

**REPLACING PAGE ADDENDUM**

***Filing Instructions:***

- 1. REMOVE FROM THE SECTION THE PAGES NUMBERED THE SAME AS THOSE ATTACHED TO THIS PINK SHEET.**
- 2. INSERT THE ATTACHED PAGES INTO THE SECTION IN THEIR PLACE.**
- 3. PLACE THIS PINK SHEET AHEAD OF PAGE 1 OF THE SECTION.**

**PICTUREPHONE® CABLE**

**TROUBLE LOCATION**

**1. GENERAL**

**1.001** This addendum supplements Section 634-405-301, Issue 1. The attached page must be inserted in the section in accordance with the filing instructions above.

**1.002** This addendum is issued to add Form E-6098 outlined in Tables B and C in 7.01.

**7. SELECTING WHICH TROUBLE TO CLEAR**

(a) Added—Form E-6098

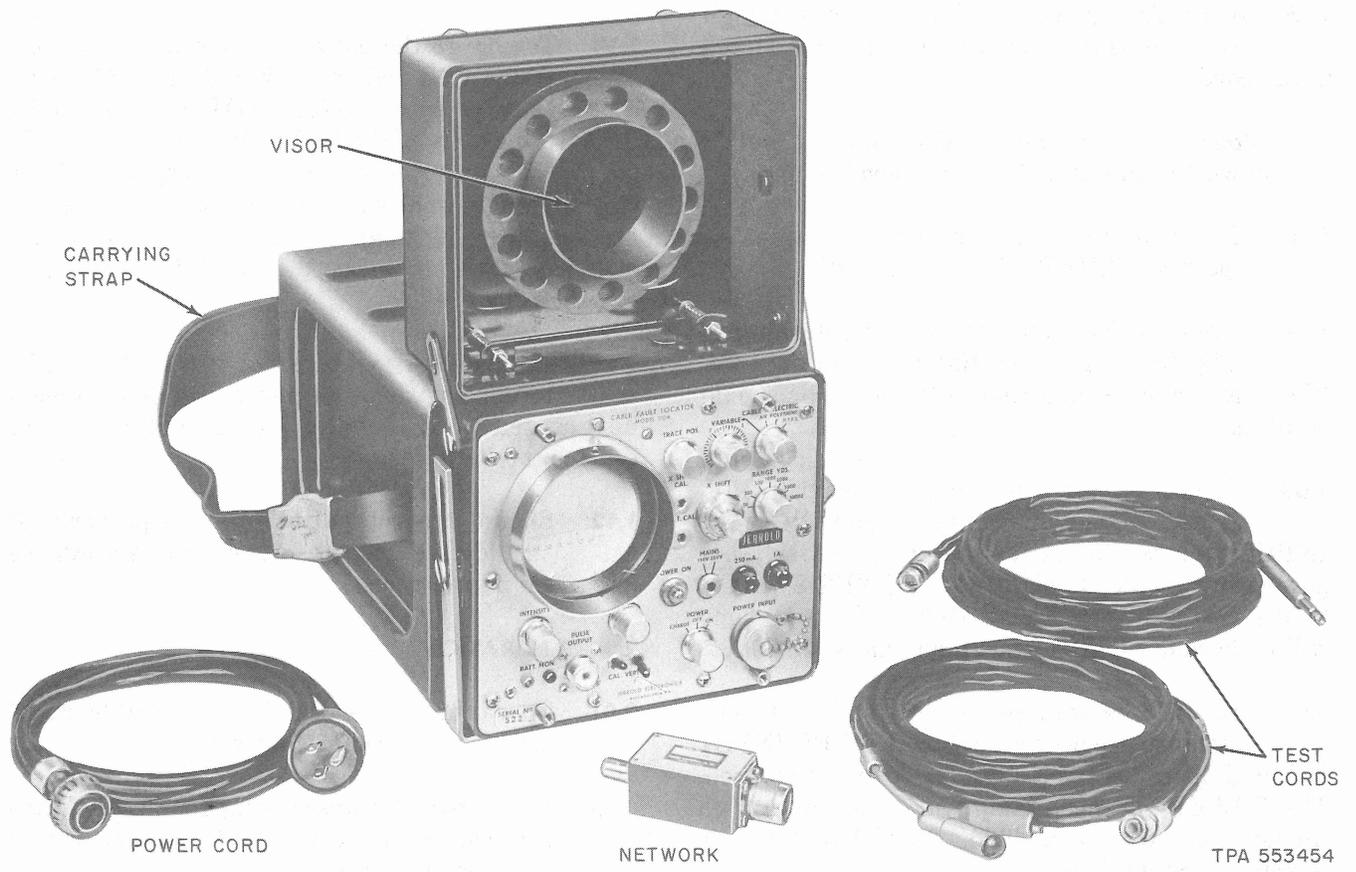
**ATTACHED:**

**Page 9 Reissued September, 1971**

**Page 10 Added September, 1971**

## PICTUREPHONE® CABLE TROUBLE LOCATION

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3. PRELIMINARY PROCEDURES . . . . .	3	1.01 This section covers the instructions for operating the Biddle 110A Cable Fault Locator (Biddle Model 655121) which is used in locating certain types of troubles which impair PICTUREPHONE® transmission. These troubles are bridged taps, build-out capacitors, paraffin filled splices and load coils (Fig. 1).	
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**Fig. 1—Cable Fault Locator**

