

COOK ELECTRIC DIVISION
MODEL 213400 MULTI-CHANNEL DIGITAL ANNOUNCER
OPERATION AND MAINTENANCE MANUAL

<u>SECTION NO.</u>	<u>TITLE</u>	<u>ISSUE</u>
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MODEL 213400 MULTI-CHANNEL DIGITAL ANNOUNCER
EQUIPMENT DESCRIPTION

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1. GENERAL

1.01 The Cook Electric Model 213400 Multi-Channel Digital Announcer provides four channels of recorded voice messages. The unit's voice storage and reproduction capability utilizes digital encoding and decoding techniques, thus eliminating the use of magnetic storage media, such as tape or drum. The digital announcer is a microprocessor-based unit, and can be configured to provide up to a maximum of 184 seconds for recording of voice messages. The announcer permits local recording of four variable length messages on four separate channels. Total length of the four messages can be no greater than the total length of message memory provided in the equipment. Various options and accessories are also offered to expand the capabilities of the multi-channel digital announcer.

1.02 This section provides the equipment description, specifications, and general operating principles of the Model 213400, plus an explanation of the various options and accessories available.

1.03 References.

- 756-0224-200 Model 213400 Multi-Channel Digital Announcer, Installation.
- 756-0224-300 Model 213400 Multi-Channel Digital Announcer, Operating Procedures.
- 756-0224-400 Model 213400 Multi-Channel Digital Announcer, Maintenance.

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2. DESCRIPTION

PURPOSE OF EQUIPMENT

2.01 The Cook Electric Model 213400 Multi-Channel Digital Announcer (see figure 1) provides four channels of recorded voice messages, utilizing the latest in digital recording techniques. For each channel, the voice message is recorded electronically, stored as digital signals in solid state memory chips, reconstructed and played back on command. The announcer is capable of high quality voice recording and reproduction, which will not degrade with use. Thus, the use of digital recording completely eliminates the use of magnetic tape or drums and the associated electrical and mechanical operating devices.

MESSAGES

2.02 The Model 213400 Multi-Channel Digital Announcer can be obtained with voice message storage up to a maximum of 184 seconds. Variable length messages can be recorded on any of the four channels up to the point where the total length of the four messages will equal the total amount of message storage time available. Thus, a message may be short or long, as necessary. The total length of the four recorded messages may be less than the message storage available, but may not exceed it. If exceeded, a portion of the last message will be cut off. Control signals are provided at the beginning and end of each message interval for control of party

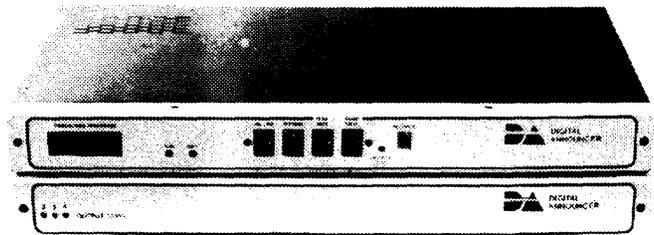


Fig. 1 - Model 213400 Multi-Channel Digital Announcer

cut-through and disconnect on external intercept trunks. Output of voice announcements and control signals for each channel are provided at interface connectors on the rear panels of the announcer.

CONFIGURATION

2.03 The Model 213400 Multi-Channel Digital Announcer consists of two aluminum chassis: (1) the Control Processor (C.P.) Chassis, and (2) the Multi-Channel (M.C.) Chassis. When installed, the C.P. Chassis will be located directly above the M.C. Chassis. The two chassis will be connected by a ribbon cable assembly through rear panel connectors.

2.04 Each chassis is 17.5 inches (445 mm) wide, 12 inches (305 mm) deep, and 1.75 inches (44 mm) high. (When rack-mounted, the two chassis use two rack spaces in the standard relay rack.)

2.05 The Multi-Channel Digital Announcer can be ordered with brackets for mounting to 19-inch (483 mm), 23-inch (584 mm), 26-inch (660 mm), or 28-inch (711 mm) relay racks. Alternate mounting holes are furnished on the sides of the chassis for installing mounting brackets, permitting adjustment of the distance the announcer cases extend out from the front and rear of the rack. The announcer can also be obtained without mounting brackets for table top use, in which case the C.P. Chassis is stacked on top of the M.C. Chassis.

2.06 C.P. Chassis. The C.P. Chassis contains the microprocessor and message memory store, is used to control the announcer, and provides the Channel No. 1 output circuitry. The front panel of the C.P. Chassis provides the main operating controls and indicators for the announcer.

2.07 The multipurpose four digit display shows the following information:

- (a) Channel number and time remaining during recording.
- (b) Channel number and actual recorded message length during playback.
- (c) Channel number and peg count (when requested).
- (d) Alarm messages associated with the announcer's built-in self-diagnostic program.
- (e) Displays channel number(s) accessed when unit is in use (in On Line mode).

2.08 Also located on the front panel are four momentary pushbuttons for function control, four LED status indicators, a modular jack for recording or monitoring, and an output level control for adjusting the output volume of Channel No. 1.

2.09 On the rear panel of the C.P. Chassis, the "J2" opening offers access to the circuit board for the installation of the 20-pin wire-wrap edge connector which provides the power connection to the chassis and the signal Input/Output interface for Channel No. 1. Also provided are a toggle switch for controlling power to the chassis, a DIP switch (S6) for option selection, and a connector for the ribbon cable connection between the two chassis. (Models with Battery Backup option also provide a toggle switch for controlling backup battery power.)

2.10 M.C. Chassis. The M.C. Chassis contains the output circuitry for Channels No. 2, No. 3, and No. 4, and provides three output level controls on the front panel for adjusting output volume of Channels No. 2, No. 3, and No. 4.

2.11 On the rear panel of the M.C. Chassis, the "J2M" opening offers access to the circuit board for installation of the 44-pin wire-wrap edge connector which provides the power connection to the chassis and the signal Input/Output interfaces for Channels No. 2, No. 3, and No. 4. Also provided are a toggle switch for controlling power to the chassis, two DIP switches (S2 and S3) for option selection, and a connector for the ribbon cable connection between the two chassis.

3. SPECIFICATIONS

3.01 Operating specifications for Model 213400 Multi-Channel Digital Announcer are given in table 1.

3.02 Selectable options, factory-installed options, and accessories for Model 213400 Multi-Channel Digital Announcer are listed in table 2; however, the operation and use of some of these items are explained in other sections of this manual.

3.03 Part number ordering information for Model 213400 Multi-Channel Digital Announcer is given in table 3.

4. OPERATING PRINCIPLES

4.01 The Model 213400 Multi-Channel Digital Announcer provides four channels of digitally recorded voice announcements, and consists of two chassis: the Control Processor (C.P.) Chassis and the Multi-Channel (M.C.)

Table 1. Operating Specifications

CHARACTERISTIC	DESCRIPTION
<u>Operational</u>	
Message Length	Basic message capacity is 32 seconds total for the unit, which if divided equally between channels, is 8 seconds per channel. Extra memory can be added to the total message capacity in increments of 16 seconds. In actual practice, message lengths can be different on each channel, up to the point where the total of all four channels does not exceed the maximum message capacity of the announcer.
Peg Count (per channel)	Provides peg count up to 999,999 per channel, overflowing to zero.
Sampling Frequency	32 kHz/24 kHz, selectable by C.P. Chassis DIP switch S6. (Total message capacity with basic 16 chip circuit board: at 32 kHz, 32 seconds; at 24 kHz, 42 seconds.) (See Section 756-0224-300 for selection procedure.)
Message and Control Connections (Wire-wrap Terminals at Channel Interfaces)	
Tip and Ring (per channel)	4-ohm, transformer isolated, MOV protected.
ST+, ST- (per channel)	Start Pulse Input, -BATT or GND start, 16 mA (approx.); level sensitive. ("Level" start or "pulse" start selectable by DIP switch.)
MBY (per channel)	Make Busy Output. Form C Relay contacts. 4A maximum load, 30 Vdc resistive.
C/MC (per channel)	Beginning of Message/Ending of Message Sync Pulse Output, Form C Relay contacts. 250 millisecond duration ± 10 milliseconds. 4A maximum load, 30 Vdc resistive.
ALM (C.P. Chassis only)	Alarm Output. Form C Relay contacts. 4A maximum load, 30 Vdc resistive.
-48 Vdc/GND (each chassis)	-48 Vdc Battery and Battery Ground Input Terminals. (The -48 Vdc line to be jumpered to the two chassis, and fused externally at 4A.)
<u>Electrical</u>	
Input Power	-42 Vdc to -56 Vdc at 1A maximum; each chassis internally fused at 1A, MOV protected. (115 Vac with optional AC Adapters.)
Tip/Ring Output Loading (per channel)	Each channel capable of driving up to two hundred 900-ohm trunks, or up to one hundred-fifty 600-ohm trunks.

Table 1. Operating Specifications (contd)

CHARACTERISTIC	DESCRIPTION
<u>Performance</u> Voice Input Frequency Response Signal to Noise Ratio Distortion Output Impedance (per channel)	Standard telephone headset, handset, or input from cassette recorder, using a modular plug to fit standard modular jack on announcer. (Transmitter 1000 ohms resistance or less, approx. -10 dBm; e.g., Northern Telecom Inc. Type G Handset.) Remote Record option permits voice input from remote pushbutton telephone. 300 Hz to 3 kHz (300 Hz to 2.7 kHz, ± 1 dBm). Greater than 45 dBm, C message weighted. Less than 6% THD (Total Harmonic Distortion) at 0 dBm output, 1 kHz sine wave, -10 dBm input. 4 ohms, transformer isolated.
<u>Environmental</u> Temperature Humidity	Storage: -20° to +70° C. Operating: 0° C to 50° C. Maximum 90 percent relative humidity (non-condensing).
<u>Physical</u> Height Width Depth Weight	Each chassis: 1.75 inches (44.5 mm); one standard rack space. Total: 3.5 inches (89 mm); two standard rack spaces. 17.5 inches (445 mm). Available with brackets for mounting on 19-inch (483 mm), 23-inch (584 mm), 26-inch (660 mm), or 28-inch (711 mm) relay rack. 12 inches (305 mm). Alternate mounting holes on cases permit adjustment of extension in front of and behind mounting surface. 10 Pounds (approx.): both chassis.

Table 2. Selectable Options, Factory-Installed Options, and Accessories

TYPE	DESCRIPTION
<p><u>Selectable Options (DIP Switch Operation)</u></p> <p>SIT (Special Information Tone) Selection</p> <p>Sampling Frequency Selection</p> <p>Start Command Selection</p>	<p>SIT code signals, sent at the beginning of message transmission, are used in some telephone systems to signal equipment for various reporting operations, as determined by the local system. Selection of SIT code generation for each channel is possible with DIP switches on the chassis rear panels. See Section 756-0224-300 for selection procedures. SIT code generation is only available at the 32 kHz sampling frequency.</p> <p>Sampling frequency rates of 32 kHz or 24 kHz are selectable with DIP switch S6 on the C.P. Chassis rear panel. See Section 756-0224-300 for selection procedure.</p> <p>"Level" or "pulsed" start commands are selectable with DIP switch S6 on the C.P. Chassis rear panel. ("Pulsed start" makes the digital announcer compatible with Northern Telecom SL-1 Switch.) See Section 756-0224-300.</p>
<p><u>Factory Installed Options</u></p> <p>Battery Back-up of Message</p> <p>Remote Record Option</p>	<p>With this factory-installed option, the announcer is protected against message loss due to loss of power. Four re-chargeable batteries are included in special circuitry, which will retain the message in memory, even if external power to the unit is lost. Otherwise, a loss of power will cause a loss of messages, requiring re-recording all four channels after power is restored. See table 3 in this section for ordering the announcer with this option. See Section 756-0224-400 for battery replacement procedures.</p> <p>With this factory-installed option, messages can be recorded and monitored from a pushbutton telephone at a remote location. See table 3 in this section for ordering the announcer with this option.</p>
<p><u>Accessories</u></p> <p>Mounting Bracket Kits</p>	<p>The digital announcer may be obtained with mounting brackets furnished, as indicated in table 3 in this section, or mounting brackets may be obtained separately for changing mounting to another rack size. Since the multi-channel digital announcer consists of two separate chassis, two mounting bracket kits are required for each installation. Mounting bracket kits are available as follows:</p> <p>19-inch (483 mm) rack -- Cat. No. 213281-101 23-inch (584 mm) rack -- Cat. No. 213281-103 26-inch (660 mm) rack -- Cat. No. 213281-105 28-inch (711 mm) rack -- Cat. No. 213281-113</p>

Table 2. Selectable Options, Factory-Installed Options, and Accessories (contd)

TYPE	DESCRIPTION
Cassette Adapter Plug Assembly	This accessory adapts the output of a portable cassette recorder to fit the modular audio input jack on the digital announcer, permitting recording of voice announcements from cassette tape. Order Cat. No. 213284.
Handset	Accessory handset has a cord terminated with a modular plug to fit the modular (RJ11) input jack on the digital announcer, for recording and monitoring. Order Cat. No. 213285.
Handset Equipped With Mini-Cassette Jack	Accessory handset has cord terminated with a modular plug to fit the modular (RJ11) input jack on the digital announcer, for recording and monitoring. This handset is also equipped with a built-in mini-cassette jack for accepting the output of a portable cassette recorder permitting recording of voice announcements from cassette tape. The mouthpiece of the handset is disabled when a mini-plug is inserted into the handset mini-jack. Order Cat. No. 213360.
AC Adapters (Two Required)	This accessory is designed to operate both chassis of the multi-channel digital announcer from 115 Vac 60 Hz power, using one adapter unit for each chassis. Order two of Cat. No. 213288.

Chassis. The C.P. Chassis provides the main controls and indicators for operating the announcer. Contained on this chassis is the modular (RJ11 type) jack used for recording and monitoring the voice announcements, the microprocessor used to control system operation, memory circuits used for storage of all four recorded channels, and the output circuitry and signal interface for Channel No. 1. The M.C. Chassis provides the output circuitry and signal interfaces for Channels No. 2, No. 3, and No. 4. The two chassis are connected together on the rear panels by a ribbon cable assembly.

4.02 Digital recording techniques are employed for recording and reproducing the four channels of voice announcements. With the channel numbers selected in sequence (starting with Channel No. 1), messages are recorded by speaking into a handset or headset, or by playing a pre-recorded message on a cassette tape unit, connected to the input jack on the C.P. Chassis. (The record interlock, which prevents entry into record mode unless one of these devices is connected to the input jack before pressing the RECORD pushbutton, also prevents a message from being accidentally erased.) Voice is converted to an audio signal at the input circuits of the announcer. Then, under microprocessor control, these analog signals are sampled many

times a second and broken into a series of individual voltages. These voltages are converted into digital signals, which are stored in memory chips on the circuit board in the C.P. Chassis.

