146A TEST SET

DESCRIPTION AND USE

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1. GENERAL

1.01 The 146A test set is a multifunction test set providing audio frequency signals for wire identification, construction testing, and fault locating. It also provides talk battery and alerting features for obtaining and maintaining a communications link between points along a cable. It is intended that the test set be usable by both cable construction and cable repair forces.

1.02 The frequency of the tone source in the test set is accurately controlled to 577.5 Hz, making it compatible with the 1097A noise filter both for fault locating and wire identification tasks. Both the signal level and interruption rate of the tone source are controllable from the front panel allowing the user to tailor the tone to his specific needs.

1.03 There are three tone outputs, one for wire identification, another for balance testing, and a third for fault locating. Tone output is by means of jacks on the front panel to which tone is switched by a function selector switch.

1.04 The battery package contains three sizes of carbon-zinc batteries for a total of six separate batteries. Battery life in service should be in excess of 150 hours.

1.05 Some important features of the 146A test set are:

(a) Precision tone source compatible with the 1097A precision filter, allowing noise free wire identification and cable fault location.

(b) Minimized interference to customers.

(c) Automatic line monitor which speeds employee's work.

(d) Selection of "spreading" or "nonspreading" signal output to aid in rapidly identifying pairs.

(e) Balance testing.

(f) Relay controlled cable fault location operation.

(g) Internal battery test.

(h) Adjustable interrupt rate which allows simultaneous operation of several test sets in the same cable.

(i) Internal talk-battery.

(j) Compatible with existing signal locating apparatus.

(k) Lightweight, portable, integrated circuit design.

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2. DESCRIPTION

THE CASE

2.01 The 146A test set, shown in Fig. 1, is housed in an aluminum case consisting of a main body, top and bottom cover. In storage and transit, both covers should be securely fastened, by their latches, to the main body. The dimensions are approximately 7 inches by 8 1/3 inches by 9 1/2 inches and with batteries and cords weighs about 12 pounds. Each cover is fastened to the main body by two latches. To remove either cover, both latches must be released. There are two sets of "D" rings on the main body to which the nylon web carrying strap may be attached. The uppermost set of rings is used when carrying the set. The lower set of rings is used to suspend the set from a cable, strand, or other firm suspension point so the front panel can easily be seen by the user.

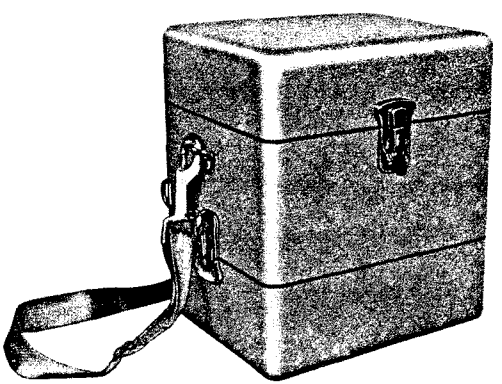


Fig. 1—146A Test Set—Enclosed in Case for Storage and Transit

2.02 In normal use only the top cover will be removed. The bottom cover is removed to replace the batteries. The bottom cover has rubber feet attached to it. When storing or transporting the set it should be resting on these feet in an upright position.

2.03 The upper cover comes completely off the test set. There is a storage compartment in this cover for the four cords supplied with the set. This compartment is formed by an inner lid within the cover with a quick release fastener. A brief description of the basic test connections and procedures is printed on both sides of the inner lid. See Fig. 2.

2.04 The closed case is dust-tight and will resist the entry of water; however, water will enter the set if it is immersed. Care should be taken to ensure against this occurrance.

2.05 While the case is strong and the set has been designed to resist shock, it must be recognized that fewer maintenance problems will result from reasonable care in the handling of the 146A test set.

FRONT PANEL

2.06 Before installing batteries into the 146A test set, it would be useful to become familiar with its front panel. To do so release the top cover latches located on the front and rear surfaces of the main body of the case, take the cover completely off the set. The cords stored there will be discussed shortly.

2.07 The front panel of the 146A test set is shown in Fig. 2. Each feature of the front panel is described briefly in the following paragraphs.

A. Battery Test

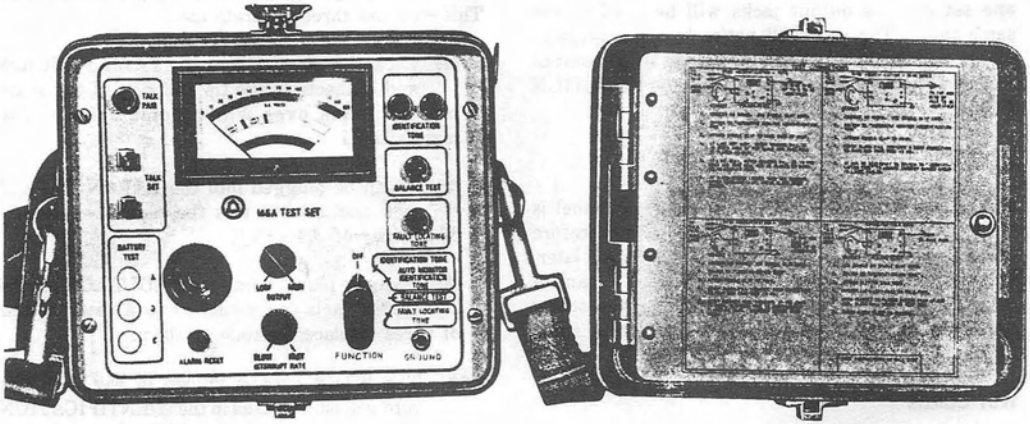
2.08 In the lower left corner of the front panel are located three push-button switches labeled BATTERY TEST A, B, and C. These switches, in conjunction with the lower scale of the meter, indicate the condition of the batteries.

B. Talk Set

2.09 Directly above the BATTERY TEST switches are the two TALK SET metal terminals. The head-telephone set is connected to these terminals to provide communication over a spare pair of wires.

C. Talk Pair

2.10 The TALK PAIR jack is located immediately above the TALK SET terminals. This jack



FRONT PANEL

INSIDE OF TOP COVER. COVER FORMS STORAGE COMPARTMENT FOR TEST CORDS.

Fig. 2—146A Test Set

is used in conjunction with the W2HB cord (supplied with the test set) to establish communication over the talk pair.

D. Alarm Reset and Alerting Device

2.11 Just to the right of the BATTERY TEST switches is located a push-button switch labeled ALARM RESET. This switch is used to silence the audible alarm sounded by the alerting device located directly above it.

E. Output and Interrupt Rate

2.12 Progressing still to the right two knobs are encountered. The upper knob is labeled OUTPUT and controls the amount of tone voltage the test set will place onto a wire. The lower knob is labeled INTERRUPT RATE and controls the rate at which the tone voltage is turned on and off to give the interrupted quality to the tone. The interruption rate can be speeded up or slowed down by using this knob.

F. Ground

2.13 Located in the lower right-hand corner is a metal post marked GROUND. This post is attached to the metal frame of the test set. The GROUND post is connected to the strand or shield of the cable being worked in by use of the W1BP cord (supplied with the test set). This connection will put the case of the test set and the shield at the same potential.

G. Function

2.14 To the left and above the GROUND post is the FUNCTION switch. It is used to select the function of the test set. The FUNCTION switch has five positions. The position of the switch depends on the type of work being done with the test set. One of the positions must be chosen for the set to operate.

Caution: When the 146A test set is not in use, it is imperative that the FUNCTION switch be placed in the OFF position to avoid dead batteries.

H. Identification Tone, Balance Test, and Fault Locating Tone Output Jacks

2.15 The output jacks are located along the right edge of the front panel. The top-most set of jacks labeled IDENTIFICATION TONE will always be used as a pair. The BALANCE TEST jack and the FAULT LOCATING TONE jack are

used singly. There is no time when more than one set of tone output jacks will be used at the same time. The user will notice by association of words and color the correspondence of an output jack or jacks with a knob position on the FUNCTION switch.

