

NAVSHIPS 96112

Non-Registered

TECHNICAL MANUAL

for

COMMUNICATION
PATCHING PANEL
SB-2244/UG

DEPARTMENT OF THE NAVY
BUREAU OF SHIPS

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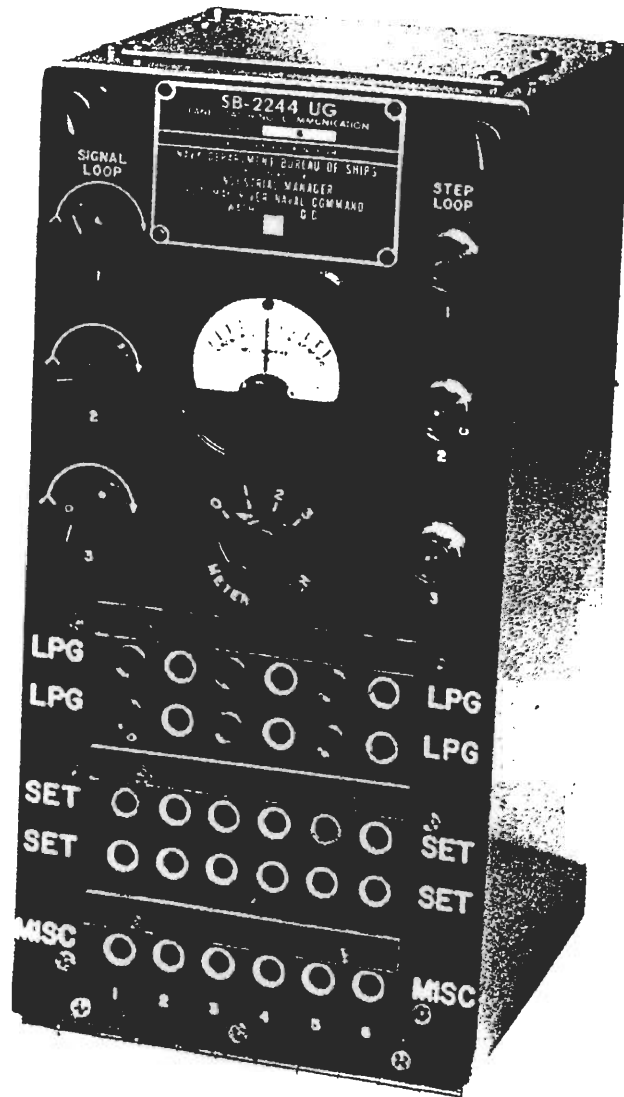


Figure 1-1. Communication Patching Panel SB-2244/UG.

GENERAL INFORMATION

1-1. PURPOSE AND BASIC PRINCIPLE

Communication Patching Panel SB-2244/UG is intended for shipboard or land based use to facilitate interconnection and transfer of teletypewriters and cryptographic equipments.

The patching panel provides three signal and stepping circuits to a transmitter-distributor from a cryptographic transmitter.

1-2. FUNCTIONAL DESCRIPTION

a. GENERAL. - Communication Patching Panel SB-2244/UG is a rectangular steel cabinet containing a terminal board which has facilities for connecting three circuits. Each circuit has two loops, one signal loop and one stepping loop. A loop comprises two looping jacks (LPG), two set jacks (Set 1 & Set 2), and one miscellaneous jack (MISC.). The signal loop has a rheostat to adjust the line current, while the stepping loop current is adjusted in steps by fixed resistors. The line current for the signal loop is monitored by a milliammeter which can be switched to any one circuit by a rotary switch. Stepping activity in the step loop is indicated by the flashing of a neon indicator, one for each stepping loop. There are three sets of miscellaneous jacks that may be connected to equipment or other circuits that normally do not appear on the patch panel. Each pair of jacks used to constitute a circuit has a polarization hole between them, to eliminate the possibility of cross patching. The controls and indicators are mounted on the front panel of the cabinet as shown in figure 1-1. The front panel is hinged at the bottom and secured at the top by two knurled thumb screws. Three special patchcords are supplied with each unit (see figure 1-2). Entry for cables terminating at the

