



Technical Practice Section 164-171
General Description and Installation Procedures
Issue 4, April 29, 1982

M-164

Convert-A-PakTM

M-164* CONVERT-A-PAK™

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*The M-164 is manufactured under one or more of the following
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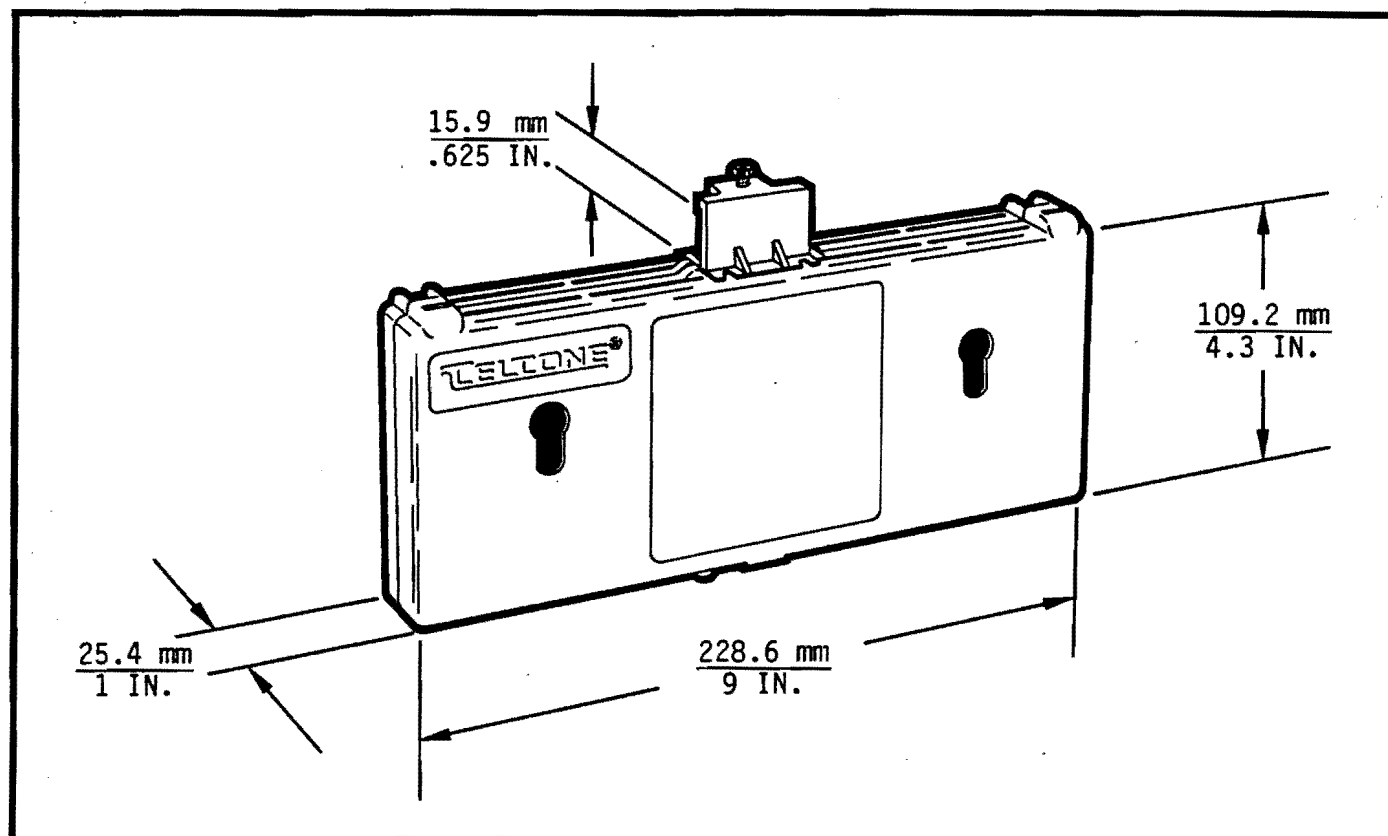


Figure 1 M-164 CONVERT-A-PAK

1. GENERAL

1.01 This technical practice describes the TELTONE® M-164-70, -71, -72, and -73 CONVERT-A-PAK™ Tone-to-Pulse Converters (Figure 1). Installation and troubleshooting procedures, specifications, and ordering information are included.

1.02 This practice is reissued to change the loop current recognition specification. A revision history is contained in Part 8.

1.03 The installation procedures in this practice are also published separately as Installer's Aid 164-271, which covers the M-164-70, -71, -72, and -73. One installer's aid is provided with each M-164 ordered.

2. CONCEPT

2.01 The M-164 is a dedicated tone-to-pulse converter designed for step-by-step central offices. Operating on the same -48 volt battery supply as other telephone equipment, it converts the Dual-Tone Multi-frequency (DTMF) digits produced by a pushbutton telephone into equivalent trains of rotary dial pulses. One M-164 converts one linefinder.

2.02 Packaged to mount on the back of a switch rack, the M-164 does not require additional floor space. Installation requires connecting only Tip and Ring pair leads and battery and ground leads (see Figure 2). Line split does not occur until the signal has been verified as a valid digit and has ended; this avoids having the line split by

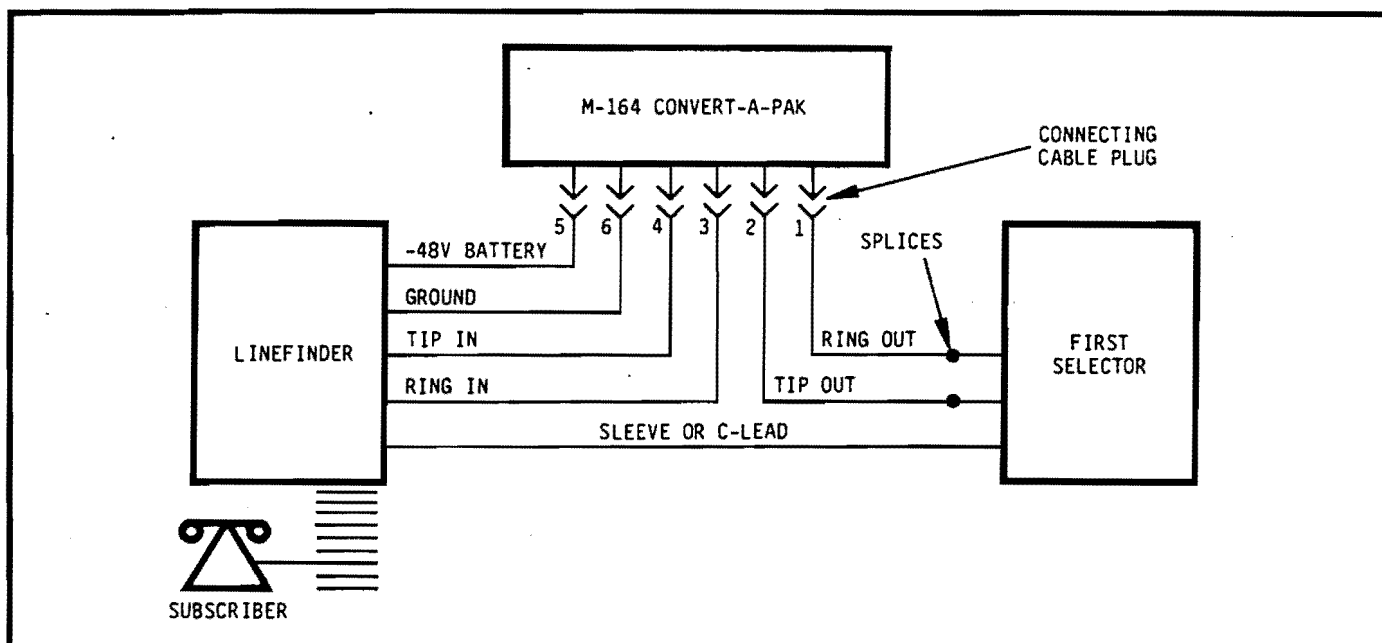


Figure 2 System Connections

spurious noise. M-164 features include the following:

- ANI Forwarding forwards an Automatic Number Identification (ANI) or a coin ground indication received during line split. **Note:** ANI mark systems which do not apply the ground mark until requested by the CO may not be compatible with the M-164.
- Answer Supervision Release inhibits the M-164 whenever Answer Supervision is received.
- End of Dialing Release inhibits the M-164 whenever an * or a # is received.
- Time-Out Release inhibits the M-164 if 16 seconds elapse without a digit being received.

2.03 The M-164-70, -71, -72, and -73 are identical except for the following features:

- The Time-Out Release timer in the M-164-70 and -72 starts when the caller goes off-hook.

- The Time-Out Release timer in the M-164-71 and -73 starts when the first digit after off-hook is received. If this is a rotary dial digit, a special Dial Pulse Release feature inhibits the converter for the duration of the call.
- The M-164-72 and -73 include a special mounting bracket, as defined in Appendix 1.

3. PHYSICAL DESCRIPTION

3.01 The M-164 CONVERT-A-PAK consists of the converter unit shown in Figure 1 and a cable assembly. Ordering details are given in Appendix 1.