I. Meter

2.16 The remaining feature of the front panel is the meter. It has three scales and therefore three distinct uses. These will be described later. If the needle does not indicate at zero it can be adjusted to do so by carefully turning the screw located in the hole in the bezel mount with a small flat blade screwdriver.

TEST CORDS

2.17 Four test cords are supplied with the 146A test set.

2.18 The W1BP cord is shown in Fig. 3. It consists of two large Mueller clips connected by a single strand of instrument wire. There are insulators over each clip. This cord attaches between the GROUND post of the test set and the cable ground.

2.19 The W2HB cord shown in Fig. 3 is a multipurpose cord. It consists of a two-wire cord, a 310 plug, and two insulated pincushion clips. This cord has three separate uses.

(1) It can be plugged into the TALK PAIR jack and connects to the tip and ring of the spare pair of wires over which communication is maintained.

(2) It can be plugged into the BALANCE TEST jack and used to test the capacitive balance of a group of wires.

(3) It can be plugged into the FAULT LOCATING TONE jack and attached to a faulted pair of wires to place the tone on them.

2.20 The W1BR cord is shown in Fig. 4. This cord will only be used in the IDENTIFICATION TONE jacks. It consists of a 425A plug, a length of instrument wire, and a pincushion clip. It is used for wire identification. In normal wire identification operations the FUNCTION switch will be set to AUTO MONITOR IDENTIFICATION TONE position. This will provide the customer protection from interference.

2.21 The W4CS cord, shown in Fig. 4, is also used only for wire identification purposes. It consists of a 425A plug, a four-wire cord and an AT-8255F clip. This cord has two uses.

(1) It allows the operation of the automatic simplex output, which places a noninterferring tone on a busy pair.

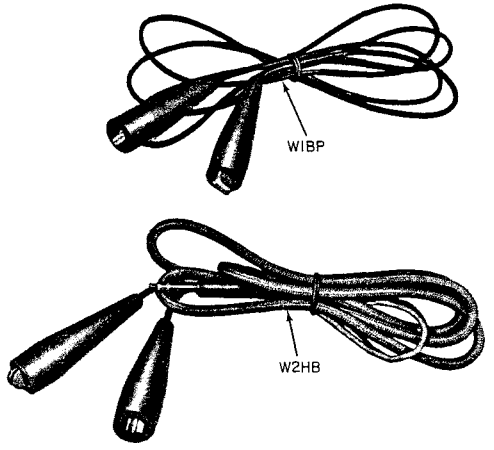


Fig. 3—Test Cords—W1BP and W2HB

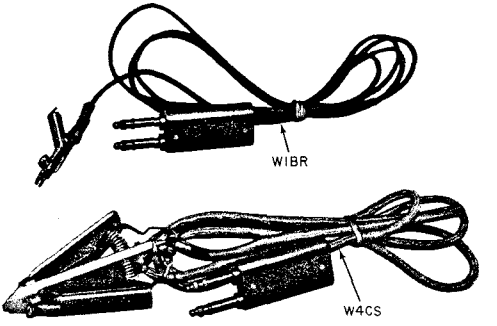


Fig. 4—Test Cords—W1BR and W4CS

(2) It also is used when identifying pairs through a "dead" or unconnected cable with a minimum of tone spreading.

3. BATTERIES

TYPE OF BATTERIES REQUIRED

3.01 The test set requires six 9 volt carbon-zinc batteries. The three A batteries are KS-21620 L1; the one B battery is KS-21619 L1, and the two C batteries are KS-21618 L1. These batteries are also available commercially as NEDA 1603, NEDA 1602, and NEDA 1604D, respectively. Batteries must be ordered separately.

INSTALLING THE BATTERIES

3.02 The following steps should be followed to install the batteries:

(1) Put the test set FUNCTION switch in the OFF position.

(2) Be sure that the top cover is fastened in place.

(3) Unsnap the latches on the bottom cover and carefully lift the main body from the bottom cover.

CAUTION: Do not separate the main body and bottom cover far enough to apply force to the battery cable which connects them.

(4) Lay the main body with the top cover attached on its side next to the bottom cover. It is not necessary to disconnect the battery cable from the main body of the test set before installing the batteries.

(5) Loosen the thumbscrew which holds the battery cover onto the battery support and remove this cover.

(6) Install the batteries following the diagram on the battery cover.

(7) Be sure that the battery snaps are fully mated to the batteries.

(8) Replace the battery cover over the battery support and refasten the thumbscrew.

(9) Replace the main body of the test set over the bottom cover being careful not to pinch the battery cord. Refasten the latches.

TESTING THE INTERNAL BATTERIES

3.03 To test internal batteries:

(1) Remove the top cover from the test set.

(2) Remove all cords.

(3) Refer to Fig. 5.

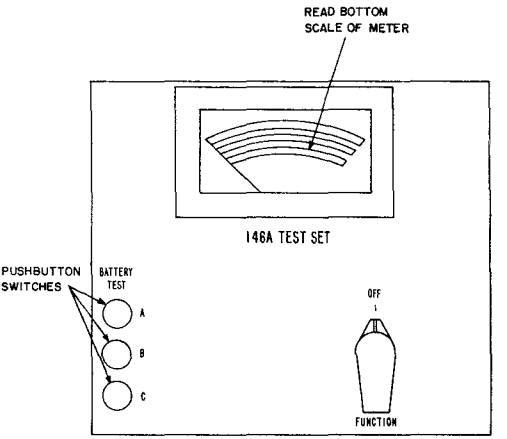


Fig. 5—Internal Battery Testing

(4) Put the test set FUNCTION switch in the OFF position.

(5) Press the pushbutton switch labeled BATTERY TEST A.

(6) The meter on the test set should read in the green or GOOD area of the bottom scale.

(7) Hold the button down for about 5 seconds to be sure that the meter reading does not change.

(8) Press the pushbutton switch labeled BATTERY TEST B.

(9) Repeat Steps 6 and 7.

(10) Press the pushbutton switch labeled BATTERY TEST C.

(11) Repeat Steps 6 and 7.

(12) If one of the meter readings, from BATTERY TEST A, B, or C, falls into the red or REPLACE area of the bottom scale of the meter, the battery or batteries (A, B, or C) associated with that test must be replaced.

