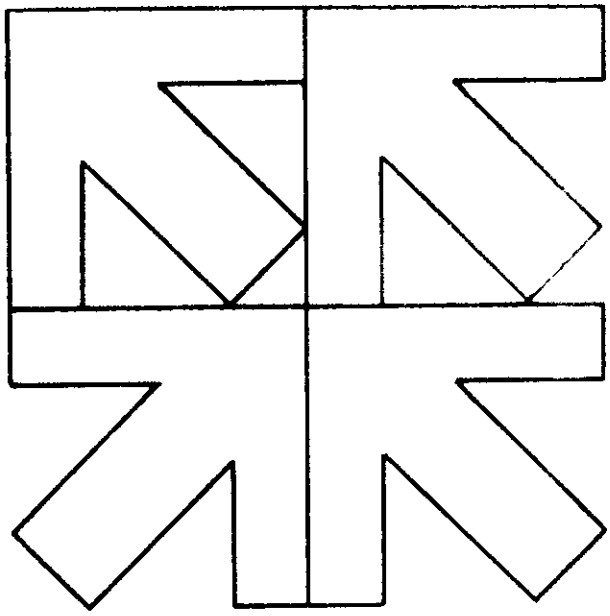
Telrad

Issue 1, March 1985

Key bx 1632C/2864C Office Telephone Systems Customer Service Manual



Installation & Maintenance Manual

TLRD-114-262-127

NOTICE

This manual is applicable to the key bx 1632C and 2864C systems. Telrad, Ltd., reserves the right to make changes in the equipment described herein without prior notification. However, changes in the equipment do not necessarily render this manual invalid.

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Section 1
Introduction

1.1 GENERAL

This manual has been written for those personnel responsible for the installation and maintenance of the key bx 1632C and 2864C. As these two systems are virtually identical the main body of this document begins with an overview of the key bx 1632C and then proceeds with instructions for installation and post-installation checkout. The final section contains troubleshooting charts for field maintenance purposes. Appendix A notes how the 2864C differs from the 1632C, and Appendix B provides the cabling and wiring instructions and Figures for the 2864C installation. Printed circuit board provisioning instructions are given in Appendix C and Appendix D explains alternative configurations for the PFU in conjunction with the emergency telephones.

1.2 REASONS FOR ISSUE

This subsection will provide update information in future issues of this document.

1.3 ADDITIONAL DOCUMENTATION

Field maintenance personnel should be familiar with the key bx 1632C & 2864C System Description manual (TLRD-104-262-114) which gives a detailed description of system features, services and special applications.

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Section 2
System Overview

2.1 GENERAL

The key bx 1632C is a stored program controled switch capable of serving 16 central office (CO) lines and 32 internal communication lines. The key bx can handle all types of trunks (e.g. standard CO lines, PBX, WATS and Centrex lines) and both dual tone multifrequency (DTMF) and impulse dial signaling. The 32 stations served by the key bx may be comprised of standard key bx "smart" sets, Featurephones and single line telephones (SLTs). Furthermore, two stations may be defined as attendant positions and enhanced by the addition of direct station select (DSS) consoles. Two busy lamp field (BLF) consoles (or up to four if the DSS consoles are not installed) can also be supported.

2.2 SYSTEM HARDWARE

2.2.1 Key switching unit - KSU. The key switching unit is the heart of the key bx (see Figure 2-1). The KSU case houses all the control cards, line cards, trunk cards and option cards that interface between the CO lines and the stations to provide the features and services of the key bx. One MS, M, GP, TR and (where impulse dial CO lines are used) ID card is essential to any system configuration. The number of L (line), T (Trunk) and MX (matrix) cards used is dependant on the capacity of the system. Cards R, TRB, TTD, XPG and SLT/OPX are used when extra features and services are included. A description of all the cards used in the key bx is given in the System Description manual (TLRD-104-262-114). A drawing of the KSU case is provided in Figures 2-2 and 2-3.

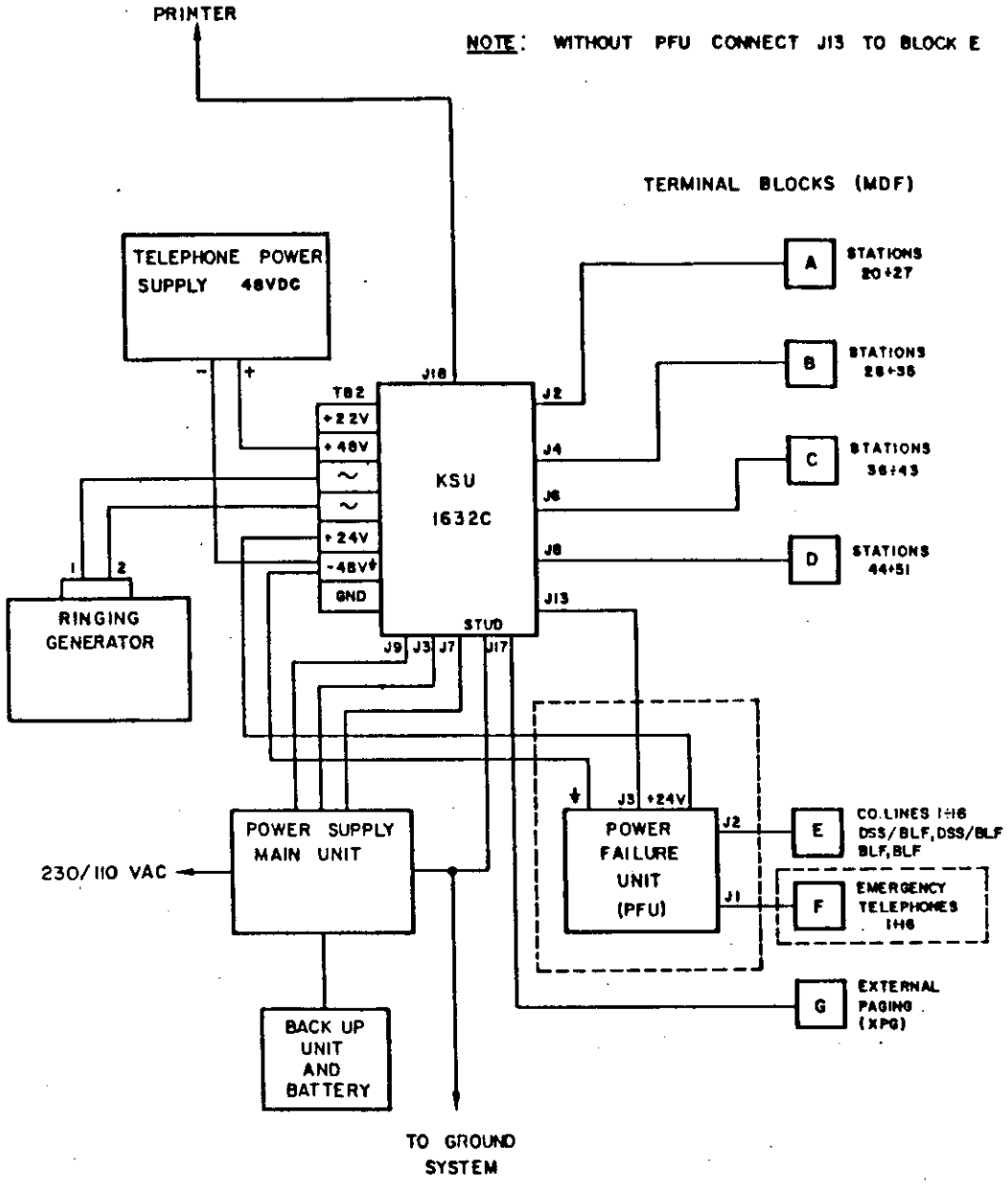

Figure 2-1 key bx system schematic (1632C).

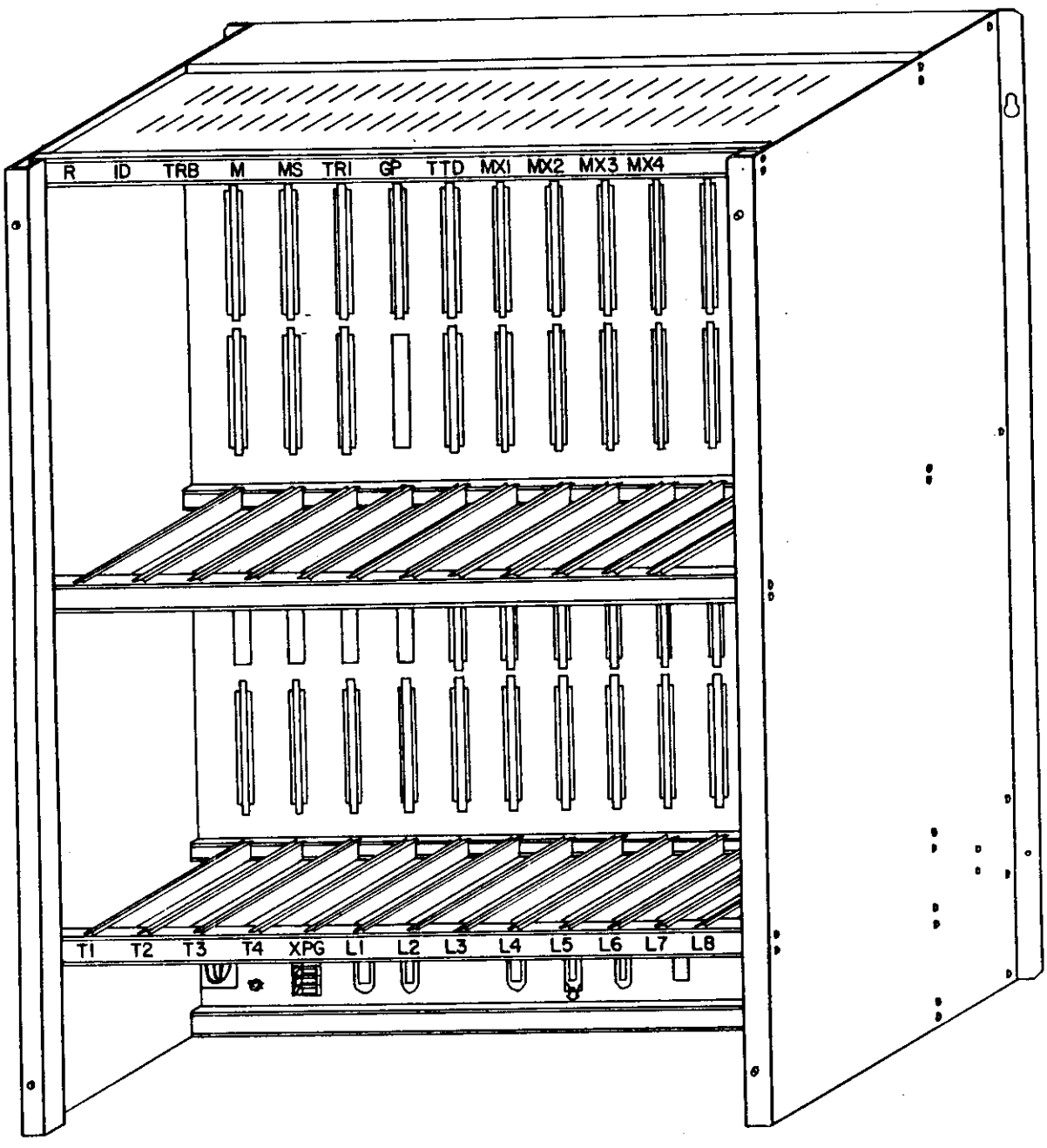

Figure 2-2 KSU: card shelves view (1632C).

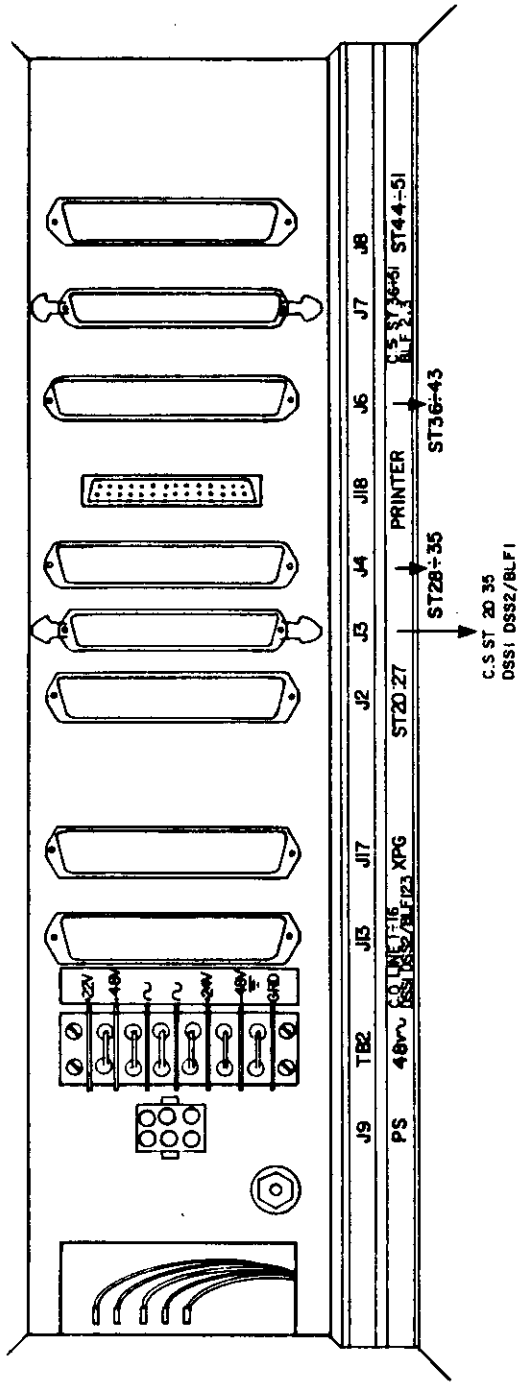

Figure 2-3 KSU: bottom section cable connections view (1632C).

2.2.2 Power supply. The power supply (Figure 2-4) converts ac mains power from a standard power outlet to the dc voltages and current sources required to operate the system.

2.2.3 Battery back-up unit. A battery back-up unit (BBU) can be connected to the power supply to power the system in the event of a mains power failure.

Note: It is recommended that the 24V back-up power source be a dry 24V battery with 60 Amp-hour capacity (to provide two hours of operation at 16 Amps) such as the LT24 (J.C. Penney).

2.2.4 Power failure unit - PFU. In the event of a total power failure (both the mains and the BBU fail) relays in the PFU bypass the KSU and connect the CO lines directly to emergency telephones.

2.3 EXTERNAL EQUIPMENT

The following features and services can be integrated into the key bx with the addition of customer-provided external equipment.

2.3.1 External paging - XPG. The key bx 1632C can be connected to up to four external loudspeakers of a public address system to provide a zoned paging facility.

2.3.2 Music-on-hold. When a calling party is placed on HOLD he may believe he has been disconnected. To avoid this problem an external music source from a radio or tape can be provided to give a calling party an audible indication that he is still on HOLD.

2.3.3 Door unit. A door bell, intercom and electric lock can be attached to the key bx so that an attendant, using the standard key bx set, can be alerted to, speak to and open the door for a person wishing to be admitted.

2.3.4 Printer. A call detail recorder (CDR) records all calls going through the key bx. An RS232C interface is provided for the attachment of any asynchronous ASCII printer for CDR data hardcopy output. Alternatively the RS232C interface may be used to connect a computer to the key bx to perform sorts according to stations for the purposes of billing etc.

2.3.5 External bell. Up to four external bells may be connected to the key bx to alert persons to an incoming calls where the ringing of individual stations would not be heard.

2.3.6 Ringing generator. Where SLT extensions are installed in the system a ringing generator must be provided to supply power to the SLT ringers.

2.3.7 48V voltage source. Where an off-premises SLT extension is installed more than 1000' from the KSU a 48V voltage source must be provided for that extension.

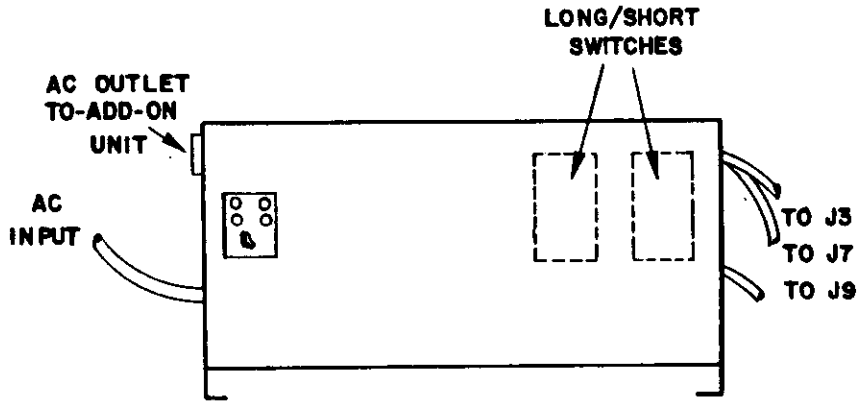

Figure 2-4a Telkoor power supply unit

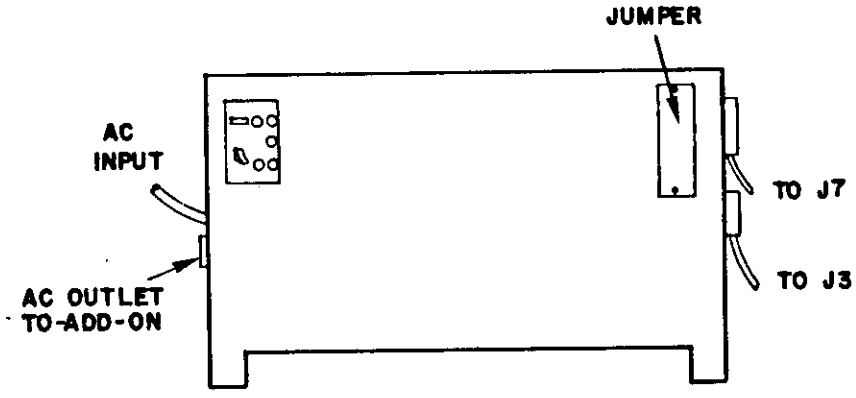

Figure 2-4b Elgin power supply unit.

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Section 3
Installation Requirements

3.1 ENVIRONMENTAL REQUIREMENTS

The Customer Service Representative (CSM) should already have planned the correct location for the KSU and power supply. If any changes have been made to the original plans ensure that the following environmental conditions are met.

- Equipment location must be dry, cool and relatively clean. It must be away from sweating water pipes, high voltage conduits and heavy machinery which can cause vibrations or electromagnetic interference. The room where the equipment is to be located must have a temperature control as extremes of temperature could damage the equipment.

- The equipment should be located as centrally as possible with regard to the extensions so as to avoid overly long cabling.

- The ac power source to be used should not be prone to fluctuations of power due to heavy machinery, air conditioners or other power loads on the same main. Such fluctuations could interfere with system operation.

3.2 KSU LOCATION

The KSU must be wall mounted as all cables to the KSU from the power supply and the MDF enter the unit from below. Furthermore the KSU should be positioned to the right of the power supply since all output lines from the power supply are located on the right side of that unit, and consequently it is advisable that the MDF be located to the right of the KSU. (See Figure 3-1 for a suggested installation layout).

3.3 POWER SUPPLY LOCATION

The power supply must be installed within 2m (6 feet) of an ac power outlet fused at 15 amps. Following 3.2 above, the power supply should be installed to the left of, and approximately 25cm (10in) from, the KSU, level with the lower section of that unit.

3.4 POWER FAILURE UNIT LOCATION

The power failure unit (PFU) connects to the KSU from below and towards the left. Consequently the PFU unit should be located to the left of the KSU either above or below the power supply.

3.5 BATTERY BACK-UP UNIT LOCATION

The BBU connects to the power supply from the right. Accordingly the BBU should be located approximately 25cm (10in) to the left of the power supply.

3.6 MAIN DISTRIBUTION FRAME LOCATION

The main distribution frame (MDF) should be located to the right of the KSU. Other location considerations should include proximity of the outside plant (OSP) cable entrance of the CO lines and distance from extension locations.

3.7 LOCATIONS FOR STATIONS

The location of each station will have already been ascertained by the Customer Service Representative. Ensure that no more than 16 lines are designated as "long lines" (between 160m (500') and 330m (1000')).

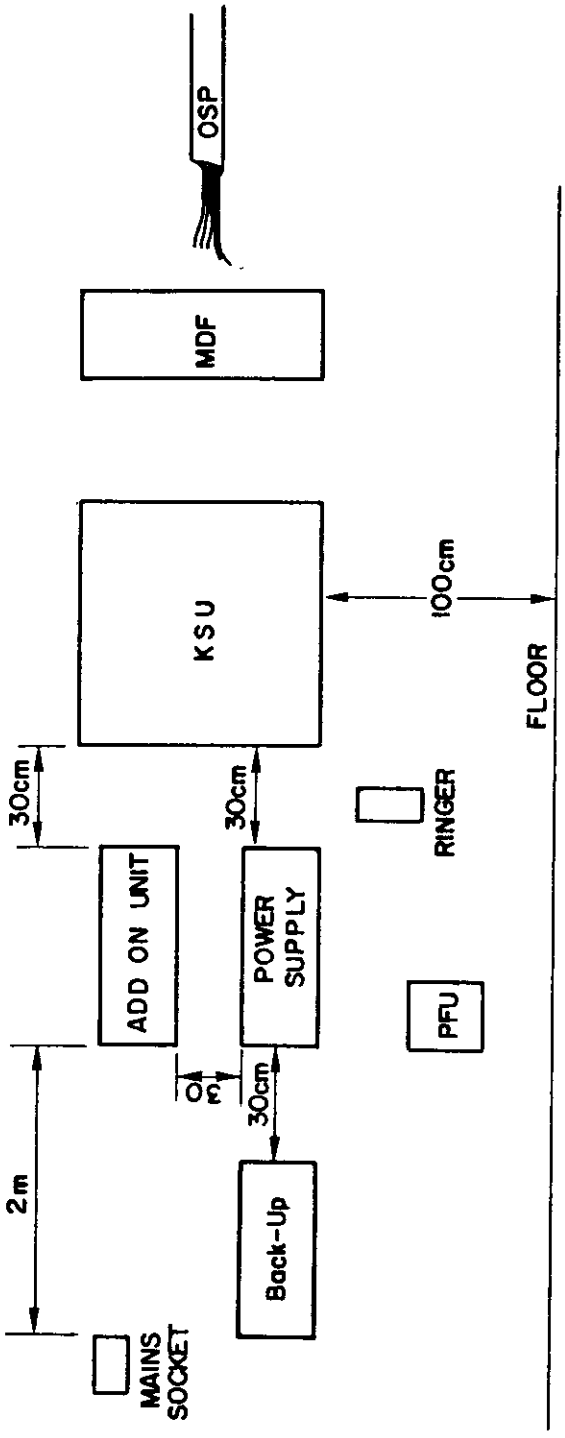

Figure 3-1 KSU, MDF, power supply and BBU installation.