3.02 The converter unit housing is thermal plastic and meets UL94 V-O requirements. A mounting bracket is included that can be rotated, offset, or attached to the top or bottom of the unit. The unit is not position-sensitive; it can be mounted upside down if convenient. Optional hardware is available that permits mounting the unit on virtually any kind of frame, wall, panel, or cabinet. Once a unit is mounted, one or two

additional units can be piggybacked onto it using the keyslots and retainers on the housings.

3.03 The cable assembly provided with the unit is 24 inches long. Cables of other lengths can be ordered separately. All cables have a keyed connector at one end, contain six leads, and are equipped with two splicing connectors.

3.04 Loop-through plugs are available to retain rotary dial service where the M-164's are not to be placed in service immediately after wiring. The plugs maintain continuity between the Tip-Ring pairs when the M-164 cable is not plugged into an M-164.

3.05 The M-164 is designed to perform as specified with 0.194 VRMS (-12 dBm) or less of Precise Dial Tone (pure tones of 350 Hz plus 440 Hz ± 0.5 percent, with no more than ± 3 dB of amplitude variation). The M-164 will also work with most other dial tones. Installation of the TELTONE M-904 Precise Dial Tone Generator is recommended wherever the available dial tone is unsatisfactory.

4. FUNCTIONAL DESCRIPTION

4.01 Connected in series between the linefinder and the first selector (Figure 2), the M-164 receives incoming DTMF signals from the linefinder and converts them into equivalent trains of dial pulses which step the forward equipment.

4.02 The M-164 is enabled by the flow of loop current which results when a caller goes off-hook. It remains enabled until the caller goes on-hook or one of the release features causes it to be inhibited. An inhibited M-164 is transparent to both rotary dialing and DTMF signaling. Once inhibited, a unit cannot be reenabled until the caller goes on-hook and then off-hook again to place another call. M-164 operational states are summarized in Figure 3.

A. Tone-to-Pulse Conversion

DTMF Signal Reception

4.03 The M-164 digit receiver shown in Figure 4 is enabled at the end of a 130 ms blanking period which follows recognition of an off-hook. (This blanking period prevents switching transients from being considered as signals.) The input stages of the receiver provide DC isolation, protection from excessive line voltages, and dial tone filtering. The bandsplit stages of the receiver separate each DTMF digit into its high-frequency and low-frequency components, in which form it is forwarded to control logic for validation.

4.04 To be recognized as valid, a digit must include only one tone from each of the two DTMF frequency groups, and both the high- and the low-frequency tones must persist for 40 ms. When the tones of a valid digit end, the digit is written into memory.

4.05 The M-164 memory is a recirculating register which can accommodate up to 20 digits at one time. A digit remains in memory no longer than is required to output any preceding digits with the specified interdigital pauses.

Line Split

4.06 To prevent outgoing dial pulses from interfering with incoming DTMF signals, a relay splits the Tip-Ring path after a valid digit is detected. When the line is split, dial tone to the caller is cut off. The line remains split until the last digit in memory has been outputted.

4.07 During line split, the incoming Tip-Ring pair is connected to the M-164 internal battery feed source and the M-164 ANI forwarding circuit:

- The internal battery feed source provides a termination and loop current for the incoming pair.
- The ANI forwarding circuit ensures that the impedance imbalance which

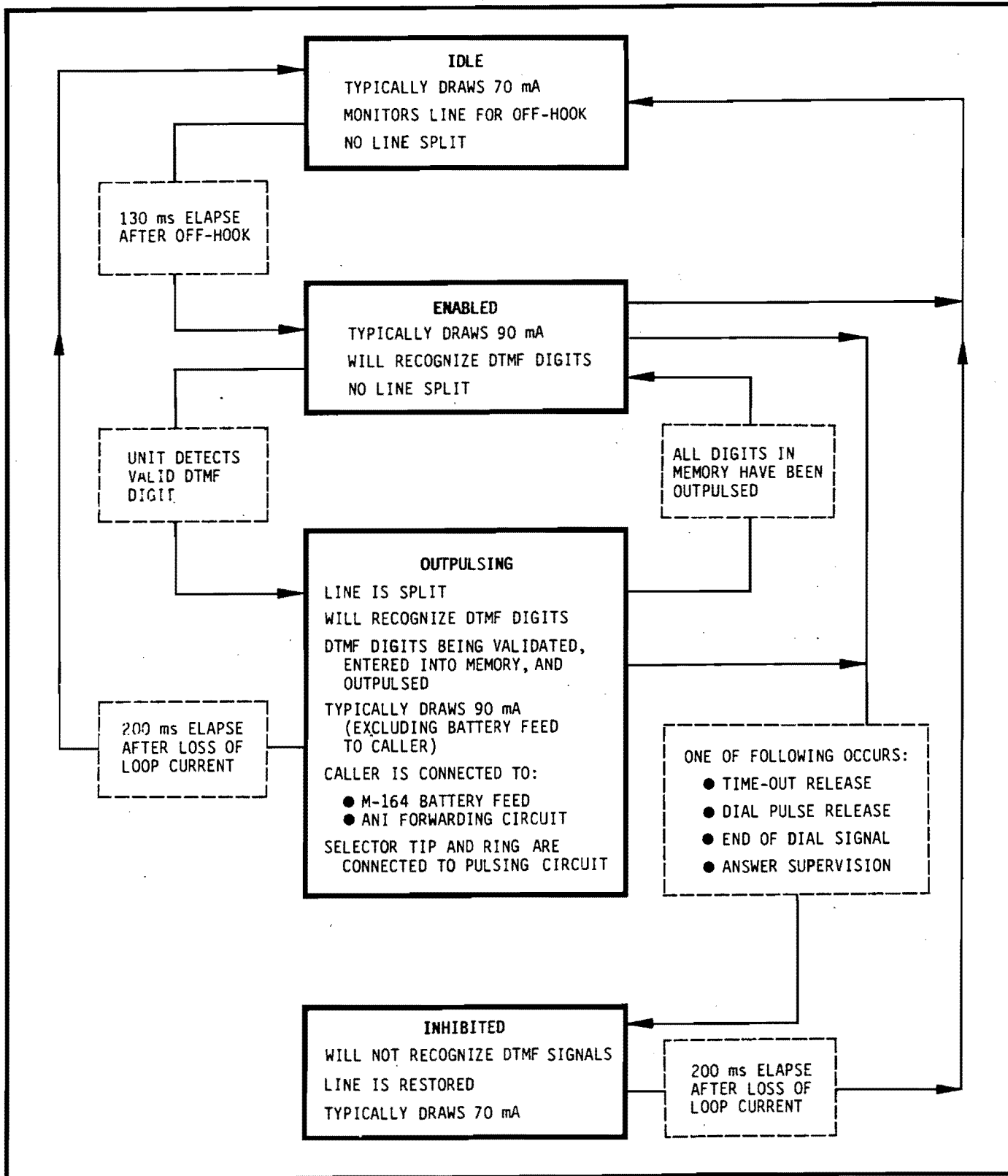


Figure 3 State Diagram

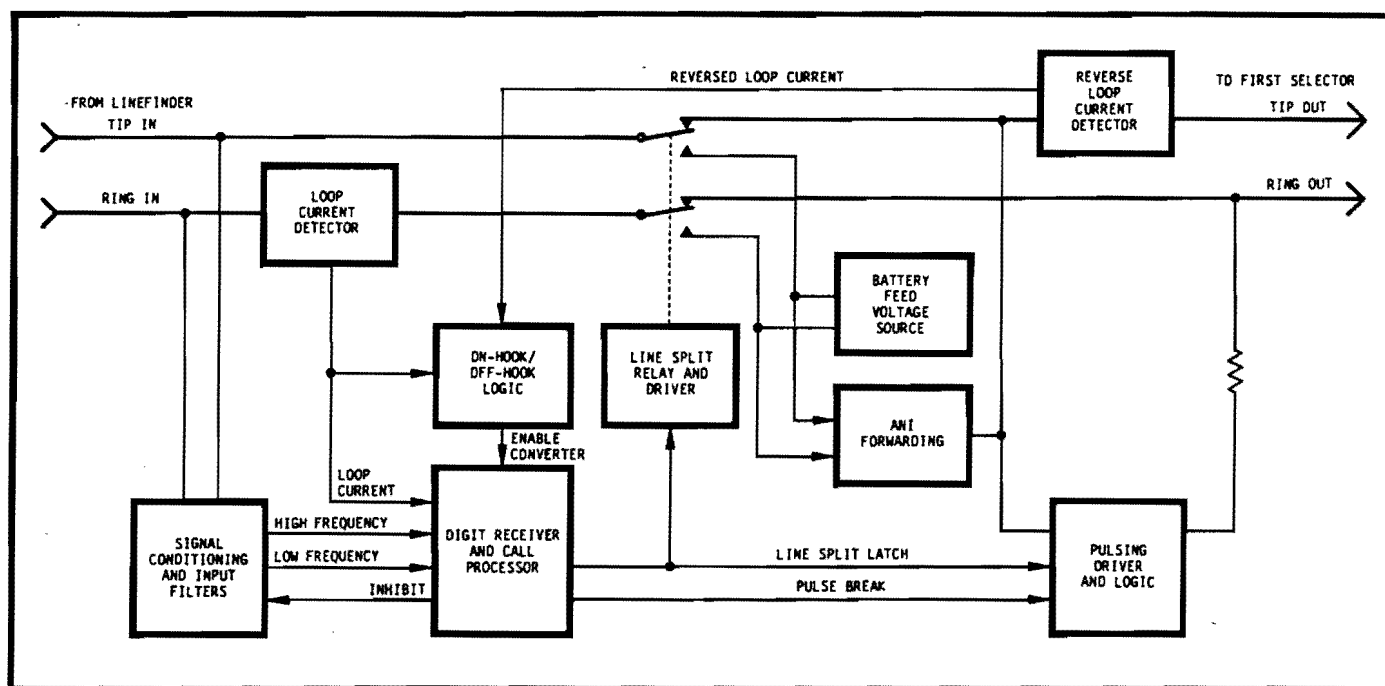


Figure 4 Block Diagram

occurs when the Tip party of a two-party line is off-hook is forwarded during line split. ANI forwarding is compatible with most toll systems, including A.E. SATT equipment, most pay-station coin ground detection systems, and most electronic ANI mark systems. ANI mark systems which do not apply the ground mark until requested by the CO may not be compatible with the M-164.