4. ESTABLISHING A TALKING CIRCUIT OVER A PREVIOUSLY IDENTIFIED PAIR

4.01 Remove the top cover from the 146A test set and open the inner lid in the cover. See Fig. 2.

4.02 Take the W2HB cord from the storage compartment.

4.03 Plug the W2HB cord into the TALK PAIR jack (Fig. 6).

4.04 Take the W1BP cord and clip it to the GROUND post on the test set and to the cable shield.

4.05 Attach a type 52-E headset, or equivalent, across the TALK SET terminals.

4.06 Attach the clips of the W2HB cord to the previously identified pair.

4.07 Set the FUNCTION switch to IDENTIFICATION TONE.

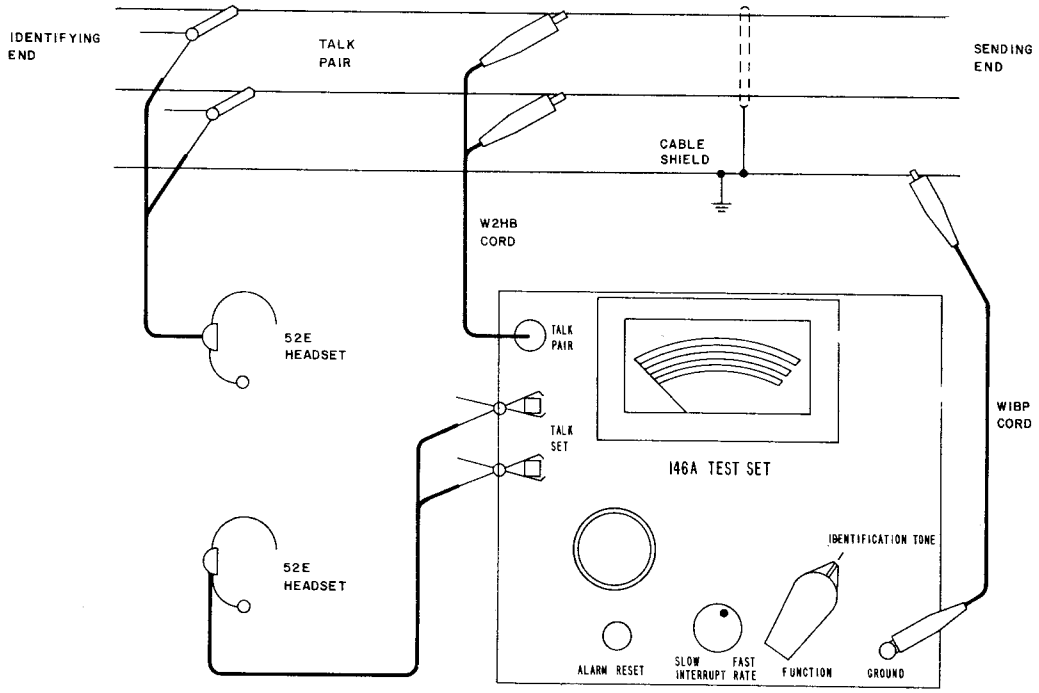


Fig. 6—Establishing a Talking Circuit Over a Previously Identified Pair

4.08 An interrupted sound will come from the alerting device on the front of the 146A test set when the headset at the identifying end of the talk pair has been attached.

4.09 The sound will be heard in both headsets. The rate at which the interrupted sound occurs is controlled by the INTERRUPT RATE knob. To silence this sound press the ALARM RESET pushbutton switch.

4.10 If the talking circuit is interrupted either accidentally or purposely the alarm will sound again. This makes a convenient means of signalling from the identifying end to the sending end.

WHEN IDENTIFICATION HAS NOT BEEN PREVIOUSLY MADE

4.11 Follow the same steps as outlined in 4.01 to 4.10 with the addition of the following steps (Fig. 7). Select the W4CS or W1BR cord. Plug this cord into the IDENTIFICATION TONE jack. Attach the clip to the talk circuit.

4.12 Set the OUTPUT control to HIGH.

4.13 To identify the talking circuit at the identifying end the tone can be picked up with a 147-type amplifier equipped with a 513A tool and a 723A receiver.

4.14 At the identifying end attach the 52E headset across the pair identified. The alerting device will sound. The sound may be silenced by pressing the ALARM RESET pushbutton switch.

Note: Remove the cord (W4CS or W1BR) carrying identification tone to the talk pair when communication has been established.

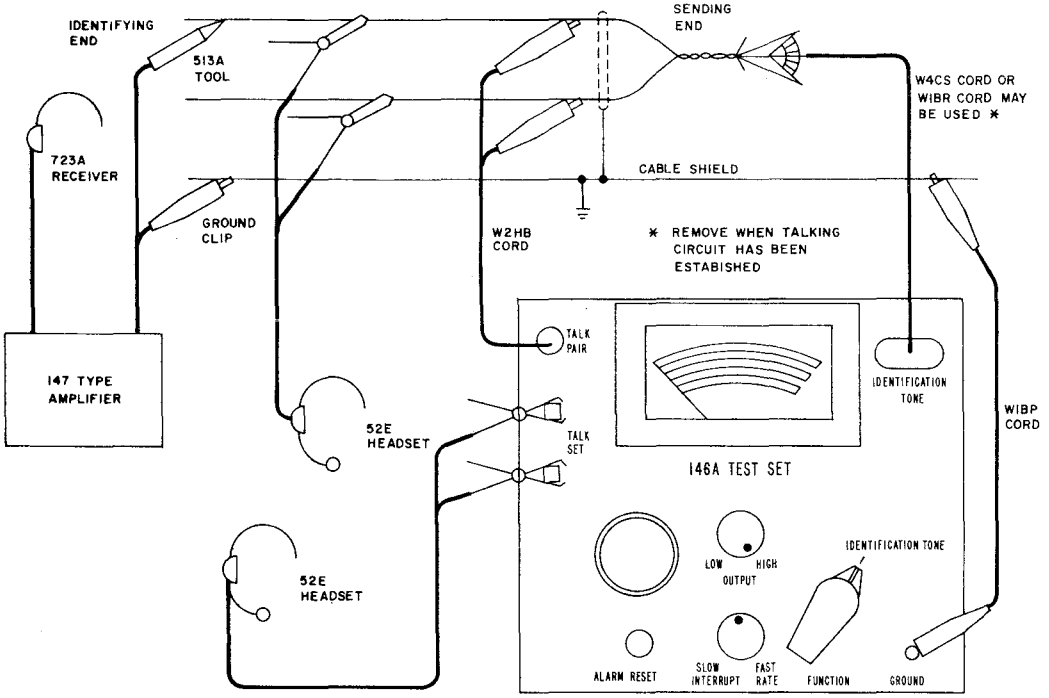


Fig. 7—Identifying and Establishing a Talking Circuit

5. WIRE IDENTIFICATION

IN SUBSCRIBER CIRCUITS

5.01 Refer to Fig. 8. Establish a talking circuit as described in Part 4.

5.02 Set the FUNCTION switch to AUTO MONITOR IDENTIFICATION TONE. Plug the W1BR cord into the IDENTIFICATION TONE jacks. Place the clip on the "Ring" side of the first pair to be identified.

LINE NOT BUSY OR "DEAD"

5.03 If the line is not busy or "dead" the meter pointer will indicate in one of the ***green areas*** of the top scale (0 to 4 volts or 45 to 60 volts). The tone will be placed on the pair. The tone can be picked up at the identifying end with a 147-type amplifier equipped with a 513A tool and a 723A receiver.

> ***Note:*** It is normal for the alerting device to sound momentarily both when first placing the clip upon the circuit and again for a little longer period when taking the clip off of the circuit.

5.04 It may be necessary to increase or reduce the tone level with the OUTPUT control. The INTERRUPT RATE control may be adjusted to give the most distinguishable signal.

LINE BUSY

5.05 If the line is busy the meter pointer will indicate in the ***first red area*** of the top scale (4 to 45 volts). The alerting device on the front panel of the test set will sound continuously. The tone will not be sent to the pair. Remove the clip from the busy circuit and go to a new circuit.

5.06 If the line receives ringing voltage, the tone will not be sent onto the pair. The meter pointer will fluctuate during ringing and the audible alarm will sound continuously. Remove the clip from the circuit, press ALARM RESET and go to another pair.

SPECIAL CIRCUITS

5.07 If the line is a special circuit whose dc voltage from "Ring" to ground is between 4 and 45 volts, or greater than 60 volts, the top scale of the meter will indicate the voltage. The alerting device will sound continuously. The tone will not be placed on the circuit.

5.08 Remove the clip from the circuit and press the ALARM RESET push button switch to restart the tone. Place the clip on another circuit.

5.09 Handle the identification of the special circuits as in 5.10 through 5.16, Wire Identification in Trunk and Carrier circuits, or in accordance with local practices.

IN TRUNK AND CARRIER CIRCUITS

> ***Note:*** This approach is not feasible when sending tone from a frame or terminal location.

5.10 Establish a talking circuit as described in Part 4.

5.11 Plug the W4CS cord into the IDENTIFICATION TONE jacks (Fig. 9). Set the FUNCTION switch to IDENTIFICATION TONE. Fasten the W4CS cord to both the "Ring" and "Tip" sides of the first pair to be identified.

5.12 When the connection is complete a brief alarm will be heard from the alarm device on the front panel as well as over the talking circuit.

5.13 The meter pointer will indicate, on the top scale of the meter, if the circuit is busy (red area), or not busy (green area).

