"DIMENSION*" 400 PBX

PREINSTALLATION AND PLANNING INFORMATION

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1. GENERAL

1.01 This section provides information, instructions, and examples of completed worksheets for use in planning installation of a new DIMENSION 400 PBX (Fig. 1) or in planning growth and rearrangement to an existing system.

1.02 The reasons for reissuing this section are listed below:

(a) To remove information pertaining to:

- LC280 tie trunk circuits
- LC285 CO trunk circuits
- Uninterruptible power service for peripheral units
- Worksheets duplicated in the customer ordering document (COD).

(b) To show change of specification number for ac power distribution panel, frequency generator, and associated equipment.

(c) To show rate change to manufacture discontinued for customer premises facility terminal (CPFT) equipment.

(d) To add information pertaining to:

- Packaged metallic facility terminal assemblies (PMFTA)
- Energy communications service adjunct system
- Ordering models for Feature Package 15 system.

Since this reissue is a general revision, no revision arrows have been used to denote significant changes.

The DIMENSION PBX is compatible with all central offices except panel.

1.03 It is recommended that fill-in worksheets and diagrams provided in this section be reproduced locally as required and the originals kept with the section for future use. Copies of the required worksheets and diagrams should be completed before the actual work begins on customer premises. Copies should be provided at the customer location, along with any other installation information, for use during the installation of the system. After the installation is completed, copies of these documents should be stored on customer premises for future reference.

A worksheet should be completed for each feature requiring special hardware.

1.04 The following items should be available at the customer location before the actual installation begins:

- Approved PBX installation location
- System cabinets and attendant console
- Auxiliary equipment
- Connector cables
- Termination field materials
- Power receptacle(s)
- Approved grounding facilities
- Working trunks
- Preinstallation worksheets completed for local minor additions or rearrangement
- Tools
- Test equipment
- Factory computer-generated lists (shipped with system).

1.05 This section is based on the drawings listed in Part 9. If this section is to be used with equipment or apparatus reflecting later issue(s) of the

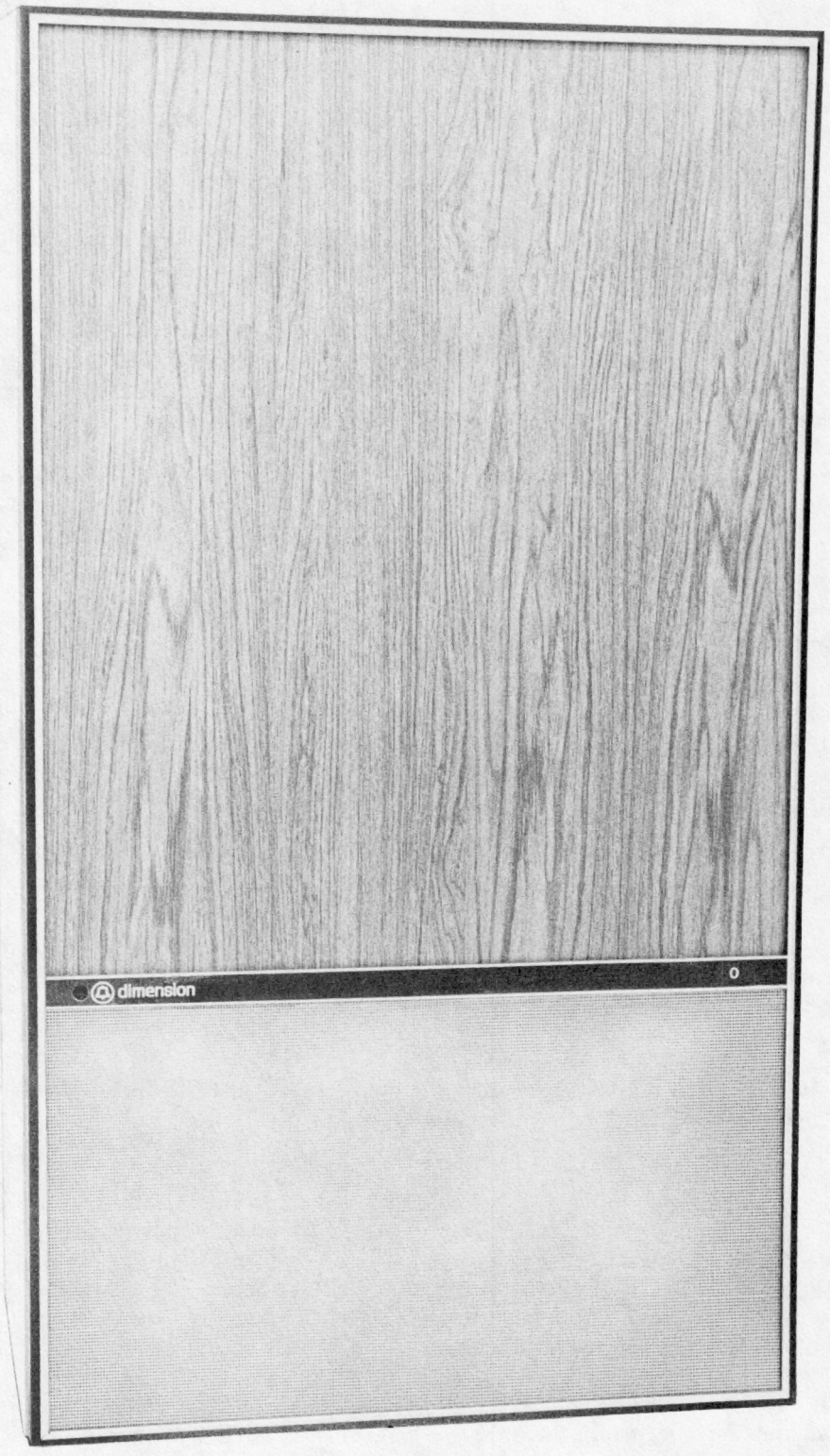

Fig. 1—DIMENSION 400 PBX Equipment Cabinet

drawing(s), reference should be made to the schematic diagrams (SDs) and circuit descriptions (CDs) to determine the extent of the changes and the manner in which the section may be affected.

2. HOW TO USE THE SECTION

2.01 When planning a new installation, review the material in Parts 4 through 7 to ensure that all requirements for power, protection, auxiliary circuits, miscellaneous components, floor plan, etc, have been given adequate consideration.

2.02 Changes to a system may be required at any time after the system is installed and accepted as shipped from the factory.

2.03 When planning changes, obtain complete, current, and accurate system records. Then, prepare new fill-in worksheets showing changes to each feature.

2.04 Refer to Parts 4 through 7 and consider necessary areas such as cabling, auxiliary equipment, additional power and/or grounding, etc, that are required to provide changes.

2.05 The fill-in interconnection worksheets contained in Part 10 must be reproduced and completed as required.

2.06 The process involved in engineering a feature is provided in the explanations and examples contained in Part 3. The examples are designed to provide a guide to engineering any feature. Refer to the appropriate DIMENSION 400 PBX Task Oriented Practice (TOP) for administration of features using the MAAP Procedures (PROCs).

3. GENERAL PROCEDURES FOR ENGINEERING FEATURES

3.01 Some features require minimal planning effort, while others require significant detailed planning and an awareness of associated hardware considerations. Explanations of the features presented in this part emphasize both the hardware and software considerations necessary when administering features. A discussion of trunk groups and software records is also included. The examples are defined and administered to bring as many functions as possible into play and are not intended to be representative of actual feature implementation.

FLEXIBLE NUMBERING OF STATIONS—MIXED NUMBERING (Example)

3.02 This feature requires in-depth planning and consideration for software administration; however, no additional hardware is required.

3.03 PROCs 29 and 30 are used when administering this feature. A detailed numbering plan is required before the fill-in worksheets for PROCs 29 and 30 can be completed.

3.04 Flexible numbering of stations—mixed numbering and single-digit dialing features allow station numbers to be assigned to lines in accordance with a customer-desired numbering plan, such as room numbers or organizational structure. Stations may be reassigned while in service to permit personnel moves without requiring number changes.

3.05 Station number assignments can begin with any digit except *, #, or 0, and can vary in length from one to four digits within the same installation. Conflicts that result from the use of the same first digit for different length station numbers can be resolved in one of three ways:

- Time-out
- Dialing a prefix digit
- Use of end-of-dialing digit (#) with TOUCH-TONE* dialing service.

To avoid time-out, a different prefix code can be used for different length station number series. The same first digit ***cannot*** be used for both station numbers and trunk or feature access codes. The same first digit ***can*** be used for trunk access and feature access codes.

3.06 The PBX provides two versions of the flexible numbering feature—the standard fixed length numbering version and the mixed numbering version. The standard fixed length version only allows for fixed length numbering with no time-out capability. All station numbers must be either two, three, or four digits in the same installation; and all trunk or feature access codes starting with the same first digit must have the same number of digits. The

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mixed numbering version provided in Feature Package (FP) No. 3 allows for varying length station numbers of up to four digits in the same installation. Time-out and an end-of-dialing digit (#) can be used for station numbering conflicts, or a prefix digit may be used for multidigit station numbers (ie, room-to-room dialing). The mixed numbering capability is limited because the same first digit cannot be used for both station numbers and trunk or feature access codes. This limitation prevents using the digits ***8*** and ***9*** for both toll and local call access, respectively, and for station numbering on the 8th and 9th floors. The limitation also prevents using unused station numbers as feature or special service trunk access codes. The only way to provide station numbering that correlates with room numbering in hotels with more than seven floors is to use a prefix (or access digit) such as 7 for room-to-room calling.

3.07 To further describe the considerations required to implement this feature, the following examples are given.

3.08 ***Example No. 1—All Telephone Sets are Rotary Dial:*** The following assumptions are made for this example.

(a) ***Hotel/Motel—10 floors:***

(1) Guest rooms on floors 2 through 10

(2) 20 rooms per floor.

(b) ***Room Numbers:***

(1) 201-212, 214-221

(2) 301-312, 314-321, etc

(3) 1001-1012, 1014-1021.

(c) ***Administrative Station Numbers:***

(1) 251-284 (plus 285-289 for abbreviated dial codes).

(d) ***Single-Digit Dial Codes:***

(1) 0—Hotel operator (attendant)

(2) 9—Local calls

(3) 8—Toll operator

(4) 6—Room service (Ext 289)

(5) 5—Bell captain (Ext 288).

(e) ***2-Digit Dial Codes:***

(1) 41—Garage (Ext 286)

(2) 42—Valet (Ext 287)

(3) 43—Restaurant (Ext 285).

(f) ***Customer-selected prefix digit "7" for dialing rooms.***

3.09 PROC 30 worksheet (Fig. 2) indicates the extension dial code groups assigned per this example. Single/double digit codes must be included if used to access stations.

3.10 PROC 29, WD 1, worksheet (Fig. 3) indicates that dial code 0 is selected for the attendant. Dial codes 8 and 9 are selected for trunk dial access codes and cannot be assigned as station first digit codes. Digits 8 and 9 are assigned in PROC 30 in line extension groups of ten (if the digits are not assigned, the digits are reserved).

PROC 29, WD 3, is used to administer the first dialed digit of a line extension for a DIMENSION PBX with a hotel/motel feature package.

3.11 PROC 29, WD 2 (no action is required for this example).

3.12 PROC 29, WD 3, worksheet (Fig. 3) indicates that administrative station numbers (251-284) may be dialed as 3-digit numbers and that rooms may be dialed using 7 as a prefix followed by the room number. By using time-outs after the appropriate digit(s), the same initial digit can be used for various stations; eg, 7201 is a room number on the second floor, and 71001 is on the 10th floor.

The prefix digit is counted in the maximum number of digits (FLD 3) and also for time-out purposes.

3.13 The prefix digit is not part of the line extension number in PROC 00 nor in PROC 30 for each line translation. The prefix digit is not entered in PROC 29, WD 4 (Fig. 3), nor is the digit part of the dial code.

EXTENSION DIAL CODE GROUPS

FIRST LINE EXTENSION NUMBER	LAST LINE EXTENSION NUMBER		PROC 30
0	9		
4 0	4 9		
2 0 0	2 2 9		
2 5 0	2 8 9		
3 0 0	3 2 9		
4 0 0	4 2 9		
5 0 0	5 2 9		
6 0 0	6 2 9		
7 0 0	7 2 9		
8 0 0	8 2 9		
9 0 0	9 2 9		
1 0 0 0	1 0 2 9		

NOTE: FIRST EXTENSION ENDS WITH 0. LAST EXTENSION ENDS WITH 9.

Fig. 2—PROC 30—Worksheet

3.14 PROC 29, WD 4, worksheet indicates that administrative stations (285-289) can be accessed by dialing a 1- or 2-digit access code or by dialing the 3-digit number. The single-digit codes, 5 and 6, are usually used as service codes (eg, room service, restaurant, etc); and the digit 4 is the first digit of a 2-digit code which could also be a service code. Three common numbering plans are summarized in Table A.

3.15 ***Example No. 2—All Telephone Sets Have TOUCH-TONE Dialing:*** Assumptions made in paragraph 3.08 apply in this example, except the prefix digit is *. In addition, the digit # is the end-of-dialing digit. (The end-of-dialing digit is optionally provided to avoid having to wait for time-out, if the customer desires this alternative.) To call a room telephone, the instructions would be: dial * plus room number (plus #, if the end-of-dialing digit is to be used; otherwise, time-out will be in effect for rooms on floors 2 through 9).

3.16 Figure 4 shows how PROC 29, WD 3, worksheet should be completed. The end-of-dialing digit is not part of the maximum number of digits. Note that both time-out and end-of-dialing digits are shown in Fig. 4. It is not technically necessary to provide both; however, if only end-of-dialing digit (#) had been provided, the dialing instructions would ***have*** to be: To call another room, dial * plus room number plus #.

3.17 PROC 29, WD 4 (Fig. 3), and PROC 30 (Fig. 2) remain the same for this example.

RECORDED TELEPHONE DICTATION ACCESS (Example)

3.18 This feature allows access to and control of customer-owned dictation equipment by PBX users. Hardware must be considered in addition to software when administering this feature. To determine hardware requirements, find the feature alphabetically listed in Part 5.

3.19 The system provides optional arrangements for recorded telephone dictation access depending on customer requirements (ie, TOUCH-TONE dialing, dial pulse, voice activated, etc). If a recorded telephone dictation trunk is accessed by TOUCH-TONE dialing, external TOUCH-TONE dialing conversion is normally not required since the system is capable of software conversion from TOUCH-TONE dialing to rotary dial

DIALING PLAN - FIRST DIGIT

WORD 1	FIRST DIALED DIGIT (1)	NO OF DIGITS (2)	CALL TYPE (3)	PROC 29
	0	1	3	
	9	1	2	
	8	1	2	

NOTES:
1. FOR FIELD 1:
   11=*
   12=#
2. FOR FIELD 3:
   1=LINE EXTENSION NUMBER
   2=TRUNK OR FEATURE
   3=SEE NOTE 3
3. IN EARLY PROC ISSUES, THE ATND DIAL ACCESS CODE IS CALL TYPE 3 IN THIS WD. IN LATER ISSUES IT IS FEATURE NUMBER 8 IN WD 2. TO FIND OUT WHICH IT IS, GO TO WD, ENTER FEAT CODE 8 AND PRESS 'DISP', 'EXEC'. IF ERROR LAMP LIGHTS, IT IS CALL TYPE 3.

FIRST DIALED DIGITS - STN TO STN

WORD 3	FIRST DIALED DIGIT (1)	PREFIX (2)	MAX NUMBER DIGITS (3)	TIME OUT AFTER DIGIT 1 (4)	2 (5)	3 (6)	4 (7)	END OF DIAL CODE (8)	NOTE: FIELD 1 AND 8: * = 11, # = 12	PROC 29
	2	0	3							
	7	1	5				1			
	4	0	2							
	5	0	1							
	6	0	1							

NOTE: PREFIX DIGIT IS COUNTED IN MAXIMUM NUMBER OF DIGITS FIELD

ONE/TWO DIGIT STATION TO STATION CODES

WORD 4	LINE EXTENSION NUMBER (1)	ONE/TWO DIGIT CODE (2)	NOTE: THE LINE EXTENSION NUMBER SHOWN IN FIELD 1 MUST BE USED IN PROC 00	PROC 29
	2 8 6	4 1		
	2 8 7	4 2		
	2 8 5	4 3		
	2 8 9	6		
	2 8 8	5		

Fig. 3—PROC 29, WDs 1, 3, and 4—Rotary Assignments—Worksheets

TABLE A

THREE PLANS FOR FLEXIBLE NUMBERING OF STATIONS—MIXED NUMBERING

PBX SERVICE	PLAN NO. 1 (See NOTE)	PLAN NO. 2 (See NOTE)	PLAN NO. 3 (See NOTE)
Single-Digit Service Codes	1 + t 2 + t . . . 7 + t	2 + t 3 4 5 6	2 + t 3 4 5
2-Digit Service Codes	1X + t 2X + t . . . 7X + t		
Room Station Numbers Floors 1 through 7	1XX 2XX . . . 7XX		
Feature Activation Codes and MISC Trunk Access Codes		1X or 1XX	
Administration Stations		2XX	2XX
Room Station Numbers Floors 1 through 9		1XX + t 2XX + t 7+ . . . 9XX + t	1XX 2XX 7+ . . . 9XX
Room Station Numbers Floors 10 through 99		10XX 11XX 7+ . . . 99XX	10XX 11XX 6+ . . . 99XX
Toll Calls	8	8	8
Local Calls	9	9	9
Hotel Operator	0	0	0

Note: + = Followed by
X = Any digit 0 through 9
t = Time out; 3 to 5

FIRST DIALED DIGITS - STN TO STN

WORD 3	FIRST DIALED DIGIT 1	PREFIX 2	MAX NUMBER DIGITS 3	TIME OUT AFTER DIGIT 1 4	2 5	3 6	4 7	END OF DIAL CODE 8	NOTE: FIELD 1 AND 8: * = 11, # = 12	PROC 29
	2	0	3							
	4	0	2							
	5	0	1							
	6	0	1							
	1 1	1	5				1	1	2	

Fig. 4—PROC 29, WD 3—TOUCH-TONE Dialing Assignments—Worksheet

pulsing. The holding time of the TOUCH-TONE dialing registers is increased as follows:

(a) A TOUCH-TONE dialing register (LC10B and LC54B) or a TOUCH-TONE dialing register and receiver (LC10C) is dedicated to each dictation connection for the duration of the connection to allow TOUCH-TONE dialing signals to be converted to dial pulses internally. Therefore, where the dictation units are frequently busy, it may be necessary to increase the number of the LC10B and LC54B or LC10C circuit packs to prevent call blockage and dial tone delays.

(b) External TOUCH-TONE dialing conversion can be provided in the standard manner. It may be less costly to provide external equipment if an additional cabinet must be installed to provide carrier spaces for the LC10B and LC54B or LC10C circuit packs.

3.20 The example selected to explain recorded telephone dictation access makes the following worst-case assumptions:

(a) The system provides TOUCH-TONE dialing service.

(b) Traffic requirements dictate additional registers would be required and external TOUCH-TONE dialing conversion should be provided.

(c) Recorded telephone dictation and TOUCH-TONE dialing conversion equipment is mounted in an auxiliary cabinet. (See Part 5.)

3.21 The equipment required for this feature is specified in Parts 5 and 6 where connections, figures, and fill-in tables are described. The equipment is as follows:

(a) J58827E-1, Lists 1, 7, and C; recorded telephone dictation trunk unit, wired per wiring options as described in Part 5. Other options required for this trunk unit are dependent on specific customer requirements which should be provided at the time of installation.

(b) J58827E-1, Lists 2, 8, A, and WB; recorded telephone dictation TOUCH-TONE dialing interface unit.

(c) J99289A-1, Lists 1, A, and D; TOUCH-TONE calling receiver mounting shelf. This mounting shelf is arranged to accommodate two TOUCH-TONE calling receiver assemblies per J99289B-1.

(d) J99289B-1, Lists 1, SA, and D (type A3), or J59204, Lists 1, A, and B (type G1) TOUCH-TONE calling receiver.

(e) LC13B auxiliary trunk circuit pack (provides two circuits).

(f) J58879F-2, auxiliary cabinet equipped with power supply and frequency generator. (If recorded telephone dictation is added to an existing auxiliary cabinet, the cabinet should be checked to ensure that a power supply and frequency generator are provided.)

(g) Miscellaneous connecting blocks and cables.

(h) 31D voice coupler.

3.22 An illustration of interconnecting wiring for recorded telephone dictation is shown in Part 5. Information is provided to show detailed connections. The data required by craft personnel can be entered in the appropriate cross-connect table.

3.23 For administrative consideration, refer to the appropriate TOP document for the necessary administrative procedures and the sequence in which they are to be administered. For the purpose of discussion, a list of administrative requirements for recorded telephone dictation trunk is assumed as follows:

- Access code 81.
- Assigned to trunk group 25.
- Equipment location (LC13B), trunk carrier 00, slot 06, and circuit 0.
- Assigned to trunk group restriction group 5 (class of service 9).
- Assigned to restricted trunk group 2. Other trunks in trunk groups 18, 19, and 20 are restricted from accessing this trunk.
- Assigned to tandem tie trunk restriction trunk group 1, and tie trunks cannot access this trunk.

3.24 PROC 29, WD 1, worksheet (Fig. 5) indicates that the first digit dialed for recorded telephone dictation access is 8, two digits are in the number, and the type of call is a trunk or feature call. If existing trunks or features are already assigned a dial access code of 8X, it would not be necessary to use this procedure. If a dial access code of 8X is used, stations may not be assigned with a first digit 8.

3.25 PROC 12 worksheet (Fig. 6) indicates that trunk group 25 is assigned dial access code 81.

3.26 PROC 10 worksheet (Fig. 7) indicates that the equipment in trunk carrier 00, slot number 06, and circuit number 0 is assigned to trunk group 25.

3.27 PROC 13 worksheet (Fig. 8) indicates that trunk group 25 is assigned trunk type 51, recorded telephone dictation feature type. All trunk types must be the same in each trunk group. TOUCH-TONE dialing can be converted internally. The example uses external TOUCH-TONE dialing conversion which requires external hardware, and the trunk is marked for TOUCH-TONE dialing out compatibility by entering *1* in FLD 5. For recorded

DIALING PLAN - FIRST DIGIT

WORD 1	FIRST DIALED DIGIT 1	MODIGOITS 2	CALL TYPE 3	1. FOR FIELD 1: 11=* 12=# 2. FOR FIELD 3: 1=LINE EXTENSION NUMBER 2=TRUNK OR FEATURE 3=SEE NOTES	NOTES: 3. IN EARLY PROG ISSUES THE ATND DIAL ACCESS CODE IS CALL TYPE 3 IN THIS WD. IN LATER ISSUES IT IS FEATURE NUMBER & 1W WD 2, TO FIND OUT WHICH IT IS, GO TO WD. ENTER FEAT CODE & AND PRESS 'DISP', 'EXEC'. IF ERROR LIGHTS, IT IS CALL TYPE 3	PROC 29
	8	2	2			

Fig. 5—PROC 29, WD 1—First Dialed Digit—Worksheet

ISSUE L4 ○ TRUNK GROUP - DIAL ACCESS CODE, ROUTE ADVANCE AND SMDR ○

TRUNK GROUP	DIAL ACCESS CODE/ I.D. NUMBER	ADVANCES TO				SMDR	ARS		PROC 12
		TRUNK GROUP 1	TRUNK GROUP 2	TRUNK GROUP 3	TRUNK GROUP 4				
1	2	3	4	5	6	7			
2 5	8 1								

Fig. 6—PROC 12—Worksheet

○ TRUNKS - NIGHT SERVICE - AIOD ○

EQUIPMENT LOCATION			TRUNK GROUP	NIGHT STATION	A.I.O.D. EQUIPMENT NUMBER		PROC 10
TRUNK CARRIER	SLOT	CKT					
1	2	3	4	5	6	7	
0 0	0 6	0	2 5				

Fig. 7—PROC 10—Worksheet

telephone dictation access, only FLDs 1, 2, and 5 may require entries. Normally, the DIMENSION capability to convert TOUCH-TONE dialing to rotary pulses would be employed and FLD 5 would contain a 0 to indicate rotary outpulsing.

3.28 PROC 14 worksheet (Fig. 9) is used to assign recorded telephone dictation trunk group 25 to a miscellaneous trunk group restriction group number to allow class-of-service assignments to optionally restrict station access. If the dictation trunk is not restricted from any stations, this procedure need not be entered. The recorded telephone dictation trunk is shown assigned to miscellaneous trunk restriction group 5 by entering *1* in FLD 6.

3.29 PROC 02, WD 2, worksheet (Fig. 10) is used to modify an existing class-of-service to allow or restrict stations from recorded telephone dictation. Class-of-service 9 will be used to restrict stations from recorded telephone dictation miscellaneous trunk restriction group 5 in FLD 6. Class-of-service (COS) 9 may allow or restrict other miscellaneous trunk groups or features as required in PROC 02, WDs 1, 3, and 4. These procedures will not be provided as a part of this example, but a new class of service may require entries in these procedures. If class-of-service 9 had not previously been assigned, PROC 02 (WDs 1 through 4) would require fill-in worksheets. Since sequence is not important in connection with class-of-service field assignments, separate worksheets per feature are not needed. If access to dial dictation is allowed to all stations, this procedure is not required.

3.30 When assigning a class of service, PROC 00 is required. A completed worksheet entry for

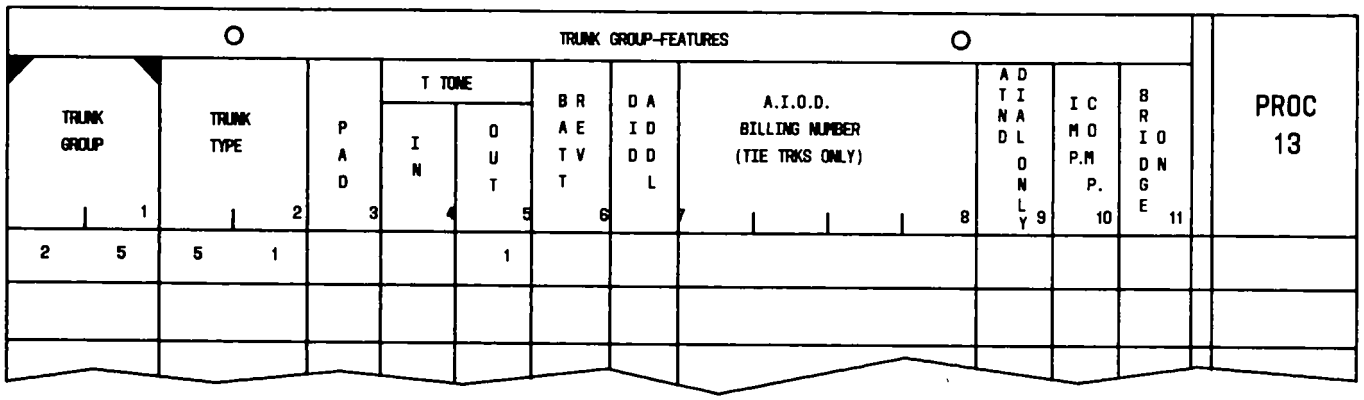


Fig. 8—PROC 13—Worksheet

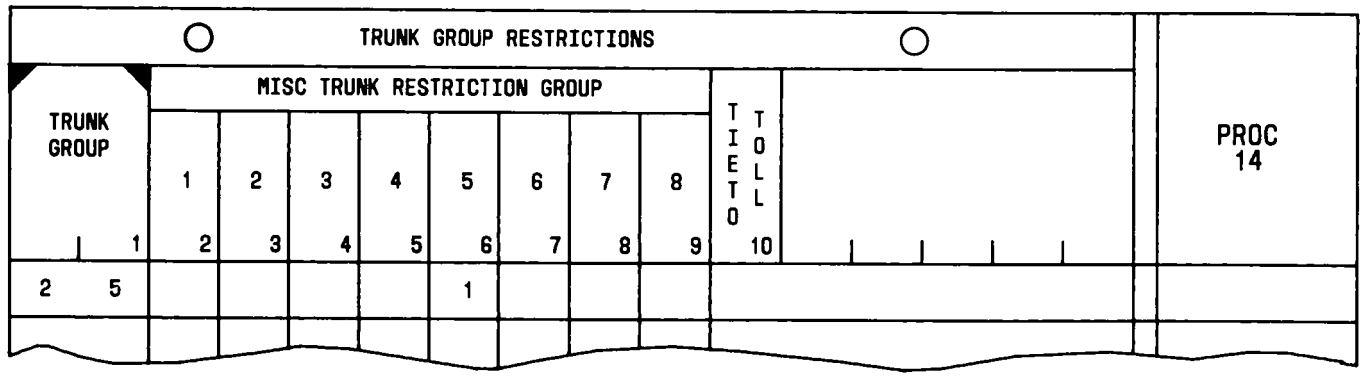


Fig. 9—PROC 14—Worksheet

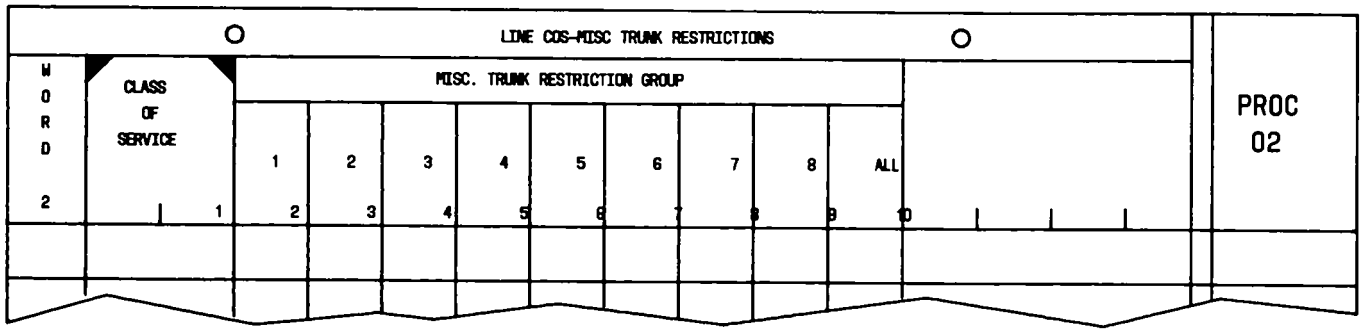


Fig. 10—PROC 02, WD 2—Worksheet

PROC 00 for each changed station is required. If miscellaneous trunk restrictions are added to assigned class of service and no station changes are involved, PROC 00 is not affected.

3.31 PROC 17 worksheets (Fig. 11) indicate that recorded telephone dictation is assigned restricted trunk group number 2 in WD 2 (access code 81) and that trunk groups 18, 19, and 20 are denied access to restricted trunk group 2. This example indicates that restricted trunk groups (1 through 13) are formed in WD 2 by assigning the dial access code(s) to the restricted trunk group number (1 through 13). Trunk groups are denied access to restricted trunk groups (1 through 13) in WD 1.

The CO-type trunks and dial repeating tie trunks are automatically denied access to an auxiliary trunk circuit and associated equipment by call processing routines. These administrative procedures are included here only to demonstrate the use of PROC 17.

3.32 PROC 17, WDs 3 and 4, worksheets (Fig. 12) indicate that the dial access code 81 is assigned to restricted trunk group number 1 in WD 4 and that tandem tie trunk group 24 is restricted from the restricted trunk group number 1 in WD 3 for recorded telephone dictation access. All PROCs and WDs have been administered for the recorded telephone dictation feature.

TRUNK GROUP NUMBERING AND TRUNK GROUP SOFTWARE RECORDS

3.33 Many of the administrative procedures involve trunk (software) records. There are two classifications of software records used with trunk groups. One is associated with physical hardware,

TRUNK TO TRUNK RESTRICTIONS

WORD 1	TRUNK GROUP	RESTRICTED TRUNK GROUP NUMBER													PROC 17
		1	2	3	4	5	6	7	8	9	10	11	12	13	
	18	1	1												
	19	1	1	1											
	20		1												

TRUNK TO TRUNK RESTRICTIONS

WORD 2	RESTRICTED TRUNK GROUP NUMBER	DIAL ACCESS CODE	PROC 17
	2	81	

Fig. 11—PROC 17, WDs 1 and 2—Worksheets

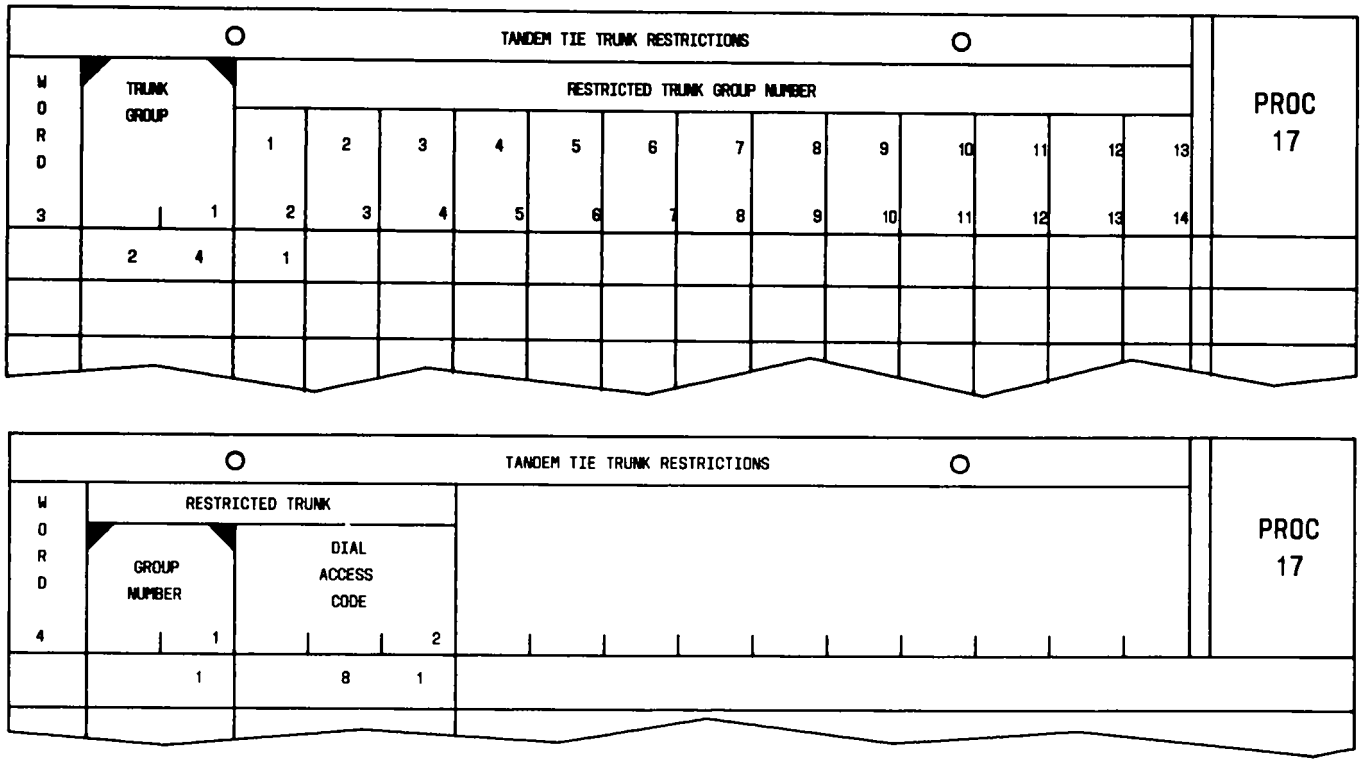


Fig. 12—PROC 17, WDs 3 and 4—Worksheets

and the other is a software record only. A software trunk group can consist of one or more records. Certain software records (trunk groups) are reserved or dedicated for specific applications, while other records are available for various optional assignment. The trunk groups are numbered sequentially 0 through 63 and are identified by encodes as listed in Table B.

Traffic studies are limited to trunk groups assigned numbers 1 through 34.

3.34 The software records are status memory words used to:

(a) Record the state of the associated physical trunk

(b) Record system status.

3.35 Trunk group 17 (originating registers) is an example of dedicated trunk group software records. These software records are reserved to record dialing status and are associated with hardware, TOUCH-TONE dialing registers. The size of this group varies with the number of TOUCH-TONE dialing registers assigned in PROCs 10 and 13.

3.36 Trunk group 8 (outgoing trunk queue records) is an example of a trunk group software record that can be optionally assigned as a group of records to be used to record a list of extensions which are waiting for access to some other physical trunk group. This queuing trunk group must be defined in PROC 11, and the number of records in this group must be specified. Trunk groups 8 through 11 and 18 through 63 are optionally assigned at the factory or on site via the MAAP procedures. Parameters of the trunk group records are established by memory size.

3.37 Table C shows the maximum number of lines, trunks, and other system parameters possible with various memory sizes and generic programs. All maximums cannot be attained simultaneously.

TABLE B

TRUNK GROUP NUMBER (ENCODE) AND TRUNK GROUP NAME

TRUNK GROUP NO. (ENCODE)	NAME OF TRUNK GROUP
0	Unequipped Trunk
1	Incoming Call Queue
2	Priority Queue
3	Interposition Queue
4	Attendant Queue
5	Attendant Originating Register
6	Switched Loops
7	Idle General Purpose
8-11	Outgoing Trunk Queues
12	ANI Pool Queues
13	ANI CO Queue
14	ANI CCSA Queue
15	Intercom Trunks
16	Dial Pulse Originating Register
17	TOUCH-TONE Dialing Originating Register
18-31	Administered as Required for A-Size Memory
18-63	Administered as Required for B- or C-Size Memory

4. INSTALLATION CONSIDERATIONS

PHYSICAL ARRANGEMENTS

4.01 The PBX equipment is housed in cabinets measuring approximately 1765 mm (69.5 inches) high by 800 mm (31.5 inches) wide by 610 mm (24 inches) deep. The cabinets fit through standard door openings (2134 mm by 914 mm [7 feet by 3 feet]) crated and mounted on a 178 mm (7-inch) high dolly. 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 location of the carrier varies in accordance with customer requirements. 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. Front panels are available to blend with office decor and can be ordered in avocado, blue, gold, orange, red, teak, or walnut. A blank front panel is available to the customer for office decoration. The side panels are a neutral (beige) color.

4.02 Cabinets are shipped from the factory complete with units, wiring, cabling, and circuit packs in place. There are three different PBX cabinets designated as follows:

- Basic cabinet (00) (J58879C)—houses basic equipment
- Supplemental cabinet (01) (J58879D, List 1)—houses supplementary equipment in up to four or five carriers.
- Auxiliary cabinet (00) (J58879F)—houses auxiliary equipment.

TABLE C

SYSTEM PARAMETERS FOR SMALL, MEDIUM, OR LARGE MEMORY CONFIGURATION

MAXIMUM QUANTITY OF		MEMORY SIZE		
		A SMALL	B MED	C LARGE
LINE CARRIERS		2	4	7
REAL STATION LINES		116	244	436
TRUNK CARRIERS		2	4	4
TRUNK GROUPS		31	63	63
OUTGOING TRUNK QUEUE GROUPS		4	12	12
TOT OF INTERCOM, QUEUE & PHYSICAL TRUNKS		61	108	158
100S GROUPS (SELECT KEYS)		6	18	18
DIAL ACCESS CODES		48	72	96
ATTENDANTS		1	3	4
SWITCHED LOOPS		6	18	24
DIAL NUMBER TRANSLATION BLOCKS		15	56	100
DIAL PULSE & "TOUCH-TONE" DIALING ORIG REG		7	11	14
DIRECTORY BLOCKS		15	56	100
DIRECTORY BLOCKS (PG-1E010)		45	56	100
DDC/UCD GROUPS		14	14	14
TRUNKS FOR NIGHT SERVICE		45	78	128
SMDR RECORDS		32	50	64
PROGRAM STORAGE REQUIREMENTS (QTY OF WORDS)	PG-1E001 ISS 1	20K	24K	32K
	PG-1E001 ISS 2	36K	36K	40K
	PG-1E002 ISS 2	—	36K	40K
	PG-1E002 ISS 3	—	40K	44K
	PG-1E003 ISS 1	28K	32K	36K
	PG-1E003 ISS 2	36K	40K	44K
	PG-1E004 ISS 2	52K	60K	64K
	PG-1E005 ISS 1	44K	52K	56K
	PG-1E005 ISS 2	52K	60K	64K
	PG-1E010 ISS 1	—	64K	64K
	PG-1E015 ISS 1	—	—	128K

4.03 Refer to Section 554-101-100 for detailed information concerning physical arrangements.

4.04 The basic equipment cabinet elements, each corresponding to a particular system function, are listed and described as follows:

- ***Fuse Panel***—Located on each carrier and provides circuit protection for the line, trunk, and control carrier circuit packs.

- ***Thermal Assembly (ED-1E364-70)***—Provides temperature control via turning on or off the fans and provides overtemperature indication at the alarm panel and a minor alarm indication at the attendant console.

- ***DC Power Supply J87419A, List 2 (MD); J87432A-1 nonreserve power used with 30-amp service (MD); J87432A-2 used with 20-amp service; J87432AA reserve power***—Provide dc power to the carriers in the basic cabinet via the fuse panels and attendant console (−48V, −48V filtered, ±5.1V, 5.1V(H), +5.0V, ±9V, and +12V).

Note: Retrofit kit (J58879A-1, List 15, and J58879C-1, List 14) replaces rectifier J87419A.

- ***DC Power Supply J87419B (MD); J87432B-2 nonreserve power used with 30-amp service (MD); J87432B-3 used with 20-amp service; and J87432BB reserve power***—Provide dc power for cabinet 01.

Note: Retrofit kit (J58879D-1, List 11 and J58879B-1, List 13) replaces rectifier J87419B.

- ***DC Power Supply J87460F***—Provides dc power with nominal holdover using KS-21906 batteries and J87455A charging unit for the basic cabinet when uninterruptible power service (UPS) is provided.

- ***DC Power Supply J87460B***—Provides dc power with nominal holdover using KS-21906 batteries and J87455A charging unit for the supplemental cabinet when UPS is provided.

- ***AC Power Distribution, Fan Assembly With Ground Block, and Frequency Generator Unit J58879JA-1***—Provide 20-amp ac power to the rectifier, fan assembly, and frequency generator(s).

- ***Frequency Generator Unit 120A (MD), J58879PC-2; 120B(MD), J58882PA-2; 120C, J58879JA-1***—Provides ringing currents to line port circuits.

- ***Alarm Panel (J58879DB)***—Provides system status indicators and controls for system testing.

- ***Supplemental Line Carrier (J58879AC)***— Provides connector positions (slots) for the pulse amplitude modulated (PAM) network, line carrier buffers, and the line port circuit packs.

- ***Basic Line Carrier (J58879AA)***—Provides connector positions (slots) for the pulse amplitude modulation (PAM) network, line carrier buffers, attendant tone, and line port circuit packs.

- ***Trunk Carrier (J58879BA)***—Provides connector positions (slots) for the network buffer and trunk port circuit packs.

- ***Trunk/Control Carrier (J58879CC)***— Provides 33 circuit pack slots with 9 of these slots dedicated for assignment of 7 trunk-type circuit packs plus digital and analog trunk buffer circuit packs. The remaining slot positions are primarily associated with memory, memory control, MC-3 processor, tape transport control, network control, and input/output circuit packs.

- ***Control Carrier (J58879CA)***—Provides connector positions (slots) for the processor, scanner/distributor and network control, and auxiliary circuit packs. List 13 provides additional wiring and labels for 16K RAM circuit packs. List 11 provides 16K RAM, LC128B circuit packs. List 12 omits LC35, LC36, and LC37 and provides LC135B, LC236, and LC238 common control circuit packs.

- ***Minirecorder (KS-21447, List 1 or List 11) and Cartridge (J58879TA)***—Provides a method of entering the software program, contained on the tape cartridge, into system memory. The List 11 minirecorder is used when the J58879CC trunk/control carrier is provided.

- ***Maintenance and Administration Panel (MAAP) (J58879DA)***—Provides the interface between the craft personnel and the system for fault diagnosis, repair, and class-of-service assignments.

- ***Customer Administration Panel (CAP) J58879DC With Applique Unit (J58879AD) (Provided with FP15 only.)***— Provides the customer with an interface to the system for the purpose of station rearrangement and change.

4.05 The major supplemental cabinet elements are identical to those of the basic cabinet except for the alarm panel, control carrier, MAAP, basic line carrier, and the minirecorder and cartridge which are not included.

FEATURE PACKAGE 15 HARDWARE AND TAPE MODELS

4.06 Feature Package 15 systems may be ordered from various hardware and software models. There are 11 hardware and 9 software models from which to choose (Tables D and E).

A. Hardware Models

4.07 Each hardware model is arranged with a set number of lines and trunks. (See EQUIPPED column in Table D.) The models are also equipped with empty line and trunk carriers for future expansion to the maximum capacity. Additional line and trunk circuit packs must be ordered and installed to fill the carriers from the initially equipped quantities up to the desired quantities or to the maximum capacity. The maximum capacity of lines and trunks plus the quantity and location of each carrier are shown in Table D.

4.08 Each model configuration is equipped with six trunk circuits and either 56 or 120 lines. With these quantities in mind, compare the customer required lines and trunk quantities with the MAXIMUM CAPACITY column in Table D. Select the number in which the maximum capacity quantities exceeds the customer current and/or future requirements. This represents the system model to be ordered.

4.09 When the required quantities exceed the equipped quantities, an LC02 circuit pack must be ordered for each four additional line circuits. An LC08D, LC09D, LC11B, etc, must be ordered for each two additional trunk-type circuits.

B. Tape Models

4.10 Nine FP15 tape models, designated A through I, are available for ordering (Table E). All tapes, except Tape A, have translations for four trunks, two TOUCH-TONE dialing registers, and various numbers of lines. Tape A has a minimum of equipment translations—only one line and one trunk. Some tape models also include translations for 5- and 10-button ECTS stations.

4.11 Select the tape model that most closely matches the customer's current and/or future requirements. The hardware model, total lines, and if ECTS stations are required, should be considered when making the selection.

C. Example of Ordering Models

4.12 A typical example of ordering hardware and tape models for an FP15 system is as follows:

(1) Set customer current requirements as:

(a) 150 total lines

- 126 station lines
- 12 5-button ETS lines
- 12 10-button ECTS lines

(b) 60 trunks

- 40 CO trunks (LC08D)
- 10 DID trunks (LC09D)
- 10 tie trunks (LC11B)

(2) Compare the required 150 lines and 60 trunks with MAXIMUM CAPACITY column of Table D. Note that model number 4 exceeds the required lines and trunks with 180 and 78, respectively, and should be selected.

(3) Order additional line and trunk circuit packs.

(a) With 150 total lines required and 120 equipped, 30 additional line circuits must be ordered and installed. (Thirty divided by 4 equals 7½. This requires that eight LC20Bs be ordered.)

Note: One LC20B must be ordered for each whole number and fraction thereof in the quotient or for each four line circuits required.

(b) With 60 trunks required and 6 equipped, 56 additional trunks must be ordered and installed. (Two of the equipped trunks are required for the two TOUCH-TONE dialing registers.)

- CO trunks—4 equipped, 40 required, leaves 36 to be ordered and installed. (Thirty-six divided by 2 equals 18. This requires that 18 LC08Ds be ordered.)

TABLE D

FP15 HARDWARE ORDERING MODELS

MODEL NO.	LINE AND TRUNK ARRANGEMENTS				EQUIPMENT PROVIDED (NOTE 1)					
					BASIC CABINET (NOTES 2,3)				SUPPLEMENTAL CABINET (NOTE 2)	
	MAXIMUM CAPACITY		EQUIPPED		TRUNK/ CONTROL CARRIER J58879CC	BASIC LINE CARRIER J58879AA	SUPPLEMENTAL LINE CARRIER J58879AC	TRUNK PORT CARRIER J58879BA	SUPPLEMENTAL LINE CARRIER J58879AC	TRUNK PORT CARRIER J58879BA
	LINES	TRUNKS	LINES	TRUNKS						
1	116	46	56	6	1 (0)	1 (1)	1 (3)	1 (2)	*	*
3	116	78	56	6	1 (0)	1 (1)	1 (3)	2 (2,4)	*	*
9	116	110	56	6	1 (0)	1 (1)	1 (3)	2 (2,4)	0	1 (0)
2	180	46	120	6	1 (0)	1 (1)	2 (3,4)	1 (2)	*	*
4	180	78	120	6	1 (0)	1 (1)	2 (3,4)	1 (2)	0	1 (0)
10	180	110	56	6	1 (0)	1 (1)	2 (3,4)	1 (2)	0	2 (0,1)
7	244	46	120	6	1 (0)	1 (1)	2 (3,4)	1 (2)	1 (0)	0
5	244	78	120	6	1 (0)	1 (1)	2 (3,4)	1 (2)	1 (0)	1 (1)
11	244	110	56	6	1 (0)	1 (1)	2 (3,4)	1 (2)	1 (0)	2 (1,2)
6	308	78	120	6	1 (0)	1 (1)	2 (3,4)	1 (2)	2 (0,1)	1 (2)
8	372	46	120	6	1 (0)	1 (1)	2 (3,4)	1 (2)	3 (0,1,2)	0

Notes:

1. Carrier position(s) in cabinet is shown in parentheses.
2. Each cabinet is equipped with power supply and ac power distribution and fan assembly.
3. Each basic cabinet is equipped with minirecorder.
4. Each trunk/control carrier is equipped with two TOUCH-TONE dialing registers LC10 and four CO trunk circuits (two LC08D).
5. Each basic line carrier is equipped with an attendant console interface LC45.

* A supplemental cabinet is not provided with this model.

TABLE E

FP15 TAPE ORDERING MODELS

TAPE DESIG	TRANSLATED WITH					
	LINES				"TOUCH-TONE" DIALING REGISTERS	CO TYPE TRUNKS
	TOTAL	STATION	5-BUTTON ECTS	10-BUTTON ECTS		
A	1	1	–	–	2	1
B	56	56	–	–	2	4
C	86	56	15	15	2	4
D	116	56	30	30	2	4
E	120	120	–	–	2	4
F	150	120	15	15	2	4
G	180	180	–	–	2	4
H	180	150	15	15	2	4
I	180	120	30	30	2	4

Note: One trunk-type circuit pack must be ordered for each whole number and fraction thereof in the quotient or for each two trunk circuits required.

- DID trunks—0 equipped, 10 required, leaves 10 to be ordered. (Ten divided by 2 equals 5. This requires that five LC09Ds be ordered.)
- Tie trunks—0 equipped, 10 required, leaves 10 to be ordered. (Ten divided by 2 equals 5. This requires that five LC11Bs be ordered.)

(4) Compare the required 150 lines, including 12 each of the ECTS stations, with the translated lines columns in Table E. ***Tape F*** could be selected with only 6 lines and 56 trunks requiring translations after installation. ***Tape H*** requires that only the trunks be translated after installation. ***Tape A*** may be selected when nearly all lines and trunks are to be translated after installation.

ENVIRONMENTAL REQUIREMENTS

A. Atmospheric and Temperature

4.13 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 F outlines the equipment room environmental requirements for the system. The humidity design range chart (Fig. 13) 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 psychocrometric table to determine the relative humidity from the difference in the two measurements.

4.14 The requirements presented in Table F represent the extreme limits of the equipment operating ranges. The temperature requirements listed in Table F are as indicated by an ordinary thermometer measured at a location 1.5m (5 feet) above the floor and 381 mm (15 inches) in front of the control cabinet. These requirements should not be construed as being desirable working conditions for minimum maintenance. Installation in nondesirable 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) with relative humidity in the 20 to 60 percent range.

TABLE F

ENVIRONMENTAL REQUIREMENTS

SYSTEM	ROOM AMBIENT (DRY BULB) TEMPERATURE°C (°F)		PERMISSIBLE RANGE HUMIDITY (%)	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
Without Fans	0 (32)	26.7 (80)	10	95
	0 (32)	29.4 (85)	8	95
	0 (32)	32.2 (90)	7	95
With Fans	0 (32)	35.0 (95)	6	80
	0 (32)	37.8 (100)	5	70
	0 (32)	40.6 (105)	4	60
	0 (32)	43.3 (110)	4	55
	0 (32)	46.1 (115)	3	45
	0 (32)	48.9 (120)	3	40

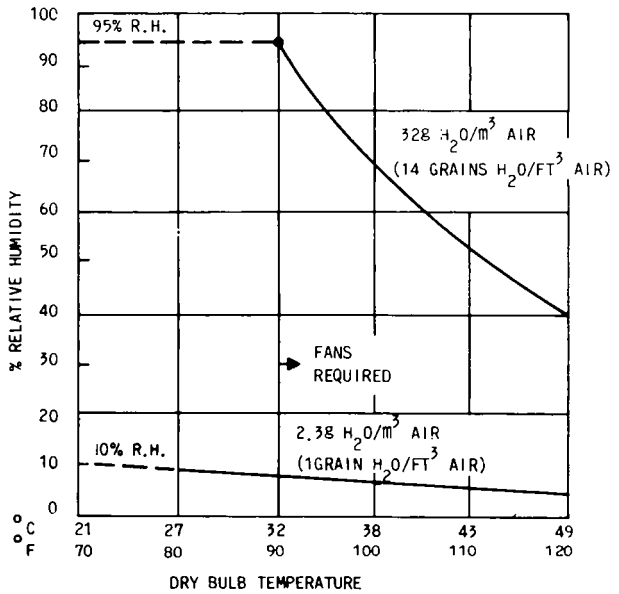


Fig. 13—Humidity Design Range

4.15 For storage and transportation environments, the permissible extremes are 66°C (150°F) with 15 percent relative humidity (RH) and −40°C (−40°F) with humidity uncontrolled. Large temperature excursions, shock, and vibration affect the tape cartridge and can cause read or write errors when operation begins. The magnetic tape should not be loaded into the tape transport during storage or shipment, but instead, should be placed in a dust-free container such as a sealed plastic wrapper. After shipment or storage, the tape should be rewound twice before attempting to read or write data in order to relieve environmentally induced stresses.

4.16 The following site selection guidelines should be followed.

(a) The equipment should be installed in an air-conditioned space whenever possible. Fans will be required in each cabinet whenever filters are used.

(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:

(a) Nonventilated rooms with less than 4.6 square meters (50 square feet) of floor space.

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

4.17 To aid in determining air-conditioning requirements when space is allocated, total power dissipation of various cabinets is shown in Table G. These power dissipation rates are sufficient to heat small rooms above the maximum operating temperatures of equipment if proper air-conditioning or ventilation is not provided. The equipment engineer should analyze the room ventilation and/or air-conditioning to insure that requirements for each installation are met.

TABLE G

TOTAL POWER DISSIPATION BY CABINET

CABINET	MAXIMUM POWER DISSIPATION	
	BTU/HR	WATTS
Basic	2594	760
Supplemental	2474	725
Auxiliary	1365	400
SMDR	1797	527

B. Filters

4.18 The use of filters in the equipment will be determined by the environment. Filters will require replacement periodically as they become laden with contaminants. The replacement interval will vary from a few weeks to a year or more, depending on the local conditions. Under average conditions, filter life can be expected to be in excess of 6 months. It is the responsibility of the telephone company (Telco) to conduct periodic filter inspections and to insure replacement when deemed necessary. Filters should be inspected (preferably in conjunction with service orders) at intervals to be determined by the nature of the environment. The environment can be divided into the following air contamination classifications:

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

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

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

(d) ***Relatively Clean Room***—Interior rooms in office space with little or no traffic. Filters are never required in this environment.

4.19 The basic PBX equipment is primarily solid state devices. Certain features require the use of open contact relays which are mounted in auxiliary cabinets or on the wall. This equipment is susceptible to the same adverse effects from contaminants as previous electromechanical equipment. Copy machines have been identified as a potential source of contaminants which can leave deposits on, erode, and insulate open contact relays. It is recommended that relay equipment be located away from equipment which exhibits this type of contaminant emission. If it is found necessary to locate relay equipment in such an environment, then a special PBX filtration system should be utilized. The special PBX filtration system should only be used in auxiliary equipment containing open contact relays. If fans are installed in this auxiliary equipment, they should not be operational when using the special PBX filtration system. In severely contaminated industrial environments, other PBX equipment may be affected. 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. The performance of the minirecorder may be affected if a high concentration of metallic contaminants is present. These can interfere with magnetic tape read or write operations. Dust, paper fiber, or carbon particles can also affect the minirecorder operation. Industrial areas suitable for prolonged human activity (without safety protection) are not considered to be severely contaminated and can be used as installation locations.

C. Transportation

In Transit

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

4.21 The system should always be transported in an upright position, unless the system is packaged in a crate specifically designed for lay-down handling. If on-side shipment is used, installation personnel should carefully raise the cabinets to an upright position before unpacking.

4.22 The basic system 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.

4.23 The preferred modes of transportation are in order of preference, ie, truck, rail, and air. Air transportation is known to subject equipment to severe handling shocks. Rail transportation is less severe, but railroad car coupling shocks can be severely stressing on the system.

Handling on Site

4.24 It is preferred that the system remain packaged in its crate until it is in the room in which it is to be located.

4.25 A forklift and dolly are acceptable means of handling the crated system on customer premises. The pallet portion of the crate is designed for this method of handling.

4.26 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 200 mm (8 inches) packaged or 25 mm (1 inch) unpackaged.

The −48V and −9V fuses should be removed prior to minirecorder removal and installation. The +5V fuse supplies both the minirecorder and the console and should also be removed when conditions require such action.

D. Structural

Floor Loading

4.27 The minimum requirement found in any commercial floor loading codes is 244 kg per square meter (50 pounds per square foot). The maximum weight of one DIMENSION 400 PBX carrier cabinet is about 340 kg (750 pounds). Thus, a free maintenance area of at least 1.4 square meter (15 square feet) per cabinet must be provided on a floor which is rated at 244 kg per square meter (50 pounds per square foot).

4.28 Concentrated floor loads under the casters of the system are about 1138 kPa [651 psi (pounds per square inch)] for the 5-carrier cabinet and for the 4-carrier PBX cabinet. Some floor surfaces, such as soft tile or linoleum, may acquire indentations over a period of time from the casters. If this is of concern to the customer, the tolerable pressure rating of the floor surface should be compared to the appropriate 1138 or 1034 kPa (165 or 150 psi) loading. If it is less, the floorplate should be used. In most cases, this will not be necessary since the cabinet will probably occupy the same position throughout its service, and such indentations will not be any more severe than those of a large desk.

Stability and Movement

4.29 When earthquake or disaster bracing is required by law or when local Telco engineers feel that it is necessary, such bracing should be installed. The areas in the United States in which earthquake bracing may be desirable are shown in Fig. 14. Four insulating bolts and washers and four spacer assemblies are used 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 mm (24 inches) should be provided behind the cabinet. An alternate method of earthquake bracing is also provided. This alternate method bolts a floor rail assembly ED-1E362-70, Group 4, to the floor and uses cabinet assembly J58879C, List 22. A restraining cable is furnished to be slipped into appropriate slots on the rail and rear of cabinet.

4.30 When the system is installed on any rough floor or carpeting, the floorplate and rollaway assembly will be placed on the floor surface and the cabinet on the plate assembly. This will protect the floor surface and aid maintenance personnel in moving the cabinet on its casters when necessary for reasons of access.

4.31 Care should be taken in moving the cabinet across deep pile carpets in order to prevent tipping. The casters have been placed so as to allow adequate force [about 445N (100 pounds)] to get the cabinet moving on thick carpeting. Also, the placement of the casters allows a moderately rapid movement [about 0.6m (2 feet)] per second of the cabinet without risk of tipping when a bump or irregularity in the floor is encountered. Movement faster than 0.6m (2 feet) per second, however, should be considered dangerous with regard to cabinet tipping.

E. Electrical Fields

4.32 In order to prevent the introduction of noise into the system, power lines that are dedicated to the DIMENSION PBX should be used. Separate branch circuits are sufficient to serve this purpose.

4.33 Electromagnetic fields may cause noise to be induced into the PBX. Care should be taken to avoid placing the PBX cabinets and/or cable runs in areas where high field strengths from sources such as AM radio transmitters, induction heaters, elevator motors, and similar equipment may be present. If the field strength is less than 0.05 volt per meter, interference is not likely. Between 0.05 and 1.0 volt per meter, interference may or may not occur. In systems where the field strength is greater than 1.0 volt per meter, interference is likely. This interference can result in a demodulated tone or garbled tone being

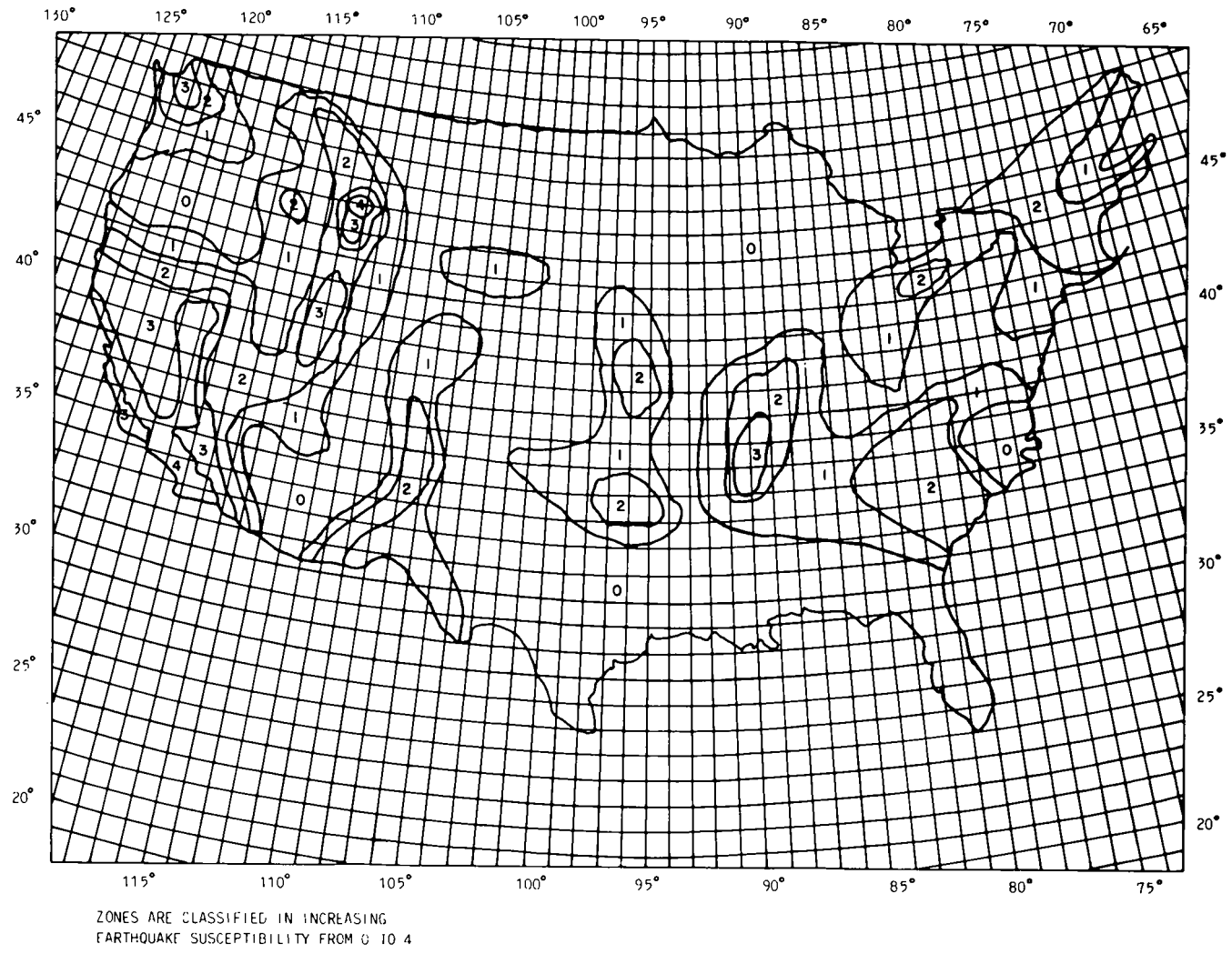


Fig. 14—Earthquake Environment (USA)

present in the audio band during telephone conversations. It should be noted that in addition to the field strength in the PBX cabinet site, the field strength in the vicinity of cable runs (both in the building and surrounding area) is important and should also be considered. Not all AM radio stations, even those with moderately high field strengths, can be expected to cause interference in the audio band. The resultant demodulated tone should be calculated to determine the action to be taken. In most cases, the interference is introduced into the system via trunk or station cables or both. Standard treatment for noise in cable pairs is obtained by installing an electromagnetic interference (EMI) filter assembly per ED-1E403. Some cabinets may require the drilling of mounting holes in the rear cover of the cabinet (Fig. 15) to mount the filter assemblies. The Group 1 EMI filter mounting assembly includes three 1513A filter assemblies equipped with connecting cable, connector retaining bracket, and mounting assembly. The mounting assembly is capable of containing ten filter assemblies. A Group 1 assembly consists of the following:

- One EMI filter mounting panel
- Three EMI filter assemblies
- Three connecting cables (ED-1E367, Group 935)
- One filter cover.

Seven additional EMI filter assemblies (Group 2) may be added to the Group 1 assembly. Each Group 2 filter assembly consists of the following:

- One EMI filter assembly
- One connecting cable (ED-1E367, Group 935).

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

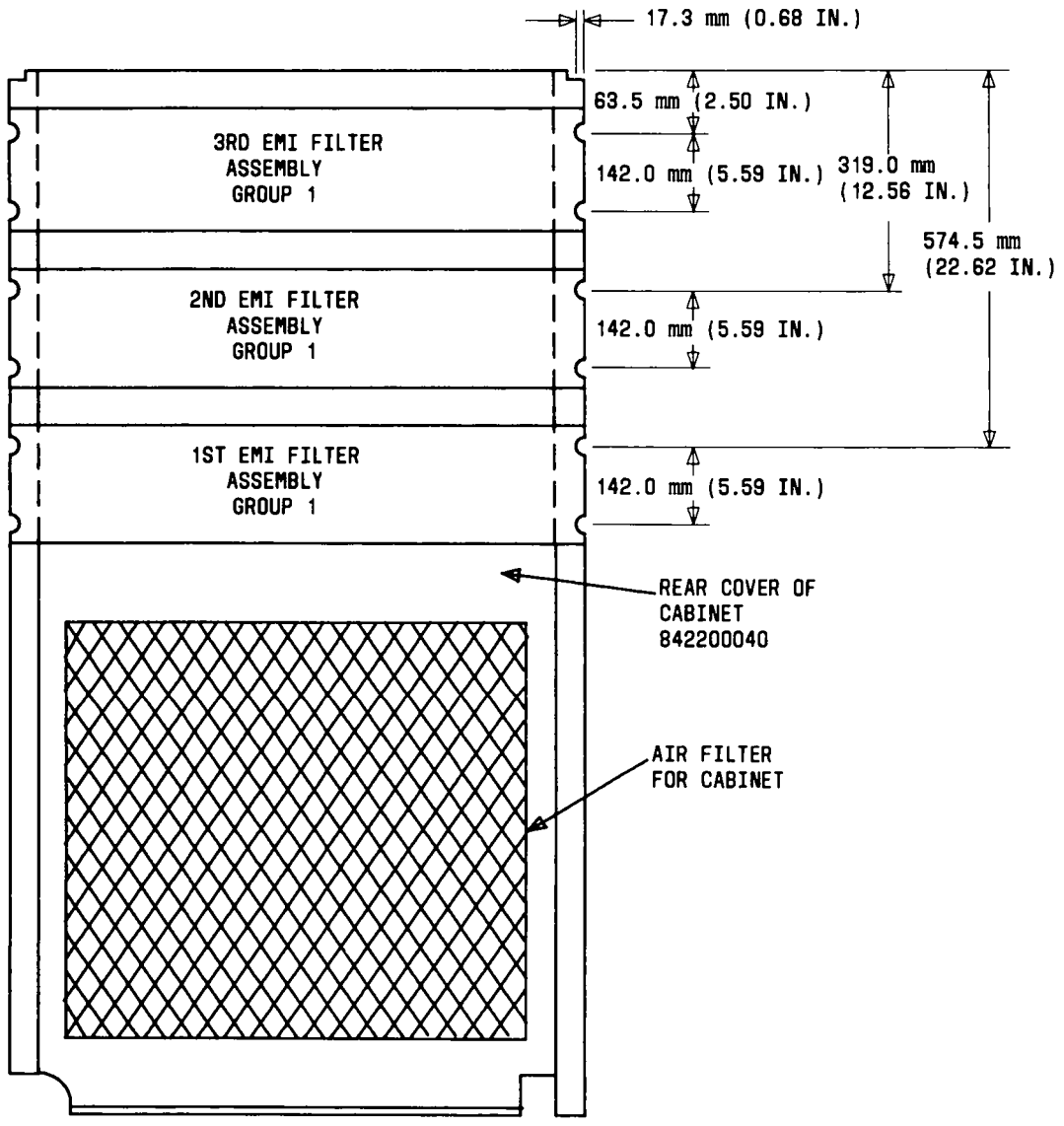


Fig. 15—EMI Filter Assembly Mounting (ED-1E403)

4.34 Should the attendant console cables be the coupling mechanism, standard 1542AM inductors should be used to filter the console audio pairs. The 1513A filter is not suitable for filtering the console cable since it inhibits data transmission on the data pairs.

4.35 Since cable pairs leaving the premises (such as trunk and off-premise station pairs) are most susceptible, these pairs should be treated first. If the treatment does not eliminate the problem, treatment of station cable pairs may be required. Examination of the PBX grounding runs (for coupling) and ground loops may also be required, depending upon local conditions. Typically, AM radio stations have been the cause of most interference problems due to the fact that the electrical characteristics of the PBX usually limit demodulation to frequencies ranging from 500 kHz to 10 MHz.

4.36 Field strength can be measured using a standard field strength meter such as the Holaday Industries HI-3001 field strength meter, the Electric Field Sensor Model EFS1 manufactured by Instruments for Industry Incorporated, or a tuneable R70B meter from Electrometrics. If the field strength from a broadcast station cannot be measured, the field strength can be approximated by dividing the square root of emitted power in kilowatts by the distance from the antenna in kilofeet. This approximation yields the field strength in volts per meter and is relatively accurate except when very close to the antenna. In those cases, the field strength must be measured.

4.37 The PBX may be subjected to noise interference from motors of more than 186 watts (1/4 horsepower) having commutators, if the PBX and commutators are situated in the same or adjacent room. Small tools and appliances with universal motors are generally not a problem, if operated on separate power lines. Motors without commutators, whether synchronous or asynchronous, generally do not cause interference into the PBX. Experience has shown that in most cases where interference was considered a major area of concern, unshielded PBXs were not affected. It is recommended that in questionable installation sites, the systems be installed and tested prior to any treatment or shielding attempts.

In order to preclude electrostatic noise in the system, the frame shall be well grounded as specified in this part. (See GROUNDING.) Maintenance personnel should always attach authorized wrist grounding strap before working on system or handling circuit packs.

F. Acoustics

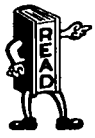
4.38 The system should be located in an acoustic environment which allows maintenance personnel to hear tones through a standard headset while performing necessary tests.

4.39 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 the Occupational Safety and Health Act (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.

G. Lighting

4.40 The light intensity level around the system cabinet should be sufficient to conform with 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, 1.5m (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.

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



Standard 48-Vdc lights used by some maintenance personnel for lighting are NOT to be powered by the PBX 48-Vdc taps, either in the power supply or backplane.

H. Security

4.42 The PBX cabinets have locks on the front doors. A 216C tool is used to operate these locks. This locking arrangement allows access to the inside of the machine by authorized personnel only.

*Registered trademark of Weston Instruments, Inc.

4.43 When auxiliary earthquake bracing is not used, the rear panel is, in effect, locked. When the back of the cabinet is against the wall, 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.

I. Insects and Rodents

4.44 The PBX cabinets are designed to seal off internal areas from insects and rodents. For this reason, the provided panels and doors should be in place at all times, particularly when such pests are known to exist in a particular location.

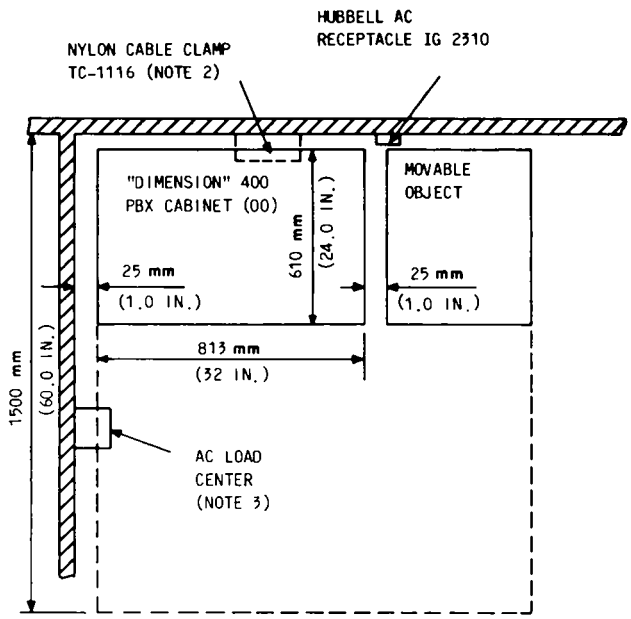
J. Floor Plans

4.45 A floor plan layout of a single-cabinet installation is shown in Fig. 16. A floor plan layout for a 2- or 3-cabinet installation is shown in Fig. 17. The main cross-connect field should be located near the cabinets, if possible, to simplify testing and maintenance. Maintenance space is required in front and rear of cabinets to permit access to the interior components. A minimum of 152 mm (6 inches) of space should be maintained between the top of the cabinet and any obstruction, such as a shelf or a ceiling, to permit adequate airflow for cooling the system.

4.46 Prepare a sketch of the proposed installation similar to Fig. 16 or Fig. 17 to show the desired placement of cabinets and cross-connect fields and the location of the customer-provided load center and power receptacles.

POWER

4.47 The commercial power provided to the system should be capable of providing each cabinet with 120-Vac 20-ampere service (30-ampere service is manufacture discontinued). This service is adequate for any fully equipped system cabinet and is required to avoid false circuit breaker tripping as a result of momentary inrush current caused by PBX ferroresonant rectifiers. Any 30-ampere circuit should be protected by a 30-ampere thermal magnetic circuit breaker (ITE QP1-B030 typical, or approved equivalent). Each 20-ampere circuit should be protected by a 20-ampere thermal magnetic circuit breaker (ITE QP1-B020 typical or approved equivalent). The circuit breaker must be capable of withstanding an initial current surge of 230 amperes for a period of 100 milliseconds.



NOTES:
1. DASHED LINES INDICATE MINIMUM MAINTENANCE AREA.
2. CABLE CLAMP WALL MOUNTED AT 1800 mm (69.5 INCHES) HIGH.
3. MAX DISTANCE BETWEEN LOAD CENTER AND HUBBELL RECEPTACLE IS 6000 mm (20').

Fig. 16—Minimum Floor Space Requirements (One Cabinet)

4.48 A 3-cabinet installation could be typically powered from a 3-wire, single-phase, 120 Vac 60-ampere feeder. However, since there is no phase restriction between cabinets, the 120-Vac 20-ampere supply required for each cabinet could be derived from a 3-phase main.

In order to maintain system integrity, dedicated power feeder lines should be used. Separate branch circuits from a dedicated load center are sufficient to serve this purpose. The feeders should not be used to power other equipment.

4.49 The PBX rectifiers are capable of operating under a wide range of frequency or input voltage conditions, provided both conditions do not occur simultaneously. The operating ranges are 99V to 129V if the frequency is from 59.1 Hz to 60.1 Hz, or 105V to 129V if the frequency is from 57.0 to 63.0 Hz.

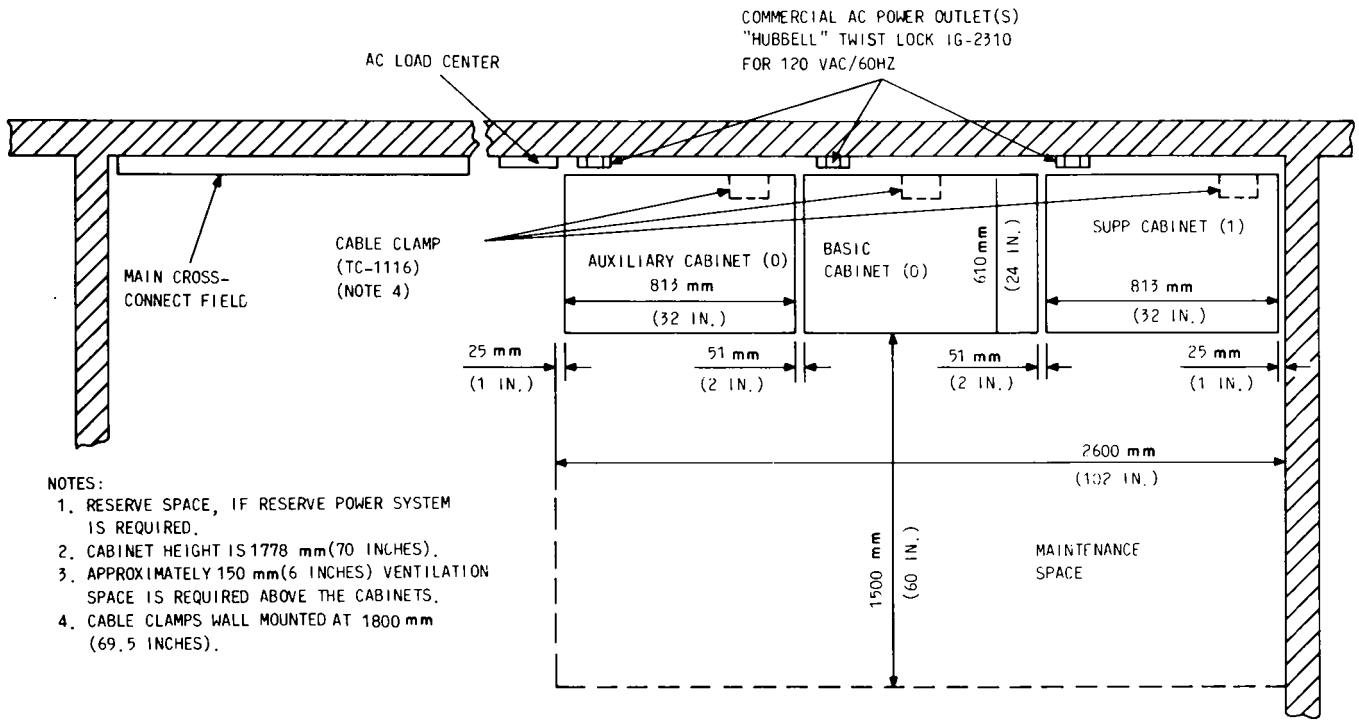


Fig. 17—Minimum Floor Space Requirements (Multiple Cabinets)

4.50 The ac distribution required for a typical PBX is shown in Fig. 18. The Telco engineer must arrange with the customer or an electrical contractor for the installation and wiring of an approved load center equipped with thermal magnetic circuit breakers, branch circuit wiring, and a wall-mounted receptacle for each cabinet. Complete cost of providing the electrical service should be borne by the customer. One circuit breaker and one receptacle are required per cabinet. Expansion to a 4-cabinet system requires the addition of two additional circuit breakers to the load center. (See Fig. 18.) In all cases, ac wiring and equipment must comply with local codes.

4.51 The circuit breaker shall provide power to a nonswitchable receptacle (wall-mounted) located behind each cabinet.

For both single and multiple cabinet system installations, the load center (ITE EQ4 or approved equivalent), ground bars (ITE GB-10), and HUBBELL* (IG-2610 or IG-2310) receptacles should be installed by the customer prior to starting the PBX installation.

A. Load Center

4.52 The load center (circuit panel ITE EQ4, or approved equivalent—customer-provided) of appropriate current rating shall be equipped with 30-ampere (MD), 20-ampere (STD), single-pole thermal magnetic circuit breakers (ITE QP1-B030 or ITE QP1-B020 typical, or approved equivalent). Each circuit breaker is to protect one associated wall-mounted receptacle. A sufficient number of circuit breakers and receptacles shall be provided to accommodate all cabinets. (See Fig. 18.)

4.53 Two ground bars (ITE GB-10 typical, or approved equivalent) will be provided locally. An approved equivalent is a copper or copper alloy bar with the same cross-sectional dimension.

*Registered trademark of Harvey Hubbell, Inc.