## SECTION 634-405-301

**Note:** The reasons for failures in equalization and transmission tests should be located using procedures described in this section.

**1.02** Failures in foreign EMF or insulation resistance tests, as well as shorts, crosses, grounds, opens, etc, which may impair PICTUREPHONE® transmission, should be located using procedures outlined in Section 634-310-501.

**1.03** The 110A Cable Fault Locator produces an electrical pulse necessary to perform the fault location test and displays the returned echo on the screen of the set. The distance to the fault can be determined by the position of the echo on the screen after setting the RANGE control switch to the desired position.

**1.04** The Biddle Model 655121 consists of a 655110 test set, a 655112 network and two test cords. One cord is terminated in alligator clips, the other is terminated in a 310 plug. Both cords are 20 feet long.

**1.05** A six foot power cord and visor for high light intensity areas are provided and stored in the cover.

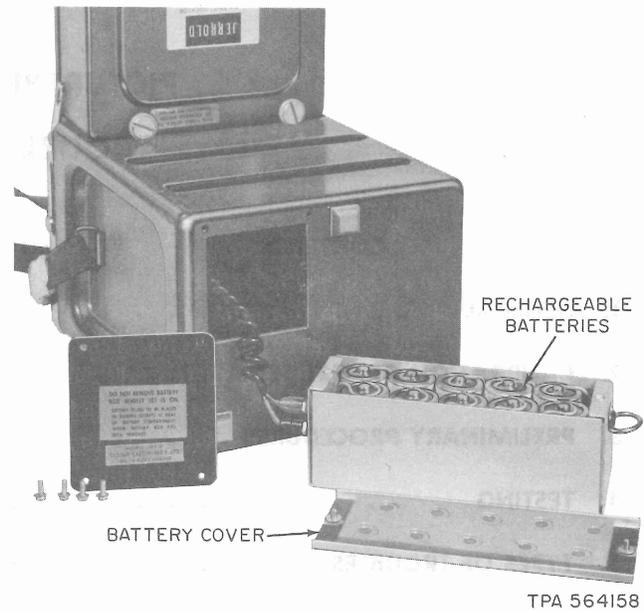
**Note:** The chrome bracket may be pulled down for use as a stand on a level surface.

**1.06** The power switch has three positions of operation; CHARGE, OFF, and ON.

**1.07** Twelve rechargeable Burgess CD10L batteries (Fig. 2) provide operating power in the field. Where available, commercial 110V, 60 Hz ac should be used.

**1.08** To operate test set using commercial 110V, 60 Hz ac power, connect from POWER INPUT jack to the 110V line using the six foot power cord provided and operate POWER SWITCH to the ON position. The POWER ON neon lamp will be lit and a high pitched hum will be audible.

**1.09** To operate test set on internal batteries, disconnect power cord from POWER INPUT jack and operate POWER SWITCH to ON position. The POWER ON neon lamp will be lit and a high pitched hum will be audible. Useful battery life is approximately 5 hours.



**Fig. 2—Fault Locator—Rear View**

**1.10** To charge the batteries, connect power cord to POWER INPUT jack and 110V 60 Hz ac power source and operate POWER switch to CHARGE position (POWER ON neon lamp will light). The batteries will be fully charged in about 14 hours. Internal circuitry has been provided to prevent overcharging. If the batteries have not been used for four weeks, they should be recharged overnight before use.

**1.11** The voltage measured at the BATT. MON. terminals after charging for 14 hours should be greater than 11 volts. If 11 volts or less, replace the batteries.

**1.12** Should the set fail to function properly, it should be returned for repair in accordance with local instructions.

## 2. CALIBRATION

**2.01** To calibrate the Biddle 110A Cable Fault Locator, proceed as follows:

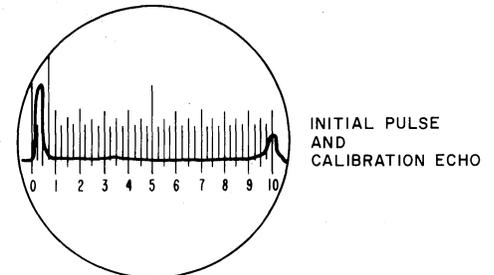
- (a) Open cover by unscrewing four coin slotted screws. Swing cover up to rest on top of unit and remove cords.

