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Z	7		J1A/C1 (DELETED)
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X	9	303, 304	1C4
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V	8	304, 305	3C4, 4B2 (DELSTED)
U	8	305	1F5
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DWG ISS	CD ISS	DATE ISSD	DRN	APP
1	1	2-25-85	CDI RCM	HEN REC RHS
2D	1 APP ED	12-31-86	CDI CM	EMD REC LAR
3B	1 APP 2B	4-9-87	CDI CM	EMD REC LAR
4B	1 APP 3B	4-9-87	CDI CM	EMD REC LAR
5M	2M	4-9-87	CDI CM	EMD REC LAR
6B	2 APP 1B	11-30-88	CDI CM	HEN REC GJK
7A	2 APP 2A	11-30-88	CDI CM	HEN REC GJK
8B	3B	2-3-89	CDI CM	HEN REC GJK
9B	9B	6-30-94		

SYSTEM USED ON	DESIGN CONTROL	SUPPORTING INFORMATION	
		CATEGORY	NO.
14A	WE	EQUIPMENT DRAWING PDP AT&T PRACTICE	J1C194A-1 8705-801-0001 201-521-101

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RN01

COMMON SYSTEMS
14A ANNOUNCEMENT SYSTEM
CIRCUIT

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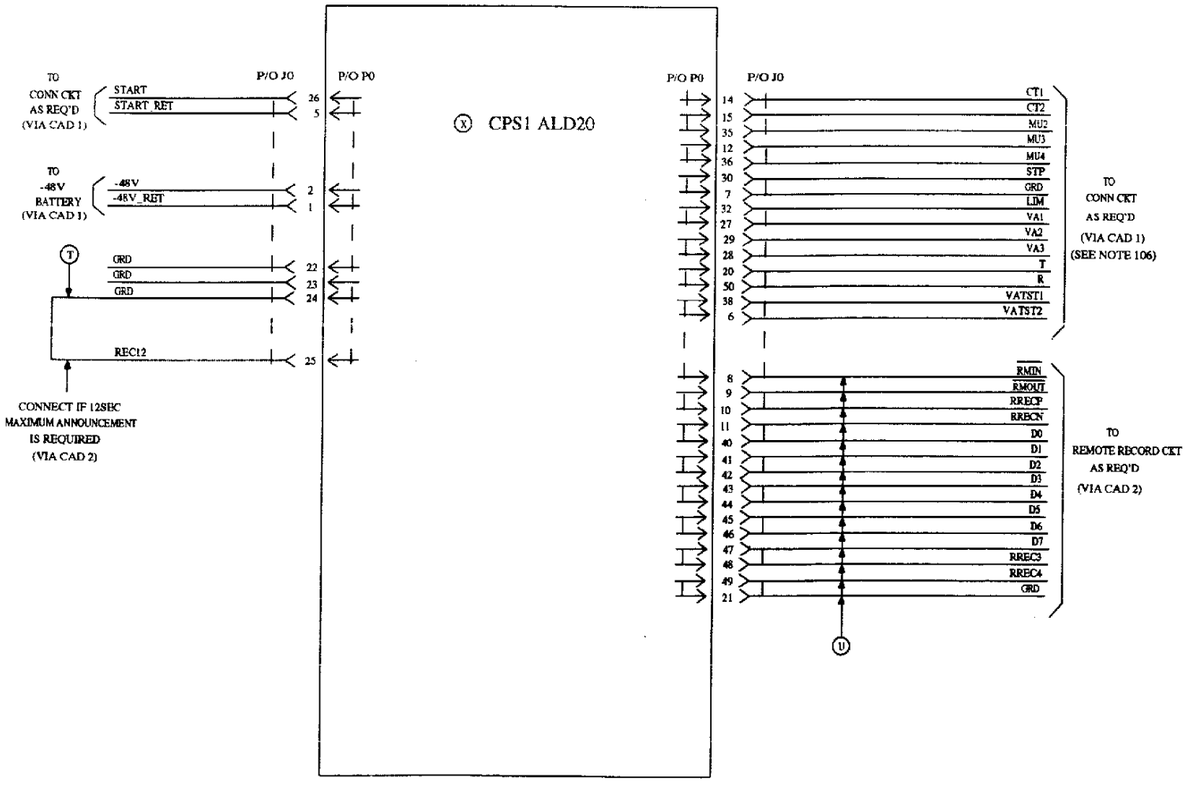
FS 1

RECORD/REPRODUCE SERVICE

FOR TRUNK SIDE CONNECTION



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APP FIG 1

CIRCUIT PACK

EQPT LOC	POSITION 1 (J0) OR 2 (J1)
DESIG	CPS1
CLEI CODE	XCPQAEEAAA
CODE	ALD20
OPTION	X
TERM. FS LOC	1C4

CONNECTOR

DESIG	LOC	CODE
J0/J1	1B2,1B5	940A

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CIRCUIT NOTES:

101.

DESIG	FUSE AMP	POTENTIAL	ONE PER
F1	1/4 A	-48V TALK	APP FIG 1 (SEE NOTE 302)

BATTERY SYMBOL	VOLTAGE RANGE
-48V TALK BAT (SEE NOTE 201)	-42.5 TO -52.5

102. A VOICE ALARM FROM A 14A ANNOUNCEMENT SYSTEM REPRESENTS LOSS OF ANNOUNCEMENT. THE VOICE ALARM TERMINALS, VA1(27) OR VA3(28) AND VA2(29) MAY BE CONNECTED TO THE CENTRAL OFFICE ALARM CIRCUIT TO DETECT A VOICE ALARM CONDITION. CAUTION, IF THE OFFICE ALARM CIRCUIT IS SUPPLIED WITH 130V, A RELAY OPERATED FROM -48V TO GROUND MUST BE INSERTED BETWEEN VA1 OR VA3-VA2 TERMINALS AND THE CENTRAL OFFICE ALARM CIRCUIT TO ISOLATE VA1 OR VA3-VA2 RELAY CONTACTS FROM THE CENTRAL OFFICE ALARM CIRCUIT.

103. THE LOOP RESISTANCE OF THE TWISTED PAIRS WHICH CONNECT THE AUDIO AMPLIFIER OUTPUT TERMINALS T(20) AND R(50) TO THE POINT WHERE DISTRIBUTION IS MADE TO MULTIPLE TRUNK CIRCUITS SHOULD BE AS LOW AS POSSIBLE. THIS WILL ASSURE MINIMUM LOSS OF ANNOUNCEMENT LEVEL WITH INCREASING NUMBERS OF TRUNK CIRCUITS. IT WILL ALSO PROVIDE MAXIMUM TALK-THROUGH SUPPRESSION BETWEEN MULTIPLE TRUNKS. IN ENGINEERING AN OFFICE, THEREFORE, TABLES 1 AND 2 BELOW SHOULD BE USED AS A GUIDE IN SELECTING THE GAGE OF WIRE TO USE IN CONNECTING THE T, R TERMINALS OF THE 14A TO THE POINT WHERE THE TRUNK CIRCUITS ARE MULTIPLED. THESE TABLES ASSURE THAT THE MAXIMUM LOSS IN ANNOUNCEMENT LEVEL FROM ONE TRUNK CIRCUIT CONNECTION TO THE MAXIMUM NUMBER INDICATED WILL NOT EXCEED 3.5DB. THEY ALSO ASSURE THAT THE TALK-THROUGH SUPPRESSION WILL BE 40DB MINIMUM. FOR EXAMPLE, TO CONNECT 100 900-OHM TRUNKS TO THE 14A WITH 100 FEET OF TWISTED PAIR, 24 GAGE WIRE OR HEAVIER MUST BE USED. IF 100 600-OHM TRUNKS ARE TO BE CONNECTED WITH 100 FEET OF TWISTED PAIR, 22 GAGE WIRE OR HEAVIER MUST BE USED.