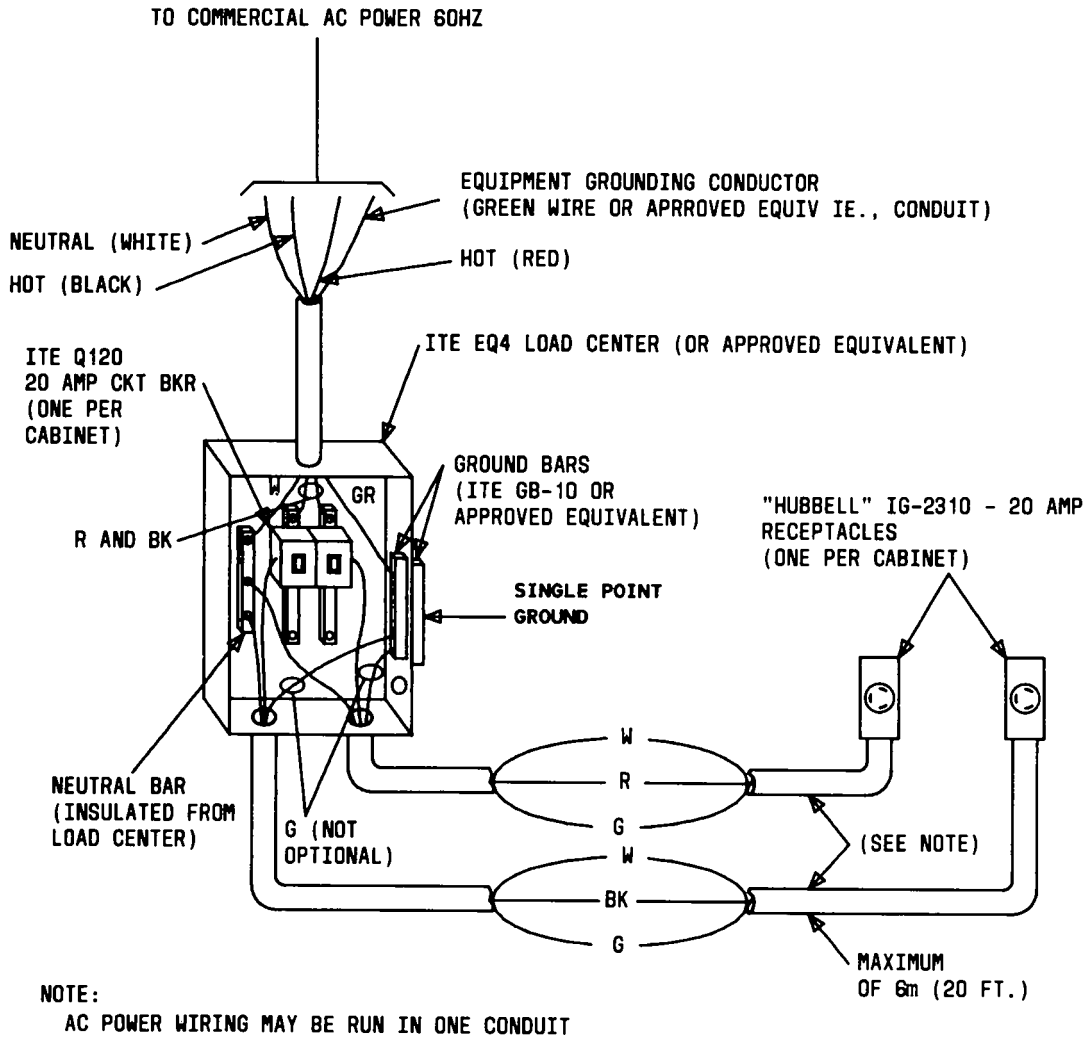


Fig. 18—Load Center and Ground Bars

4.54 The electrician shall mount the two ground bars back-to-back on the side of the load center. They are to be held together by two screws in a "sandwich" arrangement such that one is inside the load center and the other on the outside. Star washers shall be used between the screwheads and ground bar, between nut and ground bar, and between each ground bar and load center wall to ensure a permanent, reliable electrical bond between ground bars and load center wall (Fig. 19). The electrician shall use the inside ground bar to terminate all green wire grounds but not the neutral wire.

4.55 The ground bar located on the load center external wall is the PBX single-point ground and shall be used as such by the Telco installer for grounding the PBX.

Caution: This ground bar shall be tagged with Form E-3013B which requests that the Telco Repair Service be notified if connections are loose or if they must be moved.

4.56 The National Electrical Code and most local codes require that the load center be grounded through an "equipment grounding conductor" which can be one or a combination of the following: (1) a separate corrosion-resistant conductor (green wire), (2) rigid metal conduit, (3) electrical metallic tubing. The presence of a separate green wire (between the load center and the ac service entrance), when provided in addition to the approved metallic conduit, contributes negligibly to the protection of the PBX

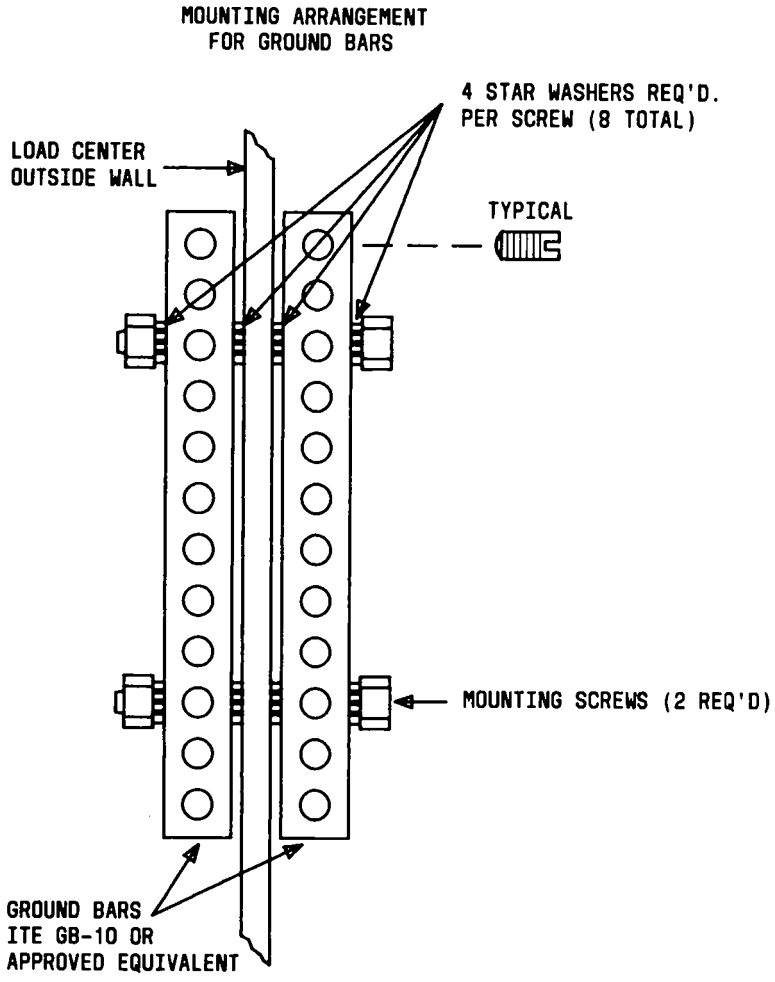


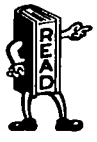
Fig. 19—Mounting Arrangement for Ground Bars

against lightning surges. A separate green wire conductor is, therefore, not specified as an installation requirement, but is recommended, if practical, in order to provide a more reliable equipment grounding conductor.

B. Power Receptacles

4.57 One HUBBELL twist-lock power receptacle, Catalog No. IG-2310, may be ordered to be shipped with each cabinet for the power receptacle installation. The HUBBELL IG-2610 for 30-ampere service (MD) or IG-2310 for 20-ampere service (STD) may also be purchased locally by the Telco, if desired. A power receptacle must be provided behind each cabinet.

4.58 The ac wiring between the load center and wall-mounted receptacle should be kept as short as practical and should not exceed 6m (20 feet) in length. This requirement limits the length of the ground wire from the basic cabinet to the single-point ground. A separate neutral wire (white) shall be run from the load center neutral bar to each receptacle.



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

4.59 Since the equipment ground for the wall-mounted ac receptacles should be derived

through the green wire conductor only, receptacles that are designed to obtain equipment ground through the conduit, when mounted in a metallic junction box, should not be used in the PBX installation. The HUBBELL IG-2610 [30-ampere (MD)] or IG-2310 [20-ampere (STD)] receptacle has its ground terminal insulated from its mounting hardware and has been specified for this purpose.

C. PBX AC Current Drain

4.60 The ac current drain for a PBX should include all cabinets, including any auxiliary equipment such as station message detail recording (SMDR), customer premise facility terminal (CPFT), etc. The values calculated from the information that follows are typical current drains (in amperes) at 120 Vac 60 Hz, and should not be used either for design purposes or for specifying the electrical service required for the PBX.

(a) ***Cabinet 00 AC Drain***

- No traffic drain = 1.7 + [0.3 × (line + trunk carrier quantity)].
- Medium traffic (6 CCS/line) drain = no traffic drain + [0.4 × (line + trunk carrier quantity)].
- Heavy traffic (9 CCS/line) drain = no traffic drain + [0.6 × (line + trunk carrier quantity)].

(b) ***Cabinet 01 AC Drain (No Control Carrier)***

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

(c) ***Auxiliary Cabinet***

- One frequency generator = 0.7A
- One interrupter = 0.2A
- Fans (when running) = 0.3A
- −48V rectifier at no load = 0.8A
- To find the ac current drain for circuits powered by the −48V rectifier (KS-22028), multiply the −48 current drain by 0.5, which is a factor that accounts for the rectifier efficiency.

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

- −48V current drain is 3 × 0.8 = 2.4 amperes
- 120 Vac current drain is 2.4 × 0.5 = 1.2 amperes
- −48V rectifier (no load) drain = 0.8 ampere
- Total ac current drain for the auxiliary cabinet is 1.2 + 0.8 = 2.0 amperes.

GROUNDING

4.61 Proper grounding of the PBX is particularly important to insure personnel safety and to protect the equipment against lightning surges. Grounding within the PBX cabinet is provided by a copper block (designated as ground block) which is mounted on the rear of the ac distribution, fan assembly, and frequency generator unit. This serves as the single connecting junction for the ac ground wire in the power cord (green wire), the circuit ground, the frame ground, and rectifier ground.

A. Cabinet Grounding Arrangement (Single and Multiple)

4.62 Grounding for the system cabinets is provided by a No. 6 AWG ground wire connected from one of the following approved ground sources to the PBX single-point ground. The PBX single-point ground is the ground bar mounted on a side wall of the load center by the electrician (Fig. 20). Cabinets other than the control cabinet (00) must be grounded ***only*** from the control (basic) cabinet 00. The coupled-bonding conductor (coupled or lashed to the CO trunks) discussed later must also connect to the PBX single-point ground. The approved grounds are as follows:

(a) "Water pipe" ground is a metallic water pipe system not less than 13 mm (1/2-inch) diameter that is electrically continuous through the

water meter and extends at least 3m (10 feet) into earth.

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

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

(d) The grounding conductor for the secondary side of the power transformer feeding the floor. (If this option is selected, the connection to the grounding conductor should be made by a licensed electrician.)

4.63 For more information on the selection of an approved ground, refer to Sections 876-300-100 and 631-400-102.

Ground Isolation: Care should be exercised when implementing the grounding scheme. To preserve the integrity of the single-point ground arrangement, verify that neither the cabinet nor any framework on the PBX side of the customer-provided load center is connected to or may be moved to inadvertently come in contact with ground at a place other than at the single-point ground (ground window).

4.64 When a data set is used with the PBX, the circuit ground of the data set must be isolated from the data set frame by opening the appropriate (screw) switch. For example, when the 113D data set is used for the remote maintenance, administration, and traffic system (RMATS), apply option P (no common ground). Option P opens screw switch S1 in the data set. This isolation is necessary to ensure that lightning surges on the data set green wire ground are not transmitted to the PBX.

B. Emergency Transfer Panel

4.65 A ground conductor (No. 6 AWG) must be provided from the approved source ground, or from the PBX single point ground, to the emergency transfer panel (609 type). A No. 14 AWG conductor may be used if sufficient mechanical protection (of the conductor) is provided. This ground conductor provides ground start for each station set having power failure transfer service and is not used for equipment protection.

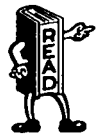
PROTECTION

A. Electrical Protection

4.66 To determine the exposure status of the PBX installation and for detailed protection requirements, refer to Section 876-300-100.

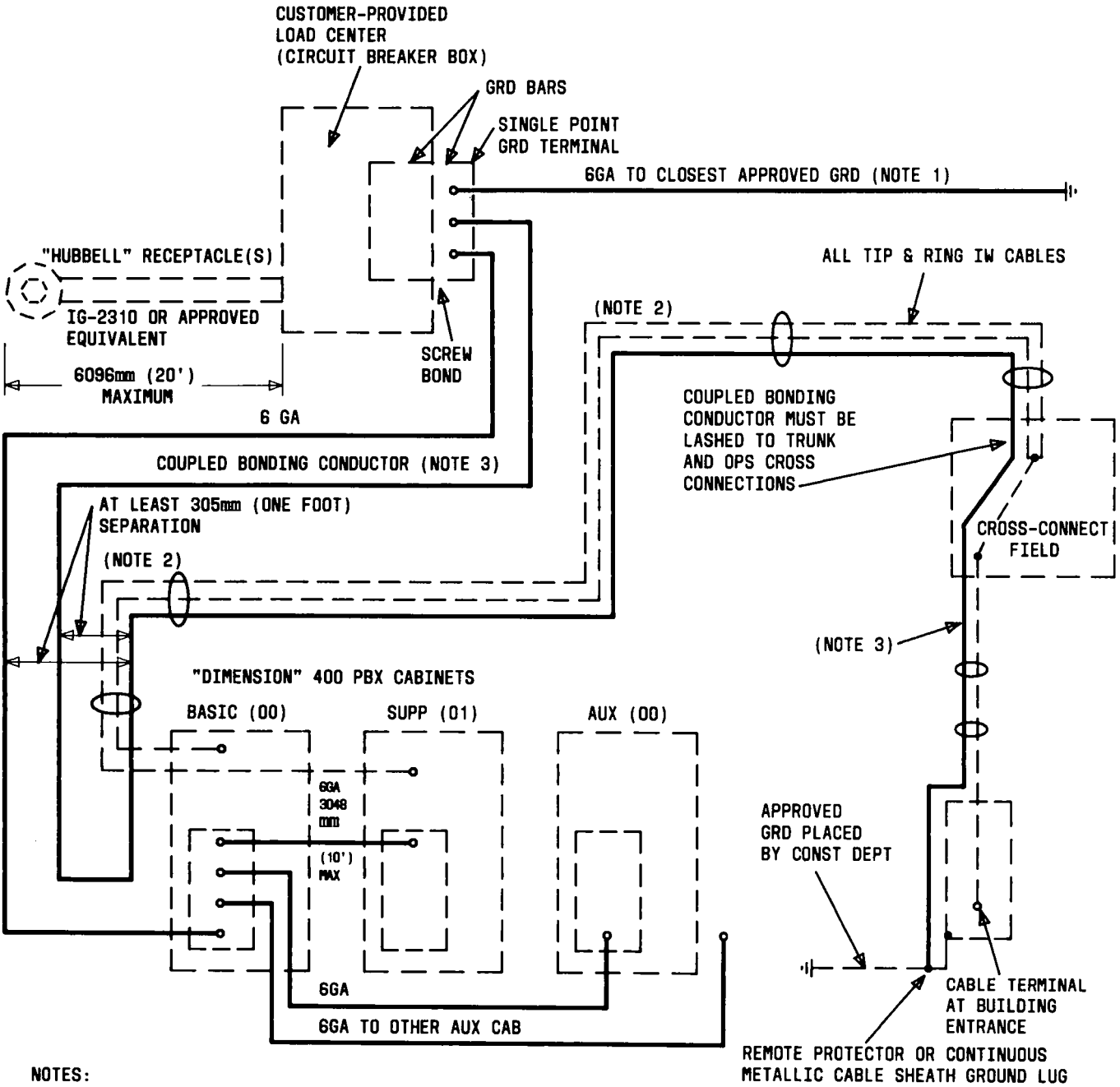
B. Protectors

4.67 If either the associated outside plant or the power source feeding the building is exposed, station protectors must be installed on all exposed building entrance cables serving the PBX. If off-premises stations are run as exposed plant, the tip and ring leads must also be protected by station protectors. In either case, the ground terminal of the protectors must be bonded to the PBX single ground terminal through a conductor that is closely coupled to the protected tip and ring leads. For more detailed information, refer to Section 876-300-100.



TO MINIMIZE LIGHTNING SURGES AT THE PBX:

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



NOTES:

1. ALL HEAVY LINES (——) ARE GROUNDING AND BONDING CONDUCTORS TO BE RUN BY PERSONNEL INSTALLING PBX.
2. CABLE TIES SHOULD LASH ALL TIP & RING IW CABLES, (FROM THE PBX TO THE CROSS-CONNECT FIELD) TO THE COUPLED BONDING CONDUCTOR. THE COUPLED BONDING CONDUCTOR SHOULD NOT ENTER THE PBX CABINET.
3. THE COUPLED BONDING CONDUCTOR MAY CONSIST OF THE FOLLOWING:
   - CONTINUOUS CABLE SHEATH
   - 6 GOOD CABLE PAIRS
   - 10 GA WIRE
   - COMBINATION OF THE ABOVE IE., 10 GA WIRE FROM SINGLE PT. GRD TO X-CONNECT FIELD AND CABLE SHIELD FROM X-CONNECT FIELD TO ENTRANCE CABLE GROUND.

Fig. 20—Grounding and Bonding for Single or Multiple Cabinets

C. Coupled Bonding Conductor

4.68 The coupled bonding conductor provides an electrical connection between the PBX single point ground and the protector ground terminal (if protectors are provided). If protectors are not provided, the coupled bonding conductor is connected to the building entrance cable ground. This connection is needed to reduce the difference in (electrical) potential that can appear between tip and ring leads and the system ground as a result of lightning surges. The coupled bonding conductor must be closely coupled (to establish transformer action) to the tip and ring leads (associated with the PBX) along the entire length of the bulding or inside wiring cable which is used to extend the conductors of the building entrance cable to the PBX.

4.69 The coupled bonding conductor connects the single-point ground to the protector ground. The conductor may consist of the following:

- A continuous metallic cable shield
- A No. 10 AWG solid copper conductor tie-wrapped to the cable between protector and the PBX cabinet
- Six spare cable pairs not less than 24 AWG
- A combination of the above.

4.70 The coupled bonding conductor must be lashed to the tip and ring cables from the PBX cabinets to the nearest protector or cable sheath associated with pairs serving the PBX. If a No. 10 AWG copper conductor is used, the conductor must be installed from the single-point ground terminal to the basic PBX cabinet and, at that point, be lashed to the inside wiring cables containing the tip and ring pairs from all PBX cabinets to the cross-connect field, and connected to the protector or to a continuous metallic cable sheath ground lug. If the ground lug does not appear at the cross-connect field, the coupled bonding conductor must be extended to the remote ground lug and lashed to the tip and ring cable to the remote terminal location.

4.71 The section of the coupled bonding conductor from the protector ground to the green cross-connect field is preferably a continuous metallic cable sheath, if such a sheath is provided. If the shield extends only to the cross-connect field, then a No. 10 AWG copper wire or six No. 24 AWG cable pairs may be used to extend the conductor to the PBX.

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

4.73 Figure 20 is a pictorial representation of the grounding and bonding conductors to be placed by installation personnel, and is similar to the "Installation and Acceptance Procedures" (IAP) document used during initial PBX installation.

Caution: Ground Isolation: Exercise care when implementing the grounding scheme.

To preserve the integrity of the single-point ground arrangement, verify that neither cabinet nor framework nor any associated power feeder enclosure (ie, conduit and receptacles on the PBX side of the customer-provided load center) is connected to or may be moved to inadvertently come in contact with ground at a place other than at the single-point ground (ground window).

D. Sneak Current Protection

4.74 Heat coils or 60-type fuses must be installed in all central office trunks that are exposed to power. Exposed off-premises extensions are not required to have sneak current protection.

FCC REGISTRATION REQUIREMENTS

4.75 The following paragraphs provide planning information concerning the implementation of the FCC registration program for the DIMENSION PBX.

4.76 The Commission has established a PBX register-only date and a PBX grandfather date. The PBX register-only date is the date by which all newly manufactured PBX systems being connected to the network must be registered. The PBX grandfather date is the date which establishes the systems

that are excluded from the technical compliance regulations of the registration program. The grandfather provision of the registration program means that all PBXs that were legally connected to the network as of the grandfather date are grandfathered for life. These PBXs may remain connected; may be removed and reinstalled; and may be removed, repaired, refurbished, and reinstalled. Reinstallation of a removed PBX is not restricted to the same customer. The system may be reinstalled for any customer.

4.77 Additions may be made to grandfathered systems using any equipment registered in configuration with the DIMENSION 400 PBX system. The grandfathered system does not become registered but the system does retain its grandfathered status. Specifically, this means that additions to grandfathered systems can only be made using units from Class C or Chief Engineers' stock. Grandfathered status is retained if units and/or cables used for repair and/or refurbishing are of a type that were connected to the network as of the grandfather date. Therefore, orders for new units from Western Electric for grandfathered systems must be restricted to maintenance, repair, or refurbishing.

4.78 To comply with regulations developed to ensure network protection from lightning surges and other induced voltages, a 66M3-50R connecting block(s) or a 25-pair cable(s) with an RJ21X jack(s) provided by outside plant should be mounted in close proximity of the cross-connect field. A connectorized A25D cable shall be terminated on the cross-connect field and connected to the 66M3-50R connecting block. For installations without controlled access, the cable should not be more than 7.6m (25 feet) long, but a registered 7.6m (25-foot) extender cable may be added to extend the distance between the cross-connect field and connecting block. No length restrictions are imposed on cabling in PBX equipment room with controlled access.

4.79 A functional block diagram of the network interface for FCC registration requirements is illustrated in Fig. 21. The only leads which are to be wired through the connecting block are tip and ring leads for central office type services (ie, CO trunks, FX, and WATS trunks). Therefore, with the DIMENSION 400 PBX, only tip and ring leads from circuit packs LC08-type (dial CO trunk circuit) and LC09-type (DID trunk circuit) are to be wired to the connecting block. All other leads, leaving the PBX toward the CO, should be cross-connected from the appropriate color-coded field to a connecting block in the green field, other than the connecting block in the green field from which the A25D connector cable originates and plugs into the 66M3-50R connecting block.

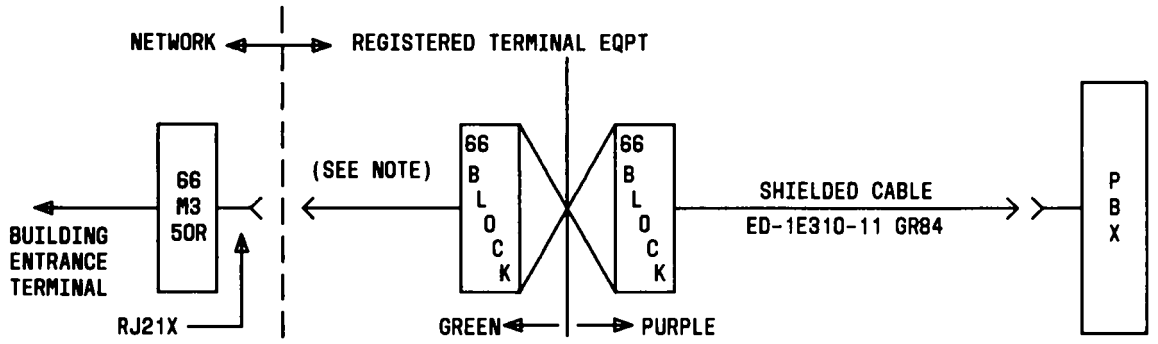
> ***Note:*** After May 1983, connections to private line network channels require a network interface connector RJ2GX for tie lines (LC11B) and connector RJ21X for off-premise station lines (LC02B).

4.80 An alternate connector (KS-16690-L1) can be used in place of the 66M3-50R. The alternate connector also supplies an RJ21X connecting jack. The FCC registration also requires that the cross-connect field to be either located in a room with controlled access or be provided with a protective cover to assure that adequate insulation is present to isolate the field from commercial power, wiring, and grounding surfaces. If the PBX is in a room with controlled access, there is no cable length restriction and the cross-connect field does not have to be covered. However, the cables must remain exposed for inspection and cannot be concealed or embedded in the building structure.

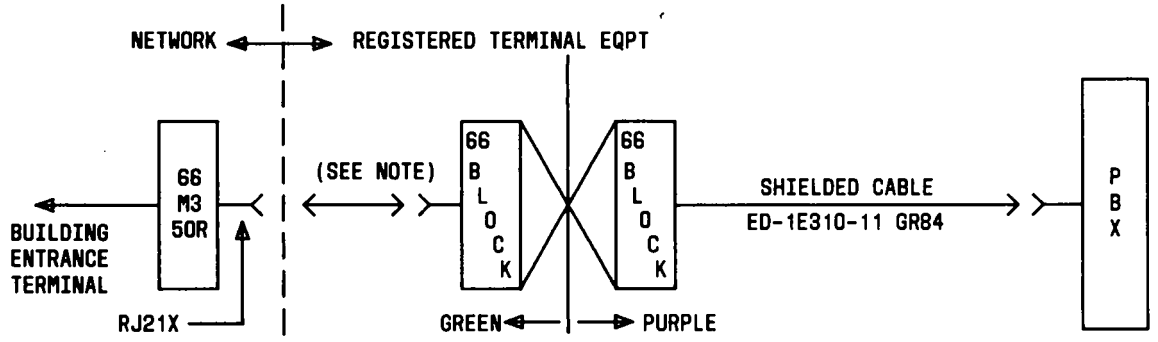
4.81 To comply with FCC technical requirements, the maximum allowed loop resistance to be used serving LC02-type and LC03-type, excluding terminal equipment, shall be less than 950 ohms. This applies to all FCC registered terminal equipment. It is required that the LC02B, LC03C, LC09D, and LC49C or LC41B vintage circuit packs be used in order to conform to the FCC criteria. Circuit packs with earlier vintage codes cannot be substituted in registered DIMENSION 400 PBXs. The grandfathered PBXs are not restricted by vintage of circuit pack codes. Only registered station sets, registered terminal equipment, equipment registered in conjunction with the DIMENSION PBX, or private line services may be connected to the LC02B and LC03B.

4.82 Systems shipping on or after October 1, 1983, must comply with FCC regulations (Part 15) pertaining to radio frequency interference (RFI). Controlled introduction of compliant systems will be made in advance of this date. The compliant systems will incorporate the following to become more resistant to RFI:

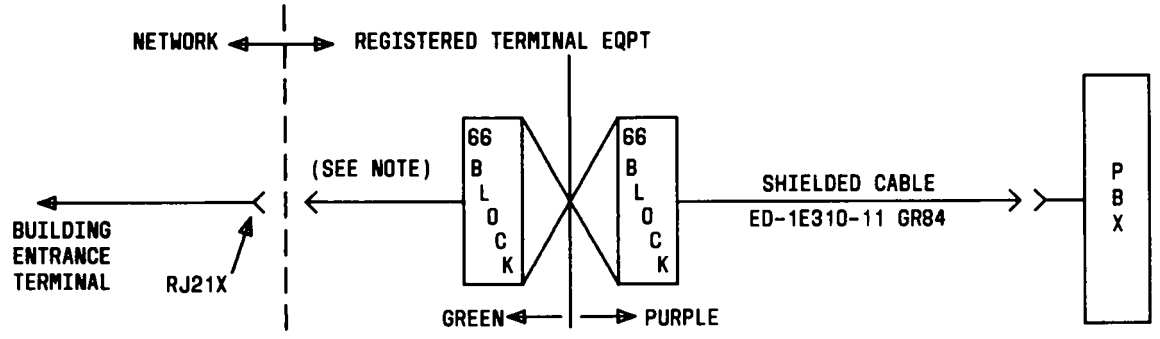
- Shielded cabinets



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



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



C. WITH MINIATURE RIBBON CONNECTOR ENDED CABLE

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

Fig. 21—Typical FCC Registered Equipment Interconnections

- Cables having drain wire shields with spade lug connectors which attach to mating connector field on back of cabinets
- RFI gasket on mating surfaces of cabinet panels which can be removed
- Conductive paint on cabinet surfaces which permanently mate
- Fasteners to secure cabinet doors in place
- Triaxial, 4-MHz, network-data cables.

4.83 DIMENSION 400 PBXs have a registration label affixed on the basic cabinet or the control carrier. Grandfathered PBXs do not have the registration label.

RESERVE POWER

4.84 If reserve power is to be used with the system, it will consist of the following, as illustrated in Fig. 22.

- Customer-provided load center (or panel board ITE EQ6 typical, or approved equivalent) equipped with circuit breakers
- 105E power plant equipped with rectifiers
- DEPENDAC* inverter—Inverter ordering codes are:

  1 kVA: D102 CAB-5174-319
  2 kVA: D202 CAB-5175-320

- −48 volt batteries
- Alarm circuits.

4.85 Minus 48 volts is connected to the PBX cabinets (00 and 01) by the reserve power plant discharge circuit through a filter in the PBX cabinet power supply. The filter output terminals are already connected to the proper power distribution terminals and require no modification. With J87342AA or J87342BB reserve power rectifiers, lead −48 RSV (A, B) is connected to the corresponding internal filter input terminal on the rectifier designated as terminal 1 on TB1. The associated ground lead GRD RSV (A, B) is connected to the corresponding cabinet ground block.

*Registered trademark of Reliance Electric Co.

A. Auxiliary Circuits

4.86 The −48 volts for auxiliary circuits is obtained from the 105E plant discharge circuit. The −48 volt rectifier in the auxiliary cabinet should not be used in systems with reserve power (Fig. 22). Auxiliary circuits requiring talking-grade battery, ie, noise below 34 dBrn C (34-dB reference noise; C=message weighting), require additional low-pass filtering of the 105E power plant discharge circuit output. The filter is suitable for −48V drains up to 8 amperes. The filter should be located close to the auxiliary circuit load. An example of a circuit requiring this filter is the loop signal repeater used as part of the customer premises facility terminal equipment.

4.87 The load center must be equipped with the following type thermal-magnetic circuit breakers (typical or approved equivalent):

- ITE QP1-B020 for each 105E rectifier
- ITE QP1-B030 for 1 kVA inverter
- ITE EE1-B040 for 2 kVA inverter. (See Note.)

Note: This is an E-type frame circuit breaker chosen to withstand inrush currents associated with the 2 kVA inverter and does not fit in the EQ6 load center. Use a NEMA-type enclosure (ITE-EE1), or order it with its enclosure as an assembly (ITE-EE1-B040-EE1).

4.88 The steady state input current values for various PBX units (at 120 Vac 60 Hz) are:

- One 105E power plant rectifier = 8.0A
- One (fully loaded) system cabinet (00 or 01) = 5.0A
- One ETC power supply (207A) = 2.0A
- One SMDR power supply (207B)—Printer version (direct output = 0.7A; 9-track tape version = 1.75A).

4.89 The various 105E power plant options required to be implemented are:

- Wired for negative battery

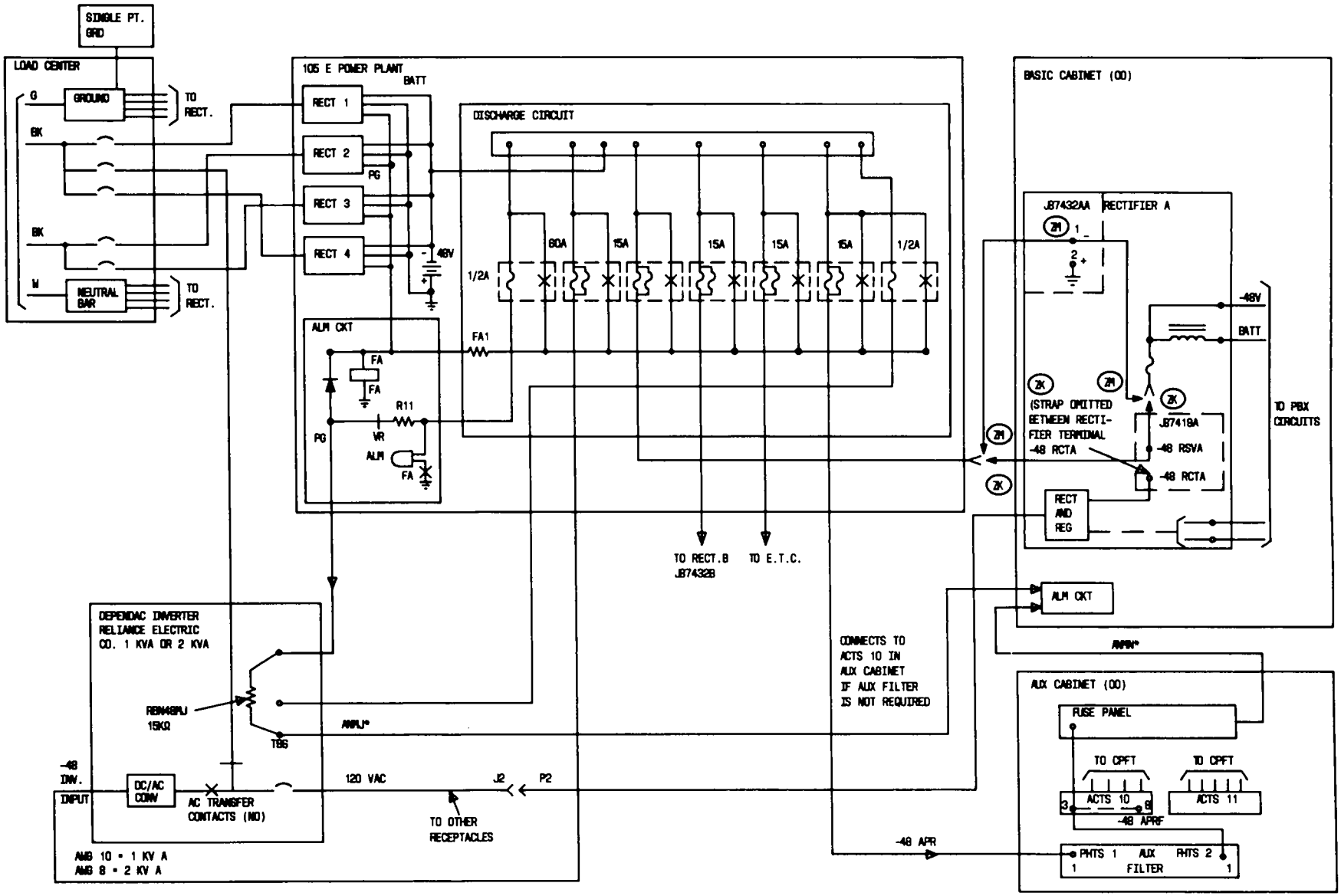


Fig. 22—Reserve Power—Block Diagram

- Without CEMF cell
- With alarm circuit
- With battery on PG lead to provide combined fuse and low voltage alarm on a single lead
- With rectifier PG lead multipled to originating discharge circuit FA1 alarm lead
- Without separation of discharge fuse alarms and control fuse alarms
- For normal continuous loads (without "A" option)
- Discharge ground insulated from framework
- With the rectifier wired for negative output (120 Vac/60 Hz) (ie, "+" terminal tied to battery discharge ground).

4.90 On reserve power installations, −48V direct current is provided to the inverter from the batteries via discharge fuses. Use 50A BUSS NON or equivalent for a 1 kVA inverter and 60A BUSS FRN (slow blow) or equivalent fuse for a 2 kVA inverter.

B. Startup

4.91 Choice of inverter size is determined by the start-up current of the PBX ferroresonant power supplies. Use the 1 kVA inverter for total start-up current up to 11 amperes. Use the 2 kVA inverter for total start-up current between 11 and 22 amperes. Use two inverters if start-up current exceeds 22 amperes. To calculate current:

- Cabinet 00—7.5A at startup for J87419A (MD) rectifier

  Cabinet 00—4.8A at startup for J87432AA rectifier

- Cabinet 01—7.1A at startup for J87419B (MD) rectifier

  Cabinet 01—4.8A at startup for J587432BB rectifier

- ETC—3.3A at startup
- SMDR—1.3A at startup.

If two inverters are to be provided, the outputs of each should never be connected together.

These values are to be used only to specify the size of the DEPENDAC inverter.

4.92 The −48 Vdc drains (in amperes) listed in Table H are used for calculating reserve power elements. Drains for units using −48V direct current are listed under "idle" and "active increment" headings in the table. Idle value is the minimum drain when all circuits in the unit are inactive. Active increment is the increase when all circuits in the unit are in use. Unit drain for all other voltages is expressed in terms of the −48V direct current from the battery plant required to generate them [which includes appropriate efficiencies and power factors associated with the inverter(s) and power supplies]. These values are listed under the heading, "equivalent −48 Vdc drain." Only one equivalent −48 Vdc drain is listed per carrier (corresponding to a fully equipped carrier) to indicate the maximum loading of the inverter for that carrier.

4.93 Idle and active increment drains listed for J58879BA trunk carrier in Table H are the maximum values ever to be expected and correspond to a carrier equipped with 32 tie trunks. If the ultimate configuration of a trunk carrier is known, the idle and active increment drains can be more closely determined by using Table I.

4.94 Idle and busy-hour battery drain levels may be determined as follows:

- Idle battery drain (total) = −48 Vdc idle drain + equivalent −48 Vdc drain.
- Busy-hour battery drain = derated −48 Vdc active increment + idle battery drain (total).
- Busy-hour increment for a line carrier having N active stations on a supplemental line carrier = 2.88 × N/64.

4.95 The number of 100 ampere-hour battery strings can be determined from the idle and busy-hour battery drains calculated by following standard power engineering procedures. The number of 11- or 15-ampere rectifiers provided as part of the 105E power plant should be such that they can carry

TABLE H

CURRENT DRAINS FOR CALCULATING RESERVE POWER ELEMENTS

GENERATOR AND FANS	-48V IDLE	-48V ACTIVE INCREMENT	EQUIVALENT -48V DRAIN	
			J87432	J87460
Frequency (Ring) Generator	—	—	2.1A	0.5
Fan Assembly	—	—	1.26A	2.26
UNITS SERVED BY PBX POWER SUPPLIES				
Control Carrier (CA)	—	—	11.4A	7.98
Trunk/Control Carrier (CC)	1.44	2.16	—	3.34
Trunk/Control Carrier (CC)	2.06	3.09	4.77	—
Basic Line Carrier (AA) (52 Lines)	0.04	2.48	2.0A	1.40
SUPP Line Carrier (AC) (64 Lines)	0.04	2.88	1.78A	1.25
Trunk Carrier (BA)	0.01	3.20	2.13A	1.49
Tape Minirecorder, MAAP, Alarm Panel	0.03	0.3	0.91A	0.64
One Attendant Console	0.05	0.2	—	—
AUXILIARY EQUIPMENT				
One Electronic TEL Controller (With 207A PWR Supply)	—	6.0	7.81A	—
SMDR With 207B PWR Supply	—	—	2.84A	—
SMDR Printer (When Operating)	—	—	3.65A	—
9-Track SMDR (Idle)	—	—	7.1A	—
9-Track SMDR (Tape in Motion)	—	—	12.2A	—
One Hotel/Motel Display Unit With 211A PWR Supply	—	—	0.15A	—
Customer Premises Facility Terminal (One Shelf)	0.6	0.2	—	—
Other *	—	—		—

* Multiply unit input volt-amperes by 0.035 to obtain equivalent -48V drain.

the full PBX load and also be able to replenish the batteries in the desired time interval.

UNINTERRUPTIBLE POWER SERVICE (UPS)

4.96 The uninterruptible power service provides for an alternate means of power holdover during times of power outage for basic and supplemental cabinets. Nominal holdover is 5 to 10 minutes duration, depending on the temperature, amount of battery backup supplied, and the current drain on the system. Nominal holdover is provided via the KS-21906, List 3 batteries (Fig. 23, Sheet 1). Extended holdover for the system is provided via the 105E power plant (Fig. 23, Sheet 2).

4.97 The associated equipment for UPS (Fig. 23) is as follows:

- ***J87460F***—Controlled ferroresonant rectifier/converter power supply for cabinet 00.

TABLE I

CURRENT DRAINS FOR VARIOUS CIRCUIT PACKS FOR CALCULATING TOTAL CURRENT DRAIN (SEE NOTE)

CP NAME	CP CODE	AMPs PER CP	X	NO. OF CPs	=	−48V IDLE DRAIN
Dual DID TRK	LC09D	0.013	X		=	
Dual AUX TRK	LC13B	0.034	X		=	
AIOD Transmitter	LC32B	0.2	X	1*	=	
Network Buffer A	LC49C	0.012	X	1†	=	0.012
TT Receiver	LC54B	0.04	X		=	———
TT RCVR and REG CKT	LC10C	0.04	X		=	
				Total −48V Idle Drain	=	
CP NAME	CP CODE	AMPs PER CP	X	NO. OF CPs	=	−48V ACTIVE INCREMENT
Dual DID TRK	LC09D	0.140	X		=	
Dual Tie TRK	LC11B	0.2	X		=	———
				Total −48V ACT INCRE Drain	=	

Note: If a circuit pack is not listed, there is no drain for that circuit.

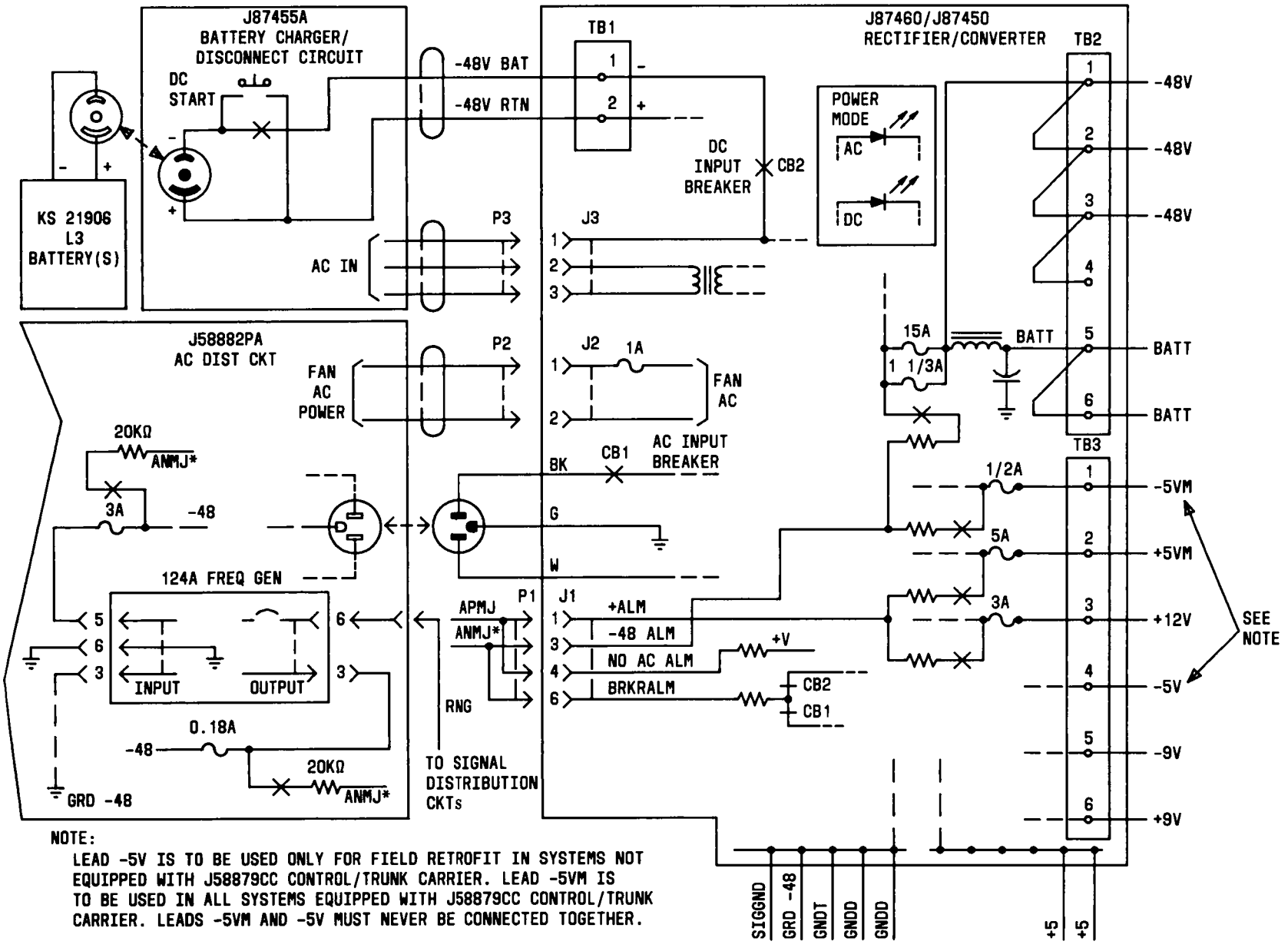
* Optional - One per PBX maximum.
† One always required per carrier.

- ***J87460B***—Controlled ferroresonant rectifier/converter power supply for cabinet 01.
- ***J87455A, List 1***—Charging unit.
- ***KS-21906, List 3***—Lead acid batteries.
- ***J58879JA-1, Lists 2, 4, and 5***—AC power distribution, 124A frequency generator, and fan assembly.

CABLING

4.98 Circuits in the PBX cabinets are connected to the lines, trunks, console(s), etc, via connector cables using KS-type plugs. These cables are then cut down on the cross-connect field. They may be ordered via the Mechanized Ordering Form (E-8124). Some special cables (flat and shielded types) are used for high frequency data channels and carrier-to-carrier cabling.

4.99 The console mounting cord is a 12-pair cable 2440 mm (8 feet) long and can be plugged directly into the appropriate carrier connector in the cabinet. If the console is to be located more than 2440 mm (8 feet) from the cabinet and a double-ended cable can be used, a B25A cable should be specified to connect the console to the cabinet. If a stub-ended cable is required to connect the console to the cross-connect field, an A25B cable should be specified. Refer to Table J for receptacle or plug selection per cable.



NOTE:
LEAD -5V IS TO BE USED ONLY FOR FIELD RETROFIT IN SYSTEMS NOT EQUIPPED WITH J58879CC CONTROL/TRUNK CARRIER. LEAD -5VM IS TO BE USED IN ALL SYSTEMS EQUIPPED WITH J58879CC CONTROL/TRUNK CARRIER. LEADS -5VM AND -5V MUST NEVER BE CONNECTED TOGETHER.

Fig. 23—Uninterruptible Power Service (Sheet 1 of 2)

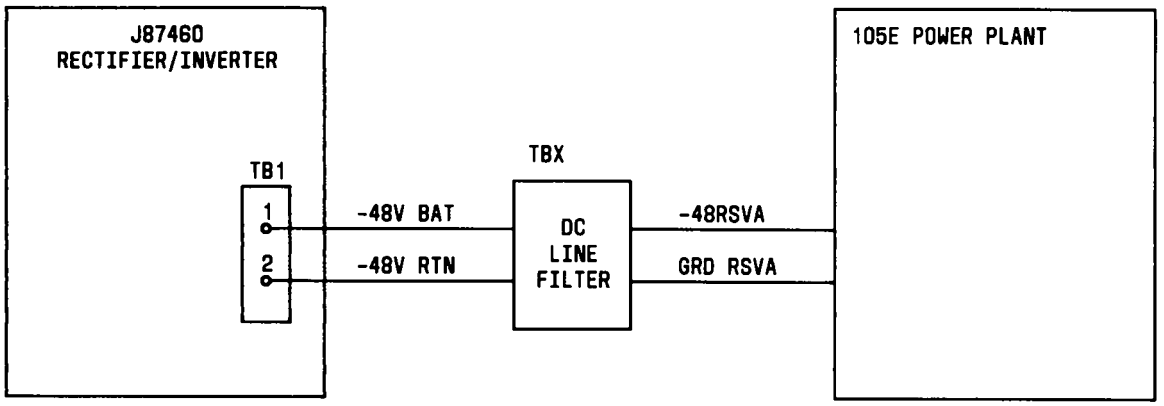


Fig. 23—Uninterruptible Power Service (Sheet 2 of 2)

TABLE J

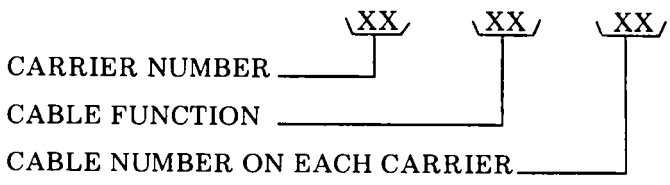
RECEPTACLE/PLUG SELECTION FOR SPECIFIED CABLES

CABLE	RECEPTACLE	PLUG
A25B	KS-16690, Lists 1 & 12 or KS-21442, List 2	
A25D		KS-16689, Lists 3 & 18 or KS-21443, List 2
B25A	KS-16690, Lists 1 & 12 or KS-21442, List 2	KS-16689, Lists 3 & 18 or KS-21443, List 2

The console power, voice, and data are provided over a 12-pair cable for a range of 210m (700 feet). A 25-pair cable extends the maximum range to 300m (1,000 feet). A console can be located 1520m (5,000 feet) from the PBX only if two attendant console repeaters are used, and can be extended to a maximum of 3350m (11,000 feet) using a total of four repeaters.

4.100 For connections from the cabinet to the cross-connect field, A25D cables should be specified. A 1.2-m to 1.5-m (4-foot to 5-foot) drape should be left in the cables between the cabinet and the point where the cables are clamped to the wall.

4.101 The cables and carrier connectors (Fig. 24) are designated by carrier number, cable function, and cable number as follows:



Note: Tables K through DD identify the cable connector terminals and show the associated circuit packs in addition to their position slots in the carriers. Table Y identifies the TCX01, TCX02, and TCX03 cable connector terminals associated with the J58879CC trunk/control carrier.

(a) ***Carrier Number:*** Assigned sequentially for each type of carrier in the system. In a 2-cabinet system, there may be a maximum of seven line carriers numbered 00 through 06 and a maximum of four trunk carriers numbered 00 through 03. One control carrier and the cables from this carrier do not have the carrier number specified.

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

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

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

- AX—From 01 through 03
- LX—From 01 through 03
- CA—From 01 through 04
- TX—From 01 through 04
- TCX—From 01 through 03
- CX—From 01 through 05.

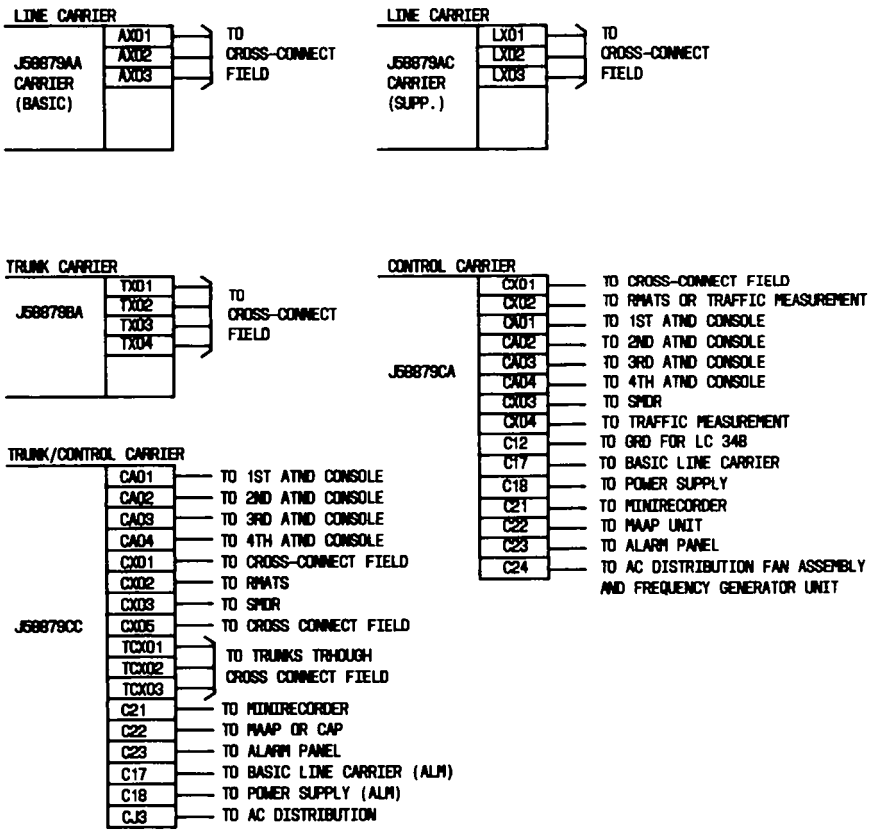


Fig. 24—Cable Plan to Cross-Connect Field

TABLE K

CONNECTOR CABLE LX01 J58879AC SUPPLEMENTAL LINE PORT CARRIER

CONNECTOR CABLE		CONN BLK	CP SLOT	CP LC02B	CP LC03C
PIN NO.	COLOR CODE	TERM. NO.	LOC NO.	LEAD DESIG (NOTE)	LEAD DESIG
26	W-BL	1		T0	T0
1	BL-W	2		R0	R0
27	W-O	3		T1	T1
2	O-W	4	02	R1	R1
28	W-G	5		T2	T2
3	G-W	6		R2	R2
29	W-BR	7		T3	T3
4	BR-W	8		R3	R3
30	W-S	9		T0	T0
5	S-W	10		R0	R0
31	R-BL	11		T1	T1
6	BL-R	12	03	R1	R1
32	R-O	13		T2	T2
7	O-R	14		R2	R2
33	R-G	15		T3	T3
8	G-R	16		R3	R3
34	R-BR	17		T0	T0
9	BR-R	18		R0	R0
35	R-S	19		T1	T1
10	S-R	20	04	R1	R1
36	BK-BL	21		T2	T2
11	BL-BK	22		R2	R2
37	BK-O	23		T3	T3
12	O-BK	24		R3	R3
38	BK-G	25		T0	T0
13	G-BK	26		R0	R0
39	BK-BR	27		T1	T1
14	BR-BK	28	05	R1	R1
40	BK-S	29		T2	T2
15	S-BK	30		R2	R2
41	Y-BL	31		T3	T3
16	BL-Y	32		R3	R3
42	Y-O	33		T0	T0
17	O-Y	34		R0	R0
43	Y-G	35		T1	T1
18	G-Y	36	06	R1	R1
44	Y-BR	37		T2	T2
19	BR-Y	38		R2	R2
45	Y-S	39		T3	T3
20	S-Y	40		R3	R3
46	V-BL	41		T0	T0
21	BL-V	42		R0	R0
47	V-O	43		T1	T1
22	O-V	44	07	R1	R1
48	V-G	45		T2	T2
23	G-V	46		R2	R2
49	V-BR	47		T3	T3
24	BR-V	48		R3	R3
50	V-S	49			
25	S-V	50			

Note: In hotel/motel applications, LC02B is replaced by LC03C when message waiting is required.

TABLE L

CONNECTOR CABLE LX02 J58879AC SUPPLEMENTAL LINE PORT CARRIER

CONNECTOR CABLE		CONN BLK	CP SLOT	CP LC02B	CP LC03C
PIN NO.	COLOR CODE	TERM. NO.	LOC NO.	LEAD DESIG (NOTE)	LEAD DESIG
26	W-BL	1		T0	T0
1	BL-W	2		R0	R0
27	W-O	3		T1	T1
2	O-W	4	08	R1	R1
28	W-G	5		T2	T2
3	G-W	6		R2	R2
29	W-BR	7		T3	T3
4	BR-W	8		R3	R3
30	W-S	9		T0	T0
5	S-W	10		R0	R0
31	R-BL	11		T1	T1
6	BL-R	12	09	R1	R1
32	R-O	13		T2	T2
7	O-R	14		R2	R2
33	R-G	15		T3	T3
8	G-R	16		R3	R3
34	R-BR	17		T0	T0
9	BR-R	18		R0	R0
35	R-S	19		T1	T1
10	S-R	20	11	R1	R1
36	BK-BL	21		T2	T2
11	BL-BK	22		R2	R2
37	BK-O	23		T3	T3
12	O-BK	24		R3	R3
38	BK-G	25		T0	T0
13	G-BK	26		R0	R0
39	BK-BR	27		T1	T1
14	BR-BK	28	12	R1	R1
40	BK-S	29		T2	T2
15	S-BK	30		R2	R2
41	Y-BL	31		T3	T3
16	BL-Y	32		R3	R3
42	Y-O	33		T0	T0
17	O-Y	34		R0	R0
43	Y-G	35		T1	T1
18	G-Y	36	13	R1	R1
44	Y-BR	37		T2	T2
19	BR-Y	38		R2	R2
45	Y-S	39		T3	T3
20	S-Y	40		R3	R3
46	V-BL	41		T0	T0
21	BL-V	42		R0	R0
47	V-O	43		T1	T1
22	O-V	44	14	R1	R1
48	V-G	45		T2	T2
23	G-V	46		R2	R2
49	V-BR	47		T3	T3
24	BR-V	48		R3	R3
50	V-S	49			
25	S-V	50			

Note: In hotel/motel applications, LC02B is replaced by LC03C when message waiting is required.

TABLE M

CONNECTOR CABLE LX03 J58879AC SUPPLEMENTAL LINE PORT CARRIER

CONNECTOR CABLE		CONN BLK	CP SLOT	CP LC02B	CP LC03C
PIN NO.	COLOR CODE	TERM. NO.	LOC NO.	LEAD DESIG (NOTE)	LEAD DESIG
26	W-BL	1	15	T0	T0
1	BL-W	2		R0	R0
27	W-O	3		T1	T1
2	O-W	4		R1	R1
28	W-G	5		T2	T2
3	G-W	6		R2	R2
29	W-BR	7		T3	T3
4	BR-W	8		R3	R3
30	W-S	9	16	T0	T0
5	S-W	10		R0	R0
31	R-BL	11		T1	T1
6	BL-R	12		R1	R1
32	R-O	13		T2	T2
7	O-R	14		R2	R2
33	R-G	15		T3	T3
8	G-R	16		R3	R3
34	R-BR	17	17	T0	T0
9	BR-R	18		R0	R0
35	R-S	19		T1	T1
10	S-R	20		R1	R1
36	BK-BL	21		T2	T2
11	BL-BK	22		R2	R2
37	BK-O	23		T3	T3
12	O-BK	24		R3	R3
38	BK-G	25	18	T0	T0
13	G-BK	26		R0	R0
39	BK-BR	27		T1	T1
14	BR-BK	28		R1	R1
40	BK-S	29		T2	T2
15	S-BK	30		R2	R2
41	Y-BL	31		T3	T3
16	BL-Y	32		R3	R3
42	Y-O	33			
17	O-Y	34			
43	Y-G	35			
18	G-Y	36			
44	Y-BR	37			
19	BR-Y	38			
45	Y-S	39			
20	S-Y	40			
46	V-BL	41			
21	BL-V	42			
47	V-O	43			
22	O-V	44			
48	V-G	45			
23	G-V	46			
49	V-BR	47			
24	BR-V	48			
50	V-S	49			
25	S-V	50			

Note: In hotel/motel applications, LC02B is replaced by LC03C when message waiting is required.

CROSS-CONNECTIONS

A. Cross-Connect Field

4.102 Figure 25 shows a typical cross-connect field layout for a DIMENSION 400 PBX (ten carriers, two cabinets, and an auxiliary cabinet). The size of the cross-connect field will vary depending on the size and options used (ie, the number of lines or if key or auxiliary equipment is used). Refer to ED-1E365-( ) for information on labeling wall backboards.

4.103 Colored 183-type backboards are used on the cross-connect field to identify the types of circuits to be terminated at the various positions. The recommended 66-type connecting blocks are identified with the system cables which terminate on the blocks. Backboard colors and type of circuits terminated are as follows:

Green (183B2)	Central office trunk sets
Blue (183B1)	Station line sets
Red (183B3)	Key and ECTS equipment
Yellow (183B5)	Miscellaneous circuits and equipment
Purple (183B4)	DIMENSION PBX circuits and equipment (line/trunk)

4.104 White 187B1 or 196A backboards, having stand-off type distribution rings, are used to separate the fields into upper and lower bands and are intended for use when wiring and cross-connecting the various connecting blocks.

B. Emergency Transfer

4.105 Prewired 609-type interface panels may be used to provide connections to emergency transfer facilities. A maximum of ten 609-type panels can be used in the DIMENSION 400 PBX for emergency transfer. Each 609-type panel contains apparatus for transferring ten stations to ten CO cable pairs during power failure or major alarm conditions. Refer to Section 5.2 of the PBX Ordering Form (E-8124) for a typical layout for ordering purposes. The panels should be mounted in the cross-connect field, as shown in Fig. 25, for ease of cross-connecting to the circuits. Worksheet 1 is provided to be filled in

TABLE N

CONNECTOR CABLE AX01 J58879AA BASIC LINE AND ATTENDANT PORT CARRIER

CONNECTOR CABLE		CONN BLK TERM NO.	CP SLOT LOCATION NO.	CP LC04 OR LC204 LEAD DESIG (NOTE 1)	CP LC05B LEAD DESIG (NOTE 2)	CP LC45 LEAD DESIG	CP LC02B LEAD DESIG	CP LC03C LEAD DESIG	CP LC17B LEAD DESIG	REMARKS
PIN NO.	COLOR CODE									
26	W-BL	1	02	T00						Leads used for recorded telephone dictation, AUX. TRK., conference register, and contact interface ckt. (SD-1E446-01)
1	BL-W	2								
27	W-O	3	03							
2	O-W	4		T10	T10					
28	W-G	5	04			T0	T0	T0		Stations are unavailable when LC45s for attendant consoles are used. LC03Cs are required for message waiting stations rather than LC02B.
3	G-W	6				R0	R0	R0		
29	W-BR	7				T1	T1	T1		
4	BR-W	8				R1	R1	R1		
30	W-S	9				T2	T2	T2		
5	S-W	10				R2	R2	R2		
31	R-BL	11				T3	T3	T3		
6	BL-R	12				R3	R3	R3		
32	R-O	13	05			T0	T0	T0		
7	O-R	14				R0	R0	R0		
33	R-G	15				T1	T1	T1		
8	G-R	16				R1	R1	R1		
34	R-BR	17				T2	T2	T2		
9	BR-R	18				R2	R2	R2		
35	R-S	19				T3	T3	T3		
10	S-R	20				R3	R3	R3		
36	BK-BL	21	06				T0	T0		
11	BL-BK	22					R0	R0		
37	BK-O	23					T1	T1		
12	O-BK	24					R1	R1		
38	BK-G	25					T2	T2		
13	G-BK	26					R2	R2		
39	BK-BR	27					T3	T3		
14	BR-BK	28					R3	R3		
40	BK-S	29	07				T0	T0		
15	S-BK	30					R0	R0		
41	Y-BL	31					T1	T1	T1	One LC17B only for code calling access
16	BL-Y	32					R1	R1	R1	
42	Y-O	33					T2	T2	T2	
17	O-Y	34					R2	R2	R2	
43	Y-G	35					T3	T3	T3	
18	G-Y	36					R3	R3	R3	
44	Y-BR	37	08				T0	T0		
19	BR-Y	38					R0	R0		
45	Y-S	39					T1	T1		
20	S-Y	40					R1	R1		
46	V-BL	41					T2	T2		
21	BL-V	42					R2	R2		
47	V-O	43					T3	T3		
22	O-V	44					R3	R3		
48	V-G	45								
23	G-V	46								
49	V-BR	47								
24	BR-V	48								
50	V-S	49								
25	S-V	50								

NOTES:
1. LC204 REPLACES LC04(MD). THE T10 LEAD IS FURNISHED BY LC204 ONLY.
2. LC05B(MD) MUST BE REMOVED WHEN LC204 IS PROVIDED IN SLOT 2.

TABLE O

CONNECTOR CABLE AX02 J58879AA BASIC LINE AND ATTENDANT PORT CARRIER

CONNECTOR CABLE		CONN BLK TERM. NO.	CP SLOT LOC NO.	CP LC02B LEAD DESIG	CP LC03C LEAD DESIG
PIN NO.	COLOR CODE				
26	W-BL	1	09	T0	T0
1	BL-W	2		R0	R0
27	W-O	3		T1	T1
2	O-W	4		R1	R1
28	W-G	5		T2	T2
3	G-W	6		R2	R2
29	W-BR	7		T3	T3
4	BR-W	8		R3	R3
30	W-S	9	11	T0	T0
5	S-W	10		R0	R0
31	R-BL	11		T1	T1
6	BL-R	12		R1	R1
32	R-O	13		T2	T2
7	O-R	14		R2	R2
33	R-G	15		T3	T3
8	G-R	16		R3	R3
34	R-BR	17	12	T0	T0
9	BR-R	18		R0	R0
35	R-S	19		T1	T1
10	S-R	20		R1	R1
36	BK-BL	21		T2	T2
11	BL-BK	22		R2	R2
37	BK-O	23		T3	T3
12	O-BK	24		R3	R3
38	BK-G	25	13	T0	T0
13	G-BK	26		R0	R0
39	BK-BR	27		T1	T1
14	BR-BK	28		R1	R1
40	BK-S	29		T2	T2
15	S-BK	30		R2	R2
41	Y-BL	31		T3	T3
16	BL-Y	32		R3	R3
42	Y-O	33	14	T0	T0
17	O-Y	34		R0	R0
43	Y-G	35		T1	T1
18	G-Y	36		R1	R1
44	Y-BR	37		T2	T2
19	BR-Y	38		R2	R2
45	Y-S	39		T3	T3
20	S-Y	40		R3	R3
46	V-BL	41	15	T0	T0
21	BL-V	42		R0	R0
47	V-O	43		T1	T1
22	O-V	44		R1	R1
48	V-G	45		T2	T2
23	G-V	46		R2	R2
49	V-BR	47		T3	T3
24	BR-V	48		R3	R3
50	V-S	49			
25	S-V	50			

TABLE P

CONNECTOR CABLE AX03 J58879AA BASIC LINE AND ATTENDANT PORT CARRIER

CONNECTOR CABLE		CONN BLK TERM. NO.	CP SLOT LOC NO.	CP LC02B LEAD DESIG	CP LC03C LEAD DESIG
PIN NO.	COLOR CODE				
26	W-BL	1	16	T0	T0
1	BL-W	2		R0	R0
27	W-O	3		T1	T1
2	O-W	4		R1	R1
28	W-G	5		T2	T2
3	G-W	6		R2	R2
29	W-BR	7		T3	T3
4	BR-W	8		R3	R3
30	W-S	9	17	T0	T0
5	S-W	10		R0	R0
31	R-BL	11		T1	T1
6	BL-R	12		R1	R1
32	R-O	13		T2	T2
7	O-R	14		R2	R2
33	R-G	15		T3	T3
8	G-R	16		R3	R3
34	R-BR	17	18	T0	T0
9	BR-R	18		R0	R0
35	R-S	19		T1	T1
10	S-R	20		R1	R1
36	BK-BL	21		T2	T2
11	BL-BK	22		R2	R2
37	BK-O	23		T3	T3
12	O-BK	24		R3	R3
38	BK-G	25			
13	G-BK	26			
39	BK-BR	27			
14	BR-BK	28			
40	BK-S	29			
15	S-BK	30			
41	Y-BL	31			
16	BL-Y	32			
42	Y-O	33			
17	O-Y	34			
43	Y-G	35			
18	G-Y	36			
44	Y-BR	37			
19	BR-Y	38			
45	Y-S	39			
20	S-Y	40			
46	V-BL	41			
21	BL-V	42			
47	V-O	43			
22	O-V	44			
48	V-G	45			
23	G-V	46			
49	V-BR	47			
24	BR-V	48			
50	V-S	49			
25	S-V	50			

TABLE Q

CONNECTOR CABLE CA01 J58879CA OR J58879CC ATTENDANT POSITION 0

CONNECTOR CABLE PIN NO.	CONNECTOR CABLE COLOR CODE	CONN BLK TERM NO.	CP SLOT LOCATION NO.	LEAD DESIG (NOTE)	REMARKS
26	W-BL	1		IOXA0	Transmit and receive leads of LC34B or LC366
1	BL-W	2	30 OR 30/33	IOXB0	
27	W-O	3		IORA0	
2	O-W	4		IORB0	
28	W-G	5		T 0040	CKT 0 of LC45 located on slot 04 of basic line carrier
3	G-W	6		R 0040	
29	W-BR	7		T1 0040	
4	BR-W	8		R1 0040	
30	W-S	9		GRDCF	
5	S-W	10		GRDCF	
31	R-BL	11		AMN*	
6	BL-R	12		AMJ*	
32	R-O	13		+5C1/CSL	
7	O-R	14		-48 C1RES	
33	R-G	15		GRD-48	
8	G-R	16		-48C1/C5	
34	R-BR	17		GRD-48	
9	BR-R	18		-48C1/C5	
35	R-S	19		GRD-48	
10	S-R	20		-48C1/C5	
36	BK-BL	21		GRD-48	
11	BL-BK	22		-48C1/C5	
37	BK-O	23		GRD-48	
12	O-BK	24		-48C1/C5	
38	BK-G	25		GRD-48	
13	G-BK	26		-48C1/C5	
39	BK-B	27		GRD-48	
14	BR-BK	28		-48C1/C5	
40	BK-S	29		GRD-48	
15	S-BK	30		-48C1/C5	
41	Y-BL	31		GRD-48	
16	BL-Y	32		-48C1/C5	
42	Y-O	33		GRD-48	
17	O-Y	34		-48C1/C5	
43	Y-G	35		GRD-48	
18	G-Y	36		-48C1/C5	
44	Y-BR	37		GRD-48	
19	BR-Y	38		-48C1/C5	
45	Y-S	39		GRD-48	
20	S-Y	40		-48C1/C5	
46	V-BL	41		GRD-48	
21	BL-V	42		-48C1/C5	
47	V-O	43		GRD-48	
22	O-V	44		-48C1/C5	
48	V-G	45		GRD-48	
23	G-V	46		-48C1/C5	
49	V-BR	47		GRD-48	
24	BR-V	48		-48C1/C5	
50	V-S	49		GRD-48	
25	S-V	50		-48C1/C5	

Note: The +5C1 and −48C1 leads become +5CSL and −48C5, respectively. In the J58879CC carrier.

TABLE R

CONNECTOR CABLE CA02 J58879CA OR J58879CC ATTENDANT POSITION 1

CONNECTOR CABLE PIN NO.	CONNECTOR CABLE COLOR CODE	CONN BLK TERM NO.	CP SLOT LOCATION NO.	LEAD DESIG (NOTE)	REMARKS
26	W-BL	1		IOXA1	Transmit and receive leads of LC34B or LC366
1	BL-W	2	30 OR 30/33	IOXB1	
27	W-O	3		IORA1	
2	O-W	4		IORB1	
28	W-G	5		T 0041	CKT 1 of LC45 located on slot 04 of basic line carrier
3	G-W	6		R 0041	
29	W-BR	7		T1 0041	
4	BR-W	8		R1 0041	
30	W-S	9		GRDCF	
5	S-W	10		GRDCF	
31	R-BL	11		AMN*	
6	BL-R	12		AMJ*	
32	R-O	13		+5C1/CSL	
7	O-R	14		-48 C2RES	
33	R-G	15		GRD-48	
8	G-R	16		-48C2/C6	
34	R-BR	17		GRD-48	
9	BR-R	18		-48C2/C6	
35	R-S	19		GRD-48	
10	S-R	20		-48C2/C6	
36	BK-BL	21		GRD-48	
11	BL-BK	22		-48C2/C6	
37	BK-O	23		GRD-48	
12	O-BK	24		-48C2/C6	
38	BK-G	25		GRD-48	
13	G-BK	26		-48C2/C6	
39	BK-BR	27		GRD-48	
14	BR-BK	28		-48C2/C6	
40	BK-S	29		GRD-48	
15	S-BK	30		-48C2/C6	
41	Y-BL	31		GRD-48	
16	BL-Y	32		-48C2/C6	
42	Y-O	33		GRD-48	
17	O-Y	34		-48C2/C6	
43	Y-G	35		GRD-48	
18	G-Y	36		-48C2/C6	
44	Y-BR	37		GRD-48	
19	BR-Y	38		-48C2/C6	
45	Y-S	39		GRD-48	
20	S-Y	40		-48C2/C6	
46	V-BL	41		GRD-48	
21	BL-V	42		-48C2/C6	
47	V-O	43		GRD-48	
22	O-V	44		-48C2/C6	
48	V-G	45		GRD-48	
23	G-V	46		-48C2/C6	
49	V-BR	47		GRD-48	
24	BR-V	48		-48C2/C6	
50	V-S	49		GRD-48	
25	S-V	50		-48C2/C6	

Note: The +5C1 and −48C2 leads become +5CSL and −48C6, respectively. In the J58879CC carrier.

TABLE S

CONNECTOR CABLE CA03 J58879CA OR J58879CC
ATTENDANT POSITION 2

CONNECTOR CABLE		CONN BLK TERM NO.	CP SLOT LOCATION NO.	LEAD DESIG (NOTE)	REMARKS
PIN NO.	COLOR CODE				
26	W-BL	1	31 OR 31/34	IOXA2	Transmit and receive leads of LC34B or LC366
1	BL-W	2		IOXB2	
27	W-O	3		IORA2	
2	O-W	4		IORB2	
28	W-G	5		T 0050	CKT 0 of LC45 on basic line carrier slot 05
3	G-W	6		R 0050	
29	W-BR	7		T1 0050	
4	BR-W	8		R1 0050	
30	W-S	9		GRDCF	
5	S-W	10		GRDCF	
31	R-BL	11		AMN*	
6	BL-R	12		AMJ*	
32	R-O	13		+5C1/CSL	
7	O-R	14		-48 C3RES	
33	R-G	15		GRD-48	
8	G-R	16		-48C3/C7	
34	R-BR	17		GRD-48	
9	BR-R	18		-48C3/C7	
35	R-S	19		GRD-48	
10	S-R	20		-48C3/C7	
36	BK-BL	21		GRD-48	
11	BL-BK	22		-48C3/C7	
37	BK-O	23		GRD-48	
12	O-BK	24		-48C3/C7	
38	BK-G	25		GRD-48	
13	G-BK	26		-48C3/C7	
39	BK-BR	27		GRD-48	
14	BR-BK	28		-48C3/C7	
40	BK-S	29		GRD-48	
15	S-BK	30		-48C3/C7	
41	Y-BL	31		GRD-48	
16	BL-Y	32		-48C3/C7	
42	Y-O	33		GRD-48	
17	O-Y	34		-48C3/C7	
43	Y-G	35		GRD-48	
18	G-Y	36		-48C3/C7	
44	Y-BR	37		GRD-48	
19	BR-Y	38		-48C3/C7	
45	Y-S	39		GRD-48	
20	S-Y	40		-48C3/C7	
46	V-BL	41		GRD-48	
21	BL-V	42		-48C/C7	
47	V-O	43		GRD-48	
22	O-V	44		-48C3/C7	
48	V-G	45		GRD-48	
23	G-V	46		-48C3/C7	
49	V-BR	47		GRD-48	
24	BR-V	48		-48C3/C7	
50	V-S	49		GRD-48	
25	S-V	50		-48C3/C7	

NOTE: THE +5C1 AND -48C3 LEADS BECOME +5CSL AND -48C7, RESPECTIVELY, IN THE J58879CC CARRIER.

TABLE T

CONNECTOR CABLE CA04 J58879CA OR J58879CC
ATTENDANT POSITION 3

CONNECTOR CABLE		CONN BLK TERM NO.	CP SLOT LOCATION NO.	LEAD DESIG (NOTE)	REMARKS
PIN NO.	COLOR CODE				
26	W-BL	1	31 OR 31/34	IOXA3	Transmit and receive leads of LC34B or LC366
1	BL-W	2		IOXB3	
27	W-O	3		IORA3	
2	O-W	4		IORA3	
28	W-G	5		T 0051	CKT 1 of LC45 on basic line carrier slot 05
3	G-W	6		R 0051	
29	W-BR	7		T1 0051	
4	BR-W	8		R1 0051	
30	W-S	9		GRDCF	
5	S-W	10		GRDCF	
31	R-BL	11		AMN*	
6	BL-R	12		AMJ*	
32	R-O	13		+5C1/CSL	
7	O-R	14		-48 C4RES	
33	R-G	15		GRD-48	
8	G-R	16		-48C4/C8	
34	R-BR	17		GRD-48	
9	BR-R	18		-48C4/C8	
35	R-S	19		GRD-48	
10	S-R	20		-48C4/C8	
36	BK-BL	21		GRD-48	
11	BL-BK	22		-48C4/C8	
37	BK-O	23		GRD-48	
12	O-BK	24		-48C4/C8	
38	BK-G	25		GRD-48	
13	G-BK	26		-48C4/C8	
39	BK-BR	27		GRD-48	
14	BR-BK	28		-48C4/C8	
40	BK-S	29		GRD-48	
15	S-BK	30		-48C4/C8	
41	Y-BL	31		GRD-48	
16	BL-Y	32		-48C4/C8	
42	Y-O	33		GRD-48	
17	O-Y	34		-48C4/C8	
43	Y-G	35		GRD-48	
18	G-Y	36		-48C4/C8	
44	Y-BR	37		GRD-48	
19	BR-Y	38		-48C4/C8	
45	Y-S	39		GRD-48	
20	S-Y	40		-48C4/C8	
46	V-BL	41		GRD-48	
21	BL-V	42		-48C4/C8	
47	V-O	43		GRD-48	
22	O-V	44		-48C4/C8	
48	V-G	45		GRD-48	
23	G-V	46		-48C4/C8	
49	V-BR	47		GRD-48	
24	BR-V	48		-48C4/C8	
50	V-S	49		GRD-48	
25	S-V	50		-48C4/C8	

NOTE: THE +5C1 AND -48C4 LEADS BECOME +5CSL AND -48C8, RESPECTIVELY, IN THE J58879CC CARRIER.

