SYSTEM DESCRIPTION AND PLANNING INFORMATION

"DIMENSION*" "PRELUDE*" PBX

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1. GENERAL

1.01 This section describes the DIMENSION PRELUDE PBX and provides planning information for installing a new system. The DIMENSION PRELUDE PBX is an electronic switching system that uses stored program control for call processing and system diagnostics. This PBX is compatible with all Central Offices (COs) except panel. Figure 1 is a block diagram showing the component parts of the PBX.

1.02 This section is reissued for the following reasons:

- To incorporate the Preinstallation and Planning information for the DIMENSION PRELUDE PBX
- To add the Federal Communications Commission (FCC) radio interference warning
- To include the Hospitality Communications System (HCS)
- To include the Enhanced Business Package.

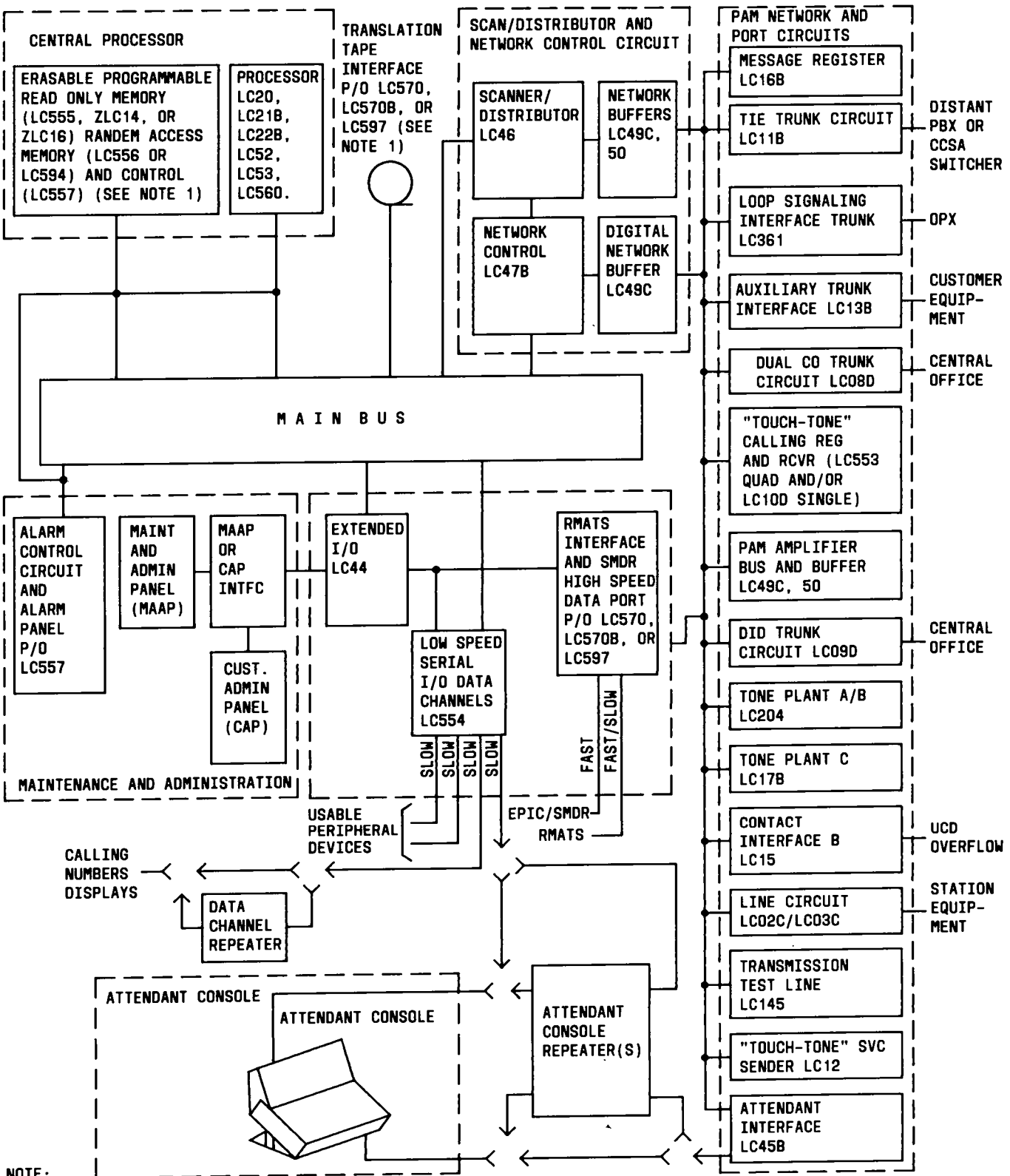
Due to the extensiveness of these changes, revision arrows are not used.

1.03 ***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 is required to take whatever measures may be required to correct the interference.***

1.04 Three nomenclatures are available for the HCS which provide respective indicators at the attendant console/terminal. Displays and button labels indicate functions according to Hotel/Motel, Health Care, or Generic nomenclature. For example, a hotel/motel room, a health care bed, and a generic environment station, all correspond. The nomenclature is administered using the Maintenance and Administration Panel (MAAP) or the Customer Administration Panel (CAP).

2. DESCRIPTION

2.01 The DIMENSION PRELUDE PBX is available in 13 hardware models (Table A). Models A, B, and C are single-cabinet configurations. Models D through M are multicabinet configurations. Standard features are available with all models, but addi-



NOTE:
1. THE LC555, LC556, AND LC570 IN MODEL A AND B SYSTEMS CAN BE REPLACED BY THE LC595 OR LC555B, LC594, AND LC570B, RESPECTIVELY, IN MODEL C THROUGH J SYSTEMS. FOR HCS SYSTEMS, THE ZLC11 REPLACES THE ZLC14, AND THE LC597 REPLACES THE LC570B.

Fig. 1—DIMENSION PRELUDE PBX—Block Diagram

tional features and related hardware can be administered.

2.02 The generic program for each single-cabinet DIMENSION PRELUDE PBX model supports specific features, including the Enhanced Business Package, and a specific number of lines and trunks.

2.03 The generic programs for multicabinet models have more capacity than those for single- cabinet models. These generic programs support a greater number of line and trunk translations. In addition, these support the Interposition Calling and Transfer feature with station-to-selected attendant calling. A multicabinet model may be a business system with the Enhanced Business Package or an HCS.

2.04 The Enhanced Business Package adds a pair of features which promotes effective business communications. The two features are Message Waiting and Station Message Detail Recording (SMDR)—Internally Formatted. Refer to the appropriate feature descriptions in Part 3 for more detail.

2.05 The HCS adds a set of features and associated hardware used in the hotel/motel/health care environment. Three multicabinet hardware models are designed to use HCS. The HCS features are.

TABLE A

"DIMENSION" "PRELUDE" PBX MODEL SPECIFICATIONS

MODEL	EQUIPPED LINES	MAXIMUM LINES	NUMBER OF LINE CARRIERS	EQUIPPED TRUNKS	MAXIMUM TRUNKS	NUMBER OF TRUNK CARRIERS (NOTE)	NUMBER OF CABINETS (APPLICATION)
A	32	52	1	4	14	1/2	1(Business)
B	56	100	1-1/2*	6	22	1*	1(Business)
C	56	116	2	4	14	1/2	1(Business)
D	56	116	2	4	46	1-1/2	2(Business)
E	120	180	3	4	46	1-1/2	2(Business)
F	56	116	2	4	78	2-1/2	2(Business)
G	120	180	3	4	78	2-1/2	2(Business)
H	120	244	4	4	78	2-1/2	3(Business)
I	120	308	5	4	78	2-1/2	3(Business)
J	120	244	4	4	46	1-1/2	2(Business)
K	120	180	3	4	46	1-1/2	2(HCS)
L	120	372	6	4	46	1-1/2	3(HCS)
M	120	244	4	4	46	1-1/2	2(HCS)

Note: Trunk circuits may occupy one half of the trunk/control carrier in addition to the supplementary trunk carrier(s).

* This value includes one half of the line/trunk carrier.

- Automatic Station Restriction
- Automatic Wakeup
- Flexible Numbering of Stations—Mixed Numbering
- Single-Digit Dialing
- Local Call Billing
- Message Waiting
- Room Status and Selection
- SMDR—Internally Formatted.

Refer to the appropriate feature descriptions in Part 3 for detail.

2.06 Hardware for additional, nonstandard features must be ordered non-X (nonstandard). Refer to Section 554-191-100 for the features available for the DIMENSION PRELUDE PBX models.

2.07 The hardware models are equipped with lines and trunks as follows:

- Model A—This configuration uses 1 cabinet that contains 1 line carrier with 32 line circuits equipped (maximum 52 lines), and a trunk/control carrier with 4 CO trunk circuits equipped (maximum 14 trunks).
- Model B—This single-cabinet configuration includes 1 line carrier, 1 line/trunk carrier, and 1 trunk/control carrier with 56 lines equipped (maximum 100 lines with 22 trunks), and 6 CO trunks equipped (maximum 26 trunks with 92 lines).
- Model C—This single-cabinet configuration includes 2 line carriers with 56 lines equipped (maximum 116 lines), and 1 trunk/control carrier with 4 CO trunks equipped (maximum 14 trunks).
- Model D—This configuration uses 2 cabinets which contain 2 line carriers with 56 line circuits equipped (maximum 116 lines). One trunk carrier and trunk/control carrier are used with 4 CO trunks equipped (maximum 46 trunks).
- Model E—This 2-cabinet configuration includes 3 line carriers with 120 lines equipped (maximum 180 lines), and 1 trunk carrier and trunk/control carrier with 4 CO trunks equipped (maximum 46 trunks).
- Model F—This 2-cabinet configuration includes 3 line carriers with 56 lines equipped (maximum 116 lines), and 1 trunk carrier and trunk/control carrier with 4 CO trunks equipped (maximum 78 trunks).
- Model G—This 2-cabinet configuration includes 3 line carriers with 120 lines equipped (maximum 180 lines), and 2 trunk carriers and a trunk/control carrier with 4 CO trunks equipped (maximum 78 trunks).
- Model H—This 3-cabinet configuration includes 4 line carriers with 120 lines equipped (maximum 244 lines), and 2 trunk carriers and a trunk/control carrier with 4 CO trunks equipped (maximum 78 trunks).
- Model I—This 3-cabinet configuration includes 5 line carriers with 120 lines equipped (maximum 308 lines), and 2 trunk carriers and a trunk/control carrier with 4 CO trunks equipped (maximum 78 trunks).
- Model J—This 2-cabinet configuration includes 4 line carriers with 120 lines equipped (maximum 244 lines), and 1 trunk carrier and a trunk/control carrier with 4 CO trunks equipped (maximum 46 trunks).
- Model K—This 2-cabinet HCS configuration includes 3 line carriers with 120 lines equipped (maximum 180 lines), and 1 trunk carrier and a trunk/control carrier with 4 CO trunks equipped (maximum 46 trunks).
- Model L—This 3-cabinet HCS configuration includes 6 line carriers with 120 lines equipped (maximum 372 lines), and 1 trunk carrier and a trunk/control carrier with 4 CO trunks equipped (maximum 46 trunks).
- Model M—This 2-cabinet HCS configuration includes 4 line carriers with 120 lines equipped (maximum 244 lines), and 1 trunk carrier and a trunk/control carrier with 4 CO trunks equipped (maximum 46 trunks).

2.08 The software translations tapes available for each hardware model are given in Table B.

Each hardware model is equipped according to specifications but various translations tapes may accompany a PBX. A system tape with translations for all or part of the equipped facilities provides translations when the system is installed. Partial translations permit customization of station numbers, access codes, etc, using the MAAP, CAP, or the Remote Maintenance, Administration, and Traffic System (RMATS). Features that require hardware may be administered by the craft person. Administrations are recorded on the translations tape when completed and the tape remains with the system.

2.09 The DIMENSION PRELUDE PBX systems are ordered through the Delivery Operations Support System (DOSS).

2.10 The DIMENSION PRELUDE PBX uses time division switching (Fig. 2) which involves sampling signals at the port circuits, summing the sampled signals in a central amplifier, and distributing the signals to the port circuits. The sampled signals charge an input capacitor at each port circuit which holds the energy level for the sample period. Smoothing of the sampled signals is provided by filters in the port circuits. Sampling at fixed time intervals permits sequential transmission of 64 simultaneous conversations over a single network path. The sampling rate is approximately 16,200 Hz or once every 62 microseconds. Data transmission of 4800 bits per second is possible via the system network.

2.11 Each port circuit (line, trunk, attendant interface, etc) contains a time slot memory (shift register) and a time division switch. The basic time division network includes a port circuit and a common bus wired to each port circuit with associated amplifiers and control circuits (Fig. 2).

2.12 Functional operation of all portions of the PBX is under the control of the processor (Fig. 1). The processor controls all system activities by executing instructions read from the main program memory. A high-level instruction is read from the erasable programmable read only memory

TABLE B

TAPE TRANSLATIONS AVAILABLE FOR EACH HARDWARE MODEL

TRANSLATIONS TAPES	TRANSLATED WITH		HARDWARE MODELS THAT USE THE TRANSLATIONS TAPES
	STATION LINES	CO TRUNKS	
A	32	4	A
B	56	6	B
C	1	1	A,B,C
D	56	4	C
E	1	1	D,E,F,G,H,I,J
F	56	4	D,E,F,G,H,I,J
G	120	4	D,E,G,H,I,J
H	180	4	E,G,H,I,J
I	1	1	K,L,M
J	120	4	K,L,M

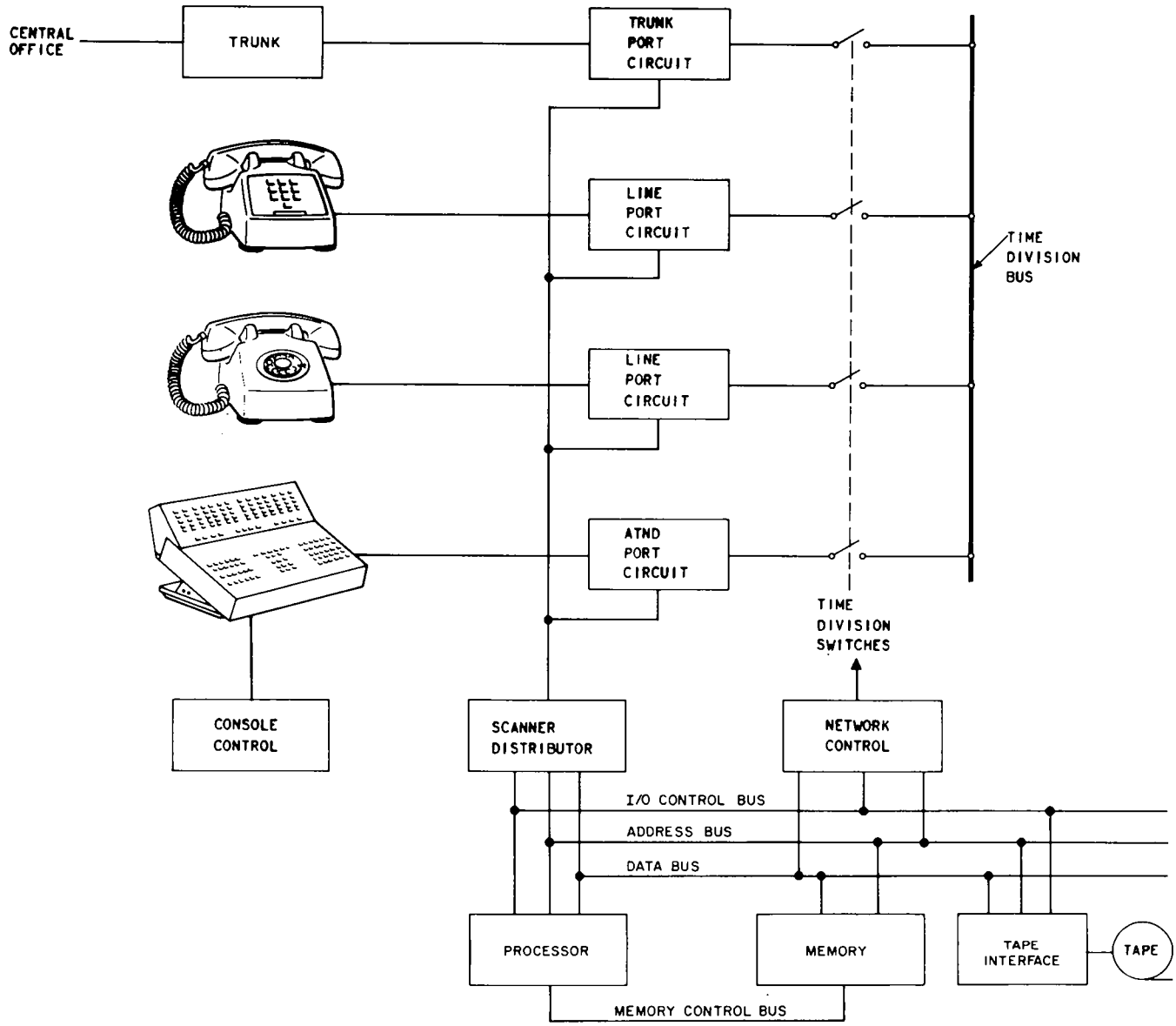


Fig. 2—Time Division Switching—Functional Block Diagram

(EPROM), and the processor executes a series of microinstructions in response to the high-level instruction. The processor communicates with the system via the main system bus and dedicated input/output (I/O) channels. Upon direct commands from the processor, the scanner/distributor scans for changes in port status, and time slots are assigned to the network control circuits. Once the time slots for active port circuits are assigned, the network control scans for switchhook status, and the processor is released.

2.13 The call processing operations, features, and controlling generic program of the system are contained in EPROM. A tape contains translation data. The tape is activated via the MAAP or CAP, and the translations are stored in random access memory (RAM).

2.14 Station Rearrangement and Change is performed via the CAP. The tape unit records translations on the tape and is operated by the craft

person, or by the customer if the tape unit is on-premises.

2.15 The system parameters and capacities of the DIMENSION PRELUDE PBX are listed in Table C. The number of lines and trunks served by a particular system is set at specific values for each model. The capacity of the system is a function of both hardware and software.

2.16 A ringing group is one-half of a line carrier. There may be a maximum of 32 stations in a ringing group. Within a ringing group, only four station lines may be rung at the same time. If four lines in a ringing group are being rung simultaneously, successive calls to lines in the group receive reorder tone.

2.17 In most cases, the ringing capability is more than adequate, since the probability of four station lines in a ringing group requiring simultaneous ringing is minimal. If ringing blockages are anticipated, these lines can be spread evenly over the equipped ringing groups. If blocking should occur due to ringing group imbalance after the system is installed, station lines may be easily reassigned to other ringing groups.

2.18 The station and trunk conductor loop range is as follows:

LOOP	RANGE
Station conductor	950 Ohms or less plus the registered terminal device resistance
Trunk conductor	The trunk conductor loop resistance shall not exceed the external circuit resistance of the connecting CO less 300 ohms.

The trunk conductor loop resistance shall not exceed the external circuit resistance of the connecting CO less 300 ohms.

2.19 Before installing the DIMENSION PRELUDE PBX, the following items must be available at the customer location:

- System cabinet(s) and attendant console(s)
- Auxiliary equipment
- Connector cables
- Termination field materials
- Power receptacle(s)
- Load center (power panel)
- Working trunks
- Tools and test equipment
- Factory computer-generated lists (shipped with the system).

3. FEATURES AND SERVICES

3.01 The DIMENSION PRELUDE PBX is capable of providing the services and features described alphabetically as follows. Refer to Section 554-191-100 for the features available with specific models.

ADVANCED PRIVATE LINE TERMINATION

3.02 The Advanced Private Line Termination (APLT) feature is a service which provides access to and termination from private line networks. The private network may be a common control switching arrangement (CCSA) or an Enhanced Private Switched Communications Service (EPSCS) network. The APLT provides for network inward dialing, Direct Outward Dialing (DOD) to the network, and other features similar to those provided on the public exchange network. The APLT trunks can tandem through the DIMENSION PBX without attendant assistance if the network has the capability. If off-net access is provided by the network, selected station lines can be denied off-net access.

3.03 Refer to Part 4 for the additional hardware required for the operation of this feature.

ALPHANUMERIC DISPLAY FOR ATTENDANT POSITION

3.04 A visual display device is provided on the attendant position to display up to four digits, letters, or symbols as designated for the attendant display features. The display features include Calling Number Display to Attendant, Class-of-Service Display to Attendant, and Incoming Call Identification.

ATTENDANT CONFERENCE

3.05 An attendant can establish a multiparty conference connection of up to six conferees in addition to the attendant.

TABLE C

"DIMENSION" "PRELUDE" PBX SYSTEM PARAMETERS

	ITEM	SINGLE CABINET MAXIMUMS (MODELS A, B, & C)	MULTICABINET MAXIMUMS (MODELS D THRU J)	HCS MAXIMUMS (MODELS K THRU M)
Equipment	Cabinets	1	3	3
	Line Carriers	2	7	7
	Trunk Carriers	—	3	3
	Trunk/Control Carriers	1	1	1
System	ADSS Group Select Keys	6	18	18
	ARS Routes	10	10	10
	ARS Patterns	32	32	32
	ARS 6-digit Lists	4	8	8
	Attendant Consoles	2	4	4
	Attendant Originating Registers	2	4	4
	Call Pickup Groups	31	31	31
	Calling Number Displays	10	10	12
	Class-of-Service	31	31	31
	Code Restriction Groups (trunk groups)	5	5	5
	Conference Trunks	1	1	1
	Controlled Restriction Groups	63	63	63
	Custom Intercom Numbers	250	750	—
	Dial Access Codes	96	96	96
	Dial Pulse/TOUCH-TONE Dialing Originating Registers	6	14	17
	Direct Department Calling (DDC) and/or Uniform Call Distribution (UCD) Groups	9	14	—
	Directory Blocks	15	100	100
	Flexible Night Service/Trunk Verification Trunks	30	110*	110

See footnote at end of table.

TABLE C (Contd)

"DIMENSION" "PRELUDE" PBX SYSTEM PARAMETERS

	ITEM	SINGLE CABINET MAXIMUMS (MODELS A, B, & C)	MULTICABINET MAXIMUMS (MODELS D THRU J)	HCS MAXIMUMS (MODELS K THRU M)
System (Contd)	Input/Output Data Channels	14	14	14
	Outgoing Trunk Queuing Groups	4	12	12
	Physical Trunk Records	26	110*	110
	Remote Access Trunks	4	4	4
	SMDR/ARS Queuing Records	10	48	48
	Speed Calling Numbers	250	1500	250
	Station Lines†	108	440	440
	Tandem Tie Trunk Restriction Dial Access Codes	13	13	13
	Total Intercom, Queuing, and Physical Trunks	75	158	158
	Trunk Group Numbers	1-31	1-63	1-63
	Trunk-to-Trunk Restriction Dial Access Codes	13	13	13
Memory	EPROM (Program Storage)	88K	88K	96K
	RAM (Translations Storage)	18K	32K	32K

* If the system contains the J58891CA line/trunk carrier, it can grow to a maximum of 122 physical trunks in a multicabinet configuration.

† Each attendant interface circuit board installed reduces the maximum number of lines by 4.

‡ One record exists for each physical trunk, intercom trunk, and each outgoing trunk queuing entry.

3.06 Refer to Part 4 (Conferencing) for the additional hardware required for the operation of this feature.

ATTENDANT CONSOLE

3.07 The attendant console is a desk-top equipment position from which the attendant handles assistance calls by means of nonlocking buttons. Buttons are provided for each of the control functions and for the loops which appear on the position. All calls placed by the attendant to trunks and to station lines are made using the TOUCH-TONE service dial provided or via the Attendant Direct Station Selection (ADSS) and Direct Trunk Group Selection (DTGS) features, when available.

3.08 The attendant console is completely electronic, using light-emitting diodes (LEDs) for indicator lamps and nonlocking buttons for controls and loops. The console is designed for switched loop operation and can be provided with an ADSS and

Busy Lamp Field (BLF) or with a BLF only. A 4-character alphanumeric field is provided for incoming call identification. The two versions of the console are similar in feature capabilities and appearance. Figure 3 illustrates the attendant console with BLF.

3.09 Refer to Part 4 for additional information regarding the Attendant Console hardware.

ATTENDANT CONTROL OF TRUNK GROUP ACCESS

3.10 An attendant can restrict dial access by all station lines to CO, Foreign Exchange (FX), Wide Area Telecommunications Service (WATS), APLT trunks, and/or tie trunk groups by dialing a code followed by the trunk group access code (or operation of a DTGS button when provided). Calls to groups so restricted will be routed to the attendant for subsequent completion or manual queuing.

3.11 When attendant control of trunk group access is activated, access to the group is restricted only if the access code for that group is dialed. Trunk groups assigned as second, third, or fourth choices in route advance sequences are accessible if the first-choice group is busy.

ATTENDANT DIRECT STATION SELECTION WITH BUSY LAMP FIELD

3.12 An attendant at a console can place or complete calls to stations within the PBX by de-

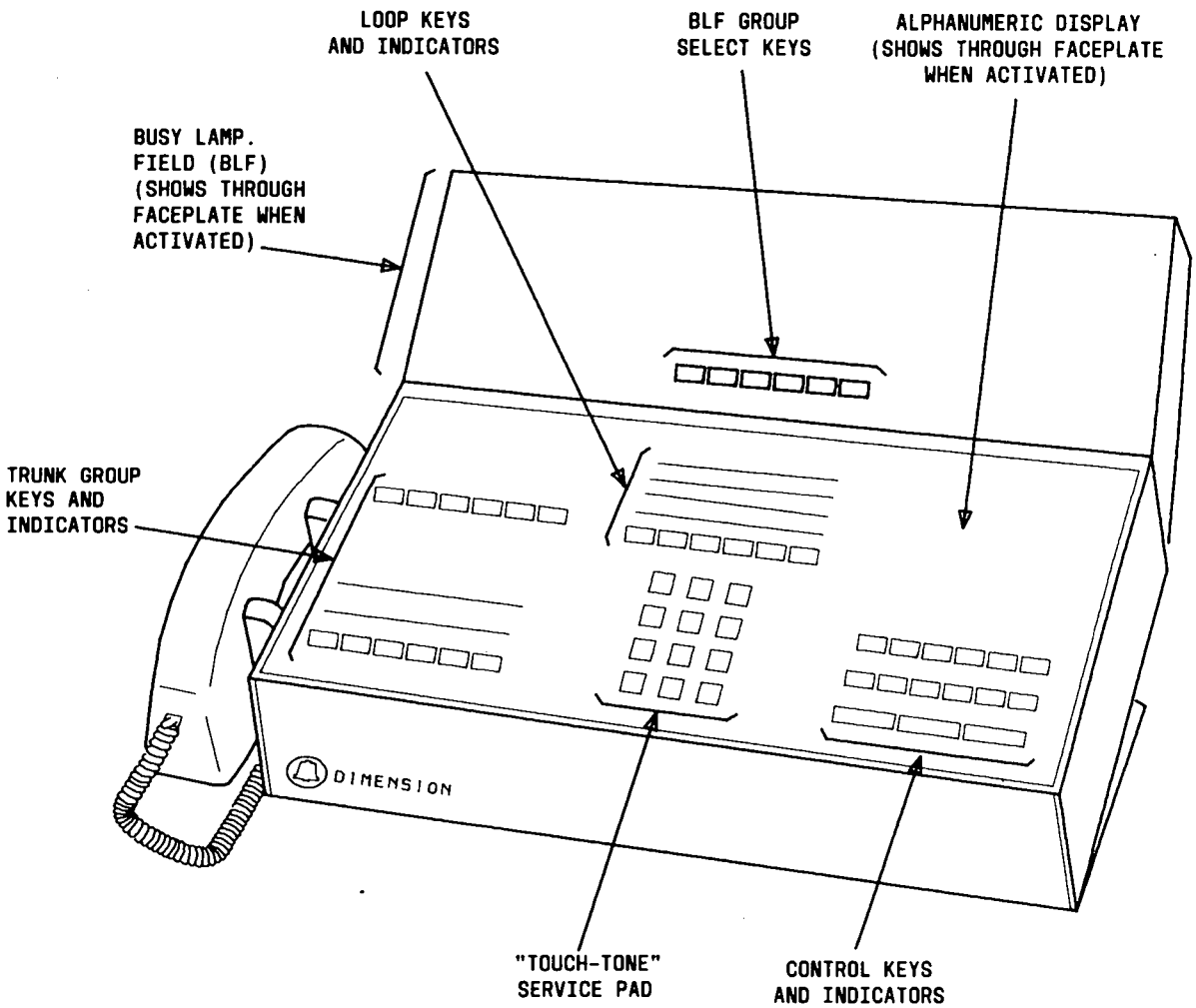


Fig. 3—Attendant Console

pressing a nonlocking pushbutton associated with the desired station line. A visual indication of the busy or idle condition of the stations is provided via a LED lamp associated with each pushbutton. Buttons and lamps are provided for only 100 station lines. When more than one hundreds group capability is desired, up to six group select buttons are provided to allow preselection of the desired 100-line group. The average feature capacity console can be equipped with six group select buttons.

3.13 Refer to Part 4 for additional hardware required for the operation of this feature.

ATTENDANT FLASH OVER TRUNKS

3.14 This feature allows the attendant to recall a traffic service position system (TSPS) operator over toll lines by depressing a new console control button FLASH. In order for a TSPS operator to be recalled, the call must have been originated at the PBX using a regular CO or FX trunk and placed via a TSPS operator. To recall the TSPS operator, the originating station must flash and dial the PBX attendant who will answer the recall and, on request, depress the FLASH button to recall the TSPS operator.

ATTENDANT LOCKOUT

3.15 The attendant is denied the ability to reenter an established connection held on an attendant position, unless recalled by a station user. The Two-Party Hold on Console feature is required for operation of this feature.

ATTENDANT TRANSFER—ALL CALLS

3.16 A station user participating in any 2-party connection can call (recall) an attendant so that the attendant may transfer the call or provide other assistance as desired. A flash during any established call will return recall dial tone to the initiating station and hold the other party. The station user then dials the access code (usually dials "0") to call the attendant. If the call had been held on the console loop or the initiating station is a manual originating line, the flash will result in immediate attendant recall.

AUTOMATIC ATTENDANT ACCESS

3.17 While in an established call, an extension with this feature in its line class of service is able to depress the switchhook to automatically call the attendant. The other extension in the call is placed on soft hold. With this option, an extension is unable to access any other feature requiring a switchhook flash, such as Three-Way Conference and Transfer.

AUTOMATIC CALLBACK—BUSY/DON'T ANSWER

3.18 A station user may activate an Automatic Callback feature when calling a busy station or an idle station that does not answer. A station user activates an Automatic Callback feature by dialing the appropriate access code followed by the extension number of the called station. When the busy called station becomes idle, the activating station receives priority ringing (three bursts of normal ringing) if idle, and the idle called station rings when the activating station goes off-hook (Automatic Callback—Calling). When the called station is idle but does not answer, the activating station receives ringing following the next off-hook to on-hook change at the called station (Automatic Callback—Busy and Don't Answer). Automatic callback calling permits calling stations to queue at a called station that is busy or does not answer. The calls are processed in the order that they queue and no call remains queued longer than 40 minutes. An activating station may originate and receive other calls while the feature is active but must be idle to receive the automatic callback call. A station user that is called back via an Automatic Callback feature must answer within an administered number of ring cycles (one to eight) or the call is canceled. Automatic callback requests are canceled by dialing the automatic callback cancel code.

AUTOMATIC ROUTE SELECTION

3.19 This feature provides automatic routing of outgoing calls over alternate customer facilities based on the direct distance dialing (DDD) number. The station user dials the Automatic Route Selection (ARS) access code followed by a DDD number. The PBX routes the call over the first available special trunk facility (such as WATS, FX, or off-network CCSA) checking in a customer-specified order. Any number translation necessary to route the call is performed. Overflow routing to toll facilities is optional. The ARS incorporates the functions of and replaces the code restriction and route advance features for routes included in the ARS route patterns.

AUTOMATIC STATION RESTRICTION

3.20 This HCS feature prevents unauthorized (and unaccountable) phone calls from vacant rooms

by automatically activating Controlled Outward Restriction when a guest checks out of a room and by deactivating the restriction when a guest checks in. Feature activation and deactivation is automatic when guests are checked in and checked out of rooms via the console/terminal. The Controlled Outward Restriction can be overridden, and other controlled restrictions can be activated/deactivated via the console/terminal.

AUTOMATIC WAKEUP SERVICE

3.21 This HCS feature automatically places wakeup calls at the time requested by hotel/motel guests or administrative personnel. Wakeup tone or wakeup music (Music-on-Hold Access available) is used.

3.22 Refer to Part 4 for the additional hardware required to operate this feature.

BUSY LAMP FIELD

3.23 The attendant is provided with a visual indication of the busy or idle condition of station lines via an LED lamp associated with each station line. Lamps are provided for only 100 station lines. When more than one hundreds group capability is desired, up to six group select buttons are provided to allow preselection of the desired 100-line group. When the ADSS feature is not provided, pushbutton DSS buttons are not associated with the lamps.

BUSY VERIFICATION OF STATION LINES

3.24 The attendant can establish a "talking" connection to an apparently busy station line to determine if the station line is in working order. Prior to connection of the attendant to a busy line, a 2-second burst of tone is applied to alert the talking parties of the attendant's presence and a 1/2-second burst of tone is reapplied every 15 seconds until the attendant disconnects. An idle station line will be rung normally when busy verification is attempted.

CALL FORWARDING—ALL CALLS

3.25 This feature allows all calls destined for a station to be routed to another station (or to the attendant), designated during activation, regardless of the busy or idle state of the called station. This feature can be activated or canceled by the station user (forwarding station) from an idle state (or busy state if the system has Call Hold) or by the attendant. The forwarding station may be used to originate calls while the feature is activated. All stations can use this feature simultaneously.

CALL FORWARDING—BUSY AND DON'T ANSWER

3.26 This feature allows calls destined for a station to be routed to another station (or to the attendant), designated during activation, whenever the called station is either busy or does not answer. This feature can be activated or canceled by the station user (forwarding station) from an idle state (or busy state if the system has Call Hold) or by the attendant. The don't answer interval is variable per system and is based on the number of ring cycles desired before transfer. The forwarding station may be used to originate calls while the feature is activated. All stations can use this feature simultaneously.

CALL FORWARDING—DON'T ANSWER

3.27 This feature allows calls destined for a station to be routed to a designated location (attendant or another station) whenever the called station does not answer. This feature can be activated or deactivated by the station user or attendant. The don't answer interval is variable and is based on the number of ring cycles desired before transfer. Either Call Forwarding—Busy and Don't Answer or Call Forwarding—Don't Answer can be assigned to a class of service (COS). (The two features cannot be assigned in the same COS.)

CALL HOLD

3.28 A station user can "hold" any call in progress by flashing the switchhook and then dialing a "hold" code. The station user is then free to do any of the following without the risk of causing a 3-way conference connection:

- Originate another call on the user's line
- Activate a service
- Return to another call that had been held via Call Hold.

If the station user does not dial any further digits after the "hold" code, muting of the station set and removal of dial tone will occur after about 6 seconds. The call remains on hold until the controlling station

user hangs up, causing the station to ring with the held call, or flashes the switchhook and redials the "hold" code. The call is returned to the user. Only one call per station line may be held at a time. The held call cannot be added to the other call.

3.29 If a previous call has been placed on hold, activating call hold automatically places the existing call on hold and returns the previous call to the activating station. The activating station may alternate between two parties using the call hold code, holding one while speaking with the other. However, all three parties may not be placed on the same talking connection. A station may hold only one call at a time. If the activating station completes one conversation and hangs up, it is rung back with the held call.

CALL PARK

3.30 This feature provides a station user the ability to place a call on hold without tying up the holding line. The call is transferred to a vacant port and then can be picked up by any PBX line by dialing the appropriate code.

3.31 Refer to Part 4 for the additional hardware required for the operation of this feature.

CALL PICKUP

3.32 A station user that is a member of a call pickup group can answer a call to a phone in that pickup group or any phone in the system. If the user wishes to answer a call within the pickup group, the user dials the call pickup feature access code. If more than one phone is ringing in the pickup group, the phone picked up is selected randomly by the system call processing. If the user wishes to answer a specific phone, the user dials the directed call pickup feature access code and the desired extension number. There can be a maximum of 31 call pickup groups and each group can have an unlimited number of members.

CALL WAITING SERVICES

3.33 This feature allows a call to a busy station line to be held waiting while a tone signal is directed towards the busy station user. Only the called station user hears this tone. The calling station receives special audible ringback. The called station user may connect to this waiting call by going on-hook. The called station rings and is connected to the call by going off-hook. Alternately, the station user may flash and dial an answer-hold code to hold the original call and answer the waiting call. Distinctive call waiting tone signals are provided to indicate the source of the call. One burst is used for station-to-station calls, two bursts are used for attendant and outside calls, and three bursts are used for originating call waiting calls. Call waiting is denied when the called station is not in a 2-party talking state, has a call already waiting, or has activated a conflicting feature. Busy tone is returned to the calling station when call waiting is denied.

3.34 ***Attendant Call Waiting (Replaces Attendant Camp-On):*** All calls the attendant completes to a busy station are held waiting. A 2-burst tone signal is directed towards the busy station user when the attendant leaves the connection. Subsequent tone signals are applied each time the attendant leaves the waiting connection after verifying the caller's desire to wait.

3.35 ***Originating Call Waiting:*** The originating class of service provides the station user the ability to direct a 3-burst priority call waiting tone signal toward any other busy station or a 3-burst distinctive ringing signal to an idle station.

3.36 ***Terminating Call Waiting:*** The terminating class of service provides the station user with call waiting service with distinctive tone signals on any call attempting to terminate on the user station when the user is busy on another call.

CALLING NUMBER DISPLAY TO ATTENDANT

3.37 This feature provides the attendant with a visual display of the station number of any PBX station seeking attendant assistance. The number is displayed on the alphanumeric display.

CALLING NUMBER DISPLAY TO STATION

3.38 Equipment is provided at a called station to display the number of the calling station within the same PBX. Capability for displaying up to four digits is provided.

3.39 Refer to Part 4 for the additional hardware required for operation of this feature.

CALLS WAITING (AT ATTENDANT CONSOLE)

3.40 When a call is waiting to be answered by the attendant and the attendant position is in use or busied out, the CW lamp lights.

3.41 When the number of calls waiting to be answered by the attendant exceeds the established calls waiting level, the CW lamp flashes. Also, a 20-millisecond burst of 1.95-kHz tone is sent to the console every 800 milliseconds to provide an audible indication.

CENTRALIZED STATION MESSAGE DETAIL RECORDING

3.42 The Centralized SMDR (CSMDR) system provides the centralized collection of traffic data from remote PBXs in a customer's network. Traffic data at each remote location is collected and stored via a 94A local storage unit for later periodic polling by the central polling unit. When the remote locations are polled, the traffic is transmitted to the central polling unit and made available in the form of a magnetic tape output or an interface to a computer port.

3.43 Refer to Part 4 for the additional hardware required for operation of this feature.

CLASS OF SERVICE

3.44 A class of service (COS) is a group of features and restrictions assigned to a working station line. Each working station line must be assigned a COS, and more than one station line can be assigned to the same COS. The features and restrictions in a COS are administered via the MAAP, CAP, or the RMATS to provide flexibility for the system. Some features interact and cannot be activated in the same COS. For example, Call Forwarding—Don't Answer and Call Forwarding—Busy and Don't Answer cannot be activated in the same COS. The DIMENSION PRELUDE PBX can have a maximum of 31 different classes of service assigned (COS 31 is reserved for the Remote Access feature).

CLASS-OF-SERVICE DISPLAY TO ATTENDANT

3.45 This feature provides the attendant with an alphabetic or numeric code display representing the COS of the calling PBX station connected to the attendant. The information is displayed on the alphanumeric display when the COS button is depressed.

CODE CALLING ACCESS (3A AND CHIME PAGING)

3.46 Attendants, station users, and tie trunk users can dial an access code and a 2- or 3-digit called party code to activate a signal which corresponds to the called party code. The called party can then be connected to the calling party by dialing an answering code from any station within the DIMENSION PBX.

3.47 Refer to Part 4 for the additional hardware required for operation of this feature.

CODE RESTRICTION

3.48 This feature denies selected station lines completion of dialed outgoing exchange network calls to selected office and area codes. The restricted calls are routed to intercept tone. Three levels of authorization permit authorized station lines the ability to complete outgoing CO or FX calls to specified area or office codes within an area. The calls allowed are a function of the particular trunk group dialed.

CONTROLLED OUTWARD RESTRICTION

3.49 An attendant can control the restriction of direct dialed outgoing exchange network calls (local CO and toll calls in hotel/motel applications) from selected station lines or groups of lines. When activated, the restricted calls are routed to intercept tone.

CONTROLLED STATION-TO-STATION RESTRICTION

3.50 An attendant can prevent selected station lines or groups of lines from receiving station-to-station calls. When activated, the restricted calls are routed to intercept tone.

CONTROLLED TERMINATION RESTRICTION

3.51 An attendant can prevent selected station lines or groups of lines from receiving any calls. This feature is a form of "do not disturb" service. When activated, restricted Direct Inward Dialing (DID) calls are routed to the attendant or to recorded announcement, if provided. All other calls to restricted stations are routed to intercept tone.

CONTROLLED TOTAL RESTRICTION

3.52 An attendant can prevent selected station lines or groups of lines from originating and receiving any calls. This feature is used to temporarily disconnect station lines. When activated, restricted DID calls are routed to the attendant or to

recorded announcement, if provided. All other restricted calls are routed to intercept tone.

CUSTOM INTERCOM

3.53 This service allows station users to dial 2- (up to 10 in a group) or 3-digit (up to 30 in a group) codes to reach frequently called stations. Priority ringing is provided to nonbusy called stations, and originating call waiting treatment is provided when a busy station is called. The intercom numbers within a custom intercom group are changeable via a designated station line, the MAAP, the CAP, and the RMATS.

CUSTOMER ADMINISTRATION PANEL

3.54 This feature provides the customer the ability to change station user features and control other PBX features. The CAP (Fig. 4) is used on a local basis (ie, located with the PBX on customer premises).

3.55 Whenever the CAP is in use, an LED lights on the MAAP connector panel interface unit. For

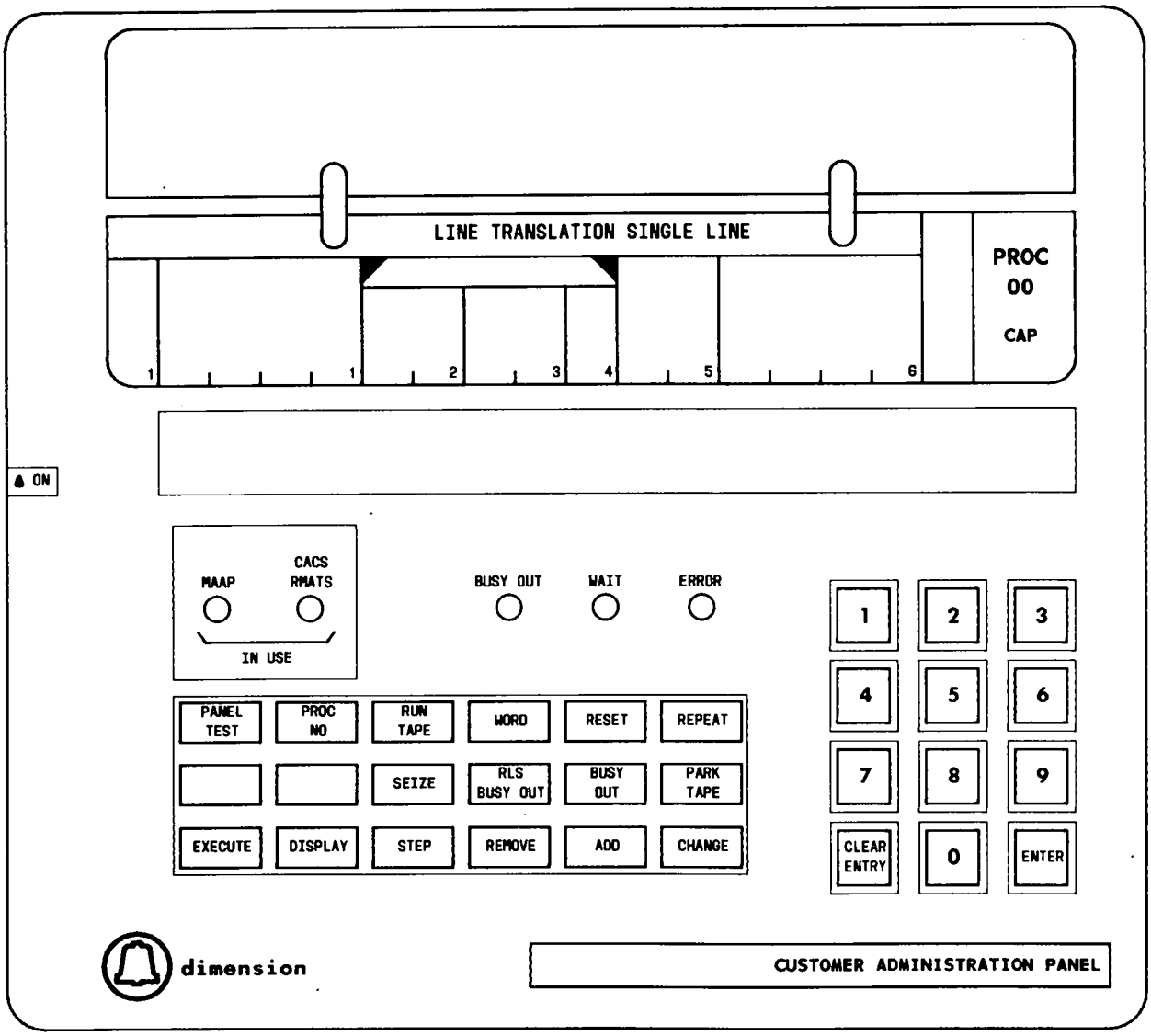


Fig. 4—Customer Administration Panel

more detailed information regarding the CAP, refer to Section 554-010-142.

DATA COMMUNICATIONS ACCESS

3.56 This feature provides access to a customer's computer equipment by DIMENSION PBX users via a trunk-type connection to data communications access ports (DCAPs) on the PBX. Computer access is available to station users and attendants at the work facility where the PBX and computer are located, to remote users via the Remote Access to PBX Services, Off-Premises Stations, and Off-Premises Station With Call Control features, and DID trunks (when station number to dial access code conversion is provided).

3.57 Refer to Part 4 for the additional hardware required for operation of this feature.

DATA PRIVACY

3.58 Activation of this feature by a station user will deny other individuals the ability to employ various bridge-on features (eg, Call Waiting, Executive Override, Busy Verification, etc, to gain access to the station user's line and consequently disturbing any data transmission which might be occurring. The attempted bridge-on caller will be routed to a tone. When the station user goes on-hook, the restriction is automatically canceled.

DATA RESTRICTION

3.59 A station line with data restriction assigned to its line COS will deny other individuals the ability to employ various bridge-on features (eg, Call Waiting, Executive Override, Busy Verification, etc) to gain access to the station line or trunk and consequently disturbing any data transmission which might be occurring. The attempted bridge-on call will be routed to a tone.

DATA SWITCHING—LEVEL 1

3.60 The Data Switching—Level 1 (DS—L1) feature is hardware oriented and enhances the data switching capabilities of any new or in service DIMENSION PBX. With this feature, a DIMENSION PBX can allow on-premises data communication from end-to-end, in digital format (no digital-to-analog conversion and vice versa). Voice communication remains in analog form. The DS—L1 feature allows a DIMENSION PRELUDE PBX the capability of switching data with speeds up to 9600 baud without any software modification. Additionally, this feature provides data call setup from a terminal keyboard (terminal dialing), from a computer (RS366 dialing), or from any on-premises station set using the Three-Way Conference Transfer feature.

3.61 Refer to Part 4 for the additional hardware required for operation of this feature.

DIAL ACCESS TO ATTENDANT

3.62 This feature allows station users within the switching system or dial repeating tie trunks to reach the attendant by dialing an access code. The attendant may complete these calls to trunk facilities or station lines.

DIGITAL CLOCK ON ATTENDANT POSITION

3.63 The time of day may be displayed on the attendant console. A digital clock uses the Incoming Call Identification (ICI) lamps to display either 12- or 24-hour time. When the attendant console is active (loops in use), the TIME/DATE button is depressed to alternately display the original ICI or the time of day. When the attendant console is not active (all loops idle), the TIME/DATE button is depressed to alternately display the time of day or the date (day and month). The Digital Clock on Attendant Console is administered via the attendant console.

DIRECT DEPARTMENT CALLING

3.64 The Direct Department Calling (DDC) provides an economical alternative to DID service for selected high call volume departments behind a PBX. Each DDC group terminates one or more non-DID Listed Directory Number (LDN) type trunks to a designated station which is normally in a hunting group. Calls to this station are queued if either the station or other members of the hunting group are busy. A maximum of 28 DDC and/or Uniform Call Distribution (UCD) groups can be provided with the DIMENSION PRELUDE PBX.

3.65 Refer to Part 4 for the additional hardware required for operation of this feature.

DIRECT INWARD DIALING

3.66 An incoming call from the exchange network (not FX or WATS) can reach a specific station

line without attendant assistance. The DID service can be provided for some station lines. Non-DID (LDN only) service can be provided for other station lines on the same PBX. The DID calls to DID-restricted station lines are routed to the attendant or to recorded announcement, depending on the option selected. The LDN can be dialed to receive attendant assistance (see LDN SERVICE in Part 3).

3.67 Refer to Part 4 for the additional hardware required for operation of this feature.

DIRECT OUTWARD DIALING

3.68 A PBX station user can gain access to the exchange network without the assistance of the attendant by dialing an access code and receiving a second dial tone. The user may then proceed to dial the desired exchange network number.

3.69 The hardware for this feature is described in Part 4.

DIRECT TRUNK GROUP SELECTION

3.70 This feature allows the attendant active on a switched loop to directly access an idle outgoing trunk in a given trunk group by depressing the button associated with the desired trunk group.

DISTINCTIVE RINGING

3.71 Unique patterns of station ringing (using existing station sets) are provided to permit the station user to distinguish between various types of calls. Three patterns are available as follows:

(a) One-burst (normal) ringing indicates station-to-station call.

(b) Two-burst ringing indicates attendant call or outside call.

(c) Three-burst ringing indicates either automatic callback, originating call waiting, outgoing trunk queuing callback, or a night service call to the default or common night station.

ENERGY COMMUNICATIONS SERVICE ADJUNCT

3.72 This feature provides the ability to minimize energy consumption during normal and peak demand periods by controlling energy-consuming devices throughout the customer's location(s).

3.73 Refer to Part 4 for additional hardware required for operation of this feature.

EXECUTIVE OVERRIDE

3.74 The station user can enter an existing 2-party busy station connection. Before the add-on is established, a 4-second burst of tone is applied to advise the calling and talking parties.

FLEXIBLE NUMBERING OF STATIONS

3.75 Station numbers of a numbering plan can be assigned and reassigned to different lines so personnel that move can keep their station number. Station number assignments can begin with any digit except *, #, and 0 but must be fixed in length to two, three, or four digits in the same installation. The same first digit cannot be used for both station numbers and trunk or feature access codes. However, feature and trunk access codes can have a common first digit if they have the same number of digits (two or three).

FLEXIBLE NUMBERING OF STATIONS—MIXED NUMBERING

3.76 Station numbers of an HCS numbering plan can be assigned and reassigned to different lines so personnel that move can keep their station number. Station number assignments can begin with any digit except *, #, and 0, and may vary in length from two to four digits in the same installation. Station numbers with a common first digit that vary in length can be distinguished using time-out dialing, an end-of-dialing code (TOUCH-TONE service) or prefix digits. Also, feature and trunk access codes can have a common first digit if they have the same number of digits (two or three).

FOREIGN EXCHANGE CENTRAL OFFICE ACCESS

3.77 This feature provides access to a distant CO via FX trunks. All incoming calls to the PBX (from the FX CO area) are placed to the listed FX directory number and are answered by the attendant similar to LDN service. Outgoing calls are made on an attendant-handled basis via direct or dial access and/or on a dial basis by stations (through use of a trunk access code).

FULLY RESTRICTED STATION

3.78 Selected station lines are denied the ability to place or receive any but station-to-station

calls. The DID calls are routed to the attendant or to a recorded announcement, if provided. The APLT calls are routed to the attendant, to an announcement, or to intercept tone. All other restricted calls are routed to intercept tone.

