed across the four-wire receive port, is amplified, and is detected in exactly the same manner as described for the 2250 Hz seize signal. The Converter responds in the same manner and returns a 570 Hz release acknowledge signal to the automatic telephone central office. The operator's cord supervisory lamp illuminates when the 2600 Hz release signal is received by the Converter. The automatic telephone central office recognizing the 570 Hz release acknowledge signal, stops sending release tone to the Converter, and drops the connection. The manual switchboard operator, after challenging, unplugs the cord. This channel in the Converter is now ready to accept or process another call.

8.2 Outgoing Call. Refer to the block diagram presented in Figure 11 for a better understanding of the following description.

c. Call originated at local 2-wire switchboard .

The calls controlled by a manual switchboard operator. This operator first selects a free channel and inserts the cord into the jack for that channel. The manual switchboard operator then depresses the access pushbutton and the seize pushbutton. A 2250 Hz seize signal is generated by the DTMF oscillator as long as the seize and access pushbuttons are depressed. This signal is coupled to the 2250 Hz tone gate and is inductively coupled from the tone gate output to the four-wire send port to the automatic telephone central office. The automatic telephone central office recognized the 2250 Hz seize tone as a request-for-service and returns a 570 Hz seize acknowledge tone signal to the Converter. The 570 Hz signal is received at the four-wire receive port and inductively coupled to the two-wire port and from there to the manual switchboard operator's handset. The manual switchboard operator recognizes the seize acknowledge tone and releases the seize pushbutton. The automatic telephone central office recognizes the end of seize signal, stops sending

570 Hz seize acknowledge signal and starts sending 425 Hz dial tone. With the access pushbutton still depressed, the operator depresses the keysender pushbuttons corresponding to the subscriber number being called. The automatic telephone central office removes dial tone after receiving the first digit. After the manual switchboard operator completes dialing, he then releases the access pushbutton. Ringback or busy tone is returned to the Converter from the automatic telephone central office.

d. Call terminated at local 2-wire switchboard. The operator can release the call by depressing the access pushbutton and by momentarily depressing the release pushbutton. This action activates the release timer in the Converter. The release timer, in turn, activates the 2600 Hz tone gate. Due to the fact that the 2600 Hz release oscillator is active all the time, activating the 2600 Hz tone gate is all that is necessary to allow the 2600 Hz release tone to be transmitted to the automatic telephone central office. The release timer will keep the tone gate activated for a period of three to ten seconds after which the timer times out and release tone is stopped. Normally, the automatic telephone central office, upon receipt of release tone, transmits a 570 Hz release acknowledge tone to the Converter. The Converter (upon receipt of release acknowledge tone) detects the tone, and after a nominal delay time of 800 milliseconds, inhibits the release timer and, thus, release tone is cut off immediately rather than after the timer has timed out. The manual switchboard operator then pulls the cord plug from the jack and this particular channel of the Converter becomes idle.

9.0 CV-1918/G DETAILED CIRCUIT DESCRIPTION(Figs. 12 and 23)

Refer to the schematic diagram presented in Figure 12 for a better understanding of the following description. For purposes of this description, O volts equals a logic 1 and -5.6 volts equals a logic O. The manual switchboard operator responds to the request-for-service by inserting a cord plug from the manual switchboard into the jack provided for the channel displaying the request-for-service and then, momentarily, depresses the access pushbutton provided for that channel. These actions by the manual switchboard operator resets the service request indicator, stops signals

being sent by this Converter to the automatic telephone central office and opens the voice path between the manual switchboard operator and the automatic telephone central office. The two-wire connection is made by manual switchboard operator inserting the cord plug from the two-wire position on the manual switchboard which is being called or is requesting service to a four-wire trunk. With these provisions, this Converter can interface eight separate two-wire to four-wire trunk-connections at any one time. The processing of a call from an automatic telephone central office will be described in the following paragraphs. A functional block diagram is included for clarification. See Figure 10. The electronic processing of a call from an automatic telephone central office begins with a seize signal of 2250 Hz originating at an automatic telephone central office and appearing on the four-wire receive port of hybrid transformer T1. This signal is then coupled by mutual inductance (through the transformer) to appear across the series network consisting of resistor R4, resistor R5 and capacitor C11. R4, R5 and C11 are in parallel with the amplifier, and are the hybrid balance compensating network. Capacitor C1 connects to a positive reference and is utilized as an RF bypass. Diode CR. is utilized to protect transistor Q1 during receipt of 90 volts rms 20 Hz ring signal. The seize signal appearing at the junction of capacitor C1 and resistor R3 is coupled through resistor R2 to the base of transistor Q1 which forms the input terminal to the input amplifier. Transistor Q1 is a grounded emitter voltage amplifier. The output from the collector of Q1 is connected to the base of an emitter-follower transistor Q2. Transistor Q2 superimposes current gain on the voltage gain accomplished by transistor Q1. A portion of the output taken from the emitter of transistor Q2 is then fed back through resistor R1 to the base of transistor Q1 to stabilize the AC voltage gain of this stage. Since the alternating current through resistor R1 is 180 degrees out of phase with respect to the alternating current flowing through resistor R2, the AC voltage gain of this stage is described by the resistance ratio of resistors R2 and R3 to resistor R1. Since resistors R2 and R3 equals 20K ohms resistance and resistor R1 has 182K ohms resistance, the approximate voltage gain from the signal induced across resistor R3 to the signal appearing at the emitter of transistor Q2 is equal to the resistance of resistor R1 over the resistance of resistors R2 and R3, or 182K/20K, or 9.1 when the loading effect of resistor R6 and the inductive capacitance of capacitor C1 is considered as negligible across the dynamic resistance of the base emitter junction of transistor Q1. A second portion of the signal appearing at the emitter of

transistor Q2 is fed through resistor R8 to charge capacitor C2. Since the time constant formed by capacitor C2 (looking into resistors R6 and R8) is long, the voltage appearing across capacitor C1 will be essentially constant. The purpose of the feedback network formed by capacitor C1, and resistors R6 and R8 is to lower the average voltage measured across resistor R9. The design level for this voltage is 1.7 volts DC. If this value is too high or too low, premature clipping of the waveform appearing across resistor R9 will occur and adversely affect the bandpass characteristic of the 570 Hz, 2250 Hz, and 2600 Hz detector tank circuits. The remainder of the AC signal across resistor R9 is coupled by capacitor C3 to the base of transistor Q3. Transistor Q3, with no AC signal imposed on its base, will be normally turned on. (The collector current of transistor Q3 will be equal to the current flowing through resistor R11 less the base current of transistor Q3 flowing through resistor R10 and resistor R20 from the positive power terminal.) The bases of transistors Q3 and Q4 both refer to a nominal 1.2 volts held at the collector of transistor Q5. This voltage represents the voltage drop across diode CR4 and the base emitter forward voltage of transistor Q5. The output of the squaring amplifier is coupled from the collector of transistor Q4 to the base of detector transistors Q7 and Q8. The detector utilizing transistor Q7 is tuned for a resonant frequency of 2600 Hz by capacitor C4 and inductor L1. The clipped portion of the detector tanks passes through either diode CR5 or diode CR6, through the Zener diode and impressed on the base of transistor Q10 and resistor R27. As the voltage across resistor R27 reaches the forward voltage of the base emitter junction of transistor Q10, approximately 40 microamps of current will pass through resistor R27. The remainder of the clipped current from the detector tank will pass through the base emitter junction of transistor Q10. The product of this base current (IB10) and current gain (HFE) of transistor Q10 will be conducted by the collector of transistor Q10 to discharge capacitor C7 through resistor R30. The remainder of the collector current (IC10) passes through resistor R29 to resistor R28 and the base of transistor Q12 to saturate its collector. The Vcc - Vsat of transistor Q12 will appear at test point 6. A portion of IC1, passes through resistor R33 and the base of transistor Q1 to saturate its collector. As the detector tank voltage falls below the required value, causing the Zener diode to conduct, the voltage across resistor R27 falls below the required forward voltage to keep the base\paremitter junction of transistor Q10 in conduction. Collector current 1C10 of transistor Q10, therefore, falls off and the current through resistor R29 now serves to charge capacitor C7. The emitter of transistor Q11 now draws current through

resistors R28 and R31. This current maintains the voltage drop across resistor R29 to keep transistor Q12 turned on. The charging time constant of capacitor C7 is sufficiently long that transistor Q11 and, therefore, transistor Q12 will be maintained in conduction until the next positive going cycle of voltage across the detector tank reaches the voltage necessary to cause the Zener diode to conduct and again inject current into the base of transistor Q10. Capacitor C7 will then again discharge through the collector of transistor Q10 to repeat the cycle. The turn-on delay circuit consists of transistors Q13, Q14, and Q15, along with capacitor C8 and resistors R32, R33, R34, R35, R36, R37, R38, and R39. The output of transistor Q12 is coupled through diode CR12, through resistor R32 to the base of transistor Q14, and through resistor R33 to the base of transistor Q13 and resistor R34. The action of this circuit is as follows: During the receipt of a seize or acknowledge signal the collector of transistor Q12 goes to a logic 1 condition. At this time, the current flow is through transistor Q12 through diode CR12, R33, and R34 to negative. Base current is thus supplied to transistor Q13 causing it to conduct. Capacitor C8 immediately discharges through transistor Q13 and holds transistor Q15 off until capacitor C8 charges to the proper potential to turn transistor Q15 on. This time period is determined by the charge time of capacitor C8 through resistor R35 and is set at a nominal time of one second. When capacitor C8 charges to the proper value (approximately 1.2 volts positive), transistor Q15 conducts. The collector of transistor Q15 switches to a logic 0 and is coupled directly to the emitter of transistor Q14. This causes transistor Q14 to conduct. The collector of transistor Q14 switches from a logic 1 to a logic 0. The collector of transistor Q14 switching to a logic 0 removes the base current from transistor Q16 and transistor Q17, switching these transistors off. The collector of transistor Q14 switches to a logic 0 and turns off transistor Q17. When transistor Q17 turns off, the potential on the emitter of transistor Q17 switches from a logic O to a logic 1. The emitter of transistor Q17 is coupled directly to the base of transistor Q27. Transistor Q17 switching off removes the necessary base current to keep transistor Q27 in conduction. The collector of transistor Q27 switches from a logic 0 to a logic 1. The collector of transistor Q27 is coupled through diode CR45 to 'the base of transistor Q28. Transistor Q28 now starts conducting. The collector of transistor Q28 is coupled through resistor R78 to-the base of latch circuit transistor Q31. This provides the base current for transistor Q31, causing transistor, Q31 to conduct. The collector of transistor Q31 is coupled through resistor R81 and diode CR50

to the base of latch transistor Q30. Transistor Q31 is a PNP transistor and the conduction of transistor Q31 causes its collector to switch to a logic 1. The logic 1 forward biases Q30 and causes it to conduct. The collector of transistor Q30 provides base drive to transistor Q31 and the circuit is "latched up". The collector of transistor Q30 is coupled through diode CR49 and resistor R53 to the base of the voice gate inhibit transistor Q19. This circuit will be explained later since it doesn't come into play until the operator inserts the plug into the jack. The collector of transistor Q30 is also coupled directly to the emitter of the 425 Hz tone gate control transistor Q29 and would enable this transistor to conduct at this time; however, an inhibit is being held at the base of Q29 by the detector-output transistor Q28 through diode CR47. This 425 Hz tone gate circuit will also be explained later since it does not come into play at this time. The collector of latch transistor Q30 is also coupled to the service request indicator (SRI) driver transistor Q33, through resistor R90. Transistor Q33 is a PNP transistor utilized to provide base drive for driver transistor Q34. The collector of transistor Q33 switches to a logic 1 when transistor Q30 conducts. This logic 1 is coupled to the base of transistor Q34 via resistor R87. This forward biases transistor Q34, causing it to saturate. The collector of transistor Q34 switches to a logic 0 and is coupled through limiting resistor R91 to the SRI lamps via a normally closed contact in the jack (J401 on Figure 26 for channel 1). The collector of transistor Q34 also forward biases transistor Q32 which is the supervisory lamp driver transistor. The collector of transistor Q32 switches to a logic 1 and is coupled to the sleeve in J401. When the operator inserts the cord into the jack, the contacts transfer and, thus, extinguishes the SRI lamps and illuminates the cord supervisory lamp. At the same time, negative potential is supplied through a set of jack contacts and CR53 to resistor R93 in the base circuit of transistor Q35. This forward biases transistor Q35 causing its collector to switch to a logic 1. The collector of transistor Q35 provides current through resistor R94 to the base of busy lamp driver transistor Q36. Transistor Q36 is now forward biased and its collector switches to a logic 0. The collector is coupled via limiting resistor R96 to the busy lamps. The busy lamps now illuminate to indicate that that particular channel is busy. With the exception of the seize oscillator and the DTMF oscillator, all the oscillators are on at all times in this Converter. The function of the 570 Hz oscillator will be described in the following paragraphs. (To avoid repetition only one of the oscillators will be explained due to the fact they are all

basically the same design.)

The collector of the 570 Hz oscillator transistor Q102 is coupled directly to positive battery potential. Base drive for transistor Q102 is derived through the oscillator transformer center tap. One side of the oscillator tank coil connects to the voltage divider network which consists of resistors R104 and R105. Capacitor C104 tunes the tank to a resonant frequency of 570 Hz. Initially, when power is turned on, transistor Q102 conducts. The DC current flow is from the positive voltage through transistor Q102 collector to the emitter, through resistor R106 and the oscillator transformer feedback winding to the negative battery terminal. Base current flows from positive voltage through resistor R104 (part of the tank coil winding to the base of transistor Q102). When transistor Q102 starts conducting, a voltage is built up across the feedback winding in the emitter circuit. A portion of this voltage is inductively coupled to the base of transistor Q102 via the tank circuit winding. Since this signal is in phase with the signal on the emitter, transistor Q102 oscillates. Oscillations are sustained as long as power is applied to the circuit. Diodes CR111 and CR112 form a clipping network across the tank circuit which keeps AC swing constant at the base of transistor Q102 (due to the saturation of the diodes on the peak of the AC swing). Therefore, the AC voltage remains essentially constant on the emitter of transistor Q102. The output is taken from the emitter to minimize the loading effect produced by the tone gate circuit. Coupling capacitor C106 couples the 570 Hz signal to the base of tone gate transistor Q25. The tone gate transistor is enabled at this time because the collector of detector-output transistor Q28 is providing bias to the emitter of transistor Q25 through resistor R67. The 570 Hz tone gate is a one-stage gate designed to provide a loss (along with the inherent loss of output transformer T1) of approximately 11 db with respect to the signal on the base of transistor Q25. The collector of transistor Q25 is directly coupled to transformer T1. Thus, the 570 Hz signal appears on the four-wire send pair at -14 dbm +2db (per specification). When the automatic telephone central office receives the 570 Hz seize acknowledge signal from the Converter, the 2250 Hz signal being transmitted from the automatic telephone central office is inhibited to the Converter. The absence of the 2250 Hz signal from the automatic telephone central office causes the transistors in the turn-on-delay circuit to return to their normal state,

The action of the turn-off-delay circuit is as follows:
When transistor Q14 returns to normal (switches off), base

drive is provided to transistor Q16 in the turn-off-delay circuit through resistor R40, diode CR21, and resistor R39. Transistor Q16 switches on, causing its collector to go to a logic 0. This logic 0 is coupled to capacitor C9. Initially, all the current flow is from positive voltage through resistor R43, resistor R39, diode CR18, capacitor C9, and transistor Q16 to the negative battery terminal. This holds transistor Q17 in the off state and no change is seen at the collector of the detector-output transistor Q28. Capacitor C9 now charges through resistor R43 and resistor R39 to provide base drive for transistor Q17 after a delay that is determined by the time constant of capacitor C9, resistor R43, and resistor R39. When transistor Q17 starts conducting, base drive is provided for Q27 through R44 and Q17. When Q27 turns on, base drive is removed from Q28, turning it off, thus, a turn-off delay of a nominal 450 milliseconds is provided as per specification. Transistor Q28 switches off to remove the enable signal from the 570 Hz tone gate. This inhibits the sending of the 570 Hz signal to the automatic telephone central office. However, due to the fact that latch transistor Q30 is still conducting, the logic 0 has been removed from diode CR46, (which is located in the base circuit of Q29, the 425 Hz tone gate control circuit). The 425 Hz tone gate circuit is now enabled. The 425 Hz signal generated by the Converter is the ringback signal. This signal is on for two seconds and off for four seconds, and is controlled by the interrupter circuit.