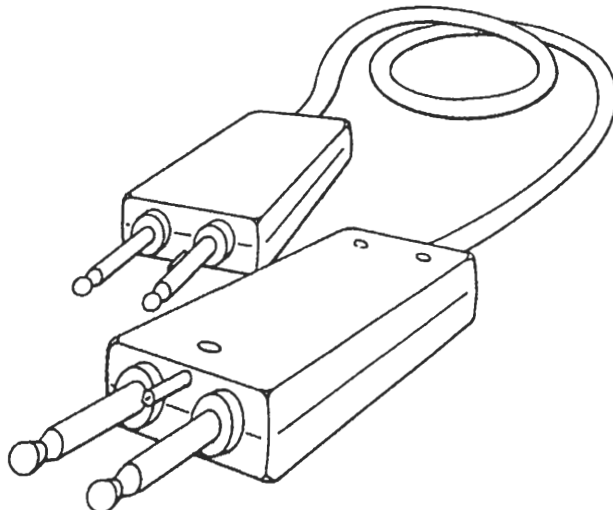


Figure 1-2. Communication Patching Panel SB-2244/UG,
Special Polarized Patchcord

main terminal board inside the cabinet is provided through a rectangular hole (4-1/16 x 2") on top of the cabinet. (Top box cover.)

b. Communication Patching Panel SB-2244/UG is designed for mounting side-by-side when more than three circuits are required. The panel cabinet is 12-1/8 inches high, 5-13/16 inches wide, and 6 inches deep (see figure 1-1).

1-3. BOX AND COVER, CABLE ENTRANCE

An accessory Cable Entrance Box is provided as an optional installation device. The Cable Entrance Box is mounted on top of the SB-2244/UG and is attached to the case by four #8 machine screws, lockwashers and hex nuts. The Cable Entrance Box dimensions are 2-7/8 inches high, 5-13/16 inches wide and 5-7/8 inches deep. When this box is attached to the panel cabinet the overall dimensions of the SB-2244/UG are 15 inches high, 5-13/16 inches wide and 6 inches deep (see figure 1-3).

1-4. EQUIPMENT SUPPLIED

The following equipment is supplied with each Communication Patching Panel, SB-2244/UG.

- a) Cable entrance box.
- b) Three special polarized patchcords.
- c) Two instruction manuals.
- d) One hundred lugs for installation purposes.
- e) One dummy plug.

1-5. QUICK REFERENCE DATA

Communication Patching Panel SB-2244/UG

Manufacturer - INDMAN, PRNC,
Washington, D. C.

Power - 120 Volts DC (local signal battery)
120 Volts DC or 67 Volts DC (local stepping
battery)

Circuits - 3

Loops/circuit - 1 signal
1 stepping

Jacks/loop - 2 looping (LPG)
2 set (set 1 & set 2)
1 miscellaneous

Line Current/loop - Signal 60 milliampere (adjustable)
Stepping
50 milliampere pulse (stepped)

INSTALLATION

2-1. GENERAL

These instructions contain information pertinent to unpacking, locating, mounting and installation of the Communications Patch Panel SB-2244/UG. They include initial checks and adjustments required to put the equipment in proper operating condition.

2-2. UNPACKING

a. GENERAL - All units including three polarized plugs and two manuals have been carefully packed to insure proper protection during shipment. Care should be exercised while handling and unpacking the unit to prevent damage.

b. Inspection - Check equipment for possible damage that may have occurred during shipment. Loosen the two knurled thumb screws at the top, front of the unit; lower the front panel to the horizontal position; then inspect component boards, switches, solder connections, etc. If repairs are required refer to Section 5 of this manual.

2-3. POWER REQUIREMENT

The line current is supplied to the panel from either a local or remote source. The voltage requirement is optional depending on the specific installation. A 120 Volt DC source is required for the signal battery while the stepping battery is a 65-70 volts DC or 120 volts DC.

2-4. INSTALLATION

a. LOCATION. - The SB-2244/UG is designed for ship-board or land based use. It should be located so that personnel have ample room to operate and maintain the unit.

See figure 2-1 for overall unit dimensions. Allow at least 12-1/4 inches in front of the unit so that the hinged front panel may be lowered without obstruction, to allow access to the interior components.

b. MOUNTING. - The unit is designed to be mounted on a bulkhead by means of four 1/4 inch holes located on the back side of the panel cabinet. The unit may be optionally mounted side-by-side in groups of three in a standard nineteen inch rack. The mounting hardware for the latter type mounting is not included with the unit.

c. CABLE CONNECTIONS. - Cables terminating at the terminal boards inside the panel may enter through the 2 inch wide, 4 inch long cable entry hole at the top of the unit or the cable entry box. When using the cable entry box, the top cover plate of the SB-2244/UG may be discarded. A package of 100 terminal lugs is provided to facilitate the attachment of wires to the terminal boards.

