

**ELECTRONIC CUSTOM TELEPHONE SERVICE**  
**SYSTEM DESCRIPTION, PREINSTALLATION, AND PLANNING INFORMATION**  
**"DIMENSION\*" PBX**

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**1. GENERAL**

1.01 This section describes the DIMENSION PBX Electronic Custom Telephone Service (ECTS). Feature Package No. 15 provides ECTS for the DIMENSION 100 PBX; Feature Packages No. 5 and 15 provide ECTS for the DIMENSION 400 PBX; Feature Packages No. 7, 8, and 12 provide ECTS for the DIMENSION 600 (formerly 400E) PBX; and Feature Packages No. 7, 8, 11, and 12 provide ECTS for the DIMENSION 2000 and Custom PBX Systems. This section also provides information, instructions, and tables (worksheets) for use in preparing for the installation or growth of the DIMENSION PBX ECTS equipment. If available, the system configuration information, obtainable from the DIMENSION PBX Ordering Form E-8124, is helpful in completing the worksheets. If computerized information is unavailable, worksheets shall be filled in from locally provided information.

1.02 This section is reissued to:

- (a) Provide current system information.
- (b) Provide coverage for the following features:
  - Automatic Call Distribution (ACD)
  - Automatic Message Waiting
  - Call Coverage
  - Call Forwarding—All Calls—Remote
  - Direct Department Calling
  - Distributed Communications System

- Enhanced Uniform Call Distribution
  - Leave Word Calling
  - Malicious Call Trace
  - Message Center Service.
- (c) Cancel Section 554-010-111, Issue 4, and include information in this section.
- (d) Change title.

Revision arrows are used to emphasize significant changes.

**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 Federal Communications Commission (FCC) Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures that may be required to correct the interference.**

**1.04** The 554 Division of Bell System Practices covers the DIMENSION PBX product line and is structured so that related information is in the same layers as follows:

- Section 554-000-000 is an index of all Issue 1 or later sections.
- Section 554-000-100 is an index of miscellaneous documentation such as Administration and Maintenance Manuals.
- Layer 554-010-XXX contains sections common to more than one DIMENSION PBX system. It covers consoles, auxiliary circuits, Customer Administration Center System (CACCS), Customer Administration Panel (CAP), ECTS, Remote Maintenance, Administration, and Traffic System (RMATS), Sta-

tion Message Detail Recording (SMDR), and Automatic Voice Network (AUTOVON) switching systems.

- Layer 554-101-XXX pertains to the DIMENSION 100 and 400 PBX systems.
- Layer 554-105-XXX pertains to the DIMENSION 600 (formerly 400E) PBX system.
- Layer 554-111-XXX pertains to the DIMENSION 2000 and Custom PBX systems.
- Layer 554-191-100 contains an index of feature documents.
- How-to-Operate instructions for the DIMENSION PBX consoles are contained in 999-200-XXX sections.

**1.05** The 554-1XX-XXX sections contain system description, engineering planning, and general software description of a tutorial nature. The Task Oriented Practices (TOP) for each system are numbered in the appropriate layers for each DIMENSION PBX system. Maintenance support is provided in a series of sections prepared for major system elements such as the PAM, scanner/distribution, processor, etc, and are intended to convey operational theory to provide a background for troubleshooting complex problems. Sections 554-1XX-115 contain descriptions and procedures for all field X-ray tests.

**1.06** Tables (worksheets) and diagrams are provided in this section for local reproduction. The originals or copies should be kept with local records for use in trouble-locating and planning future growth and rearrangements. Completed copies of the required worksheets and diagrams must be provided at the time the actual work begins. These copies are provided at the customer location with any other installation information. After installation is completed, all documents should be stored on customer premises for future reference.



**Any deviation required during the actual installation shall be noted and recorded for permanent job records.**

## 2. DESCRIPTION

## GENERAL

**2.01** The DIMENSION PBX ECTS is designed to provide key telephone features and simplified access to custom calling features (Table A). Some of the main components (Fig. 1) and characteristics are:

- A modular, multibutton electronic telephone (MET) set that interfaces with the DIMENSION PBX. The MET set uses nonlocking buttons, light-emitting diode (LED) indicators, and a tone ringer.
- A maximum of four cable pairs for each MET set, regardless of the number of buttons and lamps on the set.
- A controller that serves as a buffer for the instructions and status information between the MET set and the DIMENSION PBX. Data links are established to the PBX and each MET set from the controller.
- The DIMENSION PBX stored programs control the administration of features and maintenance routines for the MET sets. Hard-wire strapping required in some key systems to assign lines and features is eliminated by the software control.

**2.02** Three types of telephones may be provided with ECTS.

- (1) A single-line MET set called an electronic custom telephone (ECT) where all buttons are used for custom calling features.
- (2) A multiline MET set called an electronic key telephone (EKT) where the buttons are used for picking up lines, holding the lines, or custom calling features.
- (3) A straight line set (SLS) without buttons whose line number also appears on one or more (maximum 15) MET sets. The SLS may access the custom calling features by flashing the switchhook and using the feature dial access code. A MET set may be configured as an ECT or EKT by a jumper plug inside the telephone housing. Software translations in the PBX contain information relating to this status.

**2.03** The MET sets use digital data signals to control the key telephone and custom calling fea-

tures. ♦The analog voice circuit is connected directly to a line circuit pack in the DIMENSION PBX. ♦The sets are equipped with the following:

- (a) 5, 10, 20, or 30 nonlocking pick-up buttons with two lamps associated with each button:
  - (1) A red "I-USE" lamp to indicate a "button down"
  - (2) A green "STATUS" lamp to indicate the status of the line or service corresponding to the button.
- (b) A recall "R" button for accessing PBX features that require a switchhook flash when not assigned a feature button.
- (c) A TOUCH-TONE\* calling dial.
- (d) A tone ringer with a volume control on the left side of the set.
- (e) A four-pair mounting cord.

**2.04** The straight line set is a regular (500 or 2500 type) set that uses a single pair of wires to provide talking and on/off-hook signaling.

♦**2.05** On a MET set, custom calling features are accessed by pressing an assigned feature button or by pressing the recall "R" button and dialing the feature access code. On an SLS, features are accessed by momentarily pressing the switchhook and dialing the feature access code.

**2.06** One or more electronic telephone controllers are required with ECTS. A controller provides an interface between the PBX and the MET sets data control messages. See Fig. 2 for a block diagram of the ECTS.

**2.07** Each controller is equipped with a basic carrier Figure 3. A supplementary carrier is added when more than 63 MET sets are required on the basic carrier. The basic carrier contains the control circuit (including memory), the power supply, 63 ports for MET sets, and 1 port for the maintenance test station. The supplementary carrier is powered by the basic carrier and must be mounted directly above it. The supplementary carrier contains 63 ports for MET sets and 1 port for maintenance.

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TABLE A

## "DIMENSION" PBX ELECTRONIC CUSTOM TELEPHONE SERVICE FEATURES

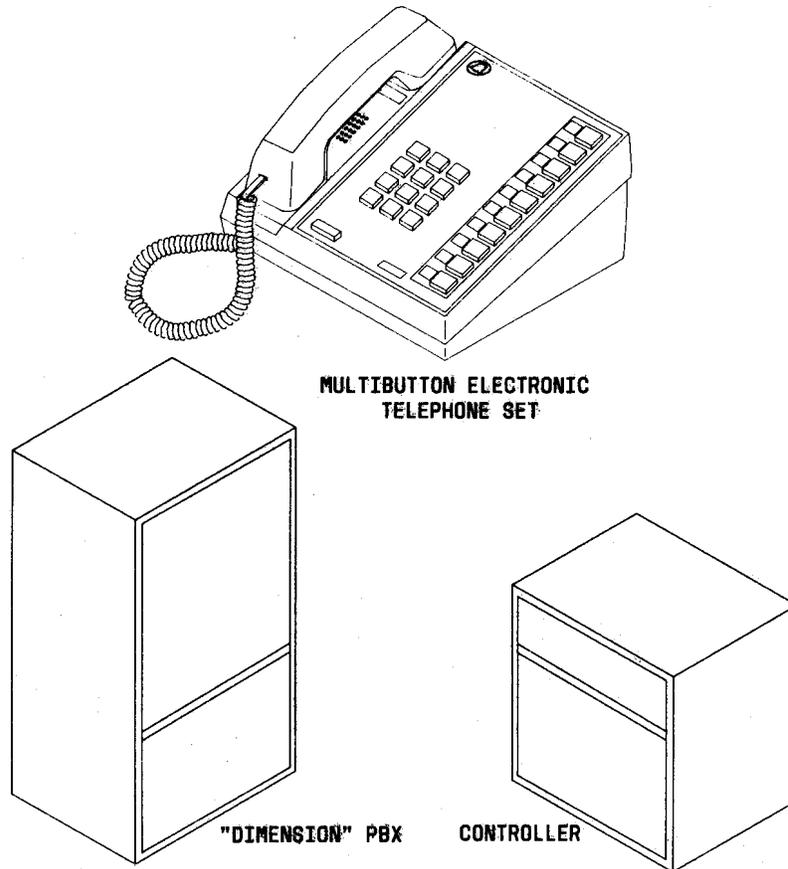
FEATURES		NON-ELECTRONIC TELEPHONE	MULTIBUTTON ELECTRONIC TELEPHONE		
			CUSTOM CALLING APPLICATION	KEY SERVICE APPLICATION	
Custom Calling Features*	Automatic Callback — Calling	X	X	X	
	Call Forwarding — All Calls	X	X	X	
	Call Forwarding — Busy and Don't Answer	X	X	X	
	Call Forwarding — Don't Answer	X	X	X	
	Call Hold	X	X	X	
	Call Pickup	X	X	X	
	Call Waiting Services	X	X	X	
	Executive Override	X	X	X	
	Last Extension Called	X	X	X	
Speed Calling	X	X	X		
Key Service Features	Answering Position	Station Busy Indication		X	X
		Station Message Waiting		X	X
		Automatic Call Distribution	X	X	X
		Enhanced Uniform Call Distribution	X	X	X
	Audible Indication	Music-On-Hold Access	X	X	X
	Conference	Bridged Call	X	X	X
		Threeway Conference Transfer	X	X	X
	Control	Exclusive Hold			X
		Hold			X
		I-Hold			X
Manual Exclusion			X	X	
Priority Hold				X	
Recall Button		X	X		
Ring Transfer		X	X		

\* These features can be button-activated on a multibutton electronic telephone with DIMENSION PBX electronic custom telephone service.

TABLE A (Contd)

## "DIMENSION" PBX ELECTRONIC CUSTOM TELEPHONE SERVICE FEATURES

FEATURES		NON-ELECTRONIC TELEPHONE	MULTIBUTTON ELECTRONIC TELEPHONE		
			CUSTOM CALLING APPLI-CATION	KEY SERVICE APPLI-CATION	
Key Service Features (Contd)	Display	I-Use Indication Line Status Indication			X X
	Incoming Call	Abbreviated and Delayed Ringing	X	X	X
		Common Audible Ringing Distinctive Ringing Station Ringer Cutoff	X	X X	X X
	Lines	Automatic Intercom			X
		Dial Intercom			X
		Manual Intercom			X
		PBX Line Access Personal Central Office Line	X	X	X X
	Signaling	Manual Signaling		X	X
Station Direct Station Selection (DSS)			X	X	
Station	Idle Line Preference			X	
	Incoming Call Preference			X	
	Last Line Preference			X	
	No Line Preference			X	
	Preselection			X	
	Prime Line Preference Ringing Line Preference			X X	
System	Power Failure Transfer	X	X	X	



**Fig. 1—Main ECTS Components**

**2.08** The basic carrier control circuit memory contains 4096 (4K) memory words used as follows:

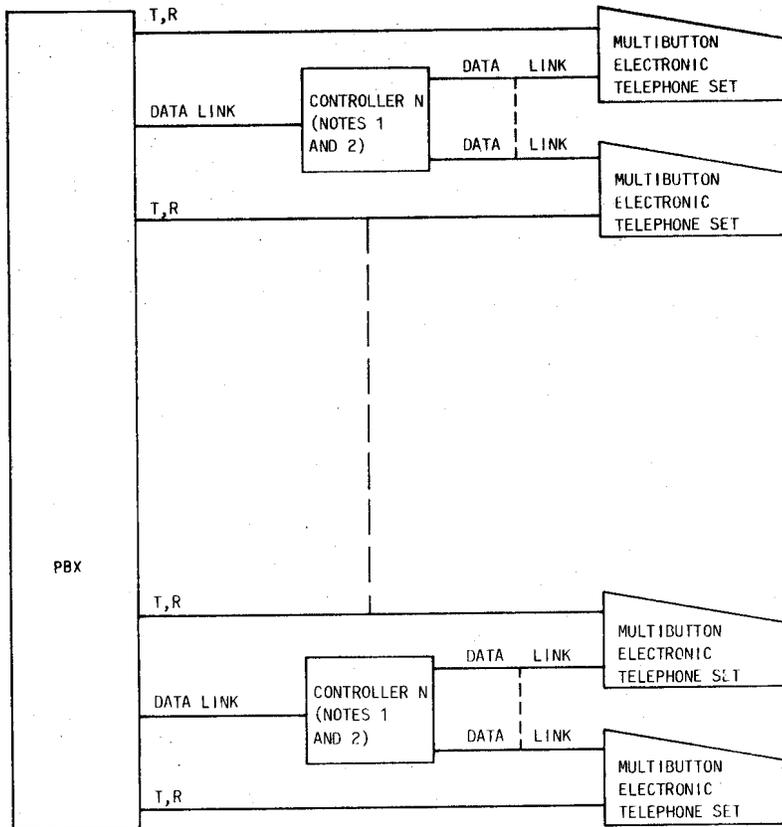
- (a) Maintenance uses 48 words.
- (b) The test station uses:
  - (1) 42 words (10 button) for DIMENSION 100 and 400 PBXs.
  - (2) 27 words (5 button) for DIMENSION 600 (formerly 400E), 2000, and Custom PBXs
- (c) MET sets use the remaining:
  - (1) 4006 words for DIMENSION 100 and 400 PBXs
  - (2) 4021 words for DIMENSION 600 (formerly 400E), 2000, and Custom PBXs.

The memory may limit the quantity of MET sets to a number less than the physical carrier port capacity.

See Table B to compute the controller memory words required for MET sets. The maximum number of controllers possible, dependant on the type of DIMENSION PBX, the feature package, and the PBX memory size, is provided in Table C.

**2.09** A steering port circuit (LC55) is assigned in the controller for each ECTS telephone. Each MET set is connected to the port with a 2-way data channel (not required for an SLS). The -48V power for the MET set is furnished over the data channel (see Part 9 of this section).

**2.10** A low speed data circuit (LC34B or LC366) is assigned in the DIMENSION PBX for each ECTS controller. This 2-way data link is used to transmit data between the PBX and the controller. The controller completes the link to the MET set through the appropriate steering port. A line circuit (LC02) is assigned in the DIMENSION PBX for each ECTS telephone. Each MET set and SLS is connected to the assigned line with a normal voice channel. This channel is used for voice and dialing signals by all



## NOTES:

1. MAXIMUM OF UP TO 126 MULTIBUTTON ELECTRONIC TELEPHONE SETS PER CONTROLLER - PROVIDING WORD CAPACITY OF CONTROLLER MEMORY IS NOT EXCEEDED.
2. THE MAXIMUM NUMBER OF CONTROLLERS PER SYSTEM DEPENDS ON THE TYPE AND MEMORY SIZE OF PBX.

**Fig. 2—DIMENSION PBX Electronic Custom Telephone Service—Block Diagram**

ECTS sets plus the switchhook flash signals by the SLS.

**2.11** The ECTS sets may be used as an emergency transfer station during power failures. The normal voice channel is transferred via a conventional 609-type emergency transfer panel. The transmit pair of the data channel from the PBX to the associated controller is disconnected and grounded toward the controller via the 609-type panel during the transfer mode.

**2.12** The MET sets, arranged for power failure transfer, must be equipped with a ground-start button to initiate outgoing calls. An electromechanical ringer must be provided on the voice channel

to receive incoming calls. If the serving central office does not accept TOUCH-TONE calling, an adjunct dial is also required. (A 500-type telephone set may be used to provide ringing and dialing capabilities.)

#### OPERATION

**2.13** A functional block diagram of the DIMENSION PBX ECTS is shown in Fig. 4. The equipment consists of an electronic telephone controller (ETC), MET sets, a cross-connect field, and the DIMENSION PBX connecting circuits. The ETC consists of four functional circuits:

- (1) The data interface
- (2) The station activity buffer

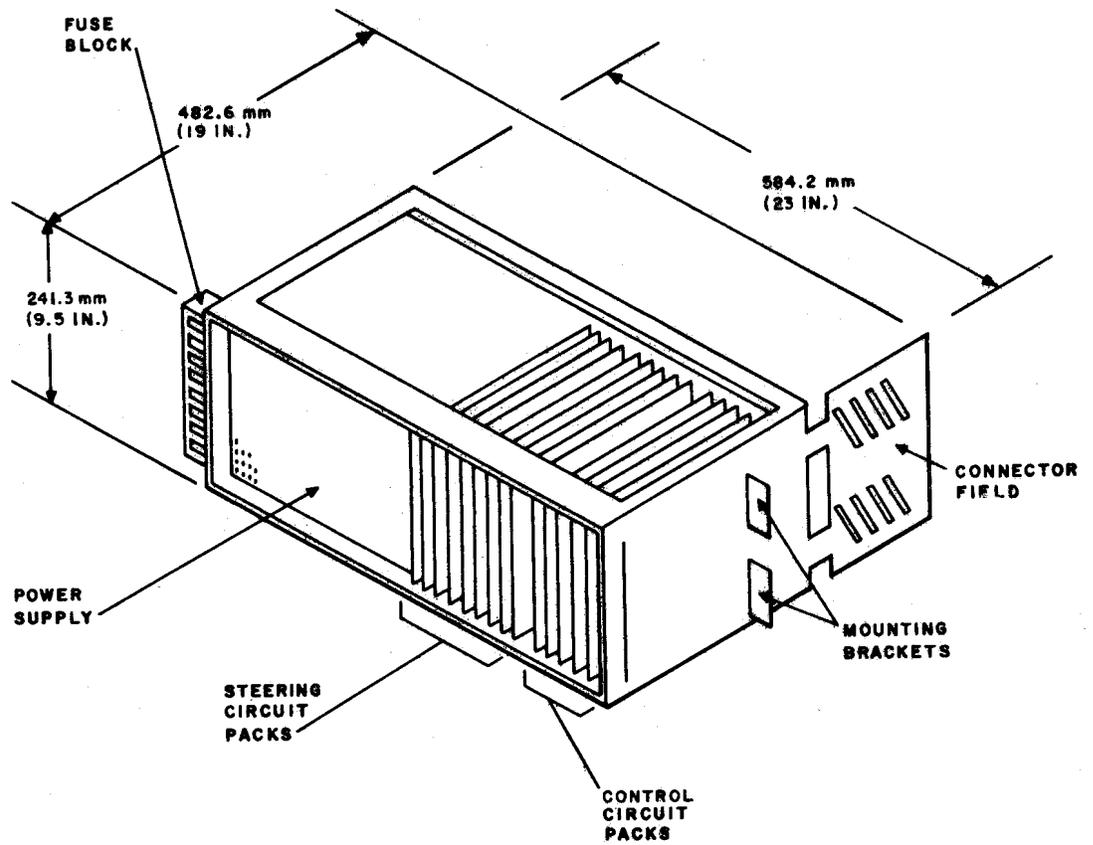


Fig. 3—Controller Basic Carrier

TABLE B

EXAMPLE OF COMPUTING WORDS OF MEMORY FOR MULTIBUTTON ELECTRONIC TELEPHONES

MULTIBUTTON ELECTRONIC TELEPHONE		NUMBER OF BUTTONS PER SET	WORDS PER BUTTON	FIXED OVERHEAD WORDS	TOTAL
APPLICATION	NUMBER OF SETS				
Electronic Custom Telephone	50	20	2		2000
				13	650
Electronic Key Telephone	40	20	3		2400
				13	520
					5570

TABLE C

## "DIMENSION" PBX SYSTEM CONTROLLER CAPACITY

ELECTRONIC CUSTOM TELEPHONE SERVICE (ECTS)		MAXIMUM NUMBER OF CONTROLLERS					
PBX SYSTEM	MEMORY SIZE	FEATURE PACKAGE					
		5	7	8	11	12	15
"DIMENSION" 100	C						1
"DIMENSION" 400	A	1					
	B	2					
	C	3					3
"DIMENSION" 600 (formerly 400E)	B		5				
	C		8	8		8	
"DIMENSION" 2000	B		5				
	C		8	8		8	
	D		13	13	8	13	
"DIMENSION" Custom	E		32				
	F		64	40		40	

(3) The steering circuit

(4) The fault control circuit.

2.14 These four functional circuits are distributed over the six circuit pack types that make up the controller (Fig. 4). One each of LC56 through LC60 provide the basic control circuits and one LC55 provides steering for eight MET sets.

(1) The data interface circuit (LC60) provides encoding and decoding of messages to and from the DIMENSION PBX on the data link.

(2) The station activity buffer circuit (LC58) controls the operational cycle. It contains the circuitry to determine the information sent to the steering circuits, the logic to interpret and update the memory, and the controller clock circuit.

(3) The memory circuit (LC57) maintains the status records of the MET sets.

(4) The steering circuit (LC55) isolates the MET set from the DIMENSION PBX. Messages are also sent to and received from the MET set.

(5) The fault control circuit (LC59) stores controller detected faults by type to be accessed by the processor. The maintenance circuit is controlled in this circuit also.

(6) The transmitter/receiver circuit (LC56) interfaces the station activity buffer information with the steering circuits. The information is sent to and collected from the station identified with each message.

2.15 The telephone transmission of voice and TOUCH-TONE signals interface directly with the line circuit (LC02) in the DIMENSION PBX. The lamp indication and audible signal information is

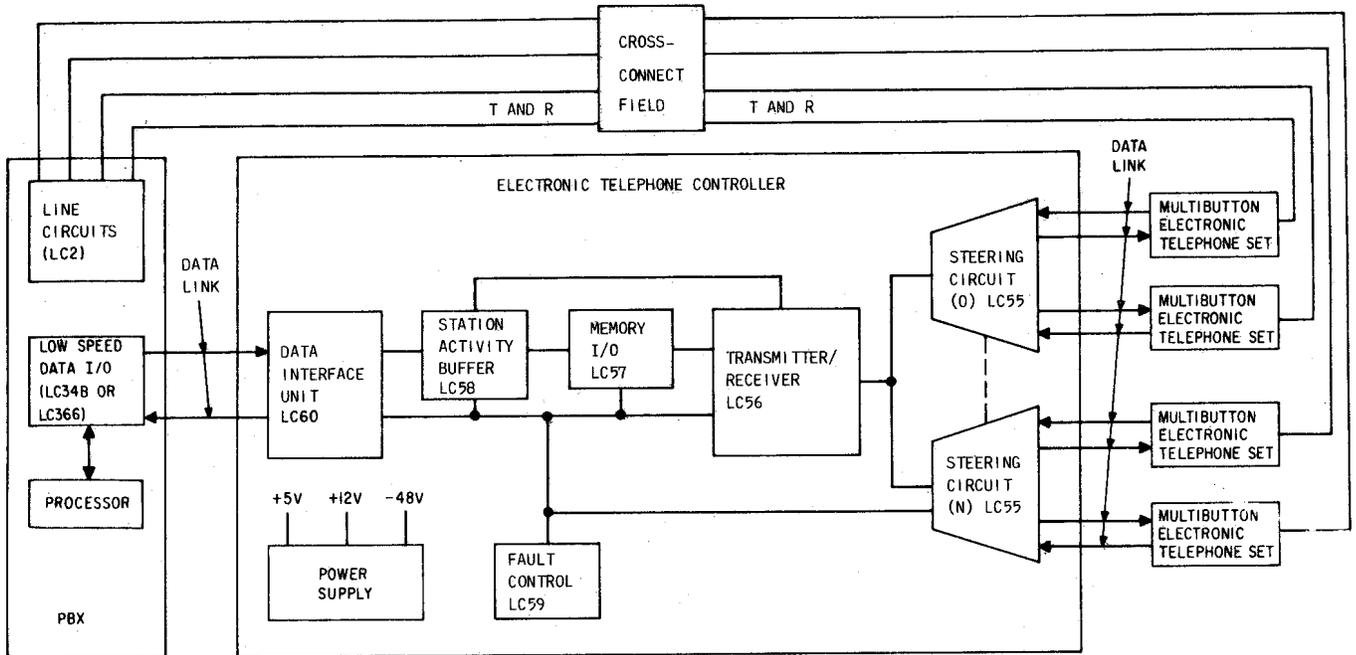


Fig. 4—DIMENSION PBX Electronic Custom Telephone Service—Functional Block Diagram

sent to the MET set on the data link. Signal information from a pressed button and an off-hook is sent to the PBX on the data link. ◀

**2.16** Call processing is under control of the DIMENSION PBX processor via the electronic controller. The controller scans each electronic station every 25 milliseconds for a change of state. A change of state is an off-hook, on-hook, or button depression. The changes of state are stored in the controller change register. The processor reads out the change register over the data link during the processor 25-millisecond scan. New change of state information cannot be registered until a processor readout takes place. If a change of state cannot be registered because the change register is occupied, service will be affected. Indicators are slow dial tone, flashes not recognized, and feature requests not acknowledged.

**2.17** The probability that a change of state will not be recognized by the DIMENSION PBX processor in 25 milliseconds is 0.007. This probability is based on a fully electronic key system, assuming random traffic at 5 CCS per line, with an average of 3 changes of state per call.

**2.18** The DIMENSION PBX exchanges information with the controller over a slow-speed data link. The I/O data link circuit (LC34B or LC366) converts the parallel data from the processor into serial biphase (commonly called bipolar) messages. Serial biphase messages from the controller to the PBX are converted into parallel form by the receive circuits in the I/O circuit. All data is encoded in forms of address, read, write, and interrogate messages which make up the instruction for logically processing the calls. Each message, sent between the PBX and controller, is composed of a 17-bit word (including a parity bit). For each word sent, a word is returned on a bit-synchronous basis; thus, for each bit transmitted to the controller, a bit is returned from the controller. Each bit consists of a positive and negative pulse (biphase return-to-zero pulsing). The data bit format used in the ECTS is shown in Fig. 5.

**2.19** During the controller scan interval, each MET set is scanned to detect any change in station activity. The controller buffers the information received as a result of scanning each MET set. This function saves real time which would be required if the processor performed a scan of each MET set.

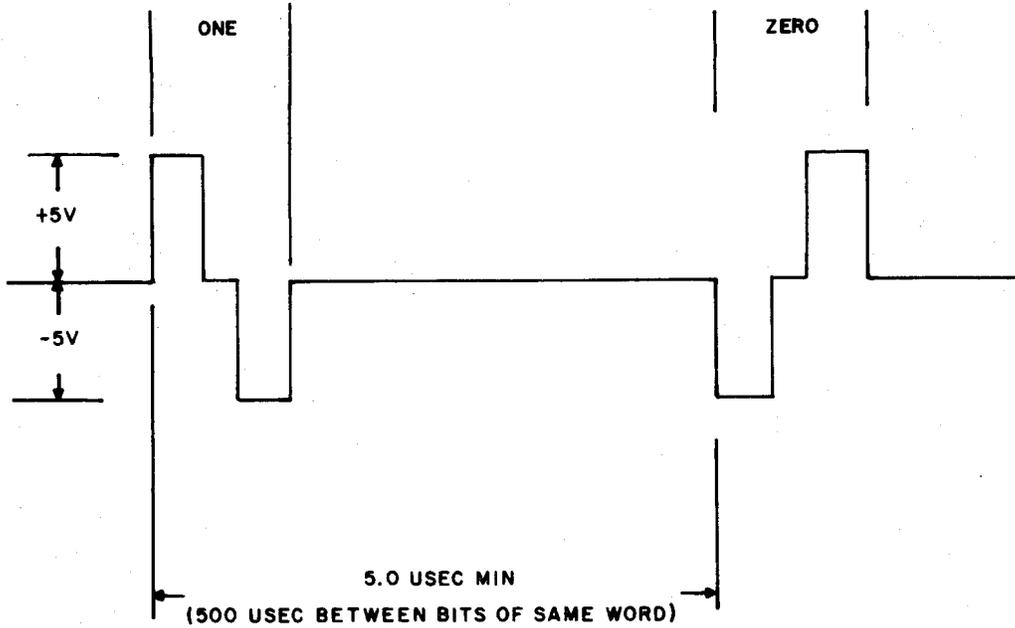


Fig. 5—Data Bit Format

**2.20** Station scanning is accomplished over the station data link which provides an independent data channel between the controller and each MET set. This link encompasses the station activity buffer, steering circuit, and logic circuits in each MET set. Logic circuits in the telephone set detect and record any change in switchhook and button activity. This information is encoded and sent to the controller to update the memory in the station activity buffer. Data receiving circuits detect the data sent to the telephone, extract timing information, and apply the information to the station indicator drivers and ringer control circuits.

**2.21** The controller station activity buffer contains a 4K-word dynamic memory which is updated during each station scan. This memory contains the address and status of each MET set served by the controller. The state of each telephone during the active scan is compared with the state information obtained from the previous scan. When a change in switchhook or button activity is detected, information is passed to the processor which determines the appropriate action to be taken. The station activity buffer receives control information for all telephone set indicator and ringer states from the DIMENSION PBX. This data is stored in the station activity buffer memory.

## CONTROLLER CAPACITY

### A. Memory Capacity

**2.22** The controller memory has a maximum capacity of 4096 words and may be a limiting factor in determining the quantity of electronic stations. The memory records button, line, and indicator status of the electronic telephone sets. Words are dedicated in memory for every button on a set whether the button is functional or not. The memory also contains maintenance routines determining the condition of the controller and the electronic telephone sets.

**2.23** Words dedicated to specific functions are as follows:

- 48 words for maintenance
- 42 words for 10-button electronic test station (DIMENSION 100 and 400 PBX) or 27 words for 5-button electronic test station [DIMENSION 600 (formerly 400E), 2000, and Custom PBX]
- 23 words for each 5-button electronic custom calling station
- 33 words for each 10-button electronic custom calling station

- 53 words for each 20-button electronic custom calling station
- 73 words for each 30-button electronic custom calling station
- 28 words for each 5-button electronic key station
- 43 words for each 10-button electronic key station
- 73 words for each 20-button electronic key station
- 103 words for each 30-button electronic key station.

**2.24** The station memory layout is initially loaded into the memory under the control of the DIMENSION PBX via repetitive transmission of memory update messages. Since the memory is dynamic, a memory reload is required after a power failure. During the reloading process, power is removed from all stations by a cutoff relay in the controller power supply to prevent lamp (LED) indicators and ringers from being activated.

**2.25** When electronic telephone set records have been removed from memory, the space in memory dedicated to that type of telephone set is left as an unassigned area. This area may be used for addition of a telephone set at a later time, but it must be the same type of set. A 5-button set cannot be allocated to space in memory which was occupied by a 10-button set even though adequate space is available.

**2.26** *Caution: While adding an ECTS station using MAAP PROC 051, an error code 72 indicates "Memory space too small" if the assignment still displays on the MAAP. REMOVE THE STATION IMMEDIATELY! Repacking the controller with this station assigned can cause all stations on this controller to be out of service.* Each time a station is added using PROC 051 in a DIMENSION 600 (formerly 400E), 2000, or Custom PBX controller memory is updated if sufficient memory is available. Either an error code of 86 or 89 is displayed if the controller memory cannot be updated. Systems using FP7 (Issue 1 or earlier) or FP8 or FP12 (earlier than Issue 1) will display error code 86 or 72 if the controller memory cannot be updated. The error codes have the following meanings:

- Error code 86—There is sufficient controller memory; however, it is fragmented and requires repacking. REPACK CONTROLLER AND ADD STATION.
- Error code 89—Controller memory is full.
- Error code 72—Controller memory is full; however, if the station being added displays on MAAP panel, it must be removed. If the station does not display, controller was not affected.

**2.27** *Caution: When PROC 40, WD 4, or PROC 060, WD 2, is executed, the controller listed in field 1 will be disabled for 1 minute.* With the DIMENSION 100 or 400 PBX, the controller memory can be repacked using PROC 40, WD 4; and with the DIMENSION 600 (formerly 400E), 2000, or Custom PBX, the controller memory can be repacked using PROC 060, WD 2.

**2.28** Repacking the memory removes all areas in memory that contain blank data due to removed stations and shifts valid station assignments in memory so that the vacant space is at the end of the memory.

#### B. Physical Limitations

**2.29** The station set capacity of a controller memory is shown in Table D. The controller also has an equipment limitation of 126 steering ports in the basic (J58879KA) and supplementary (J58879KB) carriers. The three types of telephone sets each require one steering port circuit. The Electronic Key Telephone (EKT) and Electronic Custom Telephone (ECT) require a port circuit assignment and are physically terminated on an LC55 circuit pack. The Straight Line Set (SLS) requires a port circuit assignment, but *does not* require an LC55 circuit pack or a termination in the carrier. An SLS should normally be assigned a port in the following order:

- (1) To a nonexistent controller if available within the system capacity. (See Table C.)
- (2) To a nonexistent supplementary carrier if only a basic carrier is equipped.
- (3) To an existing controller on the last available steering circuit (circuit pack *not* required).

**2.30** The SLS line number must appear on a button of one or more EKT sets (maximum 15). Only one SLS is allowed per line number assignment. Each telephone set must have a line equipment assignment (LC02) in the DIMENSION PBX.

**2.31** The Energy Communication Service (ECS) feature provides an Energy Communications Signaling Unit (ECSU) that can share the line with a voice telephone. These units *cannot* share a line with an ECTS telephone.

**3. FEATURES AND SERVICES**

**GENERAL**

**3.01** DIMENSION PBX electronic custom telephone service provides a variety of services and features. The features are identified as key service and as custom calling PBX features. Table A lists the features by functional headings.

**3.02** Only the operation of an assigned feature button on ECTS station sets is required to activate a feature. This eliminates signaling for dial tone and dialing the associated access code to activate a feature.



***DIMENSION PBX ECTS does not preclude access to custom calling features by pressing recall "R" button. (If R button is not provided, flash switchhook.) and dialing the feature access code. The feature being accessed must be allowed in the station class of service.***

**3.03** All features may be provided in the initial system order or may be added or changed on an in-service system via the Maintenance and Administration Panel (MAAP); Customer Administration Panel (CAP), Remote Maintenance, Administration, and Traffic System (RMATS); and Customer Administration Center System (CACs). Table A shows the ECTS features applicable to electronic and nonelectronic telephones.

**3.04** Brief descriptions of the ECTS features and services are listed alphabetically as follows:

**ABBREVIATED AND DELAYED RINGING**

**3.05** This feature allows the ringing associated with a call on an ECTS set to be transferred

to one or more ECTS set(s) which have an appearance of that line. The transfer will occur automatically after an optional 2-, 4-, 8-, or 16-ringing cycle. A manual transfer can be made prior to the completion of the automatic transfer by pressing an assigned ABBR RING button. Manual transfer only affects the current call to the station. The station to which ringing is to be transferred can receive either no ringing or muted ringing prior to the transfer.

**AUTOMATIC CALLBACK—CALLING**

**3.06** A station user calling a busy station line can be automatically connected to the called station when the station becomes idle. The non-ECTS station user precedes the called number with an activation code and hangs up. When both are idle, the activating station is rung, and upon answer, the called station is rung. The activating station may originate or receive other calls while the feature is active. If the callback sequence is not successful within 20 to 40 minutes, the request is deactivated.