HOT LINE SERVICE

3.79 This feature allows a station user to place a call to a preassigned number automatically when the station user goes off-hook. The hot line station can receive calls normally. Hot line calls can be directed to stations, exchange trunks, APLT trunks, and internal miscellaneous trunks such as loudspeaker paging. A maximum of 15 lines can have this service and up to 14 digits can be automatically dialed.

HOTEL/MOTEL CONSOLE/TERMINAL

3.80 The DIMENSION PRELUDE PBX Hospitality Communication System (HCS) attendant consoles are input/output terminals used to access and control various HCS features. The features controlled via the HCS console/terminal are as follows:

- Automatic Wakeup Service
- Energy Communications Service Adjunct
- Message Waiting
- Local Call Billing
- Room Status and Selection.

The HCS console/terminal also performs all normal attendant console functions. In smaller installations, the HCS console/terminal can serve both as the PBX attendant console and as the front desk terminal. In larger installations, separate attendant consoles/terminals may be necessary for these functions.

INCOMING CALL IDENTIFICATION

3.81 An attendant at a switched loop console position can visually identify the type of service or trunk group associated with a call directed to that position. The visual indication can be via the alphanumeric display, in which case, up to 30 Incoming Call Identification (ICI) indications can be provided.

INTERCEPT TREATMENT

3.82 Calls which cannot be completed are routed to an appropriate audible signal, recorded announcement, or to the attendant, depending on the noncompletion condition. These treatments are:

(a) ***Attendant Intercept:*** Certain calls that cannot be completed are routed to the attendant position for further treatment. The DID calls so routed are given normal charging treatment.

(b) ***Intercept Tone:*** This treatment provides a continuous tone alternating between a low pitch (440 Hz) and a high pitch (620 Hz) indicating that a restricted or unassigned code has been dialed or that a special service has been denied.

(c) ***Recorded Announcement Intercept:*** Intercepted calls are routed to a recorded message which indicates the reason why the call was intercepted. This intercept treatment is provided as an alternative to attendant intercept or intercept tone for DID and CCSA calls only, as a system option. Only one message can be given.

3.83 Refer to Part 4 for the additional hardware required for operation of this feature.

INTERPOSITION CALLING AND TRANSFER

3.84 An attendant at one attendant position of a multiposition attendant system can call another attendant position for purposes of consultation. An attendant can also transfer a call to another position for special handling. As an option in some systems, individual stations are allowed dial access to a specific attendant position via station-to-selected attendant calling, if accessible.

INWARD RESTRICTION

3.85 Selected station lines are prevented from receiving incoming exchange network calls and APLT calls, either DID or attendant-completed. Attendant-completed calls are routed to intercept tone. The DID calls are routed to the attendant, or to recorded announcement, depending on the option selected. The APLT calls are routed to intercept tone, to the attendant, or to recorded announcement.

LINE LOCKOUT WITH WARNING

3.86 This feature provides 10 seconds of warning tone and then holds the line out of service when a station line remains off-hook for longer than 10 seconds without dialing or after the last digit di-

aled during call origination. The hold out-of-service condition does not tie up switching facilities or call processing time and will be released when the station goes on-hook.

LISTED DIRECTORY NUMBER SERVICE

3.87 Incoming exchange network calls to the PBX via the assigned listed local telephone directory number are directed to the attendant. The attendant may complete these calls to station lines within the system or certain trunk facilities. When DID is not provided, all incoming exchange network calls must be made on an LDN basis. Listed numbers are provided for CO trunk (DID and non-DID) and CCSA trunk calls.

LOCAL CALL BILLING

3.88 This HCS feature computes charges for local calls that guests place. The charges are based on the length of a call and may also be based on the number of calls placed (optional). This information can be printed on demand. Charges can also be accumulated to provide records for accounting purposes.

3.89 Refer to Part 4 for the additional hardware required to operate this feature.

LOUDSPEAKER PAGING—BASIC

3.90 This feature allows attendants direct access and station users dial access to paging equipment for the purpose of voice paging locally and at other PBXs in the same network. The paging amplifiers and speakers may be either customer-owned or telephone company provided. All voice paging facilities make use of the telephone transmitter as the microphone. A control signal for cutoff or override of background music is also provided. Optional arrangements can provide multizone paging where access codes and/or console buttons (for direct access) are provided for each of up to six zones within a customer's complex. Dial access to all zone paging is included when multizone paging is provided. Direct access (console button) to all zone paging is optional.

3.91 Refer to Part 4 for the additional hardware required for operation of this feature.

LOUDSPEAKER PAGING—DELUXE

3.92 This feature allows attendants direct access and attendants and station users dial access to paging equipment for the purpose of voice paging locally and at other PBXs in the same network. The paging amplifiers and speakers may be either customer-owned or telephone company provided. All voice paging facilities make use of the telephone transmitter as the microphone. A control signal for cutoff or override of background music is also provided. Optional arrangements can provide multizone paging where access codes and/or console buttons (for direct access) are provided for each of up to six zones or all zones within a customer's complex. Page answer capability is provided to allow the paged party to be connected to the calling party by dialing an answer code from any station within the PBX. Priority paging is provided to permit attendants and/or designated stations to dial access a paging zone and answer-back channel (and preempt any station user connected to that zone or channel). Stations assigned with Three-Way Conference Transfer may also access paging while on any 2-party call. The second party can be added on (3-way conference) or transferred to the page answer party but not to the paging input.

3.93 Refer to Part 4 for the additional hardware required for operation of this feature.

MANUAL ORIGINATING LINE SERVICE

3.94 Station lines with this feature in their COS automatically route to the attendant when the station user goes off-hook. Dial tone is not provided to these lines and all originating connections are made by the attendant. Terminating calls to these stations are allowed.

MANUAL TERMINATING LINE SERVICE

3.95 These station lines require all terminating calls to be completed by the attendant. Nonattendant-handled calls to these lines are routed to intercept tone. The CCSA calls are routed to the attendant, an announcement, or to intercept tone, depending on the option selected. The DID calls are routed to the attendant or an announcement. Originating calls are dialed in the normal manner.

MEMORY HOLDOVER

3.96 This feature provides extended electrical power for the translations memory, RAM, in the event of electrical power loss to the DIMENSION PRELUDE PBX. A minimum of 10 hours of electrical

power is automatically activated by the AEY-1 memory holdover circuit and is provided via four low-maintenance rechargeable batteries stored in the main cabinet.

MESSAGE WAITING

3.97 This feature provides the ability to remotely (from a central location) light lamps on station sets served by a PBX to indicate that a message is waiting for the station user. These lamps can be activated from the attendant console via the ADSS/BLF field.

3.98 Refer to Part 4 for the additional hardware required to operate this feature.

MISCELLANEOUS TRUNK RESTRICTION

3.99 Preselected station lines (and dial repeating tie trunks are denied access to preselected miscellaneous trunk groups that may include FX, WATS, CCSA, tie trunk, and auxiliary trunks. Restricted call attempts are given intercept tone.

MULTIPLE LISTED DIRECTORY NUMBERS

3.100 More than one CO LDN can be associated with a single installation. Each LDN can be assigned a unique ICI. With non-DID service, a separate trunk group is required for each LDN on which a unique ICI is desired.

MUSIC-ON-HOLD ACCESS

3.101 This feature provides customer-furnished music or other audible indication to the held party during the hold interval. The held call condition can be the result of attendant position hold, call hold, 3-way conference transfer hold, or the hold associated with other similar features.

3.102 Refer to Part 4 for the additional hardware required for operation of this feature.

NIGHT CONSOLE POSITION

3.103 This feature provides an alternate attendant position which can be used at night instead of the regular attendant position to answer all calls directed to the attendant. This position provides all of the regular attendant functions.

3.104 Refer to Part 4 for the additional hardware required for operation of this feature.

NIGHT STATION SERVICE—AUTOMATIC

3.105 This feature provides automatic activation of the night station service administered in the system, whether fixed or full service. If a call (except rering from toll calls and attendant conference calls) queues at the attendant console and remains unanswered for the specified time-out (10 to 60 seconds) and there is no activity at the console, the system activates night station service. The present call and calls thereafter are served via Night Station Service—Fixed Service or —Full Service, whichever is administered.

NIGHT STATION SERVICE—FIXED SERVICE

3.106 Arrangements are provided to route calls, normally directed to the attendant, to a preselected common station line within the system when night service is activated. In addition, incoming calls from specific non-DID exchange network trunks can be arranged to route to specific station lines. The routings are provided on a fixed basis by the telephone company at the time of order or via the MAAP. Trunk Answer From Any Station (TAAS) may also be provided (additional hardware required) for night calls not assigned to or that cannot be answered by night stations.

NIGHT STATION SERVICE—FULL SERVICE

3.107 Arrangements are provided to route calls, normally directed to the attendant, to a preselected common station line within the system when night service is activated. In addition, incoming calls from specific non-DID exchange network trunks can be arranged to route to specific station lines. The routings can be assigned on a flexible basis by the attendant and remain in effect night-to-night until changed. A default common night station is assigned by the telephone company at the time of order or via the MAAP which is used in the event of a power failure that causes loss of memory. The TAAS answering capability is provided (additional hardware required) for night calls not assigned to or that cannot be answered by night stations. When in night service, all stations have 3-way conference transfer capability for transferring calls to other stations and call waiting service for night calls.

3.108 In a system with night service—full activated (manual or automatic), calls are completed as follows:

- First Call—Routes to the common number, if assigned, or to the default, if provided, and no

common number is assigned by the attendant.

- Second Call—Waits in call waiting—terminating state for completion of the first call.
- Third Call—Routes to TAAS, if provided. Subsequent calls wait in queue for TAAS. If TAAS is not provided, the third and all subsequent calls are held in queue and move up in order to the first and second positions as those calls terminate.

3.109 Several dial access codes are provided for attendant control of night service:

(a) ***Enter Night Station Number:*** This code is used by the attendant to make specific trunk-to-station night assignments.

(b) ***Enter Common Night Station Number:*** This code allows the attendant to enter a common night station assignment. The common assignment overrides any preassigned default number.

(c) ***Clear All Night Numbers:*** This code allows the attendant to clear night assignments except the default number. All calls normally directed to the attendant be routed to the default number. If TAAS is provided and no default is assigned in memory, the calls route to TAAS.

(d) ***Override Common Night Station Number:*** This code enables the attendant to override the default and/or common station assignment for routing to TAAS. This code is provided only when the system is equipped with TAAS.

OFF-HOOK TRUNK QUEUING

3.110 This feature allows a station user to remain off-hook and be queued for an idle trunk when all outgoing trunks of the dialed trunk group are in use. The feature is administered in the station's line COS. The queued station receives music, if Music-on-Hold Access is a system feature. Otherwise, the queued station receives special audible ringback.

OFF-PREMISES STATIONS

3.111 This feature provides service between the PBX and a PBX station where the station is located some distance from the PBX premises.

3.112 Refer to Part 4 for the additional hardware required for operation of this feature.

OFF-PREMISES STATION WITH CALL CONTROL

3.113 This feature provides access to the DIMENSION PBX by special off-premises extensions. The SMDR feature can be provided on all calls to and from these stations. Transmission level for a call to another station on the same PBX is approximately 5 dB higher on these stations than on regular off-premises stations. The PBX features available to users of the special off-premises extension are those features available to incoming dial repeating tie trunk users.

3.114 Refer to Part 4 for the additional hardware required for operation of this feature.

ORIGINATION RESTRICTION

3.115 A station line with this restriction cannot be used to originate calls at any time. Attempted origination is given line lockout with warning tone (10 seconds of intercept tone) treatment. Terminating calls, however, complete normally to this station line.

OUTGOING TRUNK QUEUING

3.116 Using this feature, the calling station that encounters a busy trunk group is automatically queued and goes on-hook to be called back automatically when a trunk is available. If the trunk group is part of a route advance group, the route advance sequence is checked before queuing is activated. Up to four outgoing trunk groups can be arranged for queuing. A practical limit on the number of stations that can be waiting in queue for each group can be set for a particular customer. Requests received after that limit is reached cause the station user to hear reorder tone.

OUTWARD RESTRICTION

3.117 Preselected station lines within the PBX are denied the ability to access the exchange network without the assistance of the attendant. Restricted calls are routed to intercept tone.

POWER FAILURE TRANSFER

3.118 This feature provides service to and/or from the exchange network (non-FX and WATS)

for preselected stations during a power failure at a customer's PBX when reserve power is not provided or is depleted. Incoming service is not available for DID. The power failure stations must be equipped with a ground-start button to originate calls when in power failure mode. If the CO accepts only rotary pulsing, preselected stations must be rotary-dial equipped.

3.119 Refer to Part 4 for the additional hardware required for operation of this feature.

PRIORITY QUEUING

3.120 This feature can be assigned to lines and trunks and allows respective calls to queue ahead of nonpriority calls in some queues. A line with priority queuing has priority in the attendant incoming call queue, a Uniform Call Distribution (UCD) group queue, an outgoing trunk queue, and an off-hook trunk queue. A line with Priority Queuing assigned that activates Automatic Callback—Busy and Don't Answer has priority over nonpriority automatic callback calls active at the called station. When Priority Queuing is assigned to a trunk group, trunk calls have priority in the attendant incoming call queue and UCD group queues. If a queue is full, however, even calls with Priority Queuing cannot queue.

PRIVACY AND LOCKOUT

3.121 Privacy automatically splits the connection whenever an attendant would otherwise be bridged on a call with more than one facility (eg, with both a calling and a called party). Attendant lockout denies an attendant the ability to reenter an established connection held on the console position, unless recalled by a station. When privacy is provided, the attendant lockout feature is also provided.

RADIO PAGING ACCESS

3.122 This feature provides the attendant and station user dial access to customer-owned radio paging equipment. The user can selectively tone-alert or voice-page individuals carrying pocket radio receivers. The paged party answers by dialing an answering code from a station within the PBX system.

3.123 Refer to Part 4 for the additional hardware required for operation of this feature.

RECALL DIAL TONE

3.124 This feature provides audible indication of successful switchhook flash used to request a service feature from a talking connection without loosing the other party. The result of a successful use of the switchhook flash is three bursts of dial tone followed by steady dial tone. The result of a reorigination is steady dial tone. Dialing is not registered during the interrupted portion of recall dial tone.

RECORDED TELEPHONE DICTATION ACCESS

3.125 This feature permits access to and control of customer-owned dictating equipment by station users within the system. The start and stop functions of customer-owned telephone dictating equipment may be voice-controlled or dial-controlled. The record, playback, etc, functions are dial-controlled.

3.126 Refer to Part 4 for the additional hardware required for operation of this feature.

REMOTE ACCESS TO PBX SERVICES

3.127 This feature allows a user outside the PBX to access the PBX services via an exchange network connection. The user dials a preestablished DDD number to connect to the PBX and then dials a 4-digit authorization code. The user may then place any call as if the user were at a PBX station. This service can be arranged for fully, outward, or toll restriction and/or can be denied access to miscellaneous trunk groups. All signaling is done using TOUCH-TONE calling, and the authorization code is readily changed by the attendant. Dedicated full time or shared night-service-only trunk facilities can be used for providing this service.

RESERVE POWER

3.128 This feature provides an alternate, independent source of power to maintain PBX service for a limited time (normally eight busy hours) during a power failure at the customer location.

3.129 Refer to Part 4 for additional hardware required for operation of this feature.

ROOM STATUS AND SELECTION

3.130 This HCS feature stores and displays the occupancy and cleaning status, and type number of each guest room. This feature automatically updates room occupancy status when guests are

checked in and out via the console/terminal. Cleanliness status is updated when personnel report that rooms are clean. Optionally, op-codes can be assigned for personnel to dial from room extensions to indicate the clean—looks occupied and clean—looks vacant (needs inspection) status of the rooms.

3.131 Refer to Part 4 for the additional hardware required to operate this feature.

ROTARY DIAL CALLING

3.132 Dialing information from standard rotary dial station equipment is accepted by the system. At a calling station, this feature utilizes a rotary device to generate dc pulses, representing either the address of the called facility or an instruction to a dial-controlled device. TOUCH-TONE dialing signals from station lines with the rotary dial class of service is not accepted.

ROUTE ADVANCE

3.133 This feature routes outgoing calls over alternate facilities when the first-choice trunk group is busy. The station user selects the first-choice route by dialing the corresponding access code. The equipment automatically advances to alternate trunk groups if necessary. The digits following the access code must be identical for any of the trunk groups selected. The alternate groups may also be accessed by other codes. Up to ten route advance groups may be provided, each containing a maximum of five trunk groups.

SERIAL CALL

3.134 An attendant can complete an incoming trunk call to two or more station lines in succession without requiring the called station user(s) to recall the attendant. This feature is implemented through the use of the Two-Party Hold on Console feature.

SINGLE-DIGIT DIALING

3.135 This HCS feature permits a station user to call any of a preselected group of stations by dialing a single-digit code. A time-out for dialing can be administered when Single-Digit Dialing conflicts with the normal numbering plan.

SIX-WAY MEET-ME CONFERENCE

3.136 Up to six station users (local and remote access) can, at a previously arranged time, dial the conference trunk dial access code and create a Meet-Me conference.

3.137 Refer to Part 4 (Conferencing) for the additional hardware required for operation of this feature.

SIX-WAY STATION CONFERENCE

3.138 A conference of up to six stations (lines and trunks) can be established by authorized stations.

3.139 Refer to Part 4 (Conferencing) for the additional hardware required for operation of this feature.

SPEED CALLING

3.140 Frequently called numbers that access APLT, CO, FX/WATS, and/or ARS are entered in a programmable speed calling list for easy 2- or 3-digit dialing.

3.141 Refer to Part 4 for the additional hardware required for operation of this feature.

SPLITTING—ONE-WAY AUTO/MANUAL

3.142 This feature allows the attendant to split away from a call connection (call is placed in soft hold) to establish a separate connection with another party. One-way splitting permits the attendant to split and unsplit a call as necessary. A call is split away automatically when the attendant begins to dial another station. The attendant may also join the calling and called stations together in a talking connection.

SPLITTING—TWO-WAY MANUAL

3.143 This feature permits the attendant to split away a calling party to call another station, and to alternate connections with the calling and called stations. Two nonlocking console buttons are administered for this feature. The SPLIT CLD button is used to split the called station away, and the SPLIT CLG button is used to split the calling station away. The SPLIT CLD or SPLIT CLG buttons are depressed again to return the respective parties to the attendant. The calling and called stations can be joined in a 2-way talking connection, or joined with the attendant in a 3-way conference.

STATION HUNTING

3.144 A call is routed to an idle station line in a prearranged group when the called station line is busy. Station lines cannot be in more than one hunting group. The number of hunting groups is unlimited. The size of each hunting group is limited to 30 station lines per group. The hunting sequence over the prearranged group can be accomplished as given below:

(a) ***Terminal Hunting:*** The hunt always starts with the called station line and ends with the last station line in the prearranged group, completing the call to the first idle station line encountered. Unless the first station line is called, only a portion of the group is tested. The prearranged hunting sequence can be either consecutive (station numbers are in ascending numerical sequence or nonconsecutive.

(b) ***Circular Hunting:*** The hunt starts with the called station line and always proceeds in a prearranged order to test all lines in the group once, completing the call to the first idle station line. The station numbers may be in consecutive or nonconsecutive order.

STATION MESSAGE DETAIL RECORDING

3.145 This feature provides a record of the PBX station (or attendant) identity, call completion time, call duration, dialed number, and the trunk group used for outgoing and/or incoming calls. For outgoing calls, the called number is recorded. Also, a station dialed account code number of up to 15 digits may be recorded in addition to the calling station number. A record of trunk calls is made and can be used to compute costs, allocate charges, analyze calling patterns, and effect implementation of controls and/or restrictions. The SMDR is not an exact billing record since the call duration is measured from about 10 seconds after the establishment of the connection in the customer system to the time when the trunk is disconnected. Hence, busy signal, don't answer, and wrong number calls may also be recorded.

3.146 Information is passed from the DIMENSION PRELUDE PBX to the SMDR equipment via a data channel (fast/slow speed data I/O circuit). When the RMATS is provided, the LC570, LC570B, or LC597 is used and one data channel is dedicated to SMDR (high-speed option).

A. Direct Output Version Application

3.147 The direct output version provides station message recording (except for HCS) on a printer, tape punch, or customer-provided terminal (ie, magnetic tape cartridge, printer, paper punch). The record is available as a hard copy printout, or can be stored on paper tape or a magnetic tape cartridge. The amount of output information from SMDR is proportional to customer traffic, number of stations within the PBX, and number of trunks to be monitored. The capacity of the SMDR buffer memory allows 16 call records to be stored for outputting to a terminal. These call records should be sufficient for 200 lines of heavy traffic usage. Hardware consists of a small cabinet containing eight circuit packs.

B. 9-Track Magnetic Tape Application

3.148 For systems (other than HCS) requiring capacity greater than the direct output for storing the recorded calling information, the 9-track magnetic tape version may be used. This version of SMDR provides a call storage medium (9-track magnetic tape) with a capacity of 330,000 trunk calls per tape. The tape may be changed, as required, depending on customer requirements (traffic capacity or monitoring of calls). The 9-track system is equipped with a Kennedy 9217 tape formatter used to write data on a standard 9-track magnetic tape. When output information is required by the customer in the form of a hard copy for visual inspection, the 9-track magnetic tape requires machine processing (software decoding) to group the output from the magnetic tape as required by the customer, ie, grouped by type of calls, account numbers, specific dates, etc. The 9-track magnetic tape SMDR uses the same receiving circuitry as the direct output version and provides greater record storage capacity. The 9-track magnetic tape SMDR is mounted in a dedicated SMDR cabinet and consists of a power supply, circuit pack carrier, a tape driver, and a tape formatter.

C. Internally Formatted Version

3.149 The internally formatted option for SMDR provides direct output of SMDR data just as described above except that the data is formatted via programs contained in EPROM. The ZLC11 (HCS), the ZLC14 (single-cabinet systems), or the ZLC16 (multicabinet systems) EPROM circuit formats the SMDR data and outputs it directly via the LC597 dual RS232 data ports circuit.

3.150 For more detailed information regarding SMDR, refer to Section 554-010-122.

3.151 Refer to Part 4 for the additional hardware required for operation of this feature.

STATION REARRANGEMENT AND CHANGE

3.152 This feature allows the customer, by use of the CAP, to move stations, change the features and/or restrictions assigned to a station, and perform search routines on individual stations in order to identify the services provided for that station.

3.153 Refer to Part 4 for the additional hardware required for operation of this feature.

STATION-TO-STATION CALLING

3.154 The station user can directly dial other stations within the same system without the assistance of the attendant. The number of digits required depends on the numbering plan engineered for the customer.

STRAIGHTFORWARD OUTWARD COMPLETION

3.155 An attendant can complete an outward call for a station while the station is connected to the attendant console. The attendant dials the number desired by the station, or allows the station to continue dialing.

SWITCHED LOOP OPERATION

3.156 The attendant position is arranged so that each call requiring attendant assistance is automatically switched to one of a limited number of idle loops (call access points) on an idle attendant position. Normally, the attendant-assisted call automatically releases from the position when answered by the called station (released loop operation). Incoming calls are queued (retained in a waiting state) in the order of arrival when all attendant positions are busy and are switched to each attendant position automatically to distribute the call load evenly. A console lamp indication is given to the attendant when calls are waiting to be served.

TANDEM TIE TRUNK SWITCHING

3.157 This feature allows tie trunk-to-tie trunk, tie trunk-to-CCSA, and tie trunk-to-exchange network connections through the switching system dialed directly by the distant PBX station user. Tandem connections can be restricted on a trunk group basis. Restricted calls are routed to intercept tone.

3.158 Refer to Part 4 for the additional hardware required for operation of this feature.

TERMINATION RESTRICTION

3.159 Station lines with this restriction cannot receive calls at any time. Calls can be originated normally from this station. The DID calls are routed to the attendant or to an announcement, depending on the option selected. The CCSA calls are routed to the attendant, an announcement, or to intercept tone, depending on the option selected. All other terminating calls are routed to intercept tone.

THREE-WAY CONFERENCE TRANSFER

3.160 A station user can, by flashing while on any 2-party call, effect a 3-way conference and transfer. After flashing, the controlling station user dials the third party (which can be a trunk) for private consultations while the second party is held in soft hold. The controlling user flashes a second time to effect a 3-way conference. If the user then goes on-hook, the other parties remain connected if at least one remaining party (second or third party) is a station. For trunks to remain connected, the Trunk-to-Trunk Transfer feature must be active. When a conference connection includes two trunks, and trunk-to-trunk transfer is not available, the conferees are disconnected when the controlling station goes on-hook. In addition, the controlling station can drop the third party by flashing during the 3-way conference.

THROUGH DIALING

3.161 At the discretion of the attendant, station users can complete dialing after the attendant selects the trunk facility on attendant-handled outgoing calls.

TIE TRUNK ACCESS

3.162 This feature provides access to dedicated 1-way or 2-way circuits between one PBX and another PBX.

3.163 Refer to Part 4 for the additional hardware required for operation of this feature.

TIMED RECALL ON OUTGOING CALLS

3.164 Outgoing trunk calls from selected stations are automatically transferred to the atten-

dant after a timed interval assigned to the trunk group between 1 and 31 minutes. A warning tone is sent to the calling party 30 seconds before the transfer takes place.

TIMED REMINDERS

3.165 Visual (indicator lamps) and/or audible (tone) signals are provided to automatically alert the attendant of a call waiting on the console longer than 30 seconds. The call may be waiting on a busy station line (attendant call waiting), a nonanswering station line, or the call may be held on the attendant console. This signal is retired when the loop is reseized by the attendant. The signal is reactivated 30 seconds after the attendant releases from the connection if the call is still waiting, unanswered, or held.

TOLL RESTRICTION (BATTERY REVERSAL OR 0/1)

3.166 This feature is a limited form of code restriction. It permits station users and incoming tie trunk callers to access local CO trunks. However, this feature requires that toll calls be attendant assisted. Restricted toll calls receive intercept tone. This feature is provided on a per-station-line or trunk basis and is available in the following forms:

(a) ***Battery Reversal:*** A battery reversal signal from the CO on an outgoing call routes the toll restricted calling station to intercept tone.

(b) ***0/1 (With Limited 3-Digit):*** This form of toll restriction is based on screening at the PBX rather than at the CO. Toll restricted (0/1) stations route to intercept tone if the first or second digit dialed after the trunk access code is a 0 or a 1 and the office or area code is not in the allowed call list (which has a maximum capacity of ten 3-digit codes).

TOLL TERMINAL ACCESS WITH RERING FROM TOLL

3.167 A station user or attendant can dial a toll operator directly or access a uniquely identified trunk group to a Traffic Service Position System (TSPS) position. Rering from toll allows a TSPS operator to call back over the toll access lines to quote charges (DIMENSION PRELUDE PBX only).

"TOUCH-TONE" CALLING

3.168 This feature provides dialing from standard TOUCH-TONE service station equipment. A calling station uses pushbutton-operated audible tones. A series of the tones represents the address of a called facility, an access code, or an instruction to a dial-controlled device. Rotary station instruments can be used on station lines with the TOUCH-TONE calling COS for testing purposes.

"TOUCH-TONE" CALLING SENDERIZED OPERATION

3.169 TOUCH-TONE service signaling can be used when the distant end associated with outgoing trunk calls is equipped to receive TOUCH-TONE calling signals. This takes place on speed calling and Automatic Route Selection (ARS). The calling party can be either rotary or TOUCH-TONE service and has no control over the type of sending. With ARS, the calling station must be equipped with a TOUCH-TONE service dial.

3.170 When TOUCH-TONE calling senderized operation is required, TOUCH-TONE calling circuit packs (LC12) must be installed. The number of circuit packs required is determined by traffic load.

"TOUCH-TONE" CALLING TO DIAL PULSE CONVERSION

3.171 The TOUCH-TONE calling signals are converted to dial pulse signals when the distant end associated with outgoing trunk calls is not equipped to receive TOUCH-TONE calling signals or when transmission loss prevents reliable TOUCH-TONE service signaling. External dial pulse conversion equipment is not required for this feature.

TRAFFIC MEASUREMENT

3.172 DIMENSION PRELUDE PBX systems are compatible with the RMATS. Traffic studies and structures may be flexibly administered in the PBX and automatically polled by the RMATS central facility.

3.173 The traffic studies at the PBX function in a default mode, outputting accumulative values, and a fixed study set, if specific studies are not prescribed. Table D and Table E show the default studies that are run in the default mode for the DIMENSION PRELUDE PBX systems. Specific hundred call seconds (CCS) per hour, peg, and overflow peak data may be accumulated on a per-trunk-group basis, in addition to the accumulated values. Accumulated values 42 through 48 [Electronic Custom

Telephone Service (ECTS)] and 57 [Centralized Attendant Service (CAS)] and time coincident register 4 (ECTS) are shown in Table D and Table E and are reported, but the values totaled are always zero. Information is stored in registers which are updated as peak values occur. Studies of related trunk group activity may be obtained in time coincidence with peak value studies. Time coincident studies of traffic items may also be flexibly assigned and related to peak register studies. Trunk group combinations, outgoing trunk queue activity, and ARS studies may be assigned as required.

3.174 The traffic values, default and/or assigned, are stored in a dedicated memory area which is output to RMATS (or to a local scanner) on a prescribed polling schedule. Assignable traffic values are shown in Table F. Type 3, Item 7 (ECTS) shows up on traffic reports but always has a value of zero.

3.175 The RMATS facility can be arranged to automatically poll on a daily or hourly interval. The RMATS dials the PBX via the DDD network, sends the PBX unique security access code, and receives and records data stored in the PBX. Polling results in initializing all traffic study values in the PBX.

TRUNK ANSWER FROM ANY STATION

3.176 Incoming calls, normally directed to the attendant, activate a common alerting signal on customer premises when night service is activated and night stations are not assigned or are all busy. These calls may then be answered by any station user in the system who dials a special code from any nonrestricted station.

3.177 Refer to Part 4 for the additional hardware required for operation of this feature.

TRUNK GROUP BUSY INDICATORS ON ATTENDANT POSITION

3.178 The attendant is provided with a visual indication when all trunks in a group are busy. Up to 24 busy indicators can be provided.

TRUNK GROUP WARNING INDICATORS ON ATTENDANT POSITION

3.179 The attendant is provided with a visual indication when a preset number of trunks in a group are busy. This number can be specified via the MAAP. Up to 12 warning indicators can be provided.

TRUNK-TO-TRUNK CONNECTIONS

3.180 This feature allows an incoming or outgoing trunk call to be extended via the attendant to another outgoing trunk. Trunk-to-trunk connections can be effected among the following types of trunks: CO, FX, WATS, CCSA network, and tie trunks. Disconnect supervision can be automatic in some cases, but in others, the attendant must monitor the connection and manually disconnect after use.

TRUNK VERIFICATION BY CUSTOMER

3.181 This feature provides attendant access to individual trunks of a group for making test calls to verify supervision and transmission. When a busy trunk is encountered, warning tone is sent to the talking parties and the attendant bridges onto the trunk to verify use. The attendant operates a test access code followed by the normal trunk group access code (or operation of the DTGS button) followed by the specific number of the trunk to be tested. A dial code must be assigned to incoming trunk groups to allow attendant access for testing. This same dial code is used to establish night connections on incoming trunks.

TRUNK VERIFICATION BY STATION

3.182 The Trunk Verification by Station (TVS) feature permits a designated station or remote maintenance station to verify supervision and transmission on individual PBX trunks or trunk groups. To test incoming trunks and other busy trunks, an optional bridged connection with warning tone to the talking parties verifies usage. A defective trunk can be assigned a maintenance busy state via a code dialed from the designated station line or control station. When the trunk is repaired, a code dialed from the designated station or control station changes the trunk's state appropriately. Any dial repeating tie trunk can also be used to remotely test trunks on a PBX. However, a tie trunk can only be used to test trunks to which it can normally be connected. Furthermore, the busy trunk override option cannot be used.

3.183 The TVS feature allows a designated station to test a specific trunk before the trunk is manually switched to an alternate use. The desig-

TABLE D

ACCUMULATED VALUES FOR "DIMENSION" "PRELUDE" PBX DEFAULT STUDIES

	ACCUMULATED VALUES
1	Processor Overload
2	Ring Group Block Group 0
3	Ring Group Block Group 1
4	Ring Group Block Group 2
5	Ring Group Block Group 3
6	Ring Group Block Group 4
7	Ring Group Block Group 5
8	Ring Group Block Group 6
9	Ring Group Block Group 7
10	Ring Group Block Group 8
11	Ring Group Block Group 9
12	Ring Group Block Group 10
13	Ring Group Block Group 11
14	Ring Group Block Group 12
15	Ring Group Block Group 13
16	Direct Inward Dialing Busy
17	Direct Inward Dialing Don't Answer
18	Incoming Call Attendant Abandoned
19	Trunk Answer Any Station Call
20	Trunk Answer Any Station Call Abandon
21	Remote Access (Right Code)
22	Remote Access (Wrong Code)
23	SMDR Recording-Block
24	Automatic Callback
25	Call Hold
26	Call Pickup
27	Call Waiting Originating (By Station)
28	Answer Hold
29	Call Forwarding-All Calls
30	Call Forwarding-Busy and Don't Answer
31	Call Forwarding-Deactivate
32	Speed Calling
33	Code Calling
34	Paging — Code Dialed
35	Paging — Answerback
36	Cancel Outgoing Trunk Queuing
37	Activate Control Trunk Group Access
38	Deactivate Control Trunk Group Access
39	Conference-Call
40	Call Waiting Originating (By Attendant)
41	Attendant Originated Calls (START) Key
42	Electronic Custom Telephone Service — Automatic Callback
43	Electronic Custom Telephone Service — Call Hold
44	Electronic Custom Telephone Service — Call Pickup
45	Electronic Custom Telephone Service — Call Waiting — Originating
46	Electronic Custom Telephone Service — Answer Hold
47	Electronic Custom Telephone Service — Call Forwarding — All Calls

TABLE D (Contd)

ACCUMULATED VALUES FOR "DIMENSION" "PRELUDE" PBX DEFAULT STUDIES

	ACCUMULATED VALUES
48	Electronic Custom Telephone Service — Call Forwarding-Busy and Don't Answer
49	Uniform Call Distribution Warning Peg
50	Uniform Call Distribution Warning Peg
51	Uniform Call Distribution Warning Peg
52	Uniform Call Distribution Warning Peg
53	Uniform Call Distribution Warning Peg
54	Uniform Call Distribution Warning Peg
55	Uniform Call Distribution Warning Peg
56	Uniform Call Distribution Warning Peg
57	Centralized Attendant Service Call Abandon
58	RMATS Access (Right Code)
59	RMATS Access (Wrong Code)
60	

TABLE E

DEFAULT REGISTER ASSIGNMENTS FOR "DIMENSION" "PRELUDE" PBX

	PEAK REGISTER NUMBER		TIME COINCIDENT REGISTER
1	Time Slot Peg	1	Processor Occupancy
		2	Processor Overflow
		3	Stimulus Peg
		4	Electronic Custom Telephone Service Total Peg
2	Time Slot CCS	5	Time Slot Peg
		6	Tandem Traffic Peg
3	Incoming Call Queue CCS	7	Incoming Call Queue Peg
		8	Console Group Worked CCS
		9	Console Group Worked Peg
		10	Incoming Call Queue Attendant Abandoned Peg
		11	Listed Directory Number Call Answered Peg
		12	Non-Listed Directory Number Call Answered Peg
		13	Attendant Recall Peg
		14	Attendant Originated (START Key) Peg
4	Console Group Worked CCS	15	Console Manned CCS
		16	Incoming Call Queue CCS
		17	Incoming Call Queue Peg
		18	Console Number 1 Worked CCS
		19	Console Number 1 Worked Peg

TABLE F

ASSIGNABLE TRAFFIC VALUES

TYPE	ITEM	DESIGNATION			
1 TRUNK GRP COMBINATIONS	1	TRK GRP COMBN	1	TOTAL	CCS
	2		1	INCOMING	CCS
	3		1	OUTGOING	CCS
	4		2	TOTAL	CCS
	5		2	INCOMING	CCS
	6		2	OUTGOING	CCS
	7		3	TOTAL	CCS
	8		3	INCOMING	CCS
	9	TRK GRP COMBN	3	OUTGOING	CCS
2 ATTENDANT FEATURES	1	GROUP WORKED			CCS
	2	GROUP MANNED			CCS
	3	GROUP WORKED			PEG
	4	CONSOLE 1 WORKED			CCS
	5	CONSOLE 2 WORKED			CCS
	6	CONSOLE 3 WORKED			CCS
	7	CONSOLE 4 WORKED			CCS
	8	CONSOLE 1 WORKED			PEG
	9	CONSOLE 2 WORKED			PEG
	10	CONSOLE 3 WORKED			PEG
	11	CONSOLE 4 WORKED			PEG
	12	INCOMING CALL QUEUE			CCS
	13	INCOMING CALL QUEUE			PEG
	14	INC. CALL QUEUE, ATND ABANDON			PEG
	15	LDN CALLS ANSWERED			
	16	NON-LDN CALLS ANSWERED			
	17	ATTENDANT RECALL			
	18	ATTENDANT ORIG (START KEY)			PEG
3 NETWORK & PROCESSOR	1	TIME SLOT			CCS
	2	TANDEM TRAFFIC			CCS
	3	TIME SLOT			PEG
	4	OCCUPANCY			
	5	OVERFLOW			PEG
	6	STIMULUS			PEG
	7	ECTS CONTROLLERS-TOTAL			PEG
	8	NOT ACCESSIBLE			
	9	NOT ACCESSIBLE			
	10	TIME OF DAY CLOCK			

TYPE	ITEM	DESIGNATION		
4 QUEUE MEASURE OTQ	1	QUEUE	PEG	QUE
	2			1ST
	3			2ND
	4			3RD
	5			4TH
	6	QUEUE		5TH
	7	DON'T ANSWER		6TH
	8			1ST
	9			2ND
	10			3RD
	11			4TH
	12	DON'T ANSWER		5TH
	13	BUSY CALL BACK		6TH
	14			1ST
	15			2ND
	16			3RD
	17			4TH
	18	BUSY CALL BACK	PEG	5TH
5 TRUNK GRP	(TG #)	TRUNK GROUPS 8-63 63		6TH
6 TRUNK GRP	(TG #)	TRUNK GROUPS 15-63 63		CCS
7 TRUNK GRP	(TG #)	TRUNK GROUPS 18-63 63		PEG
8 TRUNK GRP	(TG #)	TRUNK GROUPS 18-63 63		OVERFLOW OR UCD QUEUE ABANDON
				INC CCS

nated station determines the idle or busy condition of a specific trunk before the trunk tip and ring connections switch to alternate use. This same station can also busy or unbusy the trunk to all PBX traffic. The feature also provides the designated station the ability to test the trunk after it is placed back in normal PBX use to verify that the switch was made properly.

TWO-PARTY HOLD ON CONSOLE

3.184 This feature allows an attendant to hold both a calling and a called station or trunk facility (or two called facilities) on the console while maintaining the connection between them. Two-party hold is required for the operation of the Attendant Lockout, Serial Call, and Trunk-to-Trunk Connections features.

UNIFORM CALL DISTRIBUTION

3.185 This feature permits incoming CO calls, FX calls, tie trunk calls, and 800 Service calls to be directed to a queue associated with a group of selected stations and processed from the queue to the station via a circular hunting pattern. Hunting starts at the next idle station in the hunting sequence following the last station to receive a call in the group.

3.186 Refer to Part 4 for the additional hardware required for operation of this feature.

VISUALLY IMPAIRED ATTENDANT SERVICE

3.187 Visually impaired attendant service capability is achieved by supplementing the normal visual signals provided on a standard attendant position with special tactile devices and/or audible signals which enable a visually impaired person to operate the position (Fig. 5). The DIMENSION PBX consoles allow plugging an audible tone adjunct directly into the console. The audible signals identify the type of incoming call, and tones indicate calls waiting and timed reminders.

3.188 Refer to Part 4 for the additional hardware required for operation of this feature.

WIDE AREA TELECOMMUNICATIONS SERVICE ACCESS

3.189 This service provides access to or from a WATS serving office. All incoming calls to the PBX are placed to the assigned 800 service number and are answered by the PBX attendant similar to LDN service. Outgoing WATS calls to the various geographic areas are made on an attendant-handled basis via DTGS, when provided, or dial access and/or a direct dial basis by stations.

WIDE FREQUENCY TOLERANT POWER PLANT

3.190 The PBX power plant equipment operates from ac energy sources which are not as closely regulated as commercial ac power. The wide frequency tolerant plant tolerates average frequency deviations of ±3 Hz or voltage variations of −15 percent to +10 percent, as long as both conditions do not occur simultaneously. This feature also operates with customer-provided emergency power generating equipment.

4. PHYSICAL ARRANGEMENTS

FEATURE HARDWARE

4.01 Hardware information is given below according to the features that require additional hardware.

A. Advanced Private Line Termination

4.02 The APLT feature requires the LC11C tie trunk circuit pack. One LC11C supports two APLT trunks.

B. Attendant Console

4.03 The following attendant console types are recommended for use in DIMENSION PRELUDE PBX systems:

- The ADE-06DF small console with busy lamp field (BLF) is the standard console for business use (Fig. 3).
- The AGE-01DF small console with Attendant Direct Station Selection (ADSS) and BLF for business applications.
- The AGJ-01DF large console with ADSS and BLF is intended for Hospitality Communications System (HCS) applications.

4.04 The dimensions of the attendant console with ADSS/BLF option are 406 millimeters (mm) (16 inches) wide by 279 mm (11 inches) deep, by 76

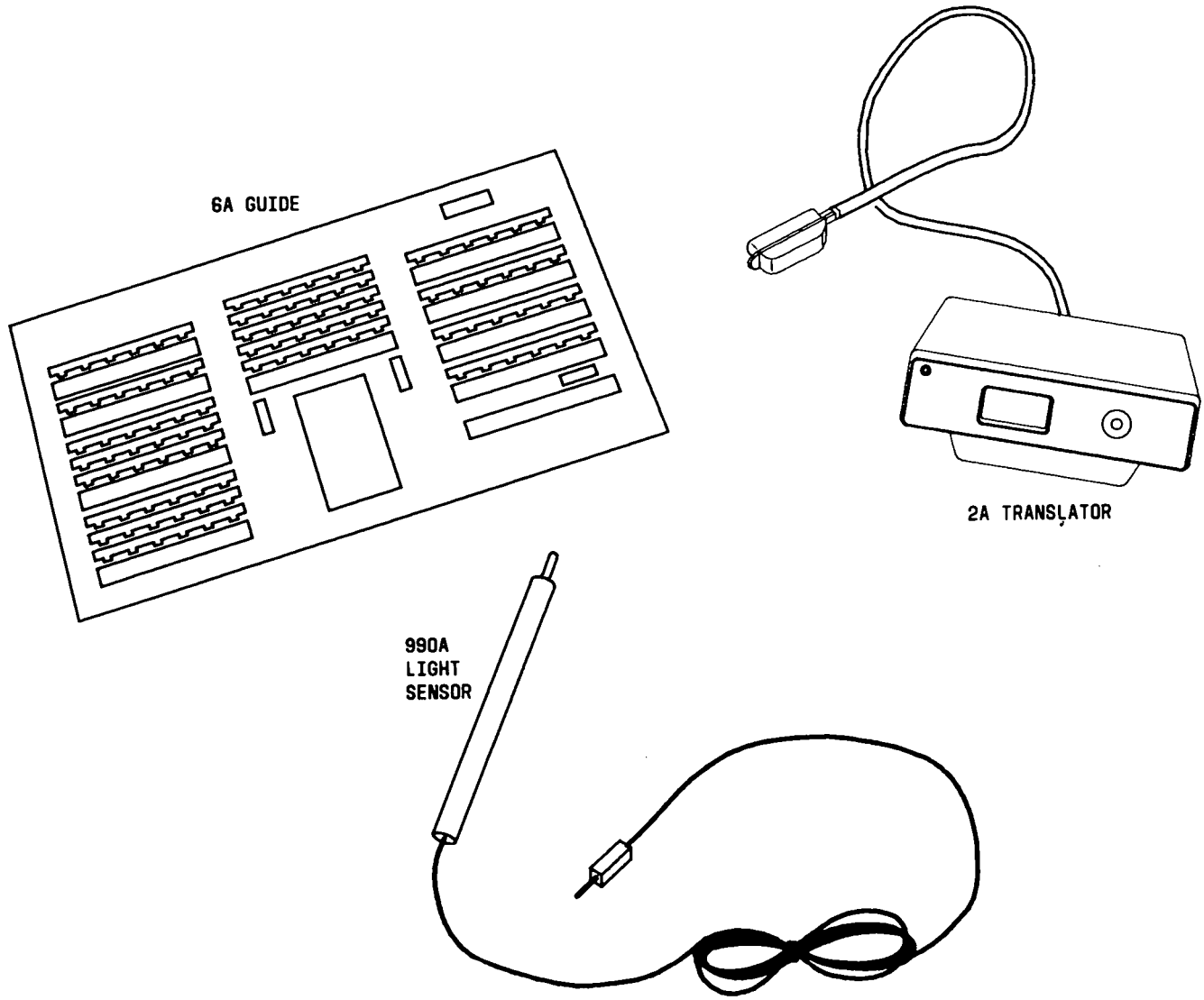


Fig. 5—Visually Impaired Attendant Service—Console Equipment

mm (3 inches) high in front, and 229 mm (9 inches) high in the rear. The attendant console is mounted on a baseplate with dimensions of 203 mm (8 inches) by 381 mm (15 inches). The K1A or K2C handsets, or a K2D handset for noisy environments, is recommended for use by the attendant. If a headset is desired, the 60A, 61A, or KS-20778 headset is recommended. These sets cannot be used simultaneously.

4.05 The console is equipped with a 12-pair mounting cord that is 2.4 meters (8 feet) long. The mounting cord is equipped with a 50-pin KS-16689, List 1 connector. A mating connector joins with a shielded 25-pair distribution cable. The mounting cord connects with the ED-1E310-11, Group 85 distribution cable when the console is directly connected to the PBX. If connected via a connectorized cross-connect field, the console mounting cord joins with an ED-1E310-11, Group 103 (Group 84 cable is used with a nonconnectorized cross-connect field) distribution cable. The group 103 shielded cable must be no less than 9 meters (30 feet) long between the PBX cabinet and an attendant console (or other unshielded equipment). Additional unshielded cable can extend a console to 300 meters (1000 feet) from the PBX when no attendant console repeaters are used.

If the attendant console is located in a building other than the one in which the PBX is located, attendant console repeaters must be used.

4.06 For more detailed information on the attendant console, refer to Section 554-010-100.

Attendant Console Repeater

4.07 The attendant console repeater unit provides range extension and/or lightning protection for the PBX low-speed data channels, as well as the alarm, ground, and −48 volt leads. An external supply located at the console end repeater provides console power. The power supply (284B1 power unit) must be ordered and mounted separately from the repeater unit. Repeaters are used in either of the two following circumstances:

(a) A console is located in a different building than the PBX.

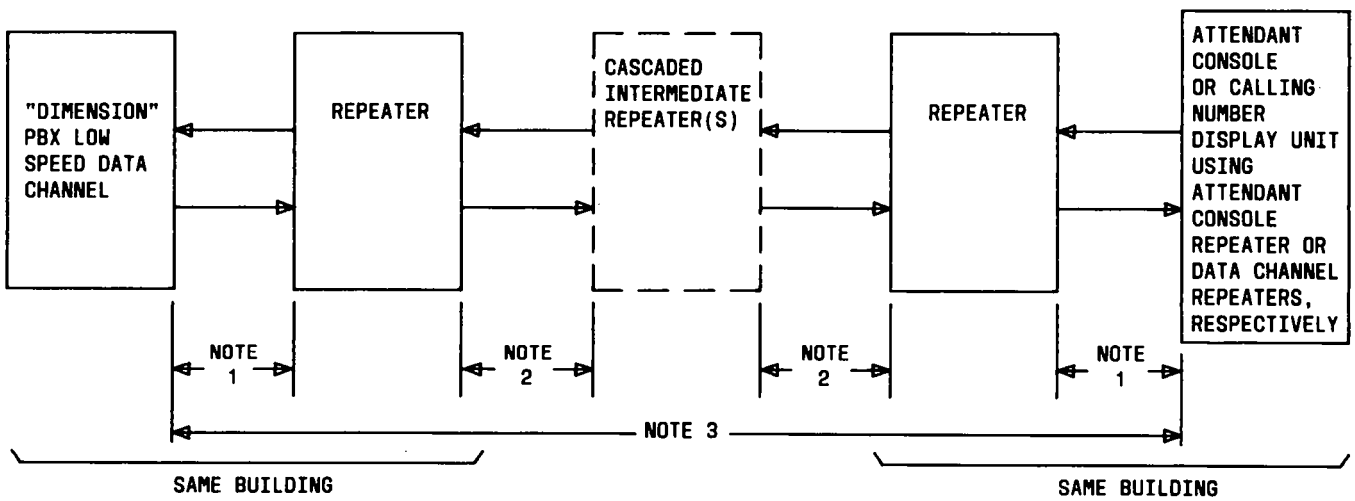
(b) The distance between the PBX and console is more than 300 meters (1,000 feet) but less than or equal to 3350 meters (11,000 feet). Up to 4 cascaded repeaters can be used for a maximum of 3350 meters (11,000 feet) between console and PBX.

Refer to Fig. 6 for a repeater arrangement.

4.08 The repeater circuit is designed to operate in unexposed environments without additional protection. It operates in exposed environments with standard protection.

4.09 ***Housing and Mounting:*** The repeater circuitry is housed in a modified key service unit with a capacity for one repeater circuit. The unit can be configured for use at either the PBX end or the console end.

4.10 The unit is designed to be wall-mounted near a 120-Vac 60-Hz outlet. Power cords are available in four lengths of 610, 1220, 1830, or 3658 mm (2, 4, 6, or 12 feet)—J58879KC, Lists A, B, C, or D, respectively.



NOTES:
1. MAXIMUM DISTANCE FROM PBX TO REPEATER OR ATTENDANT CONSOLE TO REPEATER IS 300 m (1000 FEET). ALL RANGES ARE BASED ON 24 GAUGE WIRE; INDIVIDUAL DISTANCES MAY BE INCREASED BY USING HEAVIER GAUGE WIRE BUT OVERALL DISTANCE CAN NOT BE MORE THAN 3350 m (11,000 FEET).
2. MAXIMUM DISTANCE BETWEEN REPEATERS IS 910 m (3000 FEET).
3. MAXIMUM DISTANCE BETWEEN PBX AND ATTENDANT CONSOLE WITHOUT RANGE EXTENSION IS 300 m (1000 FEET) AND WITH RANGE EXTENSION USING CASCADED REPEATERS, THE MAXIMUM DISTANCE IS 3350 m (11,000 FEET).

Fig. 6—Attendant Console or Data Channel Repeater Arrangement

4.11 ***Range Extension Configuration:*** When used for range extension (Fig. 7), the attendant console repeater is equipped as follows:

- Two J58879KD, List 1 (repeater assemblies)
- Two J58879KD, List 2 (28D2 power unit and AE-49 circuit packs)
- Four J58879KD, List 3 (AE-48 circuit packs)
- One J58879KD, List 5 (WJ4 circuit pack)—required at console end repeater only
- One J58879KD, List 6 (WJ5 circuit pack)—required at PBX end repeater only
- One J58879KD, List 7 (console power unit 284B1)
- Three J58879KD, power input cords for power units (lengths of power cords are specified in paragraph 4.10 for the attendant console repeater.

4.12 The 28D2 power unit and AE-49 circuit packs are required in both the PBX end and console end repeaters when range extension is provided. The power unit for the attendant console end (284B1) is also required with or without range extension.

4.13 If range extension is not necessary, the repeater units can still provide isolation between PBX and console.

4.14 ***Intermediate Repeaters:*** When intermediate console repeaters are used, they should be equipped as follows:

- One J58879KD, List 1 (repeater assembly with wiring option Z)
- One J58879KD, List 2 (28D2 power unit and AE-49 circuit pack)
- Two J58879KD, List 3 (AE-48 circuit packs).

4.15 ***Repeaters Without Range Extension:*** Repeaters used without range extension (Fig. 8) should be equipped as follows:

- Two J58879KD, List 1 (repeater assemblies)
- Four J58879KD, List 4 (WJ3 circuit packs).

4.16 ***Range Extension at PBX-End Repeater Only:*** A PBX-end repeater with range extension requires one J58879KD, List 6 (WJ5 circuit pack)

4.17 ***Range Extension at Console-End Repeater Only:*** A console-end repeater with range extension requires one J58879KD, List 5 (WJ4 circuit pack) and one J58879KD, List 7 console power unit 284B1.

