

**MODEL 688 ANA  
SYSTEM MANUAL**

Cognitronics Corporation  
3 Corporate Drive  
Danbury, CT 06810-4130

203-830-3400  
Fax-203830-3554

51171100-Rev 10

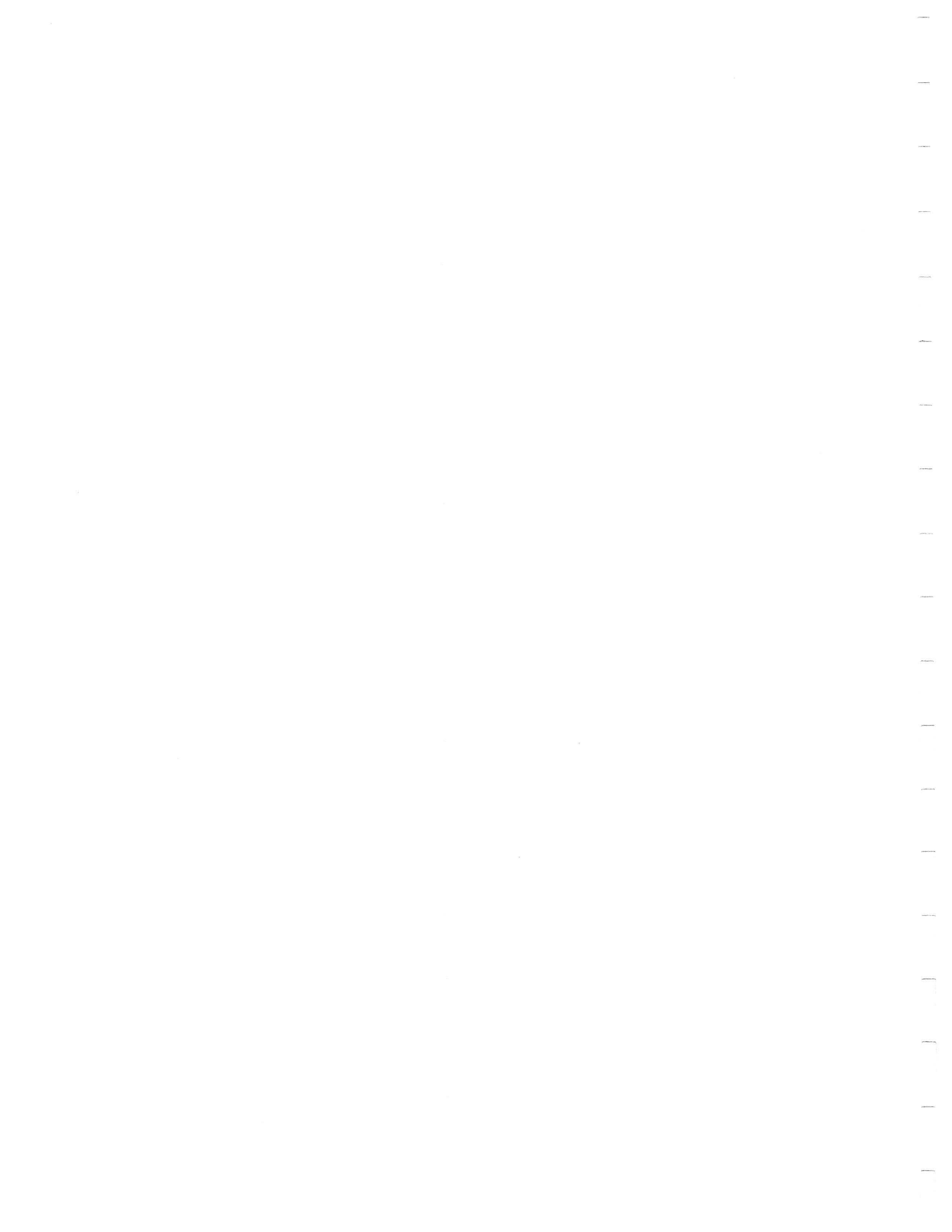


TABLE OF CONTENTS

Section	Page
LIST OF TABLES . . . . .	ii
LIST OF FIGURES . . . . .	iii
LIST OF DRAWINGS . . . . .	iii
1.0 GENERAL DESCRIPTION . . . . .	1
On-Hook and Off-Hook Signalling . . . . .	5
Connect (Seizure) and Disconnect . . . . .	5
Answer (Off-Hook) and Hang-Up(On-Hook) . . . . .	5
Reversals (Installer Selectable) . . . . .	5
Single Reversal Operation (On-Off-Hook). . . . .	5
Wink Operation (On-Off-Hook) . . . . .	5
Double Reversal Operation (On-Off-On-Off-Hook) . . . . .	6
Wink/Reverse Operation . . . . .	6
Loop and E&M DC Signalling . . . . .	6
Loop Signalling . . . . .	6
E&M Signalling . . . . .	6
E&M Type I . . . . .	7
E&M Types II & III . . . . .	7
Multifrequency AC Signalling . . . . .	7
Audible Tone Signals. . . . .	7
3.0 CIRCUIT DESCRIPTION . . . . .	10
4.0 INSTALLER SELECTABLE OPTIONS . . . . .	11
Loop or E&M . . . . .	11
Reversal Options. . . . .	11
ID Processing Option. . . . .	11
Speaker Output Option . . . . .	11
Western Electric Step-By-Step Option . . . . .	11
Reversal Timing Option. . . . .	13
Speaker Gating Option . . . . .	13
Security Options. . . . .	13
4-Digit Security Code Option . . . . .	13
Dual ST Security Option . . . . .	17
3 + 7 Digit Outside Security Option . . . . .	17
Dynamic Speaker Switching Option . . . . .	17
Pentaconta DP/ID Option . . . . .	18
5.0 FACTORY INSTALLED FEATURES AND OPTIONS . . . . .	27
DTMF Outpulsing Feature . . . . .	27
600 or 900 Trunk Option . . . . .	27
Foreign Language Option . . . . .	27
6.0 VISUAL INDICATORS . . . . .	29
7.0 INSTALLATION . . . . .	30
Inspection Before Installation . . . . .	30
Installer Selectable Options. . . . .	30
Installation - In MFT Bay . . . . .	30
Installation - In 5A REG Bay . . . . .	30
Installation - In Optional Rack Mount Shelf . . . . .	30
Initial Start-Up. . . . .	31
4 Digit Security Programming (Optional) . . . . .	31

## TABLE OF CONTENTS

Section	Page
7.0	INSTALLATION (continued)
	Test Call - Voice Version . . . . . 32
	Test Call - DTMF outpulsing Version . . . . . 32
8.0	SELF-TEST DIAGNOSTIC FUNCTIONS . . . . . 32
9.0	SPEECHMAKER WARRANTY. . . . . 32
10.0	REPAIR AND RETURN PROCEDURE . . . . . 37
11.0	ORDERING INFORMATION. . . . . 37

## LIST OF TABLES

Table	Page
1-1	Specifications . . . . . 4
7-1	Function of Option Switches . . . . . 34
7-2	Electrical & Signalling Connections. . . . . 36



## LIST OF FIGURES

Figure	Page
1-1 Model 688 ANA. . . . .	2
1-2 Typical C.O.-ANA Interconnect. . . . .	3
2-1 E&M Type I. . . . .	8
2-2 E&M Type I & III to ANA. . . . .	8
2-3 Multifrequency Pulsing Information. . . . .	9
4-1 Wink/Reverse Flow Diagram . . . . .	12
4-2 W/E SXS Flow Diagram . . . . .	14
4-3 Gated Speaker Connections . . . . .	15
4-4 4 Digit Security Flow Diagram. . . . .	16
4-5 4 Digit Security Code. SXS Operation. . . . .	19
4-6 Western Electric SXS Trunk Connects to ANA. . . . .	20
4-7 Dual ST Security, Inside Call, Flow Diagram . . . . .	22
4-8 Dual ST Security, Outside Call, Flow Diagram . . . . .	22
4-9 Dual ST & 3 + 7 Digit Security Verification . . . . .	23
4-10 3 + 7 Digit Security, Outside Call, Flow Diagram . . . . .	24
4-11 Dynamic Speaker Switching Option . . . . .	25
4-12 Pentaconta DP/1D Option . . . . .	26
5-1 Flow Chart for DTMF Outpulsing Option. . . . .	28
7-1 688 ANA Option Switch Location . . . . .	33

## LIST OF DRAWINGS

	Page
Assembly Drawing 44167940. . . . .	38
Assembly Drawing 44031550. . . . .	39
Dual Position Shelf Drawing 44167710 . . . . .	40



## MODEL 688

### AUTOMATIC NUMBER ANNOUNCER (ANA)

#### 1.0 GENERAL DESCRIPTION

1.01 This manual describes the operation and installation of the 680 Series, Automatic Number Announcer (ANA) Model 688. See Figure 1-1.

The ANA is designed to identify unknown subscriber stations or lines. The ANA will provide the calling craftsperson or cable pair system with a voice response or DTMF signals of the corresponding telephone number. With the DTMF feature the 688 will provide line identification in DTMF signals to cable pair test systems (i.e., Communications Technologies Corp. (CTC) CAS Model 2000, DAVAR, 3M MACS 3000 or Microcomputer Systems Model 575) enabling printout of the cable pair line number. (See Section 5.1.)

The Model 688 ANA is totally solid-state and is microprocessor controlled. The 688 is designed to plug into AT&T type Metallic Facilities Terminals (MFT), 5A Reg Bays with adapter optional rack mount shelf or portable case. The ANA can be configured to a wide variety of offices, including most step by step, crossbar, digital and electronic central offices.

The 688 requires a dedicated CAMA ANI or TSPS outgoing trunk, or its equivalent in electronic or digital offices. The trunk must be capable of forwarding CAMA or TSPS format calling number ANI in MF form to the ANA. Access to

the trunk should be through a dedicated routing code, which becomes the access code.

The 688 ANA can also be optioned for security access. When using this feature, outside calls require dialing the access code and a security code. Inside loudspeaker calls require dialing just the access code, or the access code plus the digit "1" and any 3 digits.

Security codes can be programmed locally, or remotely by the Telco. When using remote security access, the Telco would call a standard subscriber type telephone number dedicated to the 688 ANA. Utilizing a Touch-Tone<sup>®</sup> telephone, the Telco would enter or change the security code as required.

The 688 ANA interfaces with a wide variety of central offices, Figure 1-2 shows a typical co-ANA interconnect, exact terminology differs widely in the telephone industry, but the blocks shown exist in some form in all systems. The specialized usage of a dedicated CAMA ANI outgoing trunk (OGT) gives the access to calling number information normally used for toll billing purposes.

#### 1.02 SPECIFICATIONS

The specifications of the 688 Automatic Number Announcer are given in Table 1-1. All signal and voice inputs and outputs of the 688 are protected from accidental battery and ground shorts.