**3.07** An ECTS station user can activate Automatic Callback—Calling by pressing the assigned button or dialing the automatic callback code upon hearing a busy signal or the special audible ring signal on calling another station. The automatic callback status lamp lights steadily, confirmation tone is heard, and the station hangs up to activate the feature.

**3.08** ♦With DCS (FP8, Issue 3), a station user can activate the Automatic Callback feature toward a station on another PBX.♦

**♦AUTOMATIC CALL DISTRIBUTION (ACD)**

**3.09** This feature released with FP8, Issue 2, permits incoming Direct Inward Dialing (DID), Central Office (CO), Foreign Exchange (FX), Tie Trunk, and Wide Area Telecommunications Service (WATS) calls as well as local station and attendant calls to be terminated directly to the most ideal of a prearranged group of answering positions (referred to as a split). The answering positions appear as normal stations to the PBX and can function in the normal manner to originate and receive calls directly.

**3.10** Each agent in a split uses a station set that can be either a standard telephone set or a 10-button ECTS set. Two levels of supervision are provided: (1) split supervision and (2) system supervi-

**TABLE D**  
**CONTROLLER STATION SET CAPACITY**

TYPE	STATION SET (100% USE)	CONTROLLER CAPACITY (NOTE 1)	WORDS PER STATION	TOTAL WORDS	
				NOTE 2 (a)	NOTE 2 (b)
Electronic Key Telephone (EKT)	5-Button	126	28	3618	3603
	10-Button	93	43	4089	4074
	20-Button	54*	73	4032	4017
	30-Button	38*	103	4004	3989
Electronic Custom Telephone (ECT)	5-Button	126	23	2988	2973
	10-Button	121	33	4083	4068
	20-Button	75	53	4065	4050
	30-Button	54*	73	4032	4017
Straight Line Set (SLS) †	500 to 2800 type —				

**Note 1:** Does not include maintenance test station. Capacity shown is controller maximum, actual quantity may be limited to a quantity less than controller maximum by the DIMENSION PBX software program.

**Note 2:** Includes words for maintenance and test station as follows:

- (a) DIMENSION 100 or 400 PBX — Maintenance words 48 and test station (10-button) words 42 for a total of 90 words.
- (b) DIMENSION 600 (formerly 400E), 2000, or Custom PBX — Maintenance words 48 and test station (5-button) words 27 for a total of 75 words.

Total words used, including words for maintenance and test station, cannot exceed 4096.

\*One additional set possible on column 2(b).

†Straight line sets (no-button sets) are to be assigned to unassigned or unequipped port circuits. They can even be assigned to a nonexistent controller.

sion. An optional 106B agent status display is available for the split supervisor's use. The unit provides status displays for up to 20 agents and is driven by the ECTS controller. Optional CRTs driven by the Management Information System (MIS) PRO 150 or 500 can also be provided. The system supervisor utilizes both the MIS CRT displays and an associated line printer for traffic reports.

**3.11** The basic operation for an outside call to an ACD system is as follows:

- (1) A caller dials a listed directory number (LDN) and the call is completed to a trunk group through the serving central office (CO). The call is identified as an incoming call to an ACD trunk group and is designated to be handled by a particular ACD split or group of answering positions.
- (2) The call is placed in a queue and, if no agent is available in the split, a delay message can be presented to the incoming caller. After a user-specified delay of from 2 to 30 seconds, an optional second delay message or music can be sent to the caller.
- (3) The user specifies the number of calls to be held in queue at any given time. When this threshold is exceeded, supervision is alerted. Calls can then be channeled to alternate splits within the system or sent to another ACD location.
- (4) When an agent becomes available, a short beep (zip tone) and optional city-of-origin announcement is sent to the agent before the call is connected.
- (5) The agent, once connected to the caller and after completing the call, can answer another waiting call or remove the answering position from the queue through one of the function buttons on the ECTS set.

**3.12** The ACD agent using either feature buttons or dial access codes (DACs) can configure the answering position in the following work modes:

- **AUTO-IN**—Allows an agent to receive a new ACD call immediately upon disconnecting from a previous call assuming a call is waiting.
- **AFTER CALL WORK**—Allows an agent to complete any call-related paper work or fol-

low-up procedures following a call disconnect from the manual-in mode.

- **AUX WORK**—Used for agent's break from work—such as lunch or coffee breaks, etc. The answering position can still receive or originate non-ACD calls.
- **MANUAL IN**—Allows an agent to receive a single ACD call. Used when the agent anticipates after call work.
- **STAFFED**—Indicates to the system that the answering position is ready to receive calls.

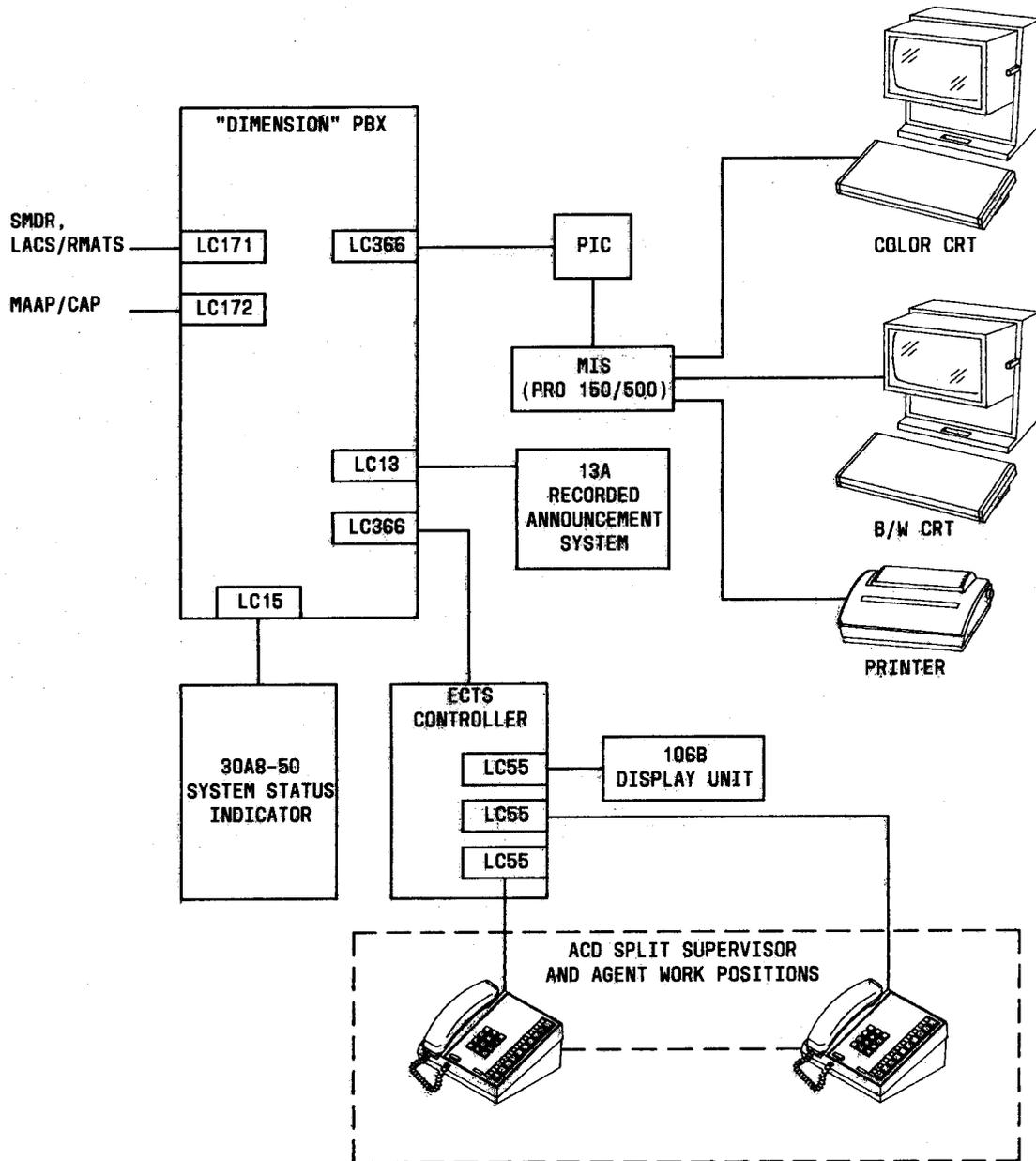
Positions equipped with headsets become staffed when the headset is plugged-in and do not require a STAFF button on the ECTS set.

**3.13** A split supervisor position is the same as an agent answering position but with additional functions that are used for supervisory duties. The additional functions may be provided with DACs, additional buttons on an ECTS set (ie, 20-button set), or by using a 10-button ECTS set equipped with direct station select buttons.

**3.14** A typical ACD with MIS equipment configuration is shown in Fig. 6. The 106B display unit (Fig. 7) provides real time ACD agent status. The unit displays five different states for each of 20 different agent positions (ie, extension numbers 2001 to 2020). The states are: staffed, ACD call, after call work, auxiliary work, and non-ACD).

**3.15** The ACD split supervisor/agent answering positions can use either straight-line sets or ECTS sets. The mode of agent work positions equipped with ECTS sets can be changed using DACs or feature buttons. Associated LEDs on the ECTS sets provide a visual indication of which mode the set is currently in. Only DACs can be used to change the mode on straight line sets. Plug-in head sets can be used with either type of set to provide hands-free operation.

**3.16** The 30A8-50 system status indicator provides queue warning lamps, indicating queue length beyond a user-defined level. The 13A Recorded Announcement System provides announcements and stores digitized speech in magnetic bubble memory. The system provides variable announcements which are adjustable in 3-second intervals to a maximum of



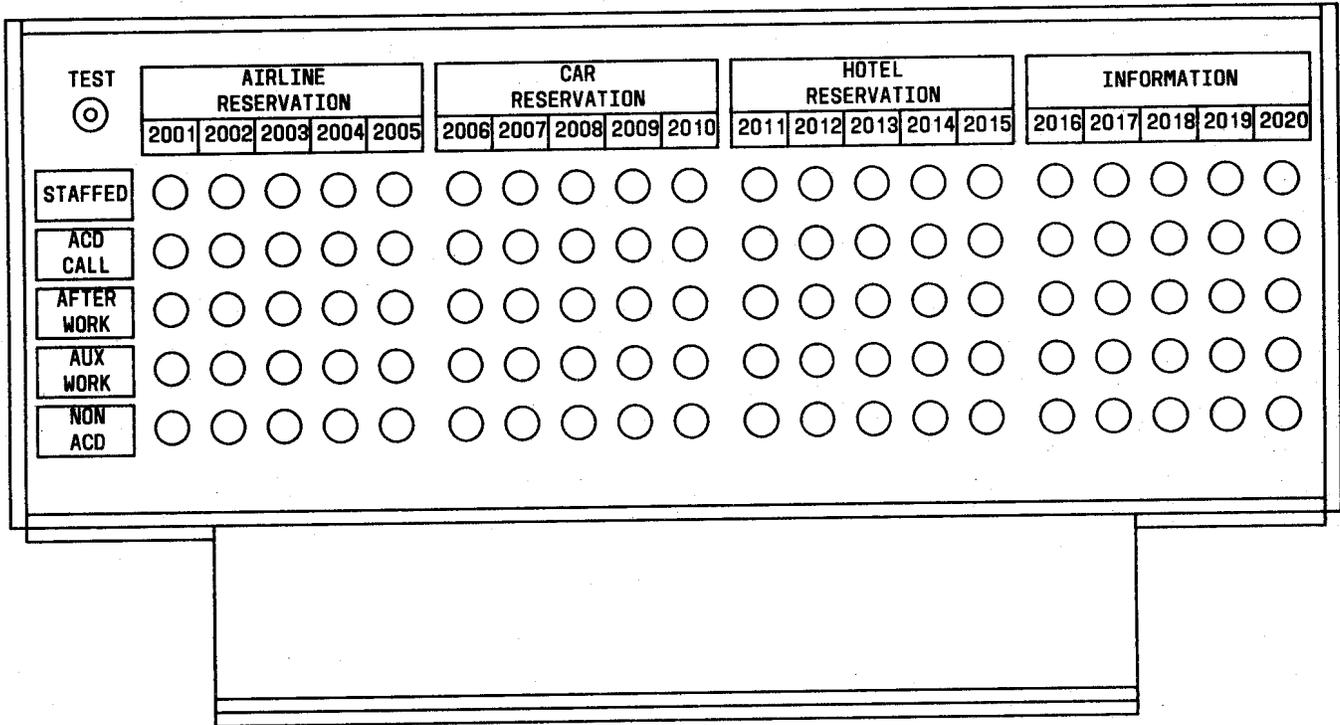
◆Fig. 6—Typical ACD With MIS Equipment Configuration◆

24 seconds. The announcement system is mounted in an auxiliary cabinet.

**3.17** The peripheral interface circuit (PIC) is used to drive the MIS. It converts signals from the LC366 to a standard EIA RS232 format.◆

**AUTOMATIC INTERCOM**

**3.18** This feature provides a talking path between two ECTS stations with automatic signaling of the called station. Upon pressing the automatic intercom access button and going off-hook, the calling station user hears an audible ring, and the called station receives a distinctive 3-burst ring. The status



◆ Fig. 7—Typical 106 B1A Display Unit◆

lamp associated with the intercom access button is steady at the calling station and flashing at the called station.

#### ♦AUTOMATIC MESSAGE WAITING (AMW)

**3.19** The AMW feature provides an automatic lamp indication on the subscriber's telephone which, when lighted, indicates that a message(s) has been left in the Message Center for the subscriber. The messages are the result of the Leave-Word Calling feature or Message Center initiated messages. When all messages have been delivered to the subscriber and marked "delivered" in the Messages Center data base, the AMW lamp will extinguish.

**3.20** Hardware required to support the feature includes MET sets with an AMW status lamp assigned; non-MET sets such as hotel/motel type 500Y or 2500Y sets equipped with neon lamps; the line circuits (LC03) which switch interrupted lamp lighting voltage (LC03) which switch interrupted lamp lighting voltage (+90V, 60 ipm) to the station lines equipped with hotel/motel type sets; and network buffer circuits (LC41) which provide the +90V, 60 ipm message waiting power for the hotel/motel sets.♦

#### BRIDGED CALL

**3.21** This feature allows an ECTS station user to go off-hook on a station line appearance which is already busy and be bridged onto the existing conversation. Only one additional station per line is allowed to bridge onto an existing call. When an existing call is a 3-way call involving two trunks and one station line, no bridging is allowed.

#### ♦CALL COVERAGE

**3.22** The Call Coverage feature (FP8, Issue 3) automatically redirects calls to alternate answering stations for assigned screening of calls and message taking. In the executive/secretary application, for example, the executive's incoming calls are redirected to the secretary if the executive's line is busy, or if the executive chooses not to receive incoming calls.

**3.23** Call Coverage service provides integrated call-handling features for the principal (the executive), the covering user (the secretary), and the internal caller. Externally originated calls to the principal

will also be redirected to the covering user or attendant. Call Coverage Service is based on a system of assigned coverage criteria for the principal. Coverage criteria, such as "line busy" or "don't answer", are the conditions under which the system redirects a call to the principal's assigned coverage. When a call is placed to the principal, the system determines whether assigned coverage criteria are fulfilled. If they are, the Call Coverage service determines which coverage point (line or group of lines) is available to answer the call. Any ringing to the principal is then stopped and the call is redirected to the available covering user. A DIMENSION PBX ECTS covering user can be assigned a button to:

- CONSULT: With the principal when answering a call that is urgent, or
- LV WD CALL ACT: That will activate the message waiting indicator at the principal telephone with a message at the message center to call the covering user for a message from caller outside the PBX, or
- COV CALLBK: That will activate the message waiting indicator at the principal telephone with a message at the message center to call back a caller within the PBX.

An end point in an assigned Call Coverage path can be a Message Center. Message Center Service is provided in Issue 3 of FP8.♦

#### CALL FORWARDING—ALL CALLS

**3.24** 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 from an idle state (or busy state if call hold is in the same feature package) or by the attendant. The activating station may be used to originate calls while activated. All stations can use this feature simultaneously.

**3.25** A DIMENSION PBX ECTS station user can activate Call Forwarding—All Calls by going off-hook, pressing the assigned button, and dialing the number of the station which is to receive the calls. When activated, the status lamp lights. Deactivation is accomplished by going off-hook on the line and pressing the CALL FWD ALL button.

**3.26** ♦In FP8 and FP12, override of Call Forwarding—All Calls is provided. This capa-

bility allows the station (station B) to which calls have been forwarded to either call the forwarding station (station A) or to transfer a call to the forwarding station. For example, the station (B) receiving the forwarded calls from a forwarding station (A) can transfer important calls back to the forwarding station (A).◀

#### CALL FORWARDING—BUSY AND DON'T ANSWER

**3.27** 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 from an idle state (or busy state if call hold is in the same feature package) 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 activating station may be used to originate calls while activated. All stations can use this feature simultaneously.

**3.28** An ECTS station user can activate Call Forwarding—Busy and Don't Answer by going off-hook, pressing the assigned button, and dialing the number of the station which is to receive the calls. When activated, the status lamp lights. Deactivation is accomplished by going off-hook on the line and pressing the CALL FWD—BY/DA button.

#### CALL FORWARDING—DON'T ANSWER

**3.29** 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. The activating station may be used to originate calls while activated. All stations can use this feature simultaneously.

**3.30** An ECTS station user can activate Call Forwarding—Don't Answer by going off-hook, pressing the assigned button, and dialing the number of the station which is to receive the calls. When activated, the status lamp lights. Deactivation is accomplished by going off-hook on the line and pressing the CALL FWD DA button.

#### CALL FORWARDING—ALL CALLS—REMOTE

**3.31** This feature, provided in Issue 3 or later of FP8, enhances the Call Forwarding feature to include the capability for stations to call forward their calls to numbers outside the PBX. The dialed number must contain only an access code and seven digits. The software will not permit forwarding to a number that is a toll call. Calls may be directed to central office trunk groups, tie trunks, AAR, or ARS. This function is provided as a class-of-service option so that it can be provided to a select group of users.◀

#### CALL HOLD

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

- Originate another call on his line
- Activate a service
- Return to another call that had been held via call hold.

**3.33** 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 will remain on hold until the controlling station user either hangs up, causing the station to ring with the held call, or flashes and redials the "hold" code to return to the original call. Only one call per station line may be held at a time. The held call **cannot** be added to the other call.

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

**3.35** An ECTS station user can activate call hold by pressing the call hold button while busy on a call, causing the call hold status lamp to wink. The user returns to the held call by pressing the call hold

button. Disconnecting from the line causes the line to ring back with the held call.

#### CALL PICKUP

**3.36** A non-ECTS station user can answer any calls directed to another station line within his pre-set pickup group by dialing a pickup code from an idle or busy station. If more than one station line in the pickup group is ringing, the individual call to be answered will be selected by the system.

**3.37** An ECTS station user can activate call pickup by pressing the assigned button when a station line within the same pickup group is ringing. When a line in the pickup group is ringing, the call pickup status lamp will flash. If activated while busy, the present call will automatically be placed on Call Hold.

#### CALL WAITING SERVICES

**3.38** 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 called station user may connect to this waiting call by hanging up, whereby the station will be rung and will be connected to the call upon answer. Alternatively, 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, and busy tone is returned if the called station is not in a 2-party talking state, if a call is already waiting, or if the called station has activated a conflicting feature.

**3.39** An ECTS station user can have the following button-activated call waiting services:

- **Call Waiting—Originating:** An ECTS station user can activate Call Waiting—Originating by pressing the assigned button upon hearing a busy tone when calling another station. The associated status lamp lights steadily, and the 3-burst priority call waiting tone is applied towards the busy station.
- **Call Waiting: Answer—**A busy ECTS station user upon hearing any call waiting tone

can answer the waiting call by pressing the assigned button. The original call will automatically be placed on hold if it is not terminated before the button is pressed.

#### A. Attendant Call Waiting (Replaces Attendant Camp-On)

**3.40** 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.

#### B. Originating Call Waiting

**3.41** The originating class of service enables the station user 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.

#### C. Terminating Call Waiting

**3.42** 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.♦

#### COMMON AUDIBLE RINGING

**3.43** This feature allows the ECTS station tone ringer to be activated when any one of two or more specified line appearances on this station has a terminating call.

#### DIAL INTERCOM

**3.44** This feature allows an ECTS station user to press the dial intercom access button, go off-hook and dial a 1- or 2-digit code to call one of a maximum of 27 other ECTS stations. A particular station may be connected to only one other station at a time. There may be two simultaneous conversations within an intercom group.

#### DIRECT DEPARTMENT CALLING (DDC)

**3.45** This feature provides an economical alternative to Direct Inward Dialing (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 trunk groups to a designated station which is normally in a hunting group. Calls to this station are queued if the station and all other members of the hunting group are busy. A total of up to 30 DDC and Uniform Call Distribution (UCD) groups are possible per DIMENSION 2000/Custom PBX. The maximum number of DDC groups is 30 minus the number of UCD groups. For systems equipped with Issue 3 of FP8, the function of the DDC feature is replaced by the Enhanced Uniform Call Distribution feature.

### DISTINCTIVE RINGING

**3.46** 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:

- One-burst (normal) ringing indicates station-to-station call.
- Two-burst ringing indicates attendant call or outside call.
- Three-burst ringing indicates either automatic callback, originating call waiting, outgoing trunk queuing callback, or custom intercom call.

### ◆DISTRIBUTED COMMUNICATIONS SYSTEM (DCS)

**3.47** The DCS provides new feature capabilities to the PBXs, equipped with FP8, Issue 3. The DCS provides customers with the capability to have feature transparency between multiple DIMENSION PBX switches. Feature transparency is the ability to activate, administer, and utilize a feature between two or more PBX switches, and have the feature operate as if it were in the same switch. The switches can be located on the same premises, a campus arrangement, or in different locations distributed through a metropolitan area. In addition, customers that require more capacity that can be provided with a single PBX can now be provided with a system comprised of several PBXs that have feature transparency between them. This then enables customers to separate and control their systems, basically, as a single entity.

**3.48 *Transparent Features:*** Each PBX equipped with DCS has available all of the

features presently offered with FP8. In addition, DCS provides some degree of feature transparency between the PBXs for the following FP8 features which are ECTS related:

- Automatic Callback Calling
- Busy Verification of Station Lines
- Call Forwarding—All Calls, Busy and Don't Answer, Don't Answer
- Call Waiting—Attendant, Originating, Terminating
- Distinctive Ringing
- ECTS Direct Station Selection (DSS)
- ECTS Last Extension Called
- Five-Digit Dialing
- Inter-PBX Call Transfer
- Station-to-Station Calling
- Threeway Conference Transfer
- Trunk Verification by Customer.

### **3.49 *Data Communications Interface Unit (DCIU):***

Feature transparency is made possible between PBXs by the addition of a DCIU and an associated DCIU interface program (DIP) to each PBX. The DCIU makes possible the transfer of information between PBX processors. The DCIU interfaces with the local PBX processor via one of 20 direct memory access (DMA) ports under control of DIP. The DIP translates DCIU instructions, generates and formats a DCS message with the appropriate feature or call information, and transmits the message by a DMA port to the DCIU.

**3.50** Once the appropriate call or feature message reaches the DCIU, the DCIU determines which PBX (ie, DCS node) the message is destined for, assigns the proper DCIU link and selects one of 20 logical channels within the link over which the message is to be transmitted. The links connect the various DCS nodes and are capable of handling information at speeds up to 19.2 Kb/s, depending on distances involved and traffic on the link.

**3.51** Assignments of DCIU links at each DCS node are made in such a manner that all nodes can

be physically connected with no more than one hop required to reach any combination of nodes. No more than four DCIU links are assigned to each node. Large DCS multiple PBX switch complexes may require the use of a 5-digit dialing plan. See "Five-Digit Dialing" feature description of the plan.

**3.52** There is currently no method for administering or maintaining all DCS cluster nodes using the same connection. All nodes must be administered and maintained as separate PBXs using a separate dial-up connection from RMATS and CACS for each PBX.

**3.53** When a feature is accessed to a distant DCS cluster node that requires the passing of the COS assignment, the COS in both the sending and receiving DCS cluster nodes must be the same.

**3.54** Like COS assignments, each trunk group (TG) that is associated with a DCIU link must be numbered exactly the same on both ends of the circuit (ie, TG 20, trunk 4 must be TG 20, trunk 4 on both ends of the circuit).♦

#### ♦ENHANCED UNIFORM CALL DISTRIBUTION (EUCD)

**3.55** This feature, provided in Issue 3 of FP8, replaces the function of Uniform Call Distribution (UCD) and Direct Department Calling (DDC) feature provided in Issue 1 of FP8/FP12. It is equivalent to the Automatic Call Distribution feature in FP8, Issue 2, except that the Performance Reporting Option 150/500 is not available. See ACD in this section for an explanation of answering position work modes. This feature permits Incoming Direct Inward Dialed (DID), Central Office (CO), Foreign Exchange (FX), Tie Trunk, and 800 Service calls as well as local station and attendant extended calls to be terminated directly to the next idle of a prearranged group of answering positions (referred to as a split). The answering positions appear as normal stations to the PBX and can function in the normal manner to originate and receive calls directly. The Force Administration Data System (FADS) display that was provided with UCD is not compatible with Issue 3 of FP8.♦

#### EXCLUSIVE HOLD

**3.56** This feature allows an ECTS station user, by pressing the exclusive hold button, to hold a call, replace the handset without losing that call, or

place a call on another PBX line. All other ECTS stations with appearances of the line are prevented from entering the call. The status lamp associated with the line access button at the activating station winks. The status lamp at all other ECTS stations with appearances of the line remains steady.

#### EXECUTIVE OVERRIDE

**3.57** The station user can be added onto a 2-party busy station connection. Before the connection is established, a 4-second burst of tone will be applied to advise the talking parties of the bridge.

**3.58** An ECTS station user can activate executive override by pressing the assigned button upon hearing a busy signal when calling another station. The status lamp remains lighted until one of the original parties hangs up.

#### HOLD

**3.59** This feature allows an ECTS station user, by pressing the hold button, to hold a call, replace the handset without losing that call, or place a call on another PBX line. The status lamp associated with the line access button winks on all ECTS stations with appearances of the line.

#### IDLE LINE PREFERENCE

**3.60** This feature automatically connects the ECTS station user to an idle line upon going off-hook. The I-use lamp will remain dark until the user goes off-hook. When more than one line is idle, the leftmost, bottommost idle line access button on the set will be selected. If no line is idle, the user receives reorder tone.

#### I-HOLD

**3.61** This feature allows an ECTS station user, by pressing the I-hold button, to hold a call, replace the handset without losing that call, or place a call on another PBX line. The status lamp associated with the line access button at the activating station flutters. The status lamp on all other ECTS stations with appearances of the line winks.

#### INCOMING CALL PREFERENCE

**3.62** This feature automatically selects, for an on-hook ECTS station, a line access button which

## SECTION 554-010-110

has a call in the ringing state. The call may be on a line that does or does not ring at this station; however, priority is given to lines that do ring.

### I-USE INDICATION

**3.63** This feature provides a red I-use lamp associated with each line access button. When off-hook, this lamp indicates the line the station is connected to. When on-hook, this lamp indicates the line the station would be connected to upon going off-hook.

### LAST EXTENSION CALLED

**3.64** This feature permits an ECTS station user while on any line appearance to automatically dial a call to the PBX station line which was last dialed by pressing the last extension called button.

### LAST LINE PREFERENCE

**3.65** This feature automatically connects the ECTS station user, upon going off-hook, to the last manually selected line.

### ▶LEAVE-WORD CALLING (LWC)

**3.66** The LWC feature (FP8, Issue 3) allows a caller to leave a predefined "canned" message for the called party. By using a feature button LV WD CALL ACT on a MET set or by dialing an access code, the LWC feature creates a message containing the calling party identification, date, time, and a message to call the calling party. The message is created and stored in the message center data base without the participation of a covering station user. The subscriber for whom the message is intended then retrieves messages by calling the message center directly. Leave-word calling messages may be cancelled by the caller pressing a feature button LV WD CALL CAN on a MET set or dialing an access code before they are retrieved. Leave-Word Calling requires the Message Center Service feature since both features use the same data base. If more than one message is sent from a given caller, a count will be maintained and only the last message will be stored. These messages are integrated with message-center messages so that any access to the message center will retrieve all the messages, including the LWC messages.

**3.67** Whenever a LWC or message-center message is waiting, the message-waiting indicator on

the station set lights as a result of the Automatic Message Waiting feature. This indicates messages are available in the message center for the subscriber.◄

### LINE RINGING

**3.68** This feature provides the ECTS station user with an audible indication of a call on a specific line that appears on the station. The audible indication is provided via a tone ringer within the ECTS station.

### LINE STATUS INDICATION

**3.69** This feature provides an indication of the call status for each line access button on an ECTS station. The indication is provided by a green lamp associated with each line access button. The status lamp flashes during the ringing state, lights steadily during the busy state, and either winks or flutters during the held state.

### ▶MALICIOUS CALL TRACE

**3.70** This feature allows a user to trace a call originating within the PBX system or beyond. This feature is to be used when a call is determined to be malicious (ie, obscene, a bomb threat, etc).

**3.71** After the feature has been activated by pressing the EMERG button from an ECTS set, or by dialing an access code from any telephone set or by an attendant console button, all facilities associated with the call are locked up except for the called station. Pertinent information about the connection is placed into a queue to be displayed to the attendant upon request. The attendant controls the feature, gathers the needed information, and deactivates the feature.◄

### MANUAL EXCLUSION

**3.72** This feature allows an ECTS station user when off-hook on a station line to prevent all other stations from bridging onto the line. Other stations will remain excluded until the feature is deactivated by the ECTS station user either by going on-hook or pressing the manual exclusion button a second time. The status lamp associated with a manual exclusion button is steadily lighted whenever the feature is active. Only one manual exclusion button is allowed for any station line, and a station with

more than one line must have a separate manual exclusion button for each line requiring exclusion.

#### **MANUAL INTERCOM**

**3.73** This feature allows an ECTS station user to press the manual intercom access button, go off-hook, and be connected to a common intercom path which can have a maximum of 15 other ECTS stations. The intercom status lamp lights steadily on all assigned stations, and up to three stations may be connected to the intercom. The manual signaling feature may be used to alert the called station.

#### **MANUAL SIGNALING**

**3.74** This feature allows an ECTS station user to signal a predetermined ECTS station by pressing the assigned button. A continuous tone is applied to the tone ringer at the predetermined station until the manual signal button is released at the activating station. The manual signaling status lamp at the activating station remains lighted while the button is pressed. Manual signaling at the signaled station will take priority over normal ringing.

#### **◆MESSAGE CENTER SERVICE**

**3.75** This feature which is provided by Issue 3 of FP8 allows a pool of agents, or operators, at a message center to provide a video terminal based answering service for subscribing station users. All message center calls are channeled to the agent pool through a designated Enhanced Uniform Call Distribution (EUCD) queue via Call Coverage redirected calls or directly dialed calls. When a call is not answered immediately by an agent, the call awaits distribution in the EUCD queue. The caller hears a recorded announcement and optional background music until the agent answers. See ACD in this section for a description of agent answering positions work modes assigned to MET set buttons with EUCD.

**3.76** Agents in the message center can retrieve messages as well as answer calls. Agents answering calls can identify the subscriber to the caller, inform callers of any messages that subscribers have left for them, and retain messages callers leave for subscribers by entering them at the video terminal, and subsequently saving them on the message center data base.

**3.77** A message-waiting lamp lights at the subscriber's telephone when there is a message.

Subscribers may call the message center directly to retrieve messages. The agent can add, delete, or change any message the subscriber designates for incoming callers. The agent can also step through the subscriber's messages sequentially and read, retain, or delete them. Each message displayed on the agent's terminal will be one of two types: those activated by callers through the Leave-Word Calling feature, or those entered by message center agents at a terminal.◆

#### **MUSIC-ON-HOLD ACCESS**

**3.78** This feature provides customer-furnished music or other audible indication to the held party when an ECTS station user activates hold, I-hold, priority hold, or exclusive hold.

#### **NO LINE PREFERENCE**

**3.79** This feature requires an ECTS station user to manually select a station line access button for each call.

#### **PBX LINE ACCESS**

**3.80** This feature allows an ECTS station user to access a PBX line. This line can appear as a line access button with an associated I-use and line status lamp on a maximum of 16 ECTS stations. However, 500- or 2500-type stations can also be used as one of the multiple appearances of the PBX line. (The PBX lines which are assigned to 1A2 key equipment may not also be assigned to ECTS stations.) Each of the PBX lines assigned to ECTS stations can be assigned with any of the features normally available with the PBX.

#### **PERSONAL CENTRAL OFFICE LINE**

**3.81** This feature provides a communication channel between an ECTS station and a central office via the DIMENSION PBX time-division network and a dedicated trunk circuit. This line can appear as a line access button with an associated I-use and line status lamp on a maximum of 16 ECTS stations.

#### **POWER FAILURE TRANSFER**

**3.82** This feature provides service to and/or from the exchange network (non-FX and WATS) for a limited number of prearranged stations during a power failure at a PBX customer location when re-

serve power is not provided, or if battery reserve is provided, when the reserve depletes. Incoming service is not available for direct inward dialing. The power failure stations must be equipped with a ground-start button to originate calls when in power failure mode and equipped with a rotary dial when the central office accepts only rotary pulsing.

**3.83** This feature requires the use of one or more 609-type emergency transfer panels, each of which provides for transfer of 10 trunks. When a power failure occurs, each CO trunk is connected directly to the predesignated 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.

**3.84** The ECTS stations can also be arranged to act as power failure transfer stations with the addition of an auxiliary ringer adjunct to the station tip and ring for incoming calls.

#### PRESELECTION

**3.85** This feature allows an ECTS station user to override line/call preference features by manually selecting a line access button while on-hook.

#### PRIME LINE PREFERENCE

**3.86** This feature automatically connects the ECTS station user, upon going off-hook, to the line designated as the prime line.

#### PRIORITY HOLD

**3.87** This feature allows an ECTS station user by pressing the priority hold button to hold a call, replace the handset without losing that call, or place a call on another PBX line. The status lamp associated with the line access button receives a "broken flutter" indication on all ECTS stations with appearances of the line.

#### RECALL BUTTON

**3.88** This button is standard on all ECTS station sets and provides the timed flash function required to obtain recall dial tone or to activate other system features. The feature eliminates the need for the user to press the switchhook for a specific time interval. Pressing the ECTS station switchhook will always be recognized as a disconnect.

#### RINGING LINE PREFERENCE

**3.89** This feature automatically selects for an on-hook ECTS station a line access button which has a call ringing the station set. If two or more lines are ringing simultaneously, the station user is connected to the first line that began to ring.

#### RINGING TRANSFER

**3.90** This feature allows ringing associated with a call on a DIMENSION PBX ECTS set to be transferred to one or more ECTS station sets which have an appearance of that line. For each line in the system, a prearranged ringing pattern is provided to each appearance. The line rings or does not ring. Pressing the ringing transfer (RING TRFR) button will reverse the ring/no ring pattern on the individual set and will occur indefinitely as long as the RING TRFR button is activated. This feature allows for an alternate ringing pattern to be put into effect in a predetermined fashion.

#### SPEED CALLING

**3.91** Station users can dial 2- or 3-digit codes to reach frequently called PBX stations or outside telephone numbers except international direct distance dialing (IDDD) and tie trunk calls. Individual lists can be changed by the station line to which that list is assigned. Group lists are changeable via a designated station line within each group. Individual or group lists can also be changed via the Maintenance and Administration Panel (MAAP).

*Note:* Speed calling can only be assigned on an ECTS set in Feature Packages 7, 8, 11, 12, and 15. When the DSS button is pressed, the call is processed to completion providing the access code and the list index number are assigned to the DSS button.