4.18 ***Cable Runs:*** The console repeater circuit is designed to be used in unexposed environments without additional protection and in exposed environments with standard 0.08 millimeter (mm) (3-mil) carbon block protection. No special treatment is required for repeater cable runs.

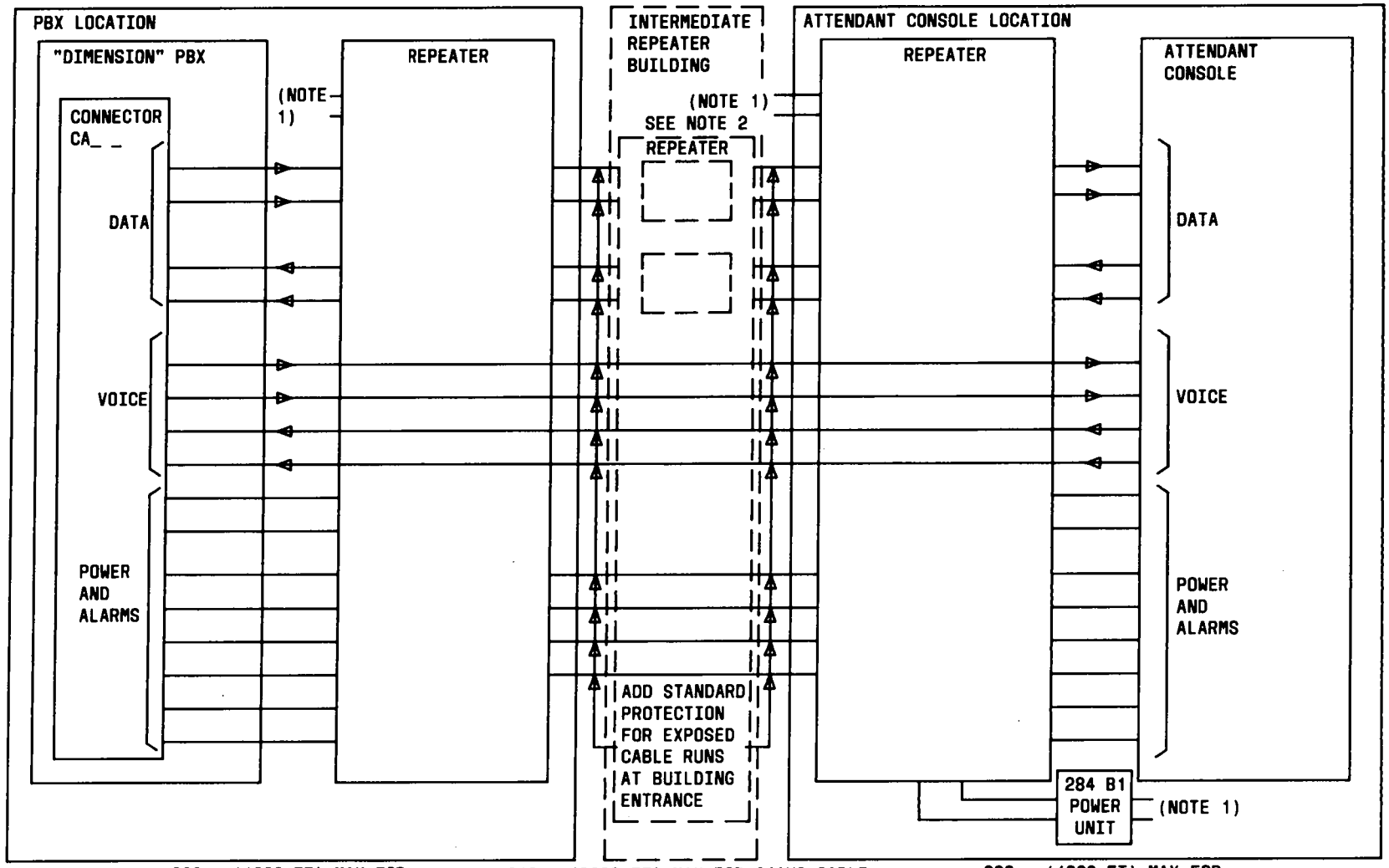
4.19 Cable runs from the repeater to the console or PBX must not be installed in an exposed environment. This restriction is determined by the PBX and console connecting circuitry which cannot tolerate exposed environments and cannot be adequately protected. All cabling used in conjunction with the console repeater circuits should be AWG 24, 25-pair, regardless of the length of the cable run.

At the console-end repeater, both power supplies must connect to the same 120-Vac source. The ground lug of the console-end repeater must connect to an approved ground.

4.20 ***Repeater Location:*** The physical characteristics of the repeater circuit require that it be installed inside a building. The repeater location should also satisfy the following requirements:

- Same building and less than 300 meters (1000 feet) cable distance from the PBX or attendant console.
- Equal to or less than 910 meters (3000 feet) cable distance between each repeater circuit.
- Close to a 3-prong ac outlet. (If range extension is provided, two outlets on the same circuit must be provided for the console-end repeater.)
- The console-end repeater must be located close to an approved ground.

4.21 ***AC Power:*** The attendant console repeater uses 123-, 117-, or 111-volt ac power. The power supplies are designed to tolerate line surges.



NOTES:

1. THE UNIT PLUGS INTO A COMMERCIAL 120VAC POWER SOURCE.
2. TWO INTERMEDIATE REPEATERS CAN BE CASCADED BETWEEN THE PBX REPEATER AND THE CONSOLE REPEATER ALLOWING A TOTAL DISTANCE OF 3350 m (11,000 FEET) BETWEEN CONSOLE AND PBX. STRAPPING OPTION Z MUST BE WIRED ON THE INTERMEDIATE REPEATERS WHENEVER CASCADED REPEATERS ARE USED.

Fig. 7—Attendant Console Repeater With Range Extension

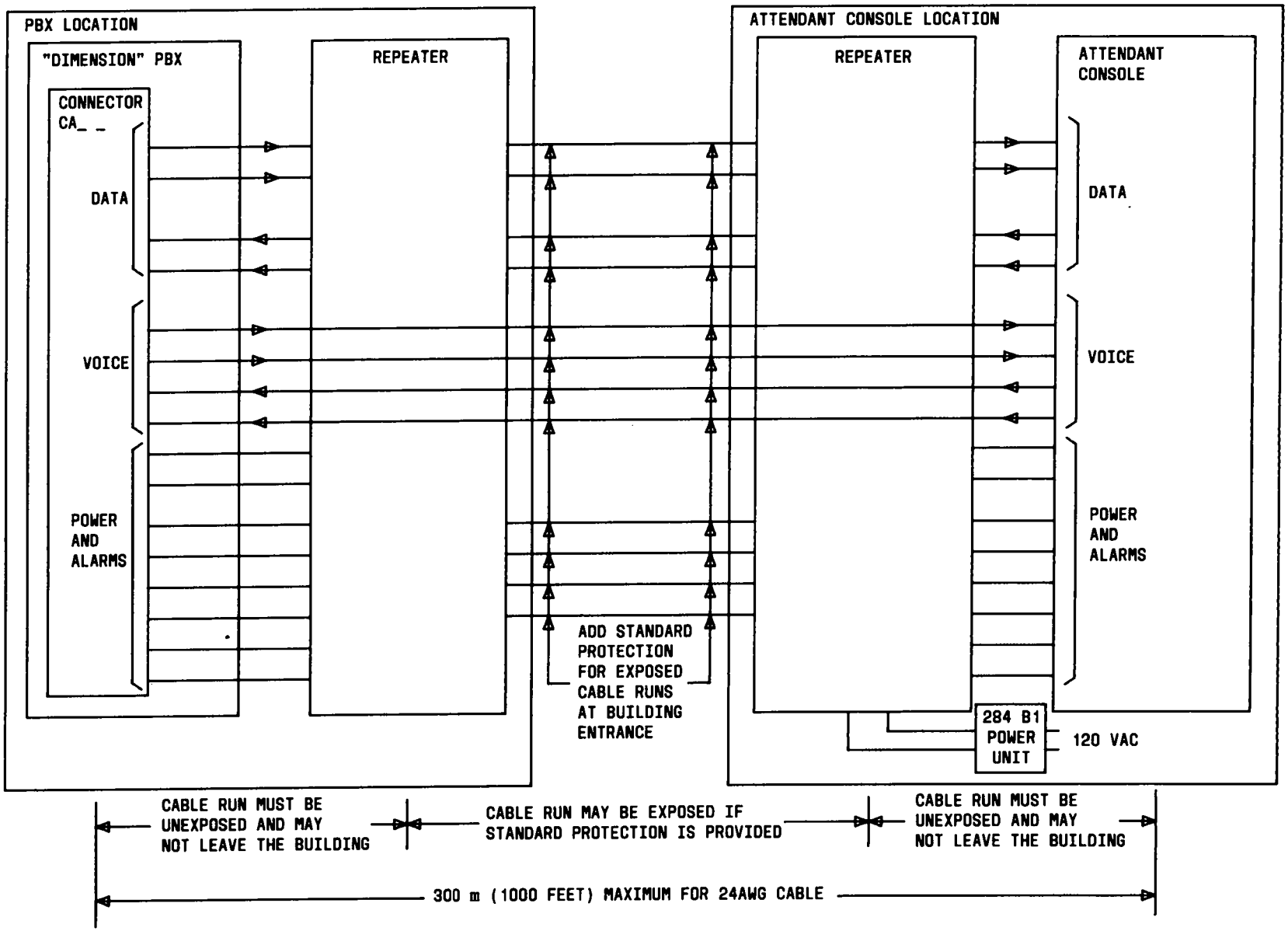


Fig. 8—Attendant Console Repeater Without Range Extension

4.22 ***Tip and Ring Protection:*** The console repeater circuit provides no protection for the 4-wire console talk path. Where exposed cable runs exist, standard carbon block protection is adequate.

4.23 Figures 7 and 8 illustrate the console repeater installations, providing lightning protection without range extension and lightning protection with range extension.

4.24 For more information about the attendant console repeater, refer to Sections 554-010-100 and 554-010-101.

C. Attendant Direct Station Selection

4.25 The standard attendant consoles with ADSS button fields are the AGE-06DF and the AGE-01DF consoles. If ADSS is desired, all consoles in a system must have the ADSS field and be the same size (same console models).

D. Automatic Wakeup Service

4.26 Automatic Wakeup Service for the DIMENSION PRELUDE PBX has two hardware options. If wakeup tone is desired, the LC204 tone circuits provide the tone. Wakeup music can be supplied from a customer music source (Music-on-Hold) via an LC13B auxiliary trunk interface circuit pack and a 36A [or a manufacturer discontinued (MD) 31D] voice coupler.

4.27 A 36A or 31D(MD) voice coupler couples customer-provided music to an auxiliary trunk circuit pack (LC13B), which provides 1-way-in reception of the music. The coupler also protects the tip and ring by limiting excessive voice power levels from the held party receiver. In addition, the coupler isolates the customer-provided equipment from harmful power levels. Maximum dc line current is 150 mA. The 36A or 31D(MD) voice coupler should be wall-mounted near the termination field. For a more detailed description of the 36A voice coupler, refer to Section 463-332-140. The 31B voice coupler is grandfathered per Federal Communication Commission (FCC) rules and may be used if available.

4.28 Following is a list of the hardware used for Automatic Wakeup Service:

- LC204 tone circuit pack
- 36A or 31D(MD) voice coupler
- LC13B auxiliary trunk interface.

E. Call Park

4.29 This feature requires one LC13B auxiliary trunk interface circuit pack for every two call park zones.

4.30 Transmission to customer-owned peripheral equipment is via dry-loop seizure or via sleeve ground-start seizure from the auxiliary trunk. The peripheral equipment ground on the sleeve lead is detected by LC13B.

F. Calling Number Display to Station

4.31 Each line of the PBX equipped for the Calling Number Display to Station feature requires the following.

- One 102D (calling number) display unit
- One 211A power unit
- One KS-19252, List 7 adapter
- One low-speed data channel (one circuit of an LC554 circuit pack).

The equipment arrangement for Calling Number Display to Station is shown in Fig. 9. The 102-type display terminal derives its power from a 211A power unit that requires a 120-Vac 60-Hz source.

G. Code Calling Access

4.32 ***Chime Paging:*** The Code Calling Access (Chime Paging) feature enables attendants, station users, and tie trunks to dial an access code and a 2- or 3-digit called party code to activate an electronic chime corresponding to the calling party by dialing an answering code from any station within the PBX. When chime paging is required, the following hardware must be installed (refer to Fig. 10 for a block diagram of hardware connections):

- LC17B tone board
- 89A control unit
- 201B power transformer.

4.33 The 89A control unit should be located as close as possible to the cross-connect field and the

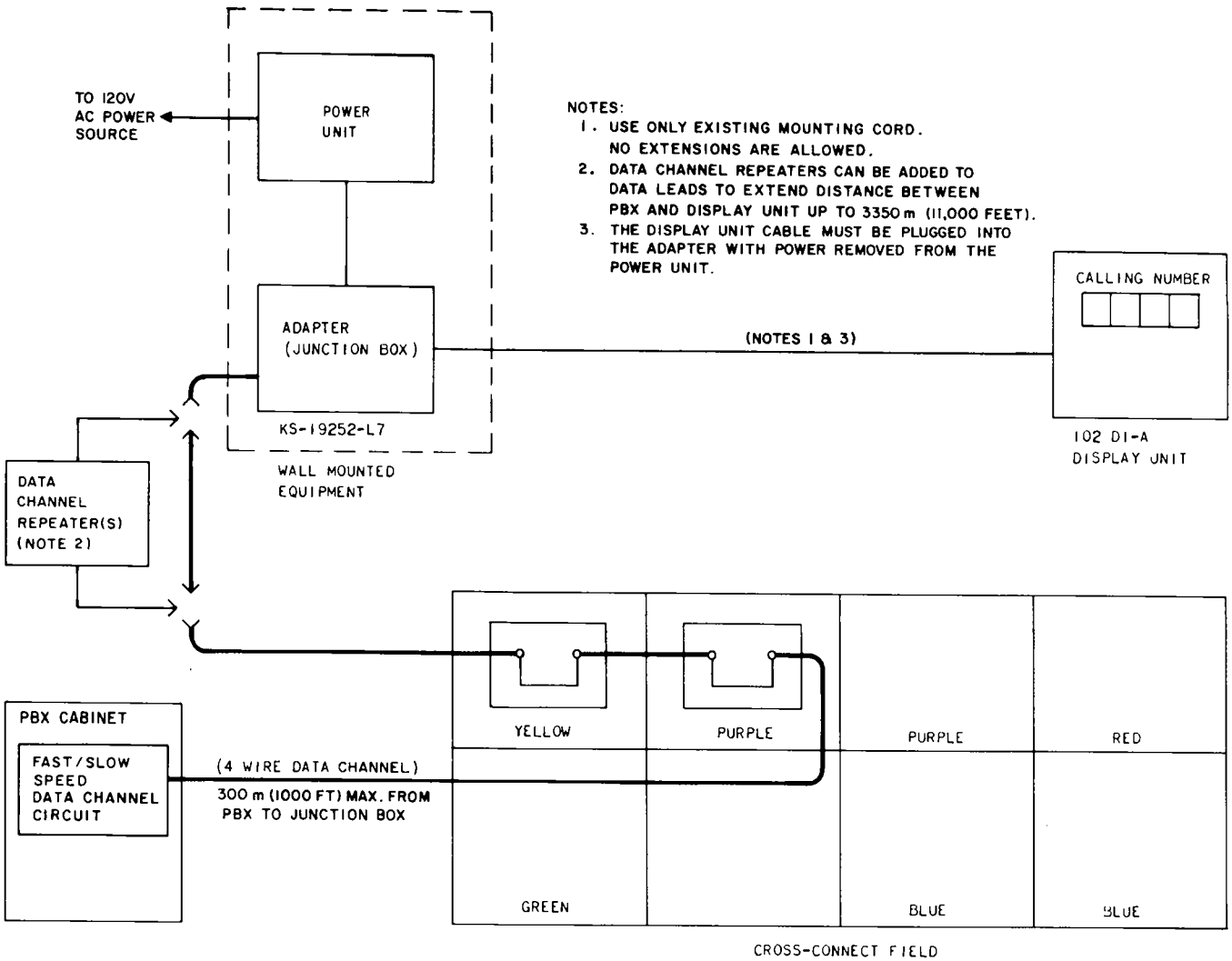


Fig. 9—Equipment Arrangement for Calling Number Display to Station

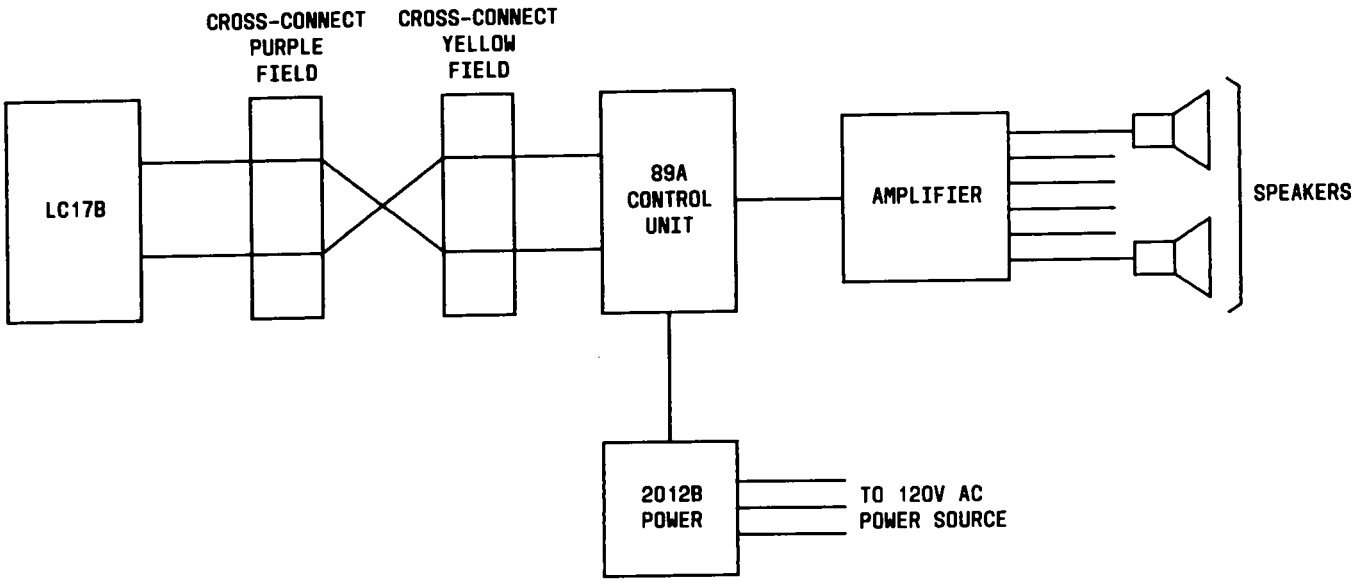


Fig. 10—Code Calling Access (Chime Paging) Equipment—Block Diagram

paging amplifier to minimize lead lengths. The customer provides a 120-Vac outlet for the 2012B transformer. One transformer is capable of serving up to three 89A control units. Both voice and chime paging can be provided in the system if two 89A control units are used. Only one amplifier is required to furnish amplification for both 89A control units. Refer to the Loudspeaker Paging Equipment description for required equipment and connections for voice and chime paging.

4.34 ***3A Code Call Access:*** The 3A Code Call Access is a standard feature provided in the DIMENSION PRELUDE PBX. This feature is an alternate method of providing chime paging. An equipment summary for 3A code calling is shown in Table G.

4.35 The 3A code calling unit may have two incoming ports and two answer ports. These four ports are connected to CO trunk circuits (LC08D) via the cross-connect field (Fig. 11). In a PBX with light traffic, only one incoming port and one answer port may be necessary. The second incoming port and answer port are optional and can be used in PBX systems where heavy traffic is anticipated.

H. Conferencing

4.36 The conference features require the LC06B attendant conference circuit pack. Each conference circuit uses one LC06B, which has six conference ports. The number of conference circuits is determined by system parameters.

The FCC requirements (Part 68 rules) limit to two (2) the number of trunks (including LC361) that can be simultaneously connected to the LC06B.

I. Customer Administration Panel (CAP)

4.37 The CAP (J58879DC-1) and the CAP interface unit (J58879DD-1, List 2) is the necessary equipment to provide the CAP feature.

4.38 The CAP can be located up to 229 meters (750 feet) from the PBX. An ON/OFF switch on the side of the CAP activates the customer's unit. Logic in the CAP interface unit disables the MAAP. The CAP functional block diagram is illustrated in Fig. 12. The interface unit (ABC-1) is mounted within the PBX cabinet. All cabling is provided.

4.39 Normally, after CAP functions are performed the DIMENSION PRELUDE PBX tape unit is activated to store translation changes. The CAP and the tape unit together permit flexible customer administration.

TABLE G

3A CODE CALL EQUIPMENT SUMMARY

	EQUIPMENT LIST		
PART NO.	DESIGNATION	LIST NO.	DESCRIPTION
J58822B	3A code send unit	1	5 cycle signal — 3-digit code
		8	5 cycle signal — 2-digit code
		9	3 cycle signal — 3-digit code
		10	3 cycle signal — 2-digit code
	Code terminal and jack	—	1st circuit access
	Code terminal	5	2nd circuit access
	TOUCH-TONE calling converter	14	Translation for 3-digit code only
		15	Translation for 2-digit code only
J59204	G1 TOUCH-TONE/Calling receiver	1	Receives TOUCH-TONE calling signals for translation
LC08D	CO trunk	—	—

J. Customer Premises Facility Terminal

4.40 Customer premises facility terminal (CPFT) equipment is available to provide transmission and signaling range extension for the system line and trunk circuits. The CPFT equipment consists of metalic facility terminal (MFT) circuit packs and terminal balancing networks housed in connectorized shelves (carriers). The CPFT is a standard arrangement that supplies all of the transmission and signaling functions required to terminate either 2-wire or 4-wire metallic facilities. Customer premises facility terminal equipment may be installed in the auxiliary cabinet (Fig. 13) or any suitable 584-mm (23-inch) mounting frames. Detailed list information on CPFT equipment is contained in the following sections:

- Sections 332-610-100, -180, -200, -500
- Section 332-910-180
- Section 332-912-161, -131, -231, -232, -261.

4.41 The CPFT family of equipment-coded J99380() is divided into ***eight*** basic components. These are further broken down by list numbers to provide flexibility for various mounting arrangements. The following CPFT units are described:

- J99380A or E—Single module shelf or double module shelf, respectively
- J99380B or C—Terminal balancing network
- J99380D—Double-depth shelf assembly
- J99380TB—Test extender
- J99380J—Power distribution and feature panel
- J99380F or G—Shelf assembly for voice frequency circuits
- J99380H—Power distribution and feature panel
- J99380K or L—Circuit pack carrier (CPC) for small CPFT installations.

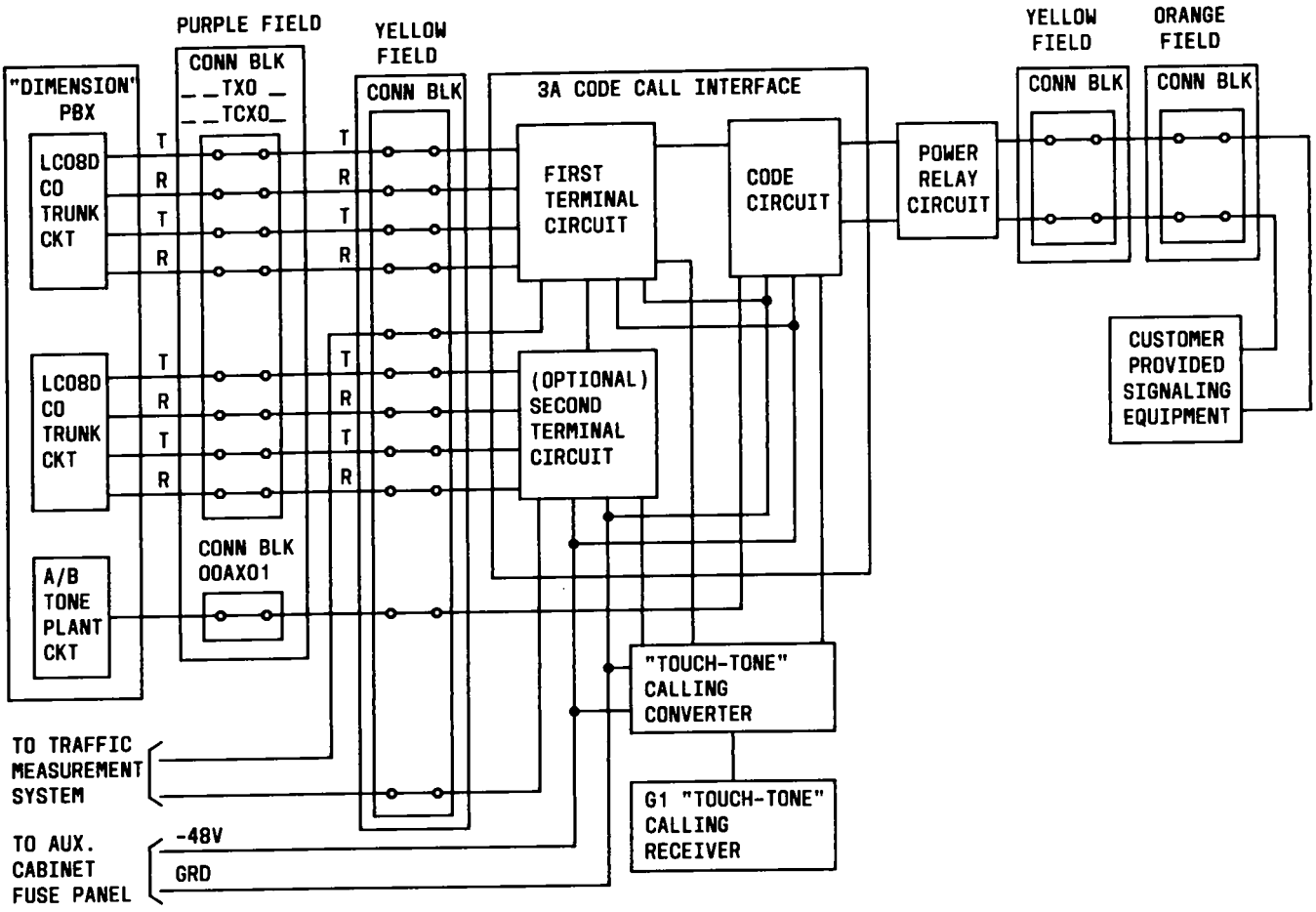


Fig. 11—General Connection Diagram for 3A Code Call Access

When loop signaling repeater units J99343AC and J99343AD are provided, the KS-19642, List 6 rectifier is replaced by the KS-22028 rectifier.

4.42 The single-module shelf (J99380A) is used when only transmission is required. A shelf which may be wired for use as a single-module or double-module shelf (J99380E) is shown in Fig. 14. Interconnection information for the single-module shelf and DIMENSION PBX is shown in Fig. 15.

4.43 When both transmission and signaling treatment are required, the double shelf is used. The shelf in Fig. 14 can be used for the double arrangement when it is wired for this purpose. Interconnection information for the double-module shelf and DIMENSION PBX is shown in Fig. 16.

4.44 The terminal balancing network panel (J99380B) is shown in Fig. 17. Interconnection information for the terminal balancing network panel (J99380B) and DIMENSION PBX is shown in Fig. 18.

4.45 The shelf assembly for 837-type networks on printed circuit (PC) boards is shown on Fig. 19. Interconnection information for the Key Telephone Unit (KTU) shelf assembly for terminal balancing is shown in Fig. 20.

4.46 An illustration of the double-depth shelf assembly (J99380D) is shown in Fig. 21.

4.47 The test extender J99380TA or J99380TB may be required to allow access to the adjustments and test points when aligning and testing the MFT circuit packs in the CPFT installation.

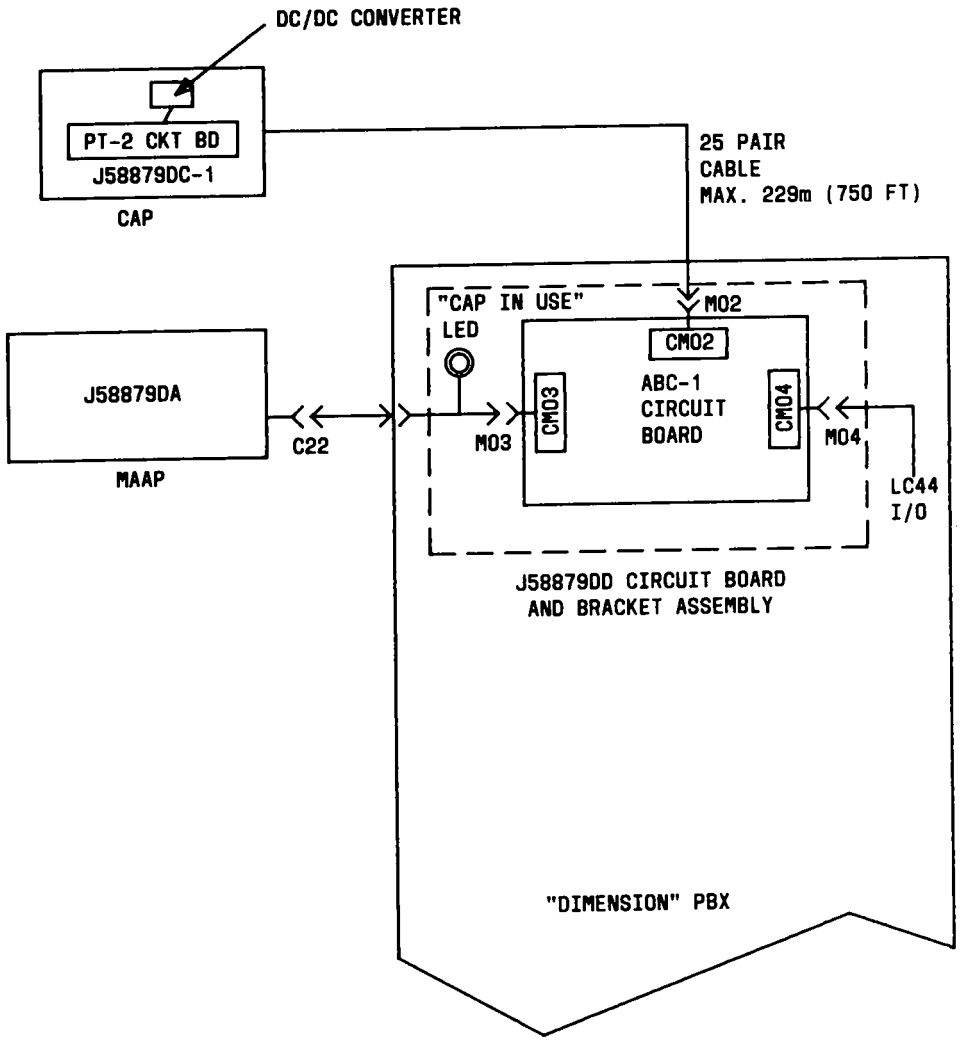


Fig. 12—CAP Interface

4.48 The power distribution and feature panel (J99380J), voice frequency circuits (J99380F or G), and the power distribution panel (J99380H) are used for supplemental power distribution.

4.49 Customer premises facility terminal arrangements for small installations (J99380K or J99380L) provide one to eight MFT circuits and a power unit. A universal circuit pack carrier for two MFT plug-ins is provided. The carrier handles either two independent single MFT module circuits or one double MFT (TU-SU) module circuit. Up to four carriers can be multipled.

K. Data Channel Repeater

4.50 The data channel repeater is a self-contained unit that provides range extension and/or lightning protection for DIMENSION PRELUDE PBX low-speed data channels. It is connected in series with the data channel to repeat data pulses and to provide isolation between input and output pairs. A repeater arrangement is shown in Fig. 6.

4.51 The repeater circuit operates in unexposed environments without additional protection and operates in exposed environments with standard 3-mil carbon block protection.

4.52 ***Housing and Mounting:*** The repeater circuitry is housed in a modified key service unit

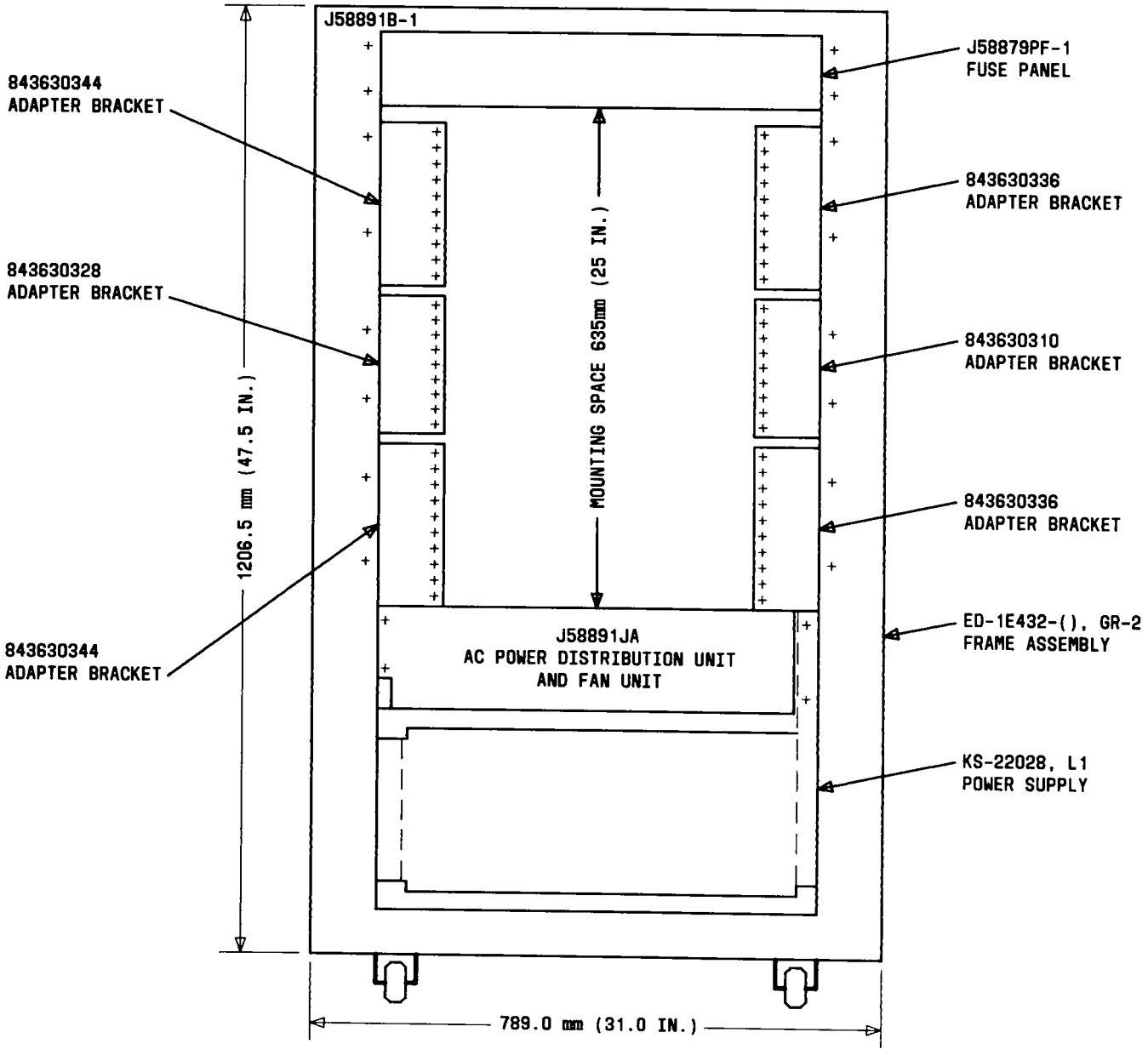


Fig. 13—J58891B Auxiliary Cabinet

with a capacity for two data channel repeater circuits.

4.53 The data channel repeater unit is wall-mounted near a 120-Vac 60-Hz outlet. Power cords are available in 610-, 1220-, 1830-, and 3660-millimeter (2-, 4-, 6-, and 12-feet) lengths—J58879KC, Lists A, B, C, and D, respectively.

4.54 ***Range Extension and Lightning Protection:*** A single-channel repeater with range extension consists of the following equipment:

- One J58879KC, List 1—Assembly, wiring, and equipment including a 28D2 power supply unit
- One J58879KC, List 2—Rectifier and timing reference circuit card (AE-49)

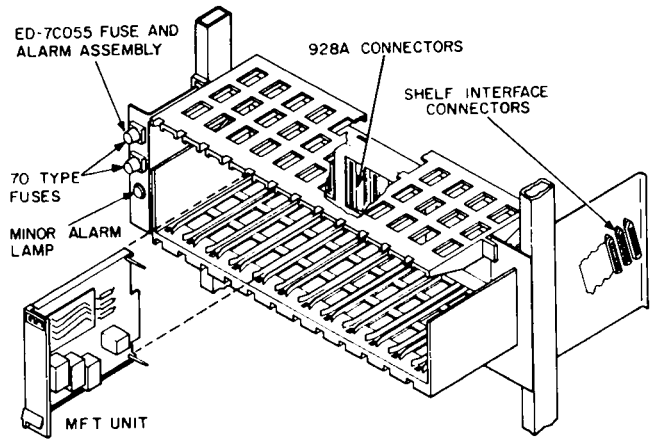


Fig. 14—Single Module Shelf (J99380A) or Double Module Shelf (J99380E)

- Two J58879KC, List 4—Data link, buffer circuit card (WJ3)
- J58879KC, List 5—Assembly, wiring, and equipment, excluding the 28D2 power supply unit.

4.55 The dual-channel repeater used for lightning protection only requires the following equipment:

- Four J58879KC, List 4—Data link, buffer circuit card (WJ3)
- One J58879KC, List 5—Assembly, wiring, and equipment, excluding the 28D2 power supply unit.

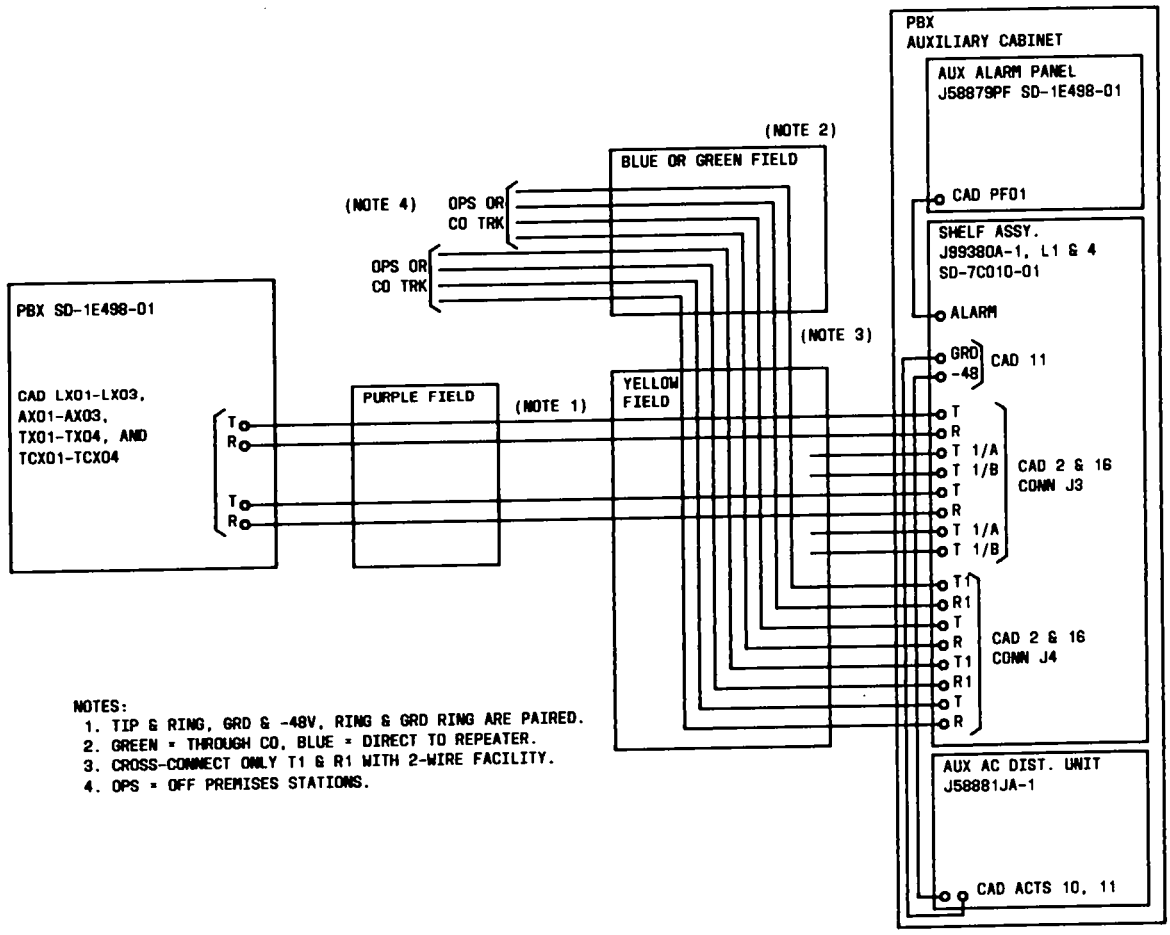


Fig. 15—Single Module MFT Assembly—PBX Interconnection

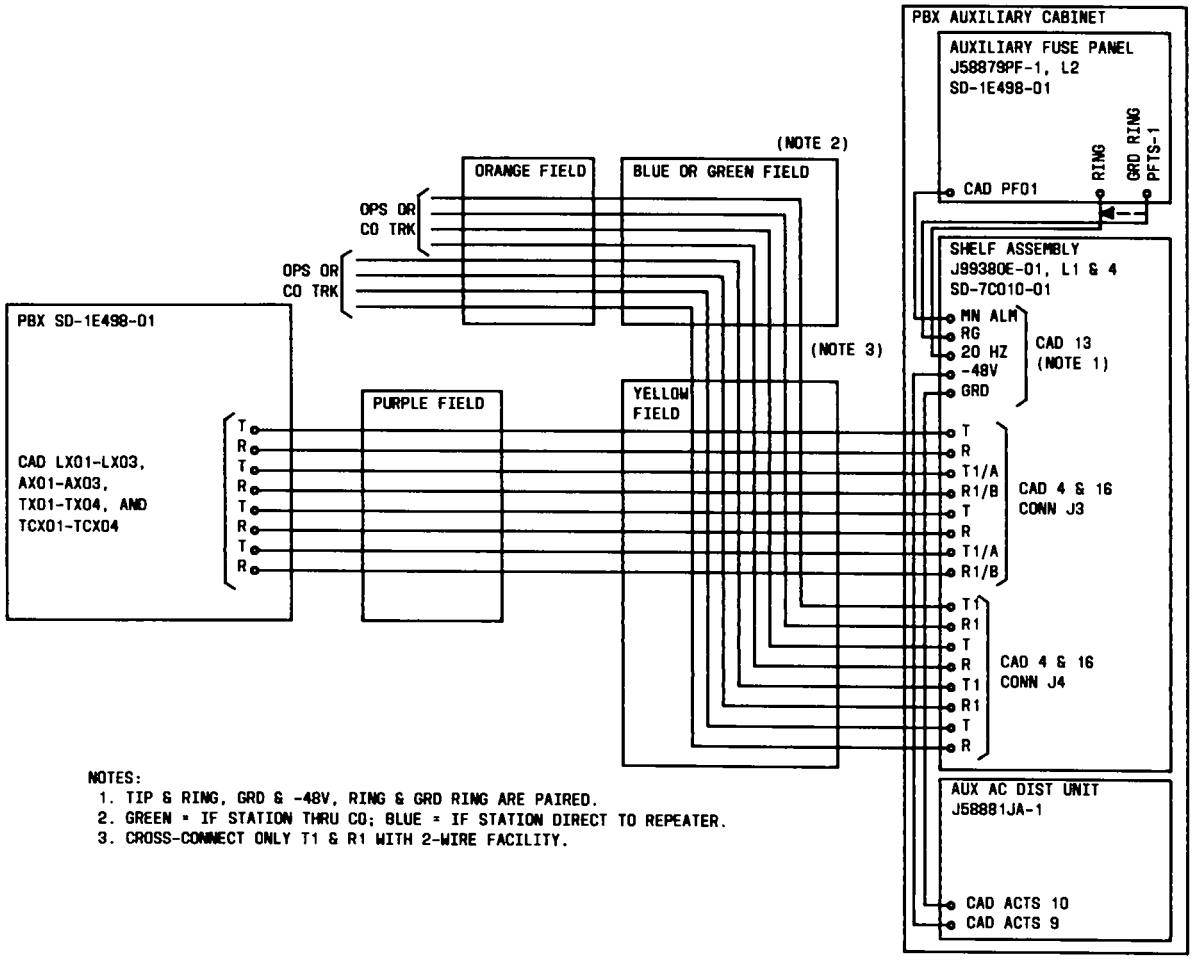


Fig. 16—Double Module MFT Shelf Assembly-PBX Interconnection

4.56 ***Data Range:*** Data channel repeaters extend the length of data channels between the PBX and a peripheral unit. One repeater in the data path permits a maximum distance of 300 meters (1000 feet) between the PBX and the peripheral unit. Repeaters in series (maximum 4) are each separated by up to 910 meters (3000 feet) and either end repeater is no more than 300 meters (1000 feet) from the respective equipment (PBX or peripheral unit).

L. Data Communications Access

4.57 ***Warning: After connection between the LC361 and LC204 (tone circuit) is made via the cross-connect field, no other circuit packs should replace the LC361 unless the connection is torn down. Other circuit packs apply hazardous voltages to the LC204.***

4.58 This feature requires one LC361 loop signaling interface trunk circuit pack (two circuits per board) for every two DCAPs. Each LC361 replaces one LC11C tie trunk circuit pack.

4.59 Loop signaling is generated by loop closures for incoming seizures and interrupted 20-Hz ringing for outgoing seizures (30 Hz in earlier systems).

4.60 The LC361 contains ringing and ringback control circuitry. Ringing comes from the ringing generator via backplane wiring. Ringback tone comes from the LC204 tone circuit via the cross-connect field (Fig. 22).

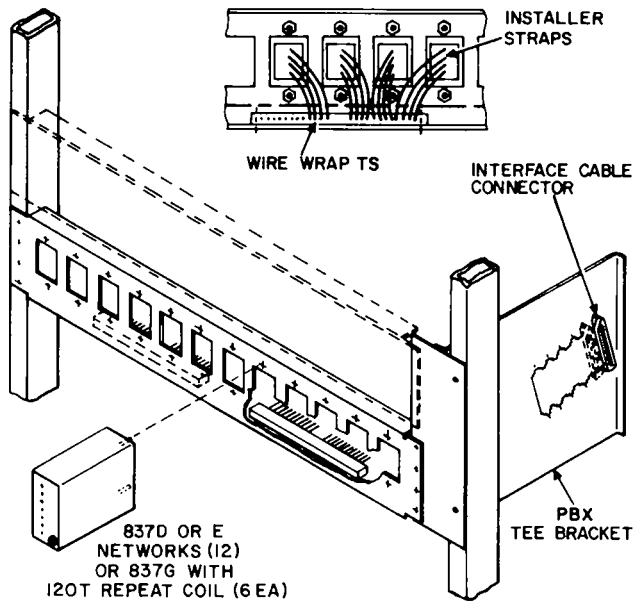


Fig. 17—Shelf and Assembly for 837-Type Networks (J99380B)

M. Data Interface (DI) for Data Switching Level I

4.61 The DI for Data Switching Level I is available in the following mounting arrangements:

- J58893A, List 1—Single stand alone DI (equipped with LC566).
- J58892A, List 1—Multiple DI stand alone unit for eight LC566 circuit packs.
- J58892A, List 2—DI LC566 circuit pack for additions to the above J58892A, List 1 unit.
- J58892AA, List 1—Rack-mounted unit that accommodates up to eight DI LC566 circuit packs. Mounts in PBX supplementary cabinet or DATAPHONE* data set cabinet.
- J58892AA, List 2—DI LC566 circuit pack for additions to the above J58892AA,L1 unit.

Also, 70-type fuses and fuse blocks provide 3A capacity for the +9V and −9V for the carriers that house LC567B circuit packs.

4.62 Refer to the appropriate circuit pack descriptions in "Cabinet Mounted Parts" for more detail on the LC566 and LC567B.

*Registered trademark of AT&TCo

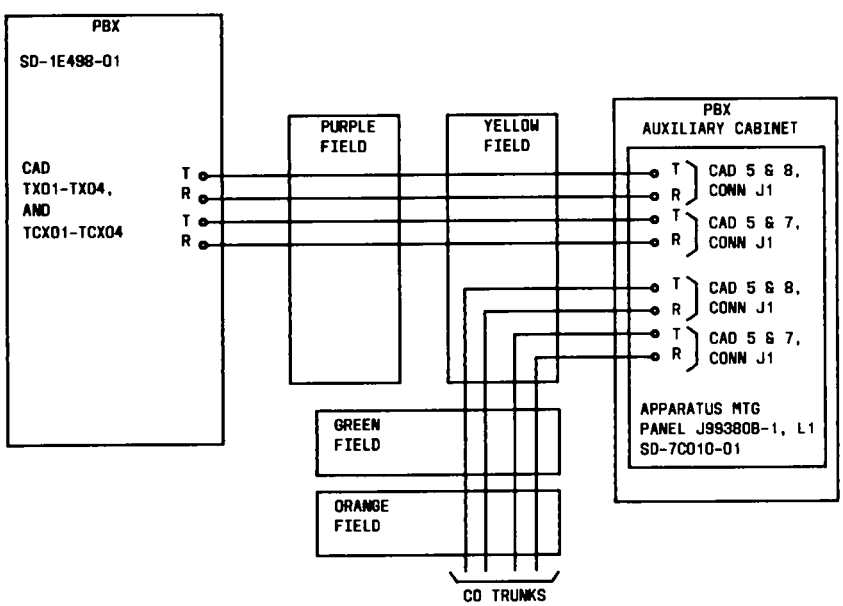


Fig. 18—Network Mounting Panel to DIMENSION PRELUDE PBX Interconnection (J99380B)

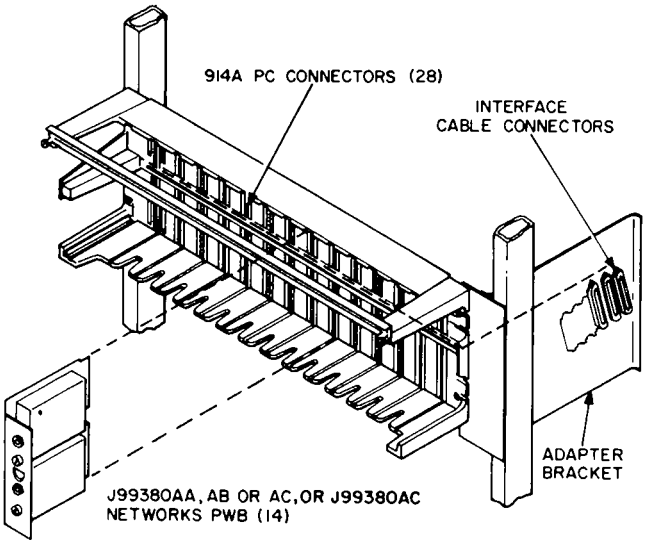


Fig. 19—Shelf Assembly for 837-Type Networks on PC Boards (J99380C)

N. Direct Department Calling

4.63 This feature requires the LC13B auxiliary trunk interface circuit board. One interface circuit of the LC13B is used to interface the recorded delay announcement set to the PBX time-division bus.

4.64 Queue warning and trunk status indicators for Direct Department Calling (DDC) are generated by a contact closure (one of eight) on the LC15 circuit pack. The LC15 also drives the traffic overflow indicator (Fig. 23). The indicator is a lamp (one per queue or one per trunk) powered by a 48-volt source on the LC15. These indicators are engineered locally.

O. Direct Inward Dialing

4.65 This feature requires the LC09D DID CO trunk circuit pack which contains two trunk circuits. The LC09D trunk circuit pack is used as a high-low reverse battery interface for other trunks and trunk-related features.