<sup>®</sup>Registered Trademark of AT&T

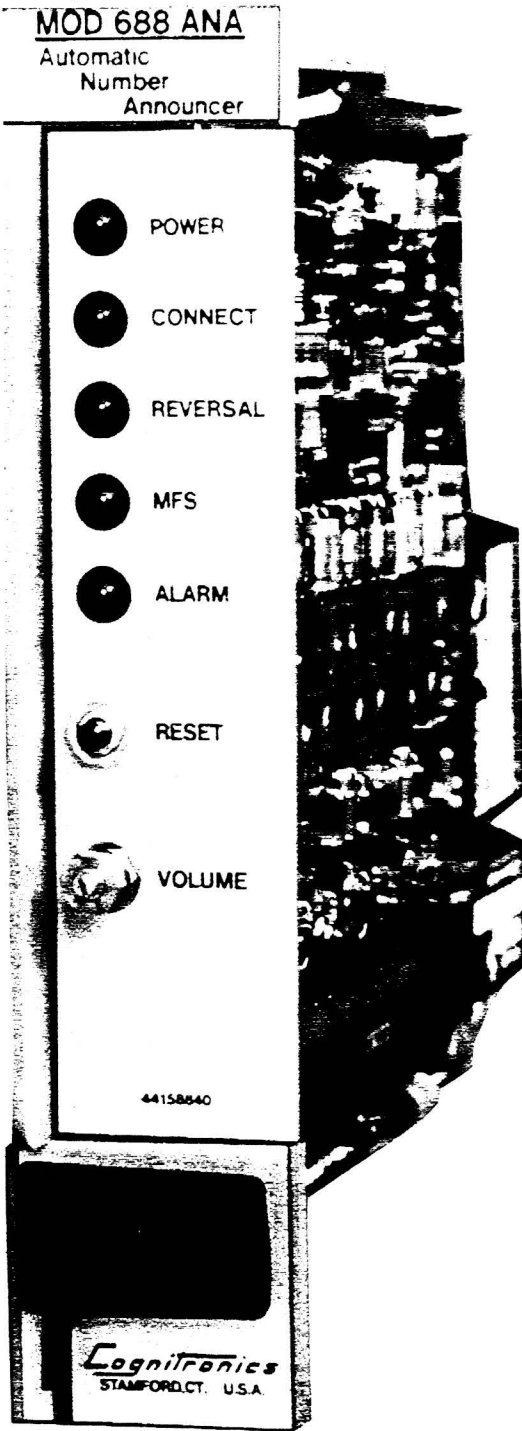


FIG 1-1  
Model 688 ANA

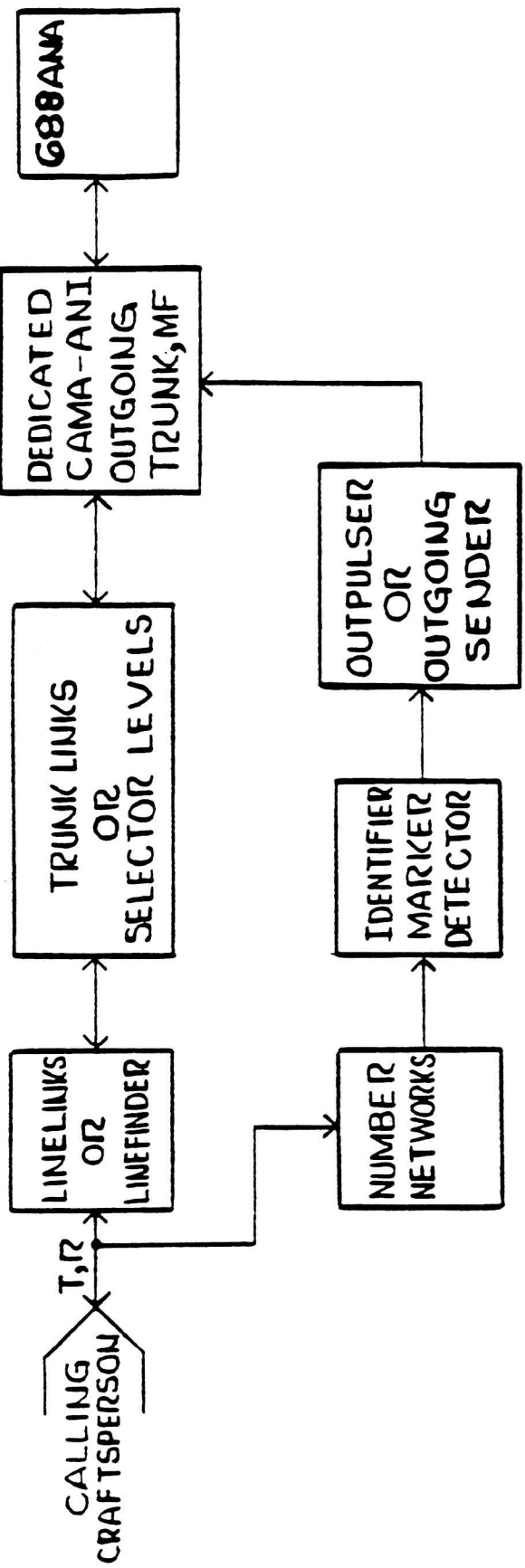


FIG 1-2  
TYPICAL C.O.-ANA INTERCONNECT

Table 1-1. Specifications

Input Voltage	-48VDC $\pm$ 10% Reverse Polarity Protected
Maximum Current	.5 AMPS (Fuse Externally at 1 1/3 AMPS)
Trunk Interface	Loop or E&M, 600 or 900 OHMS
MF Signalling	CAMA 2/6 Code
MF Level Input	-7 DBM to 0 DBM $\pm$ 2 DBM
MF Format	Standard Bell System CAMA or TSPS Format
Warning Tones	Internally Generated OFT and NST, for ANI Failure and ONI Calls
Voice Output Routing	Tip and Ring or Inside Loudspeaker
Voice Output Level	0 DBM @ 600 OHMS or 900 OHMS (Factory Preset, Field Adjustable)
Voice Frequency Response	300 Hz - 3 kHz
Security (Optional)	4 Digit, 3 + 7 Digit or Dual Start
Security Program	Local and/or Dial-Up Remote
Remote Security Dial-Up Specifications	Ring Frequency: 15 to 68 Hz Ring Voltage: 46 to 120 VAC (RMS) Loop Current: 23 MA @ 1200 OHMS 53 MA @ 0 OHMS DTMF Minimum Sensitivity: -10 DBM, 48 MV
DTMF Outpulsing	Provides DTMF Signals to On-Line Cable Pair Identification Test Systems
LED Indicators	Power, Connect, Reversal, MF/Option Error and Alarm
Dimensions	9 3/8" D x 7 7/8" H x 1 5/8 W
Mounting	Directly Plugs Into AT&T Type Metallic Facilities Terminal (MFT) Bay, 5A REG Bay (Requires 5A REG Adapter) or Optional 2 Position Rack Mounted Card Cage
Weight	Card Version - 2 lbs. Rack Mount Version - 12 lbs.
Operating Environment	Temperature: 0 $^{\circ}$ - 55 $^{\circ}$ C Humidity: 5% - 95% (non-condensing)
Bell CLEI Identification	688 Voice only: XCNAH002AA 688 Voice/DTMF 600 OHM XCNAK032AA 688 Voice/DTMF 900 OHM XCNAK042AA 5A REG Adapter: XCNAJ002AA

## 2.0 SIGNALLING

2.01 To accomplish its purpose, the ANA must utilize the signalling normally found in the telephone central office. This section presents a review of some of the signalling terminology and protocols used in the industry, and which are relevant to the operation of the ANA. The ANA typically appears to an Automatic Number Identification OGT as the called end or signalling circuit that the trunk would normally be attached to.

### 2.02 ON-HOOK AND OFF-HOOK SIGNALLING

The terms On-Hook and Off-Hook are used to designate the two signalling conditions of a trunk. Generally, if a trunk is not in use both ends are signalling on-hook. Seizure of the trunk at the calling end usually initiates an off-hook signal toward the called end. The called end will normally answer the calling end by returning an off-hook indication. These signals are often referred to as supervisory signals or "Supervision". Combinations of these signals in specific sequences can convey additional control or numeric information.

### 2.03 CONNECT (SEIZURE) AND DISCONNECT

A connect signal is a sustained off-hook signal transmitted toward the called end of a trunk following its seizure. It indicates a request for service by the calling end, and continues as long as the connection is held. Momentary interruptions are ignored as far as the connect and disconnect functions are concerned.

A disconnect signal is an on-hook transmitted toward the called end which exceeds a minimum on-hook interval of about 200 milliseconds

(ms.) it indicates that the established connection is no longer needed by the calling end, and should be released.

### 2.04 ANSWER (OFF-HOOK) AND HANG-UP (ON-HOOK)

A sustained off-hook transmitted toward the calling end usually indicates an answer condition from the called end. The ANA may be arranged to maintain a sustained on-hook condition, required by some systems.

A sustained on-hook signal from the called end toward the calling end usually indicates idle state. It also indicates that the called end is no longer active, and that the calling end should disconnect, or "hang up".

### 2.05 REVERSALS (INSTALLER SELECTABLE)

ANI outgoing trunks may require additional signalling to facilitate the initiation of transmission of called and/or calling number information to the called end (ANA). There are several methods to accomplish this, referred to collectively for ANA discussion purposes as reversals.

### 2.06 SINGLE REVERSAL OPERATION (ON-OFF-HOOK)

Single Reversal is simply an answer signal (off-hook) returned by the called end (ANA) to the calling end (OGT) in response to seizure. The trunk may then forward the ANI information. This mode is commonly used in Step-X-Step offices and is required when using 4 digit security option with these offices.

### 2.07 WINK OPERATION (ON-OFF- HOOK)

In Wink Operation, the called end (ANA) returns an on-hook to off-

hook to on-hook signal to the calling end in response to seizure. The duration of the off-hook interval is selectable in the ANA. AT&T practice specifies a minimum interval of 140 ms. Intervals of 160 or 280 ms. are available in the ANA. Following the wink the OGT may forward ANI information to the ANA.

In this mode of operation, the called end (ANA) remains on-hook for the duration of the call. Therefore, a positive hang up request cannot be exerted by the ANA. The calling craftsperson must initiate the disconnect sequence to release the ANA. This mode is used by some non-Bell E&M systems, previously called "E&M Pulse".

Note: This signalling arrangement cannot be used with security options.

#### 2.08 DOUBLE REVERSAL OPERATION (On-Off-On-Off Hook)

The Double Reversal sequence consists of a wink, followed by an off-hook transition, which requests the ANI spill. Timing between transitions is selectable as in Wink Operation.

This mode of operation is used in some crossbar and common control central offices.

Note: This signalling arrangement cannot be used with digital or electronic central offices or with security options.

#### 2.09 WINK/REVERSE OPERATION

The Wink/Reverse sequence allows input of both called and calling number information into the ANA. It consists of a wink, called number outpulsing, a reversal to off-hook, and calling number outpulsing. This mode of operation

is frequently required in electronic or digital central offices and is required with security options in these offices.

#### 2.10 LOOP AND E&M DC SIGNALLING

On and off hook signalling functions appear electrically as conditions of voltage, current and/or resistance on trunk circuits. DC signalling methods fall into two general classes, Loop or E&M.

#### 2.11 LOOP SIGNALLING

Loop signalling utilizes a two wire metallic connection between the calling and called ends of the trunk. The loop signalling circuit is usually an integral part of the trunk circuit. While several forms of loop signalling exist, the most common is "Reverse Battery Signalling". This is the method used by the ANA. In reverse battery loop operation, signalling from calling to called end is open (on-hook) or closed (off-hook) trunk loop conditions. Signalling from the called to calling end is accomplished by reversing the polarity of the battery and ground feeds for the loop over Tip and Ring. The ANA will supply battery feed on Ring in on-hook (idle) condition. In systems requiring idle battery on Tip, simply reverse Tip and Ring connections.

#### 2.12 E&M SIGNALLING

E&M Signalling is primarily used between trunk equipment and separate signalling circuits. The ANA, when configured for E&M operation, appears as the signalling circuit. Tip and Ring leads carry only voice band signals. The M lead transmits battery signals to the ANA. The E lead receives ground signals from the ANA. The ANA will also accept 4 wire transmission E&M trunk circuits utilizing A and B leads.



### 2.13 E&M TYPE I

The historic E&M interface used in electro-mechanical offices is also known as the E&M Type 1 interface. A simplified interface circuit with signalling states is shown in Figure 2-1.

### 2.14 E&M TYPES II & III

These variations of the basic E&M arrangement were developed for electronic offices. Since the basic signalling functions are identical, the ANA can be used with these interfaces as shown in Figure 2-2.

### 2.15 MULTIFREQUENCY AC SIGNALLING

AC signalling includes all in-band tone signalling over a trunk circuit's Tip and Ring leads. These include multifrequency pulsing to the called end and all call disposition signals returned from the called end.

The multifrequency pulsing system consists of transmitting and receiving equipment for transferring valid number information over a dedicated trunk using combinations of two of six frequencies in the voice bank. This allows 15 combinations, 10 for digits, and 5 for control functions. Figure 2-3 tabulates the tones, valid combinations and protocols for called and calling number information in CAMA ANI format. Note that all valid number transmissions start with KP and end with ST, STP, ST2P, or ST3P. The ANA, unless otherwise noted, will accept any of these four ST signals.

The short notation listed in Figure 2-3 is a carry-over from pre-

vious AT&T and ANA documents, and is included for reference purposes.

Many electronic or digital offices cannot be programmed to send only the calling number. Therefore, the ANA will accept a called number if it is sent. The actual digits of the called number may be deleted by the switch thus sending only KP and ST before sending the calling number.

### 2.16 AUDIBLE TONE SIGNALS

These signals give information to the user regarding the progress or disposition of a call from the ANA. The ANA utilizes two tones which are internally generated.