#### STATION BUSY INDICATION

**3.92** This feature provides a visual indication of the switchhook status of a particular ECTS station at another ECTS station. Any unassigned status lamp may be used to provide the visual indication.

#### STATION DIRECT STATION SELECTION (DSS)

**3.93** This feature allows the ECTS station user off-hook on a station line to automatically dial

preassigned station lines or access codes within the PBX by pressing the assigned DSS button in the key field. The assignment of the DSS buttons can be accomplished by the station user.

#### STATION MESSAGE WAITING

**3.94** This feature allows an ECTS station user to activate a status lamp at another designated ECTS station by pressing the message waiting button. While the feature is in use, a status lamp associated with both message waiting buttons is lighted. This feature is deactivated by pressing the message waiting button at either station.

#### STATION RINGER CUTOFF

**3.95** This feature allows the tone ringer to be cut off at a particular ECTS station by pressing the assigned button. When the button is pressed, the associated status lamp indicates feature activation. Pressing the button a second time enables the ringer and turns the status lamp off.

#### THREWAY CONFERENCE TRANSFER

**3.96** A station user can, by flashing while on any 2-party call, effect a 3-way conference and transfer. After flashing, the station dials the third party (which can be a trunk) for private consultation while the second party is held. By flashing a second time, a 3-way conference is effected. Subsequently, a transfer is accomplished when the original party goes on-hook. Where two trunks are involved in a conference, all conferees are released from the connection when the controlling station goes on-hook. In addition, the controlling station can drop the third party by flashing during the 3-way conference.

**3.97** An ECTS station user can activate Threeway Conference Transfer via use of the recall button in lieu of using the switchhook.

### 4. ENVIRONMENTAL REQUIREMENTS

**4.01** Extreme conditions of temperature and humidity may have damaging effects on system equipment. Exposure to extreme temperature and humidity may degrade telephone service, not only at the time of exposure but also when a normal environment is restored. Table E outlines the equipment room environmental requirements for a controller in a stand-alone cabinet. The humidity design range

chart (Fig. 8) is provided to indicate the safe ranges for the equipment. The use of the chart requires a hygrometer to measure wet and dry bulb temperatures and a hygrometric table to determine the relative humidity from the difference in the two measurements.

**4.02** The requirements presented in Table E represent the extreme limits of the equipment operating ranges. These requirements should not be construed as being desirable working conditions for minimum maintenance. Installation in undesirable areas will cause degradation to the extent of reducing system life. Therefore, it is recommended that floor plans for customer equipment locations specify that the room ambient temperature be maintained in the range of 4°C (40°F) to 35°C (95°F) and relative humidity in the range of 20 to 60 percent.

**4.03** For storage and transportation environments, the permissible extremes are 65.6°C (150°F) with 15 percent RH and -40°C (-40°F) humidity uncontrolled.

**4.04** The following site selection guidelines should be followed.

- (a) The equipment should be installed in an air-conditioned space whenever possible.
- (b) Environments which are not recommended for installation because of potential temperature problems include rooms in which a major heat source (ie, boiler room, furnace room, manufacturing areas using hot processes) can affect the room ambient temperature significantly. These areas could include:
  - Unventilated rooms with less than 4.65 square meters (50 square feet) of floor space.
  - Unventilated rooms with two or more exterior walls that are frequently exposed to high ambient temperatures.

**4.05** To aid in determining air-conditioning requirements when space is allocated, total power dissipation of each carrier is shown in Table F. The equipment engineer should analyze the room ventilation and/or air-conditioning to ensure that requirements for each installation are met.

TABLE E

ENVIRONMENTAL REQUIREMENTS

ROOM AMBIENT (DRY BULB) TEMPERATURE (°F) (NOTE)		PERMISSIBLE RANGE HUMIDITY %		RECOMMENDED RANGES			
				TEMP °F (NOTE)		HUMIDITY %	
MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MIN	MAX	MIN	MAX
80	32	95	10				
85	32	95	8				
90	32	95	7				
95	32	80	6				
100	32	70	5	65°	95°	20%	60%
105	32	60	4				
110	32	55	4				
115	32	45	3				
120	32	40	3				

Note: Temperature is indicated by an ordinary thermometer measured at a location 915 millimeters (3 feet) above the floor and 381 millimeters (15 inches) in front of a cabinet.

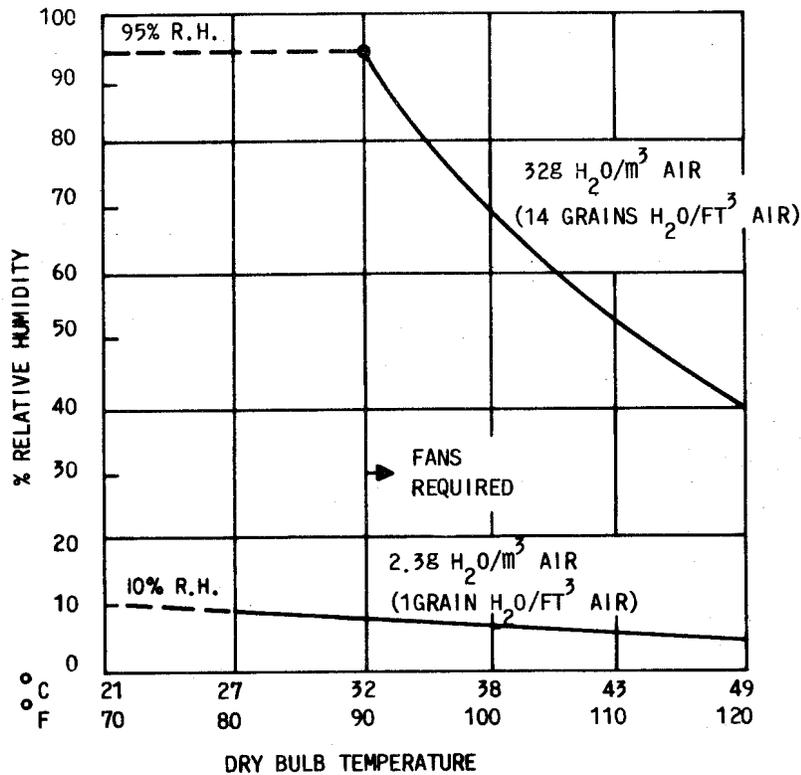


Fig. 8—Humidity Design Range

TABLE F

## TOTAL POWER DISSIPATION BY CARRIER

CABINET	MAXIMUM POWER DISSIPATION (NOTE)	
	BTU/HR	WATTS
Basic	587	172
Supplementary	239	70

◆**Note:** These values include 30% power supply inefficiency and are adequate for equipment configuration excluding DIMENSION 2000 PBX. For DIMENSION 2000 PBX, power dissipation (for air conditioning considerations) should be determined using ED1E301-01 relative to expected traffic requirements.◆

**4.06** Gold fingers and connector interfaces could chemically deteriorate through the corrosive effects of gases on particle surfaces. Environments containing high concentrations of corrosive gases such as sulfur or chlorine should not be used as installation sites.

## 5. POWER AND GROUNDING

### POWER SUPPLY

**5.01** A 120-volt, 60-Hz commercial power source is used with the DIMENSION PBX ECTS. The requirement for commercial power is an input voltage of 105 to 129 volts at an input frequency of 57 to 63 Hz. The input voltage may be 99 to 105 volts, but the input frequency must then be 59.7 to 60.3 Hz. The ac input current shall be protected at 10 amperes per basic carrier. Each controller requires a separately protected ac receptacle, 3-wire, Hubbell catalog number 5279 or equivalent (provided in cabinet when ordered per Ordering Form E-8124).

**5.02** The power supply is a 207A and is mounted in the basic carrier. One 207A power supply is required for the basic and supplementary carrier. The following is a list of the supply voltages:

- -48 volts, 6 amperes maximum
- +5.1 volts, 5 amperes maximum
- +12 volts, 200 milliamperes maximum.

**5.03** The supplementary carrier -48V bus, +5V bus, and ground bus are wired to TB1 of the 207A power supply in the basic carrier. The +12 voltage is only required for the LC59 circuit pack in the basic carrier. Connecting information is covered in the Task Oriented Practice (TOP) document.

### EMERGENCY TRANSFER

**5.04** Prewired 609-type emergency transfer panels may be provided as a part of the PBX in case of commercial power failure. Each 609-type panel contains apparatus for transferring ten electronic telephone sets to CO cable pairs and for opening two controller data channels during an emergency transfer condition. The following is a list of the requirements for an electronic telephone set to be used as an emergency transfer station:

- CO pair must provide ringing (terminating only)
- Externally mounted ringer (terminating only)
- Ground-start key (originating only)—551A type key, 77A bracket
- Adjunct rotary dial (originating only if central office is non-TOUCH-TONE service trunk group)—500 type telephone set
- Open the data channel between the PBX and the associated controller via the 609 panel during the transfer mode.

**5.05** Figures 9(A) and 10 show typical connections of electronic telephone sets assigned to emergency transfer. The externally mounted ringer and the ground-start key require additional leads not provided with standard mounting cord.

**5.06** When power failure transfer is used with ECTS stations, the transmit data link from the PBX to the electronic telephone controller must be routed through a 609-type emergency transfer panel. See Fig. 9(B) (1st choice) and Fig. 9(C) (2nd choice). This prevents a noise problem which is present if power is still phantom to the MET sets after the set's tip and ring have been transferred to the central office. This problem occurs if the -48FAC6 fuse (1-1/3 amp) in the DIMENSION PBX blows which removes power from all 609 panels. Under

these conditions the processor and controller are still communicating and power is still applied to the MET sets which have been transferred. Power must be removed from these sets in order to meet FCC registration requirements. Routing the 2-wire transmit data link (from the PBX to the controller) through the 609 panel causes the controller to remove power from all of its respective MET sets when the 609 panel loses power. This data link must be routed through a single 609 panel for every controller which has power failure transfer capability on any of its sets.



**MET sets with 4A speakerphones should not be assigned to emergency transfer in order to comply with FCC noise requirements.**

#### GROUNDING

**5.07** When the controller is remotely located from the PBX lineup, grounding must be provided by a No. 10-gauge wire connected to ground terminal 11 in the power supply. The ground wire shall be connected to an approved ground. An approved ground is:

- **Water pipe:** A metal underground water pipe in direct contact with the earth for 3.05 meters (10 feet) or more and electrically continuous
- **Building steel:** The metal frame or steel of a building that is effectively grounded
- **Concrete encase ground:** Base No. 4 AWG or larger copper wire or steel reinforcing rod not less than 6.1 meters (20 feet) in length and encased in concrete near the foundation or footing of the building
- **Ring ground:** Base No. 2 AWG or larger copper wire not less than 6.1 meters (20 feet) in length encircling the building at a depth below earth surface not less than 0.76 meter (2-1/2 feet).
- **Power ground:** Any part of power conduit supplying a power panel is acceptable if effectively grounded at the power service entrance.
- **Ground rod:** Telephone company ground rod that is bonded to power service ground.

**5.08** If the controller (and the power supply) is mounted within a PBX cabinet or in a cabinet adjacent to another PBX cabinet, it is necessary to conform with the PBX grounding scheme. For specific station and PBX electrical protection and grounding, refer to Section 876-300-100, Issue 8, or later.

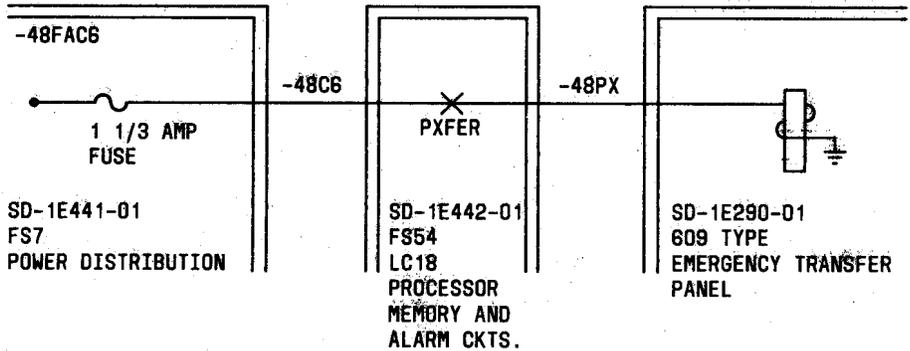
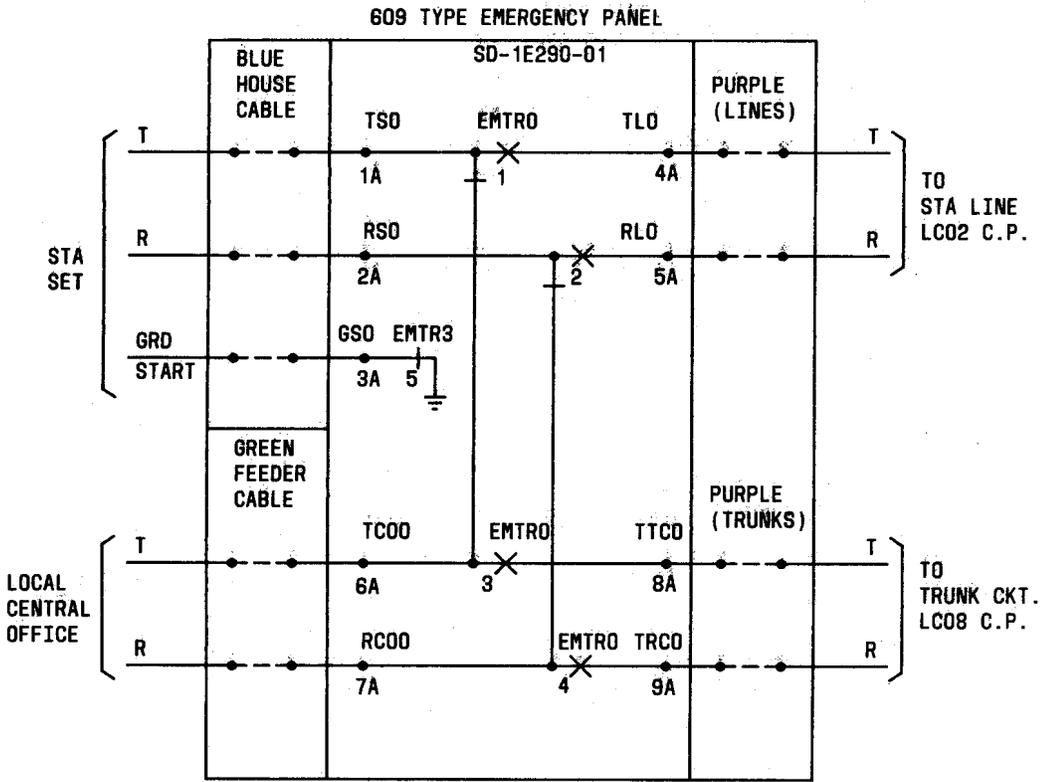
#### 6. MAINTENANCE PLAN

**6.01** The maintenance philosophy for the DIMENSION PBX electronic custom telephone service is basically an extension of that for the DIMENSION PBX. The primary objective is to minimize the repair time of the ECTS equipment while maintaining basic PBX telephone service. A combination of fault detection hardware and software diagnostic programs are used to provide trouble-locating information at the circuit pack replacement level. The use of these aids should enable isolation of a fault to either the DIMENSION PBX, the controller, data links, or the MET set(s) without changing circuit packs as a trouble-locating method. Specific hardware-caused trouble should be corrected with an accuracy of 70 percent on the first indicated circuit pack replacement. Troubles caused by software failure or complex multiple faults may require highly trained personnel.

#### MAINTENANCE AIDS—HARDWARE

**6.02** Indicating fuses and lamp (LED) indicators are provided with each carrier for circuit protection and partial fault isolation. Information pertaining to the lamp indicators is shown in Table G. Additional maintenance aids and associated functions are as follows:

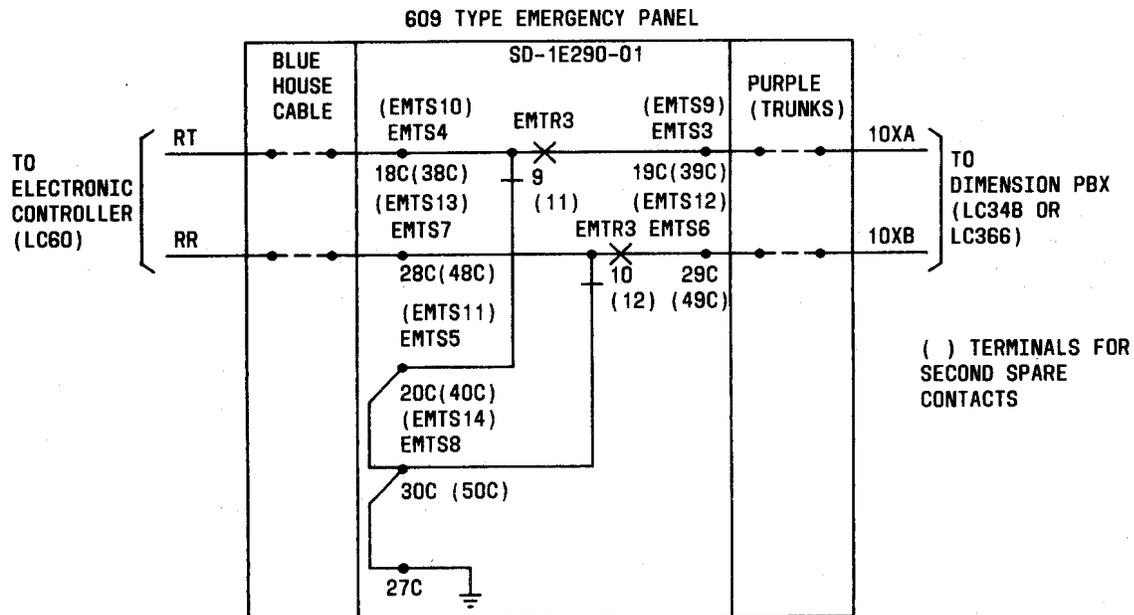
- (a) **Maintenance and Administration Panel (MAAP):** The MAAP is the basic interface between maintenance personnel and the DIMENSION PBX electronic custom telephone service equipment. The MAAP is provided in the DIMENSION PBX basic cabinet and is a software-driven device used for both maintenance and administrative purposes. The primary maintenance function of the MAAP is to enter various diagnostic programs and to display encoded fault conditions.
- (b) **Alarm Panel:** The alarm panel, located in the PBX basic cabinet, contains the MAJOR and MINOR ALARM indicators, fault indicators,



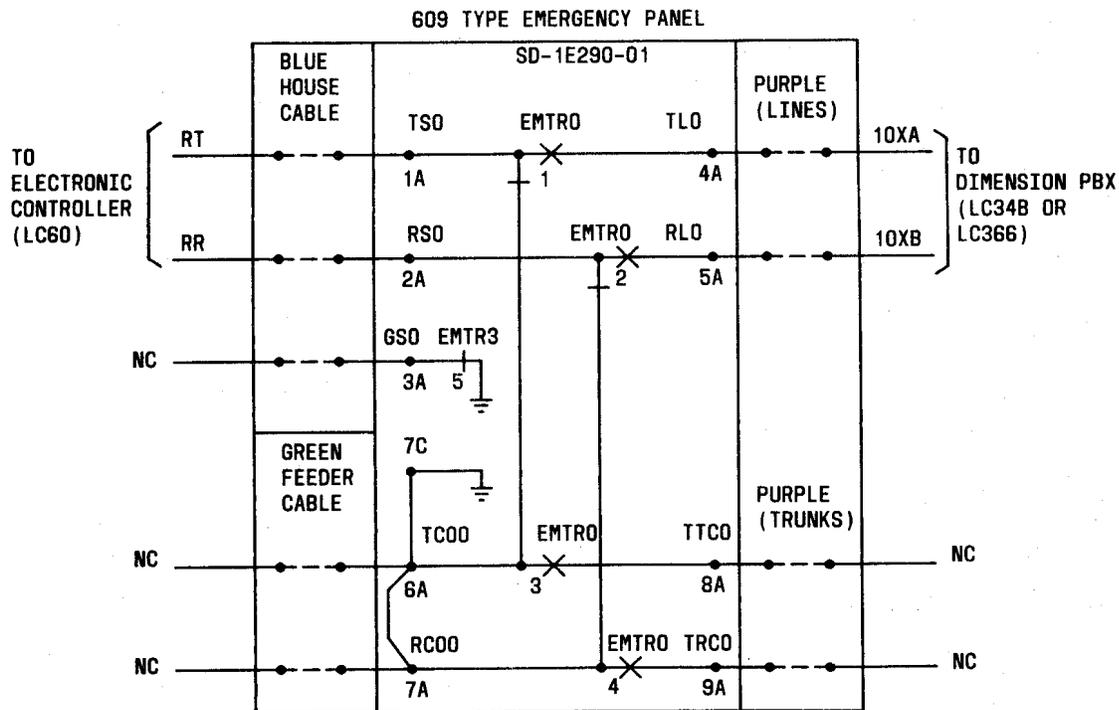
A - TYPICAL CONTACTS OF 609 PANEL TO TRANSFER STATION TO DIRECT TRUNK CONNECTION

- NOTES:**
1. EMERGENCY TRANSFER IF POWER FAILS (COMMERCIAL OR INTERNAL TO SYSTEM).
  2. EMERGENCY TRANSFER IF PROCESSOR OR MICROPROCESSOR TIMEOUT OCCURS.
  3. STATION MUST BE EQUIPPED WITH A GROUND START BUTTON, AND A MECHANICAL RINGER. AN ADJUNCT ROTARY DIAL IS REQUIRED IF THE CENTRAL OFFICE LINE IS NOT ARRANGED FOR "TOUCH-TONE" SERVICE.

Fig. 9—Typical Emergency Transfer Panel Connections (Sheet 1 of 2) (Notes 1, 2, and 3)



**B - FIRST CHOICE CONTACTS OF 609 PANEL FOR CONTROLLERS ASSOCIATED WITH POWER FAILURE STATIONS.**



**C - SECOND CHOICE TYPICAL CONTACTS OF 609 PANEL FOR CONTROLLERS ASSOCIATED WITH POWER FAILURE STATIONS.**

4. DATA LEADS TO THE CONTROLLER ARE GROUNDED DURING POWER FAILURE TRANSFER TO INCREASE NOISE IMMUNITY OF THE LC60 CP.

**Fig. 9—Typical Emergency Transfer Panel Connections (Sheet 2 of 2) (Note 4)**

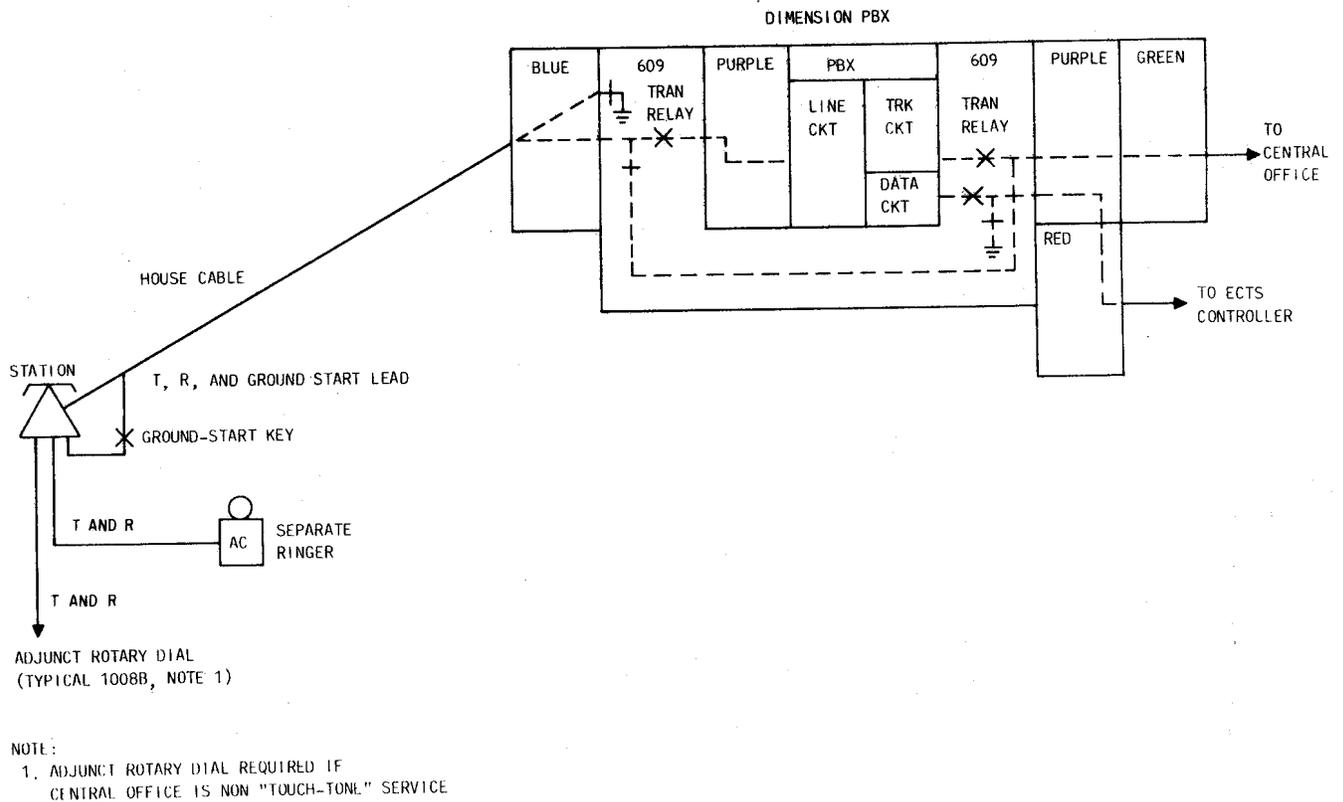


Fig. 10—Typical Emergency Transfer Panel—Station Arrangement

and controls used for system trouble analysis. In the DIMENSION 100 or 400 PBX, the FACILITY indicator is lighted; in the DIMENSION 600 (formerly 400E), 2000, or CUSTOM PBX the OTHER indicator is lighted; and an alarm is generated in the DIMENSION PBX when a fault with the controller or telephone set is detected. The PBX generates a major or minor alarm when a fault condition is detected by software or hardware. The alarms are visible inside the cabinet and are sent to the attendant console. In addition, a relay closure is provided for each alarm to send an indication of the fault to a remote location such as a central office. A major alarm indicates a failure which removes a significant number of stations from service or removes a basic feature from most stations. A minor alarm indicates a failure which affects a limited number of stations.

(c) **Fault Control Circuit Pack (LC59):** This unit, located in the controller, contains fault registers to record various faults within the ECTS equipment. A fault control register is provided to

introduce and/or inhibit particular faults, to partially test the fault detection circuitry, and to enable or disable station power under software control. Lamp indicators are provided to show the condition of various circuits within the controller (Table G). Some of the failures which are automatically detected and stored in the fault registers are:

- Data message parity from the PBX
- Partial message from the PBX
- Station activity buffer memory addressing error
- Station activity buffer memory contents error
- Station activity buffer memory parity error
- Main station activity buffer clock time-out
- Scan timer (of memory) time-out

TABLE G

CIRCUIT PACK LAMP INDICATORS

INDICATOR COLOR	INDICATOR CKT PACK LOCATION	FAULT INDICATION	STATUS
Red	LC 59	Fault exists in Controller hardware or test station plugged in.	Steadily lighted
Red	LC 56	Station address bus stuck.	Steadily lighted
Red	LC 56	Transmit/receive bus stuck.	Steadily lighted
Green	LC 56	Test register trouble or test station plugged in.	Steadily lighted or off*
Red	LC 55	Operated -48V fuse in LC 55 circuit pack.	Steadily lighted

\*This indicator normally flashes to indicate that the station activity buffer circuit to the transmitter/receiver circuit pack is functioning normally (also called controller "heartbeat").

- Transmitter to stations stuck
- Receiver from stations stuck
- Transmit/receive bus stuck
- Station address bus stuck
- Steering circuit enable stuck
- No return of bit or pulse from an electronic telephone set
- Station power turned off
- Station plugged in test jack.

(d) **Test Station Jack:** A test station jack, located on the controller, provides a dedicated station port for the connection of a MET set. This port is equipped to signal the DIMENSION PBX and the controller when the set is plugged in. The set can then be used as a terminal for communication with the PBX via the controller. Test calls can be made from the controller rather than from a

distant station. The test station should always be disconnected when not in use.

#### MAINTENANCE AID—SOFTWARE

**6.03** The DIMENSION PBX provides fault detection and isolation software. With these maintenance features, the PBX can identify and locate faults in the controller. It then displays this information on the MAAP. In order to use the information provided by the fault detection circuitry, both on-line and off-line software is required. The on-line software accomplishes the following:

- Increments peg counts on the controller when failures occur.
- Reads and analyzes the contents of the fault registers in the controller and determines whether to retransmit the previous message or assume the message was processed correctly at the controller.
- Determines when alarms should be enabled.
- Determines which alarm (major or minor) to enable, depending on the severity of the fault.

- Determines whether or not to interrupt service to a particular controller. (For particular types of failures, the station ringers, as well as the indicators, can be stuck on and no useful service is available.)
- Determines if the controller has the ability to report station activity and determines if the indicator and ringer rates are correct by analyzing changes that are reported when varying configurations are placed into the test register. The test register simulates a MET set. By shifting a ringer or indicator rate into the register, button operation can be simulated at a defined rate.
- Determines if the electronic test station has been connected.

**6.04** The off-line software accomplishes the following:

- Monitors results of on-line testing
- Tests the DIMENSION PBX LC34B or LC366 circuit pack, the controller, and MET sets
- Extinguishes alarms and zeros on-line fault storage
- Lights or extinguishes the FAULT indicator to indicate whether a fault remains in the system.

**6.05** The on-line diagnostic programs may be used to test suspected circuits in a system on an in-service basis. The off-line diagnostics are performed using MAAP procedures. These procedures will provide a MAAP display to assist in determining trouble areas.

**6.06** The system can also be tested via MAAP procedures from an RMATS center.

## 7. PHYSICAL EQUIPMENT ARRANGEMENTS

### FEDERAL COMMUNICATIONS COMMISSION (FCC) REQUIREMENTS

**7.01** Although FCC Part 15 regulations apply to systems shipped on or after October 1, 1983, controlled introduction of compliant systems will be made in advance of this date. These compliant sys-

tems will have the following to make them more resistant to transmitting or receiving radio frequency interference (RFI):

- Screen shielded cabinets
- Shielded cables to cross-connect field which are 30-feet minimum and have drain wire shields with spade lug connectors which attach to mating connector field on the back of the cabinets
- The RFI gasket on mating surfaces of cabinet panels which can be removed
- Conductive paint on cabinet surfaces which permanently mate
- Fasteners which hold the doors in place.

### MOUNTING

**7.02** The DIMENSION PBX ECTS controller can be mounted in a DIMENSION PBX cabinet (Fig. 11), an auxiliary cabinet, or in its own stand-alone cabinet J58879K (Fig. 12). Due to the heat dissipation of the power unit, a maximum of two controllers can be mounted in an auxiliary cabinet. Only one controller can be mounted in a DIMENSION PBX or stand-alone cabinet.

**7.03** *Caution: The top of the stand-alone cabinet may collapse if subjected to forces greater than 45 kilograms (100 pounds).* The stand-alone cabinet measures 762 millimeters (30 inches) high by 800 millimeters (31-1/2 inches) wide by 610 millimeters (24 inches) deep. The cabinets will fit through standard door openings 2134 millimeters (7 feet) by 915 millimeters (3 feet) crated. Each cabinet consists of a basic framework with side and front panels hinged for easy access. Carriers are mounted on the cabinet framework, and the basic carrier is always mounted in the bottom position. The cabinets are provided with rollers for ease of installation and maintenance. A cabinet lock is supplied which utilizes the 216C tool as a key. Decorator inserts are available for the front panel in avocado, gold, orange, red, blue, teakwood, or walnut finishes.

### ORDERING

**7.04** The electronic telephone controller, when ordered via Ordering Form E-8124, will be pro-

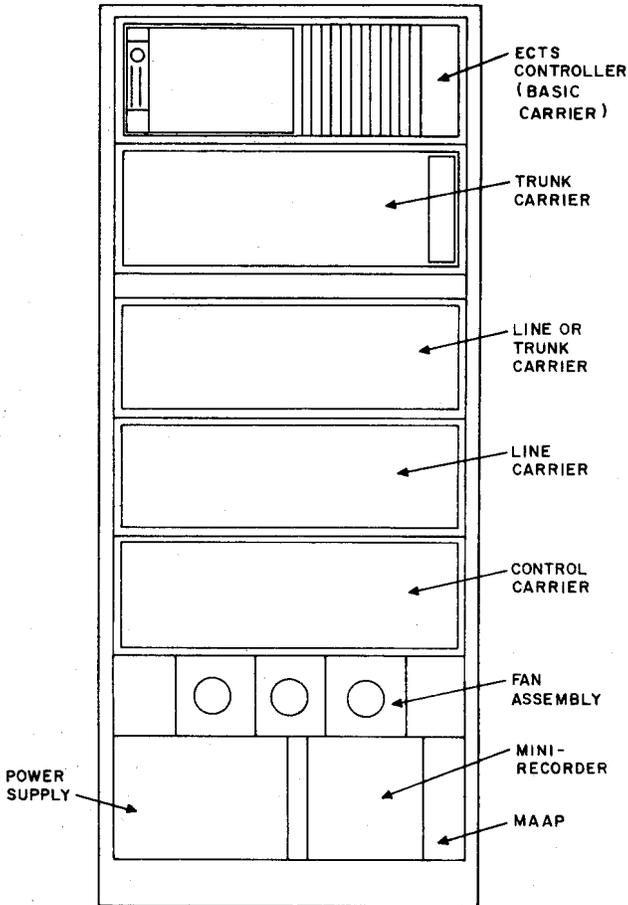


Fig. 11—DIMENSION 400 PBX Cabinet With ECTS Controller (Basic Carrier)

vided with circuit packs and carriers. Proper engineering and installation requires a knowledge of the coded equipment (carriers, cabinets, and circuit packs). In addition to the coded equipment required, the associated PBX must be equipped with the proper generic program. The Maintenance and Administration Panel (MAAP); Customer Administration Panel (CAP); Customer Administration Center System (CACs); and Remote Maintenance, Administration, and Traffic System (RMATS) are used for administering additions, changes, and circuit testing.

**7.05** Table C lists, by memory size, the maximum number of controllers that can be installed in each system.

**7.06** Table H lists the equipment codes and associated unit list numbers required for the system

configurations. The controller station set capacity is shown in Table D.

## CARRIERS

**7.07** A fully equipped controller consists of a basic carrier J58879KA (Fig. 13) and a supplementary carrier J58879KB (Fig. 14).

**7.08** The basic carrier contains a 207A power supply, and provides mountings for the control circuit packs and for eight steering circuit packs.

**7.09** The supplementary carrier provides mountings for an additional eight steering circuit packs. A flat cable is provided for connection to the controller in the basic carrier. The supplementary carrier is always mounted directly above the basic carrier and power is wired from the 207A power supply.

## CIRCUIT PACKS

**7.10** The circuit packs are similar to the circuit packs used in DIMENSION PBX. These boards are modular in concept; i.e., the circuitry for each function or associated group of functions is contained on one circuit pack or additional identical circuit packs. This enables the circuits, which perform specific functions, to be identified by circuit pack type and carrier mounting location position.

**7.11** Individual locking mechanisms and keyed backplane connectors ensure that the circuit pack is firmly locked in a specific mounting position. Figure 15 illustrates a typical controller circuit pack. Table I identifies each circuit pack by type, location, and function. The following is a numerical listing and a brief description of the circuit packs used in the ECTS.