4.03 The messages are stored in memory in channel number sequence; however, the total block of memory does not have to be divided equally among the four channels. To permit storing messages of varied lengths and still promote the economical use of memory capacity, where one message ends, the next message begins. The start and end of each channel message is marked in the memory by address pointers. The start address pointer for Channel No. 1 is always the same, but the stop and start address pointers for the subsequent channels are always variable. When the recordings are made, the microprocessor remembers the start and stop address pointers for each channel. Then, when the announcer is on line and being accessed, the microprocessor recognizes which channel is required and goes to that address pointer to retrieve the message data.

4.04 Since messages are stored in memory in channel number sequence, the four channels must be recorded in that sequence, starting with Channel No. 1. Each channel will use only the amount of memory required for the length of its message.

Table 3. Multi-Channel Digital Announcer Model Number Ordering Information

Determine Desired Catalog Number According to the Following Directions:

		XXXXXX	-	XX	XXX	X	X
A. <u>Digital Announcer Type</u>	Enter No.						
Multi-Channel	213400						
B. <u>Brackets for Relay Rack Mounting</u>	Enter No.						
None	00						
For 19 -inch (483 mm) Rack	19						
For 23-inch (542 mm) Rack	23						
For 26-inch (660 mm) Rack	26						
For 28-inch (711 mm) Rack	28						
C. <u>Total Recording Time*</u>	Enter No.						
32 Seconds	032						
48 Seconds	048						
64 Seconds	064						
80 Seconds	080						
96 Seconds	096						
112 Seconds	112						
128 Seconds	128						
D. <u>Battery Backup of Message Option</u>	Enter No.						
No	0						
Yes	1						
E. <u>Remote Record Option</u>	Enter No.						
No	0						
Yes	1						
EXAMPLE:		213400	-	19	080	1	0
A. Multi-Channel Digital Announcer							
B. Bracket for 19-inch Relay Rack Mounting							
C. 80 Seconds Total Recording Time							
D. With Battery Backup of Message Option							
E. Without Remote Record Option							
*At 32 kHz sampling rate.							

4.05 When starting to record Channel No. 1, the digital display on the C.P. Chassis front panel will indicate the total recording time (in seconds) provided for all four channels and will count down the seconds until the Channel No. 1 recording process has been stopped. Then, Channel No. 2 is selected automatically, and the digital display will indicate the available time remaining for recording the remaining three

channels. When recording the Channel No. 2 message, the digital display resumes seconds countdown from where it left off, until the Channel No. 2 recording has been stopped, and Channel No. 3 selected automatically. Channels No. 3 and No. 4 are recorded in the same manner, with the digital display showing available time remaining and counting down during recording. Therefore, it is apparent that message

length can vary for each channel; however, the total length of the four recorded messages cannot exceed the total recording time provided by the digital announcer.

4.07 When the messages are played back and monitored, the digital display will now indicate the actual length (in seconds) of the recording in each channel, and will count down to zero as each message is played back.

4.08 When the digital announcer is placed "on line", the receipt of an external start command signal at a channel interface will cause the microprocessor to initiate a program to retrieve the stored digital signals for that channel. The retrieved digital data is converted back to analog, and outputted at that channel's interface as voice, duplicating the original message. More than one channel may be accessed at a time. The channel(s) accessed will be indicated by the number on the digital display .

4.09 Power for the multi-channel digital announcer is supplied from the office battery (-48 Vdc). Power input is made through the rear panel interfaces of the two chassis; J2 on the C.P. Chassis, J2M on the M.C. Chassis. Both chassis are fused internally at 1A by replaceable 3AG slow-blow fuses, and power is switchable on both chassis by POWER switches on the rear panels. In both chassis, power supplies are reverse voltage protected, and the DC-DC converters, which provide the necessary +5V and +12V, are short circuit protected.

4.10 The operation of the multi-channel digital announcer is controlled by a microprocessor, located in the C.P. Chassis. The microprocessor controls such functions as Record and Playback, as well as various housekeeping functions, peg count, external status indicators, and a built-in diagnostic program used to assist the user in locating faults and illegal commands. Also located in the C.P. Chassis is the Dynamic Random Access Memory (DRAM), used to store the digital message data for all four channels.

4.11 Both the encoding (Analog-to-Digital or A/D) and decoding (Digital-to-Analog or D/A) of the voice I/O signal is accomplished by a Continuously Variable Slope Delta Modulator (CVSD) integrated circuit, via a serial bit stream. In RECORD mode, the CVSD in the C.P. Chassis is set up to encode, and in PLAYBACK mode, to decode, for all four channel messages. When in ON LINE mode, the CVSD in the C.P. Chassis is set up to decode for Channel No. 1, and the three CVSD's in the M.C. Chassis are set up to decode for Channels No. 2, No. 3, and No. 4.

4.12 A simplified block diagram of the multi-channel digital announcer operation in RECORD mode is shown in figure 2, and explained

as follows. The CVSD in the C.P. Chassis is set up to encode (A/D). The analog voice signal for the channel being recorded is clocked into the CVSD by the sampling frequency. The digital output of the CVSD is a serial bit pattern representing the analog input. The serial pattern is converted to parallel form in the shift register, and the microprocessor stores this data in Dynamic RAM. Data is entered and stored in Dynamic RAM in channel number sequence: Channels No. 1 through No. 4. The beginning and end of each channel is identified in the memory by address pointers.

4.13 A simplified block diagram of the multi-channel digital announcer operation in PLAYBACK mode is shown in figure 3, and explained as follows. The CVSD in the C.P. Chassis is set up to decode (D/A). With the desired channel number selected, digital data previously recorded and stored for that channel is now retrieved from Dynamic RAM in parallel form by the microprocessor, serialized in the shift register, and fed into the CVSD. The original analog signal is reconstructed by the CVSD. The analog signal is then filtered to remove the clock frequency component, amplified, and sent out to the Tip and Ring pins at the J2 interface. This output circuit is paralleled by monitor jack J1, permitting the output to be monitored by a handset or headset connected to the jack. (In PLAYBACK mode, all channels are outputted to the J2 interface for monitoring.) During playback, the digital display will show the actual message length in seconds and will countdown to zero as the message is being played.

4.14 A simplified block diagram of the multi-channel digital announcer operation in ON LINE mode is shown in figure 4, and explained as follows. When "on line", the digital announcer is ready to accept external start commands at the various channel interfaces. In ON LINE mode, the C.P. Chassis provides the circuitry and interface (J2) for Channel No. 1 output; the M.C. Chassis provides the circuitry and interfaces (J2M) for output of Channels No. 2, No. 3, and No. 4. Each channel can be independently accessed with a separate start command at its respective interface. (Accessed channel numbers will be shown on the digital display.) When a start command is received at one of the interfaces, the microprocessor recognizes the channel accessed, retrieves the data for that channel from memory, and routes it to the proper channel by a scanning process, where the original voice signal for that channel is regenerated by the corresponding CVSD and output circuitry.

4.15 The output level for all four channels is user adjustable. The OUTPUT LEVEL control for Channel No. 1 is located on the C.P. Chassis front panel. The OUTPUT LEVEL controls for Channels No. 2, No. 3, and No. 4 are located on the M.C. Chassis front panel.

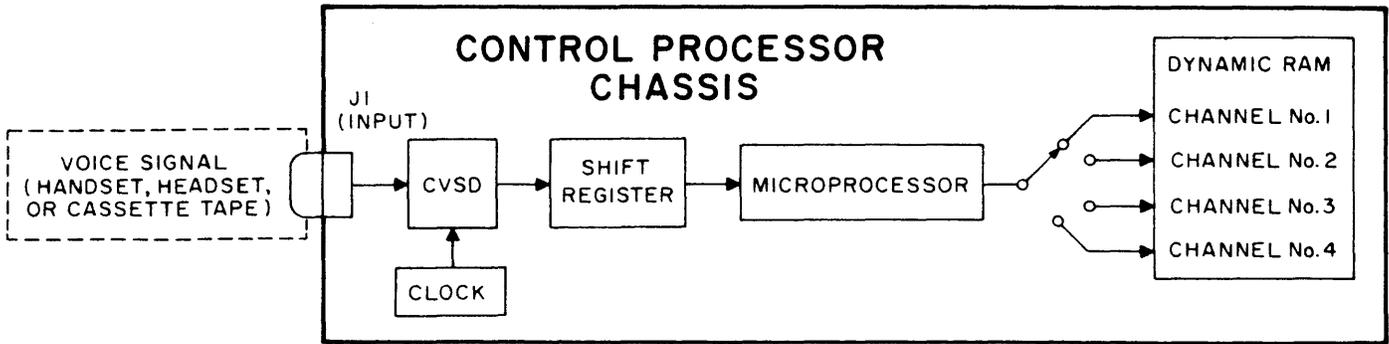


Fig. 2 - RECORD Mode Block Diagram

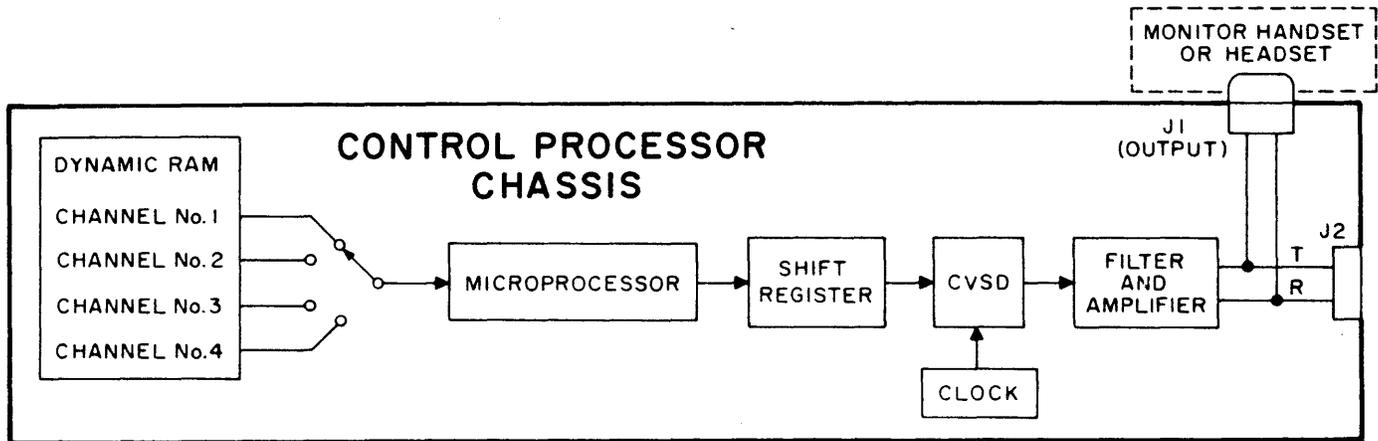


Fig. 3 - PLAYBACK Mode Block Diagram

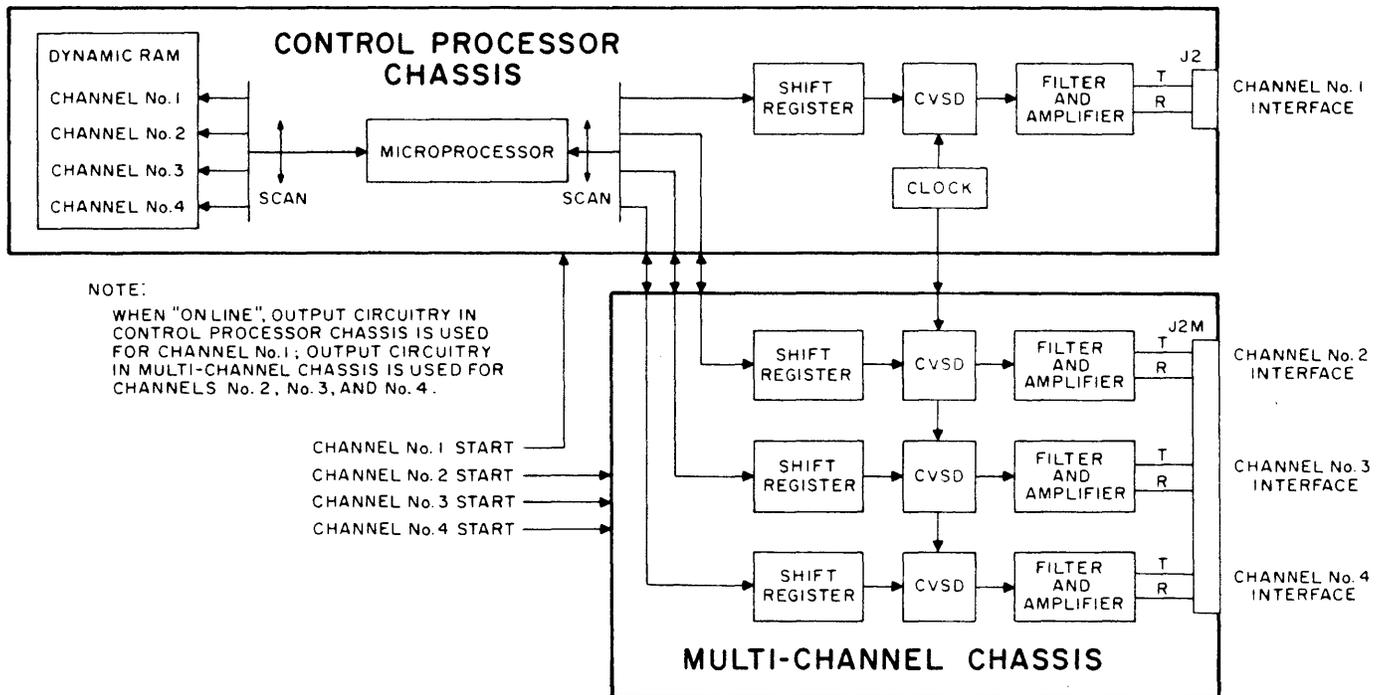


Fig. 4 - ON LINE Mode Block Diagram

4.16 Visual indicators are provided on the C.P. Chassis front panel to aid the user in operating the digital announcer. These include the ON LINE, RECORD, ALM (Alarm), and RMT (Remote) LED's (Light Emitting Diodes). At the left on the panel is the STATUS/TIME REMAINING digital display. The use of these displays and the operation of the announcer are explained in Section 756-0224-300, Operating Procedures, in this manual.

4.17 Start Commands. When the digital announcer contains recorded messages and is put ON LINE, the unit is ready to accept start commands at the channel interfaces. The start command can be either a GROUND start or a -BATTERY start, as shown in figure 5.

4.18 A "level" start or a "pulse" start mode can be selected by DIP switch S6-7, located on the rear panel of the C.P. Chassis (see selection procedure, Section 756-0224-300).

4.19 There are several start modes that effect the operation of the announcer. Changing the program firmware modifies the microprocessor's instruction set, which in turn controls how it will respond to different start signals. The start options are described in detail in the firmware publications (60-213405-XXX).

4.20 Visual indicators are provided on the digital announcer's front panel to aid the user in operating the unit. These include the ON LINE, RECORD, ALM (Alarm), and RMT (Remote) LED's. At the left is the STATUS/TIME REMAINING digital display. The use of these displays and the operation of the unit are explained in Section 756-0224-300, Operating Procedures, in this manual.

