

CABLE RESTORATION
RAPID RESTORATION AND NEON RESTORAL BOARDS
DESCRIPTION AND USE

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		1. GENERAL	
		1.01 This section covers the description and use of the Neon Restoral Boards, the Rapid Restoration Boards, and the HB-11111 and HB-11112 Test Sets (Fig. 1).	

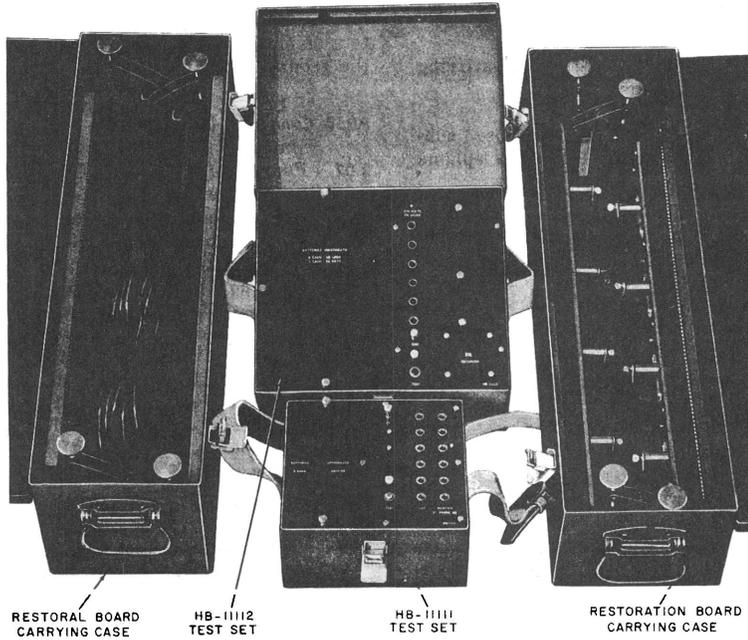


Fig. 1 — Major Components of Cable Restoral System

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1.02 In the event of a cable break, this test equipment is used to restore service in the shortest possible time by bridging across the break. Service may be reestablished on a priority basis to subscribers wishing to use their telephones while restoration is in progress.

1.03 Features of this test equipment are as follows:

- Identify field-side of pair of subscribers who wish to use their telephone.
- Automatically notify subscriber of cable damage via tape recording.
- Identify CO-side of subscriber pair to be restored via subscriber telephone number.
- Tag from terminals, control points, access points, or main distribution frame (MDF) to break. Cable may be working or non-working.
- Eliminate need for tone for identifying field-side or CO-side cable pairs.
- Permit giving priority to those subscribers wishing to use their telephone while restoration is in progress.
- Equipment is readily portable to site of cable break.
- Batteries are supplied within the test equipment; no external power source is required.

2. DESCRIPTION

2.01 This test group will accommodate up to a 600-pair cable with the self-contained batteries provided.

2.02 The Restoral System items required to bridge across a 600-pair cable break and their dimensions and approximate weights are listed in Table A.

2.03 The items listed in Table A are described individually in 2.04 through 2.18.

Neon Restoral Board

2.04 The Neon Restoral Board consists of a phenolic board equipped with quick-connect jacks, 200 neon lamps (100 each for tip and ring), and associated circuitry.

2.05 Each Neon Restoral Board will accommodate up to 100 pairs of 22-, 24-, or 26-gauge wires without skinning. Nineteen-gauge wires should not be connected to the Neon Restoral Boards, as this will cause permanent damage to the quick-connect jack springs. Clamps are provided for fastening the board to a manhole guard, strand, or to a rod driven into the ground.

Rapid Restoration Board

2.06 The Rapid Restoration Board consists of a phenolic board equipped with quick-connect jacks and four 25-pair Amphenol connectors. Clamps are provided to fasten the board to a manhole guard, strand, or a rod driven into the ground.