4.66 The DID trunk circuit operates in both immediate-start and wink-start modes. These

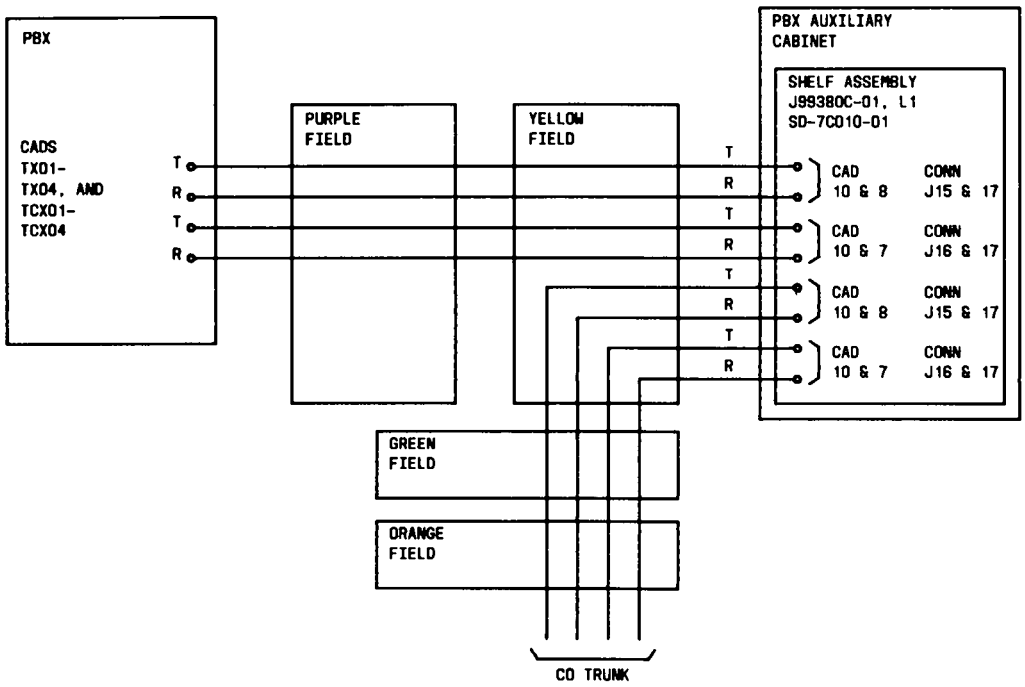


Fig. 20—KTU-Type Shelf Assembly for Impedance Matching Network (J99380C)

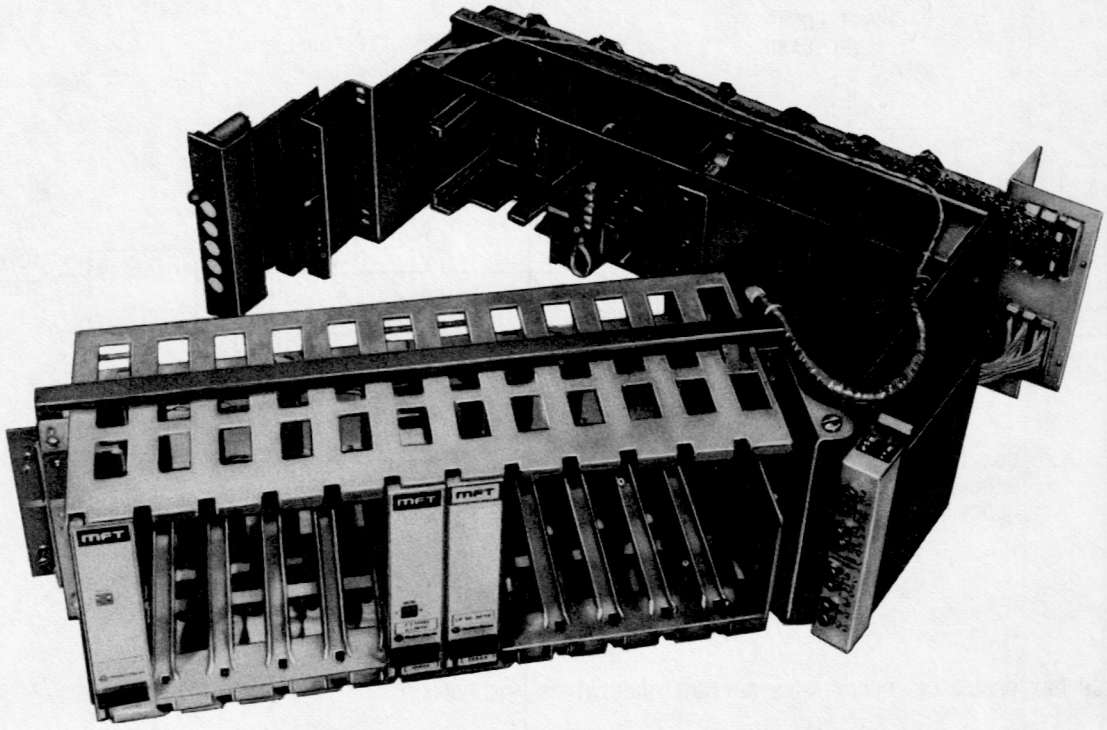


Fig. 21—Double Depth Shelf Frame With Front Double Module Shelf and Rear Network Plug-in Shelf

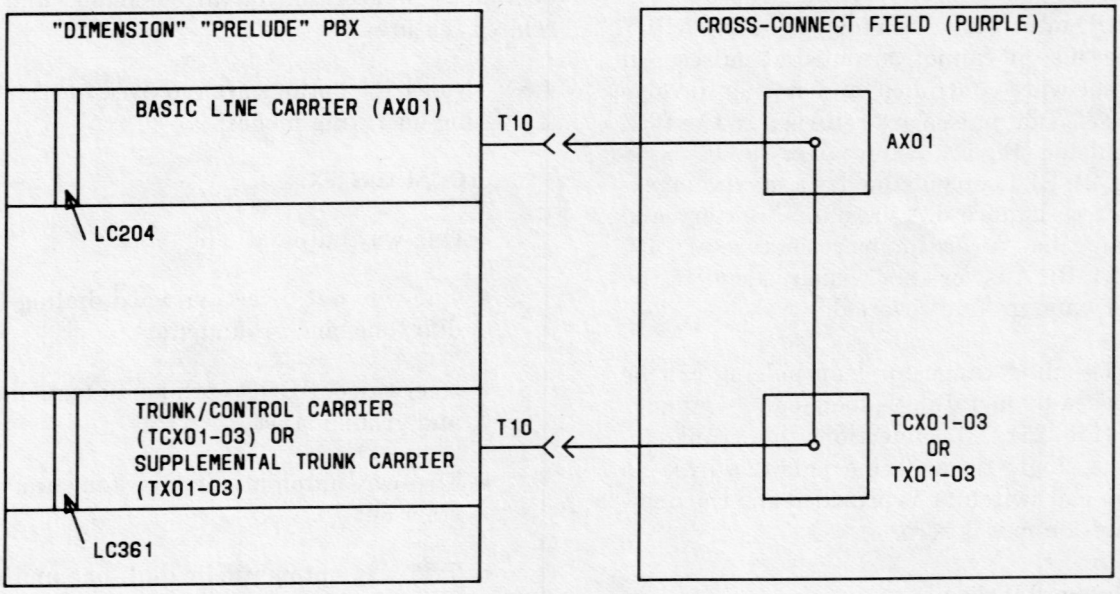
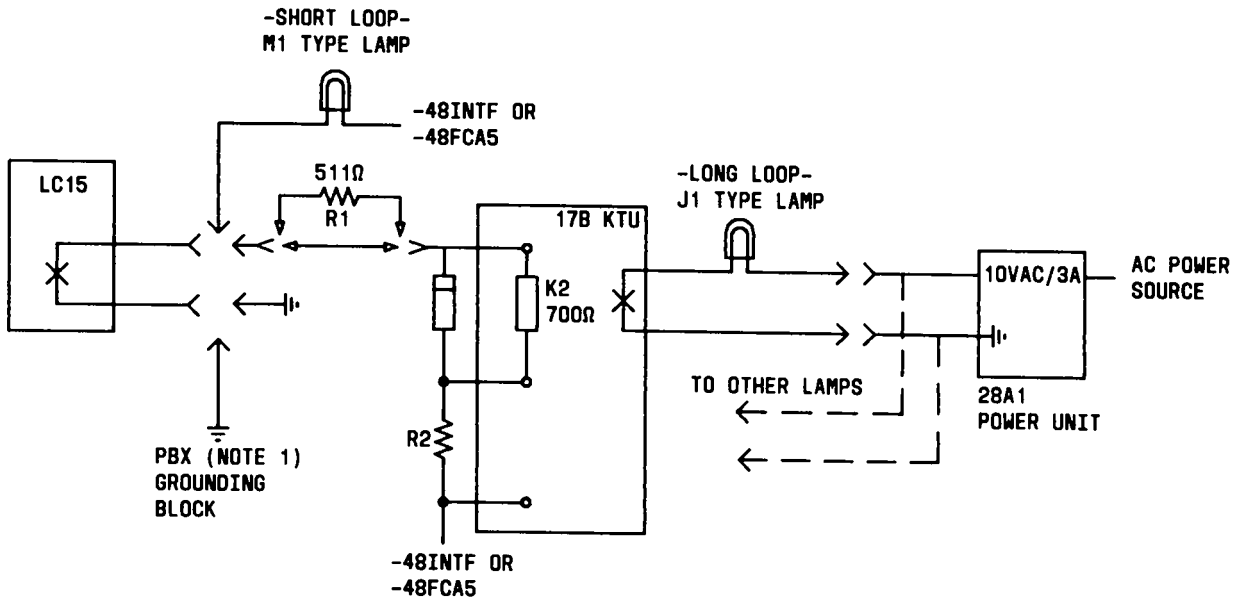


Fig. 22—Audible Tone Connections for LC361 Circuit Pack



NOTE:
1. USE PBX GROUNDING BLOCK WHEN OPTIONAL RESISTORS ARE USED

Fig. 23—UCD/DDC Traffic Overload Indicator

modes provide 1-way DID service or 2-way service, respectively, on an automatic-out/dial repeating or automatic-in basis. The LC09D cannot be used as a 2-way DID/DOD interface or as a loop signaling APLT interface, because it cannot output dial pulses. All modes are software-controlled and do not involve wiring changes. Dial pulses are returned to the PBX using loop pulsing (Fig. 24, A) or battery and ground pulsing (Fig. 24, B). Loop pulsing has a maximum external circuit resistance of 1500 ohms. Battery and ground pulsing has a maximum resistance of 2450 ohms (Fig. 24, B). Answer supervision is sent to the CO as battery and ground reversal.

4.67 The signaling range for loop pulsing can be increased by installing a loop signal extender at the PBX (Fig. 25). All connections to a trunk circuit are via a single tip and ring pair (2-wire). No transmission pad switching is provided and the nominal transmission loss is zero.

P. Direct Outward Dialing

4.68 The DOD feature is a standard feature and requires the LC08D trunk circuit pack. The LC08D is standard equipment but is described here to provide detailed information about its use. The LC08D is a dual 2-wire CO trunk circuit pack and may be used as an interface for various trunks and trunk-related features.

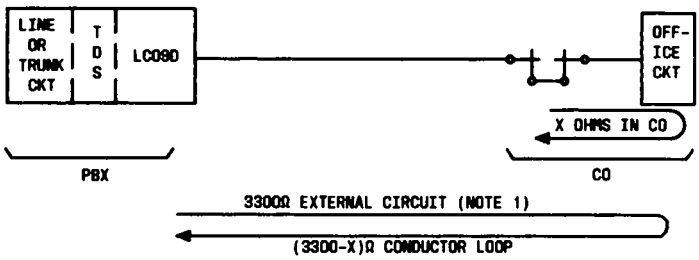
4.69 No wiring options are required for the following operating modes:

LOCAL LDN/FX

- One-way automatic in
- One-way out direct outward dialing (DOD), dial tone, and ground start
- One-way out DOD with party test, dial tone, and ground start
- Two-way automatic in/dial tone and ground start out
- Two-way automatic in/dial tone and ground start out with party test.

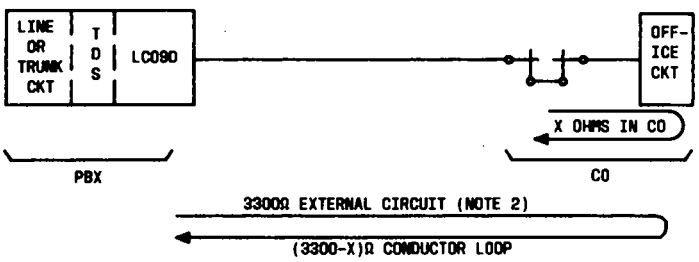
WATS

- One-way automatic in



NOTE:
1. 3300 OHMS EXTERNAL CIRCUIT RESISTANCE TO THE LC09D DID TRUNK CIRCUIT CONSISTING OF CONDUCTOR LOOP RESISTANCE +CO INTERNAL RESISTANCE FOR LOOP PULSING, (GENERALLY 0 OHMS).

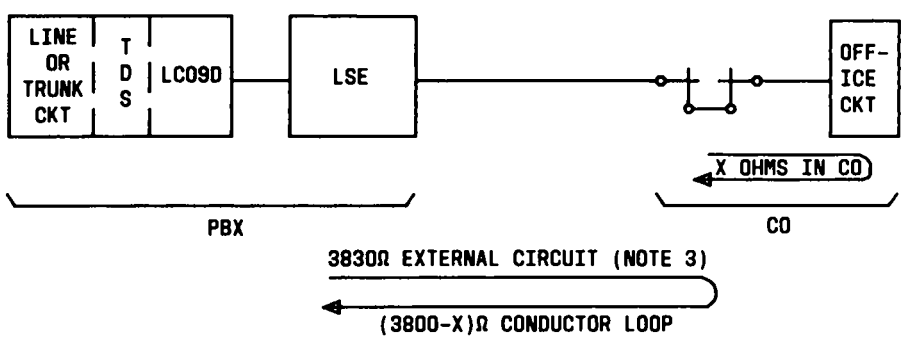
A - LOOP PULSING DID TRUNK RANGE



NOTE:
2. 3300 OHMS EXTERNAL CIRCUIT RESISTANCE TO THE LC09D TRUNK CIRCUIT CONSISTING OF CONDUCTOR LOOP RESISTANCE +CO INTERNAL RESISTANCE FOR BATTERY & GROUND PULSING (GENERALLY 430 OHMS).

B - BATTERY & GROUND PULSING DID TRUNK RANGE

Fig. 24—DID Trunk Range



NOTE:
3. 3830 OHMS EXTERNAL CIRCUIT RESISTANCE TO THE LC09D TRUNK CIRCUITS CONSISTING OF CONDUCTOR LOOP RESISTANCE +30 OHMS LSE RESISTANCE +CO INTERNAL RESISTANCE (FOR LOOP PULSING ONLY) CO INTERNAL RESISTANCE IS 0 FOR LOOP PULSING.

Fig. 25—Loop Signal Extender at PBX in DID Trunk

- One-way out DOD or toll terminal access for traffic service position system (TSPS), ground start, and dial tone
- One-way out DOD with party test, ground start, and dial tone.

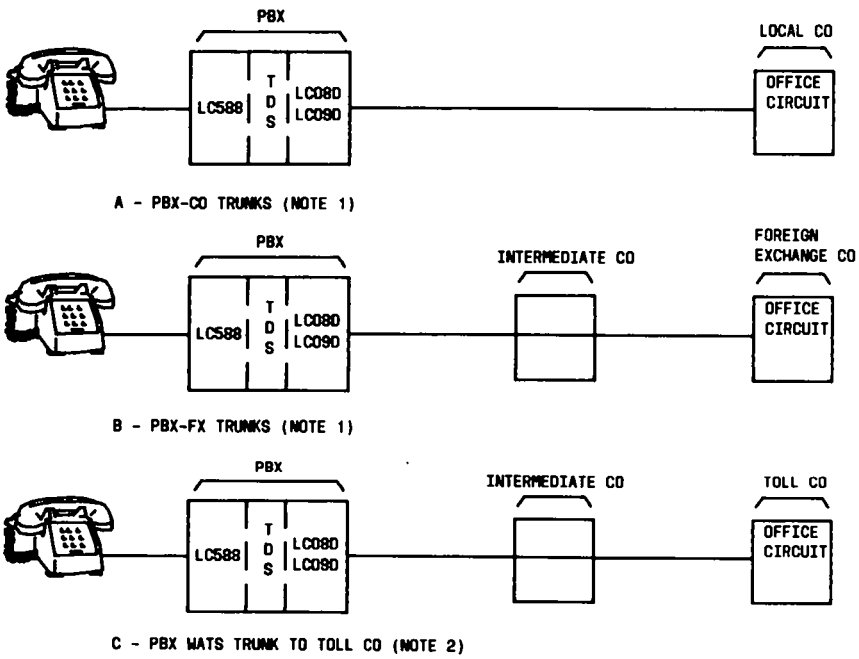
4.70 The "party test" mode is required with the Speed Calling feature. Party test is required only when outpulsing must be delayed until a trunk is seized at the CO and the CO returns dial tone.

4.71 The LC08D trunk circuit employs a standard ground-start signal and transmission path from the CO to the PBX. Various configurations of the CO trunks are shown in Fig. 26. Each circuit pack contains two independent trunk circuits.

4.72 Figure 27 shows the CO trunk circuit interface with 2-wire or 2-to-4-wire repeaters and shows 2-wire repeaters terminating 2-wire cable on a 2-wire switch. The repeater is on the CO side and provides a 900-ohm termination, for the 600-ohm output of the PBX. Figure 27 (A) can also be applied to FX/WATS installations. For 4-wire PBX-CO trunks, a 2- or 4-wire repeater is necessary at the PBX. Refer to Fig. 27, B. The 2-wire side has impedance set to 600 ohms. The 4-wire impedance can be 600 or 1200 ohms.

4.73 Terminal balance (Fig. 28) is required when PBX-CO trunks can be switched through to via net loss (VNL) tie trunks or CCSA lines.

4.74 Layout patterns for 2-wire FX/WATS trunks are the same as for PBX CO trunks. However, the choice is either intermediate or terminal repeaters according to design loss and crosstalk requirements.

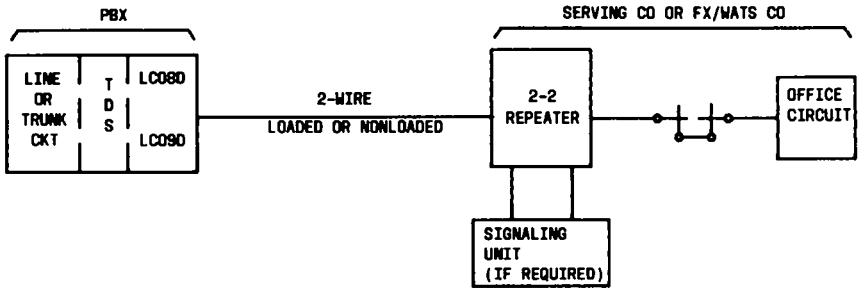


NOTES:

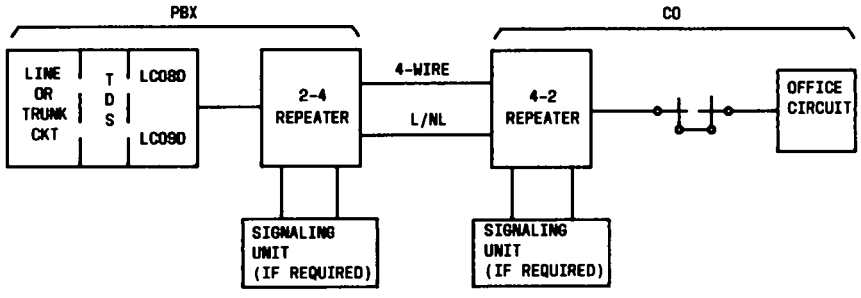
1. PBX-CO AND PBX-FX TRUNKS CAN HAVE THE FOLLOWING MODES OF OPERATION:
   - ONE-WAY AUTOMATIC IN
   - ONE-WAY OUT DOD DIAL TONE AND GROUND START
   - ONE-WAY OUT DOD WITH PARTY TEST DIAL TONE AND GROUND START
   - TWO-WAY AUTOMATIC IN/DIAL TONE AND GROUND START OUT
   - TWO-WAY AUTOMATIC IN/DIAL TONE AND GROUND START OUT WITH PARTY TEST

2. WATS TRUNKS CAN HAVE THE FOLLOWING MODES OF OPERATION:
   - ONE-WAY AUTOMATIC IN
   - ONE-WAY OUT DOD OR TOLL TERMINAL ACCESS FOR TSPS, GROUND START, AND DIAL TONE
   - ONE-WAY OUT DOD WITH PARTY TEST, GROUND START, AND DIAL TONE

Fig. 26—PBX—CO Trunk Combinations



A - 2-WIRE PBX-CO OR FX/WATS TRUNK WITH 22 REPEATER AT CO.



B - 4-WIRE PBX-CO TRUNK

Fig. 27—PBX—CO Trunks

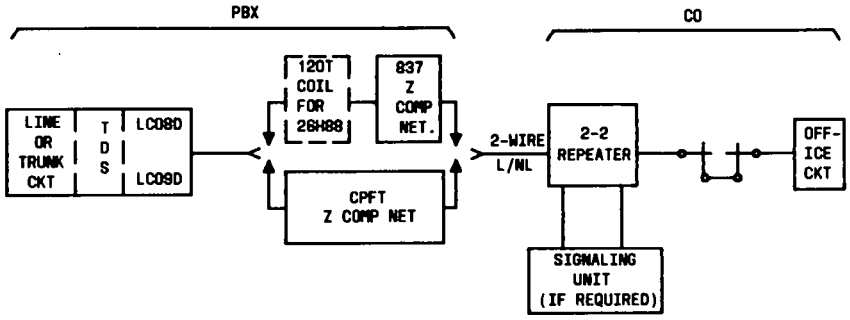


Fig. 28—2-Wire PBX—CO Trunk With Impedance Compensator

Q. Energy Communications Service Adjunct

4.75 The equipment required for operation of Energy Communications Service Adjunct (ECSA) is as follows:

- J53135A ECSA Basic Equipment Cabinet and contents
- J53135A ECSA Auxiliary Equipment Cabinet and contents (if number of loads necessitates)
- The ECSA terminal [Applies Digital Data Systems (ADDS) model REGENT* 40 or REGENT 100].
- J58882 GA Peripheral Interface Circuit (PIC).
- TELETYPE† model 4310 printer (12 inches wide, without keyboard).

*Trademark of Applied Digital Data Systems Corporation

†Registered trademark of Teletype Corporation.

4.76 Refer to Section 554-106-100 for detail about ECSA hardware.

R. Intercept Treatment

4.77 This feature requires a KS-16765, L2 standard announcement set for recorded announcement intercept. Also, one LC13B auxiliary trunk circuit is necessary to interface the announcement set with the time-division bus.

S. Line Status Indicator—24-Type

4.78 ***Warning: A possible shock hazard is present when securing the transformer power plug of the 24-type line status indicator to ac wall outlets equipped with metal receptacle covers. Do not plug the 24-type line status indicator into ac wall outlets equipped with metal covers. Use only ac outlets having plastic receptacle covers or replace metal covers with plastic covers.***

4.79 The 24-type line status indicator is used to provide visual status and audible indication of specific station lines (off-hook, on-hook, and ringing). The LEDs indicate the status of each line. The line status indicator is available with capacities for monitoring 8, 16, or 32 lines and can be mounted at a desk or on a wall. The line status indicator is bridged across the "T" and "R" leads of the monitored stations. A maximum of four 24-type line status indicators can be bridged across the same station line. Figure 29 illustrates the mounting cord terminations for the line status indicator. The line status indicator uses commercial 120-volt, 60-Hz ac power. The A25B connector cable to connect T and R leads of monitored lines must be ordered separately. The following equipment is also required:

- Indicator, 24X-YY
- Faceplate—Order one per 24-type line status indicator

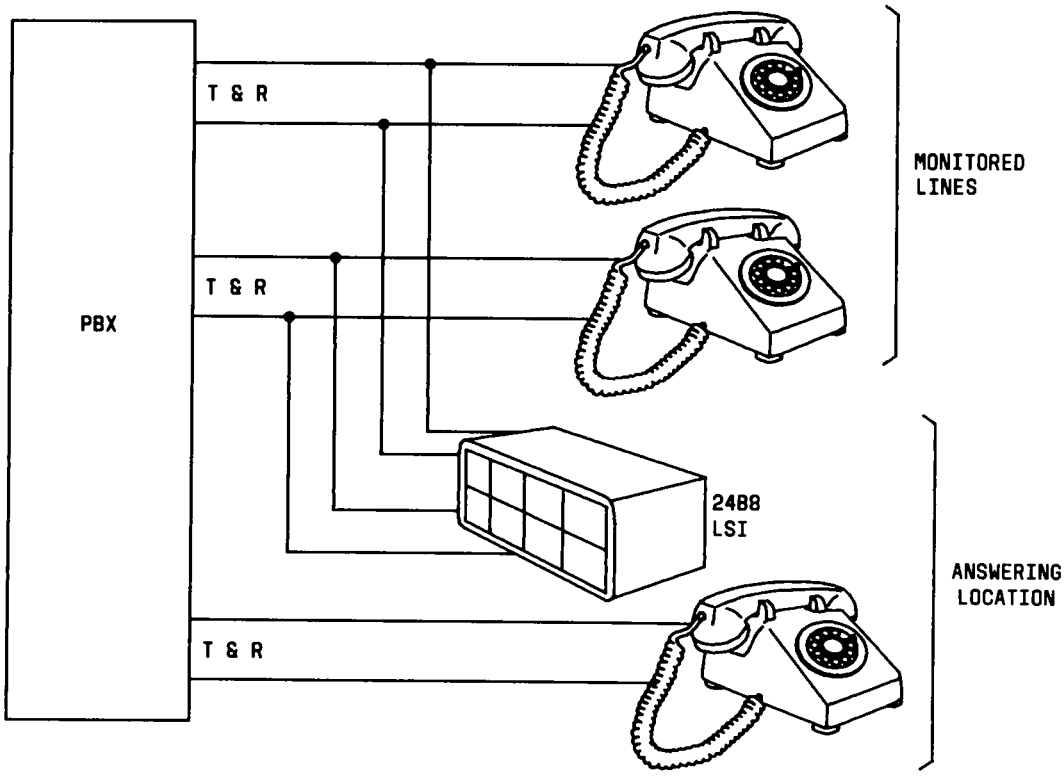


Fig. 29—24A8-50 Line Status Indicator

- Rear panel—Order one per line status indicator

- Bracket, 115A-YY—Order one per line status indicator.

Note 1: The 24-type line status indicator includes a KS-21239, L6 transformer shipped loose with equipment.

Note 2: An X indicates the line capacity of the line status indicator. Valid entries for X are 8, 16, or 32. The YY indicates the color of the line status indicator. Valid entries for YY are 03 (black) and 50 (ivory).

4.80 For more detailed information on identification and installation, refer to Section 463-210-101.

T. Local Call Billing

4.81 This feature uses the following hardware:

- TELETYPE No. 4310-AAC printer

- LC597 Dual RS232 Data Ports circuit pack

- LC16B message register interface.

- J58898B Enhanced Peripheral Interface Controller (EPIC).

4.82 The EPIC is an interface between the PBX 9600 baud, Dual RS232 Data Ports circuit (LC597) and 300 baud printers used for HCS features and SMDR. The Local Call Billing and Room Status and Selection features use the EPIC to interface audits and status reports from the LC597 to printers. The SMDR—Internally Formatted feature uses a dedicated channel on the EPIC to output call data from the LC597 directly to a printer. The EPIC input data channel from the PBX is interrupt controlled and the output channels are scanned for status. The PBX sends control, test, or data words at 9600 baud to the EPIC. The EPIC outputs data to the printers at 300 baud in RS232, 7-bit words. Control words instruct the EPIC to send the data words that follow to a particular printer. The indicated printer prints the data word. Test words instruct the EPIC to perform specific maintenance tests.

4.83 The EPIC Mac-8 processor interprets the control and test words that the PBX sends. The EPROM contains processes initiated by control words or test words. The processor directs the data words that follow control words from the PBX into the EPIC RAM, processes the words, and sends them to the intended printers. Test words from the PBX cause the EPIC processor to perform test routines stored in EPROM.

4.84 Pairs of data channels are contained on ZAFT-type circuit packs in the EPIC. Up to four data channels can be administered though one is dedicated to the PBX link and another to SMDR. Therefore, two HCS printers can be supported by one EPIC.

U. Loudspeaker Paging (Basic and Deluxe)

4.85 The paging amplifiers and speakers are either customer-owned or telephone-company provided. All voice paging facilities use the telephone transmitter as the microphone.

4.86 Loudspeaker paging requires the following equipment:

- LC13B auxiliary trunk interface circuit pack (two circuits per circuit pack and one circuit per paging zone)

- 89A control unit (one per paging zone)

- 2012B power transformer (one per three 89A control units)

- Paging amplifiers and speakers (either customer or telephone company provided).

4.87 The LC13B circuit pack is an interface between the PBX and the 89A control unit. The 2012B power transformer supplies 16-volt alternating current to the 89A control unit. The 89A control unit converts this ac current to ±12Vdc. The 89A control unit functions as follows:

- It presents a balanced input to the paging trunk circuit (LC13B) and a balanced output to the paging system power amplifier.

- It provides the user with circuitry for seizing the paging system or code call system (chime paging).

- It provides circuits for adding music and tones into a paging system.

4.88 Up to three LC13B auxiliary circuit packs can be cross-connected to paging equipment allowing a maximum of six paging zones. Connections for loudspeaker paging are illustrated in Fig. 30.

4.89 ***Loudspeaker Paging With Chime Paging and Music Background:*** Loudspeaker paging can also be provided with chime paging and music background. The required equipment, in addition to the loudspeaker paging equipment, for this arrangement is an LC17B tone board and an 89A control unit. The customer-provided equipment must be turned on at all times for the loudspeaker paging with chime paging and music background.

4.90 Connections for loudspeaker paging with chime paging and music background are illustrated in Fig. 31.

V. Message Waiting

4.91 The Message Waiting feature uses the following hardware:

- The attendant console with message waiting capability
- An optional printer
- The 2500Y-type station sets with message waiting indicators
- An LC554 dual speed serial data channel circuit pack
- The LC03C message waiting line circuit packs
- An LC41 digital network buffer circuit.

W. Music-on-Hold and Music-on-Hold Access

4.92 A 36A or 31D(MD) voice coupler couples customer-provided music to an auxiliary trunk circuit pack (LC13B), which provides 1-way-in reception of the music. The coupler also protects the tip and ring by limiting excessive voice power levels from the held party receiver. In addition, the coupler isolates the customer-provided equipment from harmful power levels. Maximum dc line current is 150 mA. The 31D voice coupler should be wall-mounted near the termination field. For a more detailed description of the 36A voice coupler, refer to Section 463-332-140. The music-on-hold interconnection is shown in Fig. 32. The 31B voice coupler is grandfathered per FCC rules and may be used if available.

4.93 These features require one LC13B to accompany the voice coupler. Only one of the two circuits of the LC13B circuit pack is used.

4.94 Transmission to customer-owned peripheral equipment is accomplished by dry-loop seizure or by sleeve ground-start seizure from the auxiliary trunk. The peripheral equipment ground on the sleeve lead is detected by LC13B.

4.95 The music source must conform to the associated American Telephone and Telegraph (AT&T) Technical Reference for Music-On-Hold Access.

X. Night Console Position

4.96 This feature requires a 6017-type key (or equivalent) and a 609A emergency transfer panel (located in the cross-connect field), and associated interconnecting cable.

Y. Off-Premises Stations

4.97 The Off-Premises Stations (OPS) feature requires connection arrangements as illustrated in Fig. 33, 34, 35, 36, and Fig. 37.

4.98 The LC02C line circuit (Fig. 33) transmits the 20-Hz ringing (30 Hz in earlier systems) to OPS positions associated with the PBX, and detects loop signaling. Conductor loop range for a station is limited to no more than 950 ohms. The range is reduced to 500 ohms if four ringers are required and 300 ohms if five ringers (Fig. 34). A loop signal extender can increase the range of the external circuit to 1610 ohms for up to two ringers and 1500 ohms for three ringers. The loop signal extender is limited to use with three ringers. Signaling ranges are based on a dc voltage level of −45 Vdc at the PBX because the nominal −48 Vdc supply varies with loading at the other dc outputs. A method for determining the range when a loop signal extender is used is provided in Section 332-910-180. Additional information on plug-in manual test frame units is provided in Section 851-300-130.

4.99 The dc signaling range of the station loops can also be increased by installing a loop start

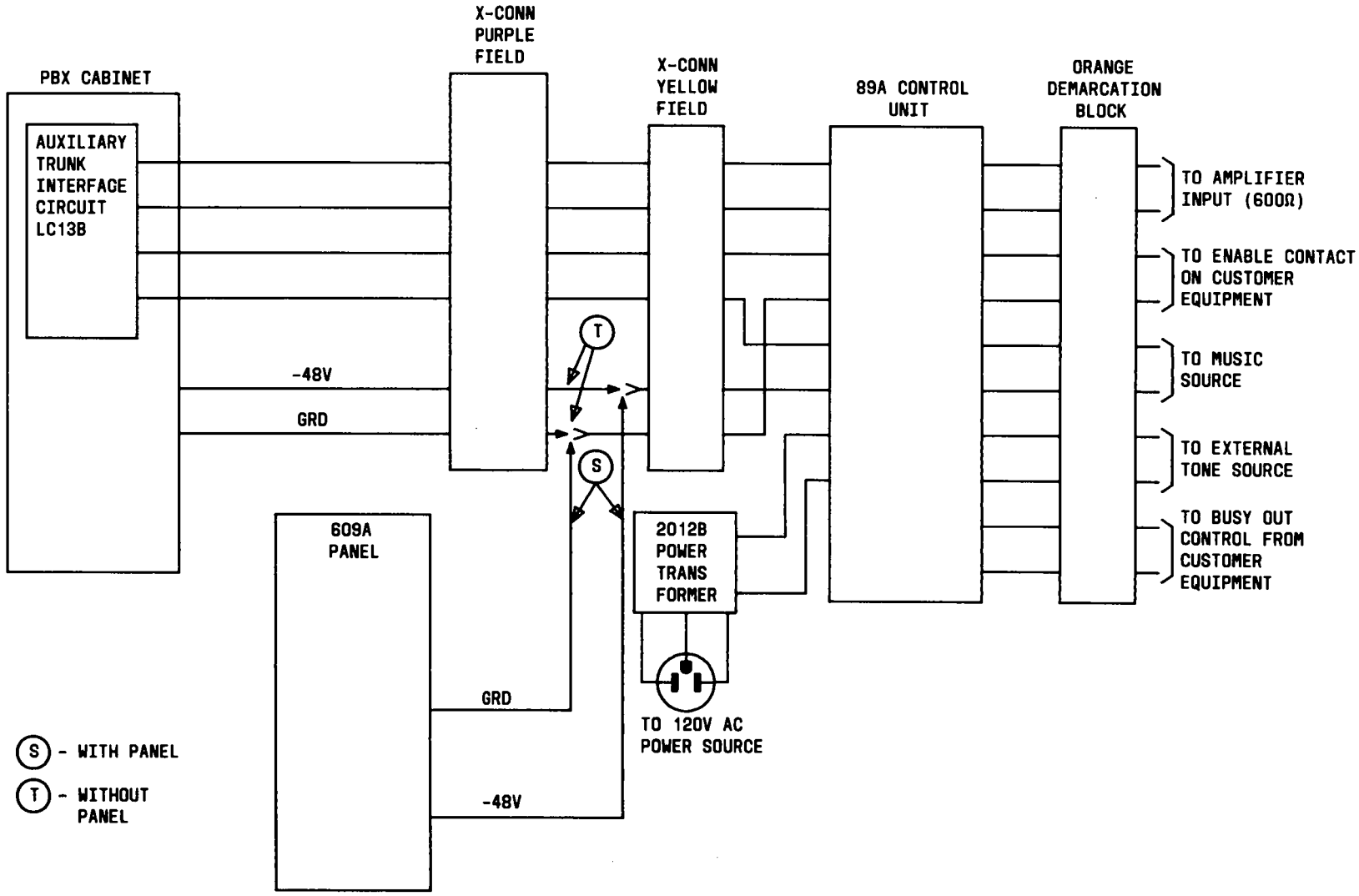


Fig. 30—Loudspeaker Paging Connections

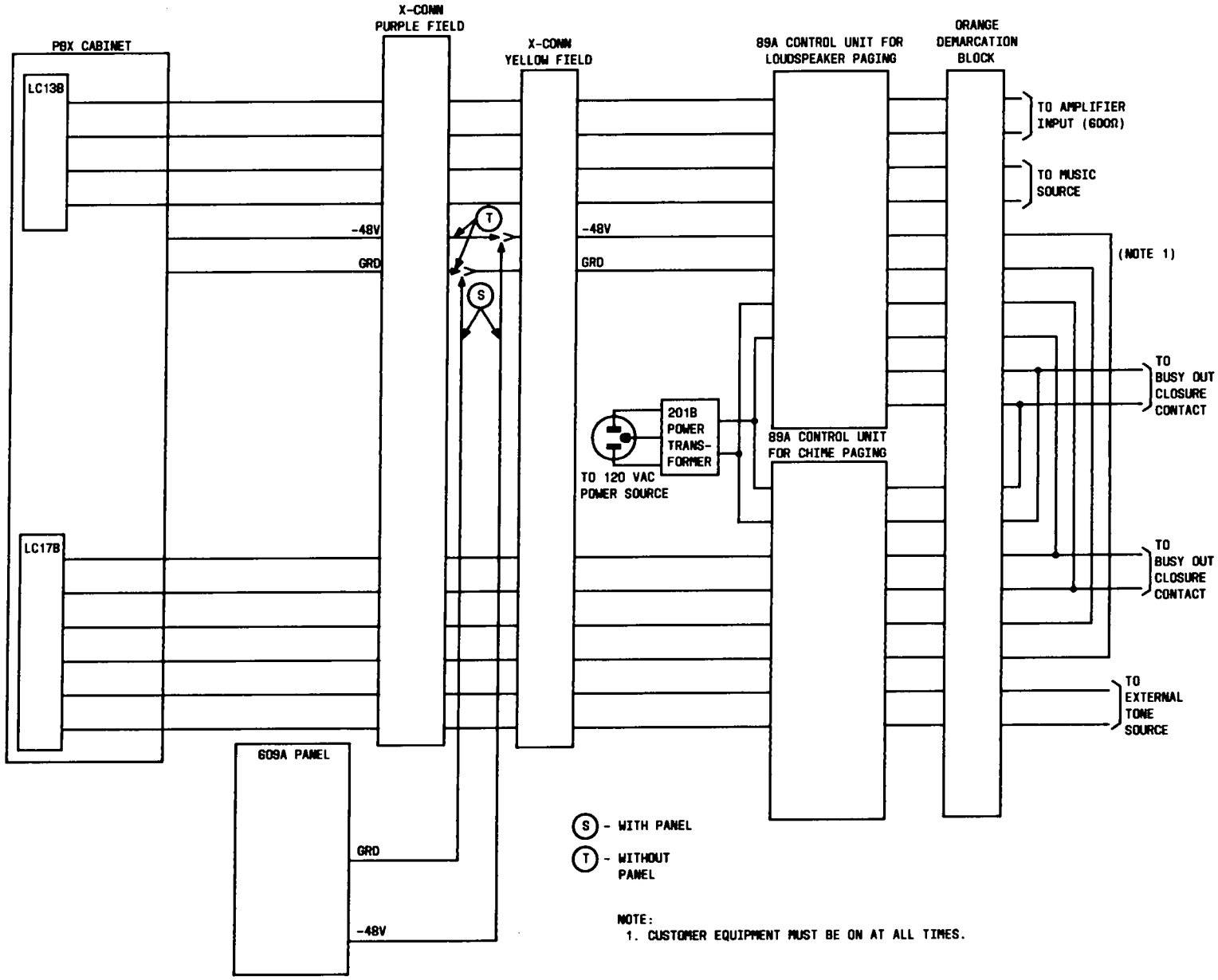


Fig. 31—Loudspeaker Paging With Chime Paging and Music Background

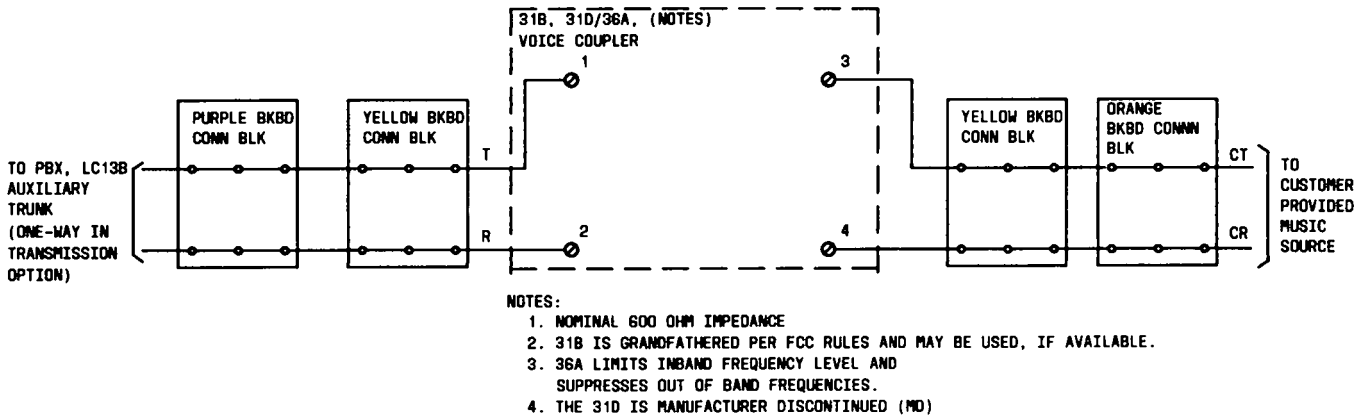
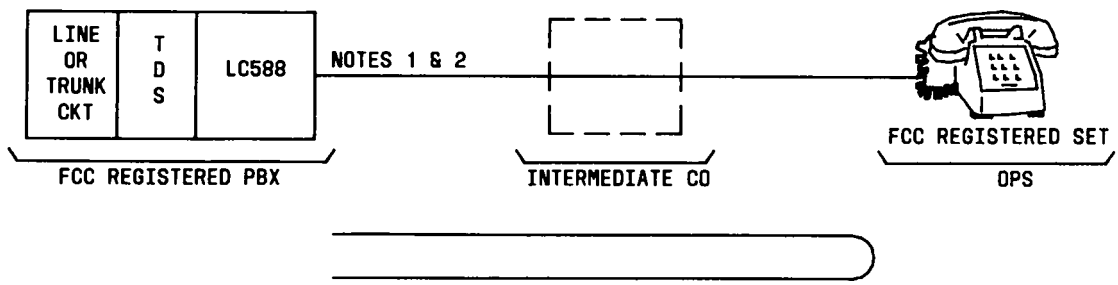


Fig. 32—Music-On-Hold Interface



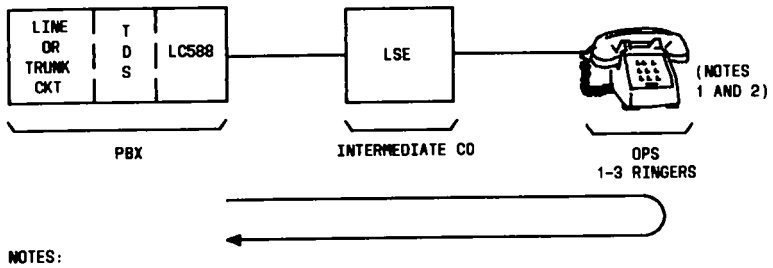
NOTES:
1. MAXIMUM LOOP RESISTANCE = 950Ω PLUS REGISTERED STATION SET RESISTANCE
2. THE MAXIMUM NUMBER OF C4A TYPE RINGERS PER LINE AND THE ASSOCIATED MAXIMUM ALLOWABLE LOOP RESISTANCE (EXCLUDING STATION SET) IS AS FOLLOWS:

RINGERS	ALLOWABLE LOOP RESISTANCE
1-3	950Ω
4	500Ω
5	300Ω

Fig. 33—LC588—OPS Signaling Range

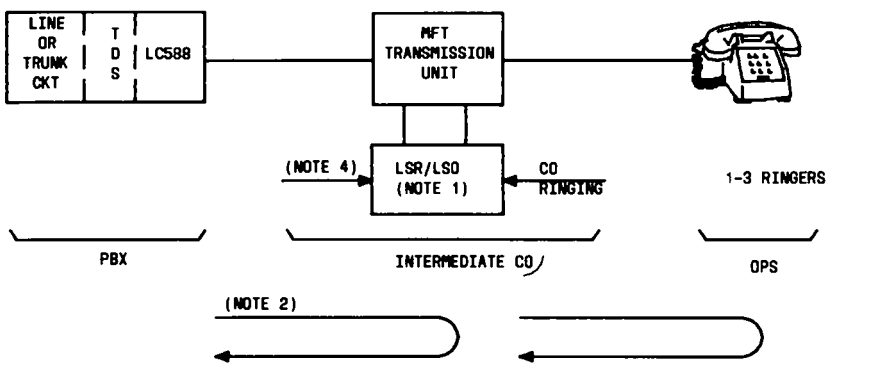
only/loop signaling repeater. Where only one repeater is necessary, a 2-to-2 intermediate repeater should be used at the serving office or intermediate CO for a 2-wire off-premises station installation (Fig. 35 and 36). The 2-to-2 terminal repeater should not be used at either the PBX or station in a 1-repeater application. If more than one repeater is needed between the station and its CO, 4-wire facilities should be used. Typical 2- and 4-wire metallic facility installations are shown on Fig. 37. Different combinations of 2-to-4-wire units can also be used by specifying the appropriate 2-to-4-wire or 4-to-2-wire intermediate or terminal repeater. The 2-wire to 4-wire signaling range from the loop signaling repeater to station is defined in SD-1C359-01.

4.100 Distinctive ringing can be transmitted over OPS lines with one loop signaling repeater. However, each burst of ringing is shortened, and each silent interval is increased. Therefore, the loop sig-



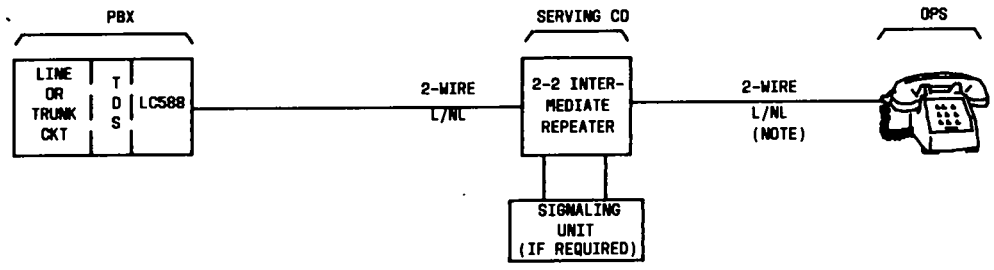
NOTES:
1. 1-2 RINGERS: 1725Ω
   (LSE I) 1525 Ω CONDUCTOR LOOP +200Ω TELEPHONE SET RESISTANCE
   1-2 RINGERS: 2155Ω EXTERNAL CIRCUIT (LSE II)
   (LSE II) 1955 Ω CONDUCTOR LOOP + 200 Ω TELEPHONE SET RESISTANCE
2. 3 RINGERS: 1500 Ω EXTERNAL CIRCUIT
   1300 Ω CONDUCTOR LOOP +200Ω TELEPHONE SET RESISTANCE

Fig. 34—Loop Signal Extender at CO in OPS Line

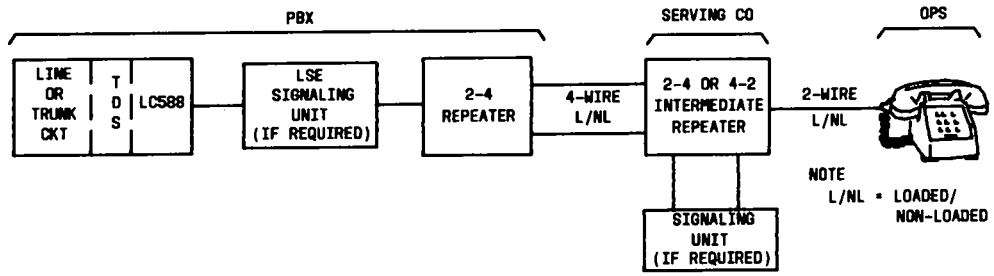


NOTES:
1. LSR/LSO = LOOP SIGNALING REPEATER - LOOP START ONLY
2. 2010 Ω EXTERNAL CIRCUIT RESISTANCE TO LC588.
   CIRCUIT CONSISTING OF 2880 Ω CONDUCTOR LOOP RESISTANCE
   +130 Ω MFT (T.U. AND LSO) INTERNAL RESISTANCE AT INTERMEDIATE CO.
3. A) 2740 Ω EXTERNAL CIRCUIT RESISTANCE TO MFT OF INTERMEDIATE CO CONSISTING OF 2540 Ω CONDUCTOR LOOP RESISTANCE + 200-OHM STATION SET RESISTANCE (BASED ON 23 MA STATION SET REQUIREMENT).
   B) 2200 Ω EXTERNAL CIRCUIT RESISTANCE TO MFT AT INTERMEDIATE CO CONSISTING OF 2000 Ω CONDUCTOR LOOP RESISTANCE + 200-OHM STATION SET RESISTANCE (BASED ON RINGING RANGE LIMIT FOR THREE RINGERS).
4. NOTE 2 VALUES ARE FOR -45VDC INPUT TO LSR, NOTE 3 VALUES ARE FOR -72VDC INPUT.

Fig. 35—Loop Start Only at CO in OPS Line



A - 2-WIRE PBX-OPS LINE WITH 2-2 INTERMEDIATE REPEATER



B - COMBINED 2-WIRE/4-WIRE PBX-OPS LINE

Fig. 36—Loop Start Only and Loop Signal Extender at CO in OPS Line

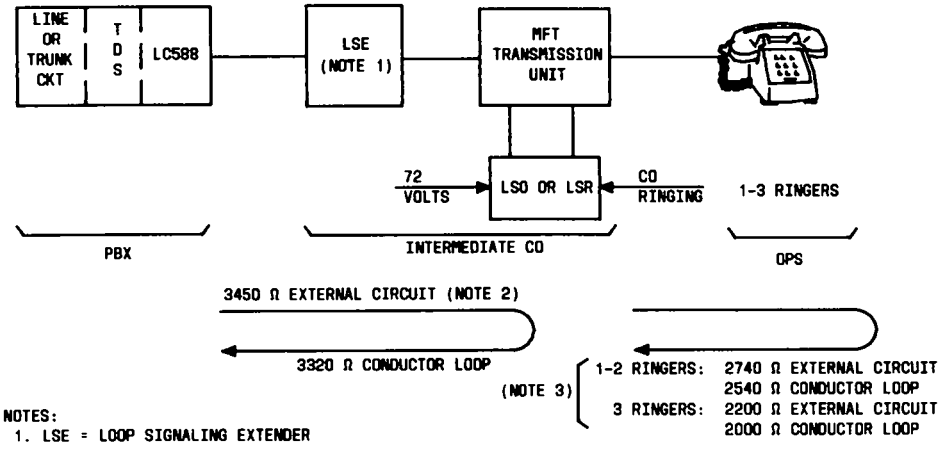
naling repeater blocks the Call Forwarding "ring ping". The loop signal extender does not effect ringing. Single frequency (SF), type FS signaling units or T-carrier, D-type FX channel units pass distinctive ringing but block "ring ping."

4.101 The following CPFT units are used for OPS configurations.

- J599343FD—DX or "ear and mouth" (E&M) to Ground Start (STA)—CPS20
- J99343FC—Ground Start to DX or E&M (CO)—CPS19
- J99343FB—DX or E&M to Loop Start (STA)—CPS18
- J99343FP—Line Start to DX or E&M (CO)—CPS17
- J99345CD—Loop Signaling Extender II—CPS16
- J99343AD—Loop Signaling Repeater, Loop-Start Only—CPS9
- J99343AC—Loop Signaling Repeater Unit—CPS8.

Z. Off-Premises Station With Call Control

4.102 ***Warning: After connection between the LC361 and LC204 (tone circuit) is made via the cross-connect field, no other circuit packs should replace the LC361 unless***



NOTES:
1. LSE = LOOP SIGNALING EXTENDER

2. 3450 Ω EXTERNAL RESISTANCE TO LC588 CONSISTING OF 3320 Ω CONDUCTOR LOOP RESISTANCE +130 Ω MFT RESISTANCE.

3. A) 2740 Ω EXTERNAL CIRCUIT RESISTANCE TO MFT AT INTERMEDIATE CO CONSISTING OF 2540 Ω CONDUCTOR LOOP RESISTANCE + 200-Ω STATION SET RESISTANCE (BASED ON 23 MA STATION SET REQUIREMENT).
   B) 2200 Ω EXTERNAL CIRCUIT RESISTANCE TO MFT AT INTERMEDIATE CO CONSISTING OF 2000 Ω CONDUCTOR LOOP RESISTANCE + 200-Ω STATION SET RESISTANCE (BASED ON RINGING RANGE LIMIT FOR THREE RINGERS).