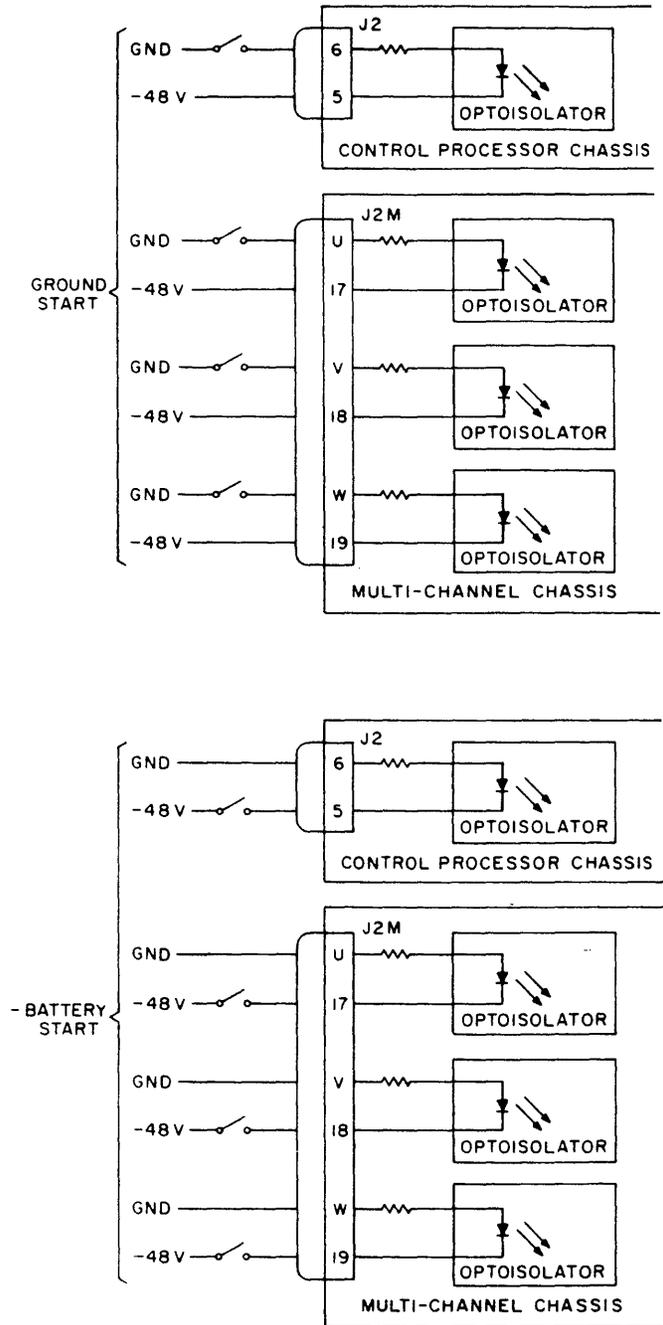


Fig. 5 - Start Mode Wiring Diagrams

5. FCC REGULATIONS

GENERAL

5.01 The Digital Announcer series of equipment manufactured by Northern Telecom Inc., Cook Electric Division, has several versions for various announcement applications. These Digital Announcers comply with FCC Rules Part 68 as an adjunct used with PBX's and have been given FCC Registration Number:

D5F982-13986-PX-N

OUTPUT LEVEL

5.02 These various announcers are designed to connect to an appropriate PBX Announcer trunk interface circuit, or to be used with the Cook Electric Ring Trip Access Circuit, or any protective coupler, when connecting to a standard telephone line.

5.03 Output signal power level has been factory set at -9 dBm in accordance with FCC Regulations Part 68.

5.04 For Central Office applications only, the output level may be adjusted by breaking the seal over the LEVEL ADJUST.

NOTE: MAKING THIS ADJUSTMENT WILL VOID THE FCC REGISTRATION.

This seal, and LEVEL ADJUST, are located on the front panel of each of the individual chassis.

5.05 Table 4 is provided to identify those equipments which fall under the requirements of the applicable FCC requirement.

RADIO FREQUENCY RADIATION

5.06 The following warning applies to all versions of the Digital Announcers listed in table 4.

Table 4. Affected Equipments

DESCRIPTION	PART NO.
Single Channel Digital Announcer	213300
Deleted	-----
Multi-Channel Digital Announcer	213400
Four Channel Synchronous Digital Announcer	213420
Four Channel Demand Phased Entry Digital Announcer	213500
Four Channel Time Phased Entry Digital Announcer	213550

WARNING:

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Table 4. List of Abbreviations used in text

ABBREVIATION	DEFINITION
A	Ampere
A/D	Analog-to-Digital
ALM	Alarm
B.O.M.	Beginning of Message
C	Centigrade
C/MC	Beginning of Message/Ending of Message Sync Pulse
C.P.	Control Processor
CVSD	Continuously Variable Slope Delta (Modulator)
D/A	Digital-to-Analog
dBm	Decibels referenced to one milliwatt
Dc	Direct Current
DIP	Dual In-line Pin
DRAM	Dynamic Random Access Memory
E.O.M.	End of Message
GND	Ground
HS	Headset
Hz	Hertz
IC	Integrated Circuit
IO	Input/Output
kHz	Kilohertz
LED	Light Emitting Diode
mA	Milliamperes
M.C.	Multi-Channel
MBY	Make Busy
MIC	Microphone
MON	Monitor
MOV	Metal Oxide Varistor
R	Ring
REC	Record
SEL	Select
SIT	Special Information Tone
ST	Start
T	Tip
THD	Total Harmonic Distortion
Vac	Volts alternating current
Vdc	Volts direct current

MODEL 213400 MULTI-CHANNEL DIGITAL ANNOUNCER

INSTALLATION

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1. GENERAL

1.01 The Cook Electric Model 213400 Multi-Channel Digital Announcer is designed for either relay rack mounting or table top use. The equipment consists of two chassis, the Control Processor (C.P.) Chassis and the Multi-Channel (M.C.) Chassis. These two chassis must be connected together with a ribbon cable assembly during installation. Central office connections must be made to wire-wrap terminals on the rear panel of each chassis.

1.02 This section provides the installation procedures for Model 213400 Multi-Channel Digital Announcer.

1.03 References.

- 756-0224-100 Model 213400 Multi-Channel Digital Announcer, Equipment Description
- 756-0224-300 Model 213400 Multi-Channel Digital Announcer, Operating Procedures
- 756-0224-400 Model 213400 Multi-Channel Digital Announcer, Maintenance

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2. INSTALLATION PROCEDURES

PRE-INSTALLATION CHECKS

2.01 Observe the following checks and precautions before installing the digital announcer.

- (a) When opening shipping cartons, carefully inspect equipment for shipping damage.
- (b) Until installation, store equipment in shipping cartons in a dry location. Do not leave on loading dock or other outside locations where equipment will be exposed to the weather.
- (c) Do not remove equipment from protective cartons until ready for installation.
- (d) Use care when unpacking from shipping cartons to avoid damage to equipment or loss of hardware included.
- (e) Two toggle switches (located on the C.P. Chassis rear panel) are shipped covered with protective brackets, attached to rear panel. DO NOT remove protective bracket until after installation, since these switches must remain in the OFF position (as shipped) until ready to power up the equipment.

MOUNTING

2.02 The digital announcer is available with side bracket hardware for mounting the two chassis in 19-inch (483 mm), 23-inch (584 mm), 26-inch (660 mm), or 28-inch (711 mm) relay racks. (Models ordered for table top use do not include this hardware.) A side bracket kit consists of two side brackets and four mounting screws. Two kits are included with the digital announcer, one kit with each chassis.

2.03 On both chassis, four tapped mounting holes are provided on each side panel. The brackets require only two holes for mounting. The extra pair of holes are provided as alternates, permitting the two chassis to be moved forward

or toward the rear on the rack, aiding in the lineup of equipment on the rack.

2.04 Install side brackets by lining up holes on the brackets with either the front two or rear two mounting holes on the side panels. (The brackets' mounting flanges can be positioned either toward the front or the rear of the chassis, as desired.) Thread mounting screws into tapped holes until tight (see figure 1).

2.05 When installing the digital announcer in the rack, the Control Processor Chassis must be located in the rack space just above the Multi-Channel Chassis. Then the two chassis must be connected together by installing a ribbon cable assembly between connectors on the rear panels, per paragraphs 2.06 and 2.07.

RIBBON CABLE INSTALLATION

2.06 A ribbon cable assembly, packed with the Multi-Channel Chassis, is used for connecting the two chassis together. The assembly consists of a section of ribbon cable, terminated at both ends with connectors.

2.07 Ribbon cable connectors, for the installation of the ribbon cable assembly, are

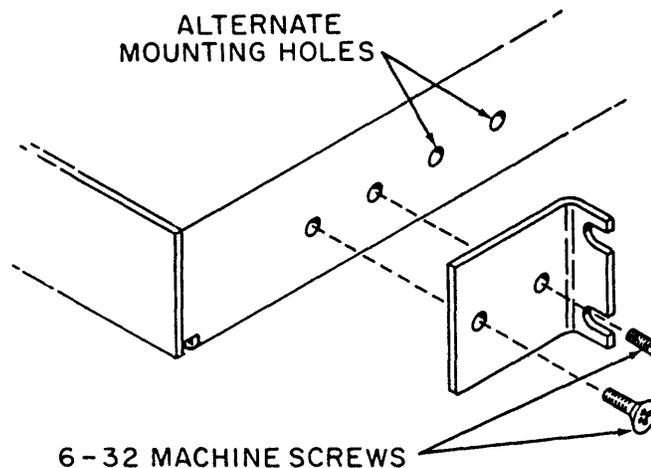


Fig. 1 - Mounting Bracket Installation

located on the rear panel of each chassis (see figure 2). (Note that Pin No. 1 is marked on the rear panel, and matching No. 1 wire position of the ribbon cable is indicated by molded triangle on the cable connectors.) Properly position ribbon cable connectors and plug into rear panel connectors, connecting the two chassis together.

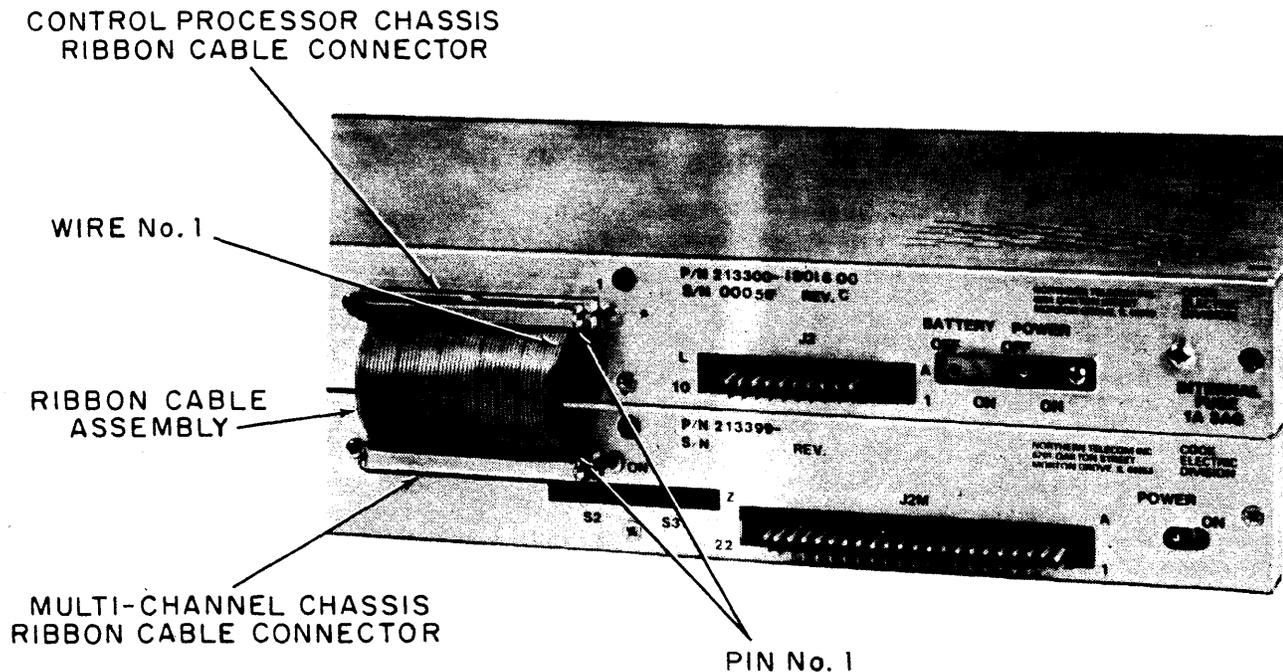


Fig. 2 - Connecting Ribbon Cable Assembly (Rear Panel)

CENTRAL OFFICE CONNECTIONS

2.08 Two card edge connectors are furnished with the digital announcer, one packed with the Control Processor Chassis, one packed with the Multi-Channel Chassis. These connectors are used as the signal I/O interfaces for the four announcer channels and for power connections to the two chassis. The socket side of edge connectors provides two rows of spring contacts for installation over the top and bottom edges of a circuit board. The pin side of edge connectors provides two rows of wire-wrap pins for connection of central office equipment.

CAUTION: An edge connector socket is not keyed and can be installed either way on a circuit board. The connector must be installed as indicated in the following instructions, or the pin numbers will not indicate the proper connections to the circuit boards.

2.09 The 20-pin edge connector, packed with the Control Processor Chassis, is to be installed in the rectangular opening labeled "J2" on the rear panel of the C.P. Chassis (see figure 3). Edge connector pin numbers, molded into the plastic base just next to the pins, identify the two rows of 10 pins each. One row is labeled (from right to left) "A" through "L", the other row labeled (from right to left) "1" through "10". The edge connector must be positioned with the "A" through "L" row at the top, the "1" through "10" row at the bottom, as illustrated, so that the proper pins line up with the letters "A" and "L" and the numbers "1" and "10" printed next to the "J2" opening on the chassis rear panel.

2.10 The 44-pin edge connector, packed with the Multi-Channel Chassis, is to be installed in the rectangular opening labeled "J2M" on the rear panel of the M.C. Chassis (see figure 4). Edge connector pin numbers, molded into the plastic base next to the pins, identify the two rows of 22 pins each. One row is labeled (from right to left) "A" through "Z", the other row labeled (from right to left) "1" through "22". The edge connector must be positioned with the "A" through "Z" row at the top, the "1" through "22" row at the bottom, as illustrated, so that the proper pins line up with the letters "A" and "Z" and the numbers "1" and "22" printed next to the "J2M" opening on the chassis rear panel.

2.11 When installing an edge connector, position as previously instructed and insert the socket side into the properly labeled rectangular opening on the chassis' rear panel, making sure that the plated connectors on the edge of the circuit board are centered in the socket slot. Then carefully press edge connector in until edge of circuit board is fully seated in spring contacts in socket.