5.14 Even if the circuit is busy the tone ***will be sent.*** The tone will be ***inaudible*** (or very nearly so) to the users of the trunk or carrier circuit under test.

5.15 The tone can be picked up at the identifying end with a 147-type amplifier equipped with a 513A tool and a 723A receiver. Adjust the OUTPUT control for the lowest setting that can be used to easily identify the pairs.

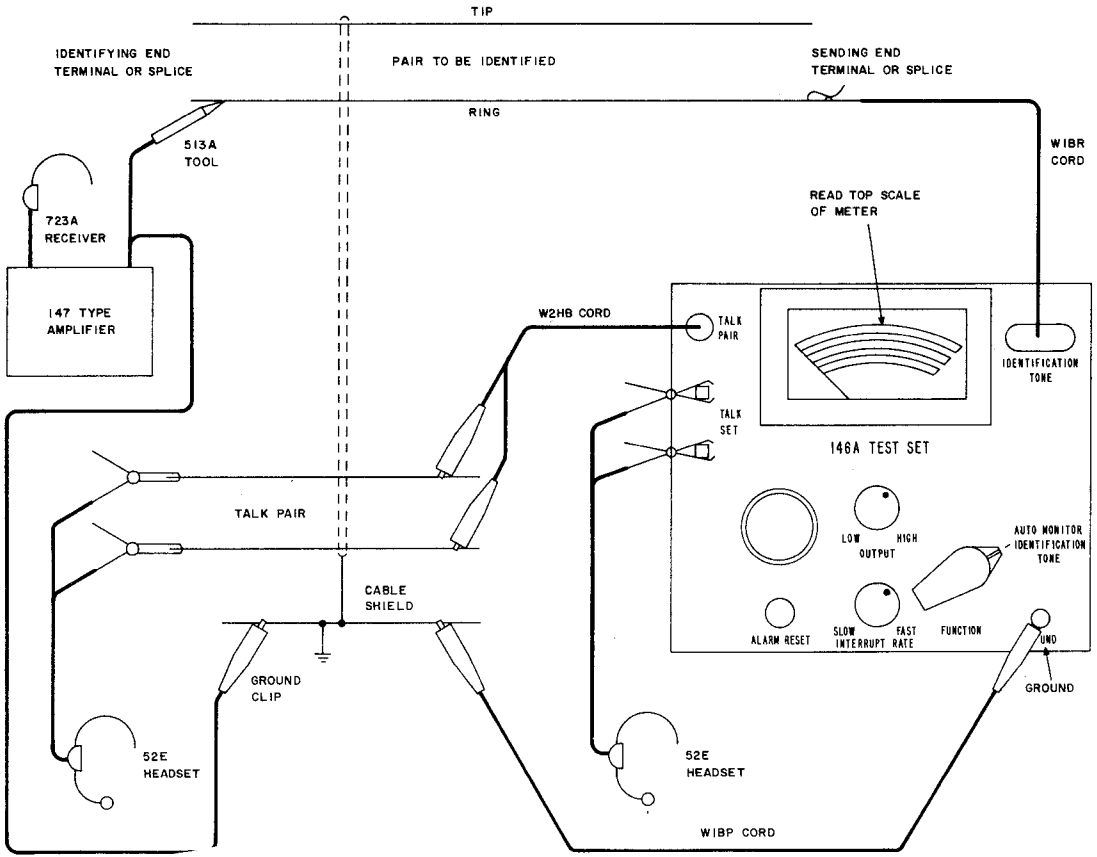


Fig. 8—Wire Identification in Subscriber Circuits

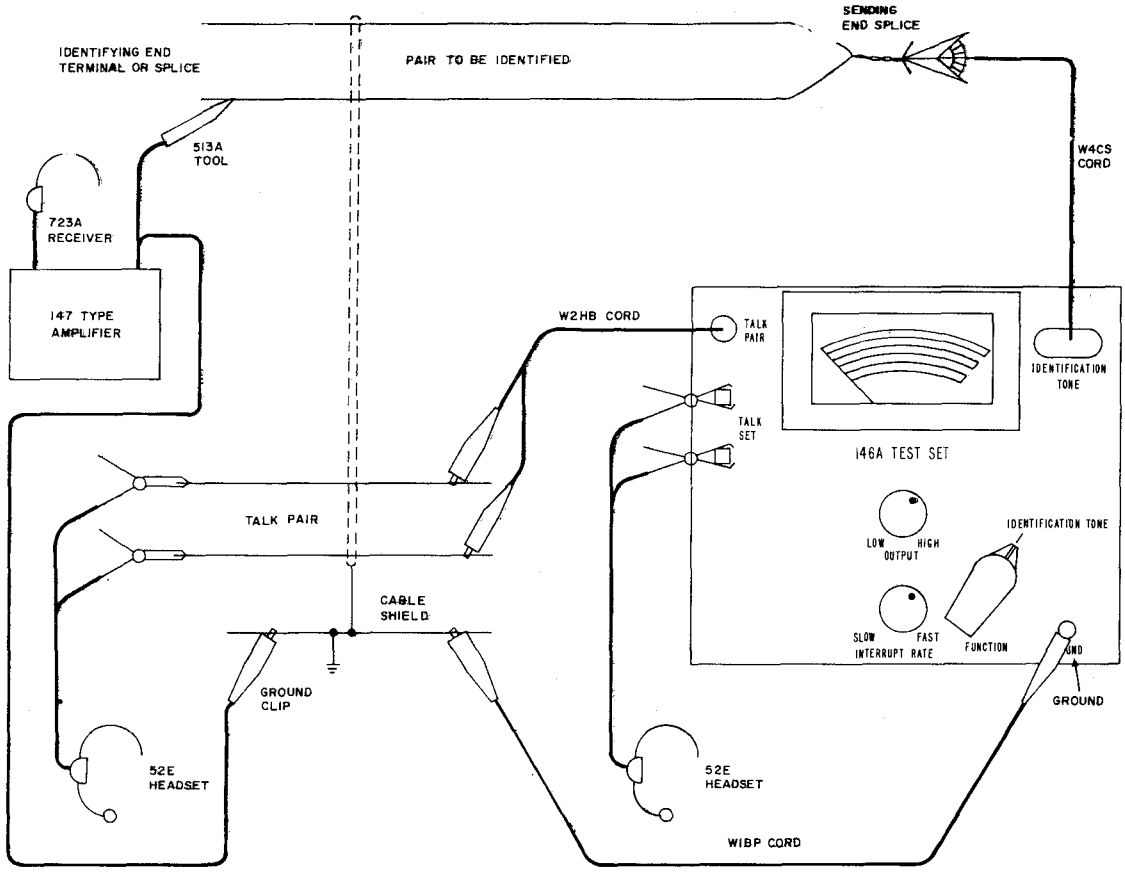


Fig. 9—Wire Identification in Trunk and Carrier Circuits

IN DEAD CABLE

5.16 Establish a talking circuit as described in Part 4.

Note: This approach is not feasible when sending tone from a frame or terminal location.

5.17 Referring to Fig. 10, connect the test set GROUND to the cable shield using the W1BP cord. Set the FUNCTION switch to AUTO MONITOR IDENTIFICATION TONE. Plug the W4CS cord into the IDENTIFICATION TONE jack. Adjust the OUTPUT control to HIGH. Attach the W4CS cord to the "Tip" and "Ring" of the first pair to be identified. A sound from the alarm device indicates that a proper connection to the pair has been made.

5.18 The tone can be picked up at the identifying end with a 147-type amplifier equipped with a 513A tool and a 723A receiver.

Locate Binder Group in Large Cable

5.19 If the cable is quite large, it may be difficult to locate the binder group containing the pair to be identified. In this case set the FUNCTION switch to IDENTIFICATION TONE until the binder group can be located. Then set the FUNCTION switch to AUTO MONITOR IDENTIFICATION TONE to find the pair within the binder group.