- (b) If 110V ac is available, attach power cord to POWER INPUT terminal. If no 110V ac is available, unit may be operated on internal batteries by turning POWER SWITCH to ON.
- (c) Turn set on and allow approximately 5 minutes warmup time.
- (d) Set CAL switch down. Set VERT X5 switch up.
- (e) Adjust INTENSITY and FOCUS controls to obtain a sharp, clear display.

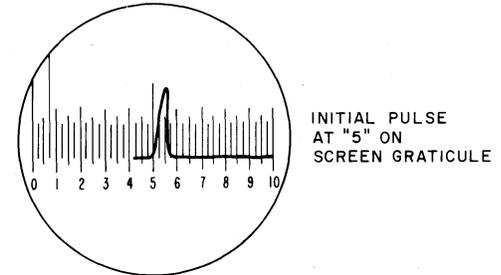
**Caution:** *INTENSITY should be kept as low as possible for comfortable viewing to prevent damage to viewing screen.*

- (f) Set RANGE to 100 and XSHIFT to 0 (full counterclockwise).
- (g) Set CABLE DIELECTRIC to AIR.
- (h) Adjust TRACE POS control so that leading edge of initial pulse is at 0 on screen graticule. Trace should approximate Fig. 3A. Note calibration echo at approximately 10 on screen graticule.
- (i) Adjust TRACE POS to set leading edge of initial pulse at exactly 5 on screen graticule, (see Fig. 3B).
- (j) Turn XSHIFT control clockwise until leading edge of echo pulse is at exactly 5 on screen graticule. (Fig. 3C).
- (k) Read XSHIFT dial. (See Fig. 3D).
- (l) XSHIFT dial should read  $980 \pm 2$ . If dial reading is greater than 982, make a slight clockwise adjustment to XSHIFT CAL and repeat steps (i) through (k). If dial reading is less than 978, make slight counterclockwise adjustment to XSHIFT CAL and repeat steps (i) through (k). Several adjustments to XSHIFT CAL may be required to achieve calibration.

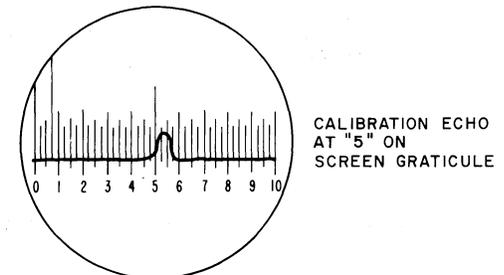
**2.02** The test set should be calibrated prior to each days use.



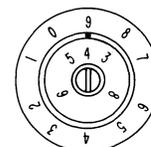
(A)



(B)



(C)



(D)

**Fig. 3—Pulse Locations**

### 3. PRELIMINARY PROCEDURES

- 3.01** Do not attach test cord of Biddle 110A Cable Fault Locator to a working pair.

**Caution:** *Never connect the Biddle 110A Cable Fault Locator to a pair without the Biddle 655112 Network and Cord package because of potential interference to other PICTUREPHONE® service in the same cable or trunk.*

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**3.02** To test a PICTUREPHONE® loop using the Biddle Cable Fault Locator, proceed as follows:

(a) Remove all cable equalizers, portable equalizer sets and cable equalizer test sets from the pair. Verify that both ends of pair to be tested are open and clear.

(b) If testing from Central Office Cable Equalizer Bay:

- (1) Install 874C card in bay, replacing Central Office Cable Equalizer.
  - (2) To test CONTROL pair, attach test leads to LINE-IN jack on cable equalizer bay.
  - (3) To test COMMON pair, attach test leads to EQ-OUT jack on cable equalizer bay.
- See Fig. 4A.

**Note:** The CONTROL pair is used to transmit a PICTUREPHONE® signal from the C. O. to the subscriber location. The COMMON pair is used for transmission in the reverse direction.

(c) If testing from Central Office MDF:

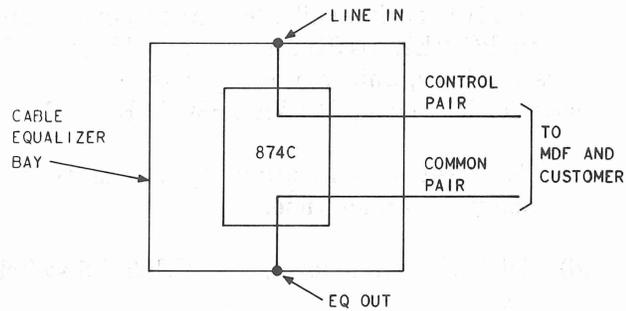
- (1) Open pair at MDF. (Remove heat coils or steel pins.)
- (2) Attach test leads to terminals.