#### OFT (Overflow Tone)

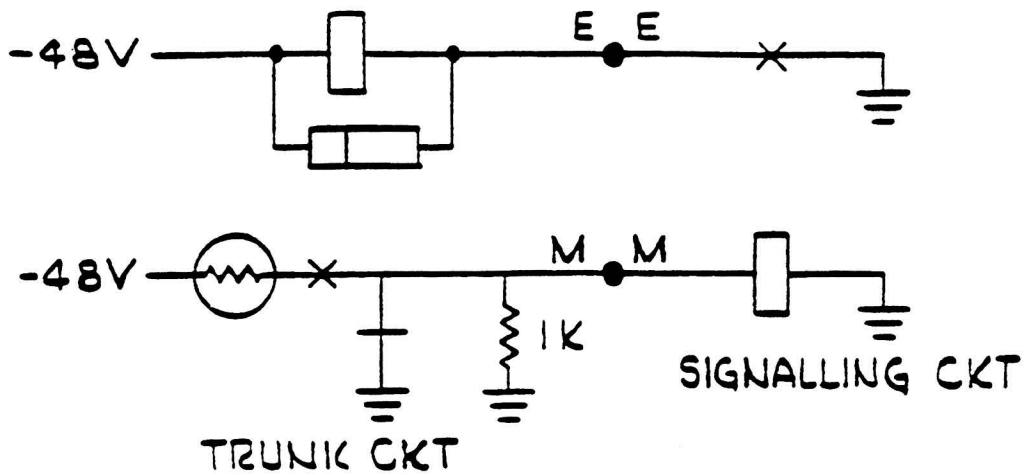
Normally 480 + 620 Hz interrupted at 120 IPM. This tone is used to indicate the following conditions:

1. MF failure, timeout, improper sequence.
2. ID is 2 or 5 (ID processing option required).
3. End of call.
4. Invalid security code entry.

#### NST (High Tone)

Normally 480 Hz tone. This tone is used as follows:

1. Wait tone for Speaker Gating option.
2. ID is 1, 4, or 7 (ID processing option required). NST is output for 2 sec. then OFT for 10 sec.



### SIGNALING STATES

	ON HOOK	OFF HOOK
TRUNK TO SIG CKT (M)	GND	BATT
SIG CKT TO TRUNK (E)	OPEN	GND

FIG 2-1 E & M TYPE I

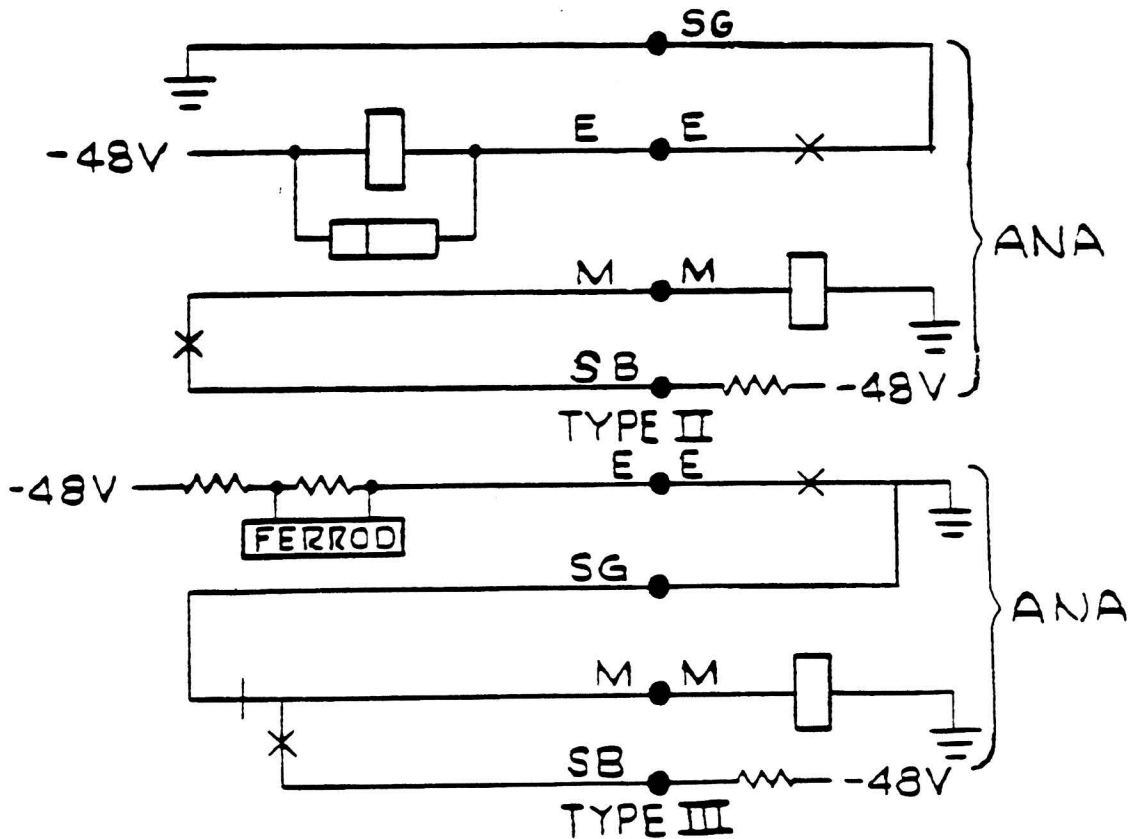


FIG 2-2 E & M TYPE II & III TO ANA

Figure 2-3 Multifrequency Pulsing Information

<u>Digit</u>	<u>Frequencies</u>	<u>Short Notation</u>
1	700 + 900	0-1
2	700 + 1100	0-2
3	900 + 1100	1-2
4	700 + 1300	0-4
5	900 + 1300	1-4
6	1100 + 1300	2-4
7	700 + 1500	0-7
8	900 + 1500	1-7
9	1100 + 1500	2-7
0	1300 + 1500	4-7

<u>Control</u>	<u>Frequencies</u>	<u>Short Notation</u>	<u>Notes</u>
KP	1100 + 1700	2-10	Beginning of a Sequence
ST	1500 + 1700	7-10	End of a Sequence
STP	900 + 1700	1-10	End of a Sequence (TSPS)
ST2P	1300 + 1700	4-10	End of a Sequence (TSPS)
ST3P	700 + 1700	0-10	End of a Sequence (TSPS)

Called Number Format

Note

KP, 0-7 Digits, ST

ST can be ST, STP, ST2P, or ST3P

Calling Number Formats

Notes

KP, 7 Digits, ST

(No ID or Category Digits)

KP, ID, 7 Digits, ST

(CAMA Identification Digit)

KP, CAT 7 Digits, ST

(2 or 3 Category Digits)

CAMA Identification Digit, if ID Processing Option is Selected

<u>Number</u>	<u>Meaning</u>	<u>ANA Action</u>
0,3,6,8,9	Accepted	Voice Response Allowed
2,5	Identification Failure	OFT for 10 Seconds
1,4,7	Operator Identification	NST for 2 Seconds, Then OFT for 10 Seconds

### 3.0 CIRCUIT DESCRIPTION

3.01 The 688 ANA is totally solid-state and is microprocessor controlled. The following paragraphs describe the ANA's internal operation.

#### ANI Interface Section

The ANI Interface provides the system control for the ANA. In addition to system control, it provides audio switching.

#### I/O Section

The channel I/O section operates with a loop or E&M ANI trunk. This section also provides the selector for multiple interface circuits to perform automatic party ID with a Western Electric SXS trunk.

#### Audio Section

The Audio Section converts a digital data stream from the Speech/Processor into analog speech for voice announcements.

#### MF Receiver

The MF Receiver is a central office grade 2-of-6 CAMA receiver. The ANI control logic also provides a time-out function for the receiver. If 5 seconds elapse while waiting for KP, or 2 sec-

onds for any other tones, a time-out indication (OFT) will be returned to the user to indicate an incomplete MF spill. The receiver is released and becomes available for another call.

#### Speech Processor Section

The Speech Processor section is a microprocessor controlled, high quality, digital speech generation device. It accepts commands and data from the ANI section. It provides speech data to the ANI interface's audio module from pre-programmed information stored in memory. Internal error tones are also generated by this section.

#### Power Supply Section

The Power Supply section is a commercial switching power supply which converts -48 volt input to +5, +12 V for the ANA electronics. The power supply provides polarity protection, fusing, and additional filtering for the ANA.

#### Remote Security Dial-Up Section

This section allows the ANA to receive remote security changes from a dedicated telephone line via a Touch-Tone telephone. This section contains a ring detect interface with a DTMF tone receiver. See Table 1-1 for specifications.

## 4.0 INSTALLER SELECTABLE OPTIONS

Options which are part of the basic ANA operation are described here. All options are selectable by the installer.

### 4.01 LOOP OR E&M

Choice of Loop or E&M signalling is independent of other options. It is implemented by dip switches on the main board. See Section 2.10 for a detailed discussion of the DC signalling.

### 4.02 REVERSAL OPTIONS

The ANA can be configured to respond to seizure in one of four ways (see Section 2.05).

1. Single reversal (on-off hook).
2. Wink start (on-off-on hook).
3. Double reversal (on-off-on-off hook).
4. Wink/reversal.

Many of the newer digital and electronic offices have their programming structured such that a called number must be sent, even if the digits have been deleted. This usually requires the wink/-reverse method of operation. Figure 4-1 presents the operational sequence for this mode. In the other reversal modes, if a called number of 6 or less digits (7 or less if ID processing is selected) is sent, it is ignored.

### 4.03 ID PROCESSING OPTION

CAMA ANI format for the calling number defines a position for an

Identification digit. If the ID Processing Option is selected, an 8 digit calling number is required. If 8 digits are not received, the calling number is ignored.

The ID digit is checked for validity. If it is valid, voice announcement is allowed. If not, OFT or NST is output over Tip & Ring (see Section 2.16).

Note that if this option is not implemented, a calling number of any form, 7 to 10 digits, is allowed, with the ANI interpreting the last seven digits as the calling number. This is the default condition, and allows ANA usage in systems utilizing no ID, non-standard ID, or category digits.

### 4.04 SPEAKER OUTPUT OPTION

This option causes the voice announcement output to be routed to the C.O. loudspeaker output of the ANA instead of the Tip and Ring. This output can drive a 600 OHM amplified speaker system.

Note: This option is required when using the 4 digit security configuration to allow speaker access and Tip and Ring operation.

### 4.05 WESTERN ELECTRIC STEP-BY-STEP OPTION

This option enables the ANA to perform automatic first or second (Ring or Tip) party identification with W/E SXS systems without common control. These systems normally identify the caller's party on the second digit dialed into the ANI trunk. An interface circuit (selector multiple leads) is provided by the ANA to facilitate