Note: If the test set FUNCTION switch is set to the IDENTIFICATION TONE position the tone ***will not be*** turned off by line voltage. In attempting to locate an open wire in a pair or identify a pair in a pedestal it is fairly common practice to place identification tone on a wire. A pair may be out of service to the customer, but still may receive ringing voltage. The tone ***will be*** turned off if ringing voltage is received while the FUNCTION switch is set to AUTO MONITOR IDENTIFICATION TONE position. It can only be turned on again by pressing the ALARM RESET switch. This would force the user to return to the test set to reset the alarm, which will also restart the tone. Therefore, for unattended tracing of opens, etc, where the line may receive ringing voltage, the FUNCTION switch should be set to IDENTIFICATION TONE no matter which cord is used.

IN QUADDED CABLE

TONE SENT FROM SPLICE LOCATION

5.20 Refer to Fig. 11. In long quadded cable it is advisable to use the W4CS cord and set the FUNCTION switch to AUTO MONITOR IDENTIFICATION TONE. With this technique the tone must be applied at the splice and not at a terminal location. The quad on which tone is sent must be nonworking.

5.21 Ground the test set with the W1BP cord to the shield of the cable. Establish a talking circuit as described in Part 4.

5.22 Plug the W4CS cord into the IDENTIFICATION TONE jack. Set the FUNCTION switch to AUTO MONITOR IDENTIFICATION TONE. Set OUTPUT knob to HIGH. Attach the W4CS cord to both the Tip and Ring side of one of the quadded pairs.

5.23 When the clip of the W4CS cord is properly attached to the pair a brief alarm will sound and tone is sent over the pair. Tone may be picked up at the receiving end using a 147-type amplifier equipped with a 513A tool and a 723A receiver. The receiving end may be either another splice location or a terminal location.

TONE SENT FROM TERMINAL LOCATION

5.24 If it is desired that tone be sent from a terminal location, refer to Fig. 12. Establish a talking circuit as described in Part 4.

5.25 Plug the W1BR cord into the IDENTIFICATION TONE jack. Set the FUNCTION switch to either IDENTIFICATION TONE or AUTO MONITOR IDENTIFICATION TONE. Set the OUTPUT knob to HIGH.

5.26 Instead of grounding the test set to the cable shield, the W1BP cord should be connected to one side of a pair of the quad. Connect the other end of the W1BP to the test set GROUND.

Warning: When used as shown in Fig. 12 the case of the test set is not at the potential of the cable shield but is at the potential of the wire to which the W1BP cord is attached.