(d) If testing from customer location:

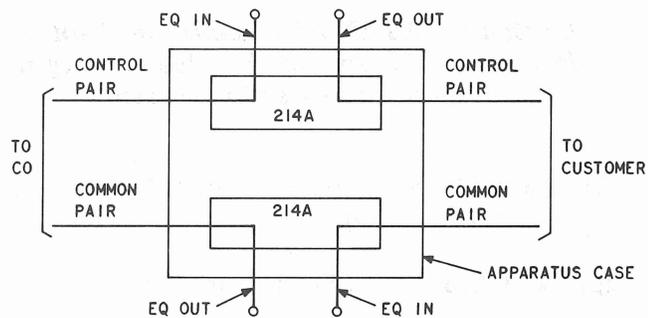
- (1) Attach test leads to terminals at either building MDF or cross box after removing all cross connections.

(e) If testing from Intermediate Cable Equalizer Location:

- (1) Install 214A adapter. (Fig. 5)
- (2) COMMON pair: To test toward the Central Office, attach test leads to EQ-OUT terminal on 214A adapter. To test towards customer, attach test leads to EQ-IN terminals on 214A adapter. (See Fig. 4B).
- (3) CONTROL pair: To test towards the Central Office, attach test leads to EQ-IN

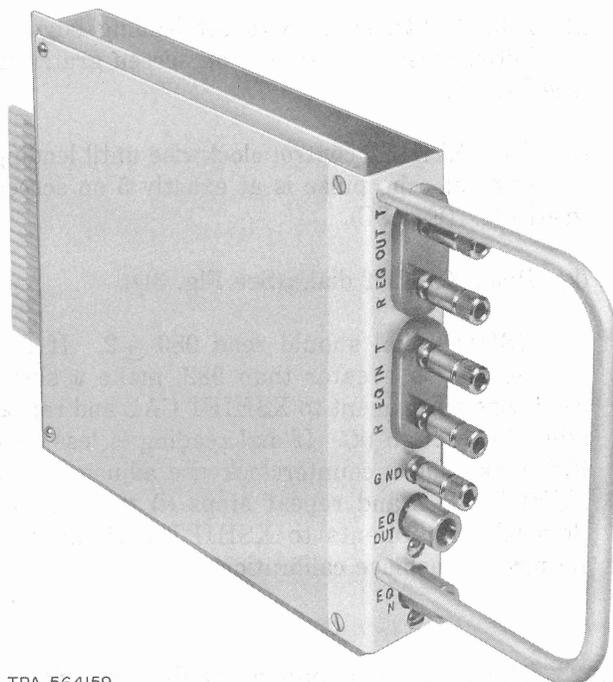


A. TESTING FROM CENTRAL OFFICE CABLE EQUALIZER BAY



B. TESTING FROM INTERMEDIATE LOCATION  
TPA 553456

**Fig. 4—Testing Locations**



TPA 564159

**Fig. 5—214A Adapter**

terminal on 214A adapter. To test toward customer, attach test leads to EQ-OUT terminals on 214A adapter. (See Fig. 4B).

**4. TESTING**

**4.01** To test for troubles with the Biddle 110A Cable Fault Locator, proceed as follows:

- (a) Calibrate as in Part 2.
- (b) Attach 655112 network to PULSE OUTPUT terminal.
- (c) Attach test cord to network. If measuring from Cable Equalizer Bay, use test cord, equipped with a 310 plug.
- (d) Turn XSHIFT control full counterclockwise to zero.
- (e) Turn CABLE DIELECTRIC switch to extreme left position (counterclockwise).
- (f) Select desired RANGE. For first trial, RANGE should be greater than the recorded length of line to be tested. [See Table A and Form E-6097 (or contact Service Center) for cable makeup].

**TABLE A**

LENGTH OF LINE	RANGE	VARIABLE SETTING
0-300 ft	100 yds	2.0
300-600 ft	200 yds	2.0
600-1500 ft	500 yds	2.0
1500-3000 ft	1000 yds	2.3
3000-6000 ft	2000 yds	2.3

**Note:** Do not use 5000 yd. or 10,000 yd. RANGE.

- (g) Turn VARIABLE control to value indicated in Table A for RANGE selected.

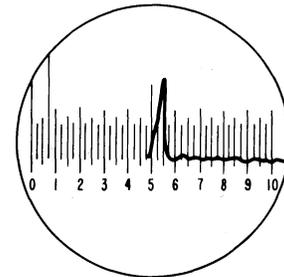
**Note:** Do not use 5000 yd. or 10,000 yd. RANGE.