TABLE U

CONNECTOR CABLE TX01 J58879BA TRUNK PORT CARRIER

CONNECTOR CABLE		CONN BLK	CP	CP	CP	CP	CP	CP	CP
PIN NO.	COLOR CODE	TERM NO.	SLOT LOCATION NO.	LC08D OR LC09D LEAD DESIG	LC11B LEAD DESIG	LC13B LEAD DESIG	LC16B LEAD DESIG	LC15 LEAD DESIG	LC361 LEAD DESIG
26	W-BL	1		T-0	T1-0	T-0	M-0	CID/0-3/020	T-0
1	BL-W	2		R-0	R1-0	R-0		CIG/0-3/020	R-0
27	W-O	3		T-1	T-0	AL1-0	M-1	CID/0-3/021	T-1
2	O-W	4		R-1	R-0	S2-0		CIG/0-3/021	R-1
28	W-G	5			E-0	C0-0	M-2	CID/0-3/022	
3	G-W	6			M-0			CIG/0-3/022	
29	W-BR	7			T1-1	T-1	M-3	CID/0-3/023	
4	BR-W	8	02		R1-1	R-1		CIG/0-3/023	
30	W-S	9			T-1	AL1-1	M-4	CID/0-3/024	
5	S-W	10			R-1	S2-1		CIG/0-3/024	
31	R-BL	11			E-1	C0-1	M-5	CID/0-3/025	
6	BL-R	12			M-1			CIG/0-3/025	T10
32	R-O	13					M-6	CID/0-3/026	
7	O-R	14						CIG/0-3/026	
33	R-G	15					M-7	CID/0-3/027	
8	G-R	16						CIG/0-3/027	
34	R-BR	17		T-0	T1-0	T-0	M-0	CID/0-3/030	T-0
9	BR-R	18		R-0	R1-0	R-0		CIG/0-3/030	R-0
35	R-S	19		T-1	T-0	AL1-0	M-1	CID/0-3/031	T-1
10	S-R	20		R-1	R-0	S2-0		CIG/0-3/031	R-1
36	BK-BL	21			E-0	C0-0	M-2	CID/0-3/032	
11	BL-BK	22			M-0			CIG/0-3/032	
37	BK-O	23			T1-1	T-1	M-3	CID/0-3/033	
12	O-BK	24			R1-1	R-1		CIG/0-3/033	
38	BK-G	25	03		T-1	AL1-1	M-4	CID/0-3/034	
13	G-BK	26			R-1	S2-1		CIG/0-3/034	
39	BK-BR	27			E-1	C0-1	M-5	CID/0-3/035	
14	BR-BK	28			M-1			CIG/0-3/035	T10
40	BK-S	29					M-6	CID/0-3/036	
15	S-BK	30						CIG/0-3/036	
41	Y-BL	31					M-7	CID/0-3/037	
16	BL-Y	32						CIG/0-3/037	
42	Y-O	33		T-0	T1-0	T-0	M-0	CID/0-3/040	T-0
17	O-Y	34		R-0	R1-0	R-0		CIG/0-3/040	R-0
43	Y-G	35		T-1	T-0	AL1-0	M-1	CID/0-3/041	T-1
18	G-Y	36		R-1	R-0	S2-0		CIG/0-3/041	R-1
44	Y-BR	37			E-0	C0-0	M-2	CID/0-3/042	
19	BR-Y	38			M-0			CIG/0-3/042	
45	Y-S	39			T1-1	T-1	M-3	CID/0-3/043	
20	S-Y	40	04		R1-1	R-1		CIG/0-3/043	
46	V-BL	41			T-1	AL1-1	M-4	CID/0-3/044	
21	BL-V	42			R-1	S2-1		CIG/0-3/044	
47	V-O	43			E-1	C0-1	M-5	CID/0-3/045	
22	O-V	44			M-1			CIG/0-3/045	T10
48	V-G	45					M-6	CID/0-3/046	
23	G-V	46						CIG/0-3/046	
49	V-BR	47					M-7	CID/0-3/047	
24	BR-V	48						CIG/0-3/047	
50	V-S	49							
25	S-V	50							

TABLE V

CONNECTOR CABLE TX02 J58879BA TRUNK PORT CARRIER

CONNECTOR CABLE		CONN BLK	CP	CP	CP	CP	CP	CP	CP
PIN NO.	COLOR CODE	TERM NO.	SLOT LOCATION NO.	LC08D OR LC09D LEAD DESIG	LC11B LEAD DESIG	LC13B LEAD DESIG	LC16B LEAD DESIG	LC15 LEAD DESIG	LC361 LEAD DESIG
26	W-BL	1		T-0	T1-0	T-0	M-0	CID/0-3/050	T-0
1	BL-W	2		R-0	R1-0	R-0		CIG/0-3/050	R-0
27	W-O	3		T-1	T-0	AL1-0	M-1	CID/0-3/051	T-1
2	O-W	4		R-1	R-0	S2-1		CIG/0-3/051	R-1
28	W-G	5			E-0	C0-0	M-2	CID/0-3/052	
3	G-W	6			M-0			CIG/0-3/052	
29	W-BR	7			T1-1	T-1	M-3	CID/0-3/053	
4	BR-W	8	05		R1-1	R-1		CIG/0-3/053	
30	W-S	9			T-1	AL1-1	M-4	CID/0-3/054	
5	S-W	10			R-1	S2-1		CIG/0-3/054	
31	R-BL	11			E-1	C0-1	M-5	CID/0-3/055	
6	BL-R	12			M-1			CIG/0-3/055	T10
32	R-O	13					M-6	CID/0-3/056	
7	O-R	14						CIG/0-3/056	
33	R-G	15					M-7	CID/0-3/057	
8	G-R	16						CIG/0-3/057	
34	R-BR	17		T-0	T1-0	T-0	M-0	CID/0-3/060	T-0
9	BR-R	18		R-0	R1-0	R-0		CIG/0-3/060	R-0
35	R-S	19		T-1	T-0	AL1-0	M-1	CID/0-3/061	T-1
10	S-R	20		R-1	R-0	S2-0		CIG/0-3/061	R-1
36	BK-BL	21			E-0	C0-0	M-2	CID/0-3/062	
11	BL-BK	22			M-0			CIG/0-3/062	
37	BK-O	23			T1-1	T-1	M-3	CID/0-3/063	
12	O-BK	24	06		R1-1	R-1		CIG/0-3/063	
38	BK-G	25			T-1	AL1-1	M-4	CID/0-3/064	
13	G-BK	26			R-1	S2-1		CIG/0-3/064	
39	BK-BR	27			E-1	C0-1	M-5	CID/0-3/065	
14	BR-BK	28			M-1			CIG/0-3/065	T10
40	BK-S	29					M-6	CID/0-3/066	
15	S-BK	30						CIG/0-3/066	
41	Y-BL	31					M-7	CID/0-3/067	
16	BL-Y	32						CIG/0-3/067	
42	Y-O	33		T-0	T1-0	T-0	M-0	CID/0-3/070	T-0
17	O-Y	34		R-0	R1-0	R-0		CIG/0-3/070	R-0
43	Y-G	35		T-1	T-0	AL1-0	M-1	CID/0-3/071	T-1
18	G-Y	36		R-1	R-0	S2-0		CIG/0-3/071	R-1
44	Y-BR	37			E-0	C0-0	M-2	CID/0-3/072	
19	BR-Y	38			M-0			CIG/0-3/072	
45	Y-S	39			T1-1	T-1	M-3	CID/0-3/073	
20	S-Y	40	07		R1-1	R-1		CIG/0-3/073	
46	V-BL	41			T-1	AL1-1	M-4	CID/0-3/074	
21	BL-V	42			R-1	S2-1		CIG/0-3/074	
47	V-O	43			E-1	C0-1	M-5	CID/0-3/075	
22	O-V	44			M-1			CIG/0-3/075	T10
48	V-G	45					M-6	CID/0-3/076	
23	G-V	46						CIG/0-3/076	
49	V-BR	47					M-7	CID/0-3/077	
24	BR-V	48						CIG/0-3/077	
50	V-S	49							
25	S-V	50							

TABLE W

CONNECTOR CABLE TX03 J58879BA TRUNK PORT CARRIER

CONNECTOR CABLE		CONN BLK TERM NO.	CP SLOT LOCATION NO.	CP LC08D OR LC09D LEAD DESIG	CP LC11B LEAD DESIG	CP LC13B LEAD DESIG	CP LC16B LEAD DESIG	CP LC32B LEAD DESIG (NOTE)	CP LC15 LEAD DESIG	CP LC361 LEAD DESIG
PIN NO.	COLOR CODE									
26	W-BL	1		T-0	T1-0	T-0	M-0		CID/0-3/080	T-0
1	BL-W	2		R-0	R1-0	R-0			CIG/0-3/080	R-0
27	W-O	3		T-1	T-0	AL1-0	M-1		CID/0-3/081	T-1
2	O-W	4		R-1	R-0	S2-0			CIG/0-3/081	R-1
28	W-G	5			E-0	C0-0	M-2		CID/0-3/082	
3	G-W	6			M-0				CIG/0-3/082	
29	W-BR	7			T1-1	T-1	M-3		CID/0-3/083	
4	BR-W	8	08		R1-1	R-1			CIG/0-3/083	
30	W-S	9			T-1	AL1-1	M-4		CID/0-3/084	
5	S-W	10			R-1	S2-1			CIG/0-3/084	
31	R-BL	11			E-1	C0-1	M-5		CID/0-3/085	
6	BL-R	12			M-1				CIG/0-3/085	T10
32	R-O	13					M-6		CID/0-3/086	
7	O-R	14							CIG/0-3/086	
33	R-G	15					M-7		CID/0-3/087	
8	G-R	16							CIG/0-3/087	
34	R-BR	17		T-0	T1-0	T-0	M-0		CID/0-3/090	T-0
9	BR-R	18		R-0	R1-0	R-0			CIG/0-3/090	R-0
35	R-S	19		T-1	T-0	AL1-0	M-1		CID/0-3/091	T-1
10	S-R	20		R-1	R-0	S2-0			CIG/0-3/091	R-1
36	BK-BL	21			E-0	C0-0	M-2		CID/0-3/092	
11	BL-BK	22			M-0				CIG/0-3/092	
37	BK-O	23			T1-1	T-1	M-3		CID/0-3/093	
12	O-BK	24	09		R1-1	R-1			CIG/0-3/093	
38	BK-G	25			T-1	AL1-1	M-4		CID/0-3/094	
13	G-BK	26			R-1	S2-1			CIG/0-3/094	
39	BK-BR	27			E-1	C0-1	M-5		CID/0-3/095	
14	BR-BK	28			M-1				CIG/0-3/095	T10
40	BK-S	29					M-6		CID/0-3/096	
15	S-BK	30							CIG/0-3/096	
41	Y-BL	31					M-7		CID/0-3/097	
16	BL-Y	32							CIG/0-3/097	
42	Y-O	33		T-0				T-0		
17	O-Y	34	11	R-0				R-0		
43	Y-G	35		T-1				T-1		
18	G-Y	36		R-1				R-1		
44	Y-BR	37		T-0						
19	BR-Y	38	12	R-0						
45	Y-S	39		T-1						
20	S-Y	40		R-1						
46	V-BL	41		T-0						
21	BL-V	42	13	R-0						
47	V-O	43		T-1						
22	O-V	44		R-1						
48	V-G	45								
23	G-V	46								
49	V-BR	47								
24	BR-V	48								
50	V-S	49								
25	S-V	50								

Note: Slot 11 may be equipped with an LC32B in the first trunk carrier

TABLE X

CONNECTOR CABLE TX04 J58879BA TRUNK PORT CARRIER

CONNECTOR CABLE		CONN BLK TERM. NO.	CP SLOT LOCATION NO.	CP LC08D LEAD DESIG	CP LC09D LEAD DESIG
PIN	COLOR CODE				
26	W-BL	1	14	T-0	T-0
1	BL-W	2		R-0	R-0
27	W-O	3		T-1	T-1
2	O-W	4		R-1	R-1
28	W-G	5	15	T-0	T-0
3	G-W	6		R-0	R-0
29	W-BR	7		T-1	T-1
4	BR-W	8		R-1	R-1
30	W-S	9	16	T-0	T-0
5	S-W	10		R-0	R-0
31	R-BL	11		T-1	T-1
6	BL-R	12		R-1	R-1
32	R-O	13	17	T-0	T-0
7	O-R	14		R-0	R-0
33	R-G	15		T-1	T-1
8	G-R	16		R-1	R-1
34	R-BR	17	18	T-0	T-0
9	BR-R	18		R-0	R-0
35	R-S	19		T-1	T-1
10	S-R	20		R-1	R-1
36	BK-BL	21			
11	BL-BK	22			
37	BK-O	23			
12	O-BK	24			
38	BK-G	25			
13	G-BK	26			
39	BK-BR	27			
14	BR-BK	28			
40	BK-S	29			
15	S-BK	30			
41	Y-BL	31			
16	BL-Y	32			
42	Y-O	33			
17	O-Y	34			
43	Y-G	35			
18	G-Y	36			
44	Y-BR	37			
19	BR-Y	38			
45	Y-S	39			
20	S-Y	40			
46	V-BL	41			
21	BL-V	42			
47	V-O	43			
22	O-V	44			
48	V-G	45			
23	G-V	46			
49	V-BR	47			
24	BR-V	48			
50	V-S	49			
25	S-V	50			

with the line and trunk assignments for emergency transfer. Trunks with terminal balancing treatment and power failure transfer service shall be cross-connected to allow the terminal balancing networks to remain in the circuit after power failure transfer. The method of connecting trunks having 837-type networks is shown in Fig. 26. The method of connecting trunks (without the 837-type networks) for power failure transfer is shown in Fig. 27.

4.106 Ground start for emergency transfer stations is provided by a 6-gauge conductor from an approved ground source (eg, water pipe, building steel frame, or ac power ground) to the 609-type emergency transfer panel. A 14-gauge conductor may be substituted if sufficient mechanical protection is provided for the conductor. This ground-start conductor runs through a relay contact in the 609-type panel to the ground-start key. Ground start is provided for each PBX station set assigned for emergency transfer service and is not intended for equipment protection.

> ***Note:*** A Thomas & Betts Co. lug ("LUG IT" No. 3531) is shipped with the 609-type panel to terminate the ground wire (No. 6 or No. 14 AWG). The 48V and ground leads to the 609-type panel should be insulated to prevent accidental shock and inadvertent transfer. These leads should not be diverted for any other purpose.

4.107 A 609-type transfer panel can be used for transferring an attendant console position for night service.

4.108 Refer to Sections 463-130-100 and 518-010-101 for detailed information on cross-connect fields installed on customer premises.

C. Cross-Connect Field Enclosures

4.109 The cross-connect field enclosure assembly (Fig. 28) is available in three sizes as follows:

(1) 686 mm (27 inches) high, 423 mm (17 inches) wide, and 229 mm (9 inches) deep. The 686 mm (27-inch) high assembly is used to cover one standard 432- by 508-mm (17- by 20-inch) backboard and one 196A distribution ring backboard. This size can be expanded horizontally and vertically as required.

(2) 1372 mm (54 inches) high, 432 mm (17 inches) wide, and 229 mm (9 inches) deep. The

TABLE Y

CONNECTOR CABLES TCX01, TCX02, AND TCX03 FOR J58879CC

CONNECTOR CABLE		CONN BLK TERM NO.	CIRCUIT PACKS, SLOT NUMBERS, CONNECTOR CABLES, AND LEAD DESIGNATIONS																	
			LC08,LC09D						LC11B						LC13B					
PIN NO.	COLOR CODE		SLOT	TCX 01	SLOT	TCX 02	SLOT	TCX 03	SLOT	TCX 01	SLOT	TCX 02	SLOT	TCX 03	SLOT	TCX 01	SLOT	TCX 02	SLOT	TCX 03
26	W-BL	1				T-0		T-0				T1-0		T1-0				T-0		T-0
1	BL-W	2				R-0		R-0				R1-0		R1-0				R-0		R-0
27	W-O	3				T-1		T-1				T-0		T-0				AL1-0		AL1-0
2	O-W	4				R-1		R-1				R-0		R-0				S2-0		S2-0
28	W-G	5										E-0		E-0				C0-0		C0-0
3	G-W	6										M-0		M-0						
29	W-BR	7										T1-1		T1-1				T-1		T-1
4	BR-W	8			04		07				04	R1-1	07	R1-1			04	R-1	07	R-1
30	W-S	9										T-1		T-1				AL1-1		AL1-1
5	S-W	10										R-1		R-1				S2-1		S2-1
31	R-BL	11										E-1		E-1				C0-1		C0-1
6	BL-R	12										M-1		M-1						
32	R-O	13																		
7	O-R	14																		
33	R-G	15																		
8	G-R	16																		
34	R-BR	17		T-0		T-0		T-0		T1-0		T1-0		T1-0		T-0		T-0		T-0
9	BR-R	18		R-0		R-0		R-0		R1-0		R1-0		R1-0		R-0		R-0		R-0
35	R-S	19		T-1		T-1		T-1		T-0		T-0		T-0		AL1-0		AL1-0		AL1-0
10	S-R	20		R-1		R-1		R-1		R-0		R-0		R-0		S2-0		S2-0		S2-0
36	BK-BL	21								E-0		E-0		E-0		C0-0		C0-0		C0-0
11	BL-BK	22								M-0		M-0		M-0						
37	BK-O	23								T1-1		T1-1		T1-1		T-1		T-1		T-1
12	O-BK	24	02		05		08		02	R1-1	05	R1-1	08	R1-1	02	R-1	05	R-1	08	R-1
38	BK-G	25								T-1		T-1		T-1		AL1-1		AL1-1		AL1-1
13	G-BK	26								R-1		R-1		R-1		S2-1		S2-1		S2-1
39	BK-BR	27								E-1		E-1		E-1		C0-1		C0-1		C0-1
14	BR-BK	28								M-1		M-1		M-1						
40	BK-S	29																		
15	S-BK	30																		
41	Y-BL	31																		
16	BL-Y	32																		
42	Y-O	33		T-0		T-0				T1-0		T1-0				T-0		T-0		
17	O-Y	34		R-0		R-0				R1-0		R1-0				R-0		R-0		
43	Y-G	35		T-1		T-1				T-0		T-0				AL1-0		AL1-0		
18	G-Y	36		R-1		R-1				R-0		R-0				S2-0		S2-0		
44	Y-BR	37								E-0		E-0				C0-0		C0-0		
19	BR-Y	38								M-0		M-0								
45	Y-S	39								T1-1		T1-1				T-1		T-1		
20	S-Y	40								R1-1		R1-1				R-1		R-1		
46	V-BL	41	03		06				03	T-1	06	T-1			03	AL1-1	06	AL1-1		
21	BL-V	42								R-1		R-1				S2-1		S2-1		
47	V-O	43								E-1		E-1				C0-1		C0-1		
22	O-V	44								M-1		M-1								
48	V-G	45																		
23	G-V	46																		
49	V-BR	47																		
24	BR-V	48																		
50	V-S	49																		
25	S-V	50																		

TABLE Y (Contd)

CONNECTOR CABLES TCX01, TCX02, AND TCX03 FOR J58879CC
TRUNK/CONTROL CARRIER

CONNECTOR CABLE		CONN BLK TERM NO.	CIRCUIT PACKS, SLOT NUMBERS, CONNECTOR CABLES, AND LEAD DESIGNATIONS																			
			LC15						LC16B						LC361						LC32B	
PIN NO.	COLOR CODE		SLOT	TCX 01	SLOT	TCX 02	SLOT	TCX 03	SLOT	TCX 01	SLOT	TCX 02	SLOT	TCX 03	SLOT	TCX 01	SLOT	TCX 02	SLOT	TCX 03	SLOT	TCX 03
26	W-BL	1				CID		CID				M-0		M-0				T-0		T-0		T-0
1	BL-W	2				CIG		CIG										R-0		R-0		R-0
27	W-O	3				CID		CID				M-1		M-1				T-1		T-1		T-1
2	O-W	4				CIG		CIG										R-1		R-1		R-1
28	W-G	5				CID		CID				M-3		M-2								
3	G-W	6				CIG		CIG														
29	W-BR	7				CID		CID				M-2		M-3								
4	BR-W	8			04	CIG	07	CIG			04		07				04		07		07	
30	W-S	9				CID		CID				M-4		M-4								
5	S-W	10				CIG		CIG														
31	R-BL	11				CID		CID				M-5		M-5								
6	BL-R	12				CIG		CIG										T10		T10		
32	R-O	13				CID		CID				M-6		M-6								
7	O-R	14				CIG		CIG														
33	R-G	15				CID		CID				M-7		M-7								
8	G-R	16				CIG		CIG														
34	R-BR	17		CID		CID		CID		M-0		M-0		M-0		T-0		T-0		T-0		
9	BR-R	18		CIG		CIG		CIG								R-0		R-0		R-0		
35	R-S	19		CID		CID		CID		M-1		M-1		M-1		T-1		T-1		T-1		
10	S-R	20		CIG		CIG		CIG								R-1		R-1		R-1		
36	BK-BL	21		CID		CID		CID		M-2		M-3		M-2								
11	BL-BK	22		CIG		CIG		CIG														
37	BK-O	23		CID		CID		CID		M-3		M-2		M-3								
12	O-BK	24	02	CIG	05	CIG	08	CIG	02		05		08		02		05		08		08	
38	BK-G	25		CID		CID		CID		M-4		M-4		M-4								
13	G-BK	26		CIG		CIG		CIG														
39	BK-BR	27		CID		CID		CID		M-5		M-5		M-5								
14	BR-BK	28		CIG		CIG		CIG								T10		T10		T10		
40	BK-S	29		CID		CID		CID		M-6		M-6		M-6								
15	S-BK	30		CIG		CIG		CIG														
41	Y-BL	31		CID		CID		CID		M-7		M-7		M-7								
16	BL-Y	32		CIG		CIG		CIG														
42	Y-O	33		CID		CID		CID		M-0		M-0				T-0		T-0		T-0		
17	O-Y	34		CIG		CIG		CIG								R-0		R-0		R-0		
43	Y-G	35		CID		CID		CID		M-1		M-1				T-1		T-1		T-1		
18	G-Y	36		CIG		CIG		CIG								R-1		R-1		R-1		
44	Y-BR	37		CID		CID		CID		M-2		M-3										
19	BR-Y	38		CIG		CIG		CIG														
45	Y-S	39		CID		CID		CID		M-3		M-2										
20	S-Y	40		CIG		CIG		CIG														
46	V-BL	41	03	CID	06	CID		CID	03	M-4	06	M-4			03		06					
21	BL-V	42		CIG		CIG		CIG														
47	V-O	43		CID		CID		CID		M-5		M-5										
22	O-V	44		CIG		CIG		CIG								T10		T10		T10		
48	V-G	45		CID		CID		CID		M-6		M-6										
23	G-V	46		CIG		CIG		CIG														
49	V-BR	47		CID		CID		CID		M-7		M-7										
24	BR-V	48		CIG		CIG		CIG														
50	V-S	49																				
25	S-V	50																				

TABLE Z

CONNEFCTOR CABLE CX01 J58879CA CONTROL CARRIER OR J58879CC TRUNK/ CONTROL CARRIER

CONNECTOR CABLE		CONN BLK TERM NO.	CP SLOT LOCATION NO.	CIRCUIT NO.		CP LC34B OR LC366 LEAD DESIG	ALARM -48V AND GRD LEAD DESIG	REMARKS
PIN NO.	COLOR CODE			LC34B	LC366B			
26	W-BL	1	33 IN CA CARRIER	0	2	IOXB6 IOXA6 IORB6 IORA6		Transmit and receive leads
1	BL-W	2						
27	W-O	3						
2	O-W	4						
28	W-G	5	30/33 IN CC CARRIER	1	3	IOXB7 IOXA7 IORB7 IORA7		
3	G-W	6						
29	W-BR	7						
4	BR-W	8						
30	W-S	9	34 IN CA CARRIER	0	2	IOXB8 IOXA8 IORB8 IORA8		
5	S-W	10						
31	R-BL	11						
6	BL-R	12						
32	R-O	13	31/34 IN CC CARRIER	1	3	IOXB9 IOXA9 IORB9 IORA9		
7	O-R	14						
33	R-G	15						
8	G-R	16						
34	R-BR	17	35 IN CA CARRIER ONLY	0		IOXB10 IOXA10 IORB10 IORA10		
9	BR-R	18						
35	R-S	19						
10	S-R	20						
36	BK-BL	21		1		IOXB11 IOXA11 IORB11 IORA11		
11	BL-BK	22						
37	BK-O	23						
12	O-BK	24						
38	BK-G	25						
13	G-BK	26						
39	BK-BR	27	28				RES -48	From LC18D
14	BR-BK	28					ANMN*	
40	BK-S	29					-48C8†	For 17B KTU
15	S-BK	30						
41	Y-BL	31					-48C6†	For 609-type night console
16	BL-Y	32					GRD-48	
42	Y-O	33					-48C6†	
17	O-Y	34					GRD-48	For 17B KTU
43	Y-G	35					-48C6†	
18	G-Y	36					GRD-48	
44	Y-BR	37					-48C6†	
19	BR-Y	38					GRD-48	
45	Y-S	39					-48C6†	
20	S-Y	40					GRD-48	
46	V-BL	41					-48 PX	Relay voltage for 609-type emergency trans
21	BL-V	42					-48 PX	
47	V-O	43					-48 PX	
22	O-V	44					-48 PX	
48	V-G	45	28				MJ	Alarm transfer panel
23	G-V	46					-48 PX	
49	V-BR	47	28				MN	Alarms
24	BR-V	48					MJR	
50	V-S	49						
25	S-V	50					MNR	

* This lead is active in the low state

† The -48C8 and -48C6 leads become -48INTF and -48TR, respectively, in the J58879CC carrier

TABLE AA

CONNECTOR CABLE CX02 J58879CA CONTROL CARRIER J58879CC TRUNK/ CONTROL CARRIER

J58879CA CONTROL CARRIER

CONNECTOR CABLE		CONN BLK TERM. NO.	CP SLOT LOC NO.	CP LC171B LEAD DESIG
PIN NO.	COLOR CODE			
26	W-BL	1		
1	BL-W	2		
27	W-O	3	32	GRD-D
2	O-W	4		BA*
28	W-G	5		GRD-D
3	G-W	6		BB
29	W-BR	7		
4	BR-W	8		
30	W-S	9		
5	S-W	10		
31	R-BL	11	31	GRD-D
6	BL-R	12	32	CC
32	R-O	13		
7	O-R	14	31	AB/GRD-D
33	R-G	15	33	GRD-D
8	G-R	16	32	CF
34	R-BR	17		
9	BR-R	18		
35	R-S	19		
10	S-R	20		
36	BK-BL	21		
11	BL-BK	22		
37	BK-O	23		
12	O-BK	24		
38	BK-G	25		
13	G-BK	26		
39	BK-BR	27		
14	BR-BK	28		
40	BK-S	29		
15	S-BK	30		
41	Y-BL	31		
16	BL-Y	32		
42	Y-O	33		
17	O-Y	34		
43	Y-G	35		
18	G-Y	36		
44	Y-BR	37		
19	BR-Y	38		
45	Y-S	39	32	GRD-D
20	S-Y	40		CD
46	V-BL	41		
21	BL-V	42		
47	V-O	43		
22	O-V	44		
48	V-G	45		
23	G-V	46		
49	V-BR	47		
24	BR-V	48		
50	V-S	49		
25	S-V	50		

J58879CC TRUNK/CONTROL CARRIER

CONNECTOR CABLE		CONN BLK TERM. NO.	CP SLOT LOC NO.	CP LC171B LEAD DESIG
PIN NO.	COLOR CODE			
26	W-BL	1		
1	BL-W	2		
27	W-O	3		GRD-D
2	O-W	4	32/37	BA*
28	W-G	5		GRD-D
3	G-W	6	32/37	BB
29	W-BR	7		
4	BR-W	8		
30	W-S	9		
5	S-W	10		
31	R-BL	11		GRD-D
6	BL-R	12	32/37	CC
32	R-O	13		
7	O-R	14		AB/GRD-D
33	R-G	15		GRD-D
8	G-R	16	32/37	CF
34	R-BR	17		
9	BR-R	18		
35	R-S	19		
10	S-R	20		
36	BK-BL	21		
11	BL-BK	22		
37	BK-O	23		
12	O-BK	24		
38	BK-G	25		
13	G-BK	26		
39	BK-BR	27		
14	BR-BK	28		
40	BK-S	29		
15	S-BK	30		
41	Y-BL	31		
16	BL-Y	32		
42	Y-O	33		
17	O-Y	34		
43	Y-G	35		
18	G-Y	36		
44	Y-BR	37		
19	BR-Y	38		
45	Y-S	39		GRD-D
20	S-Y	40	32/37	CD
46	V-BL	41		
21	BL-V	42		
47	V-O	43		
22	O-V	44		
48	V-G	45		
23	G-V	46		
49	V-BR	47		
24	BR-V	48		
50	V-S	49		
25	S-V	50		

TABLE BB

CONNECTOR CABLE CX03 J58879CA CONTROL CARRIER OR J58879CC TRUNK/CONTROL CARRIER

TERMINAL		CP SLOT LOC NO.	CP LC34B, LC366, OR LC171B LEAD DESIG
PIN NO.	COLOR CODE		
1	Red	32 (CA) or 32/37 (CC)	IOXA4
2	Black		IOXB4
3	White		IORA4
4	Green		IORB4
5	*		GRD-D
6	*		GRD-D

* These are ground leads.

TABLE CC

CONNECTOR CABLE CX04 J58879CA CONTROL CARRIER

TERMINAL		CP SLOT LOC NO.	CP LC34B LEAD DESIG
PIN NO.	COLOR CODE		
1	Red	32	IOXA5
2	Black		IOXB5
3	White		IORA5
4	Green		IORB5
5	*		GRD-D
6	*		GRD-D

* These are ground leads.

1372 mm (54-inch) high assembly is used to cover two standard 432- by 508-mm (17- by 20-inch) backboards and two 196A distribution ring backboards. This size can be expanded horizontally as required. A 609-type emergency transfer panel can be located in the vacant part of the field.

TABLE DD

CONNECTOR CABLE CX05 J58879CC TRUNK/CONTROL CARRIER

CONNECTOR CABLE		CONN BLK TERM. NO.	CP SLOT LOC NO.	CP LC366 LEAD DESIG
PIN NO.	COLOR CODE			
26	W-BL	1	35/36	IOXB010
1	BL-W	2		IOXA010
27	W-O	3		IORB010
2	O-W	4		IORA010
28	W-G	5		IOXB011
3	G-W	6		IOXA011
29	W-BR	7		IORB011
4	BR-W	8		IORA011
30	W-S	9		IOXB012
5	S-W	10		IOXA012
31	R-BL	11		IORB012
6	BL-R	12		IORA012
32	R-O	13		IOXB013
7	O-R	14		IOXA013
33	R-G	15		IORB013
8	G-R	16		IORA013
34	R-BR	17	32/37 *	IOXB014
9	BR-R	18		IOXA014
35	R-S	19		IORB014
10	S-R	20		IORA014
36	BK-BL	21		
11	BL-BK	22		
37	BK-O	23		
12	O-BK	24		
38	BK-G	25		
13	G-BK	26		
39	BK-BR	27		
14	BR-BK	28		
40	BK-S	29		
15	S-BK	30		
41	Y-BL	31		
16	BL-Y	32		
42	Y-O	33		
17	O-Y	34		
43	Y-G	35		
18	G-Y	36		
44	Y-BR	37		
19	BR-Y	38		
45	Y-S	39		
20	S-Y	40		
46	V-BL	41		
21	BL-V	42		
47	V-O	43		
22	O-V	44		
48	V-G	45		
23	G-V	46		
49	V-BR	47		
24	BR-V	48		
50	V-S	49		
25	S-V	50		

* When the LC171B is installed in slot 32/37 for RMATS, channel 14 is not avaliable as a data link.

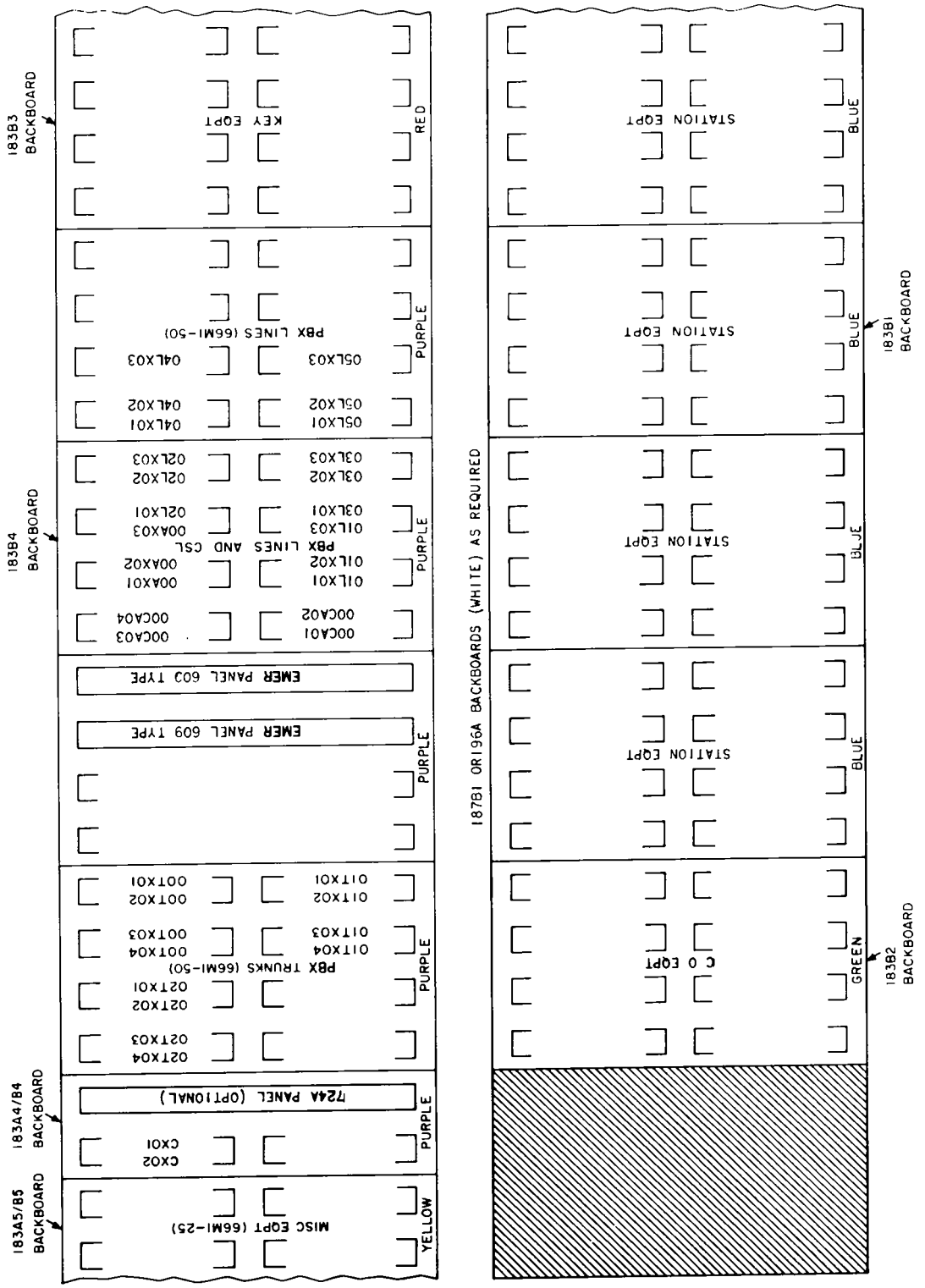


Fig. 25—Cross-Connect Field

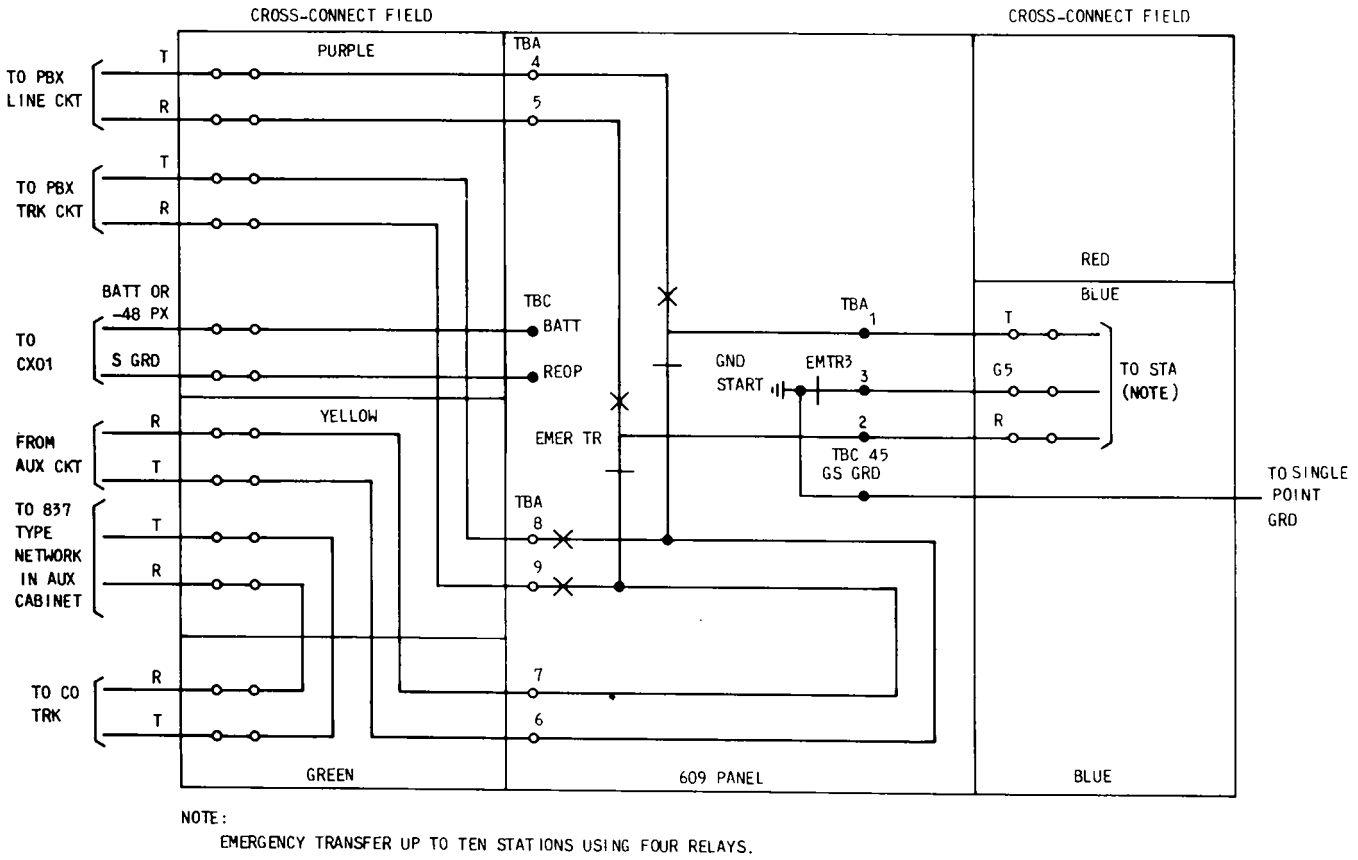


Fig. 26—Emergency Transfer of Trunks (Using 837-Type Networks) Allowing Networks to Remain in Circuit After Transfer

(3) 1930 mm (76 inches) high, 432 mm (17 inches) wide, and 229 mm (9 inches) deep. The 1930-mm (76-inch) high assembly is used to cover three standard 432- by 508-mm (17- by 20-inch) backboards and two 187B1 or three 196A distribution ring backboards. The 102- by 203-mm (4- by 8-inch) optional 724A traffic measurement panel may also be located in the cross-connect field (Fig. 25).

4.110 The cross-connect field enclosures may be multipled horizontally as needed. The top and side panels accommodate the additional depth of the 19 mm (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-1E322-70, -71, -72) of the door panel should be used. This compensates for the added depth due to the absence of the backboard.

4.111 Mount the cross-connect field enclosure assembly with the top approximately even with the top of the cabinets. The 1930 mm (76-inch) high enclosure assembly would normally be used where the cabinets are located some distance from the backboard enclosure assembly.

4.112 The installation of one ***1930 mm (76-inch)*** high cross-connect field enclosure (ED-1E322-70) to be mounted *on a wooden backboard* requires the following:

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

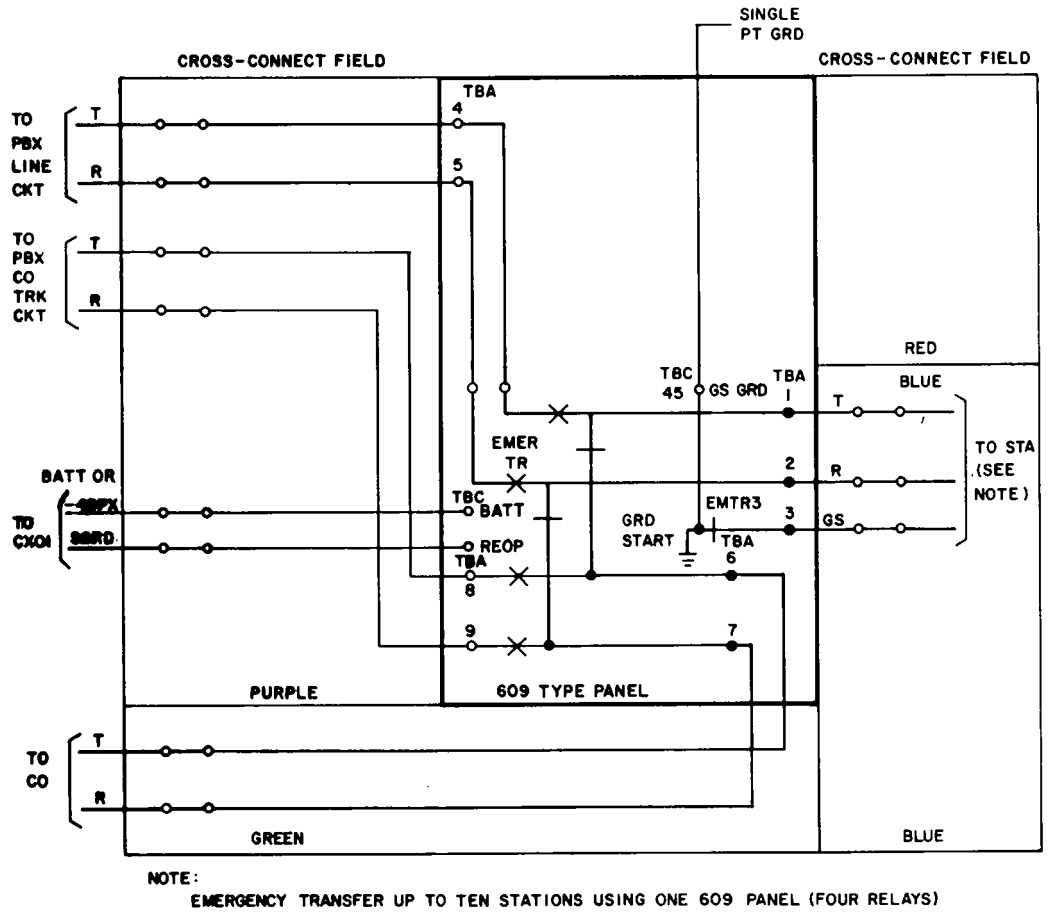


Fig. 27—Power Failure Transfer Circuit Using CO Trunks Without Terminal Balancing Equipment

When more than one enclosure is used (joined), GR-2 side panels are required only at the ends.

4.113 The installation of a ***1930 mm (76-inch)*** high cross-connect field enclosure (ED-1E322-70) to be mounted *flush on the wall* requires the following:

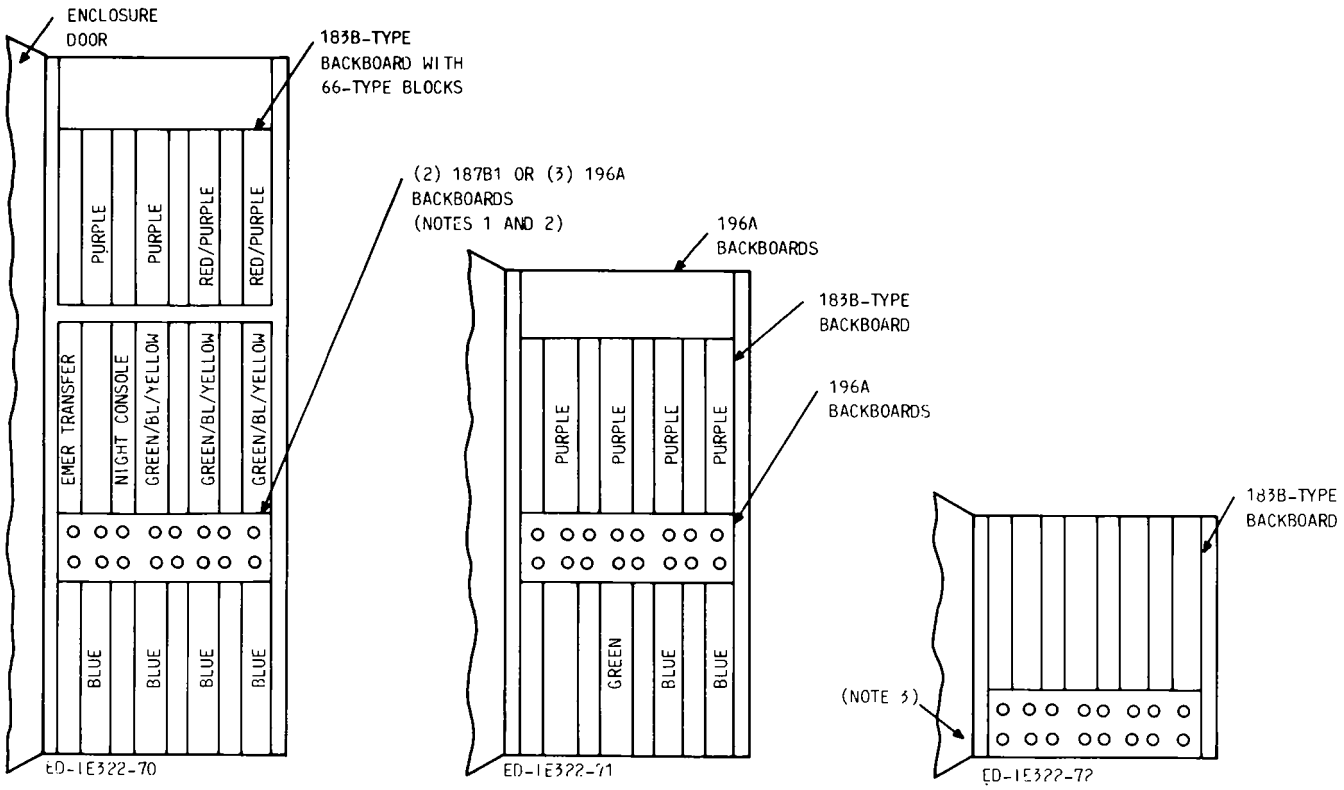
- One GR-4 (group), consisting of the door, brackets, and hardware
- Two GR-2 (groups), each consisting of a side panel and hardware
- Two GR-3 (groups), each consisting of a top/bottom panel and hardware.

4.114 The installation of a ***1372 mm (54-inch)*** high cross-connect field enclosure (ED-1E322-71) to be mounted *on a wooden backboard* requires the following:

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

When more than one enclosure is used (joined), GR-2 side panels are required only at the ends.

4.115 The installation of a ***1372 mm (54-inch)*** high cross-connect field enclosure



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. 28—Cross-Connect Field Enclosures

(ED-1E322-71) to be mounted *flush on the wall* requires the following:

- One GR-4 (group), consisting of basic enclosure with door, brackets, and hardware
- Two GR-2 (groups), each consisting of one side panel and hardware
- Two GR-3 (groups), each consisting of one top/bottom panel and hardware.

When more than one enclosure is used (joined), GR-2 side panels are required only at the ends.

4.116 The installation of a ***686 mm (27-inch)*** high cross-connect field enclosure (ED-1E322-72) to be mounted *on a wooden backboard* requires the following:

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

When more than one enclosure is used (joined), GR-2 side panels are required only at the ends.

4.117 The installation of a ***686 mm (27-inch)*** high cross-connect field enclosure (ED-1E322-72) to be mounted *flush on the wall* requires the following:

- One GR-4 (group), consisting of a basic enclosure with door, brackets, and hardware
- Two GR-2 (groups), each consisting of one side panel and hardware
- Two GR-3 (groups), each consisting of one top/bottom panel and hardware.

When more than one enclosure is used (joined), GR-2 side panels are required only at the ends.

4.118 The cross-connect field enclosures are designed to be located on customer premises and may house the following apparatus:

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

Backboard ordering information is shown in Table EE.

D. Cross-Connect Tables

4.119 Computer-generated cross-connect tables are delivered from the factory prior to the delivery of the system. These tables should be completed and provided for installer use at the time of installation. Worksheets similar to the tables are provided at the end of this section to be used as an aid in planning for initial installation or for additions to an existing system.

Line Cross-Connections

4.120 An example of a typical filled-in cross-connect table with lines assigned is shown in Fig. 29. An asterisk (*) alongside extension numbers indicates a station assignment that is considered a critical ringing station. Provided worksheets should be filled in for the basic and/or supplemental line carrier cross-connections. Space is provided on each worksheet to fill in the line carrier number, the cabinet number, the line extension (telephone) number, and the terminal number to which each circuit should be cross-connected. A typical line connected through the cross-connect field to the carrier is shown in Fig. 30. Eight extensions are allowed in a 64-line carrier. Changes to these extension assignments should not be made arbitrarily.

4.121 Provided worksheets are to be used for trunk carrier cross-connections. Space is provided on each worksheet to fill in the trunk carrier number,

TABLE EE

BACKBOARD DESIGNATIONS

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

cabinet number, trunk type, dial code, trunk group, trunk number, connector block designation, and terminal number to which each circuit should be cross-connected. Trunk-type encodes are listed in Table FF.

4.122 Figure 31 shows a filled-in example of a typical trunk carrier cross-connect worksheet. The fill-in information consists of the CO trunk number and the connector block terminal (of the cross-connect field) on which the CO trunk is terminated. Figure 30 shows a typical connection of a CO trunk to the trunk carrier via the cross-connect field.

E. Attendant Console Cross-Connections

4.123 The attendant console may connect directly to the control carrier or via the cross-connect field as shown in Fig. 32. The actual connection interface from a console to a 66M1-50 connector block is shown on Fig. 33.

F. Night Console Cross-Connection

4.124 The night attendant console provides specific console(s) for night use. The night console, when provided, is switched in and out of service via the 609-type transfer panel. The attendant must place the transfer switch (located near the console) in the night position and disconnect the handset/headset. The 609-type panel is located in the cross-connect field. Figure 34 shows connections for a 609-type panel providing transfer to the night console. Figure 35 illustrates the connection from the 00CA01 connecting block to the panel and to the console connecting block. Figure 36 illustrates the connections from the 609-type panel to the console connecting block. Attendant console leads connect to the A column on the console connecting block, and the night console leads connect to the D column on the console connecting block (Fig. 33 and 34).

5. AUXILIARY EQUIPMENT ASSOCIATED WITH FEATURES AND SERVICES

5.01 Some auxiliary equipment may be installed in the fifth carrier of cabinet 00 when that carrier is provided and not required for a line or trunk carrier. The auxiliary equipment will usually be installed in one or more J58879F auxiliary cabinet(s) (Fig. 37). Some equipment may be installed in dedicated cabinets, whereas other equipment is installed elsewhere (ie, inside building that houses the PBX).

5.02 The list structure for the auxiliary cabinet and common equipment is given in Table GG. Power for the equipment in the auxiliary cabinet (excluding ECTS controllers) is provided from the KS22028 power supply. Power to the supply is provided from an ac outlet via the J58879JA, Lists 1 and 7, ac power distribution panel.

5.03 The equipment associated with features and/or services is listed below and is described in this Part 5.

LINE CARRIER CROSS-CONNECTIONS
ORDER NUMBER XX-X-XXXXX
CUSTOMER - - - XXXXXXXX

LINE CARRIER 00 CAB 0 CONNECTOR AX01				CONN CABLE COLOR CODE	CROSS-CONNECT	
					FROM	TO
CP SLOT NO.	CKT NO.	EXT NO.	LEAD DESIG		CONN BLK 00AX01 (PURPLE)	CONN BLK (BLUE/RED)
02		TONE		W-BL	1	———
			T00	BL-W	2	**
03		TONE		W-O	3	———
			T10	O-W	4	**
04		ATND		W-G	5	———
				G-W	6	———
		ATND		W-BR	7	———
				BR-W	8	———
		ATND		W-S	9	———
				S-W	10	———
		ATND		R-BL	11	———
				BL-R	12	———
05	0	110*	T	R-O	13	BLK 1-1
			R	O-R	14	2
	1	111*	T	R-G	15	3
			R	G-R	16	4
	2	112*	T	R-BR	17	5
			R	BR-R	18	6
	3	122*	T	R-S	19	7
			R	S-R	20	8
06	0	TSTL	T	BK-BL	21	BLK 2-1
			R	BL-BK	22	2
	1	TAAS	T	BK-O	23	3
			R	O-BK	24	4
	2	123*	T	BK-G	25	5
			R	G-BK	26	6
	3	124	T	BK-BR	27	7
			R	BR-BK	28	8
07	0	125	T	BK-S	29	BLK 3-1
			R	S-BK	30	2
	1	126	T	Y-BL	31	3
			R	BL-Y	32	4
	2	127	T	Y-O	33	5
			R	O-Y	34	6
	3	185	T	Y-G	35	7
			R	G-Y	36	8
08	0	186	T	Y-BR	37	BLK 4-1
			R	BR-Y	38	2
	1	187	T	Y-S	39	3
			R	S-Y	40	4
	2	188	T	V-BL	41	5
			R	BL-V	42	6
	3	195	T	V-O	43	7
			R	O-V	44	8
				V-G	45	
				G-V	46	
				V-BR	47	
				BR-V	48	
				V-S	49	
				S-V	50	

* CRITICAL
** THESE LEADS ARE USED WITH VARIOUS FEATURES THAT REQUIRE AUXILIARY EQUIPMENT

Fig. 29—A Filled-In Example of a Typical Line Carrier Cross-Connect Table

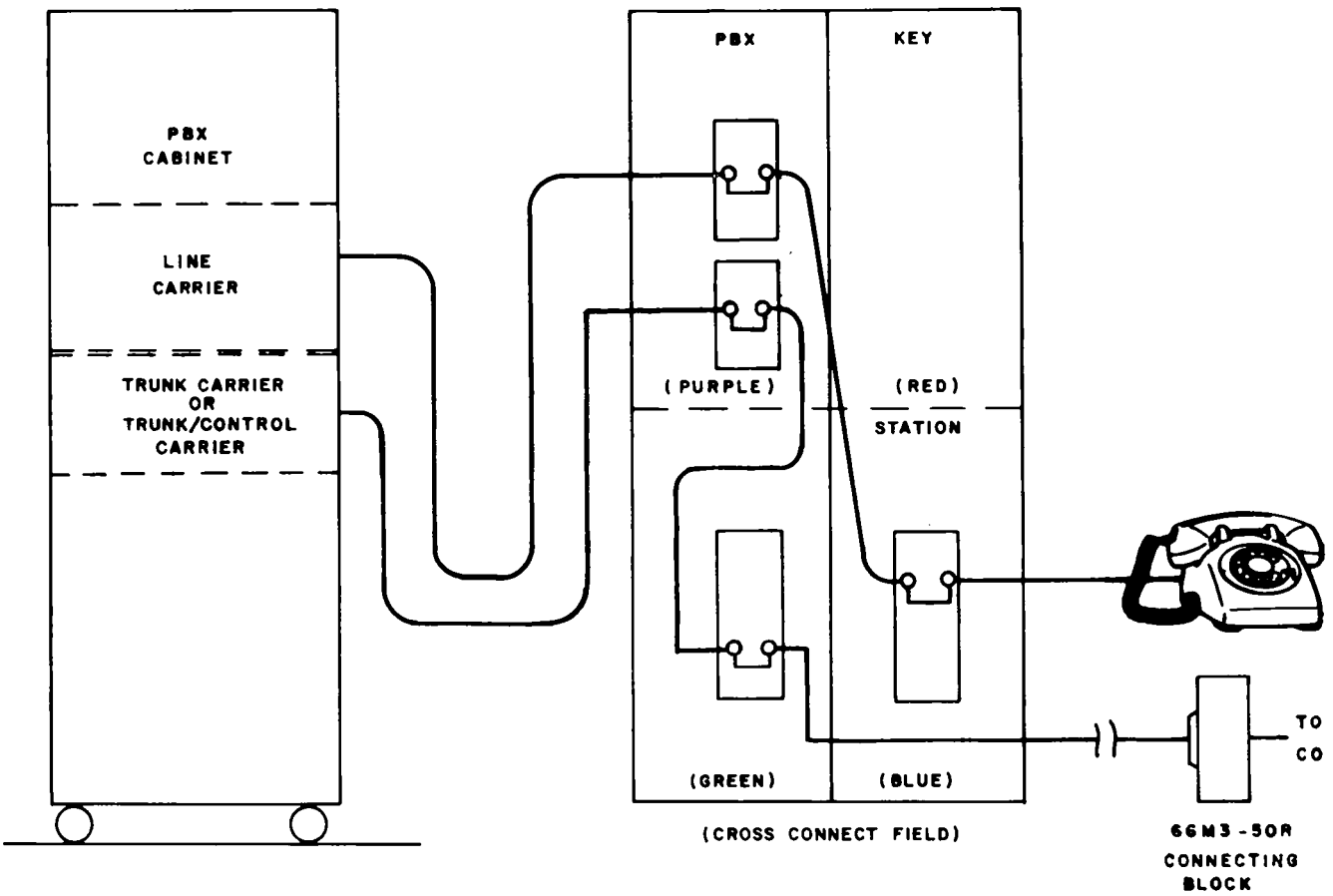


Fig. 30—Line to Nonkey Station Set Connection and CO Trunk Connected to the Trunk Carrier

- Attendant console repeater
- AUTOVON interface
- Centralized attendant service (CAS)
- Centralized station message detail recording system
- Code calling access
- Customer administration panel (CAP)
- Customer premises facility terminal (CPFT)
- Data channel repeater
- DIMENSION PBX electronic custom telephone service (ECTS)
- Energy communications service adjunct
- Line status indicator—24A/24B type
- Loudspeaker paging (basic and deluxe)
- Music-on-hold
- Packaged metallic facility terminal assemblies (PMFTA)
- Radio paging access
- Recorded announcement intercept
- Recorded telephone dictation access
- Remote maintenance, administration, and traffic system (RMATS)
- 44V4 repeater
- 24V4 repeater

TABLE FF
TRUNK TYPE ENCODES

ENCODE	TRUNK TYPES	
0		Intercom
1		DP Digit Register
2		"TOUCH-TONE" Dialing Register
3		Attendant Digit Register
4		Switched Loop
5		6-Way Conference Circuit
6		Special Queuing
		CCSA TRUNKS
12	All 2-Way	Delay Dial In/Out
13		Delay Dial Out/Wink In
14		Dial Tone Out/Delay Dial In
15		Dial Tone Out/Wink In
		CO TRUNKS
16	Regular CO	1-Way Incoming Attendant Completing
17		1-Way Outgoing DOD
18		1-Way Out DOD With Party Test
19		2-Way Attendant Completion In/DOD
20		2-Way With Party Test
21	Foreign Exchange	1-Way Incoming Attendant Completing
22		1-Way Outgoing DOD
23		1-Way Out DOD With Party Test
24		2-Way Attendant Completion In/DOD
25		2-Way With Party Test
26	WATS	1-Way Incoming Attendant Completing
27		1-Way Outgoing DOD-Access To TSPS
28		1-Way Out DOD With Party Test
29		Automatic In WATS
30	DID	Immediate Start DID
31		Wink Start DID
		TIE TRUNKS
32		1-Way In Dial Repeating
33		1-Way Out Automatic
34		1-Way Out Dial Repeating
35		1-Way In Automatic
36		2-Way Dial Repeating Both Ways
37		2-Way Dial Repeating In/Auto Out
38		2-Way Auto In/Dial Repeating Out
39		2-Way Auto Both Ways
40		1-Way In Dial Repeating Delay Dial
44		2-Way Dial Repeating Delay Dial In
45		2-Way Dial RPTG Delay Dial In/Auto Out
		SPECIAL TRUNKS AND INTERFACES
48		Internal Wakeup Announcement Unit (LC190) Interface
50		Remote Access Trunk
51		Telephone Dictation Interface
52		Recorded Announcement Interface-DID/CCSA
53		Code Calling Interface
54		Loudspeaker Paging/Call Park Interface
55		"TOUCH-TONE" Dialing Sender
56		CAS Lamp Interface
57		CAS Release Link Trunk – Outgoing From Branch
58		ANI Interface
59		Station Message Register
60		Toll Terminal Access to Toll Switchboard
61		DDC/UCD Lamp Interface
62		Music-On-Hold Interface

TRUNK CARRIER CROSS-CONNECTIONS
ORDER NUMBER XX-X-XXXXX
CUSTOMER --- XXXXXXXXX

TRUNK CARRIER 00 CAB 0 CONNECTOR TX01 (NOTE)							CONN CABLE COLOR CODE	CROSS-CONNECT		
								FROM	TO	
CP SLOT NO.	CKT NO.	TRK TYPE	DIAL CODE	TRK GRP.	TRK NO.	LEAD DESIG		CONN BLK 00TX01 (PURPLE)	CONN BLK (G/YEL)	CO TRK NO.
02	0	19	9	20	1	T	W -BL	1	1	1
						R	BL-W	2	2	
							W-O	3		
							O-W	4		
							W-G	5		
							G-W	6		
	1	19	9	20	2	T	W -BR	7	3	2
						R	BR-W	8	4	
							W -S	9		
							S -W	10		
							R -BL	11		
							BL-R	12		
							R-O	13		
							O-R	14		
							R-G	15		
							G-R	16		
03	0	16	-	18	1	T	R -BR	17	5	3
						R	BR-R	18	6	
	1	16	-	18	2	T	R -S	19	7	4
						R	S -R	20	8	
							BK-BL	21		
							BL-BK	22		
							BK-O	23		
							O-BK	24		
							BK-G	25		
						SPARE	G-BK	26		
							BK-BR	27		
							BR-BK	28		
							BK-S	29		
							S -BK	30		
							Y -BL	31		
							BL-Y	32		
04	0	17	9	19	1	T	Y-O	33	9	5
						R	O-Y	34	10	
	1	17	9	19	2	T	Y-G	35	11	6
						R	G-Y	36	12	
							Y -BR	37		
							BR-Y	38		
							Y -S	39		
							S -Y	40		
							V -BL	41		
						SPARE	BL-V	42		
							V-O	43		
							O-V	44		
							V-G	45		
							G-V	46		
							V -BR	47		
							BR-V	48		

NOTE:
IF FCC REGISTRATION IS REQUIRED, THE CO TRUNKS SHALL BE TERMINATED ON THE 66M3-50R CONNECTING BLOCK.

Fig. 31—A Filled-In Example of a Typical Trunk Carrier Cross-Connect Table

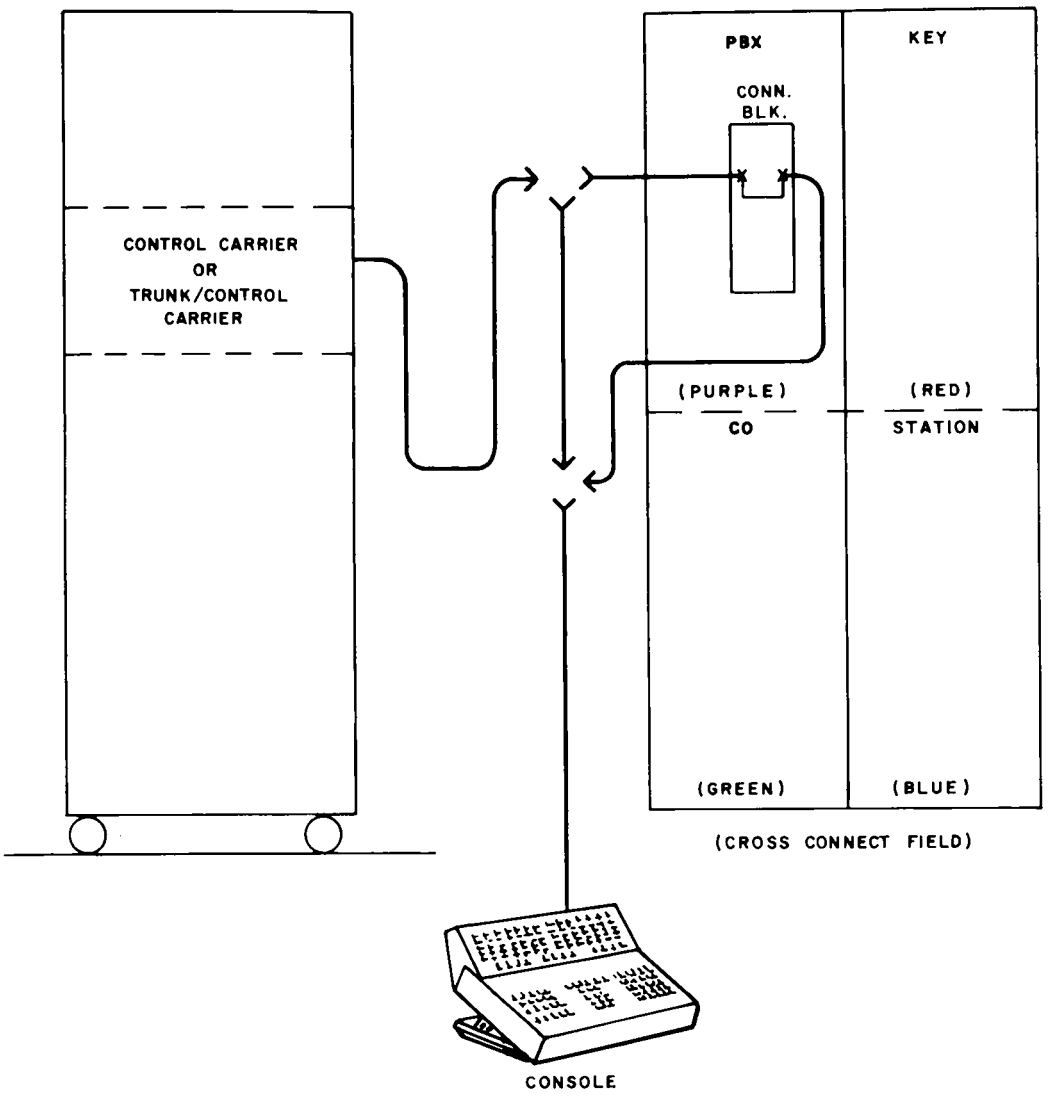


Fig. 32—Console Connected to the PBX via the Cross-Connect Field

- Station message detail recording (SMDR)
- Station message register/message waiting and calling number display to station
- System status indicator—30A8
- Traffic measurement connection/RMATS
- Trunk answer from any station
- Uniform call distribution (UCD)/traffic overflow indicator
- Visually impaired attendant service.

ATTENDANT CONSOLE REPEATER

5.04 The attendant console repeater unit (Fig. 38) provides range extension and/or lightning protection for the PBX low-speed data channels, as well as the alarm, ground, and −48 volt leads. The console power is furnished by an external supply located at the console end repeater. The power supply (284B1 power unit) must be ordered and mounted separately from the repeater unit. The repeater may be used in one of two configurations as follows:

(a) The repeater may be used when a console is located in a different building than the PBX,

CONSOLE CABLE TERMINATIONS		
LEAD DESIGNATION	CONN CABLE COLOR CODE	66M1-50 CONN BLK TERMINAL
IOXAO (+ DATA IN)	W-BL	1
IOXBO (- DATA IN)	BL-W	2
IORAO (+ DATA OUT)	W-O	3
IORBO (- DATA OUT)	O-W	4
T (+ SPEECH IN)	W-G	5
R (- SPEECH IN)	G-W	6
T1 (+ SPEECH OUT)	W-BR	7
R1 (- SPEECH OUT)	BR-W	8
GRDCF	W-S	9
GRDCF	S-W	10
AMN (MINOR ALARM)	R-BL	11
AMJ (MAJOR ALARM)	BL-R	12
+5C1 OR +5CSL	R-O	13
-48C_ RES	O-R	14
GRD-48	R-G	15
-48C_	G-R	16
GRD-48	R-BR	17
-48C_	BR-R	18
GRD-48	R-S	19
-48C_	S-R	20
GRD-48	BK-BL	21
-48C_	BL-BK	22
GRD-48	BK-O	23
-48C_	O-BK	24
GRD-48	BK-G	25
-48C_	G-BK	26
GRD-48	BK-BR	27
-48C_	BR-BK	28
GRD-48	BK-S	29
-48C_	S-BK	30
GRD-48	Y-BL	31
-48C_	BL-Y	32
GRD-48	Y-O	33
-48C_	O-Y	34
GRD-48	Y-G	35
-48C_	G-Y	36
GRD-48	Y-BR	37
-48C_	BR-Y	38
GRD-48	Y-S	39
-48C_	S-Y	40
GRD-48	V-BL	41
-48C_	BL-V	42
GRD-48	V-O	43
-48C_	O-V	44
GRD-48	V-G	45
-48C_	G-V	46
GRD-48	V-BR	47
-48C_	BR-V	48
GRD-48	V-S	49
-48C_	S-V	50

Fig. 33—Attendant Console Cross-Connections

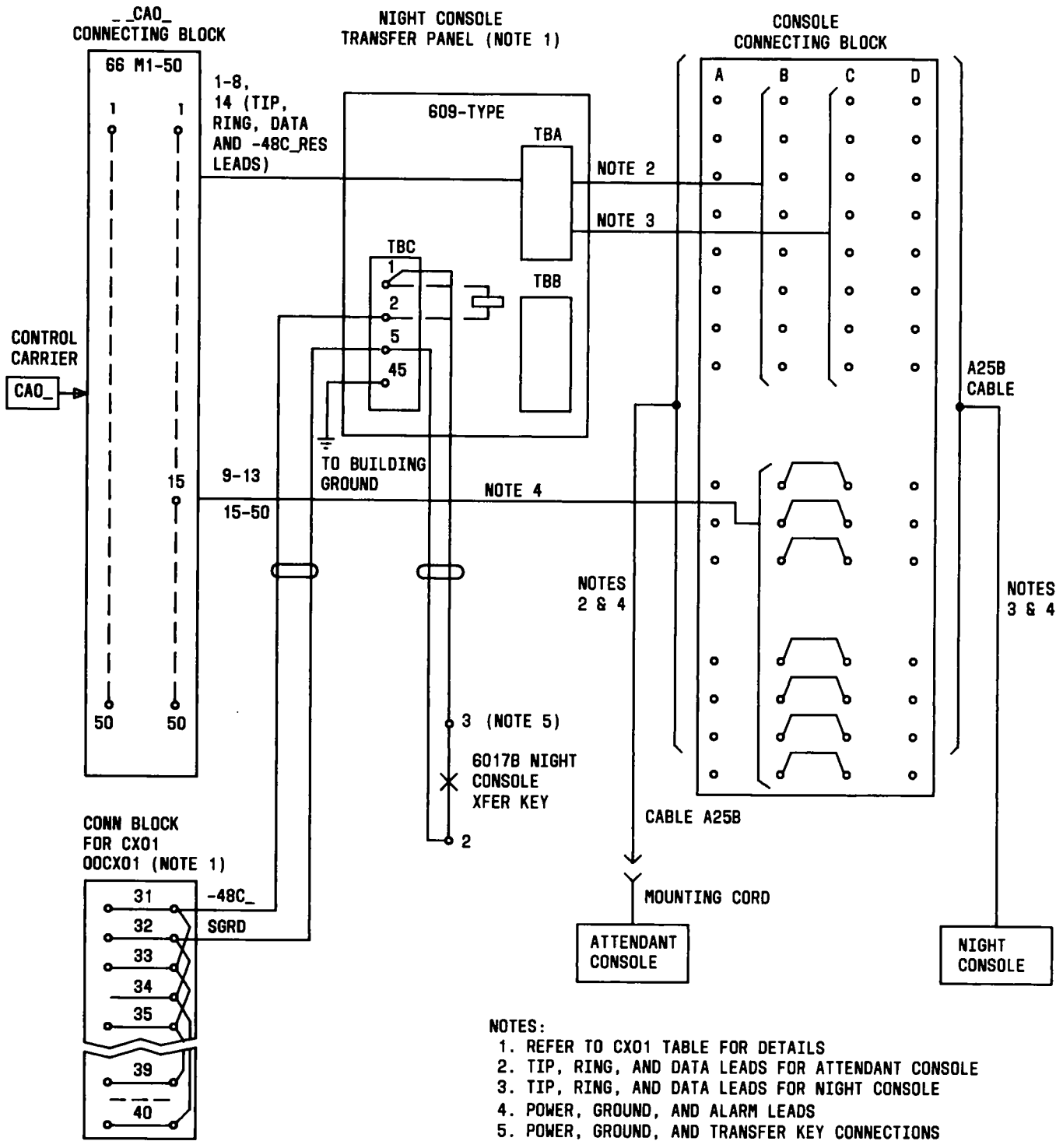


Fig. 34—Night Console Transfer Using 609-Type Panel

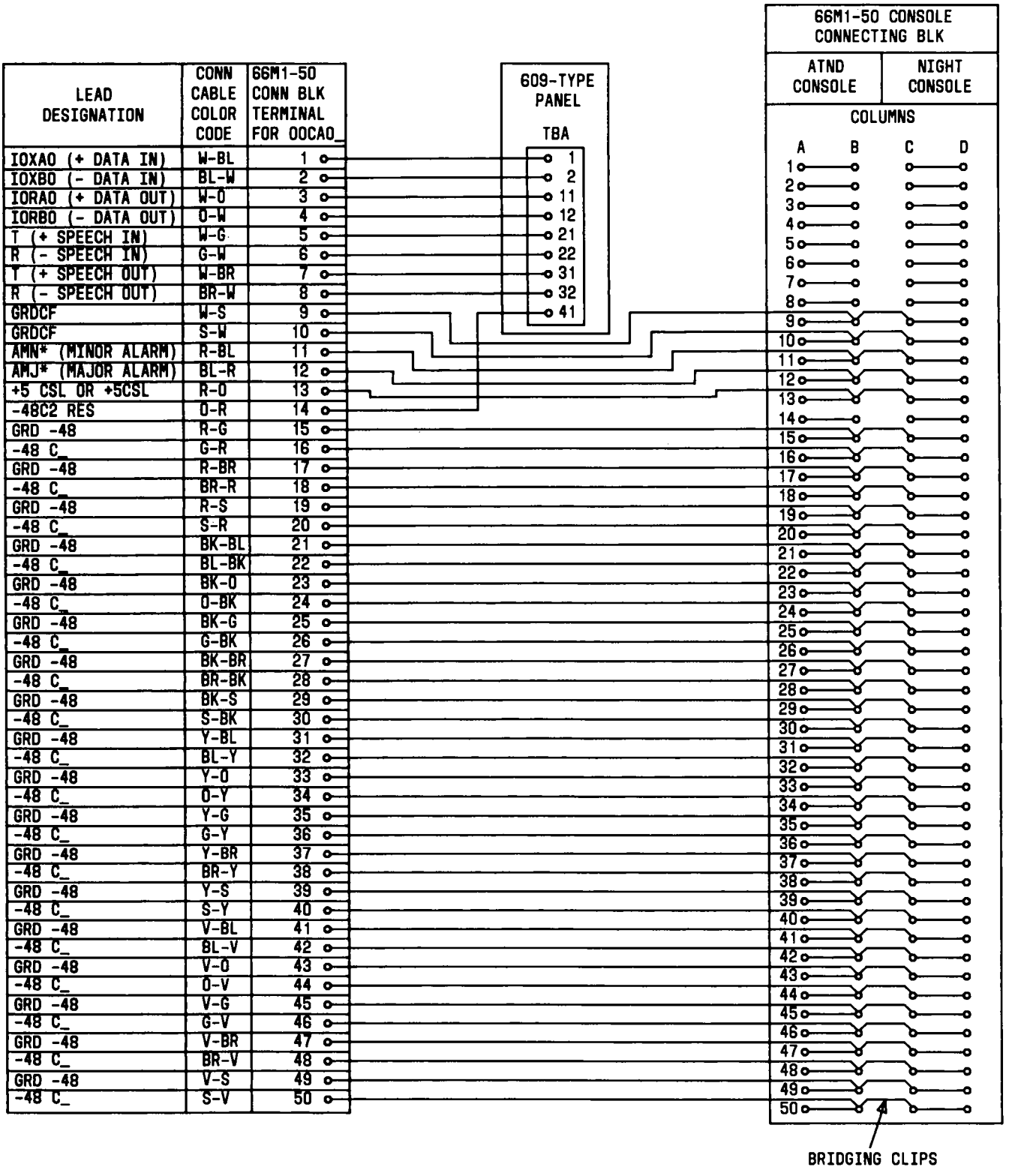


Fig. 35—Connections From 00CA01 Connecting Block to 609-Type Panel and Console Connecting Block

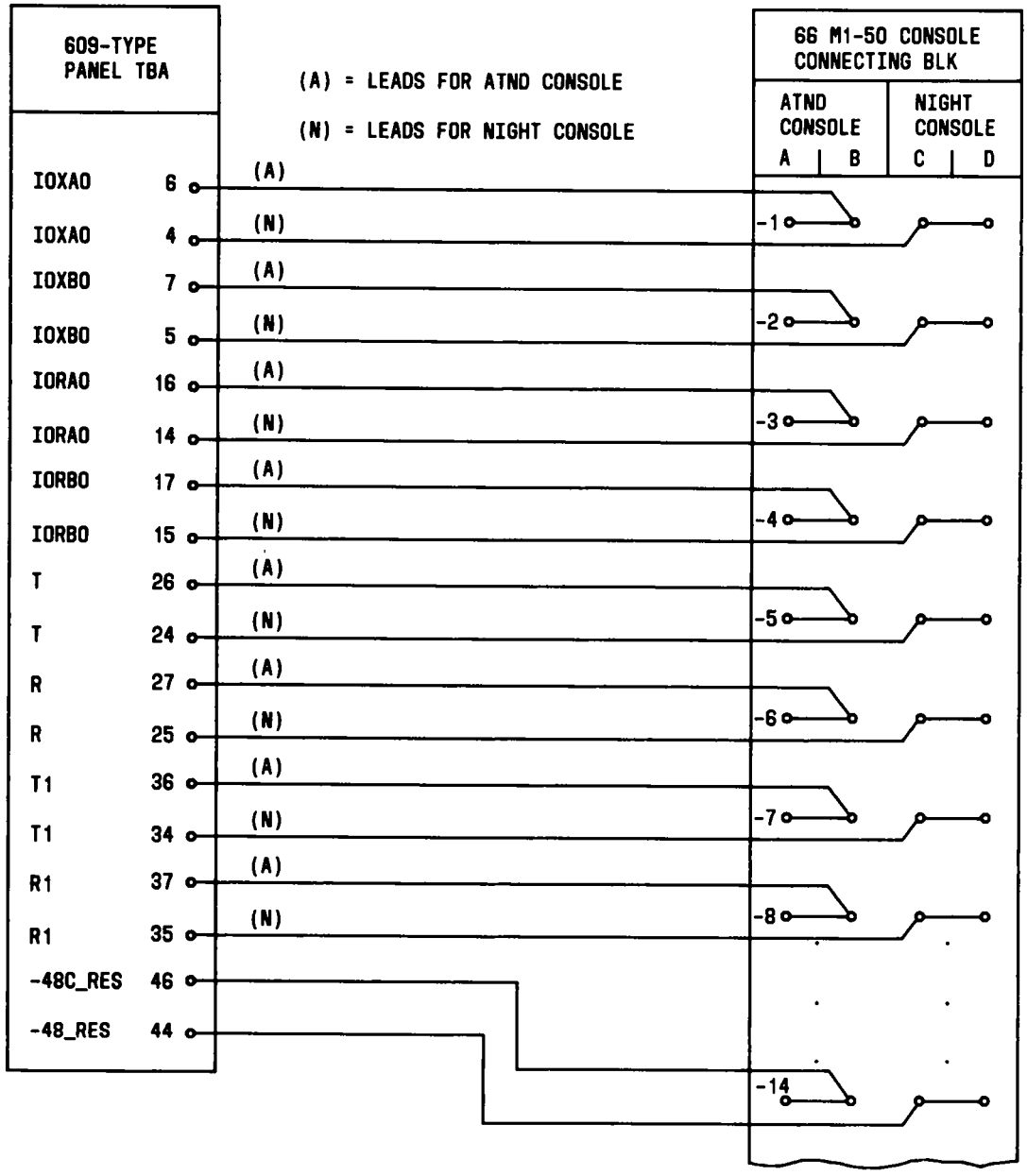


Fig. 36—Connections From 609-Type Panel to Console Connecting Block

and range extension is not required because the distance between the PBX and console is 300m (1,000 feet) or less.

(b) The repeater may be used when range extension is required because the distance between the PBX and console is more than 300m (1,000 feet) but equal to or less than 3350m (11,000 feet) [four cascaded repeaters can be used allowing up to 910m (3,000 feet) between each repeater].

5.05 The repeater detects and reconstructs incoming modified biphase (bipolar) data pulses to eliminate any pulse attenuation or distortion as well as to increase data channel range.

5.06 The repeater circuit is designed to operate in unexposed environments without additional protection and in exposed environments with standard protection.