- **LC55—Steering Circuits:** The LC55 contains the data transceiver required to send and receive data between MET sets and the ECTS controller. Each LC55 contains eight separate transceiver circuits.
- **LC56—Transmitter/Receiver:** The LC56 interfaces the station side of the station activity buffer (SAB) with the steering circuits. It handles the distribution and collection of lamp indicator, button, and ringer data. A station address register is provided for send-

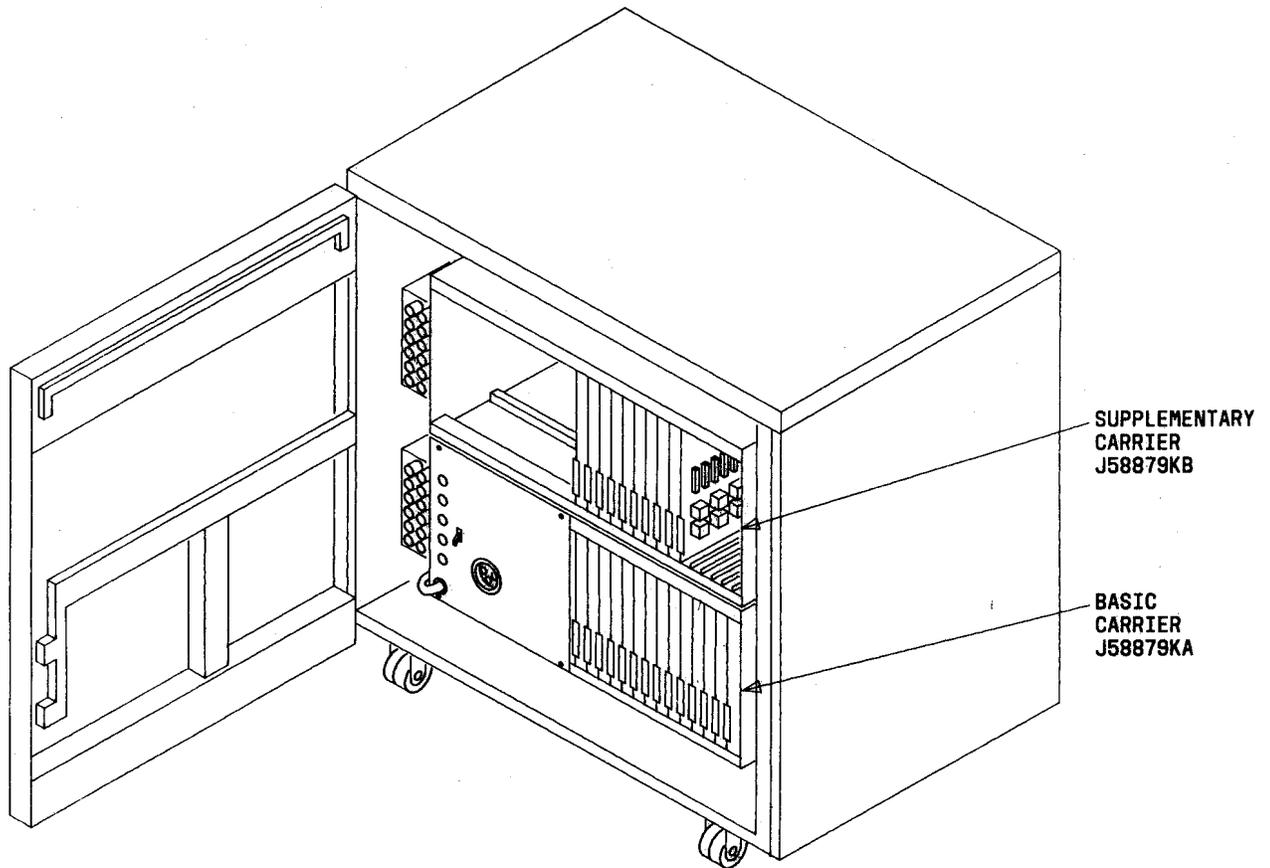


Fig. 12—Stand Alone With Fully Equipped Controller

ing and receiving data to the proper station. One LC56 is required per ECTS controller.

- **LC57—Memory Input/Output:** The LC57 contains the main memory for the ECTS controller. The memory is accessed via the DIU control circuit (LC60) and/or the steering circuit (LC55) by application of address and logic information which stores, updates, or retrieves data in memory. One LC57 is required per ECTS controller.
- **LC58—SAB Control Circuit:** The LC58 contains the primary control logic. It contains the master clock which times all controller activity relating to distribution and collection of data from MET sets. One LC58 is required per ECTS controller.
- **LC59—Fault Control:** The LC59 contains fault register circuits which monitor critical

points in each controller circuit pack. Outputs from the registers are connected to fault indicators which provide a visual indication of the overall ECTS operations. A power control circuit applies power to and removes power from MET sets as directed by the DIMENSION PBX. The power control circuit also removes power from MET sets when the controller detects critical faults which could disrupt service. One LC59 is required per ECTS controller.

- **LC60—Data Interface Unit (DIU) Control Circuit:** The LC60 decodes the serial control information from the DIMENSION PBX. It performs a bit count, parity check, timing check for proper interval between bits and words, and a validity test to ensure received information is complete and acceptable for the controller logic and memory

**TABLE H**  
**CONTROLLER EQUIPMENT LIST**

EQUIPMENT CODE	UNIT LIST	QTY	DESCRIPTION
J58879K	1	1	Framework, assembly, wiring, and equipment required for one Controller (2-carrier capacity)
	2	1	Rear cover for cable exit at top rear (rear of cabinet not exposed)
	or		
	3	1	Rear cover for cable exit at bottom rear (rear of cabinet exposed)
	A	1	Door insert (avocado or gold)
	or B or C or D	1 1 1 1	Door insert (orange or black) Door insert (red or blue) Door insert (teak or walnut)
J58879KA	1, 2, 3	1	Basic carrier equipped with power and common control circuit packs arranged for 63 station ports*
	4	8 Max.	LC55 circuit packs, as required†
J58879KB	1	1	Supplementary carrier arranged for 63 station ports‡
	2	8 Max.	LC55 circuit packs, as required§

\* The J58879KA basic carrier may be mounted in a DIMENSION PBX cabinet, an auxiliary cabinet, or a J58879K stand-alone cabinet. A maximum of one basic carrier may be installed in a DIMENSION PBX cabinet due to heat dissipation.

One 120-Volt, 10 amperes 60 Hz commercial AC power supply is required per each J58879KA basic carrier.

The J58879KA list 1 basic carrier should always be equipped with list 2 and 3. List 2 provides equipment and wiring for the 207A power supply. List 3 provides circuit packs LC56 to LC60.

† Circuit 0 of first LC55 circuit pack (carrier position 00) is used for maintenance (circuit pack required, test jack connected to slot 00, ckt 0).

‡ The J58879KB supplementary carrier can only be furnished with the J58879KA basic unit and must be located directly above it.

§ Circuit 7 of the last LC55 circuit pack (carrier position 20) is used for maintenance (circuit pack not required, slot 20, ckt 7 not connected).

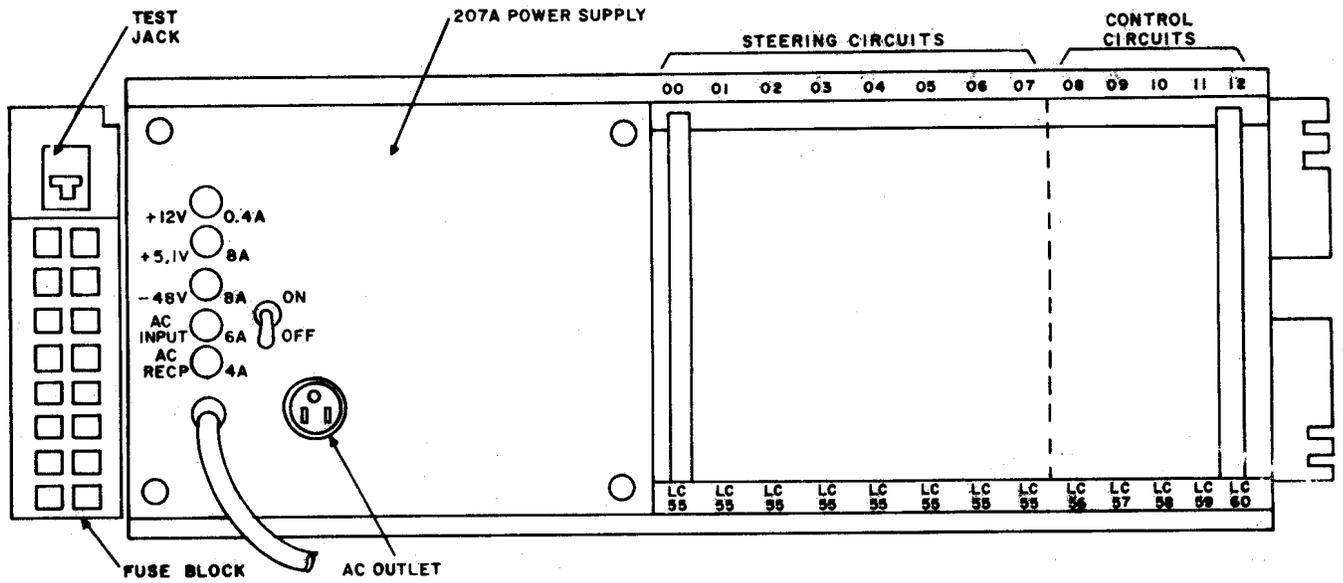


Fig. 13—Basic Carrier

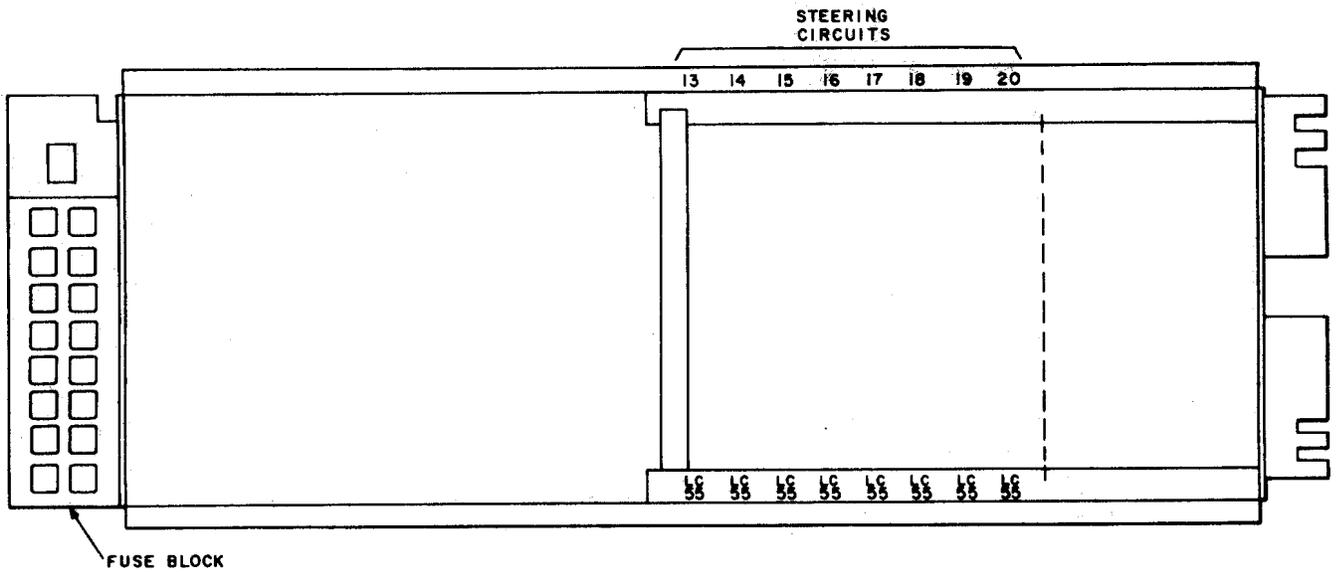


Fig. 14—Supplementary Carrier

circuits. A transmitter echos received data or transmits new data in response to an interrogate command from the DIMENSION PBX. One LC60 is required per ECTS controller.

**8. CABLING AND SPACE PLANNING**

**PLANNING**

**8.01** When planning a new installation, review information in this section to insure that all requirements for power, auxiliary circuits, miscellaneous components, floor plan, etc, have been given adequate consideration.

**8.02** Changes to a system may be required at any time after the system is installed and accepted as shipped from the factory. Consider necessary areas, such as administration, cabling, auxiliary equipment, additional power, and/or grounding, etc, that are required to provide changes.

**8.03** Obtain a set of current and accurate system records including filled-in worksheets. Then prepare new fill-in worksheets as required by change.

**8.04** Some features require minimal planning effort, while others require significant detailed planning and awareness of associated hardware considerations. Table A provides a listing of ECTS features and the types of station to which they can be assigned. The areas that must be considered when planning an ECTS installation or rearrangement are listed as follows:

(a) PBX equipment:

- Line circuit packs (LC02)
- Line carrier
- Trunk circuit packs (LC08 for personal line pickup)
- Trunk carrier
- Carrier cables for line and trunk termination on the cross-connect field
- Cross-connect field
- Mounting space for line and trunk carrier

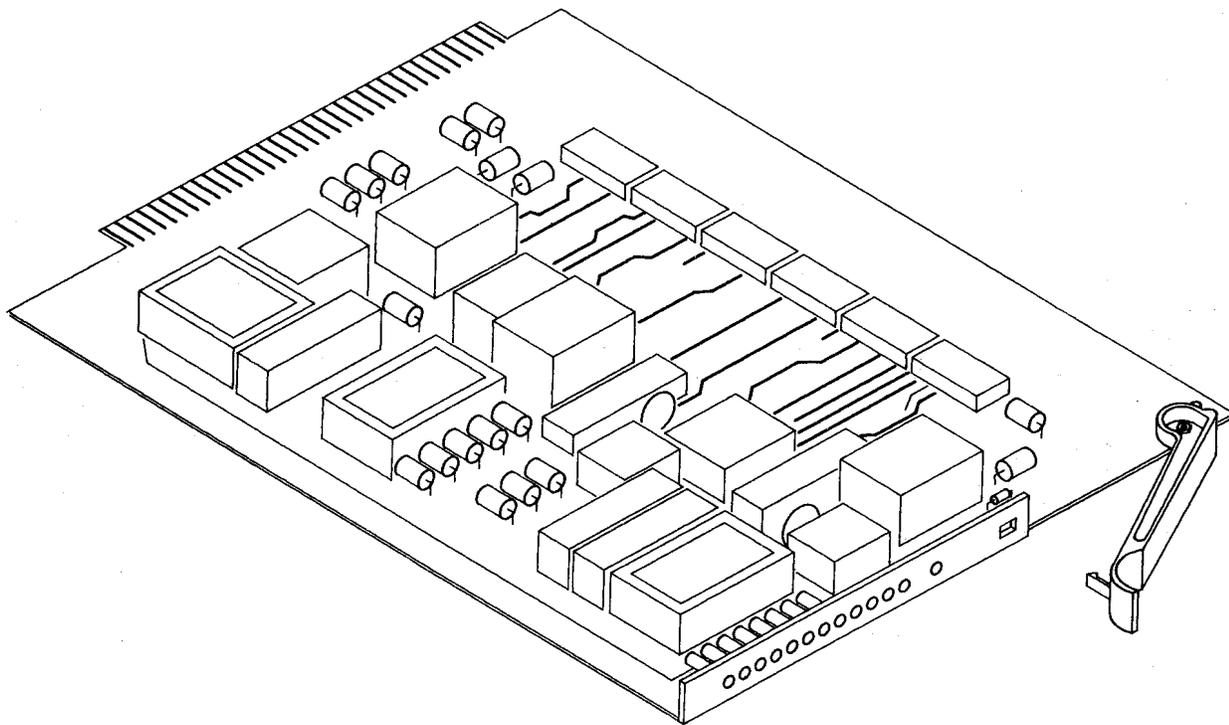


Fig. 15—Typical Circuit Pack

TABLE I  
ECTS CONTROLLER CIRCUIT PACKS

TYPE	SLOT LOCATION IN CARRIER		FUNCTION
	BASIC	SUPPLE- MENTARY	
LC 55	00	13	Steering
LC 55	01	14	Steering
LC 55	02	15	Steering
LC 55	03	16	Steering
LC 55	04	17	Steering
LC 55	05	18	Steering
LC 55	06	19	Steering
LC 55	07	20	Steering
LC 56	08	—	Transmitter/Receiver
LC 57	09	—	Memory I/O Circuit
LC 58	10	—	Station Activity Buffer Control
LC 59	11	—	Fault Control
LC 60	12	—	Data Interface Unit

- System capacity (Table C)
  - Low-speed data channel(s) (LC34B or LC366)
  - Data channel repeaters
- (b) ECTS equipment:
- Location of controller(s)
  - Controller station set capacity (Table D)
  - Distance between PBX and controller, and between controller and stations
  - Power
  - Grounding

- Features
- Emergency transfer panel
- Ground start cable pair
- Cross-connect field.

**8.05** The following items required for the complete installation should be available at the customer location at the time of actual installation. ***To minimize installation time, they should be available before actual installation.***

- Connector cables
- Cross-connect field components
- Commercial power to receptacles

## SECTION 554-010-110

- Working ground-start cable pairs
- Completed worksheets
- Tools and test equipment
- Electronic telephone controller(s)
- Multibutton electronic telephone (MET) sets
- Nonelectronic telephone sets (500 to 2800 type)
- House and feeder cables terminated
- Data channel repeaters (when required)
- Factory computer-generated information (shipped with system)
- Worksheets
- DIMENSION PBX line and trunk carriers (when required)
- DIMENSION PBX circuit packs (LC02B, LC08C, and LC34B or LC366).

**8.06** Installation, test, and maintenance procedures for the ECTS and data channel repeater are covered in TOP Sections listed in the index. See Part 10.

**8.07** Each controller must be connected to a separate data channel (LC34B or LC366) in the PBX. The LC34B or LC366 must be optioned for low-speed data transmission. Figure 16A illustrates how to arrange the LC34B circuits (0 and 1) for high or low speed by positioning the DIP socket block. Figure 16B illustrates how to arrange the LC366 circuit (0) for high or low speed by positioning the J2 DIP socket block. The LC366 circuits (1, 2, and 3) are fixed low speed only. The J1 DIP socket block on Fig. 16B is positioned for DIMENSION 400 PBX. Place the J1 DIP socket block in the top position for DIMENSION 2000 PBX.

### FLOOR PLAN

**8.08** Refer to Section 809-002-100 for general equipment room requirements (lighting, ventilation items not associated with specific installations).

**8.09** *Caution: The top of the stand-alone cabinet may collapse if subjected to forces*

*greater than 45 kilograms (100 pounds).* Figure 17 shows a floor plan layout for the DIMENSION PBX electronic custom telephone service in a stand-alone cabinet.

**8.10** Maintenance space is required in front of and on one side of the stand-alone equipment cabinet to permit access to the components.

**8.11** The maximum cabinet weight is approximately 97.7 kilograms (215 pounds), 18.8 grams per square centimeter (43 pounds per square foot), fully loaded. A floorplate may be provided with the cabinet when required by the floor surface such as soft tile or carpet.

**8.12** *Prepare a sketch* of the proposed installation, similar to Fig. 17. Show the desired placement of the cabinets, cross-connect field, and ac outlet(s). The ac outlet for the controller cabinet shall be located within 1.2 meters (4 feet) from a point where the power cord is fastened to the wall by a cable clamp.

### A. Earthquake Bracing

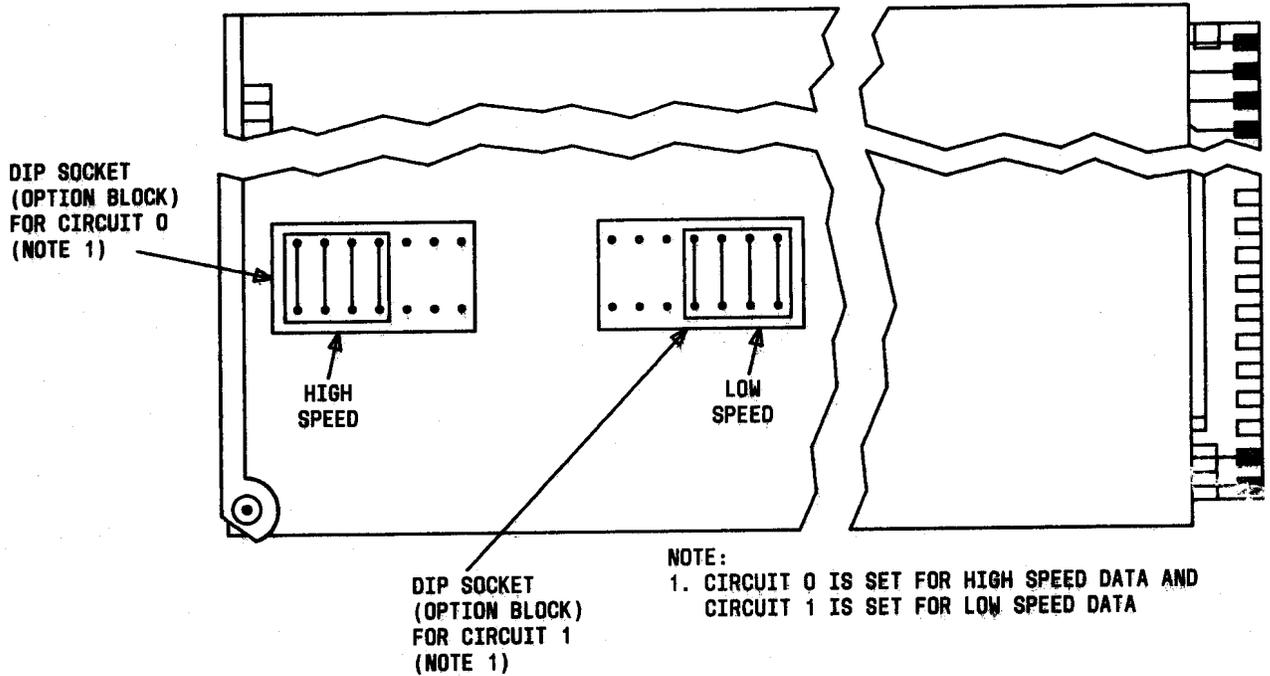
**8.13** When earthquake or disaster bracing is required by law or when local telephone service company engineers feel that it is necessary, such bracing can be provided. The areas in the United States in which earthquake bracing may be desirable are shown in Fig. 18. The ECTS cabinet may be bolted directly to the floor by using four insulating bolts (such as INSUL-BOLTS\*) and four insulating washers in holes provided in the baseplate of the cabinet for this purpose. When the cabinet is bolted to the floor, maintenance access space of 610 millimeters (24 inches) should be provided behind the cabinet.

### B. Lighting

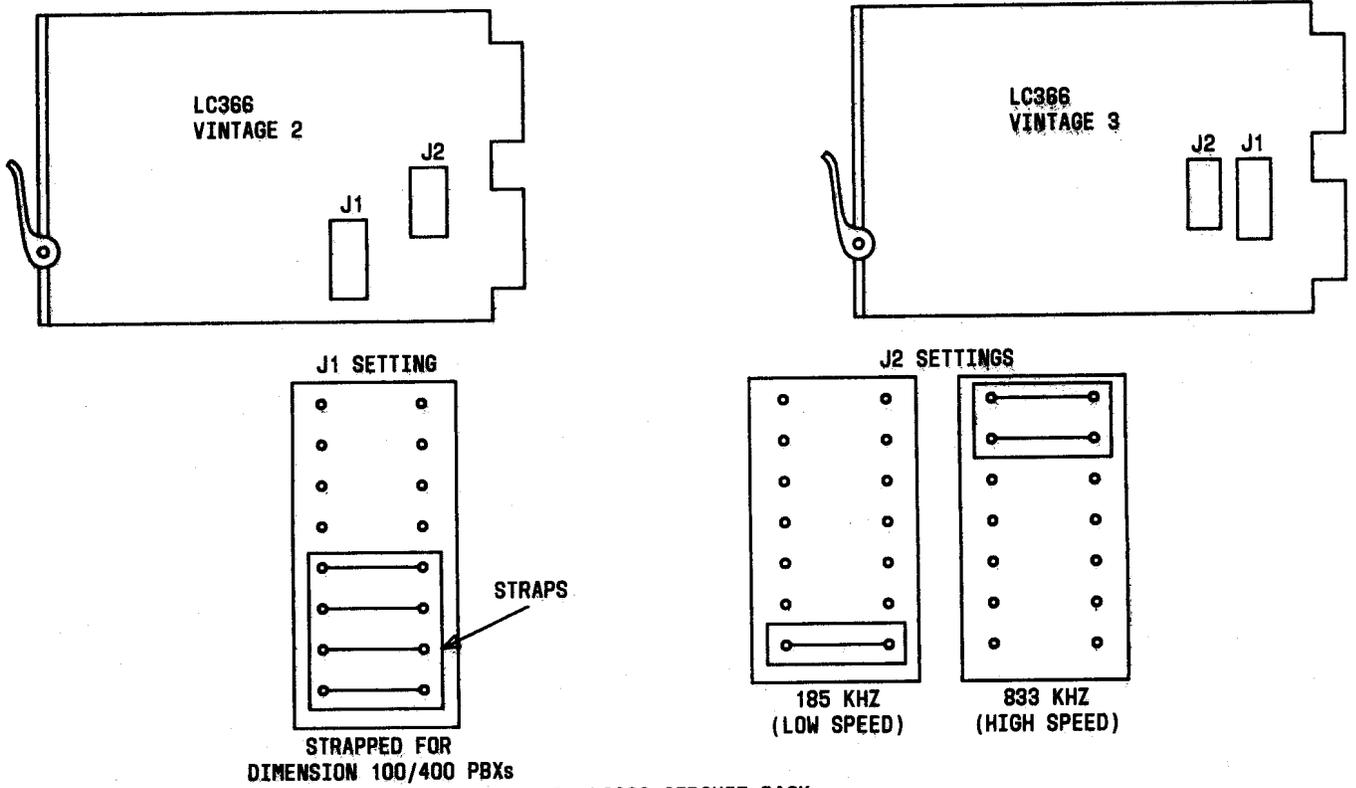
**8.14** The light intensity level around the system cabinet should be sufficient to conform with the Occupational Safety and Health Act (OSHA) standards to provide a comfortable amount of light for maintenance personnel to do the repair tasks required. To obtain accurate footcandle measurement, measure level in center aisle 1.52 meters (5 feet) above the floor, aiming meter upward. Light measurements can be made with a WESTON† footcandle meter, Model 614 (manufactured by Weston Instruments, Inc., Newark, N.J. 07114), or equivalent.

\* Trademark of Pylon Co., Inc.

† Registered trademark of Weston Industries, Inc.



A. LC34B CIRCUIT PACK



B. LC366 CIRCUIT PACK

Fig. 16—Data Link Circuit Pack Options

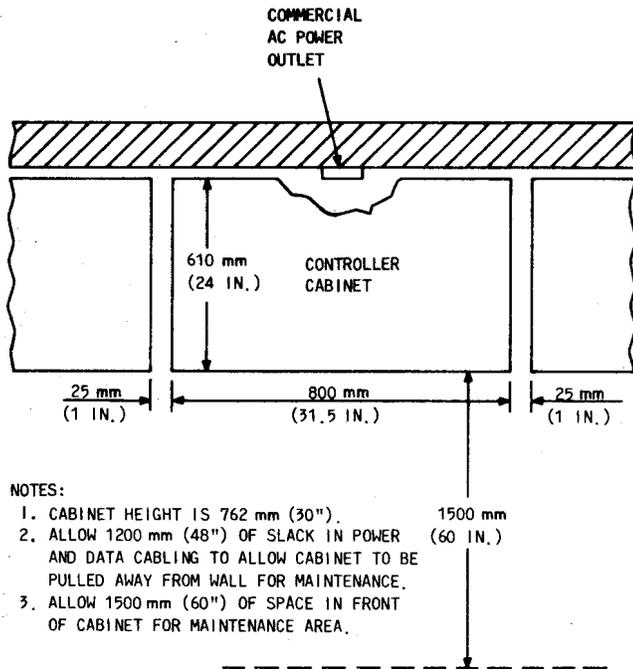


Fig. 17—Stand-Alone Cabinet—Minimum Floor Space Requirements (Notes 1, 2, and 3)



**Standard 48V lights used by some maintenance personnel for lighting are not to be powered from the 48V taps in the power supply or back-plane.**

**8.15** The lighting configuration in the area of the system should allow maintenance personnel to perform their tasks. The light intensity level should be adequate from any of the directions necessary, ie, from the front or back of the cabinet.

### C. Electrical Fields

**8.16** Electromagnetic fields may cause malfunction to be introduced into the system. Care should be taken to avoid placing the system close to radio or television transmitters. Field strength can be measured using a standard field strength meter such as the Electric Field Sensor Model EFS-1, manufactured by Instruments for Industry, Inc., or a tunable R70 meter from Electro-Metrics Co. Field strength from an AM broadcast station can be estimated by dividing the square root of the emitted

power (kW) by the distance from the antenna (kft). This approximation yields field strength in volt per meter and is useful in locating potential problem areas. If the number obtained from the above calculation is greater than unity, interference into the system is likely. Radio frequency (RF) signals may also be picked up on telephone cables and carried into the PBX. Thus, the RF field strength surrounding central office trunk cables or other cables connected to the PBX may be just as important as the field at the PBX location.

**8.17** Interference usually results in noise on connections. In most cases, the interference is introduced into the system via trunk or station cables or both. Standard correction for noise in cable pairs (such as 1542A inductors) will eliminate interference in most cases. Since cable pairs leaving the premises (such as trunks and off-premise station pairs) are most susceptible, these pairs should be treated first. If this treatment does not eliminate the problem of induced noise, treatment of station cable pairs may be required.

**8.18** Field strength values of less than 0.05 volts/meter will not likely cause a problem. For values between 0.05 and 1.0, corrective measures may or may not be necessary. Stations in the AM broadcast band (500 to 1600 KHz) are more likely to cause interference than television or FM broadcast stations (above 54 MHz). A building may also provide considerable shielding effect, reducing the interfering capability of the radiating station. Other interfering radiators include industrial radio frequency (RF) heating equipment and welders as well as low-frequency radio navigation and mobile radio communication transmitters.

**8.19 Caution:** In order to preclude electrostatic noise in the system, the frame shall be well grounded as specified in paragraphs 5.07 and 5.08. Maintenance personnel must attach an authorized wrist strap to an unpainted frame before performing any microdiagnostic test or handling and replacing circuit packs. The system may be subject to noise interference from motors [greater than 186 watts (1/4 horsepower)] having commutators if they are located in the same, or adjacent, room as the system. Small tools with universal motors are generally not a problem if operated on separate power circuits. Motors without commutators, whether synchronous or asynchronous, generally do not cause interference in the system.

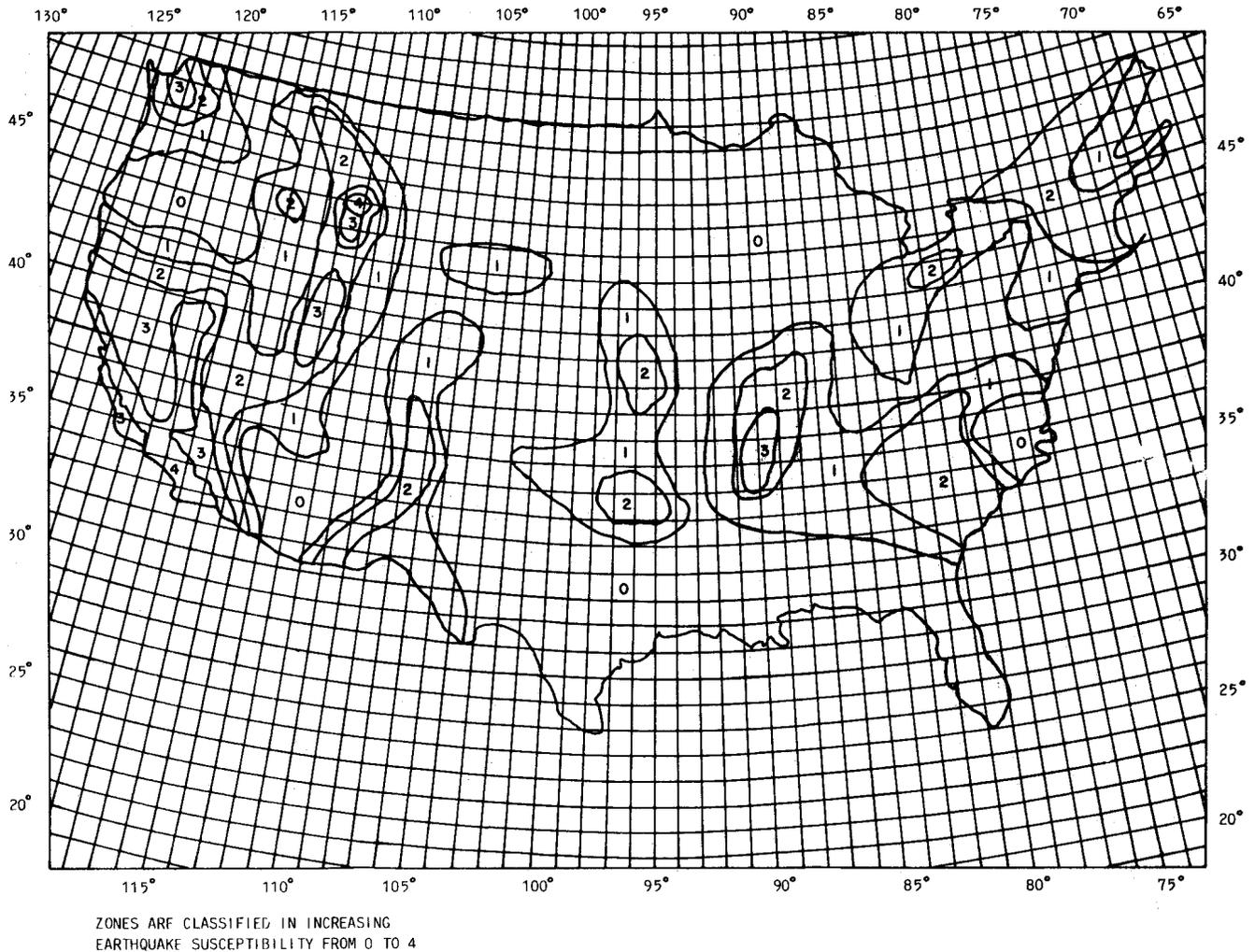


Fig. 18—Earthquake Zones (USA)

**D. Acoustics**

**8.20** The system should be located in an acoustic environment which allows maintenance personnel to hear tones through a standard headset while performing necessary tests.

**8.21** The noise levels which do not permit sound to be heard over the standard headset are about the same or greater than those specified in OSHA. This is normally 90 dB. Therefore, the OSHA requirements for sound satisfy the environmental requirements for the system, and these must be met wherever the machine is placed. Refer to current OSHA requirements for acceptable levels.

**E. Security**

**8.22** The system cabinets have locks on the front doors. A 216C tool is used to operate these locks. This locking arrangement is to allow access to the inside of the machine to authorized personnel only.

**8.23** The rear panel is in effect locked when the back of the cabinet is against the wall since the wheel locks can be operated only when accessed through the front of the cabinet. Thus, the front panel must be opened to allow the cabinet to be moved away from the wall.

**F. Insects and Rodents**

**8.24** The system cabinets are designed to retard insect and rodent entry to internal areas. For this reason, the front, back, and side panels should be used at all times, particularly when such pests are known to exist in a particular location.

**G. Transportation**

**In Transit**

**8.25** The system should always be shipped packaged in the Western Electric-provided crates.

**8.26** The packing material used for shipping cabinets from Western Electric Company is adequate for upright or lay-down (on-side) shipment. If on-side shipment is used, installation personnel should carefully raise the cabinets to an upright position before unpacking.