Outpulsing

4.08 Digits are read out of memory and outpulsed in the same order that they were written in. Outpulsing is accomplished by the pulsing driver, under the control and timing of the digit receiver and call processor. The pulsing driver opens and closes the holding loop once for each unit of digit value (nine times for a digit 9, eight times for a digit 8, etc.). The line is held split for a specified interdigital time, and restored after outpulsing of the last received digit. If another digit is received after the

line is restored, its outpulsing will be delayed for one make period.

4.09 An attenuated indication of the generated pulses (Dial Pulse Feedback) is capacitively coupled from the outgoing Tip-Ring pair to the incoming Tip-Ring pair.

B. Release Features

4.10 End of Dialing Release allows the caller to inhibit the M-164 by signaling an * or a #. After the * or # is received, no additional digits are recognized. However, digits already in memory are outpulsed.

4.11 Time-Out Release inhibits the M-164 if 16 seconds elapse without a digit being received. This feature ensures that the M-164 does not remain enabled in applications where Answer Supervision is not present. The Time-Out Release timer in the M-164-70 and -72 starts when the caller goes off-hook. The timer in the M-164-71 and -73 starts when the first digit after off-hook is received. In both units, the timer is reset to zero on receipt of each digit. If time-out

occurs while the line is split, the M-164 is not inhibited until all digits in memory have been outpulsed. Any succeeding digits are ignored.

4.12 Answer Supervision Release inhibits the M-164 if the forward equipment returns a reversal of loop current when the called party goes off-hook. This ensures that no additional outpulsing occurs after the called party answers.

4.13 Dial Pulse Release inhibits the M-164-71 and -73 if a rotary dial digit is the first digit received after the off-hook blanking period expires. These units recognize any 30 ms break in loop current as a rotary dial pulse. Any succeeding DTMF digits are ignored. (The M-164-70 and -72 do not provide Dial Pulse Release.)

4.14 On-Hook Release inhibits the M-164 if the caller goes on-hook before outpulsing is completed. Loss of forward loop current at Ring-In for over 200 ms is considered an on-hook.

5. INSTALLATION AND TESTING

5.01 An installation checklist is provided in Table 1, a cable wiring diagram in Table 2, and an installation testing checklist, in Table 3.

A. Installation Procedures

5.02 Preinstallation Checks: Contact the engineering department of the operating company if the following checks cannot be completed using office records or standard test equipment.

(1) Ensure that dial tone supplied from the first selector is either Precise Dial Tone (350 Hz plus 440 Hz) or a standard dial tone which does not contain components within the DTMF frequency range above the noise tolerance level (noise and Precise Dial Tone tolerances are specified in Part 7).

(2) Ensure that equipment connected to the linefinder does not incorporate Wink Start or Stop Dial polarity reversals.

(3) Ensure that the linefinder and forward equipment operate properly for rotary dial calls.

5.03 Preliminary Steps:

(1) Ensure that the M-164 has not been damaged in shipping.

(2) Ensure that the ordering number stamped on the M-164 housing front label agrees with the invoice and packing list.

(3) Select a site for the M-164 on the linefinder frame, usually behind the switches and just above the cable trough (see Figure 5). If required, reposition the standard mounting bracket (see Figure 6) or install any accessory mounting hardware (see Figures 7, 8, and 9).

5.04 Wire the Connecting Cable:

(1) Busy out the linefinder when it is idle and remove its fuse.

Note: Where several linefinders are associated with one fuse, busy out all those linefinders before removing the fuse. Wire all the linefinders, plug the connecting cables into the M-164's, and mount the units. Before replacing the fuse, test for rotary dial operation by placing a call through each linefinder. Replace the fuse. Installation testing can be performed at this time or, if testing is to be done later, unbusy those linefinders that have passed the rotary dial call test to restore rotary dial service.

(2) At the linefinder jack, disconnect the Tip and Ring leads going to the first selector. Tag these leads and remove them from the linefinder jack. **The polarity of this pair is critical to the operation of the M-164.**

Note: The first color listed is the background color; the second color is the stripe. Refer to Table 2 when making the following wiring connections.

Table 1 Installation Checklist

- ☐ 1. Recommended Precise Dial Tone supplied.
- ☐ 2. Make linefinder busy and remove its fuse.
- ☐ 3. Remove and identify Tip and Ring leads going to the first selector from the linefinder jack.
- ☐ 4. Wire the six cable leads as shown in Table 2.
- ☐ 5. Plug the connecting cable into the socket on the bottom of the M-164.
- ☐ 6. Perform the installation tests in Part 5.
- ☐ 7. Restore the linefinder fuse and un-busy the linefinder to put the M-164 into service.

(3) Splice the M-164 ORANGE-WHITE cable lead to the Ring lead just disconnected.

(4) Splice the WHITE-ORANGE cable lead to the Tip lead just disconnected.

(5) Connect the M-164 BLUE-WHITE cable lead to the Ring terminal of the linefinder jack.

(6) Connect the WHITE-BLUE cable lead to the Tip terminal of the linefinder jack.

(7) Connect the WHITE cable lead to the -48 volt terminal of the linefinder jack.

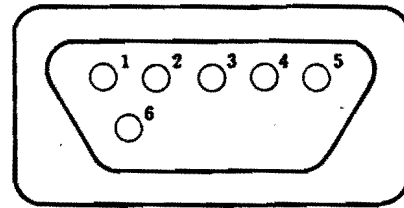
(8) Connect the RED cable lead to the ground terminal of the linefinder jack.

(9) Dress and secure the cable.

(10) Plug the cable into the socket on the bottom of the M-164. Ensure that it

Table 2 Connecting Cable Wiring

PIN	WIRE COLORS	FUNCTION	CONNECTION
1	ORANGE-WHITE	RING OUT	TO FIRST SELECTOR
2	WHITE-ORANGE	TIP OUT	
3	BLUE-WHITE	RING IN	FROM LINEFINDER
4	WHITE-BLUE	TIP IN	
5	WHITE	BATTERY	LINEFINDER TERMINAL BLOCK
6	RED	GROUND	



CABLE CONNECTOR SOCKET DESIGNATIONS ON M-164

locks with a definite click. (Ensure that the first selector does not seize when the cable is plugged in or when the first selector fuse is installed. If there is no off-hook phone on the line, such a seizure indicates a wiring error.)

5.05 Mount the Units: At the site selected in paragraph 5.03, mount the M-164 as described below.

- If the unit is to be mounted directly on the linefinder frame, tighten the screw clamp with a screwdriver or a relay wrench (W.E. Co. 417A or the equivalent). See Figure 5(A).
- If the unit is to be mounted piggyback on a previously mounted M-164 (see Figure 5(B)), insert the retainers of the second unit into the keyslots of the first unit and press downward until the two units are flush at the top and bottom. To separate units so mounted, pull backwards on the retaining clip (Figure 5(C)) of the second unit while pulling it up and out of the keyslots of the first unit.