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Section 4
Installation Procedures

4.1 GENERAL

The procedures contained in this section provide a step-by step guide for a complete key bx 1632C or 2864C installation. The procedure for the installation of the power failure unit is, of course, only necessary where an emergency telephone system is to be installed. Likewise the installation of the add-on unit of the power supply is only necessary when more than 32 key bx extensions are to be provided.

4.1.1 Tools required. Only the tools required for the installation of a PABX system are required for installing the key bx 1632C and 2864C. Required test equipment is limited to an ac/dc multimeter.

4.1.2 Precautions. It is recommended that two persons perform the installation of the KSU, power supply and power supply add-on unit, as these units are both heavy and bulky. Note also that the KSU may house up to 25 circuit cards (up to 48 on the 2864C) so that a full KSU weighs in excess of 25 Kg (35 Kg with the 2864C). The power supply and the add-on unit each weigh in excess of 22 Kg. This weight must be borne in mind when deciding the type of screws to use to mount the KSU on any given wall. If the wall is plasterboard or any other non-structural material, drilling screwholes into studs or other structural members may be necessary.

4.2 KSU INSTALLATION

Caution: It is recommended that two persons perform the following operation.

Using the two keyholes on the rear mounting brackets of the KSU case as a template, mark and drill the holes for the two mounting screws. Insert the mounting screws to within 0.5cm of the wall. Position the case on the wall and tighten the screws. Insert a further two screws in the holes on the lower part of the mounting bracket to hold the KSU firmly in place.

4.3 POWER SUPPLY INSTALLATION

CAUTION: It is recommended that two persons perform the following operation.

Using the four key-holes in the rear mounting brackets of the power supply as a template (see Figure 2-4) mark and drill the holes for the four mounting screws. Insert the four screws to within approximately 0.5cm of the wall. Hang the unit on the wall and secure by tightening the screws.

4.3.1 Add-on unit. The add-on unit is mounted in exactly the same way as the power supply.

4.3.2 Battery back-up unit. The BBU is mounted in the same way as the power supply.

4.3.3 Power supply and add-on unit fusing. The correct fuse ratings for the power supply and add-on unit are listed on the unit casings. The Telkoor models have the ratings listed on the left side panel and the Elgin units have the ratings marked above each fuse location.

4.3.4 Strapping. Determine which stations are located more than 160m (500') feet from the KSU. These lines (there must be no more than 16) should be strapped as long lines. Strapping of both the power supply and add-on unit is accomplished as follows:

(a) For the Telkoor unit remove the unit cover (screws are located on the top, front and underside of the unit) and locate the current source heatsinks on the right side of the unit. Slide the switches for each extension to either "SHORT" or "LONG" as required. For example if extension 33 is located more than 160m from the power supply then slide switch 33 to LONG. The add-on unit's switches are accessed in the same way. After strapping is completed replace the unit cover.

(b) For the Elgin unit remove the plastic cover on the upper right section of the front panel. Jumpers for each extension determine line status as SHORT or LONG. Replace plastic cover. Repeat procedure for the add-on unit if necessary.

4.4 STATION INSTALLATION

Unless wall-mounted, the station need only be cabled to a junction box located at that position. No form of mounting is required.

4.4.1 Junction boxes. At each location selected for the stations install one type SE-625A6 junction box. Additional junction boxes will be required for connecting the DSS and/or BLF consoles and for each of the SLT/emergency telephone locations if these options are supplied. The type of junction box required for SLTs and emergency telephones depends on the type of telephone installed.

4.4.2 Wall mounted station installation. The standard key bx station can be used as a desk-top set or as a wall mounted station. To wall mount a station remove the four screws on the base of the set. Remove the lower cover and separate the two sections of the station by disconnceting the flat cable at one end. Locate and remove the four screws that hold the base. Rotate the base 180 degrees. The base can now be fixed to the wall by peeling away the rubber pads in the foot wells and inserting four short screws. Reassemble the set on the wall mounted base and attach the handset hook to the upper part of the cradle (see Figure 4-1).

4.5 POWER FAILURE UNIT INSTALLATION

Remove the cover of the PFU. Using the two upper holes located inside the casing as a template, mark and drill two holes for the mounting screws. Insert two screws and hang the PFU case in position tightening the screws if necessary. Replace the cover.

4.6 GROUNDING

Ground the system by connecting the grounding lug on both the power supply and add-on unit to the stud located beside TB2 on the KSU and to a good ground such as a water pipe.

4.7 CIRCUIT BOARD INSERTION

4.7.1 M1 card. The M1 card is supplied with a memory protect battery in a small plastic bag. Before inserting the M1 card connect the battery to the card as per the enclosed instructions.

4.7.2 SLT and OPX cards. There is no slot designation for SLT or OPX cards. An SLT card to be used with internally wired SLTs can be inserted in place of any line card (L2 through L8). An OPX card which is used with external SLTs over 1000 feet away from the KSU requires a 48V voltage source. **A 48V OPX CARD MUST BE INSERTED IN SLOT L8 ONLY.**

4.7.3 Insertion procedure. Slide each card into its designated slot in the KSU ensuring that the inside connectors of each card are aligned with their female counterparts on the KSU backplane. Using both thumbs on the plastic card tabs press the card firmly into place. Cards in the upper section of the KSU must be inserted with the red tabs upper-most such that the card components face right. Cards in the lower section must be inserted with the white tabs upper-most such that the card components face left

4.7.4 Initialization. To insure proper operation of the Key bx system, a full initialization must be done upon installation or when you change common control cards.

TO INITIALIZE THE SYSTEM

1. Push toggle switch down on the Master Card.

2. Power down system for at least 15 seconds.

3. Power up system and depress the reset button on the Master Card for five seconds and release.

4. Allow the phones to slow scan.

5. When scanning is complete, push the toggle switch on the Master Card to the "up" position.

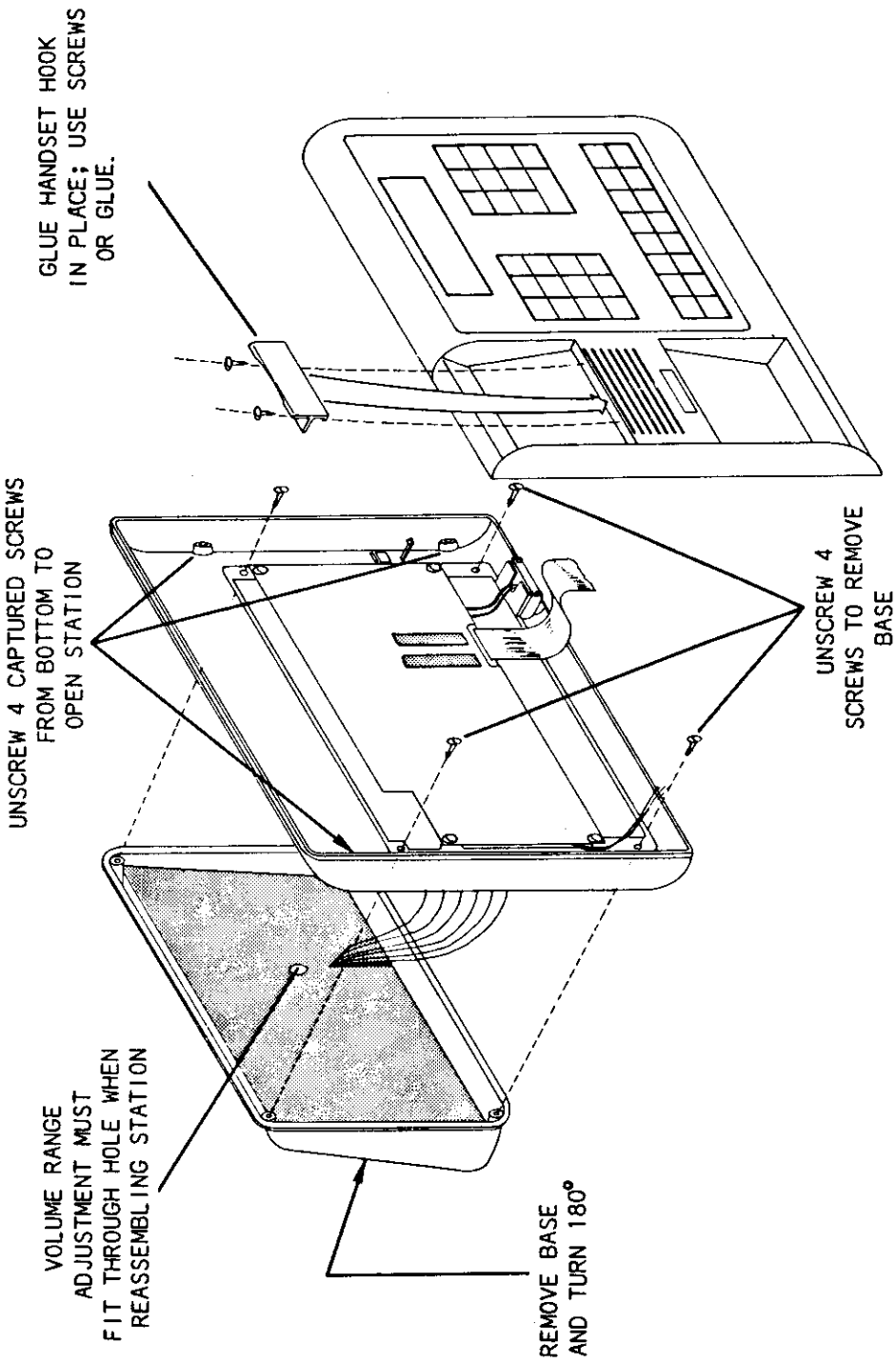

Figure 4-1 Exploded view of key bx station for wall-mounting.

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Section 5
Cabling and Wiring

5.1 GENERAL

This section provides detailed instructions for the cabling of the entire key bx 1632C. Subsections 5-2 and 5-3 are pertinent to both the 1632C and the 2864C. The rest of the section, though not directly pertinent to the 2864C, should be refered to before following the procedures in Appendix B.

Installation personnel should have on hand the cables and connectors (not supplied with the key bx) listed in Table 5-1. Extensive reference is made throughout the section to cabling Figures 5-1 through 5-6. To avoid confusion it is advised that these Figures are followed meticulously.

TABLE 5-1

key bx Cables and Connectors (not supplied)

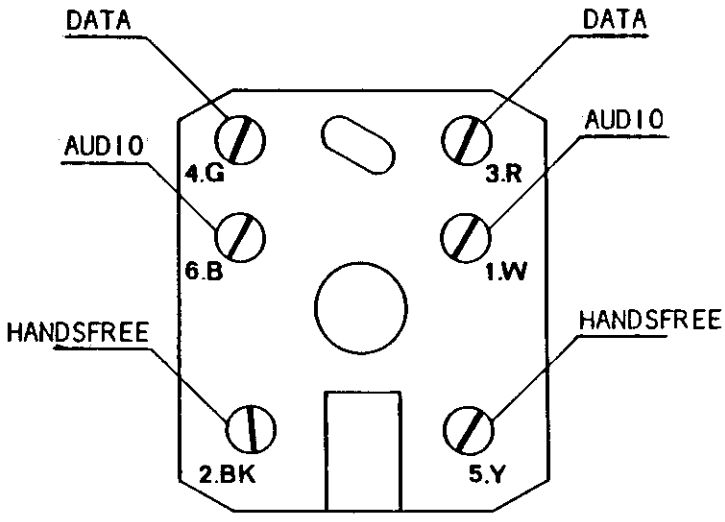
ITEM	USE
25-pair cable (24-AWG)	KSU connections J2, J4, J6, J8, J13 and J17 (J5, J10, J12, J14, J16)
Champ 552031-1 (AMP, Inc)	25-pair cable plug terminations
Champ 552011-1 or similar	90° cover for plugs
3-pair crossconnect or covered wire	MDF to junction box cabling
Type SE-625A6 junction box (or compatible)	Station or DSS location junct. box
6-wire modular cord with RJ-14C jack	Station to junction box cabling
* MDF block types are according to installer's preference *	

5.2 STATION AND DSS/BLF CABLING

> Caution: When routing cables avoid areas of extreme temperature or humidity or areas close to high voltage lines. Fluorescent lights and electrical or electromechanical equipment should also be avoided.

5.2.1 Station cabling. At each station location connect a station to the junction box using six wire modular cord terminated at each end with a standard RJ-14C telephone jack. Connect each junction box to its designated MDF block using three-pair crossconnect or three-pair covered wire (24-AWG). Junction box wiring instructions for the standard set are provided in Figure 5-1a and for SLTs in 5-1b. Connect each junction box to its designated MDF block (A,B,C or D) station side as per Figures 5-3 to 5-6. Clamp or staple the cable in place along the route between the junction box and the MDF.

5.2.2 DSS/BLF cabling. Wire the DSS/BLF junction box as shown in Figure 5-1a. (The HF pair are not used by the DSS/BLF).Using three-pair crossconnected or covered cable connect the junction box to the MDF on block E and wire according to Figure 5-4.



Note: Handsfree pair need not be connected for DSS use.

Figure 5-1a Station/DSS junction box wiring.

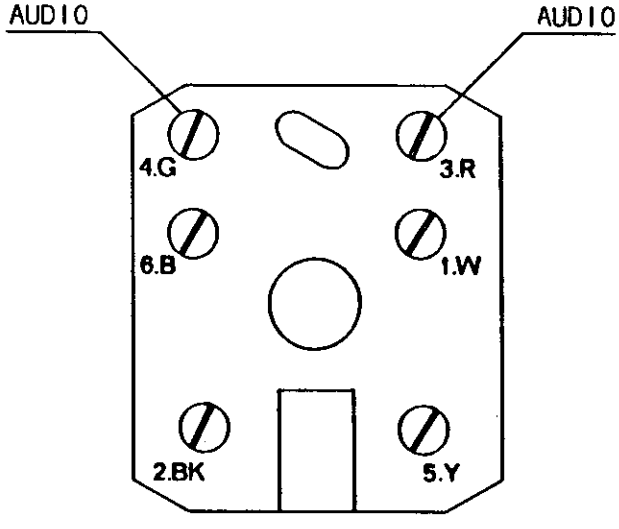
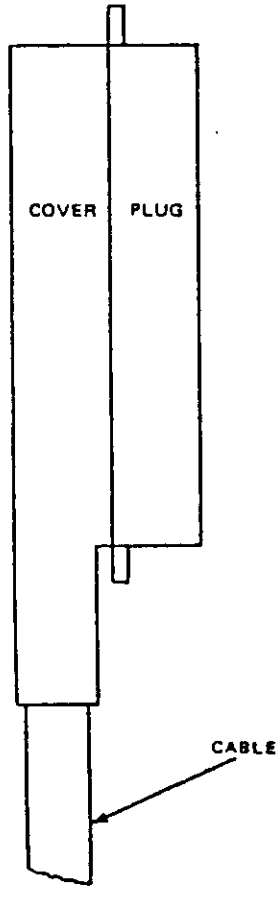
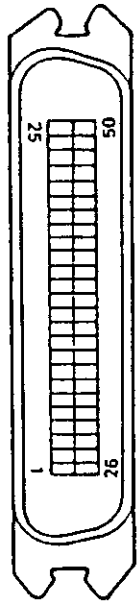


Figure 5-1b SLT junction box wiring.

5.3 CABLE TERMINATIONS

All cables between the KSU and the MDF are terminated at the KSU side using a standard Amp-Champ 25-pair 90 degree male connector (see Figure 5-2). If connectorized blocks are used on the MDF, the MDF side of the cable should also be terminated in the same way.





FEMALE CONNECTOR
FRONT VIEW

50	VS	SV	25
	VBn	VBn	
	VG	GV	
	VO	OV	
	VB	BV	
	YS	SY	
	YBn	BnY	
	YG	GY	
	YO	OY	
	YB	BY	
	BKS	SBK	
	BKBn	BnBK	
	BKG	GBK	
	BKO	OBK	
	BKB	BBK	
	RS	SR	
	RBn	BnR	
	RG	GR	
	RO	OR	
	RB	BR	
	WS	SW	
	WBn	BnW	
	WG	GW	
	WO	OW	
26	WB	BW	1

Figure 5-2 25-pair Amp-Champ connector with 90 deg. cover.

Note: For cabling and wiring of the 2864C refer to Appendix B.

5.4 CABLING KSU-MDF

The KSU is connected to the MDF via six 25-pair cables designated J2, J4, J6, J8, J13 and J17. Where an emergency telephone system is to be installed, cable J13 will connect the KSU to the PFU (see Figure 2-3). To connect the cables to the MDF proceed as follows:

(a) Connect cable J2 to MDF block A as per Figure 5-3. This block will interface with stations 20 through 27;

(b) Connect cable J4 to MDF block B as per Figure 5-4. This block will interface with stations 28 through 35;

(c) Connect cable J6 to MDF block C as per Figure 5-5. This block will interface with stations 36 through 43;

(d) Connect cable J8 to MDF block D as per Figure 5-6. This block will interface with stations 44 through 51;

(e) Connect cable J13 to MDF block E (unless a PFU is installed) as per Figure 5-7. This block interfaces with CO lines 1 through 16 as well as the DSS consoles, BLFs and the music-on-hold source;

(f) Connect cable J17 to MDF block G as per Figure 5-8. This block will interface with the various external options such as external paging, door units, etc,.

BLOCK A

FROM			TO		
ORIGIN	PIN	COLOR	JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
	26	WHI-BLU	W		
	1	BLU-WHI	B	AUDIO	
	27	WHI-ORN	Bk		
	2	ORN-WHI	Y	HF	20
	28	WHI-GRN	R		
	3	GRN-WHI	G	DATA	
	29	WHI-BRN	W		
	4	BRN-WHI	B	AUDIO	
	30	WHI-SLA	Bk		
	5	SLA-WHI	Y	HF	21
	31	RED-BLU	R		
L	6	BLU-RED	G	DATA	
1	32	RED-ORN	W		
	7	ORN-RED	B	AUDIO	
	33	RED-GRN	Bk		
	8	GRN-RED	Y	HF	22
	34	RED-BRN	R		
	9	BRN-RED	G	DATA	
	35	RED-SLA	W		
	10	SLA-RED	B	AUDIO	
	36	BLK-BLU	Bk		
	11	BLU-BLK	Y	HF	23
	37	BLK-ORN	R		
	12	ORN-BLK	G	DATA	
	38	BLK-GRN	W		
	13	GRN-BLK	B	AUDIO	
	39	BLK-BRN	Bk		
	14	BRN-BLK	Y	HF	24
	40	BLK-SLA	R		
	15	SLA-BLK	G	DATA	
	41	YEL-BLU	W		
	16	BLU-YEL	B	AUDIO	
	42	YEL-ORN	Bk		
	17	ORN-YEL	Y	HF	25
	43	YEL-GRN	R		
	18	GRN-YEL	G	DATA	
L	44	YEL-BRN	W		
2	19	BRN-YEL	B	AUDIO	
	45	YEL-SLA	Bk		
	20	SLA-YEL	Y	HF	26
	46	VIO-BLU	R		
	21	BLU-VIO	G	DATA	
	47	VIO-ORN	W		
	22	ORN-VIO	B	AUDIO	
	48	VIO-GRN	Bk		
	23	GRN-VIO	Y	HF	27
	49	VIO-BRN	R		
	24	BRN-VIO	G	DATA	
	50	VIO-SLA			
	25	SLA-VIO		SPARE	

Figure 5-3 KSU to MDF: station connections.

BLOCK B

FROM				TO	
ORIGIN	PIN	COLOR	JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
	26	WHI-BLU	W		
	1	BLU-WHI	B	AUDIO	
	27	WHI-ORN	Bk		
	2	ORN-WHI	Y	HF	28
	28	WHI-GRN	R		
	3	GRN-WHI	G	DATA	
	29	WHI-BRN	W		
	4	BRN-WHI	B	AUDIO	
	30	WHI-SLA	Bk		
	5	SLA-WHI	Y	HF	29
	31	RED-BLU	R		
L	6	BLU-RED	G	DATA	
3	32	RED-ORN	W		
	7	ORN-RED	B	AUDIO	
	33	RED-GRN	Bk		
	8	GRN-RED	Y	HF	30
	34	RED-BRN	R		
	9	BRN-RED	G	DATA	
	35	RED-SLA	W		
	10	SLA-RED	B	AUDIO	
	36	BLK-BLU	Bk		
	11	BLU-BLK	Y	HF	31
	37	BLK-ORN	R		
	12	ORN-BLK	G	DATA	
	38	BLK-GRN	W		
	13	GRN-BLK	B	AUDIO	
	39	BLK-BRN	Bk		
	14	BRN-BLK	Y	HF	32
	40	BLK-SLA	R		
	15	SLA-BLK	G	DATA	
	41	YEL-BLU	W		
	16	BLU-YEL	B	AUDIO	
	42	YEL-ORN	Bk		
	17	ORN-YEL	Y	HF	33
	43	YEL-GRN	R		
L	18	GRN-YEL	G	DATA	
4	44	YEL-BRN	W		
	19	BRN-YEL	B	AUDIO	
	45	YEL-SLA	Bk		
	20	SLA-YEL	Y	HF	34
	46	VIO-BLU	R		
	21	BLU-VIO	G	DATA	
	47	VIO-ORN	W		
	22	ORN-VIO	B	AUDIO	
	48	VIO-GRN	Bk		
	23	GRN-VIO	Y	HF	35
	49	VIO-BRN	R		
	24	BRN-VIO	G	DATA	
	50	VIO-SLA			
	25	SLA-VIO		SPARE	

Figure 5-4 KSU to MDF: station connections.