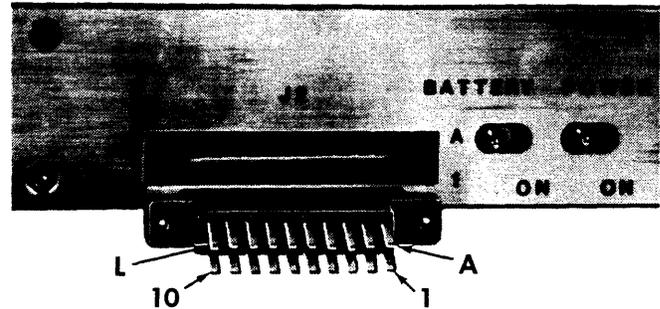


Fig. 3 - Position of 20-Pin Edge Connector for Installation on Control Processor Chassis

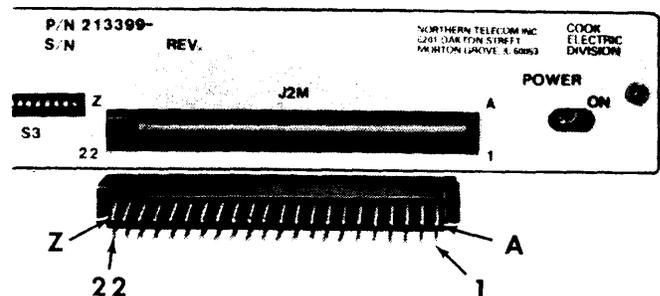


Fig. 4 - Position of 44-Pin Edge Connector for Installation on Multi-Channel Chassis

2.12 The wire-wrap pins of the "J2" edge connector on the Control Processor Chassis provide the signal I/O interface to the user control circuits for Channel No. 1, plus the power connection to the C.P. Chassis. The "J2" interface diagram is shown in figure 5.

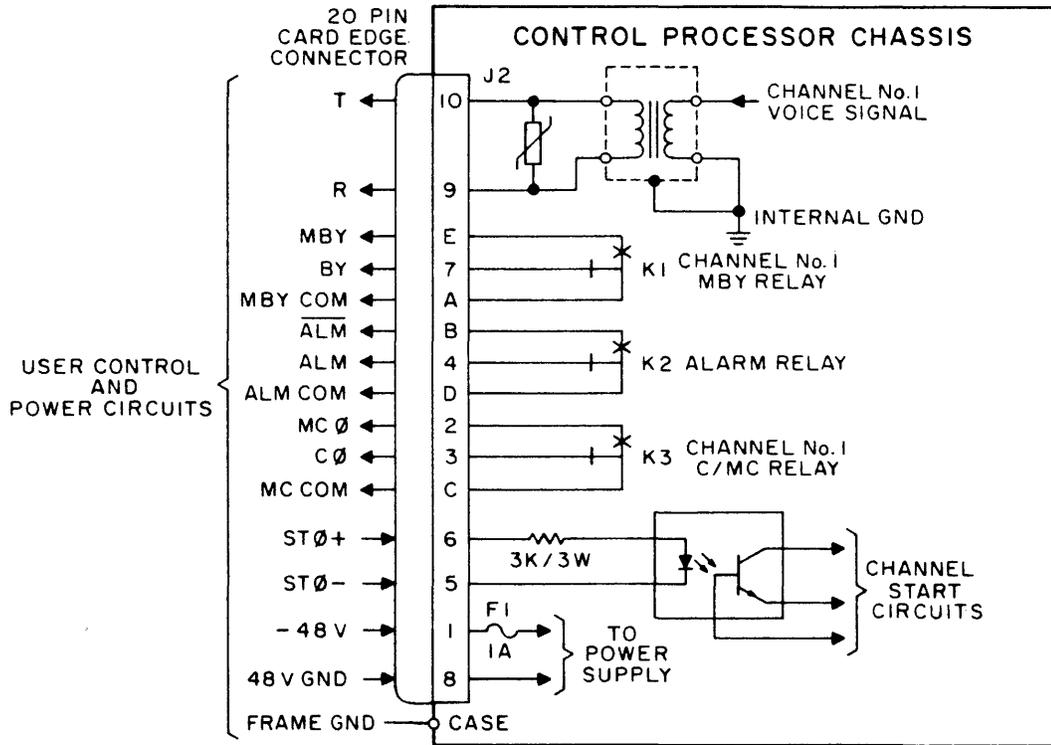
2.13 The wire-wrap pins of the "J2M" edge connector on the Multi-Channel Chassis provide the signal I/O interface to the user control circuits for Channels No. 2, No. 3, and No. 4, plus the power connection to the M.C. Chassis. The "J2M" interface diagram is shown in figure 6.

2.14 Explanations of the interface signal input/output circuits shown in figures 5 and 6 are given in table 1.

2.15 The REC/MON (record/monitor) jack on the C.P. Chassis accepts a standard telephone modular plug with the lead connections as specified in figure 7.

NORTHERN TELECOM SL-1 SWITCH CONNECTIONS

2.16 The multi-channel digital announcer may be used with the Northern Telecom SL-1



NOTE:
 IF CONTINUOUS OPERATION IS DESIRED, STRAP PIN 1 TO PIN 5 AND PIN 6 TO PIN 8.
 SET ANNOUNCER TO "LEVEL START" MODE (S6-7).

Fig. 5 - J2 Interface Connections on Control Processor Chassis

Table 1. Interface Input/Output Circuit Descriptions

NOTE: Interface to the Control Processor (C.P.) Chassis is J2; interface to the Multi-Channel (M.C.) Chassis is J2M. Refer to figures 5 and 6 for J2 and J2M interface pin numbers associated with the following circuits.	
CIRCUIT SYMBOLS	CIRCUIT DESCRIPTIONS
-48 V TEL GND	Provides DC voltage input to the power supplies in the C.P. Chassis (J2 interface) and the M.C. Chassis (J2M interface).
T R	Provides low impedance output (4 ohms) for each channel. C.P. Chassis provides output for Channel No. 1; M.C. Chassis provides output for Channels No. 2, No. 3, and No. 4.
ST+ ST-	Start leads. Used to start announcement of message. Start commands can be either -BATT or GND start. C.P. Chassis provides interface for Channel No. 1 (ST0+, ST0-); M.C. Chassis provides interface for Channels No. 2 (ST1+, ST1-), No. 3 (ST2+, ST2-), and No. 4 (ST3+, ST3-).
MBY BY	Indicates that digital announcer channels are available for intercept service. (Announcer must be ON LINE.) C.P. Chassis provides interface for Channel No. 1, associated with Relay K1 in that chassis; M.C. Chassis provides interface for Channels No. 2, No. 3, and No. 4, associated, respectively, with Relay K2, K4, and K6 in that chassis.

Table 1. Interface Input/Output Circuit Descriptions (contd)

CIRCUIT SYMBOLS	CIRCUIT DESCRIPTIONS
C MC	Provides on each channel a 250 millisecond pulse at beginning and end of message, used to seize trunk circuits and synchronize disconnect. C.P. Chassis provides interface for Channel No. 1, associated with Relay K3 in that chassis; M.C. Chassis provides interface for Channels No. 2, No. 3, and No. 4, associated, respectively, with Relays K1, K3, and K5 in that chassis.
<u>ALM</u> ALM	Indicates that digital announcer is in an Alarm Mode. Type of alarm is shown on digital display. Interface associated with Relay K2 in P.C. Chassis only.

Digital Switch, using the connections shown in figure 8. Since the SL-1 Digital Switch provides a pulsed start, the digital announcer must be placed in the "pulse start" mode by placing DIP switch S6-7 (on P.C. Chassis rear panel) in the ON (up) position (see Section 756-0224-300, paragraph 8.10).

2.21 For best audio quality, keep audio output leads (T and R connections at J2 and J2M edge connectors) separate from signal and power leads. Use twisted pairs for audio output leads.

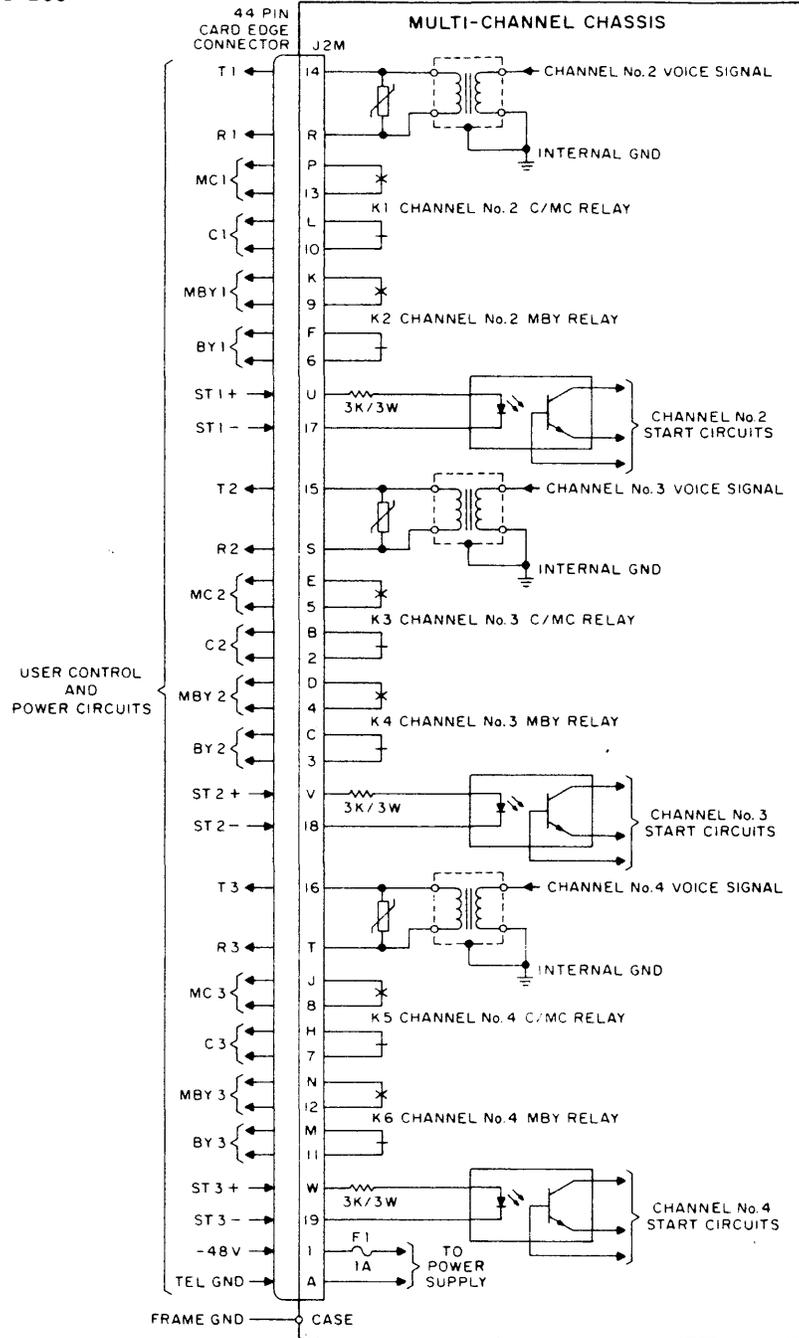
INSTALLATION PRECAUTIONS

2.17 Connect the -48 Vdc power to the Multi-Channel Digital Announcer as shown in figure 9. The -48 Vdc input pins of the J2 and J2M edge connectors (pin 1 or both connectors) should be jumpered together and connected (at either chassis) to the -48 Vdc line. (the -48 Vdc input line to the announcer must be fused externally.) The ground pins (pin 8 of J2 and pin A of J2M edge connectors) should be jumpered together and connected (at either chassis) to the +48V return line.

2.18 Be sure -48 Vdc and ground are connected in the proper polarity. The announcer will not operate or give any response when connected to a reverse polarity voltage.

2.19 If more than one Multi-Channel Digital Announcer is to be installed in the same rack, each announcer must be wired individually to the -48 Vdc supply, and each -48 Vdc input line fused separately.

2.20 Be sure that the cases of the two digital announcer chassis are grounded, using the self-tapping screws on the rear panels. Jumper the two case ground screws together, as shown in figure 9, and connect to frame or rack ground bus bar.



NOTE:
IF CONTINUOUS OPERATION IS DESIRED, STRAP PIN 1 TO PIN 17, PIN 18, AND PIN 19. ALSO STRAP PIN A TO PIN U, PIN V, AND PIN W.