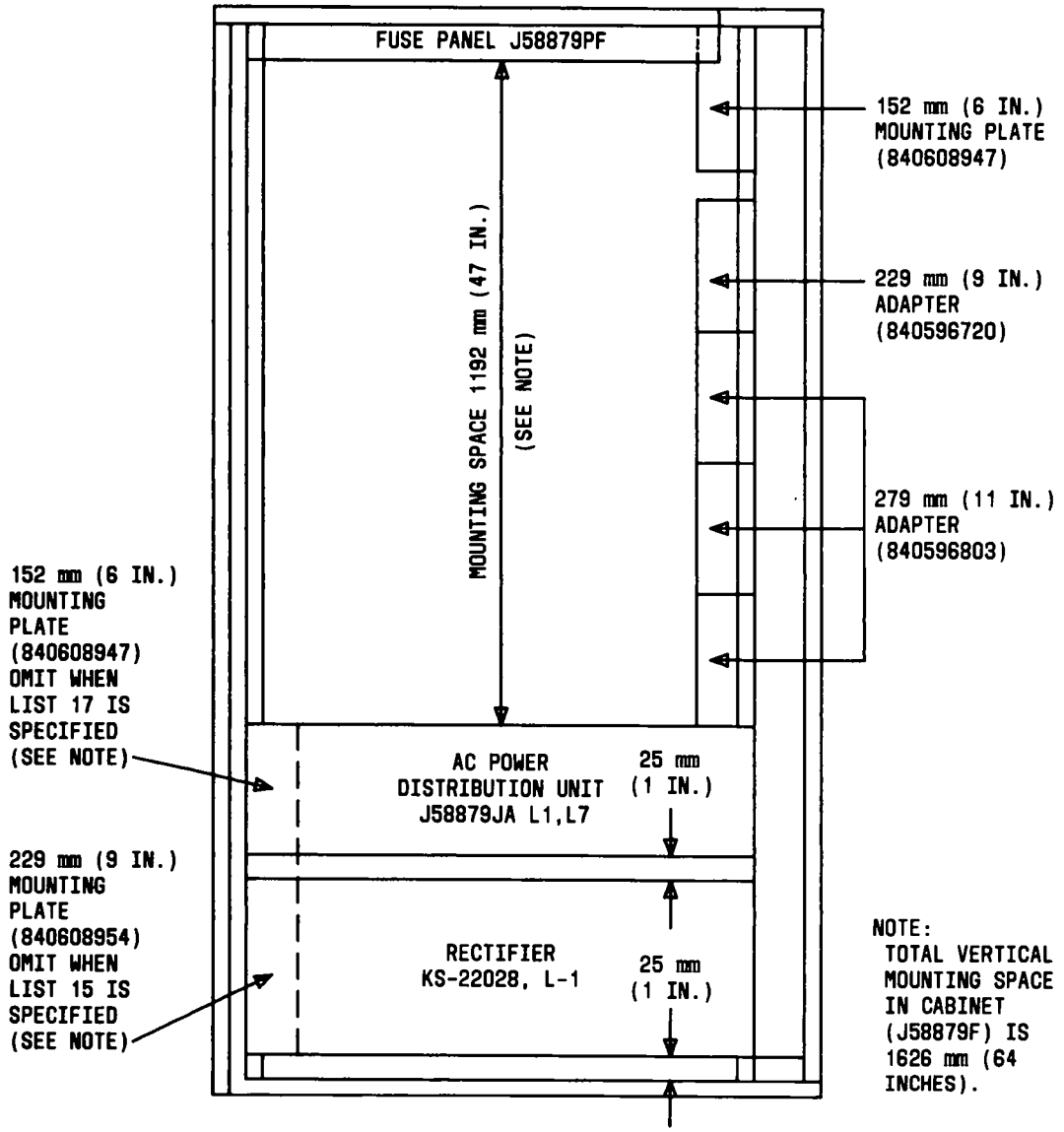


Fig. 37—Auxiliary Cabinet—J58879F

A. Housing and Mounting

5.07 The repeater circuitry is housed in a modified key service unit (Fig. 38) with a capacity for one data channel repeater circuit. The unit may be configured for use at either the PBX end or the console end.

5.08 The unit is designed to be wall-mounted near a 120-volt 60-Hz outlet. Power cords are available in four lengths—610, 1220, 1830, or 3660 mm (2, 4, 6, or 12 feet) (J58879KD, Lists A, B, C, or D, respectively).

Note: When no range extension is required, only the console-end power supply cord is required.

TABLE GG

AUXILIARY CABINET EQUIPMENT INFORMATION

ITEM NO.	CODE	DESCRIPTION
1	J58879F-2, List 1 (MD)	Framework, assembly, wiring, and equipment to provide 1626 mm (64 inches) of vertical mounting space for 584 mm (23-inch) wide auxiliary equipment units.
	J58879F-2, List 2 (MD)	Equipment required in addition to List 1 to provide an ac power distribution unit, arranged for a 117-volt power source.
	J58879F-2, List 4 (MD)	Equipment required in addition to Lists 1 and 2 when a filtered air supply is required.
	J58879F-2, List 5 (MD)	Apparatus and wiring required in addition to List 1 to provide a cable assembly when connectorized cable is used from the auxiliary cabinet to the cross-connect field.
	J58879F-2, List 6 (MD)	Equipment required in addition to Lists 1 and 2 to provide a frequency generator.
	J58879F-2, List 7	Wiring and equipment required in addition to Lists 1, and 16 or 25 and 15, to provide 23 fuse positions (–48V) and ringing and interrupter terminal strips.
	J58879F-2, List 8 (MD)	Wiring and equipment required in addition to List 6 to provide one frequency interrupter unit.
	J58879F-2, List 10 (MD)	Equipment required in addition to List 1 to provide a standard perforated top.
	J58879F-2, List 11 (MD)	Equipment required in addition to List 1 to provide a liquid spill-resistant top assembly.
	J58879F-2, List 12	Equipment required in addition to List 1, 16, or 25 to provide one auxiliary circuit filter unit.
	J58879F-2, List 14 (MD)	Equipment required to provide a wall outlet and wall plate.
	J58879F-2, List 15	Equipment required in addition to List 1, 16, or 25 to provide a –48V power supply (rectifier).
	J58879F-2, List 16 (MD)	Framework, assembly, and equipment to provide 64" of vertical mounting space for 23" wide auxiliary equipment units.
	J58879F-2, List 17 (MD)	Equipment required in addition to List 1 or 16 to provide an ac power distribution unit, arranged for a 117-volt power source.
	J58879F-2, List 18 (MD)	Equipment required in addition to Lists 1, 16, and 17 when a filtered air supply is required.
	J58879F-2, List 19 (MD)	Equipment required in addition to Lists 1 and 2 to provide a -48 Vdc power supply.
	J58879F-2, List 20	Equipment required in addition to Lists 16, 25 and 17, 24 to provide a frequency generator.

TABLE GG (Contd)

AUXILIARY CABINET EQUIPMENT INFORMATION

ITEM NO.	EQUIPMENT	DESCRIPTION
1 (Contd)	J58879F-2, List 21	Wiring and equipment required in addition to List 20 to provide one frequency interrupter unit.
	J58879F-2, List 22	Apparatus to provide wall outlet and associated mounting hardware.
2	Recorded Announcement Unit, H-400-107, List 1	Assembly, equipment and cords for one announcement set (KS-16765).
3	J58827E, List 1	Assembly, wiring, and equipment for one recorder telephone dictation trunk unit.
4	J98615AH	4V4A repeater for 48-volt operation.
5	J98615BJ, List 2	24V4C repeater for 48-volt operation.
6	J98615BL, List 2	24V4D repeater for 48-volt operation.
7	J59204CA-1, List 1	Assembly, wiring, and equipment for type G1 TOUCH-TONE calling receiving circuit, wired for two receivers.
8	J99380A, List 1	Assembly, wiring, and equipment for one single module shelf assembly equipped to accommodate up to 12 MFT transmission type plug-in units or up to 12 MFT loop extender (LSE) in any combination.
	J99380A, List 2	Assembly, wiring, and equipment required in addition to List 1 to provide for installation of List 1 into any DIMENSION PBX cabinet frames.
	J99380A, List 3	Equipment required to store one J99380TA test extender in List 2 shelf assembly.
	J99380A, List 4	Wiring and equipment required in addition to List 1 to provide for installation of List 1 as either a single shelf arrangement or the top shelf in a multiple shelf arrangement in the DIMENSION PBX auxiliary cabinet.
	J99380A, List 5	Wiring and equipment required in addition to List 1 to provide for installation of List 1 as an additional shelf in a multiple shelf arrangement in DIMENSION PBX auxiliary cabinet.
9	J99380E, List 1	Assembly, wiring, and equipment for one double module shelf assembly equipped to accommodate up to 6 MFT transmission type plug-in units and up to 6 MFT signal type plug-in units in dual mounting arrangements or up to 6 MFT transmission type plug-in units and up to 6 loop signal extender plug-in units in dual mounting arrangements.
	J99380E, List 2	Assembly, wiring, and equipment required in addition to List 1 to provide for installation of List 1 into any of the DIMENSION PBX cabinet frames.

TABLE GG (Contd)

AUXILIARY CABINET EQUIPMENT INFORMATION

ITEM NO.	EQUIPMENT	DESCRIPTION
9 (Contd)	J99380E, List 2	Assembly, wiring, and equipment required in addition to List 1 to provide for installation of List 1 into a J99380D, List 1 double depth mounting frame.
	J99380E, List 4	Wiring and equipment required in addition to List 1 to provide for installation of List 1 as either a single shelf arrangement or the top shelf in a multiple shelf arrangement in the DIMENSION PBX auxiliary cabinet.
	J99380E, List 5	Wiring and equipment required in addition to List 1 to provide for installation of List 1 as an additional shelf in a multiple shelf arrangement in the DIMENSION PBX auxiliary cabinet.
10	J58824CD-1, List 2	Assembly wiring and equipment required in addition to List 7 to repeat dialed digits to customer on a 2-out-of-7 lead basis
	J58824CD-1, List 7	Assembly, wiring, and equipment for one interface unit for dial or TOUCH-TONE dialing pulsing.
	J58824CD-1, List 9	Assembly, wiring, and equipment for one applique unit required in addition to List 7 when TOUCH-TONE dialing signals are converted to dial pulses.
	J58824CD-1, List 12	Wiring and equipment required in addition to List 7 to provide called party access.
	J58824CD-1, List 15	Assembly, wiring, and equipment for one applique unit required in addition to List 7 when TOUCH-TONE dialing signals are converted to DC signals on a 2-out-of-7 lead basis using type G1 receivers.
	J58824CD-1, List 16	Assembly, wiring, and equipment always required in addition to List 7 when used with the DIMENSION PBX system.
	J58824CD-1, List 17	Assembly, wiring, and equipment always required in addition to List 12 when used with the DIMENSION PBX system.
11	J53050F-1, List 1	Assembly, wiring, and equipment for one trunk level interconnecting unit.
12	J58847Y-1, List 3	Assembly, wiring and equipment for one link and EDU with fusing provided from PBX.
	J58847Y-1, List 4	Assembly, wiring and equipment for one link and EDU with fusing provided.
13	J58879KA-1, List 1	Assembly, wiring, and equipment for a basic electronic telephone control carrier (ECTS).
	J58879KB-1, List 1	Assembly, wiring, and equipment for a supplemental electronic telephone control carrier (ECTS).

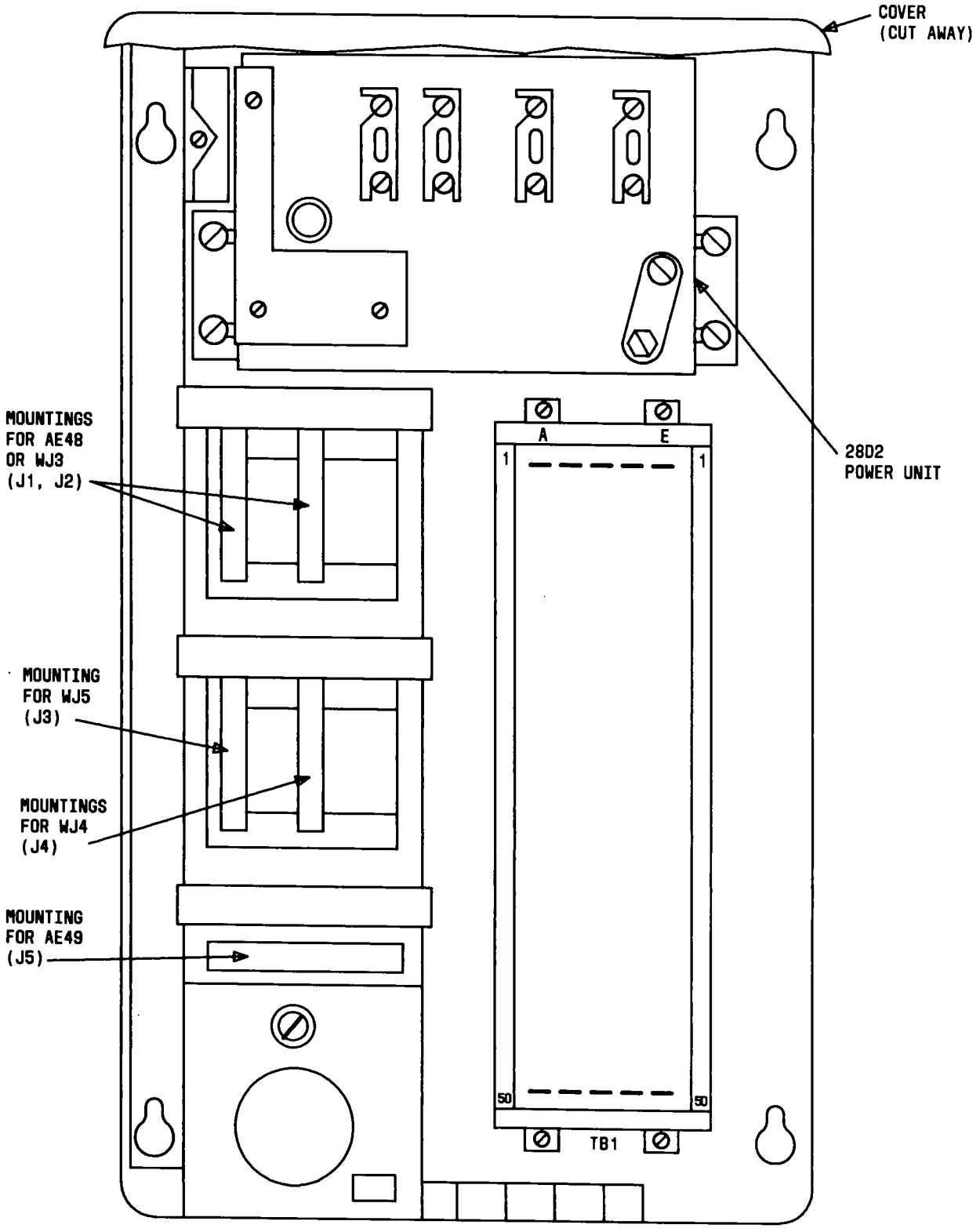


Fig. 38—Attendant Console Repeater

B. Installation

Range Extension Configuration

5.09 Range extension may be used to extend the distance from the PBX to the console up to 3350m (11,000 feet) by cascading four repeaters. When used for range extension (Fig. 39), the attendant console repeater is equipped as follows:

- Two J58879KD, List 1 (repeater assemblies)
- Two each J58879KD, List 2 (28D2 power unit and circuit pack AE-49)
- Four J58879KD, List 3 (circuit pack AE-48)
- One J58879KD, List 5 (circuit pack WJ-4)
- One J58879KD, List 6 (circuit pack WJ-5)
- Three J58879KD, Lists A, B, C, and D power input cords for power units. (Cord lengths are specified in paragraph 5.08.)

The cascaded intermediate repeaters require no alarm lead repeaters (CP WJ4 and CP WJ5), but strapping is required to bypass the circuit pack connectors. This strapping is provided by wiring option Z. Option Z provides for strapping on the connecting block of terminals 11B to 11D, 12B to 12D, and 15B through 50B to 15D through 50D, respectively.

5.10 The power unit (28D2 and circuit pack AE-49) is required in both the PBX end and console end repeaters when range extension is provided. The power unit (284B1) for the repeater at the attendant console is required with or without range extension. The power unit connections are shown in Fig. 40.

If the attendant console is located in a building separate from the PBXs, attendant console repeaters must be used.

Repeaters Without Range Extension

5.11 When repeaters are used without range extension (Fig. 41), they should be equipped as follows:

- Two J58879KD, List 1 (repeater assemblies)
- Four J58879KD, List 4 (circuit pack WJ-3)
- One J58879KD, List 5 (circuit pack WJ-4), required at console end repeater only
- One J58879KD, List 6 (circuit pack WJ-5), required at PBX end repeater only.

Cable Runs

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

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

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

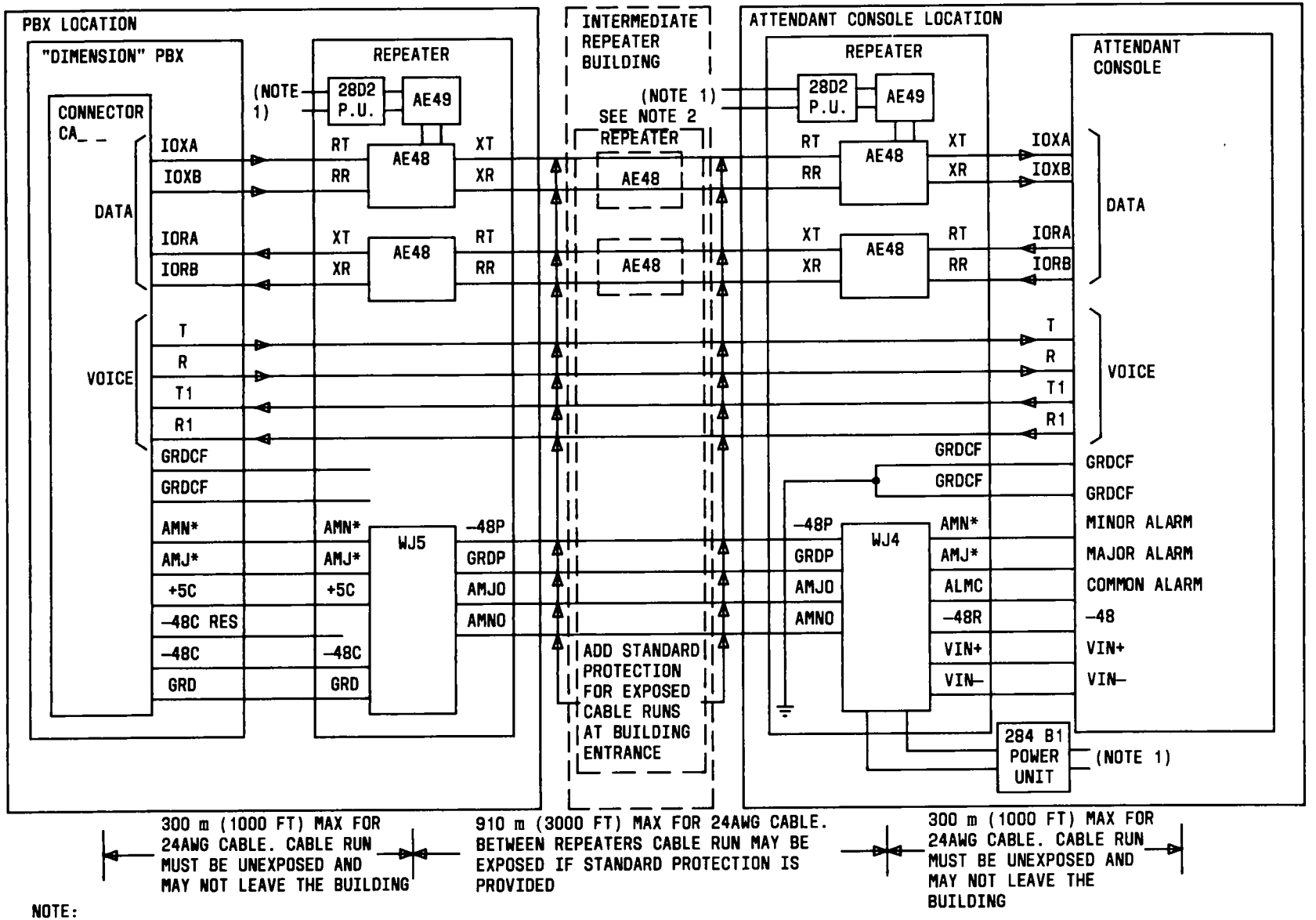
Repeater Location

5.14 The physical characteristics of the repeater circuit require that it be installed inside a building. The repeater locations should also satisfy the following requirements:

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

AC Power

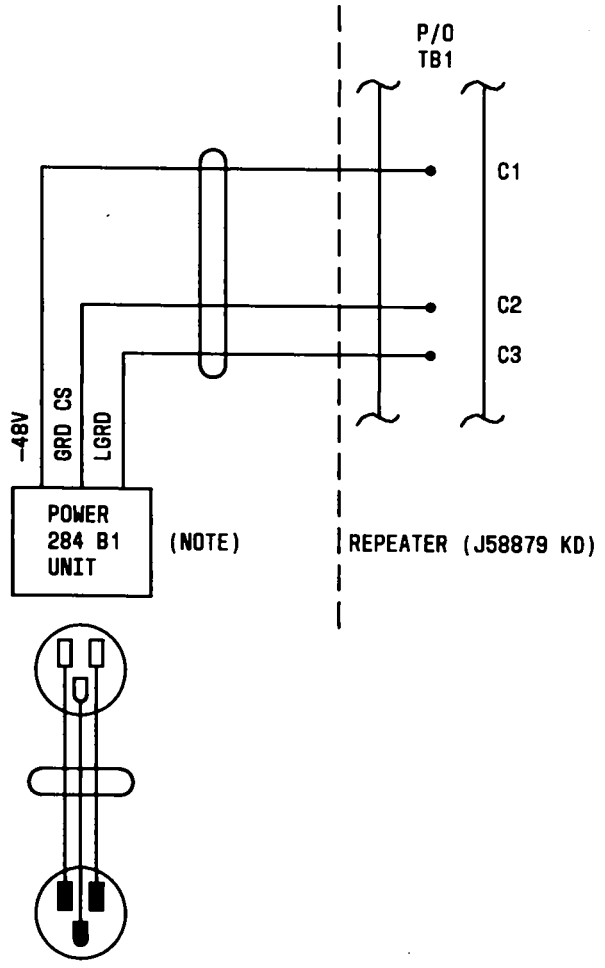
5.15 Provision is made for the use of either 123-, 117-, or 111-volt ac power. The power supplies are designed to tolerate line surges.



NOTE:

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

Fig. 39—Attendant Console Repeaters—With Range Extension



NOTE:
POWER UNIT (284 B1) SHOULD BE MOUNTED
(OR LOCATED) ADJACENT TO ASSOCIATED REPEATER

Fig. 40—Power Unit (284B1) Connections to Repeater

Tip and Ring Protection

5.16 The console repeater circuit provides no protection for the 4-wire console talk path. Where exposed cable runs exist, standard carbon block protection is adequate for these leads.

5.17 Figures 39 and 41 illustrate the console repeater installations, providing lightning protection only (without range extension) and lightning protection (with range extension).

5.18 Worksheet 2 is provided as an aid in planning the cross-connections for console repeaters and connections for cascaded repeaters.

AUTOVON INTERFACE

5.19 The AUTOVON (automatic voice network) service via the PBX provides access to and from the world-wide U. S. Department of Defense private line communication AUTOVON network. Access lines (trunk circuits) to the AUTOVON network have console appearance at the selector console. Each selector console contains a maximum of 30, 60, or 90 trunk keys with a status lamp provided for each key. Up to four 21-type selector consoles may be provided. Precedence capable access lines appear on two adjacent keys on the selector console, one key (R) for the routine port and one key (P) for the precedence port. Routine only access lines appear on a single key per access line. A maximum of four AUTOVON trunks, one or two carriers, and associated cabling is also required. Refer to Section 554-010-135 for detailed information on this service.

5.20 AUTOVON interface equipment required with the PBX to provide AUTOVON service follows:

- One selector console (minimum) type 21A, 21B, or 21C—Each selector console must be associated with a main console.
- One basic AUTOVON control and trunk carrier (J59216BA) minimum.
- One or more supplemental AUTOVON control and trunk carrier (J59216BB), as required for additional capacity.
- One special AUTOVON control and trunk carrier (J59216BC), as required, if more than six consoles are equipped.
- LC11B tie trunk circuit packs.

5.21 The PBX providing AUTOVON service must be equipped with the following features activated:

- Common control switching arrangement access
- Direct trunk group selection
- Trunk verification by customer
- Manual termination line service

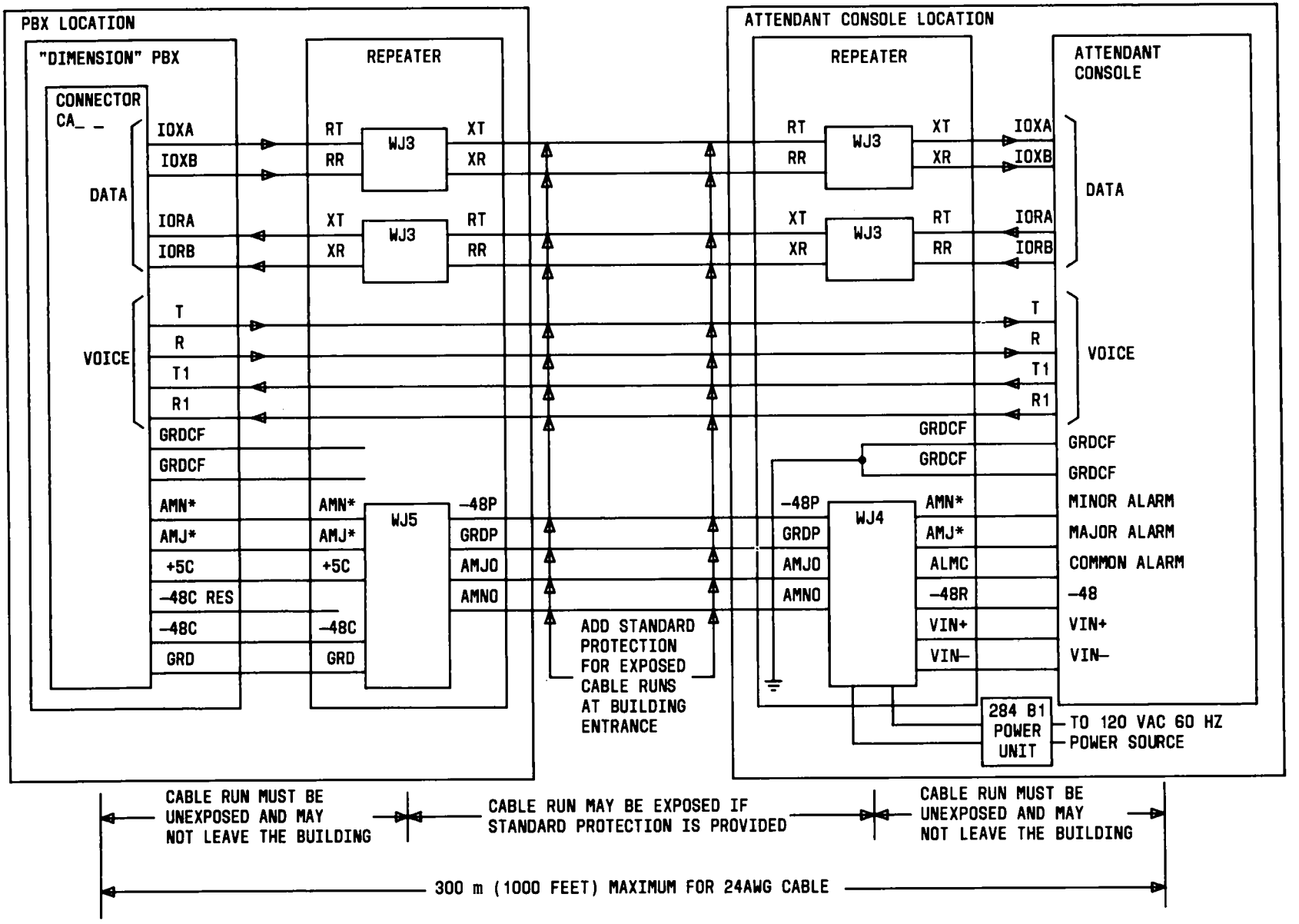


Fig. 41—Attendant Console Repeaters—Without Range Extension

- Miscellaneous trunk restriction
- Tie trunk access (automatic, 2-way).

5.22 The main console associated with the 21- type selector console must be one of the following electronic consoles:

- AAA-02AF-03-
- AAD-02AF-03-
- AAG-02AF-03-
- ADA-02AF-03-
- ADB-02AF-03-
- ADD-02AF-03-
- ADE-02AF-03-
- ADH-02AF-03-
- ADJ-02AF-03-
- AGA-02AF-03-
- AGB-02AF-03-
- AGD-02AF-03-
- AGE-02AF-03-
- AGH-02AF-03-
- AGJ-02AF-03-.

CALLING NUMBER DISPLAY TO STATION

5.23 For information on this feature, refer to paragraph 5.133.

CENTRALIZED ATTENDANT SERVICE WITH SEPARATE ATTENDANT CONCENTRATOR

5.24 The centralized attendant service (CAS) permits multilocation PBX customers (branch locations) who are served by separate central offices to concentrate attendant positions at a main location. A typical CAS arrangement is shown in Fig. 42. The main location and each branch location have different listed directory numbers (LDNs). In Fig. 43, the PBX at the main location is designated as Location 1. Whenever the DIMENSION 400 PBX is designated as Location 1, the PBX functions as a branch location although it is located at the main location where the attendant concentrator and CAS attendant(s) are located.

5.25 The attendant concentrator at the main location is connected via release link trunks (RLTs) to the PBX at each branch location. The release link trunk functions with the CAS to connect switched loops with calls requiring attendant action to a remote CAS attendant who can answer and extend the calls. When the RLT is seized on an LDN call, it provides a temporary connecting link between the PBX and a call distributing system. It provides the transmission path and returns the proper identification back over the same RLT. Once the attendant releases the call, these trunks are then made available for other calls. When the CAS feature is provided in the DIMENSION 400 PBX, the PBX serves only as a branch location. A maximum of four RLTs can be connected between each branch PBX and the centralized answering point. Each RLT is equivalent in call-handling capability to a single attendant console at the PBX location.

5.26 The DIMENSION PBX uses a standard tie trunk (LC11B) to provide 4-wire E&M or DX signaling for RLT operation. Whenever the main PBX uses the 2B automatic call distributor or the 4A call distributor, a DX or E&M signaling to ground start converter (J99343FD) must be installed between the RLT and the main location PBX (Fig. 43). A cross-connection diagram is illustrated in Fig. 44.

5.27 Two RLT backup options are provided as follows:

(a) ***Backup Control Telephone per RLT With a Lamp Panel:*** One backup nonkey set (control station set) is provided per RLT. The set is equipped with a plug-in headset or a G15A handset with modular cord and 478A adapters to supplement the existing headset and to allow the station user access to the handset prior to going off-hook. The control station can dial a code to transfer RLTs to backup facilities, dial-test RLTs and other trunks, and make any trunk or RLT maintenance-busy or unbusy. Recommended telephone sets for the backup function are 514BM, rotary dial, or 2514BM, TOUCH-TONE* telephone dial.

*Trademark of AT&T.

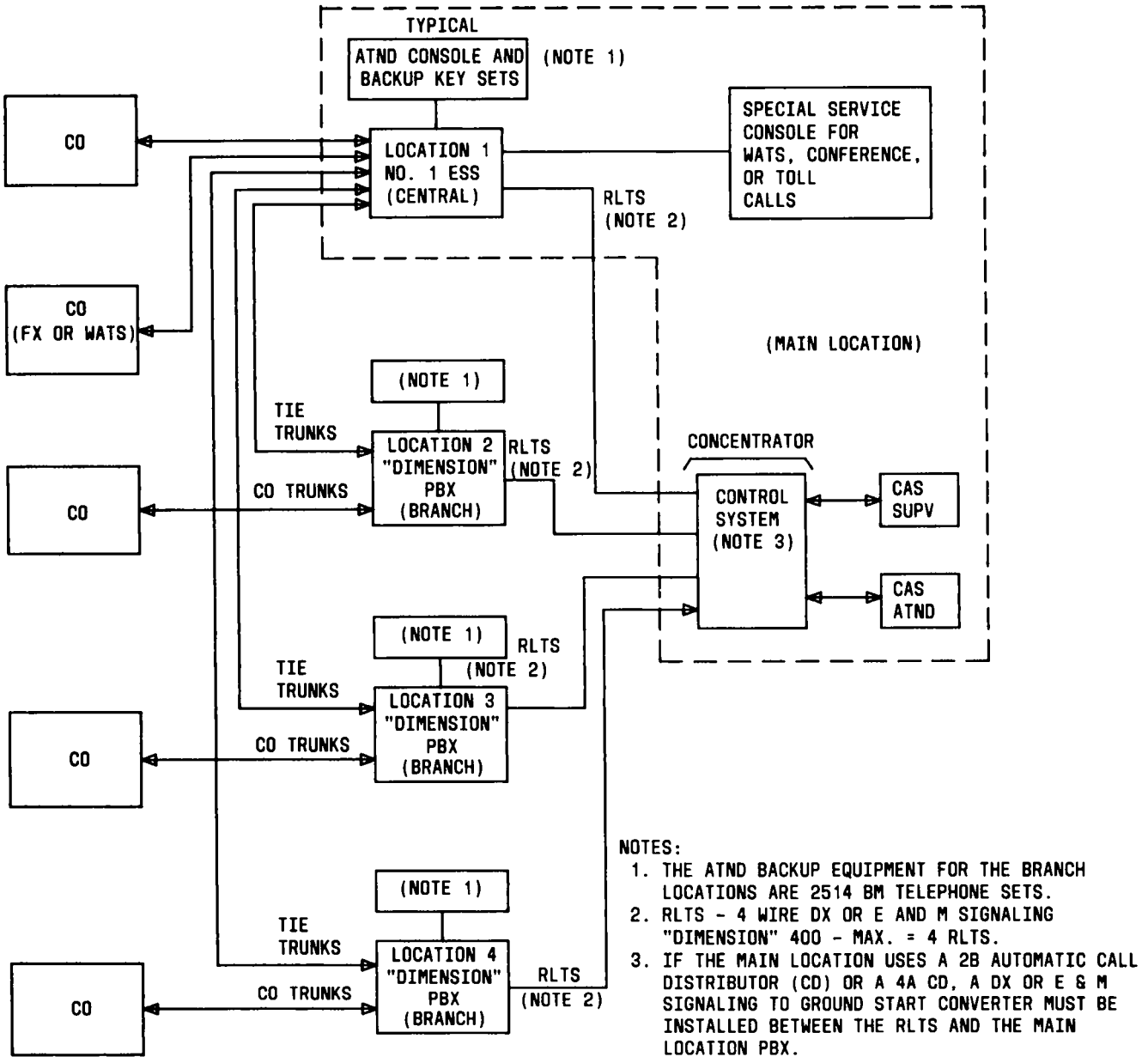


Fig. 42—CAS Arrangement Using DIMENSION PBX Systems With Separate Attendant Concentrator—Block Diagram

Note: Lamp No. 5 (CONTL) on the 30A8 CAS system status indicator provides a steady illumination for normal operation and blinks for backup mode of the RLTs.

(b) ***Trunk Answer From Any Station:*** The TAAS mode enables all RLT calls to be processed by the TAAS feature at the particular PBX. One call at a time will activate wall-mounted ringers at the branch PBX. These can be answered by any station. The answering station will use call transfer to extend the call to the desired station or trunk in the same manner as control stations.

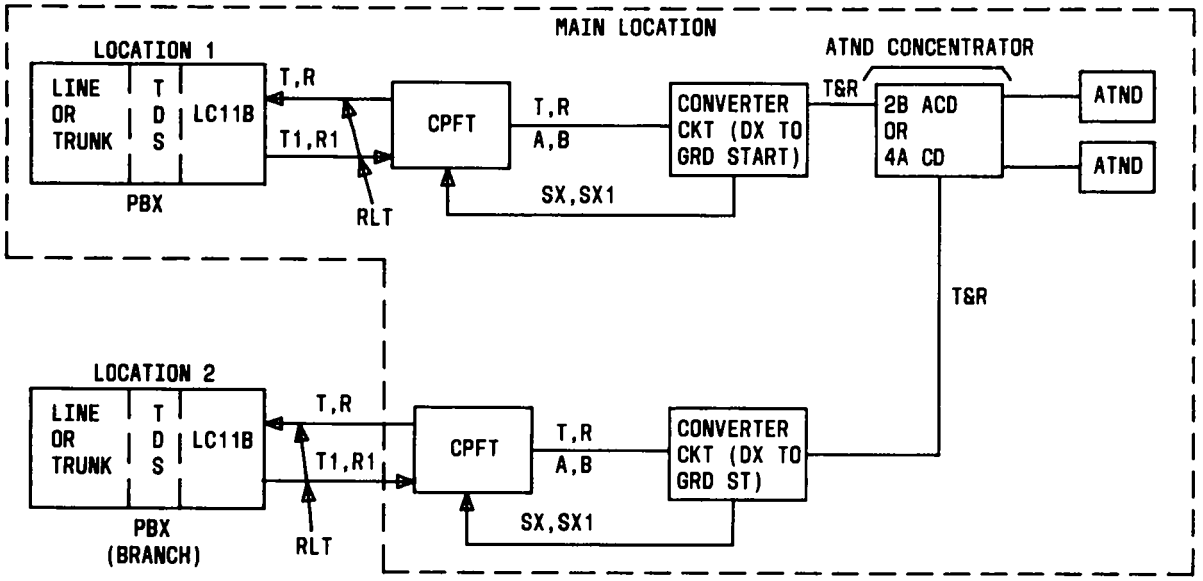


Fig. 43—CAS Arrangement With Repeaters

A. 30A8 CAS System Status Indicator and Multiple Alarm Connections

5.28 A 30A8 CAS system status indicator (SSI) can be used in conjunction with the centralized attendant service (CAS) feature to provide a status monitoring capability (Fig. 45). The SSI monitors the short holding time connections from the unattended location to the centralized answering point. The status of four RLTs is displayed on lamps RLT 1 through RLT 4 on the front panel. Refer to Table HH for lamp status information. The remaining light-emitting diodes (LEDs) display the control, overload, and major/minor alarms. The control station may test RLTs to make any trunk or RLT maintenance-busy. The control station can receive RLT calls from the RLT queue in the same manner as the CAS attendant.

5.29 The LEDs and associated circuitry are contained on an RE2 circuit pack assembly (A-850273) within a plastic ivory (#115-50) or black (#115-03) housing, suitable for desk top or wall mounting with colored panels as shown in Table II. The housing measures 165 mm (6.5 inches) wide by 133 mm (5.25 inches) deep, and 79 mm (3.125 inches) high. The SSI is equipped with a 2440 mm (8-foot) mounting cord terminated in an AMP connector at the set end and a KS-16904, List 4 connector at the plug end. Sheet 2 of Fig. 45 illustrates the ZB option of wiring for an alarm to only the CAS system status indicator.

5.30 Whenever multiple alarms are required in conjunction with CAS SSI or other connections, option A is provided (Fig. 46). Worksheet 3 is provided as an aid in planning the cross-connections for CAS. Option B provides for wiring alarms to the central office only.

B. 24A8/24B8 Line Status Indicator

5.31 Backup station lines associated with the CAS feature can be monitored and observed for off-hook status, on-hook status, and ringing status, by the 24A8/24B8 line status indicator (LSI) (Fig. 47). The indicator bridges across the T and R leads of the monitored lines and provides a visual and audible indication of these lines at the LSI. Mounting cord terminations are shown in Fig. 47.

CENTRALIZED STATION MESSAGE DETAIL RECORDING SYSTEM

5.32 A centralized station message detail recording (CSMDR) system is available to collect station message detail recording (SMDR) data for multilocation customers (Fig. 48). The centralized collection from the remote PBXs is via an automatic dialup polling arrangement over the customer or the DDD network. The polling schedule may be customer-selected and/or changed based on current needs. At each remote location, a 94A local storage unit (LSU) collects and stores the SMDR data from the

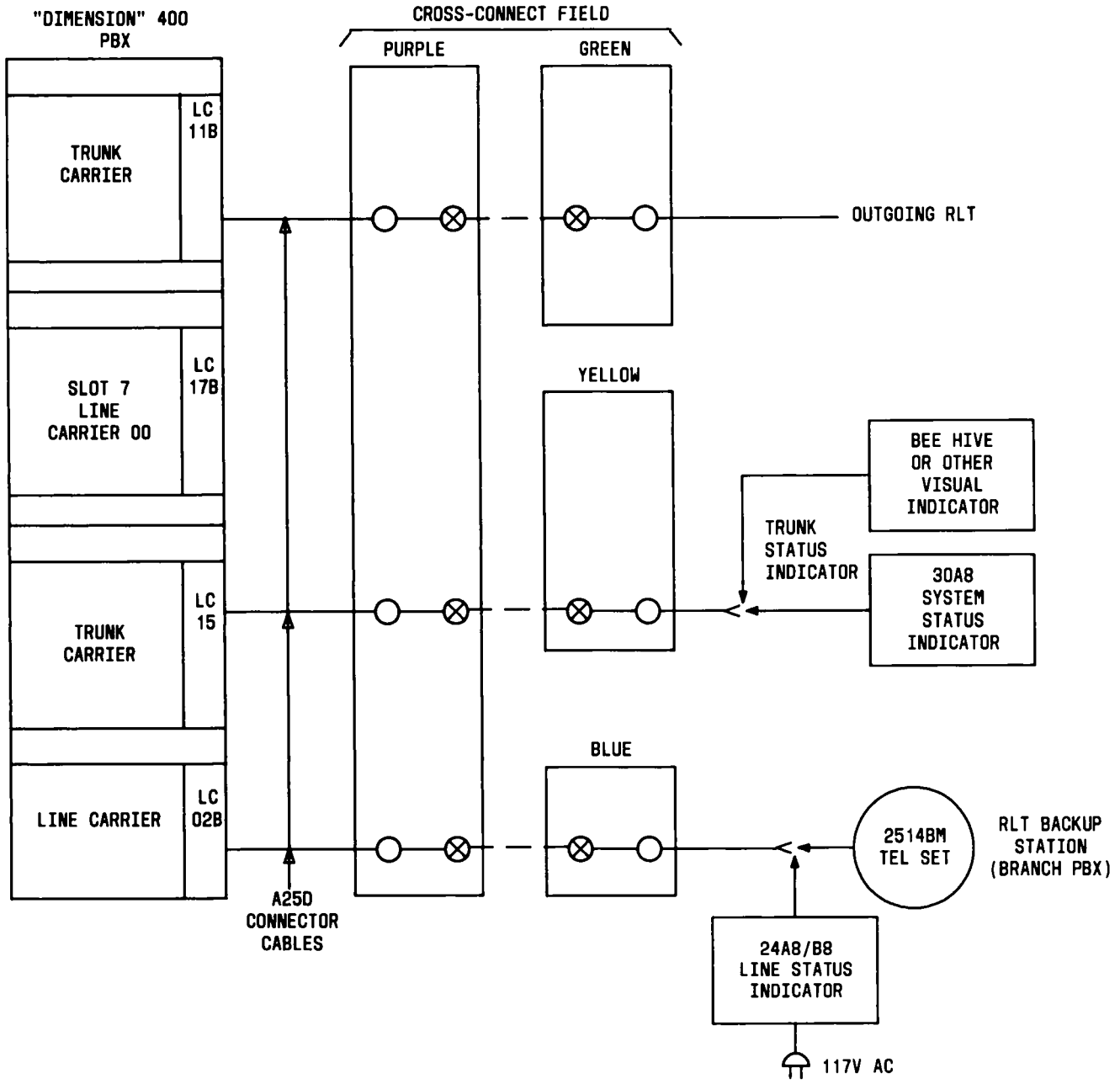


Fig. 44—CAS Branch Location Cross-Connections

PBX via a data channel. The LSU records, formats, and transmits the data in response to periodic polling by the CSMDR system. The dedicated data channel is physically located in slot 32, circuit 0, on the control carrier, or in slot 32/37, circuit 0, on the trunk/control carrier. The channel must be optionally wired for fast-speed (833 kb/s) data. Connection is made to the channel via the CX03 connector on the carrier. The connection between the PBX and the LSU is via a C2D cable and should not exceed 61 meters (200 feet). Additional information pertaining to the 94A LSU may be found in Section 190-402-100.

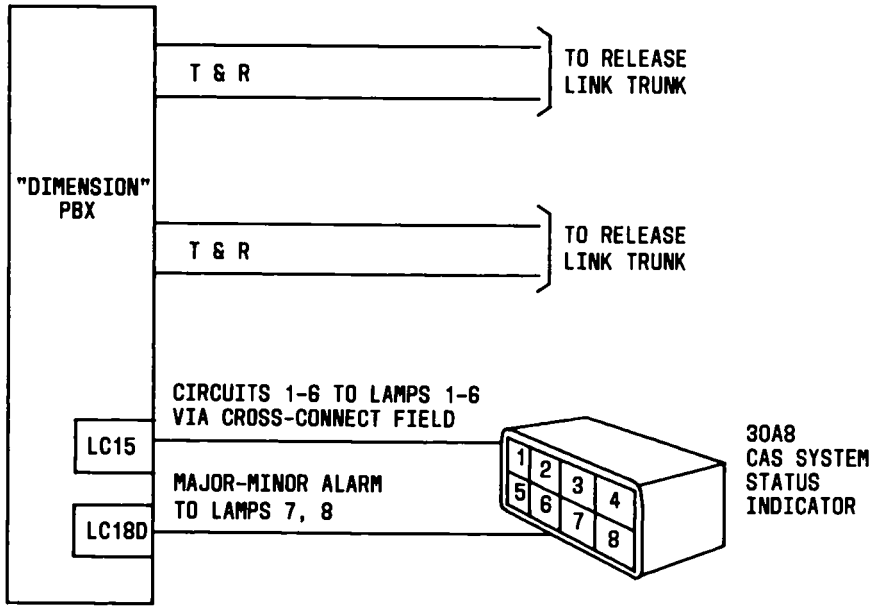


Fig. 45—30A8 CAS System Status Indicator Connections (Sheet 1 of 2)

CODE CALLING ACCESS

A. Chime Paging

5.33 The code calling access feature enables attendants, station users, and tie trunks to dial an access code and a 2- or 3-digit called party code to activate an electronic chime corresponding to the called party code. The called party can then be connected to the calling party by dialing an answering code from any station within the PBX. When chime paging is required, the following hardware must be installed. (Refer to Fig. 49 for a functional diagram of hardware connections.)

- LC17B tone board
- 89A control unit
- 2012B power transformer.

5.34 The 89A control unit should be located as close as possible to the paging trunk circuit and the paging amplifier to minimize lead lengths. The customer should provide a 120 Vac outlet for the 2012B transformer. One transformer is capable of serving up to three 89A control units. Both voice and chime paging can be provided in the system if two 89A control units are used. Only one amplifier is required to furnish amplification for both 89A control units. Refer to Loudspeaker Paging in this Part 5 for required equipment and connections for voice and chime paging. Connections for chime paging are shown in Fig. 50.

5.35 When background music is required, CMS1 and CMS2 leads (Fig. 50) should be connected to the customer's equipment to provide music over the same system while chime paging is not in progress. When only chime paging is to be provided, the CBS1 and CBS2 leads from the 89A control unit should be connected to the customer's equipment. With this connection, the CBS1 and CBS2 leads will seize the customer's equipment every time the 89A control unit is seized to transmit the chime paging signal from the PBX to the customer's equipment. Otherwise, the leads will remain idle during times that chime paging will not be utilized.

B. 3A Code Call

5.36 The 3A code call access is a standard feature provided in the PBX. This feature is an alternate method of providing chime paging. The 3A code call feature utilizes different equipment than chime paging but allows attendants, station users, and tie trunk users to dial an access code and a 2- or 3-digit called party code to activate a coded signal which corresponds to the called party code. The called party can then be connected to the calling party by dialing an answering code from any station within the PBX.

5.37 The following equipment is required to provide 3A code call access.

- J58822B-2—3A code call equipment (modified per G466520)

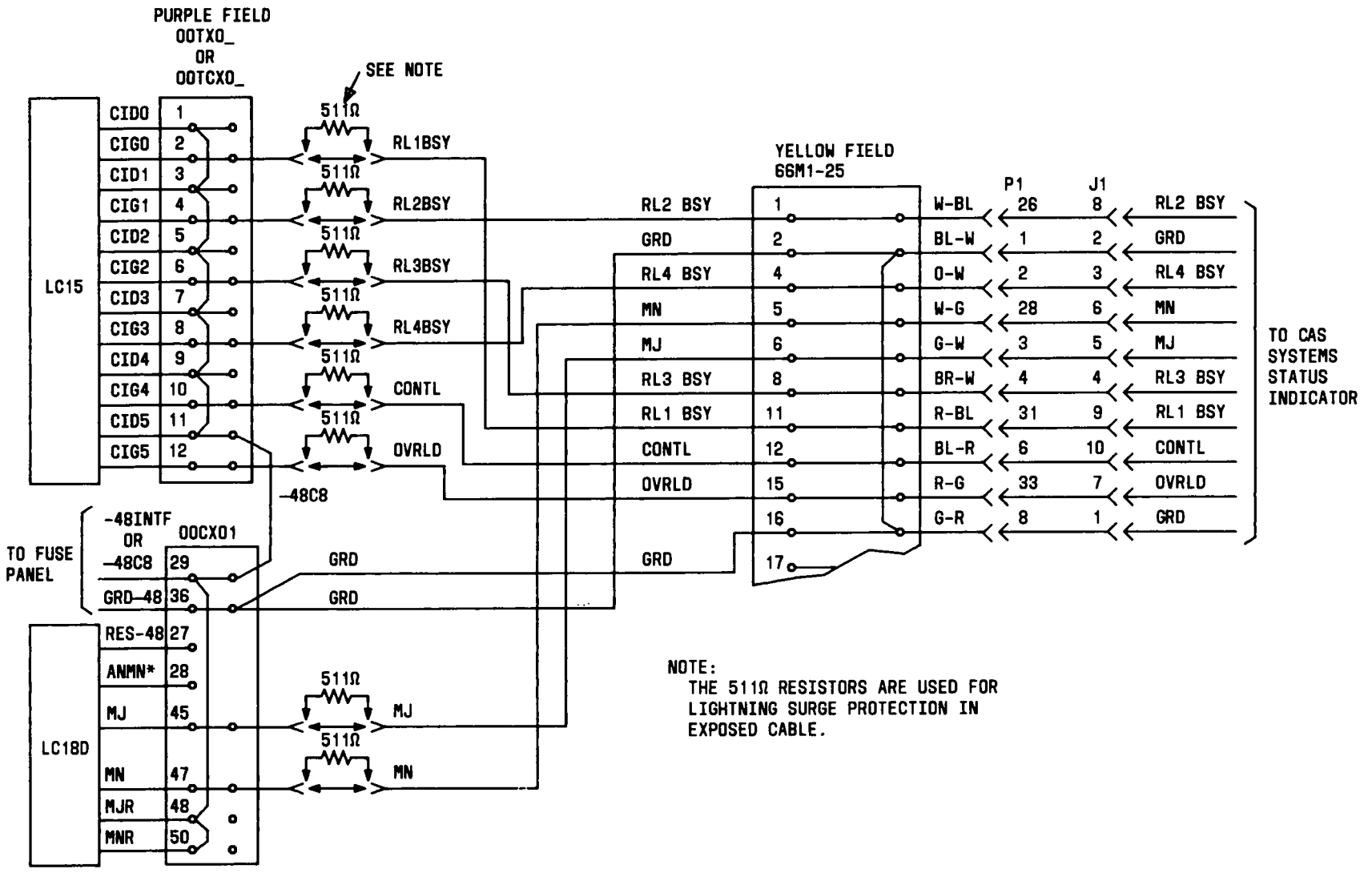


Fig. 45—30A8 CAS System Status Indicator Connections (Sheet 2 of 2)

TABLE HH

30A8 LAMP STATUS INDICATOR

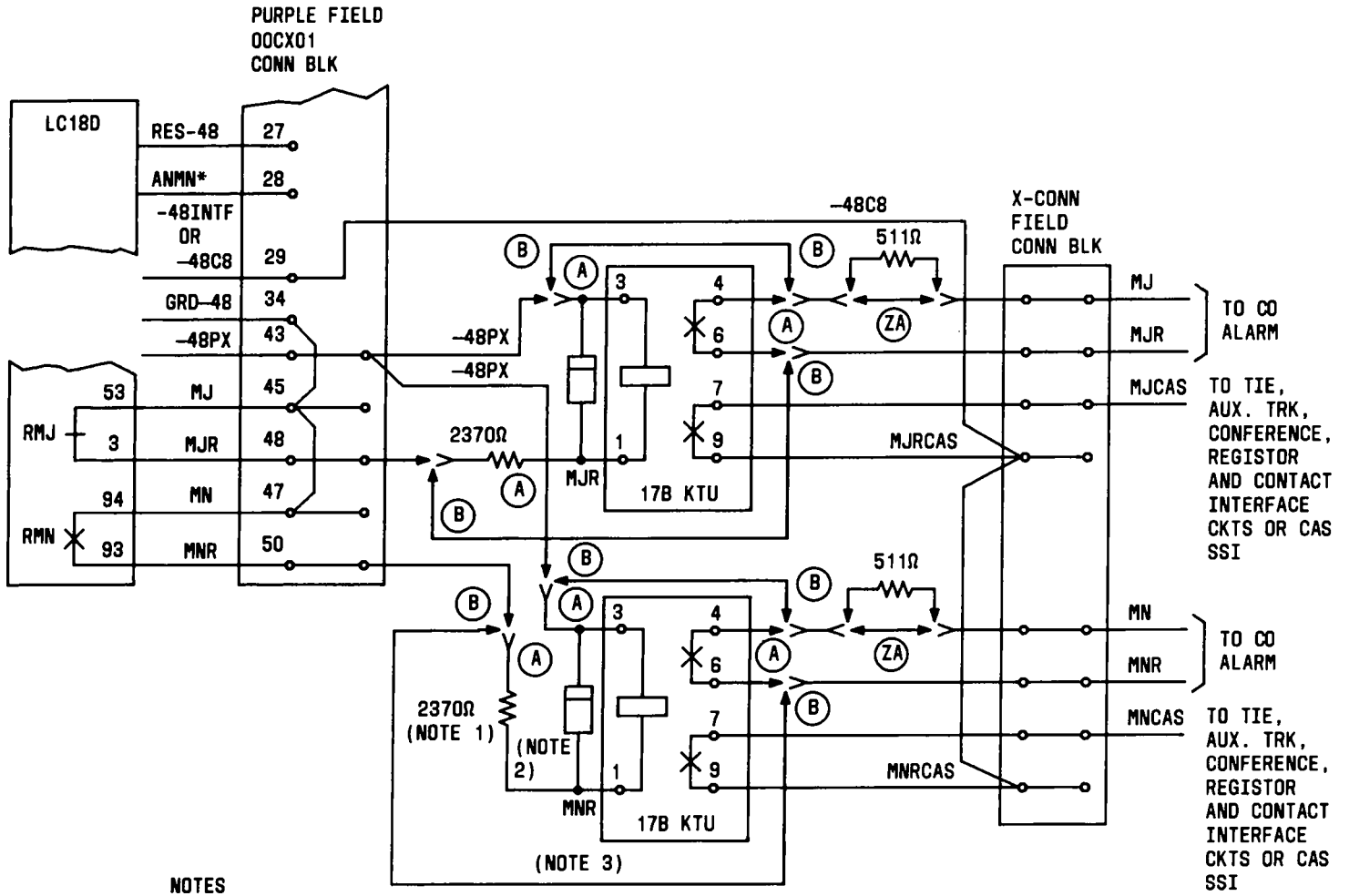
LAMP NO.	FUNCTION	STATUS INDICATION
1 2 3 4	RLT 1 RLT 2 RLT 3 RLT 4	Dark = Idle RLT/Backup Mode Steady = Busy RLT — seized both ends Wink (30 IPM) = Maintenance Busy
5	Control	Steady = Normal Blink = Backup Mode or Trunk Answer From Any Station
6	Overload	Dark = Normal Steady = Queue Overload
7 8	Major Minor	Dark = Normal Steady = Alarm

TABLE II

PANEL COLORS FOR LINE STATUS INDICATOR (24A/24B TYPE) AND SYSTEM STATUS INDICATOR (30A8)

REAR PANELS		FRONT PANELS	
COLOR	PART NO.	COLOR	PART NO.
Avocado	840597579	Black *	840597652
Gold	840597587	Avocado	840597660
Orange	840597595	Gold	840597678
Brown	840597603	Orange	840597686
Red	840597611	Brown	840597694
Blue	840597629	Red	840597702
Teak	840597637	Blue	840597710
Walnut	840597645		

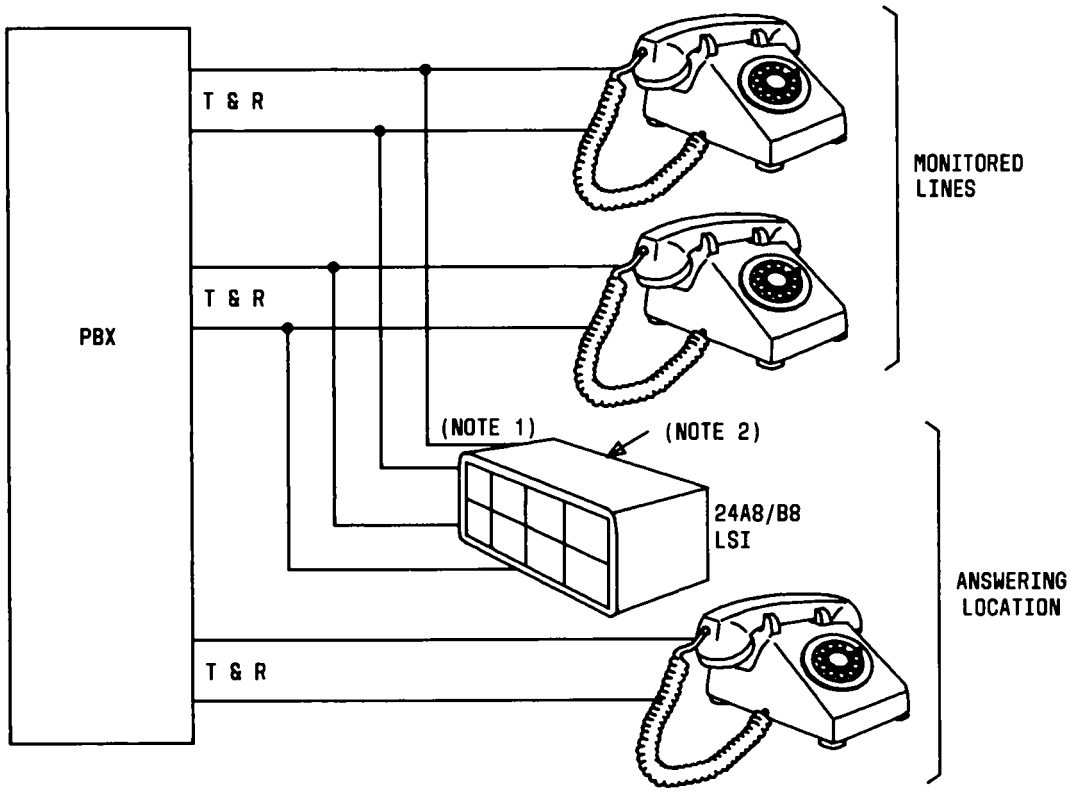
* Teak or walnut rear panel is used with black faceplate.



NOTES

1. THE 2370Ω RESISTOR IS LOCALLY SUPPLIED AND INSTALLED FOR CURRENT LIMITING. THE RESISTORS SHOULD BE KS-20289, L6C OR EQUIVALENT RATED 3 WATT ±5%, FLAME PROOF, AND END OF LIFE TOLERANCE OF ±10%
2. THE CONTACT PROTECTION NETWORKS ARE LOCALLY SUPPLIED AND INSTALLED. (TYPE 185A OR EQUIVALENT)
3. WIRING OPTION A PROVIDES MULTIPLE ALARMS; WIRING OPTION B PROVIDES FOR WIRING ALARMS TO C.O. ALARMS ONLY; WIRING OPTION ZA PROVIDES FOR DIRECT WIRING TO C.O. ALARMS IN WHICH LEADS ARE NOT RUN IN EXPOSED CABLES

Fig. 46—Connections for CAS SSI and Multiple Alarms



NOTE 1:
MOUNTING CORD (#840597322) HAS TWO SPADE LUGS TO TERMINATE ON KS-21239, L6 TRANSFORMER. DO NOT PLUG INTO 120 VAC RECEPTACLE HAVING A METAL COVER.

NOTE 2:

CORD TERMINATIONS		
COND COLOR	DESIG	A25B CONN CABLE
W-BL	T1	26
BL-W	R1	1
W-O	T2	27
O-W	R2	2
W-G	T3	28
G-W	R3	3
W-BR	T4	29
BR-W	R4	4
W-S	T5	30
S-W	R5	5
R-BL	T6	31
BL-R	R6	6
R-O	T7	32
O-R	R7	7
R-G	T8	33
G-R	R8	8
V-BL	GRD	46
BL-V	GRD	21

Fig. 47—24A8/24B8 Line Status Indicator

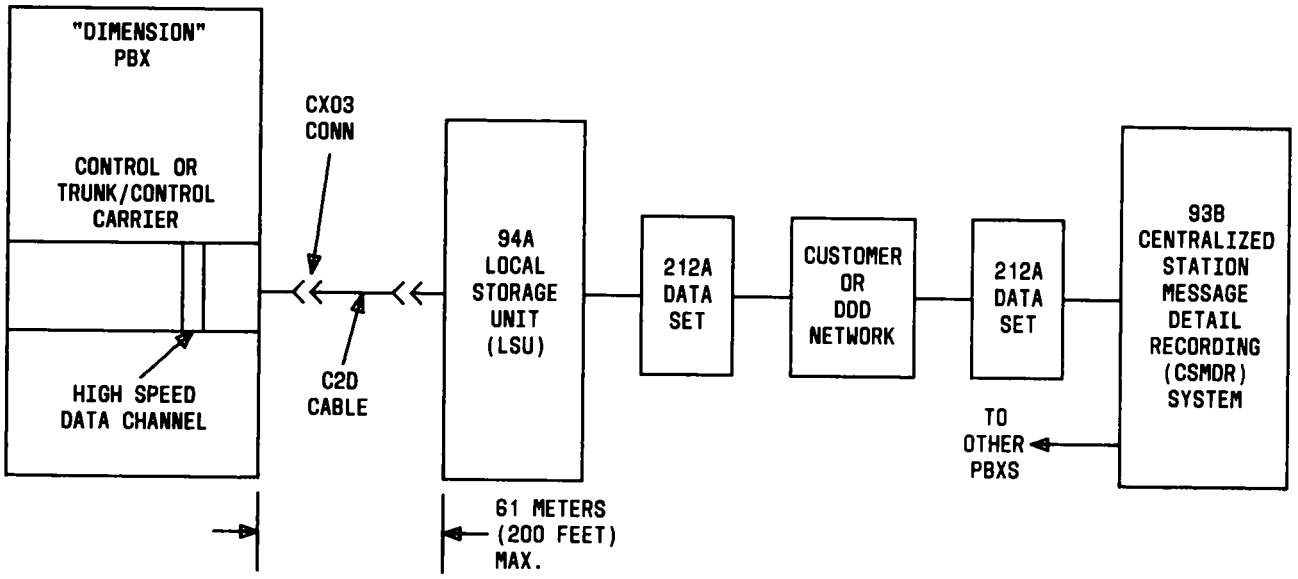


Fig. 48—Centralized Station Message Detail Recording System

- LC08D dual CO trunk circuit pack
- J59204, List 1, A&B—G1 TOUCH-TONE calling receiver.

5.38 The 3A code call unit is a relay-selector operated device which permits a PBX station user or attendant to reach a party on the premises served by the PBX. The 3A code call unit may have two incoming ports and two answer ports. These four ports are connected to central office trunk circuits via the cross-connect field (Fig. 51). In a PBX with light traffic, only one incoming port and one answer port (circuit 1 in Fig. 52) may be required. The second incoming port and answer port are optional and can be used in PBX systems where heavy traffic is anticipated.

5.39 When the optional ports are used, the ports are connected to a second terminal circuit as shown in Fig. 52. The 3A code call unit must also be modified per Bell Telephone Laboratories drawing L-466520 before use with the DIMENSION PBX. Worksheet 4 is the cross-connect fill-in sheet.

5.40 Since the G1 TOUCH-TONE calling receiver unit comes factory-wired with option W, the option must be removed when the 3A code call unit is connected. Option W consists of a wire strap between pins B6 and B28 located between CP HJ17 and CP HJ16 in the TOUCH-TONE calling receiver. The installer should remove option W by clipping out the strap. Also, a 900-ohm 1/2-watt resistor and a 2-μF capacitor must be added in series across leads T and R of the receiver (option YU).

CUSTOMER ADMINISTRATION PANEL (CAP)

5.41 The CAP (J58879DC-1) allows the PBX customer to perform certain administrative and information gathering functions on the PBX. The CAP is used on a local basis only and is based upon and analogous to the MAAP. The CAP is applicable to Feature Package 15 and provides the customer with station rearrangement and change. The customer is able to administer translation items pertaining to station sets, features, parameters, etc, on the PBX and use the PBX memory as storage and record keeping for those items.

5.42 The CAP can be located up to 229m (750 feet) from the PBX. An on/off switch on the side of the CAP activates the customer's unit and, by means of relays in the CAP interface unit (J58879DD-1), disables the MAAP data channel. The CAP interface functional block diagram is illustrated in Fig. 53. Single-ended 25C connector cables are provided for connection between the PBX and the interface unit and the CAP. The length of each cable is to be determined by the job requirements.

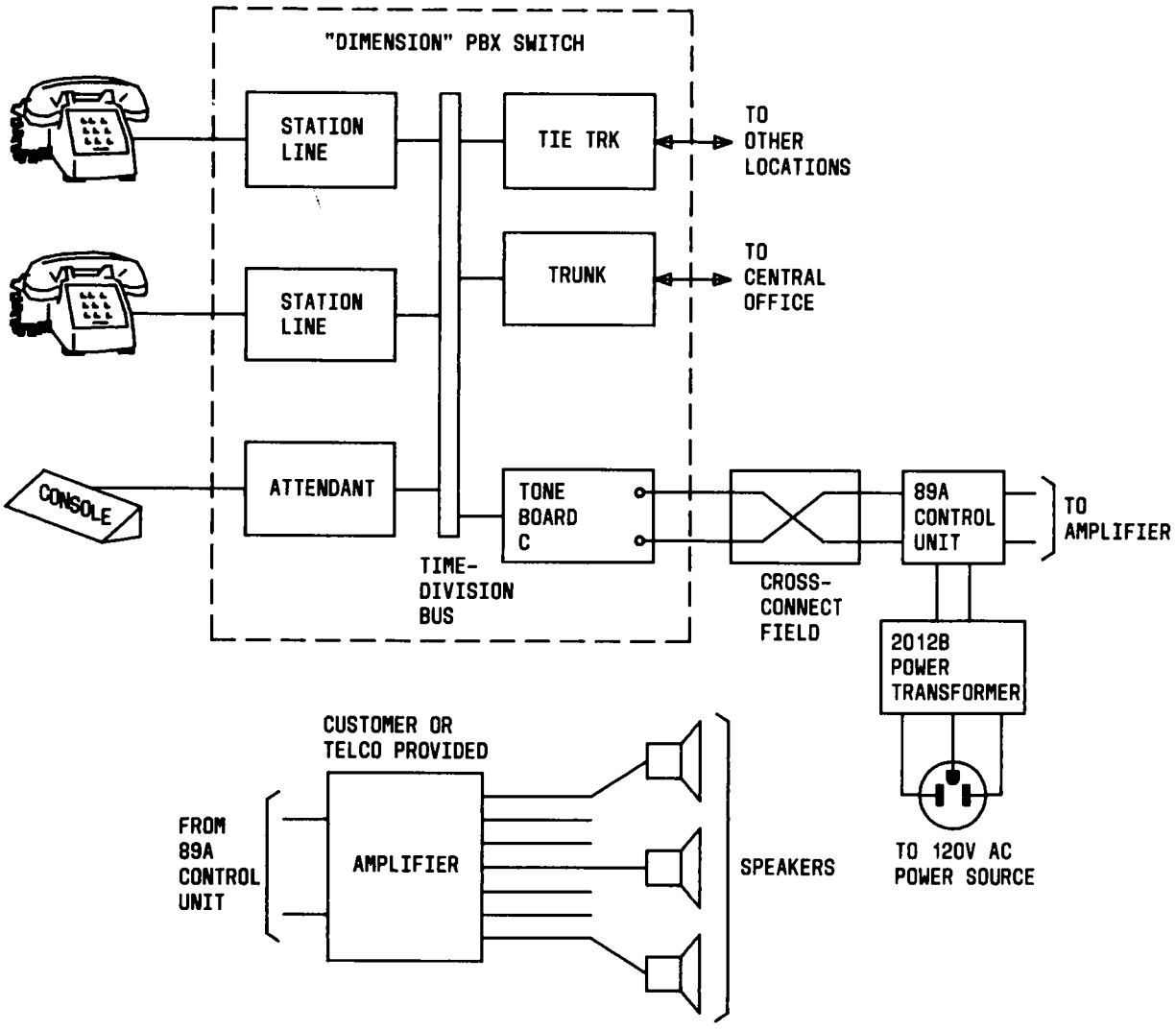


Fig. 49—Code Calling Access Equipment—Block Diagram

CUSTOMER PREMISES FACILITY TERMINAL (CPFT)

Current FCC requirements specify that network channel terminating equipment must be physically separated from customer terminals. In compliance, all CPFT configurations which permit using and mounting metallic facility terminal (MFT) equipment within DIMENSION PBX arrangements are rated manufacture discontinued. Also, the MFT equipment should no longer be mounted in a PBX auxiliary cabinet but should be physically separated from the PBX and electrically located on the network side of the cross-connect field. The CPFT equipment may be replaced with the package metallic facility terminal assemblies (PMFTA) as outlined in this part.

5.43 The CPFT equipment is available to provide transmission and signaling range extension for the system line and trunk circuits. The CPFT equipment consists of metallic facility terminal (MFT) circuit packs and terminal balancing networks housed in connectorized shelves (carriers). The CPFT is a standard arrangement which will supply

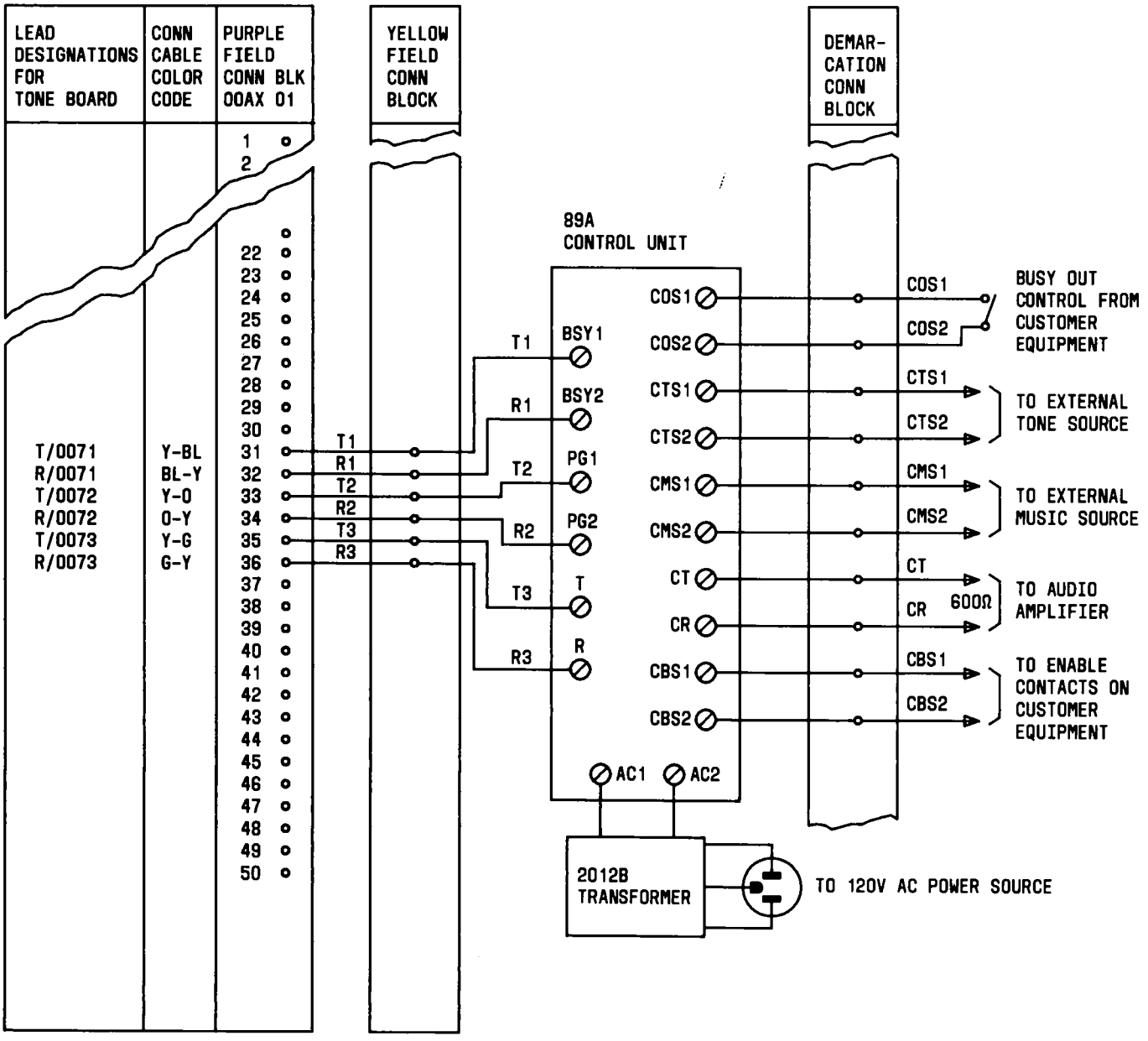


Fig. 50—Code Calling Access Connections for Chime Paging Using the 89A Control Unit

all of the transmission and signaling functions required to terminate either 2-wire or 4-wire metallic facilities. The CPFT equipment may be installed in any carrier position available in the J58879F auxiliary cabinet. The following sections contain detailed list information concerning CPFT equipment:

- Section 332-610-100
- Section 332-610-180
- Section 332-610-200
- Section 332-610-500
- Section 332-910-180
- Section 332-912-131

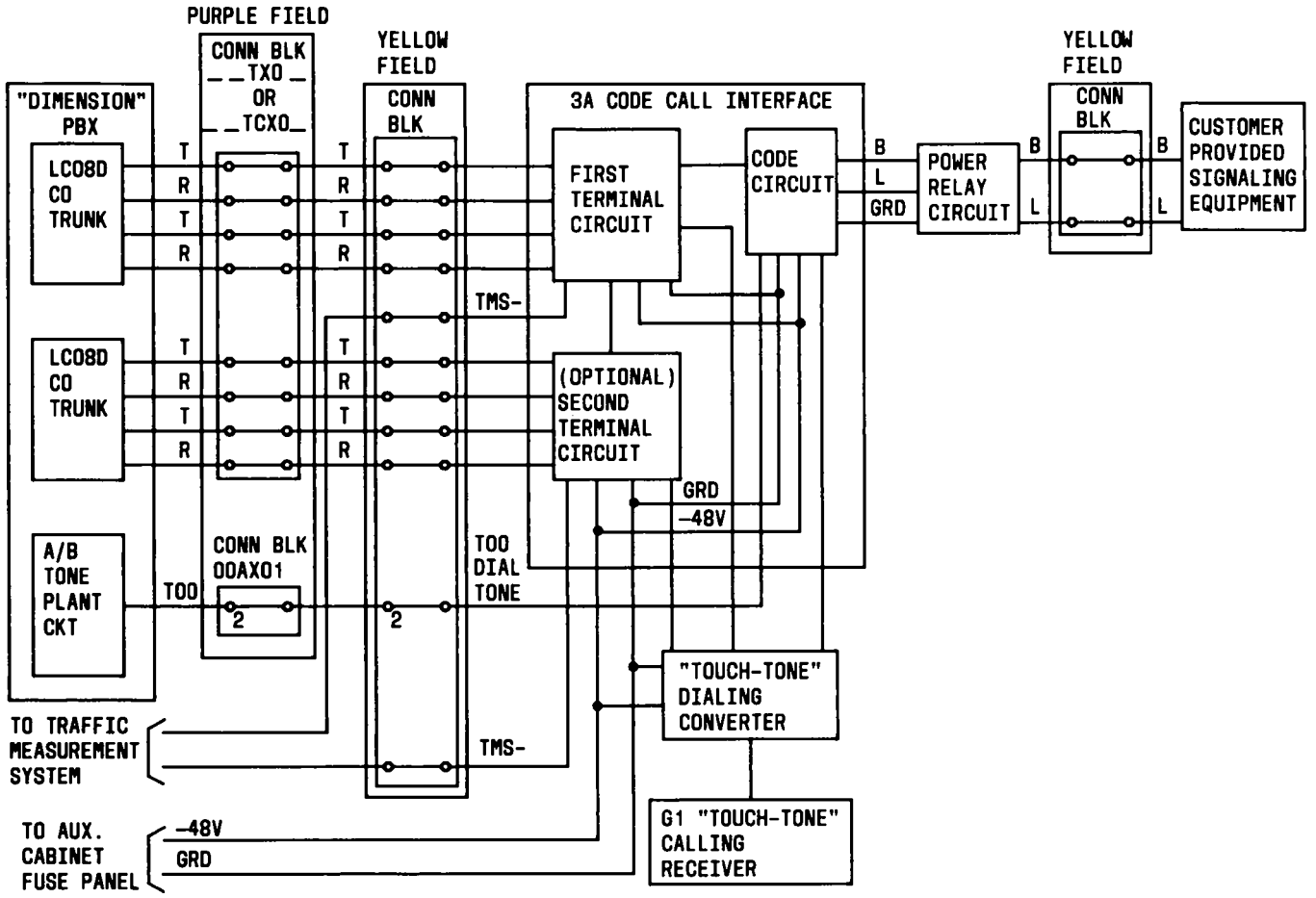


Fig. 51—General Connection Diagram for 3A Code Call Access

- Section 332-912-161
- Section 332-912-231
- Section 332-912-232
- Section 332-912-261.

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

- J99380A (MD)—Single module shelf
- J99380E (MD)—Double module shelf
- J99380B (MD) or J99380C (MD)—Terminal balancing network
- J99380D (MD)—Double-depth shelf assembly
- J99380TB (MD)—Test extender
- J99380AA (MD), J99380AB (MD), and J99380AC (MD)—Plug-in circuit packs
- J99380H (MD) or J99380J (MD)—Power distribution and feature panel
- J99380F or J99380G—Shelf assembly for voice frequency circuits
- J99380K (MD) or J99380L (MD)—Circuit pack carrier (CPC) for small CPFT installations.