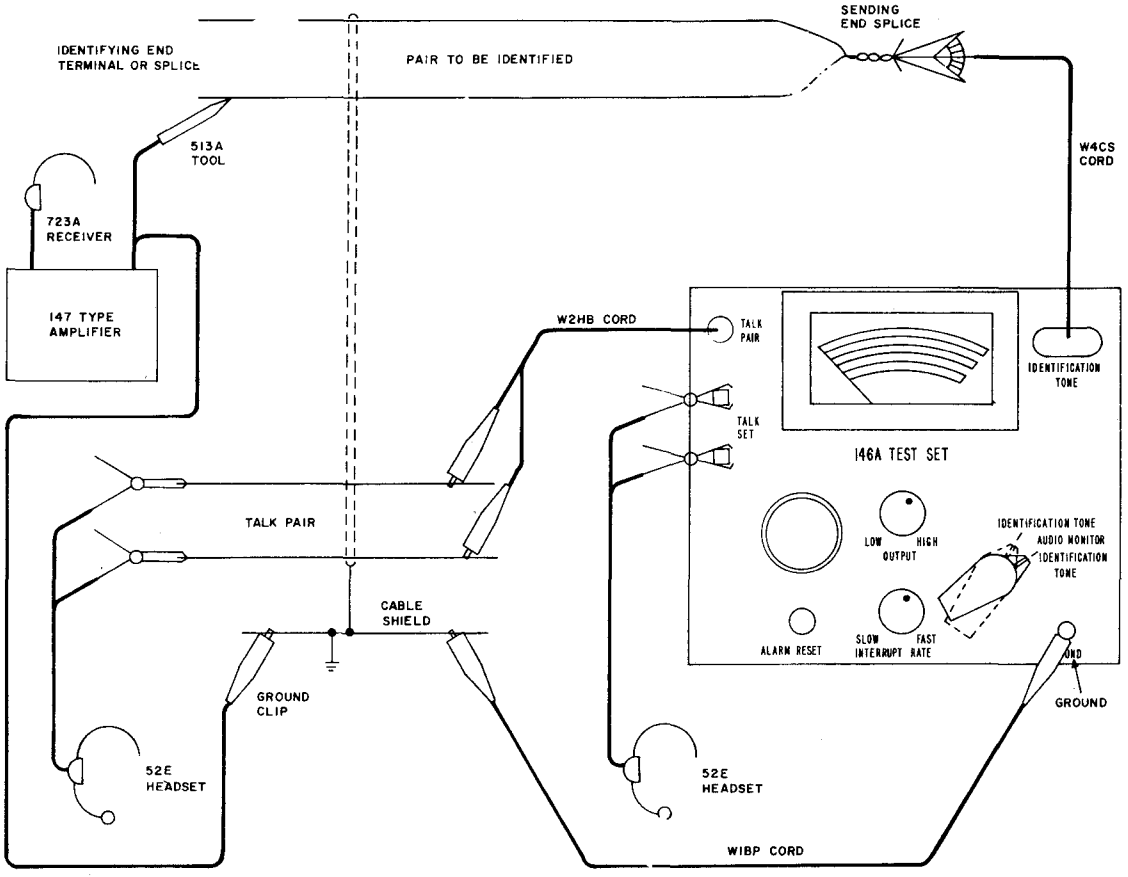


Fig. 10—Wire Identification in Dead Cable

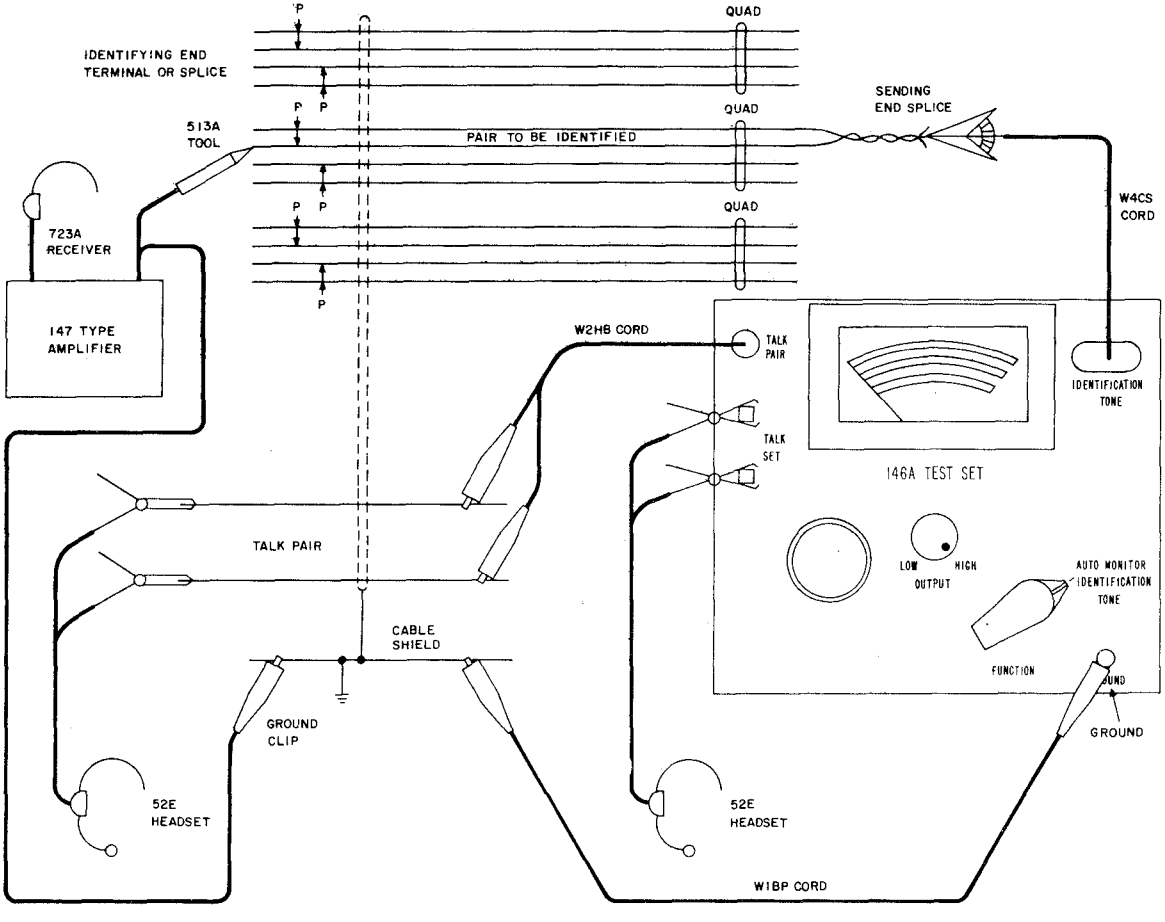


Fig. 11—Identifying Conductors in Quadded Cable—Tone Sent From Splice Location

5.27 Two alternate methods of connecting the W1BR cord and the W1BP cord are also shown in Fig. 12.

RECEIVING TONE AT AN INTERCONNECTING FRAME OR TERMINAL BLOCK WITH A HEADSET ONLY

5.28 Pairs may be identified by receiving a tone with only a 52E head telephone set using its capacitor input. This method is sometimes advantageous when identifying pairs from a field location (such as a splice to a frame or terminal block).

5.29 Establish a talking circuit as described in Part 4.

Warning: ***If the weak tone connection is made, the case of the test set is not at the potential of the cable shield, but is at the potential of the wire to which the W1BP cord is attached.***

5.30 Plug the W1BR cord into the IDENTIFICATION TONE jack. Set the FUNCTION switch to AUTO MONITOR IDENTIFICATION TONE. Connect the test set GROUND to the cable shield using the W1BP cord (Fig. 13).

Note: If the received tone is weak at the identifying end connect the test set GROUND to one side of the talk pair (instead of cable shield) using the W1BP cord. Weak tone could occur when working into a short cable.

5.31 Connect the W1BR cord to the Ring side of the pair to be identified.

LINE BUSY

5.32 If the pair is busy a continuous alarm will sound and the tone will not be sent.

5.33 If the alarm sounds continuously, remove the W1BR cord from the busy pair. Press the ALARM RESET if necessary to silence the alarm. Go to another pair.

TONE PICKED UP

5.34 The tone is picked up at the identifying end by touching the Ring side of each circuit in the area with a test clip attached to the capacitor input of the 52E headset until tone is heard.

Caution: ***When running the test clip along the terminals of the frame or block, do not make contact between adjacent terminals. It will short or cross working circuits.***