(1) All cabling coming into the unit terminates at applicable terminal blocks TB-101 through TB-105 (see figure 2-2).

The cryptographic transmitter's signal and step contacts are wired to TB-101 (LINE). The transmitter-distributor's signal and clutch contacts are wired to TB-102 (Set 1). The monitor teletypewriter should be connected to TB-103 (Set 2) signal circuits. The stepping contacts for Set 2 must be jumpered out on TB-103. Miscellaneous equipments may be connected to the miscellaneous jacks through TB-104. Battery connections for signal and step loops are made on TB-105. For circuit, terminal board, terminal, and jack relationship refer to table 2-1.

d. TERMINAL STRAPPING. - The terminals in each unit are strapped for local battery source and normal op-

TABLE 2-1. COMMUNICATIONS PATCHING PANEL SB-2244/UG
TERMINAL BOARD CONNECTIONS

CONNECTIONS		CIRCUITS					
		1		2		3	
JACKS	TERMINAL BOARD	LOOPS		LOOPS		LOOPS	
		SIGNAL	STEP	SIGNAL	STEP	SIGNAL	STEP
		Term	Term	Term	Term	Term	Term
LOOPING (LPG)	TB - 101 (LINE)	1-2	3-4	5-6	7-8	9-10	11-12
SET - 1	TB - 102 (SET 1)	1-2	3-4	5-6	7-8	9-10	11-12
SET - 2	TB - 103 (SET 2)	1-2	3-4*	5-6	7-8*	9-10	11-12*
MISCELLANEOUS	TB - 104 (MISC)	1-2	3-4	5-6	7-8	9-10	11-12
POWER SUPPLY	TB - 105	1-2	5-6	1-2	5-6	1-2	5-6

*Must be jumpered in normal operation and removed only when two transmitter-distributors are stepped from one stepping switch.