**8.27** The cabinet will be fully loaded ready for operation, with the exception of cabling, when shipped. This includes all maintenance books and manuals to be kept inside the door. This does not include the spacer assembly and floorplate which will be shipped in a separate crate.

**8.28** The preferred modes of transportation are truck, rail, and air (in order of preference). Air transportation is known to subject equipment to severe handling shocks. Rail transportation is less severe, but railroad car coupling shocks can severely stress the system.

**Handling on Site**

**8.29** It is preferable that, when possible, the system remain packaged in its crate until it is in the room in which it is to be located.

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

**8.31** Care should be taken to avoid dropping the system (either crated or uncrated) from any height. Under no circumstances should the system be allowed to drop from a height greater than 20.4 centimeters (8 inches) packaged or 2.54 centimeters (1 inch) unpackaged.

**CABLING AND CROSS-CONNECTING**

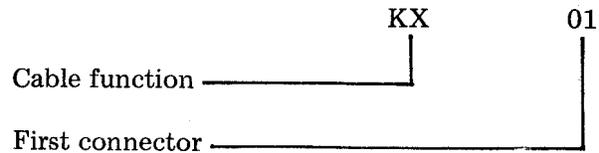


*In order to meet FCC registration requirements, the cross-connect field must have a protective cover when located in an area having unrestricted access to assure that there is adequate insulation from commercial power wiring and grounding surfaces.*

**A. Cross-Connect Field Cabling**

**8.32** The circuits in the DIMENSION PBX electronic custom telephone service, as in the PBX, are connected to lines by cables using KS-16689, List 3, plugs. These cables may be ordered per Ordering Form E-8124 or from the local supply catalog. Cables are required for the wall termination field and are normally stocked locally (A25D type).

**8.33** The cables and carrier connectors are marked as follows:



The connector cables are numbered from 01 to 06 on the basic carrier and 07 to 12 on the supplementary carrier.

**8.34** Figure 19 shows a simplified wall layout of a controller carrier mounted in a PBX cabinet (single carrier, 63 lines maximum).

**8.35** Figure 20 shows a simplified wall layout of a remotely located or stand-alone DIMENSION PBX electronic custom telephone service.

**8.36** Colored backboards are used for the cross-connect field to identify the types of circuits to be terminated. The recommended 66M-type connecting blocks are identified with the PBX cables

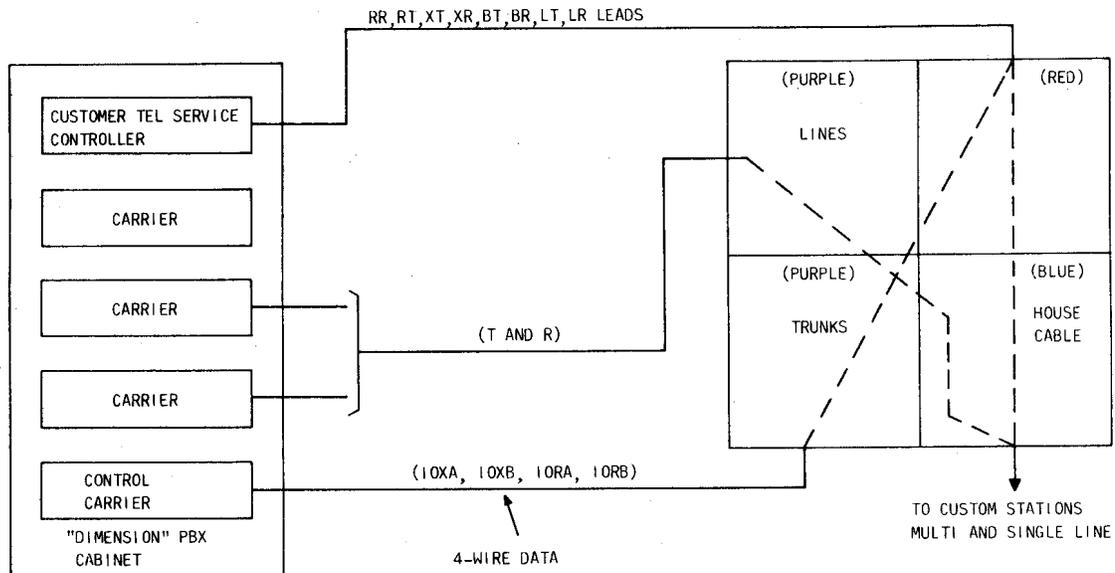


Fig. 19—Simplified Wall Layout ECTS Controller Mounted in a DIMENSION PBX Cabinet

which terminate on the blocks. Backboard colors and types of circuits terminated are as follows:

BACKBOARD COLOR	TYPE CIRCUIT TERMINATED
Green (183A2)	Central office (feeder cable)
Red (183B3)	Key equipment or electronic custom telephone service
Yellow (183A5)	Miscellaneous
Blue (183B1)	House cable
Purple (183B4)	PBX (station trunks and miscellaneous).

**8.37** White (187B1 or 196A) backboards, having stand-off type distributing rings, are used to separate the fields into upper and lower sections. The stand-off is also used for running jumpers.

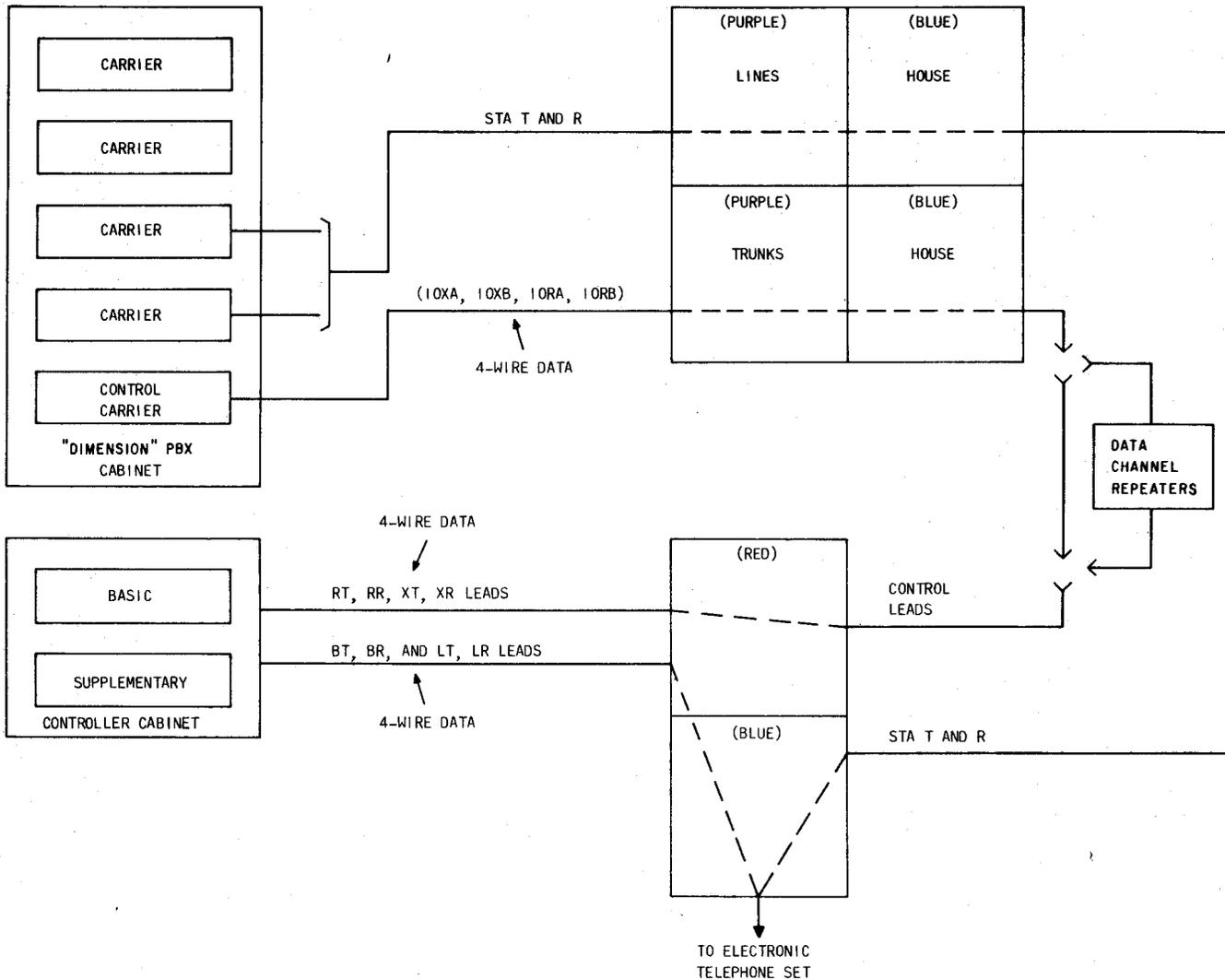
**8.38** *Prepare a sketch* of the cross-connect fields similar to Figures 19, 20, 21, or 22. Indicate the backboards, connecting blocks, and cables required for a particular installation. Wall space for future growth should be included. Refer to Sections 461-100-101 and 463-130-100 for detailed information on the cross-connect fields installed on customer premises.

## B. Cross-Connect Field Enclosures

**8.39** The cross-connect field enclosures (Fig. 23) are available in three sizes as follows:

- 68.6 centimeters (27 inches) high, 43.2 centimeters (17 inches) wide, and 21.6 centimeters (8-1/2 inches) deep. The 68.6 centimeters (27 inches) high assembly is used to cover one standard 43.2- by 50.8-centimeter (17- by 20-inch) backboard and one 187B1 distribution ring.
- 137.2 centimeters (54 inches) high, 43.2 centimeters (17 inches) wide, and 21.6 centimeters (8-1/2 inches) deep. The 137.2 centimeters (54 inches) high assembly is used to cover two standard 43.2- by 50.8-centimeter (17- by 20-inch) backboards and one 187B1 distribution ring.
- 193 centimeters (76 inches) high, 43.2 centimeters (17 inches) wide, and 21.6 centimeters (8-1/2 inches) deep. The 193 centimeters (76 inches) high assembly is used to cover three standard 43.2- by 50.8-centimeter (17- by 20-inch) backboards and two 187B1 distribution rings.

**8.40** The 43.2 centimeters (17 inches) wide backboards may be added in multiples, as re-



**Fig. 20—Simplified Wall Layout—ECTS Controller Mounted in a Stand-Alone Cabinet**

quired. The top and side panels will accommodate the additional depth of the 1.9-centimeter (3.4-inch) backboard on which the frame assembly is mounted. If the frame assembly is mounted directly on the wall (without the wooden backboard), group 4 assembly method (ED-1E322) of the door panel should be used.

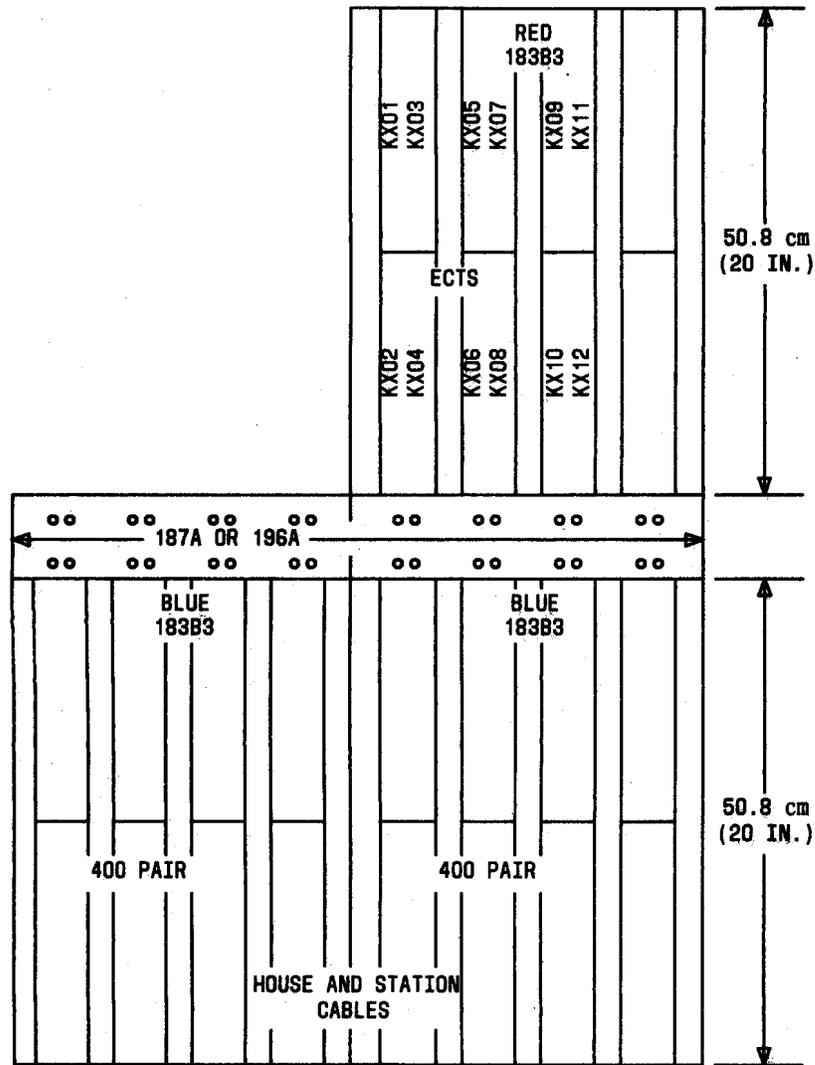
**8.41** The installation of a 193 centimeters (76 inches) high cross-connect field enclosure (ED-1E322-70) to be mounted on a wooden backboard requires the following:

- One G-1 (group)—consisting of the basic enclosure with door, brackets, and hardware

- Two G-2 (groups)—each consisting of one side panel and hardware
- Two G-3 (groups)—each consisting of one top/bottom panel and hardware.

**8.42** The installation of a 193 centimeters (76 inches) high cross-connect field enclosure (ED-1E322-70) to be mounted flush on the wall requires the following:

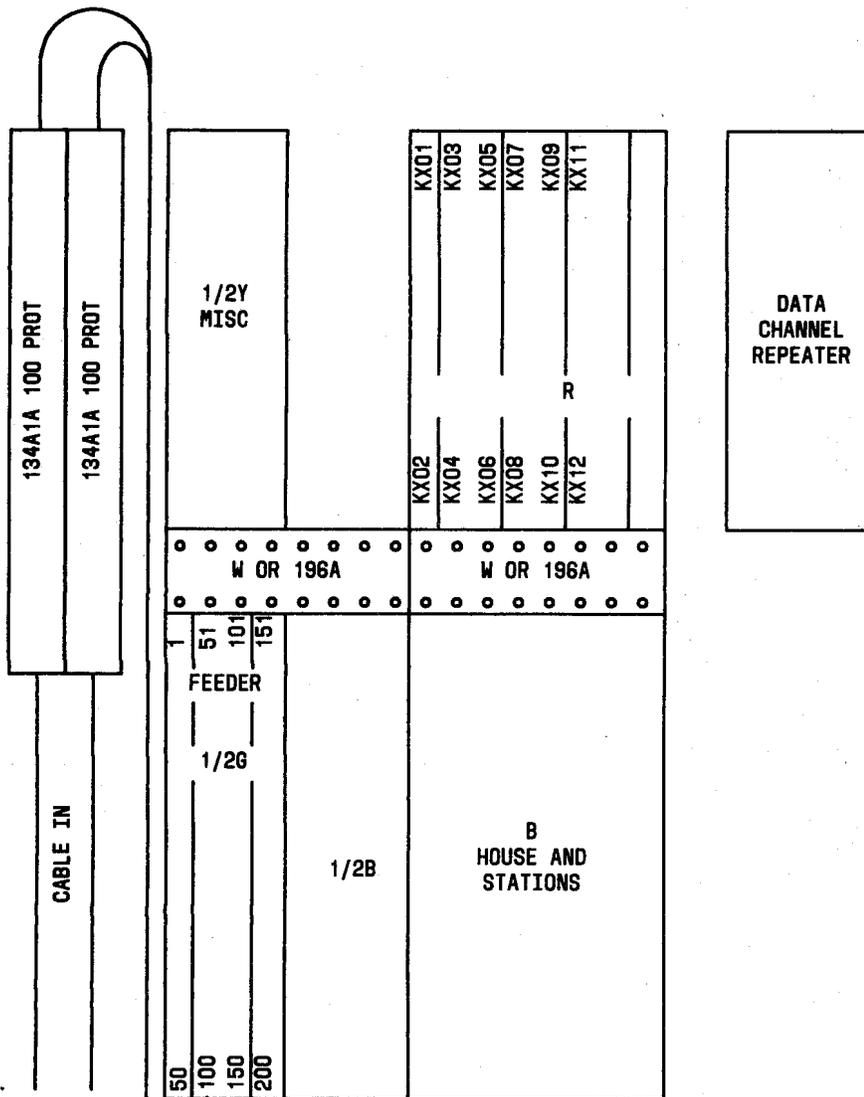
- One G-6 (group)—consisting of the door, bracket, and hardware



**NOTES:**

1. ALL BACKBOARDS ARE EQUIPPED WITH 89B BRACKETS TO MOUNT 66MI-50 OR 66MI-25 TYPE BLOCKS.
2. DESIGN OF WALL LAYOUT SHOULD PROVIDE FOR FUTURE GROWTH.
3. REFER TO SECTIONS 461-100-101 AND 463-130-100 FOR DETAILED INFORMATION ON BACKBOARDS AND CONNECTING BLOCKS.

**Fig. 21—Typical Wall Layout—Remotely Located ECTS Controller Without Data Channel Repeater (Notes 1, 2, and 3)**



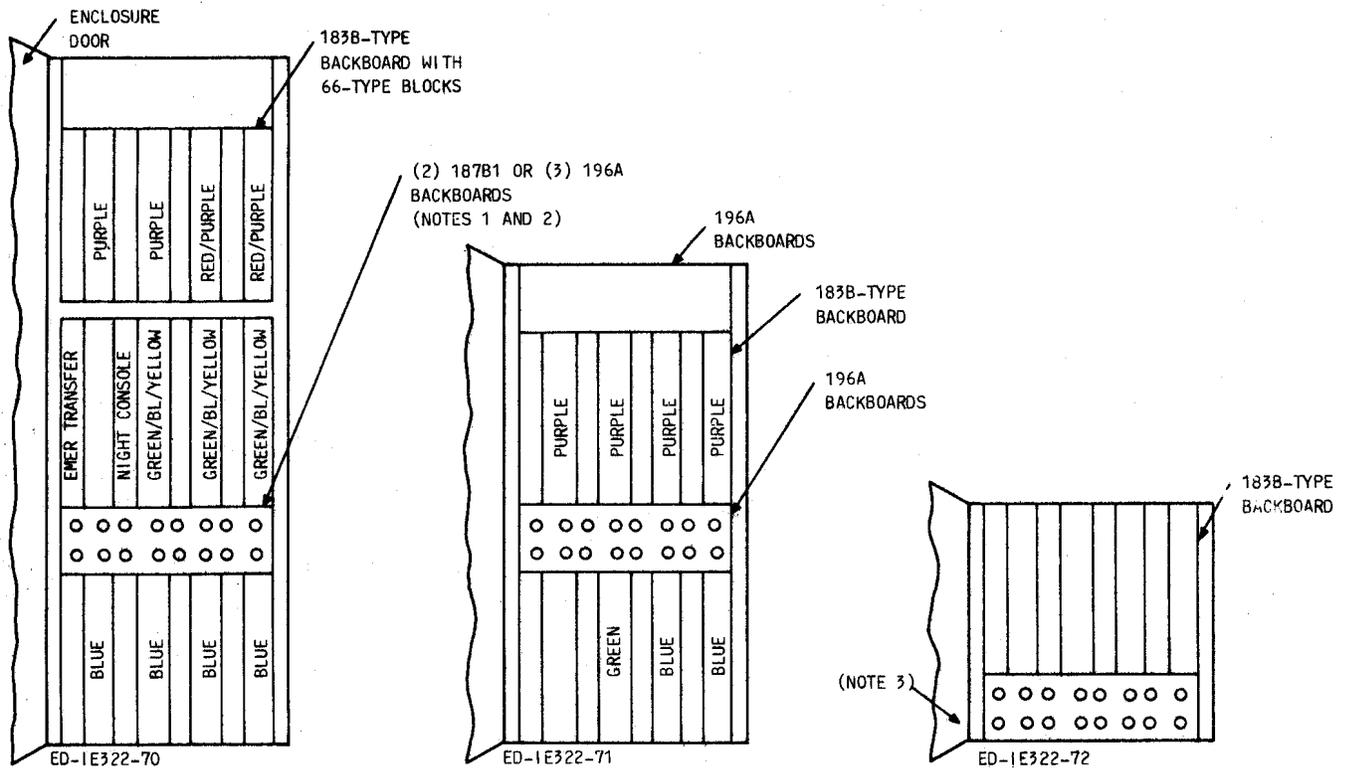
**NOTES:**

1. ALL BACKBOARDS ARE EQUIPPED WITH 89B BRACKETS TO MOUNT 66MI-50 OR 66MI-25 TYPE BLOCKS.
2. DESIGN OF WALL LAYOUT SHOULD PROVIDE FOR FUTURE GROWTH.
3. REFER TO SECTIONS 461-100-101 AND 463-130-100 FOR DETAILED INFORMATION ON BACKBOARDS AND CONNECTING BLOCKS.

**LEGEND:**

- 1/2B - 183A1 BLUE BACKBOARD
- 1/2G - 183A2 GREEN BACKBOARD
- 1/2Y - 183A5 YELLOW BACKBOARD
- B - 183B1 BLUE BACKBOARD
- R - 183B3 RED BACKBOARD
- W - 187B1 WHITE BACKBOARD

**Fig. 22—Typical Wall Layout—Remotely Located ECTS Controller With Data Channel Repeater (Notes 1, 2, and 3)**



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. 23—Cross-Connect Field Enclosures

## SECTION 554-010-110

- Two G-7 (groups)—each consisting of a side panel and hardware
- Two G-8 (groups)—each consisting of a top/bottom panel and hardware.

**8.43** The installation of a 137.2-centimeter (54-inch) cross-connect field enclosure (ED-1E322-71) to be mounted on a wooden backboard requires the following:

- One G-1 (group)—consisting of the basic enclosure with door, brackets, and hardware
- Two G-2 (groups)—each consisting of one side panel and hardware
- Two G-3 (groups)—each consisting of one top/bottom panel and hardware.

**8.44** The installation of a 137.2 centimeters (54 inches) high cross-connect field enclosure (ED-1E322-71) to be mounted flush on the wall requires the following:

- One G-6 (group)—consisting of the basic enclosure with door, bracket, and hardware
- Two G-7 (groups)—each consisting of one side panel and hardware
- Two G-8 (groups)—each consisting of one top/bottom panel and hardware.

**8.45** The installation of a 68.6 centimeters (27 inches) high cross-connect field enclosure (ED-1E322-72) to be mounted on a wooden backboard requires the following:

- One G-1 (group)—consisting of the basic enclosure with door, brackets, and hardware
- Two G-2 (groups)—each consisting of one side panel and hardware
- Two G-3 (groups)—each consisting of a top/bottom panel and hardware.

**8.46** The installation of a 68.6 centimeters (27 inches) high cross-connect field enclosure (ED-1E322-72) to be mounted flush on the wall requires the following:

- One G-6 (group)—consisting of the basic enclosure with door, brackets, and hardware

- Two G-7 (groups)—each consisting of one side panel and hardware

- Two G-8 (groups)—each consisting of one top/bottom panel and hardware.

### C. Cross-Connect Tables

**8.47** When ordered via Ordering Form E-8124, computer-generated cross-connect tables are delivered from the factory. These tables should be completed and provided for craft personnel to use at the time of installation.

**8.48** Table J is a fill-in basic line and attendant port carrier cross-connect worksheet. Table K is a fill-in line group control carrier cross-connect worksheet. Table L is a fill-in line port carrier cross-connect worksheet. Table M is an example of a typical cross-connect table with lines assigned. These tables provide the following information for each equipped line:

- Equipment location
- Circuit number
- Extension number
- Lead designation
- Color code of connector cable
- Connector block designation and terminal number in the purple field.

Space is provided on each table to fill in the color of the backboard, connector block designation, and terminal number to which each circuit should be cross-connected. Figure 24 shows typical lines connected through the cross-connect field to the controller.

**8.49** Table N shows the fill-in cross-connect worksheets for the controller cables. The table covers the basic and supplementary carriers of the first cabinet. The table may be used for additional carriers by changing the cabinet number.

**8.50** Table N provides the following information:

- Lead designation
- Color code of connector cable
- Data channel circuits to be connected

TABLE J

BASIC LINE AND ATTENDANT PORT CARRIER CROSS-CONNECT TABLE (WORKSHEET)

CABINET CARRIER CONNECTOR AX01				CONN CABLE COLOR CODE	CROSS-CONNECT	
CP SLOT NO.	CKT NO.	EXT NO.	LEAD DESIG.		FROM	TO
					CONN BLK (PURPLE) AX01	CONN BLK (RED-BLUE)
				W - BL	1	
02	TONE PORT		T00	BL - W	2	
				W - OR	3	
03	TONE PORT		T10	OR - W	4	
04	0	CONSOLE 0	T0	W - GR	5	
			R	GR - W	6	
			T1	W - BR	7	
			R1	BR - W	8	
	1	CONSOLE 1	T	W - S	9	
			R	S - W	10	
			T1	R - BL	11	
			R1	BL - R	12	
05	0		T	R - OR	13	
			R	OR - R	14	
	1		T	R - GR	15	
			R	GR - R	16	
	2		T	R - BR	17	
			R	BR - R	18	
	3		T	R - S	19	
			R	S - R	20	
06	0		T	BK - BL	21	
			R	BL - BK	22	
	1		T	BK - OR	23	
			R	OR - BK	24	
	2		T	BK - GK	25	
			R	GK - BK	26	
	3		T	BK - BR	27	
			R	BR - BK	28	
07	0		T	BK - S	29	
			R	S - BK	30	
	1		T	Y - BL	31	
			R	BL - Y	32	
	2		T	Y - OR	33	
			R	OR - Y	34	
	3		T	Y - GR	35	
			R	GR - Y	36	
08	0		T	Y - BR	37	
			R	BR - Y	38	
	1		T	Y - S	39	
			R	S - Y	40	
	2		T	V - BL	41	
			R	BL - V	42	
	3		T	V - OR	43	
			R	OR - V	44	
				V - GR	45	
				GR - V	46	
				V - BR	47	
				BR - V	48	
				V - S	49	
				S - V	50	

TABLE J (Contd)

BASIC LINE AND ATTENDANT PORT CARRIER CROSS-CONNECT TABLE  
(WORKSHEET)

CABINET CARRIER CONNECTOR AX02				CONN CABLE COLOR CODE	CROSS-CONNECT	
CP SLOT NO.	CKT NO.	EXT NO.	LEAD DESIG.		FROM	
					CONN BLK (PURPLE)	AX02
					CONN BLK (RED-BLUE)	
09	0		T	W - BL	1	
			R	BL - W	2	
	1		T	W - OR	3	
			R	OR - W	4	
	2		T	W - GR	5	
			R	GR - W	6	
	3		T	W - BR	7	
			R	BR - W	8	
11	0		T	W - S	9	
			R	S - W	10	
	1		T	R - BL	11	
			R	BL - R	12	
	2		T	R - OR	13	
			R	OR - R	14	
	3		T	R - GR	15	
			R	GR - R	16	
12	0		T	R - BR	17	
			R	BR - R	18	
	1		T	R - S	19	
			R	S - R	20	
	2		T	BK - BL	21	
			R	BL - BK	22	
	3		T	BK - OR	23	
			R	OR - BK	24	
13	0		T	BK - GR	25	
			R	GR - BK	26	
	1		T	BK - BR	27	
			R	BR - BK	28	
	2		T	BK - S	29	
			R	S - BK	30	
	3		T	Y - BL	31	
			R	BL - Y	32	
14	0		T	Y - OR	33	
			R	OR - Y	34	
	1		T	Y - GR	35	
			R	GR - Y	36	
	2		T	Y - BR	37	
			R	BR - Y	38	
	3		T	Y - S	39	
			R	S - Y	40	
15	0		T	V - BL	41	
			R	BL - V	42	
	1		T	V - OR	43	
			R	OR - V	44	
	2		T	V - GR	45	
			R	GR - V	46	
	3		T	V - BR	47	
			R	BR - V	48	
				V - S	49	
				S - V	50	

TABLE J (Contd)

BASIC LINE AND ATTENDANT PORT CARRIER CROSS-CONNECT TABLE  
(WORKSHEET)

CABINET CARRIER CONNECTOR AX03				CONN CABLE COLOR CODE	CROSS-CONNECT		
CP SLOT NO.	CKT NO.	EXT NO.	LEAD DESIG.		FROM		TO
					CONN BLK (PURPLE)	AX03	CONN BLK (RED-BLUE)
16	0		T	W-BL	1		
			R	BL-W	2		
	1		T	W-OR	3		
			R	OR-W	4		
	2		T	W-GR	5		
			R	GR-W	6		
3		T	W-BR	7			
		R	BR-W	8			
17	0		T	W-S	9		
			R	S-W	10		
	1		T	R-BL	11		
			R	BL-R	12		
	2		T	R-OR	13		
			R	OR-R	14		
3		T	R-GR	15			
		R	GR-R	16			
18	0		T	R-BR	17		
			R	BR-R	18		
	1		T	R-S	19		
			R	S-R	20		
	2		T	BK-BL	21		
			R	BL-BK	22		
3		T	BK-OR	23			
		R	OR-BK	24			
				BK-GR	25		
				GR-BK	26		
				BK-BR	27		
				BR-BK	28		
				BK-S	29		
				S-BK	30		
				Y-BL	31		
				BL-Y	32		
				Y-OR	33		
				OR-Y	34		
				Y-GR	35		
				GR-Y	36		
				Y-BR	37		
				BR-Y	38		
				Y-S	39		
				S-Y	40		
				V-BL	41		
				BL-V	42		
				V-OR	43		
				OR-V	44		
				V-GR	45		
				GR-V	46		
				V-BR	47		
				BR-V	48		
				V-S	49		
				S-V	50		

TABLE K

LINE GROUP CONTROL CARRIER CROSS-CONNECT TABLE (WORKSHEET)

MODULE CABINET CARRIER CONNECTOR LGX01				CONN CABLE COLOR CODE	CROSS-CONNECT					
CP SLOT NO.	CKT NO.	EXT NO.	LEAD DESIG.		FROM		TO			
					CONN BLK (PURPLE)	LGX01		CONN BLK (RED-BLUE)		
05			T00	W - BL	1					
				BL - W	2					
06			T10	W - OR	3					
				OR - W	4					
				W - GR	5					
				GR - W	6					
				W - BR	7					
				BR - W	8					
				07	0	CONSOLE 0	T	W - S	9	
							R	S - W	10	
T1	R - BL	11								
R1	BL - R	12								
1	CONSOLE 1	T	R - OR		13					
		R	OR - R		14					
		T1	R - GR		15					
		R1	GR - R		16					
08	0		T	R - BR	17					
			R	BR - R	18					
	1		T	R - S	19					
			R	S - R	20					
	2		T	BK - BL	21					
			R	BL - BK	22					
	3		T	BK - OR	23					
			R	OR - BK	24					
09	0		T	BK - GR	25					
			R	GR - BK	26					
	1		T	BK - BR	27					
			R	BR - BK	28					
	2		T	BK - S	29					
			R	S - BK	30					
	3		T	Y - BL	31					
			R	BL - Y	32					
10	0		T	Y - OR	33					
			R	OR - Y	34					
	1		T	Y - GR	35					
			R	GR - Y	36					
	2		T	Y - BR	37					
			R	BR - Y	38					
	3		T	Y - S	39					
			R	S - Y	40					
12	0		T	V - BL	41					
			R	BL - V	42					
	1		T	V - OR	43					
			R	OR - V	44					
	2		T	V - GR	45					
			R	GR - V	46					
	3		T	V - BR	47					
			R	BR - V	48					
				V - S	49					
				S - V	50					

TABLE K (Contd)

LINE GROUP CONTROL CARRIER CROSS-CONNECT TABLE (WORKSHEET)

CP SLOT NO.	MODULE CABINET CARRIER CONNECTOR LGX02		LEAD DESIG.	CONN CABLE COLOR CODE	CROSS-CONNECT		
	CKT NO.	EXT NO.			FROM		TO
					CONN BLK (PURPLE)	LGX02	
13	0		T	W - BL	1		
			R	BL - W	2		
	1		T	W - OR	3		
			R	OR - W	4		
	2		T	W - GR	5		
			R	GR - W	6		
	3		T	W - BR	7		
			R	BR - W	8		
14	0		T	W - S	9		
			R	S - W	10		
	1		T	R - BL	11		
			R	BL - R	12		
	2		T	R - OR	13		
			R	OR - R	14		
	3		T	R - GR	15		
			R	GR - R	16		
15	0		T	R - BR	17		
			R	BR - R	18		
	1		T	R - S	19		
			R	S - R	20		
	2		T	BK - BL	21		
			R	BL - BK	22		
	3		T	BK - OR	23		
			R	OR - BK	24		
16	0		T	BK - GR	25		
			R	GR - BK	26		
	1		T	BK - BR	27		
			R	BR - BK	28		
	2		T	BK - S	29		
			R	S - BK	30		
	3		T	Y - BL	31		
			R	BL - Y	32		
17	0		T	Y - OR	33		
			R	OR - Y	34		
	1		T	Y - GR	35		
			R	GR - Y	36		
	2		T	Y - BR	37		
			R	BR - Y	38		
	3		T	Y - S	39		
			R	S - Y	40		
18	0		T	V - BL	41		
			R	BL - V	42		
	1		T	V - OR	43		
			R	OR - V	44		
	2		T	V - GR	45		
			R	GR - V	46		
	3		T	V - BR	47		
			R	BR - V	48		
				V - S	49		
				S - V	50		

TABLE L

LINE PORT CARRIER CROSS-CONNECT TABLE (WORKSHEET)

CP SLOT NO.	MODULE CABINET CARRIER CONNECTOR LX01 (SEE NOTE)		LEAD DESIG.	CONN CABLE COLOR CODE	CROSS-CONNECT	
	CKT NO.	EXT NO.			FROM	TO
					CONN BLK (PURPLE)	CONN BLK (RED-BLUE)
2	0		T	W - BL	1	
			R	BL - W	2	
	1		T	W - OR	3	
			R	OR - W	4	
	2		T	W - GR	5	
			R	GR - W	6	
	3		T	W - BR	7	
			R	BR - W	8	
3	0		T	W - S	9	
			R	S - W	10	
	1		T	R - BL	11	
			R	BL - R	12	
	2		T	R - OR	13	
			R	OR - R	14	
	3		T	R - GR	15	
			R	GR - R	16	
4	0		T	R - BR	17	
			R	BR - R	18	
	1		T	R - S	19	
			R	S - R	20	
	2		T	BK - BL	21	
			R	BL - BK	22	
	3		T	BK - OR	23	
			R	OR - BK	24	
5	0		T	BK - GR	25	
			R	GR - BK	26	
	1		T	BK - BR	27	
			R	BR - BK	28	
	2		T	BK - S	29	
			R	S - BK	30	
	3		T	Y - BL	31	
			R	BL - Y	32	
6	0		T	Y - OR	33	
			R	OR - Y	34	
	1		T	Y - GR	35	
			R	GR - Y	36	
	2		T	Y - BR	37	
			R	BR - Y	38	
	3		T	Y - S	39	
			R	S - Y	40	
7	0		T	V - BL	41	
			R	BL - V	42	
	1		T	V - OR	43	
			R	OR - V	44	
	2		T	V - GR	45	
			R	GR - V	46	
	3		T	V - BR	47	
			R	BR - V	48	
				V - S	49	
				S - V	50	

Note: Module number only for DIMENSION 2000 or Custom PBXs.