The interrupter circuit is a monostable multivibrator of which the output stage is on for two seconds and off for four seconds. This circuit consists of transistors Q103 and Q104, resistors R107, R108, R109, R110, and R111, diodes CR113, CR114, CR115 and CR116, and capacitors C107 and C108. This circuit is controlled by individual channels (through diode CR101 to channel one) from PNP latch transistor Q31. When power is applied, transistor Q104 conducts and the collector goes to a logic 0. This logic 0 is coupled to the base of transistor Q103 through capacitor C108 and holds transistor Q103 in the off condition. Capacitor C108 then charges through resistor R109. When the capacitor charges to the proper positive voltage, transistor Q103 turns on. The collector of transistor Q103 switches to a logic O which is coupled through capacitor C107 to the base of transistor Q104. This turns transistor Q104 off until capacitor C107 charges up through resistor R108. The collector of transistor Q104 switches to a logic 0 for two seconds and to a logic 1 for four seconds. The collector of transistor Q104 is DC coupled through resistor R111 and diode CR115 to the base of the 425 Hz oscillator control

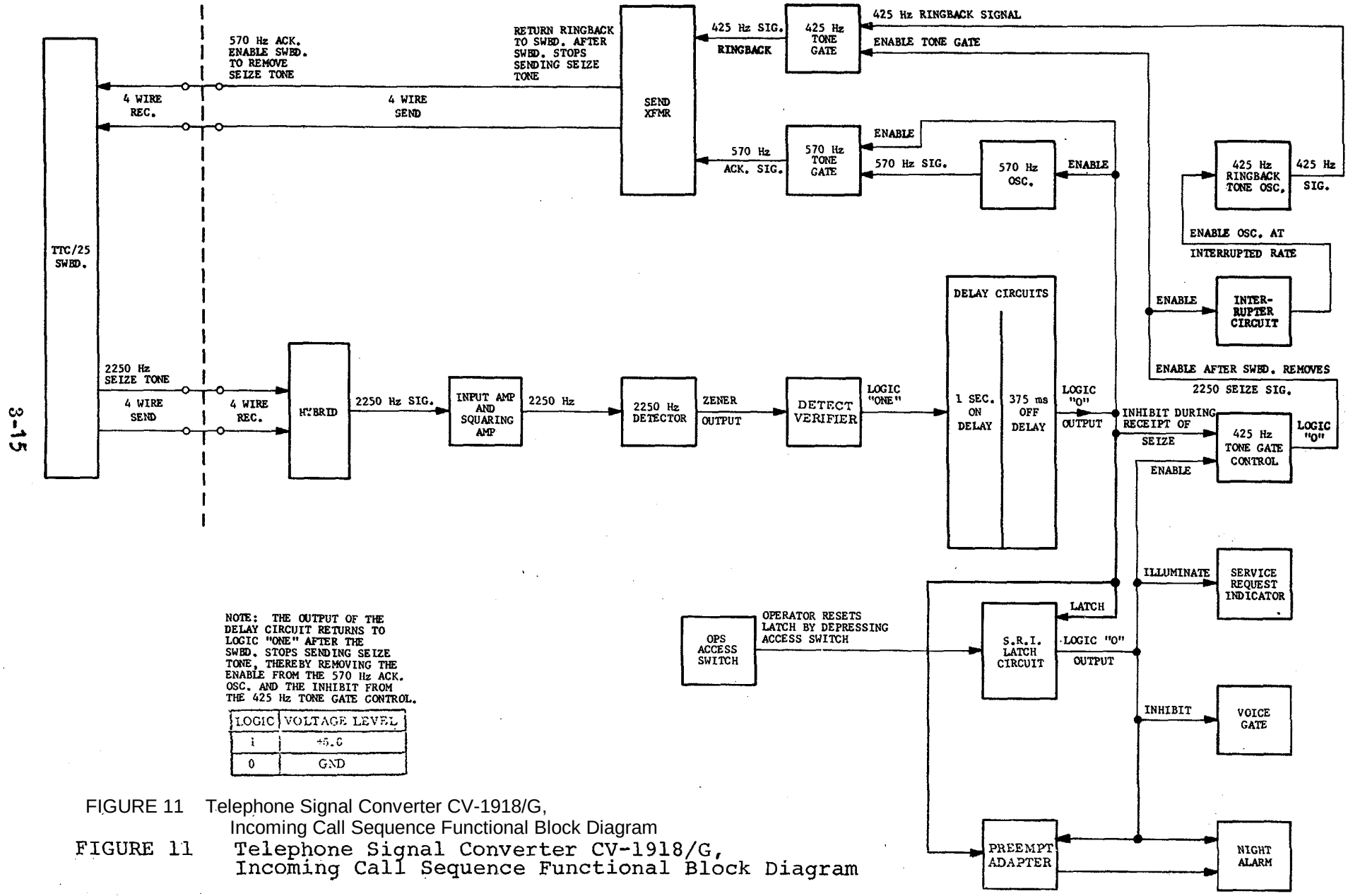
transistor Q105. Q105 controls the voltage divider which supplies base bias to Q106, the 425 HZ oscillator. Therefore, the 425 Hz oscillator is on (oscillates) for two seconds and is off for four seconds. The output of the 425 Hz oscillator is taken from the emitter of transistor Q106 and coupled via capacitor C111 to the base of tone gate transistor Q24. The 425 Hz ringback signal is now inductively coupled from the primary of the output transformer T3 to the four-wire send leads to the automatic telephone central office as ringback tone. When the operator services the call, the access pushbutton is depressed to clear the latch which inhibits the ringback tone. The operation of the three to ten seconds release timer is described and a functional block diagram included herein for clarification. See Figure 13. Depression of the access pushbutton and the momentary depression of the release pushbutton by the manual switchboard operator activates the 2600 Hz oscillator and activates the release-timer. Action of the release timer is as follows. Momentary depression of the access pushbutton and release pushbutton by the manual switchboard operator causes a negative pulse to be applied to the base of transistor Q20 via resistor R54 and capacitor C15. Depression of the release pushbutton changes the potential on resistor R54 to a positive voltage. As long as the release pushbutton is depressed nothing happens in the timer circuit. When the manual switchboard operator releases the release pushbutton, the potential on resistor R54 changes to negative. Current now flows from the positive voltage supply through resistor R56, capacitor C15, and resistor R54 to the negative battery terminal. The potential at the base of transistor Q20 switches from approximately 0.7 volt positive to 4 volts negative. Transistor Q20, which is normally conducting, now switches off, causing its collector to go to approximately two volts positive. This provides base current to transistor Q21. Transistor Q21 then switches on and provides base drive to transistor Q22. The collector of transistor Q22 then switches to a logic 0. This condition is maintained until capacitor C15 charges through resistor R56 to a voltage sufficient in value to cause transistor Q20 to conduct (0.7 volts positive). The logic O at the collector of the release timer transistor Q22 performs several functions. The logic 0 is coupled through diode CR10 to capacitor C6. This tunes the 2250 Hz detector to 57n Hz to enable receipt of the 570 Hz acknowledge signal. The logic O is also coupled to the 570 Hz gate transistor base through diode CR11 to provide base drive for transistor Q9. The resultant positive potential at the collector of transistor Q9 provides the proper bias condition for the 570 Hz driver transistor Q8. The collector of transistor Q22 is also

coupled to the 2600 Hz tone gate to enable this circuit. The output of the 2600 Hz oscillator transistor Q101 is coupled via capacitor C103 to the base of the 2600 Hz tone gate transistor Q23, inductively coupled to the four-wire send pair via send transformer T3 and, in turn, to the automatic telephone central office. The collector of release timer transistor Q22 is also coupled through diode CR38 to inhibit the voice gate circuit during the release sequence. If the automatic telephone central office recognizes release tone and returns 570 Hz release acknowledge to the Converter, the action of the Converter circuitry is identical to that explained for the 2250 Hz seize tone with the exception that when the collector of transistor Q12 (turn-on-delay transistor) switches to a logic 1, it is coupled through resistor R55 to the base of transistor Q20. This essentially parallels resistor R56 and reduces the time constant of capacitor C15 and resistor R56 to a nominal time of one second, causing the timer to turn off after one second; thus, adhering to the specification requirement for sending a minimum of 800 milliseconds of release tone. The voice gate circuit is a one-stage amplifier designed as a combination of a common base and a grounded emitter circuit configuration. The base circuit is not entirely AC bypassed due to resistor R47 (which is used as a gain control). A signal coming in on the two-wire port is coupled through capacitor C13 to the base of transistor Q18. The dynamic impedance of the transistor when conducting is approximately 10 ohms. This, in series with resistor R51, provides approximately a 600 ohm termination across hybrid transformer T1-T2 when Q18 is conducting. Transistor Q19 is utilized to inhibit transistor Q18 when the access pushbutton is depressed, when the release timer is on, or when the latch circuit is on, etc. This is accomplished by applying a logic O from the various circuits to resistor R53. This provides base drive for transistor Q19 which causes it to conduct. This provides base drive for transistor Q19 which causes it to conduct. This essentially shorts out transistor Q18. Diode CR37 then serves two functions: First, diode CR37 conducts when transistor Q19 conducts and maintains the 600 ohm termination on transformer T1-T2 hybrid. Second, with Transistor Q18 conducting diode CR37 prevents a reversal of the polarity across capacitor C13 when inhibit transistor Q19 conducts. The output of voice gate transistor Q18 is impressed across the primary winding of send transformer T3 so that speech coming in on the two-wire port of the hybrid transformer T1-T2 is coupled to the voice gate transistor Q18, is amplified, and is coupled out on the four-wire send pair via the secondary of the send transformer T3. (The send transformer T3 is a two to one

step-down transformer.) The six diodes across the four-wire send and receive ports provide lightning protection and clipping when the amplitude of the signals appearing on these ports exceeds two volts peak (approximately). The two-wire port is terminated in a 600 ohm resistor across pins 11 and 1 on J102 or across pins 1 and 2 on J401 when the operator is not in on the call. The four-wire receive and send ports are terminated by the 600 ohm impedance presented by the automatic telephone central office.

The preempt feature is arranged such that if a release and a reseizure from the four-wire switchboard is received, the two changes in state are counted via transistor Q102 and NAND gate M1, which in turn will operate relay K101. (Refer to Figs. 26 and 27)tighten a release tone is detected by the Converter, latch transistors Q30 and Q31 (on the channel card) are conducting. Base drive current to Q102 in the preempt circuit is supplied through Q31, CR103, and R108. This action ultimately enables preempt latch M1. R106, R108, and C102 provide a turn-on-delay for Q102 so as to prevent premature enabling of the preempt latch M1. When a reseize is then detected by the Converter, Q28 again turns on and supplies a momentary logic O through C101 t9 the preempt latch. The latch then sets and supplies base current through CR102 and R102 to Q101, closing relay K101. Relay K101 then enables the night alarm driver and activates the service request indicator. The supervisory lamp is illuminated on the release detection, thereby providing a preempt line status.

The automatic latch reset feature is arranged such that whenever the operator removes the cord plug at the termination of a call, the latch circuit Q30 and Q31 will be reset. The circuit consists of resistors R101 and R102, capacitor C101, and diodes CR101, CR102, and CR103. (Refer to Figure 26.) During the time that the operator is jacked in, terminal 1 is connected to OV through pin 10 and 11 on J401. Terminal "Y" is connected to -48v through S2. When the cord plug is removed, C101 charges toward -48v through R101, R102, and CR103. This voltage is clamped at -5.6v by CR103 and appears at terminal "A" through CR101. This is the condition necessary to reset latch circuit Q30 and Q31. C101 is discharged through R101 and CR102 when the operator again jacks in.



NOTE: THE OUTPUT OF THE DELAY CIRCUIT RETURNS TO LOGIC "ONE" AFTER THE SWBD. STOPS SENDING SEIZE TONE, THEREBY REMOVING THE ENABLE FROM THE 570 Hz ACK. OSC. AND THE INHIBIT FROM THE 425 Hz TONE GATE CONTROL.

LOGIC	VOLTAGE LEVEL
1	+5.0
0	GND

FIGURE 11 Telephone Signal Converter CV-1918/G, Incoming Call Sequence Functional Block Diagram

FIGURE 11 Telephone Signal Converter CV-1918/G, Incoming Call Sequence Functional Block Diagram

3-15

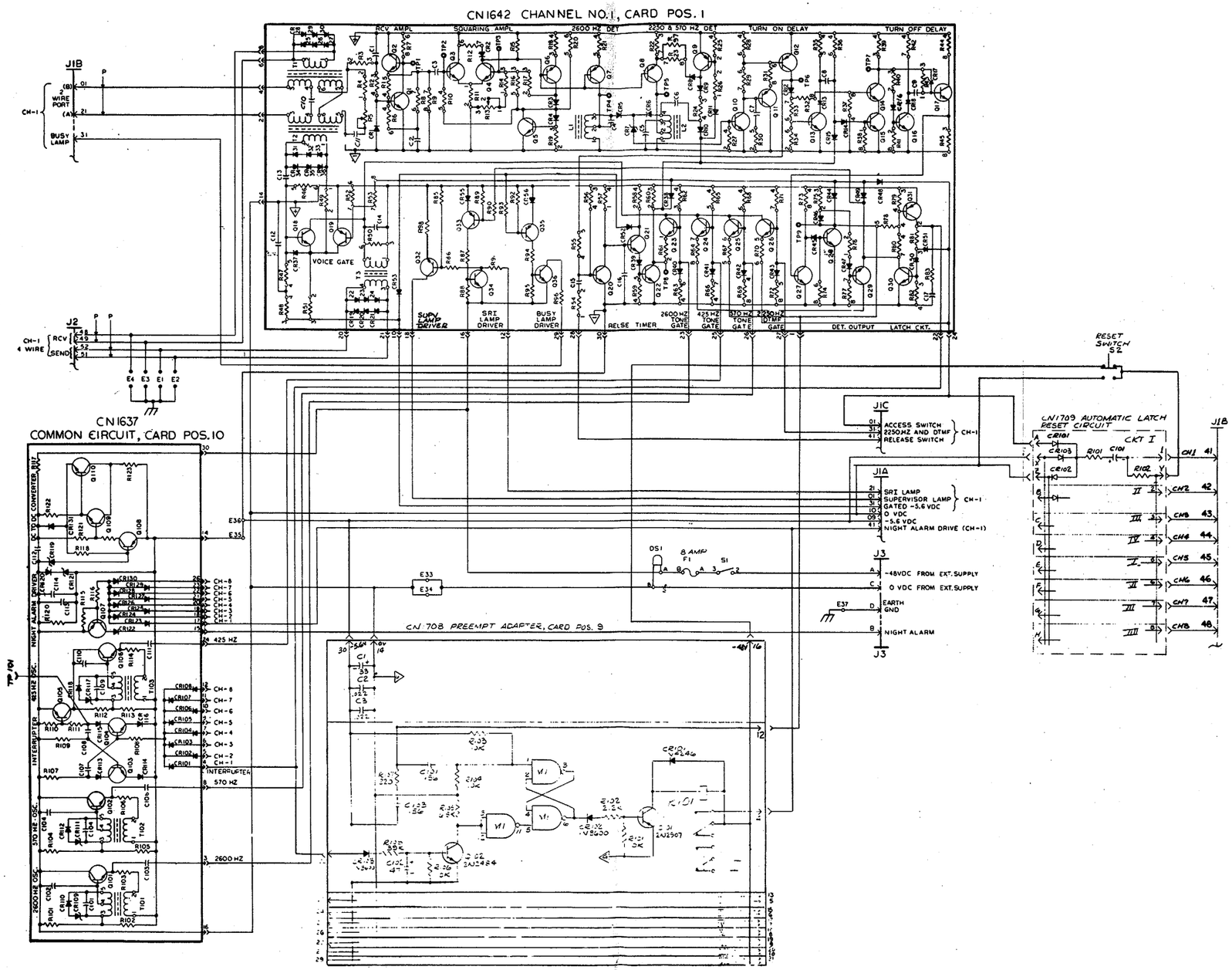


FIGURE 12 Telephone Signal Converter CV-1918/G, Part II, Schematic Diagram (Sheet 1 of 2)