TABLE 1. WIRE GAGE FOR 900 OHM DISTRIBUTION

DISTANCE (FT)	NUMBER OF TRUNK CIRCUITS						
	1	50	100	200	300	400	500
25	26	26	26	26	24	22	20
50	26	26	26	24	22	20	16
75	26	26	26	22	20	18	14
100	26	26	24	20	20	16	
200	24	24	22	18	16	14	
400	22	22	18	14	14		
800	18	18	16				
1000	18	18	14				

TABLE 2. WIRE GAGE FOR 600 OHM DISTRIBUTION

DISTANCE (FT)	NUMBER OF TRUNK CIRCUITS					
	1	50	100	200	300	400
25	26	26	26	24	22	20
50	26	26	26	22	20	16
75	26	26	24	20	18	14
100	26	26	22	20	16	
200	24	24	20	16	14	
400	20	20	16	14		
800	18	18	14			
1000	16	16				

104. ALL RELAYS WHICH CONNECT TO THE 14A ANNOUNCEMENT SYSTEM, MUST HAVE A 185A NETWORK OR EQUIVALENT INSTALLED.

105. WIRE CONNECTORS AS INDICATED EVEN IF 2ND ALD20 IS NOT USED.

106. FOR 5ESS APPLICATIONS, PINS 6, 7, 12, 26, 30, 32, 35, 36 AND 38 ARE NOT BEING USED AT THIS TIME.

EQUIPMENT NOTES:

201. SIGNAL BATTERY MAY BE USED IF TALK BATTERY IS NOT AVAILABLE IN THE FRAME WHERE THE 14A IS TO BE INSTALLED, HOWEVER IN EITHER CASE, TO CAUSE MINIMUM INTERFERENCE TO THE AUDIO SIGNALS THE 14A ANNOUNCEMENT SYSTEM SHOULD NOT BE LOCATED IN THE SAME FRAME OR ADJACENT TO EQUIPMENT WHICH PRODUCES EXTRAORDINARY ELECTRICAL ACTIVITY (SUCH AS RINGING AND TONE EQUIPMENT, SELECTOR SWITCHES, CROSSBAR SWITCHES, OR INTERRUPTER CIRCUITS).

202. A MINIMUM OF 1 INCH CLEARANCE SHOULD BE PROVIDED ABOVE AND BELOW THE 14A AND ANY OTHER CIRCUIT FOR VENTILATION PURPOSES.

203. CLEI CODES ARE AS LISTED BELOW:

CODE	CLEI CODE
ALD20	XCPQAEEAAA

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INFORMATION NOTES:

301. UNLESS OTHERWISE SPECIFIED:
RESISTANCE VALUES ARE IN OHMS.
CAPACITANCE VALUES ARE IN MICROPARADS.
VALUES PRECEDED BY THE SYMBOL + (PLUS)
OR - (MINUS) ARE IN VOLTS.

302.

FEATURE OR OPTION	PROVIDE		
	APP FIG	APP OR WRG	QTY QUANTITY
ALD20 RECORD/REPRODUCE SERVICE IN POSITION 1(J0) OR 2(J1) SEE NOTES 303 AND 304	1	X	1 PER CKT
REMOTE RECORD CONNECTION SEE NOTE 305		U	1 PER CKT
12 SECOND MAXIMUM ANNOUNCEMENT CONNECTION SEE NOTE 306		T	1 PER CKT

303. A 14A ANNOUNCEMENT SYSTEM IS EQUIPPED WITH 1 ALD20 (OPTION X) CIRCUIT PACK IN POSITION 1 FOR SINGLE CHANNEL, SINGLE ANNOUNCEMENT CAPABILITY. 2 CHANNEL, 2 ANNOUNCEMENT CAPABILITY MAY BE OBTAINED BY EQUIPPING POSITION 2 WITH A SECOND ALD20.

304. THE REQUIRED ANNOUNCEMENT FOR ALD20 IS OBTAINED BY RECORDING THE DESIRED ANNOUNCEMENT BY EITHER SPEAKING INTO A TELEPHONE HANDSET OR BY DUBBING THE PRE-RECORDED ANNOUNCEMENT FROM A TAPE RECORDER TO THE ALD20.

305. THIS IS ONLY USED IF FACILITIES ARE AVAILABLE FOR REMOTELY RECORDING ANNOUNCEMENTS ON ALD20 OVER SWITCHED NETWORK.

306. THIS CONNECTION SHOULD ONLY BE MADE IN THOSE APPLICATIONS WHICH REQUIRE THAT ALL ANNOUNCEMENTS BE LIMITED TO A MAXIMUM LENGTH OF 12 SECONDS AND KEPT IN SYNC WITH OTHER ANNOUNCEMENTS IN THE SAME FRAME.
THIS OPTION APPLIES ONLY TO ALD20 TYPE SERVICE.

307.

RECORD OF FIGURES, WIRING AND APPARATUS CHANGES					
CHANGES ON ISS	IF JOB RECORD DO NOT	THIS OPTION WAS	SEE NOTES	USE IN CIRCUIT AVAIL	DA

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COMMON SYSTEMS
14A ANNOUNCEMENT SYSTEM
CIRCUIT

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SECTION I - GENERAL DESCRIPTION

1. PURPOSE OF CIRCUIT

1.01 THIS CIRCUIT PROVIDES THE MEANS FOR RECORDING AND REPRODUCING STANDARD NETWORK-TYPE ANNOUNCEMENTS PRECEDED BY SPECIAL INFORMATION TONE (SIT) ENCODINGS.

1.02 A 14A CHANNEL THAT PROVIDES RECORD/REPRODUCE-TYPE SERVICE IS EQUIPPED WITH AN ALD20 CIRCUIT PACK.

1.03 ONE OR TWO ALD20 CIRCUIT PACKS ARE INSTALLED WHEN THE CIRCUIT IS TO BE USED FOR CONNECTION TO STANDARD ANNOUNCEMENT TRUNKS, AS IN A HOST LOCAL CENTRAL OFFICE.

2. GENERAL DESCRIPTION OF OPERATION

2.01 THE 14A IS A 2-CHANNEL MICROCOMPUTER-CONTROLLED ELECTRONIC ANNOUNCEMENT SYSTEM THAT CAN BE EQUIPPED TO PROVIDE RECORD/REPRODUCE- TYPE SERVICE.