TABLE L (Contd)

LINE PORT CARRIER CROSS-CONNECT TABLE (WORKSHEET)

MODULE_CABINET CARRIER_CONN LX02 (SEE NOTE)			LEAD DESIG.	CONN CABLE COLOR CODE	CROSS-CONNECT		
CP SLOT NO.	CKT NO.	EXT NO.			FROM		TO
					CONN BLK (PURPLE)	LX02	CONN BLK (RED-BLUE)
8	0		T	W - BL	1		
			R	BL - W	2		
	1		T	W - OR	3		
			R	OR - W	4		
	2		T	W - GR	5		
			R	GR - W	6		
3		T	W - BR	7			
		R	BR - W	8			
9	0		T	W - S	9		
			R	S - W	10		
	1		T	R - BL	11		
			R	BL - R	12		
	2		T	R - OR	13		
			R	OR - R	14		
3		T	R - GR	15			
		R	GR - R	16			
11	0		T	R - BR	17		
			R	BR - R	18		
	1		T	R - S	19		
			R	S - R	20		
	2		T	BK - BL	21		
			R	BL - BK	22		
3		T	BK - OR	23			
		R	OR - BK	24			
12	0		T	BK - GR	25		
			R	GR - BK	26		
	1		T	BK - BR	27		
			R	BR - BK	28		
	2		T	BK - S	29		
			R	S - BK	30		
3		T	Y - BL	31			
		R	BL - Y	32			
13	0		T	Y - OR	33		
			R	OR - Y	34		
	1		T	Y - GR	35		
			R	GR - Y	36		
	2		T	Y - BR	37		
			R	BR - Y	38		
3		T	Y - S	39			
		R	S - Y	40			
14	0		T	V - BL	41		
			R	BL - V	42		
	1		T	V - OR	43		
			R	OR - V	44		
	2		T	V - GR	45		
			R	GR - V	46		
3		T	V - BR	47			
		R	BR - V	48			
				V - S	49		
				S - V	50		

Note: Module number only for DIMENSION 2000 or Custom PBXs.

TABLE L (Contd)

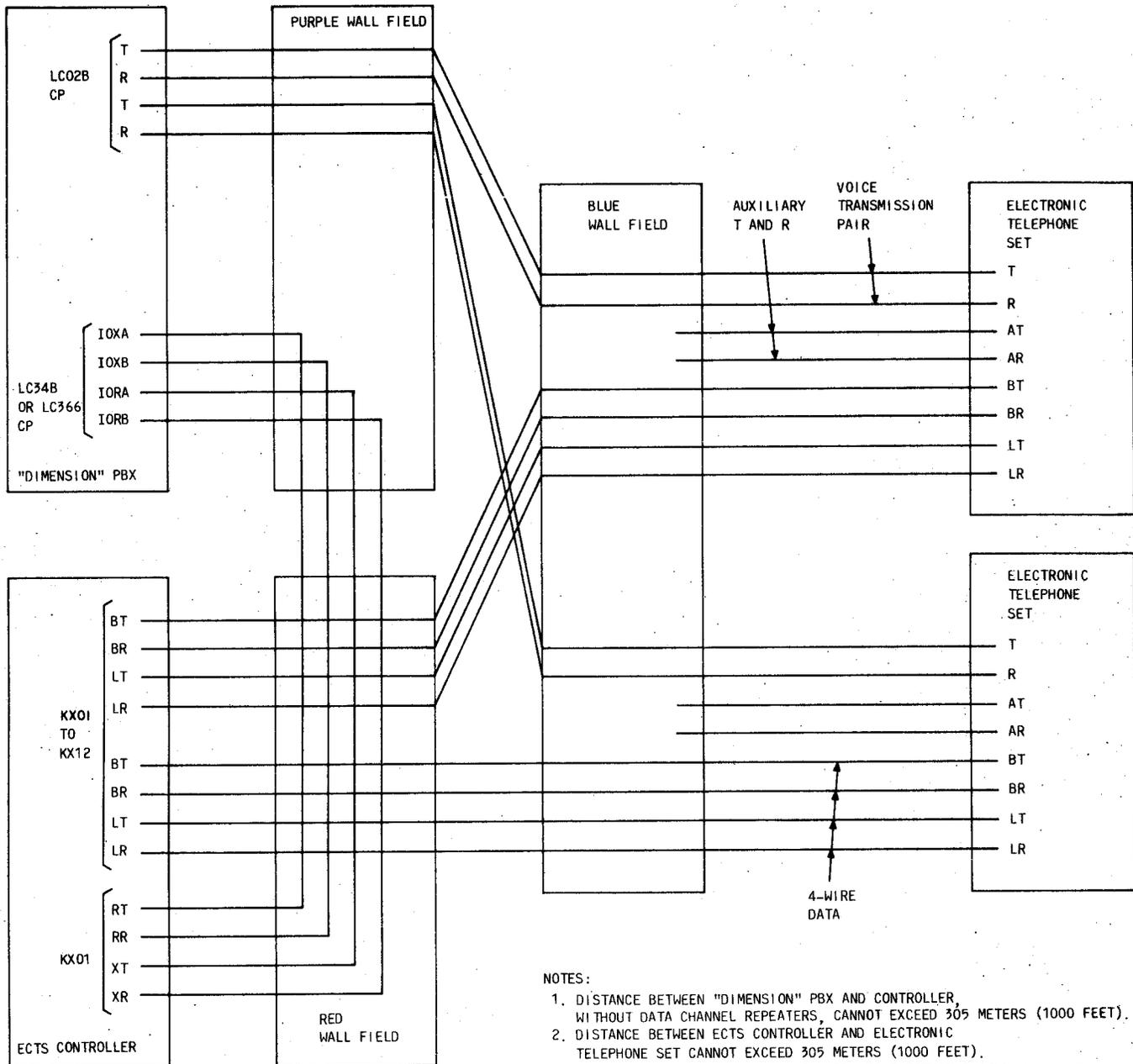
LINE PORT CARRIER CROSS-CONNECT TABLE (WORKSHEET)

MODULE CABINET CARRIER CONNECTOR LX03 (SEE NOTE)			LEAD DESIG.	CONN CABLE COLOR CODE	CROSS-CONNECT	
CP SLOT NO.	CKT NO.	EXT NO.			FROM CONN BLK (PURPLE)	LX03
15	0		T	W-BL	1	
			R	BL-W	2	
	1		T	W-OR	3	
			R	OR-W	4	
	2		T	W-GR	5	
			R	GR-W	6	
3		T	W-BR	7		
		R	BR-W	8		
16	0		T	W-S	9	
			R	S-W	10	
	1		T	R-BL	11	
			R	BL-R	12	
	2		T	R-OR	13	
			R	OR-R	14	
3		T	R-GR	15		
		R	GR-R	16		
17	0		T	R-BR	17	
			R	BR-R	18	
	1		T	R-S	19	
			R	S-R	20	
	2		T	BK-BL	21	
			R	BL-BK	22	
3		T	BK-OR	23		
		R	OR-BK	24		
18	0		T	BK-GR	25	
			R	GR-BK	26	
	1		T	BK-BR	27	
			R	BR-BK	28	
	2		T	BK-S	29	
			R	S-BK	30	
3		T	Y-BL	31		
		R	BL-Y	32		
			Y-OR	33		
			OR-Y	34		
			Y-GR	35		
			GR-Y	36		
			Y-BR	37		
			BR-Y	38		
			Y-S	39		
			S-Y	40		
			V-BL	41		
			BL-V	42		
			V-OR	43		
			OR-V	44		
			V-GR	45		
			GR-V	46		
			V-BR	47		
			BR-V	48		
			V-S	49		
			S-V	50		

Note: Module number only for DIMENSION 2000 or Custom PBXs.

**TABLE M**  
**FILLED IN EXAMPLE OF BASIC LINE AND ATTENDANT PORT CARRIER CROSS-CONNECT TABLE (WORKSHEET)**

CABINET 00 CARRIER 00 CONNECTOR AX01				CONN CABLE COLOR CODE	CROSS-CONNECT		
CP SLOT NO.	CKT NO.	EXT NO.	LEAD DESIG.		FROM	TO	
					CONN BLK 00AX01 (PURPLE)	CONN BLK (BLUE)	
				W - BL	1		
02	TONE PORT		T00	BL - W	2		
				W - OR	3		
03	TONE PORT		T10	OR - W	4		
04	0	CONSOLE 0	T	W - GR	5	HSE1-100	
			R	GR - W	6	HSE1-101	
			T1	W - BR	7	HSE1-102	
			R1	BR - W	8	HSE1-103	
	1	CONSOLE 1	T	W - S	9	HSE1-104	
			R	S - W	10	HSE1-105	
			T1	R - BL	11	HSE1-106	
			R1	BL - R	12	HSE1-107	
	05	0	236 CRIT	T	R - OR	13	HSE1-108
				R	OR - R	14	HSE1-109
1		245 CRIT	T	R - GR	15	HSE1-110	
			R	GR - R	16	HSE1-111	
2		253 CRIT	T	R - BR	17	HSE1-112	
			R	BR - R	18	HSE1-113	
3		262 CRIT	T	R - S	19	HSE1-114	
			R	S - R	20	HSE1-115	
06		0	359 TSTL	T	BK - BL	21	
				R	BL - BK	22	
	1	TAAS	T	BK - OR	23		
			R	OR - BK	24		
	2	200	T	BK - GK	25	HSE2-100	
			R	GK - BK	26	HSE2-101	
	3	201	T	BK - BR	27	HSE2-102	
			R	BR - BK	28	HSE2-103	
	07	0	202	T	BK - S	29	HSE2-104
				R	S - BK	30	HSE2-105
1		203	T	Y - BL	31	HSE2-106	
			R	BL - Y	32	HSE2-107	
2		204	T	Y - OR	33	HSE2-108	
			R	OR - Y	34	HSE2-109	
3		205	T	Y - GR	35	HSE2-110	
			R	GR - Y	36	HSE2-111	
08		0	206	T	Y - BR	37	HSE2-112
				R	BR - Y	38	HSE2-113
	1	207	T	Y - S	39	HSE2-114	
			R	S - Y	40	HSE2-115	
	2	208	T	V - BL	41	HSE2-116	
			R	BL - V	42	HSE2-117	
	3	212	T	V - OR	43	HSE2-118	
			R	OR - V	44	HSE2-119	
					V - GR	45	
					GR - V	46	
				V - BR	47		
				BR - V	48		
				V - S	49		
				S - V	50		



- NOTES:
1. DISTANCE BETWEEN "DIMENSION" PBX AND CONTROLLER, WITHOUT DATA CHANNEL REPEATERS, CANNOT EXCEED 305 METERS (1000 FEET).
  2. DISTANCE BETWEEN ECTS CONTROLLER AND ELECTRONIC TELEPHONE SET CANNOT EXCEED 305 METERS (1000 FEET).
  3. TOTAL DISTANCE FROM "DIMENSION" PBX TO ELECTRONIC TELEPHONE SET, WITHOUT DATA CHANNEL REPEATERS, CANNOT EXCEED 610 METERS (2000 FEET).
  4. ALL CABLES SHOULD BE RUN DIRECT NO BRIDGE TAPS.
  5. CADS KX01-KX12 ARE PART OF SD-1E450-01.

Fig. 24—Typical Cabling—ECTS (Notes 1 through 5)

- Line circuit to be connected
- Connecting block pin designation.

**8.51** Maximum allowable cabling distance (based on 24AWG cable) from the PBX to the controller is 305 meters (1,000 feet). This distance may be increased to 3354 meters (11,000 feet) using up to 4 data channel repeaters in series. Where repeaters are used, cable distance from the PBX or controller to the nearest repeater must not exceed 305 meters (1,000 feet). Cable distance between repeaters must not exceed 915 meters (3,000 feet).

**8.52** Range extension for distances greater than 305 meters (1,000 feet) may only be provided with adequate data channel response time. Response time was extended on systems containing Issue 2 or later of Feature Package 5, Issue 1.3 or later of Feature Package 7, Issue 1 or later of Feature Package 8, or initial release of Feature Packages 11, 12, and 15.

**8.53** The cross-connect for the data link cable assignment from the LC34B or LC366 circuit pack in the PBX to the LC60 circuit pack in the controller is the first circuit in Table N.



**Assign ECTS data link and MET set leads to direct cable feeds without bridging (bridge taps) cable pairs.**

**8.54** The station set cable assignment is shown in Table O. The quantity of stations assigned to one 25-pair cable varies depending on customer requirements. The color codes for the stations are as shown. Cross-connections to the house cable should be filled in.

**8.55** The maximum allowable cabling distance (based on 24 AWG cable) from the controller to the MET set is 305 meters (1000 feet). The cabling must remain within the same building unless data link protection is provided as shown on Fig. 25. Furnish equipment at the controller and the station location per the following:

- RT-48 Circuit Pack—two circuits per pack
- 642A Modular Panel—four RT-48 CP per panel
- 284B1 Power Unit—one 642A modular panel per power unit.

**8.56** At the controller location, install a 642A modular panel as close to the cross-connect field as practicable, and:

- Store power cable from modular panel.
- Remove modular panel fuses and replace fuse caps.
- Strap modular panel per Fig. 25 (C), option Z.
- Insert RT-48 CP into assigned 914B connector (1 per 2 ports).
- Connect modular panel Fig. 25 (C) to controller and outside cable pairs Fig. 25 (D).

**8.57** At the station location, install a 642A modular panel and a 284B1 power unit as close to the cross-connect field as practicable, and:

- Store power cable from modular panel.
- Remove modular panel fuses and replace fuse caps.
- Strap modular panel per Fig. 25 (C), option X.
- Connect -48V and GRD, from 284B1 power unit to wiring quadrant J1A (for connector J1A & J1B) and wiring quadrant J2A (for connector J2A & J2B) (Fig. 25 [C] [-48V Term C-2] [GRD Term E-1 and A-3]).
- Insert RT-48 CP into assigned 914B connector (1 per 2 stations).
- Connect modular panel (Fig. 25 [C]) to MET set and outside cable pairs Fig. 25 (E).
- Connect the TT, TR (Fig. 25 [E]) to outside cable facilities and the DIMENSION PBX line assignment.

**8.58** The RT-48 CP has been designed to provide lightning protection to the components of a MET set. In this application with the standard cable pair protection, the controller and the MET set are protected.

**8.59** *Caution: To avoid station fuse operation, cross-connects should only be performed without power applied to the data*

TABLE N

ECTS CONTROL CARRIER CROSS-CONNECT TABLE (WORKSHEET)

ECTS BASIC CARRIER MODULE_CABINET_CARRIER_CONN KX01					LINE CIRCUIT CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.
12	(Data Channel) LC60	RT	W-BL (26)	1	DIM PBX data port assgn LC34B or LC366	10XA 10XB  10RA 10RB
		RR	BL-W (1)	2		
			W-OR (27)	3		
			OR-W (2)	4		
		XT	W-GR (28)	5		
		XR	GR-W (3)	6		
			W-BR (29)	7		
			BR-W (4)	8		
			W-S (30)	9		
			S-W (5)	10		
00	1	BT (1)	R-BL (31)	11		
		BR (1)	BL-R (6)	12		
		BT (2)	R-OR (32)	13		
		BR (2)	OR-R (7)	14		
		BT (3)	R-GR (33)	15		
		BR (3)	GR-R (8)	16		
		BT (4)	R-BR (34)	17		
BR (4)	BR-R (9)	18				
00	2	BT (5)	R-S (35)	19		
		BR (5)	S-R (10)	20		
00	3	BT (6)	BK-BL (36)	21		
		BR (6)	BL-BK (11)	22		
00	4	BT (7)	BK-OR (37)	23		
		BR (7)	OR-BK (12)	24		
			BK-GR (38)	25		
			GR-BK (13)	26		
00	0 (Test Station)	T	BK-BR (39)	27		
		R	BR-BK (14)	28		
			BK-S (40)	29		
			S-BK (15)	30		
		AT	Y-BL (41)	31		
		AR	BL-Y (16)	32		
			Y-OR (42)	33		
			OR-Y (17)	34		
			Y-GR (43)	35		
			GR-Y (18)	36		
00	1	LT (1)	Y-BR (44)	37		
		LR (1)	BR-Y (19)	38		
		LT (2)	Y-S (45)	39		
		LR (2)	S-Y (20)	40		
		LT (3)	V-BL (46)	41		
		LR (3)	BL-V (21)	42		
		LT (4)	V-OR (47)	43		
LR (4)	OR-V (22)	44				
00	2	LT (5)	V-GR (48)	45		
		LR (5)	GR-V (23)	46		
00	3	LT (6)	V-BR (49)	47		
		LR (6)	BR-V (24)	48		
00	4	LT (7)	V-S (50)	49		
		LR (7)	S-V (25)	50		

TABLE N (Contd)

## ECTS CONTROL CARRIER CROSS-CONNECT TABLE (WORKSHEET)

ECTS BASIC CARRIER MODULE _ CABINET _ CARRIER _ CONN KX02			CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	LINE CIRCUIT CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG			FROM (RED)	TO (BLUE) HSE CA NO.
01	0	BT (8) BR (8)	W-BL (26) BL-W (11)	1 2		
	1	BT (9) BR (9)	W-OR (27) OR-W (2)	3 4		
	2	BT (10) BR (10)	W-GR (28) GR-W (3)	5 6		
	3	BT (11) BR (11)	W-BR (29) BR-W (4)	7 8		
	4	BT (12) BR (12)	W-S (30) S-W (5)	9 10		
	5	BT (13) BR (13)	R-BL (31) BL-R (6)	11 12		
	6	BT (14) BR (14)	R-OR (32) OR-R (7)	13 14		
	7	BT (15) BR (15)	R-GR (33) GR-R (8)	15 16		
02	0	BT (16) BR (16)	R-BR (34) BR-R (9)	17 18		
	1	BT (17) BR (17)	R-S (35) S-R (10)	19 20		
	2	BT (18) BR (18)	BK-BL (36) BL-BK (11)	21 22		
	3	BT (19) BR (19)	BK-OR (37) OR-BK (12)	23 24		
			BK-GR (38) GR-BK (13)	25 26		
01	0	LT (8) LR (8)	BK-BR (39) BR-BK (14)	27 28		
	1	LT (9) LR (9)	BK-S (40) S-BK (15)	29 30		
	2	LT (10) LR (10)	Y-BL (41) BL-Y (16)	31 32		
	3	LT (11) LR (11)	Y-OR (42) OR-Y (17)	33 34		
	4	LT (12) LR (12)	Y-GR (43) GR-Y (18)	35 36		
	5	LT (13) LR (13)	Y-BR (44) BR-Y	37 38		
	6	LT (14) LR (14)	Y-S (44) S-Y (20)	39 40		
	7	LT (15) LR (15)	V-BL (45) BL-V (21)	41 42		
02	0	LT (16) LR (16)	V-OR (46) OR-V (22)	43 44		
	1	LT (17) LR (17)	V-GR (47) GR-V (23)	45 46		
	2	LT (18) LR (18)	V-BR (48) BR-V (24)	47 48		
	3	LT (19) LR (19)	V-S (49) S-V (25)	49 50		

TABLE N (Contd)

ECTS CONTROL CARRIER CROSS-CONNECT TABLE (WORKSHEET)

ECTS BASIC CARRIER MODULE _CABINET_ CARRIER _CONN KX03					LINE CIRCUIT CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.
02	4	BT (20) BR (20)	W-BL(26) BL-W(1)	1 2		
	5	BT (21) BR (21)	W-OR(27) OR-W(2)	3 4		
	6	BT (22) BR (22)	W-GR(28) GR-W(3)	5 6		
	7	BT (23) BR (23)	W-BR(29) BR-W(4)	7 8		
03	0	BT (24) BR (24)	W-S(30) S-W(5)	9 10		
	1	BT (25) BR (25)	R-BL(31) BL-R(6)	11 12		
	2	BT (26) BR (26)	R-OR(32) OR-R(7)	13 14		
	3	BT (27) BR (27)	R-GR(33) GR-R(8)	15 16		
	4	BT (28) BR (28)	R-BR(34) BR-R(9)	17 18		
	5	BT (29) BR (29)	R-S(35) S-R(10)	19 20		
	6	BT (30) BR (30)	BK-BL(36) BL-BK(11)	21 22		
	7	BT (31) BR (31)	BK-OR(37) OR-BK(12)	23 24		
			BK-GR(38) GR-BK(13)	25 26		
02	4	LT (20) LR (20)	BK-BR(39) BR-BK(14)	27 28		
	5	LT (21) LR (21)	BK-S(40) S-BK(15)	29 30		
	6	LT (22) LR (22)	Y-BL(41) BL-Y(16)	31 32		
	7	LT (23) LR (23)	Y-OR(42) OR-Y(17)	33 34		
03	0	LT (24) LR (24)	Y-GR(43) GR-Y(18)	35 36		
	1	LT (25) LR (25)	Y-BR(44) BR-Y(19)	37 38		
	2	LT (26) LR (26)	Y-S(45) S-Y(20)	39 40		
	3	LT (27) LR (27)	V-BL(46) BL-V(21)	41 42		
	4	LT (28) LR (28)	V-OR(47) OR-V(22)	43 44		
	5	LT (29) LR (29)	V-GR(48) GR-V(23)	45 46		
	6	LT (30) LR (30)	V-BR(49) BR-V(24)	47 48		
	7	LT (31) LR (31)	V-S(50) S-V(25)	49 50		

TABLE N (Contd)

## ECTS CONTROL CARRIER CROSS-CONNECT (WORKSHEET)

ECTS BASIC CARRIER MODULE _CABINET _CARRIER _CONN KX04				LINE CIRCUIT CROSS-CONNECT		
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.
04	0	BT (32) BR (32)	W-BL (26) BL-W (1)	1 2		
	1	BT (33) BR (33)	W-OR (27) OR-W (2)	3 4		
	2	BT (34) BR (34)	W-GR (28) GR-W (3)	5 6		
	3	BT (35) BR (35)	W-BR (29) BR-W (4)	7 8		
	4	BT (36) BR (36)	W-S (30) S-W (5)	9 10		
	5	BT (37) BR (37)	R-BL (31) BL-R (6)	11 12		
	6	BT (38) BR (38)	R-OR (32) OR-R (7)	13 14		
	7	BT (39) BR (39)	R-GR (33) GR-R (8)	15 16		
05	0	BT (40) BR (40)	R-BR (34) BR-R (9)	17 18		
	1	BT (41) BR (41)	R-S (35) S-R (10)	19 20		
	2	BT (42) BR (42)	BK-BL (36) BL-BK (11)	21 22		
	3	BT (43) BR (43)	BK-OR (37) OR-BK (12)	23 24		
			BK-GR (38) GR-BK (13)	25 26		
04	0	LT (32) LR (32)	BK-BR (39) BR-BK (14)	27 28		
	1	LT (33) LR (33)	BK-S (40) S-BK (15)	29 30		
	2	LT (34) LR (34)	Y-BL (41) BL-Y (16)	31 32		
	3	LT (35) LR (35)	Y-OR (42) OR-Y (17)	33 34		
	4	LT (36) LR (36)	Y-GR (43) GR-Y (18)	35 36		
	5	LT (37) LR (37)	Y-BR (44) BR-Y (19)	37 38		
	6	LT (38) LR (38)	Y-S (45) S-Y (20)	39 40		
	7	LT (39) LR (39)	V-BL (46) BL-V (21)	41 42		
05	0	LT (40) LR (40)	V-OR (47) OR-V (22)	43 44		
	1	LT (41) LR (41)	V-GR (48) GR-V (23)	45 46		
	2	LT (42) LR (42)	V-BR (49) BR-V (24)	47 48		
	3	LT (43) LR (43)	V-S (50) S-V (25)	49 50		

TABLE N (Contd)

## ECTS CONTROL CARRIER CROSS-CONNECT (WORKSHEET)

ECTS BASIC CARRIER MODULE _ CABINET _ CARRIER _ CONN KX05					LINE CIRCUIT CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.
05	4	BT (44) BR (44)	W-BL (26) BL-W (1)	1 2		
	5	BT (45) BR (45)	W-OR (27) OR-W (2)	3 4		
	6	BT (46) BR (46)	W-GR (28) GR-W (3)	5 6		
	7	BT (47) BR (47)	W-BR (29) BR-W (4)	7 8		
06	0	BT (48) BR (48)	W-S (30) S-W (5)	9 10		
	1	BT (49) BR (49)	R-BL (31) BL-R (6)	11 12		
	2	BT (50) BR (50)	R-OR (32) OR-R (7)	13 14		
	3	BT (51) BR (51)	R-GR (33) GR-R (8)	15 16		
	4	BT (52) BR (52)	R-BR (34) BR-R (9)	17 18		
	5	BT (53) BR (53)	R-S (35) S-R (10)	19 20		
	6	BT (54) BR (54)	BK-BL (36) BL-BK (11)	21 22		
	7	BT (55) BR (55)	BK-OR (37) OR-BK (12)	23 24		
			BK-GR (38) GR-BK (13)	25 26		
05	4	LT (44) LR (44)	BK-BR (39) BR-BK (14)	27 28		
	5	LT (45) LR (45)	BK-S (40) S-BK (15)	29 30		
	6	LT (46) LR (46)	Y-BL (41) BL-Y (16)	31 32		
	7	LT (47) LR (47)	Y-OR (42) OR-Y (17)	33 34		
06	0	LT (48) LR (48)	Y-GR (43) GR-Y (18)	35 36		
	1	LT (49) LR (49)	Y-BR (44) BR-Y (19)	37 38		
	2	LT (50) LR (50)	Y-S (45) S-Y (20)	39 40		
	3	LT (51) LR (51)	V-BL (46) BL-V (21)	41 42		
	4	LT (52) LR (52)	V-OR (47) OR-V (22)	43 44		
	5	LT (53) LR (53)	V-GR (48) GR-V (23)	45 46		
	6	LT (54) LR (54)	V-BR (49) BR-V (24)	47 48		
	7	LT (55) LR (55)	V-S (50) S-V (25)	49 50		

TABLE N (Contd)

## ECTS CONTROL CARRIER CROSS-CONNECT (WORKSHEET)

ECTS BASIC CARRIER MODULE_CABINET_CARRIER_CONN KX06					LINE CIRCUIT CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.
07	0	BT (56) BR (56)	W-BL (26) BL-W (1)	1 2		
	1	BT (57) BR (57)	W-OR (27) OR-W (2)	3 4		
	2	BT (58) BR (58)	W-GR (28) GR-W (3)	5 6		
	3	BT (59) BR (59)	W BR (29) BR-W (4)	7 8		
	4	BT (60) BR (60)	W-S (30) S-W (5)	9 10		
	5	BT (61) BR (61)	R-BL (31) BL-R (6)	11 12		
	6	BT (62) BR (62)	R-OR (32) OR-R (7)	13 14		
	7	BT (63) BR (63)	R-GR (33) GR-R (8)	15 16		
			R-BR (34) BR-R (9)	17 18		
			R-S (35) S-R (10)	19 20		
			BK-BL (36) BL-BK (11)	21 22		
			BK-OR (37) OR-BK (12)	23 24		
			BK-GR (38) GR-BK (13)	25 26		
07	0	LT (56) LR (56)	BK-BR (39) BR-BK (14)	27 28		
	1	LT (57) LR (57)	BK-S (40) S-BK (15)	29 30		
	2	LT (58) LR (58)	Y-BL (41) BL-Y (16)	31 32		
	3	LT (59) LR (59)	Y-OR (42) OR-Y (17)	33 34		
	4	LT (60) LR (60)	YGR (43) GR-Y (18)	35 36		
	5	LT (61) LR (61)	Y-BR (44) BR-Y (19)	37 38		
	6	LT (62) LR (62)	Y-S (45) S-Y (20)	39 40		
	7	LT (63) LR (63)	V-BL (46) BL-V (21)	41 42		
			V-OR (47) OR-V (22)	43 44		
			V-GR (48) GR-V (23)	45 46		
			V-BR (49) BR-V (24)	47 48		
			V-S (50) S-V (25)	49 50		

TABLE N (Contd)

## ECTS CONTROL CARRIER CROSS-CONNECT (WORKSHEET)

ECTS SUPPLEMENTARY CARRIER MODULE_CABINET_CARRIER_CONN KX07					CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.
13	0	BT (0) BR (0)	W-BL (26) BL-W (1)	1 2		
	1	BT (1) BR (1)	W-OR (27) OR-W (2)	3 4		
	2	BT (2) BR (2)	W-GR (28) GR-W (3)	5 6		
	3	BT (3) BR (3)	W-BR (29) BR-W (4)	7 8		
	4	BT (4) BR (4)	W-S (30) S-W (5)	9 10		
	5	BT (5) BR (5)	R-BL (31) BL-R (6)	11 12		
	6	BT (6) BR (6)	R-OR (32) OR-R (7)	13 14		
	7	BT (7) BR (7)	R-GR (33) GR-R (8)	15 16		
14	0	BT (8) BR (8)	R-BR (34) BR-R (9)	17 18		
	1	BT (9) BR (9)	R-S (35) S-R (10)	19 20		
	2	BT (10) BR (10)	BK-BL (36) BL-BK (11)	21 22		
	3	BT (11) BR (11)	BK-OR (37) OR-BK (12)	23 24		
			BK-GR (38) GR-BK (13)	25 26		
13	0	LT (0) LR (0)	BK-BR (39) BR-BK (14)	27 28		
	1	LT (1) LR (1)	BK-S (40) S-BK (15)	29 30		
	2	LT (2) LR (2)	Y-BL (41) BL-Y (16)	31 32		
	3	LT (3) LR (3)	Y-OR (42) OR-Y (17)	33 34		
	4	LT (4) LR (4)	Y-GR (43) GR-Y (18)	35 36		
	5	LT (5) LR (5)	Y-BR (44) BR-Y (19)	37 38		
	6	LT (6) LR (6)	Y-S (45) S-Y (20)	39 40		
	7	LT (7) LR (7)	V-BL (46) BL-V (21)	41 42		
14	0	LT (8) LR (8)	V-OR (47) OR-V (22)	43 44		
	1	LT (9) LR (9)	V-GR (48) GR-V (23)	45 46		
	2	LT (10) LR (10)	V-BR (49) BR-V (24)	47 48		
	3	LT (11) LR (11)	V-S (50) S-V (25)	49 50		

TABLE N (Contd)

## ECTS CONTROL CARRIER CROSS-CONNECT (WORKSHEET)

ECTS SUPPLEMENTARY CARRIER MODULE_CABINET_CARRIER_CONN KX08					CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.
14	4	BT (12) BR (12)	W-BL (26) BL-W (1)	1 2		
	5	BT (13) BR (13)	W-OR (27) OR-W (2)	3 4		
	6	BT (14) BR (14)	W-GR (28) GR-W (3)	5 6		
	7	BT (15) BR (15)	W-BR (29) BR-W (4)	7 8		
15	0	BT (16) BR (16)	W-S (30) S-W (5)	9 10		
	1	BT (17) BR (17)	R-BL (31) BL-R (6)	11 12		
	2	BT (18) BR (18)	R-OR (32) OR-R (7)	13 14		
	3	BT (19) BR (19)	R-GR (33) GR-R (8)	15 16		
	4	BT (20) BR (20)	R-BR (34) BR-R (9)	17 18		
	5	BT (21) BR (21)	R-S (35) S-R (10)	19 20		
	6	BT (22) BR (22)	BK-BL (36) BL-BK (11)	21 22		
	7	BT (23) BR (23)	BK-OR (37) OR-BK (12)	23 24		
			BK-GR (38) GR-BK (13)	25 26		
14	4	LT (12) LR (12)	BK-BR (39) BR-BK (14)	27 28		
	5	LT (13) LR (13)	BK-S (40) S-BK (15)	29 30		
	6	LT (14) LR (14)	Y-BL (41) BL-Y (16)	31 32		
	7	LT (15) LR (15)	Y-OR (42) OR-Y (17)	33 34		
15	0	LT (16) LR (16)	Y-GR (43) GR-Y (18)	35 36		
	1	LT (17) LR (17)	Y-BR (44) BR-Y (19)	37 38		
	2	LT (18) LR (18)	Y-S (45) S-Y (20)	39 40		
	3	LT (19) LR (19)	V-BL (46) BL-V (21)	41 42		
	4	LT (20) LR (20)	V-OR (47) OR-V (22)	43 44		
	5	LT (21) LR (21)	V-GR (48) GR-V (23)	45 46		
	6	LT (22) LR (22)	V-BR (49) BR-V (24)	47 48		
	7	LT (23) LR (23)	V-S (50) S-V (25)	49 50		

TABLE N (Contd)

## ECTS CONTROL CARRIER CROSS-CONNECT (WORKSHEET)

ECTS SUPPLEMENTARY CARRIER MODULE_CABINET_CARRIER_CONN KX09					CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.
16	0	BT (24) BR (24)	W-BL (26) BL-W (1)	1 2		
	1	BT (25) BR (25)	W-OR (27) OR-W (2)	3 4		
	2	BT (26) BR (26)	W-GR (28) GR-W (3)	5 6		
	3	BT (27) BR (27)	W-BR (29) BR-W (4)	7 8		
	4	BT (28) BR (28)	W-S (30) S-W (5)	9 10		
	5	BT (29) BR (29)	R-BL (31) BL-R (6)	11 12		
	6	BT (30) BR (30)	R-OR (32) OR-R (7)	13 14		
	7	BT (31) BR (31)	R-GR (33) GR-R (8)	15 16		
17	0	BT (32) BR (32)	R-BR (34) BR-R (9)	17 18		
	1	BT (33) BR (33)	R-S (35) S-R (10)	19 20		
	2	BT (34) BR (34)	BK-BL (36) BL-BK (11)	21 22		
	3	BT (35) BR (35)	BK-OR (37) OR-BK (12)	23 24		
			BK-GR (38) GR-BK (13)	25 26		
16	0	LT (24) LR (24)	BK-BR (39) BR-BK (14)	27 28		
	1	LT (25) LR (25)	BK-S (40) S-BK (15)	29 30		
	2	LT (26) LR (26)	Y-BL (41) BL-Y (16)	31 32		
	3	LT (27) LR (27)	Y-OR (42) OR-Y (17)	33 34		
	4	LT (28) LR (28)	Y-GR (43) GR-Y (18)	35 36		
	5	LT (29) LR (29)	Y-BR (44) BR-Y (19)	37 38		
	6	LT (30) LR (30)	Y-S (45) S-Y (20)	39 40		
	7	LT (31) LR (31)	V-BL (46) BL-V (21)	41 42		
17	0	LT (32) LR (32)	V-OR (47) OR-V (22)	43 44		
	1	LT (33) LR (33)	V-GR (48) GR-V (23)	45 46		
	2	LT (34) LR (34)	V-BR (49) BR-V (24)	47 48		
	3	LT (35) LR (35)	V-S (50) S-V (25)	49 50		

TABLE N (Contd)

## ECTS CONTROL CARRIER CROSS-CONNECT (WORKSHEET)

ECTS SUPPLEMENTARY CARRIER MODULE _ CABINET _ CARRIER _ CONN KX010 (SEE NOTE)						CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.	
17	4	BT (36) BR (36)	W-BL (26) BL-W (1)	1 2			
	5	BT (37) BR (37)	W-OR (27) OR-W (2)	3 4			
	6	BT (38) BR (38)	W-GR (28) GR-W (3)	5 6			
	7	BT (39) BR (39)	W-BR (29) BR-W (4)	7 8			
18	0	BT (40) BR (40)	W-S (30) S-W (5)	9 10			
	1	BT (41) BR (41)	R-BL (31) BL-R (6)	11 12			
	2	BT (42) BR (42)	R-OR (32) OR-R (7)	13 14			
	3	BT (43) BR (43)	R-GR (33) GR-R (8)	15 16			
	4	BT (44) BR (44)	R-BR (34) BR-R (9)	17 18			
	5	BT (45) BR (45)	R-S (35) S-R (10)	19 20			
	6	BT (46) BR (46)	BK-BL (36) BL-BK (11)	21 22			
	7	BT (47) BR (47)	BK-OR (37) OR-BK (12)	23 24			
			BK-GR (38) GR-BK (13)	25 26			
17	4	LT (36) LR (36)	BK-BR (39) BR-BK (14)	27 28			
	5	LT (37) LR (37)	BK-S (40) S-BK (15)	29 30			
	6	LT (38) LR (38)	Y-BL (41) BL-Y (16)	31 32			
	7	LT (39) LR (39)	Y-OR (42) OR-Y (17)	33 34			
18	0	LT (40) LR (40)	Y-GR (43) GR-Y (18)	35 36			
	1	LT (41) LR (41)	Y-BR (44) BR-Y (19)	37 38			
	2	LT (42) LR (42)	Y-S (45) S-Y (20)	39 40			
	3	LT (43) LR (43)	V-BL (46) BL-V (21)	41 42			
	4	LT (44) LR (44)	V-OR (47) OR-V (22)	43 44			
	5	LT (45) LR (45)	V-GR (48) GR-V (23)	45 46			
	6	LT (46) LR (46)	V-BR (49) BR-V (24)	47 48			
	7	LT (47) LR (47)	V-S (50) S-V (25)	49 50			

Note: Module number only for DIMENSION 2000 or Custom PBXs.