Fig. 37—PBX OPS Line With Repeater

the connection is torn down. Other circuit packs apply hazardous voltages to the LC204.

4.103 The Off-Premises Station with Call Control (OPX) feature requires one LC361 loop signaling interface trunk circuit pack (two circuits per board) for every two OPXs. Each LC361 replaces one LC11C tie trunk circuit pack.

4.104 Loop signaling is generated by loop closures for incoming seizures and interrupted 20-Hz ringing for outgoing seizures (30 Hz in earlier systems).

4.105 The LC361 contains ringing and ringback control circuitry. Ringing comes from the ringing generator via backplane wiring. Ringback tone comes from the LC204 tone circuit via the cross-connect field (Fig. 22).

AA. Power Failure Transfer

4.106 The Power Failure Transfer feature requires the following equipment:

- Station sets that are compatible with the local CO.
- A 551A key to provide ground start buttons for stations transferred to CO service during a power failure.
- The 609-type interface panels mounted on the cross-connect field for connections to emergency transfer facilities during power failure or major alarm condition (ten connections between station sets and CO trunks possible per interface panel).
- A No. 14AWG conductor used to ground the 609-type with the PBX to permit ground start for station sets selected for Power Failure Transfer. The conductor must have mechanical protection.

4.107 The use of one or more 609-type emergency transfer panels is required. Each of the transfer panels provides transfer of ten trunks. When a power failure occurs, each CO trunk is connected directly to the preselected station line, bypassing the PBX network and removing all restrictions and system features. This feature is also enabled as an emergency transfer under certain major alarm conditions such as processor time-out.

AB. Radio Paging Access

4.108 The following equipment is required for radio paging access (refer to Table H for a summary):

- Two LC08D dual CO trunk circuit packs
- J58824CD interface trunk unit, Lists 7, 9, 12, 15, 16, and 17
- J59204CA-L1 TOUCH-TONE calling receiver (G1)
- J58847Y, Lists 3 and 4 assembly, wiring, and equipment for one link and electronic dial unit
- 36A or 31D(MD) voice coupler (if option Z or ZZ is used)
- Customer-owned radio paging transmitter and loudspeaker equipment.

Except for the LC08D circuit packs and the loudspeaker equipment, the above equipment is housed in an auxiliary cabinet.

The radio paging equipment may be several combinations of J codes, depending on the PBX.

4.109 A functional diagram of the radio paging access connections is shown in Fig. 38.

When the Z or ZZ option is used on the trunk interface unit, the voice coupler must be connected to the T and R leads between the interface trunk and the demarcation block. The Z option permits receiving only from the customer-owned equipment. The ZZ option provides for 2-way transmission. Option Y permits transmission only through the customer-owned equipment. The voice coupler need not be connected to the T and R leads for option Y.

AC. Recorded Announcement

4.110 The recorded announcement equipment consists of the following:

- The LC13B—Auxiliary trunk interface circuit pack
- The 36A or 31D(MD) voice coupler (31B voice coupler is grandfathered and may be used if available)
- The H400-107, List 1—Assembly, equipment, and cords for one announcement set (KS-

TABLE H

RADIO PAGING EQUIPMENT SUMMARY

STATION EQUIPMENT	RADIO PAGING EQUIPMENT REQUIRED	VERTICAL MOUNTING SPACE
TOUCH-TONE calling	J58824CD-1, L16, & 17 J58824CD-1, L7 & 12 J58824CD-1, L9	51mm (2 in.) 203mm (8 in.) 51mm (2 in.)
Convert TOUCH-TONE calling eqpt to dial pulse	J58824CD-1, L16 J58824CD-1, L7 & 12 J58824CD-1, L9 J58847Y-1, L3 & 4	51mm (2 in.) 203mm (8 in.) 51mm (2 in.) 254mm (10 in.)
Convert TOUCH-TONE calling eqpt to 2-out-of-7	J58824CD-1, L15 J58824CD-1, L16 J58824CD-1, L7 & 12 J58824CD-1, L17	152mm (6 in.) 51mm (2 in.) 203mm (8 in.) 51mm (2 in.)

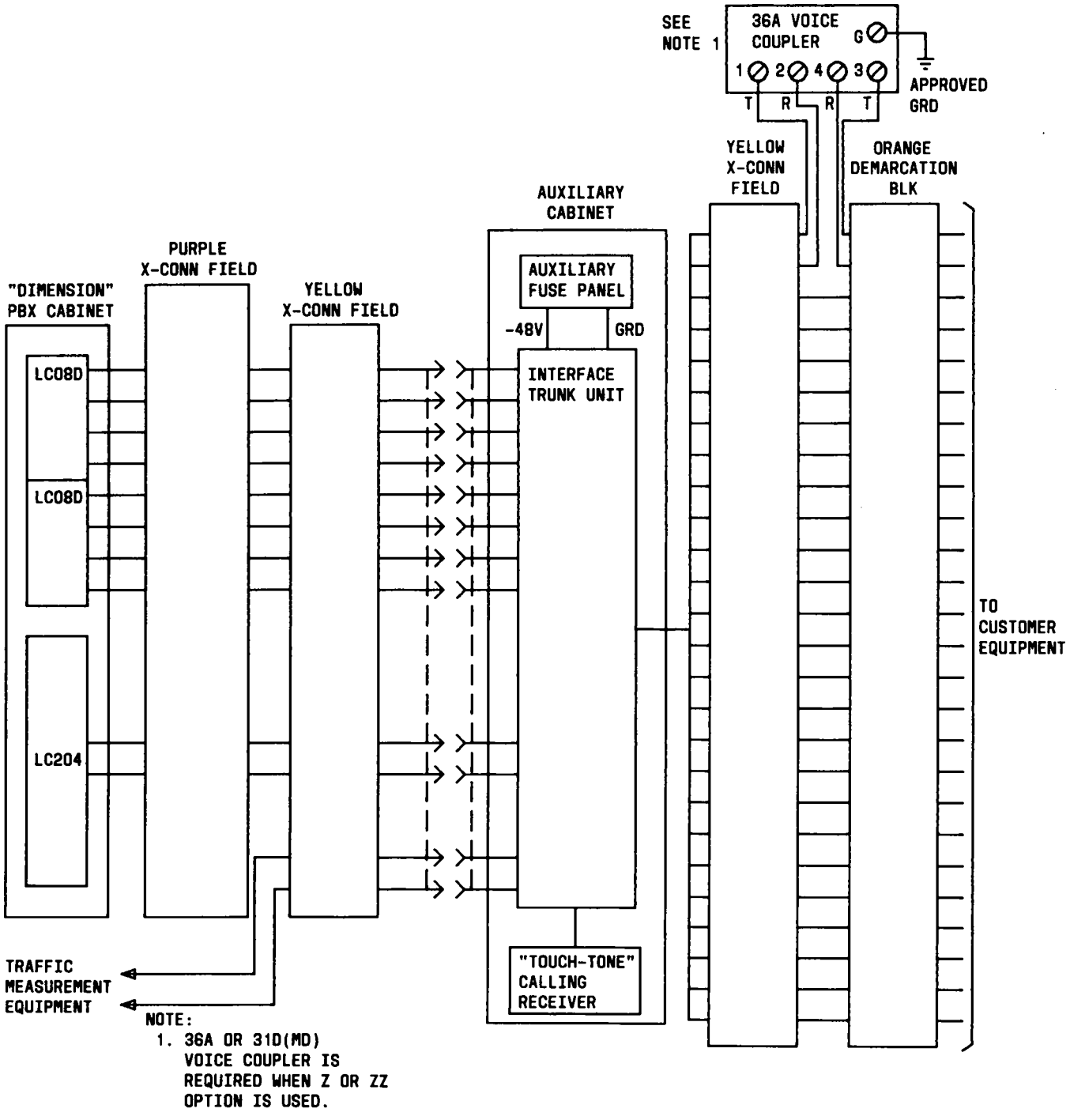


Fig. 38—Functional Diagram of Radio Paging Access Connections

16765). Except for the LC13B circuit pack, the above equipment is housed in an auxiliary cabinet.

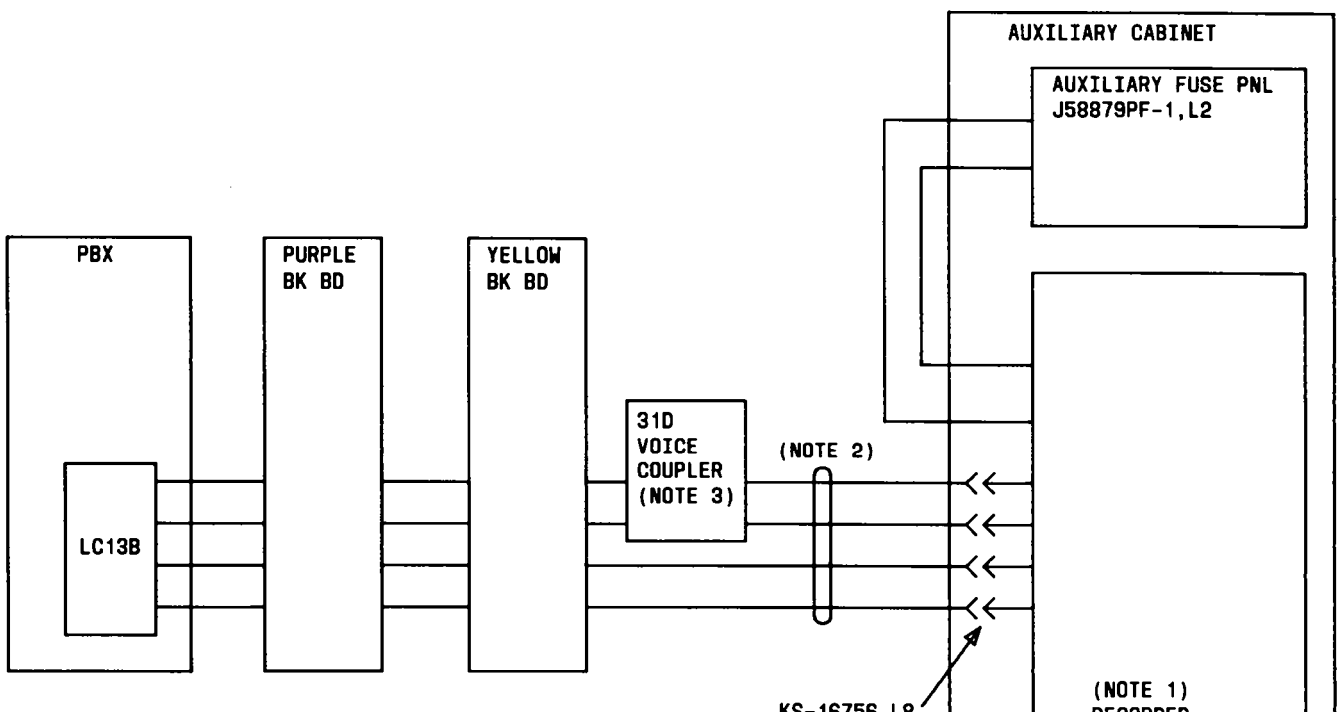
4.111 An H400-107, List 4, is required in addition to List 1 when a KS-20449, List 1 amplifier is needed for the announcement set. The KS-16765-L12 announcement sets manufactured prior to January 1, 1980, are grandfathered and do not require a voice coupler. Connections and required hardware to the PBX to the KS-16765 announcement set are shown in Fig. 39.

4.112 Both recorded announcement with Uniform Call Distribution/Direct Department Calling (UCD/DDC), and recorded announcement with Direct Inward Dialing/Advanced Private Line Termination (DID/APLT) can be in the same system. With these features, a standard announcement set supports each announcement in a locally engineered installation.

AD. Recorded Telephone Dictation Access

4.113 The equipment required for recorded telephone dictation access is listed in Table I. The recorded telephone dictation trunk is compatible with the A3 or the G1 auxiliary TOUCH-TONE calling receivers. Figure 40 is a block diagram of the wiring connections for recorded telephone dictation access. The leads between the PBX and the recorded telephone dictation trunks must not be exposed.

4.114 If the TOUCH-TONE calling capacity is exceeded, both TOUCH-TONE calling inputs



NOTES:
1. PLUG UNIT INTO J18 OR AC POWER DISTRIBUTION OR 120V AC RECEPTACLE.
2. CONNECT INSIDE WIRING DIRECTLY TO TB1, OR CONNECT TO KS14160 CONNECTOR ON LIST 7 MOUNTING BRACKET WHEN LIST 8 CORD ASSEMBLY IS PROVIDED
3. THE 31D VOICE COUPLER IS NOT REQUIRED WITH KS16765-L12 ANNOUNCEMENT SETS MANUFACTURED PRIOR TO 1/1/80 WHICH ARE GRANDFATHERED.

Fig. 39—Recorded Announcement Unit

TABLE I

RECORDED TELEPHONE DICTATION (RTD) EQUIPMENT—SUMMARY

ITEM NO.	EQUIPMENT	DESCRIPTION
1	RTD units (dial dictation machine)	Customer-provided equipment.
2	J58827E, L1, and 7 trunk	Required for supervisory control of each customer-provided unit and must be mounted in 584mm (23 in.) wide space in auxiliary cabinet. List A, 2, and 8 are required with "TOUCH TONE" calling operation.
3	J58879PC-2, L4 (120A) frequency generator	Is provided as a separate ringing source for the attendant telephone set(s). If CPFT equipment is being provided, a separate 120A generator used for continuous ringing may be shared with the feature.
4	J58879PG, L1 interrupter for audible ringing	Required for the attendant telephone sets whenever auxiliary cabinet is ordered via E-8194 questionnaire.
5	Fuse Panel	Fuses provided separately if the auxiliary cabinet is not specified.
6	Telephone set (for RTD attendant)	Provides dictation telephone set — as requred per dictation unit.
7	"TOUCH-TONE" calling circuit A. LC553, 10C, (MD), or LC10D B. Senior receiver: (1) J99289B-1, List 1, SA and D (A3) (2) J59204CA-1, L1 A, and B (G1)	If access to the dictation unit from a "TOUCH-TONE" calling set is required, both traffic and cost considerations should be considered. The system will be traffic engineered for the appropriate number of "TOUCH-TONE" calling circuits without dial dictation requirements. Since a "TOUCH-TONE" calling register must be dedicated to each dictation connection for the duration of the connection, where the dictation units are busy frequently, it may be necessary to dedicate a "TOUCH-TONE" calling circuit to each dictation trunk to prevent call blockage and dial tone delays. These dedicated circuits must be provided in addition to those specified for normal call processing. Since there may not be room for LC553, LC10C (MD), or LC10D circuit packs in existing carrier slots, it may be economical to order a separate senior receiver per dictation unit, rather than ordering carrier/cabinets; as well as other auxiliary equipment. The number of senior receivers should be considered when ordering an auxiliary cabinet versus other apparatus mounting units.
8	LC13 auxiliary trunk circuit	One LC13 provides two interface circuits for RTD or other auxiliary circuits. The LC13 provides the necessary isolation option, eliminating the need to order the isolation amplifier with the J58827E, L1 trunk.
9	36A voice coupler	One 36A voice coupler for coupling tip and ring leads per dictation machine provided. This coupler provides filtering and limiting required by the FCC registration rules, Part 68. The 31B voice coupler is grandfathered and may be used, if available.

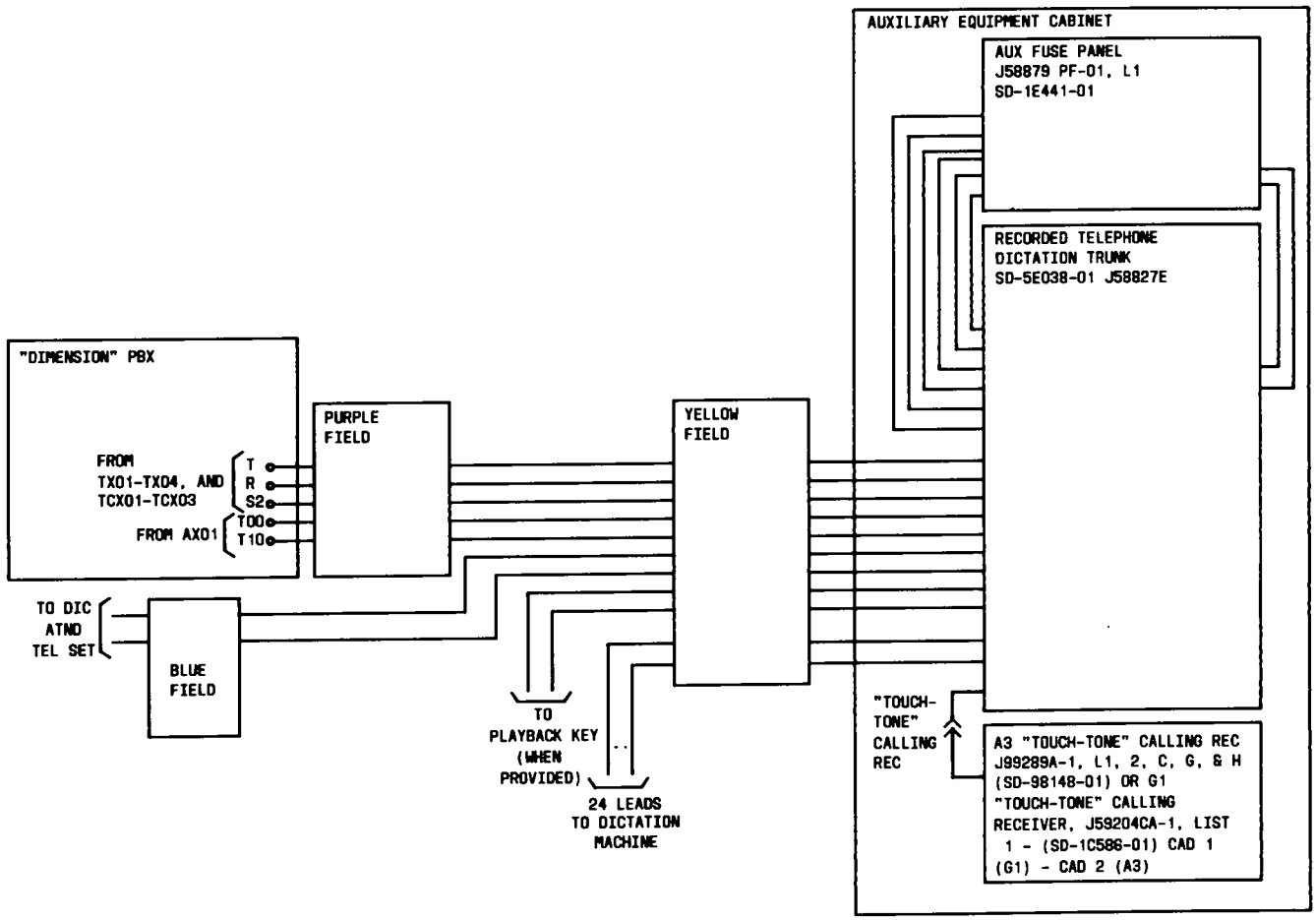


Fig. 40—Block Diagram of Recorded Telephone Dictation Trunk Connections

and dial pulse inputs may be mixed. This would require two separate trunk groups and two access codes to access the telephone dictation trunk.

AE. 44V4 Repeater

4.115 The 44V4 repeater is used only with Duplex (DX) signaling. When −48V power is used for the repeater, a 1400-ohm resistor (228A) is used between each −48V source and battery connection on the repeater.

4.116 Figure 41 shows a trunk connected to the trunk carrier via a repeater (44V4) in the auxiliary equipment cabinet. The auxiliary equipment may also be CPFT equipment.

AF. 24V4 Repeater

4.117 The 24V4 repeater interfaces 900-ohm or 600-ohm, 2-wire CO equipment using loaded or nonloaded cable. The 24V4 repeater substitutes for Metalic Facility Terminal (MFT) 2-wire repeaters for voice and data transmission.

4.118 Figure 41 shows a trunk connected to the trunk carrier via a repeater (24V4) in the auxiliary equipment cabinet. The auxiliary equipment may also be CPFT equipment.

AG. Reserve Power

4.119 This feature requires the following hardware:

- Load center (panel board) (ITE EQ6 typical or approved equivalent)

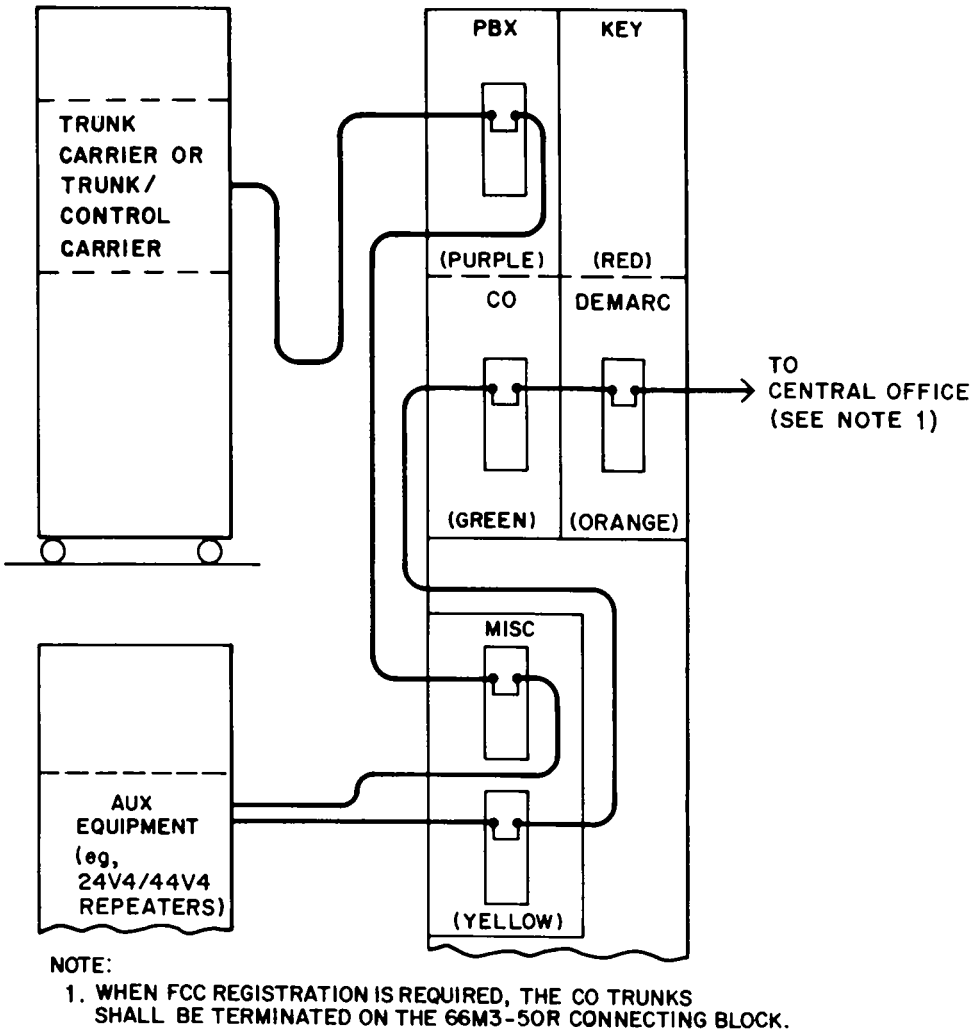


Fig. 41—CO Trunk Connected to Trunk Carrier via Auxiliary Equipment and Cross-Connect Field

- J86814—105E Power Plant (locally engineered—refer to SD-1E441-01 and Section 554-101-101)
- DependAC Inverter Type D102 CAB-5175-320 (Lorain Products Corporation) [2 Kilovolt-ampere (KVA) inverter used with larger systems]
- DependAC Inverter Type D202 CAB-5175-320 (Lorain Products Corporation) (2 KVA inverter used with larger systems)
- J87432AA—Basic cabinet rectifier (instead of J87432A power plant for systems without power reserve)
- J87432BB—Supplementary cabinet rectifier (instead of J87432B power plant for systems without power reserve).

AH. Room Status and Selection

4.120 This feature uses the following hardware:

- TELETYPE No. 4310-AAC printer
- J58898B EPIC

- LC597 Dual RS232 Data Ports interface circuit pack

The EPIC is described with the hardware for the Local Call Billing feature.

4.121 This feature requires at least one journal printer at the housekeeper station for audit and report printouts.

AI. Speed Calling

4.122 This feature requires the LC12 TOUCH-TONE calling sender/dial tone detector circuit for systems using TOUCH-TONE service.

AJ. Station Message Detail Recording

4.123 The major hardware components for the Station Message Detail Recording (SMDR) feature include the equipment cabinet, carrier, circuit packs, output devices, and interconnecting cables. All necessary equipment is provided when SMDR is ordered through DOSS. Refer to Section 554-010-122 for more detail of SMDR.

4.124 The SMDR data port is a dedicated channel on the LC570/LC570B or the LC597. The LC570/LC570B provides an SMDR channel for 9-track or direct output SMDR in the DIMENSION PRELUDE PBX. The LC597 can be used alone or with the EPIC to provide a data channel for SMDR—Internally Formatted.

4.125 Power for the SMDR (9-track and direct output) is provided by a commercial 120-Vac 60-Hz source.

4.126 ***CSMDR Interface:*** The LC570/LC570B SMDR data port also interfaces with a CSMDR system which collects and stores, and/or prints, data from each remote location. Figure 42 is a block diagram of the interface to the PBX via a 212A data set and a 94A local storage unit (LSU). For detailed information on preinstallation and description, refer to Sections 190-402-100/-200 and 190-403-200.

AK. Tie Trunk Access and Tandem Tie Trunk Switching

4.127 These features use LC11C tie trunk circuit packs and 1094A Protector units. The LC11C provides either DX or "ear and mouth" (E&M) signaling on tie trunks or APLT trunks. The circuit pack has a switchable 2-dB transmission pad switched in and out via software. An LC11C contains two independent circuits. The protector unit prevents sneak current from harming trunk equipment.

4.128 The LC11C tie trunk operates in automatic or dial repeating modes for E&M leads as well

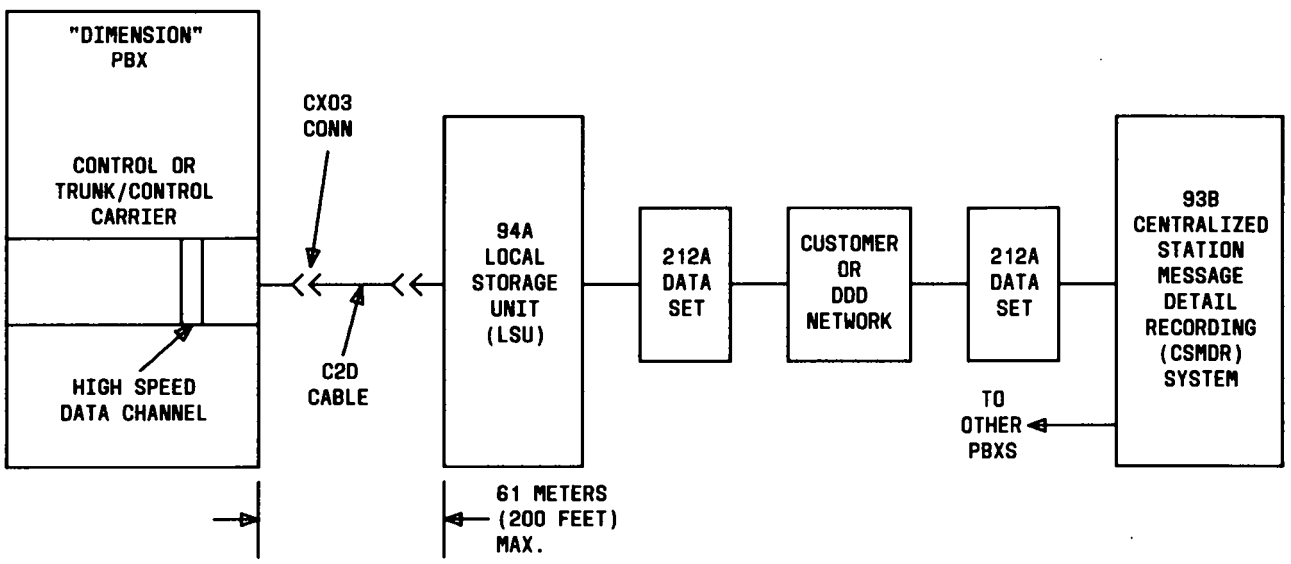


Fig. 42—Centralized SMDR Arrangement Interface to the DIMENSION PBX

as 4-wire voice transmission paths. The following tie trunk forms are available:

- One-way in/dial tone in
- One-way automatic out
- One-way dial tone out
- One-way automatic in
- Two-way dial tone in/dial tone out
- Two-way automatic in/dial tone out
- Two-way automatic in/automatic out
- One-way in, dial tone and delay dial
- Two-way delay dial or dial tone in/dial tone out
- Two-way delay dial or dial tone in/automatic out.

4.129 Following are the possible forms for APLT trunks:

- Two-way dial delay in/delay dial out
- Two-way wink start in/delay dial out
- Two-way delay dial in/dial tone out
- Two-way wink start in/dial tone out.

4.130 Various combinations are shown on Fig. 43 and 44. When the tie trunks are used between two PBXs as shown, repeaters may not be required. Long tie trunks may require a 4-wire intermediate repeater in COs through which the trunk passes. A 2-dB transmission pad switching function on the LC11C is controlled by the DIMENSION PRELUDE PBX software.

4.131 For proper transmission via the LC11C, the circuit pack impedance should be matched to the loop impedance to which it is connected. Switch 2 (SW2) on the LC11C is provided for this purpose. See Table J for the appropriate switch settings for various loop lengths in ohms.

4.132 The LC11C uses E&M signaling. For E&M signaling, a separate pair of wires carry the E&M signals and the 4-wire transmission path does not carry direct current.

4.133 Due to Part 68 of the FCC regulations, the LC11C cannot be used for DX signaling. If DX signaling is desired for use with an LC11C, an E&M to DX converter is required. The LC11C is connected to the converter via the cross-connect field (see Fig. 45).

4.134 The LC11C circuit pack can also be used to provide DID service for Centrex operation when E&M signaling capabilities are required. In the DID application, the transmission pads are permanently switched out via DID software. When E&M signaling is used, connections to the trunk are via six wires: two tip and ring transmission pairs (4-wire) and a signaling pair (the E&M leads). The LC11C furnishes either the appropriate M-lead wink or no signal, as in the case of step-by-step CO immediate start. Then, DIMENSION PBX call progress tones are returned to the calling party.

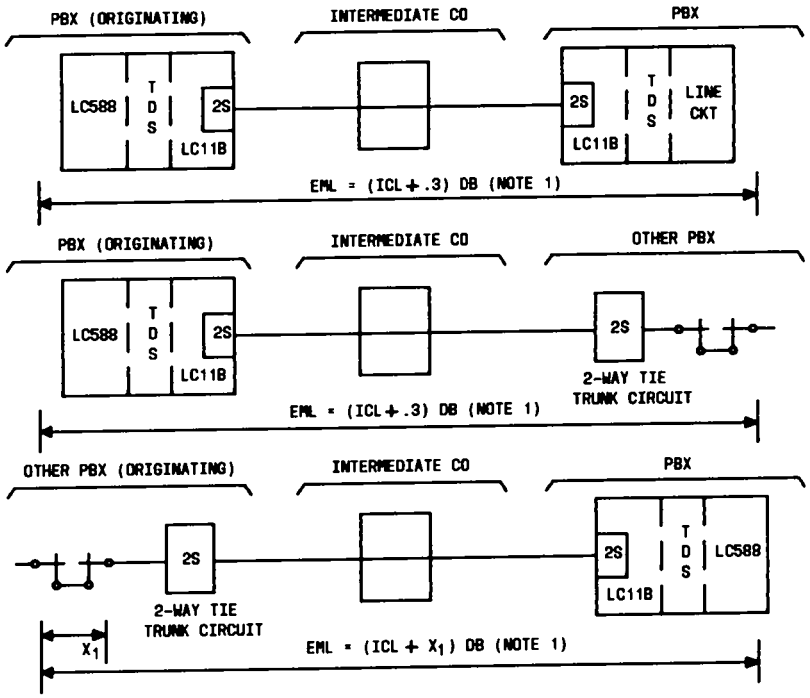
AL. Trunk Answer From Any Station (TAAS)

4.135 This feature is assigned one line circuit on an LC02C circuit pack. The signaling device (gong, bell, chime, etc) is connected directly to the assigned line circuit (option T). If the line circuit capacity is exceeded, an isolating circuit must be provided (option V) (Fig. 46).

4.136 When other than a high impedance ac coupled night ringer such as C4A2 is used or the limits below are exceeded, the 413A KTU slave relay configuration should be used. The LC02C line circuit working limits determine the use of the V option using the 413A KTU isolation.

MAXIMUM NUMBER OF C4A TYPE HIGH-Z RINGERS PER LINE	MAXIMUM LOOP RESISTANCE EXCLUDING STA APPARATUS
5	300 OHMS
4	500 OHMS
3	950 OHMS
2	950 OHMS
1	950 OHMS

Signaling devices added to the T and R leads after installation may exceed the ringing limitations. A signal repeating relay (type??) should be



NOTES:
1. EML = ESTIMATED MEASURED LOSS

1000 HZ ICL DESIGN OBJ[1]

TYPE	VNL [2]+2S+2S
SHORT HAUL	
LONG HAUL	

2. IF PAD SWITCHING IS NOT REQUIRED AT A PBX FOR ANY REASON AND IT HAS BEEN ASCERTAINED THAT THE PBX WILL NOT BECOME A TIE TRUNK TANDEM SWITCH IN FORSEEABLE FUTURE, THEN THE TIE TRUNK CIRCUIT CAN BE CLASSED AS "WITHOUT PAD" AND THE 2DB LOSS IT REPRESENTS ALLOCATED TO FACILITY LOSS.
3. ECHO SUPPRESSORS SHOULD BE USED WHEN THE VNL OF AN INDIVIDUAL TRUNK EXCEEDS 3.5DB, WHERE VNL = VNLF X LENGTH + 0.4 + D WHERE D = 0.10 X (SUM OF ALL 1000 HZ. ROUND TRIP DELAYS OF DELAY EQUALIZERS).

Fig. 43—2-Wire PBX Tie Trunks

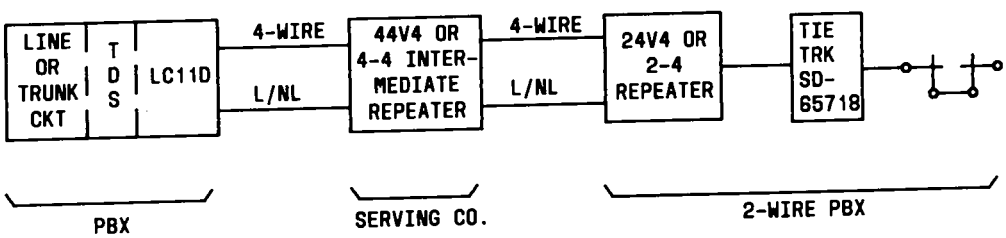


Fig. 44—4-Wire PBX Tie Trunks

TABLE J

LC11C SWITCH SETTINGS FOR VARIOUS LOOP LENGTHS

SWITCH 2 (SW2) SECTIONS	FUNC	LOOP LENGTH IN OHMS							
		0-350	351-950-	951-1550-	1551-2150-	2151-2750-	2751-3350-	3351-3950-	3951-4550-
1	Bal 1.1	C	O	C	O	C	O	C	O
2	Bal 2.1	C	C	O	O	C	C	O	O
3	Bal 3.1	C	C	C	C	O	O	O	O
4	Bal 3.0	C	C	C	C	O	O	O	O
5	Bal 2.0	C	C	O	O	C	C	O	O
6	Bal 1.0	C	O	C	O	C	O	C	O

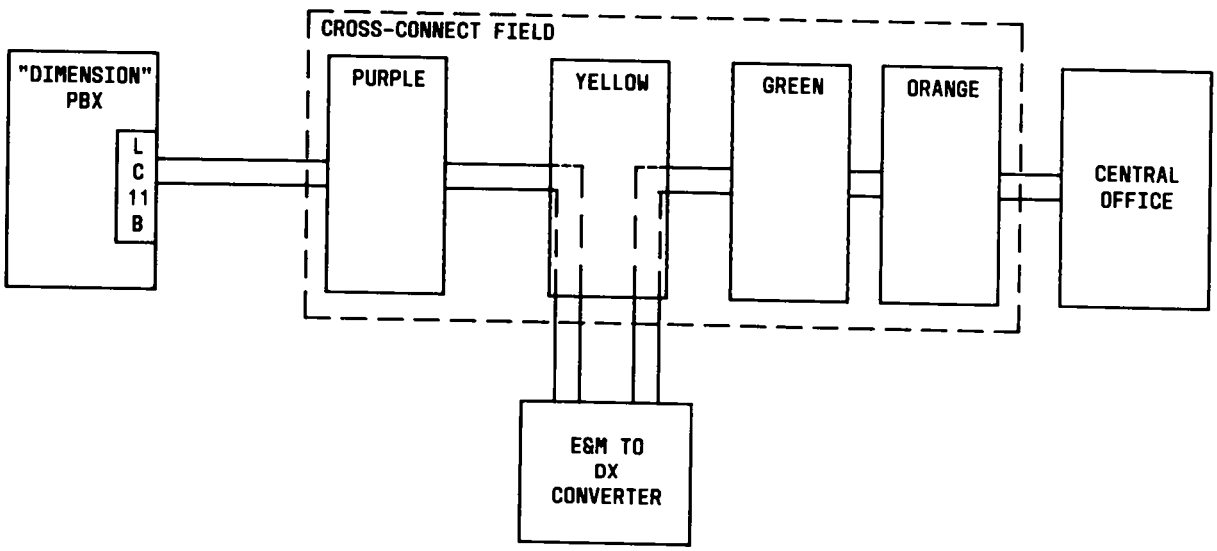


Fig. 45—Interconnections for E&M to DX Converter

used to control multiple signaling devices.

4.137 Refer to Section 463-110-100 for information on signal devices, Section 518-215-403 for information on the 413A key telephone unit, and Section 518-215-419 for information on the 642A panel.

AM. Uniform Call Distribution/Traffic Overflow Indicator

4.138 A Traffic Overflow Indicator for the attendant console is required when UCD is used. A convenient method is through a contact closure on the LC15 circuit pack that drives a lamp. A type M1/J1 lamp (Fig. 23) in the Traffic Overflow Indicator circuit performs this function. One circuit is required for UCD traffic overflow. The lamp type

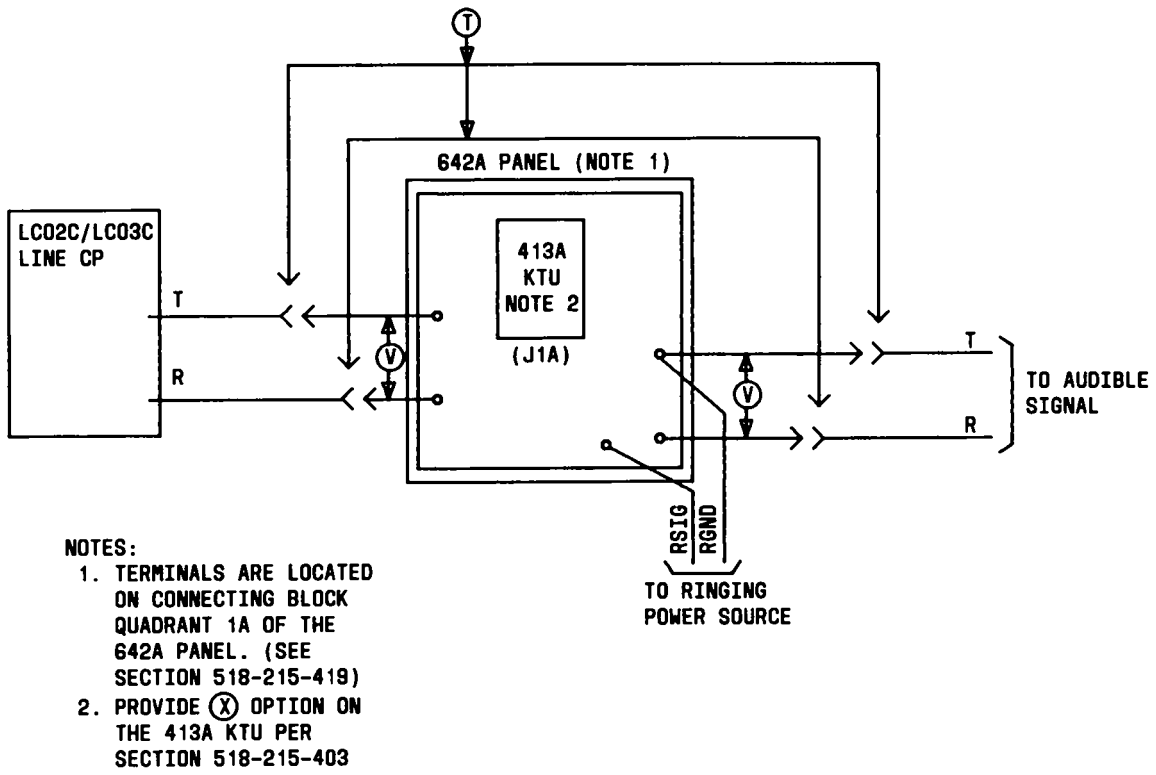


Fig. 46—TAAS Arrangement

needed and value of resistor R2 is engineered based on loop range. The M1-type lamp is for short-loop (25 ohm) range, and the J1-type lamp is for long-loop (1500 ohm) range. Both M1- and J1-type lamps mount in 15-, 17-, or 18-type indicators. In Fig. 23, R1 is an optional surge resistor of 511 ohms used for long-range loops, and the value of R2 is determined by loop-range impedance. Refer to Table K for R2 values. The diode used with R2 is a 533F diode. A 185A contact protection network can be added in place of the 533F diode. Required equipment per loop is listed in Table L.

4.139 The recorded announcement feature cannot be used for incoming station calls to the UCD or DDC group stations. When recorded announcement is active for CO-type trunks, the CP trunk calls to a UCD or DDC group are answered immediately. Each UCD or DDC group has the option of being provided with delayed recorded announcement.

AN. Visually Impaired Attendant Service

4.140 The Visually Impaired Attendant Service requires the following equipment.

- XXX-02XX-XX-XXX attendant console
- 6A grooved faceplate
- 990A light sensitive probe
- 2A translator.

Refer to Section 554-010-100 for more information.

4.141 The 2A translator performs two functions. First, it monitors the six incoming call indicator positions on the attendant console and produces a logic output that controls audible ringing. In this way, six different audible ring codes are generated that identify which of the six incoming call indicators are active. If the console is alphanumeric, the ICI information also appears in the alphanumeric display field. The six coded call indicators are as follows:

CALL INDICATOR
1. LDN call
2. Attendant call "dial 0"

TABLE K

VALUE OF RESISTOR R2 PER LOOP RANGE

LOOP RANGE	R2/OHMS
0 ohms	2.37K
500 ohms	1.62K
1000 ohms	1K
1500 ohms	5 11
2000 ohms	0

TABLE L

EQUIPMENT REQUIRED PER LOOP FOR UCD/DDC TRAFFIC OVERLOAD INDICATOR

ARRANGEMENT	EQUIPMENT REQUIRED
Short Loop (0-25 ohms)	M1-type lamp and 15-, 17-, or 18-type indicator*, LC15
Long Loop Nonexposed Cabling (26-2500 ohms)	J1-type lamp and 15-, 17-, or 18-type indicator*, LC15, 17B KTU*, 28A-1 power unit, 533F diode, or 185A contact protection network or equivalent*, KS-20810-L1A type resistor*
Long Loop Exposed Cabling (26-1600 ohms)	Same as long-loop nonexposed cabling plus J58879BA-L15 interface surge protection network (one per each four UCD/DDC groups)

* One each required per UCD/DDC group.

3. Attendant recall
4. Customer options (tie trunk, etc)
5. Customer options (WATS, etc)
6. Other than 1 through 5.

The ring rates for these call indications are shown in Fig. 47. Secondly, the 2A translator senses the light-sensitive probe output when the probe is placed over an illuminated console LED, and injects a tone onto the console headset.

This feature can only be used with an XXX-02XX-XX-XXX console which comes equipped with a KS-16689 connector assembly used for the 2A translator connection.

CABINETS

A. J58891A Network Cabinet

4.142 The J58891A cabinet (Fig. 48) for the DIMENSION PRELUDE PBX is a new design different from the standard DIMENSION PBX cabinet. The cabinet consists of three basic sections:

- The front cover assembly incorporates the front cover, the left side, the right side, and the top except that the sides and the top are only one-half of the full depth of the cabinet.
- The main cabinet assembly (which houses the carriers, power supply, etc) has the bottom shelf and the rear one-half of the sides and the top.
- The rear cover assembly is a perforated metal screen that attaches with bolts.

The front cover assembly attaches to the main cabinet assembly with flip-lock latches. With the front cover attached, the full cabinet is 1270 mm (50.0 inches) high, 789 mm (31.06 inches) wide, and 584 mm (23 inches) deep.

4.143 The equipment housed in the J58891A cabinet is the following:

- J58891AA Trunk/Control Carrier—This carrier provides slots for trunk, processor control, extended I/O, scanner/distributor, network control, buffer, data channel, memory, alarm panel, X-ray test, and RMATS/tape interface circuit packs (refer to Table M).
- J58891BA Line Carrier—This carrier provides slots for line, tone circuit, attendant interface, PAM amplifier, network buffer, and transmission test line circuit packs (refer to Table N).

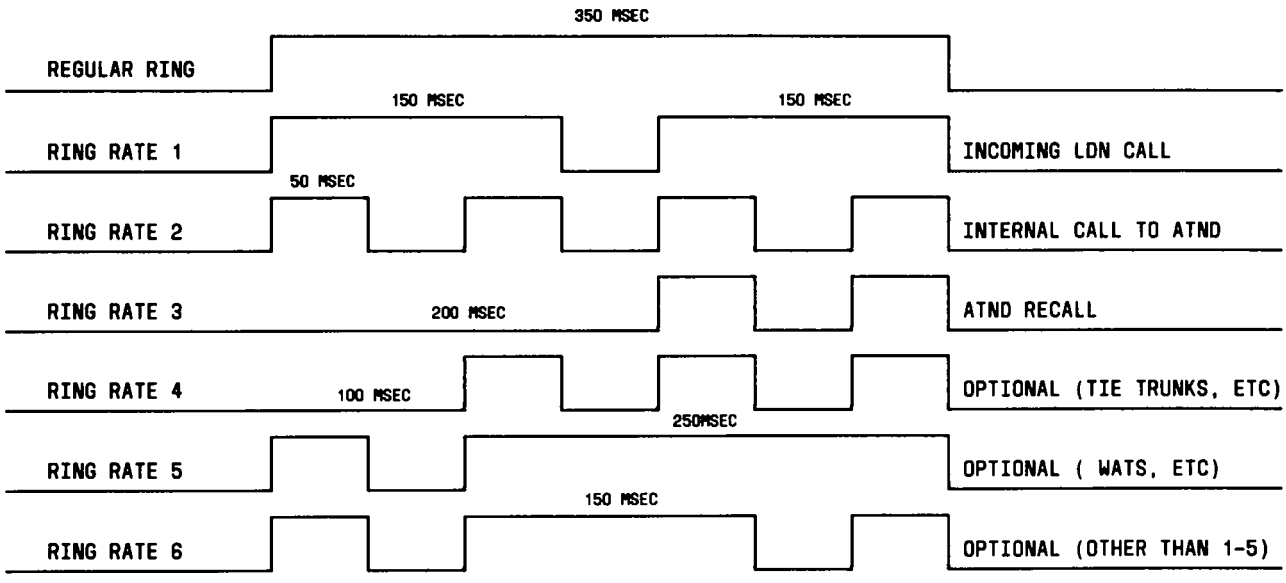


Fig. 47—Visually Impaired Attendant Service—Coded Ringing Rates

- J58891CA Line/Trunk Carrier—This carrier houses line, trunk, and network buffer circuit packs (refer to Table O).

- J58879DD CAP Interface—Provides an interface for the CAP in the system.

- J58881JA AC Power Distribution, Fan Assembly, Fusing for Consoles, and Emergency Transfer—This unit provides ac power to the power supply, circuitry for the attendant console battery supply, and houses the fan assembly. Also provided is the AEY-1 voltage regulator that provides a battery charging circuit, a −5V for the LC204 circuit pack, and a +5VM memory holdover (battery for the LC556 or LC594 RAM circuit. The standard models do not include fans, but fans can be ordered as a separate list item.

- J58879DA MAAP—This unit provides the software and hardware interface to the craft person for customer translations and repair.

- 502A Power Supply—Provides dc power to the fuse panels of the carriers and power for the attendant console (−48V, −48V filtered, +9V, −9V, +5VM, and +5V). This power supply also contains the 120C, 20-Hz ring generator (125C, 30-Hz ring generator in earlier systems).

- ED-1E364-70, GR 8 Thermal Assembly—This unit contains the thermal sensors that control the over-temperature indicator for the alarm panel. If fans are added to the system, a group 9 (GR 9) assembly must be specified.

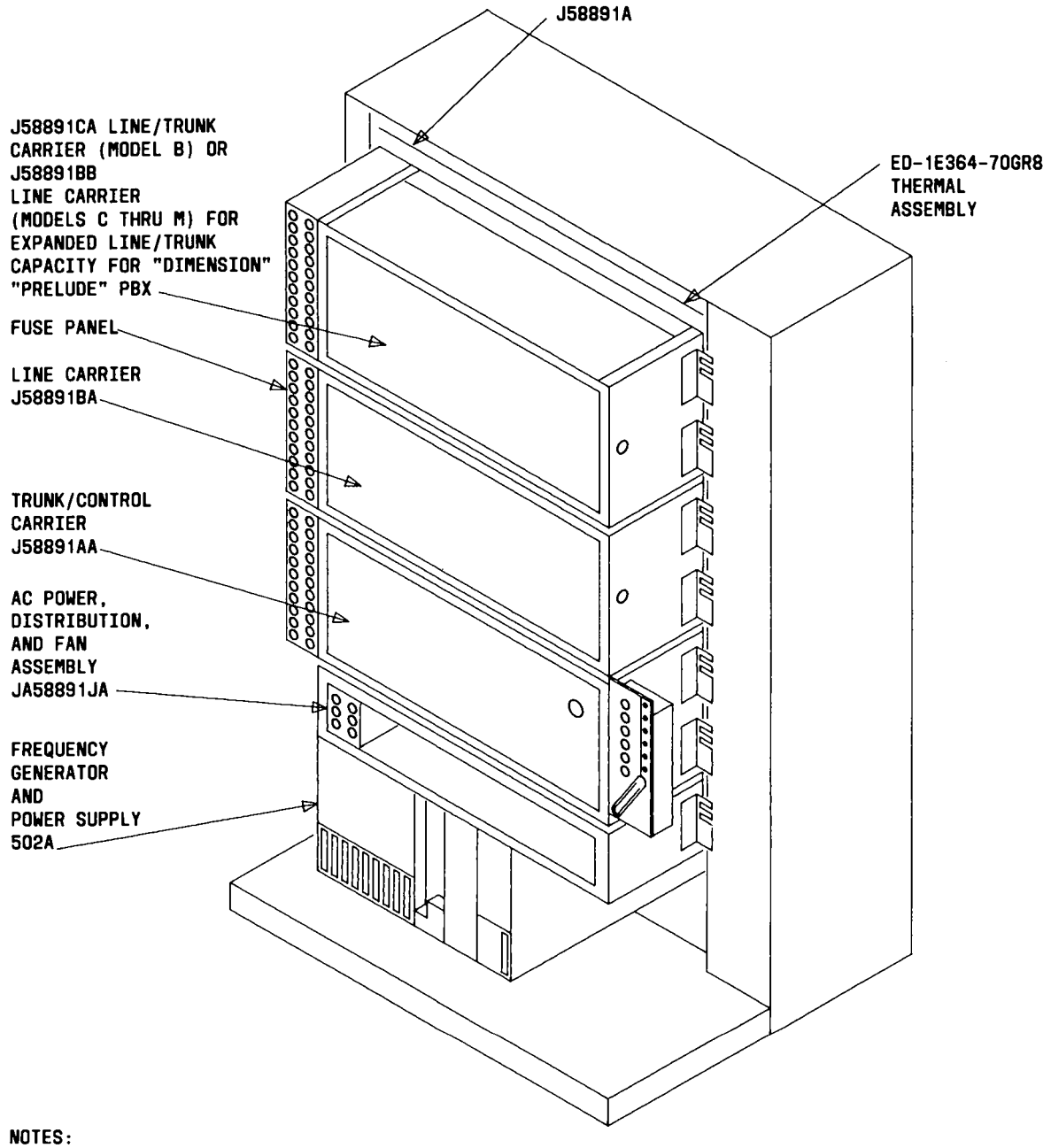
- The Optional Tape Unit—This unit, if kept on-premises, can be stored in the basic cabinet. The tape unit is used to transfer the system translations from tape to RAM and vice-versa.