BLOCK C

FROM				TO		
ORIGIN	PIN	COLOR		JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
	26	WHI-BLU	- - - -	W		
	1	BLU-WHI	- - - -	B	AUDIO	
	27	WHI-ORN	- - - -	Bk		
	2	ORN-WHI	- - - -	Y	HF	36
	28	WHI-GRN	- - - -	R		
	3	GRN-WHI	- - - -	G	DATA	
	29	WHI-BRN	- - - -	W		
	4	BRN-WHI	- - - -	B	AUDIO	
	30	WHI-SLA	- - - -	Bk		
	5	SLA-WHI	- - - -	Y	HF	37
	31	RED-BLU	- - - -	R		
L	6	BLU-RED	- - - -	G	DATA	
5	32	RED-ORN	- - - -	W		
	7	ORN-RED	- - - -	B	AUDIO	
	33	RED-GRN	- - - -	Bk		
	8	GRN-RED	- - - -	Y	HF	38
	34	RED-BRN	- - - -	R		
	9	BRN-RED	- - - -	G	DATA	
	35	RED-SLA	- - - -	W		
	10	SLA-RED	- - - -	B	AUDIO	
	36	BLK-BLU	- - - -	Bk		
	11	BLU-BLK	- - - -	Y	HF	39
	37	BLK-ORN	- - - -	R		
	12	ORN-BLK	- - - -	G	DATA	
	38	BLK-GRN	- - - -	W		
	13	GRN-BLK	- - - -	B	AUDIO	
	39	BLK-BRN	- - - -	Bk		
	14	BRN-BLK	- - - -	Y	HF	40
	40	BLK-SLA	- - - -	R		
	15	SLA-BLK	- - - -	G	DATA	
	41	YEL-BLU	- - - -	W		
	16	BLU-YEL	- - - -	B	AUDIO	
	42	YEL-ORN	- - - -	Bk		
	17	ORN-YEL	- - - -	Y	HF	41
	43	YEL-GRN	- - - -	R		
L	18	GRN-YEL	- - - -	G	DATA	
6	44	YEL-BRN	- - - -	W		
	19	BRN-YEL	- - - -	B	AUDIO	
	45	YEL-SLA	- - - -	Bk		
	20	SLA-YEL	- - - -	Y	HF	42
	46	VIO-BLU	- - - -	R		
	21	BLU-VIO	- - - -	G	DATA	
	47	VIO-ORN	- - - -	W		
	22	ORN-VIO	- - - -	B	AUDIO	
	48	VIO-GRN	- - - -	Bk		
	23	GRN-VIO	- - - -	Y	HF	43
	49	VIO-BRN	- - - -	R		
	24	BRN-VIO	- - - -	G	DATA	
	50	VIO-SLA	- - - -			
	25	SLA-VIO	- - - -		SPARE	

Figure 5-5 KSU to MDF: station connections.

BLOCK D

FROM				TO	
ORIGIN	PIN	COLOR	JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
	26	WHI-BLU	W		
	1	BLU-WHI	B	AUDIO	
	27	WHI-ORN	Bk		
	2	ORN-WHI	Y	HF	44
	28	WHI-GRN	R		
	3	GRN-WHI	G	DATA	
	29	WHI-BRN	W		
	4	BRN-WHI	B	AUDIO	
	30	WHI-SLA	Bk		
	5	SLA-WHI	Y	HF	45
	31	RED-BLU	R		
L	6	BLU-RED	G	DATA	
7	32	RED-ORN	W		
	7	ORN-RED	B	AUDIO	
	33	RED-GRN	Bk		
	8	GRN-RED	Y	HF	46
	34	RED-BRN	R		
	9	BRN-RED	G	DATA	
	35	RED-SLA	W		
	10	SLA-RED	B	AUDIO	
	36	BLK-BLU	Bk		
	11	BLU-BLK	Y	HF	47
	37	BLK-ORN	R		
	12	ORN-BLK	G	DATA	
	38	BLK-GRN	W		
	13	GRN-BLK	B	AUDIO	
	39	BLK-BRN	Bk		
	14	BRN-BLK	Y	HF	48
	40	BLK-SLA	R		
	15	SLA-BLK	G	DATA	
	41	YEL-BLU	W		
	16	BLU-YEL	B	AUDIO	
	42	YEL-ORN	Bk		
	17	ORN-YEL	Y	HF	49
	43	YEL-GRN	R		
L	18	GRN-YEL	G	DATA	
8	44	YEL-BRN	W		
	19	BRN-YEL	B	AUDIO	
	45	YEL-SLA	Bk		
	20	SLA-YEL	Y	HF	50
	46	VIO-BLU	R		
	21	BLU-VIO	G	DATA	
	47	VIO-ORN	W		
	22	ORN-VIO	B	AUDIO	
	48	VIO-GRN	Bk		
	23	GRN-VIO	Y	HF	51
	49	VIO-BRN	R		
	24	BRN-VIO	G	DATA	
	50	VIO-SLA			
	25	SLA-VIO		SPARE	

Figure 5-6 KSU to MDF: station connections.

BLOCK E

FROM			TO		
ORIGIN	PIN	COLOR	COLOR OR DESIGNATION	FUNCTION	CONNECTS TO
T 1	26	WHI-BLU	T1		TRUNK 1
	1	BLU-WHI	R1		
	27	WHI-ORN	T2		TRUNK 2
	2	ORN-WHI	R2		
	28	WHI-GRN	T3		TRUNK 3
	3	GRN-WHI	R3		
	29	WHI-BRN	T4		TRUNK 4
	4	BRN-WHI	R4		
T 2	30	WHI-SLA	T5		TRUNK 5
	5	SLA-WHI	R5		
	31	RED-BLU	T6		TRUNK 6
	6	BLU-RED	R6		
	32	RED-ORN	T7		TRUNK 7
	7	ORN-RED	R7		
	33	RED-GRN	T8		TRUNK 8
	8	GRN-RED	R8		
T 3	34	RED-BRN	T9		TRUNK 9
	9	BRN-RED	R9		
	35	RED-SLA	T10		TRUNK 10
	10	SLA-RED	R10		
	36	BLK-BLU	T11		TRUNK 11
	11	BLU-BLK	R11		
	37	BLK-ORN	T12		TRUNK 12
	12	ORN-BLK	R12		
T 4	38	BLK-GRN	T13		TRUNK 13
	13	GRN-BLK	R13		
	39	BLK-BRN	T14		TRUNK 14
	14	BRN-BLK	R14		
	40	BLK-SLA	T15		TRUNK 15
	15	SLA-BLK	R15		
	41	YEL-BLU	T16		TRUNK 16
	16	BLU-YEL	R16		
T R B C A R D	42	YEL-ORN	W		DSS/ BLF
	17	ORN-YEL	B	POWER	
	43	YEL-GRN	R		
	18	GRN-YEL	G	DATA	
	44	YEL-BRN	W		DSS/ BLF
	19	BRN-YEL	B	POWER	
	45	YEL-SLA	R		
	20	SLA-YEL	G	DATA	
	46	VIO-BLU	W		BLF
	21	BLU-VIO	B	POWER	
	47	VIO-ORN	R		
	22	ORN-VIO	G	DATA	
	48	VIO-GRN	W		BLF
	23	GRN-VIO	B	POWER	
	49	VIO-BRN	R		
	24	BRN-VIO	G	DATA	
GP CARD	50	VIO-SLA		MUSIC-ON-HOLD	TAPE/ RADIO
	25	SLA-VIO			

Figure 5-7 KSU to MDF: CC lines, DSS/BLF and MOH connections.

BLOCK G

FROM				TO		
ORIGIN	PIN	COLOR		COLOR OR DESIGNATION	FUNCTION	CONNECTS TO
	26	WHI-BLU			SPEECH	EXT. PG.
	1	BLU-WHI			PATH	ZONE 184
	27	WHI-ORN			SPEECH	EXT. PG.
	2	ORN-WHI			PATH	ZONE 185
	28	WHI-GRN			SPEECH	EXT. PG.
	3	GRN-WHI			PATH	ZONE 186
	29	WHI-BRN			SPEECH	EX.P./DOOR
	4	BRN-WHI			PATH	UNIT 187
	30	WHI-SLA				
	5	SLA-WHI				
	31	RED-BLU		NO	DRY	EXTERNAL
	6	BLU-RED		C	CONTACT	BELL
	32	RED-ORN		NO	DRY	EXTERNAL
	7	ORN-RED		C	CONTACT	BELL
	33	RED-GRN		NO	DRY	EXTERNAL
X	8	GRN-RED		C	CONTACT	BELL
	34	RED-BRN		NO	DRY	EXTERNAL
P	9	BRN-RED		C	CONTACT	BELL
	35	RED-SLA		NO	DRY	DOOR
G	10	SLA-RED		C	CONTACT	UNIT
	36	BLK-BLU		NO	DRY	
	11	BLU-BLK		C	CONTACT	OPTIONAL
C	37	BLK-ORN		NO	DRY	SWITCHES
	12	ORN-BLK		C	CONTACT	
A	38	BLK-GRN		C	DRY	EXTERNAL
	13	GRN-BLK		NC		PAGING
R	39	BLK-BRN		NO	CONTACT	ZONE 184
	14	BRN-BLK		C	DRY	EXTERNAL
D	40	BLK-SLA		NC		PAGING
	15	SLA-BLK		NO	CONTACT	ZONE 185
	41	YEL-BLU		C	DRY	EXTERNAL
	16	BLU-YEL		NC		PAGING
	42	YEL-ORN		NO	CONTACT	ZONE 186
	17	ORN-YEL		C	DRY	EXTERNAL
	43	YEL-GRN		NC		PAGING
	18	GRN-YEL		NO	CONTACT	ZONE 187
	44	YEL-BRN		GND		DOOR
	19	BRN-YEL		INPUT	SENSOR	UNIT
	45	YEL-SLA				
	20	SLA-YEL				
	46	VIO-BLU				
	21	BLU-VIO				
	47	VIO-ORN				
	22	ORN-VIO				
	48	VIO-GRN				
	23	GRN-VIO				
	49	VIO-BRN				
	24	BRN-VIO				
	50	VIO-SLA				
	25	SLA-VIO				

Figure 5-8 KSU to MDF: external connections.

Figure 5-8 KSU to MDF: external connections.

5.5 CABLING POWER SUPPLY TO KSU

5.5.1 Voltage cable connection. Before connecting the six pin voltage cable to the KSU it is important to check the four dc voltage outputs. Connect the unit to the ac power outlet and switch the power supply to ON. Using a multimeter set to the dc volts scale check each connector pin for the following tolerances with the common meter lead placed on pin 2 or 6.

- o Pin 1 -- +24V +/-1.2V
- o Pin 3 -- +22V +/-1.1V
- o Pin 4 -- +12V +/-0.6V
- o Pin 5 -- +5V + 0.25V

If the voltage on any pin is not within the above tolerances the power supply is unusable and must be replaced. If the pin readings are correct then switch the power supply to OFF and proceed to connect the voltage cable to position J9 on the KSU (see Figure 2-3). The J9 cable connector is keyed and so cannot be inserted incorrectly. Ensure the cable is firmly clipped in place.

5.5.2 Current source cable connections. Connect current source cables J3 and J7 to their respective female receptacles on the KSU (see Figure 2-3) and clip firmly in place.

5.6 CABLING PFU-KSU

Remove the PFU cover. Using a 25-pair 24-AWG cable terminated at each end with an Amp-Champ male connector, connect J3, located on the right of the PFU to J13 on the KSU. Connect the black and red wires originating from the lower right section of the PFU to TB2 connections -48VGND and +24V respectively. (See Figure 2-3).

5.7 CABLING PFU-MDF

Attach two 25-pair cables terminated at one end with an Amp-Champ male connector to the two female Amp-Champ receptacles designated J1 and J2 on the left of the unit. Connect J2 unterminated end to block E on the MDF as per Figure 5-7. Connect J1 to block F on the MDF as per Figure 5-9. If connectorized blocks are used then terminate cables J1 and J2 accordingly.

5.8 CABLING PFU-MDF

Attach two 25-pair cables terminated at one end with an Amp-Champ male connector to the two female Amp-Champ receptacles designated J1 and J2 on the left of the unit. Connect J2 unterminated end to block E on the MDF as per Figure 5-7. Connect J1 to block F on the MDF as per Figure 5-9. If connectorized blocks are used then terminate cables J1 and J2 accordingly.

BLOCK F

FROM			TO	
ORIGIN	PIN	COLOR	COLOR OR DESIGNATION	EMERGENCY TELEPHONE
	26	WHI-BLU	T1	
	1	BLU-WHI	R1	ET 1
	27	WHI-ORN	T2	
	2	ORN-WHI	R2	ET 2
	28	WHI-GRN	T3	
	3	GRN-WHI	R3	ET 3
	29	WHI-BRN	T4	
	4	BRN-WHI	R4	ET 4
	30	WHI-SLA	T5	
	5	SLA-WHI	R5	ET 5
	31	RED-BLU	T6	
	6	BLU-RED	R6	ET 6
	32	RED-ORN	T7	
P	7	ORN-RED	R7	ET 7
	33	RED-GRN	T8	
F	8	GRN-RED	R8	ET 8
	34	RED-BRN	T9	
U	9	BRN-RED	R9	ET 9
	35	RED-SLA	T10	
	10	SLA-RED	R10	ET 10
	36	BLK-BLU	T11	
	11	BLU-BLK	R11	ET 11
	37	BLK-ORN	T12	
	12	ORN-BLK	R12	ET 12
	38	BLK-GRN	T13	
	13	GRN-BLK	R13	ET 13
	39	BLK-BRN	T14	
	14	BRN-BLK	R14	ET 14
	40	BLK-SLA	T15	
	15	SLA-BLK	R15	ET 15
	41	YEL-BLU	T16	
	16	BLU-YEL	R16	ET 16
	42	YEL-ORN		
	17	ORN-YEL		
	43	YEL-GRN		
	18	GRN-YEL		
	44	YEL-BRN		
	19	BRN-YEL		
	45	YEL-SLA		
	20	SLA-YEL		
	46	VIO-BLU		
	21	BLU-VIO		
	47	VIO-ORN		
	22	ORN-VIO		
	48	VIO-GRN		
	23	GRN-VIO		
	49	VIO-BRN		
	24	BRN-VIO		
	50	VIO-SLA		
	25	SLA-VIO		

Figure 5-9 PFU to MDF: emergency telephone connections.

Section 6
Additional Equipment

6.1 EXTERNAL PAGING

The external paging facility requires the insertion of an XPG card in the KSU. The output of the KSU to the external page unit is -13 db over a 600 ohm line. Most commercially available paging systems are compatible with the key bx. Wiring to block G is shown in Figure 5-8. Note that three leads are supplied for the dry contacts on each of the external paging zones. Check the type of circuit required for the paging unit (normally open NO, or normally closed NC) and connect accordingly.

6.2 MUSIC-ON-HOLD

Pair 50/25 (VS/SV) of MDF block E (see Figure 5-7) is used for receiving music for calls placed on HOLD. The key bx requires an input of -8 db and has an input resistance of 600 ohms. The earphone output of a portable radio is adequate for this purpose.

6.3 PRINTER

Almost any asynchronous ASCII printer may be used to output CDR data. A standard RS232C interface is used utilizing pins 3 and 7 only.

6.4 DOOR UNIT

Door unit circuits are wired to MDF block G as shown in Figure 5-8. Note that if a door unit intercom is wired to the key bx it is done at the expense of the fourth external paging loudspeaker (page zone 187). The door unit facility requires the XPG card.

6.5 EXTERNAL BELLS

External bells may be wired to the system on MDF block G as per Figure 5-8.

6.6 EXTERNAL RINGER

If SLT extensions are used in the system a ringing generator must be installed. This is connected to the KSU on TB2 (see Figure 6-1). When an external ringer is installed a jumper has to be placed between points " ~ " and "+22Vdc" on TB2.

6.7 48V VOLTAGE SOURCE

Where the SLTs are used in conjunction with the CPX card as off premises extensions, a 48V voltage source must be connected to the TB2 as shown in Figure 6-2. Local codes may also require the placing of a jumper between -48V GND and the KSU chassis ground.

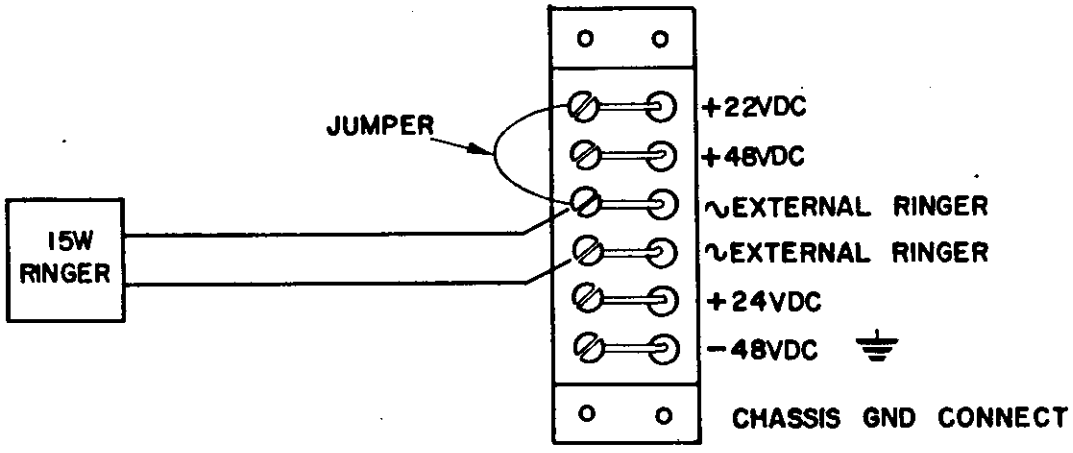


Figure 6-1 SLT ringer connection to TB2.

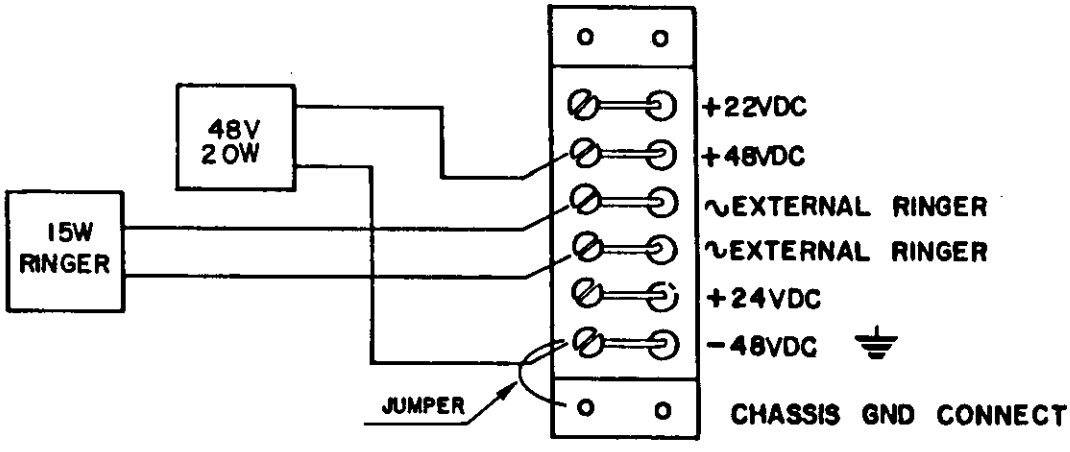


Figure 6-2 48Vdc connections to TB2.

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Section 7
Post-Installation Checkout

7.1 CABLING

After the system has been installed check all cabling and wiring against the appropriate figures. In particular the following should be checked:

(a) Station connections to the junction boxes. Check jacks are in place. Examine junction box for loose wiring.

(b) Cabling between the junction boxes and the MDF blocks.

(c) Ensure all connections to the KSU are firmly in place. Current source connectors should be clipped in position.

7.2 PRINTED CIRCUIT BOARDS

Verify that all cards are firmly seated in their respective slots. Check that M1 card is fitted with memory protection battery. Check that the switch on the MS card is in the correct position (see 4.7.3 Note:).

7.3 TB2 CONNECTIONS

Check that connections to TB2 are secured and that the jumpers (if required) are correctly placed (see Figures 6-1 and 6-2).

7.4 FUSING

Check all fusing. AC mains outlet should be fused at 15 Amps. Fuses for the power supply and add-on units are listed on the unit casings.

7.5 GROUNDING

Check all grounding. Connect grounding wire from the power supply and add-on unit to the stud located beside TB2 on the KSU and to a good ground such as a water pipe.

7.6 CHECKOUT COMPLETION

Following the completion of the above checkout procedures the system may still require provisional software programming before the power-up tests listed in Section 8 can be performed. Programming is necessary if;

(a) SLT extensions are installed (in which case ensure the SLT extensions are supported by a SLT line card);

(b) Rotary CC lines are to be connected.

Section 8
Power-Up Tests

8.1 GENERAL

This section details the correct responses and indications of a properly installed key bx system. If any of these responses or indications is not recorded refer to Section 9 Troubleshooting Charts.

8.2 POWER-UP TEST

Connect the power supply to the ac power outlet and, if necessary, switch the outlet to ON. Move the power switch on the power supply to ON. Observe the amber lamp on the power supply indicating a power throughput.

8.3 SYSTEM CHECK

On power-up observe the CO line buttons on any station. The LEDs on the buttons will light sequentially. After approximately five seconds this will stop. This indicates the system is operating. On power-up the station display will show 1 1 12:00.

8.4 STATION CHECKS

To verify correct wiring of each station go to one station and perform the following;

(1) Lift the handset and listen for dial tone indicating that the station is correctly wired through the junction box and the MDF.

(2) Initiate hands-free calls to all stations. Check answer-back response. This verifies HFTB.

(3) Go to station 20 and, using the DSS, initiate HF calls to all the other stations. Verify HF to each station. Faults may be indicated by a flashing LED and/or an error tone.

Note: Featurephones and SLIs have no HF capability.

8.5 INTERNAL CALLS

Lift the handset and initiate a call to another station by dialing a three digit number. Check for the return of ringing and ringback tones. Verify that conversation is possible between the two stations and replace the handset. Repeat this procedure for all the stations in the system.

8.6 FEATURES

Once all the cabling, station and audio, HF and data checks have been carried out, checks may be performed to verify the correct operation of all the features of the key bx stations and DSS (where provided). For the operating procedures refer to the Operating Instructions manual (ILRD-104-262-115).

8.7 SYSTEM CUTOVER

8.7.1 CO line connection. At this stage the CO lines must be connected to block E on the MDF as per Figure 5-7. (The 2864C CO lines are connected to blocks I and K per Figures B-9 and B-10).

8.7.2 CO line checkout. Following system cutover depress one of the CO line buttons and listen for dial tone. Initiate an external call by dialing a service directory (no charge) number. Check for call completion and repeat the procedure for all stations.

8.8 POWER-UP TEST COMPLETION

The key bx 1632C/2864C is now ready for programming. The above sections need only be refered to when a less than fully configured system is to be upgraded.

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Section 9
1632C/2864C Field Maintenance

9.1 GENERAL

This section contains the key bx 1632C & 2864C troubleshooting guidelines for use by field maintenance technicians. Except for wiring the general rule is isolate and replace only and do not repair.

The section assumes a general working knowledge of telephone switching and PABX equipment. It is also expected that personnel have received at least basic maintenance instruction for the key bx systems. This knowledge supplemented by the information contained in this section will enable a technician to quickly analyze any problem that may arise, locate the source of the problem and replace the faulty component.

9.2 SPARE PARTS

A field technician should maintain a full set of spare printed circuit cards and a station set, previously tested and known to be in working order. In addition the cables and connectors listed in Table 5-1 should always be on hand.

9.3 BASIC TROUBLESHOOTING PHILOSOPHY

The primary aim of the maintenance technician should be to reduce system or station down time to a minimum. The simplest and most effective way of doing this is step-by-step isolation of the fault by the replace and test method. Once the defective component or unit has been replaced it can be repaired later and the system can operate. Only in the case of faulty wiring should repair work be carried out on-site. The Operating Instructions Manual contains an in-depth description of system features and should be referred to in order to ascertain which printed circuit cards are responsible for any given feature. In this way a maintenance technician can quickly determine which card may be defective when a fault occurs. The card can then be replaced.

