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Cook Electric Division

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NT7M SERIES DIGITAL ANNOUNCERS

EQUIPMENT DESCRIPTION

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1. GENERAL INFORMATION

OVERVIEW

1.01 The NT7M Series of Digital Announcers products are designed to provide automatic voice message(s) over standard telephone lines. The Announcer may be used as a stand-alone unit, interfaced with other Digital Announcers and/or in conjunction with other equipment, such as Central Office or PBX telephone switches, telephone information centers, etc.

1.02 References

60-NT7M-200	NT7M Series Digital Announcer Installation Procedures
60-NT7M-3xx	NT7M Series Digital Announcer Operating Procedures (several)
60-NT7M-400	NT7M Series Digital Announcer Maintenance Procedures

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ADVANTAGES

1.02 Because of digital technology, the NT7M Series of Digital Announcer products provide significant advantages over less sophisticated products. The advantages are:

(1) Improved audio quality and message lifespan by eliminating drum and tape wear and dirt accumulation.

(2) Reduced space requirements allowing stand-alone usage.

(3) Reduced power consumption.

(4) Reduced maintenance through reduced scheduled maintenance and increased reliability.

(5) Significant cost reduction because of the items just listed.

1.03 The Digital Announcer has a number of options and user selectable features which provide configurations for a wide range of applications. These options are discussed in greater detail in paragraph 3, Product Description.

2. PURPOSE OF EQUIPMENT

INTENDED USES

2.01 The Digital Announcer is the functional equivalent to the electromechanical announcers frequently used for audio intercept messages (for instance, all lines are busy, a telephone number has changed, no service is available after regular office hours, etc.). The Digital Announcer may be used as a direct drop-in replacement for existing drum, tape, or cassette type devices.

2.02 The Digital Announcer lends itself well to original equipment applications which require repetition of the same message.

INTERFACE REQUIREMENTS

2.03 The Digital Announcer may be directly connected to a subscriber line through RJ-11 jacks or through hardware, wire-wrap connection directly to other equipment. The manner in which the announcer is to be connected depends on the options selected.

2.04 Specifics concerning the interface of Digital Announcer equipment are discussed in the appropriate installation and options manual.

INAPPROPRIATE APPLICATIONS

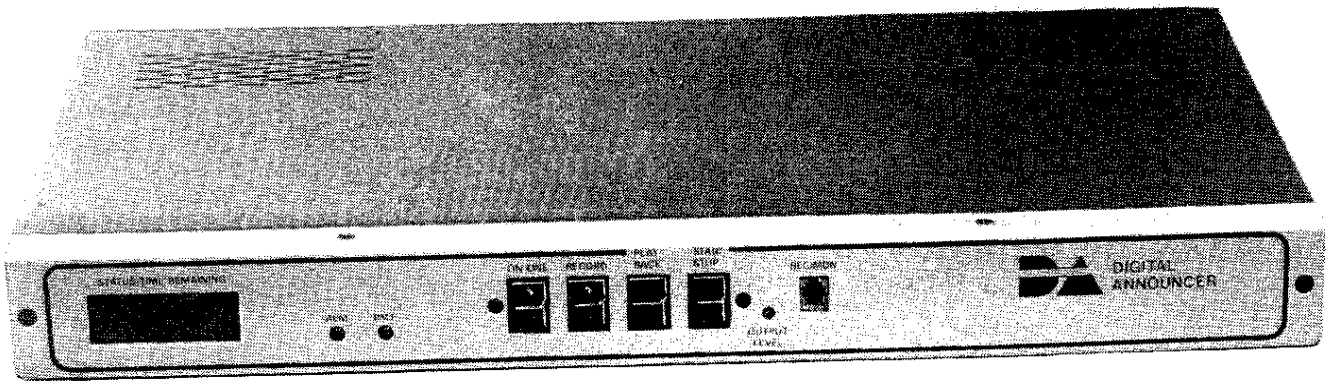
2.05 The Digital Announcer is designed for applications where no user response is expected to the message (listen only). It is <u>not</u> intended to be used as a form of telephone answering machine. The Announcer is not set up to store several messages in sequence.