2.02 THE 14A USES ONE OR TWO ALD20 CIRCUIT PACKS FOR ANNOUNCEMENT SERVICE PROVIDED TO ANNOUNCEMENT TRUNKS.

2.03 A 14A CHANNEL PROVIDING RECORD/REPRODUCE SERVICE IS EQUIPPED WITH AN ALD20 CIRCUIT PACK THAT USES 32-KILOBIT ADAPTIVE DIFFERENTIAL PULSE-CODE MODULATION (ADPCM) TO GENERATE SIT ENCODING AND HIGH-QUALITY SPEECH. THE DIGITAL DATA FOR THE SIT ENCODING AND THE SPEECH IS STORED IN BATTERY BACKED UP 1-MEGABIT STATIC RANDOM-ACCESS MEMORY (SRAM). THE SRAM CAN STORE DIGITIZED SPEECH DATA FOR ANNOUNCEMENTS OF UP TO 30 SECONDS IN LENGTH AND CAN RETAIN THIS DATA EVEN IF POWER TO THE 14A IS INTERRUPTED. A MESSAGE CAN BE RECORDED ON THE 14A EITHER BY SPEAKING INTO A STANDARD TELEPHONE HANDSET, BY DUBBING A PRERECORDED MESSAGE FROM A TAPE RECORDER, OR FROM A REMOTE LOCATION OVER A TELEPHONE LINE. SPECIAL INFORMATION TONE ENCODINGS PRECEDING A MESSAGE CAN EITHER BE DERIVED FROM A PRERECORDED TAPE OR BE GENERATED BY THE 14A. A FRONT PANEL MOUNTED 8-CHARACTER LIGHT-EMITTING DIODE (LED) DISPLAY DISPLAYS THE PROGRAMMABLE FUNCTIONS AND THE OPERATING STATUS OF THE SYSTEM. DIAGNOSTIC, TIMING, AND CONTROL FUNCTIONS ARE PROVIDED BY AN INTEL 8051 SINGLE-CHIP MICROCOMPUTER.

2.04 EACH CHANNEL PROVIDES (AT THE CONNECTOR OF AN ALD20 CIRCUIT PACK):

(A) A TRANSFORMER-COUPLED AUDIO OUTPUT ON LEADS T AND R

(B) LEADS START AND START RET, WHICH REQUIRE A CLOSURE TO START THE ANNOUNCEMENT

(C) A CONTACT CLOSURE BETWEEN CT1 AND CT2 (CUT-THROUGH), WHICH INDICATES THE BEGINNING OF THE ANNOUNCEMENT

(D) LEADS MU2, MU3, AND MU4 FOR A CONTACT CLOSURE BETWEEN MU3 AND MU4 DURING THE ANNOUNCEMENT AND A CONTACT OPEN DURING THE SILENT PERIOD AT THE END OF THE ANNOUNCEMENT

(E) THE MU2 AND MU3 COMBINATION FOR THE OPPOSITE STATE TO THE MU4 AND MU3 PAIR

(F) AN STP LEAD, WHICH IS GROUNDED DURING THE ANNOUNCEMENT AND IS MOMENTARILY OPEN AT THE END OF THE ANNOUNCEMENT.

(G) AN LIM LEAD FOR THE OPPOSITE STATE TO THE STP LEAD

(H) A CONTACT OPEN BETWEEN VA3 AND VA2 AND A CONTACT CLOSURE BETWEEN VA2 AND VA1 TO INDICATE AN ALARM CONDITION

(I) LEADS VATST1 AND VATST2, WHICH REQUIRE A CLOSURE TO TEST THE VOICE ALARM CIRCUIT

(J) LEADS TO CONNECT THE SYSTEM TO THE -48 VOLT CENTRAL OFFICE TALK BATTERY

(K) AN RMIN INPUT AND RMOUT FOR INTERFACING AN ALD20 TO A REMOTE RECORD CIRCUIT

(L) INPUTS RRECN AND RRECP USED TO INPUT AUDIO TO THE ALD20 FROM THE REMOTE RECORD CIRCUIT

(M) OUTPUTS RREC3 AND RREC4 USED TO OUTPUT AUDIO FROM THE ALD20 TO THE REMOTE RECORD CIRCUIT

(N) THE D0 THROUGH D7 INPUTS/OUTPUTS USED TO RECEIVE/SEND PROGRAM DATA FROM/TO THE REMOTE RECORD CIRCUIT.

2.05 EACH CHANNEL EQUIPPED WITH AN ALD20 CIRCUIT PACK PROVIDES ON THE FRONT PANEL:

(A) A MODULAR TELEPHONE JACK USED TO RECORD OR MONITOR AN ANNOUNCEMENT THROUGH A TELEPHONE HANDSET

(B) A TAPE JACK USED WHEN RECORDING AN ANNOUNCEMENT FROM A TAPE RECORDER

(C) A VOICE ALARM LED TO INDICATE A VOICE ALARM CONDITION

(D) AN 8-CHARACTER ALPHANUMERIC LED DISPLAY TO INDICATE THE PROGRAM OPTIONS AND THE OPERATIONAL STATUS OF THE CHANNEL

(E) A MENU SWITCH USED TO STEP THROUGH THE PROGRAM MENU DISPLAYED ON THE ALPHANUMERIC DISPLAY

(F) A SELECT SWITCH TO SELECT THE DESIRED PROGRAM OPTION

(G) A LEVEL ADJUST POTENTIOMETER TO SET THE TRANSMISSION LEVEL.

SECTION II - DETAILED DESCRIPTION

1. ALD20 CIRCUIT PACK

GENERAL DESCRIPTION

PURPOSE OF CIRCUIT

1.01 THE ALD20 CIRCUIT PACK IS DESIGNED TO PROVIDE A MEANS FOR RECORDING AND REPRODUCING NETWORK-TYPE ANNOUNCEMENTS FOR THE 14A ANNOUNCEMENT SYSTEM. RECORDINGS ARE MADE BY SPEAKING THE MESSAGE INTO A TELEPHONE HANDSET, BY DUBBING A PRERECORDED MESSAGE FROM A TAPE RECORDER, OR FROM A REMOTE LOCATION OVER A TELEPHONE LINE. THE SPEECH IS ENCODED USING A 32-KILOBIT PER SECOND ADAPTIVE DIFFERENTIAL PULSE-CODE MODULATION (ADPCM) ALGORITHM. THE DIGITIZED SPEECH DATA FOR THE ANNOUNCEMENT IS STORED IN A BATTERY BACKED UP 1-MEGABIT STATIC RANDOM-ACCESS MEMORY (SRAM). THE ALD20 THEREFORE CAN PROVIDE ANNOUNCEMENTS OF UP TO 30 SECONDS IN LENGTH AND CAN RETAIN THE ENCODED SPEECH DATA IN THE MEMORY IF POWER TO THE ALD20 IS INTERRUPTED. THE SPECIAL INFORMATION TONES (SIT) THAT PRECEDE SOME ANNOUNCEMENTS CAN BE DERIVED FROM PRERECORDED TAPES OF THESE ANNOUNCEMENTS OR CAN BE GENERATED BY THE ALD20. ALL DIAGNOSTIC AND CONTROL FUNCTIONS FOR THE ALD20 ARE PROVIDED BY AN INTEL 8051 SINGLE-CHIP MICROCOMPUTER.

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DETAILED DESCRIPTION

1.02 MAJOR COMPONENTS

THE ALD20 CIRCUIT PACK CONTAINS DIGITAL AND ANALOG CIRCUITRY. THE MAJOR DIGITAL CIRCUIT COMPONENTS OF THE ALD20 ARE AN 8051 MICROCOMPUTER, AN ADPCM SPEECH PROCESSOR, A 1-MEGABIT SRAM, AND AN 8-CHARACTER LIGHT- EMITTING DIODE (LED) ALPHANUMERIC DISPLAY. THE MAJOR ANALOG CIRCUIT COMPONENTS OF THE ALD20 ARE A UNITY GAIN INPUT BUFFER AMPLIFIER, AN AUTOMATIC GAIN CONTROL CIRCUIT, LOWPASS FILTERS, AND A TRANSFORMER- COUPLED AUDIO OUTPUT AMPLIFIER.