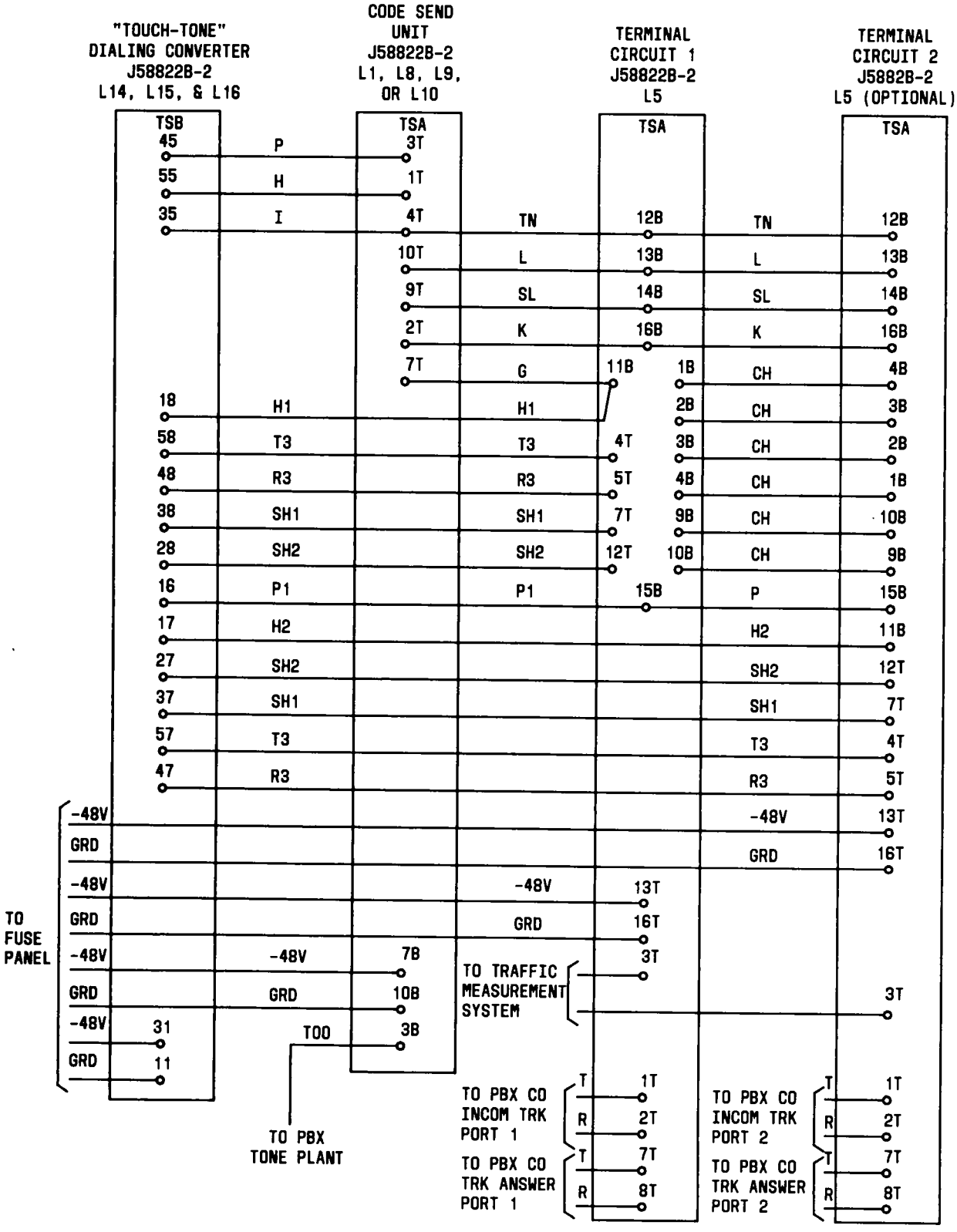


Fig. 52—Terminal Connections for 3A Code Call Access (Sheet 1 of 2)

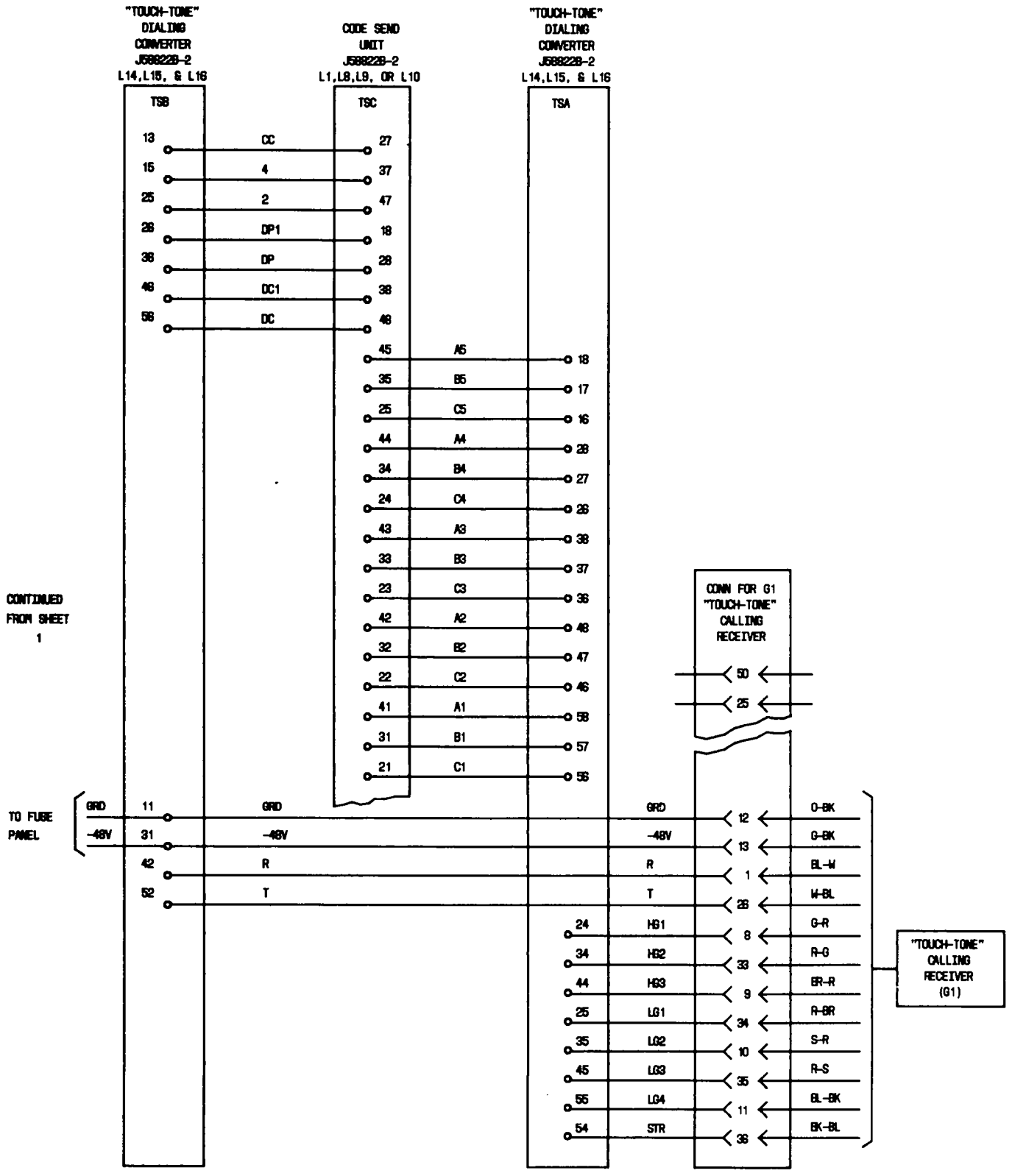


Fig. 52—Terminal Connections for 3A Code Call Access (Sheet 2 of 2)

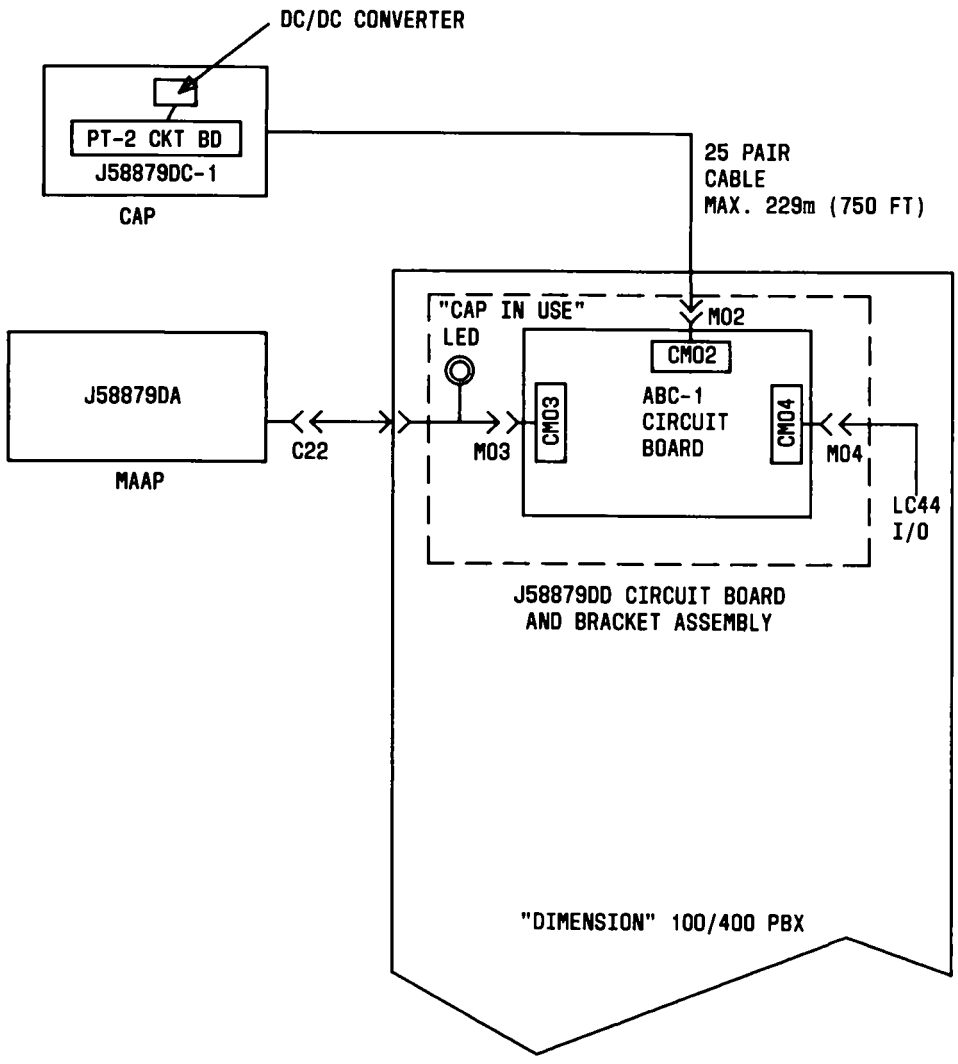


Fig. 53—Customer Administration Panel (CAP) Interface to J58879DD MAAP/CAP Interface Unit

When loop signaling repeater (LSR) units J99343AC and J99343AD are provided, the KS-19642, List 6, rectifier must be replaced by KS-19642, List 3, or KS-22028 in the auxiliary cabinet.

5.45 The single module shelf, J99380A (MD), is used when transmission only is required. A shelf which may be wired for use as a single module or double module, J99380E (MD), is shown in Fig. 54. Interconnection information for the single module shelf and PBX is shown in Fig. 55.

5.46 When both transmission and signaling treatment are required, the double shelf is used. The shelf in Fig. 54 can be used for the double arrangement when it is wired for this purpose. Interconnection information for the double module shelf and PBX is shown in Fig. 56.

5.47 The terminal balancing network panel, J99380B (MD) is shown in Fig. 57. Interconnection information for the terminal balancing network panel, J99380B (MD), and PBX is shown in Fig. 58. The connections from the 837-type network mounting panel to the cross-connect field should be completed after installation. When 837G networks

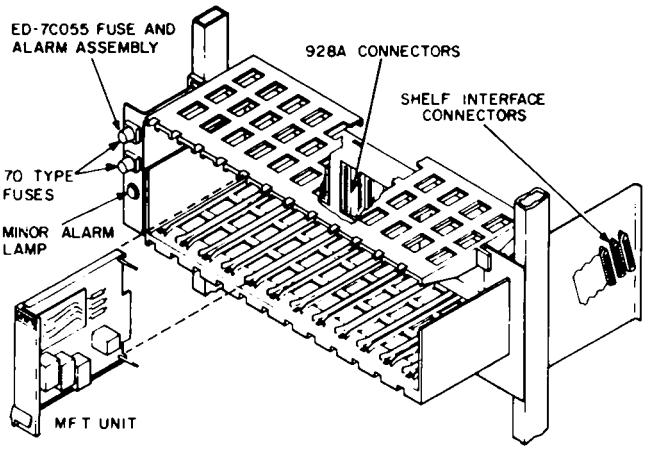


Fig. 54—Single Module Shelf, J99380A (MD), or Double Module Shelf, J99380E (MD)

are used, one 120T repeating coil and one 535DK capacitor are mounted in the space adjacent to the network. Circuits consist of one 837G network and one 120T repeating coil which have dedicated terminals on terminal strip 1 (in groups of eight) terminals (1-8), (9-16), etc.

5.48 The shelf assembly for 837-type networks, J99380C (MD), is shown in Fig. 59. Interconnection information for the KTU-type shelf assembly for terminal balancing is shown in Fig. 60.

5.49 The double-depth shelf assembly, J99380D (MD), is shown in Fig. 61.

5.50 The test extender, J99380TA (MD) (Fig. 62) or J99380TB (MD), may be required to allow access to the adjustments and test points when aligning and testing the MFT circuit packs during the CPFT installation.

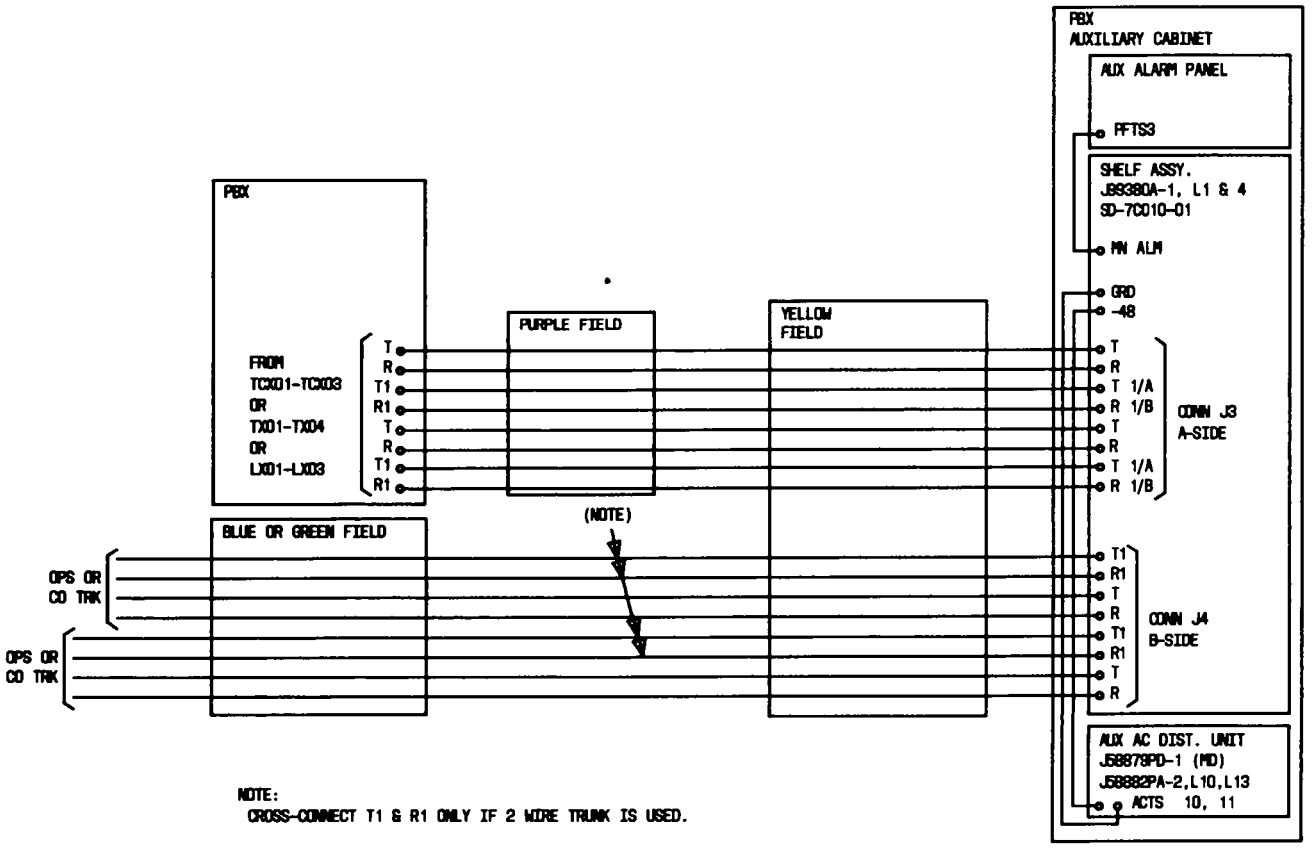


Fig. 55—Single Module MFT Shelf Assembly—PBX Interconnection, J99380A (MD)

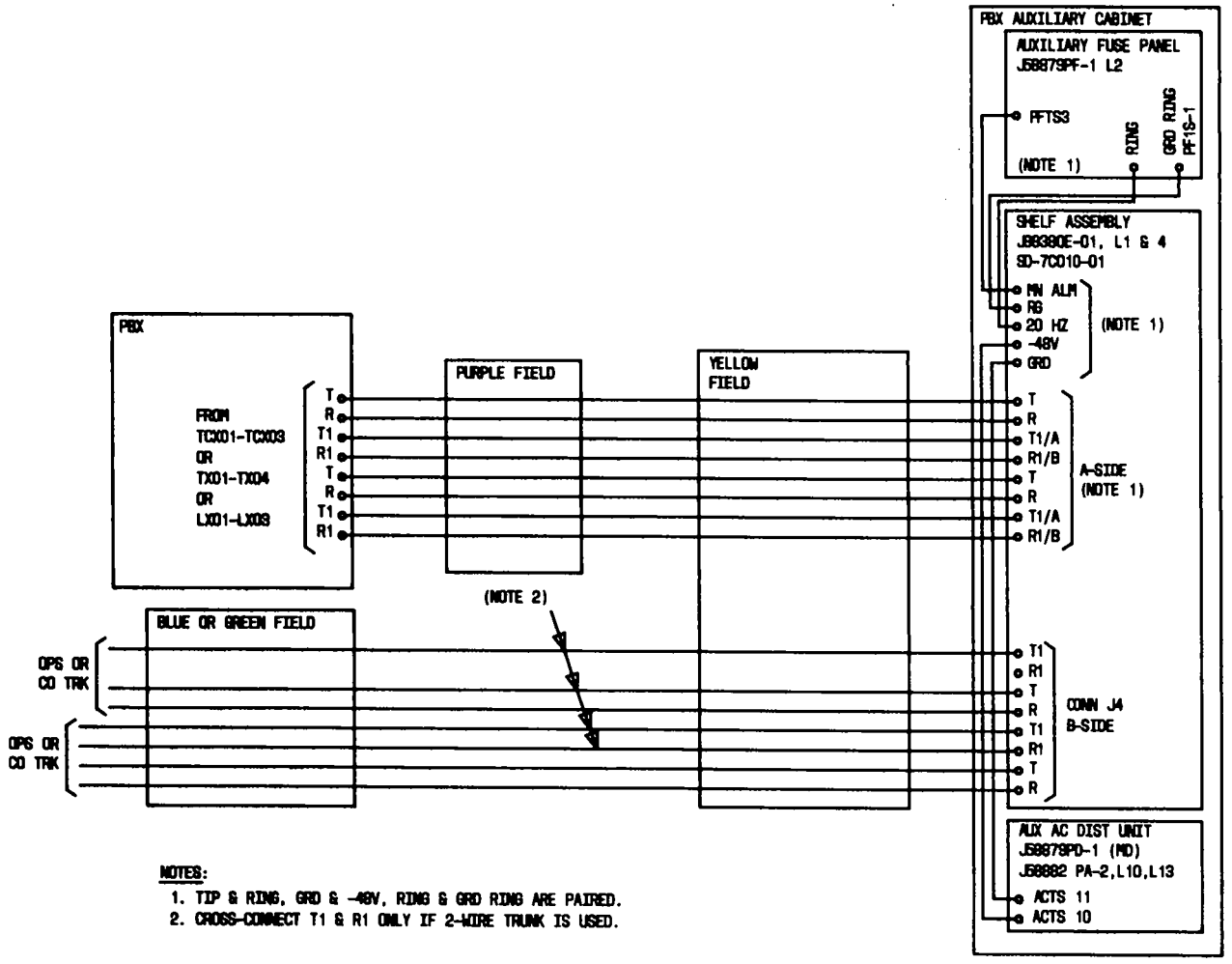


Fig. 56—Double Module MFT Shelf Assembly—PBX Interconnection, J99380E (MD)

5.51 The power distribution and feature panel, J99380J (MD), voice frequency circuits, J99380F (MD) or J99380G (MD), and the power distribution panel, J99380H (MD), are used for supplemental power distribution when required. These units may not be needed in most DIMENSION PBX installations.

5.52 A small CPFT arrangement, J99380K (MD) or J99380L (MD), for one to eight MFT circuits is available complete with power unit. A universal circuit pack carrier for two MFT plug-ins is provided. The carrier handles either two independent single MFT module circuits or one double MFT (TU-SU) module circuit. Up to four carriers can be multipled.

DATA CHANNEL REPEATER

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

5.54 The repeater detects and reconstructs incoming modified biphase (bipolar) data pulses to eliminate any pulse attenuation or distortion as well as to increase data channel range.

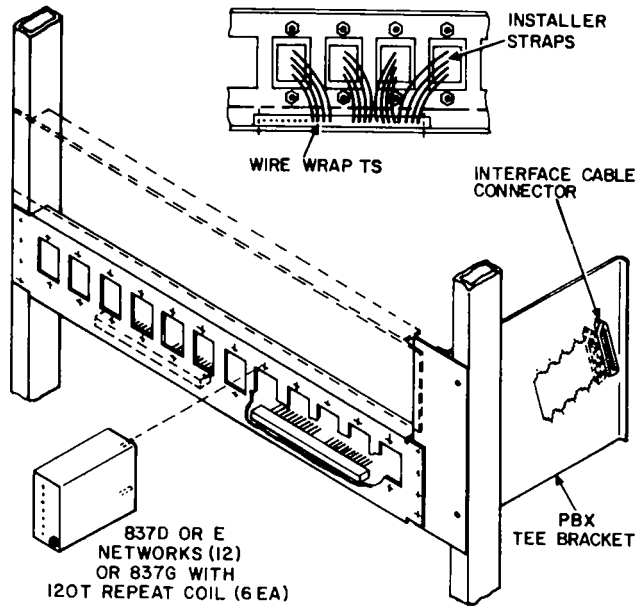


Fig. 57—Shelf and Assembly for 837-Type Networks, J99380B (MD)

5.55 The repeater circuit is designed to operate in unexposed environments without additional protection and in exposed environments with standard 3-mil carbon block protection.

5.56 Applications for the data channel repeater are station message register, calling number display, and the DIMENSION PBX ECTS.

A. Housing and Mounting

5.57 The repeater circuitry is housed in a modified key service unit (Fig. 63) with a capacity for two data channel repeater circuits.

5.58 The unit is designed to be wall-mounted near a 120-volt 60-Hz outlet. Power cords are available in 610-, 1220-, 1830, and 3660-millimeter (2-, 4-, 6-, and 12-feet) lengths (J58879KC, Lists A, B, C, and D, respectively).

B. Range Extension and Lightning Protection

5.59 A ***single-channel repeater with range extension*** (Fig. 64) consists of the following equipment:

- One J58879KC, List 1—Assembly, wiring, and equipment including a 28D2 power supply unit
- One J58879KC, List 2—Rectifier and timing reference circuit card (AE-49)
- Two J58879KC, List 3—Unidirectional repeater circuit card (AE-48) for each repeater.

A maximum of four repeaters can be cascaded for the purpose of extending the distance between the PBX and peripheral to 3350m (11,000 feet).

5.60 A ***dual channel repeater with range extension*** (Fig. 65) consists of the following equipment:

- One J58879KC, List 1—Assembly, wiring, and equipment

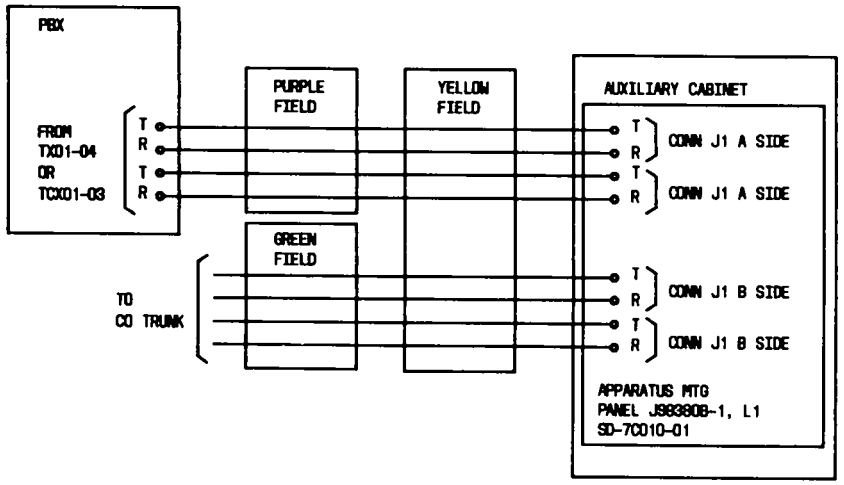


Fig. 58—Network Mounting Panel to PBX—Interconnections, J99380B (MD)

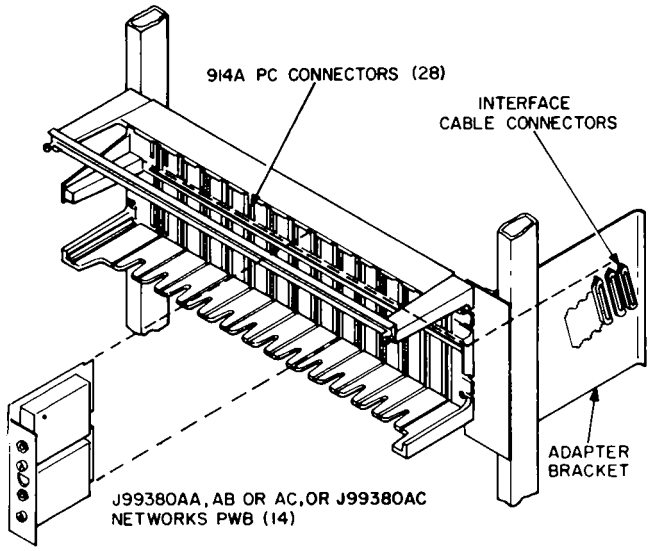


Fig. 59—Shelf Assembly for 837-Type Networks on PC Boards, J99380C (MD)

- A 28D2 power supply unit
- One J58879KC, List 2—Rectifier and timing reference card (AE-49)
- Four J58879KC, List 3—Unidirectional repeater circuit card (AE-48) for each repeater.

A maximum of four repeaters can be cascaded for the purpose of extending the distance between the PBX and peripheral to 3350m (11,000 feet).

5.61 When the data channel repeater is used for ***lightning protection only*** (Fig. 64 and 65), the equipment required is as follows:

(a) Two J58879KC, List 4—Data link, buffer circuit card (WJ3) for each data channel

(b) One J58879KC, List 5—Assembly, wiring, and equipment, excluding the 28D2 power supply unit.

C. Installation

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

5.63 A block diagram of a single channel repeater with and without range extension with some internal wiring is shown in Fig. 64. The required connections consist of ac line input and data pair terminations to connecting block TB1 with range extension. The ac line input connection is not required when the WJ3 circuit card is used for lightning protection. The intermediate repeaters must be mounted inside building(s).

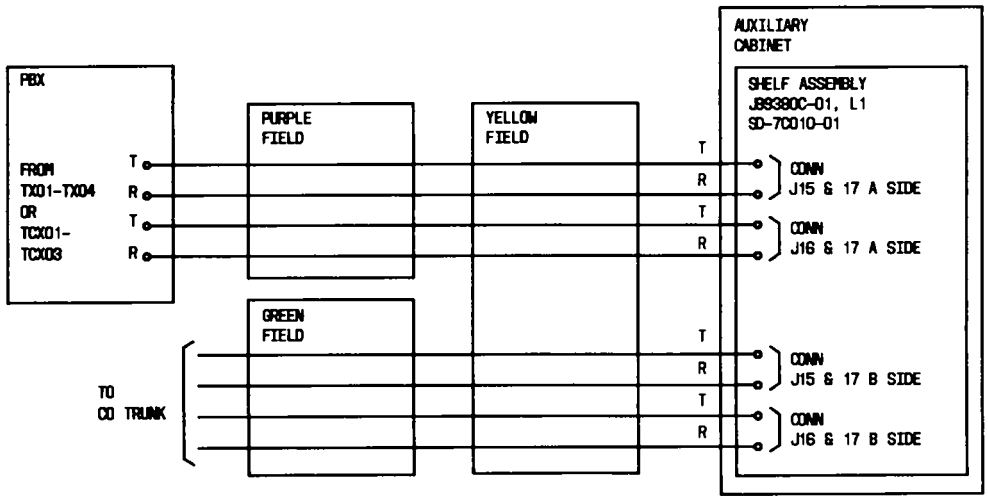


Fig. 60—KTU-Type Shelf Assembly for Impedance Matching Network, J99380C (MD)

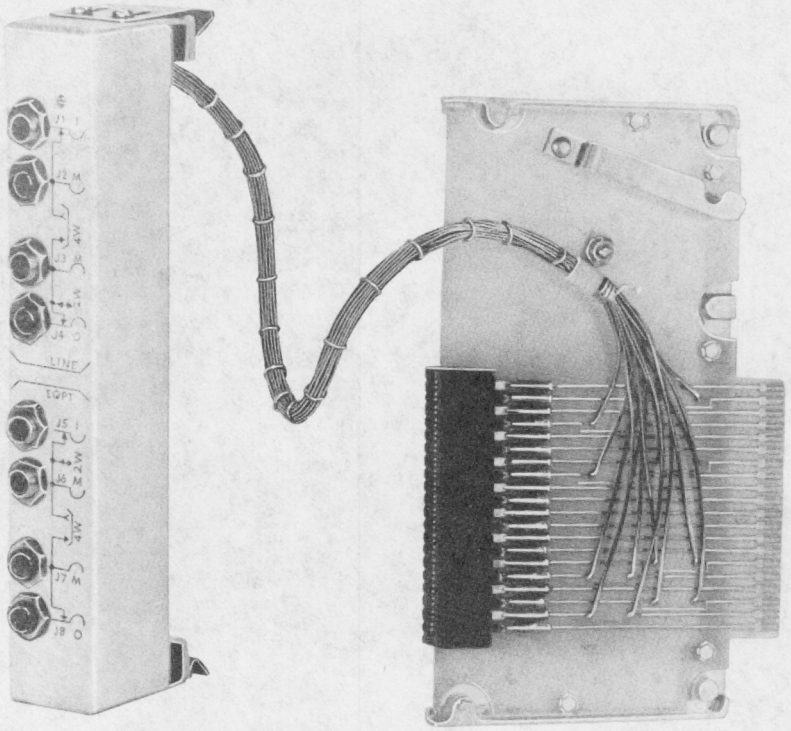


Fig. 61—Double-Depth Shelf Frame, J99380D (MD), With a Double Module Shelf, J99380E (MD), in Front and a Network Plug-In Shelf, J99380C (MD), in Rear

5.64 When operating in 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.

5.65 When operating in the peripheral to PBX data direction, the repeater input pair is connected to terminals 3B and 4B. The output pair is tied to terminals 3A and 4A.

5.66 The tip leads of the data pairs are connected to the odd-numbered terminals, and the ring leads of the data pairs are tied to even-numbered terminals.

5.67 The equipment required for a dual channel repeater to an off-premise peripheral is shown in Fig. 66. The connections for the two data channels are provided in Fig. 65. The channel 1 connections are identical to the single repeater channel connections. The channel 2 repeater circuit cards in J3 and J4 are used in conjunction with rows D and E of terminal block 1.

D. ECTS Range Extension

5.68 A typical repeater application is range extension for ECTS. Up to four repeaters can be connected in series to the PBX to a remote location (Fig. 67). One repeater is in the PBX building; the other repeater is in the remote building with possibly two other repeaters between the two. The repeater-to-repeater link may be exposed if standard protection is provided.

E. Data Range

5.69 The use of data channel repeaters and the standalone unit can extend the maximum distance between the PBX and the multibutton electronic telephone (MET) sets to 3660m (12,000 feet) as follows:

- 300m (1000 feet) between the PBX and one repeater
- 910m (3000 feet) between the first and second repeater
- 910m (3000 feet) between the second and third repeater

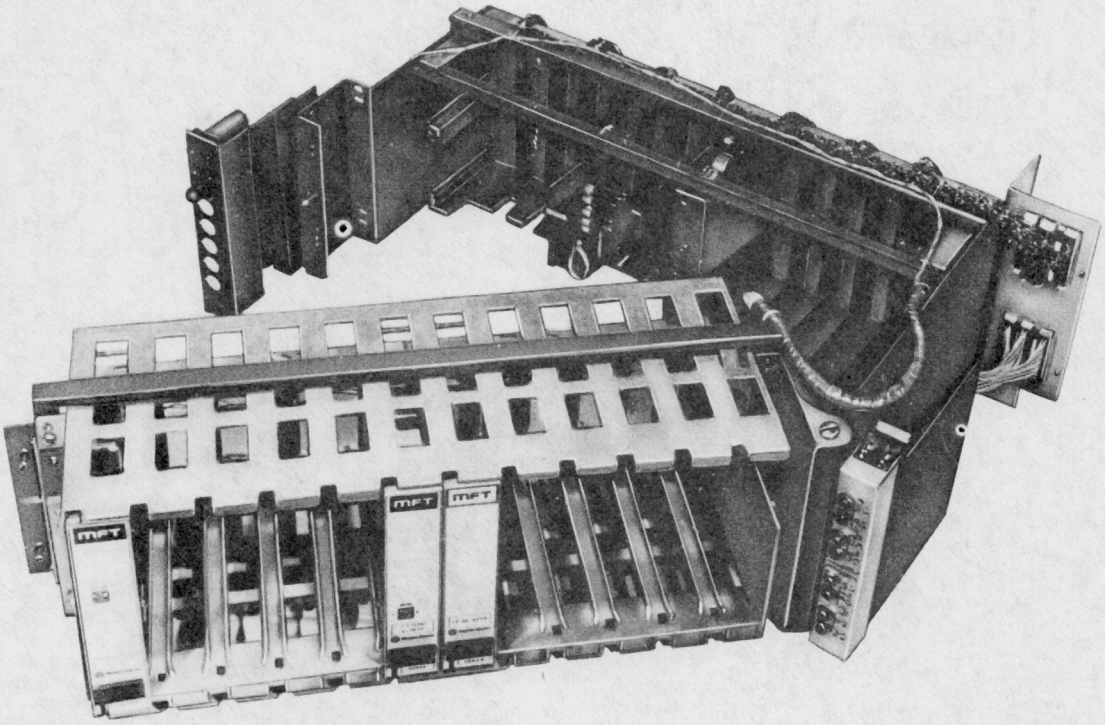


Fig. 62—Test Extender, J99380TA (MD)

- 910m (3000 feet) between the third and fourth repeater
- 300m (1000 feet) between the fourth repeater and the standalone unit
- 300m (1000 feet) between the standalone unit and the MET set.

5.70 Worksheet 5 is to be used in providing cross-connection information on the data channel repeaters and cascaded repeaters.

5.71 Data link range is a function of cable attenuation and receiver sensitivity. The repeater-to-repeater range is 910m (3000 feet) for No. 24 AWG cable. The PBX-to-repeater and repeater-to-peripheral data links are limited to 300m (1000 feet) range by receiver sensitivity.

5.72 The data range from PBX to peripheral is limited by the cable attenuation, round trip propagation delay, and the required software response time of the PBX.

5.73 The range for one direction of a data link may be estimated by the following formula:

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

Where:

XL = Transmit level of sender

RS = Receive sensitivity of receiver

α = Cable attenuation.

Both directions must be included in the calculation to determine the total data link range.

5.74 The transmit level is the magnitude of the transmitted biphase pulse. For the repeater, XL = 5 volts.

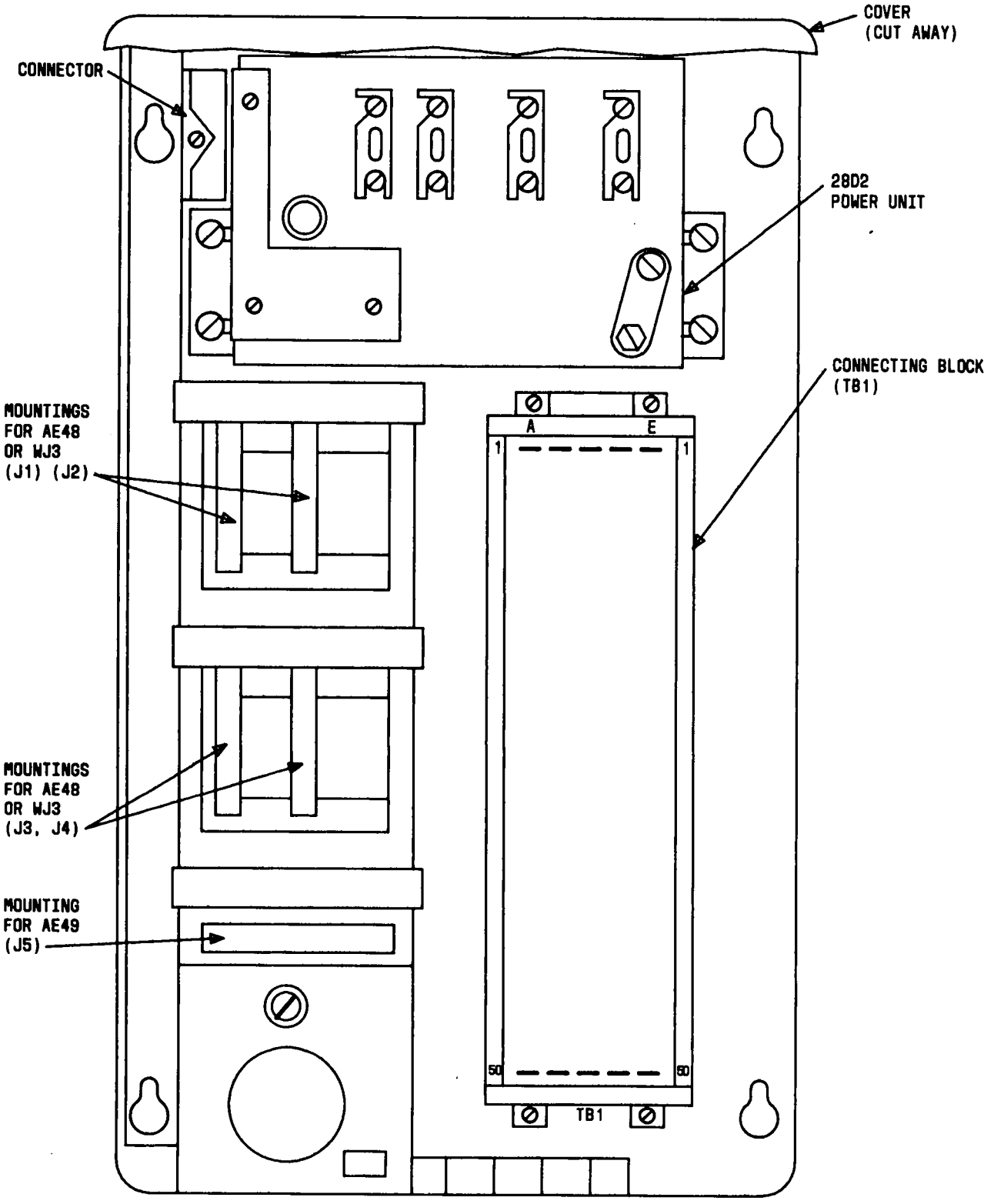
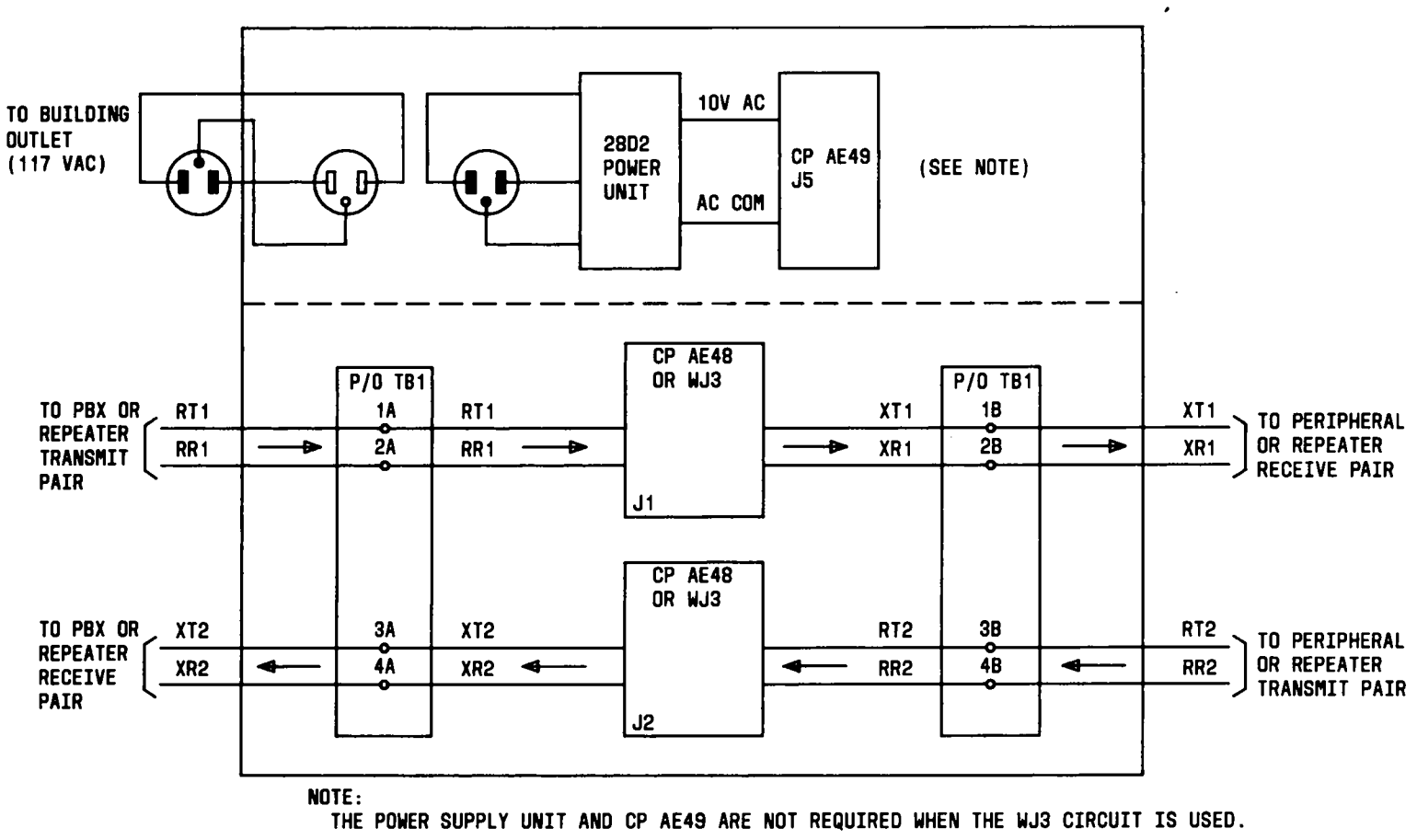
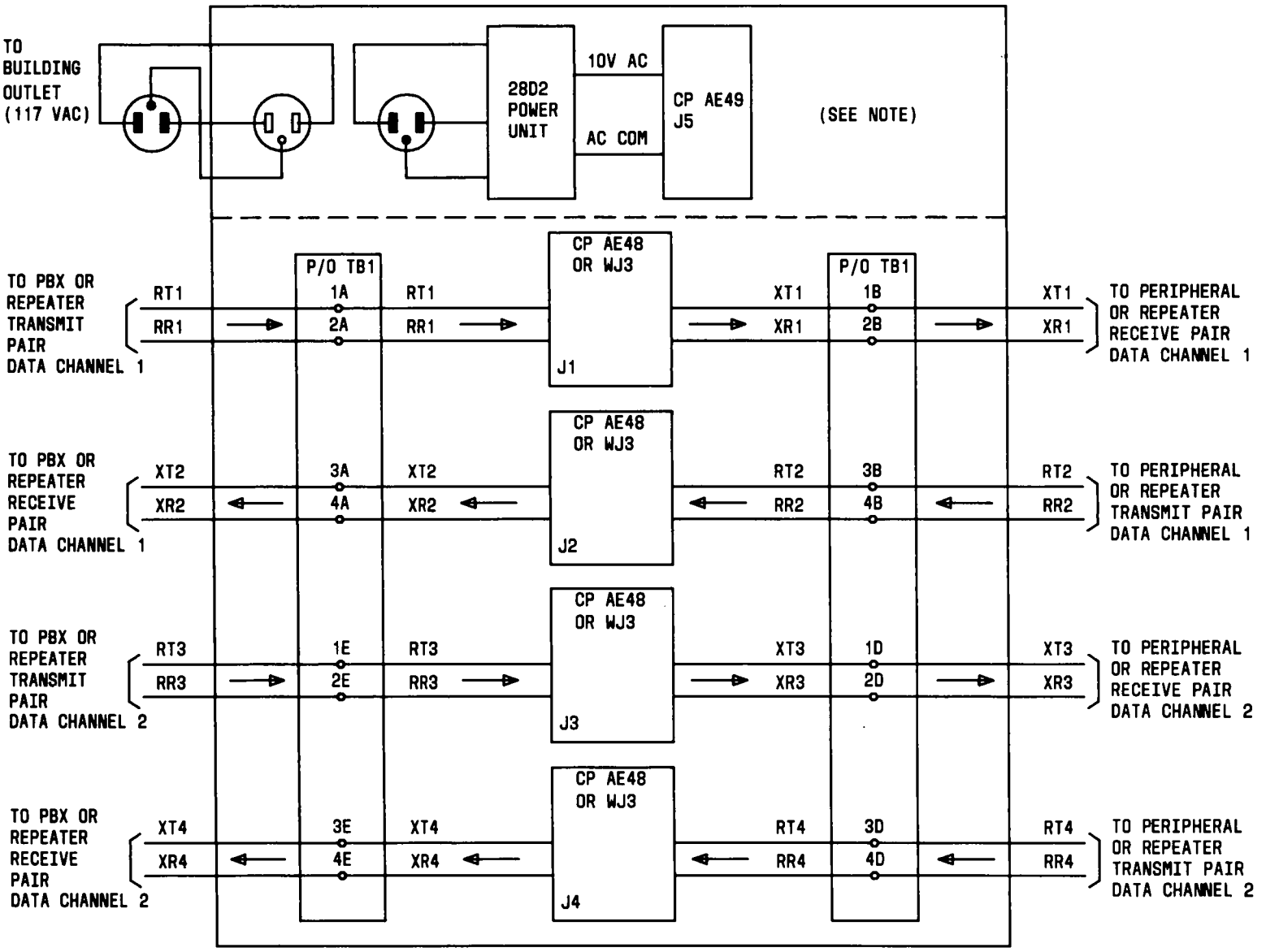


Fig. 63—Data Channel Repeater, J58879KC



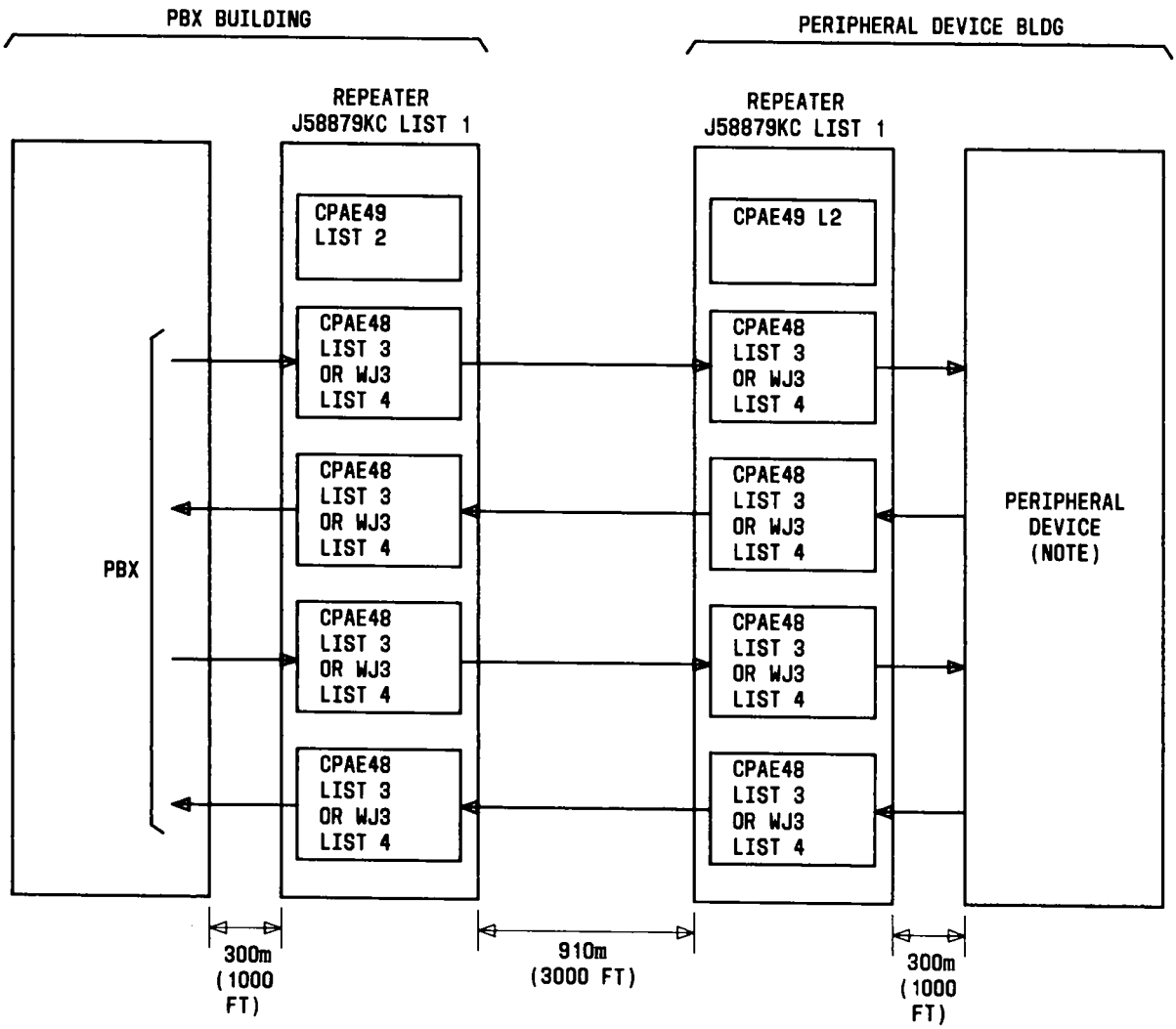
NOTE:
THE POWER SUPPLY UNIT AND CP AE49 ARE NOT REQUIRED WHEN THE WJ3 CIRCUIT IS USED.

Fig. 64—Single Channel Repeater With Range Extension (AE48) or Without Range Extension (WJ3)



NOTE:
THE POWER SUPPLY UNIT AND CP AE49 ARE NOT REQUIRED WHEN THE WJ3 CIRCUIT CARD IS USED.

Fig. 65—Dual Channel Repeater With Range Extension (AE48) or Without Range Extension (WJ3)



NOTE:
WHEN THE PERIPHERAL DEVICE IS THE CONTROLLER FOR DIMENSION PBX ECTS, THE MULTIBUTTON ELECTRONIC TELEPHONE SETS (METS) MAY BE LOCATED NOT MORE THAN 300m (1000 FT) FROM THE CONTROLLER. THE CONTROLLER CAN BE UP TO 3350m (11,000 FT) FROM THE PBX BY USING CASCADED REPEATERS.

Fig. 66—Dual Channel Repeater for Off-Premises Use

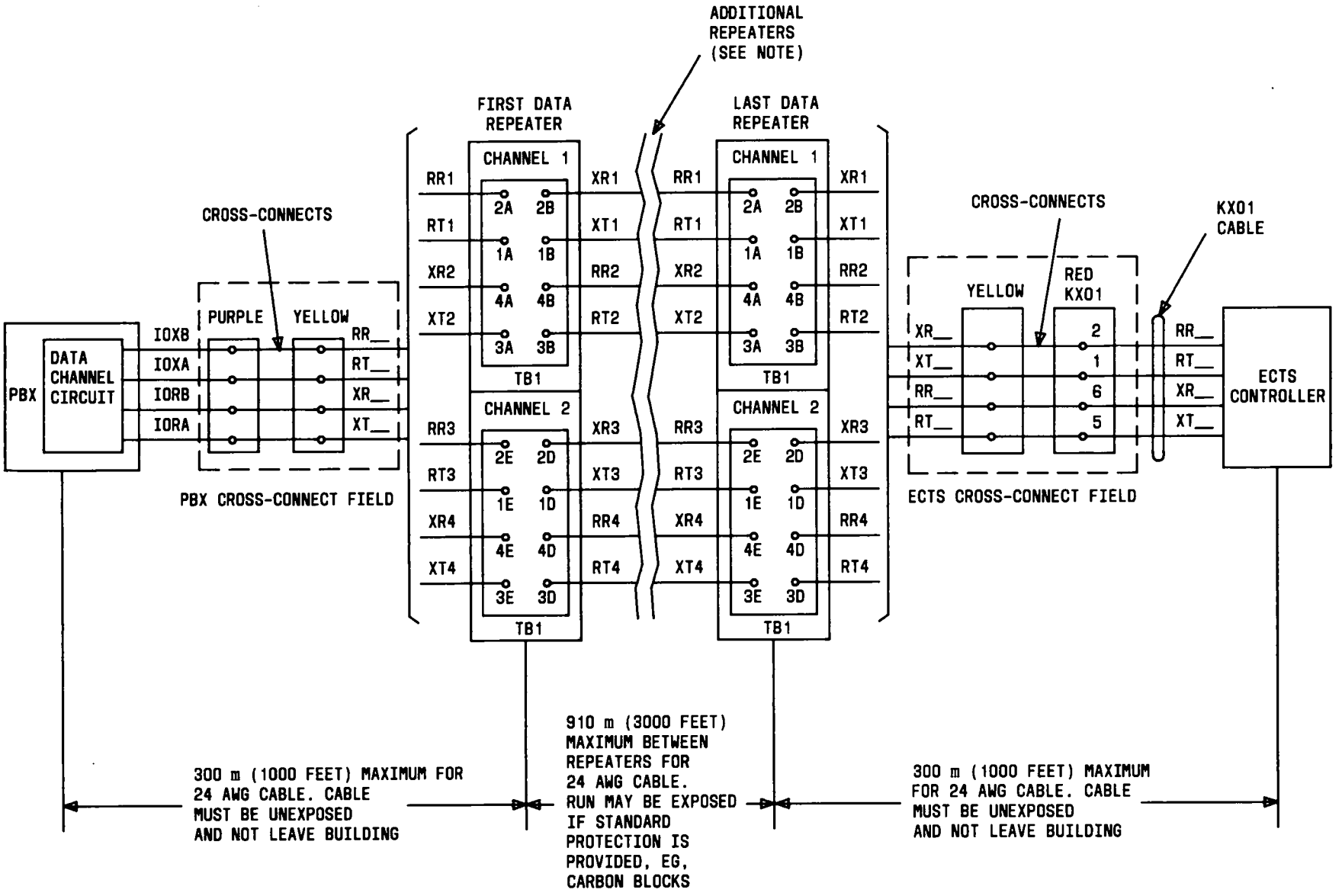
5.75 The receiver sensitivity is the minimum magnitude of biphase pulse required by the receiver circuit for detection. For the repeater, RS = 0.7 volt. For other circuits, the sensitivity depends upon the circuit card code and vintage.

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

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

$$R = \frac{20 \log_{10} \left(\frac{5.0}{0.7}\right)}{5.5/305 \text{ m}} = 947 \text{ m}$$

Note: The range formula computes cable attenuation as a function of conductor size. The formula may be applied to individual cable runs



NOTE: ADDITIONAL CASCADED REPEATERS MAY BE ADDED TO EXTEND THE TOTAL DISTANCE BETWEEN PBX AND CONTROLLER TO 3350 m (11,000 FEET).

Fig. 67—Data Channel Repeater Connection to ECTS

within a repeater installation. The 3350m (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 3350m (11,000 feet).

F. Propagation Delay

5.78 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 μs, allowing four repeaters to be cascaded for a maximum range of 3350m (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

5.79 Each unidirectional repeater circuit (AE-48) has a 2.4 μs 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 μs. In an application where four repeaters are used, a total of eight circuits is inserted in the loop for a total delay of 19.2 μs.

5.80 Additional elements in the data response time are:

- Time required to shift out the data (92 μs)
- Time required by the peripheral to respond to each bit (DIMENSION PBX ECTS = 2 μs)
- Time for the PBX receiver to respond (1 μs).

"DIMENSION" PBX ELECTRONIC CUSTOM TELEPHONE SERVICE (ECTS)

5.81 DIMENSION PBX ECTS is provided by one or more electronic telephone controllers (ETC), the associated electronic telephone sets, and the wiring and terminals required for connection.

5.82 The ETC is available in 2-line capacity sizes (63 and 126) and can be installed using two equipment mounting arrangements. A circuit pack carrier is the basic ETC equipment module. Circuit packs plug into connectors located on the carrier. A basic ETC carrier (J58879KA) provides 63 ports for electronic telephone sets. When more telephone sets are required, a supplemental ETC carrier (J58879KB) containing steering circuits for 63 additional station sets may be used. When greater button usage is required, the memory capacity in the basic ETC may be exceeded, thereby reducing the ETC capacity and requiring an additional ETC. The supplemental carrier is powered by the basic carrier and must be mounted directly above the basic carrier. Both basic and supplemental carriers are the same size as those carriers used in the PBX which permits the carrier(s) to be mounted in vacant carrier positions in a PBX cabinet. The electronic station sets must be located within 300m (1000 feet) of the ETC.

5.83 Where mounting space or station loop (data) length considerations are exceeded, a second ECTS controller mounting option is available. This option is a standalone ETC configuration which provides a separate equipment cabinet in which one basic (J58879KA) or one basic and one supplemental (J58879KB) ETC carrier is mounted. The use of the standalone cabinet may be an advantage when station loop length, space considerations, or tie cable lengths are factors. Use of the standalone ETC effectively doubles the data loop length by providing an additional 300m (1,000 feet) of PBX cabling to the ETC. The standalone can be 300m (1,000 feet) from the PBX, and the station set another 300m (1,000 feet) from the standalone ETC cabinet (J58879K). When data channel repeaters are used, the standalone cabinet can be 3350m (11,000 feet) from the PBX which will yield a 3660m (12,000 feet) potential station range.

5.84 The standalone cabinet is compatible with the PBX cabinets in size and appearance except for height. Silent operation and panels offered in several optional decorator colors are features which make the cabinet suitable for use in a customer office environment.

5.85 One basic carrier or one basic carrier and one supplemental carrier can be mounted in the basic cabinet (J58879C) or supplemental cabinet (J58879D). An auxiliary cabinet (J58879F) can contain two basic carriers and two supplemental carriers (two controllers).

5.86 The ETCs may be installed in system cabinets, in auxiliary cabinets, or in an ETC standalone cabinet.

5.87 The ECTS can only be directly accessed by MET sets which have the ability to communicate with the ETC over a low-speed data link. Electronic telephones are available with 5, 10, 20, or 30 buttons for line and feature access. The buttons provide silent, low-travel movement for ease of operation. Each feature button has a green status indicator to indicate the state of the button and feature. The line buttons used for electronic key station service have a green status indicator and a red ***I-use*** indicator to indicate which button is in use or is to be used.

5.88 Figure 68 provides basic interconnection data for installation of ETC carriers via the cross-connect field. Refer to Section 554-010-110 for additional detailed information.

ENERGY COMMUNICATIONS SERVICE ADJUNCT (ECSA)

5.89 The ECSA system consists of a DIMENSION PBX cabinet-mounted processor(s), and the associated equipment for power, alarms, and program tape. In addition, two unique energy carriers and three new circuit packs were developed for the system. The adjunct system is dedicated to monitoring and controlling the energy consumed by customer equipment. Call processing is performed by the host PBX associated with the adjunct system. Alarms leads AMJ* and AMN* extend from the ECSA to permit the host PBX attendant to monitor ECSA alarm conditions.

5.90 Important hardware considerations center around the use of the energy load control circuit 562. The control circuit provides a normally open contact at the system interface. This arrangement eliminates the use of the energy communications signaling units (ECSU) and the corresponding hardware necessary to generate and pass tones over the

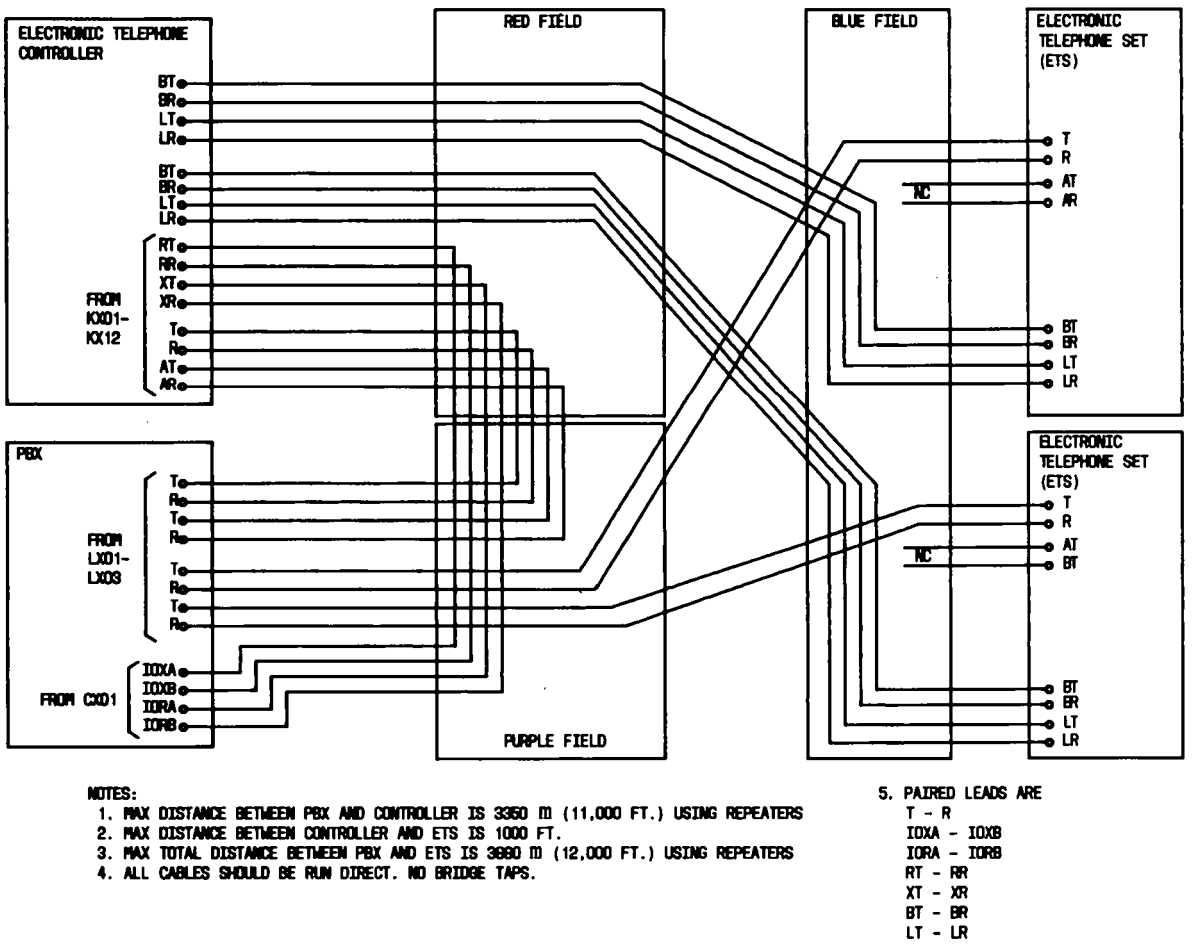


Fig. 68—DIMENSION PBX Electronic Custom Telephone Service—Interconnection

telephone leads. The system provides dedicated wiring between the LC562 contacts and the low voltage control circuitry for the energy consuming equipment. The number of circuits per each LC562 and the number of circuit pack positions in the new energy carriers determine the load handling capability per system cabinet. Other hardware considerations are that the CAP and attendant consoles are excluded from the adjunct system operation.

5.91 Relative to feature package considerations, the ECSA is equipped with a program tape based on a DIMENSION 2000 PBX FP11 with generic wording and with call processing excluded. Additional information pertaining to ECSA can be found in descriptive Section 554-106-100 and preinstallation and planning Section 554-106-101.

LINE STATUS INDICATOR—24A/24B TYPE

5.92 The 24A-/24B-type line status indicator (LSI) is used to provide a visual status and audible indication of specific station lines (off-hook, on-hook, and ringing). The status of each line is displayed by a corresponding light-emitting diode (LED) on the LSI panel. The LSI is available with capacities for monitoring 8, 16, or 32 lines and can be mounted at a desk or on a wall. The LSI is bridged across the T and R leads of the stations to be monitored. A maximum of four LSIs can be bridged across the same station line. Figure 47 illustrates the mounting cord terminations for the LSI. The LSI is equipped with a 3050-mm (10-foot) port mounting cord terminated in a 25-pair Amphenol connector. A KS-21239, List 6, transformer that powers the LSI is plugged into 120-volt 60 Hz ac commercial power source. Ordering information for housing color, faceplates, and rear panels is shown in Table II. The 25B connector cable to connect T and R leads of monitored lines must be ordered separately. Approximate measurements of the three sizes of LSIs are as follows:

- 24A8/24B8—165 mm (6.5 inches) wide by 133 mm (5.25 inches) deep by 79 mm (3.125 inches) high
- 24A16/24B16—165 mm (6.5 inches) wide by 133 mm (5.25 inches) deep by 105 mm (4.125 inches) high
- 24A32/24B32—165 mm (6.5 inches) wide by 133 mm (5.25 inches) deep by 156 mm (6.125 inches) high.

5.93 For more detailed information on identification and installation, refer to Section 463-210-101. The LSI that is used with backup station lines for CAS is included in the coverage for CAS in this Part 5.

Warning: A possible shock hazard is present when securing the transformer power plug of the LSI to ac wall outlets equipped with metal receptacle covers. Do not plug the LSI into ac wall outlets equipped with metal receptacle covers. Use ac outlets having plastic receptacle covers or replace metal covers with plastic covers.

LOUDSPEAKER PAGING (BASIC AND DELUXE)

5.94 The ***basic*** loudspeaker paging feature allows the attendant direct access and station users dial access to paging equipment for the purpose of voice paging. The ***deluxe*** loudspeaker paging feature allows the attendant direct access and the attendant and station users dial access to the paging equipment for voice paging. The paging amplifiers and speakers may be either customer-owned or telephone-company provided. All voice paging facilities make use of the telephone transmitter as the microphone. A control signal for cutoff or override of background music is also provided. Optional arrangements are available to provide multizone paging where a separate access code and/or console key (for direct access) is provided for each of up to six zones or all zones within a customer complex. Page answer capability (provided only with deluxe loudspeaker paging) allows the paged party to be connected to the calling party by dialing an answer code from any station within the PBX.

5.95 The equipment required for loudspeaker paging is listed as follows:

- LC13B auxiliary trunk interface circuit pack (two circuits per circuit pack, one circuit per paging zone)
- 89A control unit (one per paging zone)
- 2012B power transformer (one per three 89A control units).

5.96 The LC13B circuit pack furnishes an interface from the PBX to the 89A control unit. The

2012B power transformer plug into 120-volt 60-Hz ac commercial power source to furnish the 89A control unit with 16 Vac (converted to ±12 Vdc by the 89A). The functions of the 89A control unit are as follows:

- Presents a balanced input to the paging trunk circuit (LC13B) and a balanced output to a paging system power amplifier.
- Provides the user with circuitry for seizing the paging system or code call system (chime paging).
- Provides circuits for adding music and tones into a paging system.
- Suppresses objectionable disconnect clicks on conclusion of voice pages.
- Equalizes loud and soft input voice signals.
- Provides the user with capability to "busy out" the control unit.
- Provides supervision to the PBX indicating that the control unit has been seized or busied out.
- Provides for option Z where a page-in-progress has priority over a busy-out signal.

5.97 The 89A control unit has an associated click suppression circuit that suppresses the disconnect click when the click is unpleasantly loud. If the circuit is not part of the main circuit board (installed at the factory), the circuit is supplied in a kit of parts D180702. Electrical connections to the control unit are made through standoffs so that no additional wire is required when installing the kit. When click suppression is provided, the S2 screw switch must be opened by turning counterclockwise.

5.98 If several zones are to be used for paging (maximum of six), one 89A control unit must be installed for each zone. One circuit on the LC13B auxiliary trunk circuit pack must be dedicated for each zone. Answer-back channels may also be assigned for each zone (deluxe paging only) which allows the paged party to be connected to the calling party.

5.99 The answer-back channels for deluxe loudspeaker paging are always provided, regardless of the number of paging zones.

5.100 Up to three LC13B auxiliary circuit packs can be cross-connected to paging equipment which allows for the maximum of six paging zones. Connections for loudspeaker paging are illustrated in Fig. 69. Worksheet 6 is to be used in filling in cross-connection information for loudspeaker paging.

Loudspeaker Paging With Chime Paging and Music Background

5.101 Loudspeaker paging can also be provided with chime paging and music background. The required equipment, in addition to the loudspeaker paging equipment for this arrangement, is as follows:

(a) LC17B tone board

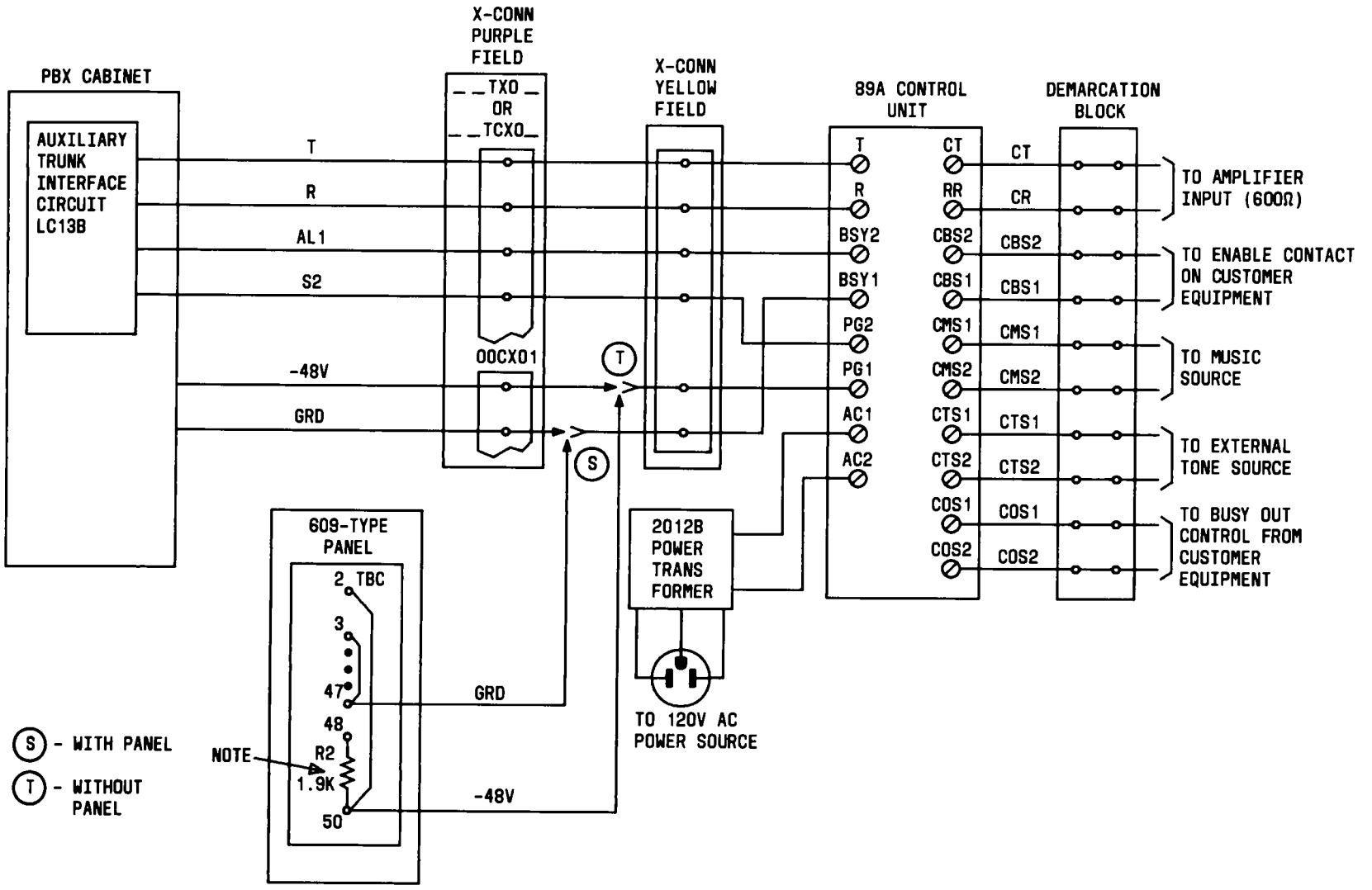
(b) 89A control unit.

The customer-provided equipment must be turned on at all times for the loudspeaker paging with chime paging and music background.

5.102 Connections for loudspeaker paging with chime paging and music background are illustrated in Fig. 70. Worksheet 7 is provided for cross-connection fill-in information for loudspeaker paging with chime paging and music background.

MUSIC-ON-HOLD

5.103 The music-on-hold feature provides music or some other audible indication to the held party during the hold period. The 31D voice coupler is used for transmission of music or other audible tones via an auxiliary trunk circuit pack (LC13B), which provides 1-way-in reception of the music. The coupler also provides protection of the tip and ring by limiting excessive voice power levels from the held party receiver. In addition, isolation is provided to the customer-provided equipment. Maximum dc line current is 150 mA. The 31D coupler dimensions are 102 mm (4 inches) long by 70 mm (2.75 inches) wide by 51 mm (2 inches) high and should be wall-mounted near the termination field. For more description on the 31D coupler, refer to CD- and SD-69613-01. The 31B voice coupler is grandfathered per FCC rules and regulations and may be used if available. The music-on-hold interconnection is shown in Fig. 71. Worksheet 8 is provided as a fill-in worksheet for connection of the music source to the PBX via the cross-connect field.



NOTE:
R2 MUST BE ADDED TO PANEL TO PREVENT ACCIDENTAL RELEASE OF OTHER TRANSFER RELAYS IF -48V BATT. IS GROUNDED. R2 = 1.91KΩ, TYPE 223A

Fig. 69—Loudspeaker Paging Connections

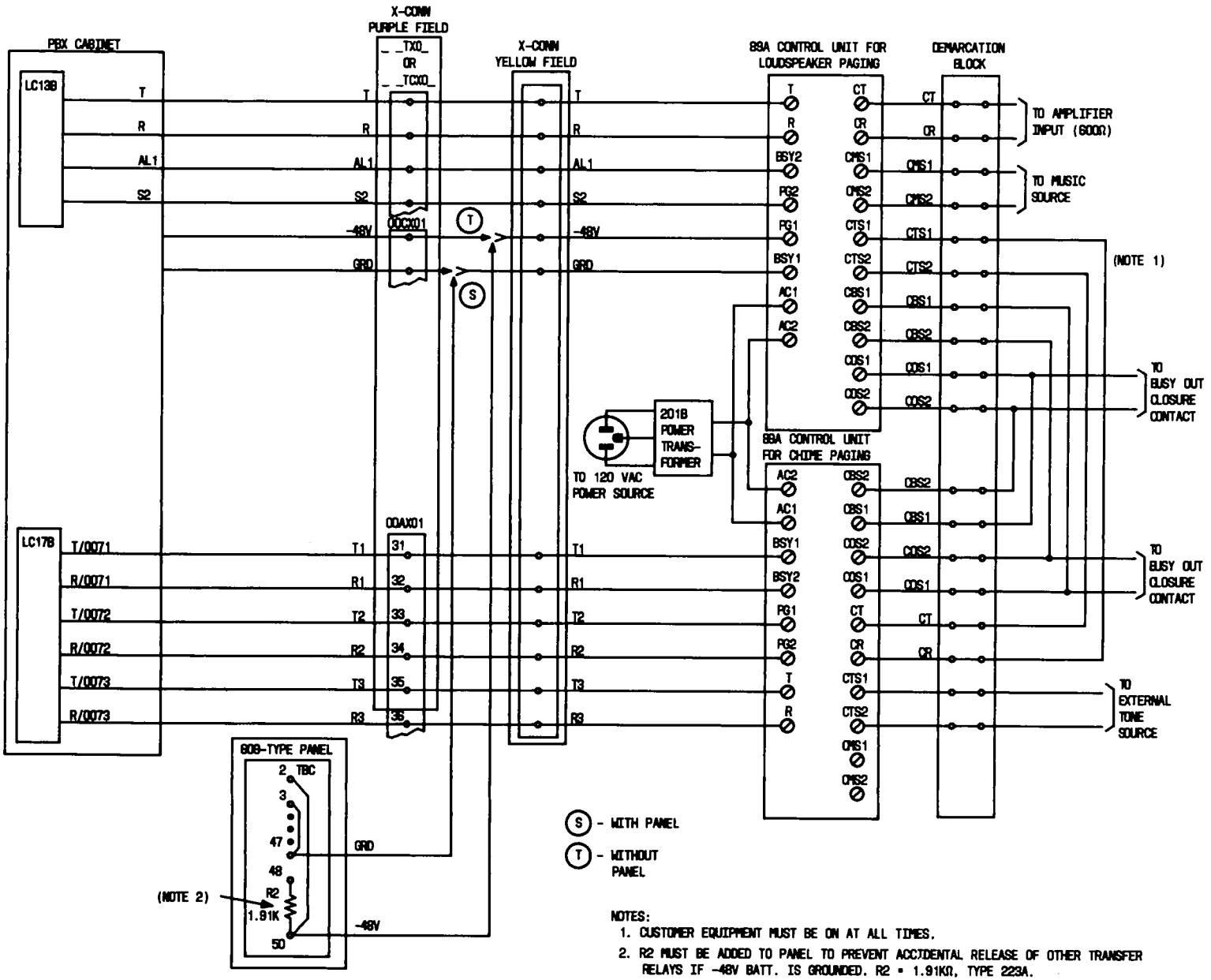


Fig. 70—Loudspeaker Paging With Chime Paging and Music Background

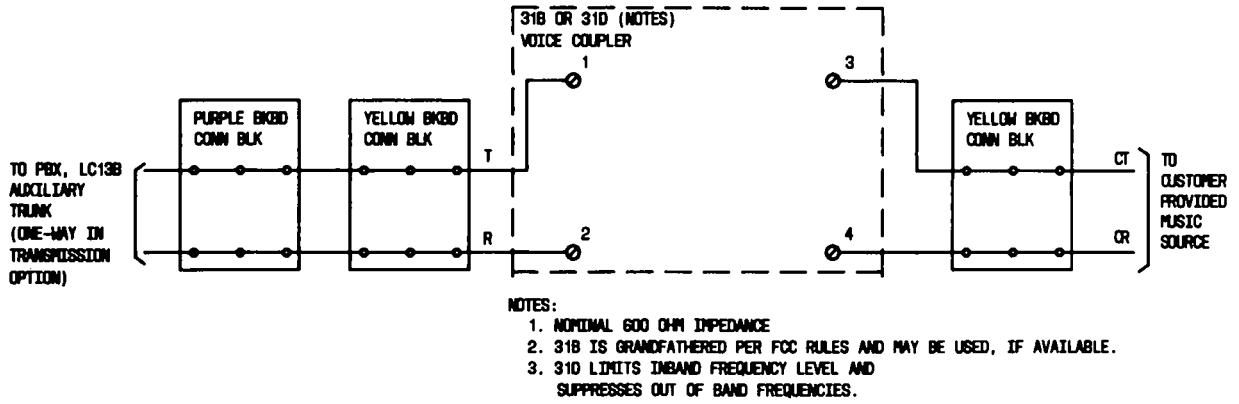


Fig. 71—Music-on-Hold Interface

PACKAGED METALLIC FACILITY TERMINAL ASSEMBLIES (PMFTA)

5.104 The PMFTA are a group of assemblies designed for mounting metallic facility terminal (MFT) transmission and signaling units. The assemblies can be located at the network interface on customer premises or in a central office. The assemblies are self-contained arrangements including a power supply, interface terminal connectors, and installation data sheets. Typical cross-connections for the PMFTA and the DIMENSION PBX are shown in Fig. 72. Refer to Sections 332-610-101 and 332-610-102 for detailed information on the assemblies. The PMFTA may be used in place of the CPFT equipment which is rated manufacture discontinued.

RADIO PAGING ACCESS

5.105 The radio paging access feature provides attendant and station users dial access to customer-owned radio paging equipment to selectively tone alert or voice page individuals carrying pocket radio receivers. The paging party may answer by dialing an answering code from a station within the PBX system.

