

TEL TONE*
M-911A COIN-FREE ADAPTER
STEP-BY-STEP SYSTEM

1. GENERAL

1.01 This section is a cover sheet for the TELTONE M-911A Coin-Free Adapter Technical Practice, Section 911-120. GAEL 1956 authorizes the use of this equipment as an alternate standard for the Pacific Company.

1.02 (Reserved for future use)

1.03 The TELTONE Model M-911A Adapter is rated STANDARD for use in 350, 355, 360, and No. 1 step-by-step (SXS) offices for the provision of Dial Tone First (DTF) with coin-free dialing (911, 611, 411, etc.) and *Touch-Tone*® services.

1.04 The Model M-911A is a solid-state device using microprocessor control logic to simulate a coin at the start of a call and allow 3-digit service codes, 0 +, 1 + and one or more 7-digit numbers as coin-free.

1.05 Due to the effects nonprecise dial tone may have on the coin-free adapter, it is necessary to *limit* their installation to offices equipped with precise dial tone equipment.

1.06 This adapter is compatible with existing coin box trunks (SD-31592 and SD-32539) and is installed between the line finder and coin box trunks on a one circuit card per trunk basis.

1.07 The Western Electric (WE) Coin Box Trunk SD-32539 with DTF option remains as an alternate standard for provision of DTF with coin-free dial service. If *Touch-Tone* service is required with this trunk, an external converter *must* be added.

1.08 *Use of the TELTONE M-911A Adapter does not remove the requirement for certain standard modifications of the central office equipment for DTF service.* Modification and new equipment

required are covered in EL 1484, EL 2299, EL 5961 and EL 6271. The latter EL provides updated information regarding conversion from coin first to DTF operation and includes an updated list of GL references.

1.09 Special Pacific Company wiring for SD-31592 or SD-32539 Coin Box Trunks is required for the TELTONE M-911A installation. The installer should check the office files for the latest issue of these drawings (PED 30022-10) before attempting to modify these trunks.

1.10 If corrections are required in the manufacturer's instruction, use Form E 3973-1PT as described in Section 000-010-901PT to process the correct information.

1.11 If equipment design and/or manufacturing problems should occur, refer to Section 010-700-011 PT for procedures on how to file an Engineering Complaint for General Trade Products (GTPs).

1.12 When revised instructions reflect changes due to modification of equipment, retain the superseded information until equipment is modified.

Note: Equipment *shall not* be modified without the approval of the Equipment Maintenance Engineer.

2. RECOMMENDATIONS FOR USE OF ALTERNATE STANDARDS

2.01 The following recommendations should be observed in the application of the alternate standard—WE Coin Box Trunk SD-32539 or the TELTONE M-911A Adapter.

2.02 If the majority of existing coin box trunks in the central office are SD-31592, use the

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SECTION 226-521-900PT

TELTONE M-911A Adapter with both types of coin box trunks SD-31592 and SD-32539 to provide DTF and *Touch-Tone*. Further additions of coin box trunks should be SD-31592 out of "C" stock for reuse in these offices. If the SD-31592 is not available, use the SD-32539 with Pacific Company modification and the TELTONE M-911A Adapter.

2.03 If the existing coin box trunks are all SD-32539, use the standard WE modifications required for DTF with coin-free dialing in these trunks. For trunk additions in these offices, continue installing these trunks with DTF options.

2.04 Economic analysis for other office trunk configurations will be the final determining factor.

3. TRAINING

3.01 A formal training package on this equipment is not contemplated as no repair work is to be performed on the circuit cards by the field forces.

3.02 Should a need for training develop, a request should be directed to the Engineering Staff Director—Switching Systems.

4. MAINTENANCE

4.01 Under no conditions are field repairs to be attempted. To do so renders the warranty null and void.

4.02 Installation, testing and troubleshooting procedures for the M-911A Adapter are included in the attached TELTONE Technical Practice.

4.03 The recommended quantity of maintenance spares for this equipment is 3% of the installed units per office without Control Supplies Center (CSC) repair spares. With CSC, 1% spares per office and a 1% spares (p004) located in CSC is recommended.

5. TEST EQUIPMENT

5.01 The handset described in GAEL 1933 may be used to test this equipment.

5.02 A test adapter, available from TELTONE allows connecting the handset to the M-911A circuit card.

6. ORDERING PROCEDURES

6.01 The Switching Engineer will order TELTONE equipment direct from the manufacturer:

TELTONE Corporation
10801—120th Avenue NE
Kirkland, WA 98033

Note: Delivery time is 45 days after receipt of order.

6.02 When ordering TELTONE equipment, use Purchase Order Form GTP 2 as specified in System Instruction (SI) 70, Section 2. Enter Master Agreement No. 74-82 on the Purchase Order. Send the blue copy of the Purchase Order as follows:

- For Northern California and Nevada—

RPO
1129 B Street, Room 207
Hayward, CA 94541

- For Southern California—

RPO
2420 Yates Avenue, Room 246
Commerce, CA 90040

Note: Refer to SI 72, Section 5, and the General Trade Products (GTP) Catalog for further information on purchasing GTP equipment.

7. REPAIR/RETURN

7.01 The TELTONE warranty is for 4 years from date of delivery. The warranty on repair units is for the remainder of the original warranty or 90 days, whichever is longer.

7.02 TELTONE provides a factory repair service on defective units in or out of warranty. Factory turnaround time is 10 working days for repairs.

Note: A flat rate charge of \$30.00 per unit will be made for units that require repair after the warranty has expired.

7.03 A TELTONE repair request card must be filled out and accompany each unit being returned. The unit being returned is shipped, transportation paid, direct to the manufacturer. (See 6.01 for address.)

Note: TELTONE repair cards can be obtained through your Sector Maintenance Engineering Staff.

8. EXCLUSIONS/REVISIONS

The following change applies to the attached manufacturer's instruction:

- Part 6, Table 4 (Page 19), Installation Checklist—superseded with Table 4 — M-911A Installation Checklist

1. Examine equipment for any physical damage. Special attention should be given to the connector contacts.
2. Mount the card file. Depending on the mounting location, it may be preferable to do the program strapping before mounting in frame.
3. Connect the battery and ground to the card file, battery goes to pin 2 and office ground to pin 11. Note that card files are prewired in groups of five.
4. Connect the reorder tone or recorded announcement start leads to pins 9 and 10, and the source tone/announcement to pins 13 and 15.
5. Connect the coin return voltage, -110 volts or -130 volts, to pin 25 for tip side application of voltage.

6. Connect the alarm system leads to pins 7 and 8.
7. Connect the answer supervision lead from the associated selector Ring to each adapter pin 21.
8. Connect ground (or pay-station mark in combined LF group) to pin 14 of each Adapter.
9. If the program strapping has not been done, do it now.
10. At this point, the Pacific Company modification of the coin box trunk SD-31592 or SD-32539 must be done along with connecting the M-911A into the circuitry. Proceed with Step 11.
11. Make the linefinder and associated coin box trunk busy. Connect the Tip, Ring, Sleeve, J1 and J2 leads as follows:
 - Linefinder Tip to pin 6
 - Linefinder Ring to pin 4
 - Linefinder Sleeve to pin 12
 - Coin Box Trunk Tip to pin 5
 - Coin Box Trunk Ring to pin 3
 - Coin Box Trunk Sleeve to pin 1
 - J1 Lead to pin 18
 - J2 Lead to pin 19
12. Examine the card contacts.
13. Insert circuit card(s).
14. Test the installation as described in Part 7, Exercise Installation, of the manufacturer's instruction.

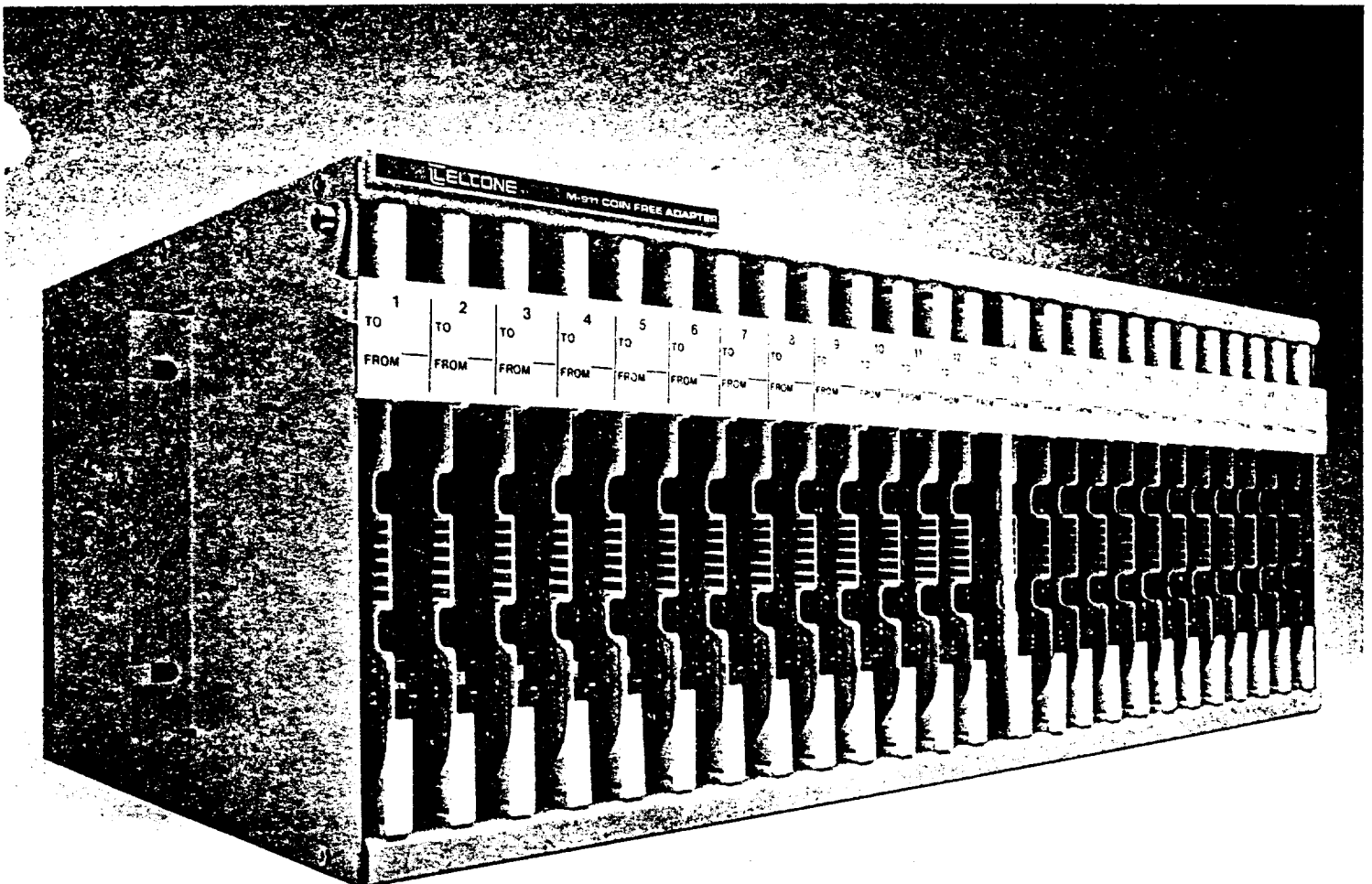
Attachment:

TELTONE Technical Practice, October 1979 Addendum to Issue 1 and Section 911-120, Issue 1, August 1979

TELONE®

**M-911
Coin-Free
Adapter**

**for
Step-by-Step
Central
Offices**



**M-911 COIN-FREE ADAPTER
 FOR STEP-BY-STEP CENTRAL OFFICES**

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1. GENERAL

1.01 This technical practice provides descriptions, installation instructions, testing procedures, specifications, and ordering information for the TELTONE® M-911-15 Coin-Free Trunk Adapter for step-by-step central offices.

1.02 Whenever this practice is reissued, the reason for reissue will be listed in this paragraph.

1.03 This technical practice (911-120) applies to all M-911-15 circuit cards numbered 201-00427-01 or higher. Information applicable to M-911-15 circuit cards numbered 201-00340-XX is found in TELTONE Technical Practice 911-110.

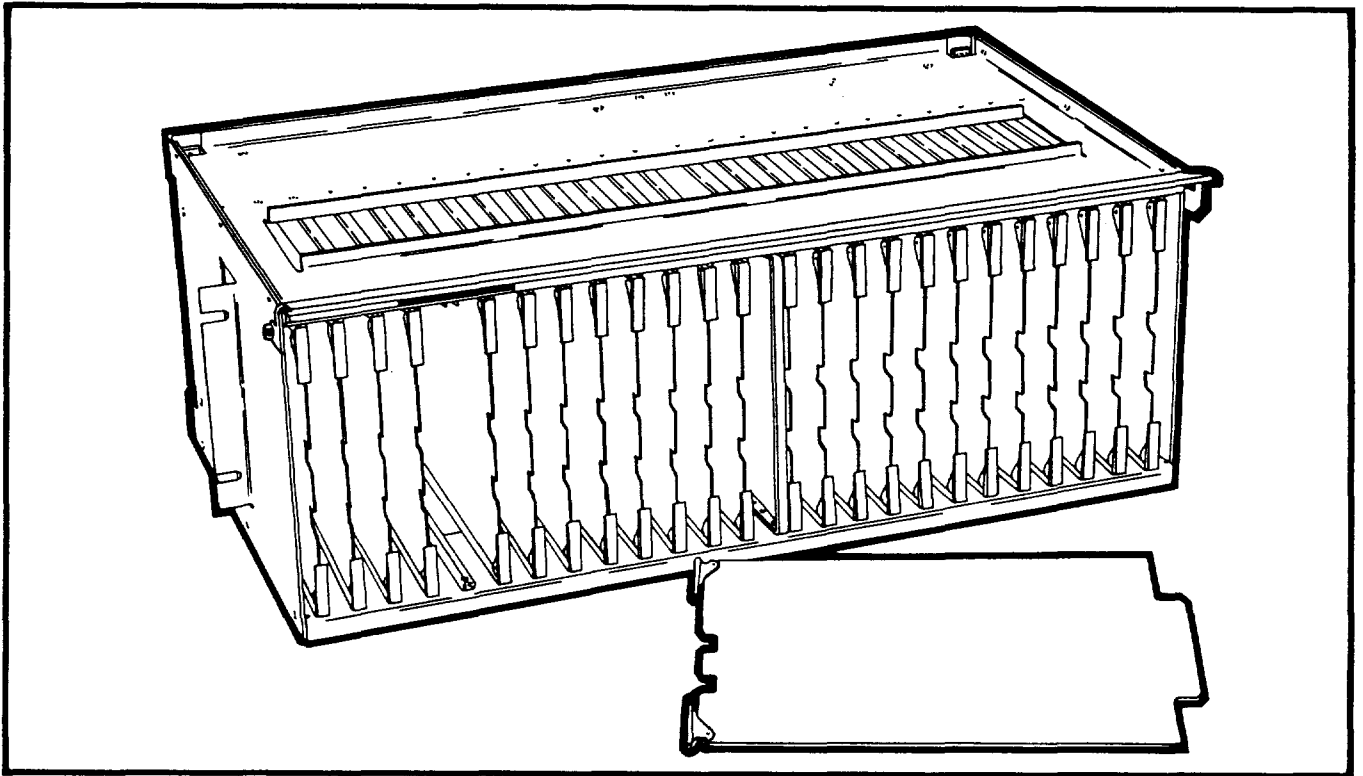


Figure 1 M-911 and the 23-Inch Card File

2. CONCEPT

2.01 The M-911 is a microprocessor-based adapter card which permits coin-free access to programmed emergency/service numbers from both rotary dial and DTMF pay stations. The Adapter also provides tone-to-pulse conversion for all calls, pay-station and private, on its associated trunk. Installation between the linefinder and the pay-station repeater (coin trunk) is standard; dedicated lines may be used when applicable. Features of the M-911 Coin-Free Adapter include:

- Existing coin trunk or repeater capability.
- Tone and rotary operation.
- Coin simulation to coin-trunk while analyzing dialed digits.
- Multi-slot or single-slot pay station compatibility.
- All service codes up to three digits coin-free.
- Coin-free 0+, 1+, and seven-digit-number programming.
- "J" relay circuit compatibility.
- Mixed or dedicated line group interfacing.
- Dropped coin return.
- Separate LED indicators for input (IN) and outpulsing functions (OUT).
- LED indicator (ALARM) for on-card loss of voltage.
- Automatic busy indication to linefinder when the Adapter is removed from the card file.