1.03 DIGITAL CIRCUIT

(A) BUS STRUCTURE

THE ALD20 HAS THREE BUSES: AN 8-BIT DATA BUS, A 16-BIT MAIN ADDRESS BUS, AND A 3-BIT DEVICE-SELECT ADDRESS BUS. THE DATA BUS LINKS THE 8051 MICROCOMPUTER (IC9) TO THE ADPCM SPEECH PROCESSOR (IC10), THE ANNOUNCEMENT MEMORY (IC13), THE 8-CHARACTER LED DISPLAY (IC26), THE RELAY FUNCTION LATCH (IC16), AND THE OCTAL BUS TRANSCEIVER (IC8). THE 16-BIT MAIN ADDRESS BUS IS USED WHEN THE 8051 ACCESSES THE ANNOUNCEMENT MEMORY AND WHEN PROGRAMMING THE 8-CHARACTER LED DISPLAY. THE 3-BIT DEVICE-SELECT ADDRESS BUS IS USED WHEN THE 8051 ACCESSES THE PERIPHERAL DEVICES.

(B) 8051 MICROCOMPUTER

THE MAIN CONTROL ELEMENT ON THE ALD20 IS THE 8051 MICROCOMPUTER (IC9). THE 8051 HANDLES ALL CONTROL AND DIAGNOSTIC FUNCTIONS FOR THE ALD20. IT OPERATES AT 12 MEGAHERTZ AND HAS AN INTERNAL 4096-BYTE READ-ONLY MEMORY (ROM) FOR PROGRAM STORAGE AND FOUR 8-BIT INPUT/OUTPUT PORTS (P0-P3). THE P0 PORT IS THE MULTIPLEXED LOW-ORDER MAIN ADDRESS AND DATA BUS DURING ACCESSES TO THE ANNOUNCEMENT MEMORY AND PERIPHERAL DEVICES. THE P2 PORT SUPPLIES THE HIGH-ORDER ADDRESS BITS. THE P1 PORT SUPPLIES THE 3-BIT DEVICE-SELECT ADDRESS BUS AND SPECIAL CONTROL FUNCTIONS. THE P3 PORT PROVIDES TWO INTERRUPT INPUTS, READ/WRITE, AND ADDITIONAL SPECIAL CONTROL FUNCTIONS. WHEN ACCESSING ANNOUNCEMENT MEMORY, THE P0 PORT IS FIRST CONFIGURED TO PROVIDE THE LOW-ORDER ADDRESS BITS. AT THIS TIME, THE ADDRESS LATCH ENABLE (ALE) IS HIGH (LOGIC LEVEL 1), AND THE OUTPUTS (1Q THROUGH 8Q) OF IC12 ARE THE SAME AS THE INPUTS (1D THROUGH 8D). THE ADDRESS LATCH ENABLE (ALE) THEN GOES LOW (LOGIC LEVEL 0), AND THE P0 PORT IS CONFIGURED AS A DATA INPUT/OUTPUT PORT. THE LOW-ORDER ADDRESS BITS ARE LATCHED ON THE OUTPUTS OF IC12, AND THE HIGH-ORDER ADDRESS BITS ARE PROVIDED BY P2. THE ANNOUNCEMENT MEMORY AND EACH PERIPHERAL DEVICE HAS A 3-BIT DEVICE-SELECT ADDRESS THAT IS PROVIDED BY P11, P12, AND P13. THE P11, P12, AND P13 PORTS ARE CONNECTED TO THE INPUTS (A, B, AND C) ON A 3-TO-8 LINE DECODER (IC11). THE OUTPUTS (0 THROUGH 7) OF IC11 ARE CONNECTED TO THE CHIP SELECT (CS) INPUTS OF EACH PERIPHERAL DEVICE. A 3-BIT VALUE ON THE INPUT OF IC11 CAUSES ONE OF ITS EIGHT OUTPUTS TO BE LOW, AND THE DEVICE WHOSE CS IS CONNECTED TO THE LOW OUTPUT IS THE ONE SELECTED. THE ANNOUNCEMENT MEMORY ALSO REQUIRES A SEVENTEENTH ADDRESS BIT, WHICH IS PROVIDED BY P10.

(C) POWERUP RESET

THE ALD20 HAS CIRCUITRY TO ENSURE THAT IT IS PROPERLY INITIALIZED AFTER POWERUP. WHEN THE ALD20 IS POWERED UP, THE 8051 IS HELD IN A RESET STATE (INPUT RST HIGH) UNTIL THE POWER SUPPLY VOLTAGES HAVE STABILIZED. CAPACITOR C21 CHARGES FROM 0 TO 5 VOLTS THROUGH A 10- KILOHM RESISTOR. THE RST STAYS HIGH UNTIL THE VOLTAGE ON PIN 9 OF IC1 EXCEEDS ABOUT 2.5 VOLTS. WHEN THE RST GOES LOW, THE 8051 BECOMES ACTIVE. AFTER INITIALIZING INTERNAL REGISTERS, THE 8051 PERFORMS DIAGNOSTIC TESTS ON THE ALD20 TO ENSURE PROPER OPERATION. IF A DIAGNOSTIC TEST FAILS, THE DISPLAY BLINKS AND THE VOICE ALARM RELAY WILL BE IN THE ALARM STATE. IF AN ANNOUNCEMENT HAS NOT BEEN PREVIOUSLY RECORDED, THE DISPLAY WILL BLINK RECORD, AND THE VOICE ALARM RELAY WILL BE IN THE ALARM STATE. THE DISPLAY WILL BLINK AND THE VOICE ALARM WILL REMAIN IN THE ALARM STATE UNTIL THE RECORD MODE IS SELECTED.

(D) EIGHT-CHARACTER ALPHANUMERIC LED DISPLAY

A FRONT PANEL MOUNTED 8-CHARACTER ALPHANUMERIC LED DISPLAY IS USED TO DISPLAY TO THE USER THE PROGRAMMABLE FUNCTIONS AND THE OPERATIONAL STATUS OF THE ALD20. THE DISPLAY IS A "SMART DISPLAY" IN THAT CHARACTER DECODING AND PROGRAMMABLE FUNCTIONS ARE PROVIDED BY THE DISPLAY. WHEN PROGRAMMING THE DISPLAY, THE 8051 GENERATES ITS DEVICE-SELECT ADDRESS ON P1, AND ACCESSES THE DISPLAY CONTROL WORD REGISTER OR THE CHARACTER RAM. THE CONTROL WORD REGISTER IS AN 8-BIT REGISTER THAT PERFORMS FIVE FUNCTIONS. THEY ARE BRIGHTNESS CONTROL, FLASH RAM CONTROL, BLINKING, SELF-TEST, AND CLEAR. DURING NORMAL OPERATION, THE DISPLAY IS PROGRAMMED FOR A MINIMUM BRIGHTNESS OF 13 PERCENT AND FOR A STEADY DISPLAY (NOT BLINKING). IF A FAILURE IS DETECTED BY THE 8051, THE DISPLAY IS PROGRAMMED TO BLINK ON AND OFF AT ABOUT A 2-HERTZ RATE AND FOR A BRIGHTNESS OF 27 PERCENT OF MAXIMUM. THE FLASH FUNCTION IS NOT USED. WHEN THE CHK SYS FUNCTION IS SELECTED, THE SELF-TEST FUNCTION OF THE DISPLAY IS INVOKED. DURING THE SELF-TEST FUNCTION, MAJOR PORTIONS OF THE DISPLAY CIRCUITRY ARE EXERCISED, AND ALL LEDS ARE ILLUMINATED. D5 (PIN 26) IS SET TO 1 IF THE SELF-TEST PASSES AND TO 0 IF THE SELF-TEST FAILS. THE CHARACTER RAM STORES THE ASCII DATA FOR EACH CHARACTER DISPLAYED. ADDRESS LINES A0 THROUGH A3 ARE USED TO SELECT THE LOCATION IN THE CHARACTER RAM WHEN THE 8051 WRITES THE ASCII DATA TO THE DISPLAY.