5.106 The equipment required to furnish radio paging access is as follows:

- Two LC08D dual CO trunk circuit packs

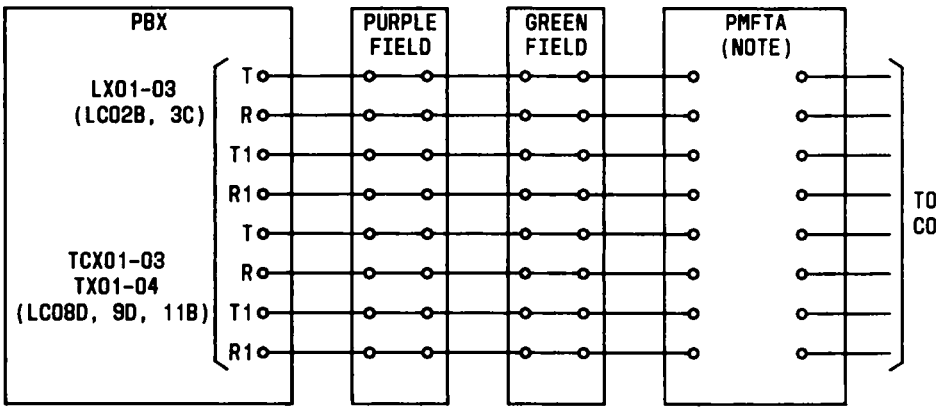


Fig. 72—Packaged Metallic Facility Terminal Assemblies Connections

- J58824CD interface trunk unit, Lists 7, 9, 12, 15, 16, and 17
- J59204CA-L1 TOUCH-TONE calling receiver (G1)
- J58847Y, L3 and L4 assembly, wiring, and equipment for one link and electronic dial unit
- 31D voice coupler (not required when interface trunk unit is wired for 1-way transmission).

The radio paging equipment units may be several combinations of J codes depending on PBX service.

5.107 The interface trunk unit has two incoming ports and two answer ports. The four ports are connected to central office trunk circuits (LC08D) via the cross-connect field. The central office trunks connected to the incoming ports are encoded 1-way outgoing with TOUCH-TONE calling to dial pulse conversion. The central office trunks connected to the answer ports are encoded 1-way outgoing with TOUCH-TONE service operation only.

5.108 Connections to the customer-provided equipment are made via the cross-connect field. The in-service feature of the interface trunk unit (on leads IS1 and IS2) is not functional in providing a busy condition to the PBX, but the IS1 and IS2 leads are still required for normal operation of the interface trunk. The recommended method of taking the interface trunk out of service is to use the attendant trunk group busy feature.

5.109 A functional diagram of the radio paging access connections is illustrated in Fig. 73. The interface trunk unit provides for several wiring options for various PBXs, but some modifications have been made to the unit to allow for connections to the PBX. The tip and ring leads are coupled to the customer-provided equipment via 31D voice coupler whenever 2-way transmission is provided.

5.110 Detailed wiring connections for radio paging access are illustrated in Fig. 74, 75, and 76. Figure 74 illustrates the connections from the PBX cross-connect field to the interface trunk unit terminal strips. Figure 75 illustrates the connections from the TOUCH-TONE dialing receiver and the customer-provided equipment to the interface trunk unit and connections between the interface trunk unit terminal strips. Figure 76 illustrates the connections from the fuse panel to the interface trunk unit terminal strips and the connections for the Y, Z, or ZZ wiring option.

When the Z or ZZ option is used, the 31D voice coupler must be connected to T and R leads between the interface trunk and the demarcation block. The Z option provides for receiving only from the customer-owned and maintained equipment. The ZZ option provides for 2-way transmission. Option Y provides for transmission only to the customer-owned and maintained equipment. The 31D voice coupler is not required to be connected to T and R leads when option Y is used.

5.111 Worksheet 9 is provided as a fill-in worksheet for radio paging access connections.

RECORDED ANNOUNCEMENT INTERCEPT

5.112 Incoming calls are intercepted and routed to a recorded message which indicates to the caller the reason for the interception. This intercept treatment is provided as an alternative to attendant intercept for DID and CCSA calls only. Only one message can be given.

5.113 The recorded announcement equipment consists of the following:

- LC13B—Auxiliary trunk interface circuit pack
- 31D voice coupler (31B voice coupler is grandfathered and may be used if available)
- H400-107, List 1—Assembly, equipment and cords for one announcement set (KS-16765).

An H400-107, List 4, is required in addition to List 1 when a KS-20449, List 1, amplifier is needed for the announcement set. The KS-16765, List 2, announcement sets manufactured prior to January 1, 1980, are

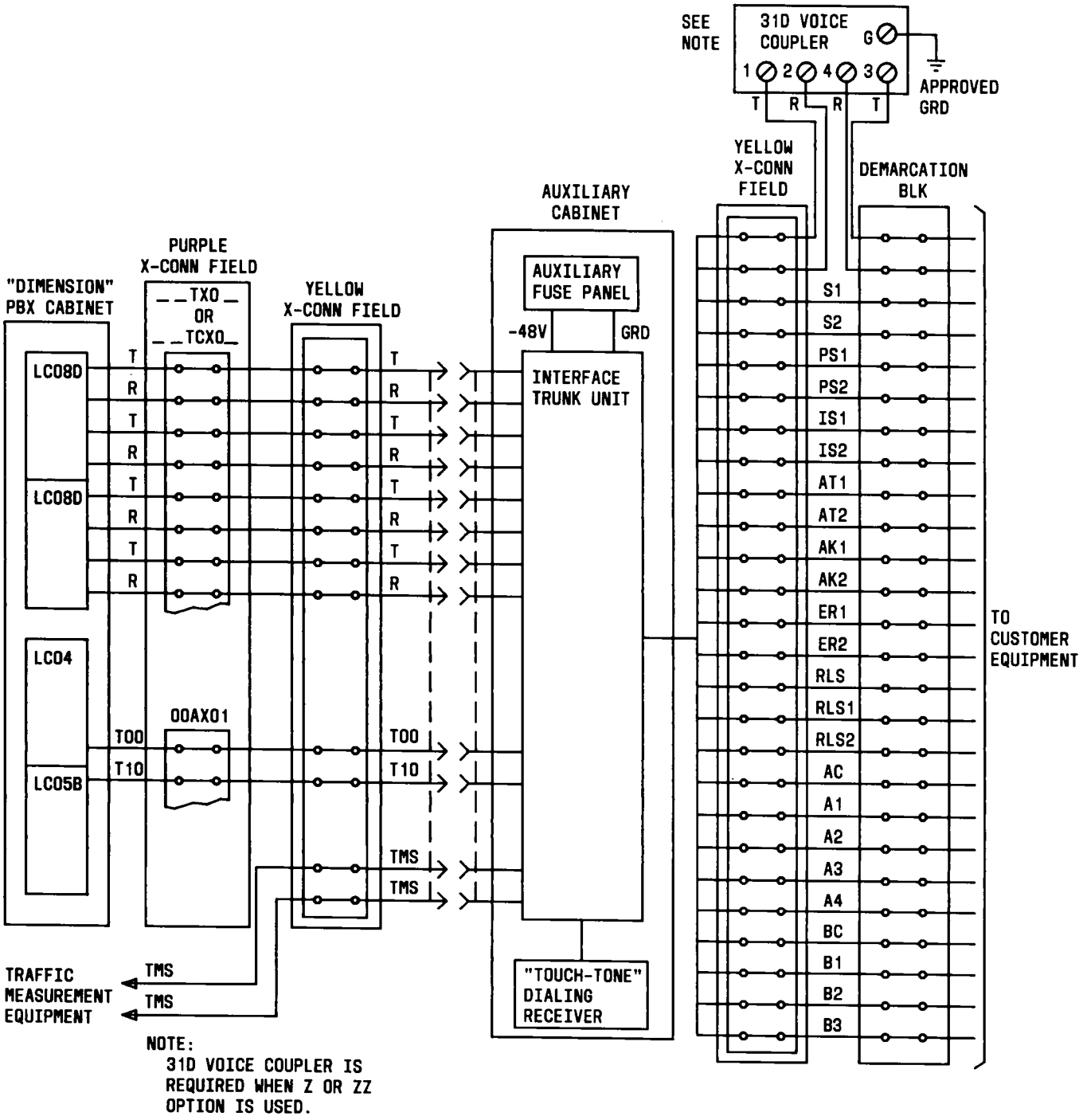


Fig. 73—Functional Diagram of Radio Paging Access Connections

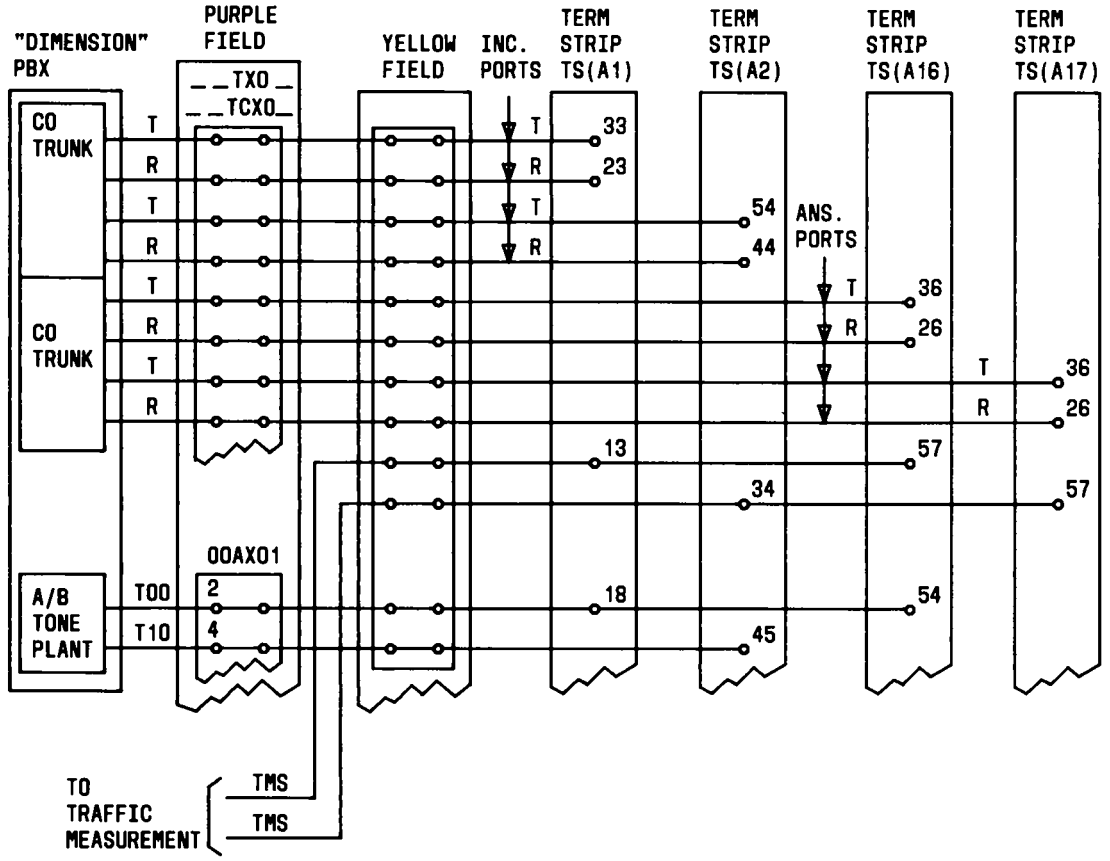


Fig. 74—Connections From DIMENSION PBX Cross-Connect Field to Radio Paging Interface Trunk Unit

grandfathered and do not require a voice coupler. Connections and required hardware to the PBX to the KS-16765 announcement set are shown in Fig. 77. Worksheet 10 is provided as a fill-in worksheet for interconnection via the cross-connect field. Whenever the fuse panel is not provided as part of the auxiliary cabinets, the ground leads from the announcement unit can be connected to spare terminals on ACTS11 located on the ac power distribution unit.

5.114 The recorded announcement feature is provided with uniform call distribution (UCD) and direct departmental calling (DDC) features in FP10 and FP15. With this arrangement, one-half of an LC13B circuit pack is required. If both recorded announcement with UCD/DDC and recorded announcement with DID/CCSA are provided in the same system, a standard announcement set must be provided in locally engineered installation to support each announcement requirement.

RECORDED TELEPHONE DICTATION ACCESS

5.115 The recorded telephone dictation trunk allows access to and control of customer-owned dictation equipment by station users within the system. The start and stop functions of customer-owned telephone dictation equipment may be voice-controlled or dial-controlled. The record and playback functions are always dial-controlled.

5.116 The equipment required for recorded telephone dictation access is listed in Table JJ. The recorded telephone dictation trunk is compatible with the A3 or the G1 TOUCH-TONE calling receivers. If the A3 receiver is used, the associated cable is connected to terminal strip (TS)D. If the G1 receiver is used, the cable connected to the receiver is connected to the telephone dictation equipment via a terminal plug that is shop wired to TS(D). When 4 x 4

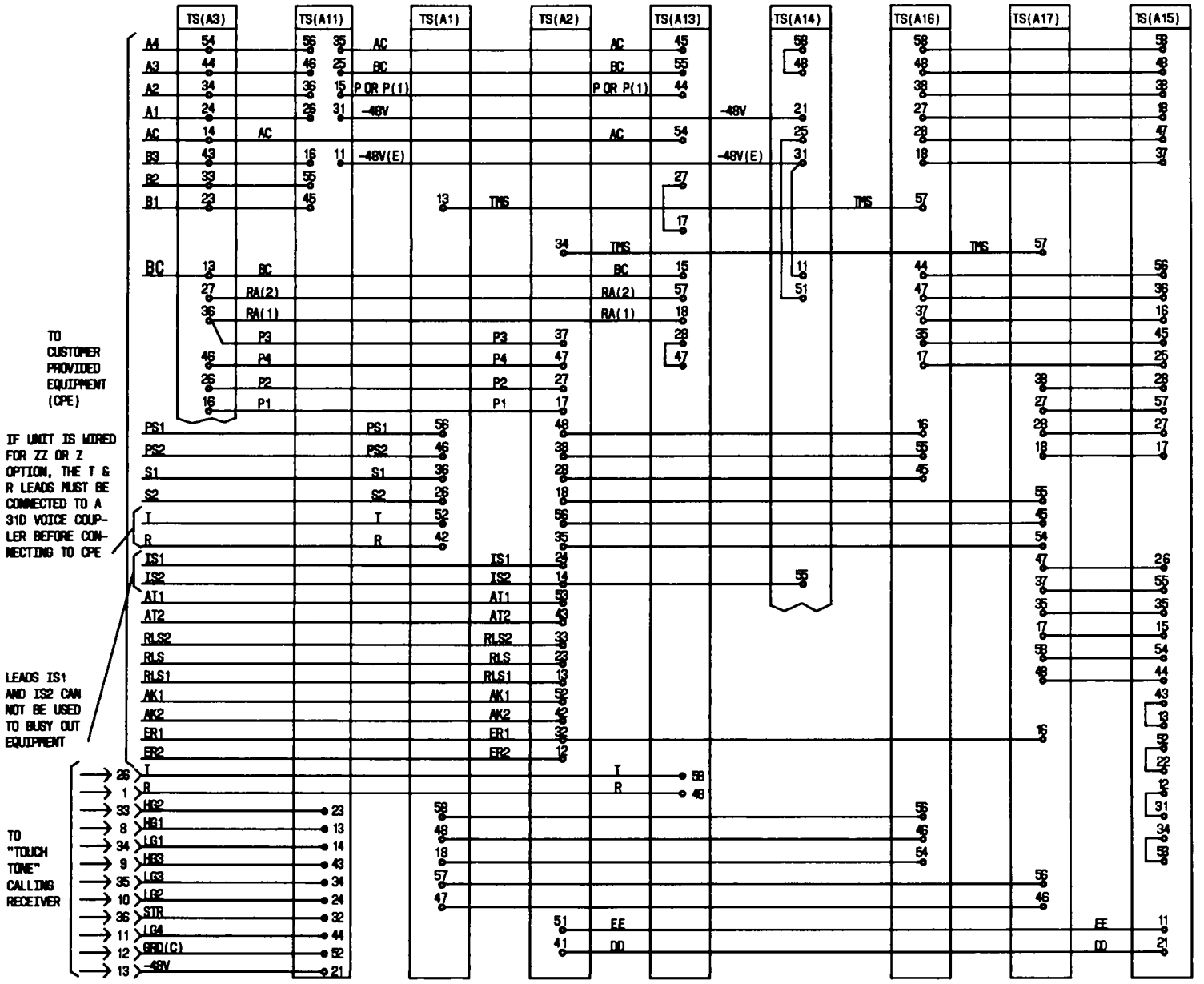
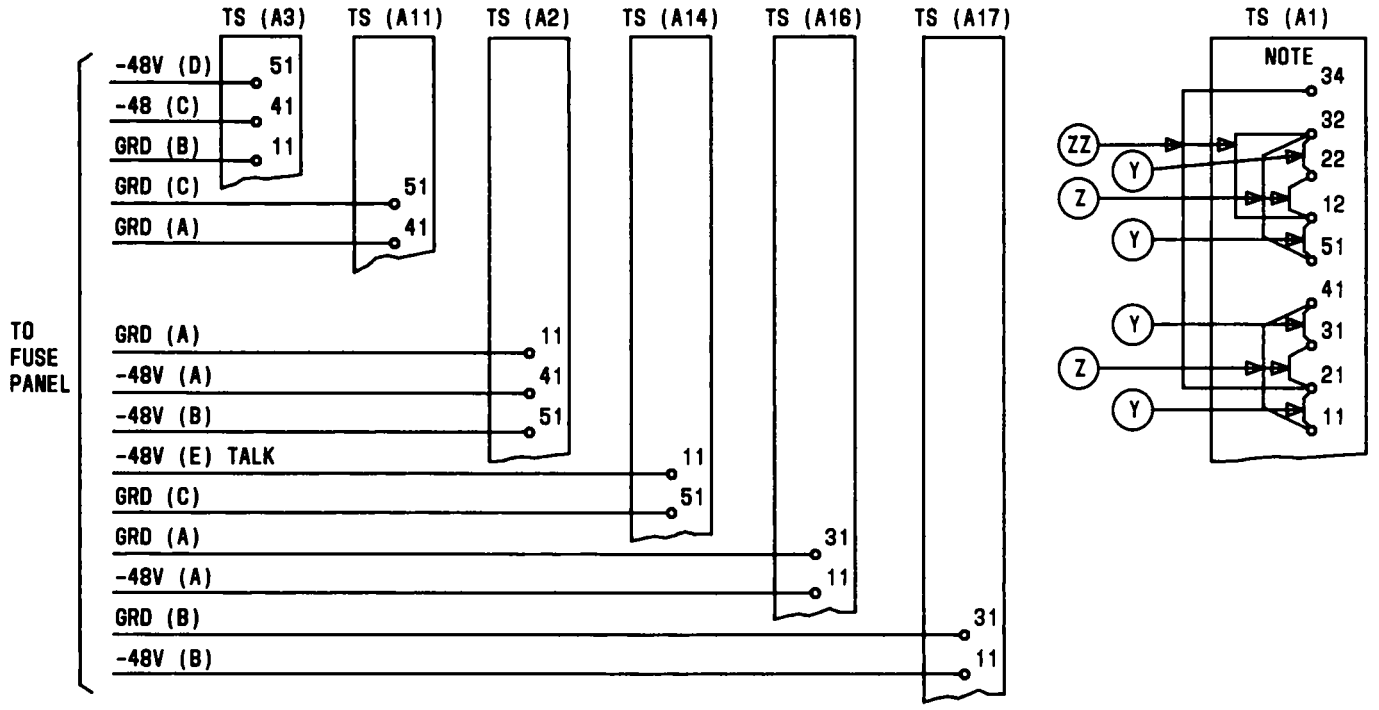


Fig. 75—Connections From the TOUCH-TONE Calling Receiver and Customer-Provided Equipment to the Interface Trunk Unit



NOTE:
IF THE Z OR ZZ OPTION OF WIRING IS USED ON THE INTERFACE TRUNK CIRCUIT, THE 31D VOICE COUPLER MUST BE CONNECTED TO TIP AND RING BETWEEN THE CONNECTING BLOCK IN THE YELLOW FIELD AND THE DEMARCATION BLOCK. IF THE Y OPTION IS USED, THE 31D VOICE COUPLER IS NOT REQUIRED.

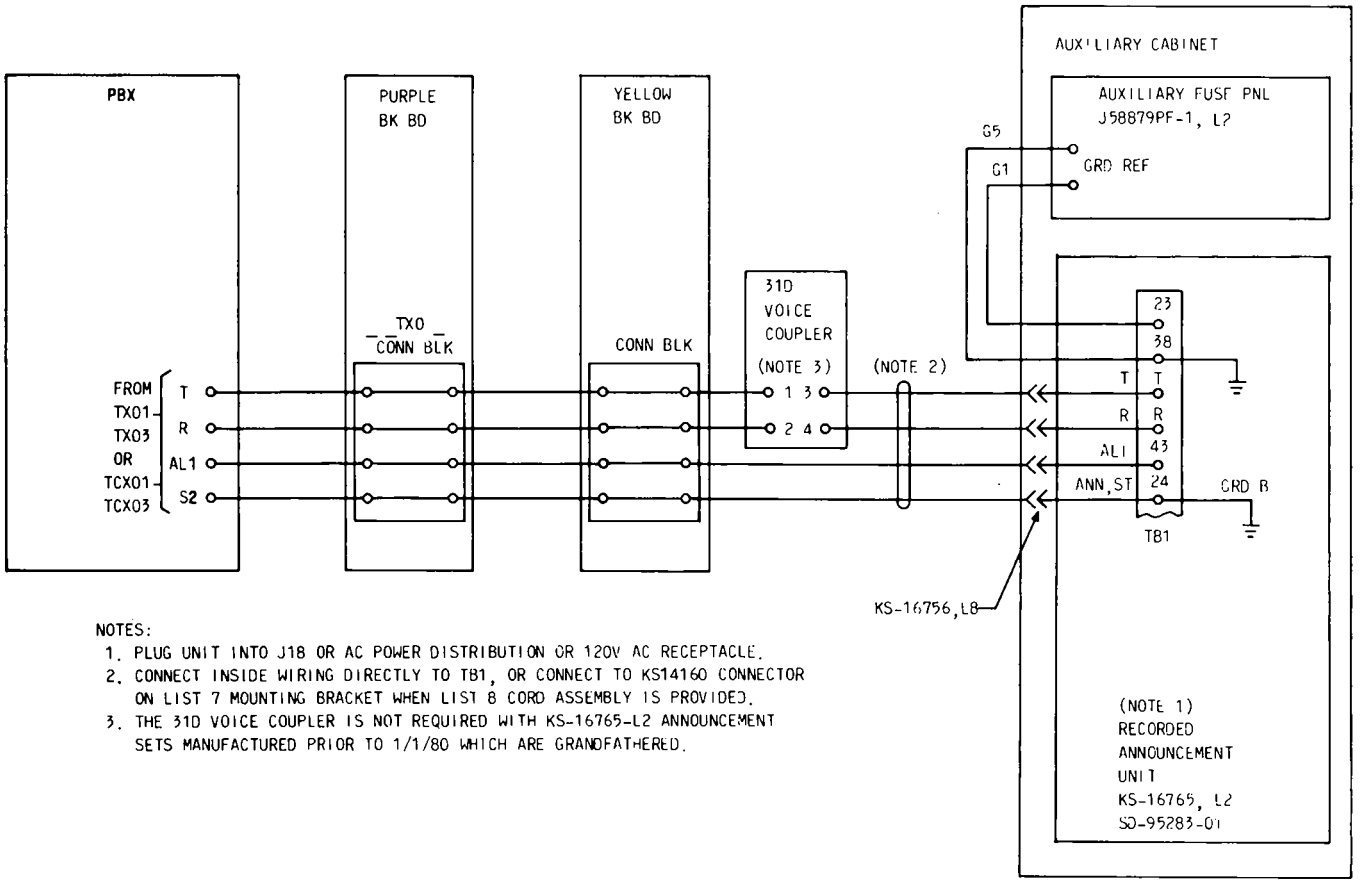
Fig. 76—Connections From the Fuse Panel to the Interface Trunk Unit for Radio Paging Access

TOUCH-TONE calling operation (A3 receiver) is required, lead HG4 must be connected to TS(D). Figure 78 illustrates a block diagram of the wiring connections for recorded telephone dictation access. Under no circumstances are the leads between the DIMENSION PBX and the recorded telephone dictation trunks to be exposed.

5.117 In cases where the TOUCH-TONE calling capacity is exceeded, the necessity to mix both TOUCH-TONE calling inputs and dial pulse inputs may arise. If this situation does occur, two separate trunk groups and two access codes are required in order to access the telephone dictation trunk.

5.118 Figure 79 illustrates detailed wiring connections at the terminal strips. Some wiring options are shown in the illustration and also the TT and TR lead connections to the 31D voice coupler. The wiring options are listed in Table KK. Worksheet 11 is provided as a fill-in worksheet for connection of the recorded telephone dictation trunk in the auxiliary cabinet.

5.119 In Fig. 79 (Sheet 2) terminal strip C illustrates the ZP option which is provided by SD-5E038-01, Issue 3B or later. The capacitor provided by this option is coded as 542G. Also, in Fig. 79, if straps are provided on TS(A) between terminals 21—51 and between 23—53, the straps are to be removed.



NOTES:
1. PLUG UNIT INTO J18 OR AC POWER DISTRIBUTION OR 120V AC RECEPTACLE.
2. CONNECT INSIDE WIRING DIRECTLY TO TB1, OR CONNECT TO KS14160 CONNECTOR ON LIST 7 MOUNTING BRACKET WHEN LIST 8 CORD ASSEMBLY IS PROVIDED.
3. THE 310 VOICE COUPLER IS NOT REQUIRED WITH KS-16765-L2 ANNOUNCEMENT SETS MANUFACTURED PRIOR TO 1/1/80 WHICH ARE GRANDFATHERED.

Fig. 77—Recorded Announcement Unit Connections

REMOTE MAINTENANCE, ADMINISTRATION, AND TRAFFIC SYSTEM (RMATS) EQUIPMENT

5.120 A typical RMATS system consists of the RMATS cabinet equipment, located at a Telco location (RMATS Service Center), and compatible DIMENSION PBXs in the serving area. The RMATS communicates with each PBX over the DDD network. The following hardware is required when RMATS is to be provided:

- 113D/113DR, List 1 or 2 (or equivalent) data set
- ED-1E367-11, G931 data set interface cable
- LC171B data control circuit
- LC18E alarm control circuit
- 4K of RAM
- LC53, vintage 5 or later processor interrupt circuit.

5.121 The RMATS provides the capability to remotely administer nearly all DIMENSION PBX features and restrictions. The system provides the capability to perform maintenance polling which automatically records alarms (trouble conditions) at the PBX. These trouble conditions can be verified and analyzed, and corrective action in many cases can be accomplished without dispatching a craft person to the PBX site. Traffic polling schedules may be established, and automatic polling thereafter conducted without the use of traffic measurement equipment at the PBX. Data collected from the PBXs is summarized and made available in a variety of reports. Further reduction of the traffic data is not necessary, although raw data can be made available for external processing if desired.

TABLE JJ

RECORDED TELEPHONE DICTATION (RTD) EQUIPMENT SUMMARY

ITEM NO.	EQUIPMENT	DESCRIPTION
1	RTD units (dial dictation machine)	Customer-provided equipment
2	J58827E, L1 and 7 trunk	Required for supervisory control of each customer-provided unit and must be mounted in 584mm (23 in.) wide space in auxiliary cabinet. List A, 2, and 8 are required with TOUCH-TONE calling operation
3	J58879PC-2, L4 (120A) frequency generator	Is provided as a separate ringing source for the attendant telephone set(s). If CPFT equipment is being provided, a separate 120A generator used for continuous ringing may be shared with the feature
4	J58879PG, L1 interrupter for audible ringing	Required for the attendant telephone sets whenever auxiliary cabinet is ordered via E-8124 questionnaire
5	Fuse panel	Fuses provided separately if the auxiliary cabinet is not specified
6	Telephone set (for RTD attendant)	Provides dictation telephone set, - as required per dictation unit
7	TOUCH-TONE calling circuit A. 10B and 54B, or 10C B. Senior receiver: (1) J99289B-1, List 1, SA and D (A3) (2) J59204CA-1, L1 A, and B (G1)	If access to the dictation unit from a TOUCH-TONE dialing set is required, both traffic and cost considerations should be considered. The system will be traffic engineered for the appropriate number of TOUCH-TONE dialing circuits without dial dictation requirements. Since a TOUCH-TONE calling register must be dedicated to each dictation connection for the duration of the connection, where the dictation units are busy frequently, it may be necessary to dedicate a TOUCH-TONE dialing circuit to each dictation trunk to prevent call blockage and dial tone delays. These dedicated circuits must be provided in addition to those specified for normal call processing. Since there may not be room for LC10B and 54B or LC10C (replaces both LC10B and LC54B) circuit packs in existing carrier slots, it may be economical to order a separate senior receiver per dictation unit, rather than ordering carrier/cabinets, as well as other auxiliary equipment. The number of senior receivers should be considered when ordering an auxiliary cabinet versus other apparatus mounting units
8	LC13B auxiliary trunk circuit	One LC13B provides two interface circuits for RTD or other auxiliary circuits. The LC13B provides the necessary isolation option, eliminating the need to order the isolation amplifier with the J58827E, L1 trunk
9	31D voice coupler	One 31D voice coupler for coupling tip and ring leads per dictation machine provided. This coupler provides filtering and limiting required by the FCC registration rules, part 68. The 31B voice coupler is grandfathered and may be used, if available

5.122 The RMATS equipment is illustrated in Fig. 80. The RMATS equipment may be equipped with up to three data sets, permitting a maximum of three PBXs to be connected at any time. This provides the capability for performing maintenance/administrative routines at a maximum of two PBXs while simultaneously conducting a traffic or maintenance poll at a third PBX.

5.123 A possible RMATS equipment arrangement using only one operator position is shown in Fig. 80. Any number of arrangements are possible and may be worked out to suit local conditions. Figure 81 illustrates a functional block diagram of RMATS.

5.124 For more detailed information about RMATS, refer to Section 554-010-130. Part 6 in this section also covers RMATS information associated with the LC171B circuit pack.

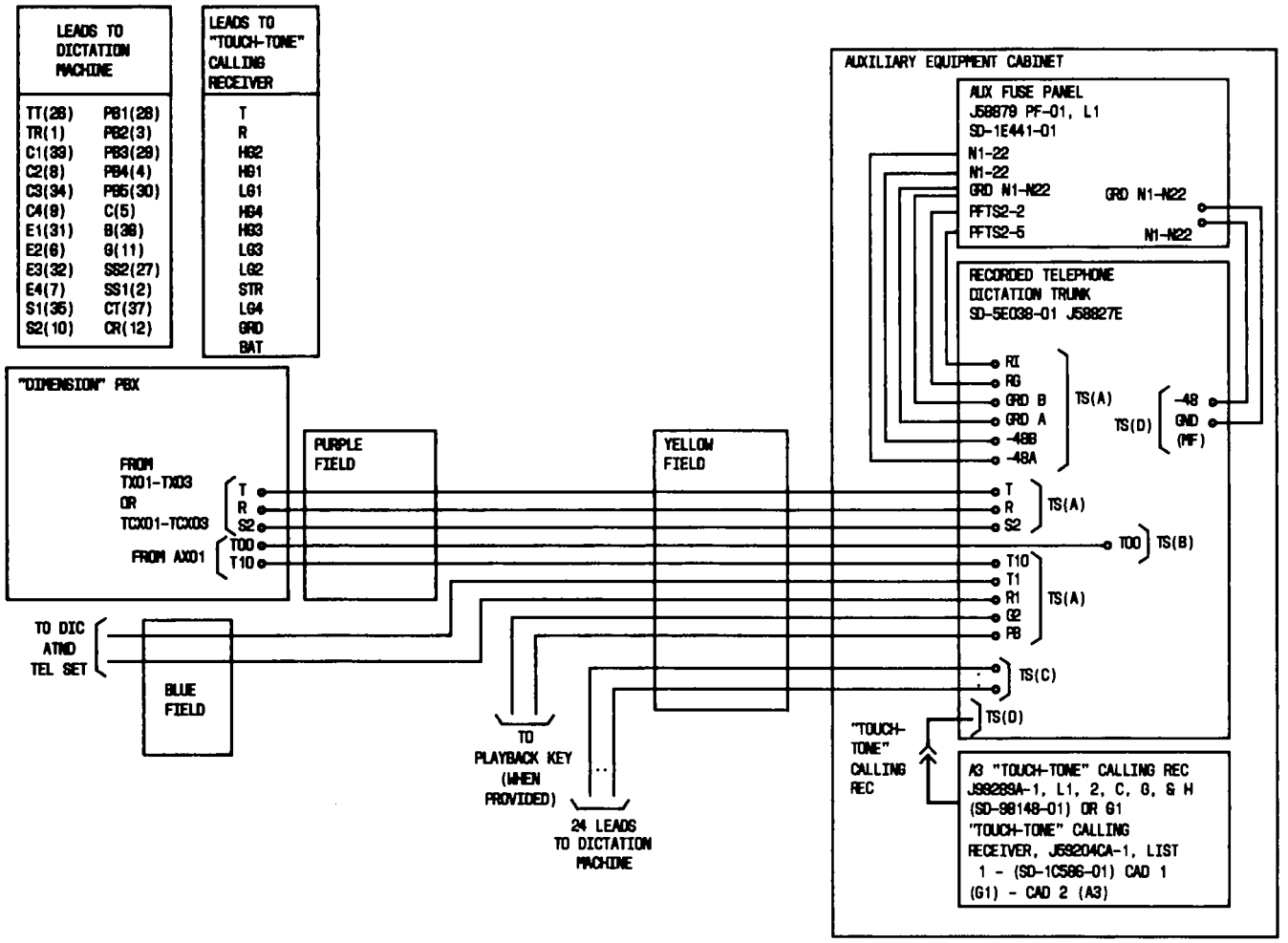


Fig. 78—Block Diagram of Recorded Telephone Dictation Trunk Connections

44V4 REPEATER

5.125 Worksheet 12 provides fill-in worksheets for connection of a 44V4 repeater in the auxiliary cabinet. When a 44V4 repeater is used, DX signaling must be used. When −48V is used to power the repeater, a 1400-ohm resistor (228A) should be used between each −48V source and battery connection on the repeater. An example of 44V4 repeater connections is shown in Fig. 82.

24V4 REPEATER

5.126 The 24V4 repeater is designed to interface 900-ohm or 600-ohm 2-wire CO equipment using loaded or nonloaded cable. It consists of a mounting shelf which holds plug-in components and test jacks. If there is no metallic facility terminal (MFT) 2-wire repeater available, the operating company may wish to use the 24V4 repeater for voice and data transmission. Worksheet 12 may also be used as a fill-in worksheet for connections of the 24V4 repeater in the system auxiliary cabinet. An example of the 24V4 repeater connections is shown in Fig. 83.

5.127 Figure 84 shows a typical trunk connected to the trunk or trunk/control carrier via the auxiliary equipment (eg, 24V4 repeater). The auxiliary equipment may be the customer premises facility terminal (CPFT) equipment.

STATION MESSAGE DETAIL RECORDING (SMDR)

5.128 Station message detail recording (SMDR) provides a record of the PBX station (or attendant) identity, call completing time, called number, call duration, and the trunk group used for all

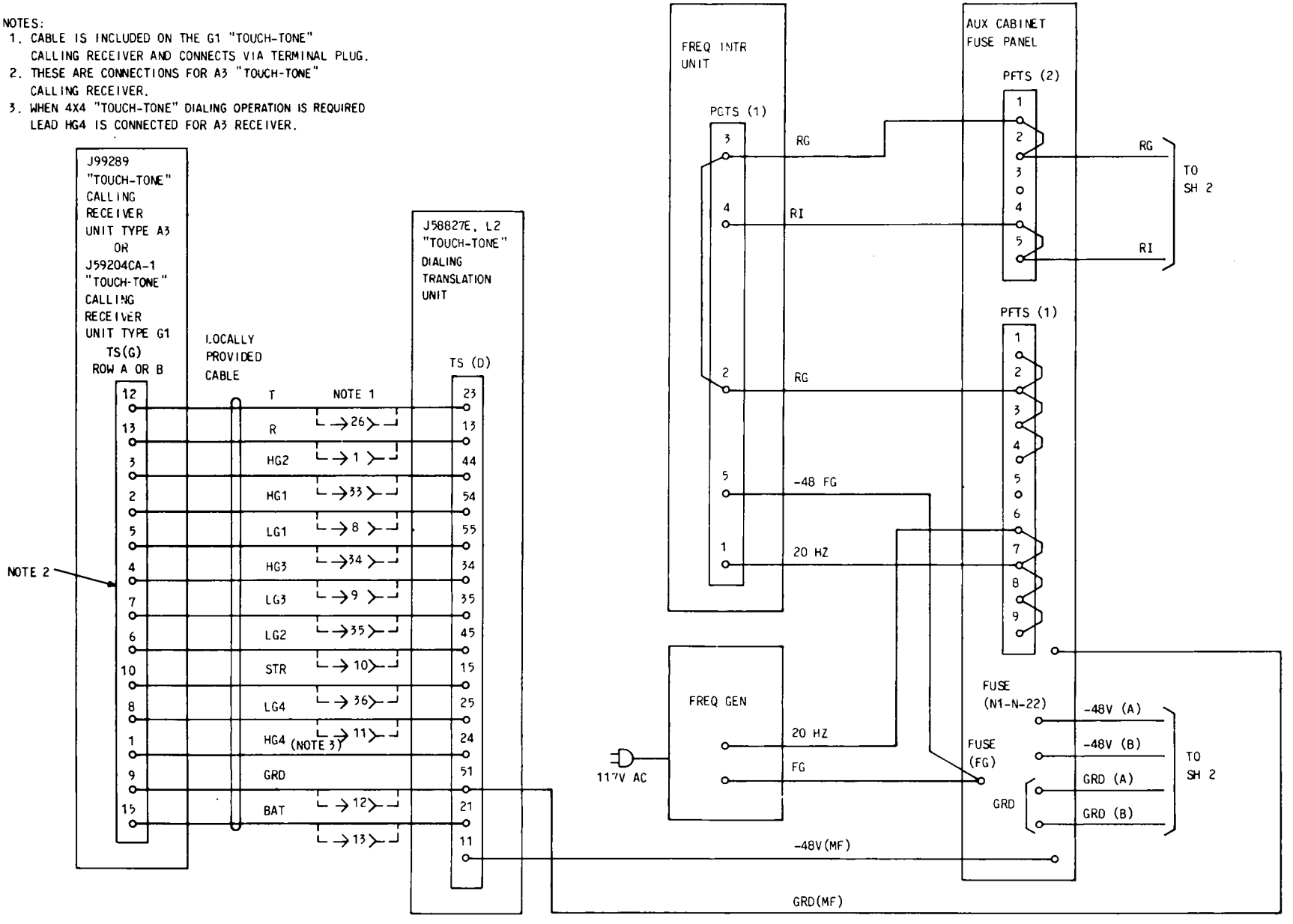
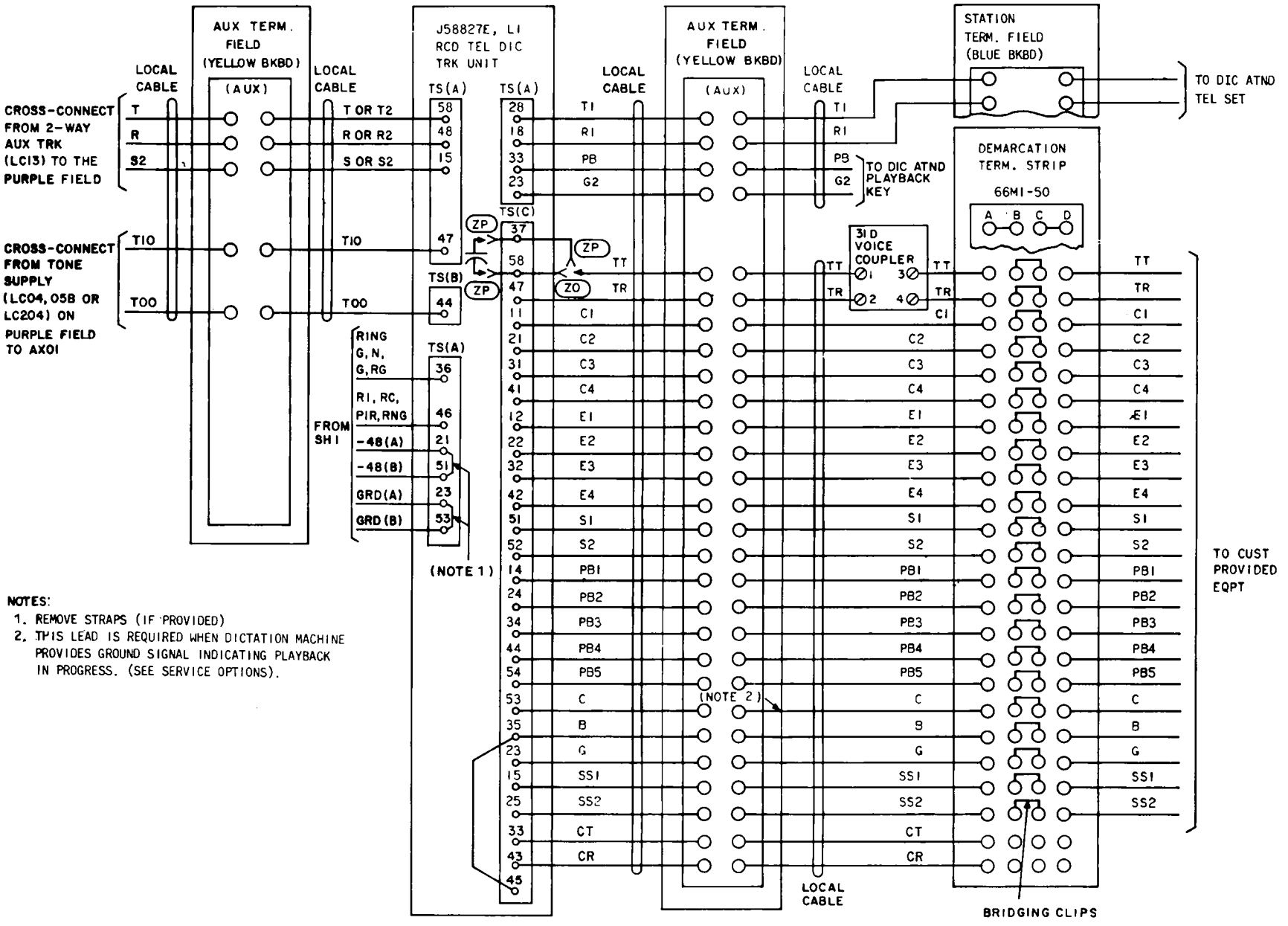


Fig. 79—Detailed Connections of Recorded Telephone Dictation Trunk Access (Sheet 1 of 2)



NOTES:
1. REMOVE STRAPS (IF PROVIDED)
2. THIS LEAD IS REQUIRED WHEN DICTATION MACHINE PROVIDES GROUND SIGNAL INDICATING PLAYBACK IN PROGRESS. (SEE SERVICE OPTIONS).

Fig. 79—Detailed Connections of Recorded Telephone Dictation Trunk Access (Sheet 2 of 2)

TABLE KK

WIRING OPTIONS FOR RECORDED TELEPHONE DICTATION ACCESS

FEATURE OR OPTION DESCRIPTION				OPTION
Trunk Located at Switching System (DIMENSION PBX)				S
Not ESS No. 1 Centrex				ZJ
Loop Resistance to Attendant Telephone Set		Less than 300 ohms		ZL
		More than 300 ohms		ZM
TOUCH TONE Dialing Operation		Required		ZC
		Not Required		ZB
Dictation Machine Start/Stop by	Dial 1*	TOUCH-TONE Calling Dial		M, W, ZG
		Rotary Dial		G, W
	Voice			M, V
Dictation Machine Unavailable to Record	Makes Trunk Busy and Signals Attendant			B
	Makes Trunk Busy			ZA
Playback Reduced by Dialing Digit 2	Yes			F
	No			E
To Increase Tone Levels From Dictation Machine (Ready to Dictate Tone, Ringing Tone, Dial Tone, Etc)				YC
Additional Machine Playback Features (Specify Only One)	Mach. Provides Playback Sig Dial 3 Extends Playback Dial 1 Ends Playback		No No Yes	R
	Mach. Provides Playback Sig Dial 3 Extends Playback Dial 1 Ends Playback		Yes Yes No	N
	Mach. Provides Playback Sig Dial 3 Extends Playback Dial 1 Ends Playback		Yes No Yes	Q
	Mach. Provides Playback Sig Dial 3 Extends Playback Dial 1 Ends Playback		Yes Yes Yes	A

* If both TOUCH-TONE dialing and rotary stations access this circuit, use options specified for TOUCH-TONE dialing operation.

OPTION	STRAPS REQUIRED ON J58827B		
	TS(A)	TS(B)	TS(C)
A		46-56	13-14
B	13-23	26-36	
E		45-55	
F		35-55 42-52	
G	46-56		
M	46-56		
N		28-38 46-56	13-14
Q		48-58	
R		48-58	53-54
S	35-45		
V		15-54 47-57 34-44 24-34 23-33	
W	11-21	18-57 37-47 17-27 34-44 33-43	
YC	†		
ZA	13-23		
ZB			48-58 28-38 18-57 47-57
ZC			18-28
ZG	47-57		
ZJ	24-34		17-27
ZL	NO STRAP REQUIRED		
ZM	25-55 14-24		

† To provide option YC, install .55μF capacitor from contact 5 of T key to contact 4M of B1 relay.

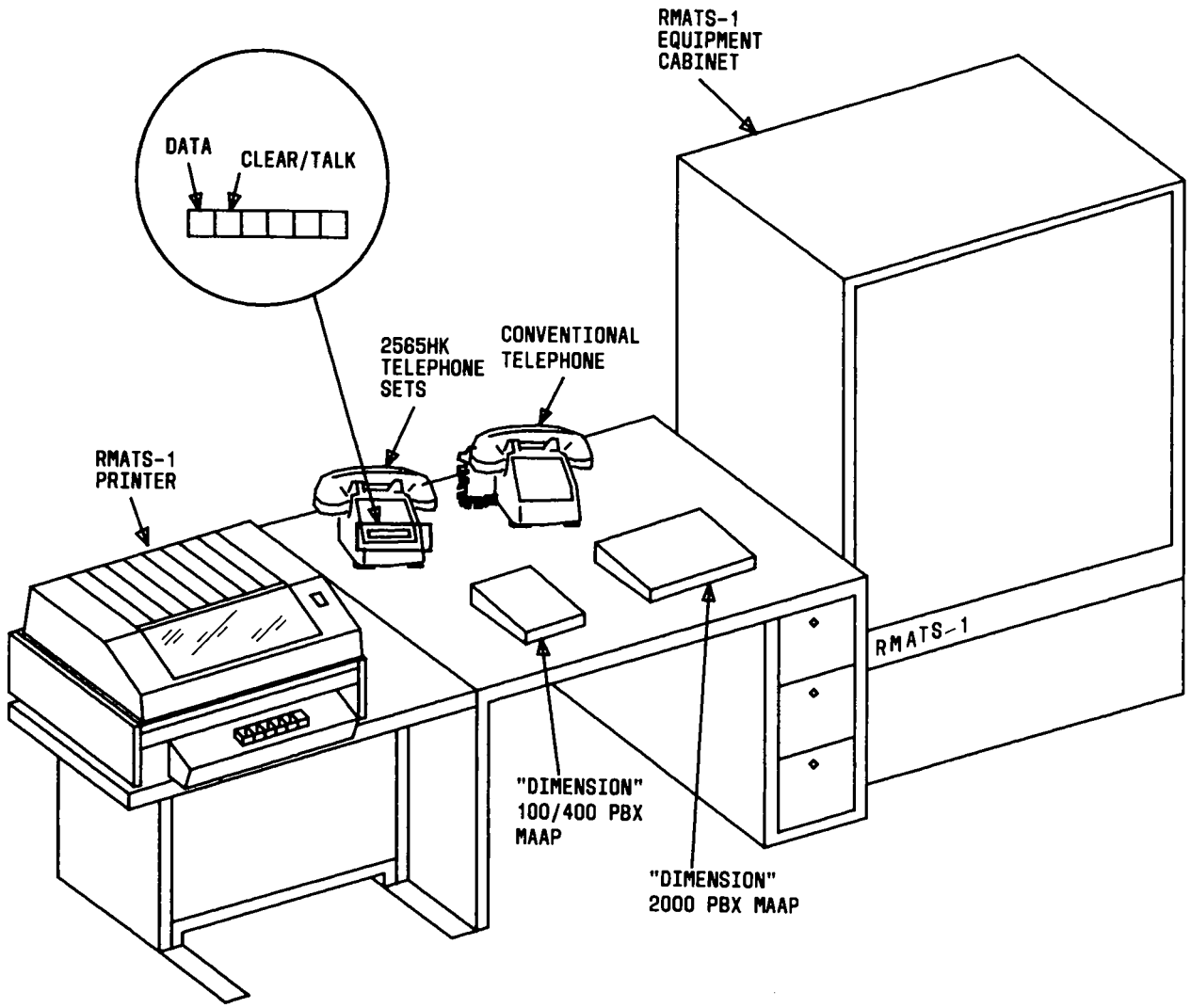


Fig. 80—RMATS Equipment

outgoing and incoming calls. The call duration is measured from 10 seconds after the establishment of the connection in the customer system to the time when the station goes on-hook. Also, a station dialed account code may be recorded in addition to the calling number. The SMDR feature is provided with FP4, FP10, and FP15.

5.129 The SMDR data port is a dedicated channel that is provided by circuit 0, slot 32 in the control carrier or circuit 0, slot 32/37 in the trunk/control carrier. Refer to Section 554-010-122 for detailed SMDR information. Optional wiring connections are shown in Fig. 85. Connections to the 724A panel are illustrated in Fig. 86.

5.130 The SMDR data port also provides an interface to a centralized station message detail recording (CSMDR) system that collects data from each remote customer premise location for multilocation customers and provides the data at a central location. Additional information pertaining to the CSMDR system is provided early in Part 5.

5.131 Power for the SMDR (9-track and direct output) is provided by commercial 120 Vac 60 Hz. Whenever the printer or paper tape punch is located remote from the SMDR, a commercial power outlet must be provided to supply the units.

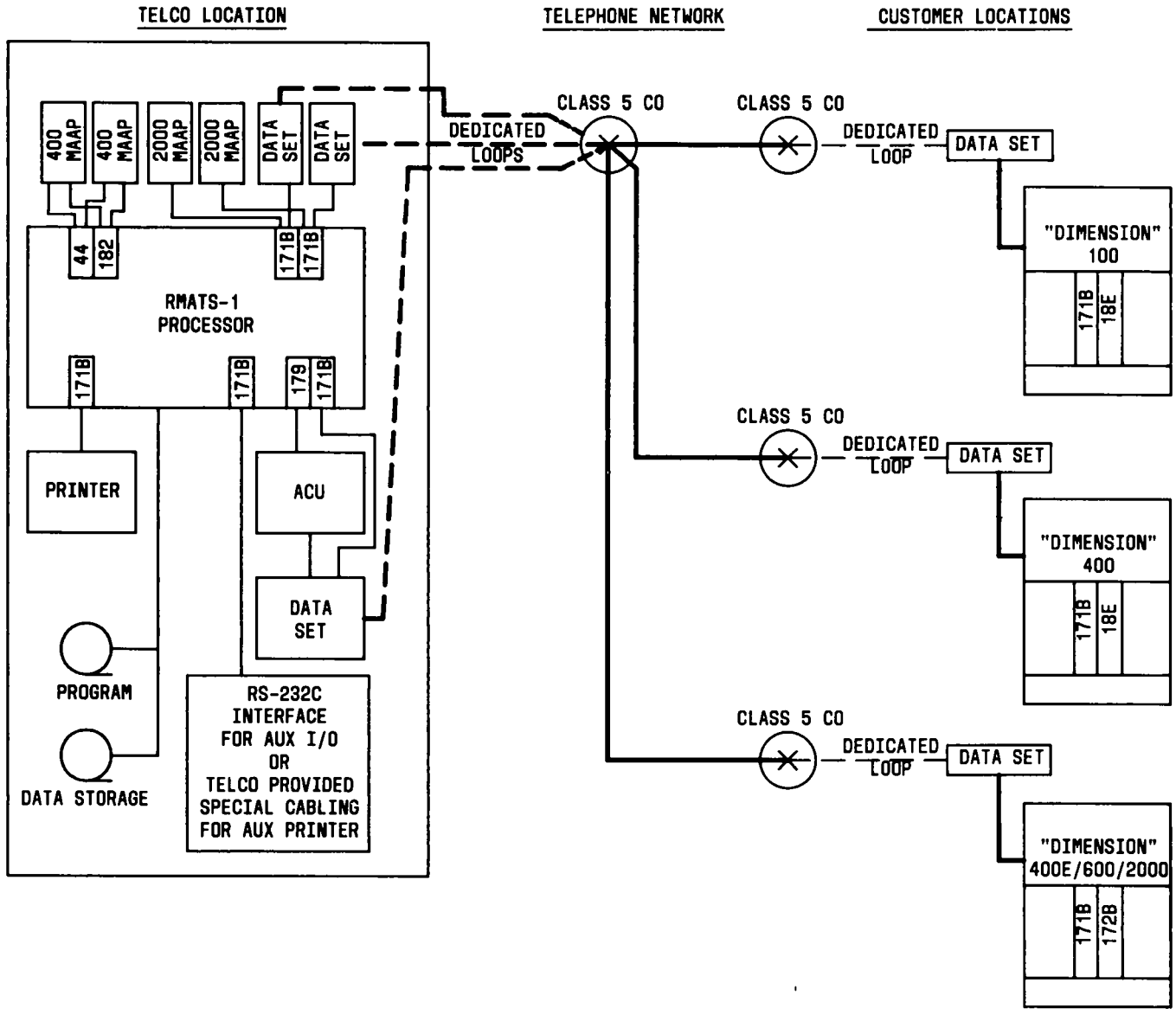


Fig. 81—RMATS Functional Block Diagram

STATION MESSAGE REGISTER/MESSAGE WAITING AND CALLING NUMBER DISPLAY TO STATION

5.132 The message registration equipment is centrally located on customer premises for use by the customer. Message unit information is recorded on a per-station-line basis for each completed outgoing local service call made by the station user. Optional surcharge arrangements may also be provided to score an additional predetermined number of units per call. The message unit information is stored in electronic memory, and the stored information is obtained by the desk clerk via an inquiry/display terminal with a digital readout. Optionally, a hard-copy printer is available for use with the inquiry/display terminal. The message unit information relating to local calling usage is generated internally at the PBX instead of detecting message unit pulses from the central office via a third wire per CO trunk. Since the PBX does not receive answer supervision from the central office, all trunk seizures which persist longer than an assumed answer time are counted as valid completed calls.

5.133 The equipment arrangement for station message register service is shown in Fig. 87. The equipment arrangement for calling number display to station is shown in Fig. 88. These features provide hotel/motel service as part of FP3.

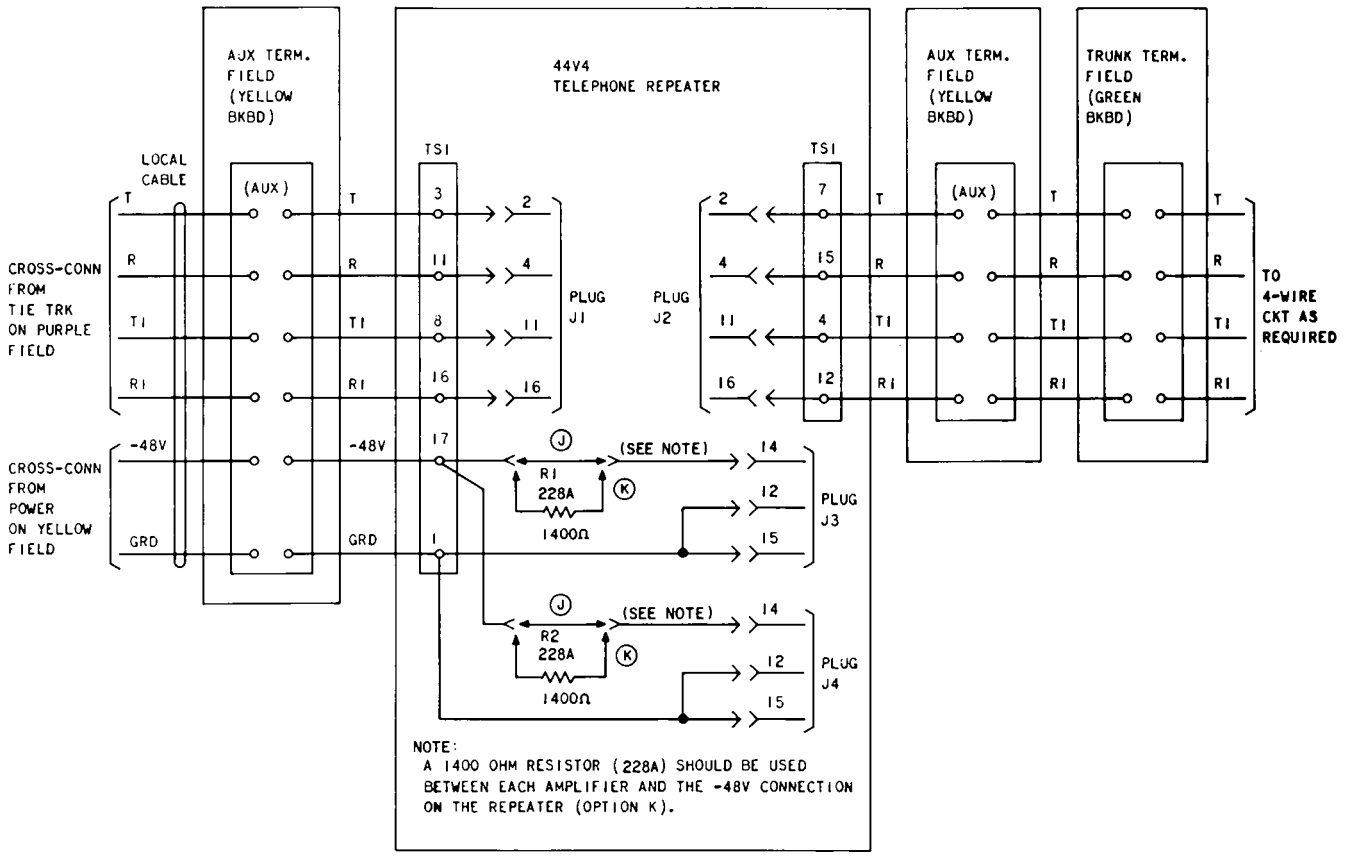


Fig. 82—44V4 Repeater Connections

5.134 The 102E1-A display unit must be installed as shown in Fig. 87. The same wiring arrangements for calling number display to station (Fig. 88) are used to connect the 102E1-A display unit. Both functions are incorporated in the 102E1-A display unit. One channel of an LC34B or LC366 circuit pack must be dedicated to the message waiting display unit. Data channel repeaters can be added to the data leads to extend the distance between the PBX and the display unit up to 3350m (11,000 feet). For detailed wiring information, refer to the Data Channel Repeater in this Part 5.

5.135 When the message waiting feature is required, an LC41B (digital buffer A and message waiting power supply) circuit pack is used to replace the existing LC49C circuit pack in slot 10 of each line carrier. The LC41B also provides the interrupted message waiting lamp voltage with a current detector circuit. An option is available for testing the neon lamp in the station set and an interrupter status lamp. In addition, an LC03C (loop start line interface) circuit pack must replace the existing LC02B circuit pack for every four lines requiring the message waiting service.

5.136 An LC34B may be installed in control carrier slots 32 through 37 or an LC366 may be installed in trunk/control carrier slots 30/33 through 35/36 to provide a dedicated data transmission circuit per station message register service. Circuit 0 and circuit 1 in slot 32 or 32/37 cannot be used since the circuits are dedicated to SMDR (0) and RMATS or traffic measurement (1). The LC34B or LC366 circuit used must be arranged for slow-speed data transmission. The MAAP designates the LC34B or LC366 circuit, carrier slot, and the carrier number providing the data channel.

5.137 When reserve (battery) power for message register memory is provided for the station message register service feature, LC38 hotel/motel battery is required in slots 14 and 15 (two slots are required) of the control carrier or in slot 13 of the trunk/control carrier. Option S provides a 256-word

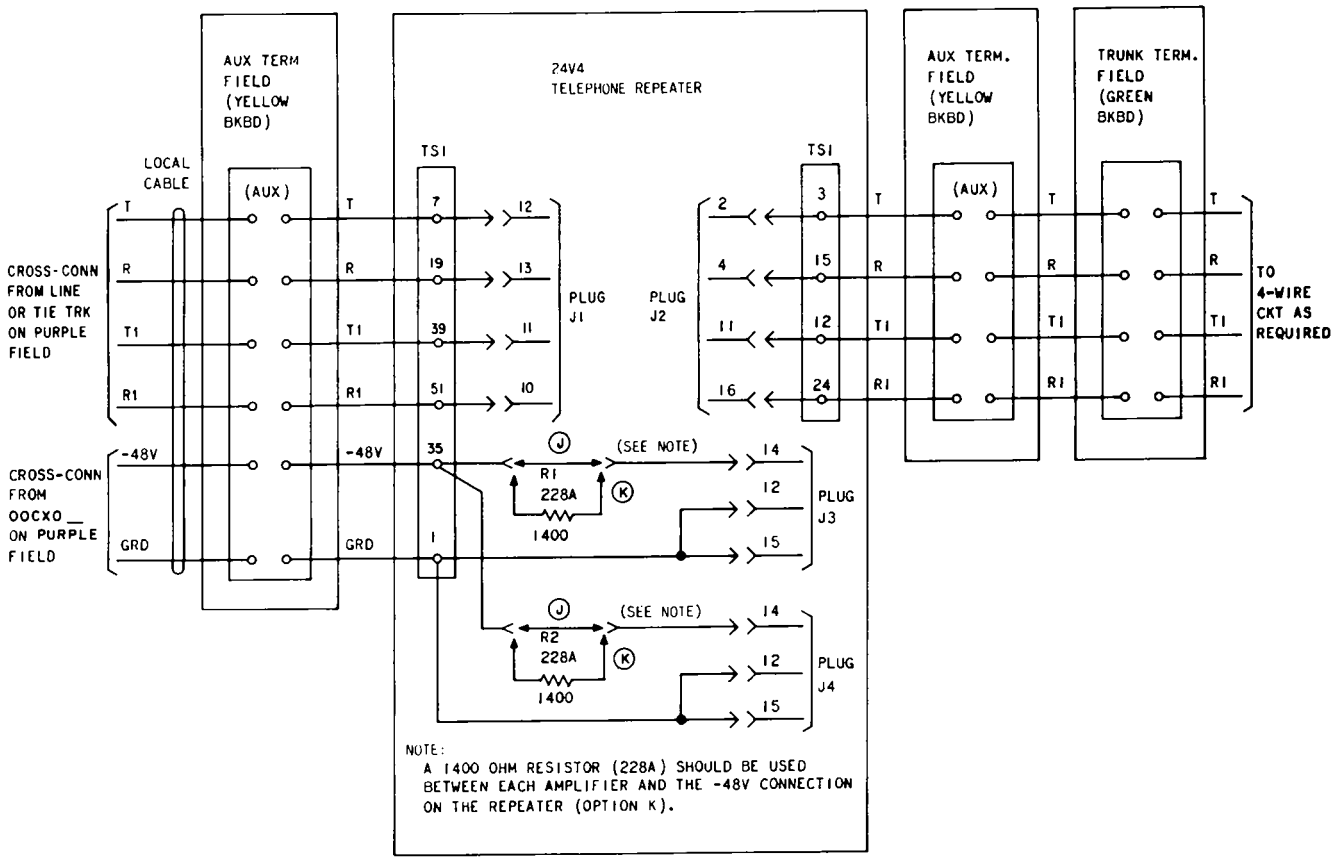


Fig. 83—24V4 Repeater Connections

memory (LC39), and option R provides a 1024-word memory (LC40). These optional circuit packs are installed in slot 16 of the control carrier or slot 15 of the trunk/control carrier.

5.138 An LC16B (message register interface) is available when station message register service is provided via a third wire from the central office. The LC16B provides eight "M" leads and eight "MR" leads (eight circuits with two options) connected to eight CO trunks at the cross-connect field. The LC16B may be installed in trunk carrier positions 02 through 09 or trunk/control carrier positions 02 through 08. The location is specified using the MAAP. For more information, refer to the LC16B coverage in Part 6.

5.139 Table LL lists the types and quantities of station message register and message waiting equipment and circuit packs required to implement the feature. The ordering code information for various equipment styles and colors is shown in Table MM. Refer to the Mechanized Ordering Form (E8124) to select equipment for this feature.

5.140 The 102-type display terminal derives its power from a 211A power unit that requires a 120-Vac 60-Hz source. The printer (if provided) also requires 120-Vac 60-Hz source.

SYSTEM STATUS INDICATOR—30A8

5.141 A system status indicator (SSI) may be used to monitor the traffic starts on release link and incoming trunks. Each SSI contains eight lamps. The lamp indications are controlled from the contact interface B circuit pack LC15 (Fig. 45, Sheet 2).

5.142 For more information on the SSI, refer to the CAS coverage in this Part 5 and to the LC15 coverage in Part 6. More detailed information is provided in Section 981-012-100.

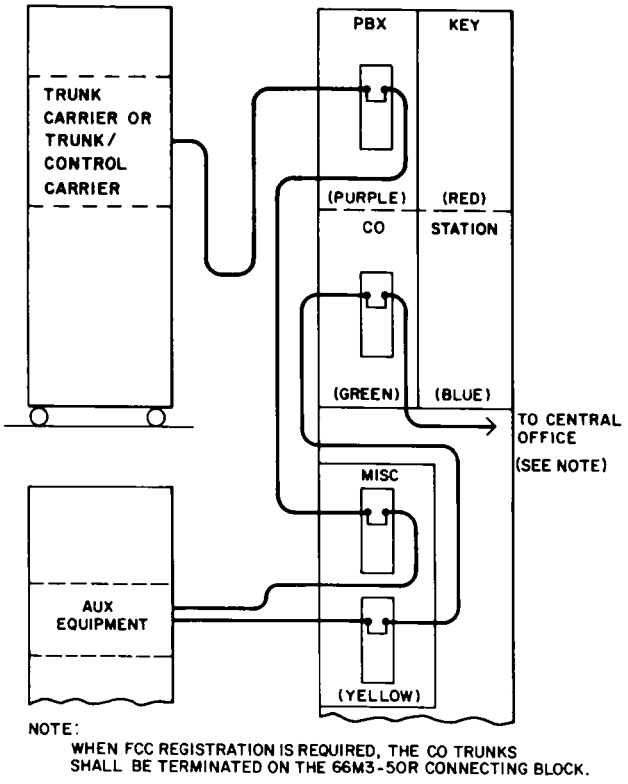


Fig. 84—CO Trunk Connected to Trunk Carrier or Trunk/ Control Carrier via Auxiliary Equipment and the Cross-Connect Field

TRAFFIC MEASUREMENT CONNECTION/RMATS

5.143 Optional equipment for traffic measurements consists of the 724A panel (located in the cross-connect field) and a connector cable C2A. The connector cable terminates (one end only) in connector CX04 and may be ordered in lengths of 15.2m and 30.5m (50 and 100 feet). The data channel terminates on TB1 of the 724A panel which is factory-wired to connector J2 as shown in Fig. 89. For remote polling of the traffic set, a CO pair is cross-connected to TB2 which is factory wired to J1 of the 724A panel. J1 is a convenient access point for the output of the traffic set. The maximum distance from the 724A panel (in the cross-connect field) to the PBX is 30.5m (100 feet) using the C2A cable.

5.144 To provide traffic measurement, an LC34B must be installed in control carrier slot 32. Circuit "1" of this location is dedicated to traffic measurement. The DIP bases containing strap wires are inserted into DIP sockets on LC34B to connect the circuits for either fast-speed or slow-speed data transmission. This circuit must be connected for fast-speed data transmission. Interconnection of traffic measurement equipment is shown on Fig. 90.

5.145 The remotely accessed traffic system (RATS) is standard to all feature packages and is completely software-oriented. It is used as an early-warning device to determine if a detailed traffic study is required. Implementation of the RATS is accomplished through the use of the MAAP.

5.146 When the remote maintenance, administration, and traffic system (RMATS) is provided for the PBX, the traffic measurement connection and RATS program are not required. Information on the LC171B circuit pack required with RMATS is described in Part 6.

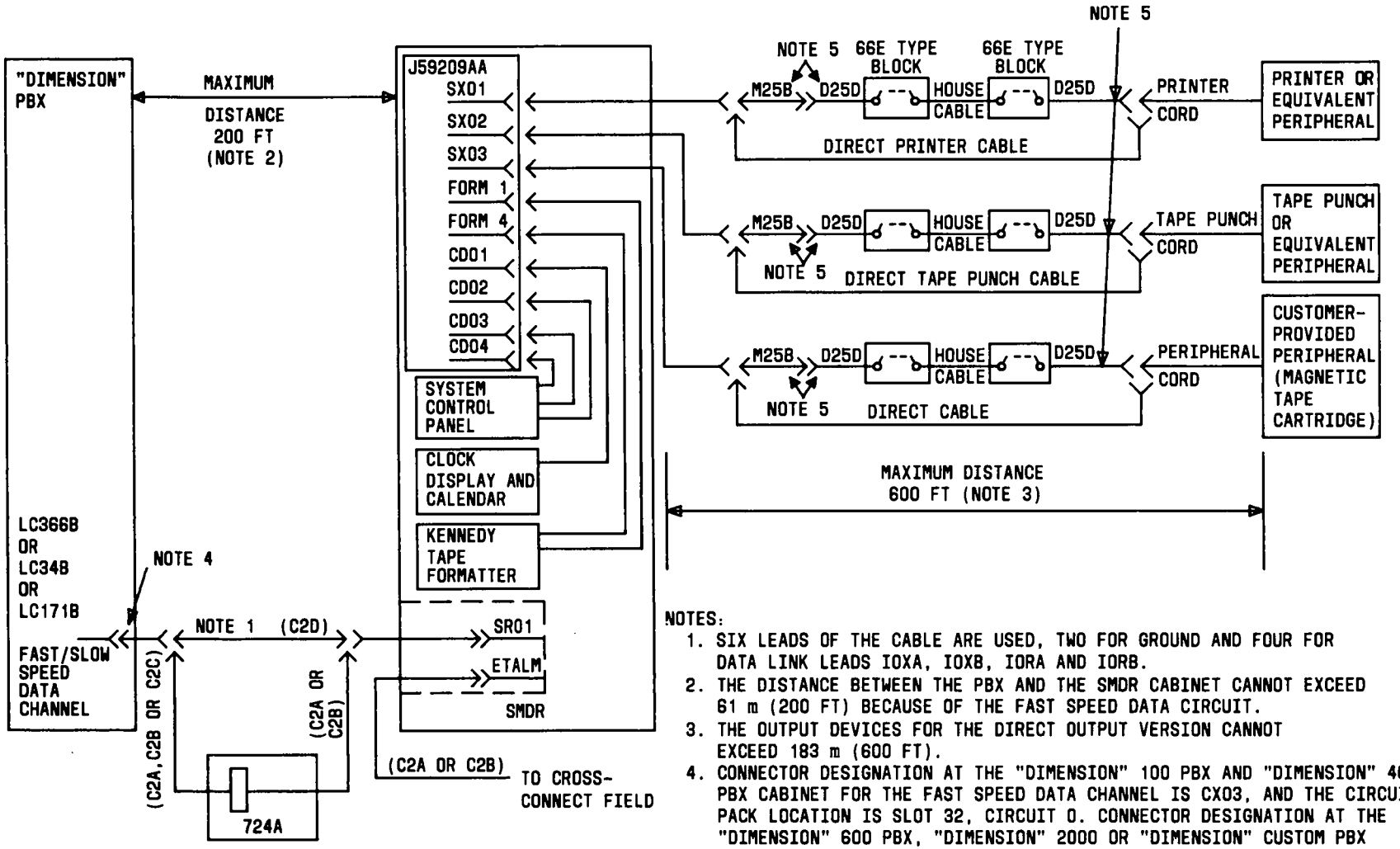
TRUNK ANSWER FROM ANY STATION

5.147 The trunk answer from any station (TAAS) feature routes all incoming calls, normally directed to the PBX attendant, to activate a common alerting signal (bell, chime, horn, lamp, or station line ringer) on customer premises when night station is activated. These calls can then be answered by any station user in the system who dials a special code from any nonrestricted station.

5.148 A single line port on an LC02B circuit pack must be designated for the feature. The signal may be connected directly to the line circuit (option T), or if the line circuit capacity is exceeded, an isolating circuit must be provided (option V) (Fig. 91). Worksheet 13 is provided as a fill-in worksheet for TAAS. When other than a high impedance ac coupled night ringer such as C4A is used or the limits in Table NN are exceeded, the slave relay configuration should be used (413A KTU mounted in a 642A modular panel). Line circuit LC02B working limits determine the use of the V option using the 15D KTU for isolation.

Adding audible signals to the T and R leads after initial installation may cause the ringing limitation to be exceeded.

5.149 Refer to Section 463-110-100 for information on signals, Section 518-215-400 for information on the 413A KTU, and Section 518-215-419 for information on the 642A panel.



NOTES:

1. SIX LEADS OF THE CABLE ARE USED, TWO FOR GROUND AND FOUR FOR DATA LINK LEADS IOXA, IOXB, IORA AND IORB.
2. THE DISTANCE BETWEEN THE PBX AND THE SMDR CABINET CANNOT EXCEED 61 m (200 FT) BECAUSE OF THE FAST SPEED DATA CIRCUIT.
3. THE OUTPUT DEVICES FOR THE DIRECT OUTPUT VERSION CANNOT EXCEED 183 m (600 FT).
4. CONNECTOR DESIGNATION AT THE "DIMENSION" 100 PBX AND "DIMENSION" 400 PBX CABINET FOR THE FAST SPEED DATA CHANNEL IS CX03, AND THE CIRCUIT PACK LOCATION IS SLOT 32, CIRCUIT 0. CONNECTOR DESIGNATION AT THE "DIMENSION" 600 PBX, "DIMENSION" 2000 OR "DIMENSION" CUSTOM PBX CONTROL CABINET FOR THE FAST SPEED DATA CHANNEL IS BX07, AND THE CIRCUIT PACK LOCATION IS SLOT 31, CIRCUIT 0.
5. THE LENGTH OF M25B IS 3048 mm (10 FT), D25D IS 1676 mm (5.5 FT). THE M25B CORD IS EQUIPPED WITH A KS-19088 L-2 MALE CONNECTOR ON EACH END. THE D25D CORD IS EQUIPPED WITH A KS-19087 L-2 FEMALE CONNECTOR AND A KS-16689 L-1 MALE PLUG.

Fig. 85—Wiring Schemes for SMDR Connections

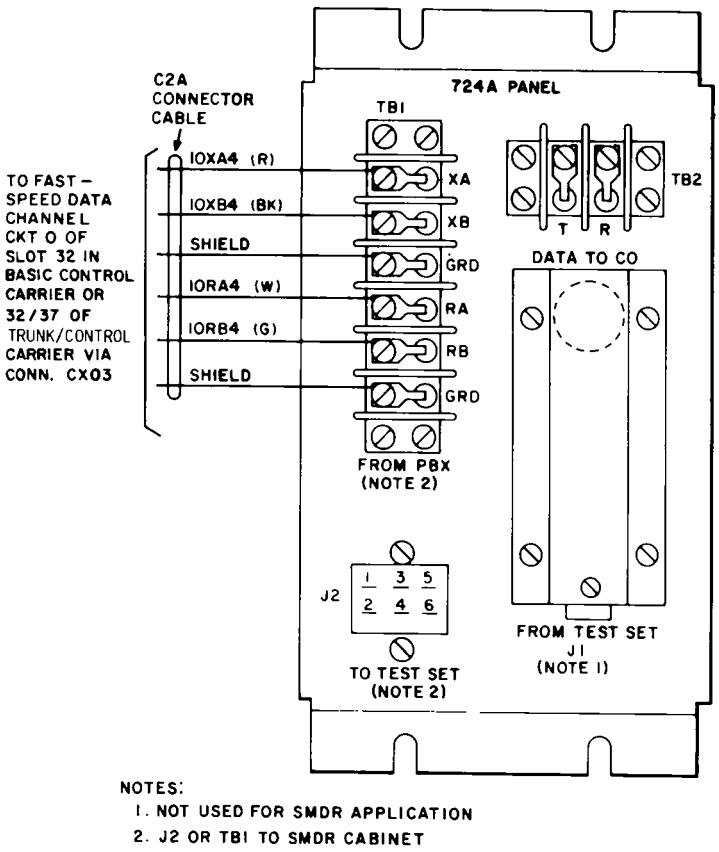


Fig. 86—SMDR Connections at the 724A Panel

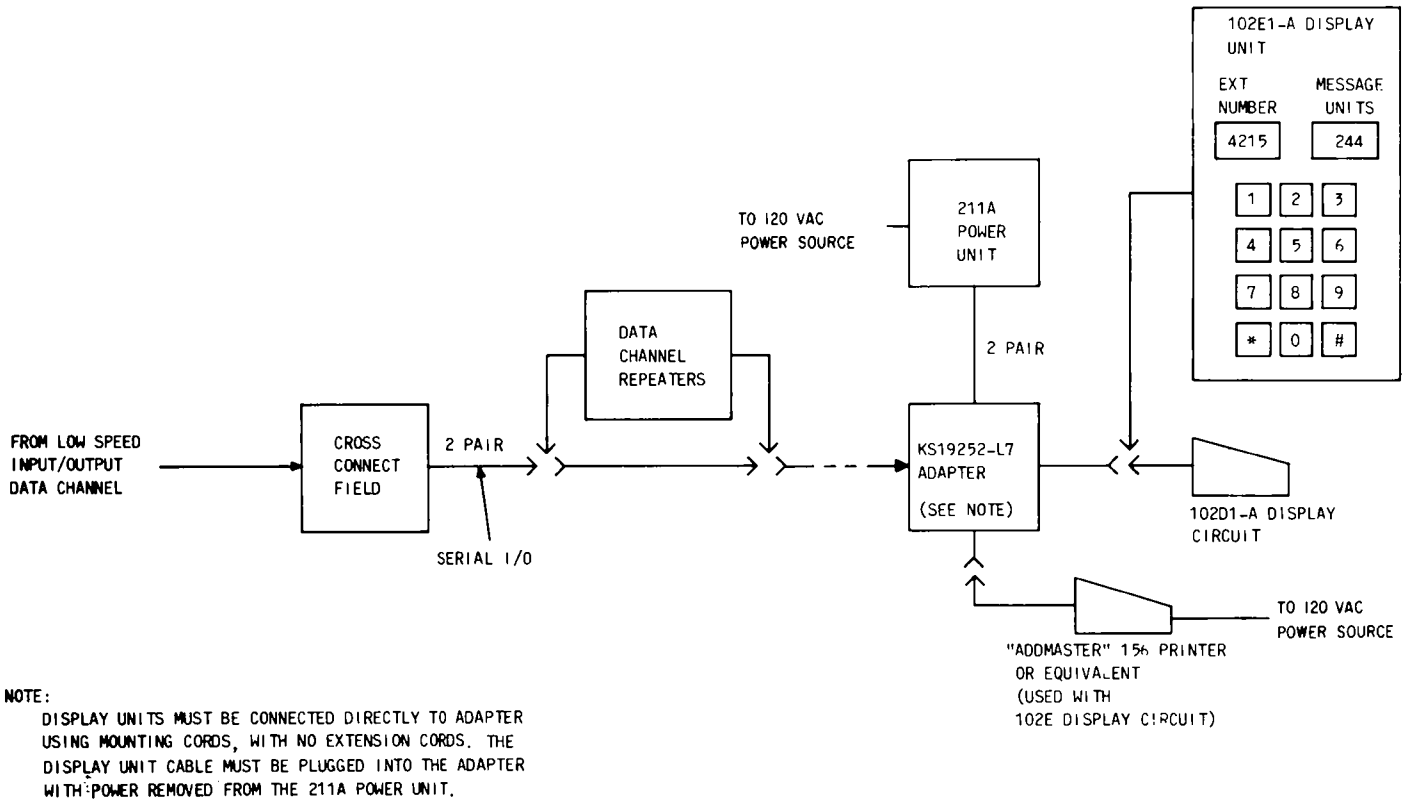
UNIFORM CALL DISTRIBUTION (UCD)/TRAFFIC OVERFLOW INDICATOR

5.150 When the UCD feature is provided, an indication of traffic overflow must be transmitted to the attendant. A convenient method is through a contact closure applied to a "beehive" lamp (Fig. 92). One circuit is required per UCD traffic overflow. Selection of the lamp type and value of resistor R2 must be engineered based on loop range requirements. The M1 lamp type is for short-loop (25 ohm) range, and the J1 lamp type is for long-loop (1500 ohm) range. (See Fig. 92.) Both M1 and J1 lamp types mount in 15-, 17-, or 18-type indicators. In Fig. 92, R1 is an optional surge resistor of 511 ohms used for long-range loops, and the value of R2 is determined by loop-range impedance. Refer to Table OO for R2 values. The diode to be added with R2 is a 533F diode. A 185A contact protection network can be added in place of the 533F diode. Required equipment per loop is listed in Table PP.