5.35 When wire identification has been made the W1BR cord at the sending end is removed and placed on another circuit.

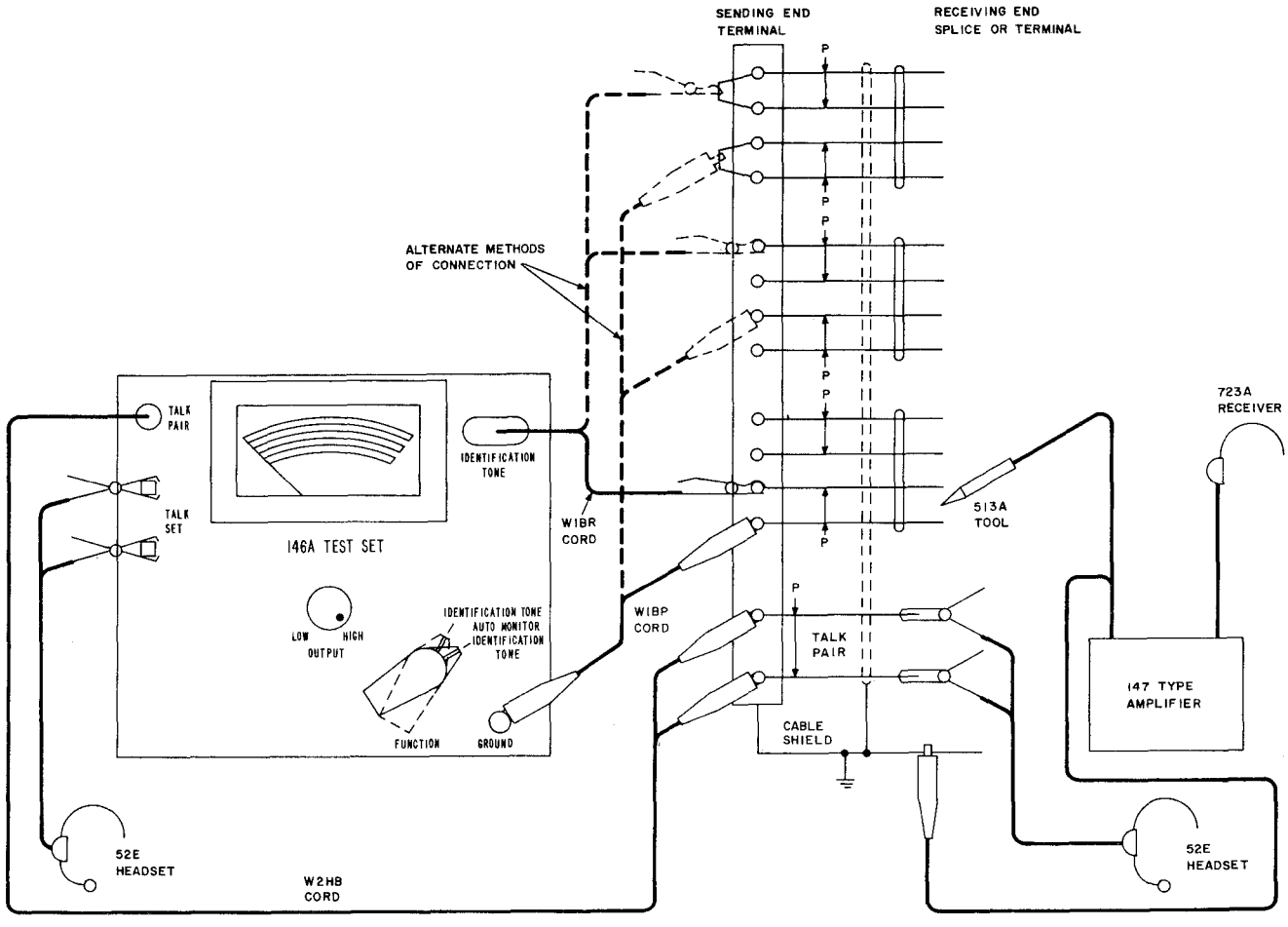


Fig. 12—Identifying Conductors in Quadded Cable—Tone Sent From Terminal Location

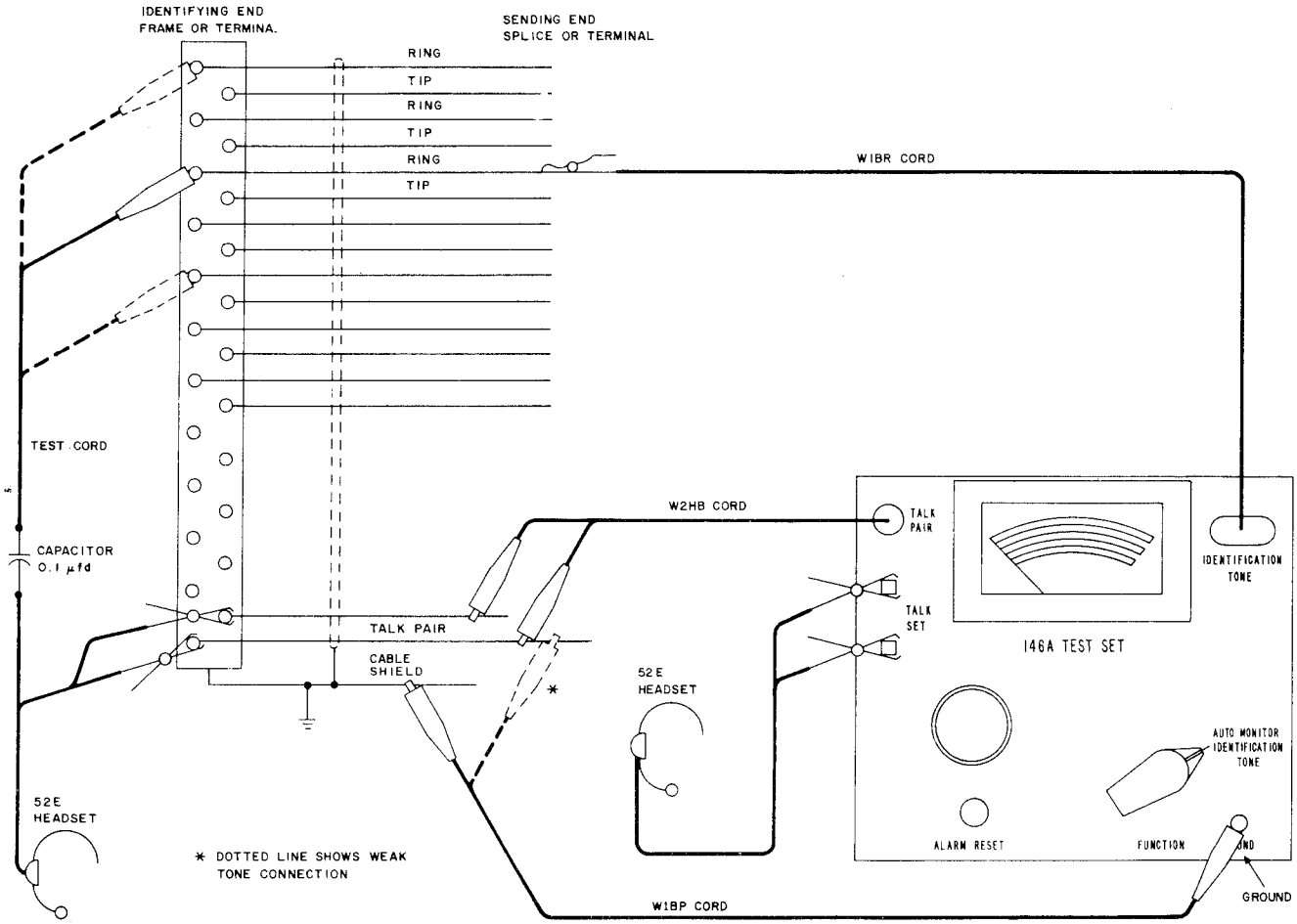


Fig. 13—Wire Identification at Frame or Terminal Block Using Headset and Capacitor—Tone Put on in Field Location

6. BALANCE TESTING

6.01 Referring to Fig. 14, connect the GROUND post on the test set to the cable shield using the W1BP cord.

6.02 Plug the W2HB cord into the BALANCE TEST jack. Attach a 52E headset (or equivalent) across the TALK SET terminals. Set the FUNCTION switch to BALANCE TEST. Set the OUTPUT knob to HIGH.

6.03 Choose one wire of a pair as a reference wire. Attach one of the clips of the W2HB cord to this reference wire.

6.04 A strong tone should be heard in the headset. Adjust the INTERRUPT RATE control to FAST.

6.05 Make contact to each remaining wire in the binder group using the other clip of the W2HB cord.

6.06 The balance test should be done on a binder group at a time. Choose a new reference wire for each new binder group.

Note: Do not touch the clip or wire with the fingers. This could give an erroneous indication.

GOOD BALANCE

6.07 Each wire which is well balanced, relative to the reference wire, will cause the received tone to drop sharply when the wire is connected. This indicates proper splicing.

Note: A split pair will probably not be detected.

POOR BALANCE

6.08 Each wire which is poorly balanced, relative to the reference wire, will cause a louder tone to be received when the wire is connected. This indicates a splicing or manufacturing error in the cable.

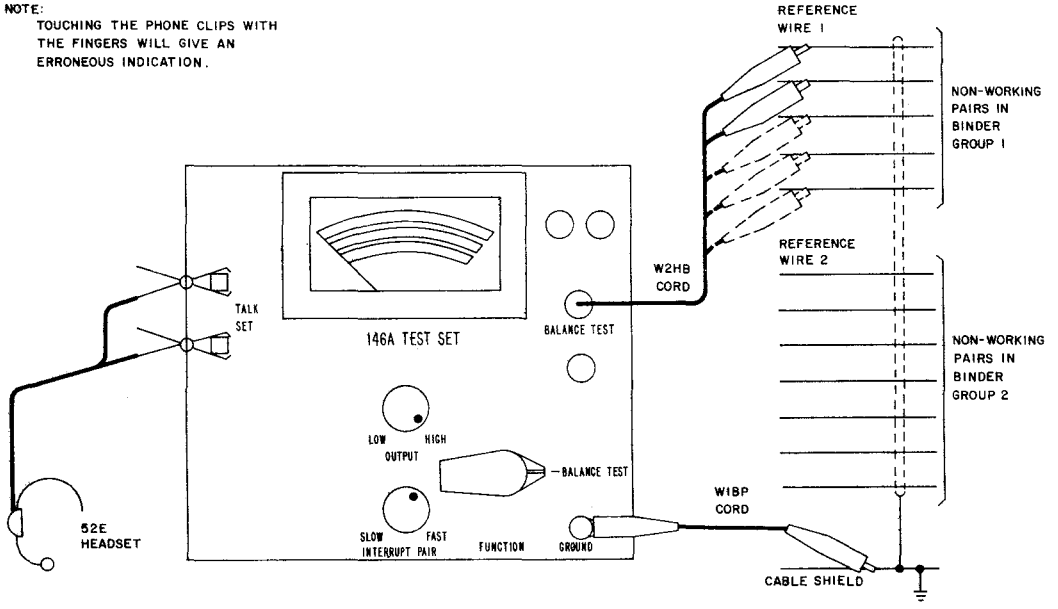


Fig. 14—Balance Testing

FAULTY REFERENCE

6.09 If all wires seem to be testing badly, then possibly the choosen reference wire is faulty. A new reference wire should be choosen and the test repeated.

WIRES SUSPECTED OF BEING DEFECTIVE

6.10 The wires suspected of being defective should be tested further. Connect one clip of the W2HB cord to both sides of the reference pair. Go over each of the faulty conductors with the other clip. The conductors which give no tone are either short-circuited or crossed.

- If no tone is heard on either side of the faulty pair, the fault is a short circuit.
- If tone is heard on only one wire of the faulty pair, the fault is a cross.

6.11 Then connect one clip of the W2HB cord to one side of the reference pair and go over the remaining faulted wires. Conductors which give a very loud tone are grounded.

6.12 The remaining faults will probably be opens. They may be tested further by connecting one clip of the W2HB cord to each faulty conductor in turn, leaving the other clip disconnected, and comparing the tone heard on each faulty conductor with that heard on the reference wire.

- An open, unless near the distant end of the cable, will give a weaker tone than that heard on the reference wire.
- The tone heard on a good conductor will be of about the same intensity as that heard on the reference wire.

Warning: The case of the test set is at the potential of the conductor to which the W1BP cord is attached. The case is not at the cable shield potential if the W1BP cord is transferred to another conductor.

