

## 3-A TERMINATING NETWORK DESCRIPTION

### 1. GENERAL

- 1.01 This section describes the 3-A terminating network and its principles of operation.
- 1.02 The 3-A terminating network is a portable piece of apparatus which may be adjusted to approximate the impedance of infinite lengths of several different types of loaded cable circuits. It may be used in cases where a non-inductive resistance termination is sufficiently accurate and has considerable advantage over more accurate adjustable terminations with respect to simplicity and portability.
- 1.03 The 3-A terminating network is especially designed for use in voice frequency crosstalk measurements and the discussion here deals particularly with its use in such measurements. However, it may be used in noise tests and also as a termination for impedance unbalance measurements. The 3-A terminating network not only provides resistance terminations for loaded cable circuits but also provides a switching arrangement by means of which the sending and receiving ends of cable circuits may be arranged for the proper terminating conditions when making far-end crosstalk measurements.

### 2. DESCRIPTION OF CIRCUIT

- 2.01 The circuit of the 3-A terminating network, as shown on the attached Drawing 212-B-3 is for a phantom group, that is, two pairs are provided from which a phantom circuit is created by means of the balanced 61-B retardation coils. Each of these three circuits may be terminated in resistances corresponding to the impedances of H-44-25, H-174-106, H-174-63 or H-172-63 cable circuits. The three separate resistances, shown at the top of Drawing 212-B-3, are for use in connection with resistances in the network proper where phantom circuits are to be terminated for phantom-to-phantom or pair-to-phantom measurements. (A pair to phantom measurement is one made between a side of one quad and a phantom of another quad.)
- 2.02 Building-out condensers of half loading section capacitance are provided which may be shunted across the side and phantom circuits. These condensers are for use in those cases where the end sections of the circuits under test are so short that considerable reflection occurs if the circuits are terminated in resistance.
- 2.03 By means of the switching arrangement provided through keys 1, 2 and 3, the following conditions may be set up:
  1. Any one or all of the three circuits in the phantom group may be terminated in resistances as stated above.

2. Any one of the three circuits may be used as a disturbing circuit in far-end crosstalk tests, that is, one may be connected to the terminals marked "Send" and at the same time the other two circuits may be terminated in resistance or one of the circuits may be connected through to the terminals marked "Receive."

### 3. DESCRIPTION OF APPARATUS

- 3.01 The assembly of the 3-A terminating network is shown on attached Drawing 212-B-2. The apparatus is assembled in a sturdy oak box having a removable cover. The box is provided with a leather handle for carrying purposes. The keys and binding posts shown on Drawing 212-B-2 are mounted on a phenol fiber panel. The dimensions of the 3-A network are  $7\frac{1}{4}'' \times 15\frac{1}{4}'' \times 6\frac{1}{4}''$  and its weight is about 18 pounds.
- 3.02 The four "Line" binding posts at the right of the set, numbered 1, 2, 3 and 4, are for the purpose of connecting the circuits to be measured to the network when such circuits compose a phantom group where side-to-side or pair-to-pair crosstalk measurements or crosstalk measurements between repeaters are to be made. (A pair-to-pair measurement is one made between a side of one quad and a side of another quad.) The two binding posts marked "Send" at the left of the set are for the purpose of connecting the disturbing source to the network or for the purpose of connecting the disturbing circuit to the crosstalk measuring set. The two binding posts marked "Receive" also located at the left are for the purpose of connecting the disturbed circuit to the crosstalk measuring set.
- 3.03 Keys 1, 2 and 3 control the circuit arrangements of side 1-2, side 3-4 and the phantom, respectively. Each of these three keys has three positions indicated as "Rec," "Term" and "Send." Operation of any of the keys 1, 2 or 3 to "Rec" connects the particular circuit associated with that key directly from the "Line" terminals on the right to the "Receive" terminals on the left of the network. Similarly, setting any one of these keys on "Send" connects the circuit associated with that key from the "Line" terminals to the "Send" terminals. Operation of any one of keys 1, 2 or 3 to "Term" places a resistance termination on the corresponding circuit.
- 3.04 Key 4 places the building-out condensers in or out of the circuit. When key 4 is in the "On" position the building-out condensers are shunted across the phantom and side circuits; while in the "Off" position the building-out condensers are disconnected from the circuits. These build-

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ing-out condensers are of half-loading section capacitance, that is, the side circuit condensers have a capacitance of .035 mf. and the capacitance of the phantom circuit condenser is .0568 mf. These condensers which are of the No. 76 type are accurate to within 5 per cent. of their rated values.