A25B Connector Cable

2.07 Four A25B Connector Cables are used to interconnect each field-side and CO-side Rapid Restoration Board. The cables are available in lengths of 10, 30, 80, 100, and 200 feet, and are terminated on each end with a 25-pair male Amphenol connector. B25A Extension Cables, having a male plug on one end and a female plug on the other end, are available for extending the length of the A25B Connector Cables. Distinctively colored bands of tape or paint applied to each end of the same cable will facilitate identification of the cable ends when connecting restoration boards.

HB-11111 Test Set

2.08 The HB-11111 Test Set is housed in a steel case. On the front panel of this test set are six TAG jacks and six IDENTIFY BY PHONE NO. jacks, a ground terminal, a push-button TEST switch, and a battery condition indicator lamp. Space is provided within the test set for three 45-volt KS-14196 Batteries.

TABLE A -- DIMENSIONS, WEIGHTS, AND QUANTITIES OF RESTORAL SYSTEM ITEMS					
ITEM	HEIGHT (IN.)	WIDTH (IN.)	DEPTH (IN.)	WT (LB)	QUANTITY
Neon Restoral Board (100 pr)	24	7-3/8 ¹	4	7	12
Rapid Restoration Board (100 pr)	24	6 ¹	5	4-1/2	12
HB-11111 Test Set	6-1/4	8-1/4	8-1/4	13 ²	1
HB-11112 Test Set	6-1/4	11-5/8	10-1/2	27 ²	1
A25B Connector Cable (Male-Male—Available in lengths of 10, 30, 80, 100, and 200 ft)					24
B25A Extension Cable (Male-Female—Available in lengths of 5, 15, 30, 60, and 100 ft)					As Required
Neon Restoral Cord (15 ft)				1	12
B Transfer Cord (6 ft)				<1	1
Telephone Headset				<1	2
Ground Wire With Clips				<1	As Required
Ground Rod, Round or Manhole Racking (Rectangular Channel)	48	1/2 Dia.		2-3/4	24 ³
Carrying Case for Neon Restoral Board (Holds 2)	7-1/2	26-3/4	7-1/2	18-1/4 ⁴	6
Carrying Case for Rapid Restoration Board (Holds 2)	6-5/8	26-3/4	7-1/2	18 ⁴	6
<p>Note 1: Includes clamps.</p> <p>Note 2: Includes batteries.</p> <p>Note 3: This quantity is required if all boards are in use at once and ground rods are used to support all boards.</p> <p>Note 4: Excluding boards.</p>					

2.09 To test the condition of batteries, momentarily depress TEST switch and observe indicator light for battery condition. If indicator lamp fails to light, replace batteries. **Do not**

hold down TEST switch longer than necessary to check batteries, as the test circuit applies a load to the batteries. Batteries should be checked periodically and replaced as necessary to ensure that the equipment is always ready for use.

HB-11112 Test Set

2.10 The HB-11112 Test Set is housed in a steel case. On the front panel of this test set are six jacks, a ground terminal, a pushbutton TEST switch, and a battery condition indicator lamp.

2.11 A battery-operated endless-belt tape playback with a 14-second message is contained in this test set to automatically notify subscribers attempting to use their telephone that the cable has been damaged, and to request them to remain on the line to facilitate restoral of service.

2.12 Space is provided within this test set for six 45-volt KS-14196 Batteries and three 4.5-volt KS-6570 Batteries.

2.13 To test the condition of the 45-volt batteries, momentarily depress TEST switch and observe indicator lamp for battery condition. If indicator lamp fails to light, replace batteries. Determine the condition of the 4.5-volt batteries by observing the recorder meter when one of the Neon Restoral Cords is plugged into one of the jacks on the HB-11112 Test Set. Replace batteries when the meter pointer is in the red zone. *Do not hold down TEST switch longer than necessary to check batteries, as the test circuit applies a load to the batteries.*

Neon Restoral Cord

2.14 The Neon Restoral Cord has a plug on each end, and is used to connect the HB-11111 and HB-11112 Test Sets to their respective Neon Restoral Boards. One cord is required for each restoral board.

B Transfer Cord

2.15 The B Transfer Cord is used to make a temporary connection from the identified subscriber pair to the subscriber bridge pair back to the CO. The cord is equipped with a C Cable Clip on each end. For further details on this cord, see Section 106-300-115.