Fig. 6 - J2M Interface Connections on Multi-Channel Chassis

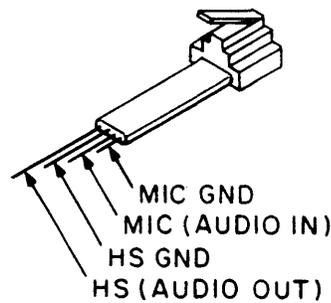


Fig. 7 - Modular Plug Interface Connections

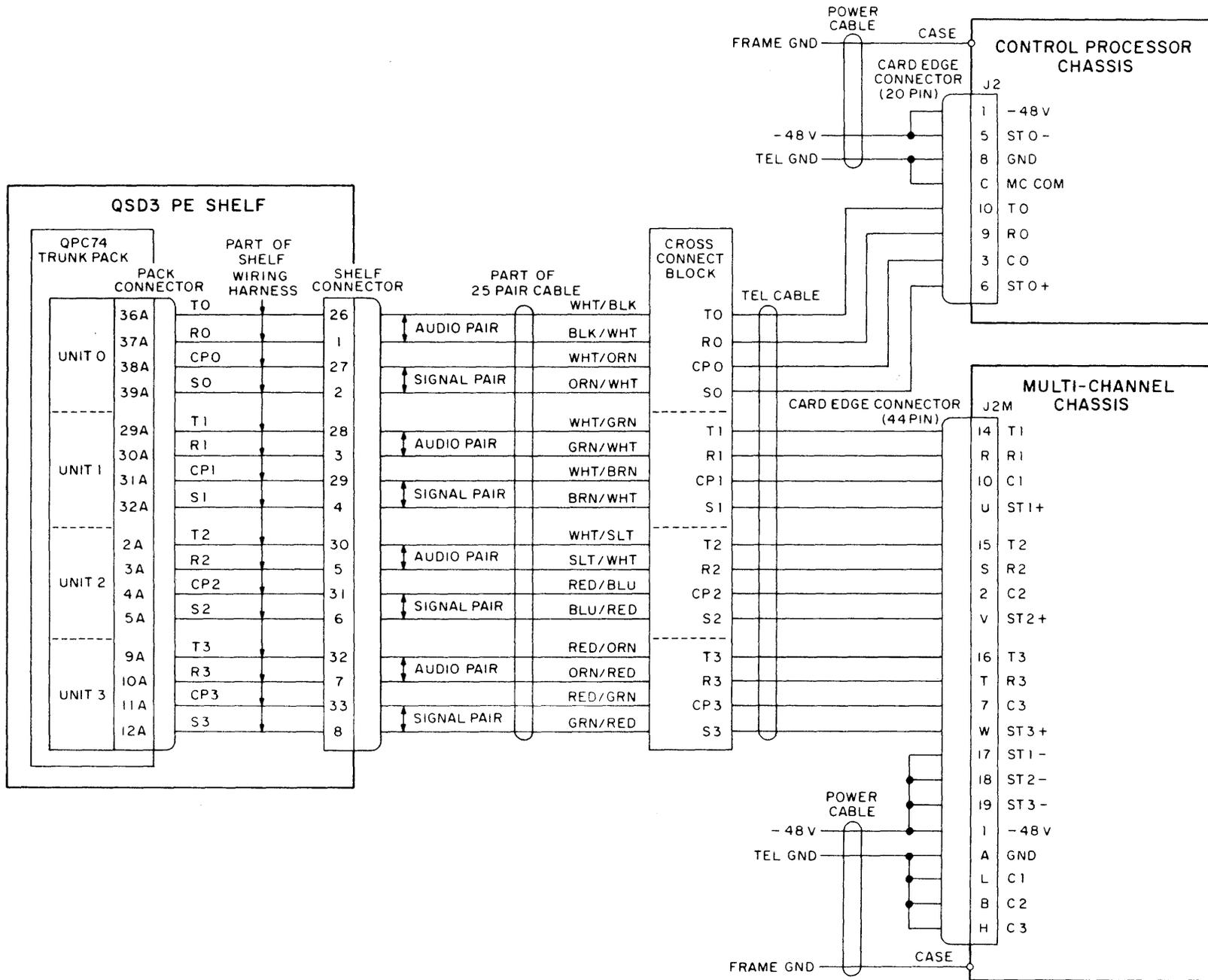
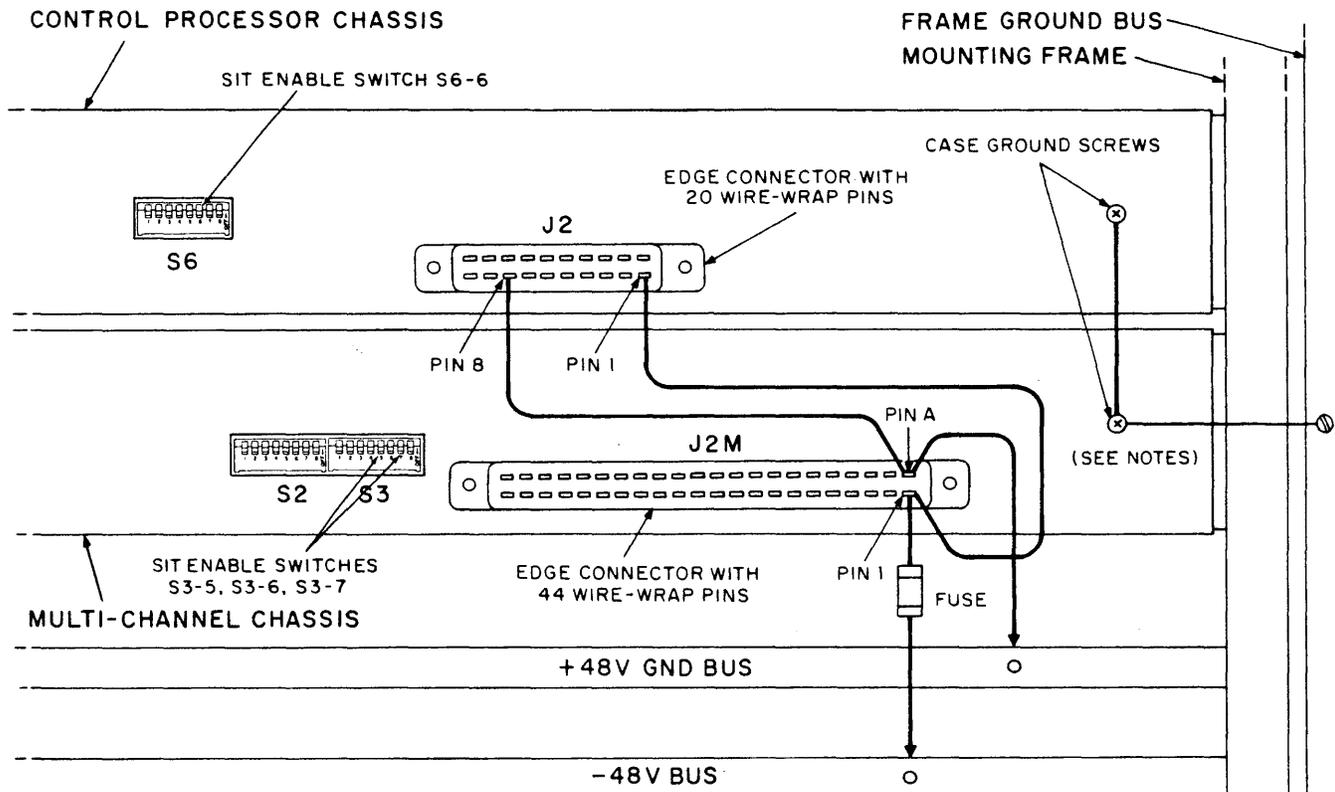


Fig. 8 - J2 and J2M Connections with SL-1 Switch



NOTES:

1. USE 18 GAUGE OR HEAVIER FOR GROUND WIRE.
2. IF FRAME GROUND BUS IS NOT AVAILABLE, A COLD WATER PIPE MAY BE USED FOR A GROUND POINT (SEE LOCAL ELECTRIC CODE).
3. SEVERE NOISE CONDITIONS MAY REQUIRE ISOLATION OF THE DIGITAL ANNOUNCER CHASSIS FROM FRAME GROUND.

Fig. 9 - Power and Ground Connections

MODEL 213400 MULTI-CHANNEL DIGITAL ANNOUNCER
OPERATING PROCEDURES

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1. GENERAL

1.01 Once properly set-up and on line, the Model 213400 Multi-Channel Digital Announcer will operate automatically with the reception of external start commands. Each channel can be independently accessed with a separate start command, and each channel will independently output its recorded message and control signals to the user equipment connected to its interface. However, the announcer must first be properly set up and the messages recorded.

1.02 This section provides the operating procedures for powering up the equipment, recording the message, presetting selectable options, and placing the announcer on line.

1.03 References.

- 60-213405-005 Multi-Channel Digital Announcer Firmware Kit
- 756-0224-100 Model 213400 Multi-Channel Digital Announcer, Equipment Description
- 756-0224-200 Model 213400 Multi-Channel Digital Announcer, Installation

756-0224-400 Model 213400 Multi-Channel Digital Announcer, Maintenance

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2. CONTROLS AND INDICATORS

2.01 Model 213400 Multi-Channel Digital Announcer front and rear panel controls and indicators are illustrated in figures 1 and 2. (The Control Processor Chassis is shown installed above the Multi-Channel Chassis.) These controls and indicators are described in table 1.

3. EQUIPMENT TURN-ON

3.01 After installation, the digital announcer is turned on as described in the Power Up Procedure given in Chart 1.

4. MESSAGE RECORDING

RECORDING WITH HANDSET OR HEADSET

4.01 The procedure for recording with a handset or headset is given in Chart 2.

RECORDING FROM A CASSETTE RECORDER

4.02 The digital announcer is also capable of recording a pre-taped message from the earphone or monitor jack of a cassette recorder. This is especially useful when the ambient noise level at the announcer location is too high to permit a satisfactory recording with a handset. A quality cassette recorder with good speed stability and adequate output should be used. If possible, operate the cassette recorder on internal batteries to avoid the possibility of introducing 60 Hz noise

4.03 An adapter assembly, consisting of a cord with a cassette recorder mini-plug on one end and a modular plug on the other end, can be used (available from Cook Electric Division).

NOTE: This adapter assembly does not normally provide monitoring capabilities.

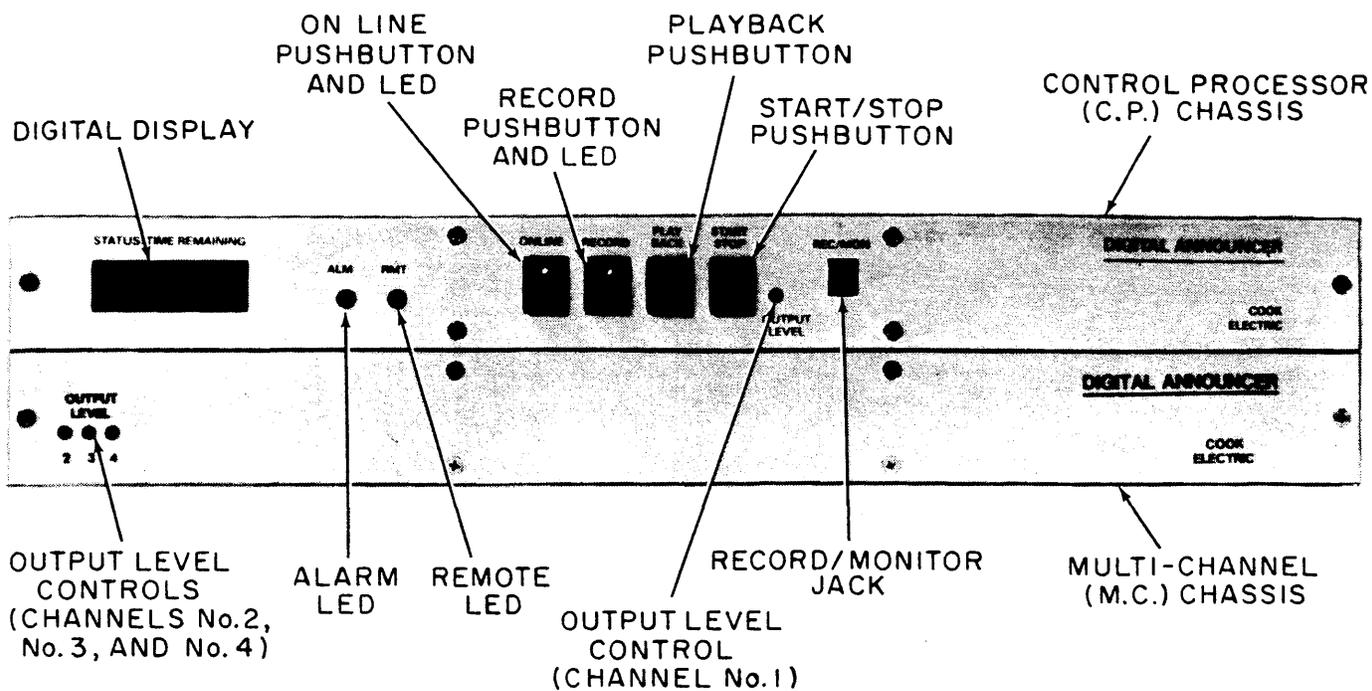
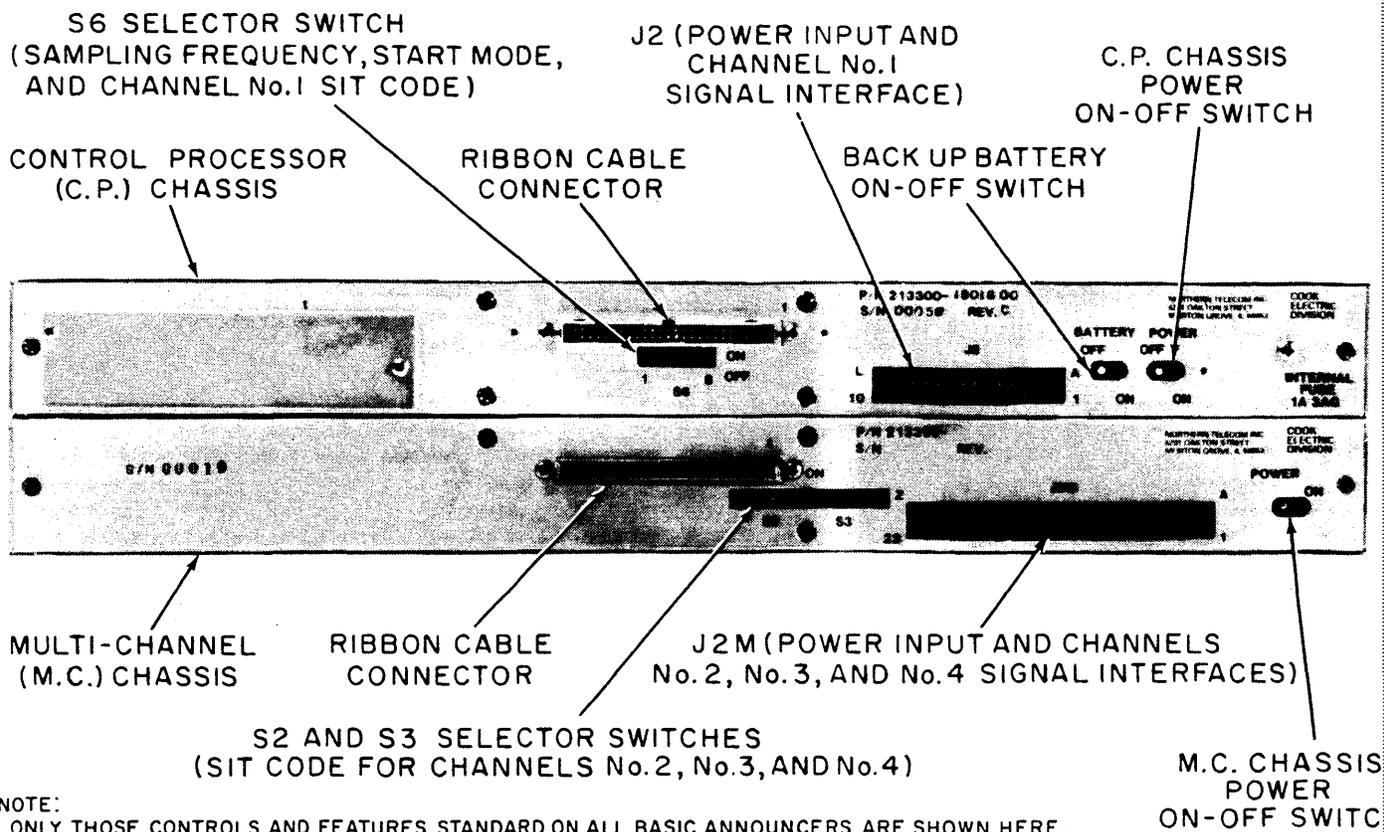


Fig. 1 - Front Panel Controls and Indicators



NOTE:
 ONLY THOSE CONTROLS AND FEATURES STANDARD ON ALL BASIC ANNOUNCERS ARE SHOWN HERE.
 COOK ELECTRIC DIVISION MAY BE CONTACTED FOR APPLICABLE LITERATURE COVERING VARIOUS
 OPTIONAL FEATURES NOT SHOWN IN THIS FIGURE.