TABLE N (Contd)

## ECTS CONTROL CARRIER CROSS-CONNECT (WORKSHEET)

ECTS SUPPLEMENTARY CARRIER MODULE_CABINET_CARRIER_CONN KX011					CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.
19	0	BT (48) BR (48)	W-BL (26) BL-W (1)	1 2		
	1	BT (49) BR (49)	W-OR (27) OR-W (2)	3 4		
	2	BT (50) BR (50)	W-GR (28) GR-W (3)	5 6		
	3	BT (51) BR (51)	W-BR (29) BR-W (4)	7 8		
	4	BT (52) BR (52)	W-S (30) S-W (5)	9 10		
	5	BT (53) BR (53)	R-BL (31) BL-R (6)	11 12		
	6	BT (54) BR (54)	R-OR (32) OR-R (7)	13 14		
	7	BT (55) BR (55)	R-GR (33) GR-R (8)	15 16		
20	0	BT (56) BR (56)	R-BR (34) BR-R (9)	17 18		
	1	BT (57) BR (57)	R-S (35) S-R (10)	19 20		
	2	BT (58) BR (58)	BK-BL (36) BL-BK (11)	21 22		
	3	BT (59) BR (59)	BK-OR (37) OR-BK (12)	23 24		
			BK-GR (38) GR-BK (13)	25 26		
19	0	LT (48) LR (48)	BK-BR (39) BR-BK (14)	27 28		
	1	LT (49) LR (49)	BK-S (40) S-BK (15)	29 30		
	2	LT (50) LR (50)	Y-BL (41) BL-Y (16)	31 32		
	3	LT (51) LR (51)	Y-OR (42) OR-Y (17)	33 34		
	4	LT (52) LR (52)	Y-GR (43) GR-Y (18)	35 36		
	5	LT (53) LR (53)	Y-BR (44) BR-Y (19)	37 38		
	6	LT (54) LR (54)	Y-S (45) S-Y (20)	39 40		
	7	LT (55) LR (55)	V-BL (46) BL-V (21)	41 42		
20	0	LT (56) LR (56)	V-OR (47) OR-V (22)	43 44		
	1	LT (57) LR (57)	V-GR (48) GR-V (23)	45 46		
	2	LT (58) LR (58)	V-BR (49) BR-V (24)	47 48		
	3	LT (59) LR (59)	V-S (50) S-V (25)	49 50		

TABLE N (Contd)

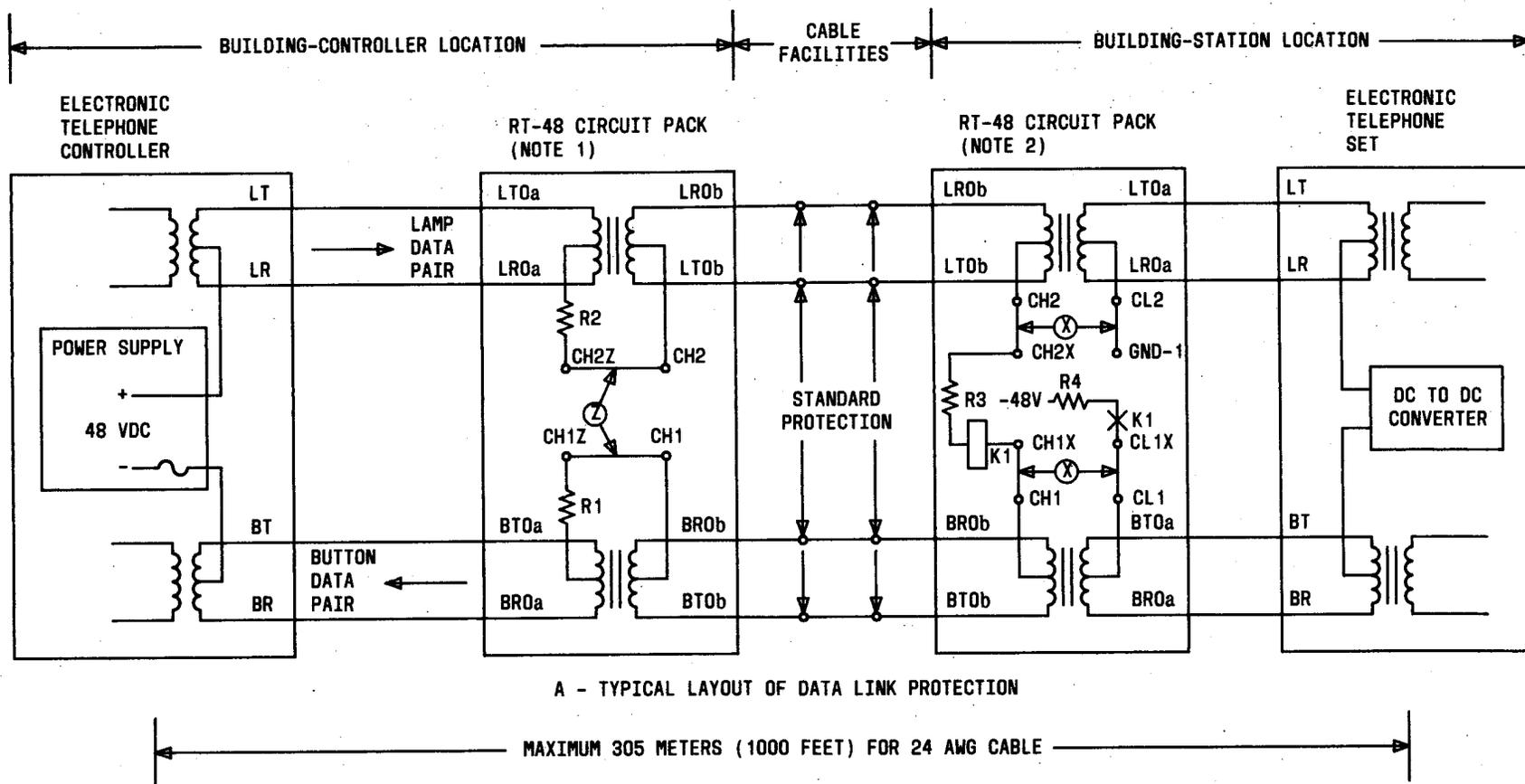
## ECTS CONTROL CARRIER CROSS-CONNECT (WORKSHEET)

ECTS SUPPLEMENTARY CARRIER MODULE_CABINET_CARRIER_CONN KX012					CROSS-CONNECT	
CP SLOT NO.	CKT NO.	LEAD DESIG	CONN CA COLOR CODE AND PIN NO.	CONN BLK PIN DESIG.	FROM (RED)	TO (BLUE) HSE CA NO.
20	4	BT (60) BR (60)	W-BL (26) BL-W (1)	1 2		
	5	BT (61) BR (61)	W-OR (27) OR-W (2)	3 4		
	6	BT (62) BR (62)	W-GR (28) GR-W (3)	5 6		
	7	BT (63) BR (63)	W-BR (29) BR-W (4)	7 8		
			W-S (30) S-W (5) R-BL (31) BL-R (6) R-OR (32) OR-R (7) R-GR (33) GR-R (8) R-BR (34) BR-R (9) R-S (35) S-R (10) BK-BL (36) BL-BK (11) BK-OR (37) OR-BK (12) BK-GR (38) GR-BK (13)	9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26		
20	4	LT (60) LR (60)	BK-BR (39) BR-BK (14)	27 28		
	5	LT (61) LR (61)	BK-S (40) S-BK (15)	29 30		
	6	LT (62) LR (62)	Y-BL (41) BL-Y (16)	31 32		
	7	LT (63) LR (63)	Y-OR (42) OR-Y (17)	33 34		
			Y-GR (43) GR-Y (18) Y-BR (44) BR-Y (19) Y-S (45) S-Y (20) V-BL (46) BL-V (21) V-OR (47) OR-V (22) V-GR (48) GR-V (23) V-BR (49) BR-V (24) V-S (50) S-V (25)	35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50		

TABLE O

STATION SET CABLE ASSIGNMENT TABLE (WORKSHEET)

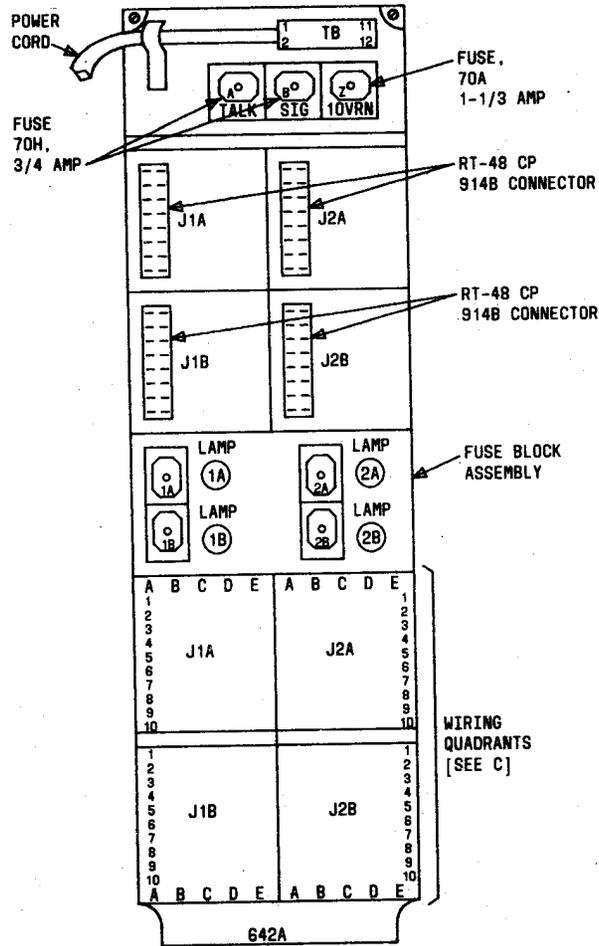
STATION NUMBER	STATION SET CABLE			CROSS-CONNECT TO
	LEAD DESIG	CONN CA COLOR CODE	CONN BLK	HOUSE CABLE (BLUE FIELD)
1st Station Controller____ Slot____ Circuit____	T ( )	W-BL	1	
	R ( )	BL-W	2	
	BT ( )	W-OR	3	
	BR ( )	OR-W	4	
	AT ( )	W-GR	5	
	AR ( )	GR-W	6	
	LT ( )	W-BR	7	
	LR ( )	BR-W	8	
2nd Station Controller____ Slot____ Circuit____	T ( )	W-S	9	
	R ( )	S-W	10	
	BT ( )	R-BL	11	
	BR ( )	BL-R	12	
	AT ( )	R-OR	13	
	AR ( )	OR-R	14	
	LT ( )	R-GR	15	
	LR ( )	GR-R	16	
3rd Station Controller____ Slot____ Circuit____	T ( )	R-BR	17	
	R ( )	BR-R	18	
	BT ( )	R-S	19	
	BR ( )	S-R	20	
	AT ( )	BK-BL	21	
	AR ( )	BL-BK	22	
	LT ( )	BK-OR	23	
	LR ( )	OR-BK	24	
4th Station Controller____ Slot____ Circuit____	T ( )	BK-GR	25	
	R ( )	GR-BK	26	
	BT ( )	BK-BR	27	
	BR ( )	BR-BK	28	
	AT ( )	BK-S	29	
	AR ( )	S-BK	30	
	LT ( )	Y-BL	31	
	LR ( )	BL-Y	32	
5th Station Controller____ Slot____ Circuit____	T ( )	Y-OR	33	
	R ( )	OR-Y	34	
	BT ( )	Y-GR	35	
	BR ( )	GR-Y	36	
	AT ( )	Y-BR	37	
	AR ( )	BR-Y	38	
	LT ( )	Y-S	39	
	LR ( )	S-Y	40	
6th Station Controller____ Slot____ Circuit____	T ( )	V-BL	41	
	R ( )	BL-V	42	
	BT ( )	V-OR	43	
	BR ( )	OR-V	44	
	AT ( )	V-GR	45	
	AR ( )	GR-V	46	
	LT ( )	V-BR	47	
	LR ( )	BR-V	48	
	V-S	49		
	S-V	50		



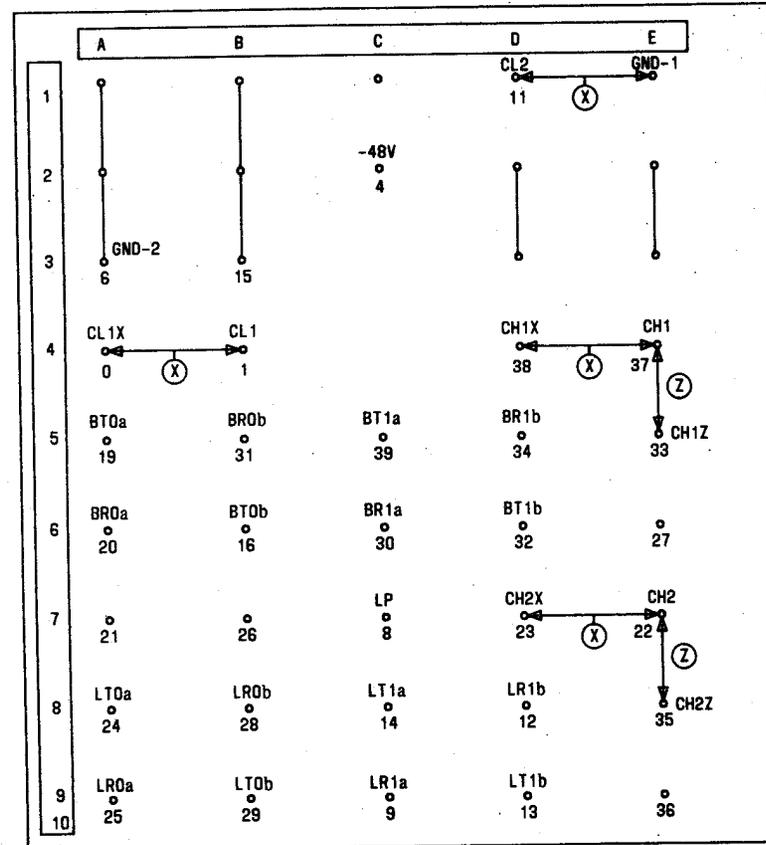
**NOTES:**

1. RT48 CP, DATA LINK PROTECTION, INSTALLED IN A 642A MODULAR PANEL
2. RT48 CP, DATA LINK PROTECTION, INSTALLED IN A 642A MODULAR PANEL. A 284B1 POWER UNIT REQUIRED, MOUNT ADJACENT TO 642A PANEL.

**Fig. 25—Data Link Protection for Controller and MET Set in Different Buildings (Sheet 1 of 4)**



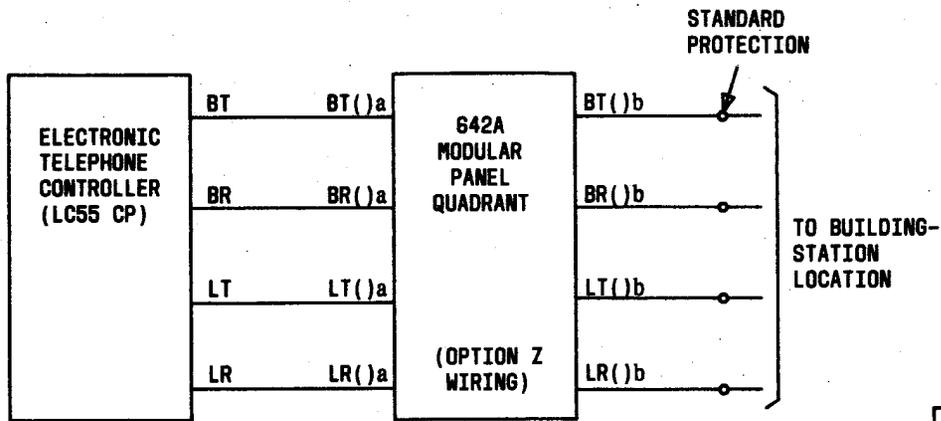
B - TYPICAL 642A MODULAR PANEL



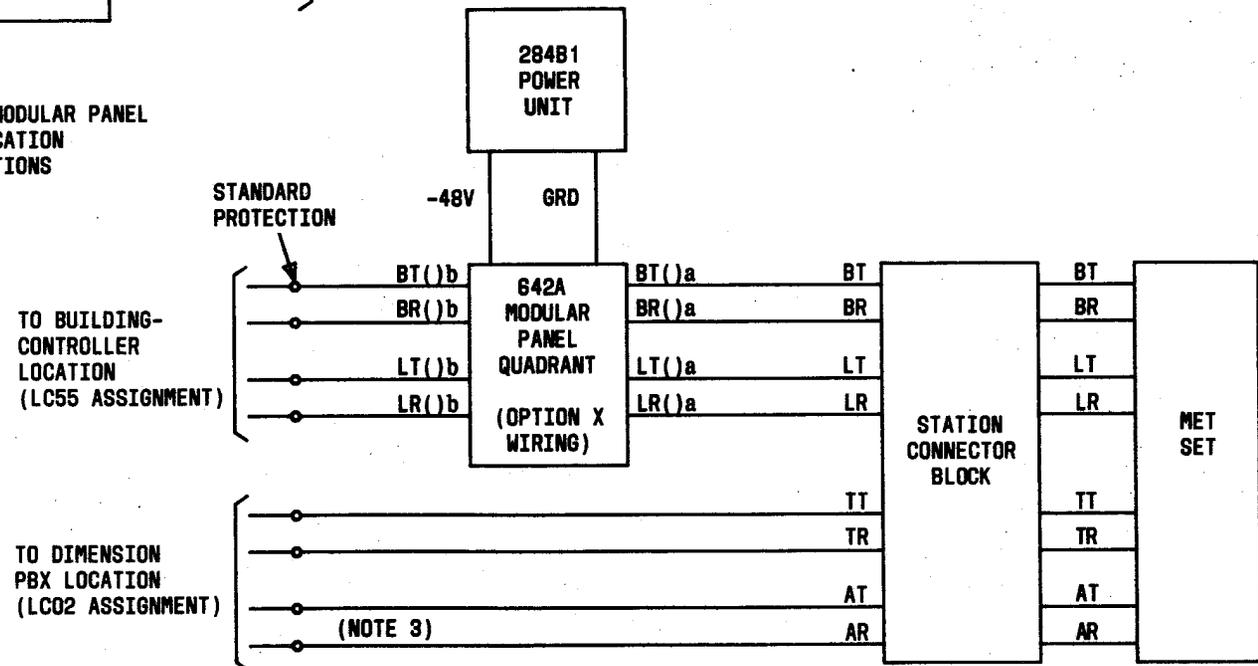
NUMBERS UNDER TERMINALS DESIGNATE CONNECTIONS TO JACK PINS OF CORRESPONDING JACKS

C - TYPICAL 642A MODULAR QUADRANT WIRING

Fig. 25—Data Link Protection for Controller and MET Set in Different Buildings (Sheet 2 of 4)



D - TYPICAL 642A MODULAR PANEL CONTROLLER LOCATION WIRING CONNECTIONS

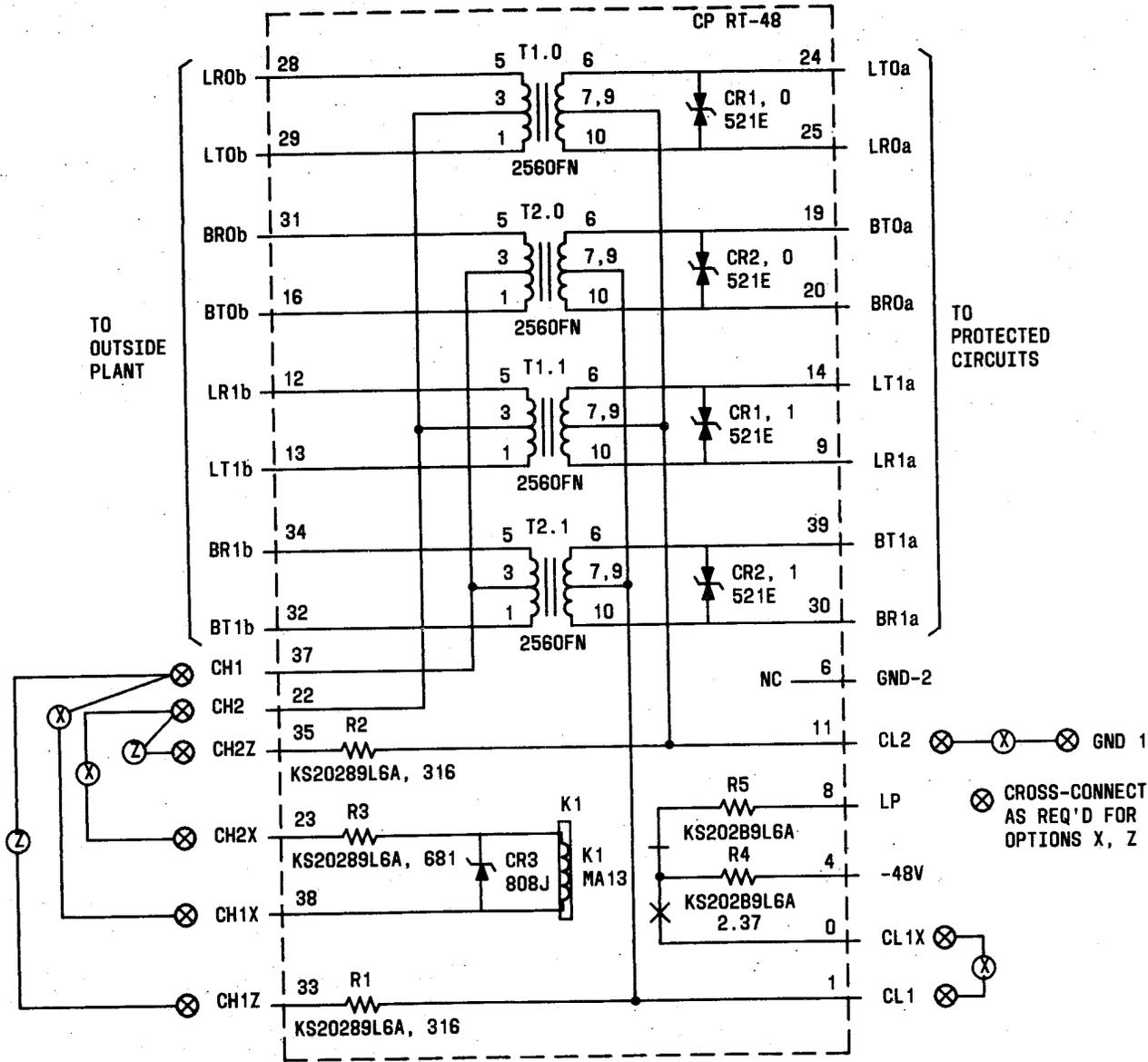


NOTE:

3. AT AND AR LEADS ARE RESERVED FOR FUTURE USE AND NEED NOT BE INSTALLED UNTIL REQUIRED

E - TYPICAL 642A MODULAR PANEL STATION LOCATION WIRING CONNECTIONS

Fig. 25—Data Link Protection for Controller and MET Set in Different Buildings (Sheet 3 of 4)



F - SCHEMATIC DF RT-48 CIRCUIT PACK

Fig. 25—Data Link Protection for Controller and MET Set in Different Buildings (Sheet 4 of 4)

**pairs. Power is removed from the data pairs if the associated LC55 circuit pack is removed or the controller power is turned off.** Power for energizing the station set is supplied from the controller via a phantom connection on the data pairs. The lamp pair (LT and LR) conductors are connected to ground. The button pair (BT and BR) conductors are at a -48 volt potential. Momentarily touching a button pair conductor to a lamp pair conductor or ground will operate the station supply fuse located on the LC55 circuit pack.

## DATA CHANNEL REPEATER

### A. General Description

**8.60** The data channel repeater provides range extension with lightning protection, or lightning protection only, for DIMENSION PBX low-speed data channels. It connects in series with the data channel to repeat data pulses and/or to provide isolation between the input and output pairs.

**8.61** The repeater range extension circuit detects and reconstructs pulses transmitted to and from the PBX. The reconstruction corrects any pulse attenuation or distortion to extend the effective range of the data channel.

**8.62** The repeater lightning protection circuit has been designed to operate in unexposed environments without additional protection, and to operate in exposed environments with standard protection.



**Where data channel repeaters are used to provide "LIGHTNING PROTECTION ONLY," power is not required.**

### B. Physical Description

#### Housing

**8.63** The repeater circuitry is housed in a modified key service unit-type apparatus housing (Fig. 26). A cross-connect block is provided. The power unit and CP AE49 are not furnished when range extension is not required (lightning protection only).

#### Mounting

**8.64** The unit is designed to be wall-mounted inside a building. When range extension is required,

mount near a 120-volt, 60-Hz outlet. It is not designed for exterior mounting or to be pole-mounted.

### Single Channel Repeater

**8.65** A single channel repeater for range extension consists of one J58879KC, List 1, housing and power unit; one J58879KC, List 2 (AE-49), rectifier and timing reference card; plus two J58879KC, List 3 (AE-48), unidirectional repeater cards. When repeater is for lightning protection only, it consists of one J58879KC, List 5, housing unit and two J58879KC, List 4 (WJ3), data link buffer cards.

### Dual Channel Repeater

**8.66** The housing can accommodate two additional AE-48 cards for a second repeater channel. A dual channel repeater for range extension thus consists of one J58879KC, List 1, housing; one J58879KC, List 2 (AE-49), rectifier card; plus four J58879KC, List 3 (AE-48), repeater cards. When repeater is for lightning protection only, it consists of one J58879KC, List 5, housing unit and four J58879KC, List 4 (WJ3), data link buffer cards.

### C. Installation

**8.67** The repeater connections and a typical application are discussed in the following paragraphs.

#### Single-Channel Repeater

**8.68** A single-channel repeater is shown in Fig. 27. Some internal wiring, which is provided, is shown for clarity. The data pair connects to connecting block TB1. The ac line connects to a 120-Volt, 60-Hz outlet when range extension is required.

**8.69** For the PBX to peripheral data direction, the repeater input pair is connected to terminals 1A and 2A of TB1. The output pair appears on terminals 1B and 2B. This data direction employs the repeater circuit located in connector J1.

**8.70** For the peripheral to PBX data direction, the repeater input pair is connected to terminals 3B and 4B, the output pair is connected to terminals 3A and 4A, and the repeater circuit located in connector J2 is employed.

**8.71** The TIP leads of data pairs are connected to odd-numbered terminals, and the RING leads

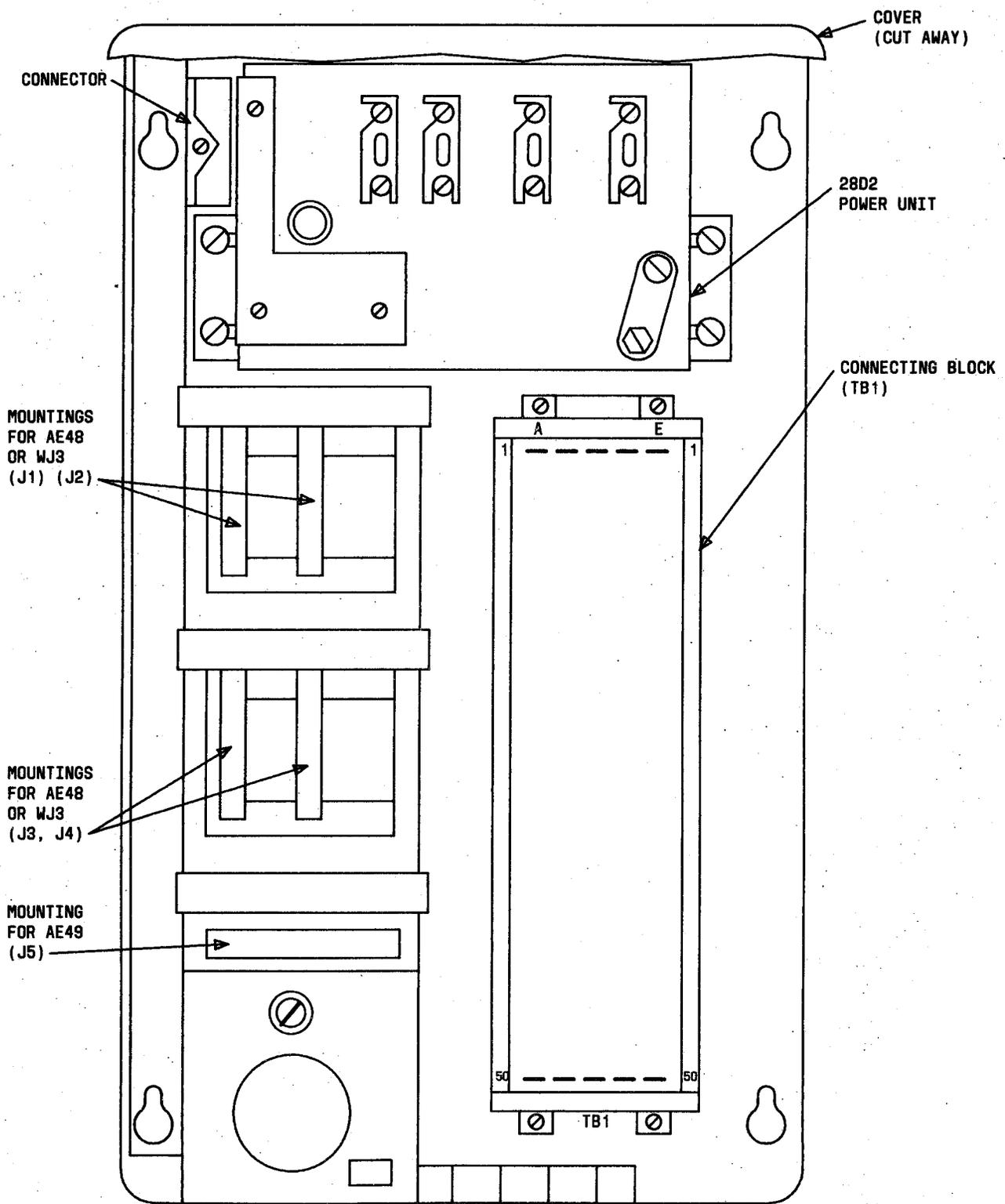
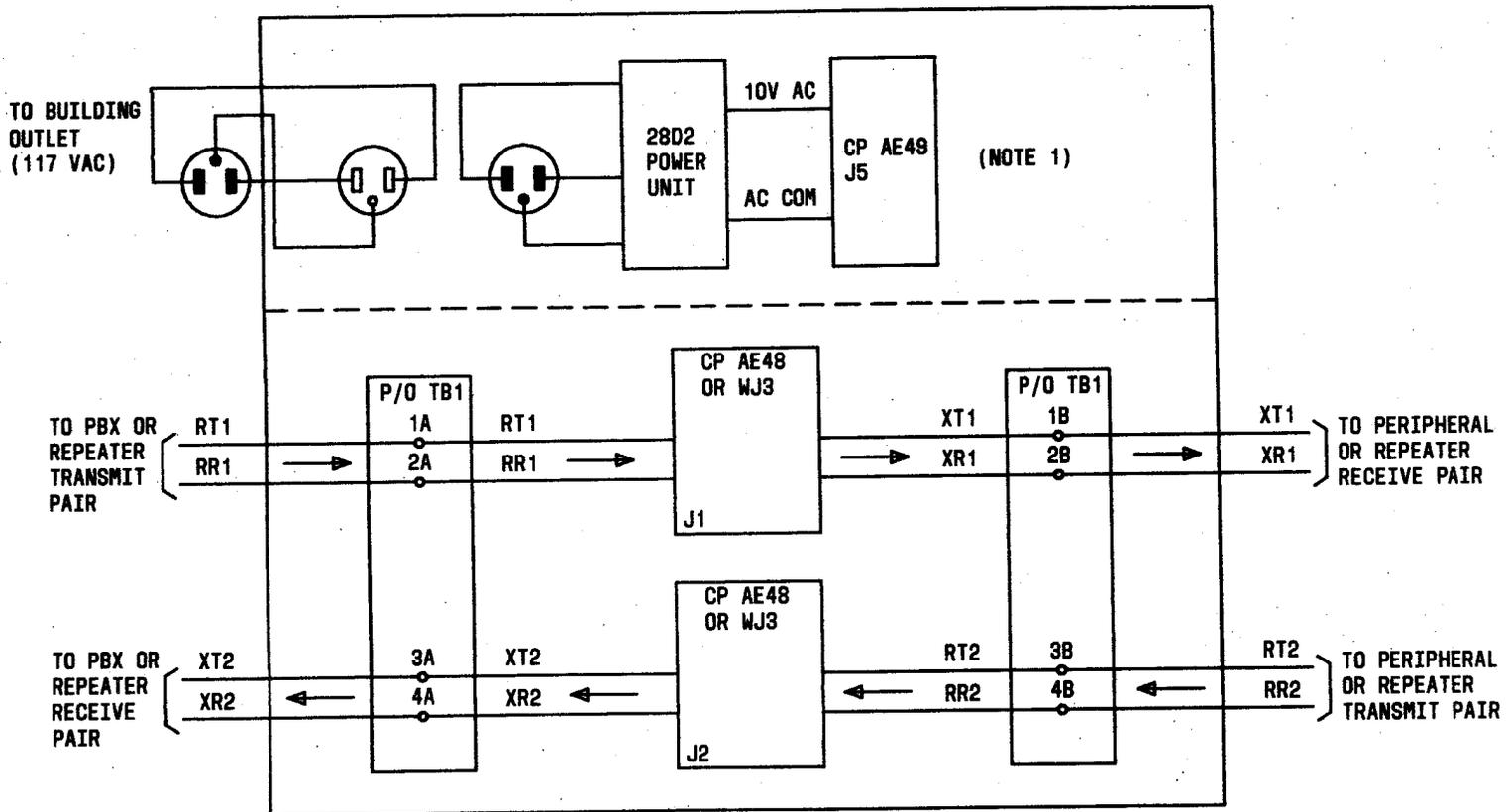


Fig. 26—Data Channel Repeater Unit



NOTE:  
 1. THE POWER SUPPLY UNIT IS NOT REQUIRED WHEN THE WJ3 CIRCUIT CARD IS USED.