6.13 To verify a split pair connect one side of the reference pair to one side of the suspect pair. Transfer the clip of the W1BP cord from the cable shield to this junction. Connect one clip of the W2HB cord to the second lead of the reference pair. Connect the other clip of the W2HB cord to the second lead of the suspect pair. A loud tone indicates a split pair. (Also see Section 634-305-505.)

7. FAULT LOCATING

RESISTIVE FAULT

7.01 The 146A test set can be used to locate resistively faulted pairs in cables. It gives a ball park indication of loop plus fault resistance. This information guides the user where to begin exploring for the fault. (See Fig. 15.)

7.02 Connect the GROUND post on the test set to the cable shield using the W1BP cord.

7.03 Adjust the OUTPUT control to HIGH. Plug the W2HB cord into the FAULT LOCATING TONE jack. Set the FUNCTION switch to FAULT LOCATING TONE.

7.04 Touch the clips of the W2HB cord together and observe the reading on the middle scale of the meter. This is the zero loop indication. The alarm device will sound briefly when this is done, indicating that the tone has come on. When the clips are separated the meter will indicate an open circuit (no deflection) and the tone is not being sent.

7.06 Attach the clips of the W2HB cord to the faulted pair.

- If the fault resistance plus loop resistance is less than about 2000 ohms then the alarm device will sound briefly.
- The meter will deflect giving a rough indication of loop plus fault resistance.
- The tone will be placed on the pair.

7.07 Location of the fault is made using a 105D exploring coil (or a 101B hand held exploring coil) and a 147-type amplifier with a 723A receiver.

7.08 If the fault is cleared during the searching, the tone will cut off automatically. If tone spills over the fault, it may help to reduce the OUTPUT control setting.

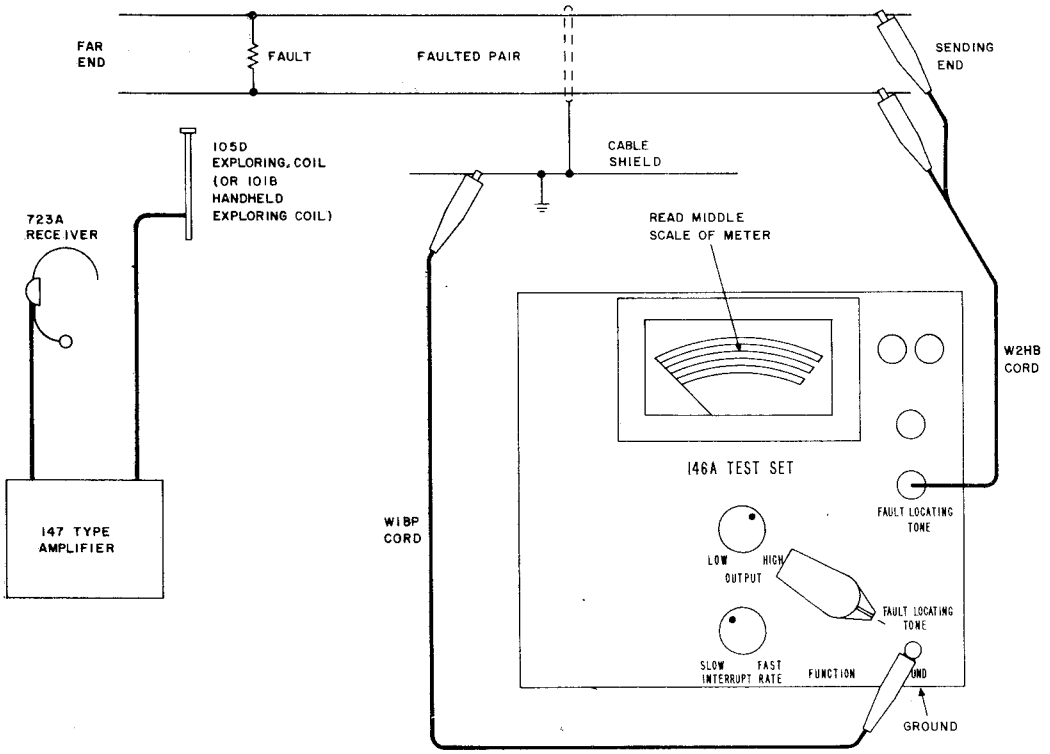


Fig. 15—Resistive Fault Locating

BATTERY ON PAIR

7.09 If there is battery on the pair the meter needle may deflect into the CO BATTERY area at the middle scale.

7.10 To test for the presence of battery, observe the meter needle position on the middle scale. Reverse the test leads and again observe the meter needle position on the middle scale.

- If the readings were equal, then there is no battery on the pair. It will make no difference how the clips are attached to the pair.
- If there is a difference in readings, then the clips should be attached so that the greater ON SCALE indication is obtained.

Caution: Do not leave the test set attached to a faulted pair having sufficient voltage to drive the meter needle off scale.

NONRESISTIVE FAULTS

7.11 If attempting to trace faults, other than resistive faults, it will be necessary to:

(1) Set the FUNCTION switch to IDENTIFICATION TONE.

(2) Plug the W1BR cord into the IDENTIFICATION TONE jack.

(3) Attach the W1BP cord from the test set GROUND post to one side of the faulted line.

(4) Attach the W1BR cord to the other side of the faulted line.

7.12 Any reading observed on the meter is caused by dc line voltage (top scale). See Section 624-800-300, Multiple Wire Fault Locating for related information.

ELECTRICAL NOISE

7.13 In some areas high level electrical noise, caused by power line interference, is a problem in fault locating. In these areas fault locating can be improved by inserting the 1097A precision filter between the 147-type amplifier and the 723A receiver.

7.14 Set the INTERRUPT RATE knob on the 146A test set to SLOW.

7.15 Explore for the fault in the same manner as without the 1097A precision filter.

8. CONTINUITY TESTING

8.01 The 146A test set can be used to verify dc paths up to several thousand ohms by using the audible alerting feature of the talking circuit. (See Fig. 16.)

8.02 Plug the W2HB cord into the TALK PAIR jack. Place a shorting wire across the TALK SET terminals. Set the FUNCTION switch to IDENTIFICATION TONE.

8.03 If any resistance from zero to several thousand ohms is placed between the clips of the W2HB cord, the audible alerting device will sound in an interrupted manner.

9. MAINTENANCE

9.01 No maintenance other than that explained in Part 3 should be performed in the field. If the test set fails to function properly it should be returned, in accordance with local procedures, to the Western Electric Company.

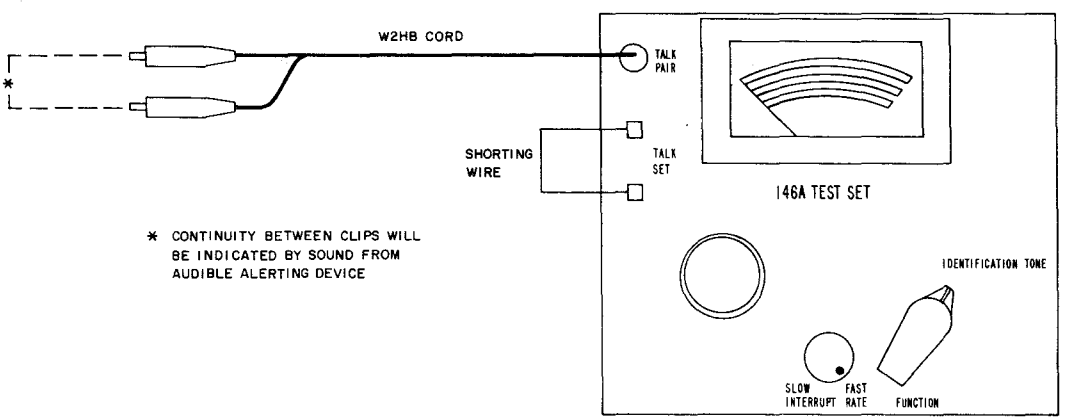


Fig. 16—Continuity Testing