3. PRODUCT DESCRIPTION

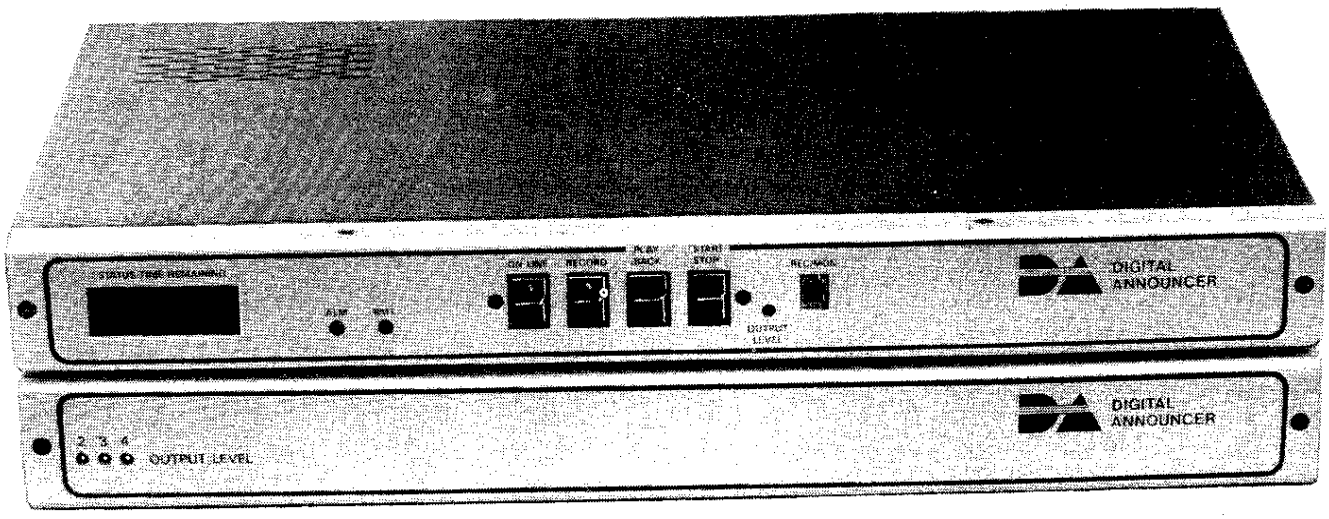
3.01 The Digital Announcer consists of a metal cabinet (Control Processor Chassis) which can be used as-is or may be adapted to rack mounts by a variety of side brackets kits. Because of the many options and features which may be selected, a second enclosure (Expansion Chassis) is often necessary for the extra circuits. Digital Announcer chassis configurations are shown in figure 1. Location of major assemblies and optional assemblies are shown in figure 2. The Digital Announcer is completely self-contained, requiring only external power, audio and signal connections.

PRODUCT SPECIFICATIONS

3.02 Specifications for the Digital Announcer vary with the number of features and options selected. The Standard Digital Announcer specifications are detailed in Table 1. Table 2 details the specifications for the unit with installed options. Specifics concerning each of the options available for the Digital Announcer line of products are contained in documentation for the option.