Telephone Headset

2.16 Two headsets are used in the field to permit communications between field side and CO side of the cable break, and with the test desk at the CO.

Ground Wire

2.17 The ground wire is used to interconnect the cable shield on each side of the cable break and each piece of test equipment.

Ground Rod

2.18 The ground rods are used as a rigid support for the Restoral and Restoration Boards on work at ground level.

3. PRECAUTIONS

3.01 Establish shield continuity across the cable break at the beginning of restoral operations.

3.02 Use adequate street markers, guards, and lights, and ventilate manholes as prescribed by local instructions.

3.03 Remove adequate sheath from the cable before connecting pairs to Neon Restoral Board. (For example, about 4 feet for a 100-pair cable; more for larger cables.)

3.04 The batteries in the HB-11111 and HB-11112 Test Sets are affected by temperature. These test sets should be protected from inclement weather and temperature extremes, both while in use and in storage. The operating range is +40 to +110° F.

3.05 The HB-11112 Test Set is a delicate instrument. Do not subject it to shock or other mechanical abuse.

3.06 Do not leave discharged batteries in the test sets. For relatively long storage periods (months), remove the batteries prior to storage.

3.07 When testing batteries, hold TEST button down only long enough to make reading, as the test circuit loads the battery.

3.08 Do not plug headset into jacks on the HB-11112 Test Set.

4. SETTING UP FIELD SIDE

4.01 *Field-Side Repairman:* Securely attach a sufficient number of Neon Restoral Boards to a manhole guard, ground rods, or strand to accommodate the damaged cable.

4.02 Remove adequate sheath from the cable, being careful not to damage the conductors.

4.03 Expose the metal shield of the cable and connect a ground wire to the shield with a suitable clip. Run the ground wire to the CO-side of the break and make a similar connection to the cable shield. (Strand or other cable shields on the same route may be used instead of the ground wire, if they are intact.)

4.04 Connect the HB-11112 Test Set to the first Neon Restoral Board using a Neon Restoral Cord. Connect the other end of the Neon Restoral Cord to the jack nearest the battery test lamp on the HB-11112 Test Set, with additional boards connected in sequence from this jack (Fig. 2).

4.05 Connect the ground terminal of the HB-11112 Test Set to the cable sheath using ground wire and clips.

4.06 Insert pairs into Neon Restoral Board, tip wire to T-jack and ring wire to R-jack. Push each wire into the jack, then pull the wire to seat the spring contact on the wire and establish contact. After a board is filled, check back of board to be sure all spring contacts are seated. Connect one end of the B Transfer Cord to the pair to be used as the subscriber bridge pair.

4.07 By setting up the field-side first, the taped message will inform the subscriber wishing to use the phone of the cable difficulty and will request the subscriber to remain on the line to assist in restoring service at the earliest possible time.

4.08 Securely attach one Rapid Restoration Board to a manhole guard, ground rod, or strand. Connect four A25B Connector Cables to

the field-side board using cables of sufficient length to bridge across the cable break. (Available connector cable lengths and extension cable lengths are listed in Table A.) Reserve two spare pairs for talk circuit; for example, pairs 99 and 100. Additional Rapid Restoration Boards may be set up if traffic demands warrant; otherwise, restoration should proceed in the usual manner.

4.09 Before the CO side is set up, the repairman may connect to the pair of any subscriber desiring service, as indicated by lighted neon lamps, by connecting the field side headset in series with a 24-volt battery. The pairs of any such subscriber should be marked with the subscriber's telephone number and restored as soon as the CO side is set up.

5. SETTING UP CO SIDE

5.01 *CO-Side Repairman:* After the cable end has been cleared, set up sufficient Neon Restoral Boards to accommodate the damaged cable and establish cable ground as outlined in 4.01 through 4.03.

5.02 Connect the CO-side Neon Restoral Boards to the HB-11111 Test Set using Neon Restoral Cords connected to IDENTIFY BY PHONE NO. jacks.

5.03 Connect the ground terminal of the HB-11111 Test Set to the cable shield using ground wire and clips.

5.04 Insert pairs in CO-side Neon Restoral Board as described in 4.06. If heat coils have been removed, request that they be replaced.