(E) SPEECH PROCESSOR

THE ALD20 USES AN ADPCM SPEECH PROCESSOR (SP) (IC10) TO ENCODE AND DECODE THE SITS AND THE SPEECH FOR THE ANNOUNCEMENTS. THIS DEVICE HAS BOTH ANALOG-TO-DIGITAL (AD) AND DIGITAL-TO-ANALOG (DA) CONVERTERS AND ADPCM ANALYSIS AND SYNTHESIS CIRCUITRY INTEGRATED INTO A SINGLE-CHIP, 40-PIN DUAL IN-LINE PACKAGE (DIP). WHEN ENCODING, THE SP HAS AS AN INPUT THE ANALOG SPEECH AND AS AN OUTPUT THE DIGITAL ADPCM DATA THAT IS SENT TO THE ANNOUNCEMENT MEMORY FOR STORAGE. WHEN DECODING, THE SP INPUTS THE ADPCM SPEECH DATA STORED IN THE ANNOUNCEMENT MEMORY AND OUTPUTS THE ANALOG SPEECH FOR THE ANNOUNCEMENT. THE SP HAS TWO MODES OF OPERATION CONTROLLED BY THE DATA COMMAND (D/$\overline{C}$ INPUT. WHEN THE D/$\overline{C}$ IS LOW, THE SP IS IN THE COMMAND MODE, AND THE 8051 CAN COMMAND THE SP TO START ENCODING (RECORD) OR TO START DECODING (PLAYBACK). THE D/$\overline{C}$ INPUT IS CONNECTED TO P15 OF THE 8051. TO START RECORDING THE 8051 MAKES P1 EQUAL C0 HEX (D/$\overline{C}$ AND CS LOW) AND WRITES 04 HEX TO THE SP THROUGH THE DATA BUS. TO START PLAYBACK, P1 EQUALS C0 HEX AND 02 HEX IS WRITTEN TO THE SP. WHEN THE D/$\overline{C}$ AND CS INPUTS GO HIGH (DATA MODE), P1 EQUALS FF HEX, AND THE RECORD/PLAYBACK FUNCTIONS OF ALD20 BEGIN. DURING THE RECORD FUNCTION, THE SP SAMPLES THE INCOMING ANALOG SPEECH SIGNAL EVERY 125 MICROSECONDS (8-KHZ RATE) AND ENCODES EACH SAMPLE INTO 4-BIT ADPCM DATA. AN INTERNAL BUFFER STORES THE ADPCM DATA UNTIL TWO SAMPLES OF THE SPEECH HAVE BEEN ACCUMULATED. THE SP THEN SIGNALS THE 8051 THAT DATA IS AVAILABLE BY PULSING ITS MCK OUTPUT HIGH. WHEN THE MCK OUTPUT GOES HIGH, THE INT0 INPUT OF THE 8051 GOES LOW, BECAUSE OF THE INVERSION OF MCK BY IC2D. THE 8051 OUTPUTS THE DEVICE-SELECT ADDRESS FOR THE SP (P1 EQUALS F0 HEX). AS A RESULT, THE D/$\overline{C}$ INPUT IS HIGH (DATA MODE), AND THE $\overline{CS}$ INPUT IS LOW. THE ADPCM DATA IN THE SP BUFFER IS SUPPLIED TO THE DATA I/O PINS OF THE SP. THE 8051 READS THE ADPCM DATA INTO ITS INTERNAL RAM AND THEN WRITES IT TO A LOCATION IN THE ANNOUNCEMENT MEMORY. WHEN THE 8051 HAS READ THE ADPCM DATA FROM THE SP, IT COMPUTES A CHECKSUM OF THE DATA BY ADDING EACH BYTE READ TO THE SUM OF ALL THE PREVIOUS DATA. WHEN THE RECORDING ENDS, THE FINAL VALUE OF THE CHECKSUM AND THE NUMBER OF BYTES READ BY THE 8051 IS WRITTEN TO THE FIRST FIVE LOCATIONS OF THE ANNOUNCEMENT MEMORY. THE PLAYBACK FUNCTION IS ESSENTIALLY THE REVERSE OF THE RECORD FUNCTION. DURING THE PLAYBACK FUNCTION, THE SP PULSES ITS MCK OUTPUT HIGH TO SIGNAL THE 8051 THAT THE SP REQUIRES ADPCM DATA. THE 8051 READS THE ADPCM DATA FROM THE ANNOUNCEMENT MEMORY, COMPUTES THE CHECKSUM, AND WRITES THE DATA TO THE SP. EACH BYTE OF ADPCM DATA CONTAINS TWO SAMPLES OF THE ANALOG SPEECH. THEREFORE, THE RECORD/PLAYBACK, WRITE/READ CYCLES TIME IS EQUAL TO 250 MICROSECONDS, TWICE THE SAMPLE PERIOD. THE RECORD/PLAYBACK FUNCTIONS ARE ENDED WHEN THE 8051 RESETS THE SP BY MAKING P1 EQUAL FB HEX.

(F) ANNOUNCEMENT MEMORY

THE ADPCM DATA FOR THE SIT ENCODINGS AND SPEECH IS STORED IN THE ANNOUNCEMENT MEMORY (A 1-MB SRAM). THE ANNOUNCEMENT MEMORY REQUIRES 17 ADDRESS BITS (A0 THROUGH A16) FOR COMPLETE ACCESS TO ALL LOCATIONS. THE 8051 ADDRESSING CAPABILITY IS ONLY 16 BITS (A0 THROUGH A15). THE SEVENTEENTH ADDRESS BIT IS PROVIDED BY P10. THE ANNOUNCEMENT MEMORY IS ORGANIZED INTO TWO HALVES: THE LOWER HALF WITH ADDRESS RANGE 0 THROUGH 0FFFF HEX AND THE UPPER HALF WITH ADDRESS RANGE 10000 THROUGH 1FFFF HEX. THE VALUE OF P1 DETERMINES WHICH HALF OF THE MEMORY IS ACCESSED. WHEN P1 EQUALS FC HEX, THE LOWER HALF OF THE ANNOUNCEMENT MEMORY IS ACCESSED, AND WHEN P1 EQUALS FD HEX, THE UPPER HALF IS ACCESSED. IN ADDITION TO THE ADPCM SPEECH DATA, THE ANNOUNCEMENT MEMORY CONTAINS DATA USED BY THE 8051 DURING ANNOUNCEMENT PLAYBACK. THE FIRST THREE LOCATIONS (ADDRESSES 0 THROUGH 2) CONTAIN THE MAXIMUM ADDRESS RANGE OF THE ADPCM DATA. THIS DETERMINES THE LENGTH OF THE ANNOUNCEMENT. THE NEXT TWO LOCATIONS (ADDRESSES 3 AND 4) CONTAIN THE CHECKSUM OF THE ADPCM DATA THAT WAS CALCULATED DURING THE RECORD FUNCTION. DURING PLAYBACK, THE CHECKSUM OF THE SPEECH DATA IN THE ANNOUNCEMENT MEMORY IS COMPUTED BY THE 8051. AT THE END OF THE ANNOUNCEMENT, THE PLAYBACK CHECKSUM IS COMPARED WITH THE VALUE STORED IN MEMORY LOCATIONS 3 AND 4. THIS PROVIDES A CHECK OF THE INTEGRITY OF THE ADPCM DATA AND A MECHANISM FOR ACTIVATING A VOICE ALARM IF A FAILURE OF THE ANNOUNCEMENT IN THE MEMORY SHOULD OCCUR. THE 8051 COUNTS THE NUMBER OF TIMES THE ANNOUNCEMENT IS PLAYED WHEN THE ALD20 IS IN THE IN-SERVICE MODE. THIS COUNT, CALLED THE PEG COUNT, IS STORED IN FOUR MEMORY LOCATIONS (ADDRESS 1F100 THROUGH 1F103 HEX). THESE ADDRESSES ARE