3. GENERAL DESCRIPTION

3.01 One M-911 circuit card is utilized per trunk. Each card is wired between the linefinder and the existing pay-station repeater as shown in Figure 2. The M-911 can be used either in line groups devoted to pay stations or in line groups with both pay stations and standard subscriber lines. Coin-free dialing for both rotary and DTMF pay stations is provided, as well as tone-to-pulse conversion for all calls on the trunk. This conversion process includes detecting as digits the two-of-seven frequencies signals shown in Figure 3, and resending the digits as a series of break pulses with the proper interdigital times.

3.02 The M-911 circuit card is 6.84 inches (17.4 cm) high by 10.52 inches (26.7 cm) deep. As shown in Figure 4, the M-911 has three red LED status indicators. The lower indicator, labeled OUT, lights while the adapter holds up the repeater during line split. The center indicator, labeled IN, lights while the adapter is detecting loop current flow through the trunk. The upper indicator, labeled ALARM, lights and remains lighted if loss of regulator voltage or microprocessor self-test failure occurs on the circuit card. The BUSY switch applies ground to the linefinder Sleeve lead when the handle is moved up. The connector contacts labeled J2 on the front edge of the card are for the TELTONE Test Adapter which allows connecting a butt-in test phone to the card.

A. Coin-Free Numbers

3.03 The M-911 provides coin-free dialing of any three-digit service code and 0 for the operator. The adapter can also be programmed (as described in Part 5 of this practice), in the field, to allow calls with 0 or 1 as the first digit to be dialed coin-free. Another program allows one or more seven-digit number(s) to be dialed coin-free. These programs are selected by strapping certain connector pins at each Adapter location. This connector strapping allows changing cards without reprogramming. The Adapter analyzes and repeats all the digits to prevent fraud. If a coin has not been deposited, and the number is unauthorized by programming,

the call will be blocked and either reorder tone or a recorded announcement will be connected through to the pay station.

B. Free-Call Operation

3.04 The Adapter recognizes pay-station calls by the presence of ground on the pay-station mark lead. If this ground is not present the Adapter resends all the received digits. The Adapter also resends digits after first digits of 1 or 0, if those programs are strapped.

C. Pay-Station Call Operation

3.05 The Adapter simulates the presence of a coin to the pay-station repeater at the start of a call from a pay station. Each digit dialed is then checked against the programs. If no coin indication is present or the succeeding digits violate the programming, the call will be restricted. If a coin indication is present, the Adapter continues to resend the received digits to complete the call.

D. Directorized Office Programs

3.06 The pay station is tested for coin deposit after the seventh digit when tone digits are received. Unless programmed otherwise, the Adapter splits the line after the tones end in preparation for resending the digit(s) as break pulses. Two programs are provided for directorized offices. One blocks the first tone digit for offices with dial pulse release. The other blocks all tone digits for offices without dial pulse release. A third program provides for offices which absorb the first three digits. In this program, the Adapter resends the first three digits and inhibits outpulsing until the seventh digit has been received.

E. End-to-End Signaling

3.07 If a tone signal * or # is received before the coin test, the call will be restricted. After the coin test, or if the Adapter is in free-call operation, an * or # signal makes the Adapter transparent to any succeeding signals to allow end-to-end signaling. Mixed rotary and tone signaling will

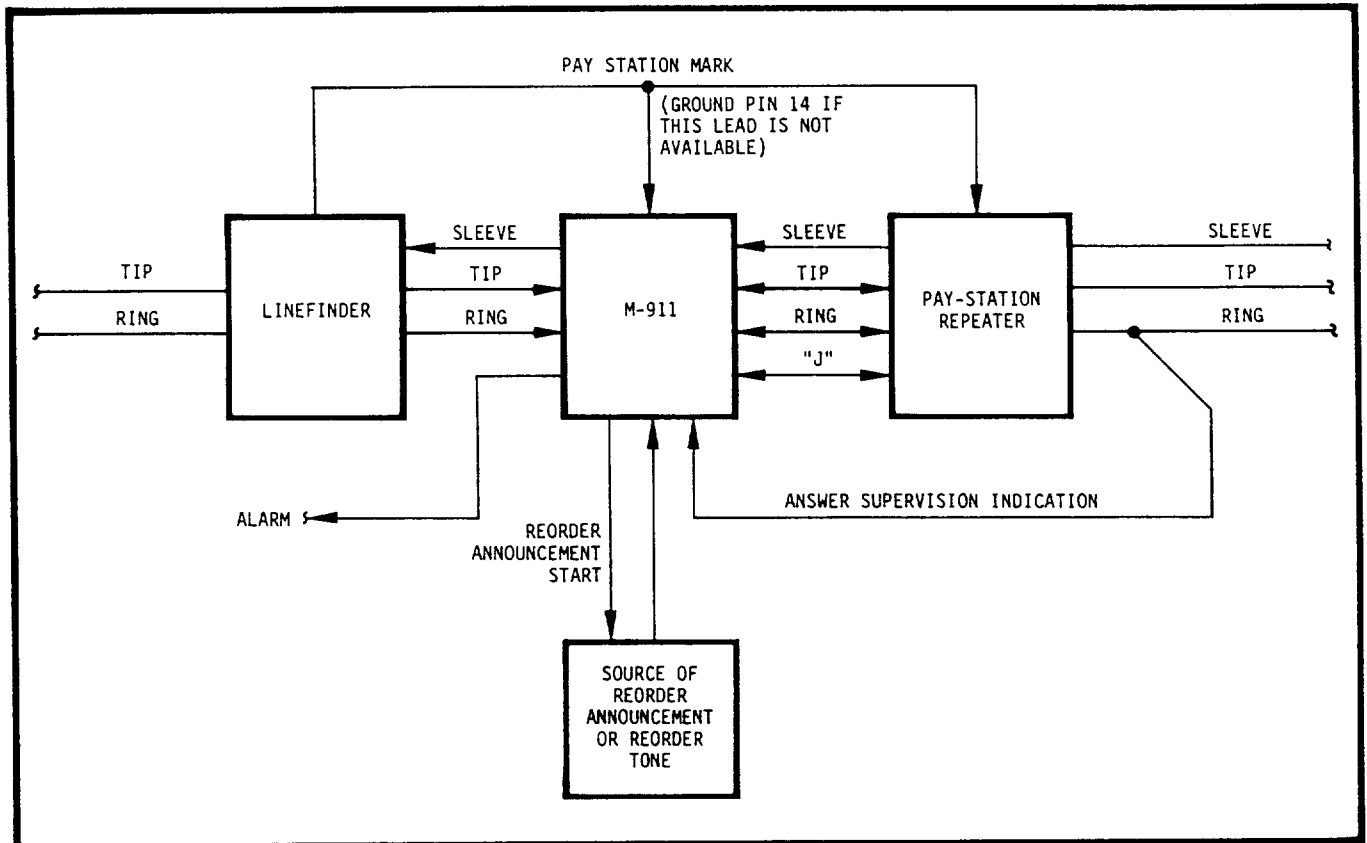


Figure 2 System Diagram

cause the call to be restricted if the Adapter is not in the free-call mode.

F. Alarm Function

3.08 The alarm function of the Adapter connects the two alarm system connection points together and applies ground to busy the linefinder Sleeve lead when an alarm condition exists. This condition is shown by a lighted Alarm indicator (upper red LED).

G. "J" Relay Circuit

3.09 The "J" circuit of the M-911 is used with certain Bell System single-slot pay stations on TSPS trunks. This option consists of a single contact, normally-closed relay which operates for the duration of the call whenever 0 or 1 is received as the first digit of the call.

H. Card Files

3.10 Three sizes of card files with connectors installed, are available for the

M-911 (see Figure 5). The card file which mounts onto a 23-inch relay rack can hold a maximum of 25 cards. The card file which mounts onto a 19-inch relay rack can hold a maximum of 20 circuit cards. The card file which mounts onto a rack or wall can hold a maximum of 5 cards. Each connector includes a shorting contact pair which connects ground to the linefinder Sleeve lead when the card is removed. This performs the automatic make-busy function. Card files include a wire tracing attachment allowing the specific equipment connected to each card to be identified from the card location.

I. Test Adapter

3.11 A Test Adapter, shown in Figure 6, is available to allow connecting a butt-in test telephone to the contacts (J2) at the front edge of the M-911 circuit card. The Tip and Ring leads from both the pay-station repeater and the linefinder are available at this connector and are brought out to Strowger-type contacts at the front of the

		DTMF CODE		
		DIGIT	LOW FREQUENCY	HIGH FREQUENCY
GROUP OF LOW FREQUENCIES	GROUP OF HIGH FREQUENCIES			
		1209	1336	1477
	697	1	ABC 2	DEF 3
	770	GHI 4	JKL 5	MNO 6
	852	PRS 7	TUV 8	WXY 9
	941	*	0	#

Figure 3 Tone Buttons and DTMF Code

Test Adapter. When the switch on the Test Adapter is in the ON position (up), a coin deposit simulation is applied to the linefinder Tip lead.

3.12 A storage hook, which can be secured to the relay rack with one of the bolts securing the card file, is provided with the Test Adapter. This arrangement provides a convenient and safe location for the Test Adapter when it is not in use.

4. FUNCTIONAL DESCRIPTION

4.01 The following descriptions of the M-911 operational sequence are provided to assist evaluation and troubleshooting. The Simplified Block Diagram, Figure 7, displays the connections of the circuit card to the interfacing equipment. Figure 8 displays the sequence of operation.

A. Free-Call Mode

4.02 In the free-call mode, the Adapter resends rotary digits or provides tone-

to-pulse conversion for tone digits. Up to 30 consecutively signaled digits may be stored and outpulsed. No coin check will be made and the Adapter will not restrict the call. The Adapter can be made transparent by signaling an * or #.

B. Pay-Station Call Sequence

4.03 If ground is present on the pay-station mark input, microprocessor logic applies the Battery Feed circuit of the M-911 to maintain loop current to the calling station. Relays K5 and K8 split the line. Loop Hold is applied to the pay station repeater. Indicators IN and OUT light to show line status.

4.04 The Coin Box Unlock circuit, shown in Figure 7, applies a 1500 ohm resistance from repeater Tip and Ring leads to ground for 125 milliseconds (typical), simulating the presence of a coin to the repeater. The line is then restored by releasing all operated relays and dial tone is sent through to the pay station. Only the indicator labeled IN remains lighted.

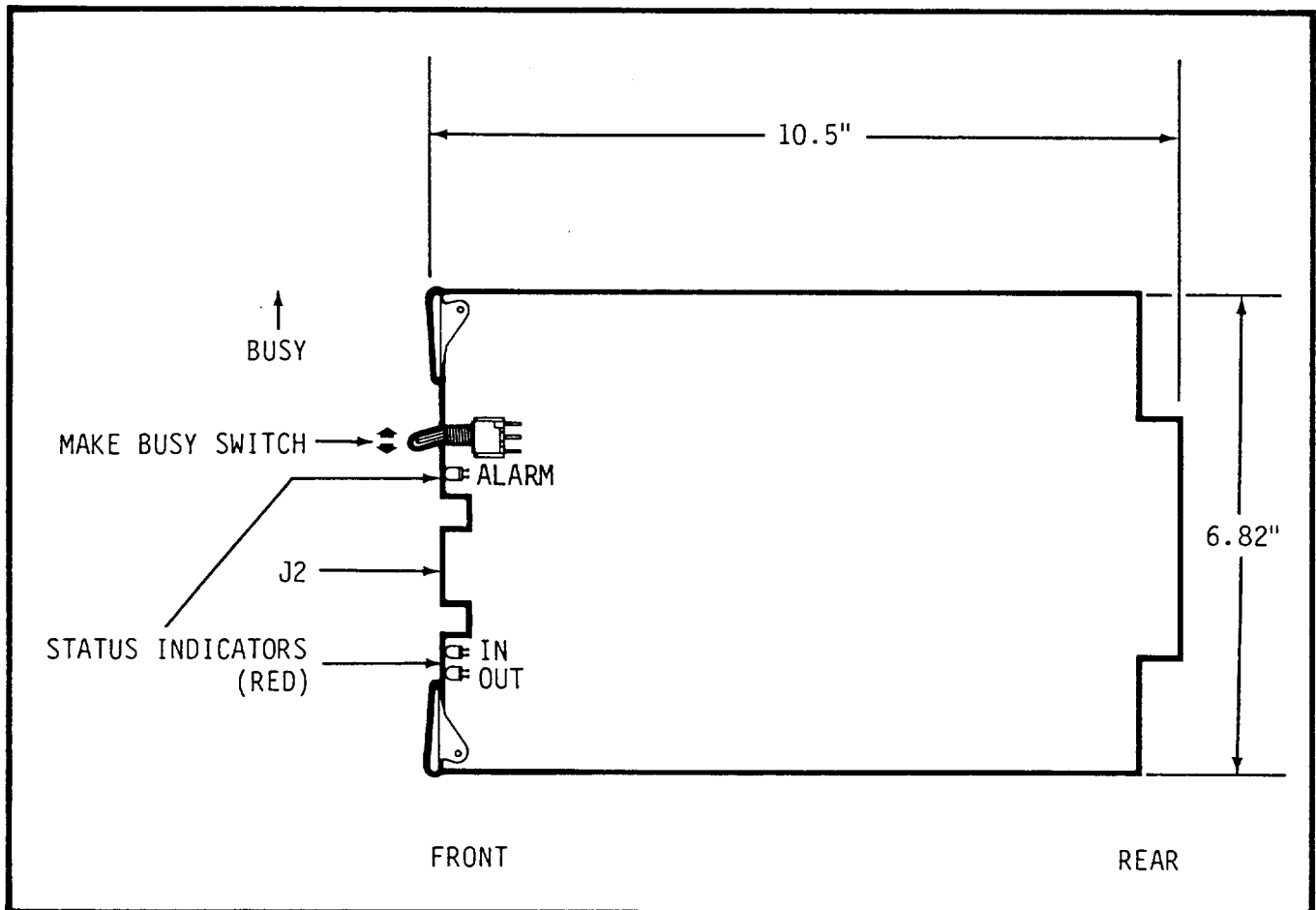


Figure 4 M-911 Circuit Card

C. Rotary Digit Response

4.05 The appearance of a rotary digit will cause the line to be immediately split upon recognition of a break in loop current which may be a valid digit. Relays K5 and K8 are operated as described earlier. Both IN and OUT indicators are lighted.

4.06 The break in loop current is timed by the Adapter for validation as a dial pulse. If a break is longer than 30 milliseconds, it is counted as a dial pulse after loop current has returned for approximately 9 milliseconds. The indicator labeled IN blinks as each break is detected. Each break pulse of the rotary dialed digit is counted in this manner until loop current persists for at least 100 milliseconds into the interdigital time. The value of the digit is then forwarded to the microprocessor for

program comparison and outpulsing. See Figure 7.

4.07 If a loop current break shorter than 30 milliseconds occurs, the line is restored and the Adapter program is not affected. If a break lasts long enough to be considered an on-hook condition (300 milliseconds), the line is restored. If loop current then returns before the Sleeve lead ground is removed, the line remains restored until a digit is signaled, at which time the call is restricted. If instead another similar break occurs, the line remains split until the Sleeve lead ground is removed. There is no reorder tone or recorded announcement.