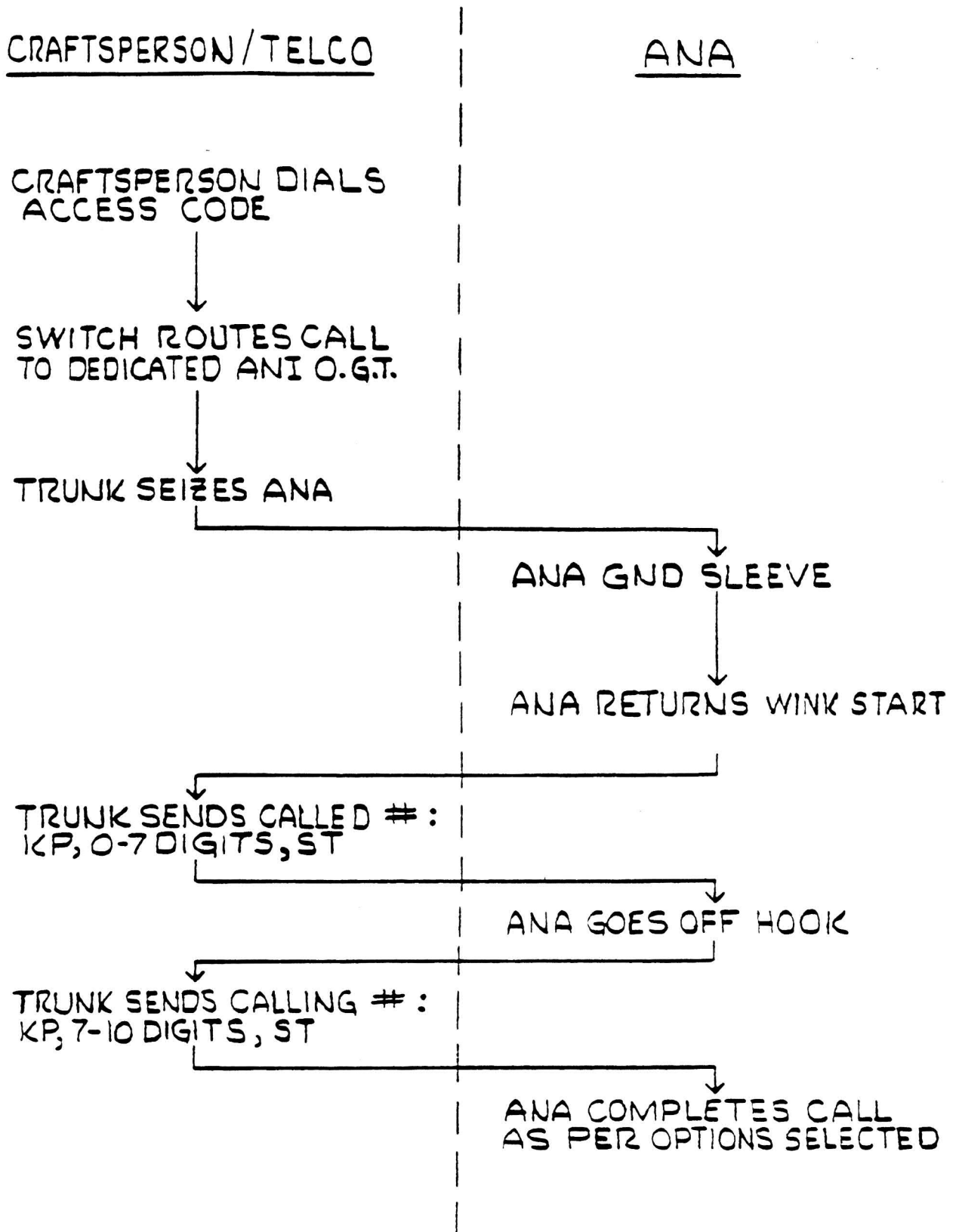


FIG 4-1 WINK/REVERSE FLOW DIAG.

the party ID function. This circuit is usually installed between the selector bank and the ANI trunk and is optional. (See Figure 4-6 for typical connections.)

After the access code is dialed, the craftsperson dials an additional digit, odd if first or Ring party is to be identified, even if Tip or second party is desired. The ANA will apply a Tip Shunt if Tip party identification is required then automatically dial a second digit into the trunk for identification. The remainder of the call proceeds as normal. Figure 4-2 presents the operation sequence for this option.

#### 4.06 REVERSAL TIMING OPTION

The time between on and off hook transitions is selectable in the ANA. Available speeds are 160 ms. and 280 ms.

#### 4.07 SPEAKER GATING OPTION

The Speaker Gating option allows the ANA to share a C.O. loudspeaker with other devices. See Figure 4-3. If the speaker is busy, the blocked caller receives NST as a wait indication. The tone is removed when the ANA acquires the speaker.

#### 4.08 SECURITY OPTIONS

The 688 ANA can be configured in any of three security modes. This allows the ANA to be used by outside as well as inside personnel and still maintain some form of access security.

#### 4.09 4-DIGIT SECURITY CODE OPTION

This security mode allows Telco personnel to utilize the ANA

through the use of a four digit security code. The user dials a three digit access code, followed by a four digit security code. If the security code matches the stored code, the announcement is released over T&R or inside loudspeaker. If it does not match, OFT is returned to the caller.

If the loudspeaker option is selected with the 4-digit security code, the 688 ANA will allow the user to select inside loudspeaker operation or T&R operation depending on the security digits dialed.

For inside loudspeaker operation the user must dial the 3 digit access code followed by the digit 1 plus any 3 digits. Note: Some trunks do not require 4 digits after the access code, therefore, only the 3 digit access is required for inside loudspeaker.

For T&R operation the user must dial the 3 digit access code followed by the 4 digit security code.

Note: When programming the 4 digit security access with this feature, the user cannot enter the digit 1 for the first digit of the security code.

The security code is set on the first call to the ANA over T&R after power-on, reset or by calling the remote security dial-up telephone line. In this way, the craftsperson hears the security code established. Figure 4-4 is a flow diagram for systems which store and forward called number information in MF form. Note that this requires the wink/reverse option.

Western SXS, along with other systems which forward the called

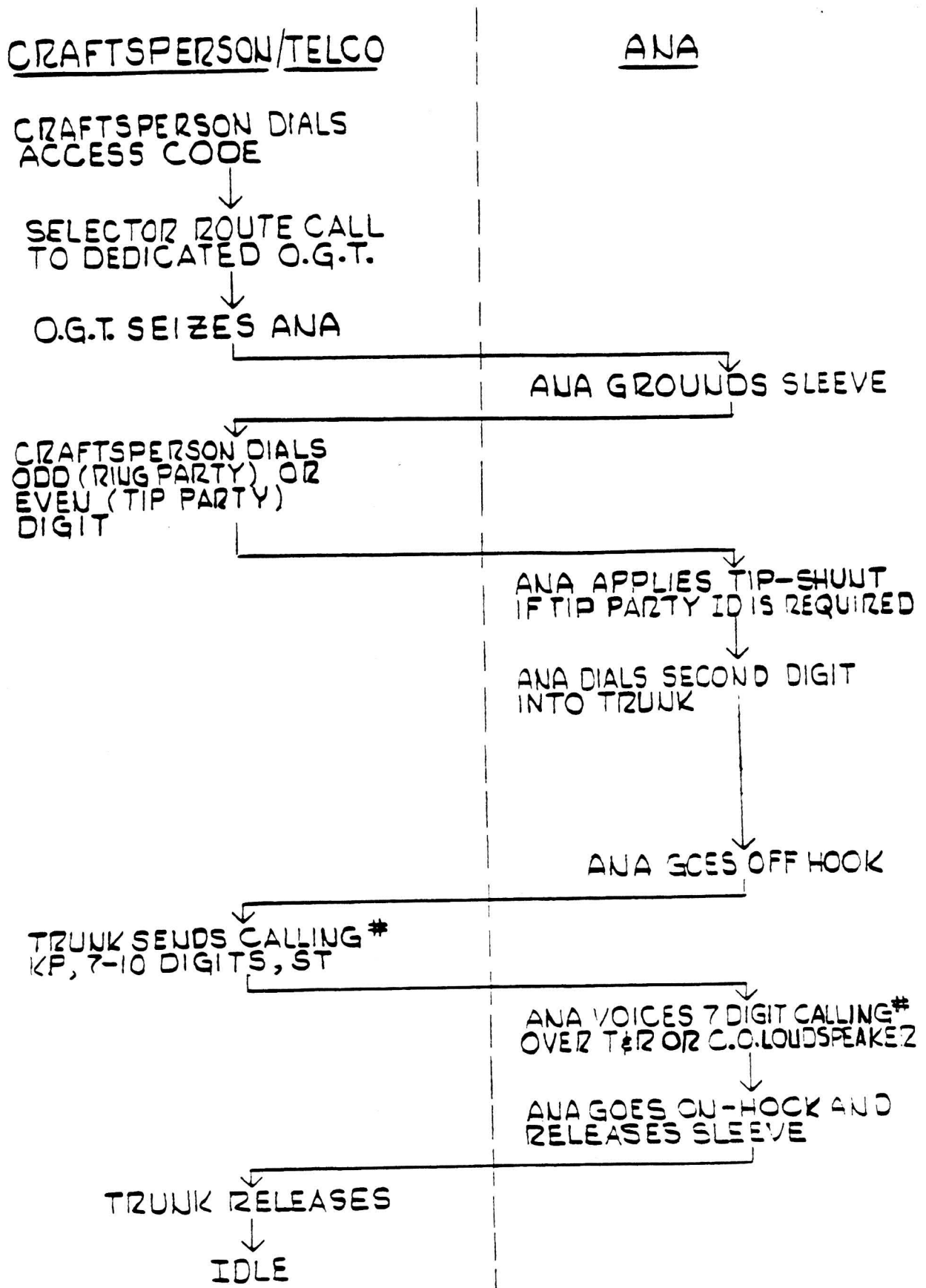


FIG 4-2 W/E S x S FLOW DIAGRAM



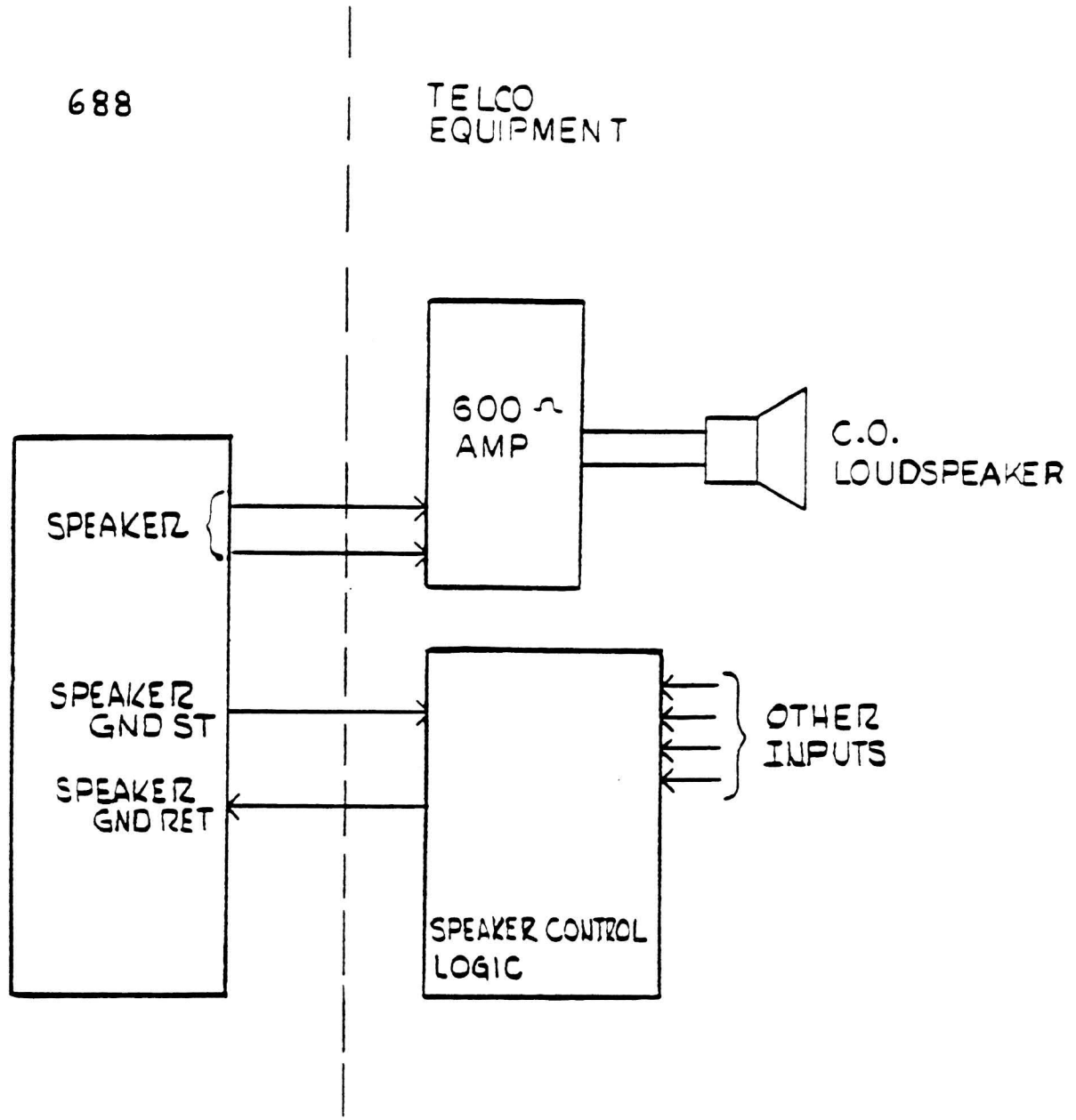


FIG 4-3 GATED SPEAKER CONNECTIONS

CRAFTSPERSON/TELCO

ANA

CRAFTSPERSON DIALS  
3 DIGIT ACCESS CODE  
PLUS 4 DIGIT SECURITY  
CODE (OUTSIDE) OR  
3 DIGIT ACCESS CODE  
PLUS 1 AND ANY 3  
DIGITS\*(INSIDE)