- (h) Set CAL switch in up position.
- (i) Attach test lead to pair.
- (j) Adjust TRACE POS control so that entire trace is viewed on the screen. (Initial pulse at 0 on screen.)

- (k) If echoes are too small to be easily read, press VERT X5 switch down.
- (l) Reduce RANGE as needed to obtain best view of echoes. If RANGE setting changes, readjust VARIABLE as in Table A, before measuring distance.

**4.02** To measure distance to an echo, proceed as follows:

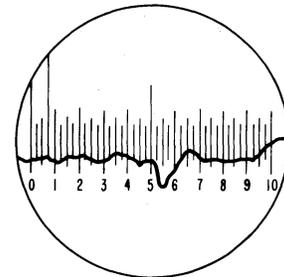
- (a) Adjust TRACE POS control so that leading edge of initial pulse is at exactly 5 on the screen graticule. (See Fig. 6A.)
- (b) Turn XSHIFT clockwise until leading edge of echo is at 4.5 on screen, then return to exactly 5 on screen graticule. (See Fig. 6B.)



RANGE=500 YDS

- 1. LEADING EDGE OF INITIAL PULSE AT CENTER SCREEN.
- 2. TURN XSHIFT CLOCKWISE.

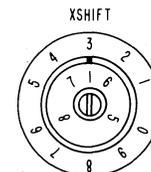
(A)



RANGE=500 YDS

- 3. LEADING EDGE OF ECHO AT CENTER SCREEN.

(B)



- 4. READ XSHIFT = 365
- 5. READ Y FROM TABLE B Y = 1.5
- 6. DISTANCE = 365 X 1.5 = 547.5 FT.

(C)

TPA 553457

**Fig. 6—Measuring Distance By Pulse Echo**

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- (c) Read 3 digit number for XSHIFT dial. (See Fig. 6C.)
- (d) Read value of Y from Table B.

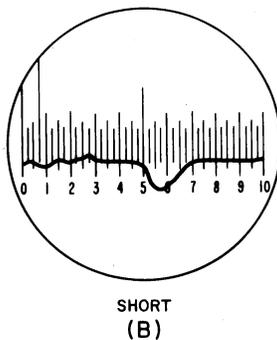
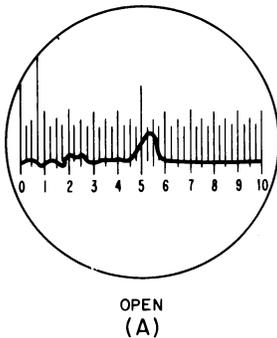
**TABLE B**

RANGE	Y FACTOR
100 yds	0.3
200 yds	0.6
500 yds	1.5
1000 yds	3.0
2000 yds	6.0

- (e) Distance (in feet.) = XSHIFT multiplied by Y, ie, Dist = XSHIFT x Y.

**5. TYPE OF TROUBLES**

**5.01** An open pair appears as a large *upward echo* on the screen. See Fig. 7A. The end of the pair will appear as an open.



**Fig. 7—Types of Troubles**

**5.02** A shorted pair appears as a large *downward echo* on the screen. See Fig. 7B.

**5.03** A bridge tap appears as a *downward echo*. This is sometimes followed by an *upward echo* due to the open at the end of the bridge tap. The shape and size of an echo from a bridge tap depends on the following:

- Length of bridged tap
- Distance to bridged tap from test site
- RANGE setting used.

Examples of bridged tap of different lengths are shown in Fig. 8. Note that as the bridged taps get longer, the upward echo increases in size. Figure 9A shows a long bridged tap close to the test site. Note that the end of the bridged tap is distinct and separate from the beginning of the bridge. Figure 9B shows a short bridged tap close to measuring site.