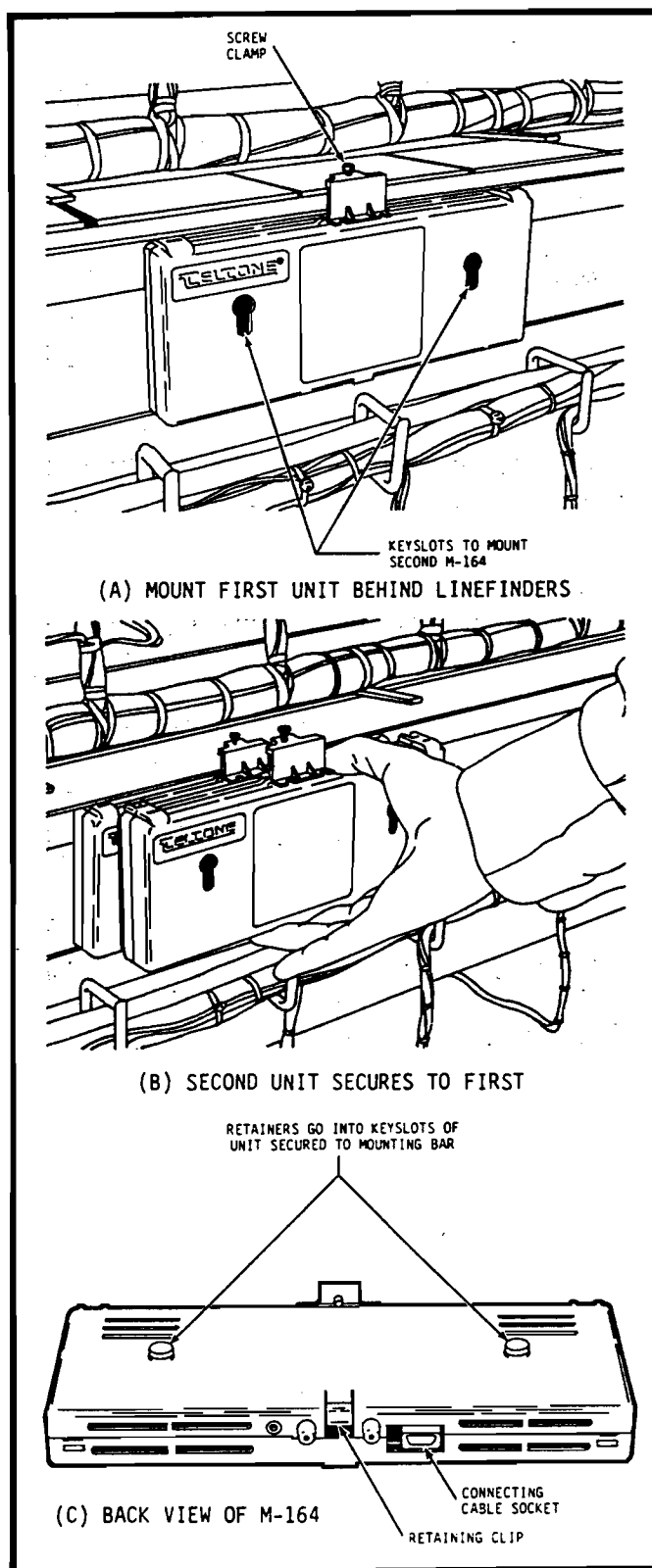


Figure 5 Linefinder Mounting

Table 3 Installation Test Checklist

- | | |
|--------------------------|--|
| <input type="checkbox"/> | 1. Rotary dial operation is not impaired. |
| <input type="checkbox"/> | 2. Call was completed through DTMF telephone at linefinder's test jack or equivalent test point. |
| <input type="checkbox"/> | 3. Called party can be heard in test telephone. |
| <input type="checkbox"/> | 4. Time-Out release exercise completed. |
| <input type="checkbox"/> | 5. On-hook inhibit exercise completed. |
| <input type="checkbox"/> | 6. End of Dialing feature exercise completed. |
| <input type="checkbox"/> | 7. Answer Supervision release exercise completed. |
| <input type="checkbox"/> | 8. ANI Forwarding feature exercise completed. |
| <input type="checkbox"/> | 9. Dial Pulse Release feature exercise completed. |

- If the unit is to be mounted on a wall or rack, attach it using the M-164-26 (Figure 7) brackets and appropriate hardware (obtained locally).

B. Installation Tests

5.06 Rotary Dial Operation:

- (1) Before installing the linefinder fuse (or whatever power source is being used), connect a rotary dial test phone at the linefinder test jack and go off-hook. Note that dial tone is connected.
- (2) Dial a digit. Note that dial tone is cut off. Dial a number and verify that the call goes through. Go back on-hook.

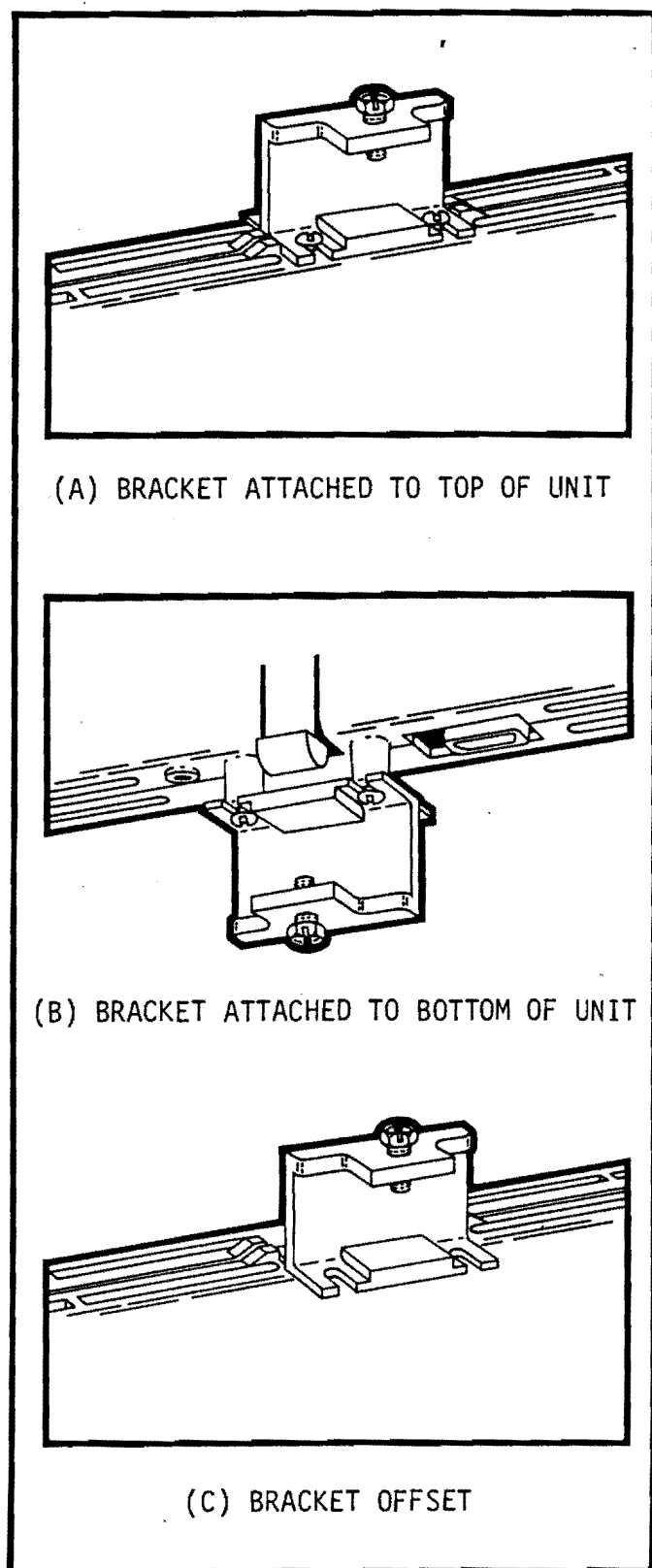


Figure 6 Repositioning the Standard Bracket

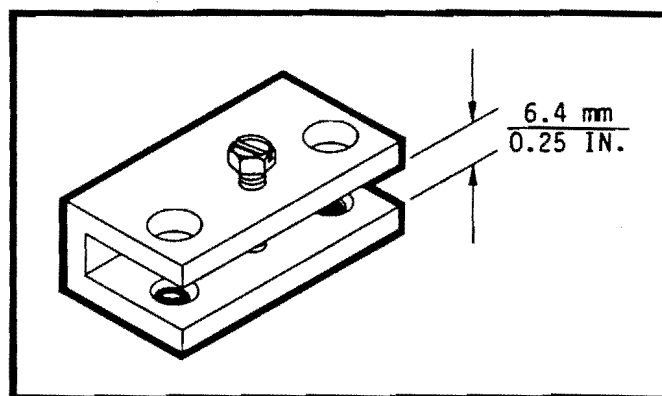


Figure 7 M-164-23 Mounting Bracket

Warning: Do not proceed with testing until both (1) and (2) of paragraph 5.06 have been successfully completed. The failure of either test indicates a fault which will impair rotary dial service and possibly damage the M-164 if the linefinder fuse is installed. Correct the wiring before proceeding with testing. If the fault persists, see Figure 11 for troubleshooting procedures.

- (3) Install the linefinder fuse.
- (4) Go off-hook at the test telephone and note that dial tone is connected.
- (5) Dial a digit and note that dial tone is cut off.

5.07 DTMF Conversion:

- (1) Connect a DTMF test phone at the linefinder test jack.
- (2) Go off-hook, listen for dial tone, and signal a test number. Note that dial tone is cut off, that dial pulse feedback is heard, and that the call goes through.