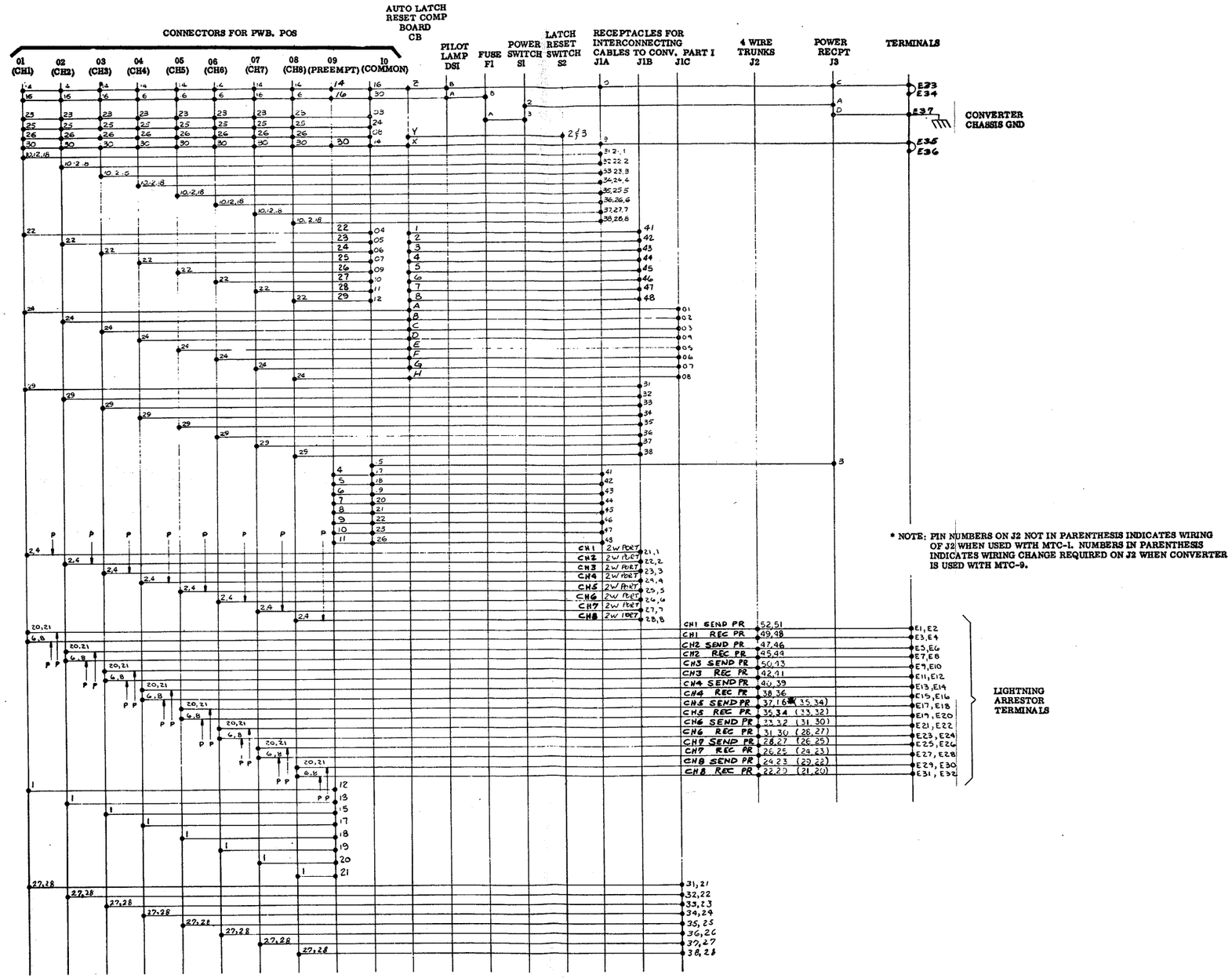


FIGURE 12 Telephone Signal Converter CV-1918/G, Part II, Schematic Diagram (Sheet 2 of 2)

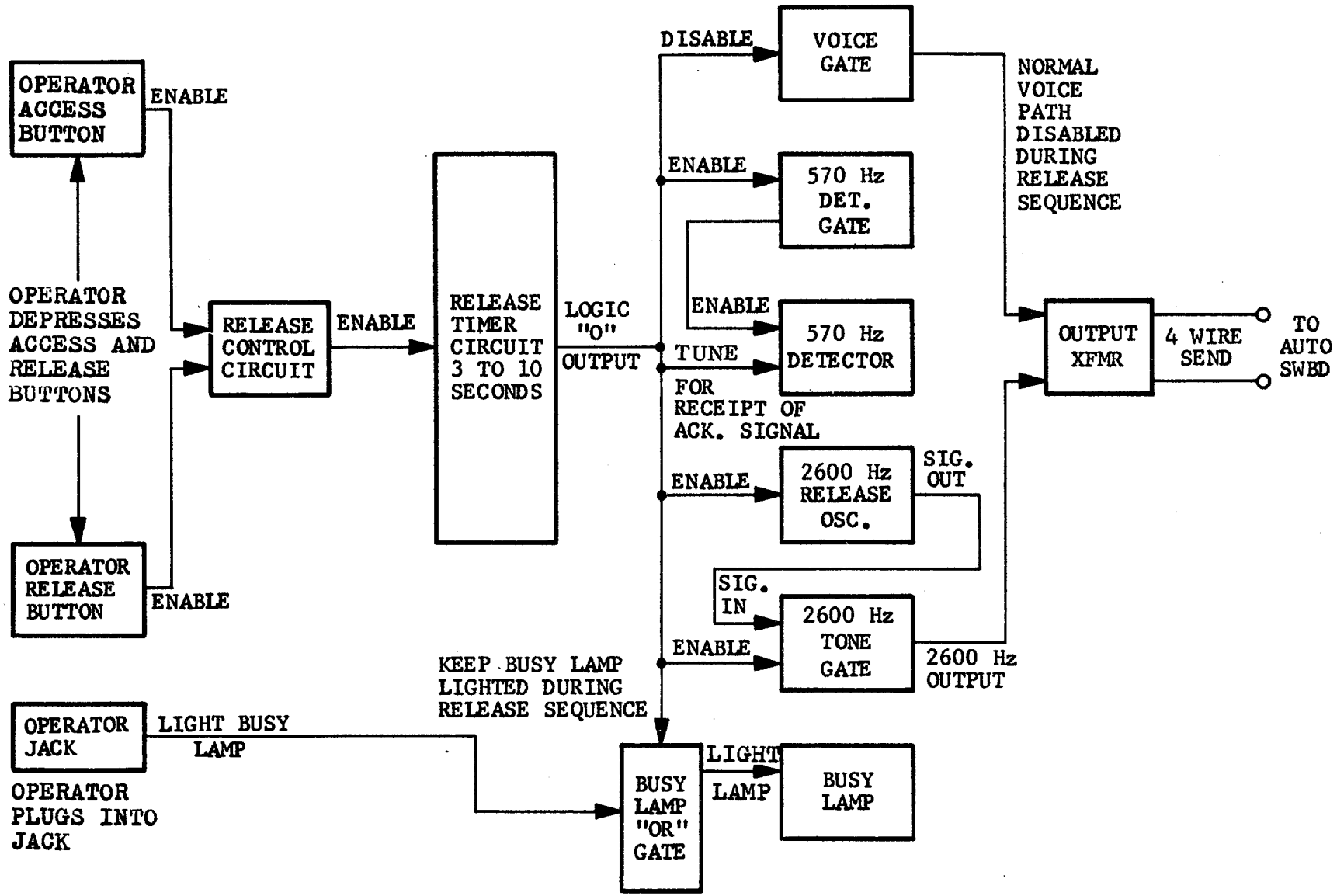


FIGURE 13 Telephone Signal Converter CV-1918/G, Release Sequence Functional Block Diagram

CHAPTER 4

MAINTENANCE

10.0. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of the CV-19181G are listed below, with a reference to the paragraphs covering the specific maintenance function.

a. Operator's daily preventive maintenance checks and services (para 10.3).
b. Cleaning (para 10.4).

10.1. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assume that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraphs 10.3 and 10.4 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment. If the equipment is being maintained in a standby condition, perform the daily checks and services before the equipment is returned to service.

b. Preventive Maintenance Checks *and Services.* The preventive maintenance checks and services charts outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the chart indicates what to check, how to check, and what normal conditions are; the *References* column lists the illustrations, paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by the operator, higher category maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

10.2. Preventive Maintenance Checks and Services Periods

Daily checks and services must be performed on the CV-1918/G. The daily preventive maintenance checks and services chart given in paragraph 10.3 specifies the checks which must be made during the following periods:

a. Before the vehicle starts on a mission.
b. When the equipment is initially installed.
c. When the equipment is reinstalled after removal for any reason.

10.3. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	*Item*	*Procedure*	*References*
1	Converter, Telephone Signal CV-19181G	Inspect equipment for completeness and satisfactory condition.	Para 5.0 Figure 1.
2	Exterior surfaces	Remove dirt, dust, grease, moisture, and fungus from the exterior of the case, front panel, and controls. Inspect painted surfaces for bare spots, rust, and corrosion.	Para 10.4
3	Connections	Inspect cabling and wiring for breaks, deterioration, and loose connections. Check tightness of all connectors.	
4	Controls and indicators	While making operational checks (item 5), observe that mechanical action of each knob, dial, and switch is smooth and free of external and internal binding, and that there is no excessive loosenness.	
5	Operation	Operate the equipment. Be alert for any unusual indications and conditions.	

10.4. Cleaning

Inspect the exterior of the CV-1918/G. The exterior should be free of dust, dirt, grease, and fungus.

a. Remove loose dirt with a clean, soft cloth.

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. DO NOT use near open flame. Trichloroethane is not flammable, but exposure of the fuses to an open flame converts the fumes to highly toxic, dangerous gases.

b. Remove grease, fungus, and ground-in dirt from the microphone holder case, earphones, and microphone boom with a cloth dampened (not wet) with trichloroethane.

c. Remove dust and dirt from the plugs, and jacks with a brush.

10.5. Scope of Organizational Maintenance

a. This section contains instructions covering organizational maintenance of CV-1918/G including instructions for performing preventive and periodic maintenance services, and repair function to be accomplished by the organizational repair technician.

b. Organizational maintenance of CV-1918/G includes-

(1) Monthly preventive maintenance checks and services (para 10.8).
(2) Quarterly preventive maintenance checks and services (para 10.9).
(3) Touchup painting(para 10.10).
(4) Troubleshooting (para 11.1 and 11.2).
(5) Replacement of easily accessible items.,

10.6. Organizational' Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the responsibility of all categories of maintenance concerned with the equipment, and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of CV-1918/G at the organizational level are made monthly and quarterly unless otherwise directed by the commanding officer. The preventive maintenance checks and services should be scheduled concurrently with the periodic service schedule of the carrying vehicle for all vehicular installations.

b. Maintenance forms and records to be used and maintained on this equipment are specified in TM 38-750.

10.7. Monthly and Quarterly Preventive Maintenance

Perform the maintenance functions indicated in the monthly and quarterly preventive maintenance checks and services charts (para lO.8 and 10.9) on the CV-19181G at the intervals specified and in the sequence listed. Whenever an abnormal condition or result is observed, take corrective action in accordance with the paragraph listed under References. All deficiencies and shortcomings will be recorded, and those deficiencies not corrected during the preventive maintenance checks and services tests will be reported to high level maintenance as specified in TM 38-750. Equipment that has deficiencies which cannot be corrected at the organizational level will be deadlined in accordance with TM 38-750. Equipment maintained in a standby condition (ready for immediate operation) must have monthly maintenance checks and services. Equipment in limited storage (requires services before operation) does not require monthly preventive maintenance.

NOTE

A month is defined as approximately 30 calendar days of 8-hour-a-day operation. For 16-hour-a-day operation, the monthly preventive maintenance checks and services will be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions.

10.8. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	*Procedure*	*References*
1	Connections	Inspect wires for cracked, or frayed installation. Replace connectors that are broken, stripped, or worn excessively.	
2	Fuses and indicators	Inspect and replace, if necessary.	Para 10.4 and 10.10
3	Metal Surfaces	Inspect exposed metal surfaces for corrosion, scratches, and pitting. Clean and touch up paint as required.	
4	Panel mounting screws	Check all panel screws and retainers for tightness or breakage. Replace or tighten as necessary.	

10.9. Quarterly Preventive Maintenance Check and Services Chart

Sequence No.	Item	*Procedure*	*References*
1	Publications	See that all publications are complete, serviceable, and current.	DA Pam 3104
2	Modifications	Check DA Pam 310-7 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	TM38-750andDA Pam 310-7
3	Spare parts	Check all spare parts (operational and organizational) for general condition and method of storage. No overstock should be evident, and all shortages must be on valid requisitions.	
4	Terminals	Inspect all terminals for tightness and good contact.	

10.10. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on bare metal to protect it from further corrosion.

10.11. Direct Support and General Support Maintenance

a. Scope of DS and GS Maintenance. Direct and general support maintenance of the CV-1918/G consists of troubleshooting, removal, and replacement or repair of chassis-mounted components including the printed circuit board, converter parts II and HII switches, connectors, fuse and lamp holders, and power card.

b. Troubleshooting. Troubleshooting the CV-1918/G includes voltage and resistance checks, operational checks shown in troubleshooting chart (para. 11.2) and continuity checks.

c. Removal of Components. Removing chassis-mounted components from the CV-1918/G requires unsoldering wires, removing the mounting hardware, and removal of component.

*d. Replacement or Repair of Componen*ts. Repair of components is accomplished by replacement with new or repaired items, soldering wires, and remounting parts.

10.12. Tools and Test Equipment Required

a. Tool Kit, Electronic Equipment TK-105.
b. Extender Card.
c. Counter, Digital, Electronic AN/USM-207A.
d. Voltmeter, meter ME-30 ( )/U.
e. Multimeter TS-352B/U.
f. Oscilloscope ANIUSM-281A.

10.13. Visual Inspection

a. Before conducting any extensive troubleshooting procedures, visually inspect the Converter for obvious faults, such as broken wires, loose connections, or physical damage caused during installation.

b. Inspect the following items for obvious defects.
(1) Digit Keysender.
(2) Seize, Release and Access Switches.
(3) Telephone Jacks.
(4) Busy and SRI Lamps and Holders.

(Next printed page is 4-5)

e. Power ON-OFF Switch

f. Cable Connectors

11.0 TROUBLESHOOTING PROCEDURES

11.1 General

Before using this chart, perform all the preliminary checkout procedures defined in Chapter 2.

When a problem exists on a certain channel, further isolation of the problem can possibly be obtained by attempting to place the same type of call on the same channel using a different operator's position. If, for example, seize tone is not transmitted from channel 1, position 1, but is normal on channel 1, position 2, the problem has been isolated to the Key Call Pedestal or the trunk unit. Part II of the Converter, which contains the channel and common equipment circuitry, is operating properly since this circuitry is common to each channel for any position. In this example, when seize tone is not transmitted and it is found to be good on the same channel at another position, further isolation of the problem can be obtained by attempting to place a call from the original position but on a different channel. If seize tone still cannot be transmitted, the problem has been isolated to the Key Call Pedestal. If seize tone can be transmitted, the problem is in the trunk unit or the interconnecting wires on the trunk unit. The above example is equally effective in isolating the problem when transmitting or receiving any of the various tones and can also be utilized efficiently to isolate the various problems which may be encountered during installation.