Fig. 2 - Rear Panel Controls

Table 1. Controls and Indicators

NAME	USE AND COMMENTS
CONTROL PROCESSOR CHASSIS	
FRONT PANEL	
STATUS/TIME REMAINING Digital Display	Multi-purpose digital display <ul style="list-style-type: none"> ● For recording, shows channel number selected to be recorded, shows time (in seconds) available for recording the displayed channel number, and counts down the seconds for timing message while recording. ● For playback, shows channel number selected for playback, shows actual time (in seconds) of the message recorded in the displayed channel number, and counts down to zero during playback. ● Displays "SEL" to indicate that announcer is waiting for a mode selection to be made. ● Indicates that announcer is in use, showing the channel number(s) accessed by an external Start command at that time. ● Displays peg count readout by channel number. ● Shows alarm modes, as follows: <p style="margin-left: 20px;">AL-0 POWER ALARM - Indicates interruptions of -48 Vdc power. Always shows status during power-up procedure. Indicates temporary power interruption if memory is not protected by Battery Backup option. If announcer has Battery Backup option, will not indicate power interruption unless outage is long enough for batteries to become completely discharged.</p> <p style="margin-left: 20px;">AL-1 MEMORY ALARM - Indicates trouble in basic Dynamic RAM circuit used for storage of voice messages.</p> <p style="margin-left: 20px;">AL-2 VOICE ALARM - Indicates, by channel number, a silent (-15 dBm or greater) portion of a message that extends to 10 seconds or more.</p> <p style="margin-left: 20px;">AL-3 NO RECORDING ALARM - Indicates attempt to place announcer ON LINE without having recorded into any channel.</p>
ALARM Indicator (Red LED)	Indicator lights only when announcer is in Alarm mode. (Type of alarm will be indicated on digital display.)
REMOTE Indicator (Red LED)	On models equipped with Remote Record option, indicator lights when announcer is accessed from a remote location for checking playback or changing a recorded message.

Table 1. Controls and Indicators (contd)

NAME	USE AND COMMENTS
ON LINE Pushbutton and Indicator (Red LED)	Used to place announcer ON LINE. Indicator lights to indicate announcer is ON LINE.
RECORD Pushbutton and Indicator (Red LED)	Used to place announcer in RECORD mode and to select channel number to be recorded. Indicator lights to indicate announcer is in RECORD mode.
PLAYBACK Pushbutton	Used to place announcer in PLAYBACK mode and select channel number to be played back.
START/STOP Pushbutton	Used in the Power Up procedure, to start and stop recording and playback process, and to clear certain alarm modes and readouts.
OUTPUT LEVEL Control	Used to adjust the volume of Channel No. 1 recorded message output.
RECORD/MONITOR Jack	Modular jack, used for connection of handset or headset for recording and playback monitoring, or for connecting a cassette recorder (using an adapter plug) for recording a pre-taped message.
REAR PANEL	
POWER Switch	On-off switch for -48 Vdc battery supply power to the Control Processor Chassis.
BATTERY Switch	On-off switch for internal four-battery supply used to protect the message memory from loss in the event of an interruption of the external -48 Vdc supply. Only on models equipped with Battery Back-up of Message option.
J2	Power input for Control Processor Chassis and signal interface for Channel No. 1. Uses an edge connector installed on plated contacts of the circuit board. External side of edge connector provides two 10-pin rows of wire-wrap pins for connecting power and Channel No. 1 signal I/O to external equipment.
S6	DIP switch provides selection of SIT (Special Information Tone) code outputs for Channel No. 1, selection of sampling frequency for digital encoding and decoding, and selection of start mode. (SIT available at 32 kHz rate only.)
Case Ground Connector	Used for grounding the Control Processor Chassis to common ground in office installations.
MULTI-CHANNEL CHASSIS	
FRONT PANEL	
OUTPUT LEVEL 2, 3, 4 Controls	Used to adjust the volume of Channels No. 2, No. 3, and No. 4 recorded message outputs.

Table 1. Controls and Indicators (contd)

NAME	USE AND COMMENTS
REAR PANEL	
POWER Switch	On-Off switch for -48 Vdc battery supply power to the Multi-Channel Chassis.
J2M	Power input for Multi-Channel Chassis and signal interface for Channels No. 2, No. 3, and No. 4. Uses an edge connector installed on plated contacts of the circuit board. External side of edge connector provides two 22-pin rows of wire-wrap pins for connecting power and Channels No. 2, No. 3, and No. 4 signal I/O to external equipment.
S2	DIP switch provides selection of SIT (Special Information Tone) code outputs for Channels No. 2 and No. 3. (SIT available at 32 kHz rate only.)
S3	DIP switch provides selection of SIT (Special Information Tone) code outputs for Channel No. 4, and SIT Enable switches for Channels No. 2, No. 3, and No. 4. (SIT available at 32 kHz rate only.)
Case Ground Connector	Used for grounding the Multi-Channel Chassis case to common ground in office installations.

Chart 1. Power Up Procedure

IMPORTANT: The following Power Up procedure refers to multi-channel digital announcer models having the Battery Backup option, and therefore equipped with a BATTERY switch on the Central Processor (C.P.) Chassis. For models without this option and switch, follow the same procedure, but omit any instructions relative to operation of the BATTERY switch.		
STEP	ACTION	COMMENTS
1	Remove safety bracket covering POWER and BATTERY switches on C.P. Chassis rear panel.	Announcer should be installed per Section 756-0224-200. As received from factory, the POWER and BATTERY switches on the C.P. Chassis rear panel are held in the OFF position by a protective safety bracket. The POWER switch on the Multi-Channel (M.C.) Chassis should also be in the OFF position. Check that these switches are OFF before connecting -48 V to either chassis. *DO NOT move BATTERY switch to ON until after step 4 has been performed.
2	First, move M.C. Chassis POWER switch to ON. Then, move C.P. Chassis POWER switch to ON.	ALM LED (Light Emitting Diode) lights, indicating alarm mode. (This LED will light at any alarm mode.) Digital display shows AL-0, indicating an initial power up condition. (This alarm indication will also be displayed after any power interruption which causes a loss of message memory.)

Chart 1. Power Up Procedure (contd)

STEP	ACTION	COMMENTS
3	Press START/STOP pushbutton.	<p>The AL-O alarm is cleared. (ALM LED goes off.)</p> <p>Announcer enters a memory check mode.</p> <p>If the minimum amount of memory is not installed or is inoperative, digital display will show AL-1, indicating a memory error.</p> <p>If memory is operational, digital display will show the maximum amount of recording time available (in seconds).</p>
4	Press START/STOP pushbutton.	Unit is placed off-line. Digital display will show "SEL".
5	Move C.P. Chassis BATTERY switch to ON.	<p>Message memory will now be protected against loss of power.</p> <p>NOTE: On models without Battery Backup of Memory option, BATTERY switch is omitted, and a power interruption will result in a loss of message memory, requiring re-recording the messages.</p>

Chart 2. Recording with Handset or Headset

<p>IMPORTANT: The total length of the four messages to be recorded into the announcer's four channels must not be longer than the maximum recording time (in seconds) provided by the announcer. It is recommended that the messages be written, read aloud, and carefully timed before recording to assure that message length will fit into recording time provided. If recording time runs out while recording, the announcer will automatically switch into Select ("SEL") mode.</p>		
STEP	ACTION	COMMENTS
1	Plug standard handset or operator's headset into REC/MON (Record/Monitor) jack on C.P. Chassis front panel.	<p>Digital announcer must be powered up and in Select ("SEL") mode as outlined in Chart 1, Power Up Procedure.</p> <p>Handset or headset must be equipped with a modular plug to match the modular jack on the panel. (If not, adapter assemblies are easily fabricated.)</p> <p>The digital announcer is equipped with an interlock that will not allow the unit to enter Record mode unless the handset or headset is properly plugged into the REC/MON jack.</p>
2	Press RECORD pushbutton	The announcer goes into Record mode and the RECORD indicator lights. The digital display alternately flashes the first channel number ("CH-1") and the maximum length of time (in seconds) provided by the announcer for recording all four channels.

Chart 2. Recording with Handset or Headset (contd)

STEP	ACTION	COMMENTS
3	Press START/STOP pushbutton to start recording the Channel No. 1 message.	The digital display will begin seconds countdown, and the unit will begin recording on Channel No. 1. Speak the message into the handset or headset transmitter. Use a normal speaking voice.
4	If desired, press RECORD pushbutton to "pause" while recording. If pause is not desired, immediately go to step 6.	During "pause", unit will stop recording, and digital display will stop seconds countdown, but will continue to flash on and off with the remaining recording time available.
5	To end "pause" and resume recording, again press RECORD pushbutton.	Digital display resumes seconds countdown, and unit resumes recording on the same channel. Resume recording the message.
6	Press START/STOP pushbutton to stop recording on Channel No. 1.	At the end of the Channel No. 1 message, stop recording. Unit stops recording and automatically switches to the next channel (Channel No. 2), with the digital display alternately flashing the new channel number ("CH-2") and the remaining recording time available.
7	Press START/STOP pushbutton to start recording the Channel No. 2 message.	The digital display will begin seconds countdown from where it left off, and the unit will begin recording on Channel No. 2. Speak the Channel No. 2 message into the handset or headset transmitter. (A "pause" while recording is possible by following instructions in steps 4 and 5.)
8	Press START/STOP pushbutton to stop recording on Channel No. 2.	At the end of the Channel No. 2 message, stop recording. Unit stops recording and automatically switches to the next channel (Channel No. 3), with the digital display alternately flashing the new channel number ("CH-3") and the remaining recording time available.
9	Repeating steps 7 and 8 to start and stop recording, record messages on Channels No. 3 and No. 4.	While recording messages on Channels No. 3 and No. 4, unit operates in a similar manner as indicated in steps 7 and 8. After Channel No. 3 is recorded, unit automatically switches to Channel No. 4. After Channel No. 4 is recorded, unit switches out of Record mode (RECORD indicator goes out), and switches to Select mode ("SEL" on digital display).
NOTE 1: With announcer in Select ("SEL") mode, successively pressing or holding down the RECORD pushbutton selects Record mode and indexes channel selection through Channels No. 1, No. 2, No. 3, and No. 4 in order, finally switching unit back to Select mode.		

Chart 2. Recording with Handset or Headset (contd)

NOTE 2: All four channels may be recorded in order as given in the previous procedure, or if desired, a channel may be skipped and the next channel recorded. To skip a channel, press the RECORD pushbutton while the channel number to be skipped is shown on the digital display. The display will switch to the next channel number in sequence. (When a channel is skipped and not recorded, that channel number during "playback" will show a message length of zero seconds, and during "on line" mode, the skipped channel will be in a Busy state, preventing access by C.O. equipment.) To later record a skipped channel, refer to Chart 6, Re-recording a Channel.

4.04 An adapter assembly, consisting of a handset equipped with a mini-jack and a modular cord (RJ-11 type) can be used and is available by ordering Cook Electric Part No. 213360. This adapter provides a monitor function through the receiver of the handset. The transmitter is disabled when a mini-plug is inserted.

4.05 The procedure for recording a pre-taped message from a cassette recorder is given in Chart 3.

5. PLAYBACK OF DIGITAL ANNOUNCER

5.01 After messages have been recorded, playback can be monitored and checked, following the procedure in Chart 4.

6. PLACING DIGITAL ANNOUNCER ON LINE

6.01 After messages have been recorded and checked, digital announcer is put on line, following the procedure in Chart 5.

RE-RECORDING A CHANNEL

7.01 When a recorded channel must be re-recorded, the channel to be changed can be re-recorded without affecting the message in the next higher channel only if the length of the new message (in seconds) does not exceed the length (in seconds) originally recorded in that channel. If the new message is to be longer than the original, when recorded it will run into the memory currently occupied by the next higher channel and erase the higher channel message, which must then also be re-recorded.

7.02 For instance, if all four channels are recorded, Channel No. 2 can be re-recorded without affecting Channel No. 3 only if the new Channel No. 2 message will fit into the memory used by the original Channel No. 2 message. If the new Channel No. 2 message is longer than the original message, the new longer message will run into the memory area currently occupied by Channel No. 3 and erase the No. 3 message, which must be re-recorded. If the re-recorded Channel

No. 3 message runs into Channel No. 4 memory, Channel No. 4 message must also be re-recorded.

7.03 If a channel has been skipped and contains no message, but the higher channels are all recorded, the skipped channel can later be recorded only by also re-recording the higher channels, since upon starting to record the skipped channel, the new message will immediately run into the memory area occupied by the next higher channel message, erasing it.

7.04 Procedures for re-recording a channel are given in Chart 6, Re-recording a Channel.

8. SPECIAL FUNCTIONS

BATTERY SWITCH

8.01 On models equipped with the Battery Backup of Message option, the BATTERY switch on the back panel of the C.P. Chassis is used to switch the backup battery ON, protecting the announcer from loss of message in the event of a power failure. (As shipped from the factory the BATTERY switch is in the OFF position, covered by a protective safety bracket to keep switch position from being changed inadvertently)

8.02 When powering up the announcer, the BATTERY switch MUST be kept in the OFF position until after the main POWER switches on the back panels of both the C.P. Chassis and the M.C. Chassis have been switched to "ON" and both chassis are powered as outlined in Chart 1.

8.03 Make sure both chassis are powered up before switching BATTERY switch on.

NOTE: On models without Battery Backup option, BATTERY switch is not included

Chart 3. Recording from a Cassette Recorder

STEP	ACTION	COMMENTS
1	Record messages for all four channels on cassette recorder.	<p>Before performing the following procedure, refer to paragraphs 4.02 through 4.04 in this section.</p> <p>Digital announcer must be powered up and in Select ("SEL") mode, as outlined in Chart 1, Power Up Procedures.</p> <p>Record cassette at maximum level that will not introduce audio distortion. Play back cassette recorder to check for good sound. <i>Carefully</i> time the messages recorded on the cassette to make sure that the total length of all messages will not exceed the maximum recording time (in seconds) provided by the digital announcer.</p>
2	During cassette playback, adjust cassette recorder output to a fairly low listening level.	Cassette output, for best recording results on digital announcer, should be -5 dBm max; -10 dBm preferred.
3	<p>Interconnect cassette recorder's earphone (or monitor) jack and digital announcer's REC/MON jack.</p> <p style="text-align: center;">OR</p> <p>Using a handset equipped with the mini-jack, interconnect cassette recorder's earphone or monitor jack and the handset jack.</p>	<p>Use Cook Electric Cassette Adapter Plug Part No. 213284, or equivalent.</p> <p>The digital announcer is equipped with an interlock that will not allow the unit to enter Record mode unless the cassette recorder is properly plugged into the REC/MON jack.</p> <p>Use Cook Electric Cassette Adapter Handset part No. 213360, or equivalent.</p>
4	Rewind cassette recorder just to the beginning of the pretaped message that is to be recorded in Channel No. 1 or the digital announcer.	
5	Press RECORD pushbutton on digital announcer.	<p>The digital announcer goes into Record mode, and the RECORD indicator (LED) lights. Channel No. 1 is selected, with the digital display alternately flashing "CH-1" and the maximum length of time (in seconds) provided by the announcer for recording all four channels.</p> <p>NOTE: While in the record mode, and if Cassette Adapter Handset (part No. 213360) is used, the recording can be monitored through the handset. This will enable the setting of reasonable recording levels before making the actual recording.</p>
6	Start cassette recorder in playback, and immediately press START/STOP pushbutton on digital announcer to start recording on Channel No. 1.	The digital display will begin seconds countdown, and the taped message will be recorded in Channel No. 1. While recording, closely check the timing of the taped message being recorded.