9.4 TROUBLESHOOTING SUMMARY

Faults on the key bx system may be divided into three categories. These are:

(1) Total system failure (all stations dead);

(2) Partial system or individual station failure

(3) Incorrect responses or indications.

9.4.1 Total system failure. If the entire system is dead:

(a) Check that the ac power outlet is ON.

(b) Check that power supply (and add-on unit) is ON.

(c) Check connections J3, J7 (as well as J11 and J15 on the 2864C) and J9 to the KSU.

(d) Test the voltages on the KSU backplane testblock to ascertain whether the power supply unit is operating.

If the power supply is faulty replace it.

9.4.2 Partial system failure. If a number of stations are dead verify how many stations are affected.

(a) If 16 stations are affected, check the numbers of the stations and then check the appropriate current source connector J3 or J7 (or J11 or J15) on the KSU for current source output (see Table 9-4)

(b) If a group of four stations with sequential numbers are affected, check and/or replace the corresponding line/SLT card before proceeding to check the corresponding MDF block wiring and cabling to the respective junction boxes.

(c) If only one or two stations are affected, check the sets for any buttons that may be stuck. A depressed button may render a station inoperable. If after releasing any buttons the set still does not function replace it. If the stations are still dead, check the cabling .

9.4.3 Incorrect responses or indications. Where all stations are receiving power but are not functioning properly refer to Tables 9-1 to 9-3 for the corrective procedure.

9.5 SLT EXTENSIONS

Where SLTs are installed ensure that the extension has been defined as such by the programmer before assuming a hardware defect.

TABLE 9-1

Station Troubleshooting Chart		
FAULT	PROBABLE CAUSE	CORRECTIVE ACTION
LEDs on upper row of CO buttons are in fast scan mode.	Station data pairs are reversed.	Reverse data pair at junction box and/or MDF.
LEDs on upper row of CO buttons are in slow scan mode.	a. Loose junction box to station connection.	Check modular cable at station and junction box.
	b. Faulty station set.	Replace station set.
	c. Faulty data path.	Check data path from station to MDF.
	d. MDF - KSU cable.	Check appropriate cable and connector.
No power to station. No visual function response or indication. Loud howl in handset.	a. Audio (HFIB) and data pairs interchanged at junction box.	Rewire station junction box.
	b. Faulty power source.	Check current between handsfree and data pair at junction box. If O.K. then check at MDF. If O.K. check at current source connectors on the KSU. (For current source pin allocations see Table 9-4).

TABLE 9-1 (continued)

No power at station.	c. Low current output from power supply.	Check current tolerances on J3 or J7 (or J11 or J15) at the KSU. Correct current is 350mA +/- 14mA. If current is correct replace the station line card. If not replace the power supply. (See Table 9-4).
Station totally dead.	a. Faulty station.	Replace station.
	b. No power.	Check voltages on J9.
	c. Faulty cabling.	Check connections at KSU and MDF. Check cabling to junction box.
	d. Faulty line card.	Replace line card.
	e. Internal wiring fault on KSU.	Check wiring between line card connector and current source from power supply. (This involves dismounting the KSU and removing the rear case cover).
No handset tone. Station functions in speaker-monitor mode.	Faulty station hook switch.	Replace station set.

TABLE 9-2

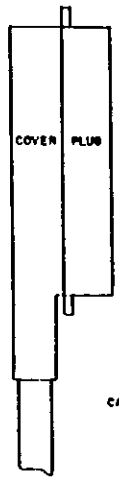
System Troubleshooting Chart		
FAULT	PROBABLE CAUSE	CORRECTIVE ACTION
LED's on all stations are in slow scan mode.	a. No dc voltages	Verify presence of voltages on the KSU backplane testblock. MS, TR and GP cards.
	c. Poor control card connections.	Remove all control cards and gently clean all the contacts. (Use cleaning spray as rubbing may damage contacts and can cause static). Check that EPROMS are firmly place.
	d. KSU connector pins are deformed.	Dismount KSU, remove back panel and repair or replace pins.
CO LED's on certain stations only are in slow scan mode; other stations are functioning normally.	Faulty TR card (1 or 2).	Replace appropriate TR card.

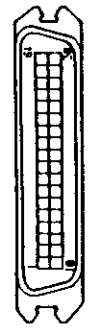
TABLE 9-3

CO line Troubleshooting Chart		
FAULT	PROBABLE CAUSE	CORRECTIVE ACTION
No CO line dial tone when CO button is depressed.	a. Improper wiring from KSU to MDF.	Check wiring at MDF and KSU.
	b. Short between CO tip and ring.	Disconnect cable at J2 on KSU and check for short between tip and ring.
	c. Faulty trunk card.	Replace trunk card.
Buzzing noise heard on dial tone at station handset or speaker.	a. Short between CO tip and ring.	Disconnect cable at J2 on KSU and check for short between tip and ring.
	b. Faulty CO line.	Check for short between tip and ring at OSP side of MDF.
	c. Faulty trunk card.	Replace trunk card.
	d. Faulty matrix card.	Replace matrix card. (See Appendix C Tables C-1 or C-2).

TABLE 9-4

Current Source Connections





Notes: All current sources are 350mA +/- 14mA.

PINS 1 to 18 always (+).
PINS 19 to 36 always (-).

Current source on pairs 1,19 to 16,34 may be selected as short or long.

Current source on pairs 17,35 and 18,36 are permanently set as long.

PIN	PIN	J3 EXTENS.	J7 EXTENS.	J11 EXTENS.	J15 EXTENS.
1	19	20	36	52	68
2	20	21	37	53	69
3	21	22	38	54	70
4	22	23	39	55	71
5	23	24	40	56	72
6	24	25	41	57	73
7	25	26	42	58	74
8	26	27	43	59	75
9	27	28	44	60	76
10	28	29	45	61	77
11	29	30	46	62	78
12	30	31	47	63	79
13	31	32	48	64	80
14	32	33	49	65	81
15	33	34	50	66	82
16	34	35	51	67	83
17	35	DSS/BLF	DSS/BLF	DSS/BLF	DSS/BLF
18	36	BLF	BLF	BLF	BLF

APPENDIX A

key bx 2864C Hardware Variations

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APPENDIX A
key bx 2864C Hardware Variations

A.1 The key bx 2864C is essentially the same as the 1632C having the same features and services and optional external equipment attachment capability. The 2864C differs from the 1632C only in capacity and consequently requires the provisioning of additional hardware. (See Figure A-1).

A.2 Up to 28 CO lines and 64 internal lines can be supported on the 2864C. Furthermore, a maximum of eight attendant consoles consisting of up to two DSSs and seven BLFs can be connected to the system.

A.3 The KSU of the 2864C is larger than that of the 1632C and has slots for 48 PCBs. (See Figures A-2 and A-3).

A.4 For installations where more than 32 key bx stations are connected an add-on unit must be attached to the power supply main unit to provide the extra current sources. Connect the ac voltage cable originating from the left side panel of the add-on unit to the ac input receptacle on the left side panel of the power supply main unit (see Figure 2-4).

A.5 The number of emergency telephones capable of being attached to the 2864C is increased to 28; one for each of the 28 CO lines. This means that a second PFU is also required for the 12 additional relays.

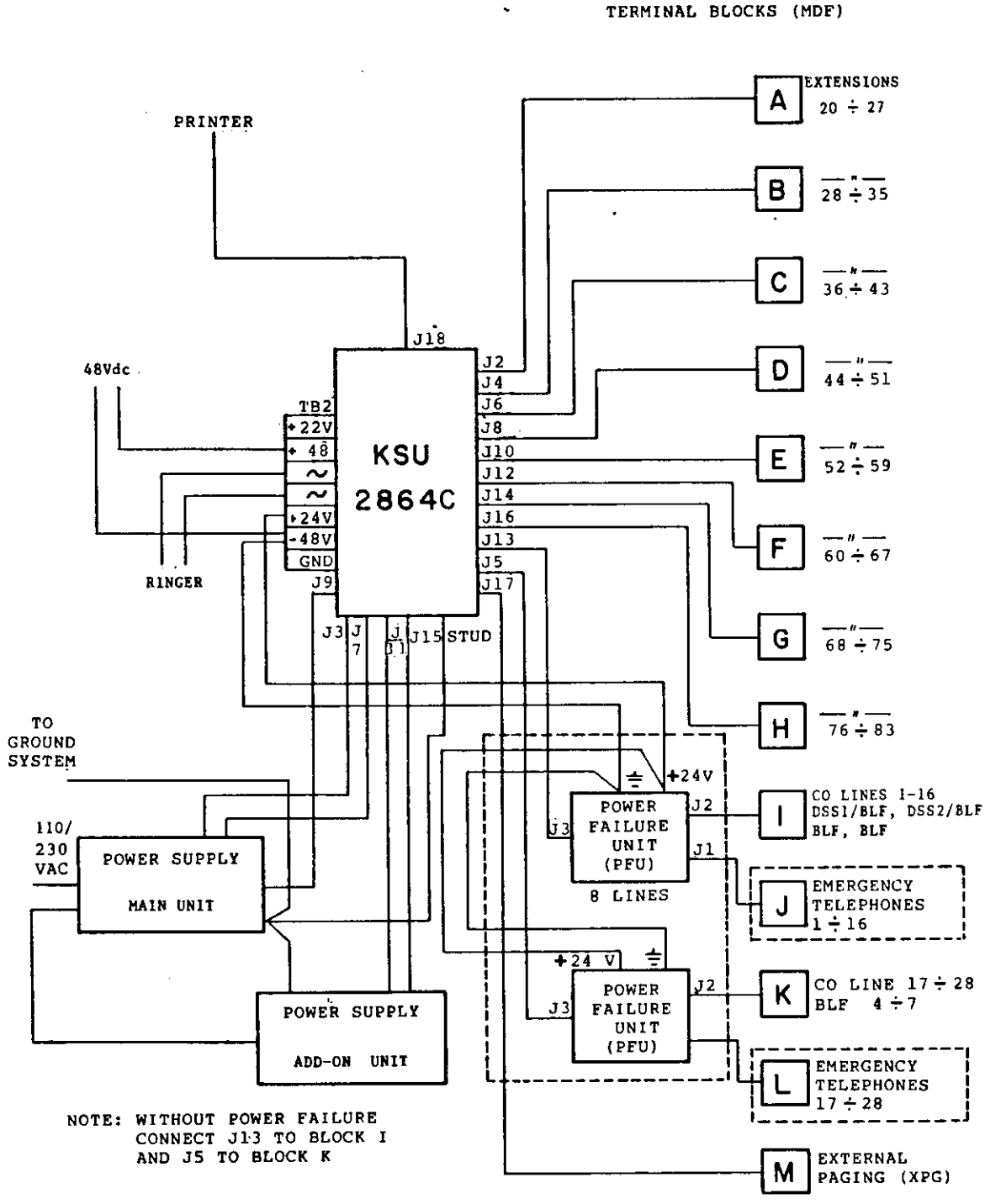

Figure A-1 key bx system schematic (2864C)

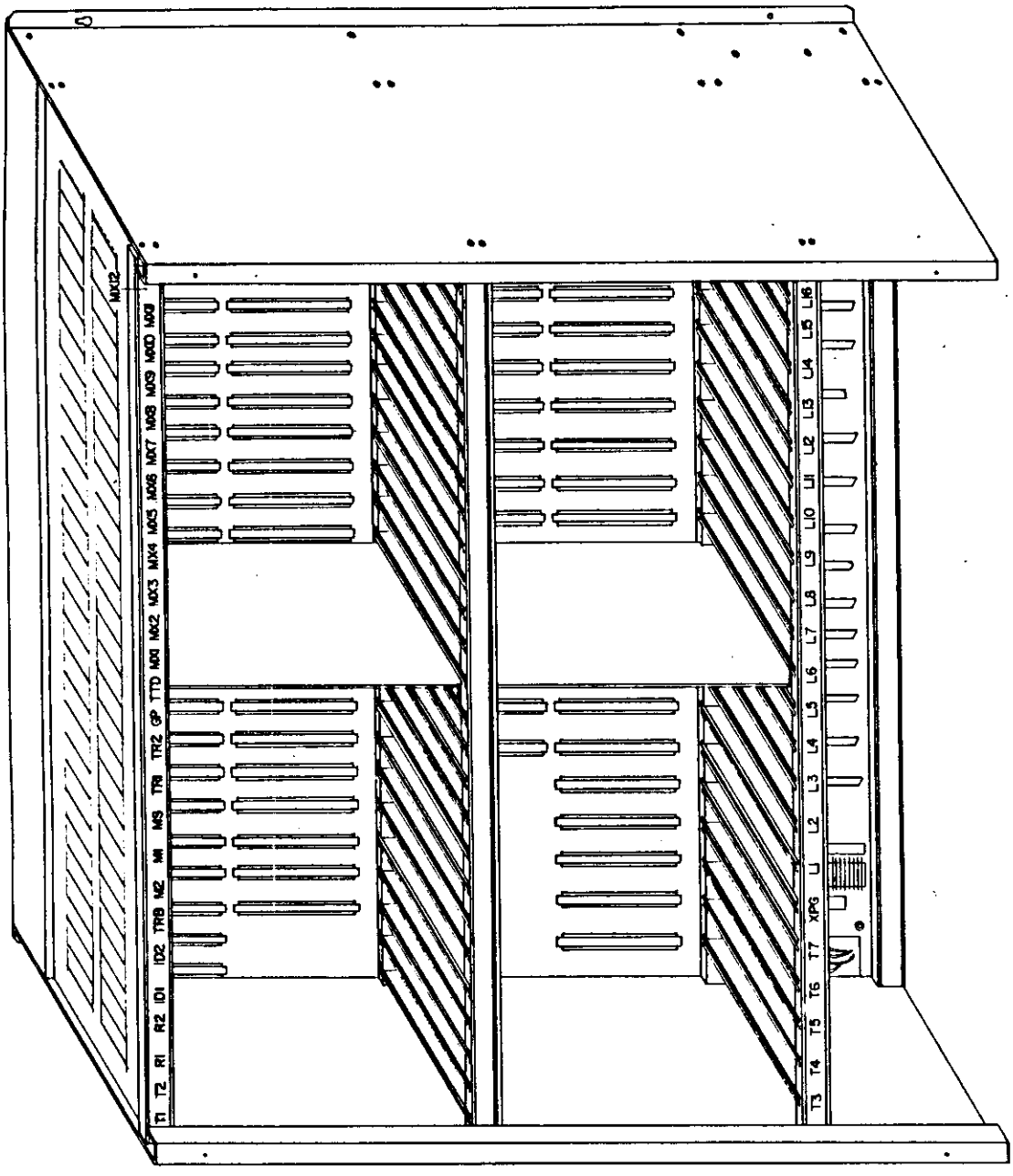

Figure A-2 KSU: card shelves view (2864C).

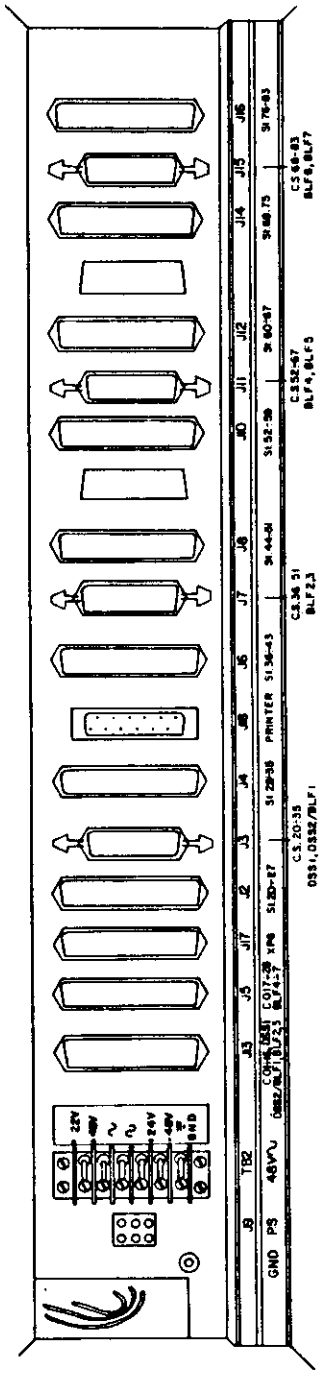

Figure A-3 KSU: bottom section cable connections view (2864C).

A.6 MDF block designations are necessarily different on the 2864C. Eight blocks are required for the KSU to station interfacing. Two blocks are required for CO lines and consequently two blocks may be required for the attachment of the emergency telephones.

A.7 Where an off-premises SLT extention is installed, a 48v OPX card is required, as with the 1632C. On the 2864C, however, the 48v OPX card must be inserted in slot L16 and not in slot L8.

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APPENDIX B
2864C Cabling and Wiring

B.1 CABLING KSU-MDF

The KSU is connected to the MDF via eleven 25-pair cables designated J2, J4, J5, J6, J8, J10, J12, J13, J14, J16 and J17. Where an emergency telephone system is to be installed, cables J5 and J13 will connect the KSU to the PFUs. To connect the cables to the MDF proceed as follows:

(a) Connect cable J2 to MDF block A as per Figure B-1. This block will interface with stations 20 through 27;

(b) Connect cable J4 to MDF block B as per Figure B-2. This block will interface with stations 28 through 35;

(c) Connect cable J6 to MDF block C as per Figure B-3. This block will interface with stations 36 through 43;

(d) Connect cable J8 to MDF block D as per Figure B-4. This block will interface with stations 44 through 51;

(e) Connect cable J10 to MDF block E as per Figure B-5. This block will interface with stations 52 through 59;

(f) Connect cable J12 to MDF block F as per Figure B-6. This block will interface with stations 60 through 67;

(g) Connect cable J14 to MDF block G as per Figure B-7. This block will interface with stations 68 through 75;

(h) Connect cable J16 to MDF block H as per Figure B-8. This block will interface with stations 76 through 83;

BLOCK A

FROM				TO		
ORIGIN	PIN	COLOR		JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
	26	WHI-BLU	- - - -	W		
	1	BLU-WHI	- - - -	B	AUDIO	
	27	WHI-ORN	- - - -	Bk		
	2	ORN-WHI	- - - -	Y	HF	20
	28	WHI-GRN	- - - -	R		
	3	GRN-WHI	- - - -	G	DATA	
	29	WHI-BRN	- - - -	W		
	4	BRN-WHI	- - - -	B	AUDIO	
	30	WHI-SLA	- - - -	Bk		
	5	SLA-WHI	- - - -	Y	HF	21
	31	RED-BLU	- - - -	R		
L	6	BLU-RED	- - - -	G	DATA	
1	32	RED-ORN	- - - -	W		
	7	ORN-RED	- - - -	B	AUDIO	
	33	RED-GRN	- - - -	Bk		
	8	GRN-RED	- - - -	Y	HF	22
	34	RED-BRN	- - - -	R		
	9	BRN-RED	- - - -	G	DATA	
	35	RED-SLA	- - - -	W		
	10	SLA-RED	- - - -	B	AUDIO	
	36	BLK-BLU	- - - -	Bk		
	11	BLU-BLK	- - - -	Y	HF	23
	37	BLK-ORN	- - - -	R		
	12	ORN-BLK	- - - -	G	DATA	
	38	BLK-GRN	- - - -	W		
	13	GRN-BLK	- - - -	B	AUDIO	
	39	BLK-BRN	- - - -	Bk		
	14	BRN-BLK	- - - -	Y	HF	24
	40	BLK-SLA	- - - -	R		
	15	SLA-BLK	- - - -	G	DATA	
	41	YEL-BLU	- - - -	W		
	16	BLU-YEL	- - - -	B	AUDIO	
	42	YEL-ORN	- - - -	Bk		
	17	ORN-YEL	- - - -	Y	HF	25
	43	YEL-GRN	- - - -	R		
	18	GRN-YEL	- - - -	G	DATA	
L	44	YEL-BRN	- - - -	W		
2	19	BRN-YEL	- - - -	B	AUDIO	
	45	YEL-SLA	- - - -	Bk		
	20	SLA-YEL	- - - -	Y	HF	26
	46	VIO-BLU	- - - -	R		
	21	BLU-VIO	- - - -	G	DATA	
	47	VIO-ORN	- - - -	W		
	22	ORN-VIO	- - - -	B	AUDIO	
	48	VIO-GRN	- - - -	Bk		
	23	GRN-VIO	- - - -	Y	HF	27
	49	VIO-BRN	- - - -	R		
	24	BRN-VIO	- - - -	G	DATA	
	50	VIO-SLA	- - - -			
	25	SLA-VIO	- - - -		SPARE	

Figure B-1 KSU to MDF: station connections.

BLOCK B

FROM				TO		
ORIGIN	PIN	COLOR		JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
	26	WHI-BLU	- - - -	W		
	1	BLU-WHI	- - - -	B	AUDIO	
	27	WHI-ORN	- - - -	Bk		
	2	ORN-WHI	- - - -	Y	HF	28
	28	WHI-GRN	- - - -	R		
	3	GRN-WHI	- - - -	G	DATA	
	29	WHI-BRN	- - - -	W		
	4	BRN-WHI	- - - -	B	AUDIO	
	30	WHI-SLA	- - - -	Bk		
	5	SLA-WHI	- - - -	Y	HF	29
	31	RED-BLU	- - - -	R		
L	6	BLU-RED	- - - -	G	DATA	
3	32	RED-ORN	- - - -	W		
	7	ORN-RED	- - - -	B	AUDIO	
	33	RED-GRN	- - - -	Bk		
	8	GRN-RED	- - - -	Y	HF	30
	34	RED-BRN	- - - -	R		
	9	BRN-RED	- - - -	G	DATA	
	35	RED-SLA	- - - -	W		
	10	SLA-RED	- - - -	B	AUDIO	
	36	BLK-BLU	- - - -	Bk		
	11	BLU-BLK	- - - -	Y	HF	31
	37	BLK-ORN	- - - -	R		
	12	ORN-BLK	- - - -	G	DATA	
	38	BLK-GRN	- - - -	W		
	13	GRN-BLK	- - - -	B	AUDIO	
	39	BLK-BRN	- - - -	Bk		
	14	BRN-BLK	- - - -	Y	HF	32
	40	BLK-SLA	- - - -	R		
	15	SLA-BLK	- - - -	G	DATA	
	41	YEL-BLU	- - - -	W		
	16	BLU-YEL	- - - -	B	AUDIO	
	42	YEL-ORN	- - - -	Bk		
	17	ORN-YEL	- - - -	Y	HF	33
	43	YEL-GRN	- - - -	R		
L	18	GRN-YEL	- - - -	G	DATA	
4	44	YEL-BRN	- - - -	W		
	19	BRN-YEL	- - - -	B	AUDIO	
	45	YEL-SLA	- - - -	Bk		
	20	SLA-YEL	- - - -	Y	HF	34
	46	VIO-BLU	- - - -	R		
	21	BLU-VIO	- - - -	G	DATA	
	47	VIO-ORN	- - - -	W		
	22	ORN-VIO	- - - -	B	AUDIO	
	48	VIO-GRN	- - - -	Bk		
	23	GRN-VIO	- - - -	Y	HF	35
	49	VIO-BRN	- - - -	R		
	24	BRN-VIO	- - - -	G	DATA	
	50	VIO-SLA	- - - -			
	25	SLA-VIO	- - - -		SPARE	

Figure B-2 KSU to MDF: station connections.