B. J58891B Auxiliary Cabinet

4.144 The J58891B cabinet (Fig. 13) has the same physical design as the J58891A cabinet and can house auxiliary units (Table P) with dimensions of 1143 mm (45 inches) high, 584 mm (23 inches) wide, and 483 mm (19 inches) deep. A −48V power supply, an ac distribution panel, a fan assembly, and a fuse panel can be provided.

C. J58891C Supplementary Cabinet

4.145 The J58891C cabinet (Fig. 49) houses the supplementary equipment for multicabinet DIMENSION PRELUDE PBXs. The cabinet is the same as the J58891A basic equipment cabinet except that it is equipped for three supplementary carriers



NOTES:
1. POSITIONS 11 THROUGH 14 ARE USED FOR EITHER LINES OR TRUNKS.
2. TRUNKS ARE LIMITED TO LC08D OR LC09D.
3. POSITIONS ARE USED FOR EITHER TRUNKS OR "TOUCH-TONE" CALLING CIRCUIT PACKS.
4. THE TRUNK CIRCUIT PACKS CAN BE CO, DID, TIE, AUXILIARY TRUNK INTERFACE, LOOP SIGNALING INTERFACE, OR CONTACT INTERFACE TRUNK B, OTHER CIRCUIT PACKS CAN BE ATTENDANT CONFERENCE CIRCUIT, "TOUCH-TONE" SERVICE SENDER/DIAL TONE DETECTOR, "TOUCH-TONE" SERVICE REGISTER AND RECEIVER, OR ANI SIGNAL DISTRIBUTION (SLOT 08 ONLY).

Fig. 48—J58891A Basic Equipment Cabinet With Front Cover Removed

TABLE M

J58891AA TRUNK/CONTROL CARRIER CIRCUIT CAPACITY AND POSITION IN CARRIER

CIRCUIT PACK		NO. OF CIRCUITS PER CP	MAXIMUM NO. OF CPs PER CARRIER	MINIMUM NO. OF CPs PER CARRIER	SLOT NUMBER																				
TYPE	CODE				01	02-08	10	11 12	15	16	17	18	19	20	21	22	23	24	27	29	32	30 33	31 34	35 36	39	40
Attendant Conference	LC06B	1	1	-		X																			
CO Trunk	LC08D	2	7	-		X																			
DID Trunk	LC09D	2	7	-		X																			
TOUCH-TONE Calling Reg and Rec	LC10D	1	7	-		X																			
Tie Trunk	LC11B	2	7	-		X																			
TOUCH-TONE Calling Sender	LC12	2	7	-		X																			
Auxiliary Trunk	LC13B	2	7	-		X																			
Contact Interface B	LC15	8	7	-		X																			
Processor Control	LC20	1	1	1											X										
Processor Control	LC21B	1	1	1									X												
Processor Control	LC22B	1	1	1													X								
Extended I/O	LC44	1	1	1																X					
Scanner/Distributor	LC46	1	1	1																				X	
Network Control	LC47B	1	1	1																					X
Digital Buffer A	LC49C	1	1	1			X																		
Analog Buffer B	LC50	1	1	1	X																				

TABLE M (Contd)

J58891AA TRUNK/CONTROL CARRIER CIRCUIT CAPACITY AND POSITION IN CARRIER

CIRCUIT PACK		NO. OF CIRCUITS PER CP	MAXIMUM NO. OF CPs PER CARRIER	MINIMUM NO. OF CPs PER CARRIER	SLOT NUMBER																						
TYPE	CODE				01	02-08	10	11 12	15	16 (NOTE)	17	18	19	20	21	22	23	24	27	29	32	30 33	31 34	35 36	39	40
Processor Data Ckt	LC52	1	1	1										X												
Processor Interrupt Ckt	LC53	1	1	1												X											
Loop Signaling Intfc	LC361	2	7	-		X																					
TOUCH-TONE Calling Rec and Reg	LC553	4	1	-				X																			
Low Speed Data Channel	LC554	4	3	-																		X	X	X			
RAM Memory	LC556*	1	1	1							X																
Memory Controller/Alarm	LC557	1	1	1								X															
Processor Control	LC560	1	1	1														X									
Data Port†	LC567B	2	2	—		X																					
X-Ray Test	LC569	1	1	-					X																		
RMATS/Tape Interface	LC570B	1	1	1																	X						
RAM Memory	LC594	1	1	1							X																
Dual RS232 Interface	LC597	1	1	1					X																		
96K EPROM Memory	ZLC11	1	1	1						X																	
88K EPROM Memory	ZLC14	1	1	1						X																	
88K EPROM Memory	ZLC16	1	1	1						X																	

Note: The ZLC14 is used in single-cabinet systems, the ZLC16 is used in multicabinet systems, and the ZLC11 is used in HCS systems.

* The LC556 provides RAM for single-cabinet systems.

TABLE N

J58891BA LINE CARRIER CIRCUIT CAPACITY AND POSITION IN CARRIER

CIRCUIT PACK		NO. OF CIRCUITS PER CP	MAXIMUM NO. OF CPs PER CARRIER	MINIMUM NO. OF CPs PER CARRIER	SLOT NUMBER									
TYPE	CODE				00	01	02	03	04	05, 06	07	08, 09	10	11-18
Line Circuit	LC02C*	4	14	-					X	X	X	X		X
Data Port	LC567B	2	3†	-										X
Attendant Interface	LC45B	2	1	-					X					
PAM Amplifier	LC48	1	1	1	X	X								
Digital Buffer A	LC49C or LC41B	1	1	1									X	
Analog Buffer B	LC50	1	1	1		X								
Transmission Test Line	LC145	1	1	-										X
Tone Circuits A and B	LC204	1	1	-				X						
Tone Plant C	LC17B	1	1	1							X			

* For HCS, replace the LC02C with the LC03C and replace the LC49C with the LC41B.

† An LC567B replaces five LC02C/LC03C circuit packs. The next three slots to the right of an LC567B must be vacant. Also, only five LC567B circuit packs are permitted per system due to the power required to operate them.

and does not contain a trunk/control carrier, a MAAP, or a CAP interface. The equipment housed in the J58891C supplementary cabinet is the following:

- J58891BB Supplementary Line Carrier—This carrier provides location slots for line circuits, message waiting line circuits, and network buffer circuits (refer to Table Q).

- J58891CB Supplementary Trunk Carrier—This carrier provides location slots for CO trunks, DID trunks, tie trunk circuits, TOUCH-TONE calling sender and receiver/register circuits, auxiliary trunk interfaces, and loop signaling interface trunks. Also, slots are provided for attendant conference circuits, a network buffer, and contact interfaces (refer to Table R). A voice announcement circuit and message register interfaces for HCS can be housed in this carrier also.

- J58891JA AC Power Distribution and Fan Assembly—The ac power distribution unit provides 120V/240V power to the −48V rectifier and 120V to the fan units. The circulation fans provide additional cooling for the system if needed. The standard models do not include fans, but fans may be ordered as a separate list item.

- 502A Power Supply—Provides dc power (−48V, −48V filtered, +9V, −9V, +5V, +5Vm) to the fuse panels of the carriers and contains the 125C ring generator. The power supply of

TABLE O

J58891CA (OPTIONAL) LINE/TRUNK CARRIER CIRCUIT CAPACITY AND POSITION IN CARRIER

CIRCUIT PACK		NO. OF CIRCUITS PER CP	MAXIMUM NO. OF CPs PER CARRIER	MINIMUM NO. OF CPs PER CARRIER	SLOT NUMBER					
TYPE	CODE				01	02-09	10	11, 12	13, 14	15-18
Line Circuit	LC02C*	4	16	-		X		X	X	
Data Port	LC567B	2	4†	-		X		X		X
CO Trunk	LC08D	2	6	-					X	X
DID Trunk	LC09D	2	6	-					X	X
TOUCH-TONE Calling Register and Receiver	LC10C	1	2	-					X	X
Digital Buffer A*	LC49C or LC41B	1	1	1			X			
Analog Buffer B	LC50	1	1	1	X					
CO Trunk	LC285	2	6	-					X	X

* When HCS is used, replace the LC02C with the LC03C and replace the LC49C with the LC41B.

† The next three slots to the right of the LC567B must be vacant and only five LC567B circuit packs are permitted per system due to the power required to operate them.

the first supplementary cabinet also provides power to the third and fourth attendant consoles.

- ED-1E364-70,GR10 Thermal Assembly—This unit contains the thermal sensors that control the over-temperature indicator on the alarm panel. If fans are added to the system, the group 11 (R11) assembly must be used.

D. J58898B EPIC Cabinet

4.146 The EPIC cabinet is a stand alone unit 187 mm (8.5 inches) tall, 258 mm (11.75 inches) wide, and 303 mm (13.7 inches) deep. This carrier houses the following hardware:

- The ZAFT-3 circuit board containing the Mac-8 microprocessor, 8K EPROM, 2K RAM, wait-state generation, and reset circuitry.

- The ZAFT-4 dual universal asynchronous receiver/transmitter (UART) circuit board with two independent RS-232 data channels and the circuitry to generate an interrupt signal.

- The ZAFT-5 dual UART circuit board with two data channels.

- The EPIC power supply which provides +5Vdc at 2A, +12Vdc at 500mA, −12Vdc at 500mA.

4.147 The EPIC houses and supports a standard four data channels (two UART circuit boards) and can grow to eight data channels (four

TABLE P

J58891B AUXILIARY CABINET AND COMMON EQUIPMENT SUMMARY

ITEM NO.	EQUIPMENT	DESCRIPTION
1	Auxiliary Cabinet, J58891B, List 1	Framework, assembly, and equipment to provide 1143mm (45 inches) of vertical mounting space for 584mm (23-inch) wide and 483mm (19-inch) deep auxiliary equipment units.
	Auxiliary Cabinet, J58891B, List 2	Equipment required in addition to List 1 to provide an ac power distribution unit, arranged for a 117-volt power source (J58881JA-1, L-7).
	Auxiliary Cabinet, J58891B, List 3	Equipment required in addition to Lists 1 and 2 to provide a forced air cooling system (J58881JA-1, L-5).
	Auxiliary Cabinet, J58891B, List 4	Equipment required in addition to Lists 1 and 2 to provide a frequency generator (J58879PC-2, L-6).
	Auxiliary Cabinet, J58891B, List 5	Wiring and equipment required in addition to Lists 1, 2, and 7 to provide 23 fuse positions (–48V) and ringing and interrupter terminal strips.
	Auxiliary Cabinet, J58891B, List 6	Wiring and equipment required in addition to List 4 to provide one frequency interrupter unit (J58879PC-2, L-7).
	Auxiliary Cabinet, J58891B-1, List 7	Equipment required in addition to List 2 to provide –48V, 8 ampere power supply (KS22028, L-1).
2	Recorded Telephone Dictation Trunk J58827E, List 1	Applies to J58879F, Lists 2, 3, 6, 7, and 8 recorded telephone dictation trunk. 102mm (4-inch) vertical mounting space required.
	Recorded Telephone Dictation Trunk J58827E, Lists 1 and 2	Cable assembly required in addition to List 1 when TOUCH-TONE calling receiver is required per CAD-21, [Each J99289A-1 mounting assembly requires 152mm (6-inch) vertical space and houses two J99289B-1 TOUCH-TONE calling receivers.]
3	44V4A Repeater J98615H, List 2, 2A	Voice repeater for 48-volt operation. Requires 51mm (2 inches) of vertical mounting space.
	44V4B Repeater J98615AH, List 3, 3B	Data repeater for 48-volt operation. 51mm (2-inch) vertical mounting space required.
4	24V4C Repeater J98615BJ, List 2	Two-wire to four-wire repeater for 48-volt operation.
	24V4D Repeater J98615BL, List 2	Two-wire to four-wire repeater for 48-volt operation with loop-around repeater in the event of a power failure.

TABLE P (Contd)

J58891B AUXILIARY CABINET AND COMMON EQUIPMENT SUMMARY

ITEM NO.	EQUIPMENT	DESCRIPTION
5	Type G1 TTC RCVR Unit, J59204, List 1	TOUCH-TONE service receiver to be used with (HJ16), input AMP and channel detector, (HJ17) channel filter CP, and AE46, relay driver CP.
6	Type A3, TOUCH-TONE Service Receiver, J99289A and J99289B	Used with J58827E, Lists 1 and 2. Each J99289A-1 houses two J99289B-11 receivers. 152mm (6-inch) vertical mounting space.
7	J99380A-1 List 1, 4 CPFT Assembly Hardware	Assembly, wiring and equipment for one shelf assembly equipped to accommodate up to 12 MFT transmission type plug-in units.
	CPFT Mounting Panel J99380B-1, List 1	Assembly, wiring and common equipment required for one apparatus mounting panel equipped to accept up to twelve 837 type units.
8	CPFT Shelf Assembly J99390C-1, List 1	Assembly, wiring and equipment required to install one shelf assembly to accommodate up to 14 KTU type circuits.
	CPFT Double-Depth Shelf Frame J99380D-1, List 1	Assembly and wiring for one hinged double-depth frame assembly suitable for mounting J99380A, B, C, and E shelf assemblies.
	CPFT Shelf Assembly J99380E-1, List 1, 4	Assembly, wiring and equipment for one double module shelf assembly suitable for mounting up to a maximum of 12 MFT, LSE, or signal type plug-in units.
9	CPFT Double-Depth Shelf Assembly J99380, List 1 Only	Provides an assembly for mounting CPFT shelves in a double-depth arrangement, ie, one front shelf and one back shelf on the same level (for mounting KTU and 837-type CKT pack). 229mm (9-inch) vertical space.
10	J58822B, List 5	Code term and jack (SD-66610) for 3A code call. 102mm (4-inch) mounting space.
	J58822B, List 5 -Optional-	Code term (optional) for 3A code call. 51mm (2-inch) mounting space.
	J58822B, Lists 1, 8, 9, or 10	3A code spend unit. 254mm (10-inch) mounting space.

TABLE P (Contd)

J58891B AUXILIARY CABINET AND COMMON EQUIPMENT SUMMARY

ITEM NO.	EQUIPMENT	DESCRIPTION
11	J58824CD, List 7, 16	Interface unit for radio paging without answerback. 254mm (10-inch) vertical mounting space.
	J58824CD, Lists 7, 12, 16, 17	Interface unit for radio paging with answerback. 254mm (10-inch) vertical mounting space.
	J58824CD, List 9	Interface unit for one applique unit when TOUCH-TONE calling signals are converted to dial pulses. 51mm (2-inch) vertical mounting space.
	J58824CD, List 15	Assembly, wiring, and equipment for one applique unit required in addition to List 7 or 13 when TOUCH-TONE calling signals are converted to DC signals on a 2-out-of-7 lead basis using type GI receivers.
12	Radio Paging J58204CA	Required for attendant access. Requires 51mm (2-inch) vertical mounting space in the auxiliary equipment cabinet.
13	Radio Paging Dial Pulse Conversion J588474, L3, L4	Required with TOUCH-TONE calling systems and with rotary dial radio paging equipment.

UART circuit boards). However, one data channel is dedicated to SMDR and another is used for signaling between the EPIC and the PBX.

CABINET-MOUNTED PARTS

A. Carriers

4.148 Carriers designed to hold the circuit packs are 241 mm (9.5 inches) in height and mount on 622-mm (24.5-inch) mounting centers. A backplane wiring panel provides the circuit pack interconnections. A fuse panel or circuit breaker panel is provided at the left of the carrier, and a connector bracket is provided, depending on the needs of the carrier. All loose wiring and cabling from the backplane to the fuses and connectors are furnished with the carrier unit.

4.149 Circuit pack slots, or positions, are numbered from left to right. The circuit packs are inserted from the front, and some circuit packs are dedicated to particular positions.

J58891AA Trunk/Control Carrier

4.150 The J58891AA carrier houses both trunks and the system processor, memory, and control. The trunks available with this carrier are the standard CO and tie DID. Also, auxiliary service trunks such as TOUCH-TONE service sender and contact interface are available. The processor, memory, and control part of the carrier include the data buffer, data channel, X-ray test, RMATS/tape interface, RAM and EPROM memory, memory controller, and alarm circuits. The J58891AA carrier used in Models C through M is the same as the trunk/control carrier used in Models A and B except for the circuit packs housed therein. The ZLC14 EPROM and LC570B RMATS/tape interface replace the LC555 and LC570, respectively, in the model A, B, and C systems. The LC594 RAM replaces the LC556 RAM, and the ZLC16 EPROM replaces the LC555 and ZLC14, in multicabinet systems (refer to Table M). The LC570B is also used in multicabinet systems. However, multicabinet systems with either the Enhanced Business Package or HCS use the LC597 instead of the

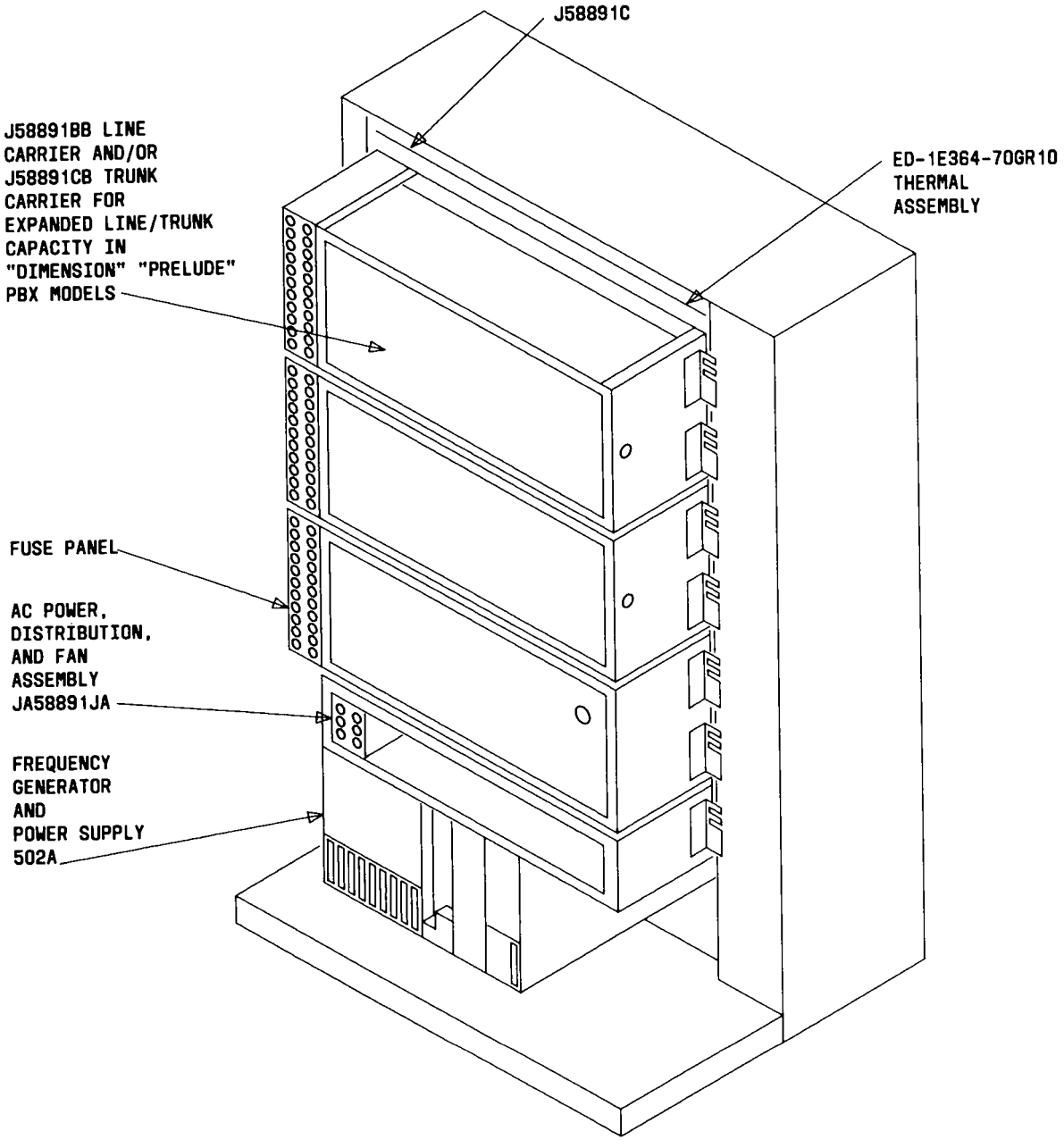


Fig. 49—J58891C Supplementary Equipment Cabinet With Front Cover Removed

LC570B. Systems with HCS also use the ZLC11 instead of the ZLC16.

J58891BA Line Carrier

4.151 The J58891BA carrier is made from a J58879AA carrier and provides the same functions. This carrier includes line, message waiting line, attendant interface, and tone circuits. Up to 56 lines (52 if an attendant console is used) can be provided by this carrier. See Table N for a listing of circuit packs and slot positions for the J58891BA carrier.

TABLE Q

J58891BB SUPPLEMENTARY LINE CARRIER CIRCUIT CAPACITY AND POSITION IN CARRIER

CIRCUIT PACK		NUMBER OF CKTS PER CP	MAXIMUM NUMBER OF CPs PER CARRIER	MINIMUM NUMBER OF CPs PER CARRIER	SLOT NUMBER								
TYPE	CODE				01	02	03	04	05, 06	07	08, 09	10	11-18
Line Circuit	LC02C*	4	16	—		X	X	X	X	X	X		X
Data Port	LC567B	2	4†	—		X			X				X
Digital Buffer A	LC49C or LC41B	1	1	1								X	
Analog Buffer B	LC50	1	1	1	X								

* When HCS is used, the LC03C replaces the LC02C and the LC41B replaces the LC49C.

† An LC567B replaces five LC02C circuit packs. The next three slots to the right of the LC567B must be vacant. Also, only five LC567B circuit packs are permitted per system due to the power required to operate them.

J58891BB Supplementary Line Carrier

4.152 The J58891BB line carrier is a J58879AC line carrier adapted to the system with DIMENSION PRELUDE PBX line circuits (LC02C/LC03C). See Table Q for circuit packs and slot positions.

J58891CA Line/Trunk Carrier

4.153 The J58891CA carrier is made from a J58881CB carrier and provides up to 12 CO or DID trunk circuits (or 10 CO/DID trunk circuits if TOUCH-TONE calling register/receiver is used) and 48 line circuits and message waiting line circuits. See Table O for a listing of circuit packs and slot positions for the J58891CA carrier.

J58891CB Supplementary Trunk Carrier

4.154 The J58891CB trunk carrier is a J58879BA-2 trunk carrier adapted to the DIMENSION PRELUDE PBX system. See Table R for circuit packs and slot positions.

B. Fan Assembly Mounting

4.155 The fan assembly mounting is always provided and is mounted in the lower portion of the basic equipment cabinet. The fans are an equipment option. Requirements for fan assembly and associated filters are specified below in ENVIRONMENTAL REQUIREMENTS.

C. Maintenance and Administration Panel

4.156 The MAAP (Fig. 50) provides the means to alter translations (eg, class of service, line assignments), initiate traffic measurement, and initiate maintenance programs used to isolate faults. The MAAP contains a 12-pushbutton data entry pad and three rows of buttons for control and operation, a 16-digit operational display, a 2-digit procedure display, and indicators for alarm and operational status.

4.157 The MAAP operations are divided into a series of procedures, each one having a definite function, such as isolation of tone failures, display and change of line information, etc. Each procedure has an associated 2-digit code from 00 through 99

TABLE R

J58891CB SUPPLEMENTARY TRUNK CARRIER CIRCUIT CAPACITY AND POSITION IN CARRIER

CIRCUIT PACK		NUMBER OF CIRCUITS PER CP	MAXIMUM NUMBER OF CPs PER CARRIER (NOTE)	MINIMUM NUMBER OF CPs PER CARRIER	SLOT NUMBER			
TYPE	CODE				01	02-09	10	11-18
Analog Buffer B	LC50	1	1	1	X			
Attendant Conference	LC06B	1	1	—		X		
TOUCH-TONE Calling Reg/Rec	LC10D	1	14	—		X	X	
Tie Trunk Circuit	LC11B	2	8	—		X		
TOUCH-TONE Calling Sender	LC12	2	8	—		X		
Auxiliary Trunk Interface	LC13B	2	8	—		X		
Message Register Interface	LC16B	8	8	—		X		
Loop Signaling Interface Trunk	LC361	2	8	—		X		
Dual CO Trunk Circuit	LC08D	2	16	—		X		X
DID Trunk Circuit	LC09D	2	16	—		X		X
Contact Interface B	LC15	8	8	—		X		
Digital Buffer A	LC49C	1	1	1			X	
Data Port*	LC567B	2	4	—		X		X

Note: Some combinations of circuits in the carriers may exceed the power limitations of a cabinet. Therefore, careful analysis of power requirements in the system is necessary and may conclude that the administrable quantity of some trunk circuits is less than the indicated number.

The next three slots to the right of the LC567B must be vacant. Recommended slot locations are slots 2, 6, 11, and 15.

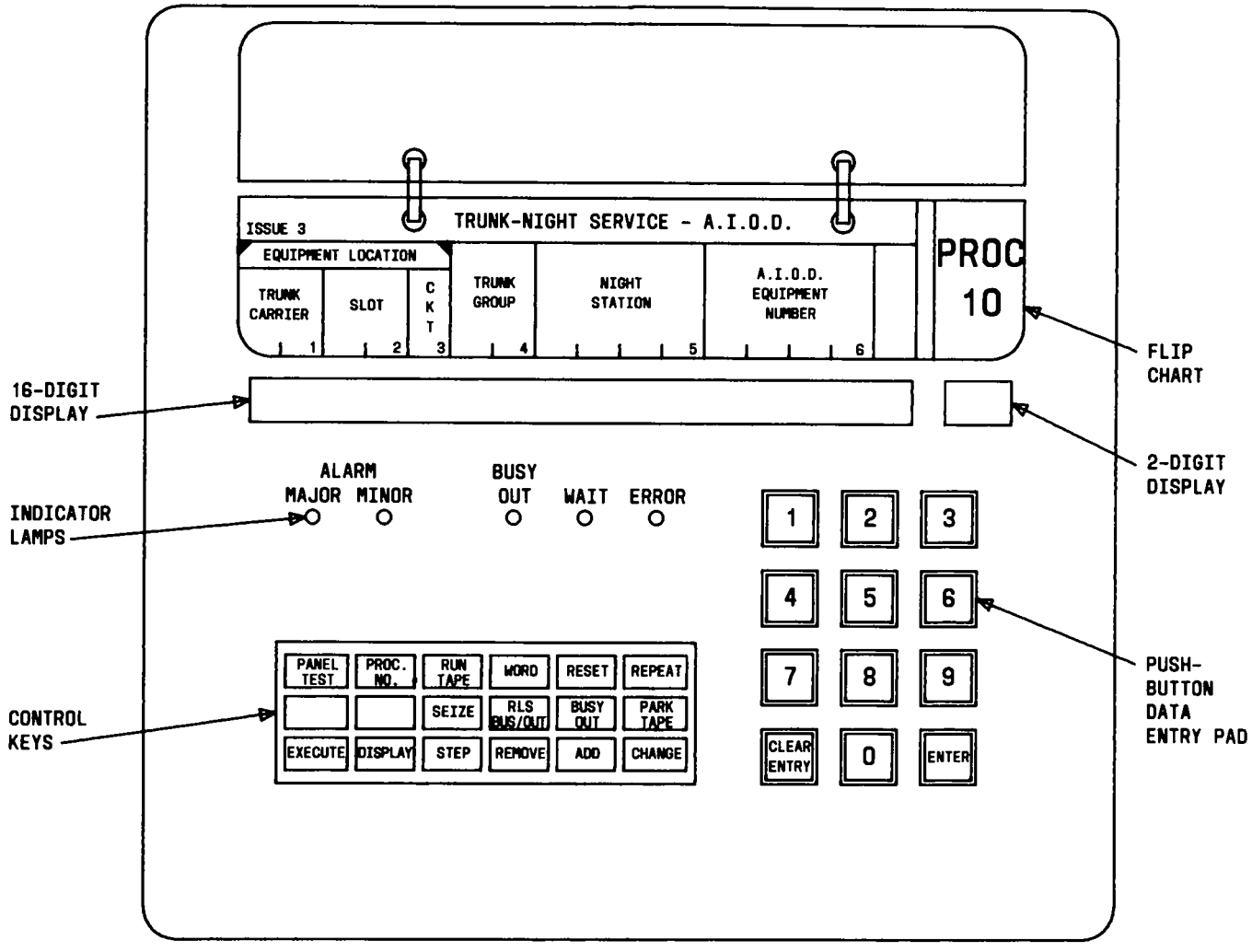


Fig. 50—Maintenance and Administration Panel

which is used for its access. When a MAAP request is made, the PBX causes the associated software program to be read from the EPROM into the paging buffer. When this is complete, the WAIT lamp is extinguished and the procedure is available for use.

4.158 The MAAP is stored inside the equipment cabinet. The MAAP is connected via a 25-pair 2.44-meter (8-foot) extension cable and must be removed from its storage rack and plugged in each time it is used.

D. Circuit Packs

4.159 Circuit packs are 203 mm (8 inches) by 292 mm (11.5 inches). Each circuit pack is equipped with an identification faceplate containing a color-coded label. The circuit packs have been separated according to function to simplify maintenance and repair. In addition, some circuit pack faceplates have test points to allow interrogation of internal circuit states for fault diagnosis.

A circuit pack is always replaced with a circuit pack having either the same or a subsequent suffix as printed on the carrier designation strip. That is, an LC49 cannot be used if the designation strip specifies LC49B. An LC49B, LC49C, or later alpha-suffix circuit packs are suitable replacements.

4.160 Circuit packs contain the circuits for the system and plug into connectors on associated carriers. Every circuit can be addressed by a 5-digit number which tells its location by carrier-slot-circuit. For example, circuit number 02-16-1 indicates the circuit located in carrier 02, slot 16, circuit number 1.

4.161 Following is a numerical listing and a brief description of the DIMENSION PRELUDE PBX circuit packs.

(1) ***LC02C Line Circuit:*** The LC02C is the interface to station within the DIMENSION PRELUDE PBX. It receives loop signaling from the station sets to detect on- and off-hook status and dial pulses. The LC02C alerts the station by sending 20-Hz ringing (30-Hz ringing in earlier systems). The tip and ring is not cut through the time division switch and so cannot achieve dc continuity. The FCC required maximum allowable loop resistance, excluding registered terminal equipment, is 950 ohms or less. The LC02C complies with FCC requirements concerning EMI associated with transmitting equipment. Each LC02C contains four separate line circuits and is located in the line carrier and line/trunk carrier.

(2) ***LC03C—Message Waiting Line Circuit:*** The LC03C is an interface to stations in the PBX that have message waiting indicators and the Message Waiting class of service. Each LC03C contains four independent message waiting line circuits.

(3) ***LC06B—Attendant Conference Circuit:*** The LC06B enables the attendant or station user to establish a conference of up to six parties. This circuit can accommodate a maximum of six stations or four stations and two trunks. A separate time slot and conference circuit port is required for each conferenced party. Attendant conference circuit units cannot be bridged together. Each LC06B contains one attendant conference circuit.

(4) ***LC08D—Dual CO Trunk Circuit:*** The LC08D provides all CO, FX, and WATS ground-start trunk interfaces to a CO. This circuit employs standard ground-start signaling and can be used in 1-way incoming, 1-way outgoing, or 2-way modes. It detects a CO battery reversal for toll diversion purposes, prevents a lockup condition from occurring when connected to a step-by-step office, and eliminates the need for external resistance pads when connected to a step-by-step office. Each LC08D contains two separate trunk circuits.

(5) ***LC09D—DID Trunk Circuit:*** The LC09D provides the DID trunk interface to a CO. It detects a low resistance loop closure (high-low signaling) as an incoming seizure, provides a reversal of battery and ground on the tip and ring leads as an off-hook indication from the PBX, and provides circuits compatible with hardware digit collection. Each LC09D contains two separate trunk circuits.

(6) ***LC10D—TOUCH-TONE Calling Register and Receiver:*** The LC10D processes TOUCH-TONE dialing. It converts TOUCH-TONE dialing signals to binary coded decimal (BCD) signals.

(7) ***LC11C—Tie Trunk Circuit:*** The LC11C provides CCSA access and tie trunk service. It may be used as a DID trunk when DX or E&M signaling is required. This circuit is a 4-wire circuit and can be optioned on the circuit pack for DX or E&M signaling. It contains switchable 2-dB transmission pads that are switched in or out via software. Each LC11C contains two independent trunk circuits.

(8) ***LC12—TOUCH-TONE Calling Sender:*** The LC12 is a 2-circuit TOUCH-TONE calling sender. It is used to output TOUCH-TONE dialing signals and to detect precise dial tone in a tandem switching arrangement.

(9) ***LC13B—Auxiliary Trunk Interface:*** The LC13B provides a method to connect a talking path to auxiliary equipment. Each LC13B contains two separate circuits. The following is a list of items which can be connected.

- Loudspeaker paging coupler
- Music-on-hold coupler
- Recorded telephone dictation trunk
- Automatic trunk level interconnecting unit.

(10) ***LC15—Contact Interface B:*** The LC15 drives the UCD traffic overflow indicator. Each LC15 contains eight circuits (six for status

indicator lamps, one for busy/idle status, and one for traffic).

(11) ***LC16B Message Register Interface:*** The LC16B detects M lead signals from the CO. These signals increment the message unit total for the line which is connected to the associated trunk. Additionally, the LC16B is required for interfacing to the energy usage sensors in implementing the Energy Communications Service Adjunct (ECSA) feature. Each LC16B contains eight station message register circuits.

(12) ***LC17B—Tone Plant C:*** The LC17B provides code calling access tones. The tone provided for code calling access has a frequency of 892 Hz.

(13) ***LC20—Processor Control:*** The LC20 contains the six data register circuits for the processor. One LC20 is required per system and is located in the trunk/control carrier.

(14) ***LC21B—Processor Control:*** The LC21B is the I/O interface circuit in the processor. It contains a storage address register, a data register, and a parity generator/checker. One LC21B is required per system and is located in the trunk/control carrier.

(15) ***LC22B—Processor Timing Circuit:*** LC22B provides a timing generator, decoding logic circuitry, and sanity timer. The LC22B circuitry combines with the 20-MHz clock (LC560) to interrupt the microprogram instructions. One LC22B is required per system and is located in the trunk/control carrier.

(16) ***LC41B—Signal Distribution Circuit:*** The LC41B circuit pack provides voltage for the neon message waiting lamps (including a current detector circuit for testing neon lamps in the station set). The circuit also provides voltage for an interrupter status lamp. One LC41B is required per line carrier.

(17) ***LC44—Extended I/O:*** The LC44 decodes data from the I/O address bus and distributes enable signals to the I/O circuits. It interfaces the processor command leads, performs gating and timing functions for the extended I/O circuits, and provides separate command leads (such as read or write) to data links, and the MAAP. One LC44 is required per system and is located in the trunk/control carrier.

(18) ***LC45B—Attendant Interface:*** The LC45B connects the attendant console voice path to the time division bus. Each LC45B contains two separate 4-wire transmission circuits.

(19) ***LC46—Scanner/Distributor:*** The LC46 interrogates the port circuits and reports status to the processor. In addition, it distributes control data to port circuits. This data controls the ring relay in the line ports and various trunk port relays. It is also used in conjunction with the network control during network tasks and decodes carrier addresses and buffer board port address bits to the LC49C. One LC46 is required per system and is located in the trunk/control carrier.

(20) ***LC47B—Network Control:*** The LC47B establishes, removes, and audits all network connections in response to commands from the processor. It performs the timing control for port circuit connections to the PAM bus. One LC47B is required per system.

(21) ***LC48—PAM Distribution Circuit:*** The LC48 serves as a common amplifier for all audio signals in the DIMENSION PBX system. Voice samples from all port circuits are summed on a time division basis at the input to the LC48. The summed voice samples are amplified and provided as an output on the time division bus to all port circuits. One LC48 is required per system.

(22) ***LC49C—Digital Network Buffer:*** The LC49C provides buffer gating and an audit selector for the network control, board and port selection decoders for the scanner/distributor, port reset logic, common ringing application and trip circuits for the line carriers, and a power return circuit to hold the shift register off the PAM bus during power-up. One LC49C is located in each carrier.

(23) ***LC50—Analog Buffer B:*** The LC50 provides status buffer gating and data distribution decoding for the scanner/distributor, a distribution amplifier, and PAM sum and distribution indicators for the PAM network. One LC50 is located in each carrier.

(24) ***LC52—Processor Data Circuit:*** The LC52 is the arithmetic unit (AMU) in the pro-

cessor which can accept data, perform 16 arithmetic operations, and apply the output to the address bus. One LC52 is required per system and is located in the trunk/control carrier.

(25) ***LC53—Processor Interrupt Circuit:*** The LC53 provides the interrupt and time clock circuits for the processor. One LC53 is required per system and is located in the trunk/control carrier.

(26) ***LC145—Transmission Test Line:*** The LC145 provides the automatic circuitry to perform transmission testing of trunks from the CO. One LC145 is required when the transmission test line is provided and is located in the line carrier. Each LC145 contains two ports (circuits). The first circuit generates a sequence of three precision tones. The second circuit acts as a receiver in performing 1-way loop-around testing from the second to the first circuit.

(27) ***LC204—Tones Circuit:*** The LC204 provides 350-Hz, 440-Hz, 480-Hz, and 620-Hz tones. These tones are used individually and in combination, at steady and interrupted rates to provide eight distinct audible tones.

(28) ***LC361—Loop Signaling Interface Trunk:*** Each LC361 contains two independent (trunk-type) full duplex serial data ports. Since the data ports are of the trunk type (assigned as trunks), the ports connect to the trunk side of the PAM bus and retain trunk features. Ringing current is of the nondistinctive type, 20 Hz ringdown signaling (30 Hz in earlier systems).

(29) ***LC553—Quad TOUCH-TONE Calling Receiver/Register:*** The LC553 processes TOUCH-TONE dialing signals and converts the signals to BCD signals. The LC553 has four circuits and each circuit operates the same as the LC10D which has only one circuit.

(30) ***LC554—Quad Low-Speed Data Channel:*** The LC554 has four bipolar serial I/O data channels. These serial data channels serve as the interface between the processor and peripheral units (ie, attendant consoles and display units). Each of these serial data channels uses 185-kHz transmission rate.

(31) ***LC555—88K EPROM Circuit:*** This circuit pack contains the generic program for single-cabinet DIMENSION PRELUDE PBX Models A and B. This memory stores 16-bit words of the generic program, routine maintenance tasks and status, and demand tasks (MAAP and CAP procedures and tests).

(32) ***LC556 RAM Circuit:*** This circuit pack contains translation tables and system status for systems using Models A, B, and C. Translations are written into RAM in 16-bit words. The LC556 circuit pack is supported by the AEY-1 memory holdover circuit and battery pack for 10 hours to prevent memory loss in the event of a power failure.

(33) ***LC557—Memory Controller and Alarm Circuit:*** The LC557 is a circuit pack that combines the functions of the LC236 (RAM data control), the LC368 (address buffer, timing, and extended memory control circuit), and the LC18D (alarm control circuit). The circuit uses board select logic and provides the following functions:

- Control of the alarm panel faceplate on the circuit pack
- Timing circuit for controlling the timing of memory access
- Memory board select
- Address latching
- X-ray interface
- Switch Analysis Tool (SWAT) interface for extended memory control
- Data buffering.

The alarm panel is located on the faceplate of the LC557 circuit pack (Fig. 51). The panel provides alarm and fault indicators, processor control switches, and tools for running microdiagnostic tests. The alarm faults include both major (AMJ) and minor (AMN alarms plus processor PAS and FAL lamps. The system fault indicators include overtemperature (TMP), fuse (FUS), network (NET), facility (FAC), scanner buffer (SCN), I/O buffer (IOB), memory (MEM), and processor (PRC). There is a microdiagnostic test select thumb-wheel (SELECT) and a microdiagnostic ENABLE button. The GO/HALT switch and the GAR indicator apply to proces-

sor control. Emergency transfer may occur during a major alarm and can be prevented by setting the NORMAL switch setting to the inhibited (INHIB) position. An emergency transfer condition can be obtained by setting the NORMAL switch to the activate (ACT) position. When in either the INHIB or ACT state, the emergency transfer (XFR) indicator is lighted. The ALARM RETIRE button is used with the ENABLE button when initializing the system.

(34) ***LC560—Processor Control Circuit:*** The LC560 provides the circuitry for the microcode of the processor for the DIMENSION PRELUDE PBX compatibility which is contained on three 16K Programmable Read Only Memory (PROMS). This circuit receives commands from memory and produces microinstructions that are required to control internal processor action. The basic functions are the same as the LC453 (processor control).

(35) ***LC566—Data Interface (DI) Circuit:*** The DI circuit provides interconnection between RS232C compatible Data Terminal Equipment (DTE) or Data Communications Equipment (DCE), or remote DIs, and the DIMENSION PBX. When the DI is used for interconnections using the DIMENSION PBX, a data port (LC567B) in the PBX is used. A RS366 compatible interface is also provided that can simulate an Automatic Calling Unit (ACU). The mode of interface, whether RS232C, RS366, or intra-PBX, is selected via option switches on the LC566. A DI can be dialed from an American Standard Code for Information Interchange (ASCII) terminal keyboard, an on-premises station set, or a RS366 computer port. The LC566 supports transmission up to 9600 baud. The number of DIs in a system is limited by the number of data port circuits (LC567B) in the PBX.

(36) ***LC567B—Data Port Circuit:*** This circuit provides the data interface circuit access to the DIMENSION PBX switched network, and performs data format conversions to allow data to be transported through the PBX. The data port supports transmission up to 9600 baud. The data port circuit can be administered to line circuit or trunk circuit location slots. An LC567B contains two data port circuits.

(37) ***LC569—X-Ray Program Circuit:*** The LC569 contains the X-ray tests and programs on EPROMs. When plugged into the system, the

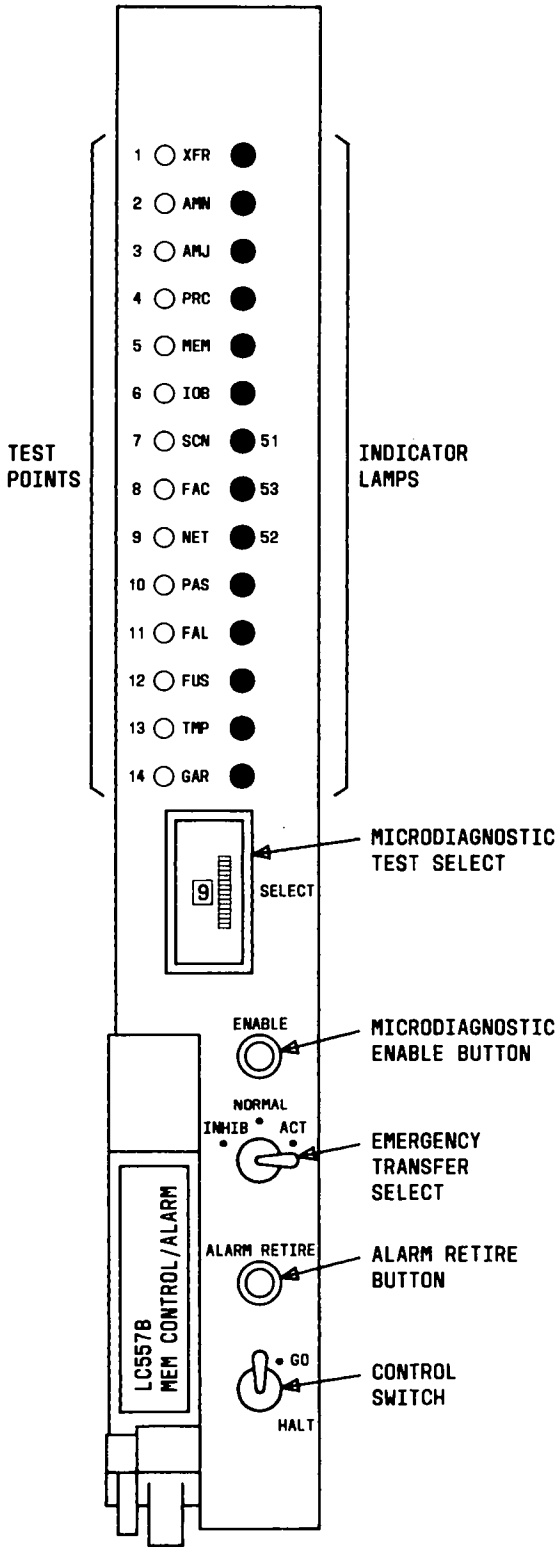


Fig. 51—Alarm Panel Faceplate for LC557 Memory Control/Alarm Circuit Pack

LC569 takes control away from the generic (EPROM). The X-ray tape supplies data used by the X-ray tests and programs to test the system thoroughly.

(38) ***LC570—RMATS/Tape Interface Circuit:*** The LC570 is used to provide an EIA RS232 compatible data channel that is used for communication with the tape drive and with the RMATS. When the LC570 is used with the tape drive, the speed of communication is fixed at 9600 baud. The speed of communication with RMATS is 300 baud. In addition to this port, there is a bipolar serial data channel to interface between the DIMENSION PRELUDE PBX and a peripheral unit (most likely SMDR). The speed of this port is selectable at 185 kHz or 835 kHz. One LC570 is required per system.

(39) ***LC570B RMATS/Tape Interface:*** This circuit pack replaces the LC570 RMATS/tape interface. The LC570B provides a buffered RS232 compatible data channel that is used for communication with the tape drive and the RMATS. The speed of interface between the LC570B and the tape drive is fixed at 9600 baud, though a buffered output may be selected for a faster, continuous, run tape operation. The craft person manually selects the speed of interface via a switch on the LC570B according to the speed the EPROM can support. Models A and B use the normal speed and Models C through J use the high-speed mode to support more line and trunk translations. The speed of interface between the LC570B and RMATS is 300 baud. The run tape operation may be performed from RMATS. The bipolar serial data channel used to interface the system with a peripheral unit such as SMDR equipment is set at 835 kHz, though 185 kHz may be manually selected. One LC570B is required per system.

(40) ***LC594 RAM Circuit:*** This circuit pack contains translation tables and system status for systems using Models D through M. Translations are written into RAM in 16-bit words. The LC594 circuit pack is supported by the AEY-1 memory holdover circuit and battery pack for 10 hours to prevent memory loss in the event of a power failure. One LC594 is required per system.

(41) ***LC597—Dual RS232 Interface Ports:*** This circuit pack is an interface between the PBX and RS232 compatible peripheral equipment. The LC597 replaces the LC570B in multicabinet systems. It interfaces the RMATS and the tape drive on one data channel, and SMDR—Internally Formatted on the other channel. Both data channels are RS232, bidirectional interfaces.

- The RMATS interface operates at 300 baud and the tape drive interface operates at 9600 baud. Though both the tape drive and the RMATS can be connected to the data channel together, both cannot operate simultaneously.
- The SMDR interface is the means of direct output of SMDR data which is formatted internally by the processor. The transmission speed of the SMDR interface is switch-selectable to 300, 1200, 4800, or 9600 baud depending on the peripheral equipment. One LC597 is required per system.

(42) ***ZLC11 96K EPROM Circuit:*** This circuit pack contains the generic program for HCS DIMENSION PRELUDE PBXs. This memory stores 16-bit words or the generic program, routine maintenance tasks and status, and demand tasks (MAAP and CAP procedures). The ZLC11 supports the LC597 for HCS. One ZLC11 is required per system.

(43) ***ZLC14—88K EPROM Circuit:*** This circuit pack contains the generic program for single-cabinet DIMENSION PRELUDE PBX Models A, B, and C. The ZLC14 replaces the LC555 and adds the Enhanced Business Package features. This memory stores 16-bit words of the generic program, routine maintenance tasks and status, and demand tasks (MAAP and CAP procedures and tests). The ZLC14 and LC570B used together can improve the speed of the run tape operation. One ZLC14 is required per system.

(44) ***ZLC16 88K EPROM Circuit:*** This circuit pack contains the generic program with the Enhanced Business Package for multicabinet DIMENSION PRELUDE PBXs. This memory stores 16-bit words of the generic program, routine maintenance tasks and status, and demand tasks (MAAP and CAP procedures). The ZLC16 supports the LC570B in the high speed mode. One ZLC16 is required per system.

5. FCC REGISTRATION REQUIREMENTS

5.01 To comply with the FCC registration requirements, a registered DIMENSION PRELUDE

PBX must be connected to the network through a network interface jack approved by the FCC. The network interface jack is considered part of the network through which registered terminal equipment connects to the network. Additionally, access to cross-connect fields and registered terminal equipment must be restricted, either by locating the cross-connect field in the PBX equipment room or providing cross-connect field enclosures. Wiring in an equipment room with restricted access must remain exposed for the purpose of inspection, and cannot be concealed or embedded in the building structure.

5.02 The 66M3-50R connecting block is the recommended interface connecting block for the DIMENSION PRELUDE PBX. Each 66M3-50R connecting block provides the required RJ21X connector (Fig. 52, A and B). An alternate arrangement consisting of the RJ21X network interface connector can also be provided using the miniature ribbon connector-ended cable (Fig. 52, C) without the 66M3-50R connecting block. When the registered terminal equipment is located in an equipment room with nonrestricted access, the connecting block should be mounted within 7.6 cable meters (25 cable feet) of the cross-connect field. However, for equipment rooms with nonrestricted access, one registered 7.6-meter (25-foot) extender cable in the path from the green cross-connect field to the interface jack is allowed to extend that length to no more than 15.2 meters (50 feet) (Fig. 52, B).

5.03 The only leads wired through the standard network interface are CO tip and ring leads for CO type service (ie, CO trunks, FX, and WATS). Therefore, with DIMENSION PBX, only tip and ring leads from circuit packs LC08D and LC09D are wired to the network interface. All other leads leaving the PBX toward the CO should be cross-connected to a separate connecting block on the green field. Use caution when determining circuits to be connected to the registered terminal equipment side of the network interface (between the RJ21X and the registered DIMENSION PBX). The leads to the network are not covered (protected) by the PBX registration protection.

5.04 The DIMENSION PRELUDE PBX complies with FCC requirements concerning conducted and radiated electromagnetic interference. Properly installed shielded cable ED-1E310-11 is required in order to meet the requirements. Cable groups 104 [GR82 Additions and Maintenance (A&M)], 103 (GR84 A&M), and 85 are used for all external connections with the PBX. Cable groups 77 through 79, and 87 through 101 are used for all intercabinet connections in multicabinet systems.

5.05 DIMENSION PBXs have a registration label affixed on the basic cabinet.

5.06 An FCC registration also requires that the station maximum allowed loop resistance used for serving LC02C/LC03C line circuits, excluding terminal equipment, shall be less than 950 ohms.

5.07 Circuit packs LC09D and LC08 meet FCC registration requirements, for connections to the telephone network, by providing additional protection from lightning surges and power crosses. These circuit packs are always replaced with circuit packs of the same or later alpha suffix whenever replacement is required.

The FCC requirements (Part 68 rules) limit to two (2) the number of simultaneous trunk connections (including the LC361) to the LC06B conferencing circuit.

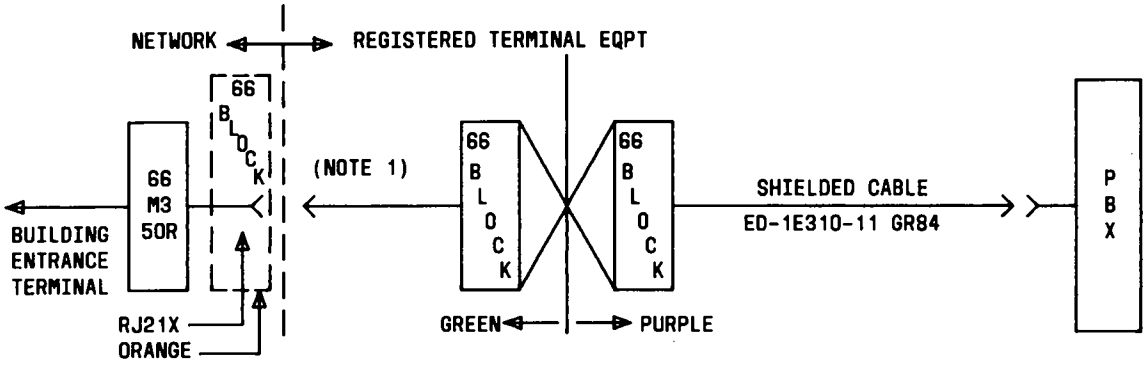
5.08 The DIMENSION PRELUDE PBX cabinets have a permanently lettered registration label that is centrally located at the top of the rear cover.