11.2 Troubleshooting Chart

Item No.	Symptoms		Probable Cause	Corrective Action
1	No seize tone being transmitted by the Converter. Unable to contact the automatic telephone central office.	(1)	Possible bad tone gate circuit.	Attempt to place the call from a different channel. If the call can be placed from a different channel, same position, this indicates the problem is in the channel PCB for the defective channel. Replace the channel PCB.
		(2)	Possible bad seize or access pushbutton, or wiring. be causing the problem. If it can be placed from another position, same channel, the access switch may be bad. Check all wiring to the seize and access pushbuttons. Replace the pushbuttons if necessary.	If the call cannot be placed from a different channel, a common switch may
		(3)	Possible bad DTMF oscillator PCB.	Replace DTMF PCB if necessary.
		(4)	Possible bad wiring connection from DTMF oscillator PCB to keysender.	Check all wiring to keysender from PCB.
2	No release tone being transmitted by the Converter.	(1)	Defective release or access pushbutton, or changed access jack contacts.	Check the release switch by attempting to send release from a different channel. If release cannot be transmitted from

11.2 Troubleshooting Chart (cont'd)

Item No.	Symptoms		Probable Cause	Corrective Action
				any channel, the trouble is probably with the release of access, pushbutton. Check all wiring to these pushbuttons if necessary. Check jack contacts, clean or adjust if necessary.
		(2)	Possible bad tone gate, or release timer circuit.	If release can be transmitted from a different channel, the trouble is probably in the channel PCB for that particular channel causing the trouble. Replace the channel PCB.
		(3)	Possible bad release oscillator.	Replace common circuit PCB in Part II of Converter.
		(4)	Common circuit PCB defective. of Converter.	Replace common circuit PCB in Part II
		(5)	Trunk unit defective.	Check all connections in trunk unit.
3	No audio path to the automatic telephone central office. Can hear, but cannot talk to distant end.	(1)	Defective voice-gate circuit.	Replace channel PCB for defective channel.
		(2)	Bad connection on hybrid transformer	Replace channel PCB for defective channel.
		(3)	Defective hybrid transformer.	Replace channel PCB for defective channel.
		(4)	Defective headset.	Substitute Headsets.

11.2 Troubleshooting Chart (cont'd)

Item No.	Symptoms		Probable Cause	Corrective Action
		(5)	Possible shorted lightning arresters or associated wiring.	Check associated lightning arresters for shorts. Replace if necessary. Check wiring for shorts or open.
4	Talk path normal. Cannot hear distant end.	(1)	Defective hybrid transformer.	Replace channel PCB.
		(2)	Defective headset.	Substitute headsets.
		(3)	Possible shorted lightning arresters or associated wiring.	Check associated lightning arresters for shorts. Replace if necessary. Check wiring for shorts or open.
5	SRI lamp does not light on incoming call.	(1)	Defective SRI lamp or wiring.	Check to see that SRI lamps on other channels illuminate. Check to insure the SRI lamp lights on the defective channel on a different position. If it does, replace the lamp on the defective position. Check wiring to the lamp.
		(2)	Defective latch circuit.	If SRI doesn't light for defective channel on any position, replace channel PCB.
		(3)	Defective detector circuit.	Replace channel PCB for defective channel.
		(4)	Defective hybrid circuit.	Replace channel PCB for defective channel.

11.2 Troubleshooting Chart (cont'd)

Item No.	Symptoms		Probable Cause	Corrective Action
		(5)	Defective trunk unit.	Check wiring on the trunk unit.
6	Busy lamp does not light after inserting cord in jack to answer a request-for-service.	(1)	Defective busy lamp or wiring.	Check to see that busy lamps on other channels illuminate. Check to insure the busy lamp lights on the defective channel on a different position. If it does, replace the lamp on the defective position, Check wiring to the lamp.
		(2)	Defective busy lamp driver circuit.	If busy lamp does not light for defective channel on any position, replace channel PCB.
		(3)	Defective trunk unit.	Check wiring on trunk unit.
7	Busy lamp lights on incoming call. The SRI lights after answering.	(1)	Wiring reversed on trunk unit.	Repair wiring.
		(2)	Defective wiring on trunk unit.	Check trunk unit.
8	Cord supervisory lamp does not light.	(1)	Defective cord circuit lamp.	Check lamp on cord. Replace if necessary.
		(2)	Defective contact on jack in trunk unit. Defective wiring on trunk unit.	Check jack contacts, adjust if necessary. Check wiring from cord circuit to trunk unit.
		(3)	Bad transistor on channel board in Converter, Part II.	Replace channel PCB in Converter, Part II.

11.2 Troubleshooting Chart (cont'd)

Item No.	Symptoms		Probable Cause	Corrective Action
9	Audio levels low, barely distinguishable. Digit tones. and supervisory signals being transmitted at the proper level. Incoming tones low level.	(1)	Possible bad hybrid or connection to hybrid.	Replace channel board in Converter, Part II for defective channel.
		(2)	Possible bad receive element in headset.	Substitute headsets. Replace receiver element in- headset if necessary.
		(3)	Audio circuit overloaded due to bad component.	Replace channel board in Converter, Part II, for defec.- tive channel.
		(4)	Possible shorted incoming wiring.	Check incoming wiring for shorts..
10	Release always times out. Appears automatic telephone central office does transmit a release acknowledge signal to the Converter. All other incoming signals normal. (2250, 2600 Hz)	(1)	Possible faulty 570 Hz detector circuit.	Replace channel PCB.
11	Not detecting release, seize or acknowledge signals being received from the automatic telephone central office.	(1)	Threshold level not adjusted properly for faulty channel.	Adjust R13 in limiter circuit per instructions in alignment procedures.
		(2)	Faulty signal amplifier. channel.	Replace channel PCB for defective
12	Cross talk noticeable or signals not at proper levels. Detected signals, etc.	(1)	Hybrid transformers not balanced properly.	Balance per alignment procedures.

11.2 Troubleshooting Chart (cont'd)

Item No.	Symptoms		Probable Cause	Corrective Action
		(2)	Possible bad hybrid transformer or circuitry.	Replace channel board for defective channel.
13	Upon removing cord plug, at completion of call, supervision lamp does not go out.	(1)	Possible bad component on automatic latch reset assembly, or associated wiring.	Check wiring associated with automatic latch reset assembly. Replace automatic latch reset assembly if necessary.
14	SRI lamp ON continuously; cannot be reset.	(1)	Faulty preempt PCB.	Replace preempt PCB.

12.0 ALIGNMENT PROCEDURES FOR CV-1918 SIGNALING AMPLIFIERS (ON CHANNEL PWB)

NOTE

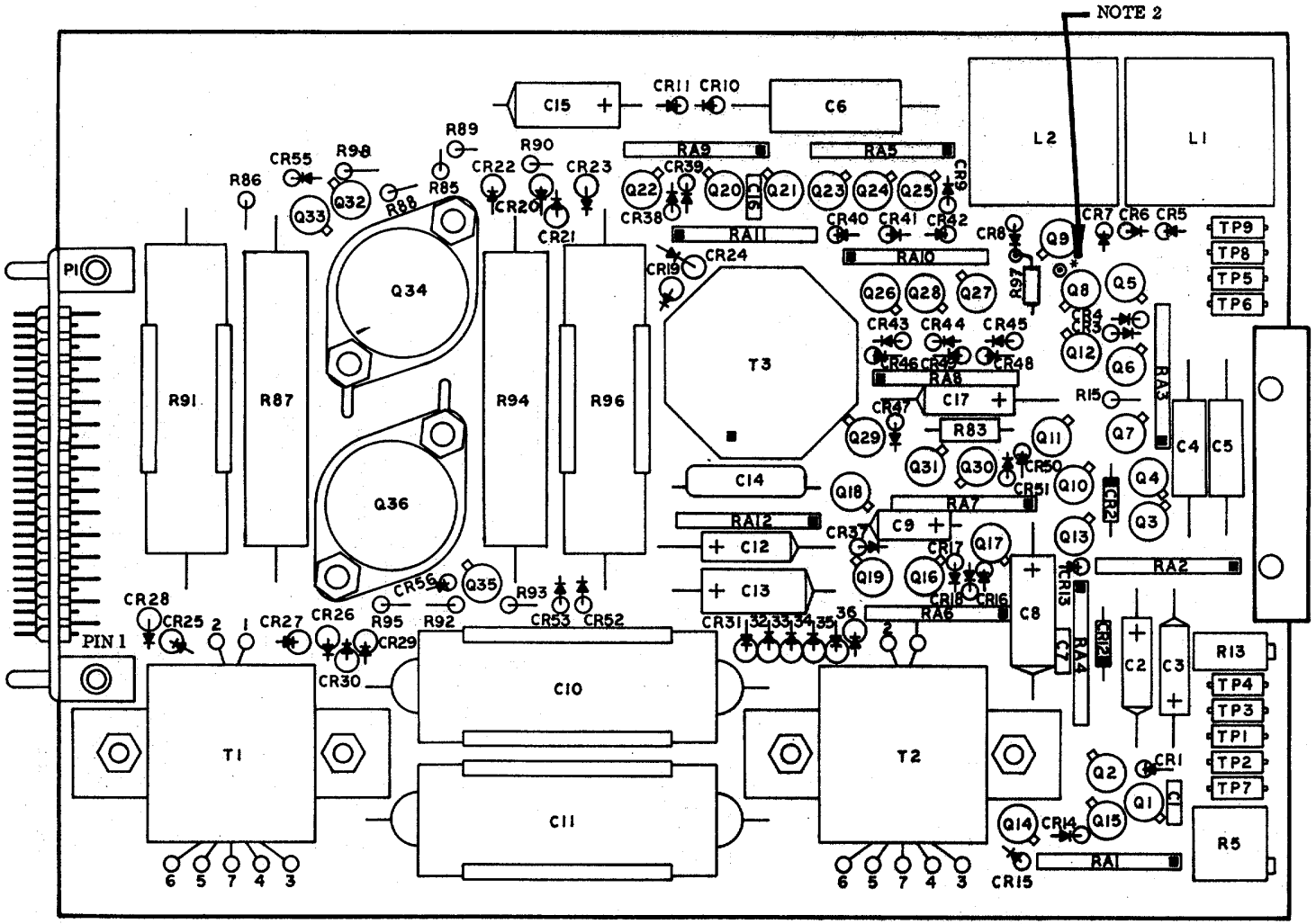
Initial alignment of the Converters has been completed at the factory. Do not attempt to perform alignment until after it has been positively determined that this is the problem. Alignment after initial checkout is not necessary. All PC cards to be aligned will require a card extender if availability of the pins is necessary.

12.1 Familiarize yourself with the location of the potentiometers and all test point locations. (See Figure 14.)

12.2 Apply a negative 5.6 volts to test point 1 (TP1).

12.3 With a high impedance DVM or a calibrated oscilloscope utilizing a 10 to 1 attenuator probe, check the DC voltage at test point 2 (TP2). Record this voltage.

12.4 Check the voltage at test point 3 (TP3). Record



NOTES:

1. REFERENCE DESIGNATORS RA1 THROUGH RA12 ARE THICK FILM NETWORKS. REFER TO THICK FILM SCHEMATICS FOR RESISTOR BREAKOUTS.
2. TERMINAL MARKED (*) IS CONNECTED TO PIN #1 OF CONNECTOR WITH 26AWG KYNAR WIRE.

■ DENOTES PIN 1

CATHODE — ANODE

FOR T1 & T2

1 = BLU	5 = OR
2 = YEL	6 = BLK
3 = RED	7 = GRY
4 = WH	

FIGURE 14 Telephone Signal Converter CV-1918/G, Channel PWB Assembly (CN1642)

this voltage.

12.5 If the voltage at test point 2 is 0.2 volts (200 millivolts) +.015 volts more positive than the voltage at test point 3, this circuit is aligned properly and further alignment is not required.

12.6 If the voltage at test point 2 is more negative than the voltage at test point 3, or is much more positive, then 0.2 of a volt adjustment of resistor R13 is necessary.

12.7 Adjust resistor R13 while observing the voltages at both test point 2 and test point 3. Adjust resistor R13 until the voltage at test point 2 is exactly 0.2 volts more positive than the voltage at test point 3. This adjustment assures that transistor Q3 is conducting in the quiescent state and transistor Q4 is cut off. In this state, the limiter circuit is ready to accept an incoming signal.

12.8 Remove the -5.6 volts from test point 1.

12.9 Apply a 2250 Hz signal to the four-wire receive pair and observe the signal at test point 5. A sinusoidal signal should appear at test point 5.

12.10 Observe the service request indicator (SRI) lamp for that channel. It should illuminate to indicate that the 2250 Hz signal has been received.

NOTE

The above procedure is called out as a field service procedure. A 2250 Hz signal can be applied by looping back send to receive on that channel and depress ACCESS and SEIZE buttons to send a seize signal to the Converter. The above procedure can be accomplished on the depot level by utilizing an oscilloscope, a VTVM, an oscillator, and an attenuator. If the alignment procedure as performed in the field still does not provide efficient service, replace the channel PCB and send the card to the depot for service.

It is recommended that all alignment procedures be performed at the depot whenever possible to avoid interrupting service through the Converter. In cases where a newly aligned card still does not provide proper service, alignment of the hybrid transformer balancing network may be necessary. Proceed as follows to perform this alignment.

13.0 ALIGNMENT PROCEDURES FOR THE HYBRID TRANSFORER BALANCING NETWORK

13.1 Locate the hybrid transformer corresponding to the particular channel in question. This transformer is mounted on the channel PCB. The channel card will have to be placed on a card extender to make this adjustment.

13.2 Locate potentiometer R5. (See Figure 14.) this potentiometer will be utilized in this alignment procedure.

13.3 Place a call to the automatic telephone central office by sending seize tone. Reference outgoing call paragraph 8.2. When dial tone is received, dial the number 548. A 1050 Hz test tone will be returned on the four-wire receive terminals for that channel (pin numbers 6 and 8 of the channel card in Part II of the Converter).

13.4 Attach a high impedance VI'VM or oscilloscope across these two pins and observe the level of the incoming signal.

13.5 Attach a high impedance VTVM or oscilloscope across the four-wire send terminals. Pins 20 and 21 of that channel card.

13.6 Adjust R5 for minimum reading on the VTVM connected across the four-wire send terminals. This should be all the alignment necessary to balance the hybrid transformer,

NOTE

The above alignment procedure can be performed at the depot by utilizing

a 600 ohm generator adjusted to 1K Hz at 0 dbm across the four-wire receive terminals on the channel card and adjusting resistor R5 for minimum reading on the four-wire send terminals.

14.0 CHECKING FREQUENCY OF 425 Hz OSCILLATOR

NOTE

The 425 Hz oscillator is controlled by the interrupter circuit. The interrupter circuit is designed to provide an enable condition for the 425 Hz oscillator for two seconds and a disable condition for four seconds. Therefore, the oscillator oscillates at the 425 Hz frequency at the rate of two seconds on and four seconds off (ringback tone). Due to this interrupted rate, it is extremely difficult to measure the frequency of the 425 Hz oscillator. Although the 425 Hz frequency is not a critical frequency (only detected audibly), it may be possible in extreme cases for the 425 Hz oscillator to drift upwards in frequency and be detected by the automatic telephone central office as a 570 Hz signal.

14.1 Place the common circuit PCB on a card extender.

14.2 Locate test point 101 on the common circuit printed wiring board. (The test points are easily accessible with the dust cover removed and are physically located on the end of the cards protruding from the converter case.) (See Figure 15.)

14.3 Attach a jumper from the -5.6 volt terminal (pin 14 on the same PCB) to test point 101. Be extremely careful when attaching the jumper to the pin so as not to short -5.6 volts to any other part of the circuitry. A jumper with a small insulated alligator clip on one end and a male test jack on the other end is recommended.