Chart 3. Recording from a Cassette Recorder (contd)

STEP	ACTION	COMMENTS
7	Press START/STOP pushbutton to stop recording on Channel No. 1.	<p>When enough time for recording the taped message on Channel No. 1 has elapsed, stop recording.</p> <p>The digital announcer stops recording on Channel No. 1 and automatically switches to Channel No. 2, with digital display alternately flashing "CH-2" and the remaining recording time available.</p>
8	Stop cassette recorder, and re-wind just to the beginning of the pre-taped message to be recorded in Channel No. 2.	
9	Start cassette recorder in play-back, and immediately press START/STOP pushbutton on digital announcer to start recording on Channel No. 2.	The digital display will begin seconds countdown from where it left off, and the taped message will be recorded in Channel No. 2. While recording, closely check the timing of the taped message being recorded.
10	Press START/STOP pushbutton to stop recording on Channel No. 2.	<p>When enough time for recording the taped message on Channel No. 2 has elapsed, stop recording.</p> <p>The digital announcer stops recording on Channel No. 2 and automatically switches to Channel No. 3, with digital display alternately flashing "CH-3" and the remaining recording time available.</p>
11	Repeating steps 8, 9, and 10 to start and stop recording, record pre-taped messages on Channels No. 3 and No. 4.	<p>After Channel No. 3 is recorded, unit automatically switches to Channel No. 4. After Channel No. 4 is recorded, unit switches out of Record mode (RECORD LED goes out), and switches to Select ("SEL") mode.</p> <p>If recording time runs out while recording, the digital announcer will automatically switch to Select ("SEL") mode.</p>
<p>NOTE 1: After all channels have been recorded, playback digital announcer (see Chart 4), and carefully monitor recorded messages for length and recording level. If necessary, make changes to message lengths or output volume of cassette tape recorder, and re-record on digital announcer.</p> <p>NOTE 2: When recording from a cassette tape, it is also possible to skip a channel in the same manner as instructed in Note 2 of Chart 2, Recording with Handset or Headset.</p>		

Chart 4. Playing Back Digital Announcer

STEP	ACTION	COMMENTS
1	Plug handset or operator's headset into REC/MON jack.	<p>After all desired channels have been recorded, as outlined in Charts 2 and 3, unit will be in Select ("SEL") mode.</p> <p>Handset or headset must be equipped with a modular plug to fit announcer's modular jack.</p>
2	Press PLAYBACK pushbutton to select Playback mode and channel: once for Channel No. 1, twice for Channel No. 2, three times for Channel No. 3, four times for Channel No. 4, (Further operation of pushbutton will repeat channel number sequence.)	<p>With a channel selected, digital display alternately flashes channel number (CH-1, Ch-2, CH-3, or CH-4) and the actual length (in seconds) of the message recorded in that channel.</p> <p>NOTE: An unrecorded (skipped) channel will display the channel number, but with a message length of zero seconds.</p>
3	Press START/STOP pushbutton.	<p>Digital display starts counting down to zero, while the message recorded in the selected channel is outputted to handset or headset for monitoring.</p> <p>At the end of the message (when display reaches zero), digital announcer will switch to Select ("SEL") mode. Playback may be terminated early by pressing START/STOP pushbutton.</p>
4	To monitor another channel, repeat steps 2 and 3.	

Chart 5. Placing Digital Announcer On Line

STEP	ACTION	COMMENTS
1	Press ON LINE pushbutton.	<p>After recording and monitoring playback, as outlined in Charts 2, 3, and 4, digital announcer will be in Select ("SEL") mode.</p> <p>ON LINE indicator (LED) lights, the MBY relays associated with recorded channels energize, and digital announcer goes On Line. Announcer is now ready to accept incoming signals and output messages through the interfaces associated with recorded channels. (An unrecorded channel will remain in a Busy state and cannot be accessed by C.O. equipment).</p> <p>When announcer is in use, digital display will show channel number(s) accessed.</p> <p>If no message has been recorded in any channel, or (on models without Backup Battery option) no recording has been made since a power failure, pressing ON LINE pushbutton will cause digital display to read "AL-3", indicating a "No Recording" alarm.</p>

Chart 5. Placing Digital Announcer On Line (contd)

STEP	ACTION	COMMENTS
		and announcer will not go on line. To clear this alarm, press START/STOP pushbutton; then record messages per Charts 2, 3, and 4.
NOTE: When digital announcer is On Line, pressing ON LINE pushbutton will take unit Off Line, switching to Select ("SEL") mode.		

Chart 6. Re-recording a Channel

STEP	ACTION	COMMENTS
		Before performing the following procedures, refer to paragraphs 7.01 through 7.04 in this section. Announcer must be in Select ("SEL") mode. It may be necessary to place unit in Off Line mode.
TO RE-RECORD A RECORDED CHANNEL		
1	Press PLAYBACK pushbutton, selecting channel number of channel to be re-recorded. (See Chart 4.)	Digital display will indicate amount of time (in seconds) already recorded in that channel. Note number of seconds currently used by that channel, and carefully time new message to determine if it will fit into number of seconds available.
2	If new message will fit into number of seconds available, record new message in that channel. (See Chart 2 or Chart 3 for recording procedures.)	When re-recording, carefully keep track of re-recording time by monitoring seconds countdown on digital display, making sure new message fits into number of seconds originally used by channel. When playing back new message (see Chart 4), also playback next higher channel to make sure that message has not been affected by re-recording the lower channel. (If message on re-recorded channel has inadvertently run longer than the number of seconds permitted, the message on the next higher channel will be erased.)
3	If new message is longer than number of seconds originally used by channel, re-record channel with new message, and then re-record messages on any higher channels affected. (See Chart 2 or Chart 3 for recording procedures.)	After re-recording, check messages by playing back all re-recorded channels. (See Chart 4.) If recording time runs out while recording, unit will automatically switch to Select ("SEL") mode.
TO RECORD A SKIPPED CHANNEL		
1	Press RECORD pushbutton, selecting channel number of channel that was skipped. (See Chart 2 or Chart 3.)	Digital display will indicate amount of time available for recording the skipped channel and re-recording any higher channels affected.

Chart 6. Re-recording a Channel (contd)

STEP	ACTION	COMMENTS
2	Record message on skipped channel, and then re-record any higher channels affected. (See Chart 2 or Chart 3 for recording procedures.)	Since the skipped channel does not originally occupy any recording memory, as soon as the recording of that channel is started, the message on the next higher channel will be erased and replaced by the message being recorded into the channel that had been skipped. Therefore, any higher channels affected must be re-recorded.

8.04 SIT (Special Information Tones) are used by telephone companies to allow equipment to identify the type and content of announcements. The digital announcer is able to produce all of the SIT codes currently in use by the telephone companies, and several more as prescribed by established standards.

8.05 S6 switches (see figure 3) are numbered from left to right, are ON in the up position, OFF in the down position, and accessible through the case opening with a small screwdriver shaft, or equivalent.

8.06 SIT code generation is governed by the instruction set in the EPROM. Details for selecting the SIT code which most closely matches the messages content are covered in the firmware publication (60-213405-XXX). Switch S6-6 must be in the ON position to enable the SIT circuits (see figure 3 for switch position).

SAMPLING FREQUENCY SELECTION

8.07 The sampling frequency used for digital encoding and decoding of the voice messages is switchable, using switch S6-5 (part of DIP switch S6), located on the C.P. Chassis rear panel (see figure 3). Switch S6-5 selects a sampling frequency of 32 kHz in the OFF (down) position, a sampling frequency of 24 kHz in the ON (up) position.

8.08 The digital announcer is shipped from the factory with S6-5 set at the normal sampling frequency of 32 kHz. The list of recording times available with the digital announcer, given in table 3, Part Number Ordering Information, Section 756-0224-100, is based on the 32 kHz sampling rate (providing recording times in increments of 16 seconds, up to maximum of 128 seconds). Switching to a sampling rate of 24 kHz provides somewhat longer recording times, up to a maximum of 184 seconds.

NOTE: SIT codes are available only at the 32 kHz sampling rate.

START COMMAND SELECTION

8.09 The digital announcer can be set to accept either "pulsed start" or "level start" commands on the ST leads of the J2 and J2M interfaces, using the S6 DIP switch on the C.P. Chassis rear panel. Switch S6-7 (see figure 3) selects the desired mode per the following settings:

S6-7	Start Mode
Down (Off)	Level Start (regular operation)
Up (On)	Pulse Start (SL-1 Compatible)

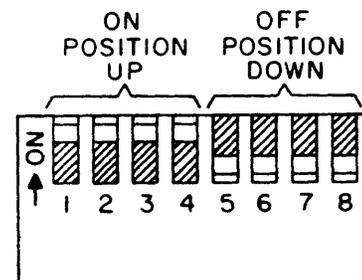


Fig. 3 - Examples of On and Off Positions for C.P. Chassis Switch S6 and M.C. Chassis Switches S2 and S3

PEG COUNT READOUT

8.10 The multi-channel digital announcer maintains peg count for all four channels, displaying, when requested, the number of times each channel has been accessed, up to 999,999 per channel, when the readout returns to zero and repeats. Peg count is also reset to zero by a power alarm (AL-0). The procedure for obtaining peg count is given in Chart 7, Peg Count Readout.

Chart 7. Peg Count Readout

STEP	ACTION	COMMENTS
1	Press PLAYBACK pushbutton.	<p>Digital announcer must be in ON LINE mode.</p> <p>Digital display will give the Channel No. 1 peg count by outputting three displays in succession, as follows:</p> <p style="text-align: center;">CH-1 PCXX XXXX</p> <p>These displays will keep flashing in sequence.</p> <p>The first display indicates the channel number, the second identifies the readout as peg count, and the X's in the second and third displays represent numerical digits. For instance, if the first display reads "CH-1", the second "PC02", and the third "6243", then the total display indicates that Channel No. 1 peg count is at that time 26,243.</p>
2	Press PLAYBACK pushbutton again	Digital display gives the Channel No. 2 (CH-2) peg count in the same sequence as described in step 1.
3	Repeat PLAYBACK operation as above for Channels No. 3 and No. 4 peg count readout.	<p>Digital display output for Channels No. 3 and No. 4 will be in same sequence described above.</p> <p>Successive operation of PLAYBACK pushbutton after Channel No. 4 will repeat channel number sequence. Readout for a specific channel can be selected rapidly by pressing PLAYBACK rapidly in succession, stopping when the desired channel number is reached to allow peg count output to be displayed.</p>
4	Press START/STOP pushbutton to terminate Peg Count readout.	

MODEL 213400 MULTI-CHANNEL DIGITAL ANNOUNCER
MAINTENANCE

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Backup Battery Replacement	1
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1. GENERAL

1.01 The Model 213400 Multi-Channel Digital Announcer, once installed, will require only a minimum amount of maintenance. Two fuses (one in the C.P. Chassis, one in the M.C. Chassis) are replaceable. Models with the Battery Backup of Message option have batteries in the C.P. Chassis that, though rechargeable, may need replacement after a considerable period of time or after a prolonged power outage.

1.02 This section contains maintenance procedures for the multi-channel digital announcer.

1.03 References.

- 756-0224-100 Model 213400 Multi-Channel Digital Announcer, Equipment Description
- 756-0224-200 Model 213400 Multi-Channel Digital Announcer, Installation
- 756-0224-300 Model 213400 Multi-Channel Digital Announcer, Operating Procedure

For additional information, contact:

Northern Telecom Inc.
Cook Electric Division
6201 Oakton Street
Morton Grove, IL 60053
Telephone 312-967-6600
Telex 72-4472
TWX 910-223-3654
Cable "Cookpro".

2. MAINTENANCE PROCEDURE

2.01 For both battery replacement and replacement of the C.P. Chassis fuse, the top cover of the C.P. Chassis must be removed.

For replacement of the M.C. Chassis fuse, the top cover of the M.C. Chassis must be removed. Remove Digital Announcer from the rack or cabinet if necessary to gain access to the top covers. Remove top, front, and rear panel screws as needed to free the cover, then lift the cover aside.

FUSE REPLACEMENT

2.02 Fuse F1 of the C.P. Chassis is located at the corner of the main circuit board, as shown in figure 1. Fuse F1 of the M.C. Chassis is located at the corner of the circuit board, as shown in figure 2. In both cases, the fuse is installed in a clip type fuse holder, and should be replaced with a one-ampere 3AG type fuse, Cook Electric Part No. 752-5872-019.

BACKUP BATTERY REPLACEMENT

2.03 In models with Battery Backup of Message option, the C.P. Chassis contains four rechargeable cells located on a small circuit board, mounted on stand-offs attached to the main circuit board. The battery pack location is shown in figure 1.

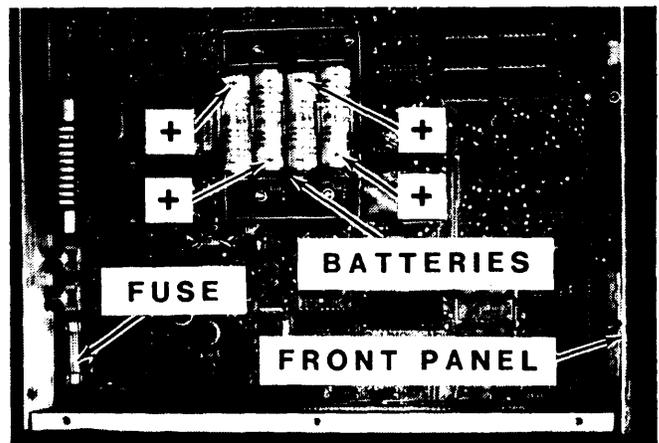


Fig. 1 - Fuse and Battery Locations in Control Processor Chassis

2.04 These batteries supply power to retain the message data in memory in the event of a -48V power outage. The only time the batteries are switched into the circuit is during an interruption of external power. Otherwise, during normal operation, these batteries are kept

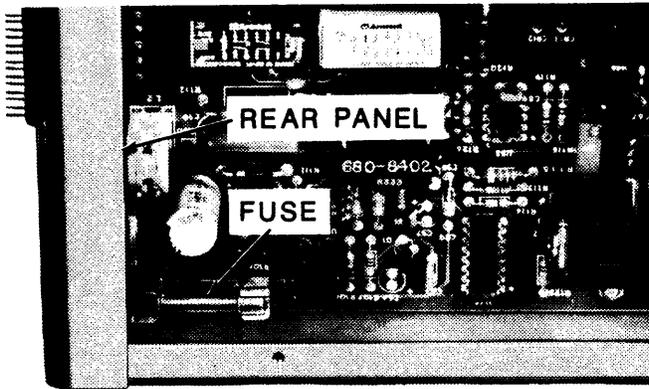


Fig. 2 - Fuse Location in Multi-Channel Chassis

on charge in the battery pack holders. After a power outage, during which the batteries had been in use, it will take up to fourteen or fifteen hours for the batteries to fully charge.