↓  
TELCO TRUNK CONNECTS  
TO ANA

ANA GNDS SLEEVE  
DOES WINK START

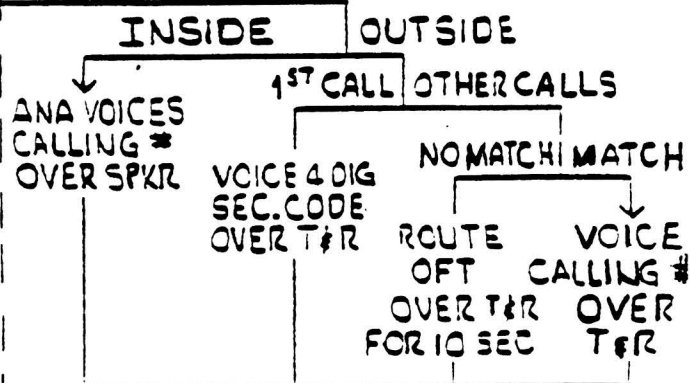
↓  
TRUNK SENDS SECURITY CODE AS  
O-7 DIGIT CALLED # IN MF

ANA GOES OFF HOOK

↓  
TRUNK SENDS  
CALLING # IN MF

NOTE:

\* SOME TRUNKS  
DO NOT REQUIRE  
4 DIGITS AFTER  
THE ACCESS CODE,  
THEREFORE ONLY  
3 DIGIT ACCESS IS  
REQUIRED FOR  
INSIDE LOUDSPEAKER



↓  
ANA GOES ON HOOK,  
RELEASES SLEEVE

↓  
CRAFTSPERSON/TRUNK  
RELEASES

↓  
ANA RETURNS TO  
IDLE

FIG 4-4 4 DIGIT SECURITY FLOW DIAG

number information in dial pulse before any off-hook answer signaling, can also use this type of security. Figure 4-5 shows the flow and Figure 4-6 shows the typical connections of a SXS trunk for this arrangement. Note that this requires Single Reversal Option.

#### 4.10 DUAL ST SECURITY OPTION

Dual ST security utilizes ANI outgoing trunks which can be arranged to accept "0 +" dialing as well as a normal routing. One trunk is then used for both inside and outside access.

Inside users simply dial a 3 digit access code. The trunk then sends the 10-7 ST with the calling number to indicate inside access. The announcement is then routed to the C.O. loudspeaker. Figure 4-7 is the flow diagram for inside operation.

Outside users dial 0 + access code + 7 digit number to be identified. The trunk forwards the 7 digit number as a called number, then sends the actual calling number with a STP, ST2P or ST3P to designate outside access. See Figure 4-8. The ANA will compare the numbers. If they match, NST will be output for 10 seconds before hang up by the ANA. If they don't match, a verification of the caller's identity is required before the voice response of the calling number is released over Tip and Ring.

To verify the caller, the ANA activates (GND) on its talk request line to drive some form of lamp or indicator, and connects the caller's audio path to the secur-

ity talk path. See Figure 4-9. After verifying the caller's identity, the key release line to the ANA must be cycled from open to ground to open. This releases the verification facility and provides the calling number announcement to the caller.

Western Step-by-Step is not supported by this security, as the called number must be forwarded in MF.

#### 4.11 3 + 7 DIGIT OUTSIDE SECURITY OPTION

With the 3 + 7 digit security the outside craftsperson must dial a 7 digit called number after the three digit access. See Figure 4-10. The called number is sent in MF and compared to the calling number. The remainder of the sequence is identical to the Dual ST security outside call described in this section. Note: This option will not function with inside loudspeaker operation.

Western SXS is also not compatible with this security, as a called number must be received in MF form.

#### 4.12 DYNAMIC SPEAKER SWITCHING OPTION

This option sends the voice output to either T&R or Loudspeaker depending on reception of an access code from the trunk. If an access code is received, the ANA will send voice output to T&R. If no access code is received, the ANA will send voice output to the Loudspeaker. Refer to Figure 4-11.

Note: This option can be used only when the following options have been selected.

- 1 - No Security
- 2 - Wink/Reversal
- 3 - Speaker On
- 4 - Dynamic Speaker

#### 4.13 PENTACONTA DP/ID OPTION

This option allows the 688 to interface with an ITT Pentaconta Central Office which forwards 2 identification digits in dial pulse (DP) prior to sending the 7 digit calling line number in MF. This

function should only be selected in Pentaconta offices which can forward MF tones from a dedicated trunk. Refer to Figure 4-12.

Note: This option can be used only when the following options have been selected.

- 1 - No Security
- 2 - Wink/Reversal
- 3 - Pentaconta DP/ID

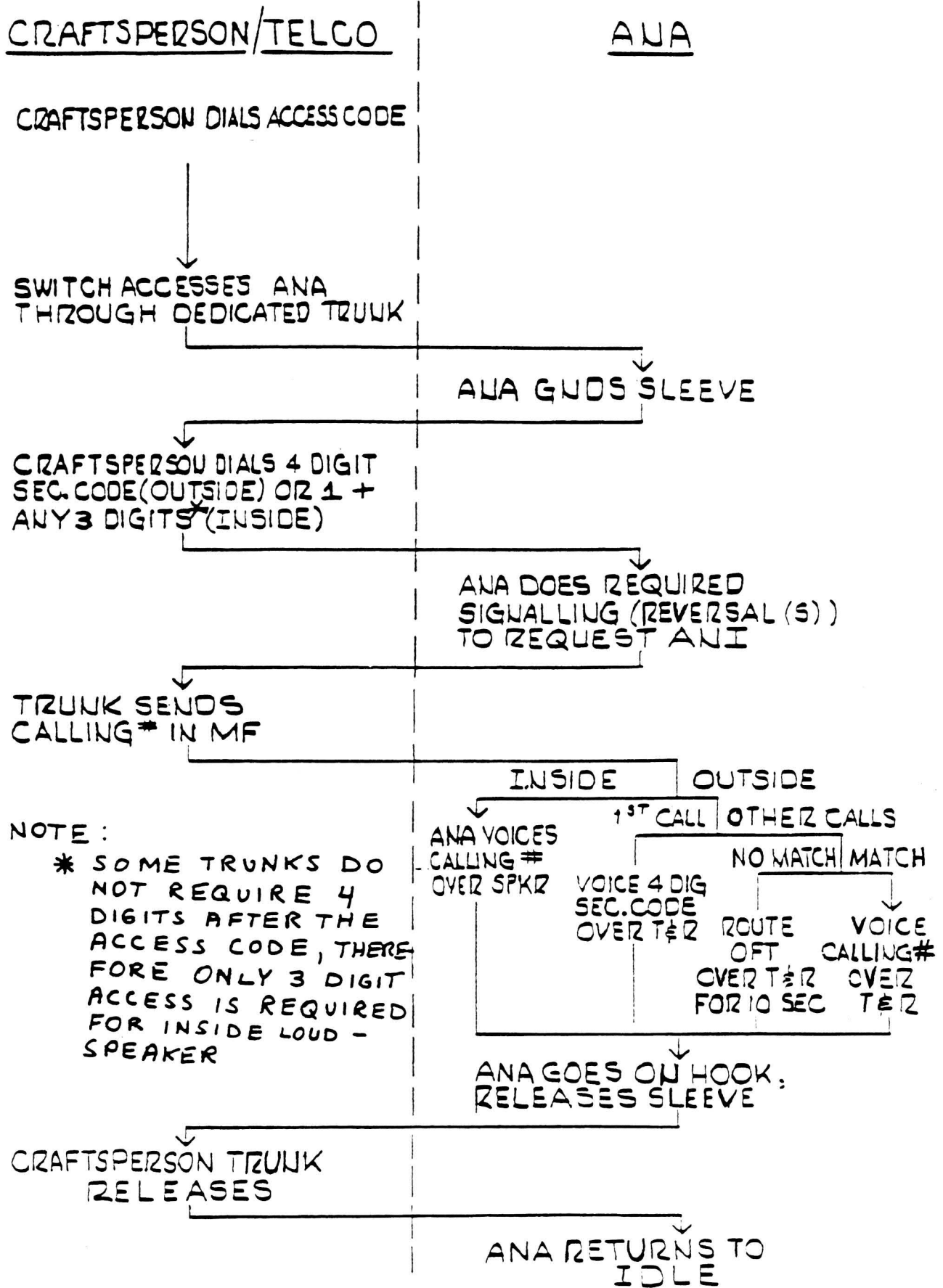
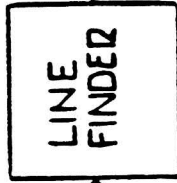
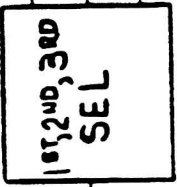
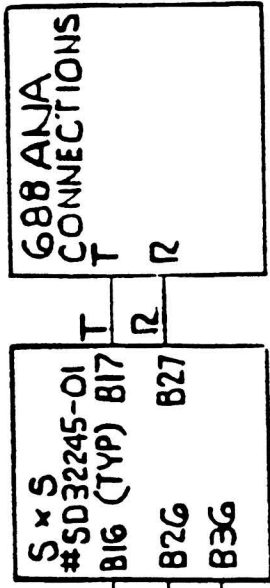


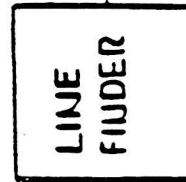
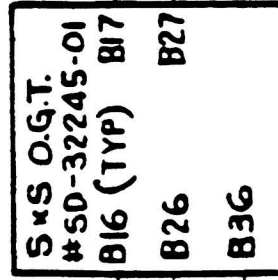
FIG 4-5 4 DIGIT SECURITY CODE. SxS OPERATION

T, R, S, CORRESPONDING TO ACCESS CODE FOR AUTOMATIC PARTY ID



CRAFTSPERSON →

WECO SXS TRUNK CONNECTED TO ANA FOR COMMON CONTROL C.O.



CRAFTS- PERSON →

WECO SXS TRUNK CONNECTED TO ANA FOR NON-COMMON CONTROL C.O.