BLOCK C

FROM			TO		
ORIGIN	PIN	COLOR	JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
L 5	26	WHI-BLU	W	AUDIO	36
	1	BLU-WHI	B		
	27	WHI-ORN	Bk	HF	
	2	ORN-WHI	Y		
	28	WHI-GRN	R	DATA	
	3	GRN-WHI	G		
	29	WHI-BRN	W	AUDIO	37
	4	BRN-WHI	B		
	30	WHI-SLA	Bk	HF	
	5	SLA-WHI	Y		
	31	RED-BLU	R	DATA	
	6	BLU-RED	G		
	32	RED-ORN	W	AUDIO	38
	7	ORN-RED	B		
	33	RED-GRN	Bk	HF	
	8	GRN-RED	Y		
	34	RED-BRN	R	DATA	
	9	BRN-RED	G		
	35	RED-SLA	W	AUDIO	39
	10	SLA-RED	B		
	36	BLK-BLU	Bk	HF	
	11	BLU-BLK	Y		
	37	BLK-ORN	R	DATA	
	12	ORN-BLK	G		
L 6	38	BLK-GRN	W	AUDIO	40
	13	GRN-BLK	B		
	39	BLK-BRN	Bk	HF	
	14	BRN-BLK	Y		
	40	BLK-SLA	R	DATA	
	15	SLA-BLK	G		
	41	YEL-BLU	W	AUDIO	41
	16	BLU-YEL	B		
	42	YEL-ORN	Bk	HF	
	17	ORN-YEL	Y		
	43	YEL-GRN	R	DATA	
	18	GRN-YEL	G		
	44	YEL-BRN	W	AUDIO	42
	19	BRN-YEL	B		
	45	YEL-SLA	Bk	HF	
	20	SLA-YEL	Y		
	46	VIO-BLU	R	DATA	
	21	BLU-VIO	G		
	47	VIO-ORN	W	AUDIO	43
	22	ORN-VIO	B		
	48	VIO-GRN	Bk	HF	
	23	GRN-VIO	Y		
	49	VIO-BRN	R	DATA	
	24	BRN-VIO	G		
	50	VIO-SLA		SPARE	
	25	SLA-VIO			

Figure B-3 KSU to MDF: station connections.

BLOCK D

FROM				TO	
ORIGIN	PIN	COLOR	JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
	26	WHI-BLU	W		
	1	BLU-WHI	B	AUDIO	
	27	WHI-ORN	Bk		
	2	ORN-WHI	Y	HF	44
	28	WHI-GRN	R		
	3	GRN-WHI	G	DATA	
	29	WHI-BRN	W		
	4	BRN-WHI	B	AUDIO	
	30	WHI-SLA	Bk		
	5	SLA-WHI	Y	HF	45
	31	RED-BLU	R		
L	6	BLU-RED	G	DATA	
7	32	RED-ORN	W		
	7	ORN-RED	B	AUDIO	
	33	RED-GRN	Bk		
	8	GRN-RED	Y	HF	46
	34	RED-BRN	R		
	9	BRN-RED	G	DATA	
	35	RED-SLA	W		
	10	SLA-RED	B	AUDIO	
	36	BLK-BLU	Bk		
	11	BLU-BLK	Y	HF	47
	37	BLK-ORN	R		
	12	ORN-BLK	G	DATA	
	38	BLK-GRN	W		
	13	GRN-BLK	B	AUDIO	
	39	BLK-BRN	Bk		
	14	BRN-BLK	Y	HF	48
	40	BLK-SLA	R		
	15	SLA-BLK	G	DATA	
	41	YEL-BLU	W		
	16	BLU-YEL	B	AUDIO	
	42	YEL-ORN	Bk		
	17	ORN-YEL	Y	HF	49
	43	YEL-GRN	R		
L	18	GRN-YEL	G	DATA	
8	44	YEL-BRN	W		
	19	BRN-YEL	B	AUDIO	
	45	YEL-SLA	Bk		
	20	SLA-YEL	Y	HF	50
	46	VIO-BLU	R		
	21	BLU-VIO	G	DATA	
	47	VIO-ORN	W		
	22	ORN-VIO	B	AUDIO	
	48	VIO-GRN	Bk		
	23	GRN-VIO	Y	HF	51
	49	VIO-BRN	R		
	24	BRN-VIO	G	DATA	
	50	VIO-SLA			
	25	SLA-VIO		SPARE	

Figure B-4 KSU to MDF: station connections.

BLOCK E

FROM			TO		
ORIGIN	PIN	COLOR	JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
L 9	26	WHI-BLU	W		
	1	BLU-WHI	B	AUDIO	
	27	WHI-ORN	Bk		
	2	ORN-WHI	Y	HF	52
	28	WHI-GRN	R		
	3	GRN-WHI	G	DATA	
	29	WHI-BRN	W		
	4	BRN-WHI	B	AUDIO	
	30	WHI-SLA	Bk		
	5	SLA-WHI	Y	HF	53
	31	RED-BLU	R		
	6	BLU-RED	G	DATA	
	32	RED-ORN	W		
	7	ORN-RED	B	AUDIO	
	33	RED-GRN	Bk		
	8	GRN-RED	Y	HF	54
	34	RED-BRN	R		
	9	BRN-RED	G	DATA	
	35	RED-SLA	W		
	10	SLA-RED	B	AUDIO	
	36	BLK-BLU	Bk		
	11	BLU-BLK	Y	HF	55
	37	BLK-ORN	R		
	12	ORN-BLK	G	DATA	
L 1 0	38	BLK-GRN	W		
	13	GRN-BLK	B	AUDIO	
	39	BLK-BRN	Bk		
	14	BRN-BLK	Y	HF	56
	40	BLK-SLA	R		
	15	SLA-BLK	G	DATA	
	41	YEL-BLU	W		
	16	BLU-YEL	B	AUDIO	
	42	YEL-ORN	Bk		
	17	ORN-YEL	Y	HF	57
	43	YEL-GRN	R		
	18	GRN-YEL	G	DATA	
	44	YEL-BRN	W		
	19	BRN-YEL	B	AUDIO	
	45	YEL-SLA	Bk		
	20	SLA-YEL	Y	HF	58
	46	VIO-BLU	R		
	21	BLU-VIO	G	DATA	
	47	VIO-ORN	W		
	22	ORN-VIO	B	AUDIO	
	48	VIO-GRN	Bk		
	23	GRN-VIO	Y	HF	59
	49	VIO-BRN	R		
	24	BRN-VIO	G	DATA	
	50	VIO-SLA			
	25	SLA-VIO		SPARE	

Figure B-5 KSU to MDF: station connections.

BLOCK F

FROM			TO		
ORIGIN	PIN	COLOR	JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
	26	WHI-BLU	W		
	1	BLU-WHI	B	AUDIO	
	27	WHI-ORN	Bk		
	2	ORN-WHI	Y	HF	60
	28	WHI-GRN	R		
	3	GRN-WHI	G	DATA	
	29	WHI-BRN	W		
	4	BRN-WHI	B	AUDIO	
	30	WHI-SLA	Bk		
	5	SLA-WHI	Y	HF	61
	31	RED-BLU	R		
L	6	BLU-RED	G	DATA	
1	32	RED-ORN	W		
1	7	ORN-RED	B	AUDIO	
	33	RED-GRN	Bk		
	8	GRN-RED	Y	HF	62
	34	RED-BRN	R		
	9	BRN-RED	G	DATA	
	35	RED-SLA	W		
	10	SLA-RED	B	AUDIO	
	36	BLK-BLU	Bk		
	11	BLU-BLK	Y	HF	63
	37	BLK-ORN	R		
	12	ORN-BLK	G	DATA	
	38	BLK-GRN	W		
	13	GRN-BLK	B	AUDIO	
	39	BLK-BRN	Bk		
	14	BRN-BLK	Y	HF	64
	40	BLK-SLA	R		
	15	SLA-BLK	G	DATA	
	41	YEL-BLU	W		
	16	BLU-YEL	B	AUDIO	
	42	YEL-ORN	Bk		
	17	ORN-YEL	Y	HF	65
	43	YEL-GRN	R		
L	18	GRN-YEL	G	DATA	
1	44	YEL-BRN	W		
2	19	BRN-YEL	B	AUDIO	
	45	YEL-SLA	Bk		
	20	SLA-YEL	Y	HF	66
	46	VIO-BLU	R		
	21	BLU-VIO	G	DATA	
	47	VIO-ORN	W		
	22	ORN-VIO	B	AUDIO	
	48	VIO-GRN	Bk		
	23	GRN-VIO	Y	HF	67
	49	VIO-BRN	R		
	24	BRN-VIO	G	DATA	
	50	VIO-SLA			
	25	SLA-VIO		SPARE	

Figure B-6 KSU to MDF: station connections.

BLOCK G

FROM				TO		
ORIGIN	PIN	COLOR	JUNCTION BOX DESIGNATION		FUNCTION	STATIONS
L 1 3	26	WHI-BLU	W			68
	1	BLU-WHI	B		AUDIO	
	27	WHI-ORN	Bk			
	2	ORN-WHI	Y		HF	
	28	WHI-GRN	R			
	3	GRN-WHI	G		DATA	
	29	WHI-BRN	W			69
	4	BRN-WHI	B		AUDIO	
	30	WHI-SLA	Bk			
	5	SLA-WHI	Y		HF	
	31	RED-BLU	R			
	6	BLU-RED	G		DATA	
	32	RED-ORN	W			70
	7	ORN-RED	B		AUDIO	
	33	RED-GRN	Bk			
	8	GRN-RED	Y		HF	
	34	RED-BRN	R			
	9	BRN-RED	G		DATA	
	35	RED-SLA	W			71
	10	SLA-RED	B		AUDIO	
	36	BLK-BLU	Bk			
	11	BLU-BLK	Y		HF	
	37	BLK-ORN	R			
	12	ORN-BLK	G		DATA	
L 1 4	38	BLK-GRN	W			72
	13	GRN-BLK	B		AUDIO	
	39	BLK-BRN	Bk			
	14	BRN-BLK	Y		HF	
	40	BLK-SLA	R			
	15	SLA-BLK	G		DATA	
	41	YEL-BLU	W			73
	16	BLU-YEL	B		AUDIO	
	42	YEL-ORN	Bk			
	17	ORN-YEL	Y		HF	
	43	YEL-GRN	R			
	18	GRN-YEL	G		DATA	
	44	YEL-BRN	W			74
	19	BRN-YEL	B		AUDIO	
	45	YEL-SLA	Bk			
	20	SLA-YEL	Y		HF	
	46	VIO-BLU	R			
	21	BLU-VIO	G		DATA	
	47	VIO-ORN	W			75
	22	ORN-VIO	B		AUDIO	
	48	VIO-GRN	Bk			
	23	GRN-VIO	Y		HF	
	49	VIO-BRN	R			
	24	BRN-VIO	G		DATA	
	50	VIO-SLA				
	25	SLA-VIO			SPARE	

Figure B-7 KSU to MDF: station connections.

BLOCK H

FROM			TO		
ORIGIN	PIN	COLOR	JUNCTION BOX DESIGNATION	FUNCTION	STATIONS
	26	WHI-BLU	W		
	1	BLU-WHI	B	AUDIO	
	27	WHI-ORN	Bk		
	2	ORN-WHI	Y	HF	76
	28	WHI-GRN	R		
	3	GRN-WHI	G	DATA	
	29	WHI-BRN	W		
	4	BRN-WHI	B	AUDIO	
	30	WHI-SLA	Bk		
	5	SLA-WHI	Y	HF	77
	31	RED-BLU	R		
L	6	BLU-RED	G	DATA	
1	32	RED-ORN	W		
5	7	ORN-RED	B	AUDIO	
	33	RED-GRN	Bk		
	8	GRN-RED	Y	HF	78
	34	RED-BRN	R		
	9	BRN-RED	G	DATA	
	35	RED-SLA	W		
	10	SLA-RED	B	AUDIO	
	36	BLK-BLU	Bk		
	11	BLU-BLK	Y	HF	79
	37	BLK-ORN	R		
	12	ORN-BLK	G	DATA	
	38	BLK-GRN	W		
	13	GRN-BLK	B	AUDIO	
	39	BLK-BRN	Bk		
	14	BRN-BLK	Y	HF	80
	40	BLK-SLA	R		
	15	SLA-BLK	G	DATA	
	41	YEL-BLU	W		
	16	BLU-YEL	B	AUDIO	
	42	YEL-ORN	Bk		
	17	ORN-YEL	Y	HF	81
	43	YEL-GRN	R		
L	18	GRN-YEL	G	DATA	
1	44	YEL-BRN	W		
6	19	BRN-YEL	B	AUDIO	
	45	YEL-SLA	Bk		
	20	SLA-YEL	Y	HF	82
	46	VIO-BLU	R		
	21	BLU-VIO	G	DATA	
	47	VIO-ORN	W		
	22	ORN-VIO	B	AUDIO	
	48	VIO-GRN	Bk		
	23	GRN-VIO	Y	HF	83
	49	VIO-BRN	R		
	24	BRN-VIO	G	DATA	
	50	VIO-SLA			
	25	SLA-VIO		SPARE	

Figure B-8 KSU to MDF: station connections.

(i) Connect cable J13 to MDF block I (unless a PFU is installed) as per Figure B-9. This block interfaces with CO lines 1 through 16 as well as two DSS/BLF, two further BLF consoles and the music-on-hold source;

(j) Connect cable J5 to MDF block K (unless a PFU is installed) as per Figure B-10. This block interfaces with CO lines 17 through 28 as well as BLF consoles 4 through 7;

(k) Connect cable J17 to MDF block M as per Figure B-11. This block will interface with the various external options such as external paging, door units, etc,.

BLOCK I

FROM			TO		
ORIGIN	PIN	COLOR	COLOR OR DESIGNATION	FUNCTION	CONNECTS TO
T1	26	WHI-BLU	T1		TRUNK 1
	1	BLU-WHI	R1		
	27	WHI-ORN	T2		TRUNK 2
	2	ORN-WHI	R2		
	28	WHI-GRN	T3		TRUNK 3
	3	GRN-WHI	R3		
	29	WHI-BRN	T4		TRUNK 4
	4	BRN-WHI	R4		
T2	30	WHI-SLA	T5		TRUNK 5
	5	SLA-WHI	R5		
	31	RED-BLU	T6		TRUNK 6
	6	BLU-RED	R6		
	32	RED-ORN	T7		TRUNK 7
	7	ORN-RED	R7		
	33	RED-GRN	T8		TRUNK 8
	8	GRN-RED	R8		
T3	34	RED-BRN	T9		TRUNK 9
	9	BRN-RED	R9		
	35	RED-SLA	T10		TRUNK 10
	10	SLA-RED	R10		
	36	BLK-BLU	T11		TRUNK 11
	11	BLU-BLK	R11		
	37	BLK-ORN	T12		TRUNK 12
	12	ORN-BLK	R12		
T4	38	BLK-GRN	T13		TRUNK 13
	13	GRN-BLK	R13		
	39	BLK-BRN	T14		TRUNK 14
	14	BRN-BLK	R14		
	40	BLK-SLA	T15		TRUNK 15
	15	SLA-BLK	R15		
	41	YEL-BLU	T16		TRUNK 16
	16	BLU-YEL	R16		
TRB CARD	42	YEL-ORN	W		DSS/ BLF
	17	ORN-YEL	B	POWER	
	43	YEL-GRN	R		
	18	GRN-YEL	G	DATA	
	44	YEL-BRN	W		DSS/ BLF
	19	BRN-YEL	B	POWER	
	45	YEL-SLA	R		
	20	SLA-YEL	G	DATA	
	46	VIO-BLU	W		BLF
	21	BLU-VIO	B	POWER	
	47	VIO-ORN	R		
	22	ORN-VIO	G	DATA	
	48	VIO-GRN	W		BLF
	23	GRN-VIO	B	POWER	
	49	VIO-BRN	R		
	24	BRN-VIO	G	DATA	
GP CARD	50	VIO-SLA		MUSIC-ON-HOLD	TAPE/ RADIO
	25	SLA-VIO			

Figure B-9 KSU to MDF: CO lines, DSS/BLF and MCH connections.

BLOCK K

FROM			TO		
ORIGIN	PIN	COLOR	COLOR OR DESIGNATION	FUNCTION	CONNECTS TO
T5	26	WHI-BLU	T17		TRUNK 17
	1	BLU-WHI	R17		
	27	WHI-ORN	T18		TRUNK 1
	2	ORN-WHI	R18		
	28	WHI-GRN	T19		TRUNK 19
	3	GRN-WHI	R19		
	29	WHI-BRN	T20		TRUNK 20
	4	BRN-WHI	R20		
T6	30	WHI-SLA	T21		TRUNK 21
	5	SLA-WHI	R21		
	31	RED-BLU	T22		TRUNK 22
	6	BLU-RED	R22		
	32	RED-ORN	T23		TRUNK 23
	7	ORN-RED	R23		
	33	RED-GRN	T24		TRUNK 24
	8	GRN-RED	R24		
T7	34	RED-BRN	T25		TRUNK 25
	9	BRN-RED	R25		
	35	RED-SLA	T26		TRUNK 26
	10	SLA-RED	R26		
	36	BLK-BLU	T27		TRUNK 27
	11	BLU-BLK	R27		
	37	BLK-ORN	T28		TRUNK 28
	12	ORN-BLK	R28		
	38	BLK-GRN			
	13	GRN-BLK			
	39	BLK-BRN			
	14	BRN-BLK			
	40	BLK-SLA			
	15	SLA-BLK			
	41	YEL-BLU			
	16	BLU-YEL			
TRB CARD	42	YEL-ORN	W		
	17	ORN-YEL	B	POWER	BLF
	43	YEL-GRN	R		
	18	GRN-YEL	G	DATA	
	44	YEL-BRN	W		
	19	BRN-YEL	B	POWER	BLF
	45	YEL-SLA	R		
	20	SLA-YEL	G	DATA	
	46	VIO-BLU	W		
	21	BLU-VIO	B	POWER	BLF
	47	VIO-ORN	R		
	22	ORN-VIO	G	DATA	
	48	VIO-GRN	W		
	23	GRN-VIO	B	POWER	BLF
	49	VIO-BRN	R		
	24	BRN-VIO	G	DATA	
	50	VIO-SLA			
	25	SLA-VIO			

Figure E-10 KSU to MDF: CO lines and BLF connections.

BLOCK M

FROM			TO		
ORIGIN	PIN	COLOR	COLOR OR DESIGNATION	FUNCTION	CONNECTS TO
	26	WHI-BLU		SPEECH	EXT. PG.
	1	BLU-WHI		PATH	ZONE 184
	27	WHI-ORN		SPEECH	EXT. PG.
	2	ORN-WHI		PATH	ZONE 185
	28	WHI-GRN		SPEECH	EXT. PG.
	3	GRN-WHI		PATH	ZONE 186
	29	WHI-BRN		SPEECH	EX.P./DOOR
	4	BRN-WHI		PATH	UNIT 187
	30	WHI-SLA			
	5	SLA-WHI			
	31	RED-BLU	NO	DRY	EXTERNAL
	6	BLU-RED	C	CONTACT	BELL
	32	RED-ORN	NO	DRY	EXTERNAL
	7	ORN-RED	C	CONTACT	BELL
	33	RED-GRN	NO	DRY	EXTERNAL
X	8	GRN-RED	C	CONTACT	BELL
	34	RED-BRN	NO	DRY	EXTERNAL
P	9	BRN-RED	C	CONTACT	BELL
	35	RED-SLA	NO	DRY	DOOR
G	10	SLA-RED	C	CONTACT	UNIT
	36	BLK-BLU	NO	DRY	
	11	BLU-BLK	C	CONTACT	OPTIONAL
C	37	BLK-ORN	NO	DRY	SWITCHES
	12	ORN-BLK	C	CONTACT	
A	38	BLK-GRN	C	DRY	EXTERNAL
	13	GRN-BLK	NC		PAGING
R	39	BLK-BRN	NO	CONTACT	ZONE 184
	14	BRN-BLK	C	DRY	EXTERNAL
D	40	BLK-SLA	NC		PAGING
	15	SLA-BLK	NO	CONTACT	ZONE 185
	41	YEL-BLU	C	DRY	EXTERNAL
	16	BLU-YEL	NC		PAGING
	42	YEL-ORN	NO	CONTACT	ZONE 186
	17	ORN-YEL	C	DRY	EXTERNAL
	43	YEL-GRN	NC		PAGING
	18	GRN-YEL	NO	CONTACT	ZONE 187
	44	YEL-BRN	GND		DOOR
	19	BRN-YEL	INPUT	SENSOR	UNIT
	45	YEL-SLA			
	20	SLA-YEL			
	46	VIO-BLU			
	21	BLU-VIO			
	47	VIO-ORN			
	22	ORN-VIO			
	48	VIO-GRN			
	23	GRN-VIO			
	49	VIO-BRN			
	24	BRN-VIO			
	50	VIO-SLA			
	25	SLA-VIO			

Figure B-11 KSU to MDF: external connections.

B.2 CURRENT SOURCE CABLE CONNECTIONS.

Connect current source cables J3 and J7 to their respective female receptacles on the KSU. If an add-on unit is used connect cables J11 and J15 to their respectve recepticles on the KSU.

B.3 CABLING PFU-KSU

Remove the PFU cover. Using a 25-pair 24-AWG cable terminated at each end with an Amp-Champ male connector, connect J3, located on the right of the PFU to J13 on the KSU . Connect the black and red wires originating from the lower right section of the PFU to TB2 connections -48vGND and +24v respectively. (See Figure 6-2). If a second PFU is used connect its J3 cable to J5 on the KSU and connect its red and black wires to the first PFU's wires red to red and black to black.

B.5 CABLING PFU-MDF

Attach two 25-pair cables terminated at one end with an Amp-Champ male connector to the two female Amp-Champ receptacles designated J1 and J2 on the left of the unit. Connect J2 unterminated end to block I on the MDF as per Figure B-9. Connect J1 to block J on the MDF as per Figure B-12. If connectorized blocks are used then terminate cables J1 and J2 accordingly. A second PFU is connected similarly; J2 to block K as per Figure B-10 and J1 to block L as per Figure B-13.