ONE OR TWO CHANNEL UNITS



THREE OR FOUR CHANNEL UNITS

Fig. 1 - Digital Announcer Configurations

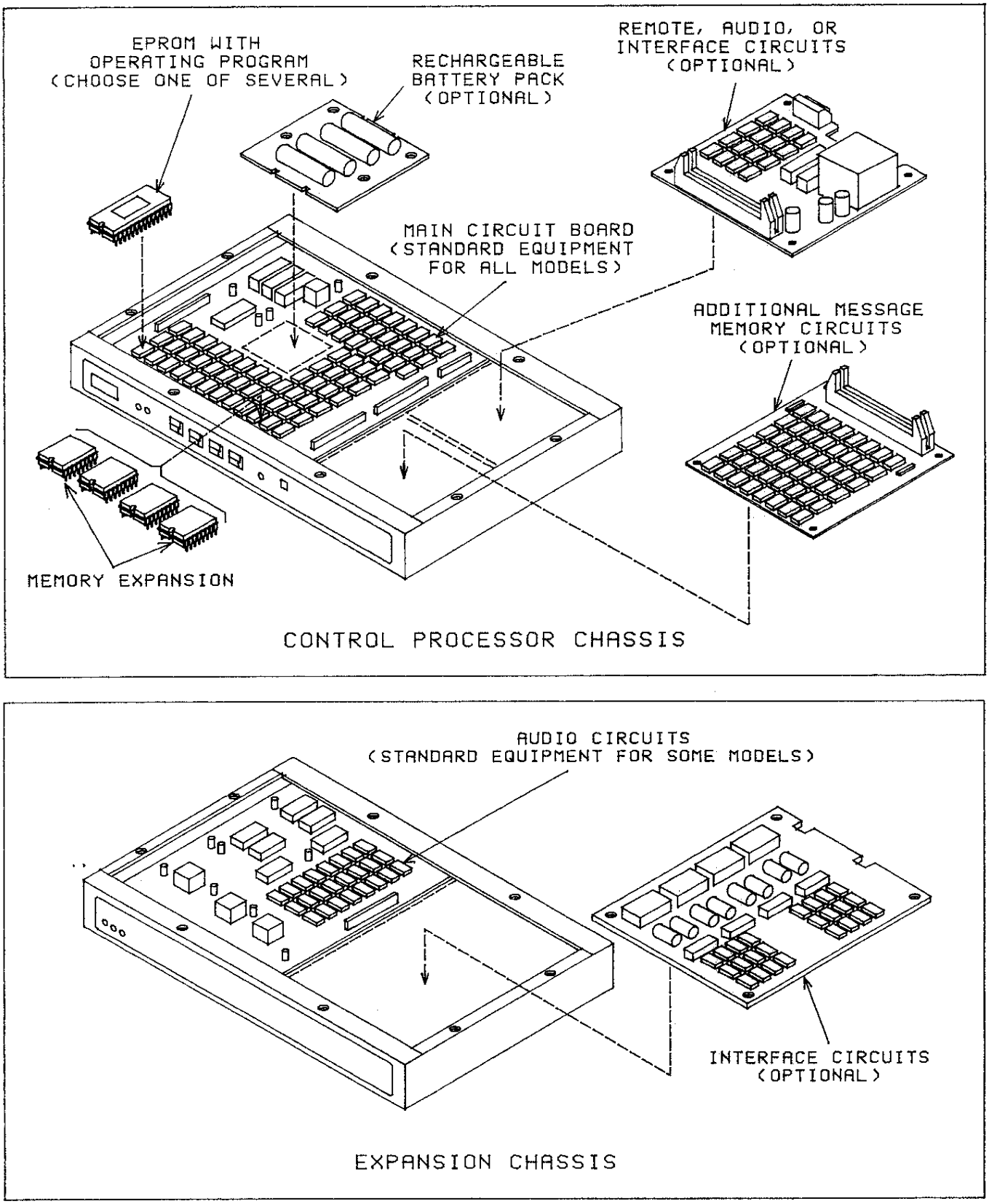


Fig. 2 - Location of Digital Announcer Options

Table 1. Digital Announcer Specifications*

CHARACTERISTIC	DESCRIPTION
Power Consumption	-42 to -66 VDC at 400 mA max. (approximately 20 W at 50 V)
Circuit Protection	1 Ampere, 3AG Slow-Blow fuse (one per chassis)
Interconnection	Audio, Power, Control, and Alarm (Wire-wrap, 20-pin connector)
Environmental	0° to 50°C (32° to 122°F) - operating. -40° to 70°C (-40° to 160°F) - storage. 10% to 90% Relative Humidity (non-condensing)
Exterior Finish	Silver w/Black letters, Brown w/White or custom ordered
Physical Dimensions	Height: 1.75 inches (44.5 mm) (Single Chassis) Height: 3.50 inches (89.0 mm) (Two Chassis) Width: 17.5 inches (445 mm) Depth: 12.0 inches (305 mm)
Weight	5 pounds with options (Single Chassis) 10 pound with options (Two Chassis)
Message Capacity	Defined by the Firmware and Memory options selected
Signal to Noise Ratio	≥45 dB, C message weighted, referred to 0 dBm output (32 kHz)
Audio Input	Approximately 250 millivolts AC rms at Record/Monitor jack)
Audio Output	Firmware selectable (Max. of 2 per chassis). Transformer Coupled Balanced Output (Tip and Ring) at ≥4 ohms Load Impedance. Max. of 200, 900-Ohm lines or 150, 600-Ohm lines Level continuously adjustable to +5 dBm (pre-set to -9 dBm)
Frequency Response	≥300 Hz (±1 dB) to 3 kHz (+1/-6 dB) @ 0 dBm Output (300 Hz to 2.1 kHz, ±1 dB)
Harmonic Distortion	≤6% THD with 0.775V rms output into 4 ohm resistive load (measured with -10 dBm, 1 kHz sine wave audio input)
Control Signals	1 Start: -42 to -66 VDC at 10 mA 1 C/MC: Form C relay contacts rated 4 A at 48 VDC resistive 1 MBY: Form C relay contacts rated 4 A at 48 VDC resistive 1 ALM: Form C relay contacts rated 4 A at 48 VDC resistive
Memory Size (single)	32 (or 64) seconds min., max. of 128 sec. (Single Chassis 64 seconds min.; Max. of 512 sec. (Two Chassis)
Compliance	FCC Class A computing device pursuant to Subpart J of Part 15 Output power pre-set to -9 dBm per Part 68 of FCC rules FCC Registered Product No. D5F982-13986-PX-N UL Recognized Product File No. E106428(N)

* NOTE: All specifications listed are measured using the 32 kHz sampling rate as set at the factory.