FIG. 4-6  
WECO SXS TRUNK CONNECTIONS TO ANA

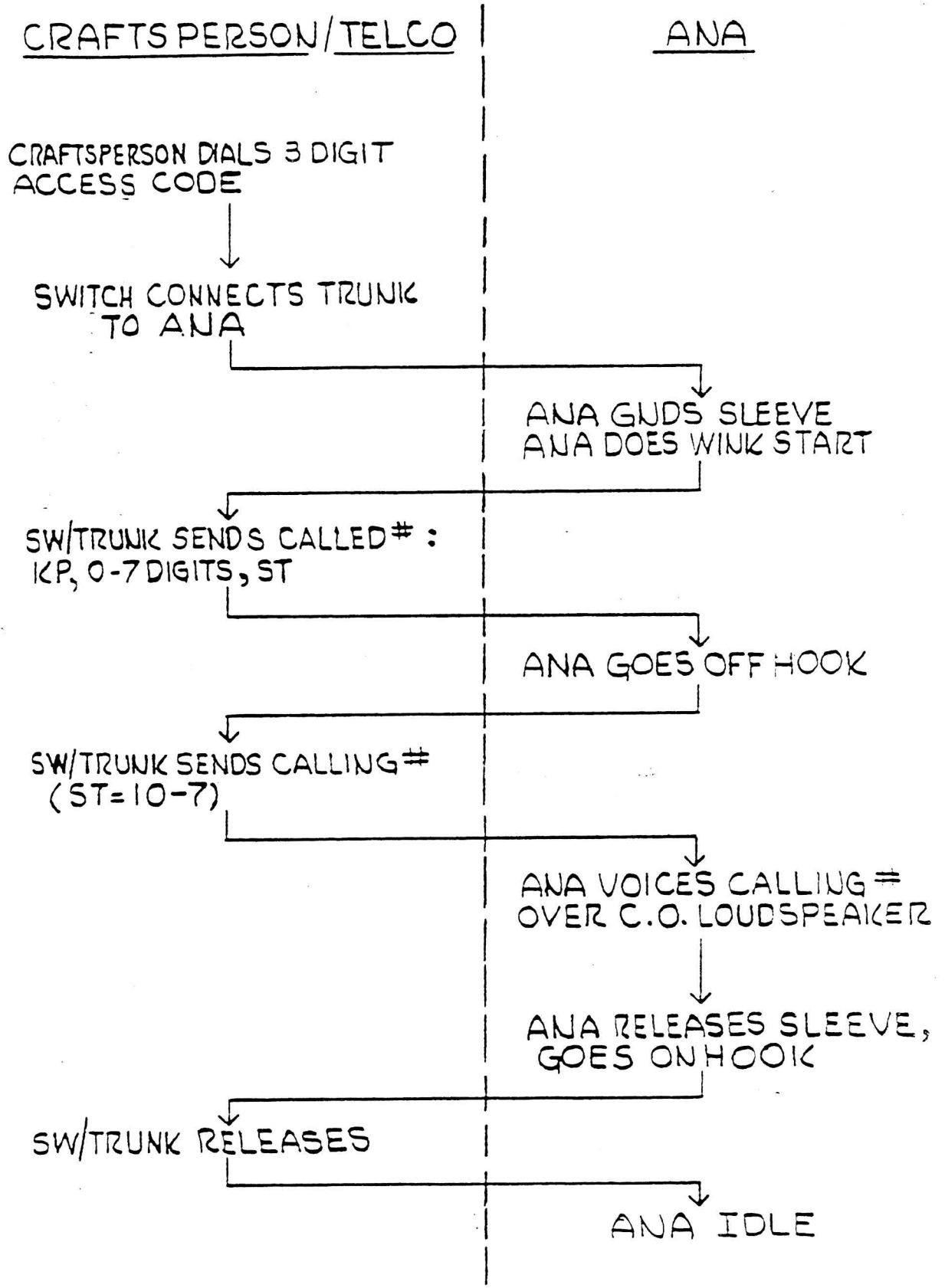


FIG 4-7 DUAL ST SECURITY, INSIDE CALL, FLOW DIAG

CRAFTSPERSON/TELCO

ANA

VERIFICATION OPERATOR

CRAFTSPERSON DIALS  
0+3 DIGIT ACCESS  
+ 7 DIGIT NUMBER

SWITCH CONNECTS TRUNK  
TO ANA

ANA GND'S SLEEVE  
DOES WINK ST

SW/TRUNK SENDS CALLED\*:  
KP, 7 DIGITS, (ST, or  
STP, or ST2P, or ST3P)

ANA GOES  
OFF HOOK

SW/TRUNK SENDS CALLING\*:  
ST=STP, or ST2P, or ST3P

MATCH NO MATCH

WST TO  
T&R FOR  
10 SEC

T&R CONNECTS  
TO TALK-PATH  
VERF. REQ GND

VERIFY CALLER

CYCLE KEY REL  
OPEN-GND-OPEN

RELEASE TALK-PATH  
VERF REQ

VOICE ≠ OVER T&R

RELEASE SLEEVE, GO ON HOOK

RELEASE ANA

IDLE

FIG 4-8 DUAL ST SECURITY, OUTSIDE CALL, FLOW DIAG



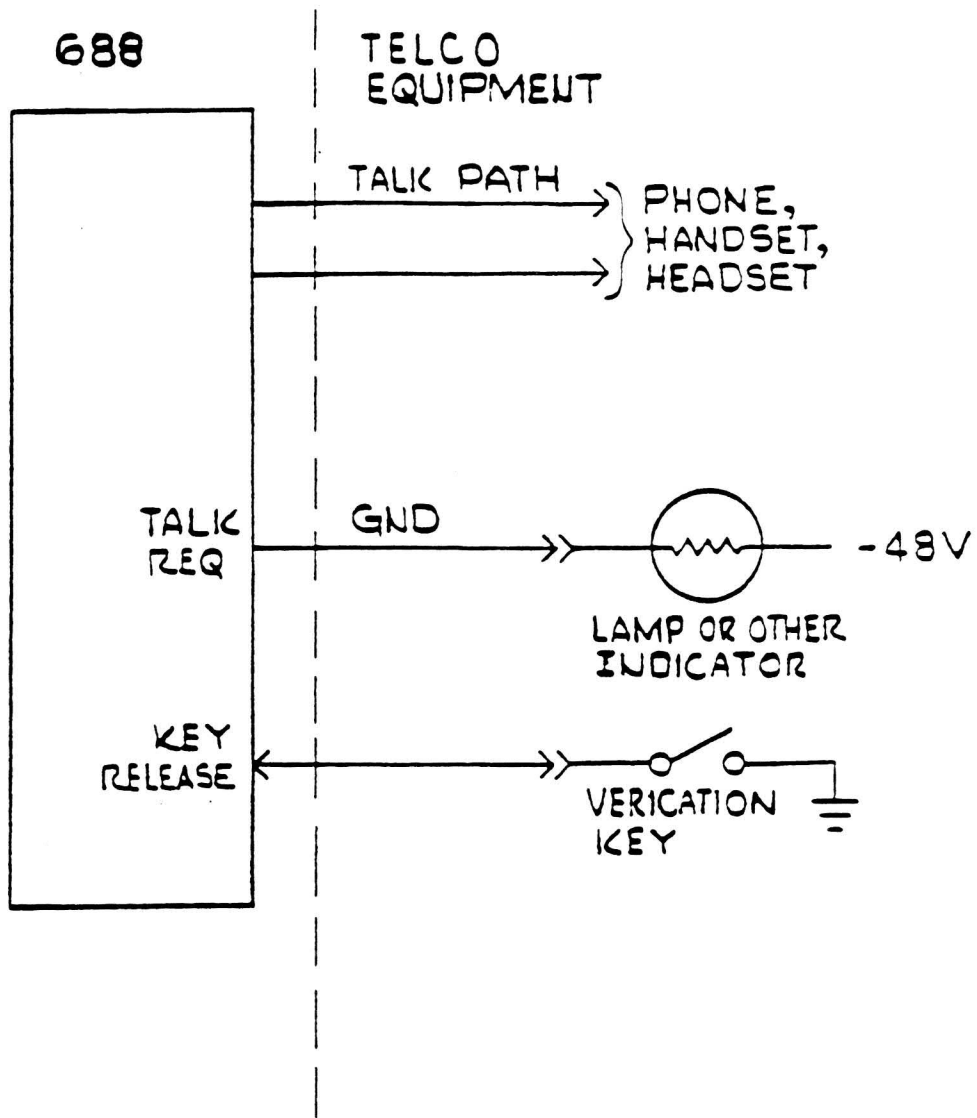


FIG 4-9 DUAL ST AND 3+7 SECURITY VERIFICATION

CRAFTSPERSON/TELCO

ANA

VERIFICATION OPERATOR

CRAFTSPERSON DIALS  
3 DIGIT ACCESS  
+ 7 DIGIT NUMBER

SWITCH CONNECTS TRUNK  
TO ANA

ANA GNDS SLEEVE  
DOES WINK ST

SW/TRUNK SENDS CALLED#:  
KP, 7 DIGITS, ST

ANA GOES  
OFF HOOK

SW/TRUNK SENDS CALLING#:  
KP, 7-10 DIGITS, ST

MATCH NO MATCH

NST TO  
T&Z FOR  
10 SEC

T&Z CONNECTS  
TO TALK-PATH  
VERF. REQ GND

VERIFY CALLED  
CYCLE KEY REL  
OPEN-GND-OPEN

RELEASE TALK-PATH  
VERF REQ

VOICE CALLING#  
OVER T&Z

RELEASE SLEEVE, GO ON HOOK

RELEASE ANA

IDLE

FIG 4-10 3 + 7 DIGIT SECURITY, OUTSIDE CALL, FLOW DIAG

CRAFTSPERSON/TELCO

ANA

CRAFTSPERSON DIALS 3  
DIGIT ACCESS CODE FOR  
T&R OPERATION OR 3  
DIGIT ACCESS CODE FOR  
INSIDE LOUDSPEAKER  
(EXAMPLE: 222 FOR T&R  
OR 220 FOR LOUDSPEAKER)

SWITCH ROUTES CALL TO  
DEDICATED OGT AND  
SEIZES ANA

ANA GND SLEEVE

ANA RETURNS WINK START

TRUNK SENDS CALLED #  
KP, XXX, ST IF T&R, OR  
KP, ST IF INSIDE  
LOUDSPEAKER

ANA GOES OFF HOOK

TRUNK SENDS CALLING # :  
KP, 7-10 DIGITS, ST

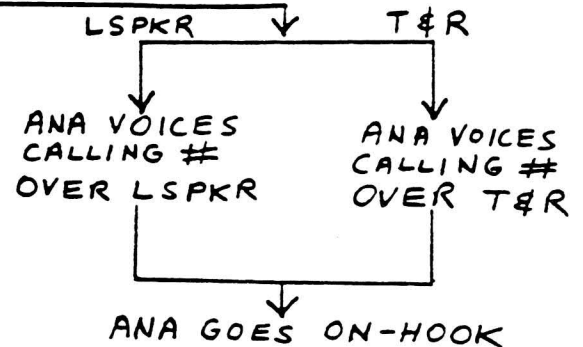


FIG 4-11 DYNAMIC SPEAKER SWITCHING OPTION

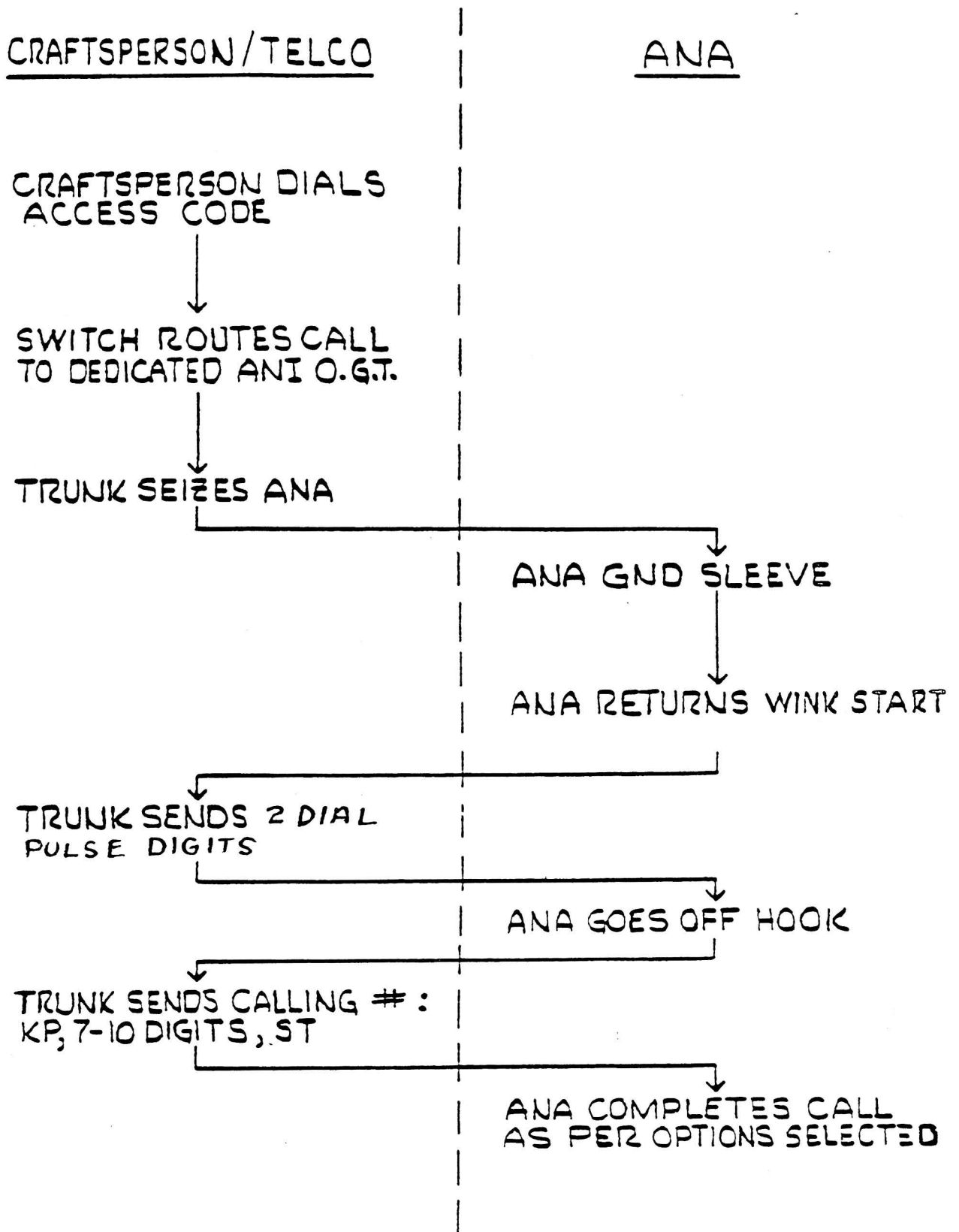


FIG. 4-12 PENTACONTA DP/ID OPTION FLOW DIAGRAM

5.0 FACTORY INSTALLED  
FEATURES AND OPTIONS

5.1 DTMF OUTPULSING FEATURE

The 688 ANA has the capability of outpulsing the 7 digit calling line number in DTMF signals or voice response over tip and ring. This feature is compatible with cable pair identification test systems, i.e.: Communication Technologies Corp. (CTC) CAS Model 2000, DAVAR, 3M MACS 3000 or Micro-computer Systems Model 575. Through a handshake arrange-

ment, DTMF signals are automatically outpulsed to the on-line test set. (See Figure 5-1.)