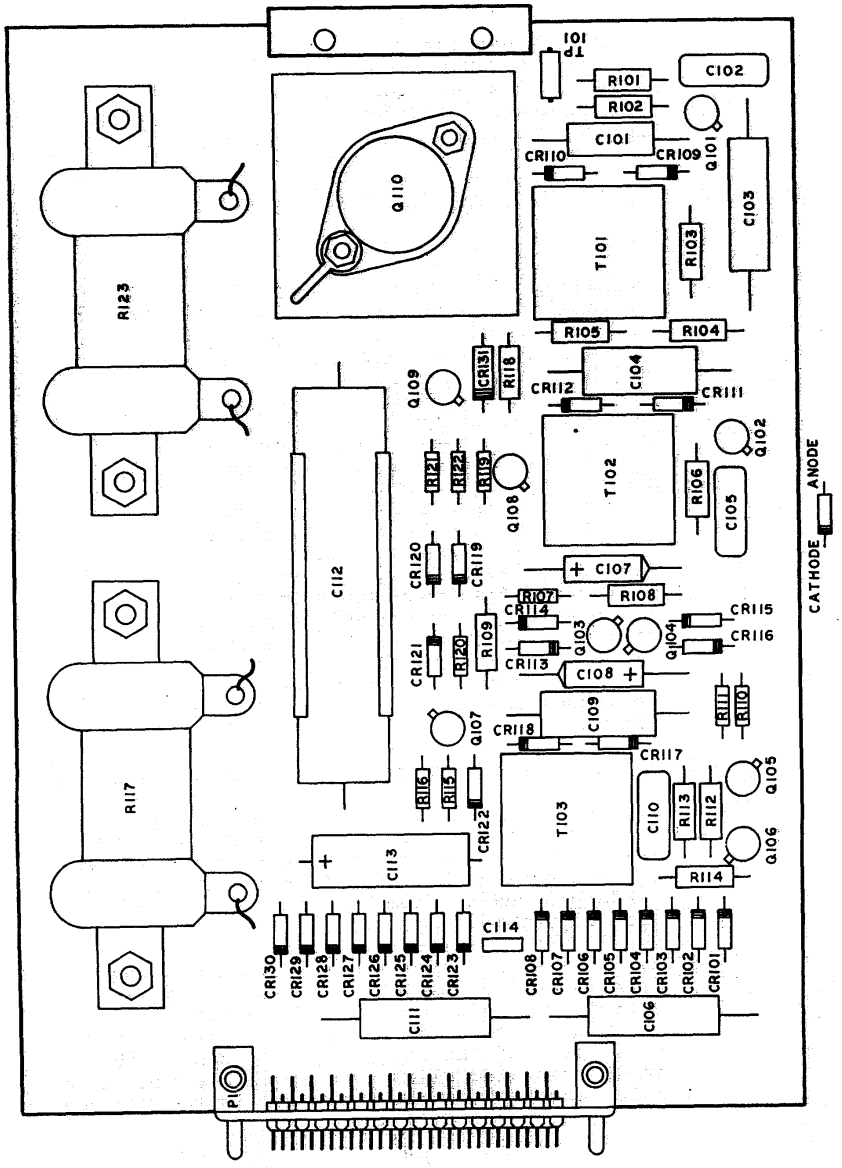


FIGURE 15 Telephone signal Converter CV-1918/G,
Common Circuit PWB Assembly 9CN1637)

14.4 With -5.6 volts applied to test point 101 on the common circuit board, the interrupter is bypassed and the 425 HZ oscillator is free running.

14.5 Place a counter between (-5.6 volts) common and pin 24 on common circuit board and check the frequency. Adjust the trim screw on transformer T103 (see Figure 15) until the counter reads 425 Hz ±5 Hz.

NOTE

The above procedure is provided to allow emergency alignment of the 425 Hz oscillator in the field. This will not normally be necessary, but if frequency alignment is necessary, locate the 425 Hz transformer (T103) on the common board and adjust the trim screw to obtain the proper frequency. The trim screws are Glyptaled at the factory and frequency drift should not be encountered. All the oscillator transformers have trim screws and can be adjusted in the field by putting the common circuit PCB on a card extender and adjusting the various transformer trim screws until the proper center frequencies are obtained. This adjustment may be performed in the field under emergency conditions if care is taken when loosening the trim screws (from the Glyptal) so as not to break the transformers; however, it is recommended that adjustments of this nature be performed at the depot.

15.0 KEYSENDER ADJUSTMENT INFORMATION (SEE FIGURE 16and 22)

CAUTION

When handling the keysender, extreme care must be taken not to grasp the keysender so that the fingers touch the spring pile-ups. Grasping by the spring pile-ups will upset their adjustment.

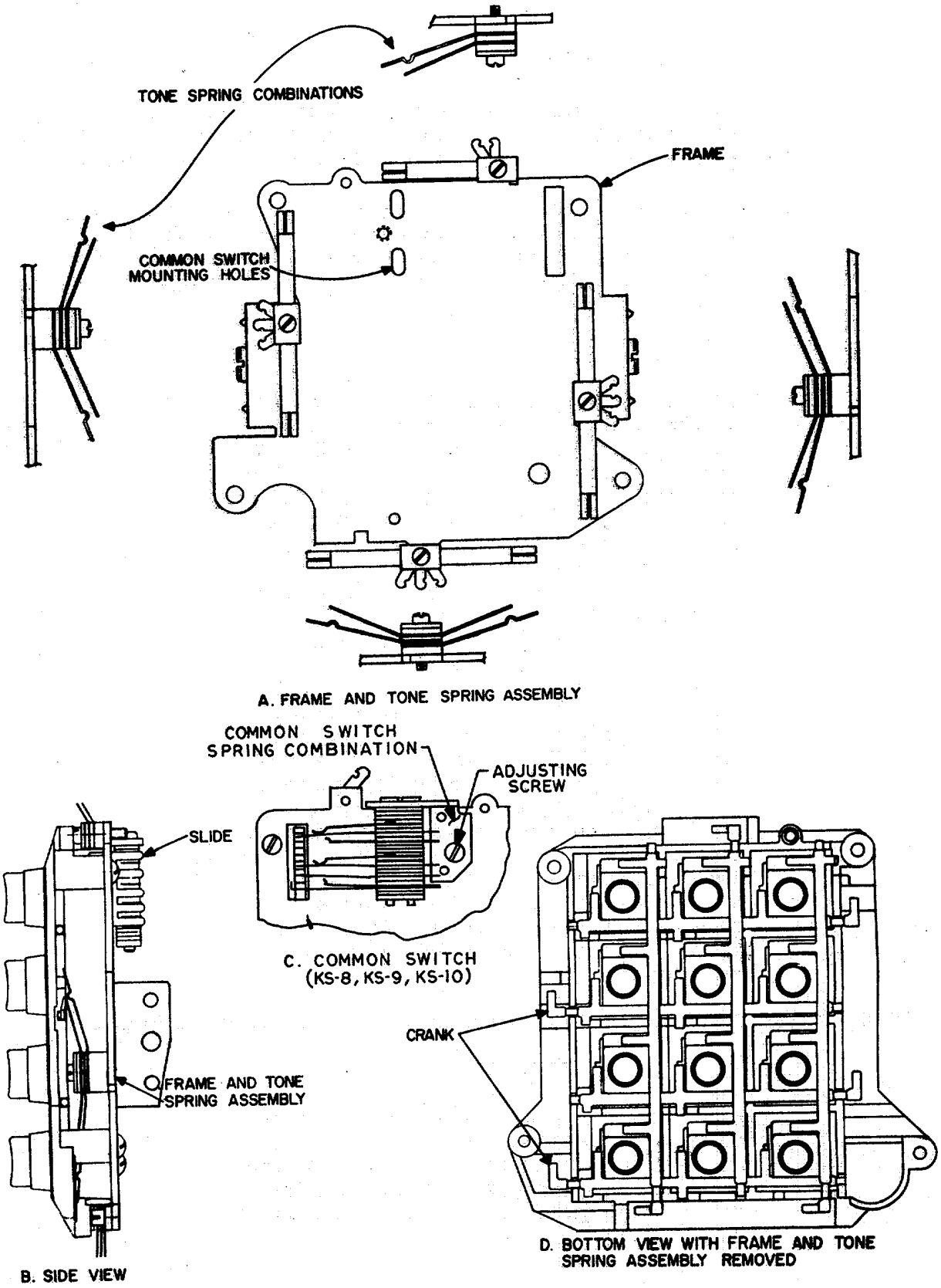


FIGURE 16 Keysender Switch Assembly

15.1 Tone Switch Adjustment Criteria

15.1.1 All bifurcated (dual) tone springs must rest against their-plastic stops with a minimum pressure of 10 grams.

15.1.2 All solid tone springs must rest against their associated crank arms with a minimum pressure of 10 grams.

15.1.3 In the nonoperated condition, there must be a minimum clearance of 1/32 inch between associated tone springs.

15.1-4 When operating,, a tone-spring combination must make with a minimum follow of 1/32 inch.

15.1.5 Pushbutton and tone-spring association is as follows.

Pushbutton	Tone-Spring Operated Pile-Ups
1	KS-1 and -4
2	KS-2 and -4
3	KS-3 and -4
4	KS-1. and -5
5	KS-2 and -5
6	KS-3 and -5
7	KS-1 and -6
8	KS-2 and -6
9	KS-3 and -6
0	KS-2 and -7
R	KS-1 and -7
C	KS-3 and -7

15.2 Common Switch Adjustment Criteria.

15.2.1 In the unoperated condition, the actuating slide must be held against its stop by the tension spring. The tension spring must be the only spring exerting a force against the slide. Other springs may be in contact with, but not exert sufficient force to cause the slide to move away from its stop.

15.2.2 In the unoperated position, each combination must be made with a minimum contact of 10 grams.

15.2.3 In the fully operate-d position each combination must be opened with a minimum contact separation of 0.010 inch.

16.0 TELEPHONE JACK ADJUSTMENT INFOMATION (Fig. 24)

16.1 With the telephone jack in the nonoperated position (plug out), adjust the spring pile-up as follows:

16.1.1 Adjust the closed contacts to a minimum contact pressure of 15 grams.

16.1.2 Adjust the normally open contacts to a minimum clearance of 1/32 of an inch.

16.1.3 There must be a minimum of 0.015 inch travel after contacts make.

16.1.4 Repeat the above adjustments with the telephone jack in the operated position.

17.0 REMOVAL OF DIGIT KEYSENDER, RELEASE SWITCH, AND SEIZE SWITCH FROM KEY CALL PEDESTAL(Figs. 16, 1S, 19)

17.1 Remove the two screws securing the top of the Key Call Pedestal to the Key Call Pedestal base plate.

17.2 Lift the Key Call Pedestal upwards until it rests on its side, leaving the internal components exposed. The bottom plate is hinged and secured to the keyshelf to allow for easy access ability to interior components.

17.3 Remove the keysender mounting screws from the sides of the Key Call Pedestal.

17.4 Remove the hex nuts from the front panel, which secure the seize and release switches to the Key Call Pedestal.

17.5 Remove the four wires from the keysender which are secured on TB301.

17.6 Remove the keysender and the two switches from the Key Call Pedestal being extremely careful not to-grasp the keysender by the spring pile-ups. Caution: (Reference paragraph 15.0 and Figure 16) and be careful not to break any of the wires extending between the keysender and the switches.

NOTE

This removes the two switches and the keysender as a unit. If it is necessary to replace a particular switch, or the keysender, carefully unsolder the wires from the defective unit observing color codes to enable correct replacement of new switch. Reverse above procedure for installation of new part.

18.0 REMOVAL OF SUBASSEMBLIES FROM PART II OF THE CONVERTER

18.1 The printed circuit card assemblies in Part II of the Converter are removable by inserting the card puller into the slot on the end of the card and gently pulling the card out of its associated connector. Use caution when inserting printed circuit card assemblies to insure that the card connector is properly aligned with the mating receptacle in the backplate. These assemblies are aligned at the factory and unless the backplate has loosened in shipment, inserting cards should present no problem. If the back-plate has loosened or shifted, loosen the screws fastening the backplate to the housing and adjust for proper alignment.

18.2 The remaining subassemblies of Part II of the Converter consist of the power ON-OFF switch, the power indicator lamp holder, the latch reset

switch, the automatic latch reset component board assembly, the signal line receptacle, the three interconnecting cable receptacles, the power receptacle, the lightning arresters, and fuses(Figs. 17, 20, 21). It is recommended that the power be turned off, the cables disconnected, and Part II of the Converter be removed from its position on the top of the first operator's position before replacing any of the subassemblies.

1.8.3 With the dust cover removed, space has been provided for removal of all the subassemblies referenced in paragraph 18.2 without removing any of the printed circuit card assemblies. However, removal of the common circuit PCB assembly in position 10 will provide additional space for easier removal of the subassemblies.

18.4 To remove the power ON-OFF switch, remove the hex nut securing the switch to the front panel on the Converter. Disconnect the switch from the circuit by unsoldering the two wires on the switch. Replace with a new switch by resoldering the wires and inserting the switch shaft through the opening in the front panel and securing the switch with the hex nut supplied with the switch{Fig. 25).

18.5 To replace the fuse assembly, remove the hex nut securing the fuse holder to the Converter. This can be accomplished from the inside of the Converter without unsoldering the wires attached to the fuse holder. However, for ease of removal, it is suggested that the wires be unsoldered prior to removing the hex nut. Replace with a new fuse holder, if necessary, by reversing the above procedure.

18.6 To replace the receptacle, remove the two screws securing the receptacle to the Converter and unsolder the wires attached to the receptacle. Observe color codes to assure proper connections when replacing with new receptacle.

18.7 To replace the latch reset pushbutton switch, remove the hex nut securing the switch to the front panel on the Converter. Disconnect the switch from the circuit by unsoldering the wires on the switch. Replace with a new switch by

resoldering the wires and inserting the switch shaft through the opening in the front panel and securing the switch with the hex nut supplied with the switch.

18.8 To remove automatic latch reset component board (Fig. 28), unsolder the 18 wires connected to the assembly. To insure proper replacement of wires, they should be tagged. Remove the four hex nuts holding the assembly to the Converter backplate. To reassemble, reverse the above procedure.

18.9 When repairs have been completed, replace the Converter into position and plug in the associated cables. Turn the power on and check the operation in conjunction with paragraph 7.0.