Table 2. Digital Announcer Specifications* (with Options)**

CHARACTERISTIC	DESCRIPTION
Memory Size	Up to 128 seconds (Up to 512 seconds with Expanded Memory)
Message Retention (Battery Backup)	128 seconds of memory - 3.0 hours, 512 seconds - 1.3 hours (measured at 25°C, new batteries and full charge)
Audio Expansion	2 fully-independent, identical Audio Outputs
Control Signals	Two (2) Start: -42 to -66 VDC at 10 mA Two (2) C/MC: Form C relays rated 4 A at 48 VDC resistive Two (2) MBY: Form C relays rated 4 A at 48 VDC resistive One (1) ALM: Form C relays rated 4 A at 48 VDC resistive
Remote Access	Record and Playback (DTMF phone) w/Remote Record/Ring Trip option
Telephone Line Interface	Responds to standard telephone ringing signals (connection via RJ-11 modular jack) with Ring Trip Access option
AC Line Power	120 VAC operation with AC Convertor accessory
Rack Mounting	EIA, RETMA, or Bell standard enclosures

* NOTE: All specifications listed are measured using the 32 kHz sampling rate as set at the factory.

** All specifications for units with options installed are the same as units without options installed unless otherwise specified.

THEORY OF OPERATION

3.03 Since the operation of the Digital Announcer is based on the operating instructions (firmware), only a general overview is presented here. Further information concerning this operation is discussed in the appropriate program operation manual which is shipped with each unit. In general, an analog voice announcement is converted to digital data and stored in memory. When the appropriate signals are received from the interface circuits, the message is converted to analog for output to the line requesting the message.

HARDWARE CONFIGURATION

3.04 The Digital Announcer products consist of a Control Processor Chassis and, if required, one or more Expansion Chassis. The Control Processor Chassis is required as part of the base unit.

3.05 The Control Processor Chassis (CPC) provides the operator interface and controls for the digital announcer. The CPC contains the microprocessor, memory (message storage), signal, control, and power supply circuitry and space for the optional additional (second channel) message memory and interface options circuit boards.

3.06 The Expansion Chassis comes in two distinct models. The Standard Expansion Chassis and the Line Expansion Chassis. These chassis are identical except for the rear panel.

3.07 The Standard Expansion Chassis is designed to contain the audio expansion circuits and interface circuits. These circuits are discussed in greater detail in paragraph 4, Options.

3.08 The Line Expansion Chassis is specifically designed to provide for multi-line access to the Digital Announcer. The chassis allows for the addition of eight subscriber lines to a single Control Processor Chassis or a CPC, expansion chassis combination. The expansion chassis may be daisychained to allow up to 200 input lines to a single digital announcer (Refer to the Multi-Line Ring Trip Access Expansion Chassis Equipment Description, Installation, and Operation, Section 060-NT7M-203).

INTERFACE CIRCUITS

3.09 The interface is especially important in cases where several lines have access to a message. The interface is responsible for handling multiple requests (i.e., busy, barge-in, automatic call distribution, etc.). The interface circuits provide impedance matching and furnish the Announcer with start signals; the Announcer returns control signals, status, and alarm to the other equipment through the interface.

3.10 Digital Announcer options which supply interface to other equipment are described in paragraph 4, Options.

3.11 The customer may supply interface circuits to the Digital Announcer. For customer supplied interface circuits, refer to Digital Announcer specifications (Tables 1 and 2) and/or the appropriate option(s) manual as required.

CAUTION: To avoid damage, take care to supply the interface to mate the characteristics of the Announcer to the attached equipment or audio distribution network.

FIRMWARE CONFIGURATION

3.12 Operating Instructions for the Digital Announcer are contained in EPROM's. These socketed firmware chips can be changed in the field. The program options are detailed in Table 3. Programs are outlined in Table 4. More detailed information is contained in the appropriate Program Operation Manual.