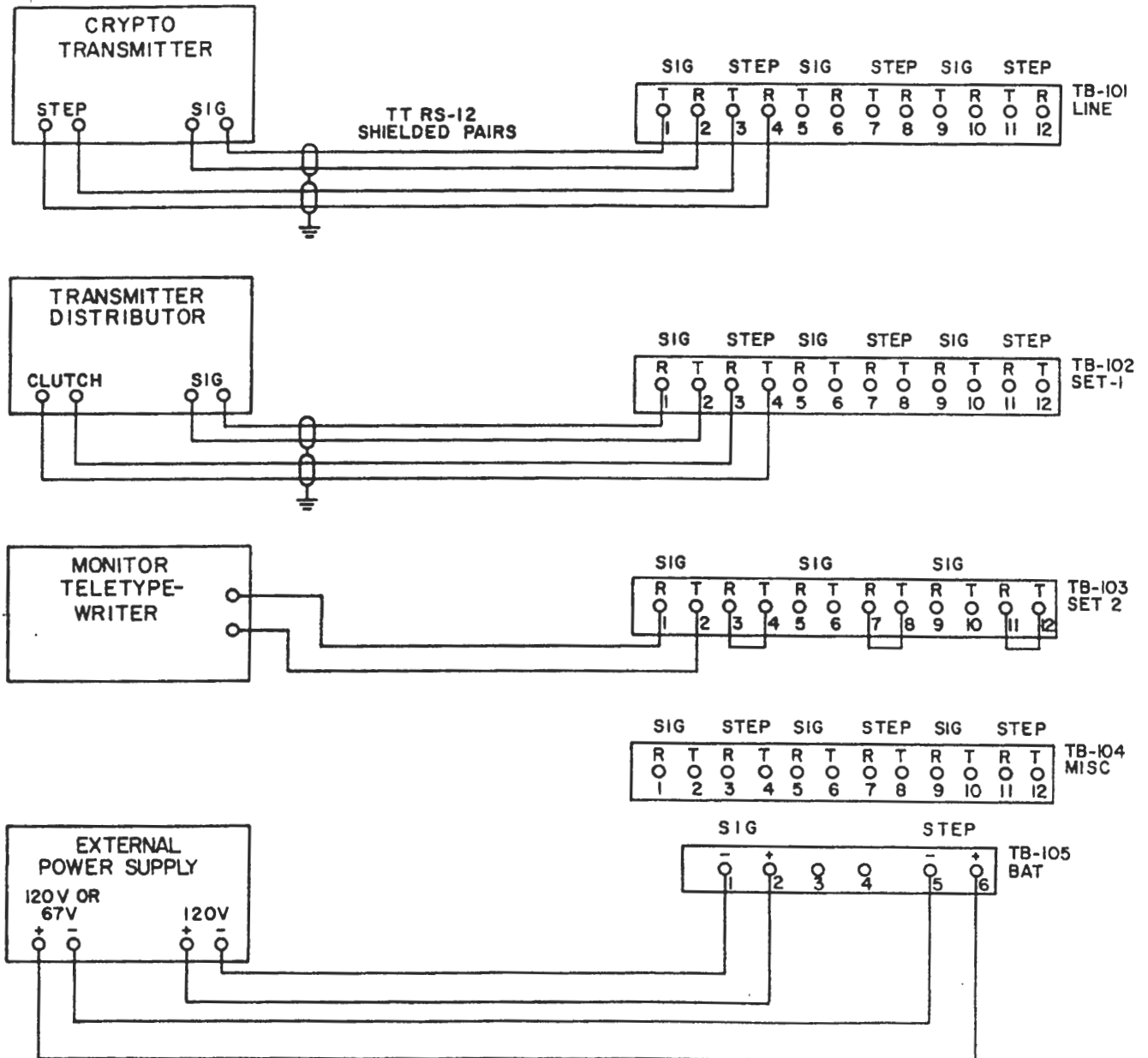


Figure 2-2. Communication Patching Panel SB-2244/UC, Terminal Board Cable Connections