6. POWER

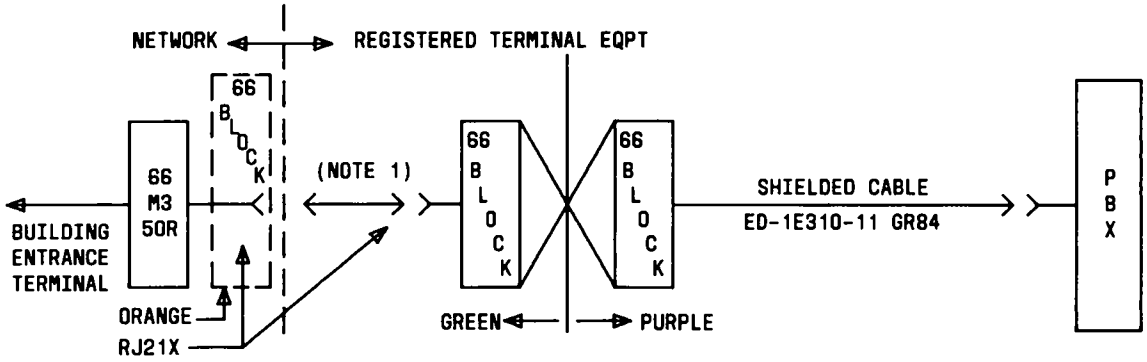
6.01 Commercial power to the PBX is nominally 120 Vac, 60 Hz. The PBX rectifiers are capable of operating under a wide range of frequency and input voltage conditions, provided that both conditions do not occur simultaneously. The operating range is 99 volts to 129 volts if the variation from 60 Hz is ±0.3 Hz, or 105 volts to 129 volts if the variation from 60 Hz is ±3 Hz. A convenience outlet of 120-Vac, 10-ampere capacity is provided inside the cabinets to accommodate test equipment or trouble lamps. A 15-ampere thermal magnetic circuit breaker should be provided on a dedicated branch to prevent nuisance tripping of this circuit breaker caused by large rectifier inrush currents occurring during short power interruptions.

6.02 Circuit fusing for circuit packs is provided with each carrier. System fusing is provided in the power distribution box.

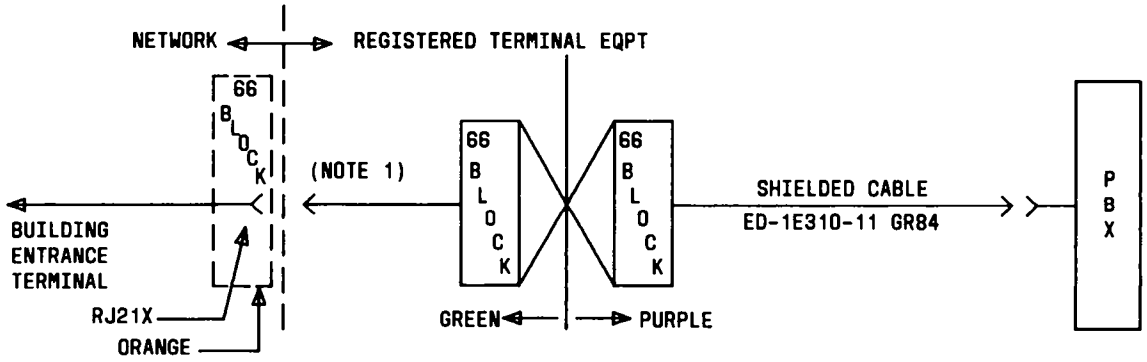
6.03 A load center containing required circuit breakers and ground bars (single-point



A. WITH 66M3-50R ON THE NETWORK SIDE



B. WITH 66M3-50R ON BOTH THE NETWORK AND REGISTERED TERMINAL EQUIPMENT SIDE



C. WITH MINIATURE RIBBON CONNECTOR ENDED CABLE

NOTE:
1. THE DISTANCE BETWEEN THE REGISTERED TERMINAL EQUIPMENT AND THE RJ21X CONNECTOR SHALL BE A MAXIMUM OF 7620 mm (25 FEET) PLUS ONE 7620 mm (25-FOOT) REGISTERED EXTENDER.

Fig. 52—Typical FCC Registered Equipment Interconnections

ground) is always provided for powering and grounding the PBX (refer to Fig. 53).

6.04 The HUBBLE* twist-lock commercial ac power outlet, catalog number IG-2310, and the 20-ampere thermal magnetic circuit breaker are used in earlier DIMENSION PRELUDE PBXs. The HUBBLE IG-4710 power outlet and the 15-ampere thermal magnetic circuit breaker replaces the above in new and repaired systems.

GENERAL

6.05 A 4-cabinet installation is typically powered from a 3-wire, single-phase, 120-Vac 60-ampere feeder. Since there is no phase restriction between cabinets, the 120-Vac, 15-ampere circuit for each cabinet can come from the 1-, 2-, or 3-phase mains.

To maintain system integrity, dedicated power feeder lines should be used. Feeder circuits separate from a dedicated service panel can serve this purpose. The feeders should not be used to power other equipment.

6.06 The ac distribution required for a 2-cabinet DIMENSION PRELUDE PBX system is shown in Fig. 53. Installation and wiring of an ap-

*Registered trademark of Harvey Hubble, Inc

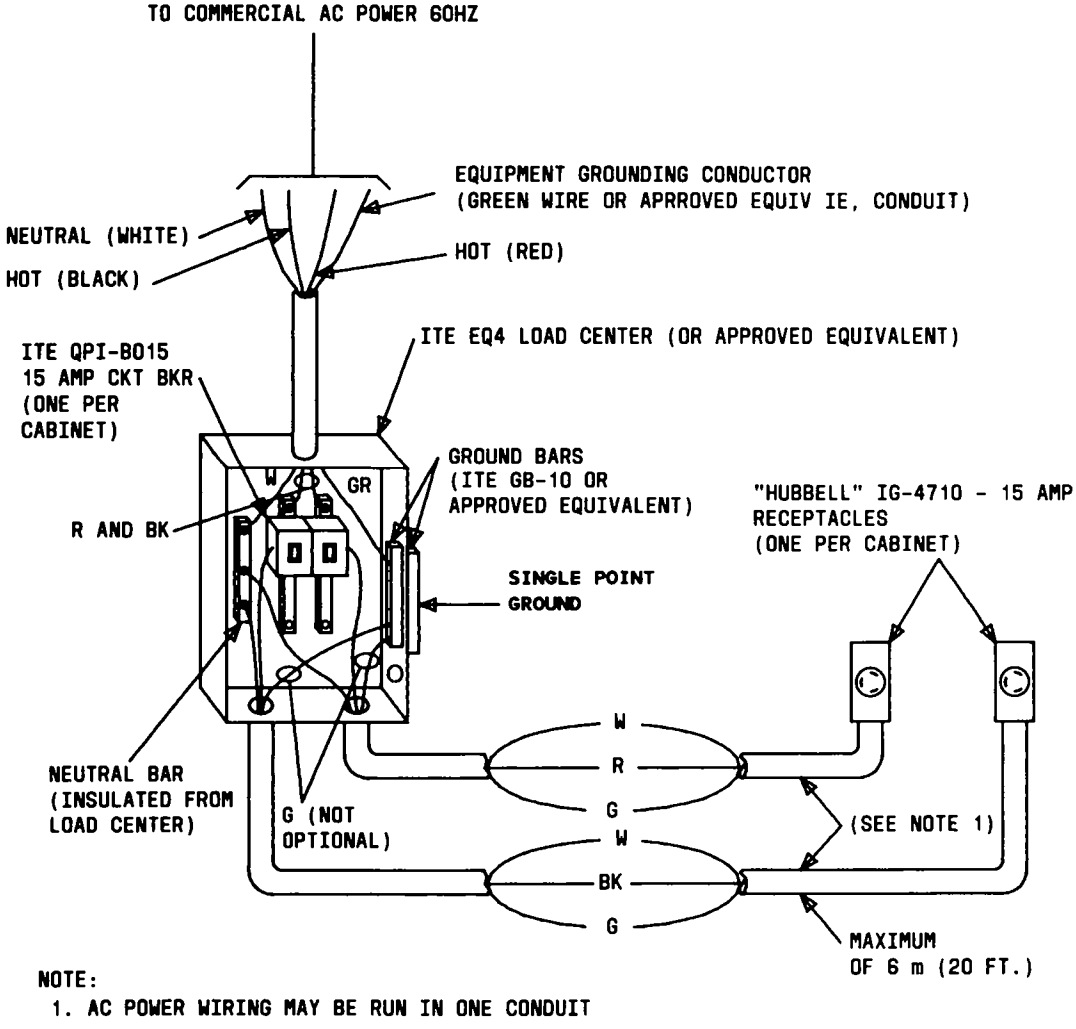


Fig. 53—Load Center and Receptacles for DIMENSION PRELUDE PBX

proved load center must include thermal magnetic circuit breakers, branch circuit wiring, and a wall-mounted receptacle for each cabinet. One circuit breaker and one receptacle are required per cabinet. In all cases, ac wiring and equipment must comply with local codes.

For both single-cabinet and multicabinet systems, the HUBBELE IG-4710 receptacles, the load center, and the ground bars are installed by the customer before installing the PBX.

LOAD CENTER

6.07 A load center (panel board) of appropriate current rating (ITE EQ4 typical, or approved equivalent) is equipped with 15-ampere single-pole thermal magnetic circuit breakers (ITE QPI-BO15 typical, or approved equivalent). Each circuit breaker protects one associated wall-mounted receptacle. The number of circuit breakers and receptacles must accommodate all cabinets (see Fig. 53).

6.08 Two ground bars (ITE GB-10 typical, or approved equivalent) are provided locally.

6.09 The two ground bars are mounted back-to-back on the side of the load center. They hold together in a "sandwich" arrangement such that one is inside the load center and the other on the outside. Star washers between the screwhead and ground bar, between nut and ground bar, and between each ground bar and load center wall ensure an electrical bond between ground bars and load center wall (Fig. 54). The inside ground bar is used to terminate all green wire grounds but not the neutral wire.

6.10 ***Caution: This ground bar shall be tagged with a form which requests that the installer's Repair Service be notified if connections are loose or if they must be moved.***

6.11 The ground bar located on the load center external wall is the PBX single-point ground and is used by the installer to ground the PBX.

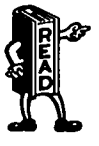
6.12 The National Electrical Code (NEC) and most local codes require that the load center be grounded through an "equipment grounding conductor". The conductor can be one, or a combination, of the following: (1) a separate corrosion-resistant conductor (green wire), (2) rigid metal conduit, (3) electrical metallic tubing, (4) intermediate metal conduit.

6.13 A separate green wire between the load center and the ac service entrance, in addition to the approved metallic conduit, offers no greater protection for the PBX against lightning exposure. However, a separate green wire conductor may be added to provide a more reliable equipment grounding conductor (protection against exposure).

POWER RECEPTACLES

6.14 One HUBBLE twist-lock power receptacle, Catalog No. IG-4710, is always shipped with each cabinet for the power receptacle installation. A power receptacle must be provided behind each cabinet.

6.15 The ac wiring between the load center and wall-mounted receptacle should be kept as short as possible and should not exceed 6.1 meters (20 feet) in length. This requirement limits the length of the ground wire from the PBX to the single-point ground. A separate neutral wire (white) must be run from the load center neutral bar to each receptacle. The cabinets should be distributed evenly over the branch circuit.



A separate ground wire (green) is required between the load center and each receptacle, even though the wiring is run in conduit, armored cable, or raceway.

6.16 The wall-mounted ac receptacles are grounded through the green wire conductor only (equipment grounding conductor). Therefore, power receptacles, designed to use conduit for protective ground, that are mounted in a metallic junction box are used in the PBX installation. The HUBBLE IG-4710 receptacle has a ground terminal insulated from mounting hardware and is specified for this purpose. The NEC requires that a green wire conductor connect the load center to the grounding terminals of the receptacles.

PBX AC CURRENT DRAIN

6.17 The ac current drain for a PBX includes all cabinets and any auxiliary equipment such as SMDR, CPFT, etc. The example values calculated

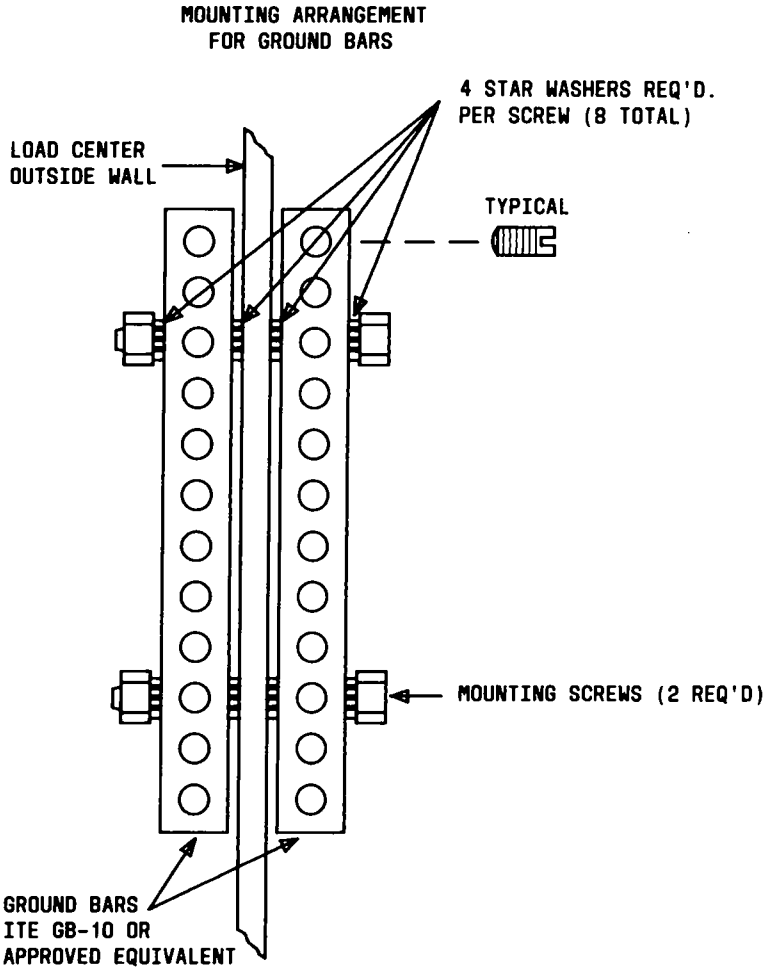


Fig. 54—Mounting Arrangement for Ground Bars

below are typical current drains (in amperes) at 120 Vac 60 Hz. These values should not be used either for design purposes or for specifying the electrical service for the PBX. They may provide current drain values that aid design of backup power (eg, batteries, motor, etc).

Cabinet 00 AC Drain

- No traffic drain = 1.7 + [0.3 X (line carriers + trunk carriers)]
- Medium traffic (6 CCS/line) drain = no traffic drain + [0.4 X (line carriers + trunk carriers)]
- Heavy traffic (9 CCS/line) drain = no traffic drain + [0.6 X (line carriers + trunk carriers)]

Cabinet 01 AC Drain (no control carrier)

- No traffic drain = 0.7 + [0.3 X (line carriers + trunk carriers)]
- Medium traffic (6 CCS/line) drain = no traffic drain + [0.4 X (line carriers + trunk carriers)]
- Heavy traffic (9 CCS/line) drain = no traffic drain + [0.6 X (line carriers + trunk carriers)].

Auxiliary Cabinet

- One frequency generator = 0.7A
- One interrupter = 0.2A
- Fans (when running) = 0.3A

- A −48V rectifier at no load = 0.8A

- To find the ac current drain for circuits powered by the −48V rectifier (KS-22028), multiply the −48V current drain by 0.5, which is a factor that indicates the rectifier efficiency.

Auxiliary Cabinet Example

6.18 If the cabinet is equipped with three CPFT carriers and one −48V rectifier, the ac drain is calculated as follows:

- The −48V current drain is 3 X 0.8 = 2.4 amperes

- The 120 Vac current drain is 2.4 X 0.5 = 1.2 amperes

- The −48V rectifier (no load) drain = 0.8 ampere

- Total ac current drain for the auxiliary cabinet is 1.2 + 0.8 = 2.0 amperes.

7. GROUNDING

7.01 Proper grounding of the PBX is particularly important for personnel safety and equipment protection against lightning surges. Grounding within the PBX cabinet is provided by a copper block (designated as ground block). The block serves as the single connecting junction for the ac ground wire in the power cord (green wire), the circuit ground, and in the frame ground.

SINGLE-CABINET AND MULTICABINET GROUNDING ARRANGEMENT

7.02 A No. 6 AWG ground wire connected from one of the following approved ground sources to the PBX single-point ground provides grounding for single-cabinet and multicabinet systems.

(a) "Water pipe" ground is a metallic water pipe system not less than 12.7 mm (1/2 inch) in diameter that is electrically continuous through the water meter and extends at least 3 meters (10 feet) into earth.

(b) "Building steel" is the building structural steel which is electrically connected to both the metallic water pipe system and the power ground.

(c) Power ground is the electrode to which the power service entering the building is grounded. This may be the metallic water pipe, a ground rod, building steel, footing, ring ground, or the metallic conduit supplying panel boards on the floor.

(d) The secondary side of the power transformer feeding the floor provides a grounding conductor (this option requires a licensed electrician to connect the grounding conductor).

The single-point ground is the ground bar mounted on a side wall of the load center (see Fig. 55). The auxiliary cabinet must be grounded only from the basic (00) cabinet. The coupled bonding conductor must also connect to the PBX single-point ground.

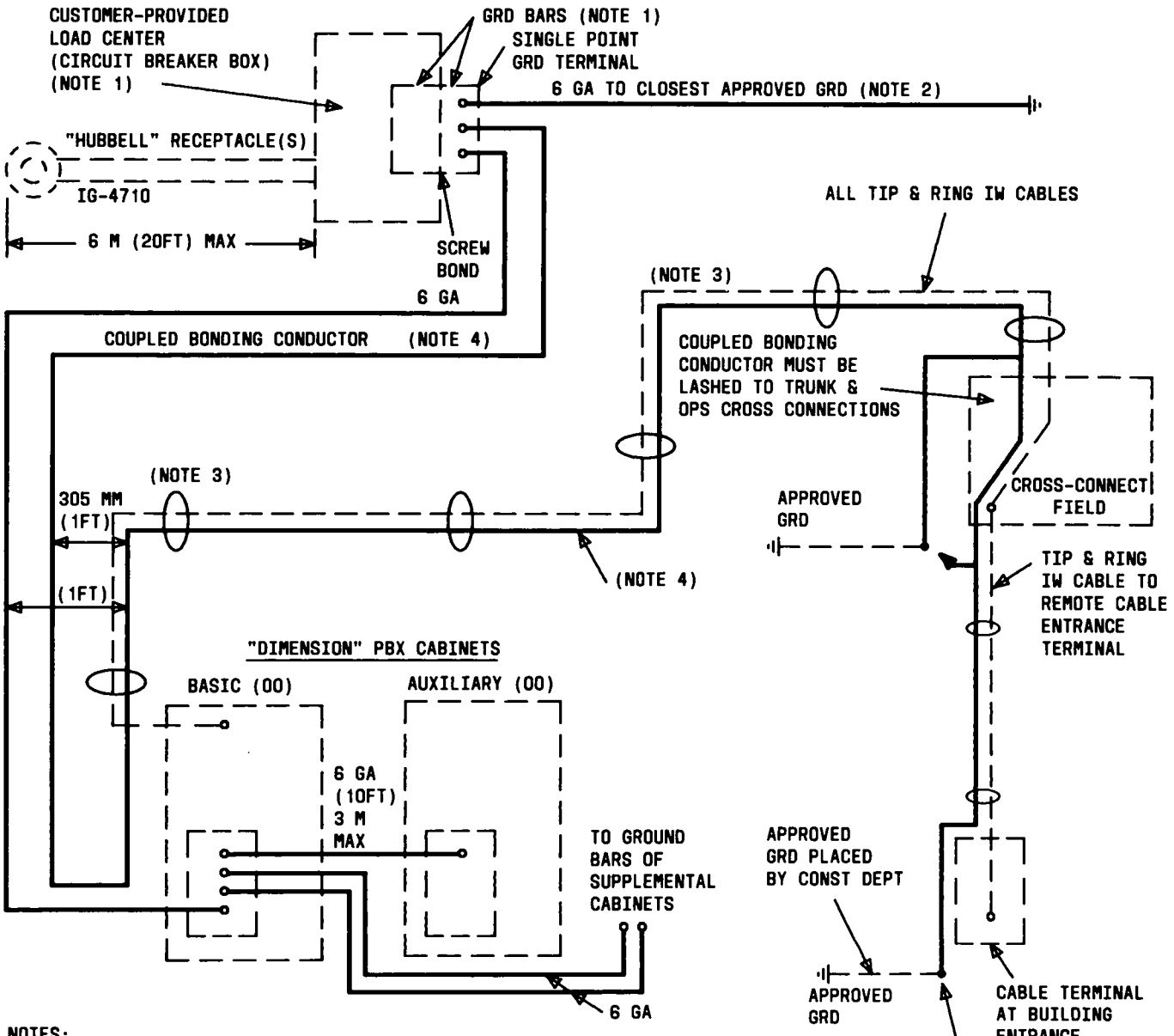
7.03 For information on how to select an approved ground, refer to Sections 876-300-100 and 631-400-102.

Ground Isolation: To preserve the integrity of the single-point ground arrangement, verify that no cabinet or framework (on the PBX side of the customer-provided load center) is connected to or may contact ground at a place other than at the single-point ground (ground window).

7.04 A data set used with the DIMENSION PRELUDE PBX must have circuit ground isolated from frame ground by opening the appropriate (screw) switch. For example, the 113DR data set used for the RMATS feature, uses option P (no common grounds). This opens screw switch S1 in the data set. This isolation is necessary so lightning surges on the data set green wire ground are not transmitted to the PBX.

EMERGENCY TRANSFER PANEL

7.05 A ground conductor (No. 6 AWG) must connect an approved ground source (eg, water pipe, building steel frame, ac power ground, or single-point ground) to the emergency transfer panel (609-type). A No. 14 AWG conductor may be used if sufficient mechanical protection of the conductor is provided. This ground conductor provides ground start for each station set having power failure transfer service, and is not used for equipment protection.



NOTES:

1. LOAD CENTER AND TWO (2) GROUND BARS (ITE GB-10 OR APPROVED EQUIVALENT) MUST ALWAYS BE INSTALLED BY THE CUSTOMER BEFORE STARTING PBX INSTALLATION.
2. ALL HEAVY LINES (—) ARE GROUNDING AND BONDING CONDUCTORS TO BE RUN BY PERSONNEL INSTALLING THE PBX. THESE LINES MUST BE RUN AS SHOWN WITHOUT DEVIATION.
3. CABLE TIES LASH ALL TIP & RING IW CABLES (FROM THE PBX TO THE CROSS-CONNECT FIELD) TO THE 10 GA COUPLED BONDING CONDUCTOR. THE COUPLED BONDING CONDUCTOR SHOULD NOT ENTER THE PBX CABINET.
4. THE COUPLED BONDING CONDUCTOR MAY CONSIST OF THE FOLLOWING:
   - CONTINUOUS CABLE SHEATH
   - 6 GOOD CABLE PAIRS
   - 10 GA WIRE
   - COMBINATION OF THE ABOVE, THAT IS, 10 GA WIRE FROM SINGLE POINT GROUND TO CROSS-CONNECT FIELD, AND CABLE SHIELD FROM CROSS-CONNECT FIELD TO THE GROUND SHOWN NEXT TO THE CABLE TERMINAL.

Fig. 55—Grounding and Bonding Requirements for DIMENSION PRELUDE PBX

8. CABLING

8.01 A cabling plan requires the following considerations:

- Maximum cable lengths
- Number of cables required
- Future growth and rearrangements.

8.02 Installation packages that include the above considerations can be ordered with each system model.

8.03 Standard A25-type cables connect stations, trunks, consoles, etc to the cross connect field. The ED-1E310-11, GR103 cable is used between the PBX and a connectorized cross-connect field. The GR84 cable (A&M) is used with a nonconnectorized cross connect field. The ED-1E310-11, GR85 is used for all other direct connections with the PBX. Cable groups 77 through 79 and 87 through 101 are used for intercabinet connections in multicabinet systems. Cable length can be added by connecting to standard A25-type cable via 107B connectorized terminal blocks.

8.04 Shielded cable for direct connections and cross-connections between the PBX and other equipment must not be shortened to less than 9 meters (30 feet).

8.05 Some special flat and shielded cables are used for high frequency data channels and carrier-to-carrier cabling. The shield must be connected to the terminal grounding blocks located on the rear cabinet uprights. These cables are then cut down on the cross-connect field.

8.06 The cables and carrier connectors are designated by carrier number, cable function, and cable number as follows:

(a) ***Carrier Number:*** Assigned sequentially for each type of carrier in the system. There may be a maximum of seven line carriers numbered 00 through 06, three trunk carriers numbered 01 through 03, and one trunk/control carrier numbered 00. The trunk/control carrier and the cables from this carrier do not have the carrier number specified.

(b) ***Cable Function:*** Circuit designations associated with the cables and connectors are as follows.

- AX—Basic line carrier
- LX—Line carrier
- CA—Attendant interface circuit in a control carrier
- TX—Trunk carrier
- TCX—Trunk/control carrier
- CX—Control carrier.

(c) ***Cable Number on Each Carrier:*** The number of the cable on the particular carrier is as follows:

- AX—From 01 through 03
- LX—From 01 through 03
- CA—01 and 02
- TX—From 01 through 04
- TCX—From 01 through 03
- CX—From 01 through 06.

8.07 See FCC registration requirement information associated with cabling in this section.

9. CROSS-CONNECT FIELD

To meet FCC registration requirements, the cross-connect field located in an area having nonrestricted access must have a protective cover. The cover provides adequate insulation from commercial power wiring and grounding surfaces.

9.01 Colored 183-type backboards identify the types of circuits that terminate at various positions in the cross-connect field. The 66-type connecting blocks are identified by the cables that connect to them. ***Backboard colors and type of circuits terminated are as follows:***

COLOR	TERMINATED
Green	CO trunk sets
Blue	Station line sets

COLOR	TERMINATED
Red	Key equipment
Yellow	Miscellaneous circuits and equipment
Purple	PBX circuits and equipment (line/trunk)
Orange	Demarcation function (CO/customer provided)

9.02 White 187B1 or 196A backboards with standoff type distribution rings separate the fields into upper and lower bands and are used for wiring and cross-connecting different connecting blocks.

POWER FAILURE TRANSFER

9.03 Prewired 609-type interface panels can provide connections to emergency transfer facilities. Each 609 A-type panel contains apparatus for transferring ten stations to ten CO cable pairs during power failure or alarm conditions. The panels are mounted in the cross-connect field, as in Fig. 56, for ease of cross-connecting to the circuits. Trunks with terminal balancing treatment and power failure transfer service are cross-connected so the terminal balancing networks remain in the circuit after power failure transfer.

9.04 A second 609-type transfer panel can be used to transfer an attendant console position for night console operation during an emergency.

9.05 A ground conductor (No. 6 AWG maximum) from an approved ground source (eg, water pipe, building steel frame, or ac power ground) to the 609-type emergency transfer panel supplies ground start for emergency transfer stations. An AWG No. 14 conductor may be used if sufficient mechanical protection is provided for the conductor. This ground start conductor connects a relay contact in the 609-type panel to the ground start key. Ground start is part of emergency transfer service for each PBX station set and is not for equipment protection.

Note: A Thomas & Betts Co. lug ("LUG-IT" No. 3531) for termination of the ground wire (AWG No. 14 through AWG No. 6) is shipped loose with the 609-type panel.

The 48-volt and ground leads to the 609A panel should be insulated to prevent shorts which can cause an unnecessary failure transfer. These leads should not be diverted for any other reason.

9.06 Refer to Section 518-010-101 for detailed information on cross-connect fields installed on customer premises.

CROSS-CONNECT FIELD ENCLOSURES

9.07 The cross-connect field enclosure assembly (Fig. 57) is available in three sizes as follows:

(1) One assembly is 686 mm (27 inches) high, 432 mm (17 inches) wide, and 229 mm (9 inches) deep. This assembly is used to cover one standard 432 mm by 508 mm (17- by 20-inch) backboard and one 196A distribution ring backboard. This size can be expanded horizontally and vertically as necessary.

(2) Another assembly is 1372 mm (54 inches) high, 432 mm (17 inches) wide, and 229 mm (9 inches) deep. This assembly covers two standard 432 mm by 508 mm (17- by 20-inch) backboards and two 196A distribution ring backboards. This size can be expanded horizontally as necessary. A 609-type emergency transfer panel can be located in the vacant part of the field.

(3) Another assembly is 1930 mm (76 inches) high, 432 mm (17 inches) wide, and 229 mm (9 inches) deep. This assembly covers three standard 432 mm by 508 mm (17- by 20-inch) backboards and two 187B1 or three 196A distribution ring backboards.

9.08 These enclosures may be multipled horizontally as needed. The top and side panels can accommodate the additional depth of the 19-mm (3/4-inch) backboard on which the frame assembly is mounted. The door panel is provided in two different groups. Group 1 is used when the field enclosure assembly is mounted on the wooden backboard and Group 4 is used when the field enclosure assembly is mounted flush on the wall (without wooden backboard).

9.09 The 1930-mm (76-inch) high enclosure assembly is normally used when the cabinets and backboard enclosure assembly are further separated.

9.10 The following equipment is needed to install one 1930-mm (76-inch) high cross-connect field enclosure (ED-1E322-70).

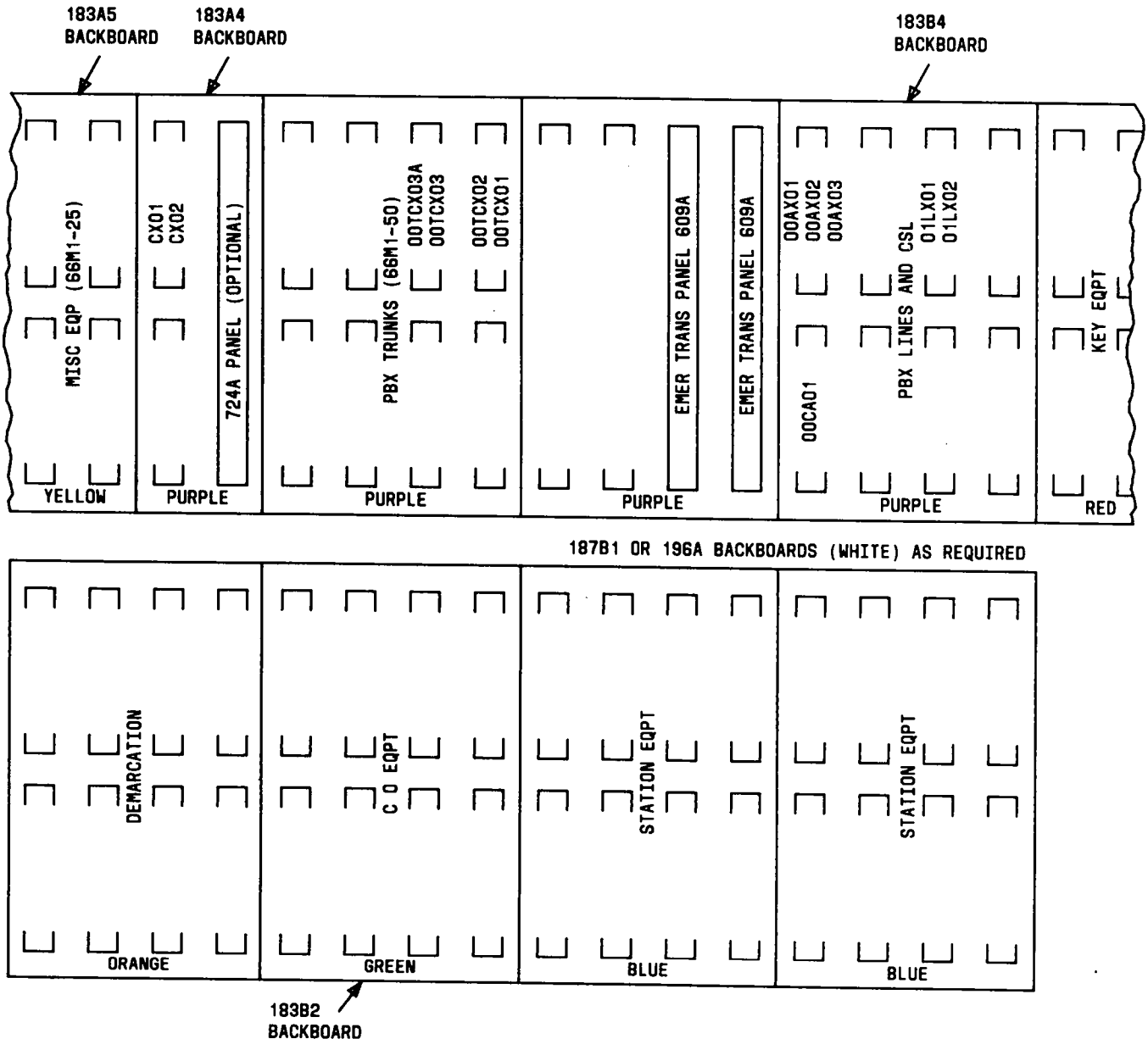


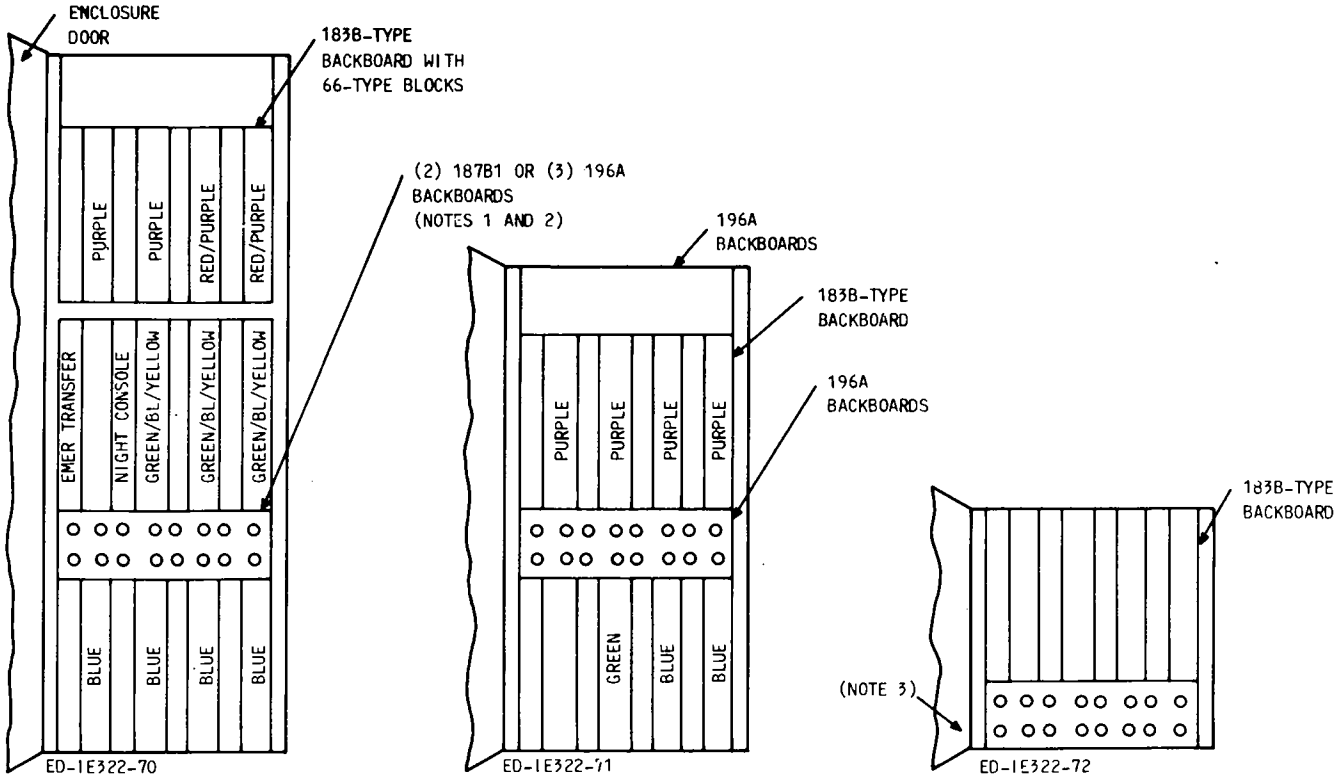
Fig. 56—Cross-Connect Field

- One GR1/GR4, consisting of the basic enclosure with door, brackets, and hardware
- Two GR2s, each consisting of one side panel and hardware
- Two GR3s, each consisting of one top/bottom panel and hardware.

When more than one enclosure is used (joined), GR2 side panels are required only at the ends.

9.11 The following equipment is needed to install a 1372-mm (54-inch) high cross-connect field enclosure (ED-1E322-71):

- One GR1/GR4, consisting of basic enclosure with door, brackets, and hardware



CODE (NOTE 4)	BACKBOARD COLOR	CIRCUITS OR EQUIPMENT TERMINATED
B2	GREEN	CENTRAL OFFICE TRUNK CIRCUITS
B1	BLUE	STATION LINE CIRCUITS
B3	RED	KEY AND ECTS EQUIPMENT
A5 OR B5	YELLOW	MISCELLANEOUS CIRCUITS AND EQUIPMENT
A4 OR B4	PURPLE	PBX CIRCUITS AND EQUIPMENT

NOTES:
1. PLYWOOD BACKBOARD MOUNTS FOR ALL SIZES (OPTIONAL).
2. BACKBOARD ARRANGEMENTS ARE FLEXIBLE. REFER TO SECTION 518-010-101 FOR TYPICAL LAYOUTS.
3. CABLING IN THROUGH KNOCKOUTS IN SIDE AND BOTTOM.
4. "A" SIZE = 21.5 cm X 50.8 cm (8.5 IN. X 20 IN.) "B" SIZE = 43.2 cm X 50.8 cm (17 IN. X 20 IN.)

Fig. 57—Cross-Connect Field Enclosures

- Two GR2s, each consisting of one side panel and hardware
- Two GR3s, each consisting of one top/bottom panel and hardware.

When more than one enclosure is used (joined), GR2 side panels are required only at the ends.

9.12 The following equipment is needed to install a 686-mm (27-inch) high cross-connect field enclosure (ED-1E322-72):

- One GR1/GR4, consisting of the basic enclosure with door, brackets, and hardware
- Two GR2s, each consisting of one side panel and hardware
- Two GR3s, each consisting of a top/bottom panel with hardware.

When more than one enclosure is used (joined), GR2 side panels are required only at the ends.

9.13 The cross-connect field enclosures are placed on customer premises and house the following apparatus:

- 183 (Type) backboards
- 184 (Type) backboards
- 187B1 backboards
- 196A backboards
- 609-Type power failure transfer panels
- 620A (modular) key panels
- 624A (modular) key panels
- 641A (modular) key panels
- 642A (modular) key panels
- 720A panel
- 722A panel
- 724A panel.

Backboard ordering information is shown in Table S. Installation packages with the appropriate enclosures and associated equipment can be ordered for each system model.

CROSS-CONNECT TABLES

9.14 Computer-generated cross-connect tables are delivered from the factory prior to the delivery of the system. These tables should be completed for use by system installers.

ATTENDANT CONSOLE CROSS-CONNECTIONS

9.15 The attendant console may be connected directly to the CA01 connector on the trunk/control carrier using an ED-1E310-11 GR85 cable no less than 9 meters (30 feet) long. Otherwise, the console can be connected to the cross-connect field (107B connectorized block) using an ED-1E310-11 GR103 cable [GR84 cable (A&M) is used with earlier nonconnectorized blocks]. Refer to Figure 58 for an illustration of these connections. Second, third, and fourth attendant consoles are connected to the CA02, CA03, and CA04 connectors, respectively, on the J58891AA trunk/control carrier.

NIGHT CONSOLE CROSS-CONNECTIONS

9.16 The attendant selects night console mode via the 6017B night transfer switch at the daytime console and disconnects the daytime console handset or headset. The night console is switched in and out of service by the 609-type transfer panel located in the cross-connect field (see Fig. 59). Day and night console connections are made via cross-connect field blocks when night console service is provided.

10. ELECTRICAL PROTECTION REQUIREMENTS

10.01 For detailed protection requirements for PBX stations and equipment, refer to Section 876-300-100.

PROTECTORS

10.02 The PBX requires station protectors if either its associated outside plant (or the building in which it is installed) or the ac power lines serving the premises are exposed to lightning surges. Station protectors protect tip and ring leads associated with trunks. If off-premises stations operate in exposed environments, they also require station protectors for their tip and ring leads. In either case, the ground terminal of the building entrance protectors must be

TABLE S

BACKBOARD DESIGNATIONS

TYPE	COLOR	SIZE IN MILLIMETERS (INCHES)	ORDERING CODE
183A4	Purple	216 (8.5) × 508 (20)	101937902
183A5	Yellow	216 (8.5) × 508 (20)	101986446
183B1	Blue	432 (17) × 508 (20)	101412989
183B2	Green	432 (17) × 508 (20)	101564631
183B3	Red	432 (17) × 508 (20)	101937910
183B4	Purple	432 (17) × 508 (20)	101937928
183B5	Yellow	432 (17) × 508 (20)	101986453
196A	White	432 (17) × 117 (4.6)	102581089
187B1	White	432 (17) × 168 (6.6)	101937944
183C6	Orange	216 (8.5) × 204 (10)	10356202

bonded to the PBX single-point ground via a conductor from the protected tip and ring leads (see "COUPLED BONDING CONDUCTOR" below). ***To minimize lightning surges at the PBX:***

- Verify that all exposed tip and ring leads are protected.
- If trunks or off-premises lines are added, determine if electrical protection is necessary and, if so, add protection.
- Provide protection if outside plant or ac lines are exposed. No protection is required if only the building is exposed.
- Always ground and bond PBX in the prescribed manner.
- Verify that the cold water pipe system is bonded to the ac power entrance ground.
- Verify that the metallic shield of the building entrance cable is grounded and also bonded to the protector ground terminal.

SNEAK CURRENT PROTECTION

10.03 Heat coils or 60-type fuses must be installed in all CO trunks or tie trunks that require electrical protection. Exposed off-premises extensions do not require sneak current protection. For detailed information on installing sneak current protection see Section 876-300-100 and Section 460-100-400.

COUPLED BONDING CONDUCTOR

10.04 An electrical connection is necessary between the PBX single-point ground and the protector ground terminal. Without protectors, the coupled bonding conductor is connected to the building entrance cable ground. The protector connection reduces the difference in potential possible between the system ground and tip and ring leads due to lightning surges. The electrical potential difference is greatly reduced by a coupled bonding conductor's close connection (to establish transformer action) to the tip and ring leads of the PBX.

10.05 The coupled bonding conductor is always connected to the PBX single-point ground, is

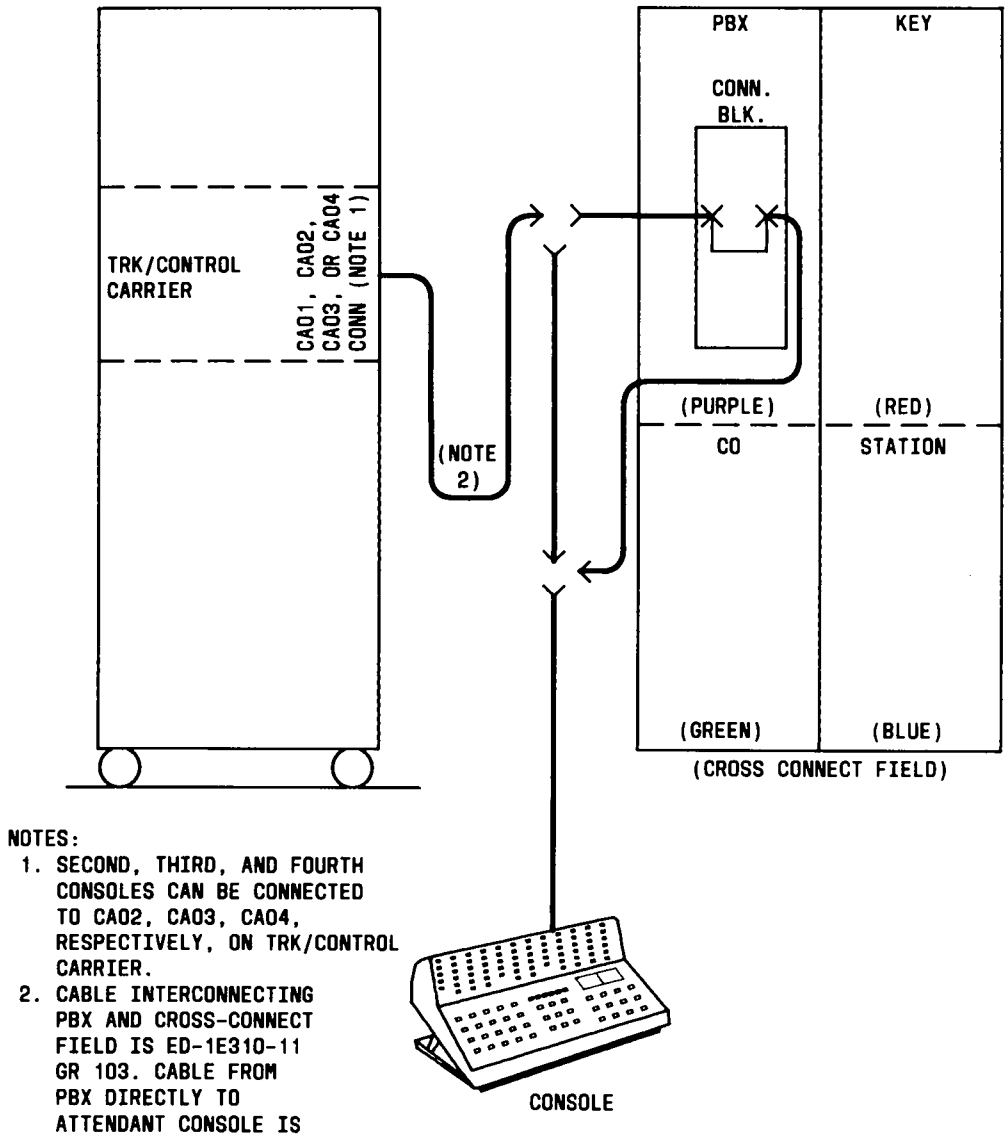


Fig. 58—Console Connected to the PBX via the Cross-Connect Field

bonded to the tip and ring cables, and follows the cables to the cross-connect field. At the cross-connect field, the conductor connects to the approved ground. The coupled bonding conductor is also lashed to the trunk and OPS cables at the cross-connect field and connects to the approved ground at the building cable entrance. If a No. 10 AWG conductor is used, it is installed from the single-point ground terminal to the basic (00) PBX cabinet. At that point the conductor is lashed to the cables containing the tip and ring pairs from all PBX cabinets. At the cross-connect field the conductor connects to approved ground via the protector or continuous metallic cable sheath ground lug. If the ground lug is not at the cross-connect field, the coupled bonding conductor is extended to the remote ground lug (building cable entrance) and lashed to the tip and ring cable there. Six spare cable pairs in the remote tip and ring cable may be tied together and used in lieu of the No. 10 AWG conductor. These cable pairs must be tagged with Form E-3013B. In a 3-story or higher building of structural steel or reinforced concrete, the shield on a riser cable can be used as remote ground. If no shielded riser cables are found, a No. 6 AWG copper

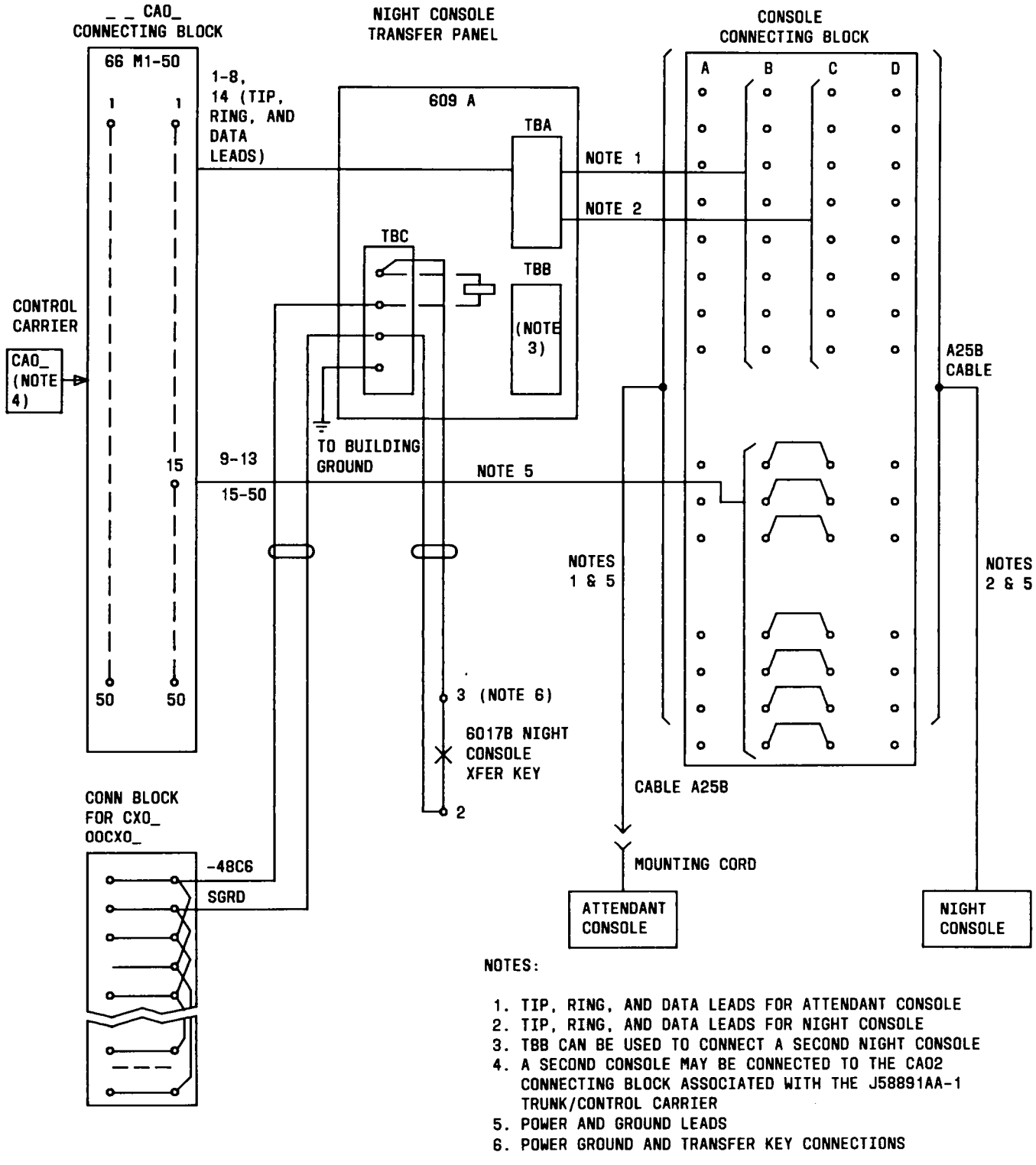


Fig. 59—Night Console Interconnection

cable can be run along an unshielded riser cable to the approved ground.

10.06 The coupled bonding conductor from the protector ground to the green cross-connect field should be the continuous metallic cable sheath, if the sheath is provided. A No. 10 AWG copper wire or six No. 24 AWG cable pairs replace the sheath where not provided at the installation.

10.07 For methods of providing the coupled bonding conductor in high-rise and low-wide buildings, see Section 876-300-100.

11. TRANSPORTATION

11.01 The system should always be shipped packaged in the Western Electric Company provided crates.

11.02 The packing material used for shipping cabinets from Western Electric is adequate for upright or lay-down (on-side) shipment. However, upright shipment is preferred. If cabinets are shipped lying down, installation personnel should carefully raise the cabinets to upright position before unpacking. The order of preference for modes of transporting PBX equipment are truck, rail, and air. Air transportation may subject equipment to severe handling shocks. Rail transportation is less severe, but railroad car coupling shocks can severely stress the system.