Table 3. Firmware Options

NUMBER OF KIT	PROGRAM NAME	AUDIO OUTPUTS	MESSAGES AVAILABLE	START INPUTS	MESSAGE LENGTH	MESSAGE ACCESS
ONE CHANNEL PROGRAMS						
NT7M90AA	BASIC	1	1	1	Variable	Immediate
NT7M908A	ASCII CODE START	1	8	1	Variable	Immediate
TWO CHANNEL PROGRAMS						
NT7M92AA	BASIC	2	2	2	Variable	Immediate
THREE CHANNEL PROGRAMS						
NT7M93AA	DEMAND PHASE SPLIT MEMORY	3	1	3	Variable*	Immediate
NT7M93BA	DEMAND PHASED TAPE EMULATOR	3	1	3	Variable*	Immediate
NT7M93DA	TIME PHASED SPLIT MEMORY	3	1	1	Variable*	Immediate
FOUR CHANNEL PROGRAMS						
NT7M91AA	BASIC	4	4	4	Variable	Immediate
NT7M91BA	SYNCHRONOUS	4	4	1	Fixed	Immediate
NT7M91CA	DEMAND PHASED ENTRY	4	1	4	Variable	Immediate
NT7M91DA	FIXED MESSAGE LENGTH	4	4	4	Fixed	Immediate

* Maximum message length of any Three Channel Program is restricted to half of the total memory capacity. Half of memory is reserved for the alternate announcement.

Table 4. Firmware Programs

PROGRAM	DESCRIPTION
COMMON PROGRAMS	
Operational Status	Indicates mode of operation (i.e., Select, On-Line, Alarm, etc.) on front panel LED display.
Memory Usage	Displays the amount of available memory (in seconds) and provides a real time count down during recording or playback.
Channel Activity	Displays active Audio output channels by number.
Remote Operation	Illuminates a dedicated Remote indicator lamp when the Announcer has accepted the security code and is under remote control
Fault Diagnostics	Built-In-Test - Alarm indicator illuminates on fault detections
Peg Count	Displays a running total of message requests (up to 999,999)
Extra Equipment	Allows the user to program up to 20 C/MC relay Control Signals operations for use as timing references or external device control
Special Information Tones	Allows the addition of industry standard tone patterns to the beginning of messages for electronic announcement identification
SPECIFIC PROGRAMS	
Basic	Provides all characteristics of common programs (differs only in the number of audio outputs).
ASCII Code Start	Allows ASCII code identification of messages (the Announcer may be controlled by a computer terminal, a P.C. or C.O. equipment).
Fixed Message Length	Allows memory to be partitioned into sections equally divided by the number of audio outputs (i.e., each channel gets the maximum, equal message time).
Synchronous	Provides fixed message lengths and simultaneous start times similar to mechanical type drum announcers.
Demand Phased Entry	Provides multiple request for one message (only one message may be recorded, but it is available on all outputs independently)
Demand Phased Split	Same as Demand Phased Entry except half of memory is reserved for an alternate message.
Demand Phased Tape Emulator	Provides a two second delay after both the active and the alternate message to simulate rewind time of tape machines.
Time Phased Split Memory	Same as Demand Phased Split except the second and third output of the outgoing message lag the original by 33% and 66% of memory length.

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4. DIGITAL ANNOUNCER OPTIONS

4.01 Options are available to modify or enhance the operation of the Digital Announcers. Each option has unique features which are selected by the user to match his specific requirements. Options must be ordered from the factory. In some cases options may be installed as a field retrofit. The features for any given option are determined by switches, jumpers, program subroutines or other operator action. Each option comes with installation and operating instructions.

MEMORY EXPANSION

4.02 The Digital Announcer has enough memory to store approximately 64 seconds of announcement time. The maximum amount of memory which can be used is equal to about 518 seconds. The announcer can accommodate up to 128 seconds of memory in sockets on the main circuit board. Memory (message length) is extended by installing additional RAM in groups of four or eight chips (32 and 64 seconds of message). Refer figure 3.

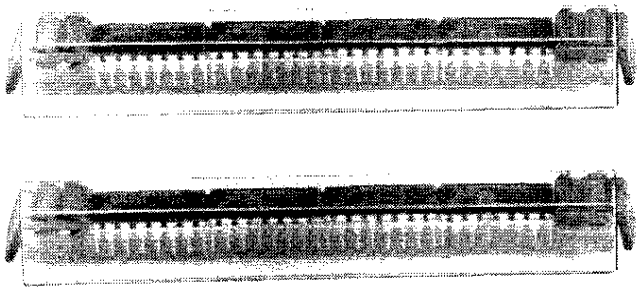


Fig. 3 - Memory Expansion
Part No. NT7M04CA (32 sec., 1 Ch.only)
Part No. NT7M04AA (64 sec.)

EXTENDED MEMORY CIRCUIT

4.03 For applications which require more than 128 seconds of message time, an Extended Memory Circuit Board (figure 4) is available. This memory board mounts next to the main circuit board in the Control Processor Chassis and provides additional sockets for another 384 seconds of message storage RAM chips. Memory may be added to this board in groups of four chips (32 sec) or eight chips (64 seconds) until a maximum of approximately 518 seconds is reached. The following list shows memory for 64 second chip sets.