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ACCESSED BY THE 8051 AND ARE SHOWN ON THE 8-CHARACTER LED DISPLAY WHEN THE PEG CNT FUNCTION IS SELECTED. IF THE POWER IS INTERRUPTED WHILE THE ALD20 IS IN THE IN-SERVICE MODE, THE 8051 IS CAPABLE OF AUTOMATICALLY PLACING THE ALD20 IN THE IN-SERVICE MODE ONCE POWER IS RESTORED. WHEN THE ALD20 IS PLACED IN THE IN-SERVICE MODE THE 8051 ACCESSES A MEMORY LOCATION (ADDRESS 1F104 HEX) AND WRITES 5A HEX INTO THIS LOCATION. AFTER THE ALD20 POWERED UP, THE 8051 READS THE VALUE IN ADDRESS 1F104 HEX, AND IF THE VALUE READ BY THE 8051 IS EQUAL TO 5A HEX AND POWERUP DIAGNOSTICS HAVE PASSED, THE 8051 PLACES THE ALD20 IN THE IN-SERVICE MODE. IF THE 8051 READS A VALUE OF 0 IN ADDRESS 1F104 HEX, AND POWERUP DIAGNOSTICS HAVE PASSED, THE 8051 PLACES THE ALD20 IN THE LOCAL MODE (LOC MODE). IN ORDER TO PREVENT THE LOSS OF THE DATA IN THE ANNOUNCEMENT MEMORY, THE SUPPLY VOLTAGE TO THE ANNOUNCEMENT MEMORY IS BACKED UP WITH A BATTERY. WHEN THE POWER TO ALD20 IS INTERRUPTED, THE COMPARATOR CIRCUIT (IC27) SENSES THE LOSS OF THE +5 VOLT SUPPLY VOLTAGE. THE OUTPUT OF IC27 (PIN 1) IS NORMALLY HIGH. WHEN THE +5 VOLT SUPPLY HAS DROPPED BY ABOUT 0.4 VOLT, THE OUTPUT OF IC27 SWITCHES LOW. THIS DISABLES THE CS INPUT (PIN 22) OF THE ANNOUNCEMENT MEMORY (IC14). WHEN THE +5 VOLTS HAS REACHED ABOUT 2.6 VOLTS, THE ANNOUNCEMENT MEMORY IS POWERED FROM THE BACKUP BATTERY.

(G) SANITY TIMER

THE ALD20 HAS A TIMER CIRCUIT THAT PROVIDES FOR SANITY CHECK OF THE 8051 PROGRAM OPERATION. THIS CIRCUITRY IS PROVIDED BY ICS 4, 5, AND 6. DURING NORMAL OPERATION, THE 8051 RESETS THIS CIRCUIT PERIODICALLY TO PREVENT IT FROM TIMING OUT. IF THE 8051 FAILS TO RESET THIS CIRCUIT FOR 32 MILLISECONDS, THE CIRCUIT TIMES OUT. THE FIRST TIME-OUT RESETS THE 8051 BY PULSING THE RST INPUT HIGH. IF THE TIME-OUT WAS CAUSED BY A SOFT ERROR CONDITION CLEARED BY THE RESET, THE 8051 RESUMES NORMAL PROGRAM OPERATION. IF THE ERROR CONDITION IS NOT CLEARED, THE 8051 FAILS TO RESET THE SANITY TIMER, AND A SECOND TIME-OUT PERIOD OCCURS. THIS SECOND TIME-OUT ACTUATES THE VOICE ALARM (VA) RELAY AND LIGHTS THE VOICE ALARM LED ON THE FRONT PANEL.

(H) REMOTE RECORD

ANNOUNCEMENTS CAN BE RECORDED ON THE ALD20 FROM A REMOTE LOCATION OVER A STANDARD TELEPHONE LINE WHEN THE ALD20 IS CONNECTED TO A REMOTE RECORD CIRCUIT. THE ALD20 IS PROGRAMMED BY THE REMOTE RECORD CIRCUIT OVER THE D0 THROUGH D7 EXTERNAL INPUT/OUTPUT DATA LINES. THE ALD20 CAN BE PROGRAMMED BY THE REMOTE RECORD CIRCUIT TO RECORD, PLAYBACK, GENERATE THE APPROPRIATE SIT ENCODING, RUN DIAGNOSTICS, AND GO INTO THE IN-SERVICE MODE. THE ALD20 IS SIGNALED FOR PROGRAMMING BY THE REMOTE RECORD CIRCUIT BY BRINGING THE RMIN INPUT LOW. IF THE ALD20 IS PLAYING AN ANNOUNCEMENT, THE ANNOUNCEMENT IS COMPLETED BEFORE RESPONDING TO THE REMOTE RECORD REQUEST. WHEN THE ALD20 RESPONDS, THE 8051 READS THE DATA ON D0 THROUGH D7 THROUGH THE OCTAL BUS TRANSCEIVER (IC8). IF A VALID PROGRAM CODE IS RECEIVED, THE ALD20 BRINGS RMOUT LOW AND SENDS THE REMOTE RECORD CIRCUIT 20 HEX THROUGH IC8. IF THE PROGRAM CODE FROM THE REMOTE RECORD CIRCUIT IS NOT VALID, THE ALD20 SENDS 10 HEX. VALID PROGRAM CODES ARE SHOWN IN TABLE A.