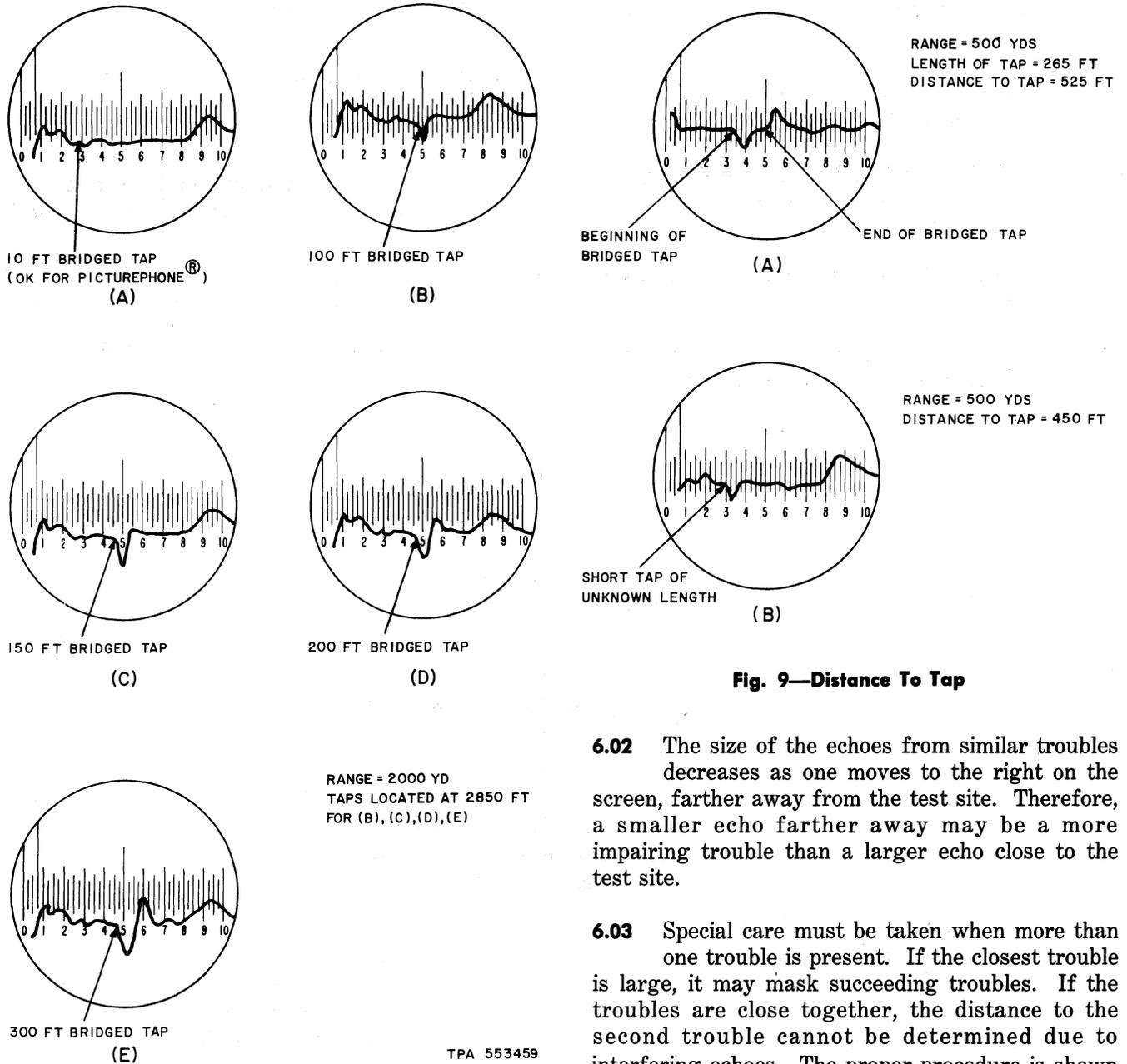
**5.04** Load coils appear as opens. Build-out capacitors appear as long bridged tap. (See Fig. 8D). Paraffin splices may also appear as small bridged taps.

**5.05** Minor troubles that may not affect PICTUREPHONE® transmission will often produce echoes, particularly if these minor troubles are close to the test site. These echoes are usually of no particular shape and may be caused by such things as gas plugs, splices, gauge changes, etc. (See Fig. 8A.)

**6. SPECIAL CONSIDERATION IN INTERPRETING THE TRACE**

**6.01** Most often, a failure in equalization or transmission tests will be caused by one of the following:

- (1) Bridged taps
- (2) Build-out capacitors
- (3) Load coils
- (4) Paraffin splices.

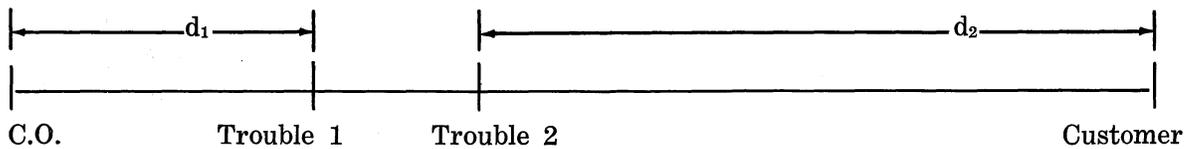


**Fig. 8—Bridge Taps**

**Fig. 9—Distance To Tap**

**6.02** The size of the echoes from similar troubles decreases as one moves to the right on the screen, farther away from the test site. Therefore, a smaller echo farther away may be a more impairing trouble than a larger echo close to the test site.