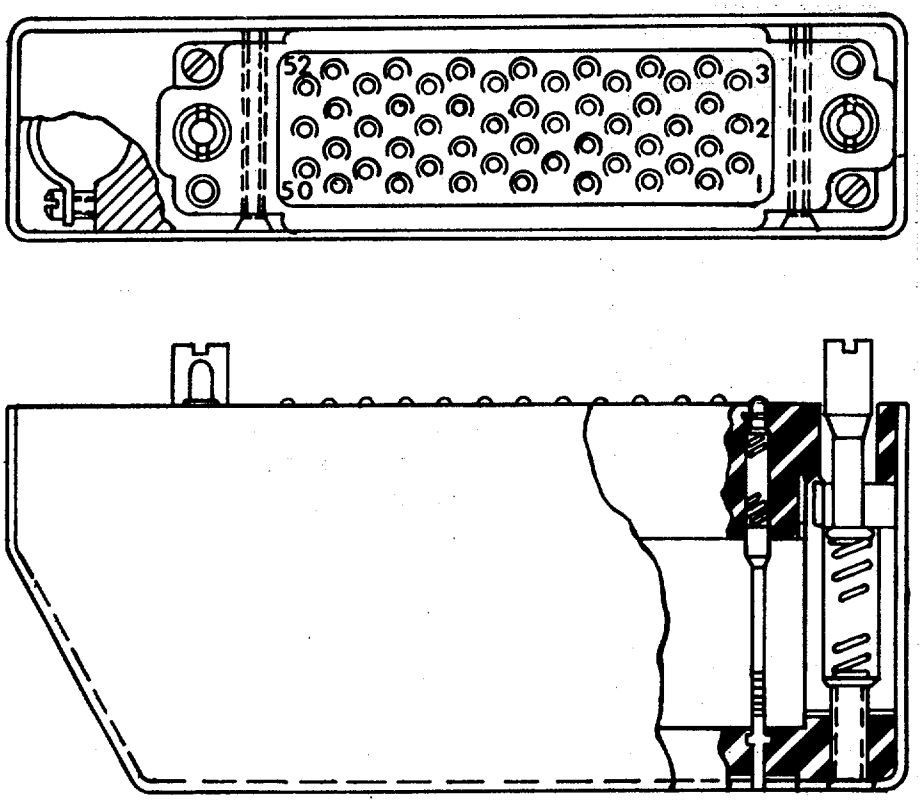


FIGURE 17 Interconnect Cable Connector

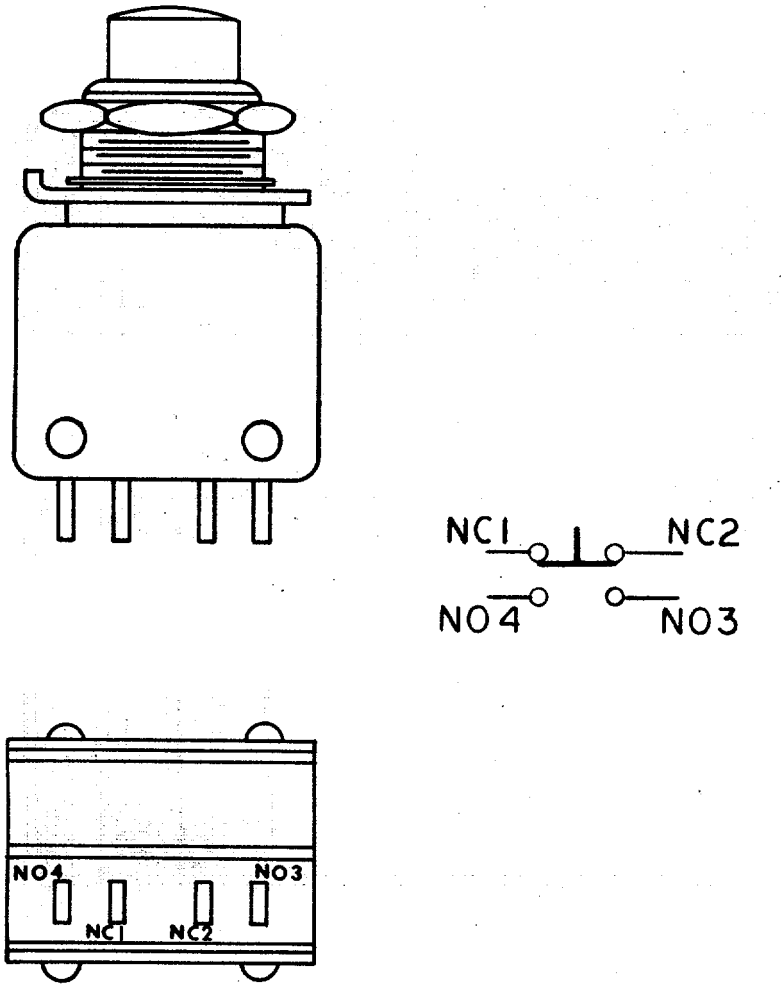


FIGURE 18 Release and Reset Switch

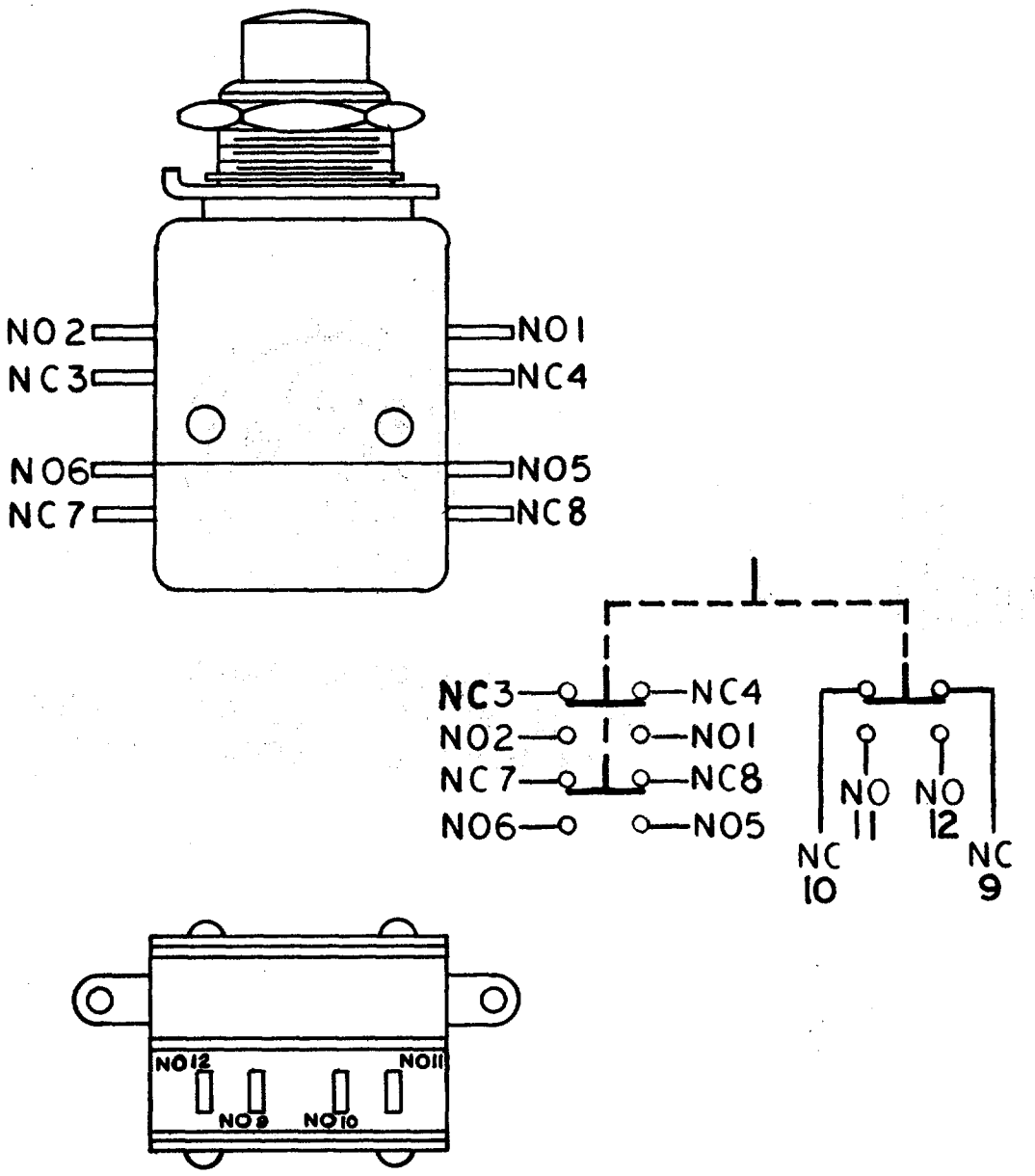
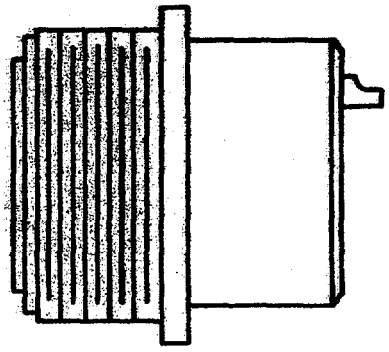
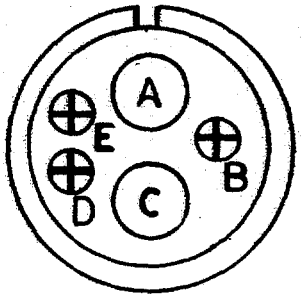


FIGURE 19 Seize and Access Switch





INSERT ARRANGEMENT
VIEW IS FRONT FACE OF PIN INSERT
OR REAR OF SOCKET INSERT

FIGURE 20 Power Connector

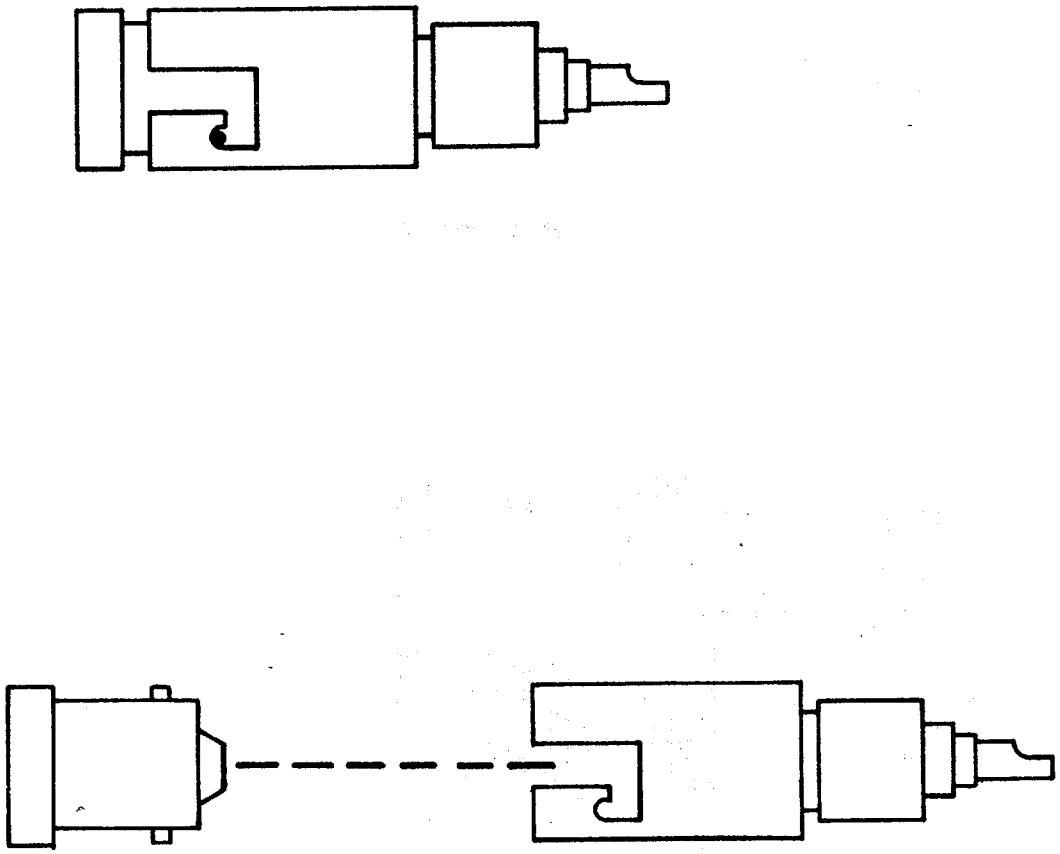


FIGURE 21 Lightning Protector

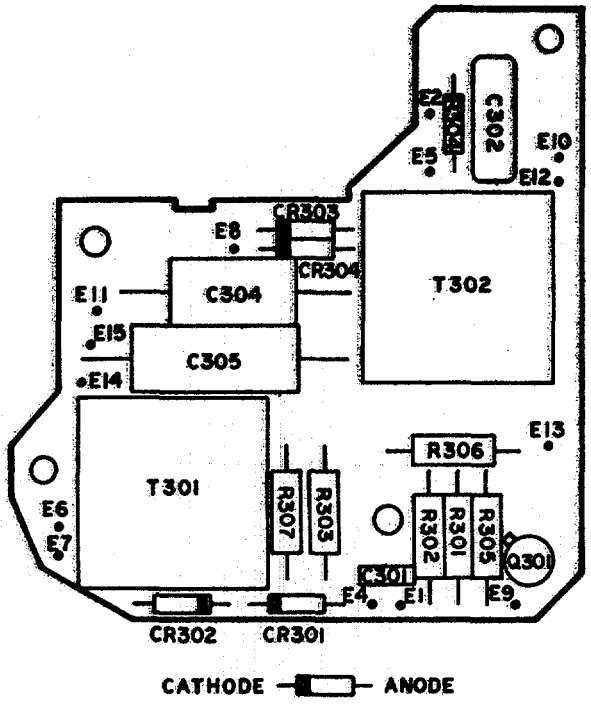


FIGURE 22 Telephone Signal Converter CV-1918/G,
DTMF Oscillator PWB Assembly (11002)