When installing the 688, the Telco installer should follow the installation procedures as outlined in Section 7 of the manual. All other signalling functions concerning this option are automatic and do not require any special arrangement of the option dip switches.

The installer should also follow the cable test system manufacturer's recommended operating procedure.

DTMF OUTPULSING SPECIFICATIONS

Pulse Width:	75 ms
Interdigit Time:	75 ms
Amplitude:	0 DBM (Factory Preset)
Frequency Accuracy:	1.5% $\pm$ 6 DBM

5.2 600 OR 900 OHM TRUNK  
OPTION

The 688 ANA is factory optioned to match a 600 OHM trunk (P/N 44167940) or 900 OHM trunk (P/N 44179090). No other installer action is required for this option.

5.3 FOREIGN LANGUAGE OPTION

The 688 ANA can be configured with any foreign language. Contact the factory for details.

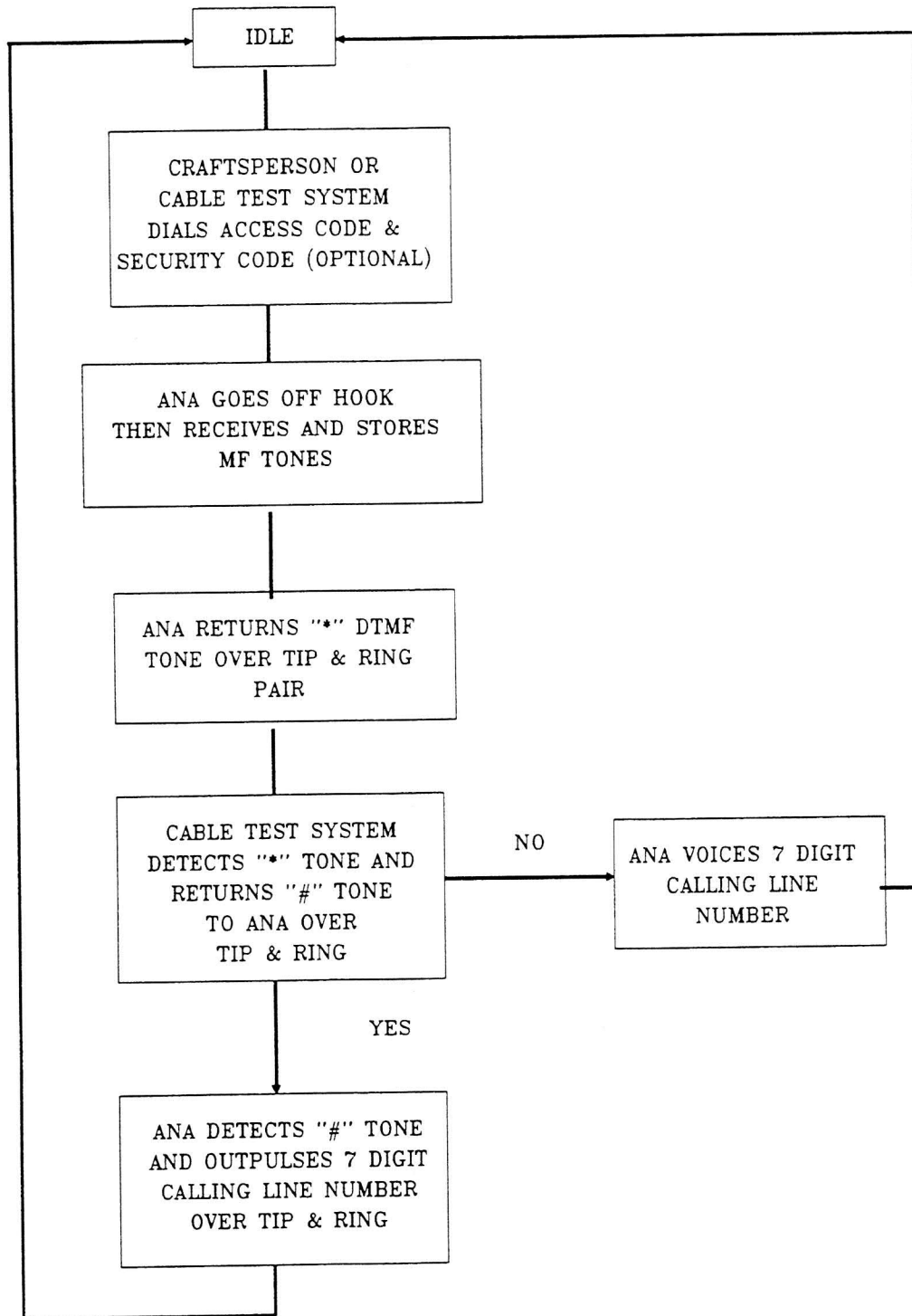


FIG 5-1 FLOW DIAGRAM FOR VOICE/DTMF OUTPUTTING OPTION

## 6.0 VISUAL INDICATORS

The ANA has 5 LED indicators visible through the front panel. They facilitate monitoring of ANA operation and also aid in installation and troubleshooting.

### Power

The Power LED illuminates when internal power and program are functioning properly. Note: The Power LED will not illuminate if the alarm LED is on.

### MFS

The MFS (Multifrequency Strobe) LED is a multi purpose indicator. When the ANA is idle, it will blink at a 2-second on, 2-second off rate. This indicates that the microprocessor is operating properly, and that portions of the speech processor are working.

When the ANA is seized, it will acquire the MF receiver, the MFS LED will then follow Multifrequency Strobes as tones are received from the sending trunk. This shows that the ANI interface is receiving and recognizing some

tones. When the MF receiver is released by a completed sequence or timeout, the LED will return to its idle mode.

Should the MFS LED flash rapidly upon power-up, an illegal combination of options has been selected. This condition can be corrected by selecting the proper option arrangement.

### Connect

The Connect LED confirms incoming seizure from the trunk. This indication is not controlled by the processor and, therefore, is a direct indication of incoming seizure.

### Reversal

The Reversal LED when active, indicates an off-hook condition being signalled toward the calling trunk by the ANA.

### Alarm

The Alarm LED will illuminate on internal power failure and internal program error.

## 7.0 INSTALLATION

7.01 This presents information to facilitate a successful installation of the 688 ANA.

### 7.02 INSPECTION BEFORE INSTALLATION

The 688 is shipped in a protective carton to minimize possible damage during transit. Before unpacking the unit, visually inspect the carton for any damage. Report any damage noted to the carrier.

Perform the following checks before installing the system:

- A) Open shipping carton; inspect system for any shipping damage.
- B) Verify packing slip serial number matches system serial number.

Notify Cognitronics immediately of any problems.

### 7.03 INSTALLER SELECTABLE OPTIONS

The 688 is shipped complete from the factory. However, the installer must select the proper options for the Central Office before installing the system. These options are implemented by DIP switches located on the main board (see Figure 7-1). See Table 7-1 for option selections.

Installation of the ANA is relatively simple as defined in the instructions herein.

The ANA works with ANI equipment. It is compatible with digital Step-by-Step, crossbar, electronic switching. However, all of

these systems must have loop signalling or E&M signalling and be capable of outputting multifrequency tones on an ANI dedicated trunk.

Cognitronics will offer assistance should the installer experience any difficulties with the installation or operation of ANA. Product Support Specialists are prepared to assist, by telephone consultation, at all times. Please call our main telephone number listed in the front of this manual for this assistance.

### 7.04 INSTALLATION - IN MFT BAY

The card edge of the 688 is designed to plug directly into AT&T Metallic Facilities Terminals (MFT) Bays. (See Table 7-2 for connections.) When the connections are made and the 688 is plugged into the slot, the system will power-up automatically. Continue to Section 7.07.

### 7.05 INSTALLATION - IN 5A REG BAY

This requires first mounting a 5A REG Adapter (P/N 43160410) onto the card edge of the 688 ANA and securing the adapter to the board with screws aligned with the holes in the adapter ears. The 688 ANA with 5A REG Adapter as a unit may then be plugged directly into the Bay. (See Table 7-2 for connections.) The unit will automatically power-up. Continue to Section 7.07.

### 7.06 INSTALLATION - IN OPTIONAL RACK MOUNT SHELF

This requires one card cage (P/N 4416710) for each two 688 units, and a pair of rack brackets for each card cage.



<u>For Rack Size</u>	<u>Bracket Pin</u>
19"	62167680
23"	62167690
25"	62185630
26"	62167700

Attach the brackets to the cage, then install that assembly in the rack. Next, you must wire the card cage connectors (see Table 7-2 for the connections). Be certain of proper orientation of the connector. Pin Number 1 is at the lower left of the dual position cage. After verifying the wiring to the connectors, plug in the system and power-up.

Note: Each 688 ANA unit should be fused at 1 1/3 amps and filtered battery is recommended.

#### 7.07 INITIAL START-UP

After the ANA is installed, press the reset button located on the front panel. This will insure program initialization has taken place. The power LED should illuminate and the MFS LED should blink at a 2 second ON, 2 second OFF interval. No other indicators should be illuminated.

Note: If the MFS LED flashes rapidly, an option error condition exists. Unplug the ANA and check the option dip switches for proper selection.

#### 7.08 4 DIGIT SECURITY PROGRAMMING (OPTIONAL)

If the 4 Digit Security option is selected, the installer can program the system using two methods which are described as follows:

#### 4 Digit Local Security

To program or change the Security Code, press the front panel reset button of the ANA. Then make a call using the new 4 digit security code. The ANA will establish the new code and voice it over Tip and Ring. Proceed normally using the new 4 digit code.

#### 4 Digit Remote Security

##### To Program Security

To initially program the 4 Digit Security code, the installer must first assign a standard type telephone number to the 688. Next, using a Touch Tone telephone the installer must call the assigned number. The system will detect ringing on the telephone line and go off-hook within 2 rings. Once off-hook, the ANA will respond to the installer's instrument with 3 short tone bursts. At this point the installer must enter the 4 Digit Security code and the system will then respond with another 3 tone bursts. The installer must then enter again the 4 digit code. The ANA will confirm entry by voicing back the 4 digit code and go on-hook.

##### To Change Security

To Change the 4 Digit Security code, the Telco must call the 688 on the assigned number. After receiving the 3 tone bursts, the user must enter the old 4 digit code and another 3 tone bursts will be heard. Next, the Telco must enter the new 4 digit code, the ANA will confirm entry by voicing back the 4 digits and go to on-hook.

Note: If no entry or invalid Touch Tone entry is received, the ANA will time-out or abort and go on-hook. All entries must be made within 10 seconds after prompting tones.

#### 7.09 TEST CALL - VOICE VERSION

The 688 ANA at this point is now ready for a test call. Upon dialing the access code and security code (optional) verify the ANA for proper operation. The connect LED indicator should light. The proper reversal sequence should be visible on the reversal LED. The MF spill should be visible on the MFS LED. Audio should be heard over Tip and Ring or loud-speaker. If the audio must be adjusted, insert a small screwdriver on the front panel volume pot and make the adjustment accordingly.

#### 7.10 TEST CALL-DTMF OUTPULSING VERSION

The 688 ANA is now ready for a test call. The cable pair test system should dial the access code and security code (optional). Next verify the ANA for proper operation, the connect LED indicator should light. The proper reversal sequence should be visible on the reversal LED. The MF spill should be visible on the MFS LED. The 7 digit calling line number should be visible at the cable pair test system.