**6.03** Special care must be taken when more than one trouble is present. If the closest trouble is large, it may mask succeeding troubles. If the troubles are close together, the distance to the second trouble cannot be determined due to interfering echoes. The proper procedure is shown in the following example. The pair appears as below.



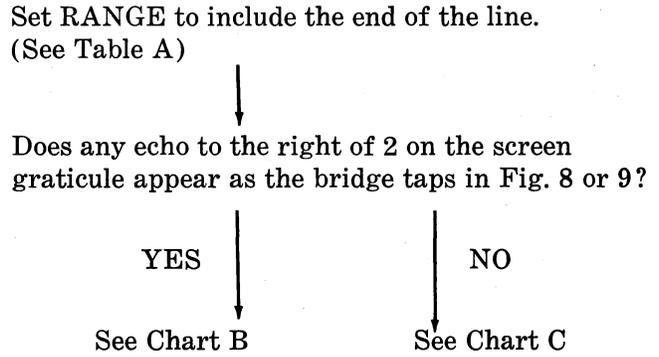
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- (1) Locate distance to trouble 1 (d1) from C. O. measurements as in 4.02.
- (2) Locate distance to trouble 2 (d2) from a far-end measurement.
- (3) If d2 is too long to locate trouble 2 accurately, trouble 2 can only be located from a C. O. measurement *after trouble 1 is cleared.*