5.05 Securely attach one Rapid Restoration Board to a manhole guard, ground rod, or strand, and connect CO side of A25B Connector Cables.

5.06 Establish a talk circuit across the break, and to the CO.

6. RESTORATION OF SUBSCRIBER WANTING SERVICE

6.01 When a subscriber attempts to use the telephone, the recorded message will tell of the cable damage and request the subscriber

to remain on the line to assist in restoration of service. Meanwhile, both T and R neon lamps on the field-side Neon Restoral Board associated with this subscriber pair will light.

6.02 Field-Side Repairman: Connect the free end of the B Transfer Cord across the pair. This completes the circuit to the test desk via the subscriber bridge pair.

6.03 Trim the pair out of the Neon Restoral Board with scissors, one wire at a time. This removes the recorded message from the subscriber pair. With the B Transfer Cord still connected, insert the subscriber pair into the Rapid Restoration Board, tip wire to T-jack and ring wire to R-jack, placing the first subscriber pair in 1, second in 2, etc. Remove B Transfer Cord from each pair after the pair is restored.

6.04 Test Deskman: Request the telephone number from the subscriber. Dial the subscriber number, which will establish the circuit through CO switching and to the CO-side Neon Restoral Board.

6.05 CO-Side Repairman: Identify the subscriber pair being restored by the T and R neon lamps that are alternately lighted by the test desk key, then trim the pair from the Neon Restoral Board with scissors. Insert the pair into the Rapid Restoration Board, tip wire to T-jack and ring wire to R-jack in sequence, starting with pair 1 on the board.

6.06 This process is repeated for each subscriber desiring service until permanent restoration is made. Meanwhile, cable identification and tagging should proceed, using tag boards and stringers for pairs not requiring immediate restoral.

7. TAGGING FIELD-SIDE PAIRS

7.01 Place a ground on the ring side of the pair to be identified at the terminal, control, or access point. The R neon lamp associated with the pair will light on the field-side Neon Restoral Board.

7.02 Tag the identified pair or place in tag board for identification. Proceed with tagging until a full complement is tagged.

Note: Only one neon lamp will light for each pair being tagged. A subscriber desiring service is easily identifiable during the tagging operation by the 2-lamp indication caused by the off-hook condition of the subscriber phone.

7.03 Groups of dead pairs or spare pairs that cannot be identified on the field side of the break can be spliced at random to corresponding groups of pairs on the CO side of the break.

8. TAGGING CO-SIDE PAIRS

8.01 Remove the Neon Restoral Cord plug from the IDENTIFY BY PHONE NO. jack and place in the TAG jack.

8.02 Place a ground on the ring side of the pair to be identified at the Main Distribution Frame (MDF). The ring neon lamp associated with the pair will light on the CO-side Neon Restoral Board.

8.03 Tag the identified pair or place in a tag board for identification.

Note: Neither tip nor ring neon lamp will light if ground is placed on tip side of pair.

8.04 If the test deskman must ring out on a pair while the Neon Restoral Cord is plugged into a TAG jack on the HB-11111 Test Set, the ring-out must be on the **Ring** side of the line.

8.05 As the pairs are tagged at the field-side and CO-side boards, they should be left in the tag boards until a full complement is identified at both sides of the break.

8.06 After a full complement is tagged, restore this complement either with a permanent cable, a temporary cable, or the Rapid Restoration Boards.

9. BREAKING DOWN SETUP

9.01 After service has been restored via temporary or permanent cable, remove all connecting cables from the test equipment.

9.02 Remove all wire ends from quick-connect jacks on restoration and restoral boards by pulling through *from the back side* of boards.

9.03 Clean and dry all equipment if necessary. Return the Neon Restoral Boards and Rapid Restoration Boards to their respective carrying cases.