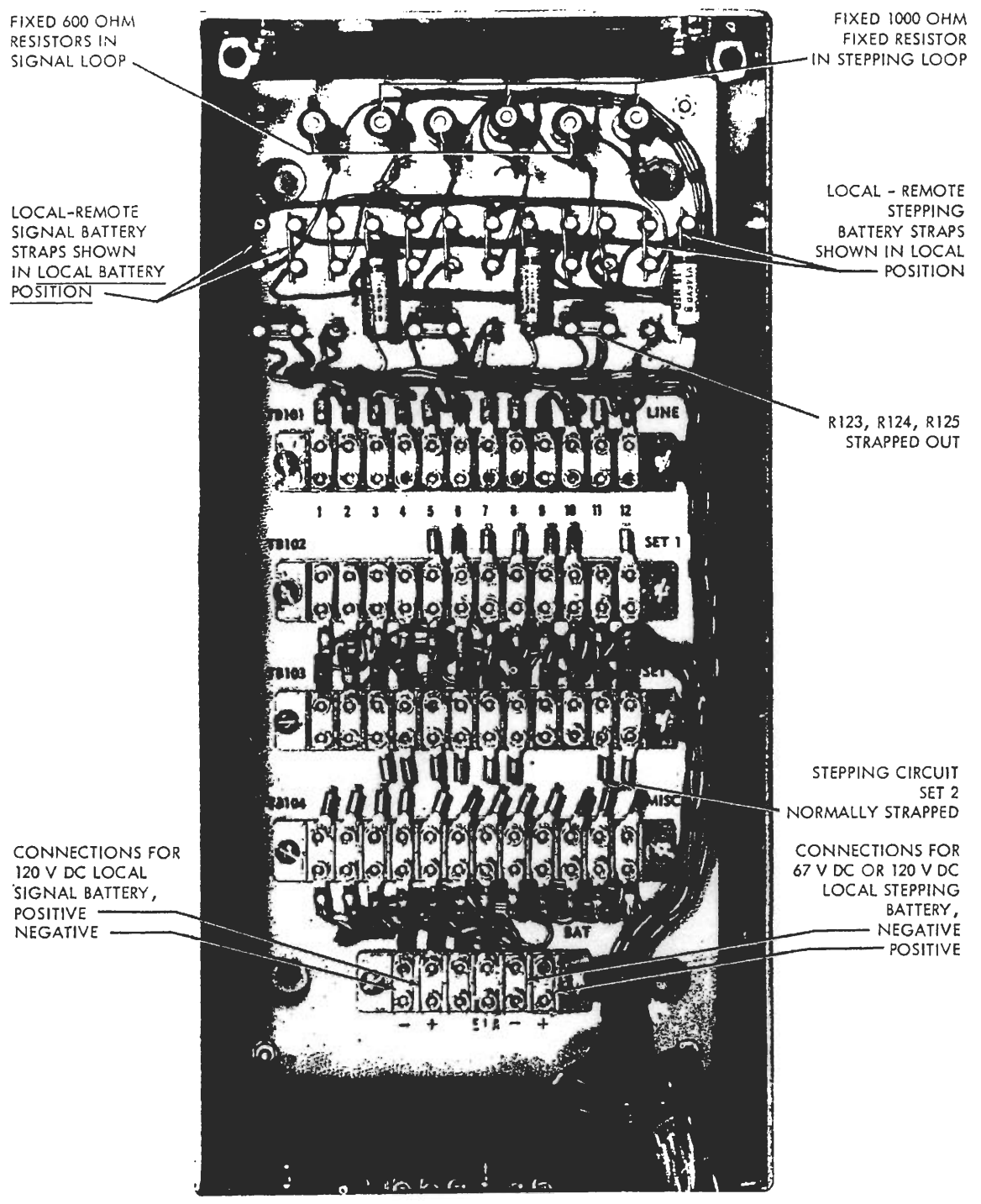


Figure 2-3. Communication Patching Panel SB-2244/UG, Component Locations

eration. Optional hook-ups may be employed in the signal and stepping loops by changing the removable straps on the terminal lugs. For location of straps and components (see figure 2-3).

(1) Signal loop. - Changing from local battery to remote battery, 120 volts DC, remove the two local battery straps and place a strap across the two bottom lugs as shown in figure 2-4.

(2) Signal loop. - Strap out the 600 ohm 10 watt fixed resistors when external loop resistance exceeds 1400 ohms or loop current cannot be raised to 60 milliamperes.

(3) Stepping loop. - Changing from local battery to remote battery 67 volts DC or 120 volts DC, remove the two local battery straps and place a strap across the two bottom lugs as shown in figure 2-4.

2-5. ADJUSTMENTS

There are no adjustments necessary before placing the unit in operation.

2-6. PREPARATION FOR RESHIPMENT

Refer to Navy standard packaging instructions and Military Specification MIL-E-17555.

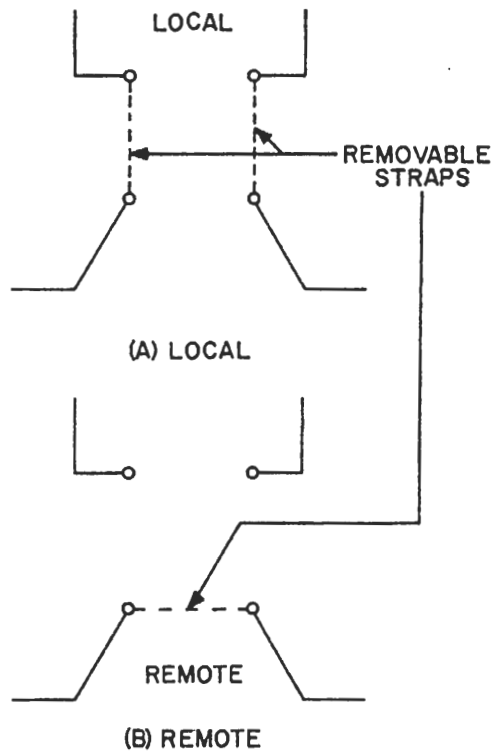


Figure 2-4. Method of Connecting Removable Straps.

(4) Stepping Loop. - If 67 volts DC is used for either local or remote battery, resistors R111, R112 or R113 should be strapped out.

(5) Stepping Loop. - When using 120 volts DC local or remote battery, it is possible to operate two transmitter-distributor clutches from a single stepping switch. To do so, remove the straps from R-123, R-124 or R-125 and from the set 2 terminals on TB-103.