BLOCK J

FROM			TO	
ORIGIN	PIN	COLOR	COLOR OR DESIGNATION	EMERGENCY TELEPHONE
	26	WHI-BLU	T1	
	1	BLU-WHI	R1	ET 1
	27	WHI-ORN	T2	
	2	ORN-WHI	R2	ET 2
	28	WHI-GRN	T3	
	3	GRN-WHI	R3	ET 3
	29	WHI-BRN	T4	
	4	BRN-WHI	R4	ET 4
	30	WHI-SLA	T5	
	5	SLA-WHI	R5	ET 5
	31	RED-BLU	T6	
	6	BLU-RED	R6	ET 6
	32	RED-ORN	T7	
P	7	ORN-RED	R7	ET 7
	33	RED-GRN	T8	
F	8	GRN-RED	R8	ET 8
	34	RED-BRN	T9	
U	9	BRN-RED	R9	ET 9
	35	RED-SLA	T10	
	10	SLA-RED	R10	ET 10
	36	BLK-BLU	T11	
	11	BLU-BLK	R11	ET 11
	37	BLK-ORN	T12	
	12	ORN-BLK	R12	ET 12
	38	BLK-GRN	T13	
	13	GRN-BLK	R13	ET 13
	39	BLK-BRN	T14	
	14	BRN-BLK	R14	ET 14
	40	BLK-SLA	T15	
	15	SLA-BLK	R15	ET 15
	41	YEL-BLU	T16	
	16	BLU-YEL	R16	ET 16
	42	YEL-ORN		
	17	ORN-YEL		
	43	YEL-GRN		
	18	GRN-YEL		
	44	YEL-BRN		
	19	BRN-YEL		
	45	YEL-SLA		
	20	SLA-YEL		
	46	VIO-BLU		
	21	BLU-VIO		
	47	VIO-ORN		
	22	ORN-VIO		
	48	VIO-GRN		
	23	GRN-VIO		
	49	VIO-BRN		
	24	BRN-VIO		
	50	VIO-SLA		
	25	SLA-VIO		

Figure B-12 KSU to MDF: emergency telephone connections.

BLOCK L

FROM			TO	
ORIGIN	PIN	COLOR	COLOR OR DESIGNATION	EMERGENCY TELEPHONE
	26	WHI-BLU	T17	
	1	BLU-WHI	R17	ET 17
	27	WHI-ORN	T18	
	2	ORN-WHI	R18	ET 18
	28	WHI-GRN	T19	
	3	GRN-WHI	R19	ET 19
	29	WHI-BRN	T20	
	4	BRN-WHI	R20	ET 20
	30	WHI-SLA	T21	
	5	SLA-WHI	R21	ET 21
	31	RED-BLU	T22	
	6	BLU-RED	R22	ET 22
	32	RED-ORN	T23	
P	7	ORN-RED	R23	ET 23
	33	RED-GRN	T24	
F	8	GRN-RED	R24	ET 24
	34	RED-BRN	T25	
U	9	BRN-RED	R25	ET 25
	35	RED-SLA	T26	
	10	SLA-RED	R26	ET 26
	36	BLK-BLU	T27	
	11	BLU-BLK	R27	ET 27
	37	BLK-ORN	T28	
	12	ORN-BLK	R28	ET 28
	38	BLK-GRN		
	13	GRN-BLK		
	39	BLK-BRN		
	14	BRN-BLK		
	40	BLK-SLA		
	15	SLA-BLK		
	41	YEL-BLU		
	16	BLU-YEL		
	42	YEL-ORN		
	17	ORN-YEL		
	43	YEL-GRN		
	18	GRN-YEL		
	44	YEL-BRN		
	19	BRN-YEL		
	45	YEL-SLA		
	20	SLA-YEL		
	46	VIO-BLU		
	21	BLU-VIO		
	47	VIO-ORN		
	22	ORN-VIO		
	48	VIO-GRN		
	23	GRN-VIO		
	49	VIO-BRN		
	24	BRN-VIO		
	50	VIO-SLA		
	25	SLA-VIO		

Figure B-13 KSU to MDF: emergency telephone connections.

APPENDIX C
Card Provisioning

C.1 COMMON EQUIPMENT

Both the 1632C and the 2864C require the following cards:

- 1 MS card — The MS card of the 2864C differs from that of the 1632C.
- 1 GP card
- 1 M card (M1)
- 1 TR card (TR1)

C.2 OPTIONAL COMMON EQUIPMENT

The following cards may be installed:

- TTD - Touch-tone-Decoder card (required if DTMF SLTs are installed or if DISA or TRUNK PATCH features are to be used).
- ID - Impulse dial card for impulse dial trunks.
- R - expansion card for ID card. ID and R cards are used as follows:

  ID1 for trunks 1-8
  R1 for trunks 9-16
  ID2 for trunks 17-24
  R2 for trunks 25-28

- TRB - for interfacing with DSS and BLF consoles. Up to eight units, including two DSSs are supported by the card.
- M2 - second memory card used where any of extensions 64 to 83 have personal speed dialing capability (stations or DTMF SLTs).
- TR2 - second TR card for use where more than 32 extensions are installed.
- XPG - general options card for external paging and door units.

C.3 INTERFACE CARDS

C.3.1 **Extensions.** Two types of interface card are available:

- L - line cards for standard key bx "smart" sets/Featurephones;
- SLT/OPX - for interfacing with single-line telephones and off-premises extensions. Each card supports four extensions. At least one L card must be used in slot L1 for stations 20-23. All others can be L and SLT/OPX cards.

C.3.2 **Trunks.** T cards interface with the trunks. Each T card can interface with up to four trunks.

C.4 MATRIX CARDS

Each matrix cards provides eight communication links for 32 inputs. Table C-1 shows each matrix card's function for the 1632C and Table C-2 for the 2864C.

TABLE C-1

MATRIX CARD NUMBER	CONNECTS EXTENSIONS	TO
1	20 - 51	TRUNKS 9 - 16
2	20 - 51	TRUNKS 1 - 8
3	20 - 51	EXTS. 20 - 51 FOR ICM - ICM
4	20 - 51	EXTS. 20 - 51 FOR ICM - HFTB

TABLE C-2

MATRIX CARD NUMBER	CONNECTS EXTENSIONS	TO		
1	20 - 51	TRUNKS	25 - 28	+TTD links
2	20 - 51	TRUNKS	17 - 24	
3	20 - 51	TRUNKS	9 - 16	
4	20 - 51	TRUNKS	1 - 8	
5	20 - 51	EXTS.	20 - 51	ICM - ICM
6	20 - 51	EXTS.	20 - 51	ICM - HFTB
7	52 - 83	EXTS.	52 - 83	ICM - HFTB
8	52 - 83	EXTS.	52 - 83	ICM - ICM
9	52 - 83	TRUNKS	1 - 8	
10	52 - 83	TRUNKS	9 - 16	
11	52 - 83	TRUNKS	17 - 24	
12	52 - 83	TRUNKS	25 - 28	+TTD links

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APPENDIX D
Alternative PFU Cabling

D.1 GENERAL

The emergency telephone system described in this document is connected in such a way that the SLTs for emergency use cannot be used while the key bx is operating. This arrangement allows a maximum of "smart" stations to be used. If however a number of SLT extensions are to be used within the system the PFU may be connected so as to allow these sets to serve additionally as the emergency units. Of the many ways of achieving this, one is illustrated below (see Figure D-1).

Note that further blocks must be added to the overall system configuration. An additional block may also be used for connection to J1 (marked "shorted connector" in the Figure) to give flexibility in designating individual CO line to SLT connections. Depending on local codes more than one SLT may be connected to the same CO line.

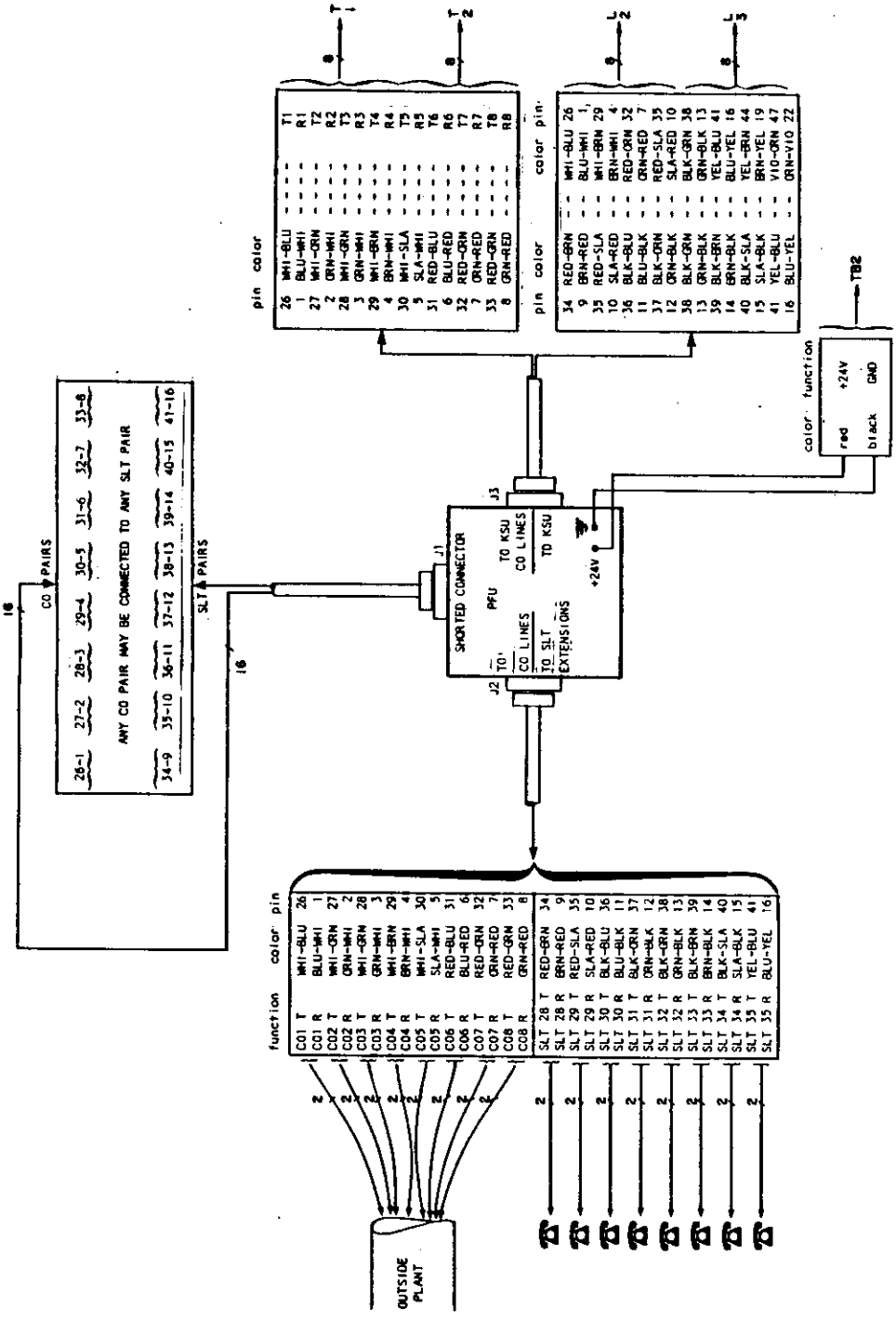

Figure D-1 Alternative PFU connections.

APPENDIX E

VALUE OF "C" PROGRAMMING FEATURES WHEN INITIALIZED

FEATURE	VALUE
CO Line Access Restriction	None Assigned
Toll Restriction	None Assigned
Incoming Call Ringing (Day)	Ext. 20 on all CO's
Incoming Call Flashing (Day)	All Ext. on all CO's
Incoming Call Ringing (Night)	Ext. 20 on all CO's
Incoming Call Flashing (Night)	All Ext. on all CO's
Trunk Queue Groups	No Lines Assigned
CO Lines Behind PABX	No Lines Assigned
CO Lines Behind CENTREX	No Lines Assigned
Day Bells	All Lines Assigned
Night Bells	All Lines Assigned
Toll Groups	No Lines Assigned
Day DISA	No Lines Assigned
Night DISA	No Lines Assigned
First DSS CO Lines	All Lines Assigned
Second DSS CO Lines	No Lines Assigned
DTMF/Rotary CO Lines	All Lines DTMF
DTMF Detect	1 = Yes
Paging Access	All Stations on All Zones
Page Routing	All Stations on All Zones
SLT Rotary	No Stations Assigned
SLT DTMF	No Stations Assigned
System Speed Restriction	No Stations Assigned
System Speed Tool Restriction	No Stations Assigned

APPENDIX E

FEATURE	VALUE
411 Restriction	No Stations Assigned
Flash Access	All Stations Assigned
Automatic Answer	All Stations Assigned
On-Hook Verbal Intrusion	All Stations Assigned
All Intrusion	All Stations Assigned
DND Access	All Stations Assigned
DND Forward	No Stations Assigned
Manager/Secretary	No Stations Assigned
Multi-Manager-Secretary	No Stations Assigned
ICM Restriction	No Stations Assigned
Pick-Up Groups	No Stations on Any Lines Assigned
Account Code Reminder	No Stations Assigned
Bell Stations	No Stations Assigned
Double Row Shift	No Stations Assigned
Second DSS Station Routing	No Stations Assigned
Feature Phones	Ext. 20 Flashes Only
Hold Time	1 Min. 20 Sec.
Day Recall Time	1 Min. 20 Sec.
Night Recall Time	1 Min. 20 Sec.
DSS Recall Time	1 Min. 20 Sec.
Unscreened Transfer Recall Time	1 Min. 20 Sec.
Handsfree Talkback Time	40 Sec.
Page Time	40 Sec.
Open Loop Time	1.0 Sec.
Flash Time (for 'Behind PABX' Lines Only)	0.6 Sec.

FEATURE	VALUE
Flash Time (for 'Behind CENTREX" Lines Only)	0.6 Sec.
CCSA Time	8 Sec.
Patch Time	1 Min. 20 Sec.
Minimum Time - Incoming Call	0 Sec.
Minimum Time - Local Call	0 Sec.
Minimum Time - Long Distance Call	0 Sec.
Minimum Number of Digits	0
Page Length	60 Lines
End of Page	6 Lines
SYstem Speed-Dial Programming Schedule	Ext. 20 Only
Time Setting Station	Ext. 20 and 21
Second DDS Station	No Stations Assigned
Toll Access Restriction (0/1)	Type 0
Manual Pause	1 = Yes
Baud Rate	300
Parity	Even
Header	1 = Yes
Blank Line	0 = No
Participating Stations	1 = Yes
Music On Hold	1 = Yes
ECC Programming Station	No Stations Assigned
Toll Table Set Up	Tables Come Denied with N11 + 800 Allowed
Local Table	200
Long Distance Table	1200

TECHNICAL SPECIFICATIONS

Capacity

Trunks	816: 8 1632: 16 2864: 28
Extensions	816: 16 1632: 32 2864: 64
Direct Station Select Consoles	816: 1 1632: 2 2864: 2
Busy Lamp Fields	816: – 1632: 3 2864: 7
Intercom Links	816: 4 1632: 6 2864: 6

Physical

Key Switching Unit (height, width, depth)	816: 44 X 42 X 12 cm (18 X 17 X 5 inches) 1632: 65 X 54 X 23 cm (26 X 22 X 9 inches) 2864: 65 X 74 X 23 cm (26 X 30 X 9 inches)
Power Supply (height, width, depth)	816: 24 X 42 X 13 cm (10 X 17 X 5 inches) 1632: 28 X 58 X 25 cm (11 X 23 X 10 inches) 2864: two supplies 28 X 58 25 cm (11 X 23 X 10 inches)
Weight	816: KSU 8.5 kg (19 lb) Power Supply 12 kg (26 lb) 1632: KSU 26 kg (57 lb) Power Supply 28 kg (62 lb) 2864: KSU 36 kg (79 lb) Power Supply 2 X 28 kg (62 lb)

Technology

System Control	Stored Program Control (SPC); distributed processing between microprocessors in KSU and in stations.
Switching	CMOS integrated space division.

Power Requirements

Input	196-254V ac, 50 Hz, or 105-125V ac, 60 Hz, or 24-27V dc (for battery backup).
Consumption	816: less than 200 Watts 1632: less than 300 Watts 2864: less than 600 Watts

Outdialing

DTMF or impulse dialing

Cabling Requirements

Station wiring	3-pair modular cable
Maximum cabling runs	816 up to four stations 330 meters (1000 feet); all other stations 160 meters (500 feet) from KSU. 1632: up to 16 stations 330 meters (1000 feet); all other stations 160 meters (500 feet) from KSU. 2864: up to eight stations 330 meters (1000 feet); all other stations 160 meters (500 feet) from KSU. Off-Premis Extension (OPX) up to 5 km (3 miles) from KSU.

Operations Conditions

Temperature	0-45 degrees c (32-113 degrees f)
Humidity	20-80 percent relative.

Telrad Telecommunication and Electronic Industries, Ltd., is the largest designer and manufacturer of telecommunications equipment in the Near East. For more than 30 years, it has been the principle supplier of telephone switching and terminal equipment for Israel; in the last five years, it has become a leading exporter of telecommunications technology, with markets on five continents. Its products include digital multiplex Central Office equipment, electronic PABX exchanges, key systems, and a wide variety of telephone sets. It is a leading developer of office systems which integrate voice and data communications in a single network.

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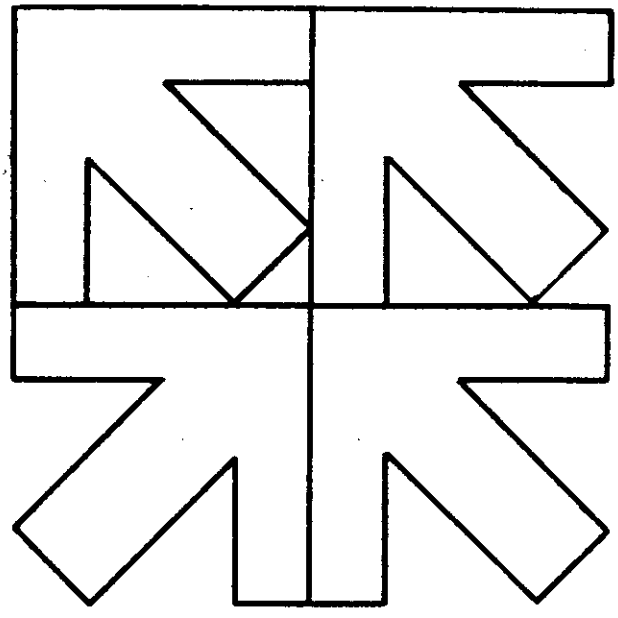
Key bx 1632C/2864C Office Telephone Systems Customer Service Manual



I. System Description

TLRD-104-262-114

NOTICE

This manual is applicable to the key bx 1632 and 2864, software versions C. Telrad, Ltd. reserves the right to make changes in the equipment described, and in this manual, without notification. However, changes in the equipment do not necessarily render this manual invalid.

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Section 1
INTRODUCTION TO key bx

1.1 GENERAL

The key bx is a family of electronic office telephone systems which incorporate the sophisticated features of large EPABX's with the simplicity of operation of a key telephone. Of the two versions reviewed in this manual, the key bx 1632C can serve up to 32 extensions and connect with up to 16 Central Office (CO) lines. The key bx 2864C provides for up to 64 extensions and up to 28 CO lines.

1.2 PURPOSE OF MANUAL

This manual is intended to acquaint the Customer Service Representative and the user with the key bx 1632C and key bx 2864C key telephone systems. It includes a general description of both systems' hardware and features. The manual is complemented by the Operating Instructions (TLRD-104-262-115) and the Programming Manual (TLRD-114-262-122).

Unless expressly stated otherwise, the explanations included herein are applicable to both the key bx 1632C and the key bx 2864C.

1.3 SYSTEM GENERAL DESCRIPTION

- The system operates with its own microprocessor-based station, or with ordinary Single Line Telephones (SLTs). The key bx station communicates with the Key Switching Unit (KSU) over a dedicated control path link, making possible extremely simple operation of advanced PABX features. Virtually all these features are available also at SLTs, by dialing one-digit access codes.

- The **key bx** telephones are microprocessor controlled multibutton sets with all CO lines and functions appearing on the face panel. Call completion and custom calling feature activation are performed by means of momentary pushbuttons; visual indicators show the status of calls and use of functional features.

- The **key bx** can handle all types of loop disconnect trunks - (CO, TIE, PBX, WATS and FX lines). Incoming lines may use dual tone multifrequency (DTMF) or impulse dialing signaling.

- The system is completely programmable from the Direct Station Select (DSS) console, which is a standard unit supplied for attendant operation. The system is extremely easy to learn -- the user need not memorize special codes or have specialized training in telephony or computers. The customer service representative -- and even the customer himself if he chooses -- can program any feature of the system in the customer's office.

1.4 FUNCTIONAL DESCRIPTION

The microprocessor in each **key bx** telephone transmits messages to the Central Processing Unit (CPU) to provide the desired routing of speech and tone signals. A signal from the micro- processor also lights the appropriate Light Emitting Diodes (LEDs) within the telephone. The telephones are basically "smart" terminals that connect to the line cards through three-pair cables. One pair is for voice signals, the second is for Hands-free Talk Back (HFTB), and the other is for data (control) signals.

Within the system there is complete separation between audio and data signals. Voice switching is accomplished by a space-division matrix switch.

1.4.1 Link distribution.

The **key bx** has eight links dedicated to internal use. In the 2864C, five of the links are general purpose and internal call links. One is a dedicated tone link, one is connected to a page amplifier, and one for DSS service. In the 1632C, three of the eight links are dedicated like in the 2864C, two links serve for DTMF decoding, (only when DTMF SLIs are equipped) and three links are left for general purpose. One outside line link is dedicated to each outside line termination for a maximum of 28 (in the key bx 2864C) or 16 (in the key bx 1632C).

Figures 1-1 and 1-2 show the link distribution of key bx 1632C and 2864C switching matrices.

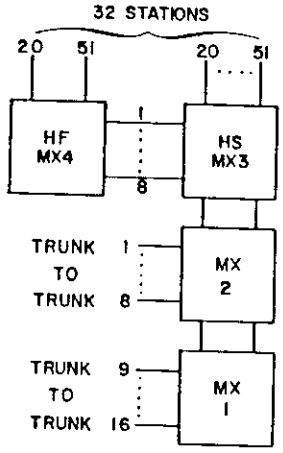

Figure 1-1 Link distribution of key bx 1632C switching matrices.

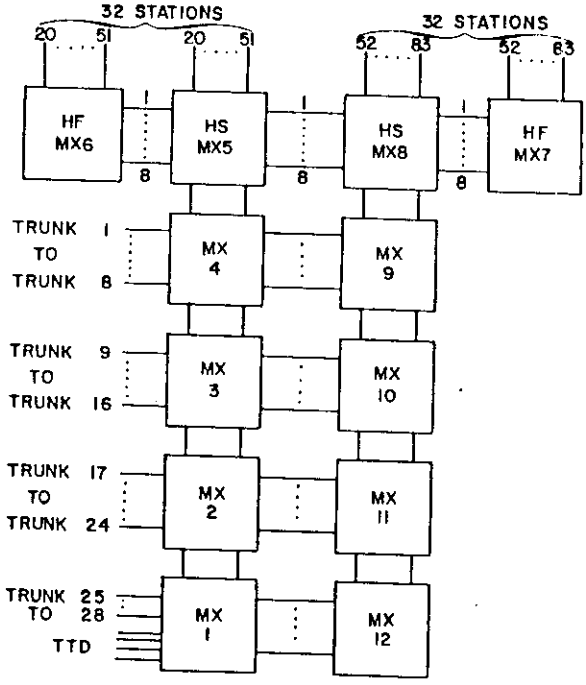

Figure 1-2 Link distribuiton of key bx 2864C switching matrices.