D. Tone Digit Response

4.08 When the first digit is a tone digit, the line is not split until tone signaling ends and the outpulsing process starts. From

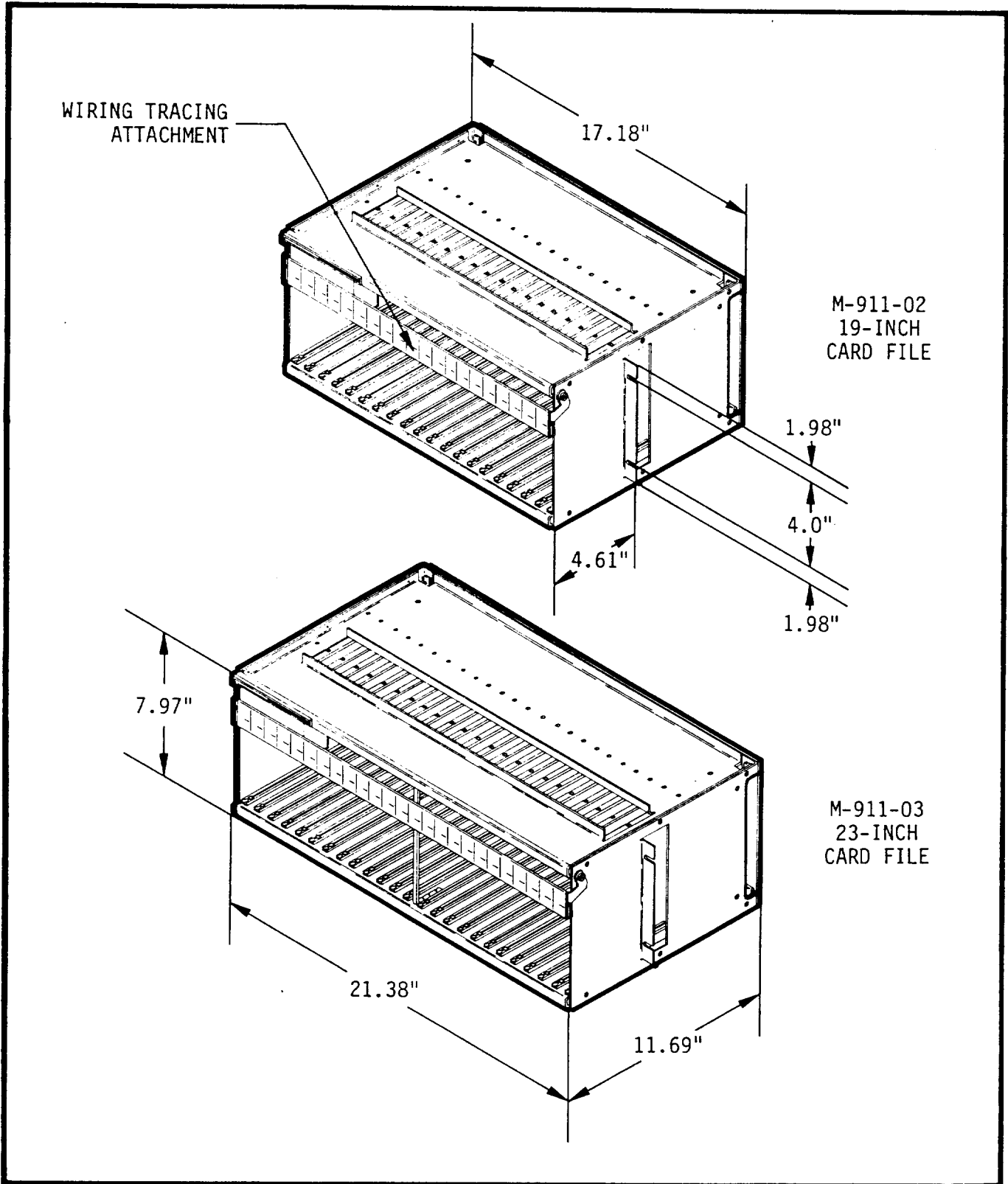


Figure 5 5-Card Rack/Wall Mount Card File and 19-Inch and 23-Inch Card Files with Tracing Attachments (Sheet 1 of 2)

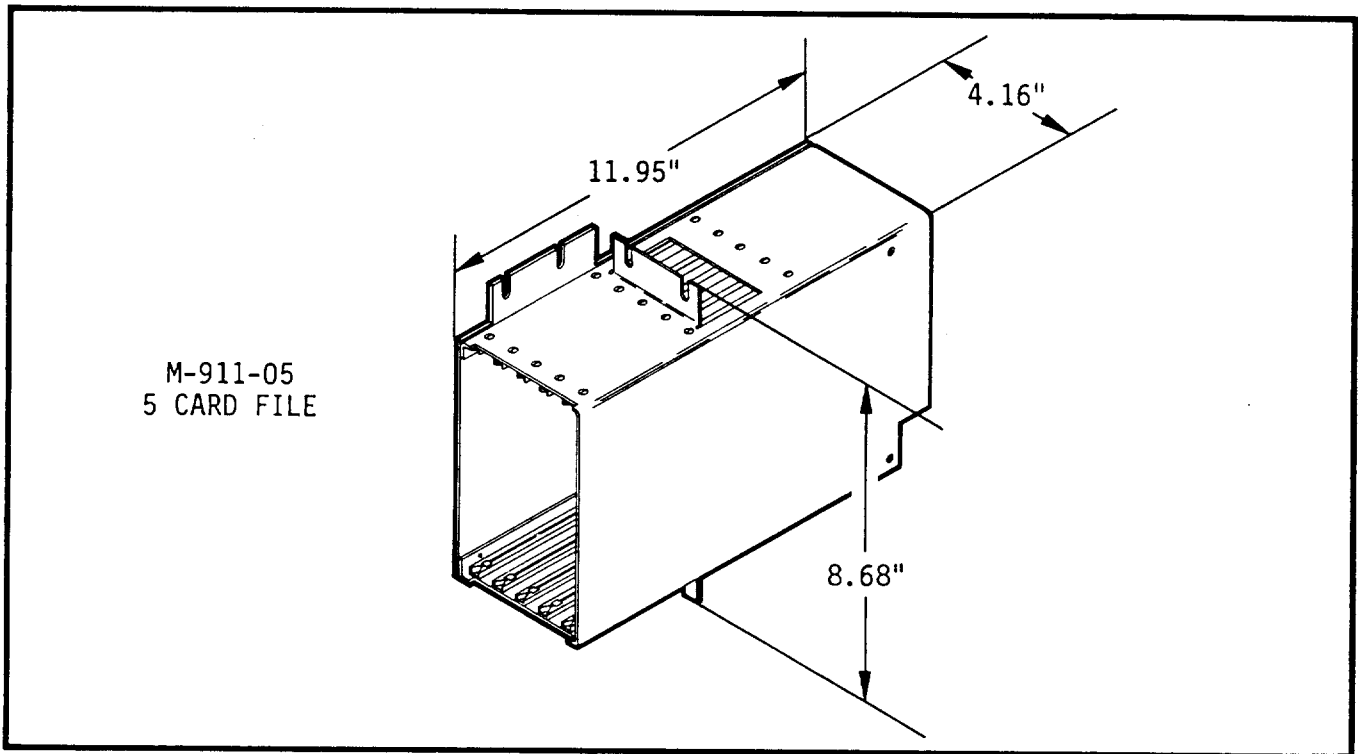


Figure 5 5-Card Rack/Wall Mount Card File and 19-Inch and 23-Inch Card Files with Tracing Attachments (Sheet 2 of 2)

this point the tone digit outputting process is the same as for rotary digits. If either of the two directorized office programs are used the line will be split as soon as the tones are detected. The program for offices with dial pulse release does this early split only for the first digit. The program for directorized offices without dial pulse release does the early split for all the allowed tone digits in the call.

E. Outputting

4.09 The digit is outputted by the Solid State Pulser. The indicator labeled OUT blinks as each break pulse is generated. The timing of the outputted digit is controlled by the Adapter at 10 pulses per second with a 62.5 percent break and an interdigital time of 840 milliseconds. This pulse regeneration enhances operation in offices where line capacitance, line imbalance, or rotary dial variations appreciably degrade the incoming pulses. The line is held split during the interdigital time after each digit except if 0 is received as the first digit. In this case the line is restored one make-

interval after the last break. Succeeding digits can be detected and processed while outputting continues, unless the Adapter restricts the call.

F. Restrict Sequence

4.10 When the Adapter restricts the call, Battery Feed is applied and relays K4, K5, K6, and K8 are operated. Loop Hold is inhibited so the forward equipment drops and can be used for other calls. The indicator labeled OUT goes dark. To hold the linefinder, the Adapter applies ground to the linefinder Sleeve lead.

4.11 Relays K5 and K8 perform the same functions as during line split. Relay K6 connects the reorder tone or reorder announcement source from Op Amp to Tip through battery feed and provides a contact make, if required, to start the recorded announcement. These circuits remain operated until the calling station goes on-hook and the loop current indication ceases. The indicator labeled IN then goes dark.