3.05 The key on the extreme right designated "Loading" controls the non-inductive resistance terminations, as shown on Drawing 212-B-3. The largest resistance values provided are 1650 ohms for the side circuits and 1050 ohms for the phantom circuits. These resistances correspond approximately to the impedance of H-174-106 circuits at 1000 cycles. In order to obtain the proper resistance values for terminating H-174-63 and H-44-25 circuits this key is so arranged that it will short-circuit portions of the resistance referred to above when it is thrown to the H-174-63 or H-44-25 positions. In this connection H-172-63 circuits may be terminated in the same manner as

H-174-63. The resistance values obtained by setting the loading key in various positions are as follows:

Position	Side Circuit Termination	Phantom Circuit Termination
H-174-106	1650 Ohms	1050 Ohms
H-174-63 or H-172-63	1650 Ohms	800 Ohms
H- 44-25	800 Ohms	500 Ohms

The resistances are accurate to within 2 per cent. of the values indicated on Drawing 212-B-3.

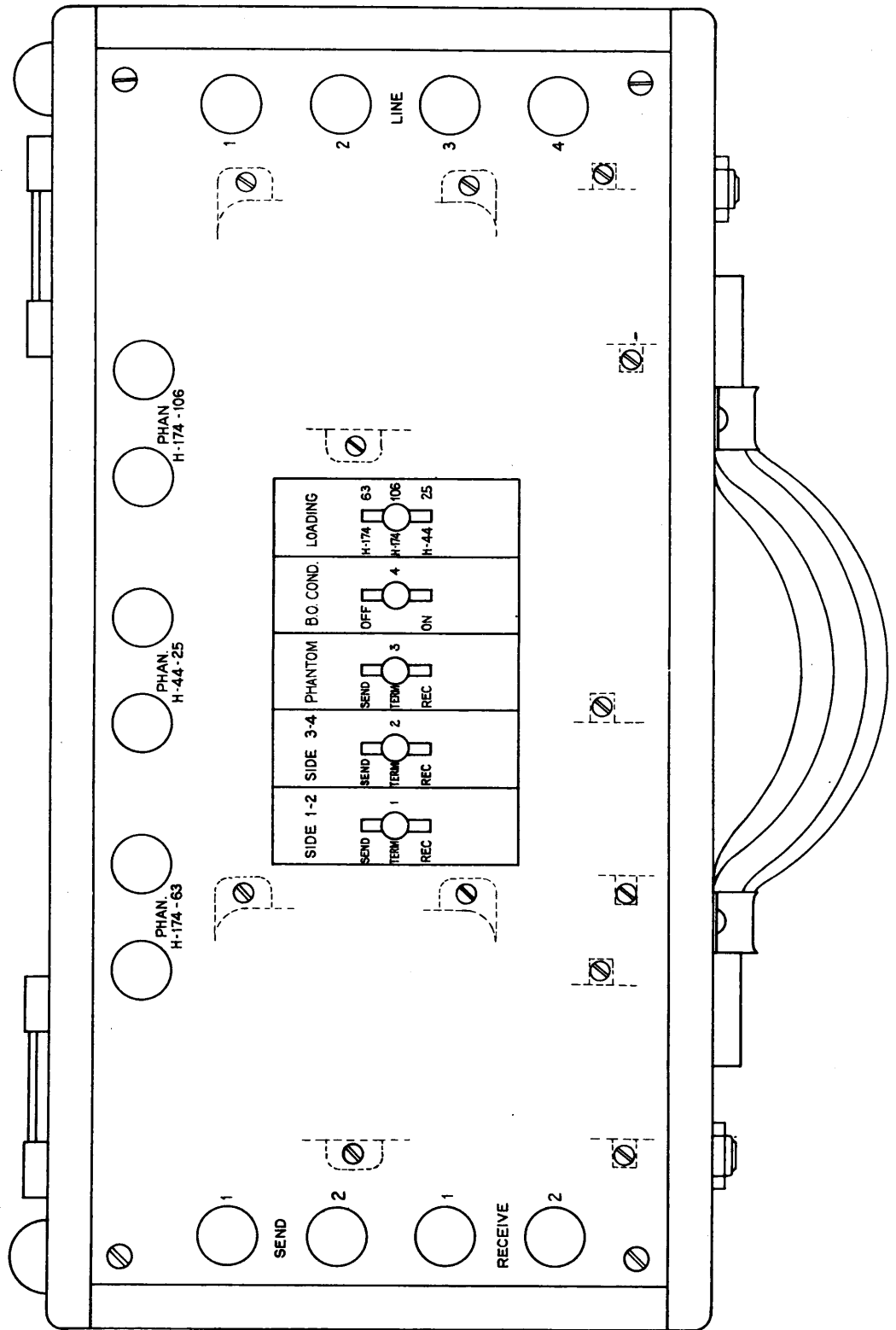
3.06 An 800-ohm resistance is connected to the two binding posts marked "Phan. H-174-63." Similarly, resistances of 500 ohms and 1050 ohms are connected, respectively, to the binding posts marked "Phan. H-44-25" and "Phan. H-174-106." These resistances are for use in terminating a phantom when phantom-to-phantom or pair-to-phantom crosstalk measurements are made.

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### 3-A TERMINATING NETWORK CIRCUIT DIAGRAM

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