5.08 Answer Supervision Release:

- If the DTMF test phone is polarity guarded, go off-hook and signal a test number which will return Answer Supervision before the M-164 times

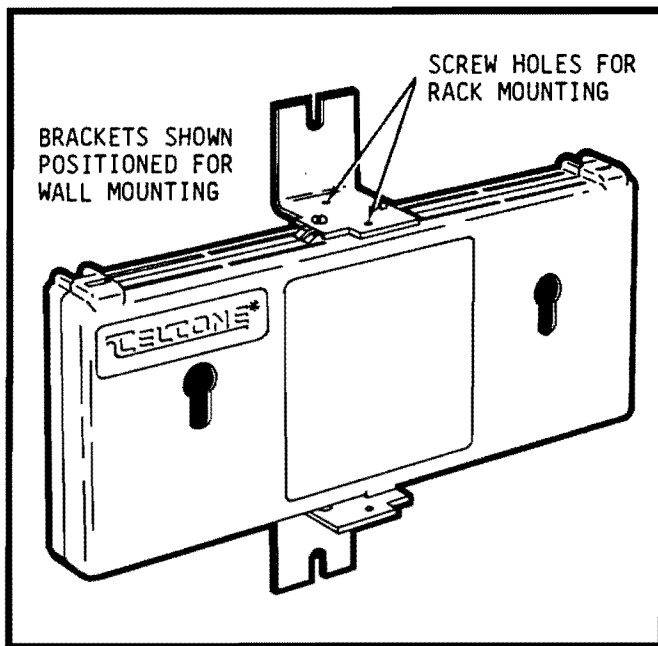


Figure 8 M-164-26 Mounting Brackets

out. When the called station goes off-hook, signal additional digits.

- If the DTMF test phone is not polarity guarded, connect a second unguarded DTMF phone at the linefinder test jack in parallel with the first phone but with the polarity of the Tip and Ring connections reversed. Go off-hook with the first phone and signal a test number which will return Answer Supervision before the M-164 times out. When the called station goes off-hook, go off-hook with the second phone and signal additional digits.
- In either case, dial pulse feedback should not be present, indicating that the additional digits were not outpulsed because the M-164 has released. Go back on-hook.

5.09 Time-Out Release: Go off-hook. Wait 10 seconds and signal a digit. Verify that the digit is outpulsed. Wait 20 seconds before signaling another digit. This digit must not be outpulsed. Go back on-hook.

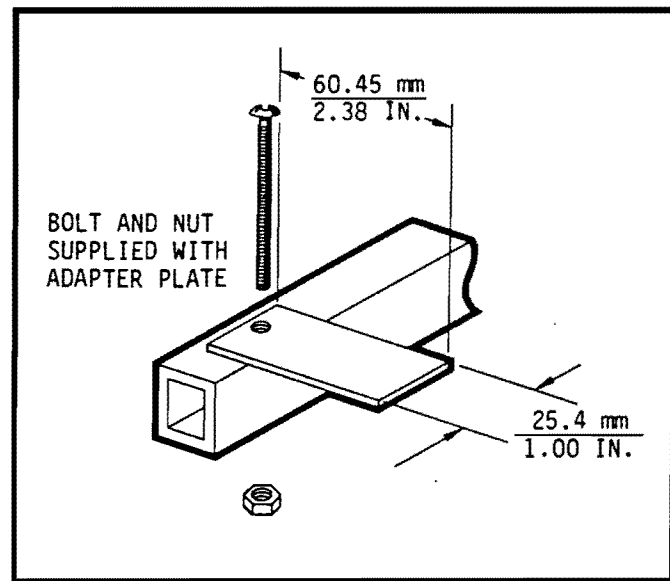


Figure 9 M-164-27 Box Frame Adapter Plate

5.10 On-Hook Inhibit: Go off-hook and signal several high-value digits. Quickly go on-hook and off-hook again. Dial pulse feedback should not be present, indicating that the M-164 was inhibited by the loss of loop current. Go back on-hook.

5.11 End of Dialing: Go off-hook and signal several digits. When dial pulse feedback ceases, signal an * followed by additional digits. Dial pulse feedback should not be present, indicating that the M-164 has been inhibited from further outpulsing. Go on-hook and repeat the test, substituting a # for the *. Go back on-hook.

5.12 ANI Forwarding: Test for an ANI indication at the forward equipment as described in the appropriate BSP or local practice. The M-164 forwards an ANI indication only while it holds the line split—that is, during outpulsing and the interdigital times.

C. Complete the Installation

5.13 Disconnect the test phone(s) from the linefinder test jack and unbusy the linefinder to put the M-164 into service.

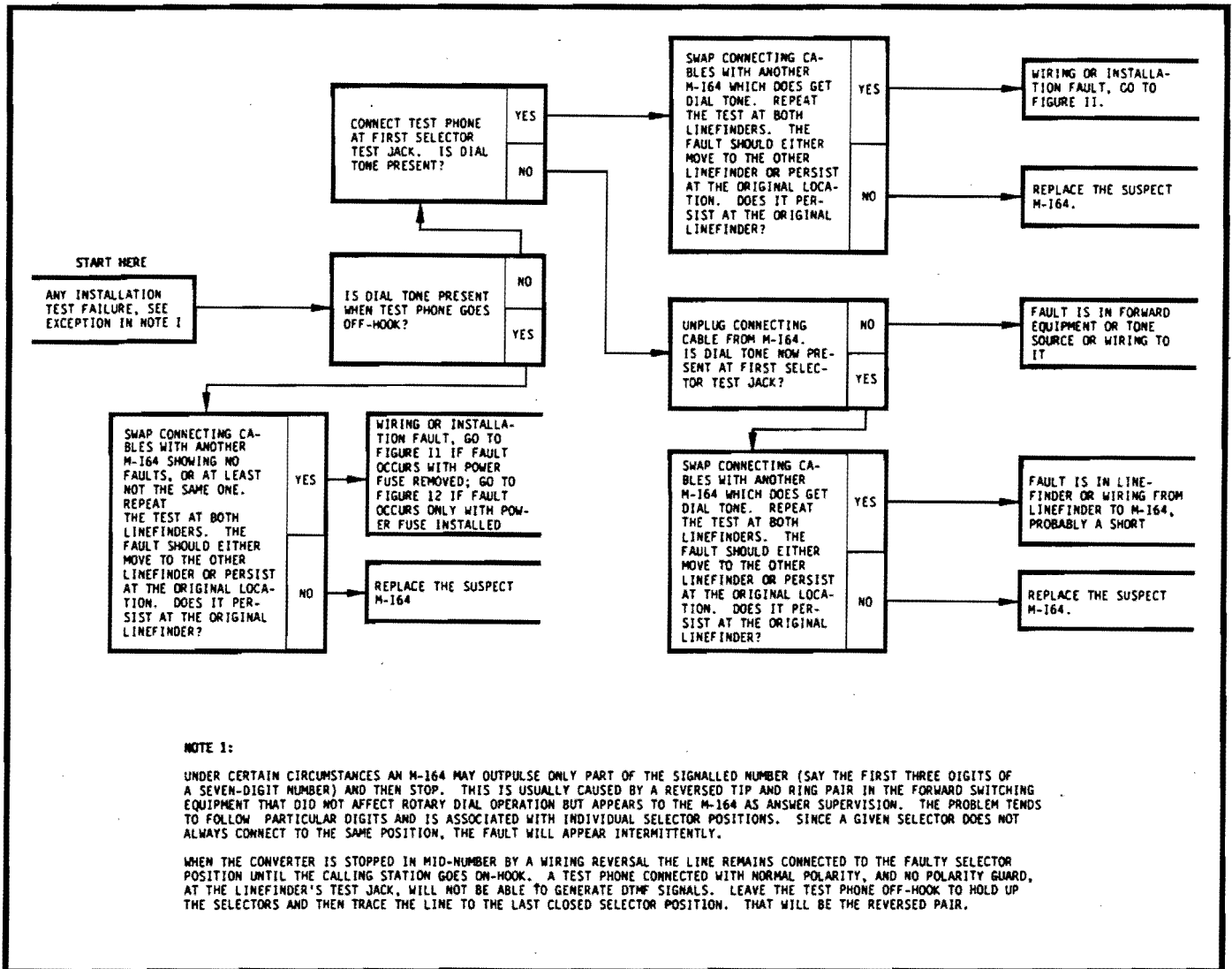


Figure 10 Fault Isolation for In-Service Units

6. TROUBLESHOOTING

6.01 The simplest way to determine whether a fault is in the wiring or the M-164 is to swap the suspect unit with a known-good one. If the fault disappears, the original unit must be replaced.

6.02 If the fault persists, one of the following troubleshooting charts can be used as an aid in locating the fault:

- Figure 10, for an in-service unit.
- Figure 11, for a unit that fails installation testing before the line-

finder fuse has been installed (i.e., fails rotary dial operation tests (1) and (2) of paragraph 5.06).

- Figure 12, for a unit that fails any of the installation tests performed after the fuse has been installed.

6.03 The most common wiring fault is to reverse Tip and Ring leads.

6.04 Any faulty M-164's must be returned to Teltone Corporation. The M-164 has no field-serviceable or -replaceable components.