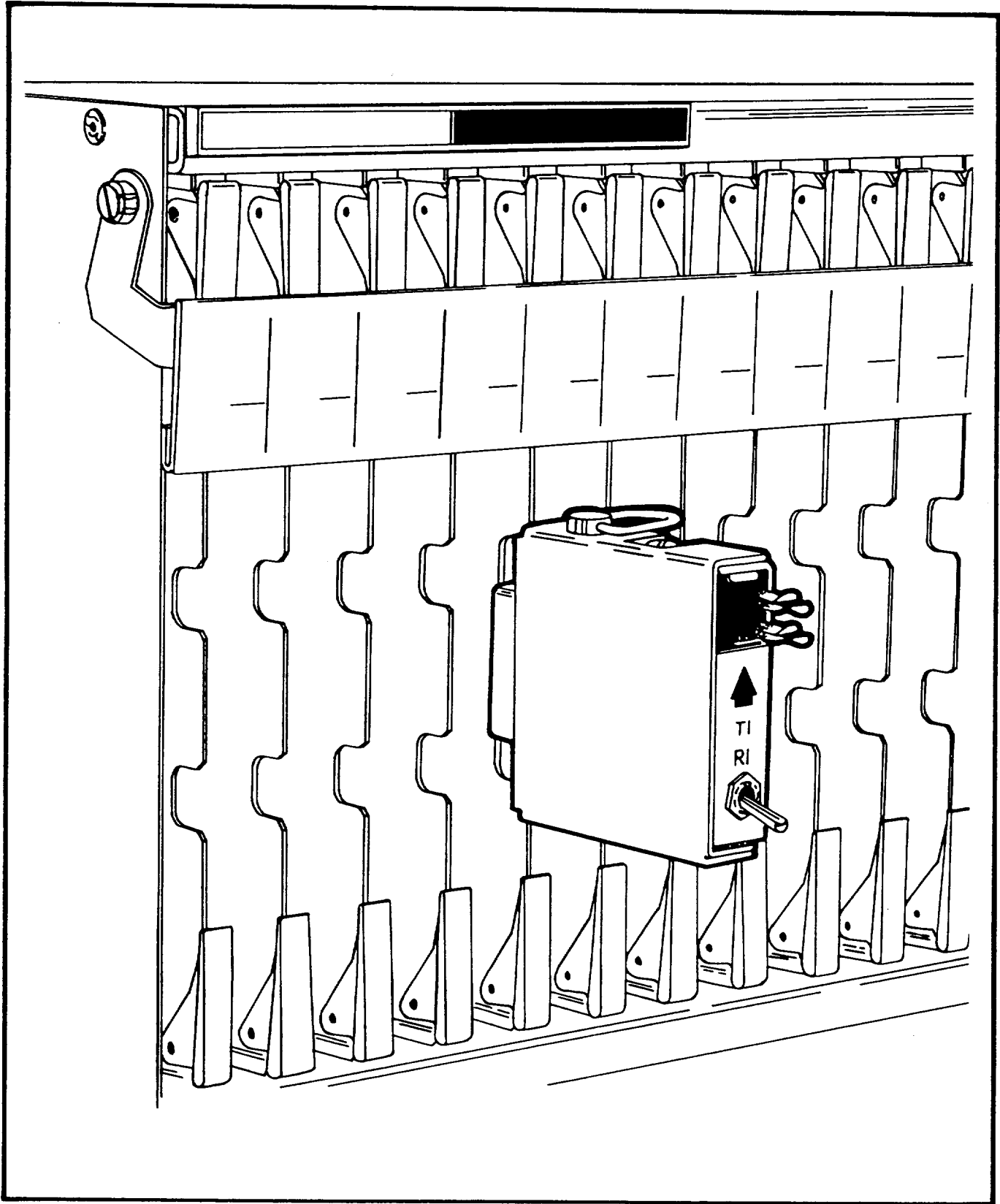


Figure 6 M-911-04 Test Adapter on Circuit Card

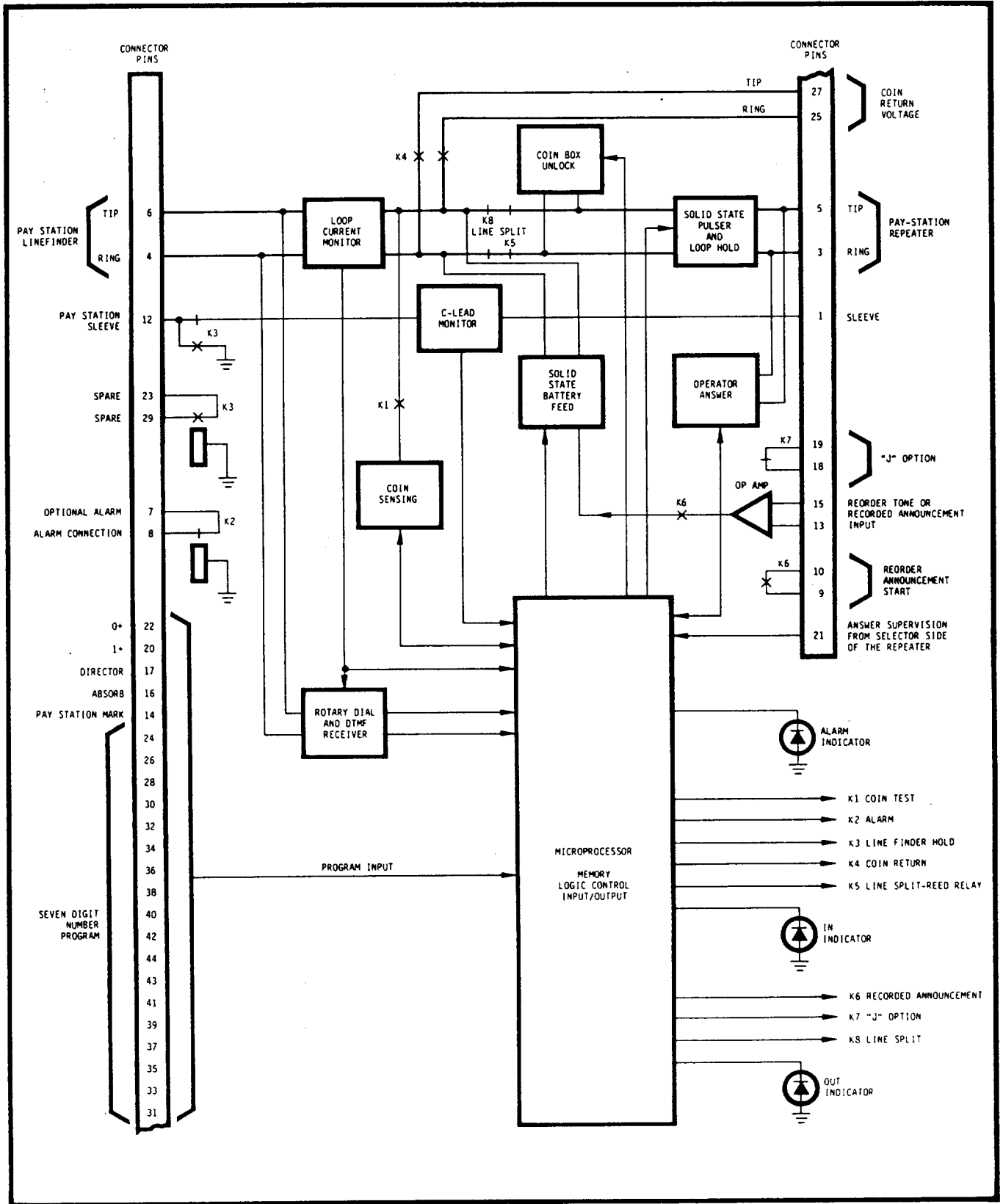


Figure 7 Simplified Block Diagram

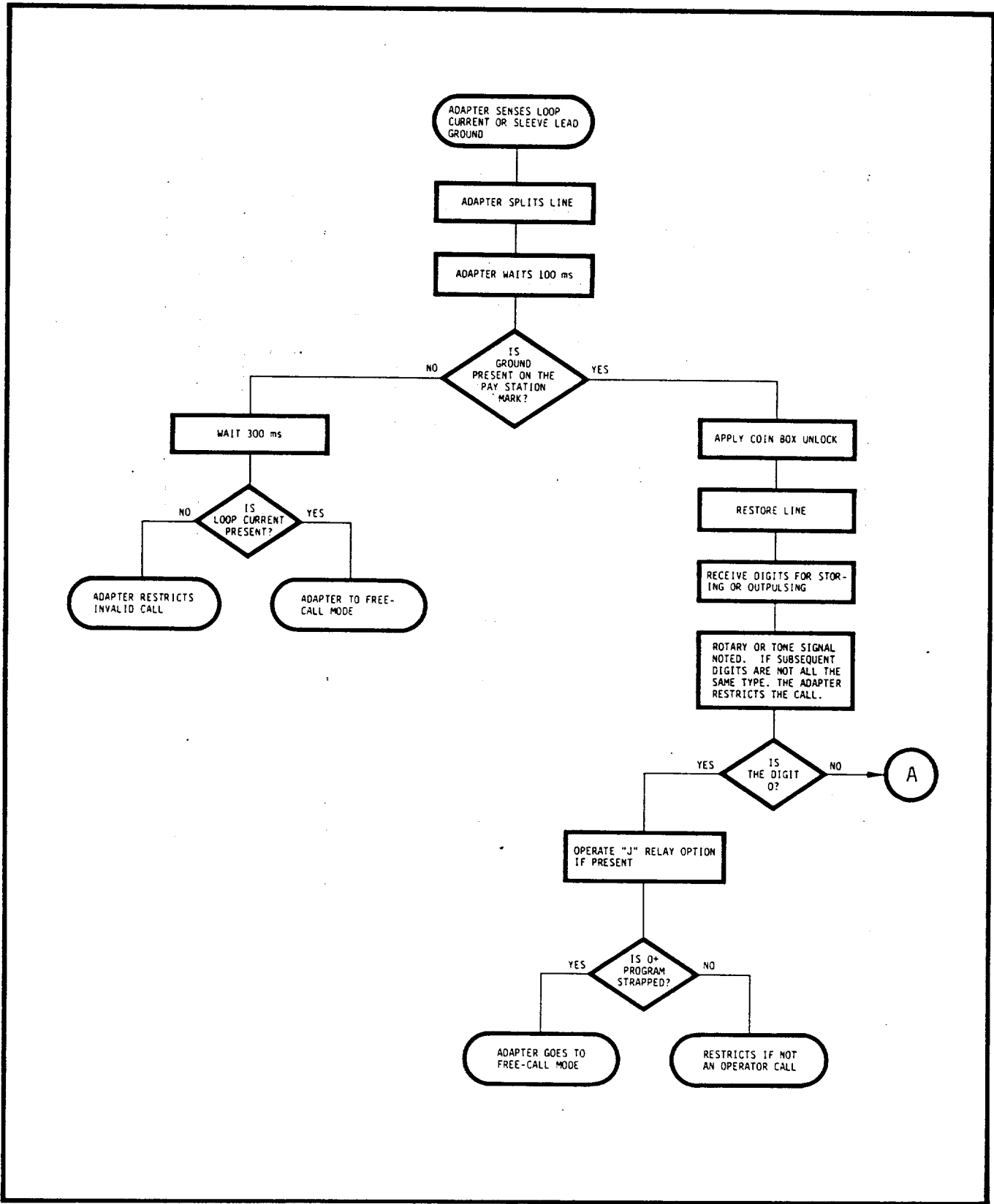


Figure 8 Sequence Flow Chart (Sheet 1 of 2)

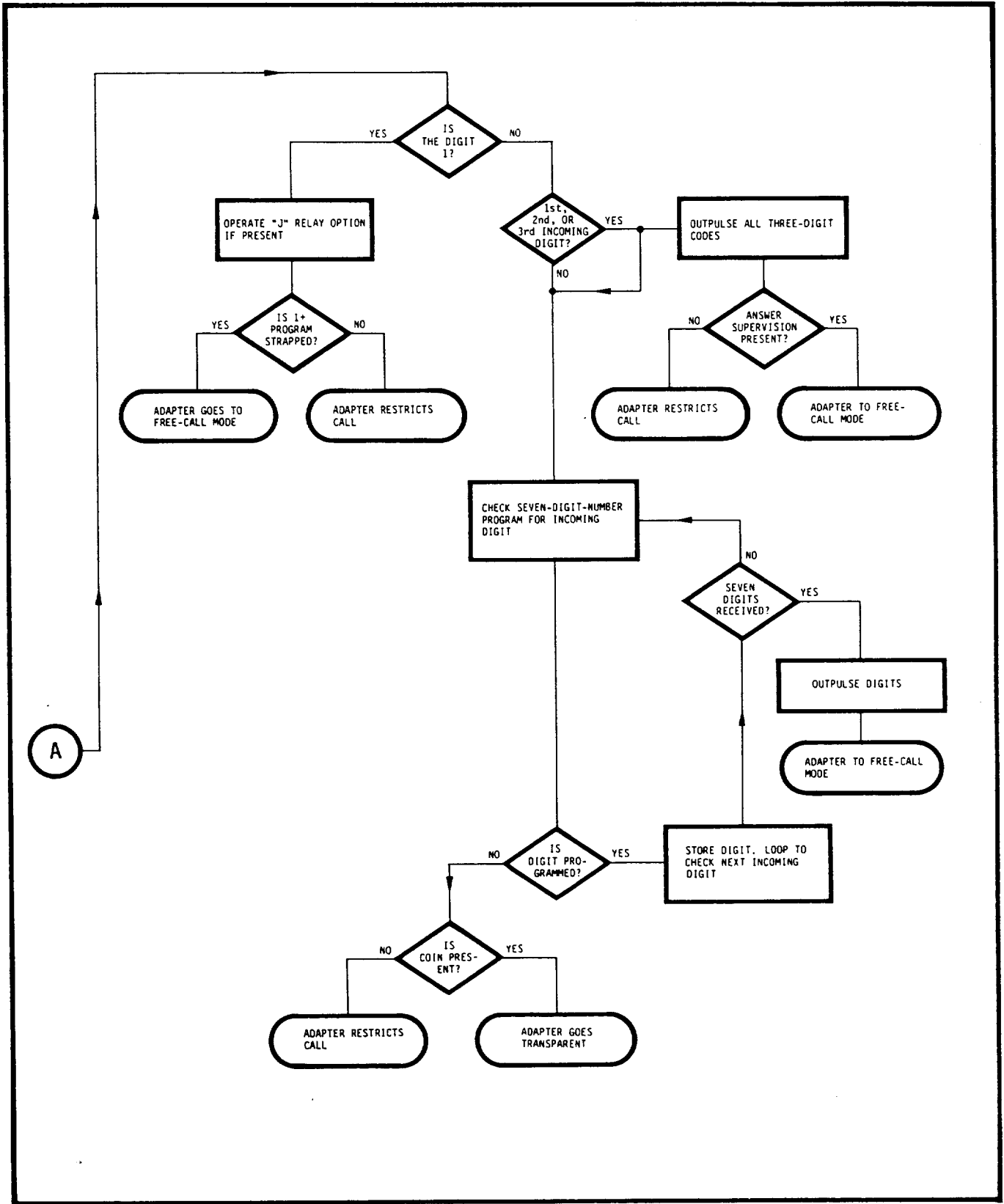


Figure 8 Sequence Flow Chart (Sheet 2 of 2)

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4.12 After loop current has been absent for 300 milliseconds, the Adapter operates relay K4 to apply -110 volts or -130 volts to the Tip side of the line from the linefinder for at least 450 milliseconds. This returns any coins that have been deposited. The line is then restored by the microprocessor.

G. Program for First Digit

4.13 If the Adapter is not yet in the free-call mode the microprocessor, having outpulsed the first digit, will note what digit value was signaled and whether it was rotary or tone generated. All succeeding digits must be the same type, rotary or tone, or the Adapter will restrict the call. If rotary digits are used, any series of more than ten rotary breaks will cause the call to be restricted. If tone digits are used and an * or # signal is received before either a coin check has been made or the Adapter has gone to the free-call mode, the call will be restricted. If a coin check has been made or the Adapter is in the free-call mode, an * or # signal will cause the Adapter to become transparent after any preceding digits have been outpulsed.

H. Answer Supervision

4.14 The answer supervision indication from the Ring lead at the selector side of the repeater will cause the Adapter to either restrict the call or become transparent to all signals on the line until Sleeve lead ground is removed. If the Adapter is in the free-call mode it becomes transparent when answer supervision is detected. If the Adapter is not in the free-call mode and answer supervision appears before the coin check has been made but after four digits have been received, the Adapter checks for presence of a coin. The call is restricted if no coin is present. The Adapter becomes transparent if a coin is present.

I. Supervision Signals

4.15 The Adapter is transparent to coin collect and coin return voltages except when the line is split. The Adapter is transparent to ringing voltage, dry circuit conditions, and reverse battery signaling at all times. If the line is split when a dry

circuit or reverse battery condition is detected, the line will be restored in 100 milliseconds on the assumption that the call was placed to the operator. Detection of these Operator Answer functions, including coin signaling, nullifies detection of loop current loss.

5. PROGRAM STRAPPING

5.01 The M-911 provides coin-free access to the operator and allows any three-digit code to be signaled coin-free without optional programming. Additional programs are selected by wire wrapping straps between the connector pins at each M-911. This connector strapping permits changing circuit cards without reprogramming. See Figure 9.

5.02 There are six programs which can be enabled with wire-wrapped straps on the connector: coin-free 0+ programming, coin-free 1+ programming, coin-free programming for one or more seven-digit number(s) and three office programs. The three office programs are mutually exclusive.

A. Office Programs

5.03 The **digit absorption program** can be used when there are no tone receivers beyond the coin trunk. In this program, the first three DTMF digits are outpulsed as soon as they are received. Succeeding digits are stored in the M-911 until a total of seven have been received. If a coin has been deposited, the last four digits are then outpulsed. If this program is desired, pin 16 of the connector is strapped to ground (pin 11) and pin 17 must be left open. See Table 1.

5.04 When the **program for directorized offices with dial pulse release** is used, the M-911 blocks the first DTMF digit by splitting the line upon initial detection of a tone. The outpulsed digit then activates the dial pulse release of the office equipment. If this program is desired, both pins 16 and 17 of the connector should be strapped to ground (pin 11). See Table 1.

5.05 When the **program for directorized offices without dial pulse release** is used, the M-911 blocks the tones of every

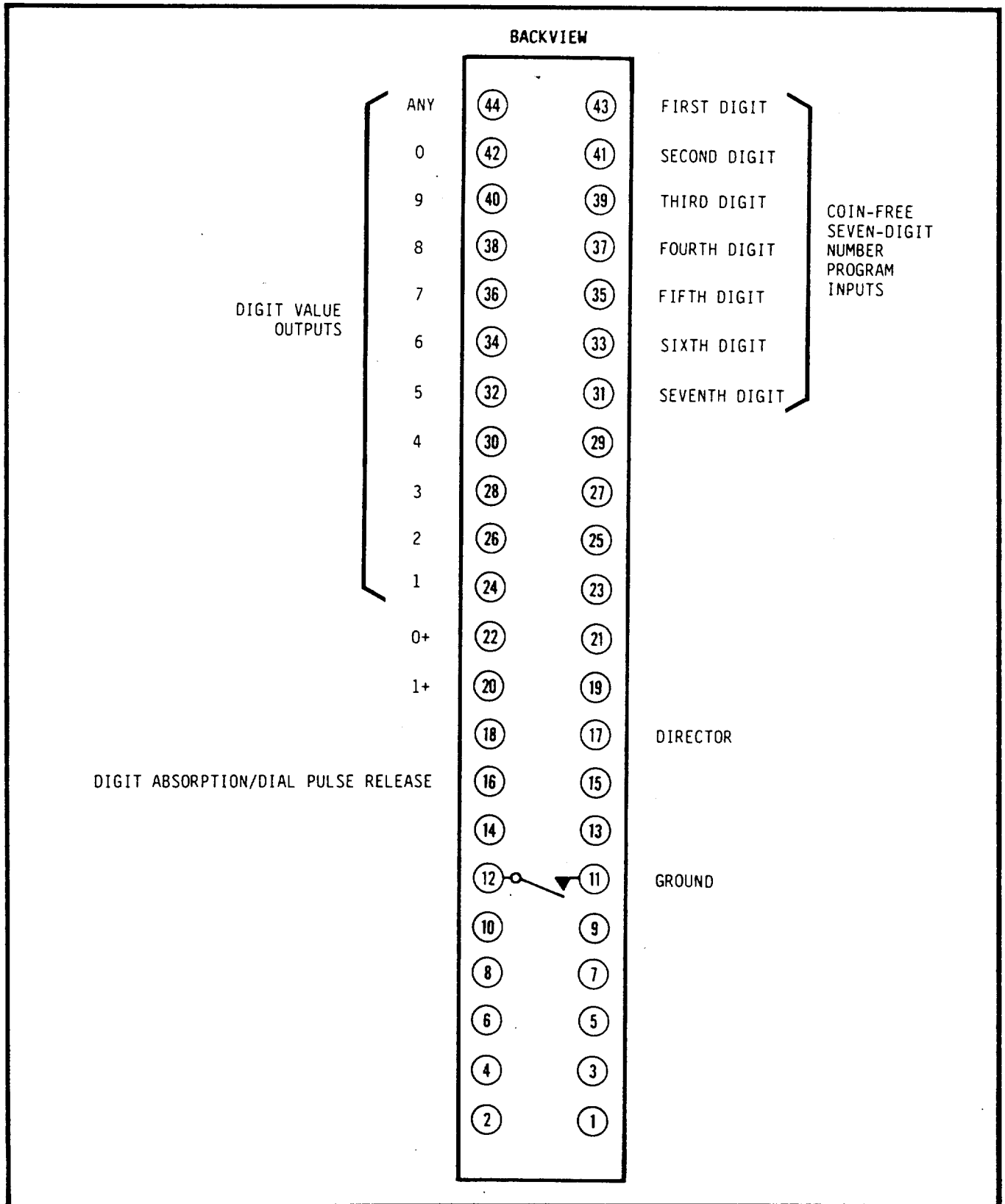


Figure 9 Program Connector Pins

Table 1 Office Program Selection

Director (pin 17)	Digit Absorption Dial Pulse Release (pin 16)	OFFICE DESCRIPTION
OPEN	OPEN	No Digit Absorption; Non-Directorized
OPEN	GROUND	Digit Absorption; Non-Directorized
GROUND	OPEN	All Digits Blocked; Directorized
GROUND	GROUND	First Digit Only Blocked; Directorized

Note: GROUND indicates a wire wrap connection to Pin 11 (ground).

Table 2 Selection For 0+ and 1+ Programs

Pin 22	Pin 20	CALL DESCRIPTION
GROUND	OPEN	Calls with 0 as first digit are coin-free (0+)
OPEN	OPEN	Calls with 0 or 1 as first digit are pay calls
OPEN	GROUND	Calls with 1 as first digit are coin-free (1+)
GROUND	GROUND	Calls with 0 or 1 as first digit are coin-free (0+ and 1+)

Note: GROUND indicates a wire wrap connection to Pin 11 (ground).

digit from reaching the forward equipment. If this program is desired, pin 17 of the connector is strapped to ground (pin 11). Pin 16 must be left open. See Table 1.

B. 0+ Program

5.06 If calls with 0 as the first digit are to be dialed coin-free, pin 22 of the connector should be strapped to ground (pin 11). See Table 2.

C. 1+ Program

5.07 If calls with 1 as the first digit are to be dialed coin-free, pin 20 of the

connector should be strapped to ground (pin 11). See Table 2.

D. Seven-Digit Number Program

5.08 One particular seven-digit number may be programmed as coin-free. The output pins for the value of each digit are strapped to the input pins in the sequence of the digits in the number to be dialed. The first seven pins at the top of the right hand row are the inputs for this program, first digit at the top, as shown in Figure 10. The digit value output pins are at the top of the left hand row.