TABLE A

PROGRAM CODE	MEANING
01	RECORD
02	PLAYBACK
03	GO IN-SERVICE
04	DIAGNOSTIC REQUEST
05	NO-OP
06	NO-OP
07	EXIT
80 HEX + N	GENERATE SIT NO. N

WHERE N = 01 TO 20 HEX

RECORDING AND PLAYBACK ARE STOPPED BY THE REMOTE RECORD CIRCUIT BY MAKING RMIN LOW. WHEN RECORDING OR PLAYBACK IS ENDED, THE ALD20 MAKES RMOUT LOW AND SENDS 20 HEX THROUGH IC8. A DIAGNOSTIC REQUEST FROM THE REMOTE RECORD CIRCUIT CAUSES THE ALD20 TO TEST THE 8051 PROGRAM MEMORY, THE ANNOUNCEMENT MEMORY, AND THE AUDIO OUTPUT CIRCUIT. WHEN THE DIAGNOSTIC FUNCTION IS COMPLETED, THE ALD20 SENDS THE REMOTE RECORD CIRCUIT 20 HEX IF ALL TESTS HAVE PASSED AND 09 HEX IF ANY TEST FAILS. IF A DIAGNOSTIC REQUEST DETECTS A FAILURE OR THE REMOTE RECORD CIRCUIT FAILS TO RESPOND TO THE ALD20 SIGNALS OR IF TWO INVALID OPCODES IN SEQUENCE ARE RECEIVED BY THE ALD20, THE ALD20 HAS A MEANS FOR EXITING THE REMOTE MODE. IF NO RECORDING WAS MADE DURING THE REMOTE MODE SESSION, THE ALD20 RETURNS TO THE IN-SERVICE MODE. HOWEVER, IF A RECORDING WAS MADE AND THE GO IN- SERVICE COMMAND WAS NOT RECEIVED BY THE ALD20, THE ALD20 VOICE ALARM RELAY IS ACTUATED, AND THE DISPLAY FLASHES REM MODE.

1.04 ANALOG CIRCUIT

(A) AUDIO INPUT

THE AUDIO FOR THE ANNOUNCEMENT TO BE RECORDED CAN BE SUPPLIED TO THE ALD20 THROUGH THREE DIFFERENT INPUTS: THE REMOTE RECORD INPUT LINE (RRECN-RRECP), THE TAPE JACK (J1), AND THE TELEPHONE HANDSET JACK (J2). ALL THESE INPUTS ARE CONNECTED TO A UNITY-GAIN AUDIO AMPLIFIER (IC17). THE OUTPUT OF THE UNITY-GAIN AMPLIFIER IS SUPPLIED TO THE AUTOMATIC GAIN CONTROL (AGC) CIRCUIT (IC14). THE AGC CIRCUIT MAINTAINS A CONSTANT AUDIO LEVEL OF ABOUT -3.0 VU AT THE INPUT OF THE SPEECH PROCESSOR (IC10) FOR AUDIO LEVELS BETWEEN -20 AND +10 VU AT ANY OF THE ABOVE INPUTS OF THE ALD20. THE OUTPUT FROM THE AGC CIRCUIT IS FILTERED BY IC15 BEFORE BEING SUPPLIED TO THE SPEECH PROCESSOR FOR ENCODING. INTEGRATED CIRCUIT IC15 CONTAINS TWO LOW-PASS SWITCHED CAPACITOR FILTERS, EACH WITH A CUTOFF FREQUENCY OF 3 KILOHERTZ.

(B) AUDIO OUTPUT

THE DECODED AUDIO OUTPUT OF THE SPEECH PROCESSOR IS FIRST FILTERED BY IC15 AND THEN SUPPLIED TO THE AUDIO OUTPUT AMPLIFIER (IC18) THROUGH THE LEVEL ADJUST POTENTIOMETER (PT1). TRANSFORMER T2 PROVIDES OUTPUT ISOLATION AND AN OUTPUT IMPEDANCE OF ABOUT 4 OHMS. ANOTHER TRANSFORMER, T1, SUPPLIES AUDIO TO THE TELEPHONE HANDSET JACK (J2) AND TO THE REMOTE RECORD CIRCUIT THROUGH OUTPUT LINES RREC3-RREC4. DURING EACH CUT-THROUGH INTERVAL, THE AUDIO OUTPUT SECTION IS CHECKED. THIS IS DONE BY HAVING THE SPEECH PROCESSOR (IC10) GENERATE A 1-KILOHERTZ TONE DURING THE CUT-THROUGH INTERVAL. THE 1-KILOHERTZ TONE IS SUPPLIED TO A COMPARATOR CIRCUIT. IF THE 1-KILOHERTZ TONE IS PRESENT, THE INPUT TO THE 8051 (PIN 15) IS LOW, AND THE ANNOUNCEMENT STARTS AT THE END OF THE CUT-THROUGH INTERVAL. IF THE 1-KILOHERTZ TONE IS NOT PRESENT, PIN 15 OF THE 8051 IS HIGH; THE VOICE ALARM RELAY ACTUATES; AND THE DISPLAY WILL BLINK AUD FAIL.

SECTION III - REFERENCE DATA

1. WORKING LIMITS

1.01 THE -48 VOLT DIRECT CURRENT IS SUPPLIED BY THE TALK BATTERY TO MINIMIZE ELECTRICAL NOISE INTERFERENCE. THE SIGNAL BATTERY CAN BE USED IF THE TALK BATTERY IS NOT AVAILABLE.

1.02 THE TYPICAL CURRENT DRAIN ON THE -48 VOLT DC SUPPLY IS 0.16 AMPERE FOR EACH ALD20.

1.03 TO MINIMIZE INTERFERENCE TO THE AUDIO SIGNALS, THIS CIRCUIT SHOULD NOT BE LOCATED IN THE SAME FRAME OR ADJACENT TO CIRCUITS THAT PRODUCE EXTRAORDINARY ELECTRICAL ACTIVITY (RINGING AND TONE EQUIPMENT, SELECTOR SWITCHES, CROSSBAR SWITCHES, OR INTERRUPTER CIRCUITS).

1.04 CONNECTIONS TO THIS CIRCUIT CAN BE MADE WITH SINGLE-WIRE GROUNDED CONNECTIONS WHEN REQUIRED. HOWEVER, MINIMUM NOISE INTERFERENCE WILL BE ACHIEVED WITH TWISTED PAIR CONNECTIONS.

1.05 FOR MINIMUM LOSS WITH MULTIPLE TRUNK CONNECTIONS AND FOR MAXIMUM CROSSTALK REJECTION, THE LOOP RESISTANCE OF THE TWISTED PAIRS THAT CONNECT THE AUDIO OUTPUT T-R LEADS TO THE POINT WHERE DISTRIBUTION IS MADE TO MULTIPLE TRUNK CIRCUITS SHALL BE AS LOW AS POSSIBLE. (SEE CIRCUIT NOTE 103 ON SD-97798-01.)

1.06 THE OPERATING TEMPERATURE RANGE IS 0 THROUGH 55 DEGREES CELSIUS.

2. FUNCTIONAL DESIGNATIONS.

2.01 RELAYS

DESIGNATION	MEANING
CT	CUT THROUGH
MU	MUTE
STP	STOP
LIM	LIMIT
VA	VOICE ALARM

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3. FUNCTIONS

3.01 THE 14A ANNOUNCEMENT SYSTEM EQUIPPED WITH AN ALD20 CIRCUIT PACK OR PACKS (RECORD/REPRODUCE) HAS THE FOLLOWING FEATURES.

(A) IT PROVIDES FOR RECORDING AND REPRODUCING UP TO TWO CHANNELS OF ANNOUNCEMENTS, WHICH CAN BE PRECEDED BY SIT ENCODINGS.

(B) IT PROVIDES FOR CHANGING ANNOUNCEMENTS BY RECORDING FROM A TELEPHONE HANDSET, FROM A TAPE RECORDER, OR FROM A REMOTE LOCATION OVER A TELEPHONE LINE.

(C) IT PROVIDES AN 8-CHARACTER LED DISPLAY TO INDICATE PROGRAM OPTIONS AND OPERATIONAL STATUS.

(D) IT PROVIDES FOR PROGRAMMING THE SYSTEM FROM FRONT PANEL MOUNTED SWITCHES.

(E) IT PROVIDES FOR THE SELECTION AND OPTIONAL INTERNAL GENERATION OF SIT ENCODINGS.