5.151 The recorded announcement feature cannot be used for incoming station calls to the UCD or DDC group stations in FP10. When recorded announcement is active for CO-type trunks, the CO trunk calls to a UCD or DDC group are answered immediately. Each UCD or DDC group has the option of being provided with delayed recorded announcement.

VISUALLY IMPAIRED ATTENDANT SERVICE

5.152 This service enables a visually impaired attendant to utilize the DIMENSION 02-type console through the application of a grooved faceplate (6A guide), a light sensitive probe (990A light sensor), and an audible tone adjunct (2A translator). The six incoming call indicators (ICI) are converted to audible ring code as well as the console LED indications which are monitored by the light-sensitive probe. If the console is alphanumeric, the ICI information also appears in the alphanumeric field. Refer to Section 554-010-100 for more information.



NOTE:
DISPLAY UNITS MUST BE CONNECTED DIRECTLY TO ADAPTER USING MOUNTING CORDS, WITH NO EXTENSION CORDS. THE DISPLAY UNIT CABLE MUST BE PLUGGED INTO THE ADAPTER WITH POWER REMOVED FROM THE 211A POWER UNIT.

Fig. 87—Equipment Arrangement of Station Message Register Displays

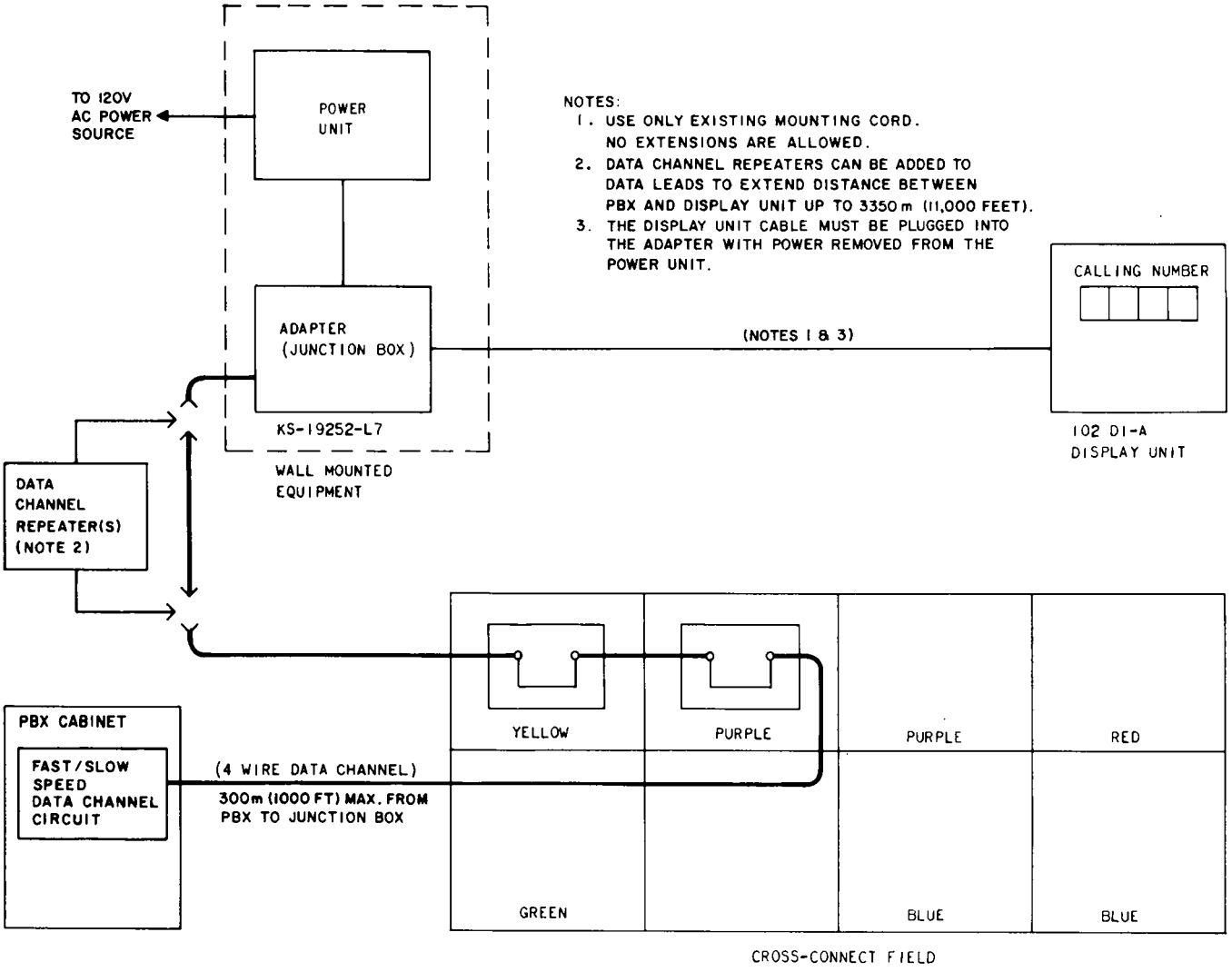


Fig. 88—Equipment Arrangement for Calling Number Display to Station

TABLE LL

HARDWARE REQUIREMENTS FOR STATION MESSAGE REGISTER AND MESSAGE WAITING

CIRCUIT	QUANTITY NEEDED	MAXIMUM NUMBER ALLOWED
102D1-A Display circuit	One per station equipped for calling number display to station	6
102E1-A Display circuit	One per message waiting display and/or message register service	3 102E1-A Units
ADDMASTER printer model 156	One per 102E1-A as required	3
211A Power unit	One per 102D1-A plus one per 102E1-A	6
KS-19252, L7 Adapter	One per 102D1-1 plus one per 102E1-A	6
LC16B	One per eight trunks equipped for message registration	8 Per trunk carrier
LC34B or LC366	One per two/four 102D1-A units. One per two/four 102E1-A units. One per combination of 102D1-A plus 102E-1A units	5 (LC34B) Per control carrier, 2 CKTS per CP. 4 (LC366) Per trunk/control carrier, 4 CKTS per CP
LC38	One per system where power holdover for extended memory is required	1
LC39	One per system when PG-1E003 memory configuration A is required	1
LC40	One per station when PG-1E003 memory configuration B or C is required	1
LC03C	One per each 4 lines requiring message waiting (replaces LC02).	16 Per line carrier
LC41B	One per line carrier (replaces LC49)	1 Per line carrier

This service can only be used with the 02-type console.

6. STANDARD AND OPTIONAL COMPONENTS

CIRCUIT PACKS (STANDARD)

6.01 The PBX is shipped complete with circuit packs installed. However, engineering a DIMENSION PBX installation requires knowledge of the circuit pack locations in the basic equipment cabinet (Fig. 93).

6.02 Plug-in printed wiring boards contain the circuitry to control operation of the switching system. Special marking is used to designate circuit pack vintages which must be chosen for installation in specific systems. This marking is a lettered suffix forming a part of the circuit pack code number. When a circuit pack code specified includes a lettered suffix, only that circuit pack code (or a later version indicated by a higher-lettered suffix) should be used.

TABLE MM

HOTEL/MOTEL DISPLAY AND POWER UNIT CODES

102C1-A DISPLAY UNITS: HOTEL/MOTEL MESSAGE REGISTER DISPLAY		
CODE	HOUSING COLOR	FACEPLATE COLOR
102C1-A-3T	Black	Teak
102C1-A-3W	Black	Walnut
102C1-A-50T	Ivory	Teak
102C1-A-50W	Ivory	Walnut
102C1-A-58T	White	Teak
102C1-A-58W	White	Walnut
102D1-A DISPLAY UNITS: CALLING NUMBER DISPLAY		
CODE	HOUSING COLOR	FACEPLATE COLOR
102D1-A-3T	Black	Teak
102D1-A-3W	Black	Walnut
102D1-A-50T	Ivory	Teak
102D1-A-50W	Ivory	Walnut
102D1-A-58T	White	Teak
102D1-A-58W	White	Walnut
211A-TYPE POWER UNIT		
CODE	HOUSING COLOR	FACEPLATE COLOR
211A-100	Black & silver	Avocado
211A-108	Black & silver	Teak
211A-109	Black & silver	Walnut
211A-111	Black & silver	Gold
211A-112	Black & silver	Orange
211A-114	Black & silver	Red
211A-115	Black & silver	Blue

A circuit pack is always replaced with a circuit pack having either the same or a later alpha suffix as printed on the carrier designation strip. That is, an LC08 cannot be used if the designation strip specifies LC08B. The LC08B, C, or later alpha-suffixed circuit packs are suitable replacements.

CIRCUIT PACKS (OPTIONAL)

Maintenance personnel should always attach authorized wrist grounding strap before handling circuit packs.

6.03 In addition to the standard circuit packs required for normal system operation, some of the following optional circuit packs may be required to implement various features.

- Alarm control circuit (LC18D)
- Attendant conference circuit (LC06B)
- Attendant interface circuit (LC45)
- Automatic number identification (ANI) signal distribution circuit (LC32B)
- ANI transmitter circuit (LC31C)
- Auxiliary trunk interface circuit (LC13B)
- Contact interface B circuit (LC15)
- Data control circuit (LC171B)

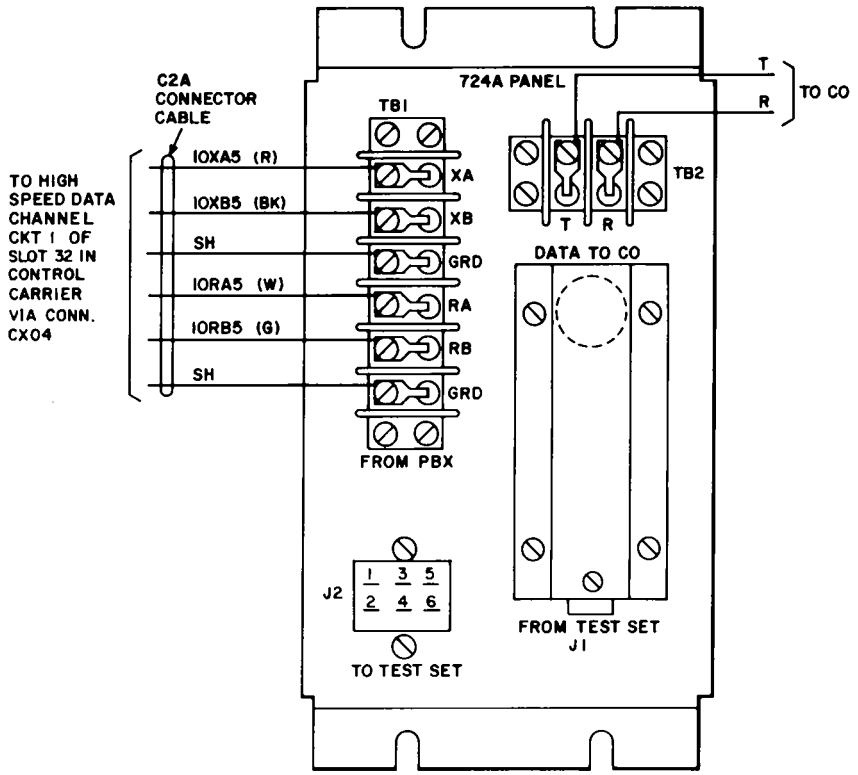


Fig. 89—Optional 724A Panel for Traffic Measurement

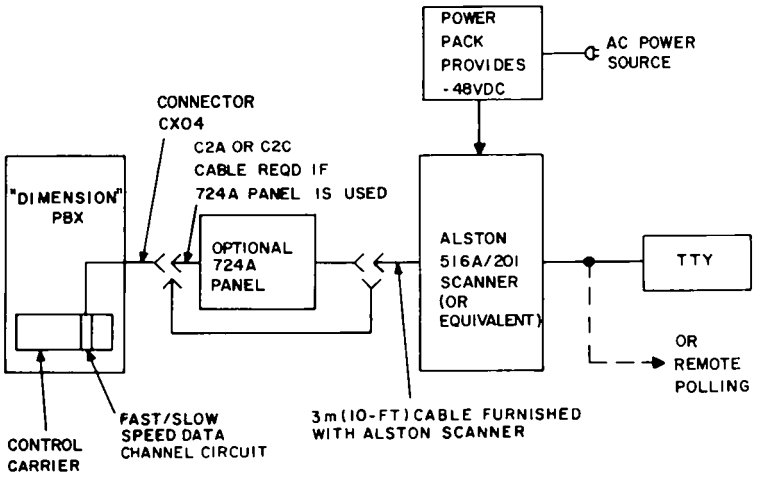


Fig. 90—Interconnection of Traffic Measurement Units

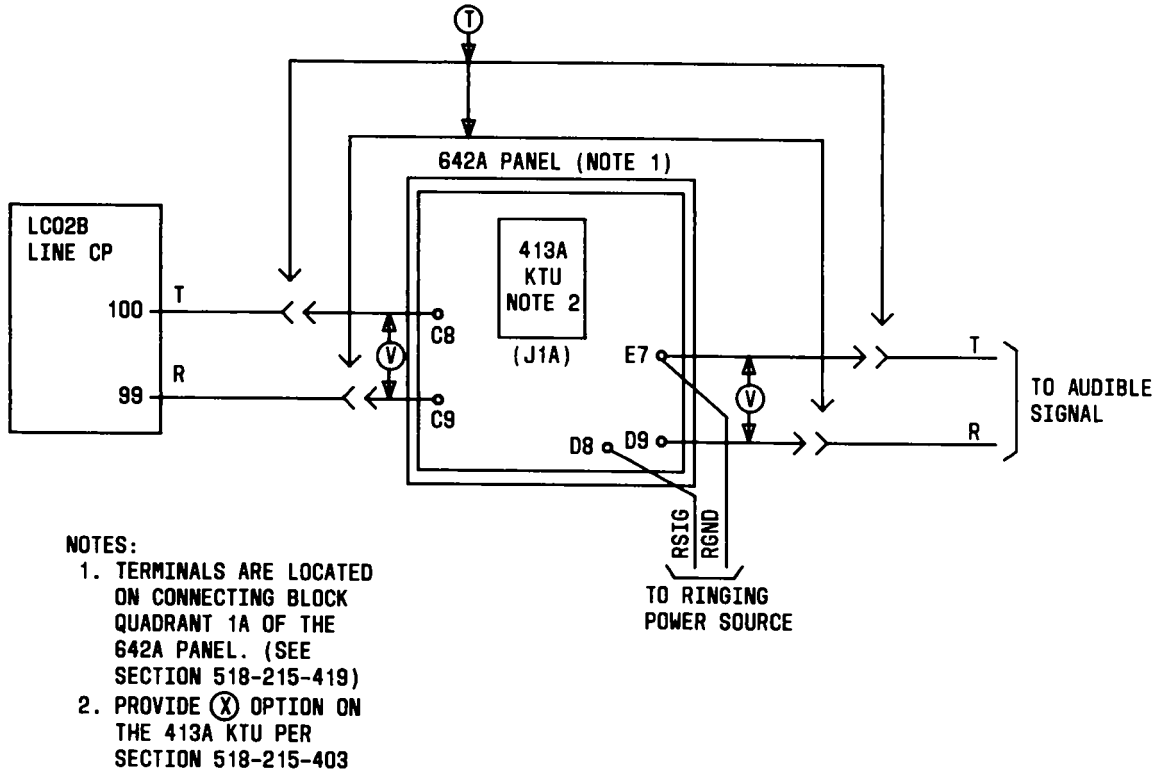


Fig. 91—TAAS Circuit Arrangement

- Dual speed serial data channel circuits (LC34B and LC366B)
- Loop signaling interface trunk (LC361)
- Message register and energy control power monitor interface circuit (LC16B)
- Message waiting line circuit (LC03C)
- Signal distribution circuit (LC41B)
- Tie trunk circuit LC11B
- Tone plant C circuit (LC17B)
- Transmission test line circuit (LC145).

A. Alarm Control Circuit (LC18D)

6.04 An LC18D is provided only when ***remote*** major and minor alarms are required. An LC551 alarm control circuit is used in all other system configurations. The LC18D is positioned in slot 28 of control carrier J58879CA-2 List 13 (A&M), and trunk/control carrier J58879CC.

B. Attendant Conference Circuit (LC06B)

6.05 Each LC06B contains one attendant conference circuit and is located in slots 02 through 09 in the trunk carrier or in slots 02 through 08 in the trunk/control carrier. This circuit enables the attendant to establish a multiparty conference of up to six conferees in addition to the attendant. This circuit will accommodate a maximum of six stations or four stations and two trunk conferences by connecting lines or trunks to conference circuit ports. Separate time slots and conference circuit ports are required for each party in conference. At each port, the conference circuit adds the signals received at all other ports to generate the return signal. Reflections created by the interfacing line and trunk circuit hybrids are canceled by inverting the phase of a selected set of port-to-port transmission paths.

TABLE NN

MAXIMUM LOOP RESISTANCE ASSOCIATED WITH C4A-TYPE HIGH IMPEDANCE RINGERS

MAX. NO. OF C4A-TYPE RINGERS PER LINE	MAX. LOOP RESISTANCE EXCLUDING STATION APPARATUS
5	300 ohms
4	500 ohms
3	950 ohms
2	950 ohms
1	950 ohms

C. Attendant Interface Circuit (LC45)

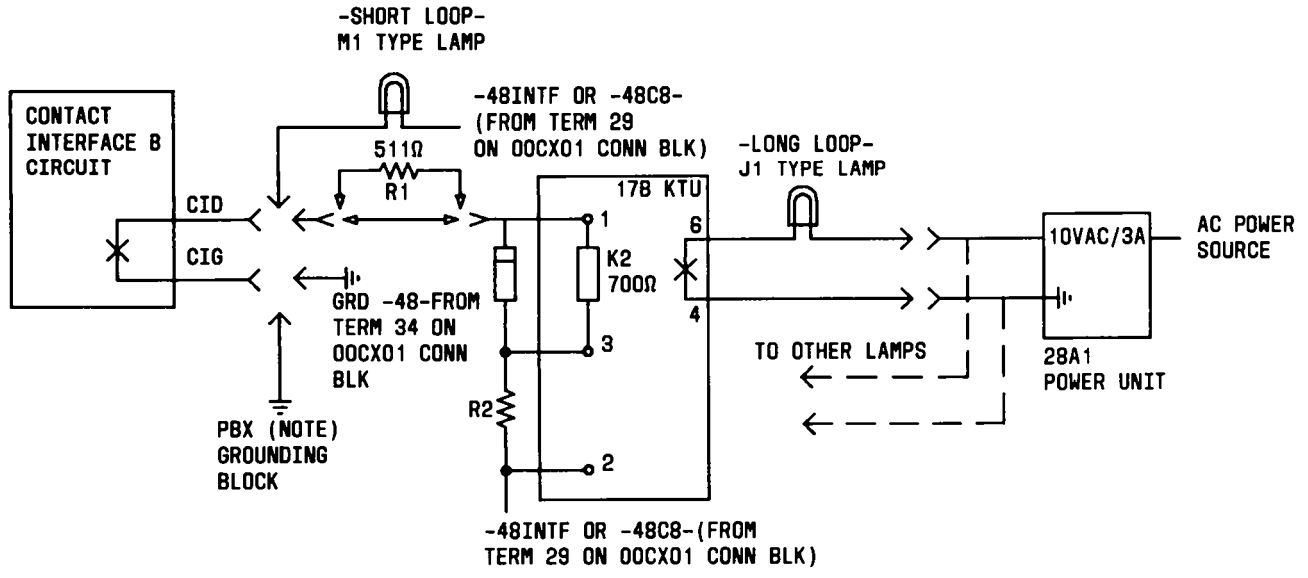
6.06 The LC45 interfaces the attendant console to the time division bus. Each LC45 contains two separate 4-wire transmission paths, allowing up to four attendant consoles per system. The LC45s are installed in slots 04 and 05 of the J58879AA basic line carrier.

D. Automatic Number Identification (ANI) Signal Distribution Circuit (LC32B)

6.07 One LC32B is required per system for the AIOD feature. The LC32B is located in slot 11 of any trunk carrier (J58879BA) or slot 07 of the trunk/control carrier (J58879CC). Each LC32B contains two ANI data channels. After a call is registered in the ANI control and register circuit (LC31B), the ANI data channel encodes the station identification and transmits it to the central office. A standard 3050 mm (10-foot) cable assembly (J59204AJ-1, List 4) is available equipped with plugs and adapter for direct connection into LC32B and the ANI data link test set (J59204AJ-1, List 1). This equipment is required to test the ANI operation.

E. ANI Transmitter Circuit (LC31C)

6.08 One LC31C is required per system when ANI is required and is located in the control carrier, slot 36 for J58879CA-1 (MD) or slot 38 for J58879CA-2 and J58879CC carriers. The LC31C provides the ANI control and register circuit. The circuit stores the identity of the calling DIMENSION PBX party until it is transmitted to the central office.



NOTE:
USE PBX GROUNDING BLOCK WHEN OPTIONAL RESISTORS ARE USED

Fig. 92—UCD/DDC Traffic Overload Indicator

TABLE OO

VALUE OF RESISTOR R2 PER LOOP RANGE

LOOP RANGE	R2/OHMS
0 ohms	2.37K
500 ohms	1.62K
1000 ohms	1K
1500 ohms	511
2000 ohms	0

TABLE PP

EQUIPMENT REQUIRED PER LOOP FOR UCD/DDC TRAFFIC OVERLOAD INDICATOR

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

* One each required per UCD/DDC group.

F. Auxiliary Trunk Interface Circuit (LC13B)

6.09 Each LC13B contains two circuits and each trunk carrier can accommodate up to eight LC13B circuit packs. The LC13B provides circuitry to cut through the talking path to customer-provided equipment and to ground the sleeve lead for controlling or sensing supervision between the connected equipment. Six sections per switch are provided on LC13B. The correct section positions required for various features are shown in Fig. 94. Directional transmission is achieved by setting switch sections 1, 2, 5, and 6 open or closed according to function. The LC13B circuit packs provide an interface with the following customer equipment:

- Loudspeaker paging trunk circuits
- Recorded announcement circuits
- Recorded telephone dictation trunk circuits
- Music on hold.

G. Contact Interface B Circuit (LC15)

6.10 The contact interface B circuit (LC15) is used with FP10 and FP15 when the 30A8 CAS system status indicator (SSI) is installed for the centralized attendant service (CAS) feature. One LC15 circuit pack containing eight circuits is installed as J58879BA, List 14, in slots 02 through 09 at the universal trunk port carrier or as J58879CC, List 20, in slots 02 through 08 in the trunk/control carrier. Six of the circuits are actually used, with major and minor alarms routed from the alarm panel via LC18E (Fig. 95). The LC15 circuit permits visual monitoring of the CAS equipment via the SSI. The CAS lamp test is administered via feature encode (50) and the CAS lamp interface via trunk-type encodes (56) and (61). Interconnection (via the cross-connect field) is illustrated on Fig. 96. For more detailed connections, refer to Fig. 45, Sheet 2.

6.11 When the uniform call distribution (UCD) feature and/or direct department calling (DDC) features are provided in addition to CAS, a second LC15 circuit pack may be required to furnish a queue warning indication. One lamp per UCD/DDC group may be used to indicate when the number of calls in the queue exceeds a predetermined number (traffic overload). This level (1 through 15) is administered in software. The overflow indication, which is generated via a contact closure on LC15, triggers a "beehive" indicator lamp from a dc voltage source via the circuit pack. By using a 24A8/24B8 line status indicator (LSI), the busy, idle, and ringing status of each UCD/DDC line can be monitored. A maximum of 14 DDC groups can be administered. However, only eight circuits are available on the LC15 circuit pack for dedication to UCD/DDC monitoring.

6.12 Worksheet 5 is a fill-in worksheet for the LC15 circuit pack as used with CAS and UCD/DDC features. A maximum of two circuit packs is allowed.

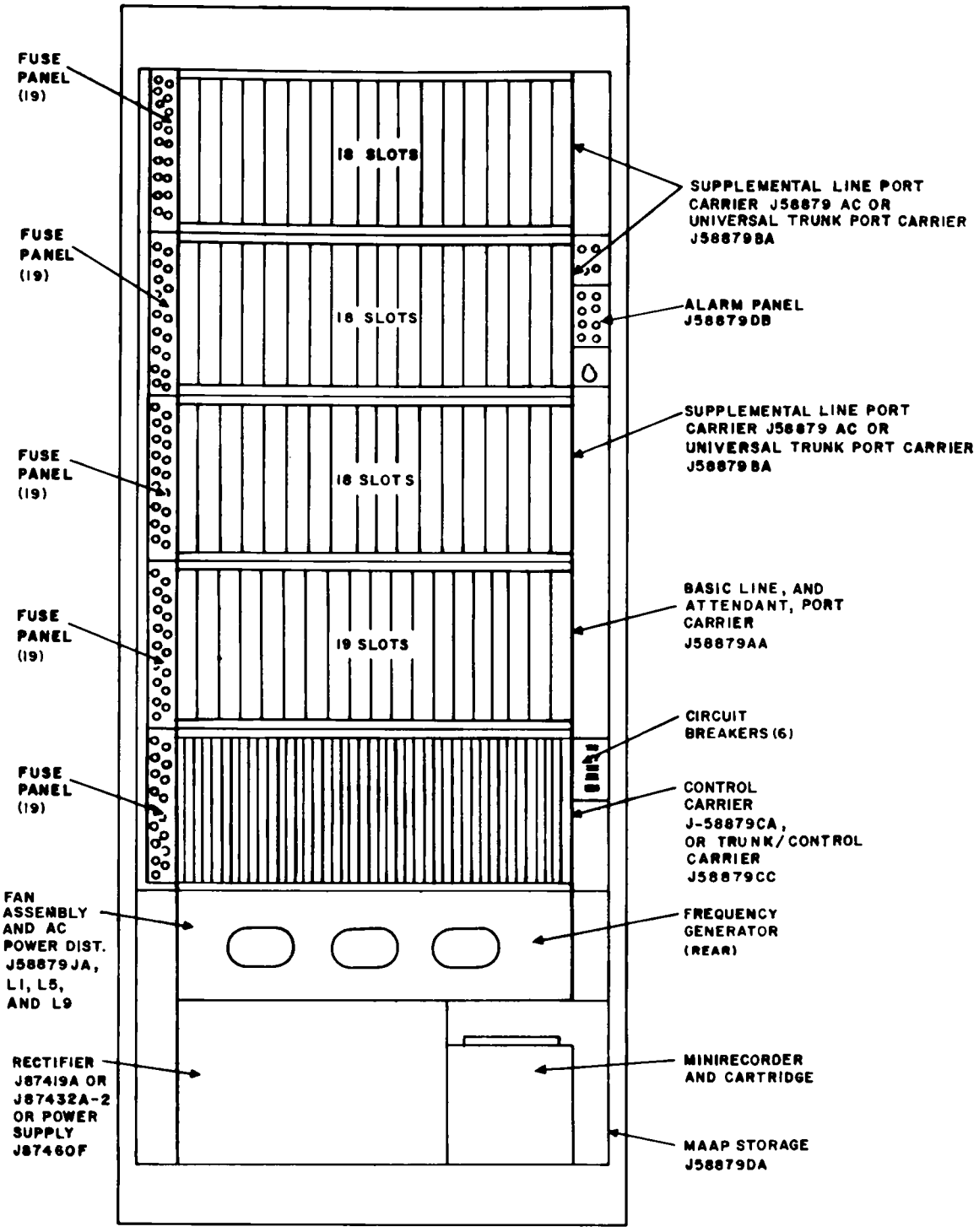
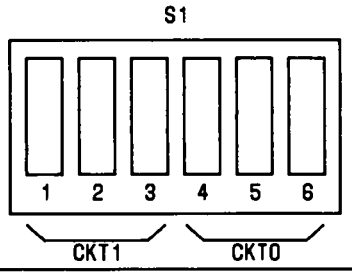


Fig. 93—Typical Equipment Arrangement—Single Cabinet



LC13B CIRCUIT NO.	LC13B SWITCH SECTION NO.	ASSOCIATED AUXILIARY CIRCUIT				
		RECORDED TELEPHONE DICTATION	RECORDED ANNOUNCEMENT	LOUDSPEAKER PAGING/ MALICIOUS CALL TRACE	MUSIC ON HOLD	AUTO WAKEUP SERVICE
0	6 5 4	OPEN OPEN CLOSED	OPEN CLOSED OPEN	CLOSED OPEN OPEN	OPEN CLOSED CLOSED	OPEN CLOSED OPEN
1	3 2 1	CLOSED OPEN OPEN	OPEN CLOSED OPEN	OPEN OPEN CLOSED	CLOSED CLOSED OPEN	OPEN CLOSED OPEN

NOTE:
SWITCH SECTIONS ARE CLOSED BY PRESSING THE ROCKER TOWARDS THE SECTION NUMBER

Fig. 94—LC13B Switch Section Settings for Auxiliary Circuits

H. Data Control Circuit (LC171B)

6.13 Circuit pack LC171B is used in conjunction with the remote maintenance, administration, and traffic system (RMATS). Each circuit pack contains two circuits, 0 and 1, and is installed into control carrier slot 32 or trunk/control carrier slot 31/34 in the space normally occupied by an LC34B or LC366 circuit pack. One circuit (1) of the LC171B circuit pack connects to the external data set which communicates with the RMATS. The other circuit (0) is a typical high-speed link which functions similar to an LC34B or LC366 channel. Data set connection is shown in Fig. 97. For lightning protection, the data test set circuit ground is isolated from frame ground. The LC171B circuit pack with speed control option blocks is shown in Fig. 98.

I. Dual Speed Serial Data Channel Circuits (LC34B and LC366B)

LC34B Circuit Pack

6.14 The two dual speed serial data channels of LC34B are designated circuits ***0*** and ***1***. However, these circuits are referenced as ***A*** and ***B*** on the front circuit pack test point identification table. For example, circuit ***0*** is labeled ***A***, and circuit ***1*** is labeled ***B***. Circuit ***1*** (B) of LC34B in control carrier slot 32 is dedicated to traffic measurements and must be set to low speed by physically resetting the DIP socket option block as shown in Fig. 99. Circuit ***0*** (A) is dedicated to SMDR and should be set to high speed.

6.15 Slots 30 and 31 of the control carrier are reserved for two LC34Bs for use with up to four attendant consoles. Circuits 0 and 1 of LC34B in slot 30 are dedicated to consoles 1 and 2. Circuits 0 and 1 of LC34B in slot 31 are dedicated to consoles 3 and 4. All LC34B circuits used for consoles must be arranged for slow-speed data transmission. Figure 99 illustrates how to arrange the circuits for fast or slow data transmission by placing the DIP socket block in appropriate position.

LC366B Circuit Pack

6.16 The LC366B has one dual-speed serial data channel and three fixed low-speed (185 kHz) serial data channels. The LC366B is located in slots

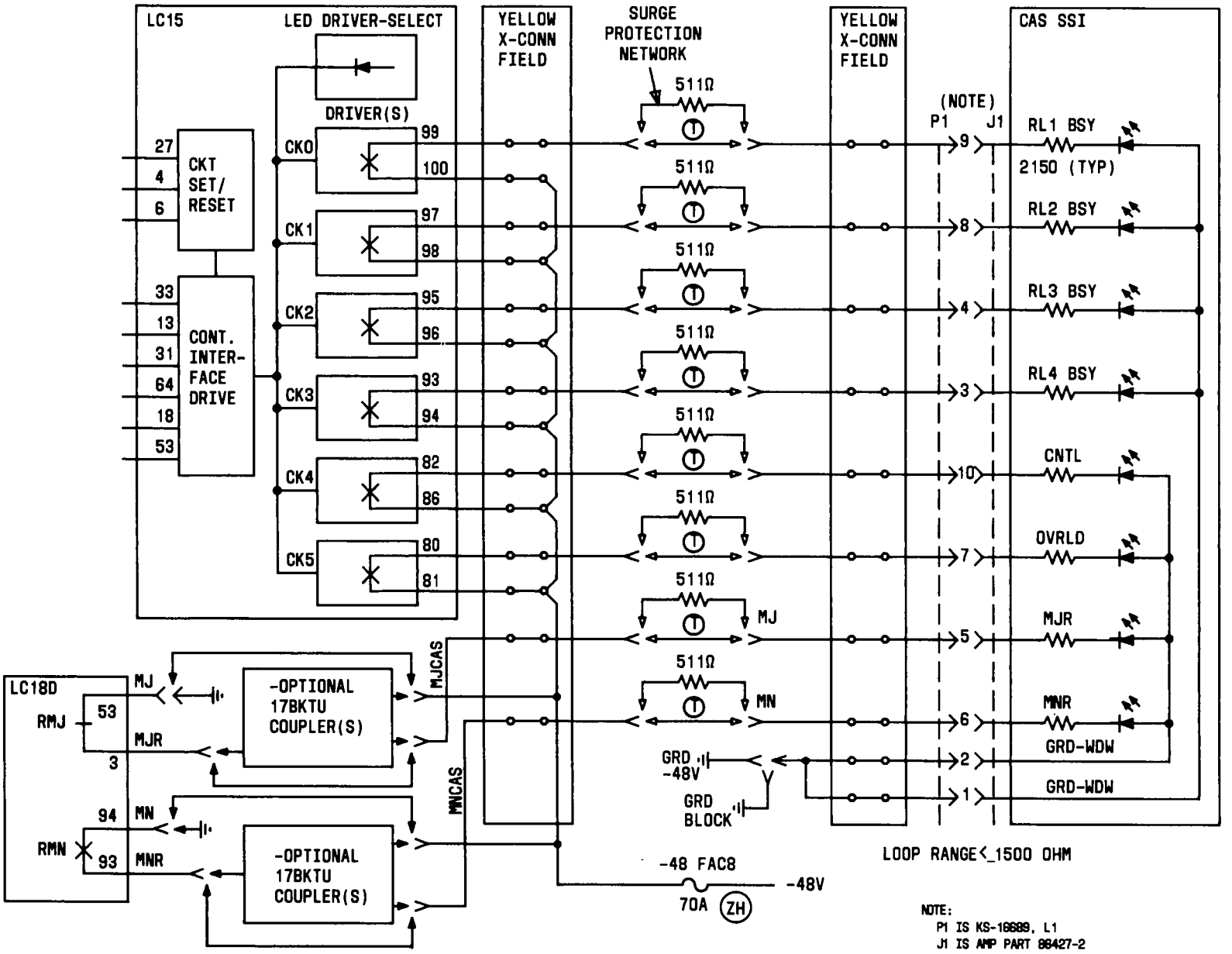


Fig. 95—Contact Interface B (LC15) and System Status Indicator

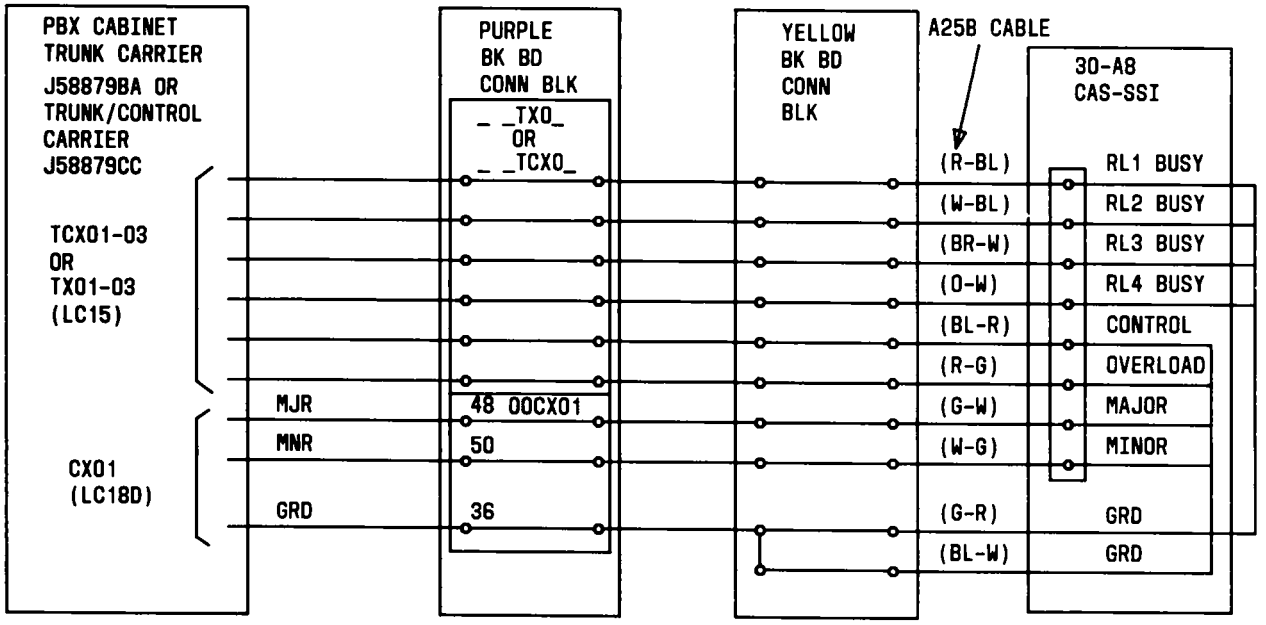


Fig. 96—LC15 Contact Interface B—Interconnections

30/33, 31/34, 32/37, and 35/36 of the trunk/control carrier. The dual-speed channel is designated as (0) and the three low-speed channels are designated (1), (2), and (3).

6.17 Figure 100 shows the J1 and J2 dual in-line package (DIP) option sockets with straps. The J1 DIP option socket is a 16-pin configuration which is used to select the type of system that is using the LC366. The J2 DIP option socket is a 14-pin configuration that is used to select either low-speed or high-speed (833 kHz) for serial data channel 0.

J. Loop Signaling Interface Trunk (LC361)

Warning: When the cross-connect field is wired for an LC361 circuit pack, a connection is made to the T10 lead from the LC05B or LC204 tone circuits at the cross-connect field. After this connection is made, no other circuit pack should be inserted into the same carrier slot due to the presence of voltages that may be hazardous to the circuit pack.

6.18 The LC361 provides a port circuit for off-premises extensions (OPX) with call control and/or a port circuit for the data communication access feature. The LC361 provides a loop start interface circuit for off-premises station applications where improved transmission or SMDR is desirable.

6.19 The LC361 contains two circuits per circuit pack and can be installed in carrier slots 02 through 09 in the trunk carrier or slots 02 through 08 in the trunk/control carrier. The LC361 provides loop signaling similar to the LC02B line circuit; incoming seizures are generated by loop closures and outgoing seizures are generated by interrupted 20-Hz ringing. Ringing and ringback control circuitry are provided on each LC361. Additional wiring is required to bring the 20-Hz ringing and ringback tone to the carrier slots. The 20-Hz ringing is obtained directly from the ringing generator via the carrier backplane wiring. The audible ring tone is obtained from the LC05B tone plant B or the LC204 tone circuit via the cross-connect field (Fig. 101).

K. Message Register and Energy Control Power Monitor Interface Circuit (LC16B)

6.20 The LC16B is provided for message register service and provides two wiring options. Option ZD provides single-wire ground return message register service. Option ZE provides 2-wire message register service which reduces the potential for interference to and from other circuits in the same cable.

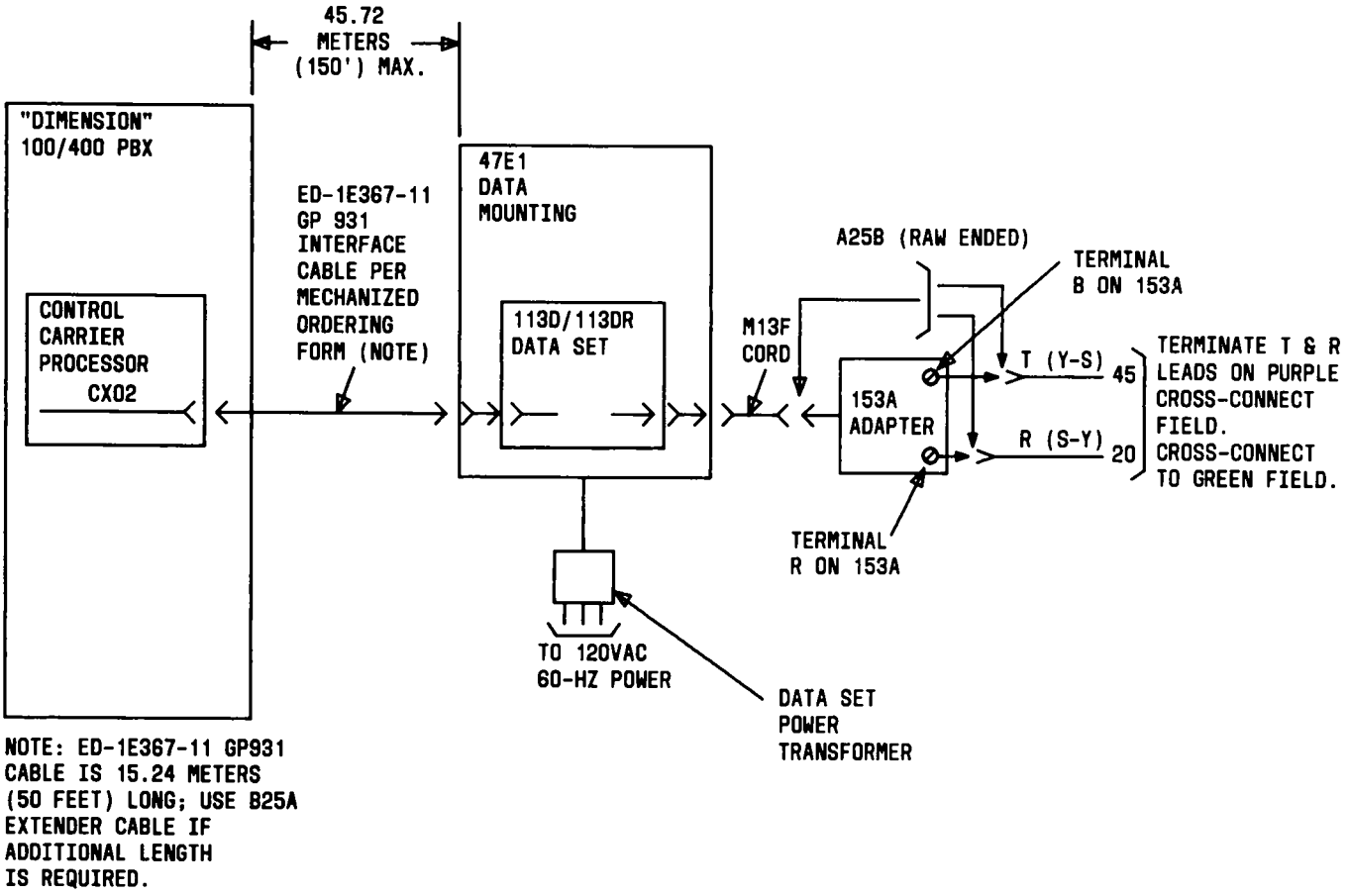


Fig. 97—Data Set Connections for RMATS

6.21 The LC16B has three 16-pin dual in-line package (DIP) sockets (X1, X2, and X3) which are used to select the options. Only the X2 socket is used in the DIMENSION 400 PBX. Shorting blocks with four jumper straps are inserted as required in the socket (Fig. 102). The bottom half of X2 sets the options for circuits 0 through 3 and the top half sets the options for circuits 4 through 7. The two circuit groups can be optioned independently.

When the LC16B is shipped, shorting blocks may be installed in option sockets X1 and X3. These shorting blocks MUST BE REMOVED for the DIMENSION 400 PBX.

L. Message Waiting Line Circuit (LC03C)

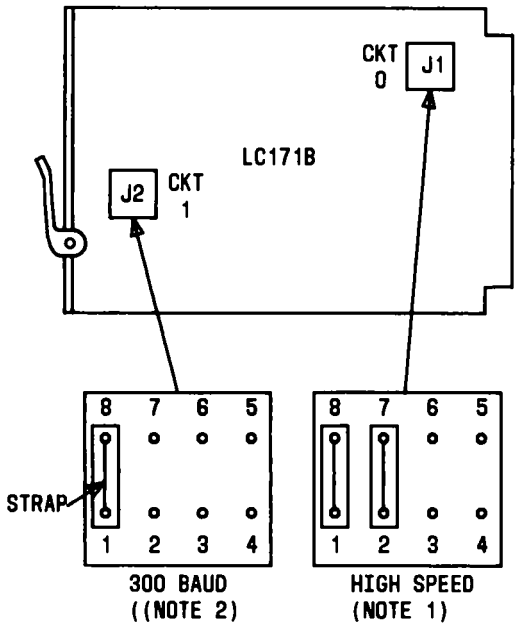
6.22 Each LC03C contains four separate line circuits and is located in the line carrier. This circuit provides an interface for stations requiring a message waiting lamp. It functions in the same manner as the LC02B line circuit but, in addition, can interface with a message waiting lamp located on or near a PBX station.

M. Signal Distribution Circuit (LC41B)—Hotel/Motel

6.23 The LC41B provides the functions of LC49B and replaces the LC49B in the line carrier when the message waiting feature is provided in the system. In addition, it provides the interrupted message waiting lamp voltage. An option is available to provide a current detector circuit for testing the neon lamp (in the station set) and an interrupter status lamp.

N. Tie Trunk Circuits (LC11B)

Warning: The circuit pack option switches must never be operated while power is applied to the circuit.



NOTES:
1. DATA CHANNEL SET TO HIGH SPEED FOR SMDR
2. DATA CONTROL SET TO 300 BAUD RATE FOR RMATS-1

Fig. 98—Data Control Circuit (LC171B)—Circuit Pack Options

6.24 The LC11B tie trunk circuit operates in automatic or dial repeating modes with normal/reverse DX signaling and E&M leads as well as a 4-wire voice transmission path. The LC11B has a switchable 2-dB pad which is removed from the transmission path for a 2-dB gain when the trunk circuit is involved in a tandem connection.

6.25 The LC11B circuit packs can be installed in slots 2 through 8 in a trunk/control carrier and in slots 2 through 9 in a trunk port carrier.

6.26 The LC11B circuit pack has three option switches located as shown in Fig. 102. One switch (SW1) is provided for each of the two circuits provided by the unit. The third option switch (SW2) is shared by the two circuits as shown. The optional settings for the tie trunk includes matching the signaling circuitry to the loop length, and include settings for DX normal signaling, DX reverse signaling, and E&M (dial trunk) signaling. Worksheet 14 is a fill-in worksheet for use with Fig. 103.

O. Tone Plant C Circuit (LC17B)

6.27 The code calling access generator located on tone plant C circuit pack (J58879AA, List 8) is used with FP10 and FP15 whenever a tone is needed for code calling access, or to provide LDN tones to the CAS attendant. This allows the PBX station line users, tie trunks, and attendants to dial activate an electronic chime corresponding to a dialed code. The called party is connected to the caller via an answering code from any station. The options for code calling electronic chime tone include 25 (2-digit) codes or 125 (3-digit) codes, with any combination of digits 1 through 5. The circuit generates a burst of 892-Hz tone declining in amplitude exponentially in 500 milliseconds. One or more tone bursts are used to represent each digit of the 2- or 3-digit called party code. Each signal burst generated by the electronic chime generator is approximately 500 milliseconds in length. The separation between each burst represents a dialed digit being approximately 25 milliseconds. The timing between each dialed digit of the code is approximately 1.5 seconds, with the timing between each of the three cycles being approximately 4.5 seconds.

6.28 The LC17B circuit pack is installed in slot 07 of the basic line carrier (J58879AA). The protective 89A control unit (SD-1E297-01) must be used between the circuit pack and the customer-owned equipment. The 89A control unit provides tip and ring isolation for loudspeaker paging as well as code calling access. It is powered by the 2012B power supply and may be wall-mounted.

6.29 Dial access to code calling from a tie trunk is allowed. The remote access to PBX feature is permitted to access code calling, if the class of service allows the access. The CAS attendant can access code calling for stations and trunks. Refer to Part 5 for detailed information on code calling connections.

P. Transmission Test Line Circuit (LC145)

6.30 The LC145 circuit pack provides for installation tests, routine maintenance tests, and trouble- shooting tests to be performed on transmission paths between CO locations and DIMENSION PBX systems.

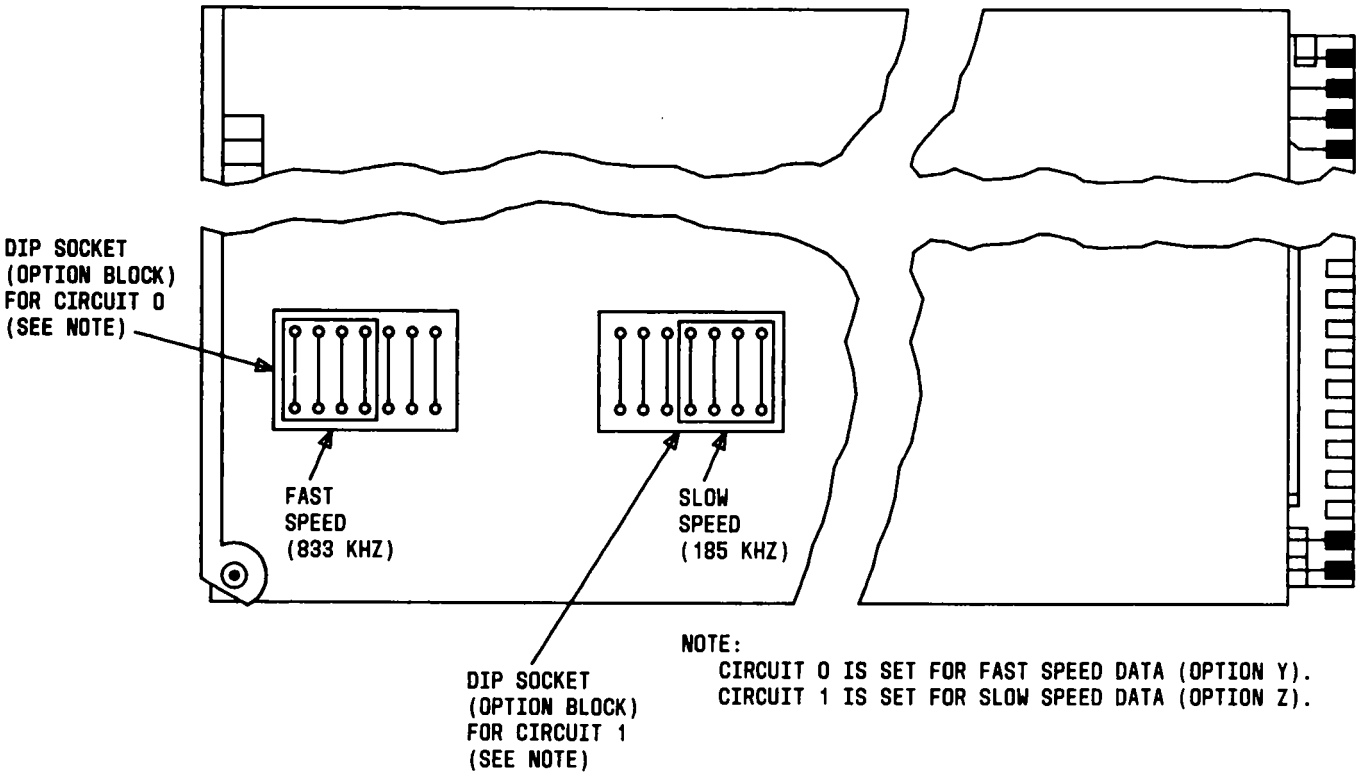


Fig. 99—LC34B Circuit Pack Options

6.31 One LC145 circuit pack is required per PBX system and is interchangeable with the LC02B (station line) circuit pack. It can be used in any available carrier slot designated for LC02B assignment. Normally, the LC145 circuit pack will be shipped in a predetermined LC02B circuit pack carrier slot in new PBX systems. Since the LC145 circuit pack is used in place of an LC02B circuit pack, station telephone numbers available for customer usage are reduced by four (each LC02B contains four station line circuits). System software is unaffected by the LC145 circuit pack, and the LC145 is administered in the same manner as an LC02B circuit pack.

6.32 The following guidelines should be utilized for installation of the LC145 circuit pack:

(a) The LC145 circuit pack should be installed in all systems that are arranged for CCSA service, DID service, enhanced private switching communications service (EPSCS), tandem tie trunks, advanced private line termination (APLT), and systems with seven or more 2-point private lines.

(b) The LC145 circuit pack should be installed in any system that is considered appropriate by

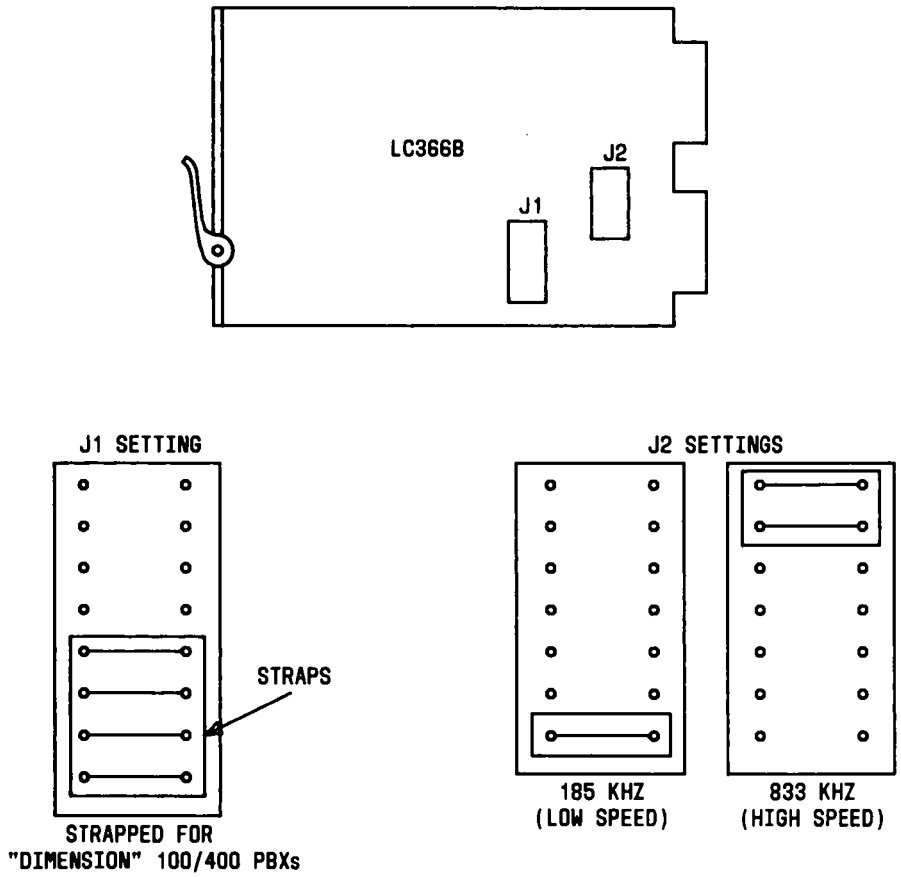


Fig. 100—LC366B Circuit Pack Options

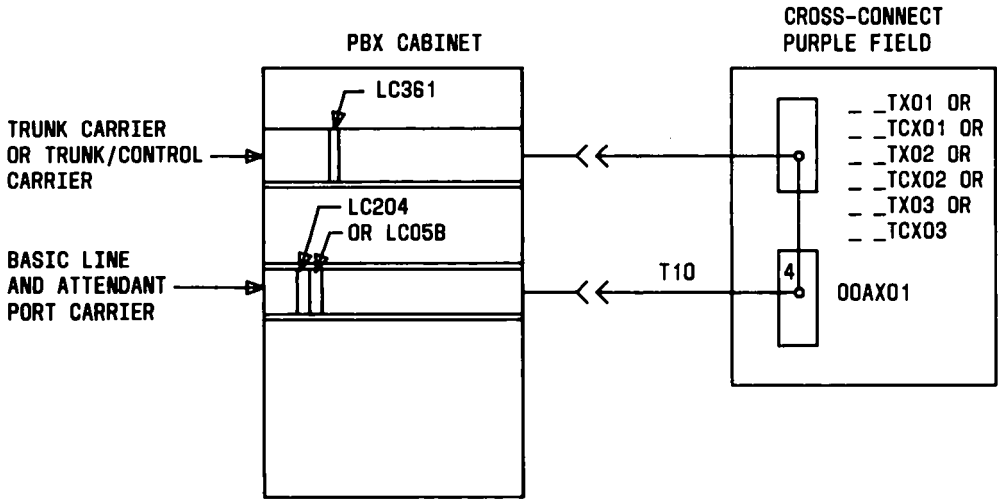


Fig. 101—Audible Ring Tone Connections for LC361 Loop Signaling Interface Trunk

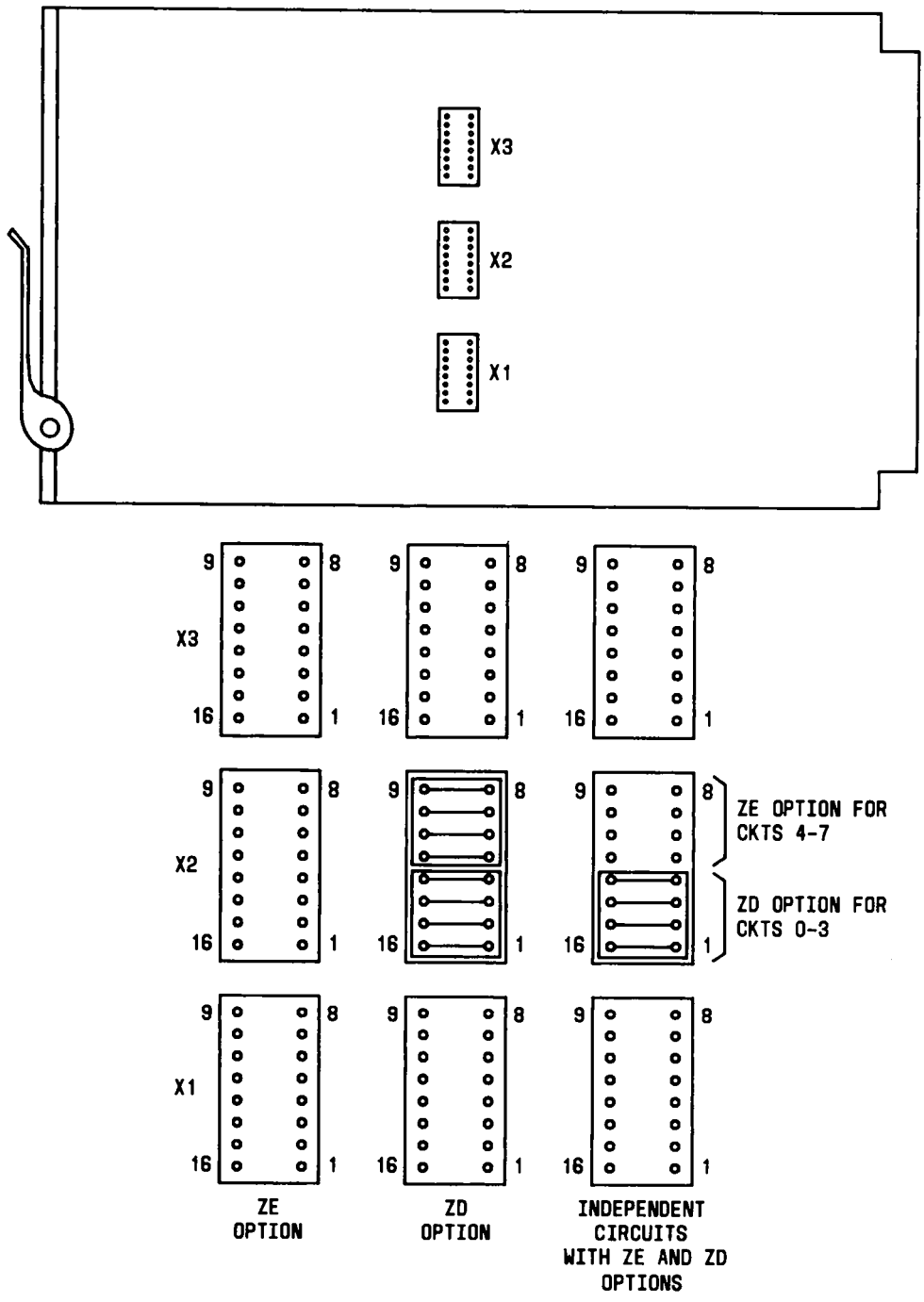
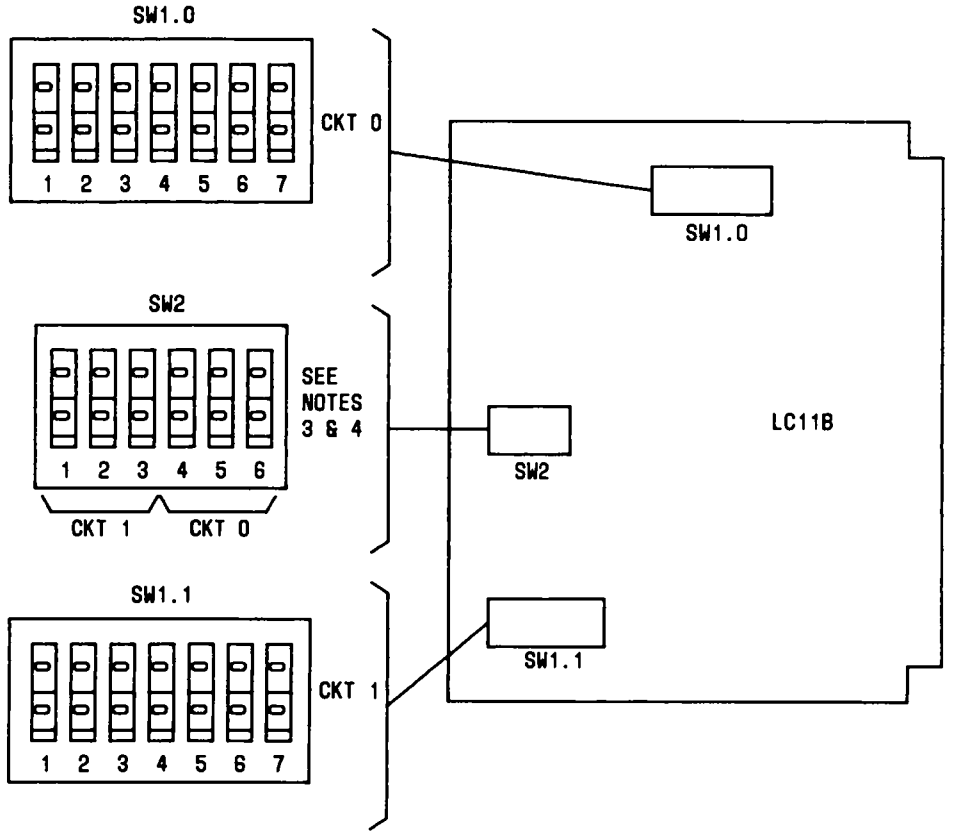


Fig. 102—LC16B Circuit Pack Options



OPTIONS SWITCHES
(ALL SECTIONS SHOWN OPEN)

A (SEE NOTE 1)									
SWITCH 2 (SW2) SECTION	FUNC	LOOP LENGTH IN OHMS							
		0-350	351-950	951-1550	1551-2150	2151-2750	2751-3350	3351-3950	3951-4550
1	BAL1.1	C	O	C	O	C	O	C	O
2	BAL2.1	C	C	O	O	C	C	O	O
3	BAL3.1	C	C	C	C	O	O	O	O
4	BAL3.0	C	C	C	C	O	O	O	O
5	BAL2.0	C	C	O	O	C	C	O	O
6	BAL1.0	C	O	C	O	C	O	C	O

B (SEE NOTE 2)				
SWITCH 1 (SW1) SECTION CKT 0/1	FUNC			
		DX NORMAL	DX REVERSAL	E&M
1	EL	O	O	C
2	EM2	C	C	O
3	EM1	C	C	O
4	DXRV2	O	C	O
5	EM4	C	O	O
6	DXRV1	O	C	O
7	EM5	C	O	O

NOTES:
1. SWITCHES SHOWN IN A ARE USED FOR MATCHING THE SIGNALING CIRCUITRY TO THE LOOP LENGTH.
2. SWITCHES SHOWN IN B ARE USED FOR SELECTING DX OR E&M SIGNALING.
3. SWITCHES MUST BE SET PRIOR TO INSERTING THE CIRCUIT PACK INTO THE CARRIER.
4. SWITCH SECTIONS ARE CLOSED BY DEPRESSING THE ROCKER TOWARD THE SECTION NUMBER.

Fig. 103—LC11B Circuit Pack Switch Locations and Switch Options

operating company transmission and maintenance engineers.

7. EQUIPMENT APPLICATION

TRUNK CIRCUIT-TYPE SELECTION

Note: The nominal loss through the PBX network is 5 dB for line-to-line connections. For 2-terminal connections involving a trunk, nominal loss is 0 ±0.5 dB if the trunk does not have a switchable pad or if it does and the pad is switched out. This applies to line-to-trunk and trunk-to-trunk connections. For connections involving trunks when the 2-dB switchable pad is switched in, the nominal insertion loss is 2.0 ±0.5 dB.

The DIMENSION PBX is compatible with all central offices except panel.

7.01 The basic trunk circuit types used in the DIMENSION 400 PBX are as follows:

- LC08D—Dual CO trunk circuit
- LC09D—DID trunk circuit
- LC11B—Tie trunk circuit
- LC13B—Auxiliary trunk interface circuit.

7.02 Dial pulsing is generated (regenerated) in the trunk circuit under software control, while TOUCH-TONE calling is transmitted via the time division switch through the trunk transmission path to the central office. Tip and ring cannot be cut through the time division switch to achieve dc continuity.

A. LC08D—Dual CO Trunk Circuit

7.03 The LC08D is a dual 2-wire CO trunk circuit pack. The circuit pack may be used as an interface for other trunks and trunk-related features.

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

LOCAL LDN/FOREIGN EXCHANGE

- 1-Way-In Attendant Completing
- 1-Way-Out DOD
- 1-Way-Out DOD With Party Test
- 2-Way Attendant Completing In/DOD
- 2-Way With Party Test.

WIDE AREA TELEPHONE SERVICE (WATS)

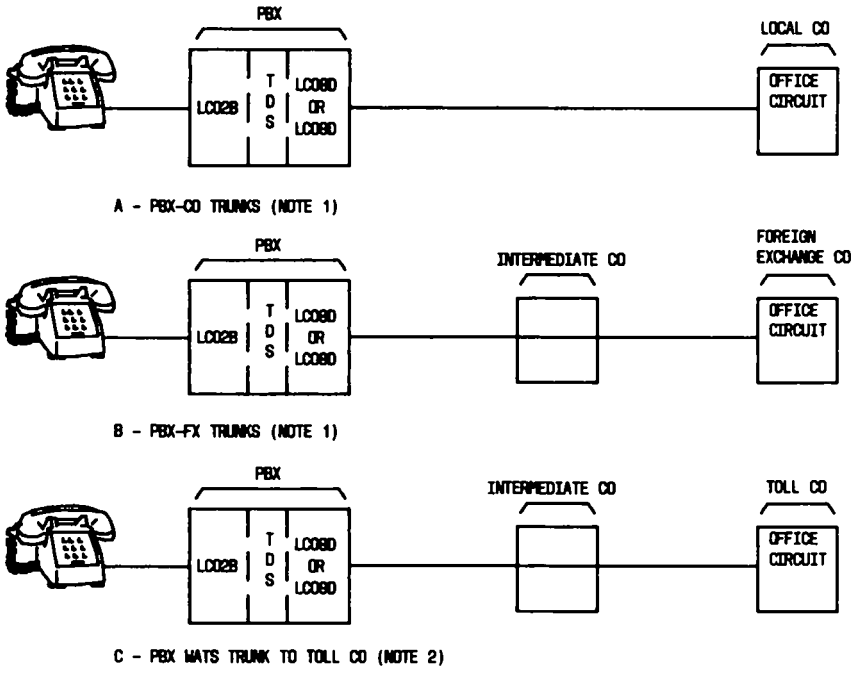
- 1-Way-In Attendant Completing
- 1-Way-Out DOD
- 1-Way-Out DOD With Party Test
- Automatic INWATS.

7.05 The "party test" mode is required with either the speed-calling feature included in FP4, FP10, and FP15 or the hot-line feature included in FP3. Party test is required only when outpulsing must be delayed until a positive indication is received, signifying that trunk seizure at the central office has occurred and the central office is returning dial tone.

7.06 The LC08D trunk circuit employs a standard ground-start signal and transmission path from the central office to the PBX. Various configurations of the CO trunks are shown on Fig. 104. Two separate trunk circuits are provided on each physical circuit pack.

7.07 The trunk circuit sees an open tip lead and CO battery on the ring lead as an idle signal. A trunk seizure from the central office is indicated when it grounds the tip and applies battery to ring or vice versa. The battery and ground signals are detected by the trunk circuit and interpreted by software. The trunk circuit does not respond to loop closure or to standard ringing.

7.08 The central office sees an idle trunk as a high resistance between tip and ring shunted by a ringing bridge termination with −48V direct current



NOTES:

1. PBX-CO AND PBX-FX TRUNKS CAN HAVE THE FOLLOWING MODES OF OPERATION:
   - ONE-WAY IN ATTENDANT COMPLETING
   - ONE-WAY OUT DOD
   - ONE-WAY OUT DOD WITH PARTY TEST
   - TWO-WAY ATTENDANT COMPLETING IN/DOD
   - TWO-WAY WITH PARTY TEST

2. WATS TRUNKS CAN HAVE THE FOLLOWING MODES OF OPERATION:
   - ONE-WAY IN ATTENDANT COMPLETING
   - ONE-WAY OUT DOD
   - ONE-WAY OUT DOD WITH PARTY TEST
   - AUTOMATIC IN WATS

Fig. 104—PBX-CO Trunk Connections

on both tip and ring. Trunk circuit seizure by the PBX is generated by a closed loop and a grounded ring lead through 100 ohms.

7.09 Figure 105 shows the CO trunk circuit interfacing with 2-wire or 2-to-4-wire repeaters and depicts the use of 2-wire repeaters to terminate 2-wire cable on a 2-wire switch. The repeater is on the CO side and provides a 900-ohm termination, facing the 600-ohm output of the PBX. Figure 105(A) can also be applied to FX/WATS installations. For 4-wire PBX-CO trunks, a 2- or 4-wire repeater is necessary at the PBX [Fig. 105(B)]. The 2-wire side has impedance set to 600 ohms. The 4-wire impedance can be 600 or 1200 ohms.

7.10 Terminal balance (Fig. 106) is required when PBX-CO trunks can be switched through to via net loss (VNL) tie trunks or CCSA lines.

7.11 Layout patterns for 2-wire FX/WATS are the same as for PBX central office. However, the choice of using either intermediate or terminal repeaters is available, as determined by design loss and crosstalk requirements.

When a 2-way CO trunk is connected to a step-by-step system (eg, No. 1, 350A, 355A, 360A) outgoing information trunk circuit (SD-32170-01), an LC08B (or later alpha-suffix LC08–) should be substituted for LC08(MD).

7.12 ***Two-Port Originating Register for Outgoing CO Trunks:*** This feature provides the option of using a 2-port originating register (OR) on outgoing CO-type trunks arranged for TOUCH-TONE dialing to dial pulse conversion when

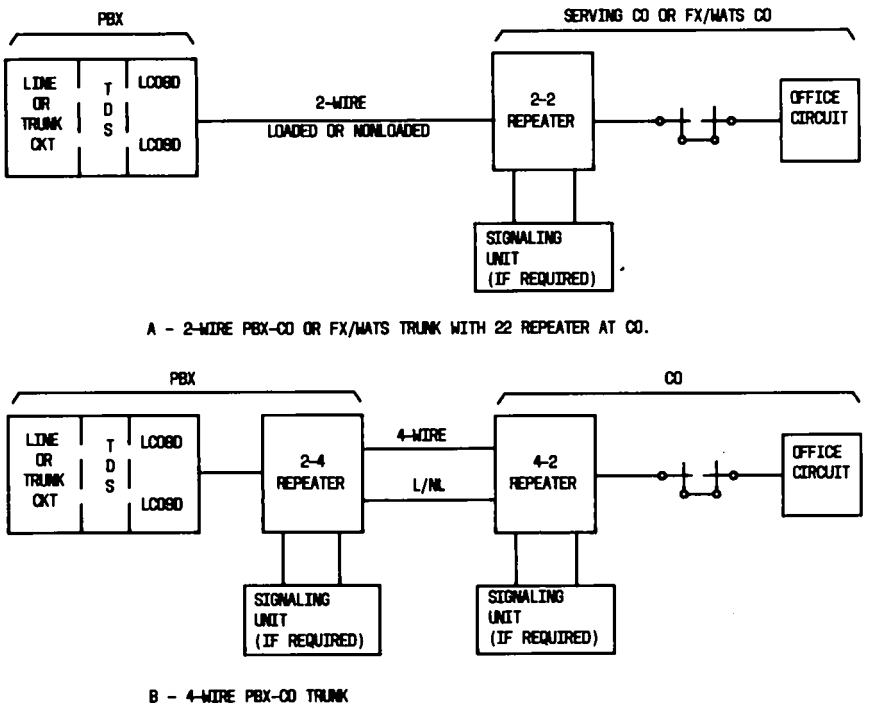


Fig. 105—PBX-CO Trunks

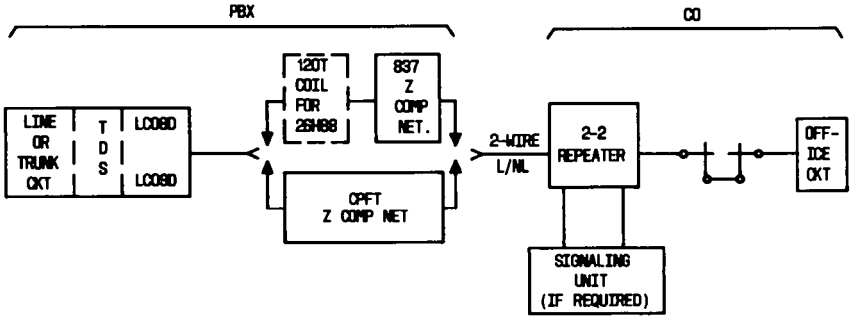


Fig. 106—2-Wire PBX-CO Trunk With Impedance Compensator

the calling party is a TOUCH-TONE dialing station, attendant, or tie trunk. The 2-port OR is a special mode of operation of the standard TOUCH-TONE dialing receiver whereby the TOUCH-TONE calling party is on one port and the called facility on a second port. A talking path between ports one and two is normally maintained; however, when a TOUCH-TONE dialing signal is detected, this path is opened for the duration of the signal. Use of the 2-port OR for outgoing CO calls is administered via the MAAP. The number of TOUCH-TONE dialing receivers must be engineered accordingly to compensate for the fact that the attendant must now share in the use of the receivers. Prior to this fix, this conversion was accomplished without a TOUCH-TONE dialing receiver.

B. LC09D—DID Trunk Circuit

7.13 The direct inward dialing (DID) feature enables an incoming exchange call to terminate

on a specific station line on the PBX. The LC09D circuit pack sees an open tip and ring from the central office as an idle signal. The circuit detects a low resistance loop closure as seizure from the central office. The circuit provides a momentary reversal of battery and ground on tip and ring as a wink-start signal to the central office.

7.14 The DID trunk circuit pack (LC09D) operates in both immediate-start and wink-start modes to provide 1-way DID service or 2-way service on an automatic-out/dial repeating or automatic-in basis. It cannot be used as a 2-way DID/DOD interface or as a loop signal CCSA interface, because dial pulses cannot be sent outgoing. It is used as high-low reverse battery interface for other trunks and trunk-related features.

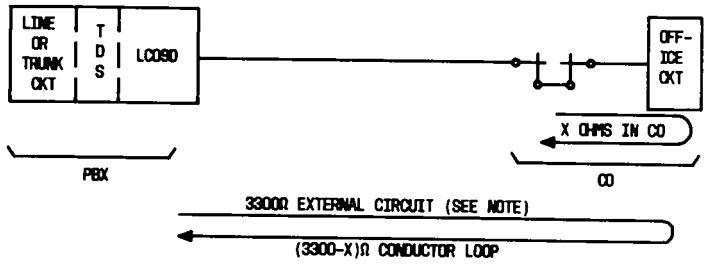
7.15 All modes are software-controlled and do not involve wiring changes. For immediate-start, the DID trunk circuit receives dial pulses from the step-by-step central office. For wink-start, the DID trunk circuit sends a momentary battery reversal back to the common control central office which must be detected before dial pulsing is sent back to the PBX. Dial pulsing information reaches the PBX as loop pulsing or as battery and ground pulsing with maximum resistance of 3300 ohms (Fig. 107). Answer supervision is sent to the central office as battery and ground reversal.

7.16 The signaling range for loop pulsing can be increased by the installation of a loop signaling extender at the PBX (Fig. 108). All connections to a trunk circuit are via a single tip and ring pair (2-wire). No transmission pad switching is provided, and the nominal transmission loss is zero.

C. LC11B-Tie Trunk Circuit

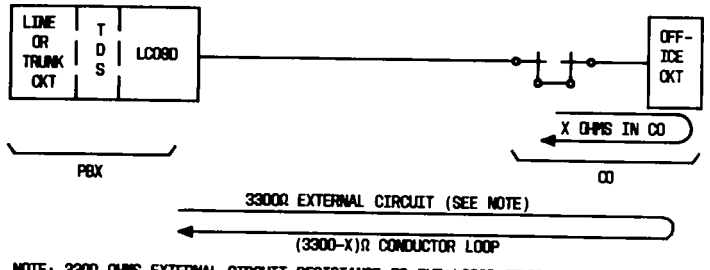
7.17 The LC11B-tie trunk circuit operates in automatic or dial repeating modes, with normal/reverse DX signaling and E&M leads, as well as a 4-wire voice transmission path. The following arrangements are available:

- 1-Way-In Dial Repeating
- 1-Way-Out Automatic
- 1-Way-Out Dial Repeating



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

A - LOOP PULSING DID TRUNK RANGE



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

B - BATTERY & GROUND PULSING DID TRUNK RANGE

Fig. 107—DID Trunk Range

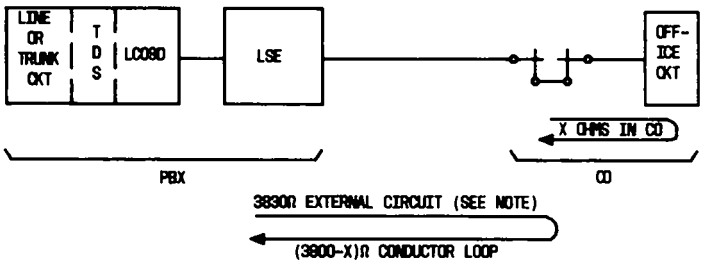


Fig. 108—LSE at DIMENSION PBX in DID Trunk

- 1-Way-In Automatic
- 2-Way Dial Repeating Both Ways
- 2-Way Dial Repeating-In/Automatic-Out
- 2-Way Automatic-In/Dial Repeating-Out
- 2-Way Automatic In/Out
- 1-Way-In Dial Repeating—Delay Dial
- 2-Way Dial Repeating—Delay Dial
- 2-Way Dial Repeating In/Automatic-Out-Delay Dial-In.

7.18 The CCSA access is available with the following operational characteristics:

- 2-Way Dial In/Out
- 2-Way Wink-In/Delay Dial-Out
- 2-Way Dial Tone-Out/Delay Dial-In
- 2-Way Dial Tone-Out/Wink-In.