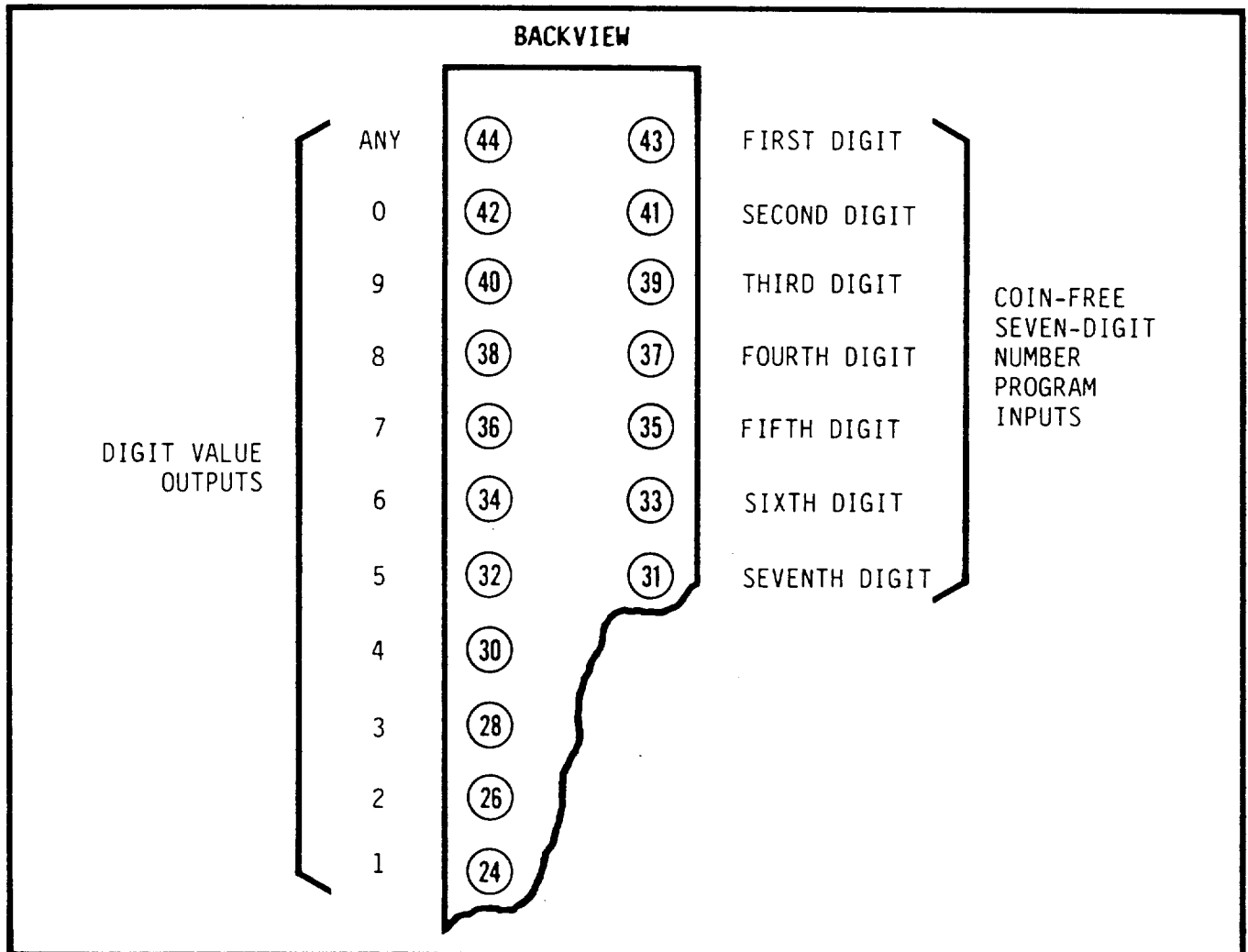


Figure 10 Seven-Digit-Number Program Pins

5.09 The digit value pin of the first digit is strapped to pin 43, the second digit is strapped to pin 41, the third to pin 39 and so forth until all seven digits of the number are strapped. As an example, Table 3 lists the wire straps to make the number 827-9626 coin-free.

Caution: Do not connect a program INPUT pin to more than ONE program OUTPUT pin. More than one wire-wrap strap made to a particular number input pin may result in service interruption.

5.10 Use of the ANY (value) pin allows programming variations of the seven-digit number to be coin-free. Pin 44 at the top of the left hand row of pins is the

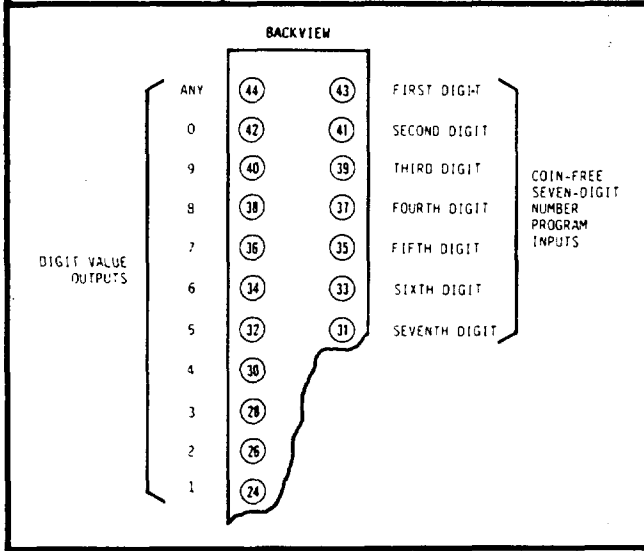
ANY pin. A typical use of this feature is to strap the first three digits for the exchange prefix of the operating company's Centrex, and to strap pin 44 to pins 37, 35, 33, and 31. This strapping allows all calls to the company prefix to be coin-free.

6. INSTALLATION

6.01 Before installation of the M-911 is begun, the equipment with which it will be operating should be tested for proper operation. Particularly, the relays in the pay-station repeater should be adjusted as described in the applicable maintenance practice. Table 4 provides a checklist of the installation steps for each M-911 circuit card.

Table 3 Sample Seven-Digit-Number Strapping

Sample strapping to make 827-9626 coin free	
DIGIT	STRAPS
8	strap pin 38 to pin 43
2	strap pin 26 to pin 41
7	strap pin 36 to pin 39
9	strap pin 40 to pin 37
6	strap pin 34 to pin 35
2	strap pin 26 to pin 33
6	strap pin 34 to pin 31



6.02 Examine all the items received to assure they have not been damaged in transit. The circuit card part number is stamped on the circuit side of the card and should match the packing list and Table 6.

A. Cautions

6.03 Circuit cards shipped individually are packed in electrically conductive bags to protect MOSFET components on the cards from static electricity. During and after removal from the bags, handle the cards by the edges or the front panel, and avoid touching circuit traces or components. This will minimize any possibility of damage to components from static electricity built up on the body of the installer. Should a circuit card require returning, it should be placed in a bag if available.

B. Wiring Procedures

6.04 Recommended procedure is to wire one Adapter first and test it. This procedure avoids repeated mistakes. Do not place the linefinder into service until the Adapter installation has been tested. To minimize down time, do as much wiring as possible (up to paragraph 6.26) before the linefinder is made busy. This wiring can be completed for all Adapters to be installed before cutover is begun. The usual procedure when several Adapters are wired at once is to maintain each linefinder busied out until the installation of each associated Adapter has been exercised as described in Part 7 of this practice. This procedure is practical when the Adapters are cut over in groups of five to match the fusing arrangement.

6.05 It may be desired to wire the entire installation, insert the Adapter cards, and put the lines back into service before individually testing the Adapters. If this situation exists, recommended procedure is as follows: Do not install the supply fuses of the Adapters. The linefinder Sleeve lead should be temporarily jumpered from pin 12 to pin 1 of the M-911 connector. Then disable the alarm system. A call should be placed through each linefinder to assure that regular service has not been impaired. The Adapters should be left in this configuration until testing is ready to begin.

6.06 When ready to test the Adapters, busy out the five linefinders associated with a given M-911 supply fuse. Disconnect those five Adapter cards. Disconnect the jumper between pin 1 and pin 12 on each of those five connectors. Unbusy the linefinders. Install the selected M-911 supply fuse. Insert and test the Adapter cards one at a time as described starting at paragraph 7.03. Each Adapter card can then be put into service as soon as it is completely tested.

C. Mount the Card File

6.07 Depending on where the card file is to be mounted, it may be more efficient to do the program strapping on the connectors before mounting the card file. In this case, remove the back panel of the card file

Table 4 Installation Checklist

1.	Examine received materials, paragraph 6.02	<input type="checkbox"/>
2.	Mount the card file, paragraphs 6.07 through 6.09 (Depending on the mounting location, it may be preferable to do the program strapping first, if so see part 5 of this practice)	<input type="checkbox"/>
3.	Connect the battery and ground pairs to the card file, battery goes to pin 2 and ground to pin 11, paragraphs 6.10 through 6.12	<input type="checkbox"/>
4.	Connect the reorder tone or recorded announcement source to pins 13 and 15, paragraphs 6.13 and 6.14	<input type="checkbox"/>
5.	Connect the coin return voltage, -110 volts or -130 volts, to pin 25 to apply it to Tip or to pin 27 to apply it to Ring of the line, paragraph 6.18	<input type="checkbox"/>
6.	Connect the alarm system leads to pins 7 and 8, paragraphs 6.16 and 6.17	<input type="checkbox"/>
7.	Connect answer supervision lead to each Adapter, selector Ring to pin 21, paragraph 6.19	<input type="checkbox"/>
8.	Connect pay-station mark or ground to pin 14 of each Adapter, paragraph 6.20	<input type="checkbox"/>
9.	If applicable, connect the J1 lead to pin 18 and the J2 lead to pins 19, paragraph 6.21	<input type="checkbox"/>
10.	If the program strapping has not been done, do it, see part 5 of this practice	<input type="checkbox"/>
11.	Make the linefinder busy, connect the Tip, Ring, and Sleeve leads as follows:	
	Linefinder Tip to pin 6	<input type="checkbox"/>
	Linefinder Ring to pin 4	<input type="checkbox"/>
	Linefinder Sleeve to pin 12	<input type="checkbox"/>
	Repeater Tip to pin 5	<input type="checkbox"/>
	Repeater Ring to pin 3	<input type="checkbox"/>
	Repeater Sleeve to pin 1	<input type="checkbox"/>
12.	Examine the connector contacts and card contacts, paragraphs 6.28 and 6.29	<input type="checkbox"/>
13.	Insert circuit card(s), paragraph 6.30	<input type="checkbox"/>
14.	Test the installation as described in part 7 of this practice	<input type="checkbox"/>

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by turning each of the six captive fasteners on the panel about a quarter of a turn counterclockwise. Then proceed as directed in part 5, PROGRAM STRAPPING, of this practice.

6.08 Each card file occupies eight vertical inches of the relay rack. Mount the card file with the nameplate at the top. Secure the file to the front of the rack with four screws. The five-slot card file may be mounted on either the rack or a convenient wall space.

6.09 One or two mounting plate spaces should be left between the card files when more than three are mounted on a rack. This spacing eases the chimney effect of the cards in the lower files heating cards in the upper files.

D. Connect Battery and Ground

Caution: The circuit cards must not be inserted into the connectors when any wiring is being done on the connectors. The one exception occurs when the program strapping is done before any other wiring. Assure that each circuit card is pulled an inch or more out of its connector.

6.10 If the protective back panel of the card file is still in place, remove it by turning each of the captive fasteners on the panel a quarter turn counterclockwise. The battery and ground terminals of the connectors are prewired together in groups of five as shown in Figure 11. Route one twisted pair of 20-gauge or 22-gauge wires from the office fuse panel to the card file location for each five cards being installed. Route these pairs and all other wiring through the access openings in the rear of the card file side panels.

6.11 Wire wrap the ground lead of each pair to pin 11 in each group of five connectors used, as shown in Figure 11. The ground on pin 11 should be common to the central office ground. Pin 11 is the sixth pin up from the bottom in the right-hand row of the connector as shown in Figure 12.

Connect the battery leads of each pair to pin 2 in the same five connector group as shown in Figure 11. Pin 2 is the bottom pin of the left-hand row as shown in Figure 12. Each pair should be fused for 1-1/3 amperes.

6.12 Install the fuses and verify with a voltmeter that -48 volt battery appears on pin 2 in each five-connector group. Verify that ground appears on pin 11 in each group. Then remove the fuses and complete the wiring as described in the following paragraphs.

E. Connect Reorder Tone

6.13 Connect the output of the reorder tone source to pins 13 and 15. If the reorder tone source output is a single wire, connect the output to pin 13 and connect pin 15 to ground on pin 11 (see Figure 12).

F. Connect Reorder Announcement

6.14 Connect the Adapter to a reorder announcement source of no more than 8 ohms impedance. Connect this source to pins 13 and 15 of the connector. If the recorded announcement source output is a single terminal, connect the terminal to pin 13 and connect pin 15 to ground on pin 11 (see Figure 12). The reorder announcement start function should be wired to pins 9 and 10 of the connector.

G. Adjust Reorder Source Level

6.15 The Adapter provides approximately 10 dB of attenuation between the reorder source and the pay station. If a specific signal level on the line is required, the input to the Adapter should be set 10 dB above that required level.

H. Connect Alarm Leads

6.16 The alarm feature of the M-911 consists of a pair of relay contacts which close when an alarm condition occurs. One of these closures applies ground to the linefinder Sleeve lead. The other set of contacts provides a metallic path between connector pins 7 and 8. These contacts are rated at 0.3 ampere and 10 watts. Pins 7 and

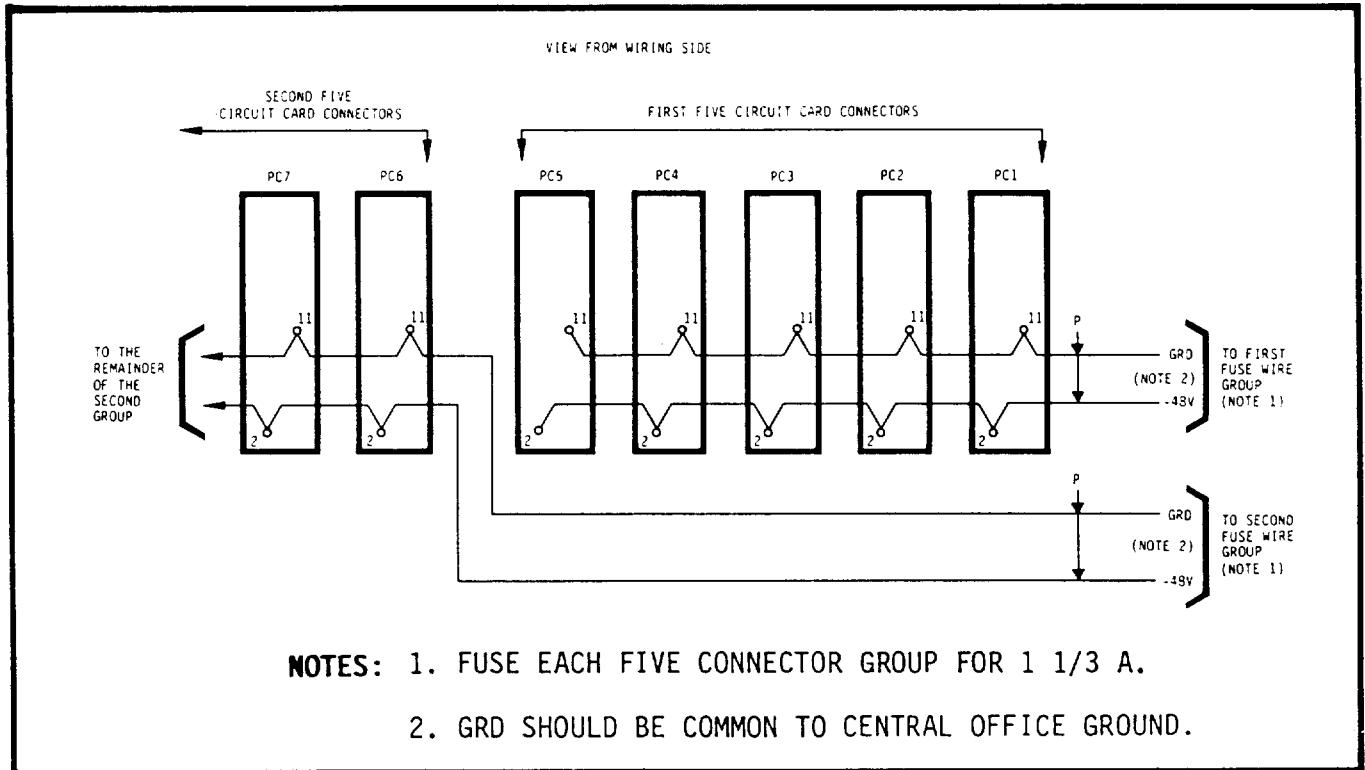


Figure 11 Battery and Ground Wiring

8 are the fourth ones up from the bottom of the connector.