Note: If the 4 digit security option is selected with this arrangement, the first call to the system after power-up or reset will set the security code. The ANA will establish the security code and will outpulse the 4 digit code to the cable test system.

#### 8.0 SELF-TEST DIAGNOSTIC FUNCTIONS

8.01 The 688 ANA is equipped with an internal self-test diagnostic program. If certain components fail, the alarm relay will output and the alarm LED will light on the front panel. If this condition exists unplug the ANA and re-install. If the alarm condition still exists the ANA should be returned for repair.

Note: It is recommended that the customer return the defective system to Cognitronics Corporation for servicing, due to the special test equipment and parts required.

For repair and return procedures, see Section 10.

#### 9.0 SPEECHMAKER WARRANTY

Cognitronics warrants their SPEECHMAKER products to be free from defects in material and workmanship under normal use and service for a period of eighteen (18) months after date of shipment.

Cognitronics' sole obligation under the warranty shall be to repair or, at its option, replace free of charge, excepting transportation, postage and/or insurance costs, any articles or parts thereof, which Cognitronics, upon inspection, shall determine to have been defective upon return of the equipment to the factory.

The warranty shall not cover any article subjected to misuse, neglect or accident or which shall have been altered in such a manner as to affect adversely its performance, stability, or reliability. The warranty set forth is exclusive and in lieu of all other warranties expressed or implied, by operation of law or otherwise.

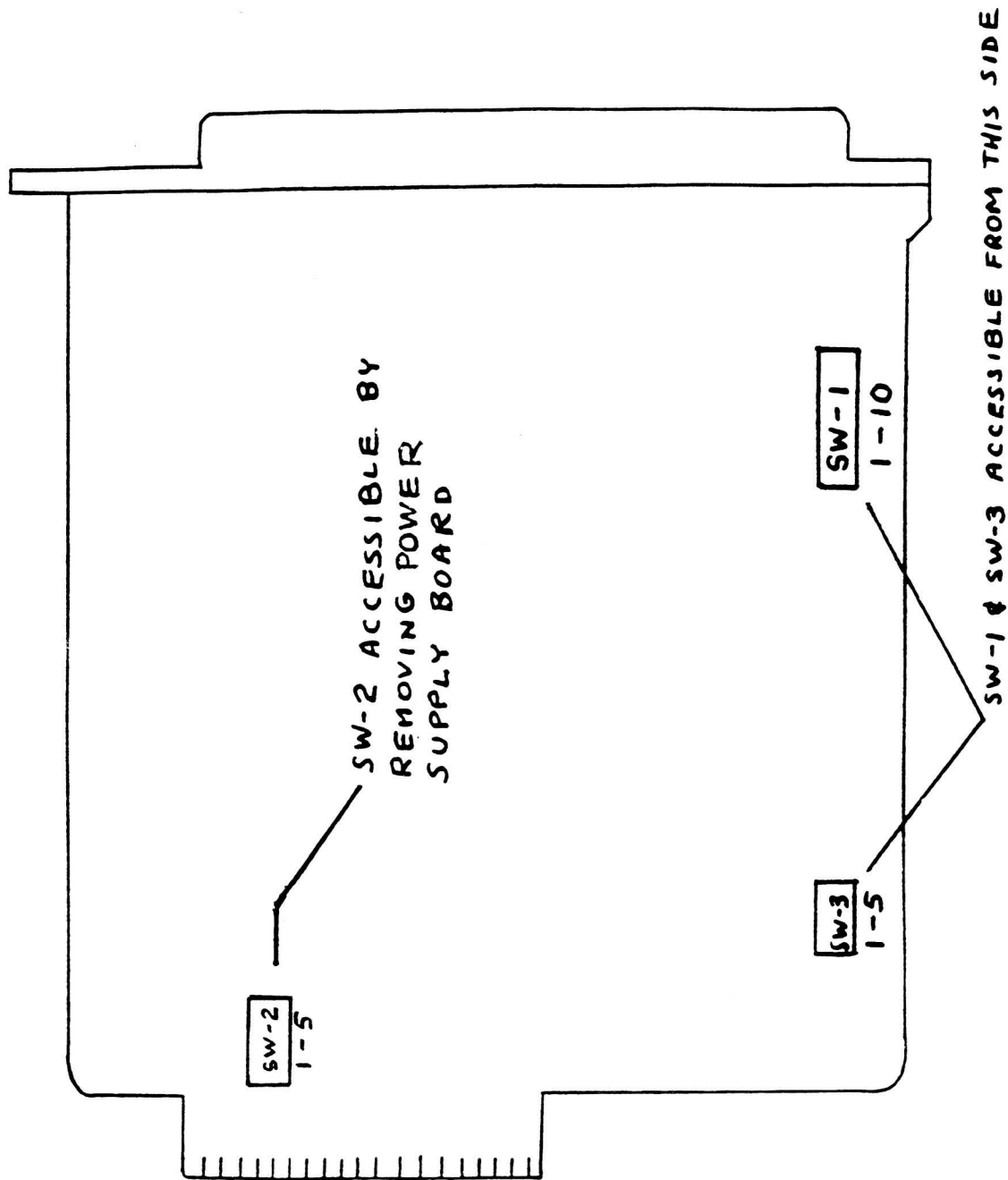


FIG. 7-1 688 ANA OPTION SWITCH LOCATION



EXAMPLE  
of Switch  
Positions

Table 7 - 1  
Function of Option Switches

X = ON

MODE	FUNCTION	SW-3					COMMENTS
		1	2	3	4	5	
Trunk Signalling	Loop (Reverse Battery)				X	X	For loop outgoing trunk
	E&M Type I & III	X					For E&M Type I or III outgoing trunk
	E&M Type II						For E&M Type II outgoing trunk
	E&M with AC Load on T&R	X	X	X			Inserts .47 UF capacitance across Tip & Ring

Dynamic Speaker Switching	ON	SW-1					COMMENTS
		5					
		X					a) Wink/Reversal function must be selected b) Do NOT select with security options c) Do NOT select for exclusive inside loudspeaker
	OFF						

Security	No Security	SW-1			SW-2			COMMENTS		
		1	2	3	1	2	3			
										a) Function must be selected with dynamic speaker switching (See section 4.12) b) SW-2, position 3, is factory preset to the ON position
			X						X	SW-2, position 3, is factory preset to the ON position
	3 + 7 Digit	X	X	X	X	X	See section 4.11 for clarification			
	Dual Start	X	X	X	X	X	See section 4.10 for clarification			

Reversals	Single reversal On-Off Hook Wink/Reversal See section 4.02  Wink Start On-Off Hook Double Reversal On-Off-On-Off-Hook	SW-1		COMMENTS		
		9	10			
			X		X	Must be selected when using 4 digit security option with SXS office a) Must be selected when using security with X-bar, ESS or digital office b) Must be selected with Dynamic Speaker Switching and Pentaconta DP ID Option
			X			a) Do not select for digital or ESS office b) Do not select with security option a) Do not select for digital or ESS office b) Do not select with security option

Continued next page

Reversal Timing	160 MS	SW-1 8	Select for normal reversal timing
	280 MS	X	Select for longer reversal timing which may be necessary in mechanical offices

Audio Output Routing	Inside Loudspeaker	SW-1 4	<ul style="list-style-type: none"> <li>a) Must be selected when using 4 digit security with output routing over T &amp; R and loudspeaker.</li> <li>b) Select for exclusive loudspeaker.</li> <li>c) Select with dynamic speaker switching option</li> </ul>
	Tip & Ring		a) Select for exclusive T & R operation

Speaker Gating	ON	SW-1 3	<ul style="list-style-type: none"> <li>a) Select if inside loudspeaker with gating</li> <li>b) Requires speaker gating leads from ANA</li> </ul>
	OFF		

ID Processing	ON	SW-1 6	Select for Standard CAMA or TSPS format
	OFF	X	Select only if category digit (2 or 3 digit ID) or no ID central office

WECO Party ID	ON	SW-1 5	<ul style="list-style-type: none"> <li>a) Select if WECO SXS with non-common control C.O.</li> <li>b) Must be selected if Dynamic Speaker Switching option is required</li> </ul>
	OFF		

Pentaconta DP/	ON	SW-1 7	<ul style="list-style-type: none"> <li>a) Select for ITT Pentaconta office with DP ID and MF outpulsing</li> <li>b) Wink/Reversal function must be selected</li> </ul>
	OFF		

Table 7 - 2

## Electrical &amp; Signaling Connections

688 ANA Connection	Optional Cage		WECO MFT		WECO 5A REG	
	PIN	Cage PIN #	MFT Card Cage PIN #	MDF Side	5A REG Card Cage PIN #	MDF Side
-48 VDC	-	11	11	-	15	-
Ground	-	18	18	-	12	-
Tip } Outgoing	AA	17	17	A-T	17	T
Ring } ANI Trunk	Z	19	19	A-R	18	R
T1 } 4 wire	Y	6	6	A-T1	X	
R1 } Transmission only	X	5	5	A-R1	X	
E } Outgoing	T	7 or 24	7 or 24	A-S1	X	
M } ANI Trunk	K	4 or 25	4 or 25	A-S2	X	
Speaker/Amplifier	J	14	14	B-T1	X	
Speaker/Amplifier	H	13	13	B-R1	X	
Remote Security Line-T	C	3	3	B-T	14	T1
Remote Security Line-R	B	2	2	B-R	13	R1
S.G. } Type II & III	U	12	12	B-S1	X	
S.B. } E&M Only	A	10	10	B-S2	X	
Speaker GND Start	N	X	X		X	
Speaker GATE Return	S	X	X		X	
Sleeve-if required	P	X	X		X	
TI-IN } Selector multiple	Q	X	X		X	
RI-IN } leads for WECO	W	X	X		X	
TI-OUT } party ID only	Q	X	X		X	
RI-OUT }	V	X	X		X	
Talk request } Dual start	M	X	X		X	
Key release } & 3+7 digit	R	X	X		X	
Talk path } security	C	X	X		X	
Talk path } only	B	X	X		X	
Alarm (N.O.)	D	X	X		X	
Alarm (Com)	F	X	X		X	
Alarm (N.C.)	E	X	X		X	

X = Unassigned, Telco selectable

Note: The 688 is factory wired to the above connections on the card edge connector. The telco, however, can assign any signalling function to any of the 40 fingers on the card edge connector. This can be achieved by adding or removing jumpers on the wire wrap connectors. (see drawing #44031550 area 93) for wire wrap connector location.

10.0 REPAIR AND RETURN  
PROCEDURE

Send paper work to:

Cognitronics Corporation  
Sales  
3 Corporate Drive  
Danbury, CT 06810-4130

Include the following:

- A) Purchase order number
- B) Ship and bill to address
- C) Name of person to contact
- D) Telephone number of contact
- E) System serial number

Send system to:

Cognitronics Corporation  
Attn: Repair Department  
3 Corporate Drive  
Danbury, CT 06810-4130

Include:

- A) Copy of purchase order
- B) Name of person to contact
- C) Telephone number of contact

Note: Cognitronics will repair the defective system within a three day work period, excluding weekends and holidays provided all necessary paper work is received and in proper order.

11.0 ORDERING INFORMATION

When ordering the 688 ANA the only information that must be submitted is the description and part numbers of the system, options and accessories. The part numbers are as follows:

DESCRIPTION                      PART NUMBER

- A) Model 688 ANA                      44167940  
(600 OHM)  
w/DTMF/Voice  
Outpulsing.  
Provides voice  
response output  
to craftsperson  
or DTMF signals  
to cable pair test  
sets. Plugs into  
AT&T MFT Bay or  
optional shelf.
- B) Model 688 ANA                      44179090  
(900 OHM)  
w/DTMF/Voice  
Outpulsing.  
Provides voice  
response output  
to craftsperson or  
DTMF signals to  
cable pair test  
sets. Plugs into  
AT&T MFT Bay or  
optional shelf.

OPTIONS AND ACCESSORIES

- A) 5A REG Adapter                      43160410  
required with 688  
for 5A REG instal-  
lation
- B) Dual Position                      44167710  
Horizontal Shelf  
required with 688  
for Rack Mount  
installation or  
Portable Case

Specify 1 set of brackets:

- 19" Brackets                      62167680
- 23" Brackets                      62167690
- 25" Brackets                      62185630
- 26" Brackets                      62167700

- C) Portable Case:                      43102860  
(Requires 2 posi-  
tion cage. Maximum  
two, 2 position  
cages.)