(F) IT PROVIDES, FOR EACH CHANNEL, A TRANSFORMER-COUPLED AUDIO OUTPUT AND CONTACT CLOSURES FOR SIGNALING.

(G) IT PROVIDES, FOR EACH CHANNEL, CONTINUOUS AUTOMATIC SELF-DIAGNOSIS BY A MICROCOMPUTER.

(H) IT PROVIDES, FOR EACH CHANNEL, A VOICE ALARM CLOSURE OR AN OPEN CIRCUIT (IN THE ALARM STATE) IF LOSS OF POWER OR LOSS OF THE ANNOUNCEMENT SHOULD OCCUR.

(I) IT PROVIDES, FOR EACH CHANNEL, A 1-KHZ REFERENCE TONE FOR ANNOUNCEMENT LEVEL ADJUSTMENT.

(J) IT PROVIDES FOR CONNECTION TO STANDARD ANNOUNCEMENT TRUNKS.

(K) IT PROVIDES FOR CONNECTION TO A REMOTE RECORD CIRCUIT.

4. CONNECTING CIRCUITS.

4.01 THE FOLLOWING ARE TYPICAL CONNECTING CIRCUITS.

SD-5D015-01	5ESS* SWITCHING EQUIPMENT, MODULAR METALLIC SERVICE UNIT
SD-5D130-01	5ESS* SWITCHING EQUIPMENT, MISCELLANEOUS CABINET (6 FT) CIRCUIT
SD-25574-01	MISCELLANEOUS CIRCUIT
SD-25736-01	COIN SUPERVISORY CIRCUIT
SD-26121-01	CROSSBAR SYSTEM, NO. 5 INTERCEPTING TRUNK CIRCUIT
SD-27980-01	COMMON SYSTEMS, VOICE ALARM AND CONTROL CIRCUIT
SD-27984-01	CROSSBAR SYSTEM, NO. 1 VOICE ALARM CIRCUIT
SD-27985-01	CROSSBAR SYSTEM, NO. 1 ANNOUNCEMENT TRUNK CIRCUIT FOR USE WITH NO. 6A, &A, 13A, OR 14A ANNOUNCEMENT SYSTEM
SD-32202-01	STEP-BY-STEP SYSTEM, INTERCEPTING TRUNK CIRCUIT
SD-32370-01	STEP-BY-STEP SYSTEM, PERMANENT SIGNAL HOLDING TRUNK CIRCUIT
SD-32538-01	STEP-BY-STEP SYSTEM AUXILIARY COIN/TRUNK CIRCUIT
SD-32539-01	STEP-BY-STEP SYSTEM, COIN TRUNK CIRCUIT
SD-33034-01	STEP-BY-STEP SYSTEM, RECEIVER OFF-HOOK TONE CONNECTOR CIRCUIT
SD-35011-01	STEP-BY-STEP SYSTEM, INTERCEPTING TRUNK CIRCUIT
SD-35067-01	STEP-BY-STEP SYSTEM, ALARM CIRCUIT
SD-95959-01	COMMON SYSTEMS, VOICE ALARM CIRCUIT
SD-96510-01	COMMON SYSTEM, VACANT CODE OR OVERFLOW TRUNK CIRCUIT
SD-99329-01	COMMON SYSTEMS, AUXILIARY PERMANENT SIGNAL HOLDING TRUNK CIRCUIT
CRI-1A139-13	1ESS+ AND 2ESS+ CRI/DCS FOR RECORDED ANNOUNCEMENT FRAME

* REGISTERED TRADEMARK OF AT&T
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SECTION IV - REASONS FOR REISSUE

A. CHANGED AND ADDED FUNCTIONS

A.1 THE ALD20 CIRCUIT PACK HAS BEEN ADDED (AS OPTION X) TO PROVIDE A RECORD/PLAYBACK CAPABILITY.

B. DESCRIPTION OF CHANGES

B.1 THE ALD20 CIRCUIT PACK WAS DESIGNED TO FUNCTIONALLY REPLACE THE ALD2 CIRCUIT PACK. THE ALD1/2/5 AND AWH1 CIRCUIT PACKS HAVE ALL BEEN DISCONTINUED. ALL DOCUMENTATION HAS BEEN UPDATED TO DELETE REFERENCES TO THESE DISCONTINUED CIRCUIT PACKS. ONLY INFORMATION PERTINENT TO THE ALD20 CIRCUIT PACK HAS BEEN REVISED ACCORDINGLY.

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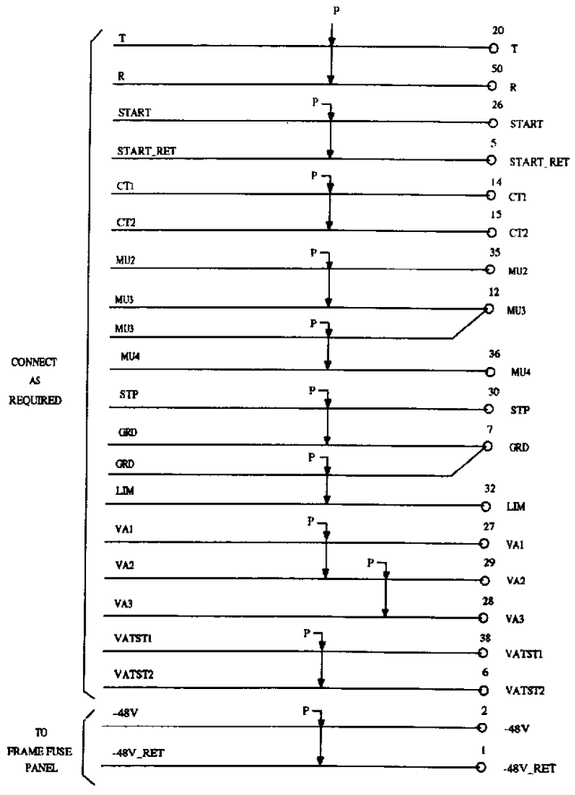
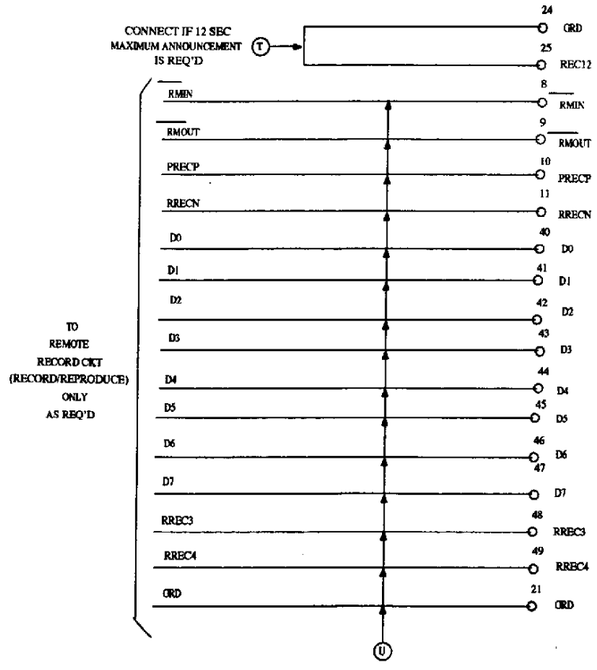
CAD 1

TYPICAL TRUNK SIDE



CAD 2

OPTIONAL CABLING
(OPTIONS T AND U)



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