6.17 Connect the alarm common lead to pin 8, in the left row, of the first connector in the card file. The same pins of the other connectors can be strapped from that one. Connect the other alarm lead to pin 7 of the first connector and strap the other pin 7's from that connector. The design of the alarm system may require some arrangement other than wiring all the connectors together.

I. Connect Coin Return Voltage

6.18 The voltage that returns deposited coins after the Adapter has restricted a call must be connected to pins 25 and/or 27 according to the requirements of the local equipment. The majority of installations apply -110 volts or -130 volts to the Tip side of the line. These installations would connect the voltage to pin 25 of the M-911 connector. If voltage is to be applied to the Ring side of the line, connect that voltage to pin 27. Make the required connection to the

first connector in the card file. The same pin(s) of the other connector(s) can be strapped from the first connector. IN EITHER CASE, DO NOT ATTACH GROUND (PIN 11) TO THE REMAINING OPEN PIN.

Warning: Adapter will be damaged if ground is connected to either pin 25 or 27.

J. Connect Answer Lead

6.19 Tap the Ring lead on the selector side of the pay-station repeater and connect it to pin 21 of the M-911 connector. Pin 21 is the eleventh pin up from the bottom in the right-hand row. This lead implements the detection of answer supervision by the M-911.

K. Connect Pay-Station Mark

6.20 Tap the pay-station mark lead from the linefinder and connect it to pin 14 of the M-911 connector. Pin 14 is the seventh pin up from the bottom in the left-hand row of pins. If the linefinder group is

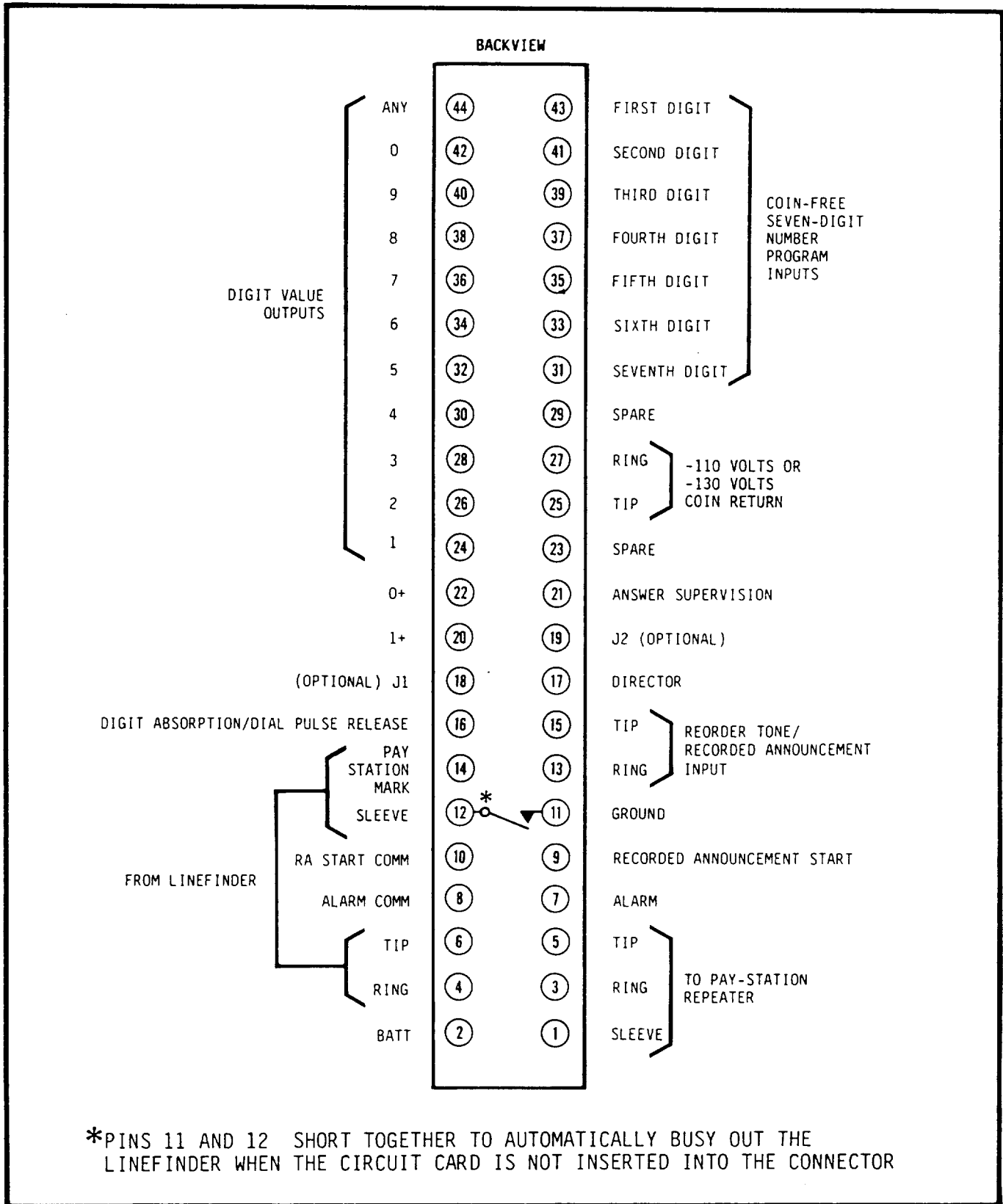


Figure 12 Connector Pins

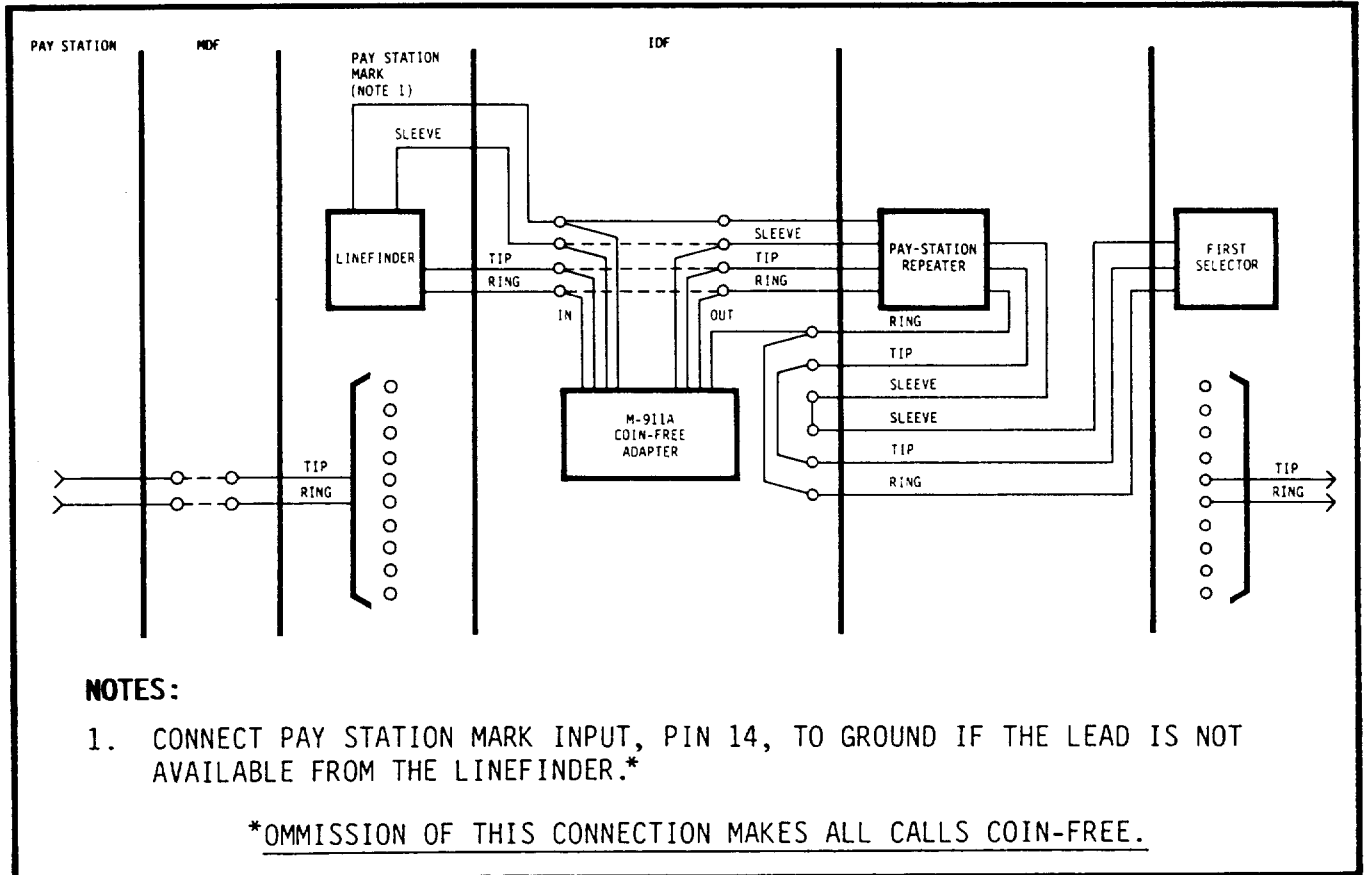


Figure 13 IDF Wiring

not a mixture of pay-station lines and standard private lines, there may be no pay-station mark lead. In that case, strap pin 14 to ground on pin 11. OMISSION OF THIS CONNECTION MAKES ALL CALLS COIN-FREE.

L. Connect "J" Option Leads

6.21 The "J" option is used with some Bell System single-slot pay stations associated with TSPS trunks. The J1 lead from the trunk connects to pin 18 of the connector, the ninth pin up from the bottom in the left-hand row. The J2 lead connects to pin 19, the tenth pin up from the bottom in the right-hand row.

M. Programming

6.22 If the Adapter program strapping of the connector pins, described in part 5 of this practice, has not been done, do it now. If the program strapping has been done,

proceed as directed in the following paragraphs.

N. Connect Tip, Ring, and Sleeve Leads

6.23 Each M-911 is wired between the linefinder and its associated pay-station repeater, as shown in Figure 13. At most installations the leads to and from the M-911 simply replace existing IDF jumpers (shown as dotted lines in Figure 13) between the linefinder and the repeater. The specific connector pins to which the leads are connected are shown in Figure 11. Manually busy out the linefinder before starting this wiring. Particular care should be taken not to reverse the polarity of the Tip and Ring pairs, since such a reversal will cause the M-911 to malfunction. Complete the wiring described in the following four paragraphs for each card connector.

6.24 Connect the Tip lead from the linefinder to pin 6 of the M-911 connec-

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tor. Pin 6 is the third pin up from the bottom in the left-hand row of pins. Connect the Ring lead from the linefinder to pin 4 which is the second pin up from the bottom in the left-hand row.

6.25 Connect the Sleeve lead from the linefinder to pin 12 of the connector. Pin 12 is the sixth pin up from the bottom in the left-hand row. When the M-911 circuit card is removed from the connector, this Sleeve lead connection is shorted, by the connector, to the ground connection on pin 11 opposite it. This implements the automatic busy feature.

6.26 Connect the Tip lead of the paystation repeater to pin 5 of the M-911 connector. Pin 5 is the third pin up from the bottom in the right-hand row of pins. Connect the Ring lead of the repeater to pin 3 of the connector. Pin 3 is the second pin up from the bottom in the right-hand row. Connect the Sleeve lead of the repeater to pin 1 of the connector which is the bottom pin in the right-hand row.

6.27 As the wiring for each trunk is completed, record the appropriate information on the wiring tracing attachment of the card file.

O. Examine Contacts

6.28 Before inserting the circuit cards into the connectors, check the contacts of the connector and the contacts on the back edge of the card. Look into the card file from the front and verify that none of the connector contacts are bent out of their proper alignment (see Figure 14).

6.29 Examine the connector contacts on the back edge of the circuit cards. These contacts must be **EXTREMELY** clean to assure optimum connection to the outside wiring. If they show dirt, fingerprints, grease, solder flux, or anything that does not look like a bright shiny surface, those contacts should be cleaned before the card is inserted. Alcohol on a clean cloth removes most foreign substances without the risks of more volatile solvents.

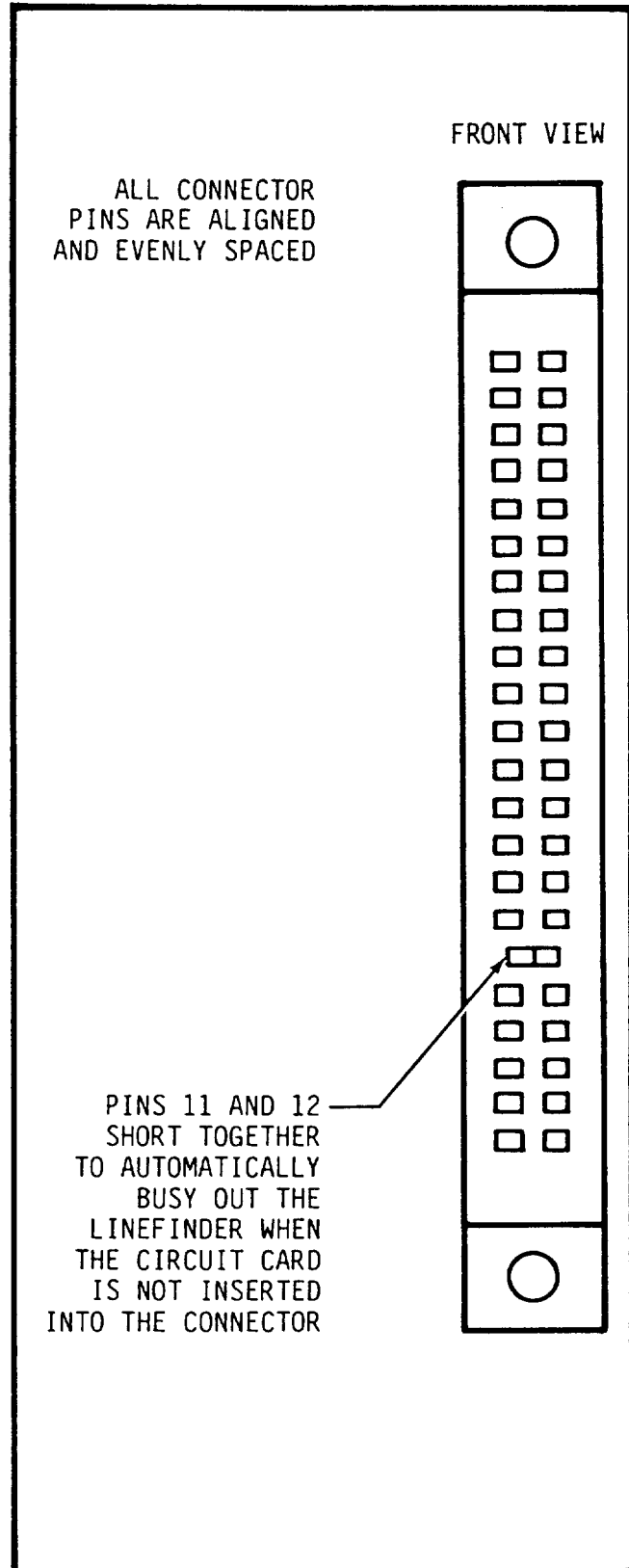


Figure 14 Connector Contacts

Table 5 Exercising Checklist

1.	(If this is an initial installation test, proceed as described in paragraphs 7.01 through 7.03 before doing this step)	<input type="checkbox"/>
	Busy the linefinder with the switch on the M-911, exercise the restrict function with a rotary dial phone, paragraphs 7.05 through 7.09	<input type="checkbox"/>
2.	Exercise the operator restrict feature if the Adapter is not programmed for coin-free 0+ calls paragraph 7.10	<input type="checkbox"/>
3.	Exercise the coin-free 0+ and 1+ programs if they are used, paragraphs 7.11 through 7.13	<input type="checkbox"/>
4.	Exercise the coin-free seven-digit number program if it is used, paragraph 7.14	<input type="checkbox"/>
5.	Exercise the DTMF conversion function if it is provided, paragraphs 7.15 and 7.16, if it is not provided the procedure is complete, go to paragraph 7.23	<input type="checkbox"/>
6.	Exercise the mixed signaling restriction, paragraph 7.17	<input type="checkbox"/>
7.	Exercise the DTMF restriction, paragraph 7.18	<input type="checkbox"/>
8.	Exercise the appropriate office program, if any are used, paragraphs 7.19 through 7.22	<input type="checkbox"/>
9.	Put the M-911 into service, paragraph 7.23	<input type="checkbox"/>

P. Insert Circuit Cards

6.30 The fuses supplying the Adapters should not be inserted yet. When all the wiring to the connector is completed, the circuit card(s) can be inserted. Disable the alarm if it is connected. Assure that the BUSY switch is set in the up (busy) position. The cards go into the card file with the components to the right as seen from the front of the housing. Care should be taken to assure the card is started in the two proper card guides to mate with the connector. As the back edge of the card is inserted into the connector a definite snap-tight fit will be noticed. The card extractors will be just touching the card guides when the Adapter is properly seated in the connector.