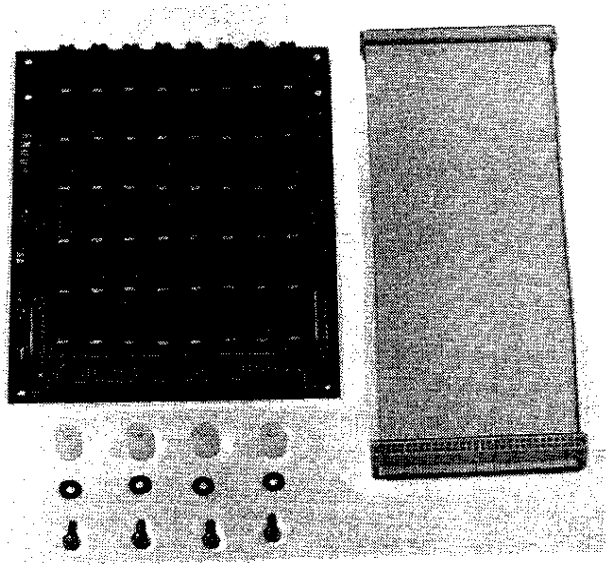


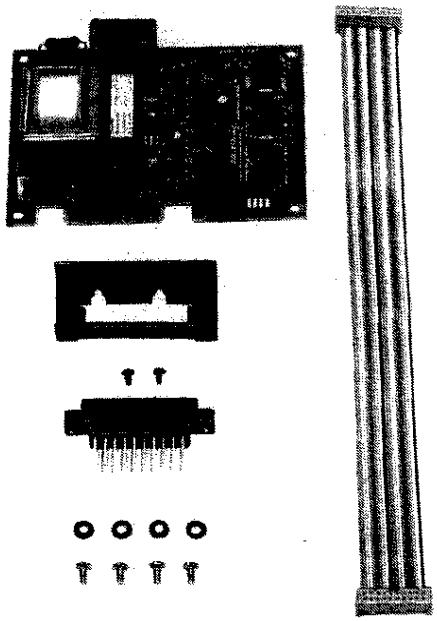
Fig. 4 - Extended Memory Circuit
Part No.NT7M10BA

Number of kits	Number of ICs	Seconds at 32kHz	Seconds at 22kHz
1 *	8	64	92
2	16	128	184
3 *	24	192	276
4	32	256	368
5	40	320	460
6	48	384	553
7	56	448	645
8	64	512	737

* These memory circuits are always factory installed.

ONE LINE RING TRIP ACCESS

4.04 The Ring Trip Access option (figure 5) matches the Digital Announcer output characteristics to a subscriber telephone line. This permits the unit to operate as a stand-alone device without the usual dependence on Central Office or PBX equipment. This option has provisions to adjust line impedance, ring count, number of message repetitions, Barge-In type operation, etc. One Ring Trip Access circuit is required for each telephone line; several Ring Trip Access circuits may be wired in parallel if necessary. For more information refer to the Ring Trip Access Equipment Description, Installation, and Operation Manual (060-NT7M-351).

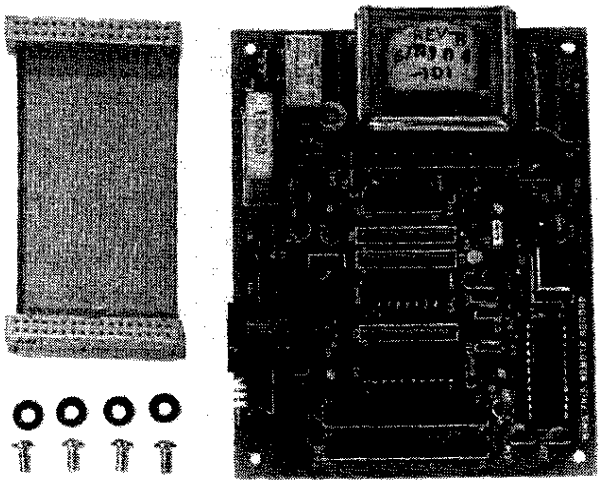


FCC Registration No. D5F982-13556-VP-N

Fig. 5 - One Line Ring Trip Access Kit
Part No. NT7M08BA

RING TRIP/REMOTE RECORD

4.05 The Ring Trip/Remote Record option (figure 6) combines a subscriber line interface with a remote access circuit. Remote Record allows the Announcer to accept message changes from a Dual Tone Multiple Frequency (DTMF) telephone (trademark names such as Touch Tone*, Digitone**, etc.). Programmable access codes provide security against unauthorized message changes. Ring Trip Access matches the Digital Announcer to a subscriber telephone line as previously described. The remote Record and Ring Trip functions may be disabled independently without interaction. For more information refer to the Ring Trip/ Remote Access Equipment Description Installation and Operation Manual (060-NT7M-311).