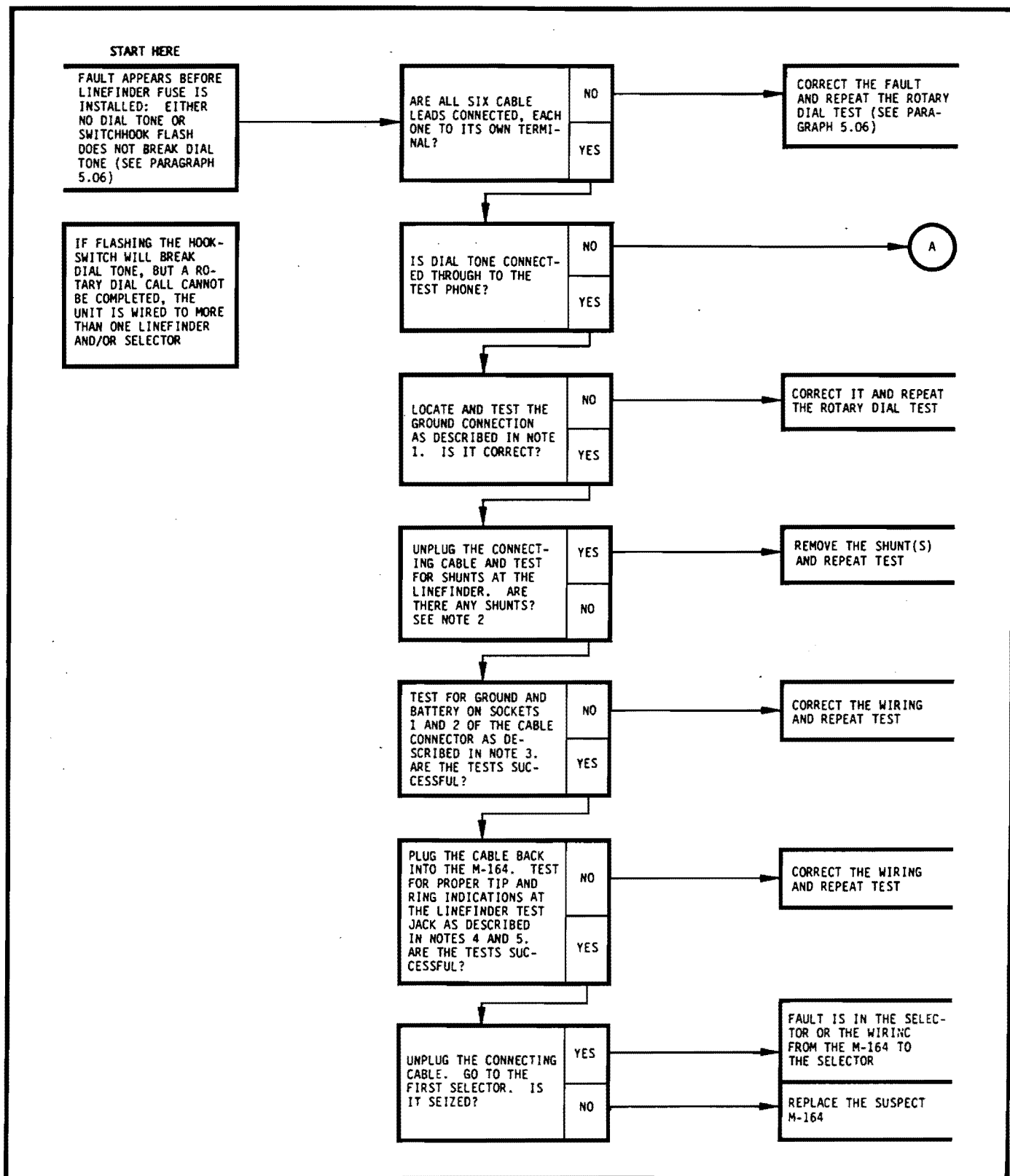
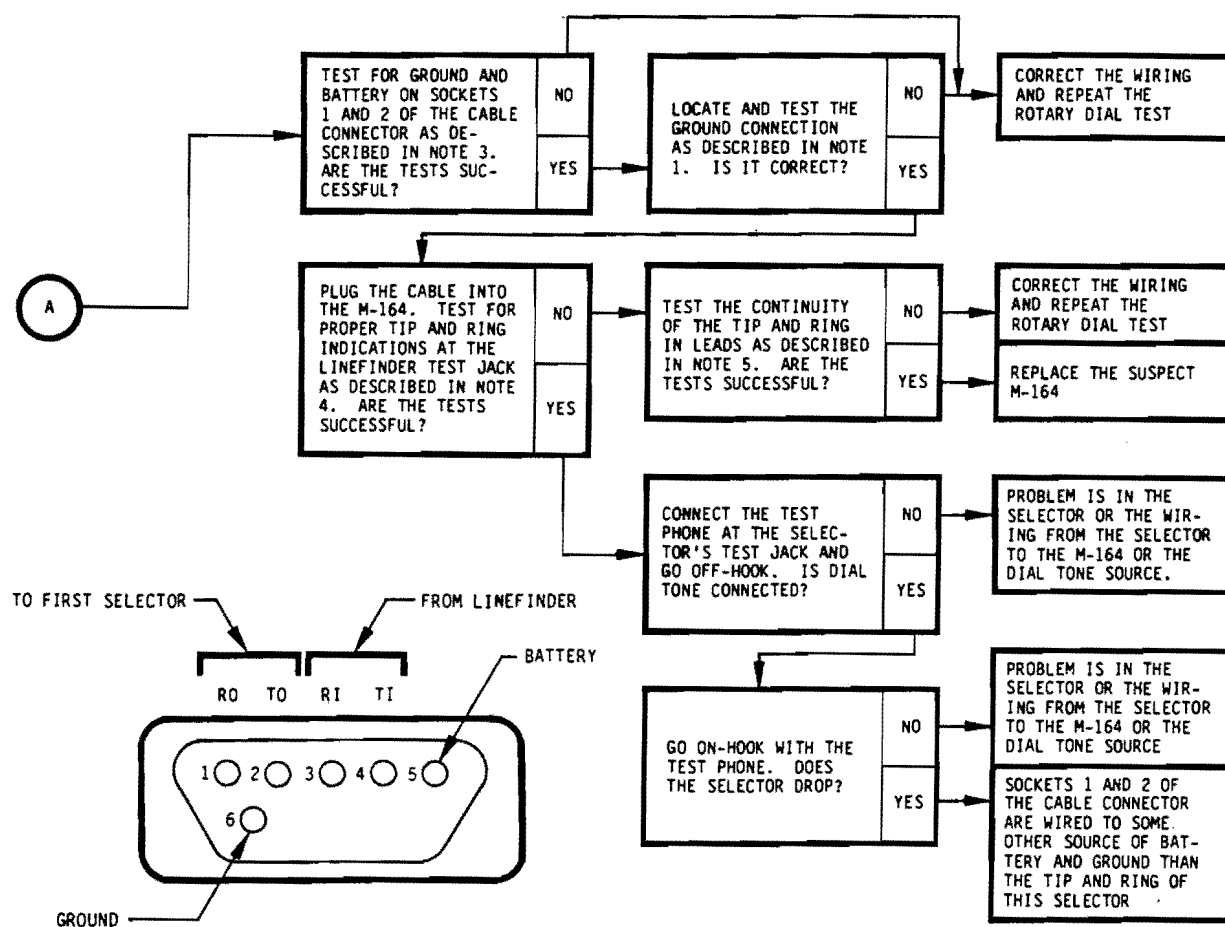


Figure 11 Fault Appears Before Fuse Installed (Rotary Dial Operating Fault) (Sheet 1 of 2)



NOTES:

1. TRACE THE RED CABLE LEAD TO THE TERMINAL TO WHICH IT IS CONNECTED. VERIFY THAT TERMINAL TO BE POWER SUPPLY GROUND. THEN CHECK CABLE CONTINUITY BY CONNECTING A VOLTMETER BETWEEN CABLE CONNECTOR SOCKET 6 AND A BATTERY BUS NOT SERVING THE M-164. REPLACE CABLE IF FULL METER DEFLECTION DOES NOT OCCUR.
2. WITH CABLE UNPLUGGED FROM THE M-164, TEST FOR BATTERY AND GROUND AT THE LINEFINDER JACK TERMINALS. PRESENCE OF EITHER INDICATES A SHUNT.
3. WITH A VOLTMETER CONNECTED TO A BATTERY BUS NOT SERVING THE M-164, CHECK FOR GROUND ON CABLE CONNECTOR SOCKET 2. THIS GROUND SHOULD BE SELECTOR TIP. IF IT IS NOT ON SOCKET 2, TRY SOCKETS 1, 3, 4, AND 5 AND CORRECT THE WIRING. THEN CONNECT THE VOLTMETER TO GROUND AND TEST FOR BATTERY ON SOCKET 1 (SELECTOR RING). TRY SOCKETS 3, 4, AND 5 AND CORRECT THE WIRING IF BATTERY IS NOT ON SOCKET 1.
4. PLUG CABLE INTO M-164 AND CONNECT VOLTMETER AS IN NOTES 1 AND 3. TEST FOR GROUND ON THE LINEFINDER TIP TERMINAL AND FOR BATTERY ON THE LINEFINDER RING TERMINAL. IF EITHER IS ABSENT, THERE IS A FAULT. IF THE CONNECTIONS ARE REVERSED, CORRECT THE WIRING AND CONTINUE.
5. UNPLUG THE CABLE FROM THE M-164. WITH AN OHMMETER, TEST THE CONTINUITY OF THE CABLE BETWEEN SOCKETS 3 (RING IN) AND 4 (TIP IN) AND THE LINEFINDER TERMINALS TO WHICH THEY ARE CONNECTED.