**7. SELECTING WHICH TROUBLE TO MEASURE AND CLEAR**

**7.01** To determine which echo is to be measured proceed as in the following flow diagrams:

**CHART A**



**CHART B**

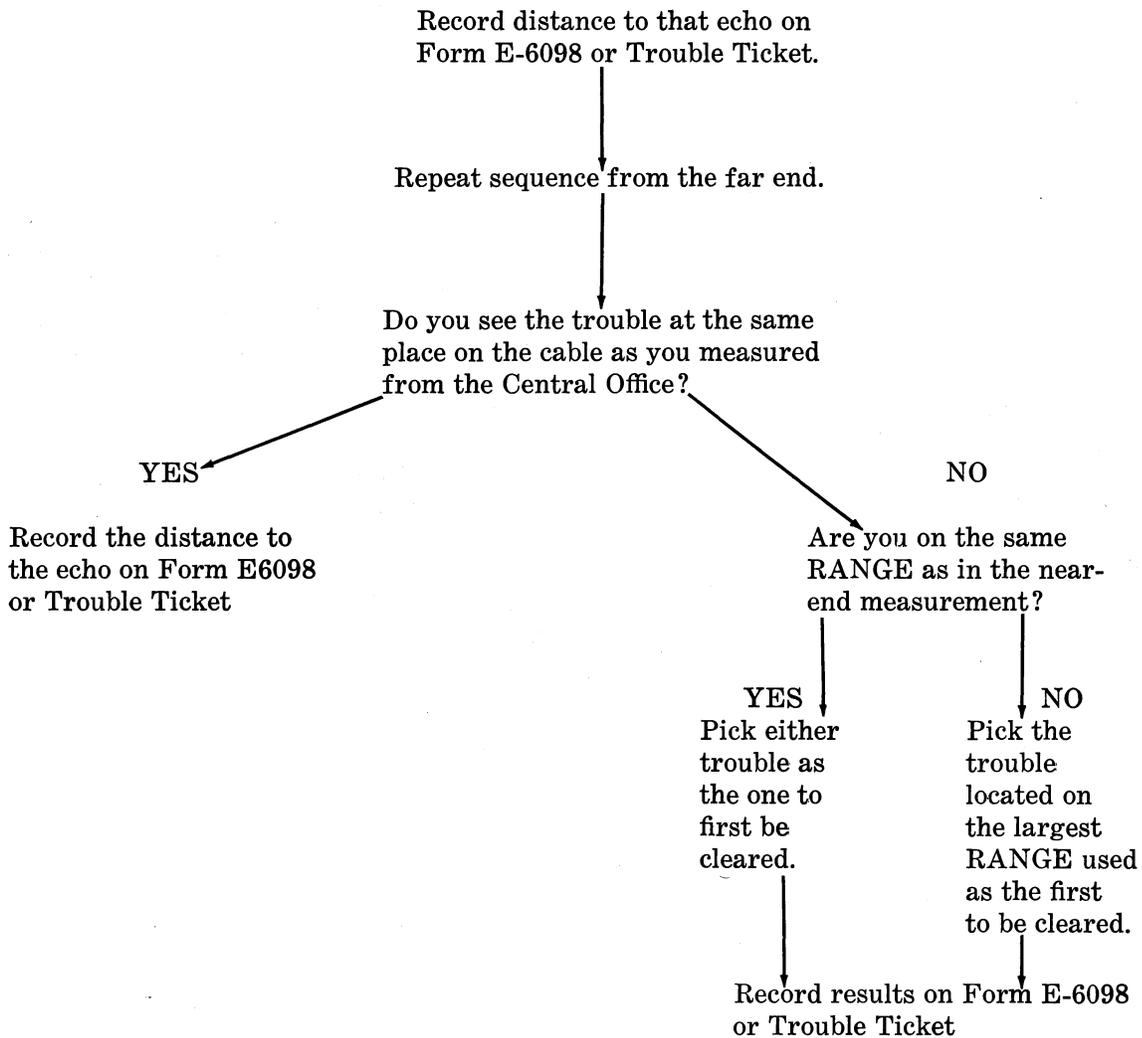
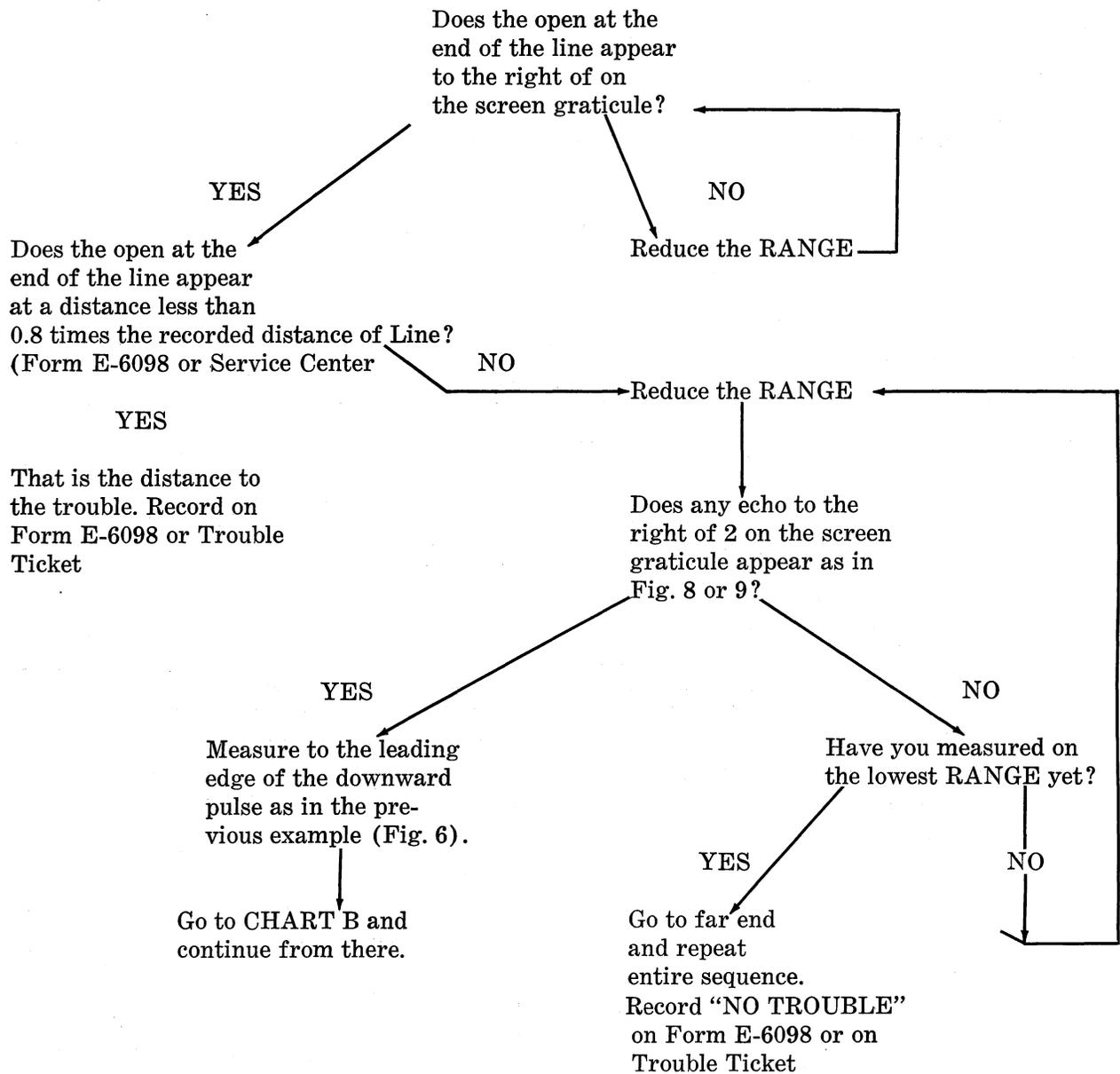


CHART C



8. MAINTENANCE

8.01 No maintenance except battery, cords, or carrying strap replacement should be performed in the field.