11.03 The system should remain packaged until moved to its permanent location.

11.04 A forklift and dolly are acceptable means of handling the crated system on customer premises. The pallet portion of the crate is designed for these methods of handling.

11.05 The system (crated or uncrated) should not be dropped from any height. Furthermore, under no circumstances should the system drop from a height greater than 203 mm (8 inches) packaged or 25 mm (1 inch) unpackaged.

12. ENVIRONMENTAL REQUIREMENTS

TEMPERATURE AND HUMIDITY

12.01 Exposure to extreme temperatures and humidity may degrade telephone service and cause lasting damage to the system equipment.

12.02 The equipment is designed to operate at ambient temperatures from 0° to 49° C (32° to 120° F) and at 10 to 95 percent relative humidity conditions. These limits should not be regarded as desirable working conditions for minimum maintenance, and do not include power or battery equipment. Recommended ambient temperature is the range of 18° to 35° C (65° to 95° F). Recommended relative humidity for equipment locations is from 20 to 60 percent.

12.03 The ac distribution unit in the J58891A and J58891C cabinets provide power for the rectifiers and the optional fan assembly. The temperature sensors are powered by dc from the power supply. If cabinet temperature exceeds 54° ±3° C (130° ±5° F), the sensors activate the fans, if provided, until the temperature drops to 46° ±3° C (115° ±5° F). A critical temperature indicator is activated at 63° ±3° C (145° ±5° F) generating an overtemperature alarm.

> ***Note:*** Temperature is measured by an ordinary thermometer at a location 1524 mm (5 feet) above the floor and 381 mm (15 inches) in front of the cabinet.

12.04 The following are site selection guidelines:

(a) The equipment should be installed in an air-conditioned space whenever possible. Fans are ordered nonstandard when necessitated by the following conditions:

(1) The equipment space is not air-conditioned and the ambient temperature can exceed 32° C (90° F).

(2) Filters are used.

(b) Environments which are not recommended for installation because of potential temperature problems include:

(1) Rooms in which a major heat source (ie, boiler room, furnace room, manufacturing areas using hot processes) can affect the ambient room temperature significantly.

(2) Conditions that cause excessive ambient temperature include the following:

(a) Nonventilated rooms with less than 50 square feet of floor space

(b) Nonventilated rooms with two or more exterior walls that are frequently exposed to high ambient temperatures.

12.05 Determine air-conditioning requirements, according to room size, using the total power dissipation of the PBX cabinet as 432 watts (1587 BTU/HR).

12.06 The above power dissipation rate can heat small rooms above the maximum operating temperature of equipment without proper air-conditioning or ventilation. Determine if the room ventilation and/or air-conditioning systems meet the requirements for each installation.

AIR CONTAMINATION

12.07 Use of filters in the equipment is determined by the environment. Environments are divided into the following air contamination classifications:

(a) ***Heavy Industrial:*** Space in which industrial processes or construction work act as sources of excessive dust or lint. This environment is not recommended as an installation site. However, if it is necessary to install a system in this environment, filters are required on each cabinet.

(b) ***Average Industrial:*** Nonmanufacturing space in industrial areas. Filters must be used on each cabinet installed in this environment.

(c) ***Average Residential:*** Storage or office space with heavy traffic or with adjacent building exits and entrances. In this environment, if the system is equipped with fans (for temperature control), filters are required on each cabinet.

(d) ***Relatively Clean Room:*** Interior rooms in office space with little or no traffic. Filters are not required in this environment.

12.08 The basic PBX equipment is primarily solid-state devices though certain features require the use of contact relays. The relays are mounted in auxiliary cabinets or on the wall. This equipment is susceptible to the same adverse effects from contaminants as previous electromechanical equipment. Copy machines may contaminate open contact relays. Relay equipment should be located away from equipment that emits such contaminants. If it is necessary to locate relay equipment in such an environment, special filtration should be used. The special filtration system in Section 534-367-201 is only used in auxiliary equipment containing open contact relays. Fans installed in this auxiliary equipment, are not used with the special filtration system.

12.09 In severely contaminated industrial environments, other equipment may be affected. Gold fingers and connector interfaces could chemically deteriorate through the corrosive effects of gases. Environments containing high concentrations of corrosive gases should not be used as installation sites. Industrial areas suitable for prolonged human activity (without safety protection) are not considered severely contaminated, and can be used as installation locations.

12.10 Filters require replacement when contaminated. The replacement interval varies from a few weeks to a year or more, depending on local conditions. Under average conditions, filter life can be longer than 6 months. Filters are inspected at intervals determined by the system environment.

ACOUSTICS

12.11 The system should be located in an environment that allows maintenance personnel to hear tones through a standard headset during necessary tests.

12.12 The noise levels which do not permit sound to be heard over the standard headset are the same or greater than those specified in the Occupational Safety and Health Act (OSHA)(normally 90 dB). Refer to current OSHA requirements for acceptable levels.

LIGHTING

12.13 The light intensity around the system cabinet should conform with OSHA standards to provide comfortable lighting for maintenance personnel. For accurate footcandle measurement, measure light in center aisle, 1524 mm (5 feet) above the floor, aiming meter upward. Light measurement can be made with a WESTON* Footcandle Meter, Model 614.

ELECTRICAL FIELDS

12.14 To prevent noise in the system, power lines specifically for the PBX should be used. Separate branch circuits can serve this purpose.

12.15 Electromagnetic fields may cause noise in the PBX. Avoid placing the PBX cabinets

*Registered trademark of Weston Instruments, Inc

and/or cable runs near high field strengths from sources such as AM radio transmitters, induction heaters, elevator motors, and similar equipment. If the field strength is less than 0.05 volt per meter, interference is not likely. Interference may or may not occur in fields between 0.05 and 1.0 volt per meter. In systems where the field strength is greater than 1.0 volt per meter, interference is likely. This interference can result in a demodulated tone or garbled tone in the audio band during telephone conversations. The resultant demodulated tone should be calculated to determine the correction needed. In addition to the field strength near the PBX cabinet, the field strength near cable runs (both in the building and surrounding area) should also be considered. Not all AM radio stations cause interference in the audio band. In most cases, interference is introduced into the system via trunk or station cables or both.

12.16 Noise in cable pairs is corrected by installing an electromagnetic interference (EMI) filter assembly per ED-1E403. Mounting holes for the filter assembly are predrilled (Fig. 60). The mounting assembly has capacity for ten 1513A filter assemblies. A Group 3 assembly consists of one EMI filter mounting panel and one filter cover. The EMI filter assemblies (Group 2) must be added to the Group 3 assembly. Each Group 2 filter assembly consists of one EMI filter assembly and one connecting cable (ED-1E367, Group 935).

12.17 One filter assembly and a connecting cable accommodate one 25-pair trunk or line cable. The connecting cable connects the J1 connector on the filter assembly to the cross-connect field. There are no power requirements, but a ground lead must connect the unit to the main ground block.

12.18 Since cable pairs leaving the premises [such as trunk and off-premises station (OPS) pairs] are most susceptible, these pairs are treated first. If the treatment does not eliminate the problem, treatment of station cable pairs may be required. Examination of the PBX grounding runs (for coupling) and ground loops may also be required, depending upon local conditions. The AM radio stations cause most interference due to the electrical characteristics of the PBX which limit demodulation to frequencies from 500 kHz to 10 MHz.

12.19 If the attendant console cables are the coupling mechanism, standard 1542AM inductors are used to filter the console audio pairs. The 1513A filter is not used for filtering the console cable because it inhibits data transmission on the data pairs.

12.20 Field strength is measured using a standard field strength meter like the Holaday Industries model HI-3001, the Instruments for Industry Inc. Electric Field Sensor (EFS1), or the Electrometrics R70B meter. If the field strength from a broadcast station cannot be measured, the field strength can be approximated by dividing the square root of emitted power in kilowatts by the distance from the antenna in kilometers. This approximation gives field strength in volts per meter and is relatively accurate except when very close to the antenna. In those cases, the field strength must be measured.

12.21 Noise interference results in a PBX placed near (same or adjacent room) motors of more than 186 watts (1/4 horsepower) having commutators. Small tools and appliances with universal motors do not cause interference if operated on separate power lines. Motors without synchronous or asynchronous commutators generally do not cause interference in the PBX. Often, concern for interference is unnecessary because unprotected PBXs are generally not affected. Therefore, noise interference correction is performed after a system is installed and tested.

To prevent electrostatic noise in the system, the frame is grounded as described in this section. Maintenance personnel should wear an authorized wrist strap grounded to the frame to prevent electrostatic noise and discharge in the PBX.

13. FLOOR PLANS

13.01 A minimum floor plan for a single-cabinet system is shown in Fig. 61. All dimensions in this figure are minimal. The total footprint area is 0.46 square meters (5.0 square feet per cabinet. The recommended area including maintenance is 2.16 square meters (23.3 square feet) per cabinet. Maintenance space is required in front of and on the side of the equipment cabinets to permit access to the interior components.

13.02 A suggested floor plan for a 4-cabinet DIMENSION PRELUDE PBX is shown in Fig. 62. The footprint area of each cabinet is 0.46

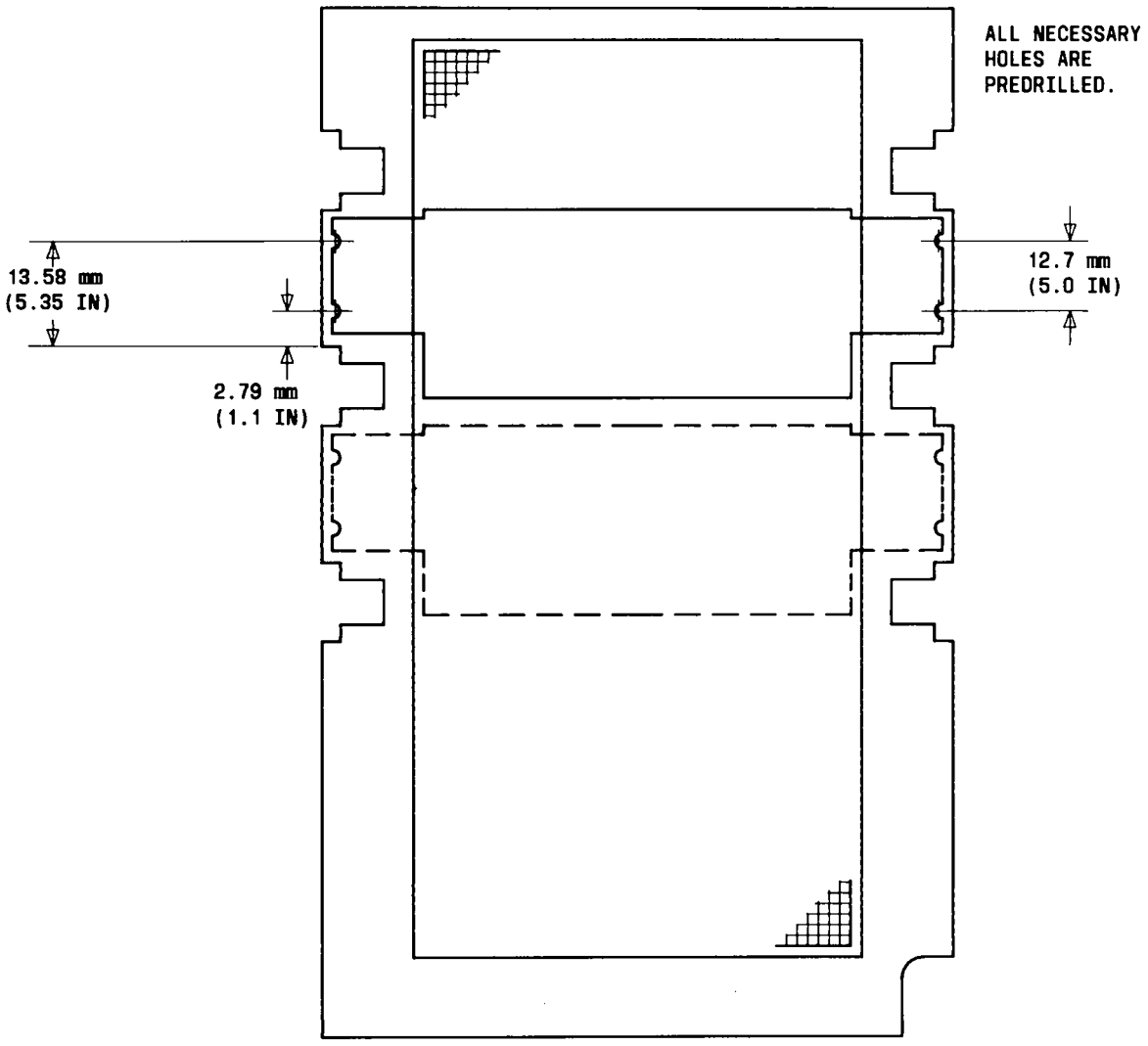


Fig. 60—EMI Filter Assemblies Mounted on Rear Panel of PBX Cabinets

square meters (5.0 square feet). The recommended area for each system cabinet, including maintenance area, is 2.16 square meters (23.3 square feet).

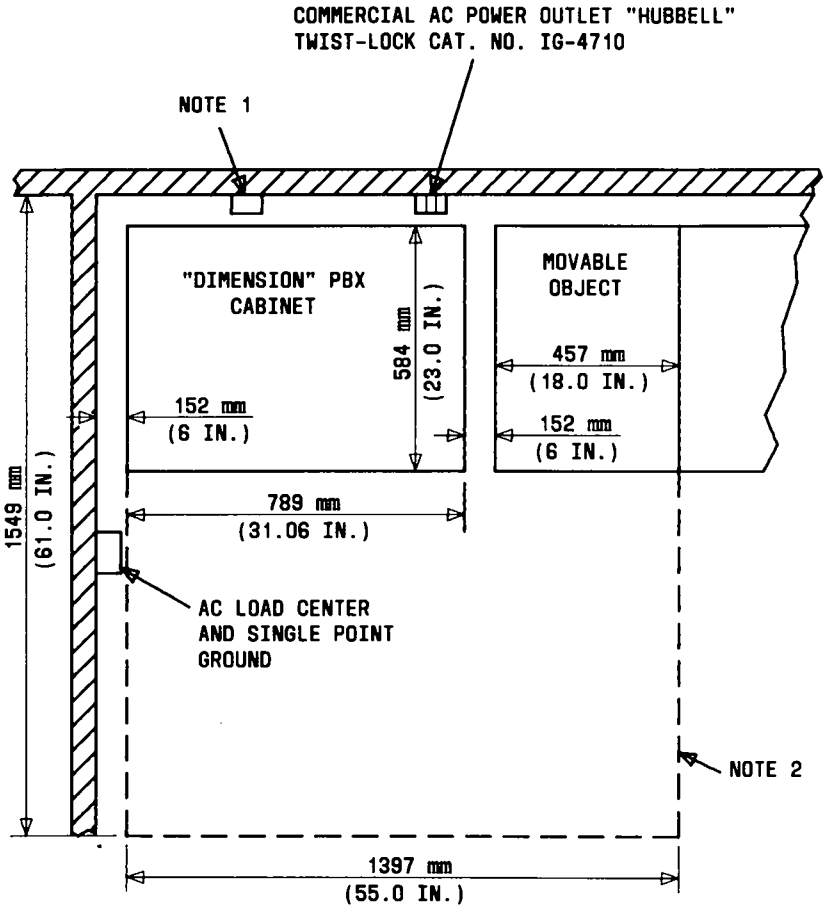
13.03 A great deal of flexibility is available beyond these standards. However, the minimum requirement specified in commercial floor loading codes must always be met. The requirements for thermal environment must also be followed.

13.04 A minimum of 152 mm (6 inches) of space should be maintained between the top of the cabinet and any obstruction (shelf or ceiling) to permit adequate air flow for cooling the system. Also, 152 mm (6 inches) of space is required on each side of the cabinets for access to the flip latches that secure the front cover.

13.05 A nylon cable clamp is wall-mounted 12.7 mm (1/2 inch) from the top of each cabinet. The maximum distance between load center and HUBBLE receptacle is 6 meters (20 feet). The main cross-connect field should be located near the cabinets to simplify testing and maintenance.

FLOOR LOADING

13.06 The minimum requirement in any commercial floor loading codes is 244 kg per square meter (50 pounds per square foot). The maximum



NOTES:
1. NYLON CABLE CLAMP MOUNTED 13 mm (1/2 IN.) FROM TOP OF CABINET.
2. DASHED LINES INDICATE MINIMUM MAINTENANCE AREA.

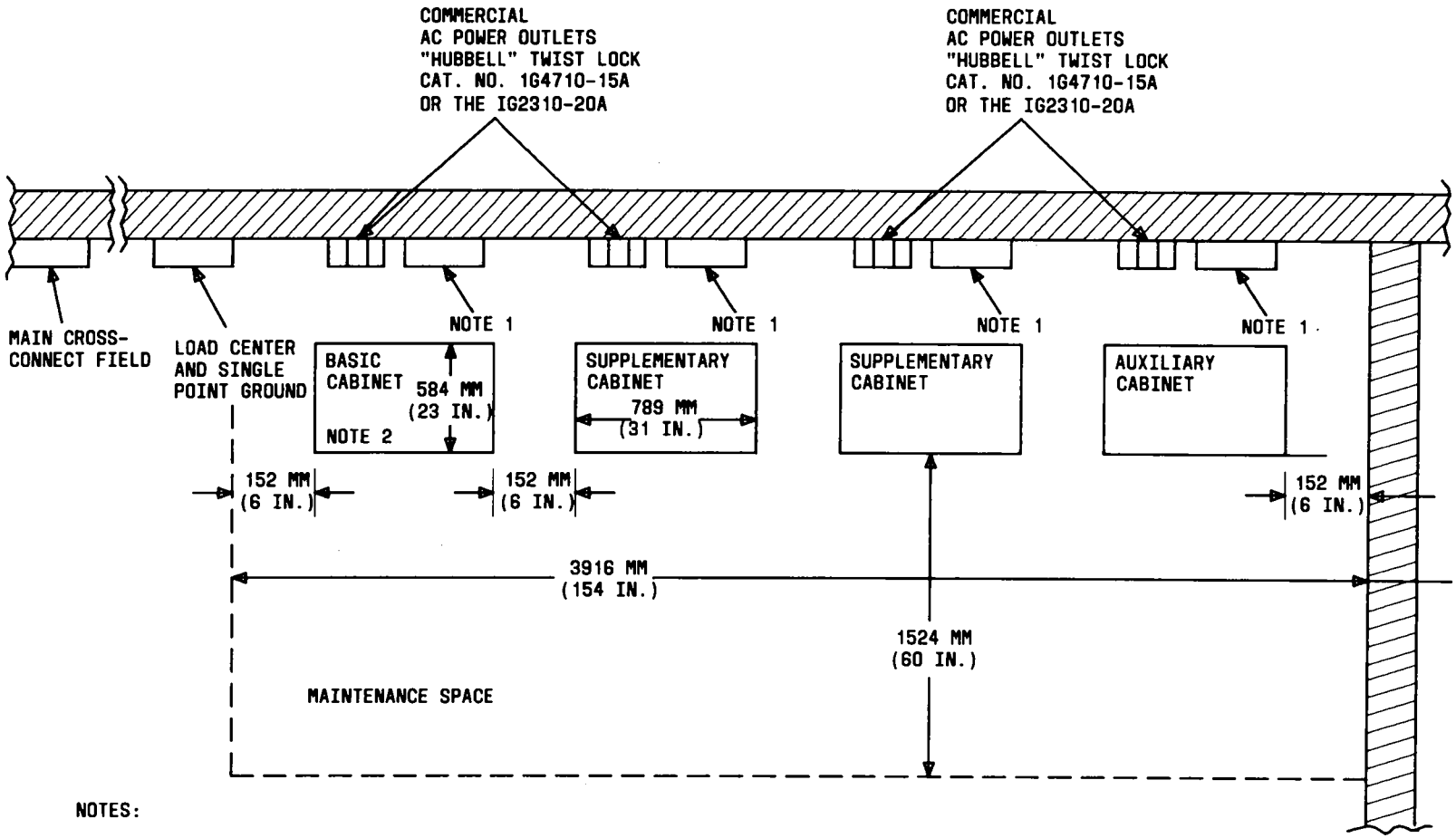
Fig. 61—Minimum Floor Space Requirements

weight of the PBX carrier cabinet is about 272 kg (600 pounds). Thus, a free maintenance area of at least 1 square meter (12 square feet) per cabinet must be provided on a floor rated at 244 kg per square meter (50 pounds per square foot).

13.07 Concentrated floor loads under the casters of the system are 135 psi (pounds per square inch) for the 3-carrier PBX cabinet. The cabinet casters may cause lasting dents in some surfaces such as soft tile or linoleum. If this is a concern, the tolerance of the floor surface can be compared to the 135 psi loading. If the floor tolerance is less, the floor plate should be used. In most cases, this is not necessary because the cabinet rarely occupies the same position throughout its service. Hence, the dents are usually no more severe than those of a large desk.

STABILITY AND MOVEMENT

13.08 Earthquake or disaster bracing may be required by law or otherwise necessary. Earthquake probability for areas in the United States is shown in Fig. 63. Earthquake bracing for PBXs is used accordingly. The PBX cabinet may be bolted directly to the floor. Four insulating bolts, four insulating washers, and four spacer assemblies are used in holes provided in the baseplate of the cabinet. A cabinet bolted to the floor should have maintenance access space behind it of 610 mm (24 inches).



NOTES:

1. NYLON CABLE CLAMP MOUNTED 13 MM (0.5 IN.) FROM TOP OF EACH CABINET.
2. APPROXIMATELY 152 MM (6 IN.) VENTILATION SPACE IS REQUIRED ABOVE EACH CABINET.

Fig. 62—Multiple Cabinet DIMENSION PRELUDE PBX Minimum Floor Space Requirements

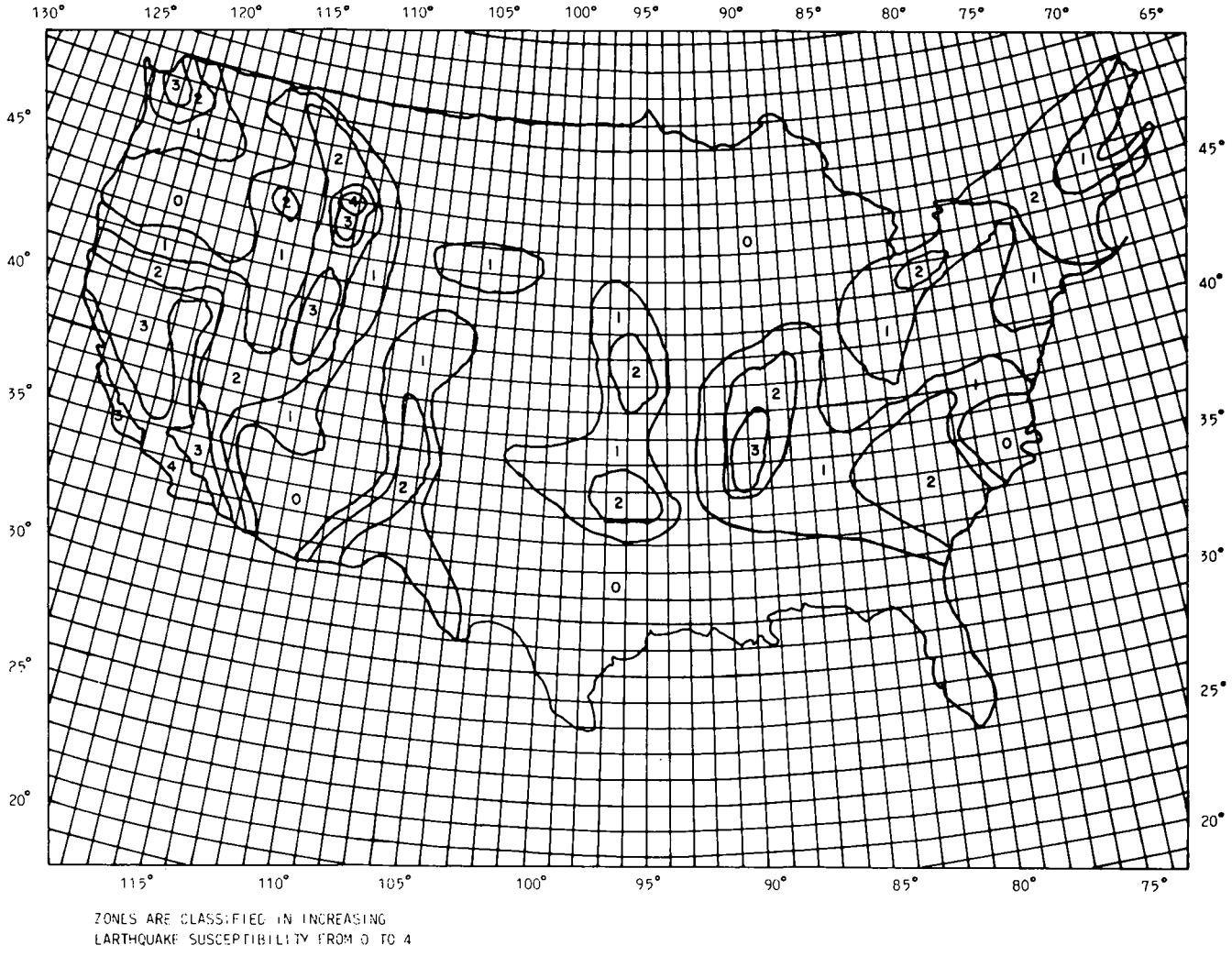


Fig. 63—Earthquake Environment (USA)

13.09 Move the cabinet slowly across deep pile carpets to prevent tipping. The cabinet casters allow adequate force (about 36 kg or about 80 pounds) to start the cabinet moving on thick carpet. Also, the casters permit moderate movement (about 610 mm per second or about 2 feet per second) of the cabinet without risk of tipping on bumps or irregularities in the floor. Movement faster than 610 mm per second (2 feet per second) may cause the cabinet to tip.

14. DESCRIPTION OF OPERATION

GENERAL INFORMATION

14.01 Call processing is controlled by the central processor. The processor monitors the status of peripheral devices and reacts to changes of state in the system by executing software instructions. The software instructions are contained in the generic main memory on the EPROM circuit pack. The RAM contains translations information read from the tape or administered via the MAAP. The processor uses translation information such as class of service, hunting, and line number-to-equipment location, for call processing. The customer can choose standard translations available according to the model PBX desired, or the customer can choose a more customized configuration. The standard translations, on the tape, for the model configurations can be shipped with the system and readily administered. Alternate-

ly, a very basic set of translations can be customized as desired on the premises via the MAAP. If desired, the tape drive unit (BRAEMAR) and the CAP can be made available for further on-sight translation administration by the customer.

14.02 When a DIMENSION PRELUDE PBX is installed, the translations contained on the tape are read into the RAM, or the desired translations are administered via the MAAP. In any event, the translations administered when the PBX is installed are stored on the tape which is kept in the PBX basic equipment cabinet. The BRAEMAR tape drive unit may or may not be resident with the system. If a power failure occurs that is longer than the memory holdover battery duration, the translations in RAM are lost. The translations must be reinitialized when power returns. If the tape drive unit and tape are accessible by the system, the translations on the tape are automatically reloaded. Otherwise, the translations are reloaded by manually operating the tape drive unit. The following failures and errors make reinitialization necessary:

(a) ***Long Power Failure (RAM Contents Lost):*** This occurs after approximately 10 hours on memory holdover when the battery duration is exceeded. The RAM contents are restored from the tape. If the tape drive unit is not accessible by the system, the PBX automatically activates Power Failure Transfer.

(b) ***Software Errors:*** The INITA program takes control of the PBX when software errors such as bad memory parity, illegal program branches, or illegal memory writes occur. The INITA program aborts calls or maintenance tasks being performed and reschedules call processing tasks.

(c) ***Persistent Software Errors:*** The occurrence of five software errors within 2 minutes causes the INITB program to take control of the PBX. If INITB is activated again within 20 minutes, the system reacts as if a long power failure has occurred, as in (a) above.

CALL PROCESSING

14.03 The processor maintains records of call states and all port circuits in the memory. The processor monitors the on-hook/off-hook state of each line (or trunk) port by issuing commands to the scanner. The scanner interrogates the line circuit and reports the changes of states to the processor. When the scanner detects and reports a line off-hook to the processor, the processor assesses the line's prior state and line class-of-service. If the off-hook line was previously idle (and if allowed origination), the processor executes a series of instructions which cause dial tone at the off-hook line. The processor first searches for an idle time slot (1 of 64 available talking paths on the time division bus). If available, the time slot is assigned to the off-hook line and stored in a memory record. The processor then searches for an idle originating register (rotary or TOUCH-TONE service). If a register is available, the processor marks it busy (in memory) and records a connection between the off-hook line port and the register. If rotary dialing is used, the register is contained strictly in software and no time slot connection is recorded.

14.04 Next the processor assigns the time slot numbers to the line port and register or tone port. The processor issues commands via the scanner/distributor and the network control circuits when it assigns the time slot. The scanner/distributor addresses and enables each port circuit while the network control provides each port circuit with timing necessary to define the time slot. To define the time slot, the network control activates a shift register (time slot memory) in the active port circuit. Network control then continually clocks the shift register so that it maintains a record of the appropriate time slot. Two port circuits assigned to the same time slot are connected to the common time division bus at the same instant (1 microsecond). These simultaneous connections are repeated frequently enough to provide satisfactory transmission. The sampling rate is approximately 16,200 Hz or once every 62 microseconds for an interval of 600 nanoseconds. Data transmission of 4800 bits per second is possible. The off-hook line appears in the same time slot with the port chosen by the processor and receives dial tone via the register circuit or tone port. For TOUCH-TONE service, the TOUCH-TONE calling receiver shares the time slot with the off-hook line, and receives the TOUCH-TONE calling signals generated at the line.

14.05 The processor continues to monitor the call progress by instructing the scanner to monitor the dialing state. If rotary or TOUCH-TONE dialing occurs, the scanner detects the change of state and replies to the processor. The change of state is

the line on-hook for rotary dialing or a nonzero digit from the TOUCH-TONE calling receiver. The processor recognizes the change of state as initial dialing and commands the scanner/distributor and network control to address the tone port and remove the dial tone from the time slot.

14.06 Call processing with stored program control accesses intelligence primarily in memory with little intelligence in fixed logic. The fixed logic circuits, lines, trunks, etc, are kept simple and less costly. The trunk circuits need only translate incoming signals (ground, loop current, battery reversal, etc) to a digital state for the scanner. The scanner reports the state to the processor which compares the state with the prior state and records any stimulus (change in state). This stimulus is passed to the stored program which decides what action to take. Then, the program can cause a new state in the trunk circuit (eg, cut-through, ground start, battery reversal, etc) by operation of electronic flip-flops that control sealed reed relays in the trunk circuit.

14.07 The time division bus (Fig. 2) is the multiplexing or common point for all voice and tone communicating circuits. All circuits having a connection or port appearance on the bus are controlled via a time division switch in each line, trunk, or service circuit. The time division switch of each port in a talking connection is activated simultaneously to connect the desired circuits to the time division bus. Timing for the time division switching is provided by a master network clock located within the network control. Circuits in the network control set up or take down talking connections by writing or clearing time slot data from memory elements (shift registers) in each port circuit.

SCANNER/DISTRIBUTOR AND NETWORK CONTROL

14.08 The processor communicates with the line and trunk circuits via the scanner/distributor. The processor issues a distribution command over the address bus, data bus, and control bus. The scanner/distributor decodes the address, designates the port equipment number, and selects the appropriate line or trunk circuit. A scan command returns the circuit state data to the processor from the decoded circuit, and a distribute command sends data from the processor to the decoded circuit. The state of each port in a given scan interval is compared by the processor to the previous state for that port, and any change initiates further processing. In case of an initial request for service, the processor signals the network control to assign a time slot to that port. The time slot assignment activates the time division switch of that particular circuit and provides an audio connection with all other ports having the same time slot. The processor periodically addresses ports via the scanner/distributor and searches for a change of state. Present state (eg, on- or off-hook of a line circuit) of the addressed ports is decoded, updated, and returned to the processor via the data bus. The scanner/distributor scans trunk circuits for incoming seizure, battery reversal, loop current, and dialing.

14.09 The scanner/distributor receives the address of the port or ports to be scanned from the processor via the address bus. The address can contain as many as 11 bits. Bits 0 and 1 represent port-select. Bits 2 through 5 determine board-select. Bits 6 through 9 are carrier-select. Bit 10 is used as an additional port select bit when more than four port addresses per board position are required. The carrier address is decoded and enables the corresponding carrier buffer circuit pack. Buffer circuit packs and carriers have a direct relationship (eg, buffer number 2 is located in and electronically associated with units mounted in carrier number 2). The 4-bit board address is decoded into 1 of 16 circuit packs by carrier buffers. The 2-bit port address is decoded into 1 of 4 ports on the selected circuit pack.

14.10 Once the carrier is selected and enabled, the scanner/distributor selects the addressed board and returns one status bit.

14.11 The network control sends timing and data inputs to the port shift registers. Upon command from the processor, the network control sets up connections (assigns time slots), takes down connections (clears time slots), or verifies an existing time slot assignment. Communication between the network control and the processor is via the control, address, and data bus. All network connections are established by writing time slots in port circuits. The port address and the time slot number to be written and the load time slot (LOTS) command are sent to the network control by the processor. The appropriate port address is decoded, and the desired port circuit is selected by the scanner/distributor. In response to the LOTS command, the time slot number is matched to a time slot counter in the network control circuit. When a match is found, the write signal is sent to all ports by the network control. The

signal is recognized only by the selected port, and a logical 1 is written in that port register. The port register shifts the 1 under control of the time slot clock from the network circuit. Each time the 1 cycles through the port register (once for every 64 clock pulses), the output of the shift register causes the port circuit to be connected to the time division bus. The 1 circulates in the shift register and establishes the connection in the correct time slot until a clear time slot (CLRTS) or clear shift register (CLRSR) processor command clears the single 1 or clears all 1s in the port shift register.

14.12 Two different methods for collecting and registering digits in the system provide rotary and TOUCH-TONE calling. Conventional rotary dialing creates a series of makes (off-hook) and breaks (on-hook) on the dialing port. The loop state is detected in the corresponding port circuit, buffered, and made available to the scan and distribute circuit. The scanner/distributor scans the status leads every 10 milliseconds under software control for the ports in an established dialing state. Dial pulse sampling is returned via the data bus and stored directly in the appropriate software originating register. Rotary-dialed digits are registered one pulse at a time.

14.13 TOUCH-TONE calling uses a TOUCH-TONE calling receiver/register. The register has a port appearance on the time division bus. When the calling station is equipped for TOUCH-TONE calling, a time slot assignment connects both the dialing station and the receiver. TOUCH-TONE calling frequencies from the station are passed via the time division bus to the register port and on to the receiver. Circuitry in the receiver detects and decodes these frequencies to a 2-out-of-7 code for the register. The register decodes this 2-out-of-7 data into BCD. The scanner/distributor circuit scans this register output and passes the BCD data to the processor via the data bus. The TOUCH-TONE calling digits are stored one digit at a time.

PULSE AMPLITUDE MODULATION NETWORK AND PORT CIRCUITS

14.14 The PAM network is a common amplifier for all audio signals switched in the PBX. Outputs from all port circuits are transmitted on the sum bus on a time division basis at the input to this amplifier. The audio signals are amplified and provided as an output on the distribution bus to all port circuits. The port circuits receive these signals only from ports on the same time slot.

14.15 Port circuits are circuits having an appearance on the time division network, (eg, line circuits, trunk circuits, TOUCH-TONE calling registers, etc). Each port circuit contains the shift register (time division switching control memory) and a time division switch to establish a connection to the time division bus.

A. Line/Trunk

14.16 The PAM network provides the time division bus common amplifier for all lines and trunks. Each line or trunk requires an appearance (port) on the time division bus. Each port circuit is electronically connected to the time division bus common amplifier, via switches in the port circuit, and is controlled by master timing in the network control.

B. Tone Circuits

14.17 The LC204 and LC17B circuit packs contain tone circuits. The system requires one LC204 to provide system tones. The LC17B provides appropriate tones for code calling access.

14.18 Call progress tones are generated from four single-frequency signal oscillators. The tones are usually combined and modulated, and are steadily maintained or interrupted at precise rates for the generation of the following nine distinctive tones:

(a) Dial tone (DT)—350 Hz and 440 Hz steady dial tone indicates that the processor is ready to accept dialed digits.

(b) Recall dial tone (RDT)—350 Hz and 440 Hz at 300 ipm (interruptions per minute) for three bursts; then steady dial tone. The RDT indicates a successful flash, party placed on soft hold and ready for dialing.

(c) Confirmation tone (CT)—350 Hz and 440 Hz at 300 ipm for three bursts indicates successful activation or deactivation of a feature.

(d) Miscellaneous tone (MT)—440 Hz:

(1) Warning tone—On for 1 to 2 seconds. Included are:

- Trunk verification by customer

- Busy verification of station lines (repeated every 15 seconds)
- ARS
- Executive override
- Timed recall on outgoing calls.

(2) Call waiting tone—One, two, or three bursts of tone on 0.2 second and off 0.2 second. Included are:

- Attendant call waiting
- Originating call waiting
- Terminating call waiting.

(e) Intercept tone (ICPT)—620 Hz on 0.2 second and 480 Hz on 0.2 second. The ICPT indicates defined dial code or illegal feature activation.

(f) Reorder tone (RT)—480 Hz and 620 Hz on 0.3 second, off 0.2 second at 120 ipm. The RT indicates temporary blockage due to traffic overload.

(g) Busy tone (BT)—480 Hz and 620 Hz at 60 ipm. The BT indicates that called station is off-hook.

(h) Audible ringback tone (ART)—440 Hz and 480 Hz on 0.8 second, off 3.2 seconds. The ART indicates that called station is being rung or call is being queued for attendant answer.

(i) Special audible ringback tone (SART)—440 Hz and 480 Hz on 0.8 second, followed by 440 Hz on 0.2 second, off for 3.0 seconds. The SART indicates call waiting is active on called station.

14.19 The LC17B circuit pack generates a code calling tone (CCT) of 892 Hz pulse timing, 0.5 second interpulse intervals, 0.05 second interdigital, 1.5 seconds intercycle, 4.5 seconds for three full cycles.

14.20 The time division switching of the PBX permits the selected tone to be applied to the selected port. Several network ports can be connected to the same tone port in different time slots. Tone samples are placed on the time division bus by similar sampling switches used in other port circuits. All the tones for the PBX are shown in Fig. 64. Distinctive ringing patterns implemented through a basic system feature are also shown in Fig. 64.

PROCESSOR

A. Control Logic

14.21 The processor is a 16-bit microprogrammed general-purpose computer. It performs the common control functions by executing a program stored in EPROM. The processor communicates with other circuits via the 16-bit unidirectional address bus, bidirectional data bus, and 6-bit memory control bus. All internal data movement and manipulation is accomplished by operating on the 16-bit word in 4-bit segments.

B. Memory and Memory Control

14.22 System memory includes two circuit packs in the trunk/control carrier. The LC555/ZLC14, ZLC16, or ZLC11 is a 112K EPROM circuit where the generic feature program resides. The LC556 or LC594 circuit stores the customer translations. The customer translations are loaded from the tape into the RAM or administered via the MAAP.

14.23 The processor communicates with the memory by providing the address of the desired word on the address bus and issuing a read command. When the desired word is accessed, the memory control signals the processor that access of the desired word is complete.

14.24 To write a word into memory, the processor sends an address on the address bus, sends the data word on the data bus, then issues a write command. After the data word is written into the proper memory location, memory control signals the processor that the write function is complete.

14.25 Once a DIMENSION PRELUDE PBX is installed and initiated, the tape is stored inactive in the system cabinet. The tape is used to reload translations information when a power failure causes loss of memory. Also, when translations are changed via the MAAP or CAP, a run tape operation is performed to save the new translations on the tape.

C. Software Records

14.26 Software records are a part of memory and are required for trunks, station-to-station

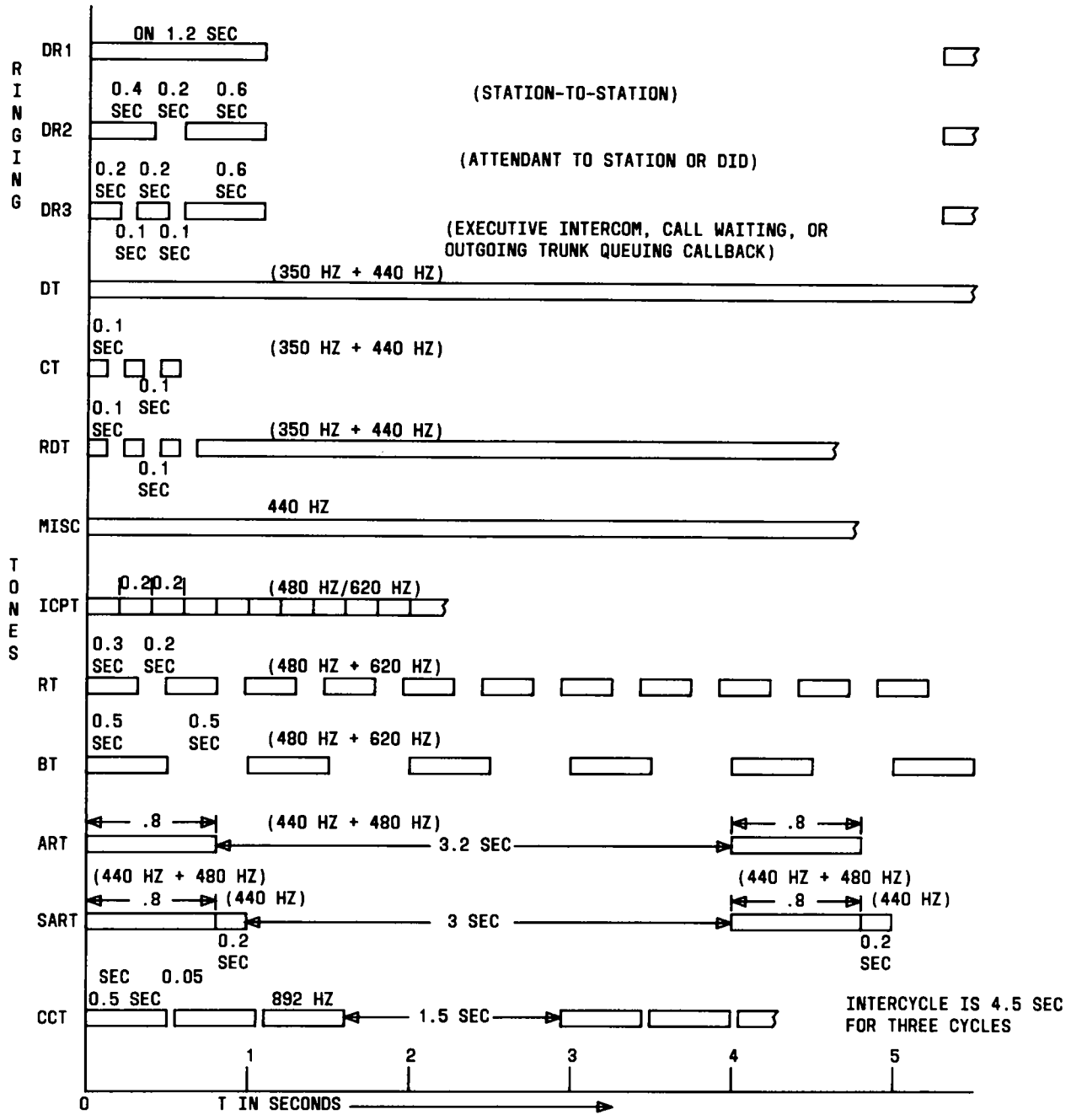


Fig. 64—Tones and Ringing

and station-to-attendant (intercom records) calling, and for dial pulse and TOUCH-TONE calling digit registration. The three categories are described below.

Trunk Records

14.27 One trunk record is required for each of the following trunks—CO, FX, WATS, DID, APLT, tie, paging, dictation, etc. These are referred to as hardware trunks since they also require circuit packs. In addition, trunk records are required for queue record, and one trunk record is used for each possible attendant switched loop. All trunk records not assigned as hardware trunks, queue records, dial pulse registers, attendant registers, or switched loops become intercom records.

Intercom Records

14.28 Intercom records are trunk records for station-to-station and station-to-attendant calls, and for use of such features as Automatic Callback—Calling, Call Waiting, and Call Hold. On a station-to-station call, the intercom record is held for the duration of the call. On station-to-attendant calls, the intercom record is released when the attendant answers. There is no trunk hardware associated with an intercom call. Intercom records should be provided on a P.02 grade of service.

Register Records

14.29 Register records are used on all station-originated calls as well as on incoming DID, tie trunk, and APLT calls. Mainly, a register record receives and stores digits during call processing. Register records handling dial pulse calls require no hardware, but register records handling TOUCH-TONE calling require a TOUCH-TONE calling register/receiver. Each TOUCH-TONE calling register/receiver is associated with a specific register record. Register records with TOUCH-TONE calling register/receivers can accept both TOUCH-TONE dialing and dial pulses. Register records without TOUCH-TONE calling register/receivers can accept only dial pulses.

14.30 The maximum number of register records is always provided with each memory configuration. Proper traffic engineering ensures that systems are equipped with the required number of TOUCH-TONE calling receivers and that record capacities are not exceeded.

14.31 The register record is used for converting TOUCH-TONE calling signals to dial pulses when the distant end of a trunk call is not equipped to receive TOUCH-TONE calling signals. The TOUCH-TONE calling receiver prohibits the TOUCH-TONE calling signals from leaving the DIMENSION PBX when dial pulse conversion is active.

14.32 Each attendant has a dedicated register record which cannot be accessed by stations, trunks, or other attendants. Although the attendant consoles are equipped with TOUCH-TONE service pads, the attendant register record does not require a TOUCH-TONE calling receiver. The console signals are detected by attendant console button scanning through the LC554 data channel. Like the station register records, the attendant register records convert TOUCH-TONE calling signals to dial pulses. Both TOUCH-TONE calling signals and dial pulses are sent to the distant end for CO type calls but not for tie trunks.

14.33 When TOUCH-TONE calling to dial pulse signal conversion is required on attendant-to-trunk calls, the attendant seizes a station TOUCH-TONE calling register record. The TOUCH-TONE calling receiver then prohibits TOUCH-TONE calling signals from leaving the PBX. This eliminates the possibility of problems in a distant or intermediate PBX. When conversion is not required, the attendant does not access a TOUCH-TONE calling receiver and TOUCH-TONE calling signals are sent over the trunk.

14.34 An all-dial pulse system requires a TOUCH-TONE calling register/receiver, with two-port originating register function, to keep TOUCH-TONE calling digits off the dial pulse trunks for public network calls.

15. MAINTENANCE

A. General Information

15.01 The maintenance philosophy includes specific objectives and long-term goals to establish a practical maintenance plan. Systems are designed for reliability and easy maintenance along with customer convenience. Replaceable circuit packs contain the system circuits. The components on a circuit pack are not replaceable in the field. The long-term goals (based on full usage of the provided maintenance aids) are as follows.

(a) Isolation of at least 95 percent of all troubles encountered by craft personnel

(b) Isolation and repair time—an average of 1/2 hour after arrival on premises

(c) Correction of 90 percent of circuit pack failures by the first circuit pack replacement.

The ability of fault isolation to a single replaceable circuit pack minimizes replacement requirements and costs. Less than 5 percent of the problems are either software-associated or more complex multiple faults. The isolation of such faults requires personnel with a high level of system knowledge and training. Automatic fault detection, fault reporting, and fault isolation aids support this maintenance plan. The maintenance plan requires use of these aids to isolate faults rather than replacing circuit packs as a fault isolating method.

B. Alarms

15.02 A major or minor alarm is generated when a fault condition is detected by software or hardware. The alarms are indicated by LEDs on the alarm circuit pack and on the attendant console.

15.03 A major alarm generally indicates a failure which removes a significant number of stations from service or removes a basic feature from most stations. A minor alarm generally indicates a failure which affects a limited number of stations or trunks. A major or minor alarm is always indicated by one or more fault indicator lights which help to isolate a fault to a specific function which has failed.

C. Fault Indicators

15.04 Software and maintenance circuitry constantly monitor critical functions. When a fault condition is detected, a major or minor alarm is generated and one or more fault indicators light on the alarm circuit pack. The alarms and fault indicators are marked for quick reference to maintenance procedures used to restore the system to operation.

D. Maintenance Aids

15.05 The maintenance aids built into the system and their associated functions are as follows:

(a) ***MAAP:*** This unit provides the basic maintenance and administration interface with the system. It is used for diagnostic troubleshooting and for entry of translation and/or patch information. Lines, trunks, and registers may be individually selected and tested from this panel.

(b) ***Alarm Circuit Panel:*** This panel contains the major and minor alarm indicators, fault indicators, and controls used for system trouble analysis (performing diagnostic tests on the processor and memory). System initialization can also be performed from this panel.

(c) ***Other Troubleshooting Aids:*** These aids include indicating-type fuses, test points on circuit packs, and busy/idle indicators (LEDs on line and trunk circuit packs).

E. Maintenance Tools and Test Sets

15.06 The following tools and test sets are used for maintenance:

- Digital Multimeter (KS-20599, List 4)—Used for measurement of system voltages requiring greater accuracy than the standard volt-ohm-milliammeter (KS-14510) can provide.
- Carrying Cases (KS-21539, L1)—Used for protection and shipment of magnetic tapes and circuit packs.
- Transmission Test Set (Type 4AN)—Used to provide the interface between the standard hand test set and the tip and ring access points on circuit packs in order to test the transmission capabilities of the line circuits.
- Logic Probe (KS-22003, L1)—Used to detect absence or presence of system timing pulses.
- X-Ray Program Package (LC569 circuit board and X-ray tape)—Used for internal testing and troubleshooting.
- Tape control unit.

F. Remote Maintenance, Administration, and Traffic System (RMATS) and Trouble Reports

15.07 The RMATS provides remote access to the logic and memory (circuitry, translations, etc) of RMATS equipped DIMENSION PBX systems from a central location.

15.08 The RMATS arrangement consists of RMATS equipment which is connected to the DIMENSION PBX via dial-up data links.

15.09 The RMATS provides the capability to administer and change nearly all customer services, features, and restrictions from a remote operation center. However, though the RMATS and the BRAEMAR tape unit can be connected in the DIMENSION PRELUDE PBX simultaneously, they cannot be active simultaneously. Traffic service polling is provided as an integral part of RMATS, making it possible to obtain traffic data on a regularly scheduled basis without the use of portable traffic equipment at the PBX location.

15.10 Since each PBX is equipped with only one data set, maintenance/administrative and traffic polling activities cannot be performed at the PBX at the same time. Maintenance and administrative activities should normally be conducted during the business day by specially trained personnel.

15.11 When the data link has been seized by the RMATS central facility, the local MAAP is disabled and cannot be used.

15.12 In order to function with the RMATS central facility, the DIMENSION PRELUDE PBX must be equipped with an LC570, LC570B, or LC597 circuit pack (with slow-speed option), and one low-speed automatic answering data set (eg, 113D).

15.13 For more detailed information regarding RMATS, refer to Section 554-010-130.

15.14 Maintenance testing can be performed at an RMATS central facility to evaluate a trouble report prior to dispatching a repair person to the customer location. Trouble reports may indicate that an alarm exists, accompanied by a customer complaint. After analyzing the report, the maintenance personnel perform the following routine procedures to restore the system to operation:

(1) Verify trouble report with attendant.

(2) Observe the fault indicators and follow alarm procedures until all indicators and alarms are cleared.

(3) Make test calls.

(4) Follow nonalarm troubleshooting procedures until all nonalarm troubles are cleared.

Certain indications may require the use of one of several maintenance displays or programmed diagnostic procedures via the MAAP. The results of these diagnostic procedures are displayed on the MAAP. Corrective action is usually simple circuit pack replacement. However, circuit pack replacement is never used as a trial-and-error method. If use of the MAAP fails to isolate the problem, the logic probe provides an additional means of locating faults.

G. X-Ray Program Package

15.15 The X-ray program package is a circuit pack and tape used to exercise the system. The LC569 circuit pack contains control programs and tests that interrogate and test the system. The tape contains test data and other devices used by the X-ray programs and tests. Programs are run at the time of installation prior to any other system tests. After initialization, the X-ray programs run continuously unless a system failure is detected. If a failure occurs, a fault indication is given. No special hardware or test equipment is required for X-ray. For further information about X-ray, refer to Section 554-102-115.