Figure 11 Fault Appears Before Fuse Installed (Rotary Dial Operating Fault) (Sheet 2 of 2)

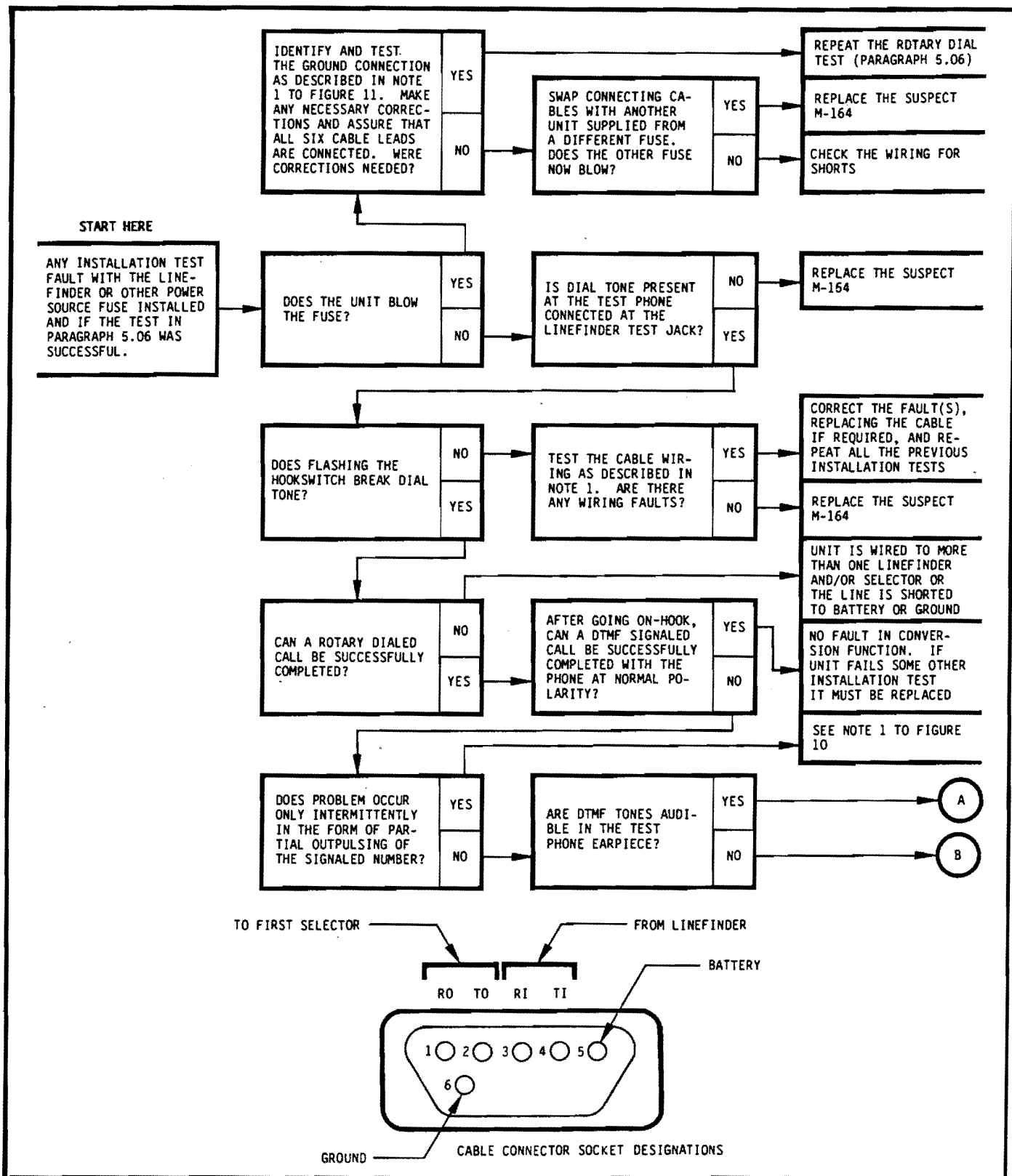


Figure 12 Fault Appears After Fuse Installed (Sheet 1 of 3)

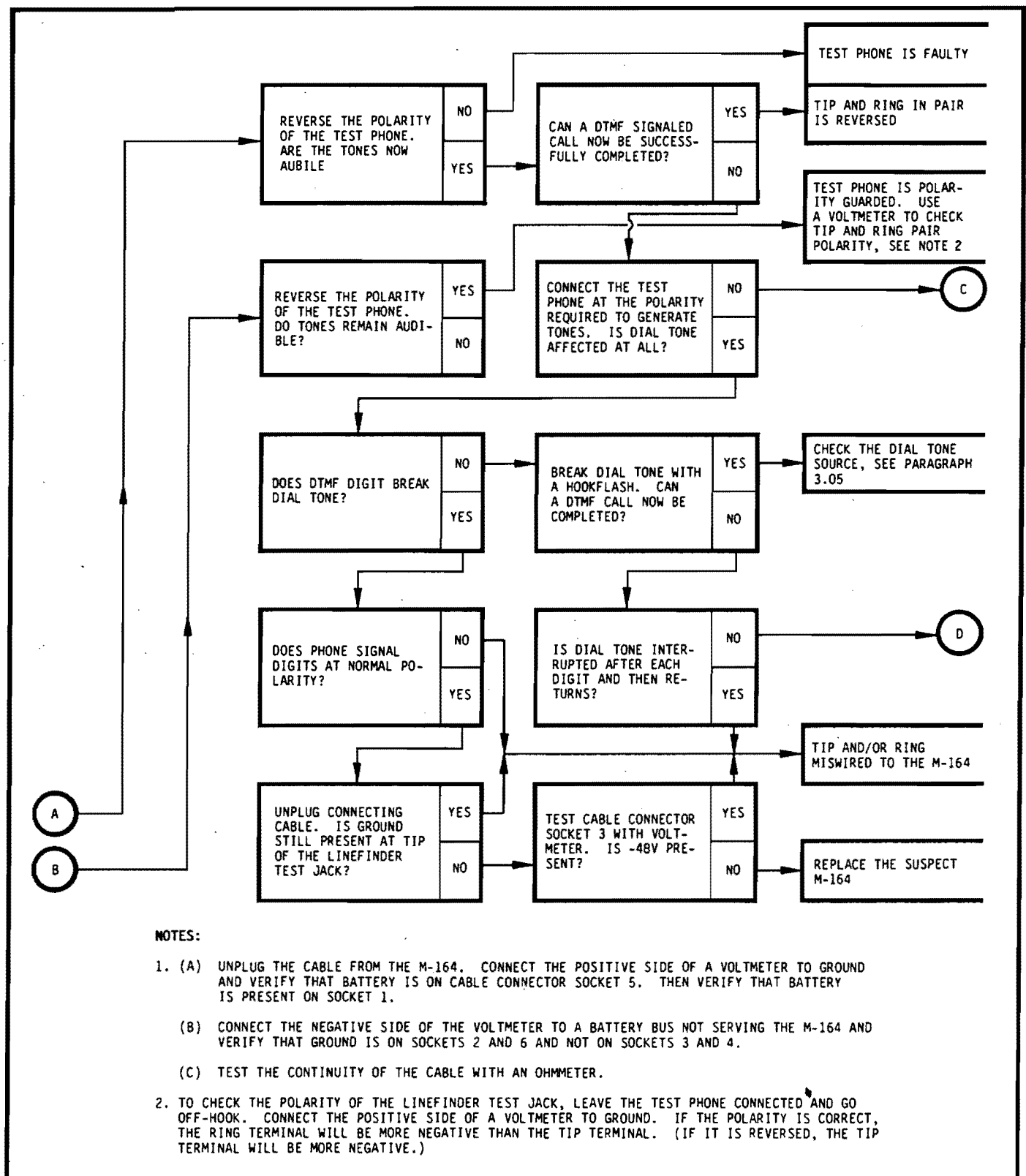


Figure 12 Fault Appears After Fuse Installed (Sheet 2 of 3)