7.19 Various combinations are shown on Fig. 109 and 110. When the tie trunks are used between two PBXs as shown, repeaters may not be required. Long tie trunks may require a 4-wire intermediate repeater in central offices through which the trunk passes. A pad switching function on the LC11B is controlled by the class of the tie trunk and its connecting trunk.

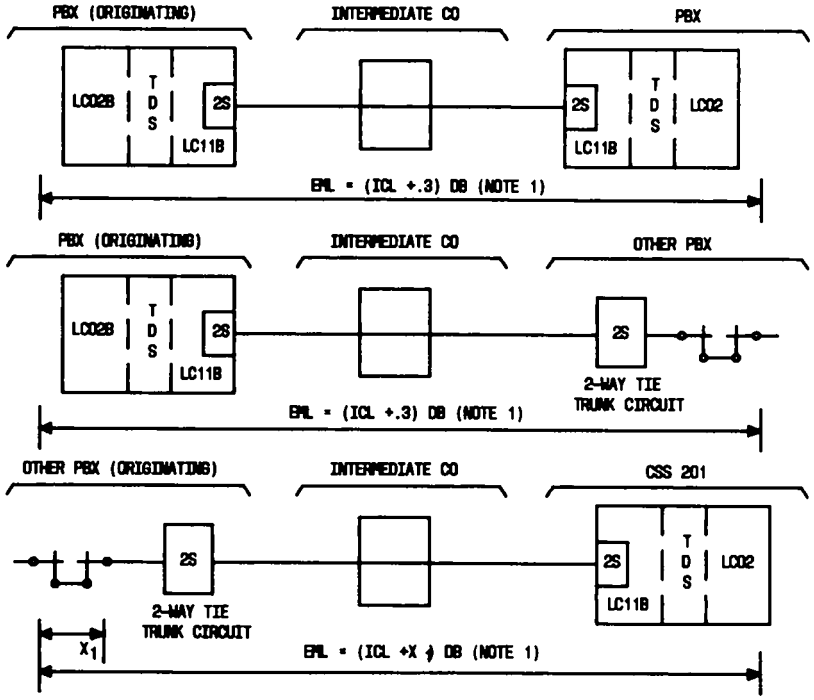
7.20 The LC11B circuit can be optioned on the circuit pack for standard DX or E&M signaling. The DX signaling capability is completely contained within the LC11B and is simplexed onto the 4-wire transmission path before leaving tie trunks. Means for reversing the simplex connection are also provided on LC11B. If E&M signaling is provided, a separate pair of wires carry the E&M signals, and the 4-wire transmission path does not carry direct current. Two independent trunk interfaces are provided on one circuit pack, and the signaling method of one does not limit the signaling method of the other. The LC11B has switchable 2-dB transmission pads but does not include any adjustable gain provision.

7.21 The LC11B circuit pack can also be used to provide DID service for centrex operation when DX or E&M signaling capabilities are required. In the DID application, the transmission pads will be permanently switched out via DID software. When a trunk circuit on LC11B is optioned for DX signaling, all connections to that trunk are via the two tip and ring transmission pairs (4-wire). When it is optioned for E&M signaling, connections to the trunk are via six wires—two tip and ring transmission pairs and a signaling pair (the E&M leads). The LC11B furnishes either the appropriate M-lead wink or no signal, as in the case of SXS CO immediate start, and the PBX call progress tones will be returned to the calling party.

7.22 The (DX or E&M) interface circuit is divided functionally into three sections:

- Control or digital portion
- Signaling portion
- Voice transmission portion.

The digital portion interfaces with the network control circuit which performs control and time-slot



NOTES:

1. EML = ESTIMATED MEASURED LOSS

1000 HZ ICL DESIGN OBJ [1]

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

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

Fig. 109—2-Wire PBX Tie Trunks

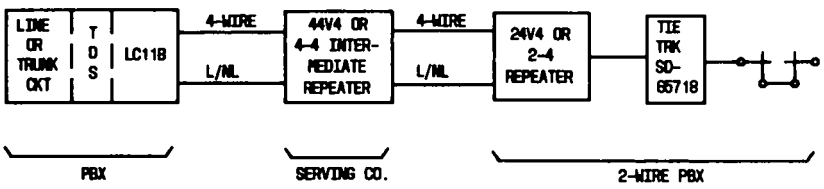


Fig. 110—4-Wire PBX Tie Trunks

functions via the even-port address. It also interfaces with the scanner/distributor circuit and the PAM network to furnish time-slot information. The DX or E&M signaling is performed in the signaling portion. The transmission section provides the 4-wire path and pad switching to the distant end.

7.23 Tie trunk signaling varies in accordance with the operating characteristics of the circuit. "Outgoing only" indicates that access can be gained only at the local PBX. "Incoming only" implies that only the distant PBX can gain access. A combination circuit can be seized from either connecting PBX, but the operation on each end may vary. The following trunk circuit arrangements are shown with their signaling characteristics:

- 2-Way Dial Repeating-Out/Automatic-In
- 1-Way Dial Repeating or Automatic-Out
- 2-Way Dial Repeating-In/Automatic-Out
- 1-Way Dial Repeating or Automatic-In
- 2-Way Dial Repeating
- 2-Way Automatic.

D. LC13B—Auxiliary Trunk Interface Circuit

7.24 The auxiliary trunk circuit is used with such features as recorded telephone dictation and loudspeaker paging. Transmission to customer-owned peripheral equipment is accomplished by dry-loop seizure or by sleeve ground-start seizure from the auxiliary trunk. A ground on the sleeve lead which has been returned by the peripheral equipment will be detected by LC13B.

OFF-PREMISES STATIONS

7.25 The off-premises stations (OPS) feature is provided for by connection arrangements as illustrated in Fig. 111 through 114. The LC02B line circuit pack used with OPS is illustrated in Fig. 111(A). Figures 111(B and C) through 114 illustrate V7 and older vintages of the LC02 circuit pack used with OPS.

7.26 The LC02 line circuit transmits the 20-Hz ringing to stations associated with the PBX, and it detects loop signaling. Range to a station is limited to no more than 950 ohms. Range is reduced to 500 ohms if four ringers are required and 300 ohms for five ringers [Fig. 111(B)]. When a loop signaling extender (LSE) is added (Fig. 111), the external circuit resistance is extended to 1610 ohms for up to two ringers and 1500 ohms for three ringers. The LSE is limited to use with three ringers. Signaling ranges are based on a dc voltage level of −45 volts at the PBX, because the nominal −48 Vdc supply varies with loading at the other dc outputs. A method for determining the range when an LSE is used is provided in Section 332-910-180. Additional information on metallic facility terminal (MFT) plug-in units is provided in Section 851-300-130.

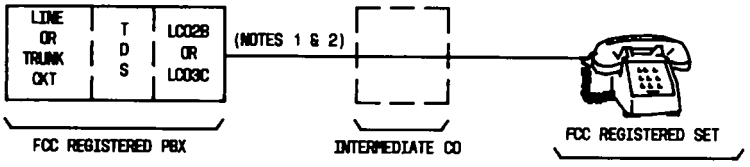
7.27 The dc signaling range of the station loops can also be increased by the installation of a loop signaling repeater/loop start only (LSR/LSO) as shown in Fig. 112 and 113. Where only one repeater is necessary, it is recommended that a 2-2 intermediate repeater be used at the serving office or intermediate central office for a 2-wire OPS installation (Fig. 112). Use of the 2-2 terminal repeater at either the PBX or station is not advisable in one repeater application. If more than one repeater is needed between the station and its central office, 4-wire facilities should be used. Typical 2- and 4-wire metallic facility installations are shown on Fig. 114. Different combinations of 2-4 wire MFT units can be used by specifying the appropriate 2-4 wire or 4-2 intermediate or terminal repeater at the 2-wire to 4-wire conversion points. When the MFT LSR is used, the range from the LSR to station is defined in SD-1C359-01.

7.28 Among the features offered by the PBX are distinctive ringing and the "ring ping" signal of the call forwarding—all calls feature. This is a reminder that the feature is in effect. It consists of a single 100-ms burst of 20-Hz ringing sent to the station each time a call is forwarded. The three distinctive ringing signals are periodic:

Pattern 1: 1.2 seconds on; 4 seconds off

Pattern 2: 0.4 second on
Pattern 2: 0.2 second off
Pattern 2: 0.6 second on
Pattern 2: 4.0 seconds off

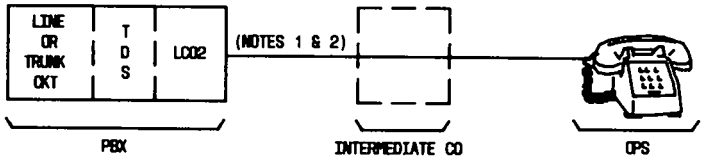
Pattern 3: 0.2 second on
Pattern 3: 0.1 second off
Pattern 3: 0.2 second on
Pattern 3: 0.1 second off
Pattern 3: 0.6 second on
Pattern 3: 4.0 seconds off.



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

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

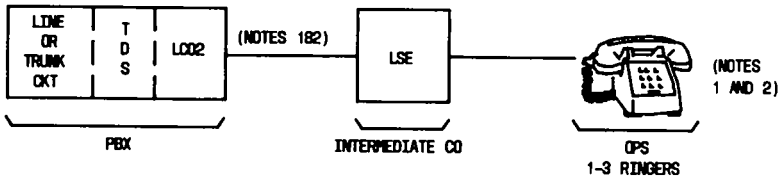
A - CIRCUITS USING CPS LC02B AND LC03C



NOTES:
1. MAXIMUM LOOP RESISTANCE IS 1250Ω INCLUDING TELEPHONE SET OR 1050 EXCLUDING TELEPHONE SET (VINTAGES OLDER THAN LC02B).
2. THE MAXIMUM NUMBER OF C4A TYPE RINGERS PER LINE AND THE ASSOCIATED MAXIMUM ALLOWABLE LOOP RESISTANCE (EXCLUDING STATION SET) IS AS FOLLOWS:

RINGERS	ALLOWABLE LOOP RESISTANCE
1-3	1050Ω
4	500Ω
5	300Ω

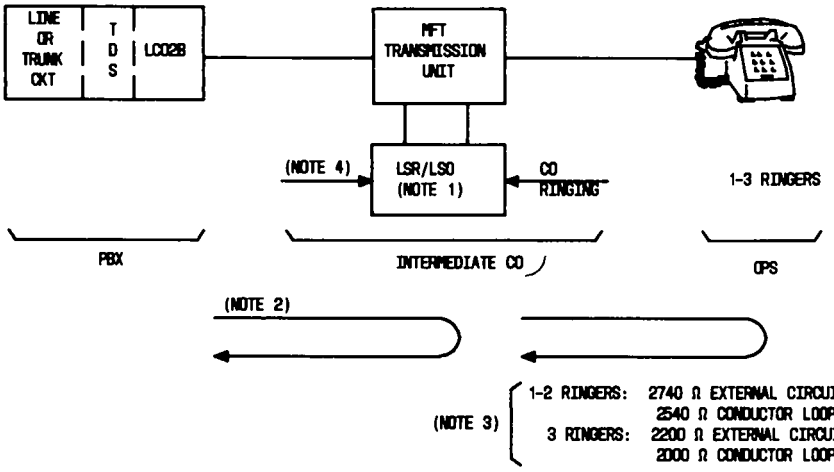
B - CPS SIGNALING RANGES 1-5 RINGERS, NO RANGE EXTENSION



NOTES:
1. 1-2 RINGERS: 1610 Ω EXTERNAL CIRCUIT (LC2 = V1, V2, V5) OR 1725Ω (LC2 = V3, V4, V6, V7) (LSE I) 1410 Ω CONDUCTOR LOOP +200Ω TELEPHONE SET RESISTANCE
   1-2 RINGERS: 2040Ω EXTERNAL CIRCUIT (LC2 - V1, V2, V5) OR 2155Ω (LC2 = V3, V4, V6, V7) (LSE II)
2. 3 RINGERS: 1500 Ω EXTERNAL CIRCUIT
   1300 Ω CONDUCTOR LOOP +200Ω TELEPHONE SET RESISTANCE

C - LSE AT CO IN CPS LINE

Fig. 111—Off-Premises Stations



NOTES:
1. LSR/LSO = LOOP SIGNALING REPEATER - LOOP START ONLY
2. 1335 Ω EXTERNAL CIRCUIT RESISTANCE TO LC02B (V1, V2, V5) CIRCUIT CONSISTING OF 1205 Ω CONDUCTOR LOOP RESISTANCE +130 Ω MFT (T.U. AND LSO) INTERNAL RESISTANCE AT INTERMEDIATE CO. 2010 Ω EXTERNAL CIRCUIT RESISTANCE TO LC02B (V3, V4, V6, V7)
3. A) 2740 Ω EXTERNAL CIRCUIT RESISTANCE TO MFT OF INTERMEDIATE CO CONSISTING OF 2540 Ω CONDUCTOR LOOP RESISTANCE +200-OHM STATION SET RESISTANCE (BASED ON 23 MA STATION SET REQUIREMENT).
   B) 2200 Ω EXTERNAL CIRCUIT RESISTANCE TO MFT AT INTERMEDIATE CO CONSISTING OF 2000 Ω CONDUCTOR LOOP RESISTANCE +200-OHM STATION SET RESISTANCE (BASED ON RINGING RANGE LIMIT FOR THREE RINGERS).
4. NOTE 2 VALUES ARE FOR -45VDC INPUT TO LSR, NOTE 3 VALUES ARE FOR -72VDC INPUT.

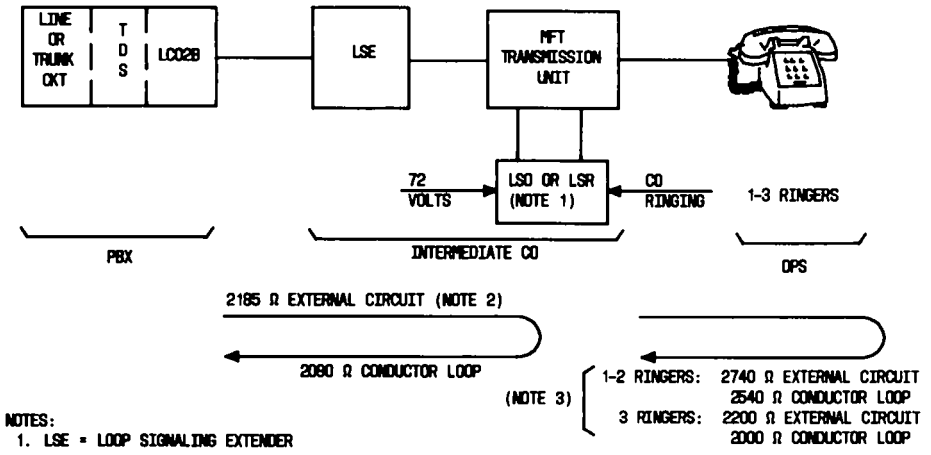
Fig. 112—LSO at CO in OPS Line

All OPS lines are compatible with these features, including short range lines using voice frequency transmission facility with no signaling repeaters. Distinctive ringing can be transmitted over OPS line with one LSR; however, each burst of ringing will be shortened by 100 ms, and each silent interval will be increased by 100 ms. The "ring ping" will be blocked by the LSR. The LSE is transparent to both features. Single frequency (SF) type FS signaling unit or T-carrier with D-type FX channel units will pass pattern 1 distinctive ringing, but blocks patterns 2 and 3 and "ring ping."

7.29 When call pickup and call hold features are provided, the 24A/24B type line status indicator (LSI) can be used to monitor the status of PBX lines. The 24A/24B type indicator bridges across the T and R leads of the stations to be monitored. The status of each line is displayed by a corresponding LED on the LSI panel. A maximum of four LSIs can be bridged across the same station line. The indicator is provided in three versions for monitoring 8, 16, or 32 lines. The circuit operates with lines using −48V battery and conventional 90V 20-Hz ringing superimposed on −48V direct current. The answering station at the LSI is alerted when a monitored line is being rung. The answering station dials a call pickup code, and the PBX redirects the call to the answering station.

7.30 The following MFT signaling units are used with CPFT and are applicable to the OPS configurations.

- J99343FD—DX or E&M to Ground Start (STA)—CPS20
- J99343FC—Ground Start to DX or E&M (CO)—CPS19
- J99343FB—DX or E&M to Loop Start (STA)—CPS18
- J99343FP—Line Start to DX or E&M (CO)—CPS17



NOTES:
1. LSE = LOOP SIGNALING EXTENDER

2. A) 2220 Ω (LSE I) EXTERNAL CIRCUIT RESISTANCE TO LC02B (V1, V2, V5) CIRCUIT CONSISTING OF 2090 Ω CONDUCTOR LOOP RESISTANCE +130 Ω MFT (T.U., LSO & LSE) INTERNAL RESISTANCE AT INTERMEDIATE CO.
   B) 3450 Ω EXTERNAL RESISTANCE TO LC02B (V3, V4, V6, V7) CONSISTING OF 3320 Ω CONDUCTOR LOOP RESISTANCE +130 Ω MFT RESISTANCE.
   C) 2485 Ω (LSE II) EXTERNAL CIRCUIT RESISTANCE TO LC02B (V1, V2, V5) CIRCUIT CONSISTING OF 2355 Ω CONDUCTOR LOOP RESISTANCE +130 Ω MFT RESISTANCE.

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

Fig. 113—LSO and LSE at CO in OPS Line

- J99345CD—Loop Signaling Extender II—CPS16
- J99343AD—Loop Signaling Repeater, Loop-Start Only—CPS9
- J99343AC—Loop Signaling Repeater Unit—CPS8.

8. GROWTH AND REARRANGEMENTS

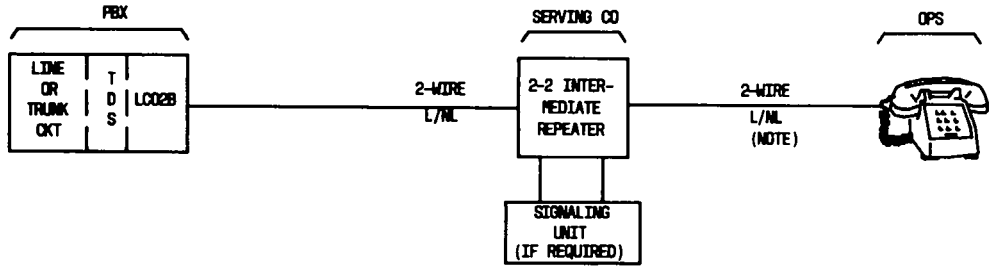
8.01 This part provides information about on-site tape processing feature package updates to new issues and engineering information to aid in planning the addition of the following hardware to an existing DIMENSION PBX.

- Frequency generator [J58879JA-1, List 3 (120C, non-UPS) or List 4 (124A, UPS)]
- Frequency interrupter (J58879PG, List 1)
- Supplemental line carrier (J58879AC-1, -2)
- Trunk carrier (J58879BA-1, -2)
- UPS power supply (J87460).

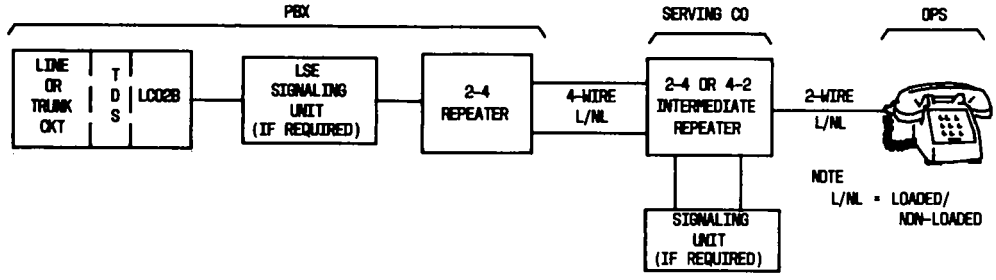
ON-SITE TAPE PROCESSING

8.02 The on-site tape processing (ONTAP) program is a new field-update procedure that permits Feature Package 2 (FP2) systems to be field-upgraded to later issues. With the introduction of ONTAP, there is no longer a necessity to return FP2 program tapes to Western Electric for the "blow-back" process.

8.03 The ONTAP may be used to upgrade a PBX from FP2, Issue 1, to FP2, Issue 2, and/or Issue 2 to Issue 3.1. The upgrade process involves transferring the customer's current translation data from the existing generic form to the form required by the new issue of the feature package. Once transferred, the new translation data is recorded on the tape cartridge which contains the new issue of the feature package. All of the transformation and recording processing is done on the customer's PBX without interrupting telephone service. In addition, no hardware modifications to the system are required to use ONTAP. Modifications may be required, however, in order to provide the services on



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



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

Fig. 114—PBX-OPS Line With Repeater

the new feature package issue. For example, additional memory (LC25 circuit packs) will normally be required when updating from Issue 1 to Issue 2 or Issue 2 to Issue 3.1.

8.04 The ONTAP software packages are provided on standard DIMENSION PBX cartridges and are coded as follows:

(a) FP2, Issue 1, to FP2, Issue 2—B memory (J58885A-1, Lists 1 and 2, and M1R) and C memory (J59885A-1, Lists 1 and 3, and M2R)

(b) FP2, Issue 2, to FP2, Issue 3.1—B memory (J59885B-1, Lists 1 and 2, and M1R) and C memory (J58885A-1, Lists 1 and 3, and M2R).

In addition to ONTAP cartridges, it is necessary to obtain standard cartridges which contain the new issue of the feature package. Normally, three of these cartridges are required per system. In the case where a system is upgraded by more than one issue (ie, Issue 1 to Issue 3.1), one standard cartridge for each intermediary issue is required.

FEATURE PACKAGE UPDATES

8.05 In FP3-Issue 2, FP4-Issue 2, FP5-Issue 2, and FP10-Issue 1, new features and enhancements have been included over previous issues. Additional hardware is required for the later issues. The total memory required for the three memory configurations is shown in Table C. Customers desiring an update of their system can obtain the later issues by sending a copy of their tapes with current translations to Western Electric for "blow-back" processing.

8.06 The additional hardware required for FP3, Issue 2, and FP5, Issue 2, is as follows:

- Memory circuit packs that provide 8K memory words for A, B, and C memory configurations
- A 01DF- or 02BF-type attendant console (required to take advantage of enhancements requiring audible tones)
- One LC171B circuit pack for RMATS

- J58879CA-1, L1, or J58879CA-2, L9, control carrier (a retrofit kit [ED-1E389-30, Group 1 or Group 2] for backplane wiring to support the RMATS data set may be required on early carriers)

- A 113D, L1/L2, data set or equivalent and ED-1E310-11, G56 cable for RMATS.

8.07 The additional hardware required for FP4, Issue 2, is as follows:

- Memory circuit packs that provide 4K, 8K, and 4K memory words for the A, B, and C memory configurations, respectively

- A 01DF- or 02BF-type attendant console (required to take advantage of enhancements requiring audible tones)

- TOUCH-TONE dialing senders and receivers.

8.08 The additional hardware required for FP10, Issue 1, is as follows:

- Memory circuit packs that provide 4K memory words for the A and B memory configurations

- A 01DF- or 02BF-type attendant console (required to take advantage of enhancements requiring audible tones)

- TOUCH-TONE calling senders and receivers.

FREQUENCY GENERATOR—120A (MD), J58879PC-2, LISTS 4 AND 5; 120B (MD), J58882PA-2, LIST 18; AND 120C, J58879JA-1, LIST 3

8.09 It may be necessary to install one or two frequency generators in a second (01) PBX cabinet or install a single generator in an auxiliary cabinet (00). The relative location of these generator units is shown on Fig. 115. Burndy connectors with cables and miscellaneous terminal strip data are also shown on Fig. 115.

The 120A frequency generator (MD) supplies ringing current to a maximum of three line carriers or to one fully equipped auxiliary cabinet. The 120B (MD) or 120C frequency generator supplies ringing current for a maximum of five line carriers. When retrofitting cabinet 01 with a 120B or 120C, only one unit shall be mounted in the cabinet.

8.10 If a 120A (MD) frequency generator is to be replaced by a 120B (MD) or 120C frequency generator, a wiring change will be required to combine all output leads and terminate them at the third line carrier. The fuse must be AGC-2 (2A).

FREQUENCY INTERRUPTER—J58879PG, List 1 (A&M)

8.11 If a frequency interrupter is to be installed in an auxiliary cabinet, a single mounting panel (Fig. 116) enables the interrupter and frequency generator to be mounted together in the base of the auxiliary cabinet. The mounting panel can also accept two frequency generators in a supplemental cabinet (01).

SUPPLEMENTAL LINE CARRIER—J58879AC-1 AND J58879AC-2

8.12 The following type supplemental line carriers can be added to either a basic PBX cabinet (00) or a supplemental cabinet (01):

(a) J58879AC-1 (MD)—wired backplane

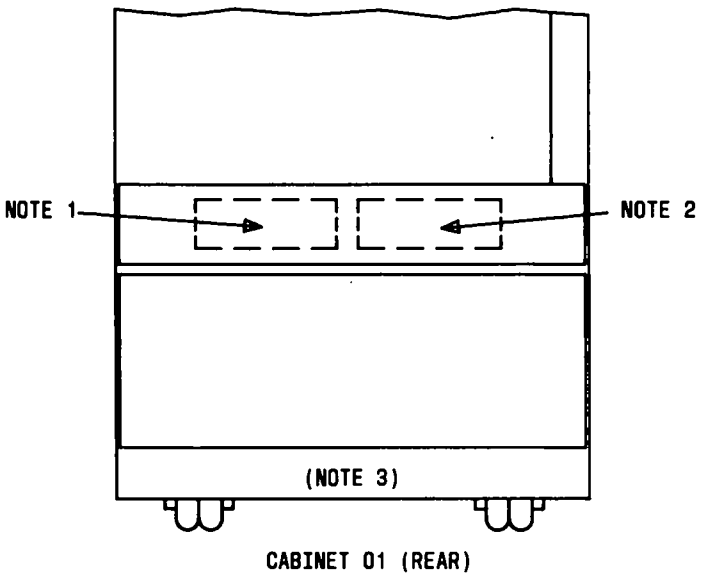
(b) J58879AC-2 (STD)—printed backplane.

8.13 The appropriate cable group for use with either PBX cabinet should be selected from Table QQ. A rear view of a typical 2-cabinet PBX, depicting the cable layout is shown in Fig. 117. The dc power leads are connected to the terminals of the new carrier at the factory. These must be connected to the frame bus according to Table RR. Ensure that the PBX ac power cord is removed from the 120-Vac receptacle.

8.14 The CONN LK03 of the preceding line carrier must be connected to CONN LK02 of the added carrier using the cable which was selected from Table QQ. The CONN LK07 of the preceding line carrier is then connected to CONN LK08 of the added carrier.

A. Basic Cabinet (00)

8.15 The appropriate cable group to connect the added line carrier to the control carrier can be



NOTES:
1. FREQUENCY GENERATOR (0) J58879PC-2, L5 } CAN BE REPLACED BY A
2. FREQUENCY GENERATOR (1) J58879PC-2, L4 } SINGLE 120B OR 120C FREQ GEN
3.

CABINET		AC DISTRIBUTION UNIT OUTLET	CONNECTIONS
AUXILIARY		J20	R TO -48 FG R-Y TO PFTS1 (TERM 6)
01	GEN 0	J12	W TO GRDWDW (TERM 7) R-Y TO TS2 (TERM 10)
	GEN 1	J13	W TO GRDWDW (TERM 12) R-Y TO TS2 (TERM 11)

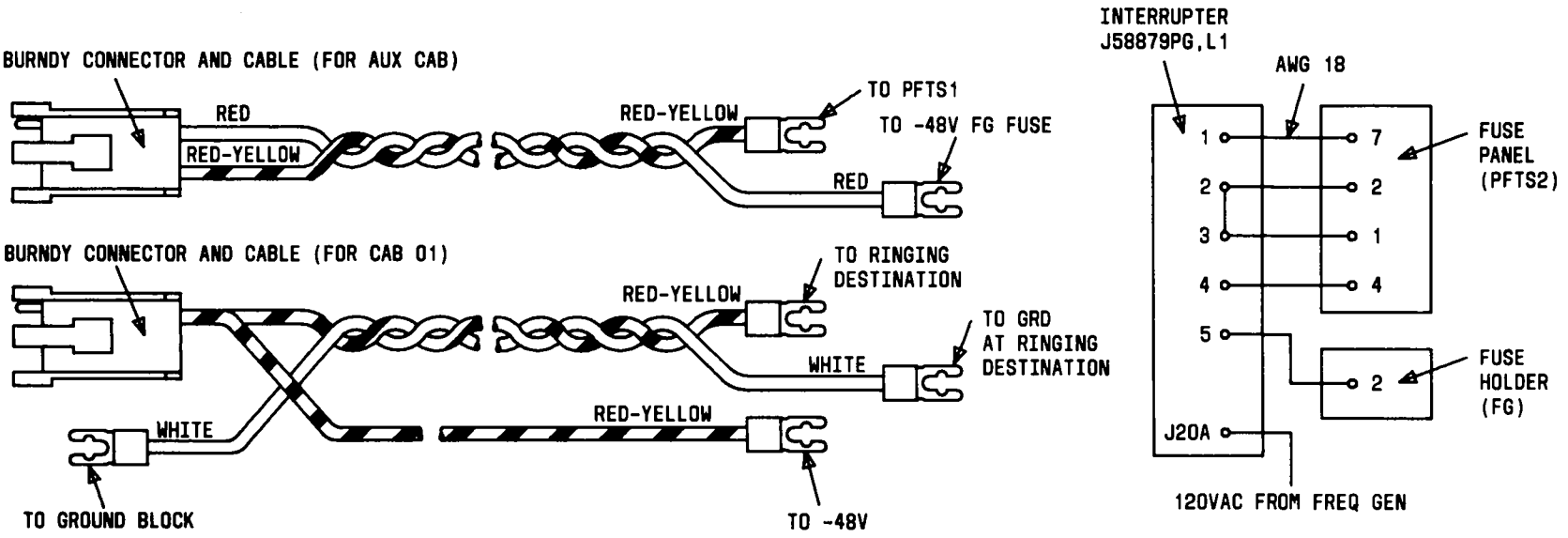


Fig. 115—Frequency Generator and Interrupter Installation Data

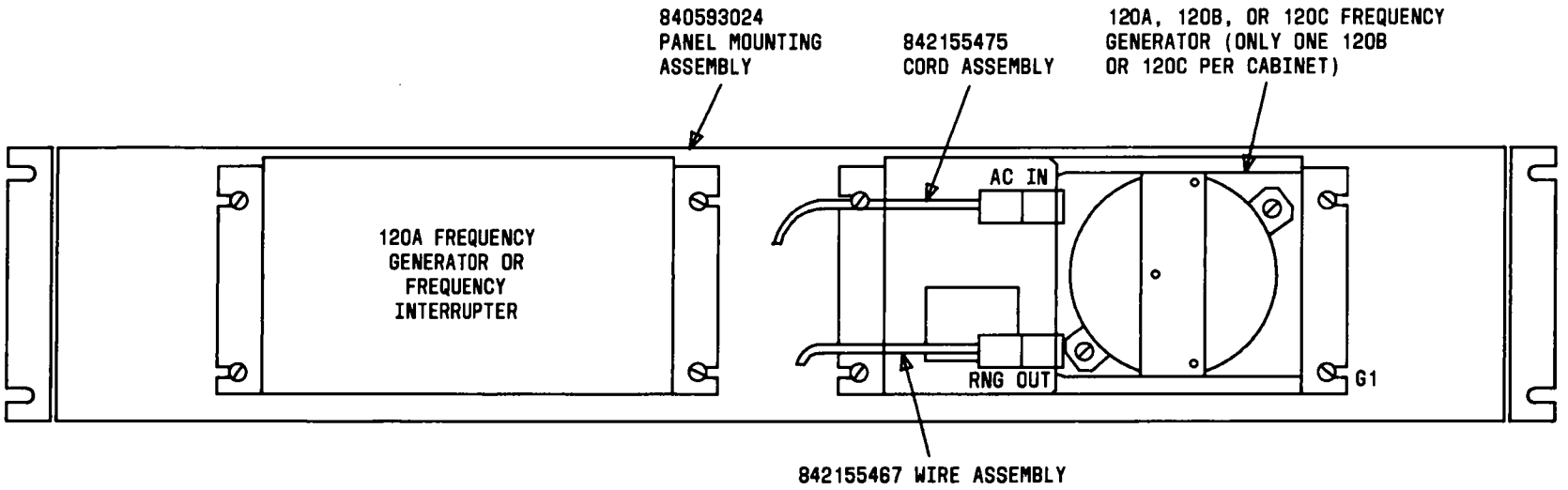
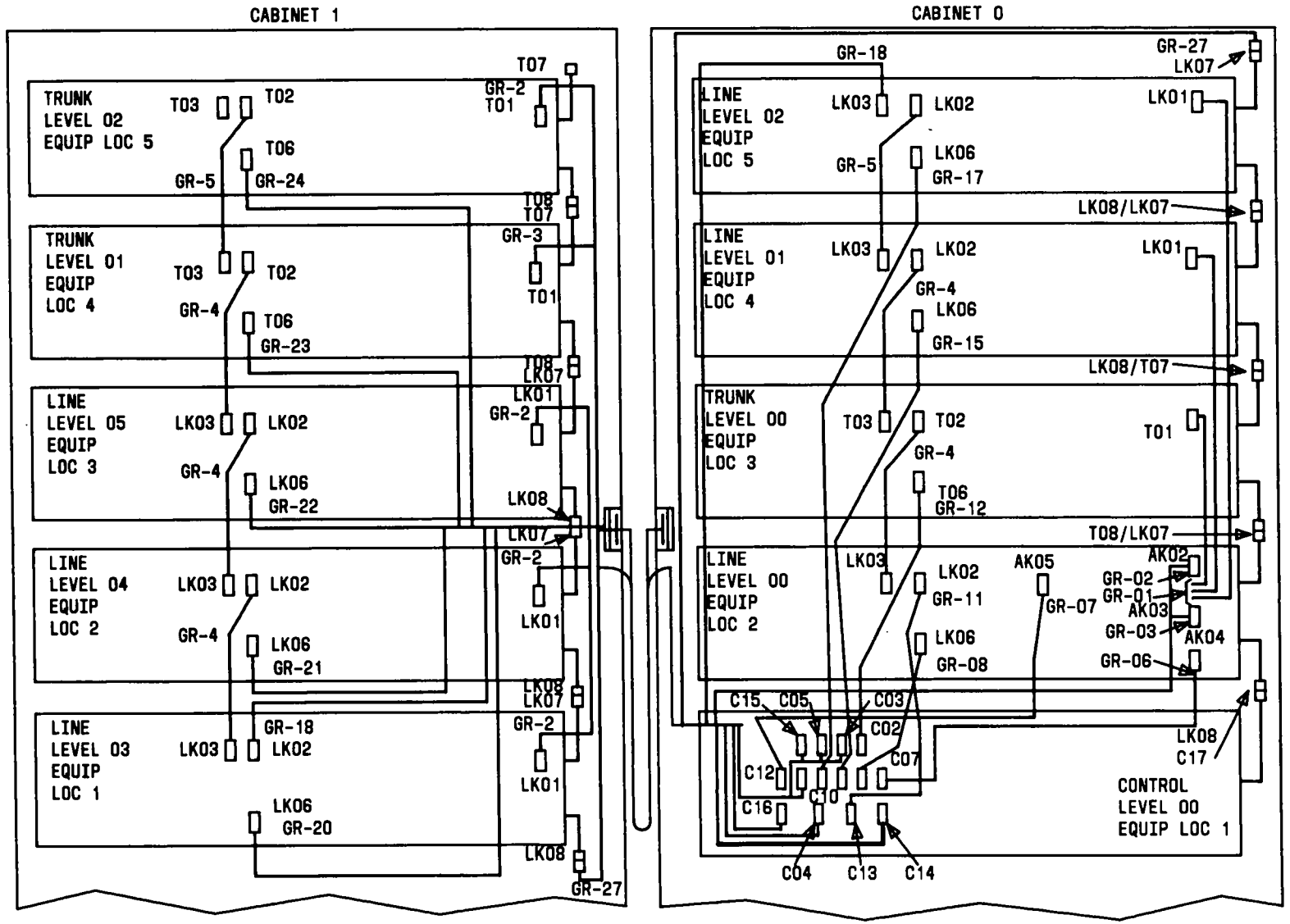


Fig. 116—Mounting Panel for Frequency Generator Interrupter



TYPICAL 2-CABINET CABLE LAYOUT
(REAR VIEW)

Fig. 117—Typical 2-Cabinet Cable Layout (Rear View)

TABLE QQ

CARRIER CABLE GROUPS

PBX CABINET	EQUIPMENT LOCATION	ED-1E310-01 CABLE GROUPS	
0	3	4, 12	
0	4	LINE CARRIER	4, 15
		TRUNK CARRIER	4, 13
0	5	TRUNK CARRIER	5, 14
		1ST J58879AC	5, 16
		2ND J58879AC	5, 17
1	1	18, 20, 27, 2 OR 3 *	
1	2	4, 21, 2 OR 3 *	
1	3	4, 22, 2 OR 3 *	
1	4	4, 23, 2 OR 3 *	
1	5	5, 24, 2 OR 3 *	

* One group 2 cable serves all line carriers (1 through 5). One group 3 cable serves all trunk carriers (1 through 5).

TABLE RR

CARRIER—FRAME BUS CONNECTIONS

FRAME BUS	(NOTE) COLOR
GRD D	BK-BL(2)
GRD T	BK-W
GRD –48V	BK-R
+5V	R-S
	R-BL
–5V	R-O
+9V	R-G
–9V	R-BR
BAT	R-W
–48V	R-Y

Note: Carrier end of cables are factory-connected.

selected from Table SS. The control carrier connectors which are required to interface the control carrier to LK06 of the added line carrier are also shown on Table SS. The selected LK01 connector is referenced on Table SS. The remaining loose wiring is then connected according to Table TT. The carrier levels and equipment locations referenced on these tables are shown on Fig. 117.

B. Supplemental Cabinet (01)

8.16 Flat cable can be selected from Table UU to connect between LK06 of the added line carrier and the appropriate connector at the control carrier located in cabinet 00. The proper control carrier connector can also be chosen from Table UU.

8.17 Coaxial cable ED-1E310-10 (group 2) must be connected to CONN AK02 of the added line carrier. The loose wiring must be connected according to Table VV.

TRUNK CARRIER—J58879BA-1 AND J58879BA-2

8.18 The following type trunk carriers can be added to either a basic cabinet (00) or a supplemental cabinet (01):

(a) J58879BA-1 (MD)—wired backplane

(b) J58879BA-2 (STD)—printed backplane.

8.19 The appropriate cable group must be selected from Table QQ. A rear view depicting the cable layout of the 2-cabinet PBX is shown in Fig. 117. The dc power leads must be connected between the added carrier and the frame bus according to Table RR. These cables have been previously connected to the carrier at the factory. Ensure that the ac power cord is removed from the 120-Vac receptacle.

8.20 The selected cable will be used to connect CONN T03 of the preceding carrier to CONN T02 of the added carrier. The CONN T07 of the preceding carrier is also tied to CONN T08 of the added carrier.

A. Basic Cabinet (00)

8.21 The appropriate cable group required for interconnection between the added trunk carrier and the control carrier can be selected from

TABLE SS

LINE AND TRUNK CARRIER INTERFACE CONNECTORS

ADDED EQUIPMENT LOCATION	USE CABLE GROUP	ADDED CARRIER LEVEL	CONTROL CARRIER CONN NO.	CONN DESIGNATION
3	12	–	–	–
4	13, 15	LINE LEVEL 01	C09	01LK01
5	14, 16, 17	LINE LEVEL 02	C10	02LK01
–	–	TRUNK LEVEL 00	C02	00T01
–	–	TRUNK LEVEL 01	C03	01T01

Table SS. The selected cable will be used to connect between CONN T06 of the added trunk carrier and the appropriate connector at the control carrier (Table SS). The proper T01 connector shown on Table SS will be used to interface the preceding line carrier. The assembly should then be completed and appropriate cross-connections performed.

B. Supplemental Cabinet (01)

8.22 Flat cable must be connected from Table UU to connect between CONN T06 of the added trunk carrier and the connector on the control carrier at cabinet 00. Connect the end of the selected cable to CONN T06 at the rear of the supplemental cabinet. The cable can then be run to the basic cabinet (00).

8.23 The control carrier connector numbers required for various added trunk leads (Fig. 117) must be selected from Table UU.

8.24 Coaxial cable ED-1E310-10 (group 3) must be connected to CONN AK03 of line carrier (00). The final assembly should then be completed and appropriate cross-connection performed.

UPS POWER SUPPLY—J87460

8.25 The basic and supplemental cabinet power supplies [J87419 (MD) or J87432] can be replaced with the J87460 UPS unit as follows:

(a) J87460F (Basic)

(b) J87460B (Supplemental).

8.26 The J87419 power supply is directly replaceable with the J87460 UPS unit. The cabinets containing the power supply require some small holes to be drilled and tapped in the uprights for the J87455A charging unit and the KS-21906, List 3, battery pack. The air vents in the base of the cabinet should be checked for proper size. The J58882PA ac power distribution unit requires replacement with a new J58879JA-1 unit provided with a 124A frequency generator. Also, the cabinets require replacement of the panel at the rear of the cabinet. Some very old cabinets may require the drilling of holes in the base of the cabinet. The spare fuse holder and the MAAP storage brackets may require relocation.

8.27 The J87432 power supply is directly replaceable with the J87460 UPS unit except that a new cable harness is required to replace the cable that is part of the J87432 power supply. The cabinets require the drilling of holes in the uprights for the charging unit and battery pack. The air vents in the base should be checked and the back panels will require replacement. The drilling of holes in the base of the cabinet should not be necessary. The J58882PA power distribution unit requires a replacement with a J58879JA-1 unit providing a 124A frequency generator.

8.28 Retrofitting the 124A frequency generator to the existing power distribution unit may be possible on some systems. Some old systems that have the 30-amp type power cord require a replacement with a 20-amp type. The 30-amp breaker and the outlet should be replaced with a 20-amp breaker and outlet.

TABLE TT

LINE CARRIER INTERCONNECTIONS

FROM		TO	
ADDED LINE CARRIER	TERMINAL NO. (NOTE 1)	TERMINAL NO. (NOTE 2)	EXISTING LINE CARRIER
FIRST LINE CARRIER (J58879AC)	LKTS1 - 6 OR LP07	AKTS3 - 6 OR AP26	BASIC LINE CARRIER (J58879AA)
	LKTS1 - 4 OR LP09	AKTS3 - 5 OR AP22	
SECOND LINE CARRIER (J58879AC)	LKTS1 - 6 OR LP07	LKTS1 - 6 OR LP07	PRECEDING LINE CARRIER (J58879AC)
	LKTS1 - 4 OR LP09	LKTS1 - 5 OR LP08	

Note 1: Terminal strip LKTS1 is located on J58879AC-1 (MD) unit. Terminal strips LP07 and LP09 are located on J58879AC-2 (STD) unit.
Note 2: Terminal strip AKTS3 is located on J58879AA-1 (MD) unit. Terminals AP22 and AP26 are located on J58879AA-2 (STD) unit.

TABLE UU

LINE AND TRUNK CABLE GROUPS AND CONNECTORS

ADDED EQUIPMENT LOCATION (SEE NOTE)	ED-1E310-11 CABLE GROUP NUMBER	ADDED LINE OR TRUNK LEVEL	CONTROL CARRIER CONNECTOR NUMBER
2	21	02 (LINE)	C10
3	22	03 (LINE)	C11
4	23	04 (LINE)	C14
5	24	05 (LINE)	C15
*		06 (LINE)	C16
		01 (TRUNK)	C03
		02 (TRUNK)	C04
		03 (TRUNK)	C05

Note: All equipment locations and levels are shown in 2-cabinet PBX figure.
* Groups 20 through 24 of flat cables to control carrier are for expansion into cabinet 01 where 5 positions are available.

8.29 Some very early cabinets require circuit pack replacements to reduce the −5 volt current drain. (The J87419A and J87432A power supplies provide 2.5 amps of the −5 volt and the J87460F UPS unit provides 1.0 amp of the −5 volt.) Circuit packs to be replaced are:

- LC3—replaced with LC3B
- LC6—replaced with LC6B
- LC8—LC8C replaced with LC8D
- LC9—LC9C replaced with LC9D
- LC13—replaced with LC13B.

8.30 Detailed procedures for retrofit of the J87460 UPS unit are documented in the drawing change sheet (DCS)—1E441-30.

9. REFERENCES

9.01 The following sections are associated with DIMENSION 400 PBX and, when available, may be used for additional information.

SECTION	TITLE
332-610-100	Customer Premises Facility Terminal Equipment—General Description
332-610-210	Customer Premises Facility Terminal Equipment—Installation
332-610-500	Customer Premises Facility Equipment—Maintenance and Testing
518-010-101	Centralized Key Telephone Installations
554-000-000	DIMENSION PBX Numerical Index (Refer to this index for TOP Documents)
554-000-100	DIMENSION PBX Miscellaneous Documentation Index (Documents that support DIMENSION PBX systems)
554-010-100	DIMENSION PBX Attendant Console—Description
554-010-101	DIMENSION-Type PBXs—Auxiliary Circuits—Maintenance Support Information
554-010-110	DIMENSION PBX Electronic Custom Telephone Service—System Description
554-010-122	DIMENSION PBX Station Message Detail Recording

TABLE VV

WIRED AND PRINTED BACKPLANE LINE CARRIER TERMINATIONS

LEAD DESIG	LEAD COLOR	(SEE NOTE) FROM ADDED CARRIER		(SEE NOTE) TO EXISTING CARRIER	
RNGG	W	1ST LINE CARRIER (J58879AC)	LKTS1 TERM 6 OR LP07	TERMINAL 7 GROUND WINDOW	
RNG	R-Y		LKTS1 TERM 4 OR LP09	J58879PC-2, L4 BLUE BURNDY CONN	
RNGG	W	2ND LINE CARRIER (J58879AC)	LKTS1 TERM 6 OR LP07	PRECEDING J58879AC	LKTS1 TERM 6 OR LP07
RNG	R-Y		LKTS1 TERM 4 OR LP09		LKTS1 TERM 5 OR LP09
RNGG	W	3RD LINE CARRIER (J58879AC)	LKTS1 TERM 6 OR LP07	PRECEDING J58879AC	LKTS1 TERM 6 OR LP07
RNG	R-Y		LKTS1 TERM 4 OR LP09		LKTS1 TERM 5 OR LP09
RNGG	W	4TH LINE CARRIER (J58879AC)	LKTS1 TERM 6 OR LP07	TERMINAL 12 GROUND WINDOW	
RNG	R-Y		LKTS1 TERM 4 OR LP09	J58879PC-2, L5 BLUE BURNDY CONNECTOR	
RNGG	W	5TH LINE CARRIER (J58879AC)	LKTS1 TERM 6 OR LP07	PRECEDING J58879AC	LKTS1 TERM 6 OR LP07
RNG	R-Y		LKTS1 TERM 4 OR LP09		LKTS1 TERM 5 OR LP09

Note: Terminal strip LKTS1 is located on J58879AC-1 (MD). Terminals LP07 and LP08 are located on J58879AC-2 (STD).

SECTION	TITLE
554-010-130	DIMENSION PBX—Remote Maintenance, Administration, and Traffic System (RMATS-1)— Description and Operation
554-101-100	DIMENSION 400 PBX—System Description
554-101-105	DIMENSION 100 and 400 PBXs—General Software Description and Call Processing—Maintenance Support Information
554-101-106	DIMENSION 100 and 400 PBXs—Scanner/Distributor and Network Control—Maintenance Support Information
554-101-107	DIMENSION 100 and 400 PBXs—PAM Network and Port Circuits—Maintenance Support Information
554-101-108	DIMENSION 100 and 400 PBXs Central Processor—Maintenance Support Information
554-101-115	X-Ray Program Package—Operating Procedure—DIMENSION 100 and 400 PBXs and RMATS-1 Central Facility
554-191-100	DIMENSION PBX Feature Document Reference Guide
631-400-102	Cable and Terminal Board in the Subscriber's Building

SECTION	TITLE
801-026-171	CPFT Equipment Design Requirements—Common Systems
809-002-100	PBX Equipment Space
876-300-100	Electrical Protection

9.02 The following schematic diagrams (SDs) and associated circuit descriptions (CDs) are applicable and may be referred to when required.

SD-1C586-01 1	TOUCH-TONE Calling Receiving Circuit Type G1
SD-1E440-01 1	System Application
SD-1E441-01 25B	Power Distribution
SD-1E442-01 14AC	Processor, Memory, and Alarm Circuits
SD-1E443-01 7B	Processor Interface Circuits
SD-1E444-01 16B	Signal Distribution Circuits
SD-1E445-01 14B	Line, Attendant, and Tone Circuits
SD-1E446-01 14D	Central Office, Tie, Auxiliary Trunk, and Register and Conference Circuits
SD-1E449-01 15B	Station Message Detail Recording
SD-1E451-01 4D	102C and 102D Display Circuits
SD-1E460-01 1	PBX System CSS 201 Data Channel Repeater
SD-5E038-01 9D	Recorded Telephone Dictation Trunk
SD-69910-01 8AC	Attendant Electronic Console
SD-66926-01 15AC	Switching System 400 Interface Trunk Circuit
SD-7C0101-01 9B	Specification for CPFT
SD-95283-01 9B	Recorded Announcement Unit

10. FILL-IN WORKSHEETS

10.01 The following worksheets should be reproduced locally and the originals kept with the section for use in planning future changes.

- Worksheet 1—Emergency Transfer Connections
- Worksheet 2—Attendant Console Repeater Connections
- Worksheet 3—Cross-Connections for Centralized Attendant Service and UCD Interface (LC15)
- Worksheet 4—3A Code Call Access Cross-Connections
- Worksheet 5—Data Channel Repeater Connections for J58879CA Carrier
- Worksheet 6—Connections for Loudspeaker Paging—89A Control Unit
- Worksheet 7—Connections for Loudspeaker Paging with Chime Paging and Music Background
- Worksheet 8—Music-on-Hold Cross Connections
- Worksheet 9—Radio Paging Access Cross-Connections
- Worksheet 10—Recorded Announcement Cross-Connections
- Worksheet 11—Recorded Telephone Dictation Trunk Unit Cross-Connections
- Worksheet 12—Auxiliary Field Cross-Connections for 44V4 or 24V4 Repeaters
- Worksheet 13—Trunk Answer From Any Station (TAAS) Cross-Connections
- Worksheet 14—Tie Trunk (LC11B) Switch Section Settings.

WORKSHEET 1
(SHEET 1 OF 2)
EMERGENCY TRANSFER CONNECTIONS

FROM					TO TERM. BLOCK A OR B ON 609-TYPE UNIT (SEE NOTE)	EMER TRANSFER CONNECTIONS
LOCATION	BACKBOARD	CONN. BLK NO.	TERM. NO.	TERM. DESIG.		
From Station____	Blue (Station EQPT)			T R Start	1 2 3	First or Sixth EMER Transfer CONN
From PBX Line CKT____	Purple (PBX Lines)			T R	4 5	
From GRD Start CO TRK____	Green (CO Trunks)			T R	6 7	
From PBX CO TRK CKT____	Purple (PBX Trunks)			T R	8 9	
From Station____	Blue (Station EQPT)			T R Start	11 12 13	Second or Seventh EMER Transfer CONN
From PBX Line CKT____	Purple (PBX Lines)			T R	14 15	
From GRD Start CO TRK____	Green (CO Trunks)			T R	16 17	
From PBX CO TRK CKT____	Purple (PBX Trunks)			T R	18 19	
From Station____	Blue (Station EQPT)			T R Start	21 22 23	Third or Eighth EMER Transfer CONN
From PBX Line CKT____	Purple (PBX Lines)			T R	24 25	
From GRD Start CO TRK____	Green (CO Trunks)			T R	26 27	
From PBX CO TRK CKT____	Purple (PBX Trunks)			T R	28 29	

NOTE: The first through the fifth emergency transfer connections are connected to TBA on the panel and the sixth through the tenth are connected to TBB on the panel.

WORKSHEET 1
(SHEET 2 OF 2)
EMERGENCY TRANSFER CONNECTIONS

FROM					TO CONN BLOCK A OR B ON 609A UNIT	EMER TRANSFER CONNECTIONS
LOCATION	BACKBOARD	CONN. BLK NO.	TERM. NO.	TERM. DESIG.		
From Station____	Blue (Station EQPT)			T R Start	31 32 33	Fourth or Ninth EMER Transfer CONN
From PBX Line CKT____	Purple (PBX Lines)			T R	34 35	
From GRD Start CO TRK____	Green (CO Trunks)			T R	36 37	
From PBX CO TRK CKT____	Purple (PBX Trunks)			T R	38 39	
From Station____	Blue (Station EQPT)			T R Start	41 42 43	Fifth or Tenth EMER Transfer CONN
From PBX Line CKT____	Purple (PBX Lines)			T R	44 45	
From GRD Start CO TRK____	Green (CO Trunks)			T R	46 47	
From PBX CO TRK CKT____	Purple (PBX Trunks)			T R	48 49	
CX01	Purple		41	BATT or -48PX	2 TBC	
CX01	Purple		34	SGRD	1 TBC	
From Single Point Ground			APPR GRD	GSGRD	45 TBC	

WORKSHEET 2
(SHEET 1 OF 3)
ATTENDANT CONSOLE REPEATER CONNECTIONS

FROM				TO
PURPLE FIELD CONN BLK OOCA_ _ TERM. NO.	YELLOW FIELD CONN BLK TERM. NO.	LEAD DESIGNATION	CONN CABLE COLOR CODE	REPEATER CONN BLOCK TERMINAL TB1
1	1	IOXAO (+ DATA IN)	W-BL	1A
2	2	IOXBO (- DATA IN)	BL-W	2A
3	3	IORAO (+ DATA OUT)	W-O	3A
4	4	IORBO (- DATA OUT)	O-W	4A
5	5	T (+ SPEECH IN)	W-G	5A
6	6	R (- SPEECH IN)	G-W	6A
7	7	T1 (+ SPEECH OUT)	W-BR	7A
8	8	R1 (- SPEECH OUT)	BR-W	8A
9	9	GRDCF	W-S	9A
10	10	GRDCF	S-W	10A
11	11	AMN (MINOR ALARM)	R-BL	11A
12	12	AMJ (MAJOR ALARM)	BL-R	12A
13	13	+5C1 OR +5CSL	R-O	13A
14	14	-48C_ RES	O-R	14A
15	15	GRD-48	R-G	15A
16	16	-48C_	G-R	16A
17	17	GRD-48	R-BR	17A
18	18	-48C_	BR-R	18A
19	19	GRD-48	R-S	19A
20	20	-48C_	S-R	20A
21	21	GRD-48	BK-BL	21A
22	22	-48C_	BL-BK	22A
23	23	GRD-48	BK-O	23A
24	24	-48C_	O-BK	24A
25	25	GRD-48	BK-G	25A
26	26	-48C_	G-BK	26A
27	27	GRD-48	BK-BR	27A
28	28	-48C_	BR-BK	28A
29	29	GRD-48	BK-S	29A
30	30	-48C_	S-BK	30A
31	31	GRD-48	Y-BL	31A
32	32	-48C_	BL-Y	32A
33	33	GRD-48	Y-O	33A
34	34	-48C_	O-Y	34A
35	35	GRD-48	Y-G	35A
36	36	-48C_	G-Y	36A
37	37	GRD-48	Y-BR	37A
38	38	-48C_	BR-Y	38A
39	39	GRD-48	Y-S	39A
40	40	-48C_	S-Y	40A
41	41	GRD-48	V-BL	41A
42	42	-48C_	BL-V	42A
43	43	GRD-48	V-O	43A
44	44	-48C_	O-V	44A
45	45	GRD-48	V-G	45A
46	46	-48C_	G-V	46A
47	47	GRD-48	V-BR	47A
48	48	-48C_	BR-V	48A
49	49	GRD-48	V-S	49A
50	50	-48C_	S-V	50A

WORKSHEET 2
(SHEET 2 OF 3)
ATTENDANT CONSOLE REPEATER CONNECTIONS

FROM			TO
PBX END REPEATER OR CASCADE REPEATER P/O TB1	LEAD DESIGNATION	CONN CABLE COLOR CODE	CONSOLE END REPEATER OR CASCADE REPEATER P/O TB1
1E	XT	W-BL	1A
2E	XR	BL-W	2A
3E	RT	W-O	3A
4E	RR	O-W	4A
5E	T	W-G	5A
6E	R	G-W	6A
7E	T1	W-BR	7A
8E	R1	BR-W	8A
9E		W-S	9A
10E		S-W	10A
11E	AMND	R-BL	11A
12E	AMJD	BL-R	12A
13E		R-O	13A
14E		O-R	14A
15E	GRDP	R-G	15A
16E	−48P	G-R	16A
17E	GRDP	R-BR	17A
18E	−48	BR-R	18A
19E	GRDP	R-S	19A
20E	−48	S-R	20A
21E	GRDP	BK-BL	21A
22E	−48	BL-BK	22A
23E	GRDP	BK-O	23A
24E	−48	O-BK	24A
25E	GRDP	BK-G	25A
26E	−48	G-BK	26A
27E	GRDP	BK-BR	27A
28E	−48	BR-BK	28A
29E	GRDP	BK-S	29A
30E	−48	S-BK	30A
31E	GRDP	Y-BL	31A
32E	−48	BL-Y	32A
33E	GRDP	Y-O	33A
34E	−48	O-Y	34A
35E	GRDP	Y-G	35A
36E	−48	G-Y	36A
37E	GRDP	Y-BR	37A
38E	−48	BR-Y	38A
39E	GRDP	Y-S	39A
40E	−48	S-Y	40A
41E	GRDP	V-BL	41A
42E	−48	BL-V	42A
43E	GRDP	V-O	43A
44E	−48	O-V	44A
45E	GRDP	V-G	45A
46E	−48	G-V	46A
47E	GRDP	V-BR	47A
48E	−48	BR-V	48A
49E	GRDP	V-S	49A
50E	−48	S-V	50A

WORKSHEET 2
(SHEET 3 OF 3)
ATTENDANT CONSOLE REPEATER CONNECTIONS

FROM	TO		
REPEATER CONSOLE PBX TERM. NO.	LEAD DESIGNATION	CONN CABLE COLOR CODE	CONSOLE CONN TERM. NO.
1E	IOXAO (+ DATA IN)	W-BL	1
2E	IOXBO (- DATA IN)	BL-W	2
3E	IORAO (+ DATA OUT)	W-O	3
4E	IORBO (- DATA OUT)	O-W	4
5E	T (+ SPEECH IN)	W-G	5
6E	R (- SPEECH IN)	G-W	6
7E	T1 (+ SPEECH OUT)	W-BR	7
8E	R1 (- SPEECH OUT)	BR-W	8
9E	GRDCF	W-S	9
10E	GRDCF	S-W	10
11E	AMN (MINOR ALARM)	R-BL	11
12E	AMJ (MAJOR ALARM)	BL-R	12
13E	COMM ALARM	R-O	13
14E	-48C -17 REG	O-R	14
15E	VIN +	R-G	15
16E	VIN -	G-R	16
17E	VIN +	R-BR	17
18E	VIN -	BR-R	18
19E	VIN +	R-S	19
20E	VIN -	S-R	20
21E	VIN +	BK-BL	21
22E	VIN -	BL-BK	22
23E	VIN +	BK-O	23
24E	VIN -	O-BK	24
25E	VIN +	BK-G	25
26E	VIN -	G-BK	26
27E	VIN +	BK-BR	27
28E	VIN -	BR-BK	28
29E	VIN +	BK-S	29
30E	VIN -	S-BK	30
31E	VIN +	Y-BL	31
32E	VIN -	BL-Y	32
33E	VIN +	Y-O	33
34E	VIN -	O-Y	34
35E	VIN +	Y-G	35
36E	VIN -	G-Y	36
37E	VIN +	Y-BR	37
38E	VIN -	BR-Y	38
39E	VIN +	Y-S	39
40E	VIN -	S-Y	40
41E	VIN +	V-BL	41
42E	VIN -	BL-V	42
43E	VIN +	V-O	43
44E	VIN -	O-V	44
45E	VIN +	V-G	45
46E	VIN -	G-V	46
47E	VIN +	V-BR	47
48E	VIN -	BR-V	48
49E	VIN +	V-S	49
50E	VIN -	S-V	50

WORKSHEET 3

CROSS-CONNECTIONS FOR CENTRALIZED ATTENDANT SERVICE AND UCD INTERFACE (LC15)

FROM				TO		FROM	TO		
TRK CARRIER_____							YELLOW EKBD		SSI, LSI OR BEEHIVE
CONN CABLE			CKT NO.	LEAD DESIG (LC15)	CONN CABLE COLOR CODE	CONN BLK 0_TX0_OR 0_TCX0_TERM.	CONN BLK	TERM.	
0_TX01 0_TCX01	0_TX02 0_TCX02	0_TX03 0_TCX03							
SLOT 02	SLOT 05 (04)	SLOT 08 (07)	0	CID	W-BL	1			
				CIG	BL-W	2			
			1	CID	W-O	3			
				CIG	O-W	4			
			2	CID	W-G	5			
				CIG	G-W	6			
			3	CID	W-BR	7			
				CIG	BR-W	8			
			4	CID	W-S	9			
				CIG	S-W	10			
			5	CID	R-BL	11			
				CIG	BL-R	12			
			6	CID	R-O	13			
				CIG	O-R	14			
			7	CID	R-G	15			
				CIG	G-R	16			
SLOT 03 (02)	SLOT 06 (05)	SLOT 09 (08)	0	CID	R-BR	17			
				CIG	BR-R	18			
			1	CID	R-S	19			
				CIG	S-R	20			
			2	CID	BK-BL	21			
				CIG	BL-BK	22			
			3	CID	BK-O	23			
				CIG	O-BK	24			
			4	CID	BK-G	25			
				CIG	G-BK	26			
			5	CID	BK-BR	27			
				CIG	BR-BK	28			
			6	CID	BK-S	29			
				CIG	S-BK	30			
			7	CID	Y-BL	31			
				CIG	BL-Y	32			
SLOT 04 (03)	SLOT 07 (06)		0	CID	Y-O	33			
				CIG	O-Y	34			
			1	CID	Y-G	35			
				CIG	G-Y	36			
			2	CID	Y-BR	37			
				CIG	BR-Y	38			
			3	CID	Y-S	39			
				CIG	S-Y	40			
			4	CID	Y-BL	41			
				CIG	BL-Y	42			
			5	CID	V-O	43			
				CIG	O-V	44			
			6	CID	V-G	45			
				CIG	G-V	46			
			7	CID	V-BR	47			
				CIG	BR-V	48			

WORKSHEET 4
3A CODE CALL ACCESS CROSS-CONNECTIONS

CROSS-CONNECT										
FROM			TO/FROM	TO/FROM	TO/FROM	TO 3A CODE CALL UNIT			
PBX EQUIPMENT		LEAD DESIG	CONN BLK --TXO-- OR --TCX-- (PURPLE)	CONN BLK 00AX01	CONN BLK (YELLOW)	TERM. CKT 1 TSA	TERM. CKT 2 TSA	CODE SEND UNIT TSA	"TOUCH-TONE" DIALING CONVERTER TSB
LC08D (PORT 1) CAB___ CARR___ SLOT___	CKT 0	T				1T			
		R				2T			
	CKT 1	T				7T			
		R				8T			
LC08D (PORT 2) CAB___ CARR___ SLOT___	CKT 0	T					1T		
		R					2T		
	CKT 1	T					7T		
		R					8T		
LC04 OR LC204 CAB___ CARR___ SLOT 2		T00		2				3B	
TRAFFIC MEASUREMENT SYSTEM		TMS				3T			
		TMS					37		
FUSE PANEL		-48V				13T			
		GRD				16T			
		-48V					13T		
		GRD					16T		
		-48V						7B	
		GRD						10B	
		-48V							31
		GRD							11

WORKSHEET 5

(SHEET 1 OF 2)

DATA CHANNEL REPEATER CONNECTIONS FOR J58879CA CARRIER

SLOT LOC OF LC34B INSTLD IN CONT CARR	DATA LEADS			CROSS-CONNECT		REPEATER AT PBX END		CASCADE REPEATER		CASCADE REPEATER		REPEATER AT ECTS CONTR END		CROSS-CONNECT	
				CONN BLK PURPLE FIELD 00CX01	CONN BLK YELLOW FIELD	TERM. BLK 1 (TB1)		TERM. BLK 1 (TB1)		TERM. BLK 1 (TB1)		TERM. BLK 1 (TB1)		CONN BLK YELLOW FIELD	CONN BLK RED FIELD KX01
	CKT	DESIG	COLOR			TO A OR E	FROM B OR D	TO A OR E	FROM B OR D	TO A OR E	FROM B OR D	TO A OR E	FROM B OR D		
33	0	I0XB	W-BL	1											2
		I0XA	BL-W	2											1
		I0RB	W-O	3											6
		I0RA	O-W	4											5
	1	I0XB	W-G	5											2
		I0XA	G-W	6											1
		I0RB	W-BR	7											6
		I0RA	BR-W	8											5
34	0	I0XB	W-S	9											2
		I0XA	S-W	10											1
		I0RB	R-BL	11											6
		I0RA	BL-R	12											5
	1	I0XB	R-O	13											2
		I0XA	O-R	14											1
		I0RB	R-G	15											6
		I0RA	G-R	16											5
35	0	I0XB	R-BR	17											2
		I0XA	BR-R	18											1
		I0RB	R-S	19											6
		I0RA	S-R	20											5
	1	I0XB	BK-BL	21											2
		I0XA	BL-BK	22											1
		I0RB	BK-O	23											6
		I0RA	O-BK	24											5

WORKSHEET 5

(SHEET 2 OF 2)

DATA CHANNEL REPEATER CONNECTIONS FOR J58879CA CARRIER

SLOT LOC AND CKT NO. FOR LC366 IN CONT/TRK CARRIER		MAAP EQPT TRNSL		DATA LEADS		CROSS-CONNECT			REPEATER AT PBX END		CASCADE REPEATER		CASCADE REPEATER		REPEATER AT ECTSCONTR END		CROSS-CONNECT	
						CONN BLK PURPLE FIELD		CONN BLK YELLOW FIELD	TERM. BLK 1 (TB1)		TERM. BLK 1 (TB1)		TERM. BLK 1 (TB1)		TERM. BLK 1 (TB1)		CONN BLK YELLOW FIELD	CONN BLK RED FIELD KX01
SLOT	CKT	SLOT	CKT	DESIG	COLOR	CX01	CX05		TO A OR E	FROM B OR D	TO A OR E	FROM B OR D	TO A OR E	FROM B OR D	TO A OR E	FROM B OR D		
30/33	2	33	0	IOXB	W-BL	1	—											2
				IOXA	BL-W	2	—											1
				IORB	W-O	3	—											6
				IORA	O-W	4	—											5
	3	33	1	IXOB	W-G	5	—											2
				IXOA	G-W	6	—											1
				IORB	W-BR	7	—											6
				IORA	BR-W	8	—											5
31/34	2	34	0	IOXB	W-S	9	—											2
				IOXA	S-W	10	—											1
				IORB	R-BL	11	—											6
				IORA	BL-R	12	—											5
	3	34	1	IOXB	R-O	13	—											2
				IOXA	O-R	14	—											1
				IORB	R-G	15	—											6
				IORA	G-R	16	—											5
35/36	0	35	0	IOXB	W-BL	—	1											2
				IOXA	BL-W	—	2											1
				IORB	W-O	-	3											6
				IORA	O-W	—	4											5
	1	35	1	IOXB	W-G	—	5											2
				IOXA	G-W		6											1
				IORB	W-BR	—	7											6
				IORA	BR-W	—	8											5
	2	36	0	IOXB	W-S	—	9											2
				IOXA	S-W	—	10											1
				IORB	R-BL	—	11											6
				IORA	BL-R	—	12											5
	3	36	1	IOXB	R-O	—	13											2
				IOXA	O-R	-	14											1
				IORB	R-	—	15											6
				IORA	G-R	—	16											5
32/37	2	37	0	IOXB	W-BL	—	17											2
				IOXA	BL-W	—	18											1
				IORB	W-O	—	19											6
				IORA	O-W	—	20											5

WORKSHEET 6
CONNECTIONS FOR LOUDSPEAKER PAGING – 89A CONTROL UNIT

CROSS-CONNECT							CROSS-CONNECT	
FROM				TO	89A CONTROL UNIT		TO - FROM	TO
PBX (NOTE 1)		PURPLE BKBD		YELLOW BKBD			DEMARCATION BLOCK	CUSTOMER EQUIPMENT
LEAD DESIG		CONN _TCX0_ OR _TX0_	BLK OOCX01 (NOTE 2)	CONN BLK___	TO	FROM		TS___
TX0_ OR _TCX0_	CX01	TERM	TERM	TERM.	TERM.		TERM.	TERM.
T					T	CT	PAGING AMP, INPUT	
R					R	CR	PAGING AMP, INPUT	
AL1					BSY2	CBS1	ENABLE CONTACT	
S2					PG2	CBS2	ENABLE CONTACT	
	-48V				PG1	CMS1	MUSIC SOURCE	
	GRD				BSY1	CMS2	MUSIC SOURCE	
						CTS1	EXTERNAL TONE SOURCE	
						CTS2	EXTERNAL TONE SOURCE	
						COS1	BUSY OUT CONTACT	
						COS2	BUSY OUT CONTACT	

AUXILIARY TRUNK _____ CARRIER _____
SLOT _____ CIRCUIT _____

Note 1: The loudspeaker paging circuit is on LC13 in slots 2 through 9 of the trunk carrier or slots 2 through 8 of the control/trunk carrier. Associated leads appear in TX01, TX02, and TX03 or TCX01, TCX02, and TCX03.

Note 2: If option (S) is to be used, the -48V and GRD leads are to be connected to terminals 2 and 3 respectively on Terminal Block C of the 609A Panel; Terminals 50 (-48V) and 47 (GRD) connect to the yellow backboard and then to PG1 and BSY1 respectively on the 89A control panel.

WORKSHEET 7

CONNECTIONS FOR LOUDSPEAKER PAGING WITH CHIME PAGING AND MUSIC BACKGROUND

CROSS-CONNECT									CROSS-CONNECT					
FROM			TO / FROM			TO / FROM	89A CONTROL UNIT FOR LOUDSPEAKER PAGING AND MUSIC		89A CONTROL UNIT FOR CHIME PAGING		DEMARCATION BLOCK (SEE NOTE)		TO CUSTOMER EQUIPMENT TS___	
PBX LEAD DESIGNATIONS FOR			PURPLE BKBD			YELLOW BKBD								
			CONN BLK TERM.				TERMINALS		TERMINALS		TERMINALS		LEAD FUNCTION	TERM.
TX0__ OR TCX0__	AX01	CX01	__TX 0_OR _TC XO_	00 AX 01	00 CX 01	CONN BLK TERM.	TO	FROM	TO	FROM	TO	FROM		
T	–	–		–	–		T							
R	–	–		–	–		R							
AL1	–	–		–	–		BSY2							
S2	–	–		–	–		PG2							
–	–	-48V	–	–			PG1							
–	–	GRD	–	–			BSY1							
–	–	–						CT					AMP INPUT	
–	–	–						CR					AMP INPUT	
–	–	–						CMS1					MUSIC SOURCE	
–	–	–						CMS2					MUSIC SOURCE	
–	–	–						CTS1						
–	–	–						CTS2						
–	–	–						CBS1						
–	–	–						CBS2						
–	–	–						COS1					BUSY OUT	
–	–	–						COS2					BUSY OUT	
–	T/0071	–	–	31	–				BSY1					
–	R/0071	–	–	32	–				BSY2					
–	T/0072	–	–	33	–				PG1					
–	R/0072	–	–	34	–				PG2					
–	T/0073	–	–	35	–				T					
–	R/0073	–	–	36	–				R					
										CBS2				
										CBS1				
										COS2			BUSY OUT	
										COS1			BUSY OUT	
										CT				
										CR				

AUXILIARY TRUNK _____ CARRIER _____ SLOT _____ CIRCUIT _____

Note: The demarcation block terminals associated with the respective 89A control leads as shown are to be strapped together.

WORKSHEET 8

MUSIC-ON-HOLD CROSS-CONNECTIONS

AUX TRUNK INTFC CKT LEAD DESIG	PURPLE BKBD CONN BLOCK __TX0 _OR __TCX0 _	YELLOW BKBD CONN BLOCK	31B OR 31D VOICE COUPLER (SEE NOTE)		YELLOW BKBD CONN BLOCK	CUSTOMER-PROVIDED MUSIC SOURCE
			PBX SIDE	CPE SIDE		
T			1	3		CT
R			2	4		CR

AUXILIARY TRUNK_____ CARRIER_____

SLOT_____ CIRCUIT_____

Note: 31B voice coupler is grandfathered per FCC rules and may be used if available.

WORKSHEET 9

(SHEET 1 OF 2)

RADIO PAGING ACCESS CROSS-CONNECTIONS

CROSS-CONNECT						CROSS-CONNECT			
FROM			TO / FROM		TO / FROM	TO			
PBX LEAD DESIG FOR		OTHER LEADS	PURPLE BKBD CONN BLK TERM.		YELLOW BKBD CONN BLK TERM.	TERMINAL STRIPS FOR INTERFACE TRUNK UNIT			
TX0__ OR TCX0__	AX01		__TX0__OR __TCX0__	00AX01		TS(A1)	TS(A2)	TS(A16)	TS(A17)
T	—	—		—					
R	—	—		—					
T	—	—		—					
R	—	—		—					
T	—	—		—					
R	—	—		—					
T	—	—		—					
R	—	—		—					
—	T00	—		2		18	—	54	—
—	T10	—		4		—	45	—	—
		TMS				13	—	57	—
		TMS				—	34	—	57

CO TRUNK_____ CARRIER_____

SLOT_____ CIRCUIT_____

WORKSHEET 9

(SHEET 2 OF 2)

RADIO PAGING ACCESS CROSS-CONNECTIONS

CROSS-CONNECT						
FROM				TO FROM	TO FROM	TO DEMARCATION BLOCK
INTERFACE TRUNK UNIT				YELLOW BKBD CONN BLK___	31B/31D VOICE COUPLER	
LEAD DESIG	TS(A1)	TS(A2)	TS(A3)			
T	52	—	—		1 3	
R	42	—	—		2 4	
S1	36	—	—			
S2	26	—	—			
PS1	56	—	—			
PS2	46	—	—			
IS1	—	24	—			
IS2	—	14	—			
AT1	—	53	—			
AT2	—	43	—			
AK1	—	52	—			
AK2	—	42	—			
ER1	—	32	—			
ER2	—	12	—			
RLS	—	23	—			
RLS1	—	13	—			
RLS2	—	33	—			
AC	—	—	14			
A1	—	—	24			
A2	—	—	34			
A3	—	—	44			
A4	—	—	54			
BC	—	—	13			
B1	—	—	23			
B2	—	—	33			
B3	—	—	43			

WORKSHEET 10
RECORDED ANNOUNCEMENT
CROSS-CONNECTIONS

LEAD DESIG FOR AUXILIARY TRUNK INTERFACE CIRCUIT AT TXO_ OR TCXO_ CONNECTOR	CROSS-CONNECT			
	TO / FROM		TO	
	PURPLE BKBD	YELLOW BKBD		
	_ _ TXO_ OR _ _ TCXO_ CONN BLK		RECORDED ANCMT UNIT	TB1
	TERM.	CONN BLK TERM.	LEAD DESIG	TERM.
T			T	
R			R	
AL1			AL1	43
S2			ST	24
			G1	23
			G5	38

AUXILIARY TRUNK_____ CARRIER_____

SLOT_____ CIRCUIT_____

WORKSHEET 11

(SHEET 1 OF 3)

RECORDED TELEPHONE DICTATION TRUNK UNIT CROSS-CONNECTIONS

PBX LEAD DESIG FOR		CROSS-CONNECT					
		FROM		TO / FROM	FROM		
TX0__ OR TCX0__	AX01	PURPLE FIELD CONN BLOCK		YELLOW FIELD CONN BLK	RECORDED TELEPHONE DICTATION UNIT		
		__TX0__OR __TCX0__	00AX01				
		TERM.	TERM.	TERM.	LEAD DESIG	TS(A)	TS(B)
T	—		—		T	58	
R	—		—		R	48	
S2	—		—		S2	15	
—	T00	—	2		T00		44
—	T10	—	4		T10	47	

AUXILIARY TRUNK_____ CARRIER_____

SLOT_____ CIRCUIT_____

WORKSHEET 11

(SHEET 2 OF 3)

RECORDED TELEPHONE DICTATION TRUNK UNIT CROSS-CONNECTIONS

RCD TEL DIC TRK UNIT LEAD DESIG	CROSS-CONNECT				
	FROM		TO / FROM	TO / FROM	TO
	RCD TEL DIC TRK UNIT		CONN BLK	CONN BLK	DEMARCATION TERMINAL STRIP
	TERM. STRIP	TERM.	YELLOW BKBD	BLUE BKBD	BLK___ TERM.
T1	A	28			(Note 1)
R1	A	18			(Note 1)
PB	A	33		—	(Note 2)
GRD	A	23		—	(Note 2)
				TO / FROM: 31B/31D VOC CPLR	
TT	C	58		1 / 3	
TR	C	47		2 / 4	
C1	C	11		—	
C2	C	21		—	
C3	C	31		—	
C4	C	41		—	
E1	C	12		—	
E2	C	22		—	
E3	C	32		—	
E4	C	42		—	
S1	C	51		—	
S2	C	52		—	
PB1	C	14		—	
PB2	C	24		—	
PB3	C	34		—	
PB4	C	44		—	

Note 1: Connect T/R to dictation attendant telephone set.

Note 2: Connect to dial attendant playback key.

WORKSHEET 11

(SHEET 3 OF 3)

RECORDED TELEPHONE DICTATION TRUNK UNIT CROSS-CONNECTIONS

RCD TEL DIC TRK UNIT LEAD DESIG	CROSS-CONNECT			
	FROM		TO	TO
	RCD TEL DIC TRK UNIT		YELLOW BKBD	DEMARCATION TERMINAL STRIP
	TERM. STRIP	TERM.	BLK___ TERM.	BLK___ TERM.
PB5	C	54		
C	C	53		
B	C	35		
G	C	23		
SS1	C	15		
SS2	C	25		
CT	C	33		
CR	C	43		

WORKSHEET 12

AUXILIARY FIELD CROSS-CONNECTIONS FOR 44V4 OR 24V4 REPEATERS

PBX LEAD DESIG FOR		CROSS-CONNECT			REPEATER	
		FROM		TO / FROM	TO	
TX0__ OR TCX0__	CX01	PURPLE BKBD CONN BLK TERM.		YELLOW BKBD CONN BLOCK	TS1-___	
		__TX0__OR __TCX0__	00CX01	TERM.	24V4	44V4
T	—		—		7	3
R	—		—		19	11
T1	—		—		—	8
R1	—		—		—	16
—	−48V	—	33		35	17
—	GRD	—	36		1	1

TIE TRUNK_____ CARRIER_____

SLOT_____ CIRCUIT_____

LEAD DESIG	FROM REPEATER		CROSS-CONNECT	
			TO / FROM	TO
	TS1-___		YELLOW BKBD CONN BLK TERM.	GREEN BKBD CONN BLK TERM.
	24V4	44V4		
T	3	7		
R	15	15		
T	12	4		
R1	24	12		

WORKSHEET 13

TRUNK ANSWER FROM ANY STATION (TAAS) CROSS-CONNECTIONS

LINE CKT LEAD DESIG	CONN PIN NO. (SEE NOTE)	PURPLE BKBD CONN BLK (SEE NOTE)	YELLOW BKBD CONN BLK (SEE NOTE)	KTU 413A WITH 642A PANEL		AUDIBLE DEVICE (RINGER)	AUDIBLE DEVICE (RINGER) POWER SOURCE (SEE NOTE)
				IN TERM. NO.	OUT TERM. NO.		
T				C8	E7	T	RGND*
R				C9	D9	R	—
—	—	—	—	—	D8	—	RSIG†

LINE CARRIER_____SLOT_____CIRCUIT_____

Note: To be filled in at time of installation.

* Connect to common terminal of power source for the audible device.

† Connect to the terminal of audible device power source to be switched.