FCC Registration No. D5F982-14715-VP-N

Fig. 6 - Ring Trip/Remote Record Kit
Part No.NT7M07BA

* Trademark of AT&T
** Trademark of Northern Telecom

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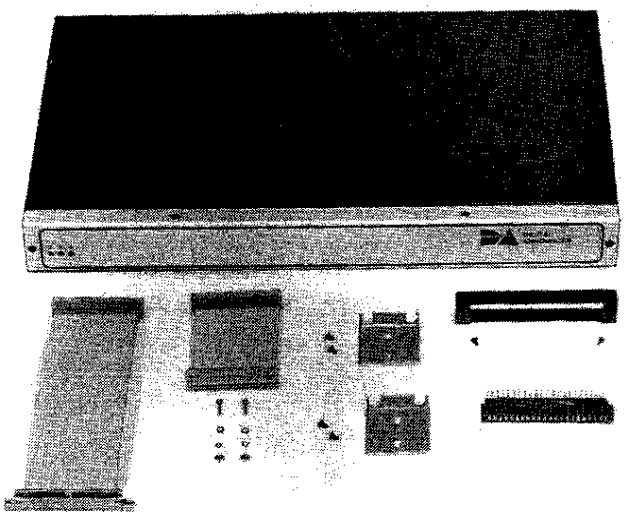
THREE CHANNEL AUDIO EXPANSION

4.06 A Three Channel Audio Expansion is available to increase the audio capacity of single output Digital Announcers to four fully independent audio outputs. The circuit board contains all of the components for the audio circuit. Data and control signals are taken from the main circuit board via an external ribbon cable. Additional sets of relay contacts are also provided to allow each of the audio circuits to control external equipment.

4.07 The Three Channel Audio Expansion mounts in the Expansion Chassis and has its own power supply (figure 7). The operation of the additional channels is controlled by the characteristics of the firmware selected.

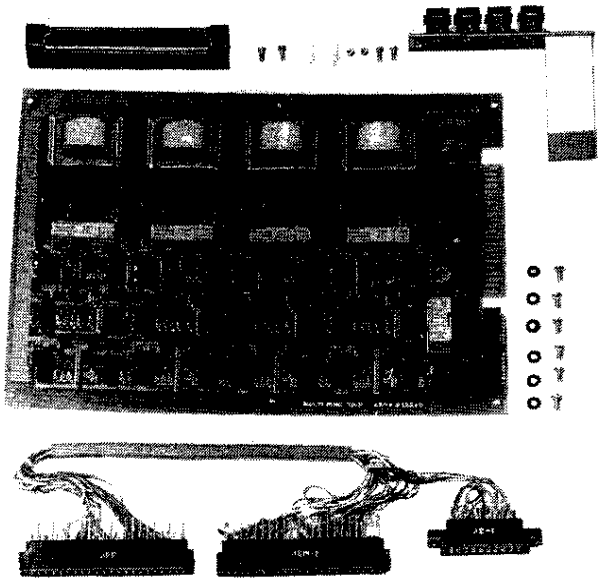
4.08 Upgrade with this option will require a firmware change to control the additional audio output. Operation and installation of the firmware is detailed in the Installation and Operation manuals supplied with the option.



NT7M26BA
Fig. 7 - Three Channel Expansion Kit

FOUR LINE RING TRIP ACCESS

4.09 Four Line Ring Trip Access option (figure 8) which matches the Digital Announcer output characteristics to four subscriber telephone lines, permitting the unit to operate as a stand-alone device without the usual dependence on Central Office or PBX Equipment. It has provisions to adjust line impedance, ring count, number of message repetitions, Barge-In type operations, etc. Four Line Ring Trip Access circuits may be wired in parallel if more than four telephone lines must receive the recorded announcements. For more information refer to the Four LIne Ring Trip Equipment Description Installation and Operation Manual (060-NT7M-354). This option may be added to the Expansion Chassis and is also included in the Multi-Line Ring Trip Access option (Refer to paragraph 4.10).



FCC Registration No. D5F982-13556-VP-N

Fig. 8 - Four Line Ring Trip Access Kit
Part No. NT7M07BA

LINE EXPANSION

4.10 The Line Expansion Kit (figure 9) is used applications where several independent telephone line pairs or audio circuits must have access to one voice announcement. The Line Expansion uses a pair of Four Line Ring Trip Access Circuits in the Multi-Line Digital Announcer Chassis. The Four Line Ring Trip Access option has been previously described.