TROUBLESHOOTING

4-1. GENERAL

In order to troubleshoot Communication Patching Panel SB-2244/UG, the principles of operation must be understood. A circuit analysis is presented in paragraph 4-2. The diagram shown in figure 4-1 is a simplified form of local battery connections in relation to typical external equipments, for both the signal and stepping loops. The wiring diagram in figure 4-2 is typical for all circuits. Troubleshooting procedures follow the analysis.

4-2. CIRCUIT ANALYSIS

Figure 4-1 is a simplified hook-up of the signal and stepping loops in circuit #1, and is typical of all three circuits.

a. SIGNAL LOOP. - The signal input to a cryptographic device is connected across terminals 1 and 2 of terminal board TB-101 (LINE). When a loop does not supply its own line current, provisions are made to connect a local source of 120 volts DC across terminals 1 and 2 of terminal board TB-105. These connections are paralleled across the corresponding terminals of each loop and local current can be connected in or out of each loop by means of removable straps (refer to figure 4-2). The selector magnets of the monitor teletypewriter are across terminals 1 and 2 of terminal board TB-103 (Set 2) while the signal contacts of the transmitter-distributor are across terminals 1 and 2 of terminal board TB-102 (Set 1). The 600 ohm 10 watt resistor R-108 limits the current of the loop to a maximum of approximately 200 milliamperes. The 1500 ohm rheostat adjusts the current in the loop to a 60 milliamperere reading on meter M-101. One terminal of the rheostat is connected to the tip (T) contact of LPG jack J-101 through the 10 ohm meter shunt resistor R-101 (see figure 4-2). The second looping jack (LPG) J-107 is in series with J-101 and Set 1 jack (J-114). The Set 1 jack is connected to TB-102 (1 and 2) and the Set 2 jack J-120 is connected to TB-103 (1 and 2).

The meter circuit as shown in figure 4-2 is in the signal loop only. This circuit consists of METER M-101, a milliamperere meter movement calibrated 100-0-100 milliamperere, a 970 ohm meter multiplier resistor, and a 10 ohm meter shunt resistor. Meter switch S-101 is used to place the meter into any one of the three signal loops, or to remove it from the loop in the "0" position. This completes the signal loop.

Patching or transfer of a teletypewriter is done by inserting a plug into Set 2 jack J-120. The ring (R) and tip (T) of the plug are connected to terminals 1 and 2 of TB-103, respectively, (refer to figure 4-2.) This action connects the plug to the teletypewriter wired into circuit #1. The remainder of the loop is closed and disconnected from the teletypewriter. Therefore, to patch the tele-

typewriter to another circuit, it is patched from its corresponding set jack to the looping jack of the desired circuit. If the teletypewriter already wired into the desired circuit is not to be used, plug in another patchcord to its corresponding set jack and leave the other end free. See Section 3 for other patching options.

b. STEPPING LOOP. - In figure 4-1 a step switch in the cryptograph transmitter is wired across terminals 3 and 4 of terminal board TB-101 (LINE) and the clutch coil of the transmitter-distributor is wired across terminals 3 and 4 of terminal board TB-102 (Set 1). Terminals 3 and 4 of terminal board TB-103 (Set 2) are strapped. This strap is removed only when two transmitter-distributors are to be operated by a single cryptographic device. The second clutch is then wired across terminals 3 and 4. When the step loop does not supply its own line current, provisions are made to connect a local 120 or 67 volt DC across terminals 5 and 6 of terminal board TB-105. These connections are paralleled across the corresponding terminals of each loop and local current can be connected in or out of each loop by means of removable straps, (refer to figure 4-2.) Current in the stepping loop is limited to 50 milliamperes by the 1000 ohm 10 watt resistor R-111, when the local battery is 120 volts DC. If the local battery is 67 volts DC, R-111 must be strapped out (see figure 4-2). Stepping action in the loop is indicated by the flashing of the neon indicator. When the step switch closes in the crypto-device, capacitor C-101 discharges across the primary of transformer T-101. This discharge voltage is stepped up sufficiently in the secondary of T-101 to cause the indicator lamp to flash. The flashing indicator is connected across the first looping jack J-102 and the Set 2 jack J-120 (see figure 4-2). Looping jack, J-102 and J-108 are in series with the local battery supply and the Set 1 and 2 jacks J-114 and J-120. These jacks are connected to terminals 3 and 4 of terminal boards TB-101 through TB-103, respectively. This completes the stepping loop.

Patching in the stepping loop is done in the same manner as the signal loop. Due to the special polarized patchcords, patching of signal loops and stepping loops is simultaneous.