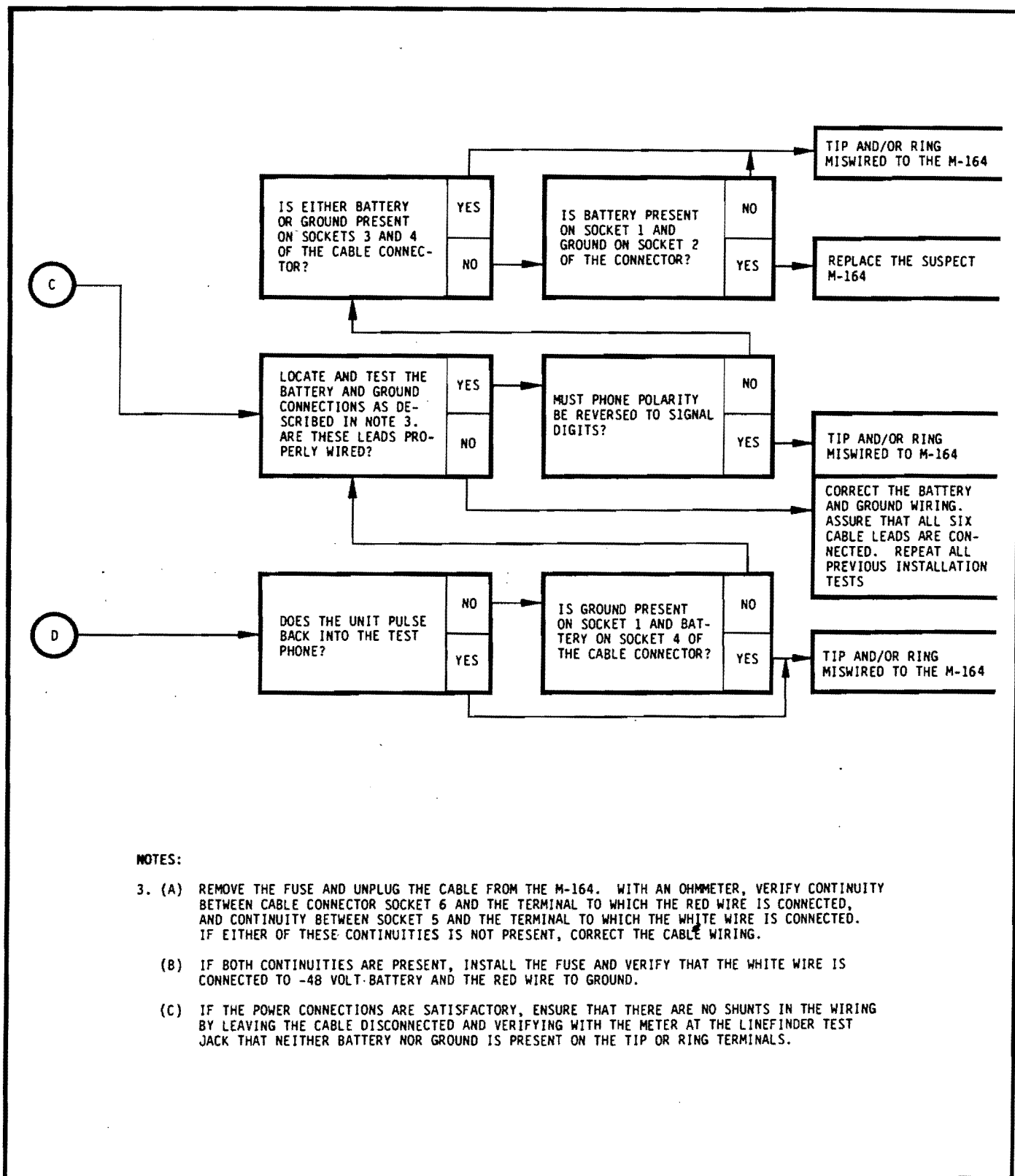


Figure 12 Fault Appears After Fuse Installed (Sheet 3 of 3)

7. SPECIFICATIONS**Input Impedance**

(tone receiver) 75K ohms minimum, AC coupled (see Note 1)

Input DTMF Signaling

Signal accept level (per frequency) 0.062 to 1.55 VRMS (-22 to +6 dBm), see Note 2

Signal reject level (per frequency) 0.138 VRMS (-35 dBm) see Note 2

Tone accept bandwidth $\pm(1.5\% + 2 \text{ Hz})$

Tone reject bandwidth $\pm 3.5\%$

Signal accept duration $\geq 40 \text{ ms}$

Input accept inter-digital time $\geq 40 \text{ ms}$

Signal cycle time $\geq 85 \text{ ms}$

Amplitude difference (twist), high frequency relative to low frequency +6 dB -8 dB, see Note 3

Noise tolerance 20 dB, see Note 4

Precise dial tone tolerance -12 dBm per tone maximum (0.194 VRMS, see Note 2)

DTMF digit recognition after off-hook $\geq 130 \text{ ms}$

Register Capacity 20 digits, recirculating

Interface Characteristics

Insertion loss $\leq 0.1 \text{ dB}$

Longitudinal balance talkthrough $\leq 60 \text{ dB}$ (see Note 1)

signaling during line split $\leq 50 \text{ dB}$ (see Note 1)

Loop current recognition $\geq 12 \text{ mA}$

ANI offset recognition $\leq 2700 \text{ ohms}$

ANI offset forwarding $1500 \pm 150 \text{ ohms}$

Input DC Signaling

Answer Supervision recognition 100 ms (typical)

On-hook recognition 200 ms minimum

Blanking for Dial Pulse Release 2 to 3 seconds from off-hook

Dial Pulse Break recognition 30 ms minimum

Output Signaling

Pulse rate $10 \pm 0.5 \text{ PPS}$

Pulse ratio 58% to 62% break

Outpulse interdigital time 710 to 760 ms

Outpulse loop resistance $300 \text{ ohms} \pm 10\%$

Time-Out Period $16 \pm 1 \text{ seconds}$

Line restoral time after last break pulse of most recently received digit 715 to 755 ms

Power Requirements

Voltage	-43 to -56 VDC
Current	
Idle or inhibited	70 mA, typical
Enabled	90 mA, typical
Outpulsing	90 mA, typical (does not include battery feed current to subscriber)
Fusing requirement	1/3 ampere

Environmental Requirements

Temperature limits	0° to 55° C
Relative humidity limits	0 to 85%

Note 1: For frequencies 200 Hz to 3000 Hz, loop current 60 mA minimum.

Note 2: Voltage levels stated in dBm are obtained using a standard voltmeter calibrated to provide a scaled voltage mea-

surement in dBm for a 600 ohm impedance. No termination should be applied for this measurement.

Note 3: Combined level of random, difference, and harmonic noise components at least 40 dB below the lowest level DTMF component.

Note 4: Relative to lowest level DTMF component with DTMF test tones at centerband, twist ± 1 dB with combined harmonics and difference frequencies at -32 dB below lowest level DTMF component. Noise level is not to exceed -35 dBm.

8. REVISION HISTORY

Issue 2, January 19, 1979

Practice revised to include information on the Dial Pulse Release feature.

Issue 3, January 7, 1982

Revised to add the M-164-70, -72, and -73; to change the register storage capacity and output interdigital time specifications; and to include additional optional mounting hardware.

ORDERING INFORMATION

BASIC UNITS

- | | |
|----------|---|
| M-164-70 | Tone-to-Pulse Converter with time-out starting at off-hook. Includes cable (-05), mounting bracket (-25), and installer's aid (164-270). Technical practice 164-171 also included with each 10 units or with each order. |
| M-164-71 | Tone-to-Pulse Converter; same as -70 but has Dial Pulse Release and time-out starting after first digit. Includes cable (-05), mounting bracket (-25), and installer's aid (164-271). Technical practice 164-171 also included with each 10 units or with each order. |
| M-164-72 | Tone-to-Pulse Converter; same as -70, with same accessories and documents except that mounting bracket (-23) is substituted for (-25). |
| M-164-73 | Tone-to-Pulse Converter; same as -71, with same accessories and documents except that mounting bracket (-23) is substituted for (-25). |

CABLE ASSEMBLIES

- | | |
|-----------|---|
| CA-164-05 | 24-inch, 6-wire Cable Assembly (included with basic units). |
| CA-164-06 | 48-inch, 6-wire Cable Assembly |
| CA-164-12 | 12-foot, 6-wire Cable Assembly |

MOUNTING HARDWARE

- | | |
|----------|--|
| M-164-25 | Standard Mounting Bracket, for mounting units on 3/4-inch or smaller frames, can be attached to top or bottom of unit or offset for clearance of equipment on frames (included with basic units -70 and -71). |
| M-164-23 | Mounting Bracket for mounting units on 1/4-inch or smaller frames where space limitations preclude use of standard bracket; can be attached to top or bottom of unit but not offset (included with basic units -72 and -73). |
| M-164-26 | Two Wall/Rack Mounting Brackets (two required for each M-164) |
| M-164-27 | Box Frame Adapter Plate for Automatic Electric type equipment frames. One required for every two M-164's. |

MISCELLANEOUS

- | | |
|-----------|--|
| M-164-22 | Loop-Through Plug. Maintains rotary dial service when cable is unplugged from the M-164 by connecting Tip and Ring IN and OUT pairs. |
| M-164-171 | Technical Practice (this document). One provided with each order. |

suggestions

Readers Suggestion Form

Any suggestions you can offer to improve the usefulness and accuracy of this practice for your application will be appreciated and duly considered.

In the block below, please indicate the practice number, issue number, and date shown in the upper right hand corner of the front page. Then write out your suggestions and other applicable information in the provided spaces. Finally, detach this sheet from the practice, fold as indicated, staple once, and mail it.

Thank you.

TEL TONE TECHNICAL PRACTICE		
	ISSUE	DATE

How do you use this practice?

- ☐ Product familiarization
☐ Installation
☐ Training
☐ Maintenance
☐ Other _____

Do you find this practice suitable for your needs?

- ☐ Yes ☐ No

Please check any specific criticism(s), give page number(s), and explain below.

- ☐ Clarification needed, page(s) _____
☐ Additional information needed, page(s) _____
☐ Information not required, page(s) _____
☐ Error(s), page(s) _____

COMMENTS _____

☐ Please have a representative call.

☐ Please send information on other Teltone products: _____

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COMPANY			
ADDRESS			
CITY	STATE	ZIP CODE	REFERENCE DRAWING OF INTERFACING EQUIPMENT
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