6.31 Exercise the installation as described in Part 7 of this practice. If the lines are to be put into service before the M-911's are exercised as described in paragraph 6.08,

the BUSY switches on the circuit cards must be set to the down (unbusy) position.

7. EXERCISING INSTALLATION

7.01 If the Adapters are now in service and have been operating, start at paragraph 7.04. If a first-time test of an installation is required, start here. Before beginning, assure that the cards are inserted into the connectors, the fuses are not installed, the alarm is disabled if it was connected, and the BUSY switch is set in the down (unbusy) position. For convenience, an Exercising Checklist, Table 5, is included.

7.02 Connect a rotary test phone at the linefinder test jack. The phone must be able to simulate a coin deposit if the linefinder group is dedicated to pay stations. Verify that a rotary dial call can be completed. Unbusy the linefinder. The alarm relay of the M-911 will keep the line from being seized. Verify this by testing the

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Sleeve lead of the linefinder for presence of ground when the test phone is on-hook. Make these two tests either at the linefinders associated with the five Adapters supplied from the first fuse to be installed or at all the linefinders being adapted, depending on local practice. Disconnect the Adapters associated with the fuse to be installed, by pulling them one inch out of the connectors. The lines will then be busied by the shorting contact of the M-911 connector.

7.03 The cards should not be connected yet. Install the fuse. Assure that no test phones have been left off-hook; the linefinder must be released. Set the BUSY switch on the card to the up (busy) position. Connect the card to be tested. Sliding the card back to the connector and then snapping it into the connector minimizes stress on the circuits. None of the indicators should light continuously before the test phone is taken off-hook. The indicators may light briefly as the card is inserted into the connector. Any cards which do light the indicators continuously should be immediately disconnected and suspected of being faulty. From here on, exercise the Adapter just as if it were in service. Toggle the BUSY switch, slowly, to initialize the card. Go to paragraph 7.05.

7.04 If the Adapter is in service there may be a call in progress at the time exercising is desired. This will be shown by either or both the IN indicator and the OUT indicator on the circuit card being lighted. Set the BUSY switch on the card to the up (busy) position. If no switch is visible, lift the wiring tracing attachment to reveal the switch. When both indicators go dark, indicating the call has ended, the switch train must be completely idled. To do this, set the BUSY switch down for approximately half a second and then back up to the busy position. This action resets the adapter to the start-of-call sequence and assures that the forward equipment will be idle when the test phone goes off-hook.

A. Restrict Function

7.05 Connect a rotary test phone to either the linefinder test jack or the top set of terminals on the M-911-04 Test Adapter.

If the test adapter is not used, the phone must be able to simulate coin deposit. The Test Adapter slips onto the contacts on the front edge of the circuit card as shown in Figure 6. If the linefinder group is a mixture of pay-station lines and private subscriber lines it will be necessary to attach, during the following tests, a ground pick to either pin 14 of the connector or the pay-station mark lead at the linefinder (the busied linefinder will not be providing a pay-station mark).

7.06 Set the switch on the front of the Test Adapter to the OFF position (down). Go off-hook with the rotary test phone. Both the IN and OUT indicator will light for approximately one second. Note that dial tone can be heard in the test phone. Observe that the center, IN, indicator lights. Dial a digit other than 0 or 1, that is not used as the first digit of the number(s) programmed for coin-free operation. Observe that the IN indicator blinks as the dial on the phone returns to the rest position. Then observe that the lower indicator, labeled OUT, blinks the same number of times after the dial has stopped. Note that dial tone has been cut off.

7.07 Dial three more digits. Note that reorder tone or the reorder announcement can be heard in the test phone. Observe that the lower, OUT, indicator goes dark and the center, IN, indicator remains lighted. Go on-hook with the test phone. Both indicators will go dark.

7.08 Set the switch on the Test Adapter to the ON position (up) to simulate a coin deposit. Set the BUSY switch on the circuit card down and back up. Repeat the previous exercise and observe that a call can be completed instead of being restricted.

7.09 Leave the switch on the Test Adapter in the ON position (up) to simulate a coin deposit. Set the BUSY switch on the circuit card down and back up. Test end-to-end signaling by dialing seven digits. Observe that all the digits are outpulsed, as shown by the OUT indicator. Dial an * and two more digits. Observe that the OUT indicator does

not show outpulsing for the two digits. The Adapter is transparent to incoming digits. Go on-hook with the test phone.

B. Operator Restrict

7.10 If the Adapter is not programmed for coin-free 0+ operation, exercise the operator restrict feature as follows. Set the BUSY switch down and back up. Go off-hook with the test phone. Dial 0 and verify that the call goes through to the operator. Go on-hook, set the BUSY switch down and back up, and go back off-hook. Dial 0 and any other digit. The call will be restricted regardless of coin deposit or the interval between the digits. Note that the second digit is not outpulsed to the pay-station repeater. Go on-hook with the test phone.

C. Coin-Free 0+ and 1+

7.11 Set the switch on the Test Adapter to the OFF position. If the Adapter connector is strapped for 0+ operation, exercise it as follows. Set the BUSY switch down and back up. Go off-hook, dial 0, follow it with a number, and observe that the call is answered by the intercept operator. Go on-hook with the test phone.

7.12 If the connector is strapped for coin-free 1+ operation, exercise it as follows. Assure that the switch on the Test Adapter is in the OFF position. Set the BUSY switch down and back up. Go off-hook, dial 1, follow it with a number, and observe that the intercept operator comes on the line to handle the call.

7.13 If the connector is not strapped for coin-free 1+ operation, exercise it as follows. Maintain the Test Adapter switch in the OFF position. Set the BUSY switch down and back up. Go off-hook and dial 1. Observe that the call is restricted. Observe that with either the Test Adapter switch in the ON position or a coin deposit simulated by the test phone the call is also restricted by the M-911.

D. Seven-Digit Number(s)

7.14 If the Adapter connector is strapped to allow coin-free calling of a seven-

digit number, verify the strapping by completing a call to that number with the Test Adapter switch in the OFF position. If a group of seven-digit number variations are coin-free by use of the ANY pin, place calls to a representative sample of that group. A rotary dial call will be restricted after the third digit is dialed when a digit not allowed by the program is signaled. Restriction occurs on the seventh digit dialed when the number is signaled with a DTMF phone.

E. Tone-To-Pulse Conversion

7.15 Exercise the tone-to-pulse conversion function, if applicable, as described here. Go on to paragraph 7.23 if the tone dialing feature is not used. Disconnect the rotary dial phone from the Test Adapter.

7.16 Connect a DTMF test telephone to the upper terminals of the Test Adapter or the linefinder test jack. Move the Test Adapter switch to the OFF position. Set the BUSY switch down and back up. Go off-hook with the DTMF phone. Signal any numerical digit but 0. Observe that the IN indicator does not blink and the OUT indicator blinks once for each unit of value of the digit signaled. Go on-hook with the test phone. Repeat this sequence and observation for each remaining numerical digit.

F. Mixed Signal Restriction

7.17 One method of fraud prevention provided by the M-911 is immediate restriction in the presence of mixed signaling. Set the BUSY switch down and back up. Go off-hook with the DTMF test phone and signal two digits which should not cause restriction. Flash the switchhook. The Adapter will restrict the call. Go on-hook with the test phone.

G. DTMF Restriction

7.18 When tone dialing is used, the M-911 checks for coin deposit after the seventh digit. Set the BUSY switch down and back up. Go off-hook with the DTMF test phone. Signal a seven-digit number which is not programmed for coin-free operation. Observe that up to the first six digits are outpulsed, if they are signaled

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slowly, and then reorder tone or the recorded announcement is connected to the test phone. (Since tone dialing is faster than rotary outpulsing, the number of digits outpulsed before seventh-digit restriction occurs is not predictable.) The lower, OUT, indicator goes dark. Go on-hook with the test phone. If this test is repeated with either the Test Adapter switch in the ON position or a coin deposit simulated by the phone, the call will be completed.

H. Office Programs

7.19 The three programs for different types of offices are mutually exclusive and are tested differently. If the office does no digit absorption and is not directorized, go to paragraph 7.23. If the office does digit absorption go to paragraph 7.20. Go to paragraph 7.21 if the office is directorized.

I. Digit Absorption

7.20 To exercise the digit absorption program, go off-hook with a DTMF test phone. Signal the first three digits of a number. Set the switch on the Test Adapter to the ON position or simulate a coin deposit with the phone. Observe that these digits are outpulsed as indicated by the blinking of the lower indicator. Signal the next three digits of the number. Observe that they are not outpulsed. Signal the last digit of the number. Observe that the last four digits are now outpulsed and both the IN and OUT indicators remain lighted. Go on-hook with the test phone and go to paragraph 7.23.

J. Directorized Offices

7.21 In a directorized office without dial pulse release the M-911 blocks the tones for all the digits by splitting the line upon initial detection of each DTMF digit. In a directorized office with dial pulse release only the first DTMF digit is blocked. The ability to complete a DTMF call with the switch on the Test Adapter in the ON position in these offices indicates proper operation of these programs in the M-911.

7.22 To verify that the M-911 is blocking the digit tones, do the following test. Before signaling the digit, observe that the

OUT indicator is not lighted. Signal the digit and do not let the button up. If the OUT indicator is lighted, the tones are being blocked. Let the button up and observe that the OUT indicator blinks once for each pulse after it has lighted.

K. Put Adapter Into Service

7.23 Having successfully completed all the applicable exercise steps, the M-911 can be put into service. Remove the ground pick from pin 14 if one was required. When disconnecting the Test Adapter, press the card into the card file with one hand while pulling the Test Adapter off the connector so the card is not pulled out of its connector. Do not leave the Test Adapter on the card with the switch in the ON position. Move the BUSY switch on the Adapter card down to the unbusy position. Assure that the linefinder is not left busied out. Repeat the steps described in the preceding paragraphs for each Adapter card installed. Replace the back panel of the card file and swing the wire tracing attachment down in front of the shelf when all the installed Adapter cards have been exercised.

8. PREPAY PAY-STATION MODIFICATIONS

8.01 Modifications to the pay stations and their associated switching equipment may be necessary for them to operate with the M-911. If the following requirements exist, no modifications are needed and coin-free service can begin immediately. Otherwise, modify the equipment to meet the following conditions:

- (a) The pay stations and associated switching equipment must be wired for loop start operation.
- (b) The pay stations must be set up for dial-tone-first operation. Dial shunts across the rotary dial impulse springs must be removed. Dial shunts disabling the tone pads prior to coin deposit must be removed. The pay stations must be able to signal the central office without a coin deposit.

A. Modification of Older Pay Stations

8.02 Modifications to multi-slot pay-station telephones like the A.E. type 62 or type LPA-82 will be required. The coin spring shunt (usually a green wire) across the dial impulse springs must be removed.

B. Modification of Newer Pay Stations

8.03 The required modification to single-slot pay stations, like the A.E. type 120A, can usually be found in the appropriate practice under Emergency Calling Modification. For the A.E. type 120A this is GTE Practice 476-201-100. As directed, remove the strap between pin Y and pin Z on the interface card. If it is present, also remove the strap between pin E and pin Q.

8.04 For A.E. type LPB-82, remove the green wire (shunt) from the coin spring shunt contact.

8.05 For N.E. types NE-233 QA, QB, QC, and QE, remove the wire from contact 2 on the coin relay.

8.06 For other types of pay stations, make the required modifications to meet the conditions described in Paragraph 8.01.

8.07 Cutover is established for each pay station as the modification, if required, is completed. Each modified pay station should be tested for proper coin-free operation according to locally established procedures. Unmodified pay stations maintain compatibility with existing pre-pay services. This allows cutover to be scheduled over an indefinite interval to accommodate work schedules and manpower loads.

9. TROUBLESHOOTING

9.01 If an M-911 passes all the applicable exercising steps in part 7 of this practice, there is nothing wrong with it and the cause of any difficulty being experienced must be located elsewhere. Failure to pass the exercising steps must be isolated to one particular M-911 and the associated equipment.

9.02 If an M-911 does not pass all applicable exercising steps in part 7 and the troubleshooting procedure described in the following (Figure 15) determines that the M-911 circuit card is faulty, the card must be sent to an appropriate service center. The components on the M-911 card are neither field serviceable nor field replaceable.

10. SPECIFICATIONS

Input Impedance (tone receiver)	75K ohms, AC coupled
Input DTMF Signal Requirements	
Signal level (per frequency)	-22 to +6 dBm (0.062 to 1.55 VRMS), see note 1
Tone accept bandwidth	+1.5% +2 Hz -1.5% -2 Hz
Tone signal duration	≥ 40 ms
Tone input interdigital time	≥ 40 ms
Cycle Time	110 ms
Digit Input Rate	9 digits per second maximum
Amplitude difference (twist), high frequency with respect to low frequency	+6 dB maximum -8 dB maximum see note 2
Precise dial tone tolerance	≤ -12 dBm per tone (0.0194 VRMS), see note 1