9.04 Coil all A25B Connector Cables and Neon Restoral Cords.

9.05 Check condition of batteries in the HB-11111 and HB-11112 Test Sets, and replace if necessary. *Do not permit discharged batteries to remain in the test sets.*

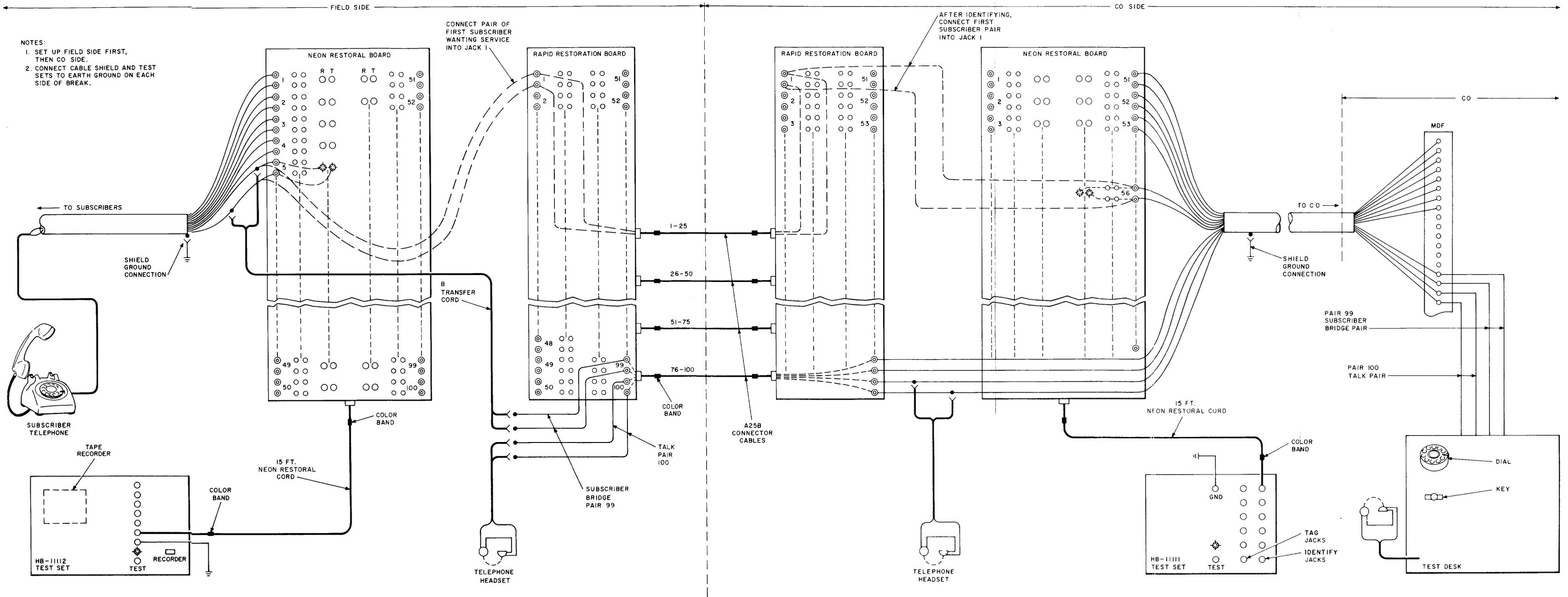
10. MAINTENANCE AND STORAGE

10.01 Before storing equipment, check for any damage that may have been sustained during last usage, and get damaged items repaired or replaced before storage.

10.02 Apply a drop or two of light oil on the clamping device threads of the restoral and restoration boards.

10.03 A running time log should be kept on the HB-11112 Test Set, which should be returned to the factory for overhaul and tape replacement after every 1200 hours use.

10.04 Store all equipment in a dry place away from extremes of heat or cold, and preferably in a single location so that all equipment may be quickly loaded the next time it is needed.



NOTES:
 1. SET UP FIELD SIDE FIRST, THEN CO SIDE.
 2. CONNECT CABLE SHIELD AND TEST SETS TO EARTH GROUND ON EACH SIDE OF BREAK.

CONNECT PAIR OF FIRST SUBSCRIBER WANTING SERVICE INTO JACK 1

AFTER IDENTIFYING, CONNECT FIRST SUBSCRIBER PAIR INTO JACK 1

Fig. 2 — Overall Connections for Cable Restoration