2.05 The condition of the batteries may be tested without the use of test fixtures or special equipment by the use of the following instructions. Select a period of low usage (i.e., no requests for messages) and turn the Digital Announcer POWER Switch to its OFF position (the BATTERY Switch must remain ON). Wait 5 minutes, then turn the Digital Announcer POWER Switch ON again. Clear any Alarms and test the messages as described in the Operating Instructions section of this manual. Weak or

defective batteries will cause partial or total memory failure; good batteries will retain the announcement without fault. It is recommended that a backup copy of the announcement should be available before performing this battery test.

NOTE: The battery pack circuit board is mounted to the main board with four stand-offs; do not put excessive strain on the main circuit board when replacing batteries.

2.07 Individual cell and battery pack voltages are provided in Table 1 to further define failures. The voltages listed in the table are not to be taken as absolute values; they are intended only to serve as guidelines to determine acceptable performance limits. Please contact Northern Telecom for replacement batteries or for additional assistance.

3. REPAIR

3.01 Repairs involving replacement of components on the circuit boards are not recommended. Return to Northern Telecom Inc., Cook Electric Division, 6201 Oakton Street, Morton Grove, IL 60053. If technical assistance is required, call 312-967-6600 or TWX 910-223-3654.

Table 1. Rechargeable Battery Parameters

TEST CONDITIONS	MEASUREMENT	POSSIBLE PROBLEM
BATTERY Switch set to ON POWER Switch set to ON	Individual cell voltages between 1.2 and 1.5 volts	Higher voltage: poor contact or corrosion Lower voltage: weak or shorted cell
BATTERY Switch set to ON POWER Switch set to ON	Total battery pack voltages between 5.0 and 6.0 volts	Higher voltage: cracked foil or loose nuts Lower voltage: cell installed backwards
BATTERY Switch set to ON POWER Switch set to OFF	Total battery pack voltages between 4.8 and 5.8 volts	Lower voltage: weak cell, poor contact, or in- sufficient charging time

APPENDIX

DIGITAL ANNOUNCER INSTALLATION AND OPERATION
(FOR USE WITH MODEL 213300, 213400, OR
213500 DIGITAL ANNOUNCERS)

Insert in manual after SECTION 756-0223-400, Model 213300 Digital Announcer Maintenance

GROUNDING AND NOISE CONSIDERATIONS

1.01 In some situations a Digital Announcer may randomly show an alarm condition (AL-0 or AL-2) or play back distorted or garbled messages even though the unit is installed and wired in strict accordance with the procedures outlined in this publication. In many cases, the cause of these faults can be traced to interference generated by the other electrical equipment which is operated in proximity to the Announcer. If the source of this disturbance can be located and controlled, the Digital Announcer can operate in a normal manner.

1.02 Electrical noise is defined as a random disturbance or unwanted signal which tends to obscure the desired signal. Electromechanical devices such as relays and stepper switches will often generate electrical noise which can adversely affect the proper operation of electronic equipment. This noise is usually present in the form of transient voltage spikes (short duration, high energy pulses). These spikes are both random and rapid in nature, so they frequently cannot be detected by standard voltmeters; however, more sensitive instruments such as logic analyzers and wide band oscilloscopes will verify their presence. Older telephone offices are particularly likely to have high levels of noise which can cause electronic equipment to malfunction.

1.03 Because electrical noise is a variable, there is no universal cure for it. In general, when the coordinated ground points such as equipment mounting frames, power sources, cold water pipes, building steel, etc., are installed

and maintained in accordance with local telephone grounding and local electrical wiring codes, the grounding system's resistance can be held below the minimum recommended value and noise will not be a problem. Inadequate, improper, or deteriorated ground connections will make noise very difficult to contain or control.

1.04 The Digital Announcer's noise tolerance levels can frequently be raised to an acceptable level through the use of noise suppression components and special grounding techniques. Kits containing the suppression devices and the instructions for their installation are available from the manufacturer upon request; please contact Northern Telecom Inc., Cook Electric Division, Field Service Department for assistance.

1.05 References

National Electrical Code
Article 250

Canadian Electrical Code
C 22.1

Local Telephone Company
Grounding Practices

For additional information, contact:

Northern Telecom Inc.
Cook Electric Division
6201 Oakton Street
Morton Grove, Illinois 60053
Telephone (312)-967-6600
Telex 72-4472
TWX 910-223-3654
Cable "Cookpro"

**214533 AND 214534 CONNECTOR RETAINERS
(FOR USE WITH NORTHERN TELECOM DIGITAL
ANNOUNCERS AND SPECIAL FUNCTION KITS)**

EQUIPMENT DESCRIPTION AND INSTALLATION

Add the following information to the Installation Instructions:

CAUTION: Always shut off the Dc power by removing the -48V fuse at a power distribution point or unplugging the Ac Converter before moving the Retainer.

- 60-213300 Model 213300 Single Channel Digital Announcer Operation and Maintenance Manual
- 60-213385 Multi-Ring Trip Access Kit Installation and Operation Instructions
- 60-213388 Ring Trip Access Circuit Kit Installation and Operation Instructions
- 60-213400 Model 213400 Multi-Channel Digital Announcer Operation and Maintenance Manual
- 60-213420 Model 213420 Four Channel Synchronous Announcer Equipment Description, Installation and Operation
- 60-215000 DMS-10 Digital Announcer System Interface Equipment Description, Installation, and Operation Manual

1.01 Edge Connector Retainers have been added to all current production runs of Digital Announcers. The Retainer serves the dual function of captivating the Edge Connectors used for Announcer Interface Wiring and providing both electrical and mechanical protection for the exposed connector pins. The Edge Connector Retainers have slotted mounting holes so that the mounting screws need not be removed when connectors must be accessed. Figure 1 shows Edge Connector Retainers used for 20-pin (P/N 214533) and 44-pin (P/N 214534) Edge Connectors.

1.02 Edge Connector Retainers may be removed by loosening each mounting screw about one full turn and lifting the Retainer up and off (see removal procedure steps A-D in figure 2; the procedure may be reversed for installation). If necessary, the Retainer may be turned at a right angle and slid over the edge connector to separate the two from each other (figure 2E). Use care when handling the wiring attached to the connector to avoid creating open, intermittant, or shorted circuits.

For additional information, contact:
Northern Telecom Inc.
Cook Electric Division
6201 Oakton Street
Morton Grove, Illinois 60053
Telephone (312)-967-6600
Telex 72-4472
TWX 910-223-3654
Cable "Cookpro"

1.03 References

- 60-213287 Remote Record Circuit Kit Installation and Operation Instructions
- 60-213289 Three Channel Add-On Kit Equipment Description and Installation

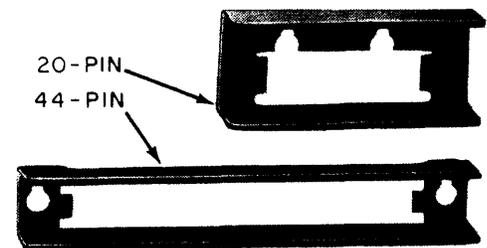
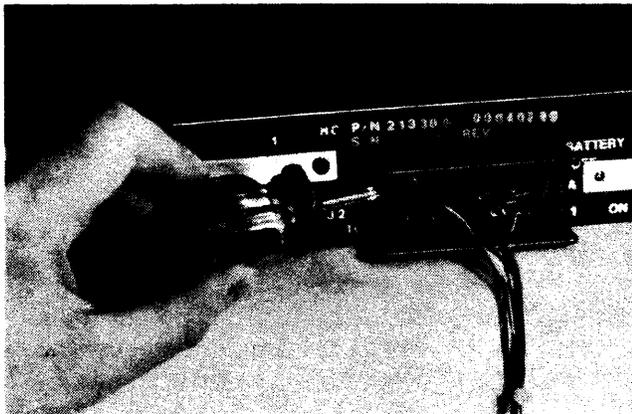
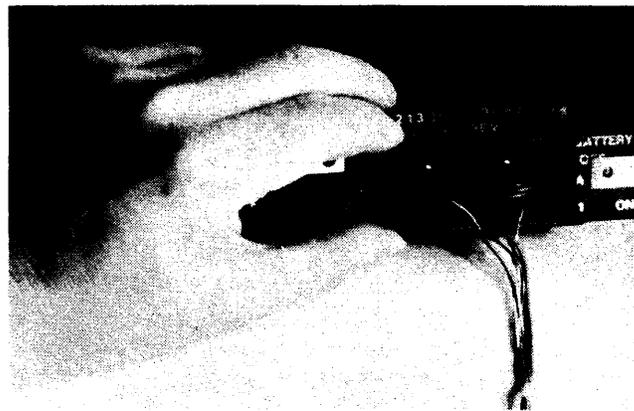


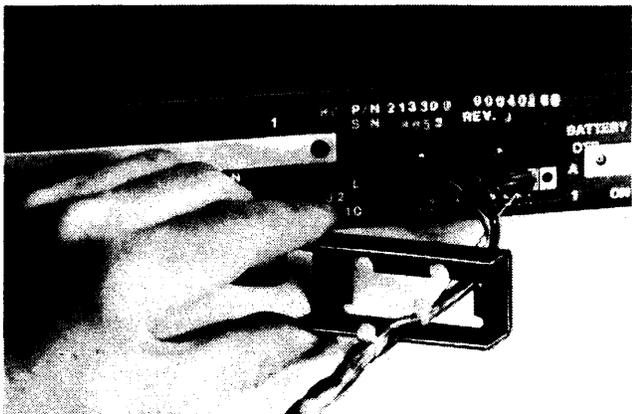
Fig. 1 - Edge Connector Retainers



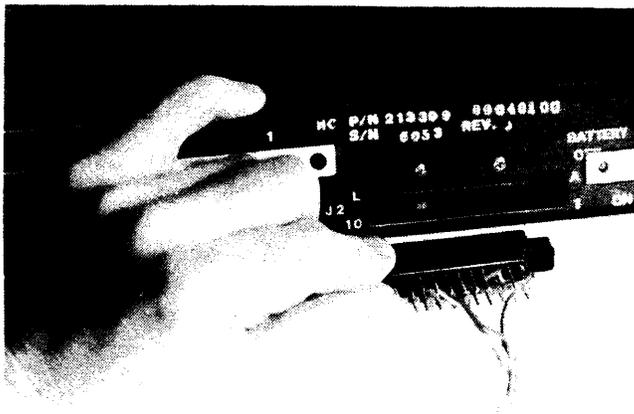
A. - Loosen Connector Retainer Mounting Screws one full turn (Do Not Remove)



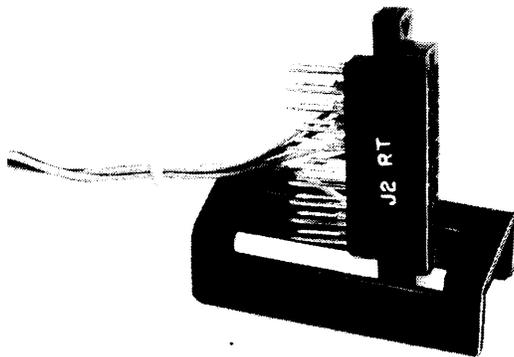
B. - Lift Connector Retainer up to disengage keyhole slots from the screws



C. - Pull Connector Retainer back enough to clear Edge Connector wirewrap pins



D. - Remove Edge Connector from Printed Circuit Board with a rocking motion



E. - If necessary, turn Connector Retainer sideways and slide off Edge Connector

Fig. 2 - Removing Connector Retainer and Edge Connector (reverse steps for installation).

**ALTERNATE MOUNTING BRACKET
(FOR USE WITH ALL MODEL 213300, 213400,
OR 213500 DIGITAL ANNOUNCERS)**

INSTALLATION

GENERAL

1.01 Alternate mounting brackets for the Digital Announcer are described in this practice.

1.02 References

60-213400 Model 213400 Multi-Channel Digital Announcer Operation and Maintenance Manual

For additional information, contact:

Northern Telecom Inc.
Cook Electric Division
6201 Oakton Street
Morton Grove, Illinois 60053
Telephone (312)-967-6600
Telex 72-4472
TWX 910-223-3654
Cable "Cookpro"

INSTALLATION

2.01 Some production runs of Digital Announcers have the bracket attachment holes in different locations on the Control Processor and Multi-Channel chassis. This means that certain bracket positions will result in an offset between the two enclosures. Although this has no effect on Digital Announcer performance, some customers may object to the uneven appearance.

2.02 Alternate mounting brackets are packed with the standard brackets for each Digital Announcer. If the standard brackets do not permit proper chassis alignment, the alternate brackets should be used to achieve the correct spacing.

2.03 Figure 1 shows both standard and alternate bracket attachment.

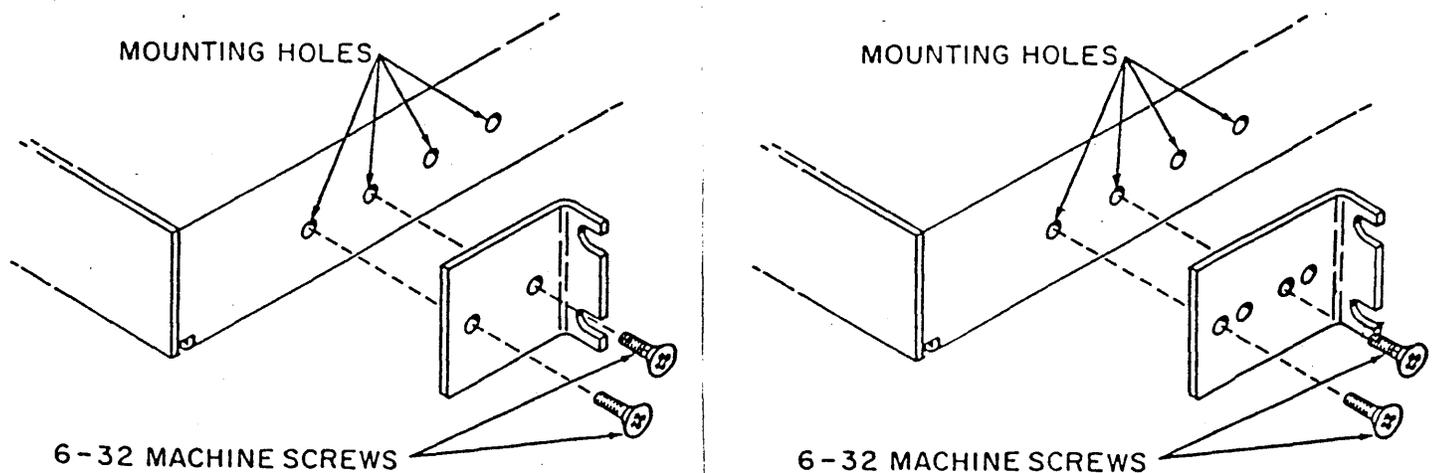


Fig. 1 - Attachment of standard and alternate mounting brackets to Digital Announcer