1.5 SYSTEM COMPONENTS

1.5.1 Switching and power equipment

The control and switching equipment are located in the Key Switching Unit (KSU). This is a completely modular unit which makes possible simple and cost-efficient configuration of the system to meet specific needs. The KSU has card slots for several types of printed circuit boards, and cable jacks for connection to the Main Distribution Frame (MDF).

a) **Common control cards.** There are four types of common control cards -- MS, GP, TR, and M1.

- The MS (Master) card contains the system CPU which controls system operation and is linked by data lines to the microprocessors located on the control and interface cards. It also contains the master reset for the entire system.

  On the MS card there is a memory protect switch. When this switch is in the UP position, resetting the MS card by depressing the reset button will not alter the stored configuration. With the memory protect switch in the DOWN position, resetting the MS card will reset the system and the programmed configuration.

- The system memory resides on the M1 card. The M1 card holds the programming memory, the speed dial directory, the save-repeat memory and the alarm memory. The M1 card is also the common use system memory that the Master card utilizes when operating the system. A lithium battery protects the data stored in case of power failure.

  In the 2864C, a second memory card is necessary -- the M2 card -- for holding the personal speed dial memory of stations 64-83;

- The **GP card** provides interface between the CPU and the switching matrix cards;

- The TR card manages communication of control signals between stations and the MS card. One TR card supports up to 32 stations. The card has its own microprocessor and memory.

b) Interface cards for connecting stations, line cards, attendant console (IRB card), Single Line Telephones (on or off premise), and trunks (T cards). The number of cards required depends on the type of terminal equipment and the number of trunks installed;

c) Matrix (MX) cards, for performing switching functions. The number of these cards depends on the size of the system installed;

d) The ID card is used when the system is connected to impulse dial (ID) signaling trunks. The ID card provides the trunk cards with dialing signals and masking for eight trunks;

e) The R card complements the ID card, providing masking service for eight additional trunks. Both the ID and the R card must be installed in a system connected to more than eight ID trunks. For the key bx 2864C up to two pairs of these cards may be installed.

In the U.K. version of the key bx all the masking is provided by the R card. This means that both the ID and the R card must be equipped when connecting the key bx to ID signaling trunks.

- The TTD card allows connection of SLT sets with DTMF dialing. In addition to this, it performs a number of optional functions, such as DISA and trunk patching (available in the USA only).

- XPG card, for connection of external paging equipment, external bells and door unit.

Appendix B contains provisioning requirements, for determining what and how many printed circuit cards are required for every possible configuration of the key bx.

1.5.2 Cabling

The KSU is connected to the Main Distribution Frame (MDF) by means of industry-standard 25-pair connectors. In addition, three connectors lead to the external power supply, and a RS-232C connector provides an interface to a printer or computer for Call Detail Recording (CDR).

A terminal strip is on the KSU to connect a 48V power supply for off-premise extensions, and a ring generator for SLTs.

1.5.3 Power supply

The Power Supply uses standard 110-V or 220-V mains source and produces all the regulated voltages required for operation of the key bx. In case of a power failure, the Power Supply can also be powered by an optional battery backup unit, so that telephone service can be continued.

An additional (add-on) power supply must be equipped in 2864C systems with more than 32 stations.

Installation of OPXs at more than 1.5 kilometers from the KSU requires an external 48V power source.

1.5.4 Power Failure Unit

An optional Power Failure Unit (PFU) provides emergency telephone service, in case battery backup is not provided. The PFU automatically connects CO lines to eight or 16 emergency telephone sets in case of power failure.

1.5.5 Terminal Equipment

The **key bx** can operate with its own "smart" terminal equipment, or with industry-standard SLT sets. There are two types of **key bx** stations: the Standard, and the Featurephone. Each of these is provided with or without display (Featurephone has no display in the U.S.).

(a) The Standard Station has a standard 12-key dialpad, plus 11 dedicated feature buttons, and two rows of outside line buttons. It comes with an internal speaker and microphone for Hands-Free Talkback (HFTB), and an optional display. On the front side of the telephone there is a speaker volume control knob.

Light Emitting Diodes (LEDs), and the optional display, provide visual indications of telephone activity, including incoming calls, messages, and other functions. LEDs in the trunk buttons indicate if a trunk is busy, in use at the user's station, or on hold at the user's station. Several distinctive rings and tones indicate internal and external incoming calls, ringbacks, and other information. See Section 1.2 of the Operating Instructions Manual (TLRD-104-262-115) for a full explanation of the key bx telephone's visual and auditory indicators.

The key bx station is available with an optional LED display. This is an invaluable aid for making the use of the key bx even smoother and easier. When the station is not in use, the display shows the date and time of the day. During station operation, the display shows who is ringing (which extension or outside line), the number dialed, the

elapsed time of outside calls, the time to which the station alarm clock has been set, and other bits of useful information.

(b) **The Featurephone** provides all the services and features provided by the standard set, but has only two feature buttons -- hold and function -- rather than 11, and only 8 outside line buttons. Pressing the function button converts the dial pad into a feature keypad, which can provide all the functions performed by the function keypad of the standard set. On the front panel the functions performed by the dialpad are clearly marked, and all the LEDs of the standard set are present. The Feature Phone has a speaker, but has no microphone, so it cannot perform hands-free talkback. Like the standard set, it is connected to the KSU by three-pair wire.

The Featurephone is available in two versions, with or without display (not in U.S.)

(c) **Single-Line Telephones (SLTs).** SLTs may be used for up to 28 of the key bx 1632C extensions and up to 60 of the key bx 2864C extensions, as ordinary extensions. Four of these may be Off-Premises extensions (OPX). The SLTs may be either DTMF (tone) or impulse dial telephones.

Most of the system features available at standard stations are also available at SLT sets, by dialing special access codes.

Two software packages for the key bx make possible use of SLTs. With the key package, SLTs emulate key telephones -- they access trunks individually by number. The hybrid package enables SLTs to operate as a full PABX extension. An SLT accesses a trunk by dialing 9, or by selecting a trunk group.

Section 3 of the Operating Manual provides information on operation of SLT sets in the key bx network.

1.5.6 Direct Station Select (DSS) Console

The DSS console serves a dual function in the key bx system. As an attendant's console, it performs all the call traffic management functions required by a small office. As a programming station, it loads all information required to configure the system. The console is switched from program mode to DSS mode by means of a switch on the rear of the unit.

Two DSS consoles can be installed in the key bx. The first works in conjunction with station 20. The second can be configured to work with any other key bx station. When two DSSs are installed, only the first -- the one associated with station 20 -- can be used for system configuration.

1.5.7 Busy Lamp Field

The Busy Lamp Field (BLF) is a useful management tool for monitoring extension status, and as an aid to a standby telephone attendant, during heavy traffic loads. The BLF has a light for each extension, which shows the status of the extension. The lights are arranged exactly as the lights on the DSS.

Section 2
FEATURES AND SERVICES -- GENERAL

2.1 GENERAL

The features and services of the key bx are designed to be fully programmable. Many of the features which in other telephone exchanges are factory set, can be set in the key bx by simple programming procedures.

Programmable functions include:

- call routing and forwarding. The key bx can be configured to route and forward incoming calls to designated stations;
- dialing restrictions for each telephone extension and CO line;
- system time functions, such as duration of hold, time to recall, pause time for dialing on CCSA and enhanced dial networks, flash time for operation with PABXs, and other time parameters;
- Call Detail Recording parameters. The system can be configured to print a log of incoming and outgoing calls, in any format, on any standard ASCII printer, or to output the log into a computer for sorting.

2.2 FEATURE TABLE

Table 2-1 lists the features available in the key bx 1632C and 2864C systems, with a brief description of each feature and its programmable options. The features are described in detail in Section 3, 4, 5 and 6.

Table 2-1
key bx 1632C and 2864C FEATURES AND SERVICES

Feature	Description	Programmable Options
SYSTEM FEATURES		
Nonblocking trunk access	Access to CO lines is nonblocking;	
Programmable System Times	All timing parameters can be individually programmed.	Flash times; hold time; recall time for day or night service; recall time for recall to attendant station; transfer recall time; maximum duration of handsfree talkback conversation; maximum duration of page announcement; pause time for CCSA and PABX dialing.
Direct Inward Station Access (DISA)	Outside caller can directly access any key bx extension and make outside calls by calling the key bx on a specially designated trunk.	Executive Credit Codes (ECC) can be assigned to users, to limit access to outside dialing using the DISA feature: DISA trunks are selectable; access to DISA trunks can be block to key bx extensions.

(continued)

Table 2-1 (continued)

Feature	Description	Programmable Options
Trunk-to-Trunk Patch	Outside caller can be patched through to another key bx trunk by a key bx station.	Patch time -- duration of patched call without intervention of key bx station -- is programmable.
Call Detail Recording	Details of telephone usage can be printed on any asynchronous ASCII printer or dumped to a computer port.	Printer characteristics, including baud rate, parity, page length; printout format, including header style, blank lines between call records; minimum duration of local calls required for logging; minimum duration of long distance calls required for logging; minimum time of incoming calls; minimum number of dial digits required for logging; choice of listing all extensions participating in a call or only the last party; account coding of calls for billing purposes.
PABX and CENTREX Interface	System can be configured to enable interface with CENTREX or PABX system.	Dial signals [*] and [#] can be configured to be interpreted by key bx or passed transparently to outer exchanges; flash time can be adjusted to PABX or CENTREX specifications.

(continued)

Table 2-1 (continued)

Feature	Description	Programmable Options
Split System Configuration	System can be configured to serve as two tenant exchanges.	When two DSS consoles are installed, recalls can be routed to either, both, or, neither of the DSSs; calls to the attendant can be routed to either DSS; and the message function is affected.
Open-Loop Detection	System automatically drops CO lines when far-end party terminates.	Open loop time programmable. Central Office must supply open loop signal service.
Selectable Dial Signaling	System can be configured for DTMF or impulse dialing.	For impulse dialing, optional hardware is required.
Hybrid Configuration	System can be configured as key system, or as hybrid system for use with Single Line Telephones.	Changing configuration from key to hybrid requires change of hardware.
External Inputs	Audio inputs available for music on hold.	
External Outputs	Audio outputs for external page system.	XPG card required.
External Relays	Relays, accessible by dialing codes, for door unit and external bells.	XPG card required.

(continued)

Table 2-1 (continued)

Feature	Description	Programmable Options
CALL ROUTING FEATURES		
Flexible Call Routing	Incoming calls can be routed for efficient CO line service.	CO line ringing and flashing during day and night service; simulated.
Automatic Call Handling	Unanswered transfered calls ring back automatically to pre-fixed patterns, so that calls are not dropped.	Ringback and other time parameters of rerouted calls are programmable; when two DSS consoles are installed ringbacks can be routed to either both or neither DSS.
Day and Night Service	Different call-routing maps can be programmed for day and night service.	Ringing and flashing of CO lines can be individually programmed independently for day and night service.
External Bells	Ring signals can be routed to external bells for noisy or open environments.	Each bell can be programmed to ring for several trunks or extensions; ringing can be routed independently for day or night service.
Page Groups	All stations can receive or initiate messages through their speakers.	Selected stations can be denied access to paging. Four page groups can be defined.
DND Forward	Call forwarding provided for extensions in DO NOT DISTURB mode.	Forward station defined during system programming.
Follow Me	A user can select a follow me extension where all incoming calls to his phone will ring.	

(continued)

Table 2-1 (continued)

Feature	Description	Programmable Options
STATION USER FEATURES		
Intercom calling	Users can dial other extensions in the key bx.	Dialing to selected extensions can be restricted.
On-hook dialing	All function keys can be activated and all dialing done on-hook.	
Hands-free Talkback (HFTB)	Built-in speaker and microphone give station capability of answering intercom calls handsfree.	Automatic termination after programmable time when in HFTB mode (feature not available in Featurephone).
Exclusive Hold	A call on hold at a station flashes at that station only.	
Executive Intercom	Each extension can have direct access to up to eight other extensions, by means of the sec'y button.	Maximum of 8 groups of executive intercom links are available.
Automatic Answer	Station can answer a ringing CO line without pressing the CO line button.	Automatic Answer is programmable for each station.

(continued)

Table 2-1 (continued)

Feature	Description	Programmable Options
Speed Dialing	90 system speed dial numbers and 7 station speed dial numbers are available to each station.	System speed dial numbers can be entered by a selected station; station speed dial numbers can be entered at each station; access to system speed dial list can be denied to selected extensions.
Redial	Automatic Redial of last number dialed up to 32 digits.	
Save/Repeat dialing	One-key redialing of frequently dialed number.	
Call Transfer	CO calls can be transferred by a number of methods.	Automatic recall of unanswered transfers after a programmable time.
Flash Disconnect	Station can disconnect a call on the CO line, without losing the line.	Flash time is programmable for PABX and CENTREX lines. Access to flash function is programmable for each extension.
Call Pickup	Extension can pick up calls ringing or on hold at another station.	

(continued)

Table 2-1 (continued)

Feature	Description	Programmable Options
Group Pickup	Extension can pick up call ringing or on hold at another extension in the same group.	Up to 14 pickup groups definable.
Conference Calling	Conference calls can be made with up to five parties, including two CO lines and three extensions.	
Do Not Disturb	When station is in DND mode, calls from outside are muted. Calls from the inside ring twice with a muted ring and are then disconnected.	DND access programmable; DND forward to a programmable station;
Message Leaving	Station can leave a call-back message at another extension, return or cancel messages.	
Display	10-digit display shows time and date, elapsed time of call, messages, number dialed, CO line or extension ringing, page codes, conference parties, pickup extension, call forward extension.	Time and date can be set from attendant station, station 21 and another selected station. On hanging up, elapsed time of call stays on for a certain time, after which it is replaced by time and date display automatically.

(continued)

Table 2-1 (continued)

Feature	Description	Programmable Options
Shift	In the 2864C system, the SHIFT keys enable key bx station user to see status and access all 28 outside lines with only 14 outside line buttons.	Two modes of shift operation are available, programmable per station.
Account Code Reminder	Tone warns callers to enter account code for billing purposes.	Reminder tone is programmable per extension.
Alarm Clock	Any station can be set to ring at a selected time.	Alarm is set by station user.
Trunk Queuing	Station can queue for trunk use. Priority is determined by lowest extension number.	Division of CO lines into trunk groups for queuing is programmable.
SINGLE-LINE TELEPHONE FEATURES		
Key/Hybrid configuration	In key version, SLT extensions can access specific trunks by request. In hybrid version, SLT can access trunks by trunk groups.	Hybrid and key configurations require different hardware.
DTMF or Impulse Dialing	DTMF and impulse dial extensions can both be used in the same installation.	Signaling type is selectable per extension.

(continued)

Table 2-1 (continued)

Feature	Description	Programmable Options
Station emulation	SLT performs virtually all functions of standard station, including internal and outside dialing, messaging, transfer, conference, follow me, pickup, trunk queue, hold, speed dial, redial.	
ATTENDANT FEATURES		
(For systems in which one or two DSS consoles are equipped).		
Two attendant stations	Two attendant stations can be installed.	Routing of ringbacks and calls for attendant assistance is programmable per trunk and extension.
Dedicated Intercom Link	Speech link is always reserved for attendant intercom calls.	First DSS only.
Busy Lamp Field	Direct Station Select (DSS) console shows status of all extensions.	Up to eight BLFs can be installed in 2864C system.
Digital Display	DSS console display shows CO lines in use as well as extension using specific line.	

(continued)

Table 2-1 (continued)

Feature	Description	Programmable Options
Handset or Headset Operation	DSS console works in conjunction with station 20, or with optional headset connected directly to unit. Release button terminates line use with headset or handset operation.	Specially modified DSS is required.
Call Transfer	by means of dedicated DSS button	
Call Camp-on	by means of dedicated DSS button	
Paging	by means of dedicated DSS buttons	
Day Alert mode	Attendant can enlist another station as a secondary attendant station during heavy traffic periods, or as a replacement in case she has to be absent for a short while.	Secondary station selectable from DSS.
Automatic Recall	Unanswered calls return automatically to attendant station after timeout.	Recall time is programmable.
Serial Calls	Attendant can request ringback when a conversation is terminated.	
Night Service	selectable by dedicated DSS night button	

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Section 3
SYSTEM FEATURES

3.1 PROGRAMMABLE SYSTEM TIMES

All time parameters in the key bx are set in software, and are programmable from the DSS console. This feature adds a dimension of versatility and makes it possible to interface the key bx with virtually any exchange, public or private.

Two types of time parameters are programmable -- internal call routing times, and external signaling times. Internal call routing times include the maximum length of a page announcement or hands-free call before the call is automatically terminated; ringback times when a call is on hold or transfered; and other internal parameters. These times can be set to meet the specific traffic needs of the customer. Internal call routing times are explained in detail in Section 4.3.

External signaling times include flash times and durations of pause time in dialing sequences. These parameters serve two purposes -- to adapt the system to the specifications of the telephone network, and to configure the key bx to operate behind a PABX or CENTREX system. When configured behind a private exchange, the key bx can serve as an expansion or an enhancement of the exchange, adding the advanced features of the key bx, without detracting from the features of the larger exchange. Section 3.5 describes how to configure the key bx as an enhancement to PABX or CENTREX exchanges.

3.3 STATION PRIORITY ON TRUNK QUEUE

During heavy usage, when there is competition between extensions for telephone services, the key bx grants outside lines first to the lowest extension numbers when trunk queuing (see Section 5.13). When several

stations have requested use of a single trunk or trunk group, the station with the lowest extension number is given the trunk first.

For this reason, when planning an installation, it is desirable to install the lowest numbered extensions in the offices of the most senior personnel (beginning from extension 21).

3.4 CALL DETAIL RECORDING (CDR)

With an RS-232C connector in the KSU, Call Detail Recording is available. Any asynchronous ASCII printer can be connected to the port. All interface parameters of the port can be set from the DSS The CDR printout can be formated in a number of ways -- the key bx knows how to print each day's calls on a separate page, and can print page headers, and set page length and other format parameters.

When CDR is installed, account coding of calls is possible. This means that during a call, a user can enter a charge number, which appears on the printout.

A single call can have several account numbers.

The CDR port can also be connected to a computer, which can perform sorts on the output and produce station-by-station reports on a regular basis.

3.5 PABX AND CENTREX INTERFACE

The **key bx** has special features for use when the system is installed behind a Private Branch Exchange (PABX) or CENTREX service in the Central Office. These features make it possible to expand an existing office system, or to enhance an unsophisticated PABX with key bx features.

The software configurations for behind PABX and behind CENTREX are designed to make maximum use of the main exchange features. The configurations operate as follows:

(a) behind PABX: When dialing on a line behind PABX, all key bx feature buttons except [*] and [#] (on the dialpad) operate normally. These two keys, however, are dialed out to the PABX. Many PABXs use these keys to activate features. So the key bx user has at his disposal all the PABX features. Those key bx features which use the [*] and [#] keys -- speed dial, account coding redial, and pause time -- are unavailable on trunks behind PABX. All other key bx features operate normally.

No dialing restrictions are applied to trunks behind PABX, since the PABX itself can usually apply dial restrictions to the line. Flash time can be set to the specifications of the PABX, to make use of this feature.

If the PBX has few or no special features, it may be preferable to configure the key bx trunks as ordinary CO lines, so that the key bx speed dial and other features are available. In this case, a special feature -- pause time -- makes outside calling convenient. The key bx can insert pauses into a dial sequence, whether the number is dialed manually or with the system speed dial directory. Pauses are inserted with the [#] key. When behind PABX which requires 9 to seize a CO line, a user can enter the number 9#555-1234 in his speed dial directory.

The key bx will dial 9, wait for the pause time -- time for the PABX to seize an outside line and get a dial tone -- and then automatically dial the number.

The pause time can be configured for automatic use or manual use. Manual pause lets the user enter pauses when redialing or save-repeat dialing, as well as when speed dialing. Specifically, the difference between manual and automatic pause is as follows:

- automatic pause -- during the first four digits of a dial sequence, [#] is dialed out by the key bx. In the following digits, [#] causes the key bx to pause for the pause time;
- manual pause -- dialing [#] at any time causes the key bx to pause; [#] is never dialed out to the trunk.

NOTE

When a trunk is configured as behind PABX, [#] is always dialed out to the trunk, regardless of whether manual or automatic pause is selected.

(b) behind CENTREX: All key bx feature buttons operate normally, including the [*] and [#] keys. Flash time can be set to CENTREX specifications.

A trunk cannot be programmed to be both behind CENTREX and behind PABX.

3.6 TENANT SERVICE

The **key bx** can be configured to serve as a split or tenant exchange, so that it in effect acts as two virtually independent exchanges. Thus, two small businesses can share a single key bx -- each tenant business has its own CO lines, its own extensions, and its own attendant station.

Tenant configuration is done by using the following programmable functions:

- CO line access restriction -- blocks access of business A's extensions to business B's trunks and vice versa - see Section 6;
- incoming call ringing (day) - see Section 4.2;
- incoming call flashing (day) - see Section 4.2;
- incoming call ringing (night) - see Section 4.2;
- incoming call flashing (night) -- these functions configure business A's CO lines to ring and flash only at business A extensions, and business B's CO lines to ring and flash only at business B extensions - see Section 4.2;
- ICM restriction -- To a limited extent, this feature allows you to block business A extensions from making intercom calls to business B extensions and vice versa - see Section 5.1. Access can be restricted to up to eight extensions;
- paging routing - see Section 4.6;
- page access -- these function must be programmed so that one business cannot page the other business' extensions -- see Section 4.6.
- pick-up grouping -- separate pick-up groups can be defined for each tenant business;
- second DSS station routing and second DSS CO lines -- trunks and recalls from extensions can be routed to either DSS.

Common system functions must be shared by the two exchanges. These include night service (see Section 4.2), Call Detail Recording (Section 3.4), system speed dial directory (Sections 5.5 and 6.1). Only one extension can be privileged to adjust the key bx clock, and the time set is the same for all extensions.

There is great flexibility in the routing of outside lines and division of extensions between the two tenants of the key bx exchange. An outside line can be configured to ring at either, both, or neither of the two attendant consoles. It can be configured to ring back, after transfer or hold, at either, both, or neither of the consoles. If an outside line is configured to ring back at neither console, a call is automatically dropped after the recall time.

Account coding of calls makes billing of common services a simple matter. If both businesses share certain outside lines -- for example the DISA trunk, or special Value Added Network trunks -- the extension and account code of the user appears on the Call Detail Record for each call placed.