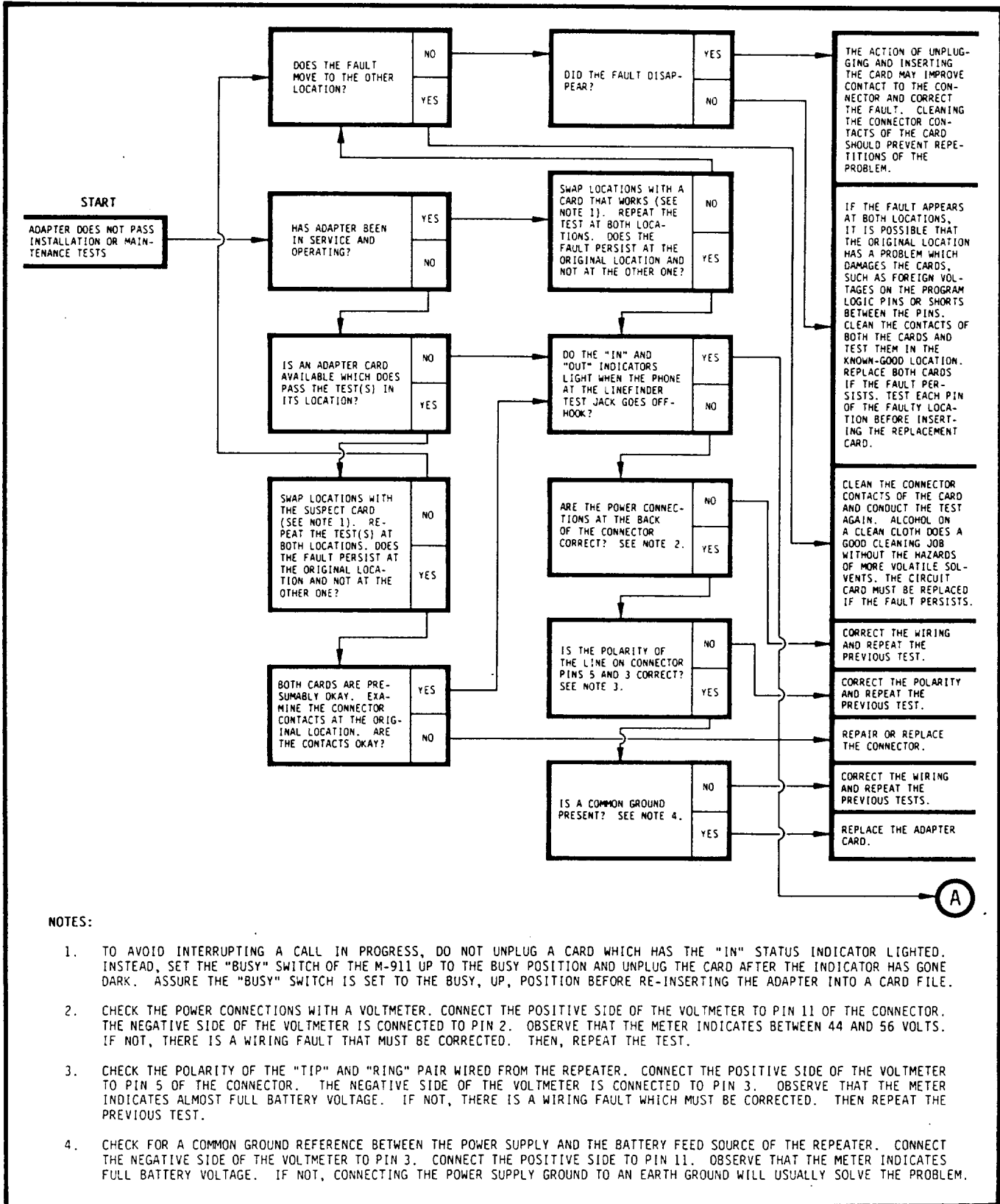
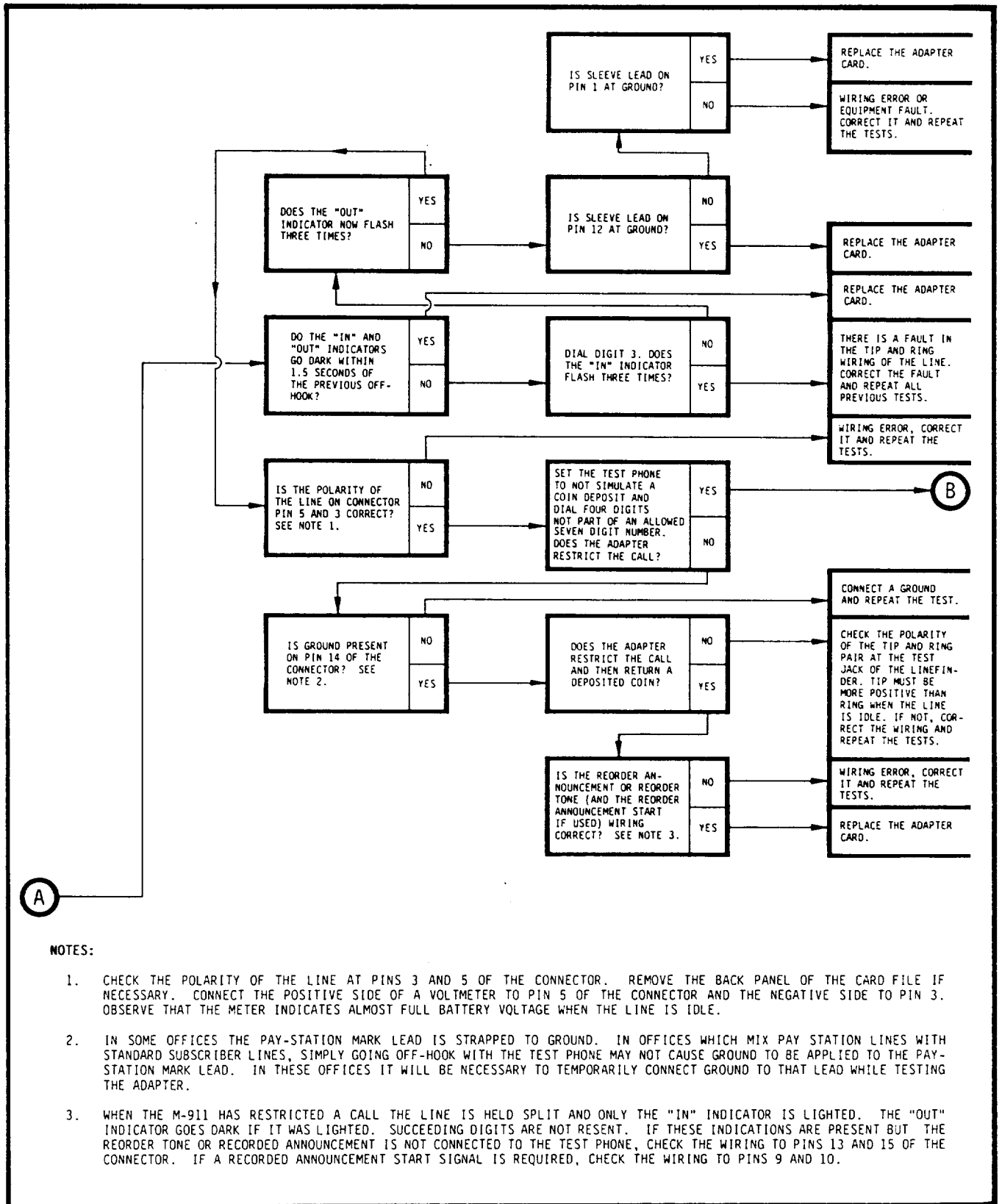


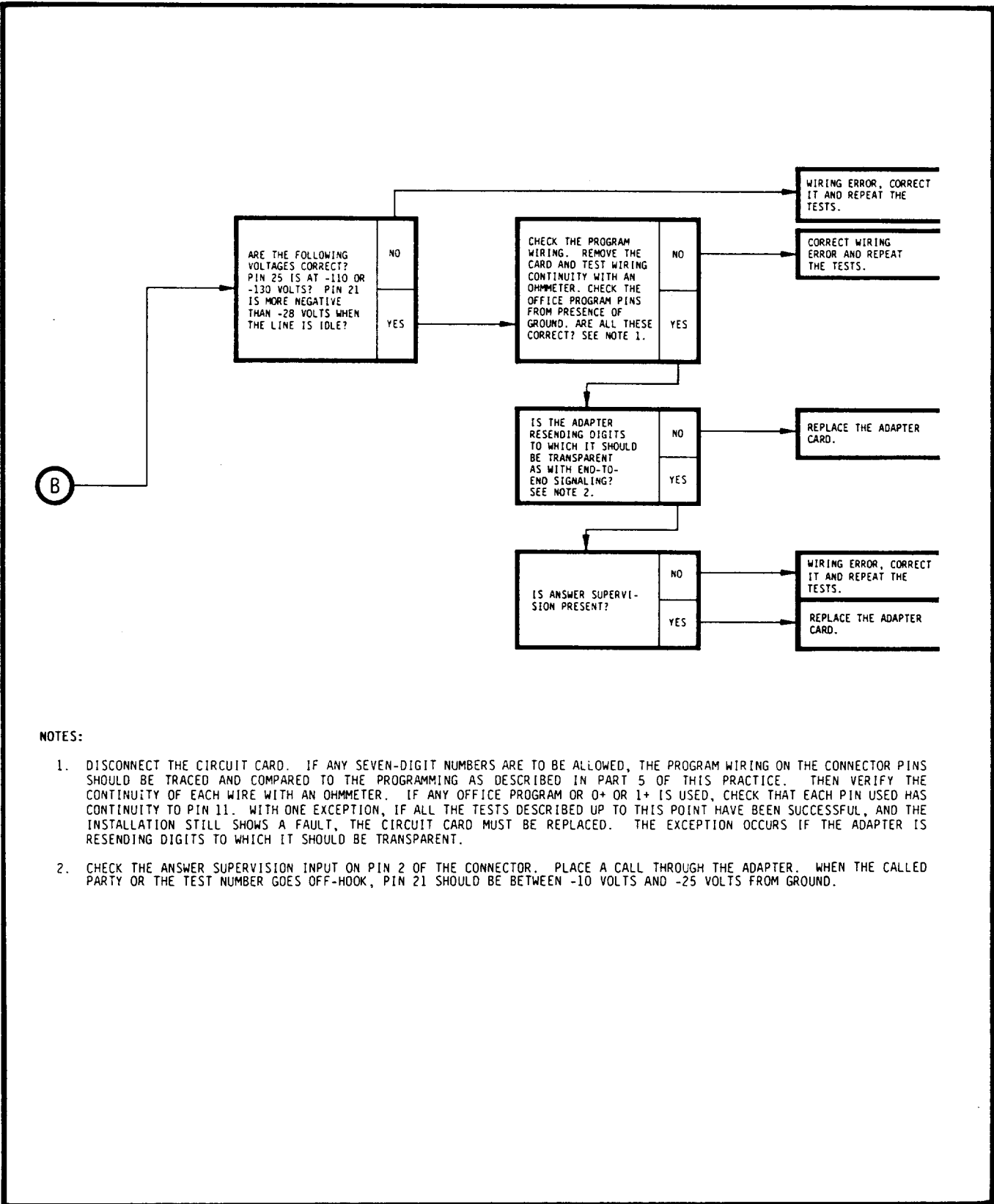
Figure 15 Troubleshooting Procedure (Sheet 1 of 3)



NOTES:

1. CHECK THE POLARITY OF THE LINE AT PINS 3 AND 5 OF THE CONNECTOR. REMOVE THE BACK PANEL OF THE CARD FILE IF NECESSARY. CONNECT THE POSITIVE SIDE OF A VOLTMETER TO PIN 5 OF THE CONNECTOR AND THE NEGATIVE SIDE TO PIN 3. OBSERVE THAT THE METER INDICATES ALMOST FULL BATTERY VOLTAGE WHEN THE LINE IS IDLE.
2. IN SOME OFFICES THE PAY-STATION MARK LEAD IS STRAPPED TO GROUND. IN OFFICES WHICH MIX PAY STATION LINES WITH STANDARD SUBSCRIBER LINES, SIMPLY GOING OFF-HOOK WITH THE TEST PHONE MAY NOT CAUSE GROUND TO BE APPLIED TO THE PAY-STATION MARK LEAD. IN THESE OFFICES IT WILL BE NECESSARY TO TEMPORARILY CONNECT GROUND TO THAT LEAD WHILE TESTING THE ADAPTER.
3. WHEN THE M-911 HAS RESTRICTED A CALL THE LINE IS HELD SPLIT AND ONLY THE "IN" INDICATOR IS LIGHTED. THE "OUT" INDICATOR GOES DARK IF IT WAS LIGHTED. SUCCEEDING DIGITS ARE NOT RESENT. IF THESE INDICATIONS ARE PRESENT BUT THE REORDER TONE OR RECORDED ANNOUNCEMENT IS NOT CONNECTED TO THE TEST PHONE, CHECK THE WIRING TO PINS 13 AND 15 OF THE CONNECTOR. IF A RECORDED ANNOUNCEMENT START SIGNAL IS REQUIRED, CHECK THE WIRING TO PINS 9 AND 10.

Figure 15 Troubleshooting Procedure (Sheet 2 of 3)



NOTES:

1. DISCONNECT THE CIRCUIT CARD. IF ANY SEVEN-DIGIT NUMBERS ARE TO BE ALLOWED, THE PROGRAM WIRING ON THE CONNECTOR PINS SHOULD BE TRACED AND COMPARED TO THE PROGRAMMING AS DESCRIBED IN PART 5 OF THIS PRACTICE. THEN VERIFY THE CONTINUITY OF EACH WIRE WITH AN OHMMETER. IF ANY OFFICE PROGRAM OR 0+ OR 1+ IS USED, CHECK THAT EACH PIN USED HAS CONTINUITY TO PIN 11. WITH ONE EXCEPTION, IF ALL THE TESTS DESCRIBED UP TO THIS POINT HAVE BEEN SUCCESSFUL, AND THE INSTALLATION STILL SHOWS A FAULT, THE CIRCUIT CARD MUST BE REPLACED. THE EXCEPTION OCCURS IF THE ADAPTER IS RESENDING DIGITS TO WHICH IT SHOULD BE TRANSPARENT.
2. CHECK THE ANSWER SUPERVISION INPUT ON PIN 2 OF THE CONNECTOR. PLACE A CALL THROUGH THE ADAPTER. WHEN THE CALLED PARTY OR THE TEST NUMBER GOES OFF-HOOK, PIN 21 SHOULD BE BETWEEN -10 VOLTS AND -25 VOLTS FROM GROUND.

Figure 15 Troubleshooting Procedure (Sheet 3 of 3)

Noise tolerance (C-message weighted)	-22 dB, see note 3	Blanking of dial pulse break recognition after end of rotary dial digit recognition	200 ± 8 ms
Harmonic tolerance	-28 dB, see note 4	DTMF early line split	within 22 ms of a valid DTMF signal
Difference frequency tolerance	-18 dB, see note 4		
Interface Characteristics		Output Signaling	
Allowable loop resistance	≤ 1800 ohms, ≥ 100 ohms,	Coin box unlock (line split and 1.5K ohms to ground on both Tip and Ring)	200 to 250 ms
Insertion loss	≤ 0.5 dB	Coin Return	425 to 450 ms
Longitudinal balance with 30 ma of loop current	≥ -55 dB	Pulse rate	10 ± 0.5 PPS
Loop current recognition	≥ 19 ma to operate	Pulse ratio	61% to 63% break
Sleeve lead recognition	ground to -4 VDC	Output interdigital time	800 ms nominal
Coin deposit recognition (-48V applied to Tip with Ring open)	≥ 10 ma	Outpulse resistance	300 ohms
Answer supervision rec- ognition (Ring lead to selector)	0.2V battery to 0.45V battery	Power Requirements	
Coin control recognition	125 ms typical	Voltage	-44 to -56 VDC
Dial pulse break recognition	27 ± 2 ms	Idle Current	150 ma
Dial pulse make recognition	9 ± 2 ms	Operating Current	200 ma
End of rotary dial digit recognition (make after last break)	100 ms	Environmental Requirements	
		Temperature limits (up to 50% relative hu- midity and 700 to 800 mm Hg)	0° to 55° C
		Relative humidity (at 0° to 55° C and 700 to 800 mm Hg for up to 72 hours)	0 to 85% (noncondensing)
		Mechanical shock	≤ 6-inch drop
		Note 1: Voltage levels stated in dBm are obtained using a standard voltmeter cali-	

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brated to provide a scaled voltage measurement in dBm for a 600-ohm impedance. No termination should be applied for this measurement.

Note 2: Combined level of random, difference, and harmonic noise components at least -40 dB below the lowest level DTMF component.

Note 3: Relative to lowest level DTMF component with DTMF test tones at centerband, twist at ± 1 dB with combined harmonics and difference frequencies at -32 dB below lowest level DTMF component. For tests covering the entire accept bandwidth the noise tolerance is -40 dB relative to lowest level DTMF component.

Note 4: Relative to lowest level DTMF component over entire accept bandwidth, twist at ± 1 dB and random noise at -32 dB below lowest level DTMF component. With DTMF test tones at centerband, the harmonic and difference frequency tolerance is -16.7 dB relative to the lowest level DTMF component.

Specifications are subject to change without notice.

11. ORDERING INFORMATION

11.01 Order M-911 circuit cards and hardware by the item ordering numbers

listed in Table 6 and described in the following paragraphs.

A. Circuit Cards

11.02 One M-911 circuit card (ordering number M-911-15) is needed for each coin trunk being adapted to coin-free service. This card also provides tone-to-pulse conversion.

B. Card Files

11.03 Three sizes of card files are available for the M-911. Figure 5 shows the dimensions of the card files. The M-911-02 card file fits onto a 19-inch rack and holds a maximum of 20 circuit cards. The M-911-03 card file fits onto a 23-inch rack and holds a maximum of 25 circuit cards. The M-911-05 is rack or wall mounted and holds a maximum of 5 circuit cards. Card files have all required connectors and card guides installed. Jumpers connecting the battery pins together in groups of five are installed, as are jumpers connecting the ground pins together in matching groups.

C. Test Adapter

11.04 The M-911-04 Test Adapter allows testing an in-service M-911 at the card so LED indicators can be easily seen. Use of the Test Adapter also eliminates all doubt as to which card is being tested.

Table 6 Item Ordering Numbers

ORDERING NUMBERS	ITEM DESCRIPTION
M-911-15	Rotary and tone coin-free adapter circuit card for step-by-step offices
M-911-02	Card file for 19-inch relay rack, holds 20 cards
M-911-03	Card file for 23-inch relay rack, holds 25 cards
M-911-05	Card file for rack or wall mount, holds 5 cards
M-911-04	Test adapter with storage hook
740-00034-01	44-pin connector with two mounting screws
101-00029-01	Frame mounting adapter plate: expands 23-inch card file to fit 27-inch mounting frame/expands 19-inch card file to fit 23-inch mounting frame.
731-00017-08	Mounting screws for 101-00029-01 adapter (2 screws per adapter)

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.

TELONE 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	
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CITY STATE ZIP CODE	REFERENCE DRAWING OF INTERFACING EQUIPMENT
TELEPHONE EXT.	

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