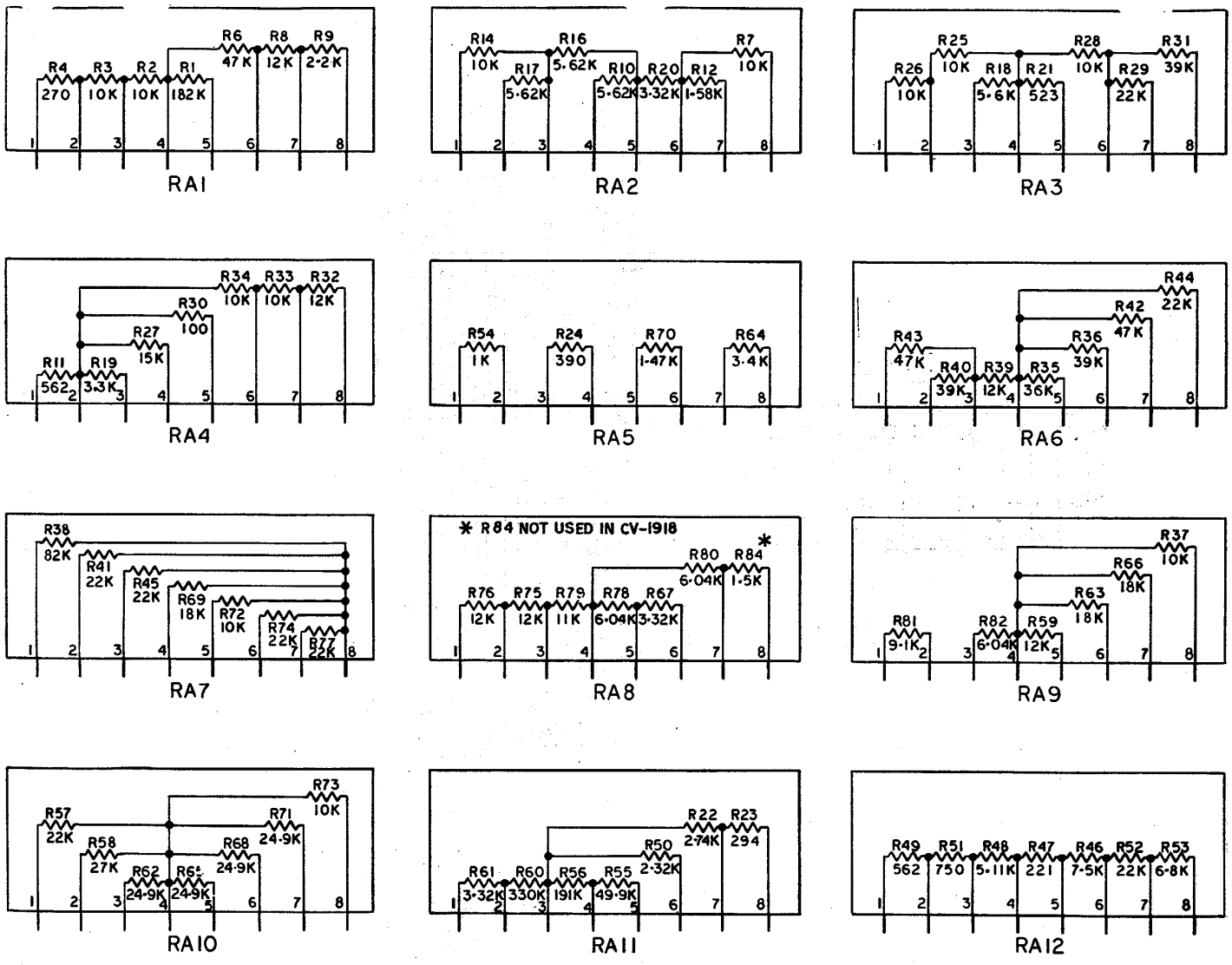


FIGURE 23 Thick Film Network Resistor Schematics

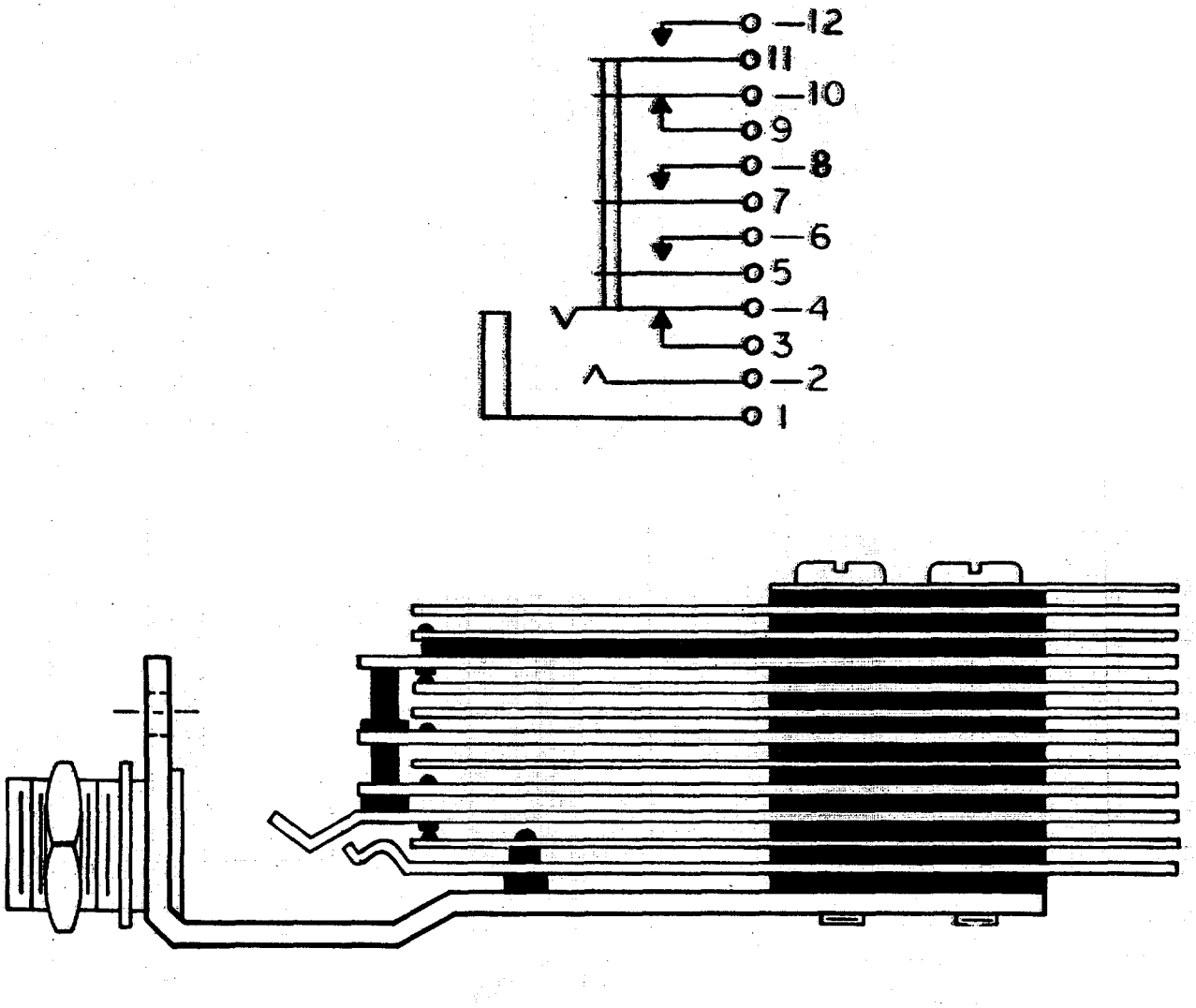


FIGURE 24 Telephone Jack

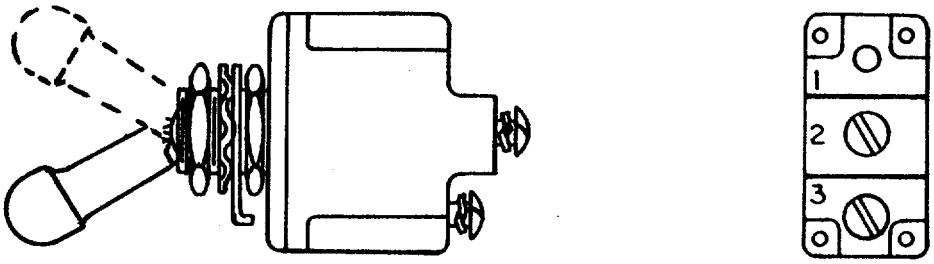


FIGURE 25 Power ON-OFF Switch

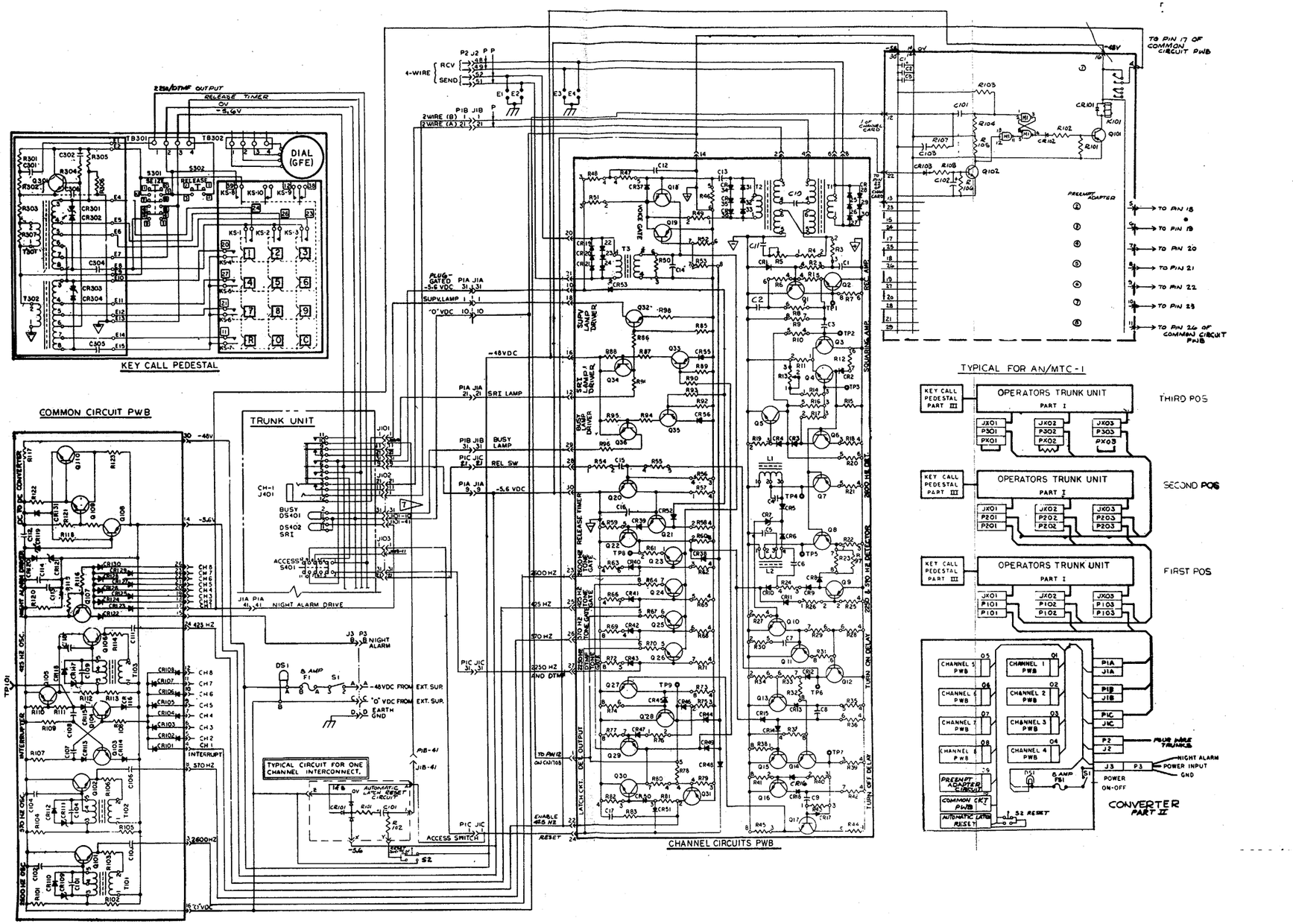
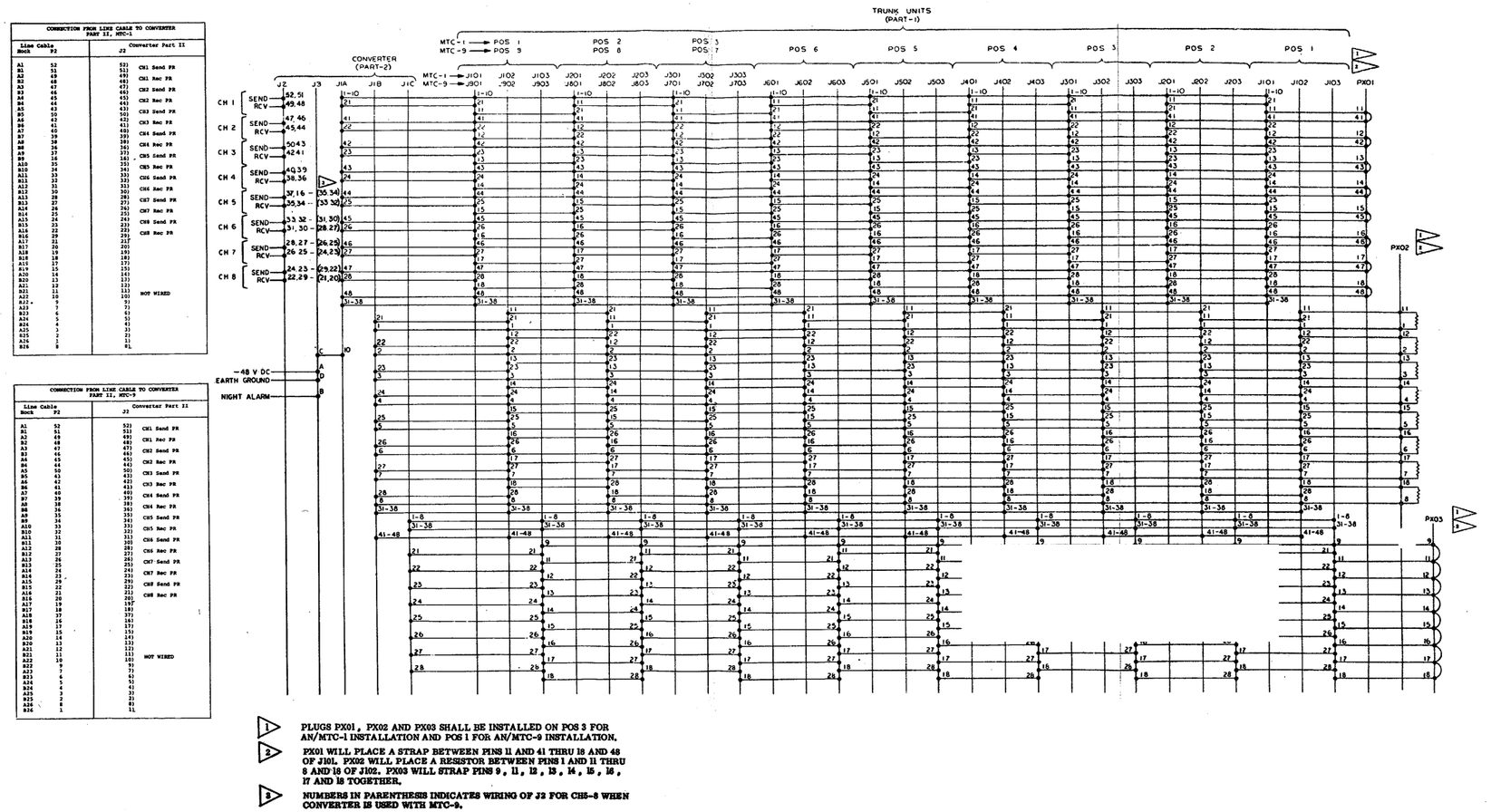


Figure 26. Telephone Signal Converter CV-1918/G, System Schematic (Sheet 1 of 2)

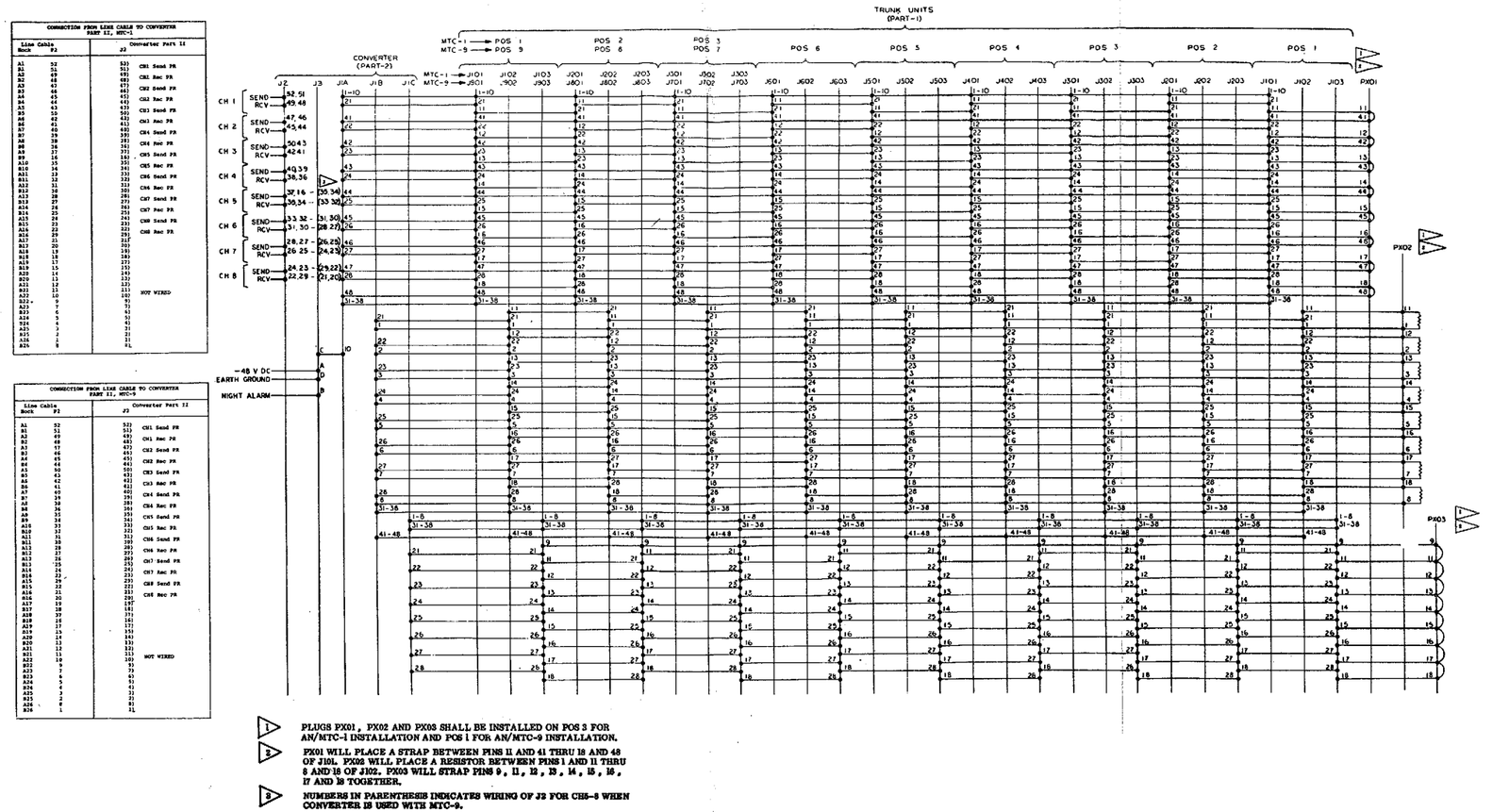


1. PLUGS PX01, PX02 AND PX03 SHALL BE INSTALLED ON POS 3 FOR AN/MTC-1 INSTALLATION AND POS 1 FOR AN/MTC-9 INSTALLATION.
2. PX01 WILL PLACE A STRAP BETWEEN PINS 11 AND 41 THRU 18 AND 48 OF J101. PX02 WILL PLACE A RESISTOR BETWEEN PINS 1 AND 11 THRU 8 AND 18 OF J102. PX03 WILL STRAP PINS 9, 11, 12, 13, 14, 15, 16, 17 AND 18 TOGETHER.
3. NUMBERS IN PARENTHESIS INDICATES WIRING OF J2 FOR CH5-8 WHEN CONVERTER IS USED WITH MTC-9.