4-3. TROUBLESHOOTING PROCEDURES

When an equipment malfunction is observed, the function of each circuit must be checked before attempting to localize the trouble. If only one function of a circuit is inoperative, the wiring and components solely concerned with that function should be investigated. If two functions of a circuit are inoperative, it is likely that the fault lies in a unit common to both. The visual check shown below must be performed prior to the operational checks given in the troubleshooting chart. During troubleshooting, refer to the wiring diagram, figure 4-2, as necessary.

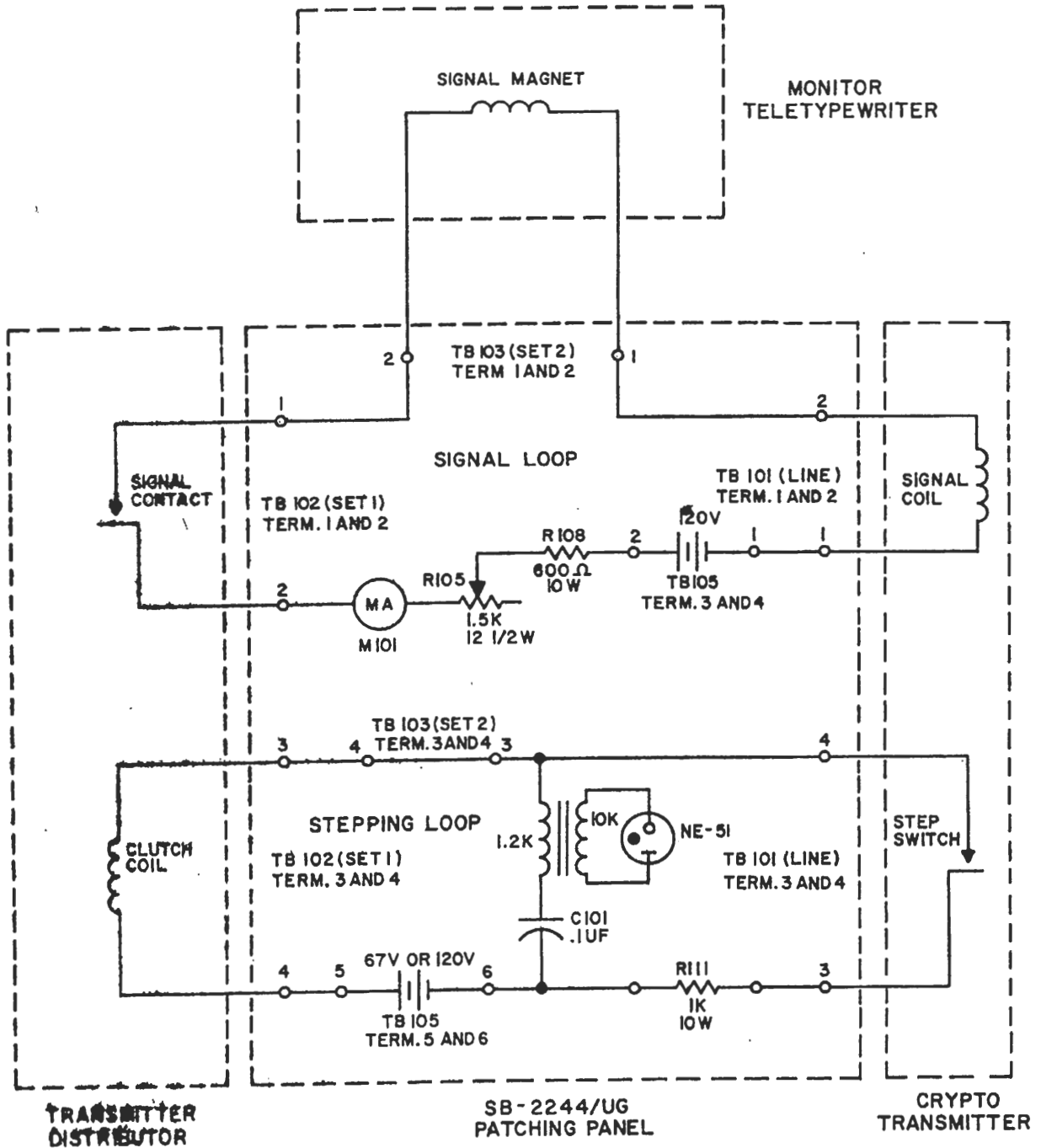
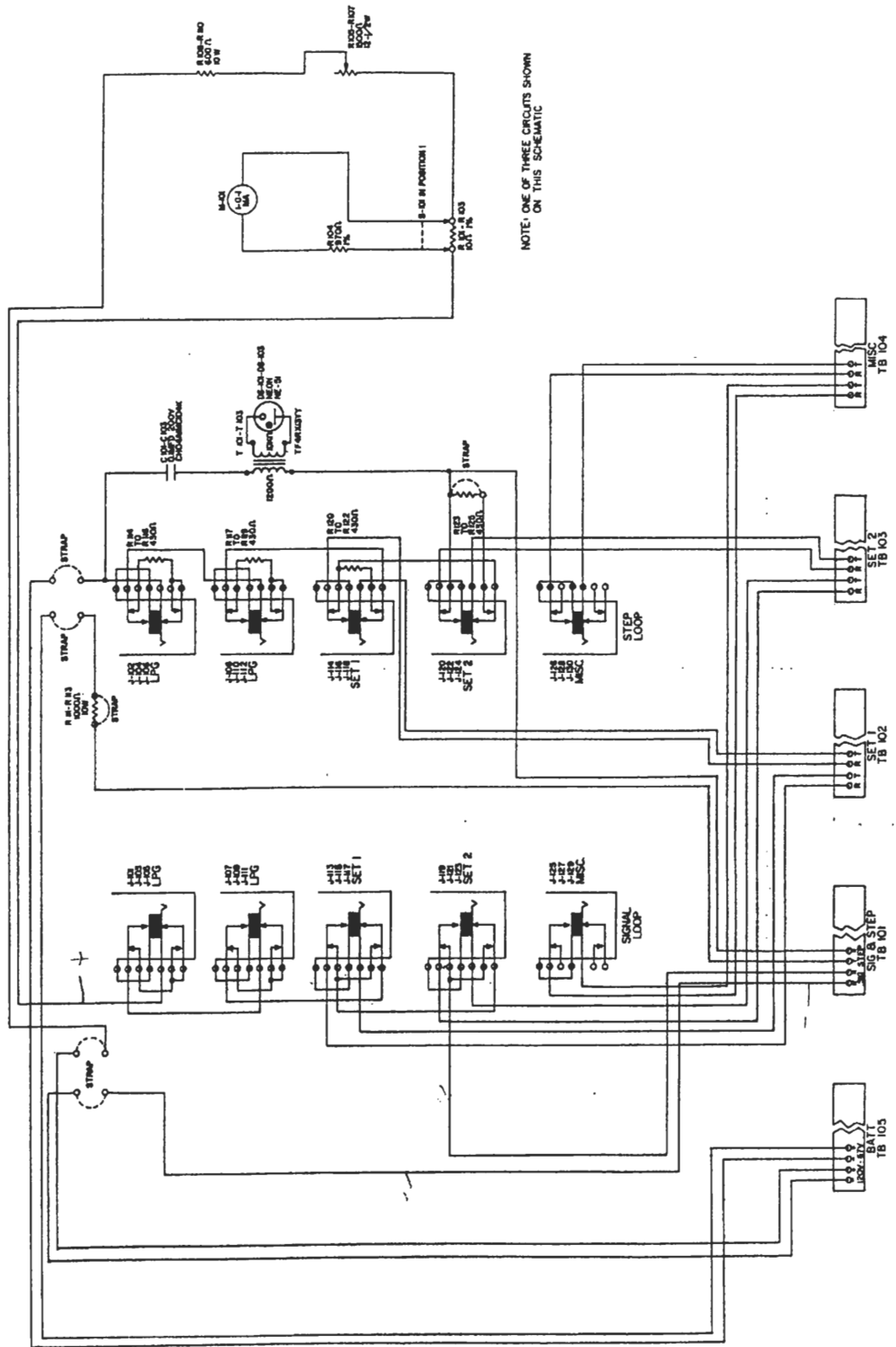


Figure 4-1. Communication Patching Panel SB-2244/UG Simplified Circuit



ORIGINAL

Figure 4-2. Communication Patching Panel SB-2244/UG, Schematic Diagram - Typical Circuit.