Fig. 27—Single Channel Repeater

of data pairs are connected to even-numbered terminals.

**8.72** Cabling to the PBX is terminated on column A, while cabling to the peripheral is terminated on column B.

**Dual Channel Repeater**

**8.73** The connections for two data channels are shown in Fig. 28. The channel 1 connections are the same as the single repeater channel connections. For the second channel, the repeater cards in connectors J3 and J4 are used in conjunction with rows D and E of terminal block 1.

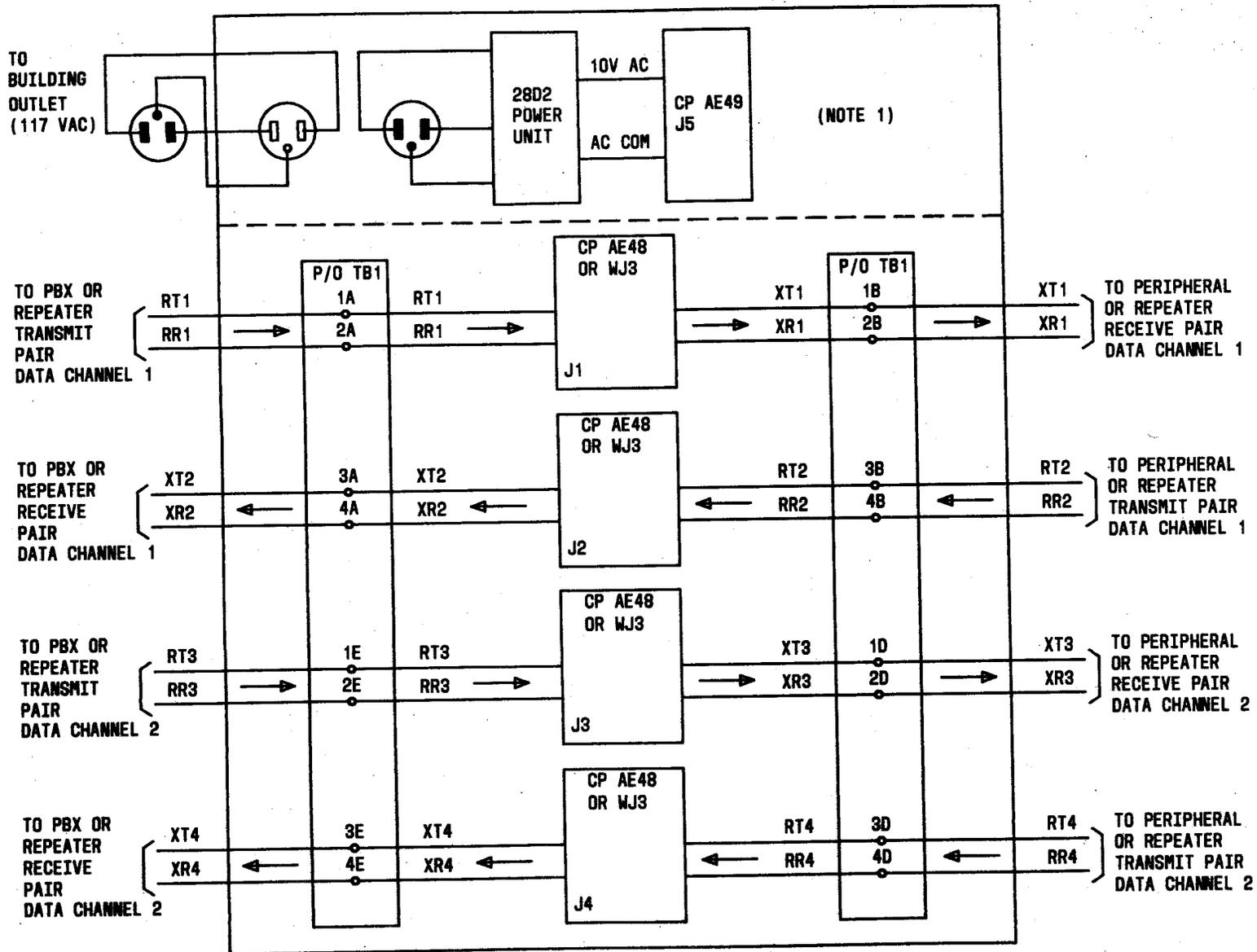
**D. ECTS Range Extension**

**8.74** Figure 29 illustrates a typical repeater application for the DIMENSION PBX electronic

custom telephone service. One repeater is used at the PBX location, another at the ECTS location, and a maximum of two in between when required. The repeater-to-repeater links may be exposed if standard protection is provided.

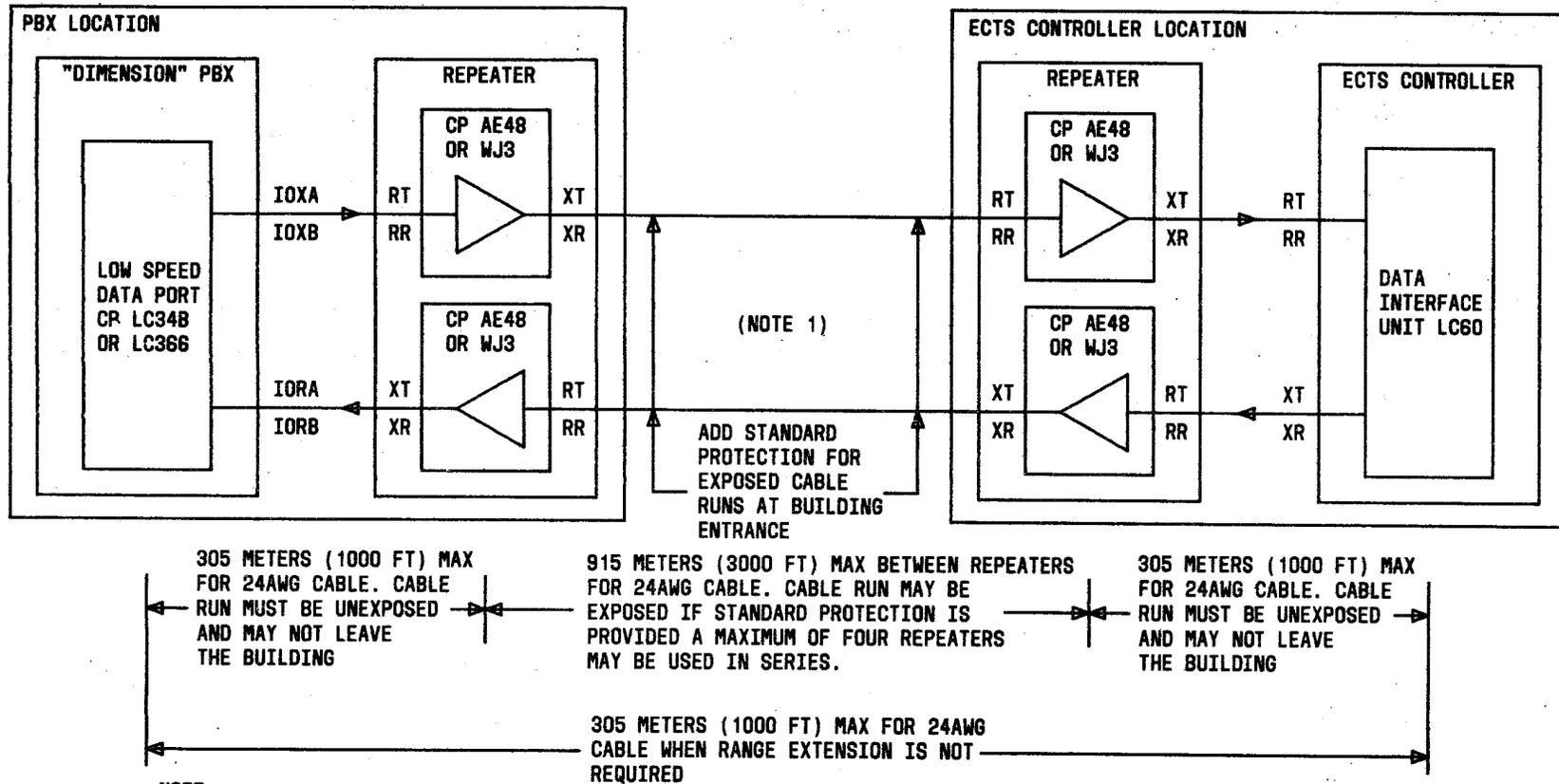
**8.75** Data link range is a function of cable attenuation and receiver sensitivity. The repeater-to-repeater range is 914m (3000 feet) for No. 24 American Wire Gauge (AWG) cable. The PBX-to-repeater and repeater-to-DIMENSION PBX ECTS data links are limited to a 305-m (1000-foot) range due to receiver sensitivity.

**8.76** The data range is limited by the cable attenuation and round trip propagation delay. The range for one direction of a data link may be estimated by the following formula.



NOTE:  
 1. THE POWER SUPPLY UNIT IS NOT REQUIRED WHEN THE WJ3 CIRCUIT CARD IS USED.

Fig. 28—Dual Channel Repeater



**NOTE:**

1. INTERMEDIATE REPEATERS CAN BE USED WHEN REQUIRED TO EXTEND DISTANCE BETWEEN "DIMENSION" PBX AND ECTS CONTROLLER TO 3,354 METERS (11,000 FEET).

**Fig. 29—ECTS Range Extension**

$$R = \frac{20 \text{ LOG}_{10} \frac{XL}{RS}}{\alpha(\text{dB/UNIT LENGTH})}$$

Where:

XL = Transmit level of sender

RS = Receive sensitivity of receiver

$\alpha$  = Cable Attenuation

Both directions must be measured to determine the data link range.

**8.77** The transmit level is the magnitude of the transmitted biphasic pulse. For the repeater, XL = 5 volts.

**8.78** The receiver sensitivity is the minimum magnitude of biphasic pulse required by the receiver circuit for detection. For the repeater, RS = 0.7 volt. For other circuits, the sensitivity depends upon the circuit card code and vintage.

**8.79** The cable attenuation is a function of the cable type and temperature. For No. 24 AWG cable,  $\alpha = 5.5$  dB per 305m (1000 feet).

**8.80** The previously mentioned values can be substituted into the range formula as shown below:

$$R = \frac{20 \text{ LOG}_{10} \frac{5.0}{0.7}}{5.5/305\text{m (1000 FEET)}} = 947\text{m (3105 FEET)}$$

**Note:** The range formula computes cable attenuation as a function of conductor size. The formula may be applied to individual cable runs within a repeater installation. The 3353-m (11,000-foot) maximum range is limited by propagation delay which is not affected by conductor size. The range formula *should not* be used to extend the total data link range beyond 3353m (11,000 feet).

**8.81** The maximum data range is limited in software by the time allowed for a data channel response. The maximum response time permitted by software is 160  $\mu\text{s}$ , allowing four repeaters to be cascaded for a maximum range of 3353m (11,000 feet) using 24 AWG wire. Range extension increases the data response due to repeater delay and cable propagation. The maximum distance between repeaters may be changed by using different gauge twisted pair wire as follows:

AWG	DIST	PERCENT CHG
26	2400	-20
24	3000	0
22	3600	+20
19	4800	+60

**8.82** Each unidirectional repeater circuit (AE-48) has a 2.4  $\mu\text{s}$  delay. In an application employing two repeaters, a total of four repeater circuits are inserted in the loop for a total delay of 9.6  $\mu\text{s}$ .

**8.83** Cable delay is approximately 1.7  $\mu\text{s}$  per 305m (1,000 feet). In the previous application, when a 1524-m (5,000-foot) maximum range is used, the total cable length is 3048m (10,000 feet) resulting in a cable delay of 17  $\mu\text{s}$ .

**8.84** Additional elements in the data response time are:

- Time required to shift out the data (92  $\mu\text{s}$ )
- Time required by the peripheral to respond to each bit (ECTS = 2  $\mu\text{s}$ )
- Time for the PBX receiver to response (1  $\mu\text{s}$ ).

**8.85** The ECTS application using two data repeaters requires the software to allow 122  $\mu\text{s}$  for a data channel response.

## 9. MULTIBUTTON ELECTRONIC TELEPHONE SET

### PHYSICAL DESCRIPTION

**9.01** Multibutton electronic telephone (MET) sets (Fig. 30) feature contemporary-styled ivory

## SECTION 554-010-110

colored housings, modular handset and mounting cords, and decorator options available in seven colors (avocado, gold, orange, brown, red, blue, and black) and two wood-grain finishes (teak and walnut). The MET sets may be either desk- or wall-mounted.

**9.02** All MET sets are equipped with a:

- TOUCH-TONE telephone dial
- Tone ringer and a volume control knob
- Recall button
- Number of line/feature buttons.

The MET sets are available for ECTS use with line/feature buttons and associated indicators as follows:

- 5-button (5-button array)
- 10-button (10-button array)
- 20-button (two 10-button arrays)
- 30-button (three 10-button arrays).

The 40-button MET set is not intended for ECTS use.

**9.03** Two special MET sets are also available:

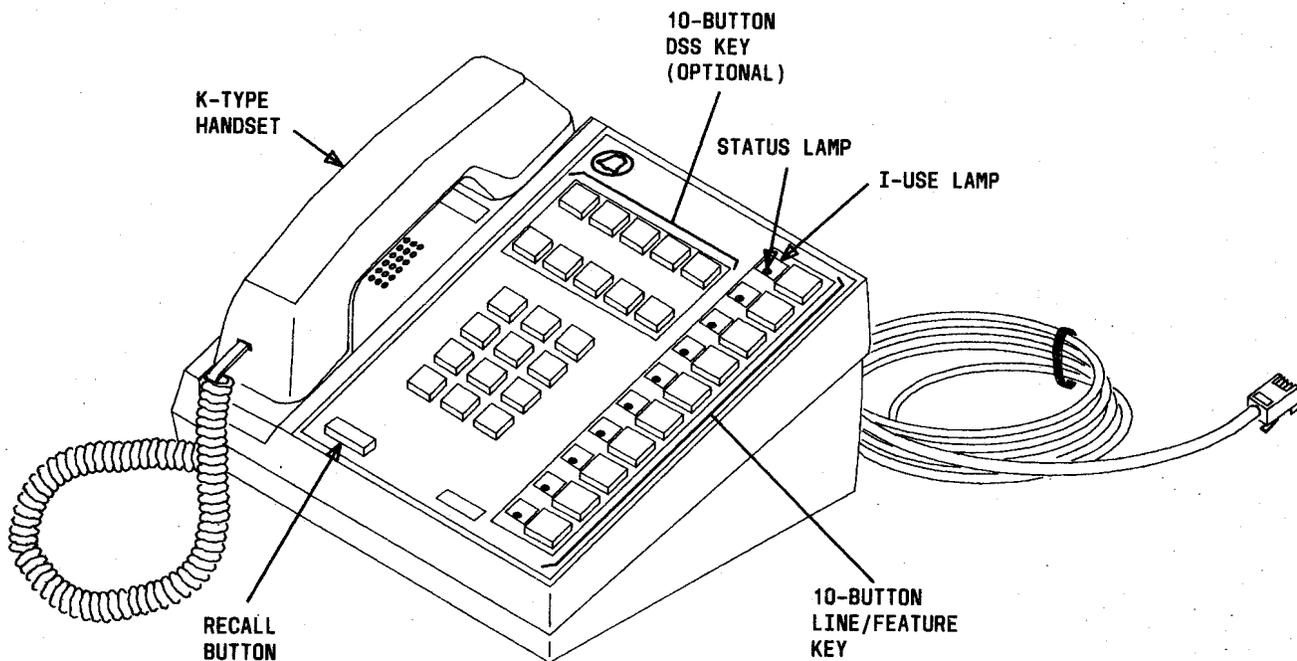
- (1) A 10-button set with an additional 10-button direct station select array (no indicators)
- (2) A 20-button set (in 30-button set housing) equipped with a built-in speakerphone. This set cannot be used as a power failing transfer station.

The MET sets may also be used with a:

- TOUCH-A-MATIC\* automatic adjunct dialer
- 4A speakerphone
- SPOKESMAN\* loudspeaker
- Modification used by those who are hard of hearing.

**9.04** The line or feature buttons are designed for low-travel operation and provide a make contact only when pressed. Refer to Table P for the but-

\*Registered trademark of AT&T.



**Fig. 30—Multibutton Electronic Telephone Set Equipped with DSS Buttons**

ton designations and associated features. The indicators are associated with each line button and are protected by plastic lenses.

**9.05** All MET sets operate on 24-gauge conventional twisted pair station cabling at cable distances of up to 305 meters (1000 feet) from the controller. Four-pair cabling is required independently of the number of buttons on the telephone. Two pairs provide speech services to the PBX, and two pairs provide power and 2-way data transmission to the controller. Six sets, for example, may be served within one 25-pair cable running from the controller to a satellite location, providing individual 4-pair cables to each telephone.

#### FUNCTIONAL DESCRIPTION

**9.06** The MET sets differ from conventional key-type telephone sets primarily by the manner in which the key features are activated and the station indications (lamp and ringer) are controlled. The sets receive all control data plus power over a 4-wire data link. This requires that data handling, power, and logic circuitry be built into each MET set. Printed wiring boards are used to provide this circuitry. The functional relationship of circuits is shown in Fig. 31.

**9.07** The four pairs serving the MET sets (Worksheet Table O) are assigned the following functions:

- (a) The first pair (T and R) is the primary tip and ring connecting the DIMENSION PBX line circuit to the telephone speech network and is used to carry the telephone voice and TOUCH-TONE dialing signals.
- (b) The second pair ([BT and BR] half of a full-duplex data link) carries data from the telephone to the controller concerning the status of the switchhook, recall (R) button, DSS key, and all assigned line and feature buttons.
- (c) The third pair (AT and AR) is for application of auxiliary speech services and is not used in ECTS application at this time.
- (d) The fourth pair ([LT and LR] second half of a full-duplex data link) carries data from the controller to the MET set. This results in lighting lamp indicators and sounding tone ringer signals.
- (e) Power for energizing the station set circuitry is applied via a phantom connection on the

data pairs from the controller, as shown in Fig. 32. The lamp pair (LT and LR) conductors are connected to earth ground via the controller power supply. The button pair (BT and BR) conductors are at a -48 volt potential with respect to earth ground.

**9.08** A data receiver and transmitter is contained in the telephone set. The receiver is connected to one side of the station data link via a transformer. Data transmitting circuits combine the station output signals with timing information and transmit this to the controller via a transformer in the other side of the loop. A switching regulator-type power supply is connected to the center taps on each data transformer to regulate the dc power phantom over the data pairs.

**9.09** The logic circuits respond to the information generated by the telephone user and controller. Information passed to the controller concerns switchhook status and signals based on line or feature button activity. Information transmitted from the DIMENSION PBX via the controller signals the station when any request for service has been processed and provides the audible and/or visual indications confirming the call state.

**9.10** A line or feature request is initiated at a MET set by momentary operation of the desired button. The button produces a contact closure during the time it is pressed. This closure is sensed when each button contact is scanned in sequence. The status of all buttons is stored in the controller memory, enabling the controller to compare button status and detect any button change which requires action on the part of the processor. The controller passes this information to the DIMENSION PBX and, after processing, responds by transmitting the required visual and/or audible data signals to the requesting station.

**9.11** The visual indications at the telephone set are provided by drivers and indicators which are controlled by the logic circuits. A green status indicator indicates the state of each assigned feature or line pickup. A red I-use indicator is provided for each active line button to indicate the state of the line in use or to be used. Each indicator is driven by circuitry mounted on a printed wiring board which is physically part of the key assembly.

**9.12** The tone ringer transducer is directly controlled by outputs from the logic circuitry. The

TABLE P

## BUTTON DESIGNATIONS FOR ECTS FEATURES

FEATURE NAME	BUTTON DESIGNATION
Abbreviated and Delayed Ringing	ABBR RING*
Automatic Callback — Calling	AUTO CALL BACK
Automatic Intercom	ICOM†
Call Forwarding — All Calls	CALL FWD ALL
Call Forwarding — Busy and Don't Answer	CALL FWD BY/DA
Call Forwarding — Don't Answer	CALL FWD DA
Call Hold	CALL HOLD
Call Pickup	CALL PICK UP
Call Waiting Services:	
Call Waiting — Answer	CALL WAIT ANS
Call Waiting — Originating	CALL WAIT ORIG
Consult Coverage Callback	CONSULT COV CALLBK
Dial Intercom	ICOM (N)‡
Exclusive Hold	EXCL HOLD
Executive Override	OVER RIDE
Hold	HOLD
I-Hold	I HOLD
Last Extension Called	LAST EXT CALL
Leave Word Calling — Active	LV WD CALL ACT
Leave Word Calling — Cancel	LV WD CALL CAN

See footnotes at end of table.

TABLE P (Contd)

## BUTTON DESIGNATIONS FOR ECTS FEATURES

FEATURE NAME	BUTTON DESIGNATION
Manual Exclusion	MAN EXCL*
Manual Intercom	MAN ICOM
Manual Signaling	MAN SIG L†
PBX Line Access	(3- or 4-Digit Number)
Personal Central Office Line	(7-Digit Number)
Priority Hold	PRI HOLD
Ring Transfer	RING TRFR*
Speed Calling	SPD CLG
Station Direct Station Selection (DSS)	DSS (Plus 3- or 4-Digit Number)
Station Message Waiting (Signaled)	MSG WAIT†
Station Message Waiting (Signaling)	MSG WAIT†
Station Ringer Cutoff	RING CUT OFF

\* PBX Extension Number

† Name or Initials of Called or Signaled Party

‡ N is the 1- or 2-Digit Dial Code Number

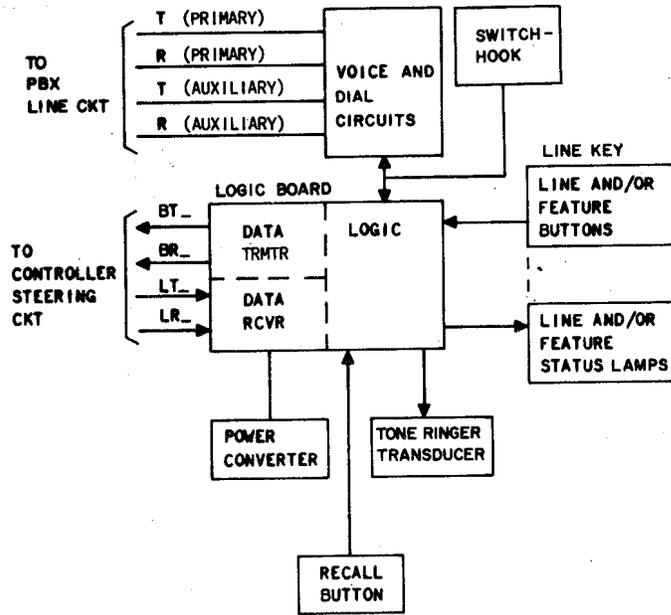


Fig. 31—Electronic Telephone Set—Functional Block Diagram

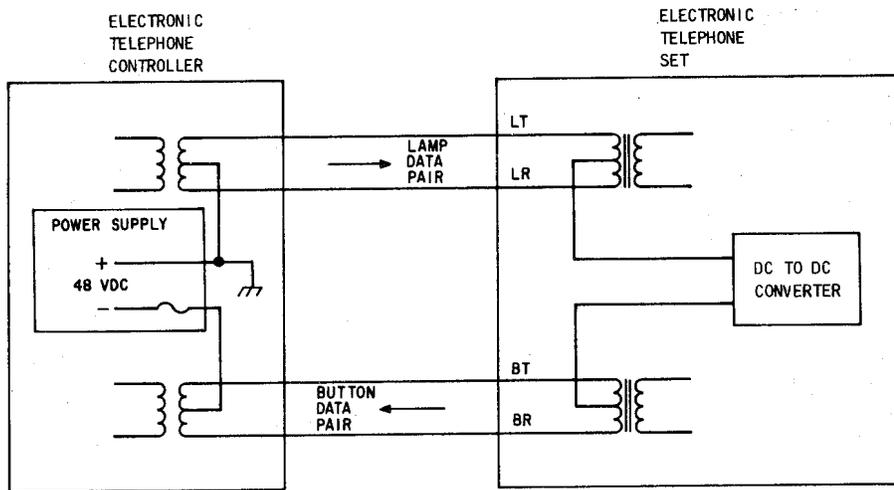


Fig. 32—DC Phantom Power for Electronic Telephone Set

ringer responds to the incoming call feature software program to produce the common or distinctive ringing pattern encoded for the telephone.

9.13 All switchhook activity on a MET set in the DIMENSION PBX custom telephone service is

confined to off-hook or on-hook signaling. Any switchhook operation during a telephone conversation is interpreted as a disconnect. A recall (R) button is provided on each MET set to generate a flash function for accessing the DIMENSION PBX attendant or other services.

9.14 For more detailed information regarding MET sets, refer to Sections 503-100-129 and 503-100-130.

#### ▶AUTOMATIC CALL DISTRIBUTION (ACD) ANSWERING POSITION

9.15 The ACD system routes designated incoming PBX calls directly to the next available answering position of a prearranged circular hunt group (referred to as a split). The incoming call workload is balanced among the members of the group. The answering positions also function normally to originate and receive calls directly.

9.16 An answering position can choose between two operating modes (AUTO IN or MANUAL IN) or one nonoperating mode (AUX WORK) for the ACD system. When not in one of these modes, the position is unstaffed. When the agent originates or receives a call on the extension line (LINE), the agent is removed from other modes until the call is completed.

9.17 Any ECTS set may be used as an answering position. A 10-button ECTS equipped with a headset (Fig. 33) is recommended due to improved service capability. The plug-in headset provides hands-free answering with automatic connect and disconnect on ACD calls. Dial access codes (DACs) are used to change modes on answering positions when buttons are not assigned. The ACD modes can be changed using an assignable ECTS button without interrupting an answering position conversation. Each feature button assigned an ACD mode has a green status light-emitting diode (LED) to provide a visual indication of the mode the answering position is in.

9.18 The ECTS set must have the key telephone option to administer the modes on buttons. The following ACD modes may be assigned to buttons:

- AUTO IN: In this mode, the agent receives ACD calls automatically (with alerting information) routed from the queue. The answering position is available to receive a new ACD

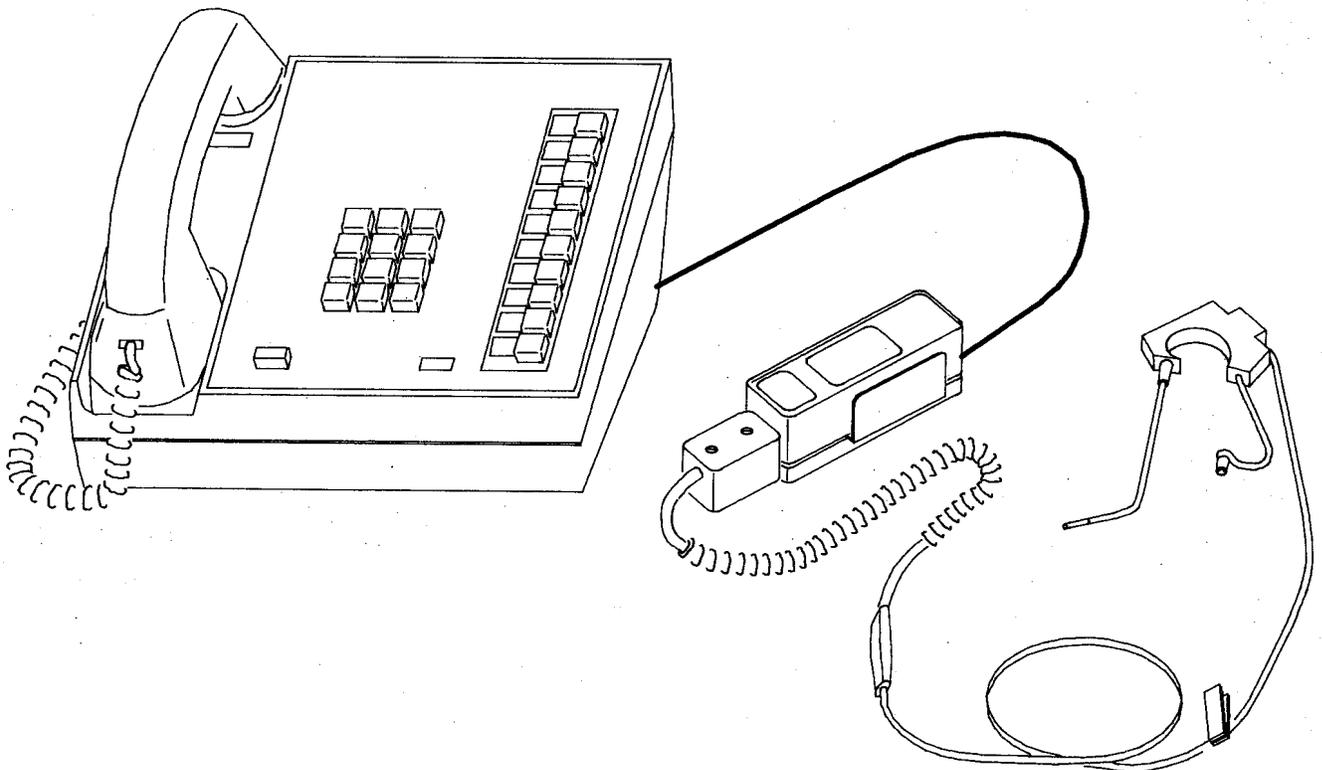


Fig. 33—ACD Agent Answering Position Equipped With a Headset

call when the previous call is disconnected. Pressing this button releases all other modes and changes the agent to the AUTO IN mode.

- **MANUAL IN:** In this mode, the agent anticipates call-related paper work or some follow-up procedure. The agent receives an ACD call automatically (with alerting information) routed from the queue. The answering position changes to an After Call-Work mode when the call is disconnected. Pressing this button releases all other modes and changes the agent to the MANUAL IN mode.
- **AUX WORK:** In this mode, the agent is involved in other than ACD duties while the answering position is still staffed. The position may receive or originate a non-ACD call while in this mode. Pressing this button releases the AUTO IN or MANUAL IN mode and changes the agent to the AUX WORK mode.
- **LINE:** This button is used by agents to answer non-ACD calls to the extension number assigned to the answering position. The agent uses the LINE button to originate a call also. The red I-USE and the green status LEDs associated with the LINE button function the same as any ECTS pick-up button. Audible ringing is also available for incoming non-ACD calls. Pressing this button changes the position to the extension number. The agent is displayed as NON ACD and returns to the present ACD mode when the call is released.

**9.19** Other buttons assigned to aid an agent operating an answering position are:

- **HOLD:** Press this button to hold an existing call (CALL HOLD).
- **RLS:** Press this button to release an existing call.
- **REPEAT:** Press this button to repeat the city-of-origin or queue-of-origin announcement when present with an incoming ACD call.
- **EMERG:** Press this button to invoke a "malicious call trace" when harrassed on an incoming call.

- **ASSIST:** Press this button to call in the split supervisor for assistance.
- **STAFF:** Press this button when the answering position is occupied, press a second time and position is unstaffed. Positions equipped with a headset become staffed when the headset is plugged-in and do not require a STAFF button.

**9.20** When an ACD is connected to a Management Information System (MIS), the overall system is a Call Management System (CMS). The MIS equipment known as performance reporting option (PRO) 500 or PRO 150 uses agent login to identify the agent with the answering position being used. Two buttons may be assigned or DACs can be used to enter the agent identifying number.

- **LOG IN:** Press this button and dial unique ID number (4 digits) twice to be the agent associated with this position.
- **LOG OFF:** Press this button before unplugging headset or becoming unstaffed.

**9.21** A split supervisor is the same as an answering position with additional functions that are used for supervisory duties. The additional functions may be provided with DACs, additional buttons on the ECTS set, or by using a 10-button set equipped with direct station select (DSS) buttons. Button assignments for a split supervisor position are as follows:

- **MONITOR:** This button is used by the supervisor to access monitoring before dialing the agent to be monitored.
- **ADD:** This button is used by the supervisor to access the split member-activate code when adding a member to a split.
- **DELETE:** This button is used by the supervisor to access the split member-deactivate code when removing a member from a split.
- **ANN:** This button is used by the supervisor to access and verify the recorded announcement.
- **CALL FWD ALL:** This button is used by the supervisor to access the Call Forwarding-All

Calls feature when forwarding all calls from a split and its queue to another split, a PBX station, or an attendant console.

- **CALL FWD BY/DA:** This button is used by the supervisor to access the Call Forwarding-Busy and Don't Answer feature when forwarding all calls from a split and its queue to another split, a PBX station, or an attendant console.
- **CANCEL CALL FWD:** This button is used by the supervisor to remove the split from Call Forwarding.
- **CALL WAIT ANSWER:** This button is used by the supervisor to answer a waiting call while busy on another call.
- **ASSIST:** This button is used by the supervisor to call the system supervisor.
- **OVERLOAD BALANCE:** This button is used to invoke and cancel split overflow calls to terminate on another PBX/ACD. The destination could be a PBX station, an attendant console, or an ACD split on another mode.

**9.22** An answering position status indicator (Fig. 7) is available to provide visual monitoring of up to 20 positions on each unit. Each position has five status indications as follows:

- **STAFFED:** Position is staffed and available to receive an ACD call (must be in AUTO IN or MANUAL IN mode).
- **ACD CALL:** Position is active on an ACD call (must be in AUTO IN or MANUAL IN mode).
- **AFTER WORK:** Agent completing tasks associated with ACD call just completed (must be answering calls in MANUAL IN mode).
- **AUX WORK:** Position is staffed and agent is performing non-ACD tasks (must be in AUX WORK mode).
- **NON ACD:** Position is staffed and active on a non-ACD call (must be on a Non-ACD call using LINE button).

## ENHANCED UNIFORM CALL DISTRIBUTION ANSWERING POSITION

**9.23** Answering positions used are the same as an ACD except for connection to an MIS. The LOG IN or LOG OFF is not applicable to Enhanced Uniform Call Distribution; otherwise, the work modes and associated buttons are the same as previously described for ACD.♦

## 10. REFERENCES

### BELL SYSTEM PRACTICES

**10.01** The following sections are associated with the DIMENSION 100 PBX, the DIMENSION 400 PBX, the DIMENSION 600 (formerly 400E) PBX, the DIMENSION 2000 and Custom PBX, and the DIMENSION PBX Electronic Custom Telephone Service and may be used for additional information.

SECTION	TITLE
460-110-180	Packaged Switching Systems Selection of Equipment Location
461-100-101	Terminating and Cross-Connecting on Customer Premises—General Plan
463-130-100	Backboards—Identification and Installation
503-100-129	2991A/B-, 2992A-, and 2993A-Type Multibutton Electronic Telephone (MET) Sets
503-100-130	2991C/D-, 2992C-, 2993C-, and 2994C-Type Multibutton Electronic Telephone (MET) Sets — General Description
554-000-000	Numerical Index—Division 554-DIMENSION PBX (Refer to this index for TOP Documents.)
554-000-010	Labor Time Reporting for DIMENSION PBX (100, 400, 2000, and Custom) to Track Costs
554-000-100	DIMENSION PBX—Documents not listed in 554 Division Index (Refer to this index for Adminis-

SECTION 554-010-110

SECTION	TITLE	SECTION	TITLE
	tration and Maintenance Manuals.)	554-105-100	DIMENSION 600 (formerly 400E) PBX—System Description
554-010-112	DIMENSION PBX Electronic Custom Telephone Service—Theory of Operation	554-111-100	DIMENSION 2000 and Custom PBX—System Description
554-101-100	DIMENSION 400 PBX—System Description	554-191-XXX	DIMENSION PBX Feature Documents
554-101-102	DIMENSION 100 PBX—System Description	876-300-100	Electrical Protection Station and PBX