Figure 26
Telephone Signal Converter CV-1918/G,
Complete Wiring Diagram (Sheet 2 of 2)

CONNECTION FROM LINE CABLE TO CONVERTER PART II, MTC-1			
Line Cable Block	P2	Converter Part II J2	
A1	52	52)	CH1 Send FR
A2	51	51)	CH1 Rec FR
A3	49	49)	CH2 Send FR
A4	48	48)	CH2 Rec FR
A5	47	47)	CH3 Send FR
A6	46	46)	CH3 Rec FR
A7	45	45)	CH4 Send FR
A8	44	44)	CH4 Rec FR
A9	43	43)	CH5 Send FR
A10	42	42)	CH5 Rec FR
A11	41	41)	CH6 Send FR
A12	40	40)	CH6 Rec FR
A13	39	39)	CH7 Send FR
A14	38	38)	CH7 Rec FR
A15	37	37)	CH8 Send FR
A16	36	36)	CH8 Rec FR
A17	35	35)	
A18	34	34)	
A19	33	33)	
A20	32	32)	
A21	31	31)	
A22	30	30)	
A23	29	29)	
A24	28	28)	
A25	27	27)	
A26	26	26)	
B1	25	25)	
B2	24	24)	
B3	23	23)	
B4	22	22)	
B5	21	21)	
B6	20	20)	
B7	19	19)	
B8	18	18)	
B9	17	17)	
B10	16	16)	
B11	15	15)	
B12	14	14)	
B13	13	13)	
B14	12	12)	
B15	11	11)	
B16	10	10)	
B17	9	9)	
B18	8	8)	
B19	7	7)	
B20	6	6)	
B21	5	5)	
B22	4	4)	
B23	3	3)	
B24	2	2)	
B25	1	1)	
B26	0	0)	

CONNECTION FROM LINE CABLE TO CONVERTER PART II, MTC-9			
Line Cable Block	P2	Converter Part II J2	
A1	52	52)	CH1 Send FR
A2	51	51)	CH1 Rec FR
A3	49	49)	CH2 Send FR
A4	48	48)	CH2 Rec FR
A5	47	47)	CH3 Send FR
A6	46	46)	CH3 Rec FR
A7	45	45)	CH4 Send FR
A8	44	44)	CH4 Rec FR
A9	43	43)	CH5 Send FR
A10	42	42)	CH5 Rec FR
A11	41	41)	CH6 Send FR
A12	40	40)	CH6 Rec FR
A13	39	39)	CH7 Send FR
A14	38	38)	CH7 Rec FR
A15	37	37)	CH8 Send FR
A16	36	36)	CH8 Rec FR
A17	35	35)	
A18	34	34)	
A19	33	33)	
A20	32	32)	
A21	31	31)	
A22	30	30)	
A23	29	29)	
A24	28	28)	
A25	27	27)	
A26	26	26)	
B1	25	25)	
B2	24	24)	
B3	23	23)	
B4	22	22)	
B5	21	21)	
B6	20	20)	
B7	19	19)	
B8	18	18)	
B9	17	17)	
B10	16	16)	
B11	15	15)	
B12	14	14)	
B13	13	13)	
B14	12	12)	
B15	11	11)	
B16	10	10)	
B17	9	9)	
B18	8	8)	
B19	7	7)	
B20	6	6)	
B21	5	5)	
B22	4	4)	
B23	3	3)	
B24	2	2)	
B25	1	1)	
B26	0	0)	



1. PLUGS PX01, PX02 AND PX03 SHALL BE INSTALLED ON POS 3 FOR AN/MTC-1 INSTALLATION AND POS 1 FOR AN/MTC-9 INSTALLATION.
2. PX01 WILL PLACE A STRAP BETWEEN PINS 11 AND 41 THRU 18 AND 48 OF J10L. PX02 WILL PLACE A RESISTOR BETWEEN PINS 1 AND 11 THRU 8 AND 18 OF J102. PX03 WILL STRAP PINS 9, 11, 12, 13, 14, 15, 16, 17 AND 18 TOGETHER.
3. NUMBERS IN PARENTHESIS INDICATES WIRING OF J2 FOR CH5-8 WHEN CONVERTER IS USED WITH MTC-9.

Figure 26
Telephone Signal Converter CV-1918/G,
Complete Wiring Diagram (Sheet 2 of 2)

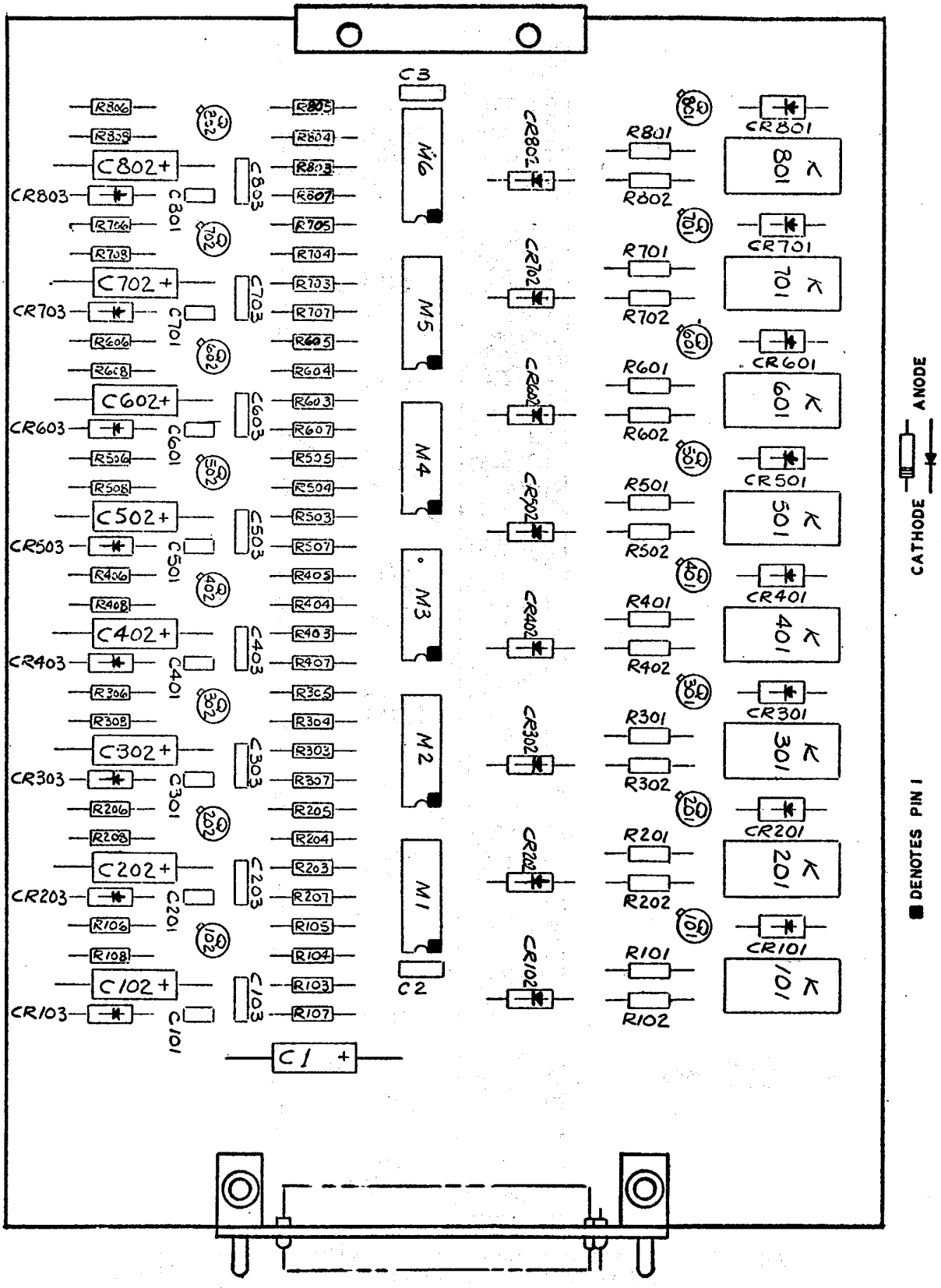


FIGURE 27 Telephone Signal Converter CV-1918/G,
Preempt Adapter Circuit PWB Assembly

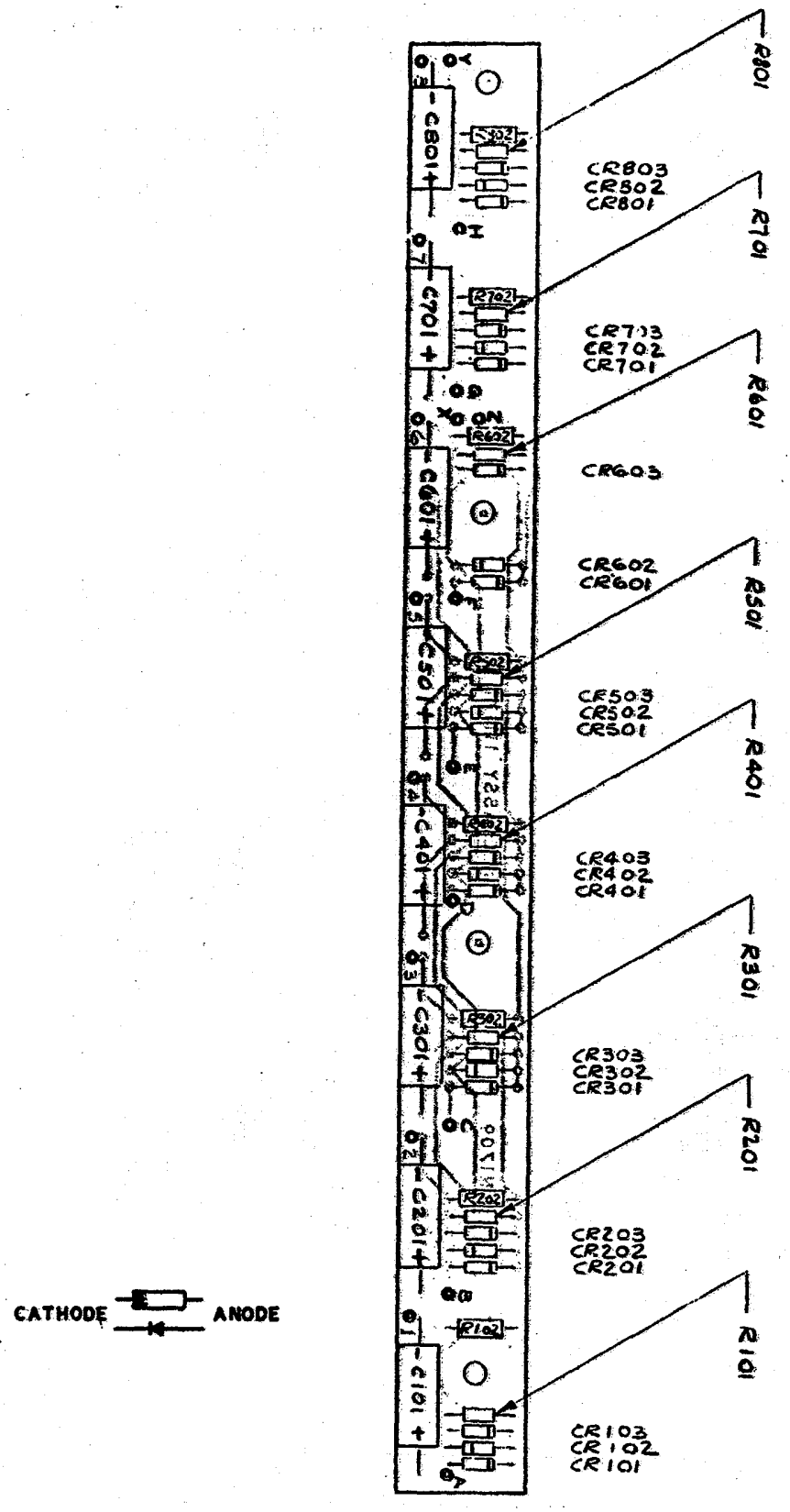


FIGURE 28 Telephone Signal Converter CV-1918/G, Automatic Latch Reset Component Assembly

APPENDIX A

REFERENCES

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	US Army Equipment Index of Modification Work Orders.
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies, and Equipment Used by the Army.
TB SIG 222	Solder and Soldering.
TB 43-0118	Field Instructions for Painting and Preserving Electronics Command Equipment Including Painting of Electrical Equipment Shelters.
TM 11-2146	Central Office, Telephone Manual AN/TTC-7 and AN/ITTC-7A and Telephone Central Office Group, Manual AN/GTA-14(V).
TM 11-5805-284-15	Operator's, Organizational, Direct Support, General Support, and Depot Maintenance Manual including repair parts lists: Central Office, Telephone, Manual AN/MTC-1 and AN/MTC-1A.
TM 11-5805-288-15	Operator's, Organizational, Direct Support, General Support, and Depot Maintenance Manual including Repair Parts and Special Tools Lists: Central Office, Telephone, Manual AN/MTC-9.
TM 11-5805-556-14-1, -2	Operator, Organizational, DS, and GS Maintenance Manual: Central Office, Telephone, Automatic AN/TTC-25(V) (NSN 5805-00-910-8841).
TM 11-6625-320-12	Operator's, and Organizational Maintenance Manual: Voltmeter, Meter ME-30A/U and Voltmeters, Electronic ME-30B/U, ME-30C/U, and ME-30E/U.
TM 11-6625-320-35	DS, GS, and Depot Maintenance Manual: Voltmeter, Meter ME-30A/U and Volmeters, Electronic ME-30B/U and ME-30C/U.
TM 11-6625-366-15	Operator's, Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U
TM 11-6625-700-14-1	Operator's, Organizational, Direct Support, and General Support Maintenance Manual, including Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools): Digital Readout, Electronic Counter AN/USM-207A (Serial Nos. 1A Through 1100A).
TM 11-6625-1703-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual Including Repair Parts and Special Tool Lists: Oscilloscope AN/USM-281A.
TM 38-750	The Army Maintenance Management System (TAMMS).

APPENDIX B

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

B1. General

This appendix provides a summary of the maintenance operations for the CV-1918/G. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operation.

B2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition; i.e., to clean, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

d. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameter.

e. Align. To adjust specified variable elements of an item to about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

h. Replace. The act of substituting a serviceable like-type part, subassembly, module (component or assembly) for an unserviceable counter-part.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/assembly, end item or system. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. Overhaul. That periodic maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment/components.

B3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column *3, Maintenance Functions.* Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a “work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time" figures will be shown for each

category. The number of man-hours *spec*ified by the "work time" figure represents the average tine required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C - Operator/crew
O - Organizational
F - Direct support
H - General support

e. Column 5, Tools and Equipment. Column 5 specifies ,by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

B-4. Tool and Test Equipment Requirements (Table 1)

a*. Tool or Test Equipment Reference Code.* The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance function.

d. National/NATO Stock Number. This column lists the National NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for Manufacturers (5digit) in parentheses.

(Next printed page is B-3)

Section II. MAINTENANCE ALLOCATION CHART FOR CV-1918/G (V) (1) & (2)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIP
			C	O	F	H	D	
00	Converter, Telephone Signal CV-1918/G (V) (1) & (2)	Inspect	0.2					
		Test		0.5				1
		Service		0.2				
		Install		2.0				2
		Repair [1]		0.3				
		Repair [2]			1.0			1, 2
		Alignment			2.0			1, 2, 3, 4, 5, 6
		Overhaul					30.0	1, 2, 3, 4, 5, 6
01	Electronics Unit	Repair			1.0			1, 2
0101	Common Circuit Printed Wiring Board Assembly	Repair					2.0	1, 2, 4, 5, 6
		Alignment			1.0			2, 3, 6
0102	Channel Printed Wiring Board Assembly	Repair					2.0	1, 2, 4, 5, 6
		Alignment			1.0			2, 3, 4, 5
0103	Preempt Adapter Printed Wiring Board Assembly	Repair					2.0	1, 2, 4, 5 6
0104	Automatic Latch Reset Component Board Assembly	Repair			1.0			1, 2
02	Trunk Unit	Replace		1.0				2
		Repair			1.0			1, 2
		Adjust			0.5			2

1. By replacement of printed circuit cards, trunk unit, Key Call Pedestal, lightning arresters, or cables.
2. By replacement of chassis mounted piece parts.

Section II. MAINTENANCE ALLOCATION CHART FOR CV-1918/G (V) (1) & (2)

(1) GROUP NUMBER	(2) COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIP
			C	O	F	H	D	
03	Key Call Pedestal	Replace		0.5				2
		Repair			1.0			1, 2
0301	DT,4 Oscillator Printed Wiring	Repair			1, 0 ,			1, 2, 4
	Board Assembly							
0302	Keyset	Repair			1.0			2
		Adjust			1.0			2.
	Wiring Cables	Replace		0.3				2
		Repair			0.5			I, 2

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL / NATO STOCK NUMBER	TOOL NUMBER
1	O, F, D	Multimeter TS-352B/U	6625-00-553-0142	
2	O, F, D	Tool Kit, Electronic Equipment TK-105	5180-00-610-8177	
3	F, D	Extender Card		
4	F, D	Voltmeter, meter ME-30 ( )/U	6625-00-643-1670	
5	F, D	Oscilloscope AN/USM-281A	6625-00-228-2201	
6	F, D	Counter, Digital, Electronic AN/USM-207A	6625-00-044-3228	

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MDW(1)	LBAD (14)
Armies (2)	SAAD (30)
Corps (2)	TOAD (14)
HISA (Ft. Monmouth)(33)	SHAD (3)
Svc Colleges (1)	Ft Gillem (10)
USASESS (5)	Sig FLDMS (1)
USAADS (2)	USAERDAA (1)
USASFAS(2)	USAERDAW(1)

NG: None.
USAR: None.
For explanation of abbreviations used, see AR 310-50.

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