4.11 The Line Expansion Kit provides connections for up to eight separate subscriber telephone lines. This option may be daisychained to allow many input lines access to a single digital announcer (150, 600-Ohm lines or 200, 900-Ohm lines). For more details refer to the Multi-Line Ring Trip Access Expansion Chassis Equipment Description, Installation, and Operation, Section 060-NT7M-203.

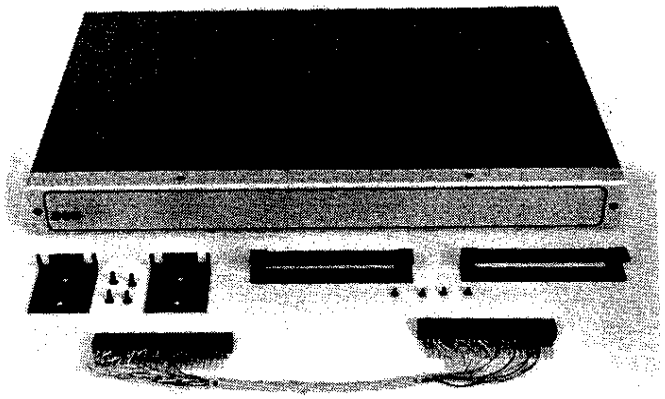


Fig. 9 - Line Expansion Kit
Part No. NT7M29CA

DIGITAL ANNOUNCER DISTRIBUTION SYSTEM

4.12 The Digital Announcer Distribution System (figure 10) allows up to five Digital Announcers (20 messages) to be connected to a maximum of 375 audio circuits per connector bank. The connector banks are constructed with Northern Telecom BIX modular cross-connect wiring blocks, which serve as a termination point between equipment interfaces and Digital Announcers. (Consult the manufacturer for assistance in selecting the Distribution System which best matches your specific application.)

4.13 The Distribution System has a built in matching network for each of the audio output pairs to allow direct connection to existing telephone circuits without modification. Control signal wiring for each announcement is also brought out to the terminal blocks. The modular construction of the Digital Announcer Distribution System permits mounting in standard equipment frames, and easily accommodates future expansion in groups of 25 pairs.

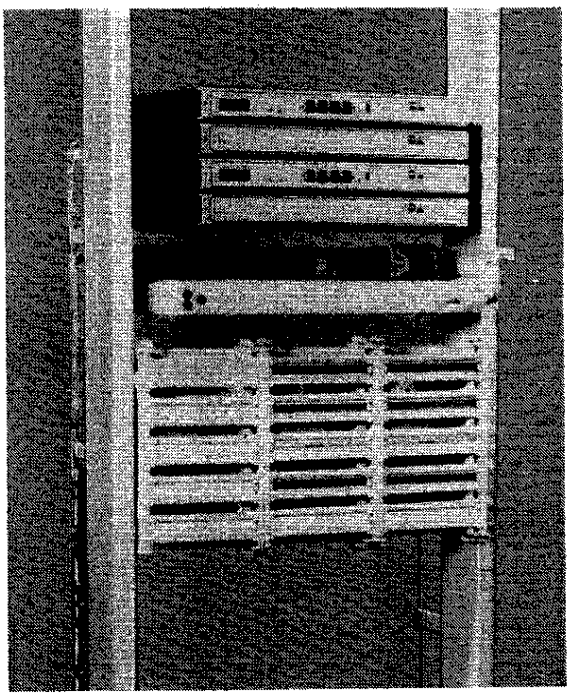


Fig. 10 - Announcer Distribution System
Part No. 214600

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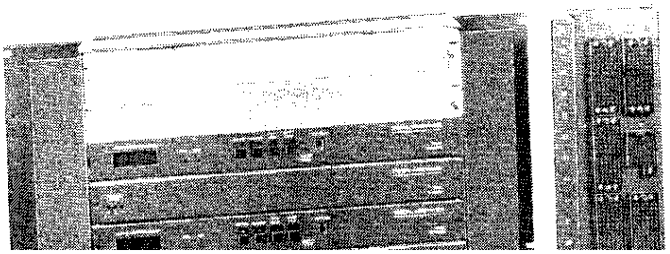
DMS-10 INTERFACE

4.14 Digital Announcers may also be used in conjunction with telephone switching equipment to provide electronic announcement capabilities. The DMS-10 Digital Announcer System Interface (figure 11) provides up to twelve individual messages in a plug compatible equipment module. This system fits into the space normally occupied by analog message announcement equipment. A quick-