3.7 OPEN LOOP DETECTION

When an incoming caller terminates a call to the key bx, the key bx automatically detects the open loop and drops the line. This has two advantages:

- Users who are restricted from dialing long-distance calls or from dialing on a given CO line cannot bypass the restriction by dialing on a line that was already seized for a previous call.
- When an outside caller on hold in the key bx hangs up, the line is automatically dropped. Without open-loop detection, the unused line would remain on hold, wasting switching facilities and outside access.

NOTE

Open-loop detection requires that the Central Office provides an open-loop signal service. This feature is available on DTMF trunks only.

3.8 SELECTABLE DIAL SIGNALING

The key bx can be configured for DTMF (tone) dialing or impulse dialing. DTMF signaling is standard. Impulse dialing requires the addition of an optional printed circuit card, which sends dial pulses to the trunk.

When the impulse dial option is installed, each SLT extension can be configured inde- pendently as either DTMF or impulse. Any extension can dial any trunk, regardless of type.

When impulse dial is selected the **key bx** ignores the [#] and [*] signals.

3.9 HYBRID CONFIGURATION

The **key bx** can be used with **key bx** stations, designed to make maximum use of all the key bx advantages, or with ordinary Single-Line Telephones (SLTs).

Two firm ware versions are available for the **key bx** which allow installation of SLTs. When the key version is installed, the user dials 9 and the number of the outside line.

The other version is for hybrid configuration. With this, an SLT cannot select the specific trunk he wants to dial on. Depending on the configuration defined, he can seize a line by dialing 9, as in ordinary PABX operation; or by dialing 9 and the number of a trunk group he wishes to use. Up to eight trunk groups can be defined. Definition of trunk groups makes possible selective access to special trunk types (FX, WATS, or ordinary Direct Distance Dial trunks), and also facilitates tenant service, when an exchange is shared by two separate businesses.

3.10 EXTERNAL CONNECTIONS

The **key bx** has connections for several types of external equipment.

- One outside audio source to the system enables music on hold;
- the key bx can be connected to a four-channel external page system. Each channel can be accessed individually. The key bx can be adapted to virtually any commercially available page system;
- external bells can be connected to the system and can be programmed to ring for stations or for CO lines;
- door unit. The key bx has a sensor for connection to a front door bell; an audio pair for an intercom; and a relay for activating an electric lock. When someone rings the door bell, it activates the buzzer at the attendant console. By dialing 187, the attendant can talk to the person at the front door by intercom; and she can open the electric lock by pressing the [*] button on her telephone. Front door units with all the required connections are commercially available; if a unit cannot be bought, the components can be purchased individually and simply installed;

3.11 DIRECT INWARD SYSTEM ACCESS (DISA) AND TRUNK PATCH

Any outside line of the key bx may be defined as a DISA trunk. When an outside caller dials the key bx on this trunk, he hears an internal key bx dial tone. He can then dial extensions, and make outside calls using key bx CO lines, by entering a special Executive Credit Code (ECC). All of the key bx extensions may be defined as ECCs. The code is made up of an extension number (20 to 83) and a four-digit secret code. The codes are entered through a selected station during system configuration. They can be changed or read only by reconfiguring the ECC station using the key bx Direct Station Select console as a programming station.

Use of DISA for incoming or outgoing calls is recorded on the Call Detail Record with a special symbol. The extension part of the ECC appears on the printout, so it is clear who made use of the DISA service; but the secret four digits of the ECC code do not appear.

In addition to DISA, a trunk patch feature is available. An outside caller can ask a key bx station user to establish a call on another key bx trunk; the station user can then exit the conversation, and the two outside lines are patched together. The key bx user has complete control over the patch -- he can reenter the conversation or cut it off at any time.

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Section 4
CALL-ROUTING FEATURES

4.1 CONFIGURABLE CALL ROUTING

Incoming calls on outside lines can be configured to ring at up to eight key bx extensions, and to flash at any number of extensions. Call routing can differ for day and night service.

4.2 DAY AND NIGHT SERVICE

Two completely independent call routing maps can be defined for the key bx -- one for day service and one for night service. Day and night service are defined by the following functions:

(a) incoming call ringing and flashing. Each outside line can be programmed to ring and flash at certain extensions during day service, and other extensions during night service. Also, each outside line can be programmed to be a DISA line (see Section 3.10) or to ring at an external bell, be it during day service, night service, or both.

(b) call rerouting and time parameters. Calls which have been placed on hold or transfered, are automatically rerouted if they are unanswered. This rerouting differs for day and night service. Section 4.2 describes this difference in detail. The time parameters which define the call rerouting are programmable independently for day and night service.

c) external bells. Bells can be programmed to ring for selected CO lines during day service, and for different CO lines during night service.

d) DISA. Direct inward system access can access selected extensions during day service, and other extensions during night service.

The **key bx** remembers what mode it is in, even if there is a power failure. So, if the system is in night service when the power fails, it will remain in night service when the power comes back on.

4.3 AUTOMATIC CALL HANDLING

The **key bx** automatically handles unanswered calls which have been placed on hold or transfered. The call is rerouted three times during the day, and twice during night service. If two DSS's are installed, the call can be routed to the first DSS, the second DSS, both stations or neither one, during day service. If after the last transfer, no one answers the call, it is automatically dropped. All the time parameters related to call rerouting are programmable. This feature provides the maximum assurance that outside calls will not be dropped.

There are four routes a call can take:

- rerouting of a call that has been placed on hold during day service. The call remains on hold for the hold time, then automatically rings back the holding extension. The call rings at the extension for the day recall time. If no one answers, the call is automatically transfered to the attendant's station. The call rings at this station for the DSS recall time. If no one answers after the DSS recall time, the call is automatically dropped.

  If two DSSs are installed with the system, the calls can be programmed to recall at the first attendant station, the second attendant station, both stations, or neither one. If no ringback is configured, the call is dropped after the day recall time.

- rerouting of the same call during night service. The call rings back at the holding extension after the hold time. It rings at the extension for the night recall time. This time is programmable inde- pendent of the day recall time -- normally it is programmed for a longer period. If no one answers within the night recall time, the call is automatically dropped -- it is not transfered on to the attendant station(s).

- rerouting of transfered calls during day service. A call that has been transfered during the day to another extension rings at that extension for the transfer recall time. If no one answers, the call rings back at the attendant's station. It continues ringing for the DSS recall time and is then dropped.

- call transfered during night service. It rings at the station for the unscreened transfer time, then rings back at the originating station for the night recall time. After the night recall time,

the call is automatically dropped -- it is not transfered on to the attendant station.

All the times mentioned above are programmable. When the system is first installed, they are set to default settings. You may program the time parameters for a wide range of values, or you can set any of them to unlimited. In this case, the call will continue to ring (or be held) for an unlimited time, and will not be transfered on.

4.4 EXTERNAL BELLS

key bx extensions or outside lines can be configured to ring, not only at the extension or station, but also at an external bell. This is useful when the key bx is installed in noisy or open environments.

4.5 PICK-UP GROUPS

There are 14 pick-up groups definable in the key bx. A user can pick up a call that is ringing at another extension in his group by pressing the pick up and [*] keys. The user in a group can still pick up a call to an extension not in his group, but he must know which station or line is ringing.

4.6 PAGE GROUP

The **key bx** has the capability of serving as a public address system for paging and announcements. Paging can be by means of the built-in speakers in the key bx stations, or by means of an external page unit with up to four channels. The external page unit must have its own amplification.

Stations and external speakers can be divided into eight page groups. Four of these groups are for station speakers -- the others are for external speakers and station speakers. Any number of stations can be included in each group. Usually, one of the groups is reserved for a general page -- including all key bx stations.

The maximum duration of a paging announcement is defined during system programming. When a user makes a page announcement which exceeds the maximum time, the page is automatically terminated. This prevents the possibility of someone making an announcement, and forgetting to hang up his station at the end of it.

During a page, and after it is ended, display stations display the word "PAGE", the station that initiated the page, and the page group. The page is introduced and terminated with a double tone burst in the station speakers. A station user can stop a page announcement by twice pressing the dnd button.

Access to paging can be defined when the system is programmed. Any extension can be allowed or blocked from paging on each of the page groups.

4.7 CALL FORWARDING

The **key bx** can forward calls from unattended stations to manned stations. There are two types of forwarding: the user can forward his calls using the FOLLOW ME feature, using the dnd key and dialing any extension he wants to forward to; and a permanent call forward number can be selected for each station using the programmer. In this case, when a call is placed to the station in DND mode, it is automatically forwarded to the forward station. If the caller has a display station, he sees in the display the number of the forward station.

Section 5
USER FEATURES

5.1 INTERCOM CALLING

The **key bx** has several features for streamlining internal communications. There are two modes of internal calling -- handset to handset, and hands-free, which allows the called party to answer without lifting the handset.

The **key bx** standard station has a built-in speaker and standard microphone, and two independent speech paths, one for handset and one for hands-free operation. This means a caller can reach the key bx station through the speaker, even though the handset is busy. This feature, called intrusion, can be limited on those extensions where the user does not wish to be disturbed during telephone conversations. A key bx station can be configured to have one of three levels of intrusion:

- no intrusion. In this configuration, a caller may not make a hands-free call to the station any time. The station user may still use the station speaker for on-hook dialing;

- on-hook intrusion. A caller may make a hands-free call to the station when the station is not in use; but if the station user is talking through the handset, the caller cannot make the hands-free call. Instead, he hears a busy signal;

- all intrusion. A caller may make a hands-free call to the station, whether or not the station handset is busy.

Selected stations can be blocked from dialing other selected extensions. This feature is called ICM (Intercom) Restriction.

The maximum duration of hands-free calls is defined during system programming. If a caller tries to talk hands-free for longer than the maximum time, the call is automatically terminated. (The time can also be set to unlimited.) If the called party wishes to talk longer than the programmed time, he can lift the handset, and continue the conversation indefinitely.

5.2 HOLD AND PICKUP

Any outside call can be placed on hold. Usually hold is exclusive: the trunk button for the line on hold flashes only at the station which held the call. All other stations will show the line as busy, with a steady light in the button.

When a call is transfered, or transfered by page, the trunk buttons of both the transfering station and the destination station or stations flash, until the call is picked up.

A call on hold at one station can be picked up at another station with the pickup function. The user puts a call on hold, hangs up, goes to another extension, and continues the call.

Operation of the pickup function is explained in detail in Sections 2.11 to 2.14 of the Operating Instructions.

5.3 EXECUTIVE INTERCOM

The station user has a special function key (sec'y) for direct access to up to eight other extensions which he needs to call frequently. The sec'y key also indicates the status of the extension he is trying to reach. If only one executive intercom station is defined, the user calls it by pressing sec'y. If more than one station is defined, he presses sec'y and dials the number of the link -- 1 through 8. The light in the button shows if the station he called is busy, speaker-busy, or in dnd mode.

5.4 AUTOMATIC ANSWER

A key bx station can be programmed so that it answers incoming trunk calls by pressing the CO line button, or by simply lifting the handset. The latter method is called Automatic Answer.

Single-Line Telephone extensions (SLTs) are automatically granted automatic answer by the key bx.

5.5 SPEED DIALING

The key bx has an internal speed dial directory. The directory includes 90 speed dial numbers for use of all key bx extensions, plus seven additional personal speed dial numbers for each station. In addition, each station has a save/repeat dial button.

The system speed dial directory is more than a simple aid to dialing -- it can serve as a method of controling telephone costs. This is because the key bx can be programmed so that dialing a system speed dial number circumvents dialing restrictions. Thus, a user who needs dial only two or three long-distance numbers can be restricted completely from toll dialing from his station, but the few numbers he needs can be included in the system speed-dial list. He can then reach those numbers, without being able to use his station for long-distance personal calls. This method of dial restriction is explained in more detail in Section 6.

An extension can be restricted altogether from using the system speed dial directory. Or it can be permitted access to the directory, but prevented from circumventing dialing restrictions when using speed dialing. These functions are explained in Section 6.

In addition to speed dialing and save/repeat dialing, each extension can redial the last number dialed using the [*] (asterisk) key on the dialpad.

5.6 CALL TRANSFER

A user can transfer a call from extension to extension by several methods. He can transfer the call unscreened -- without announcing the call or making sure the station he is transfering to is manned. He can also make a screened transfer -- he can announce the call, either with a hands-free announcement or by placing a handset to handset call, before transfering (these two methods are explained in Section 2.16 of the Operating Instructions). The user can also make a confirmed transfer using the conference feature -- he announces the call, and confirms that the parties are talking before hanging up.

If a call is transfered unscreened to an unmanned extension, it does not ring there indefinitely. Instead, after a programmable time, it is transfered to the attendant's station (during day service), or back to the extension which transfered the call in the first place (during night service). The routing of transfered calls is described in detail in Section 4.3.

5.7 FLASH DISCONNECT

A user can disconnect a call by hanging up (either by going on hook or by pressing the speaker button in the case of a hands-free call), or by pressing flash. When talking on a trunk, pressing flash terminates the call, but keeps the trunk, so the user hears a dial tone.

Two programmable functions make this feature versatile. First, the use of the flash button can be denied to selected extensions. In this case, the user must hang up in order to release the conversation. This is useful to prevent "line hogging", when not enough CO lines are available to the users. Second, the flash time is programmable when programmed behind PABX or CENTREX. This makes it possible to suit the key bx to the specifications of the Central Office or PABX system it is connected to.

5.8 CONFERENCE CALLING

A key bx user can initiate a conference call of up to five participants. The participants may include two trunks. Participants in the conference see the extension or CO line numbers of the other participants in the station display. Any extension participating in the conference may exit the conference and reenter it, and may add additional parties to the conference.

The conference feature can be used to set up a trunk to trunk patch between two outside callers. The key bx station can set up the patch, and exit the call, leaving two outside lines talking together. The key bx user still controls the call -- he can rejoin the conversation or disconnect it at any time.

5.9 DO NOT DISTURB

The key bx has a sophisticated set of programmable functions to ensure office privacy on the one hand, and access in case of need, on the other. These functions include:

- DND access -- enables a station to enter do not disturb mode to prevent interruption by outside or internal calls;
- DND forward (see Section 4.7) -- to forward intercom calls to another station;
- ICM restriction (see Section 5.1) -- to restrict access to an extension by other extensions.

In addition, the user has a FOLLOW ME feature, which enables him to forward all his incoming calls to another extension. FOLLOW ME can be canceled either from the initiating or the forward extension.

When a station enters DND mode, intercom calls ring twice with a muted ring, and then the caller hears a busy signal. Trunks ring at the station with a muted ring.

5.10 MESSAGES

The **key bx** has a message service and automatic ringback. A user can leave a message at a station which does not answer. There is a dedicated function key on the station for this purpose. The msg button of the station which received the message lights, and the display shows the message "Call XX" (the number of the calling extension). Messages cannot be left at SLT extensions.

A maximum of two messages can be left at a station -- one from the attendant station and one from any other extension. If another station attempts to leave a message at the station, it receives a retry tone.

Section 2.19 in the Operating Instructions manual explains how to leave and return messages.

If a user calls an extension and it is busy, he can use the message feature to request automatic ringback. In this case, as soon as both extensions become available, the key bx rings the caller, and automatically redials the called extension. Automatic ringback is available to SLTs as well as stations.

A user can cancel a message appearing at his station. The attendant can cancel all messages from the attendant console.

5.11 DISPLAY

The **key bx** standard station has an optional display, which shows time, elapsed time of calls, and other information.

Elapsed call time begins running 15 seconds after the last dialed digit.

When the station is not in use, the display shows the time and date. A user can call the time and date onto his display whenever he wants by pressing the time button on the station. During a power failure, the time is stored, and when power is restored the clock continues running from the time when it stopped. This means that, in case of a power failure when no one is in the building, a user can easily know the duration of the failure by noting the hour of the key bx clock.

5.12 ALARM CLOCK

The **key bx** station has an alarm function. The alarm can be set to any time -- when the time comes, the key bx calls back the station with a distinctive alarm ring. Operation of the alarm feature is explained in Section 2.27 of the Operating Instructions manual. If the station has a display, the user sees the time of the alarm in the display.

5.13 TRUNK QUEUING

During periods of extremely heavy telephone traffic, all outside lines may be busy. Users may order an outside line by trunk queuing. When a line become available, the key bx rings back the ordering extension, and gives it the line.

CO lines can be divided into trunk groups for purposes of queuing.

When several extensions are queued for use of a single trunk or trunk group, service is granted on a priority basis, rather than first come, first serve. Extensions with the lowest extension numbers are granted lines first. Therefore, when planning an installation, it is desirable to install the lowest numbered extensions in the offices of those users with the most urgent need for telephone services.

5.14 ATTENDANT FEATURES

Station 20 serves as one attendant station in the key bx. Any other station can be designated as a second attendant station. Lost calls can be programmed to ring back at the first attendant station, the second station, both stations, or neither one. System functions, such as setting the system clock and entering numbers in the system speed dial directory, can be performed at these stations; in initial configuration, all outside lines ring at attendant station 20.

The attendant stations can be equipped with optional Direct Station Select (DSS) consoles, which give the attendants a wide range of special functions for telephone traffic management. These include

- call transfer by means of a dedicated DSS button;
- camp-on -- allows the attendant to transfer a call and to park it at a busy extension with a warning tone;
- paging by means of dedicated function buttons;
- day alert mode, which allows the attendant to designate another station as a secondary attendant position, for periods of heavy traffic or when the attendant is away from the console;
- automatic recall of unanswered calls to station 20;
- serial calling -- an incoming call returns automatically to the attendant when the called extension hangs up;
- night service, implemented by means of a dedicated function button.
- headset operation -- allows opeeration of attendant console with headset. The [rls] button is used to release calls during headset operation.
- buzzer -- an additional auditory signal for recalls, which can be silenced with the mute button.

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Section 6
DIALING RESTRICTION

6.1 GENERAL

The **key bx** has a sophisticated system of dialing restrictions, which enables the customer to configure his exchange to permit only those toll calls he wants charged to his telephone. General restrictions can be applied to each station individually; exceptions can be defined to every restriction.

The crux of the restriction system is a set of toll tables, definable for each trunk. These tables make possible four-digit toll restriction on a table basis; additional restrictions are possible using other programmable functions.

Ten programmable functions are used to configure dialing restrictions for the key bx system:

- 0/1 Restriction -- configures dial restrictions for the dialing plan of the area where the key bx is installed;
- Table Restriction -- determines whether the toll restriction for CO lines will be by means of a Toll Table, or by means of the 0/1 restriction;
- Access Restriction -- blocks an extension from accessing a trunk;
- Toll Restriction -- determines, for each extension, whether an outside line will be toll-restricted, or dialing on that line is completely unrestricted;
- Toll Table -- this function is used to load the table of restricted dial prefixes, if Table Restriction is selected for outside lines;

- 411 Restriction -- blocks an extension from accessing Directory Assistance;

- System Speed Dial, speed dial restriction and speed toll restriction -- the system speed dial directory can be used to override other dialing restrictions on a selective basis.

6.2 CO LINE RESTRICTION DEFINITION

CO line dial restrictions are defined in the key bx on three levels -- the system level, the trunk level and the extension level. At the system level, dialing restrictions are defined as 0 type or 1 type, depending on the dialing scheme of the area of installation.

- 1 type restriction is for areas where a caller must dial 1 or 0 before the area code, to gain access to the long-distance network. When 1 is selected, dialing 1 or 0 as the first digit is prohibited, except for

  1x11 (x is any digit)
  1555
  1800

- 0 type restriction is for areas where a caller dials the area code without an initial 1 or 0. In this case, dialing 0 or 1 as the first or second digit is prohibited. The following exceptions are permitted:

  x11 (x is any digit)
  800
  1x11
  1555
  1800

In addition, the 411 restriction is defined at the system level. This restriction blocks extensions from dialing 411 (directory assistance).

At the CO line level, the customer can define general toll dialing restriction for each CO line, or selective restriction. The general restriction is defined by the 0/1 toll restriction function. Selective restriction is done be means of a toll table, which defines dialing prefixes which may not be dialed on that CO line.

At the extension level, the customer may define, for each extension individually, whether the dialing restriction defined for each CO line applies to that extension. He may also use the access restriction to block all access to a CO line.

6.3 SPEED DIAL

The system speed dial directory can be used as an effective method of configuring dial restrictions. The system speed dial list can be configured to circumvent dialing restrictions applied to a given extension. Thus, an extension may be restricted from dialing all toll numbers; but when the user dials a speed dial number, the key bx executes the call, regardless of dialing restrictions.

For each extension, all access to the system speed dial directory can be blocked; or, if the customer does not want to use the speed dial directory for the purpose of enabling long distance calls, the system can be configured to check dialing restrictions when a speed dial number is selected.

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APPENDIX A
COMPARISON OF key bx SYSTEMS

key bx COMPARATIVE CHART

	System		
	816	1632	2864
Capacity			
Trunks	8	16	28
Extensions	16	32	64
SLT extensions	12	28	60
Features			
Internal Page Zones	2	4	4
External Page Zones	4	4	4
Trunk Groups	4	8	8
External Bells	2	4	4
System Speed Dial Numbers	90	90	90
Personal Speed Dial Numbers	7	7	7
Dial Codes			
Extensions	20-35	20-51	20-83
Internal Page	40/41	84-87	84-87
External Page	42-45	184-187	184-187
Personal Speed Dial Codes	01-07	00-06	00-06
System Speed Dial Codes	10-99	10-99	10-99

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Appendix B
PROVISIONING INSTRUCTIONS

B.1 MANDATORY COMMON EQUIPMENT

Every key bx 1632C and 2864C systems require the following common equipment cards:

	1632C	2864C
• Master Card	1*	1*
• GP Card	1	1
• TR Card	1	1
• M1 Card	1	1
• M2 Card	-	1 (only if personal speed dial memory for stations 64-83 is needed)

* These cards are different for 1632C and 2864C.

B.2 OPTIONAL COMMON EQUIPMENT

The following common equipment may be installed in both the 1632C and the 2864C:

- TTD -- Touch-Tone Decoder Card. Required if DTMF SLTs are installed, or for DISA or trunk patch.
- ID -- Impulse Dial Card. Required for impulse dialed trunks
- R Card -- expansion for ID card, as follows:

Card required	For Trunks	
ID1	1-8	
R1	9-16	
ID2	17-24	2864C only
R2	25-28	" "

- TRB Card -- for interface to DSS and BLF units. Up to 8 units, including 2 DSS consoles, are supported by the card (different for 1632C and 2864C).
- TR2 Card -- second TR card required if more than 32 extensions are installed in key bx 2864C.
- XPG Card -- required if external paging is provided.

B.3 INTERFACE CARDS

B.3.1 To extensions. Two types of interface cards are available:

- L cards -- for interface to key bx stations;
- SLT/OPX cards -- for interface to Single-Line Telephones and Off-Premise Extensions.

Each card supports four extensions. At least one L card is required, for extensions 20-23. All other cards may be L or SLT. A maximum of 8 extension interface cards may be installed in the key bx 1632C, and 16 extension interface cards in the 2864C.

B.3.2 To trunks. T Cards interface to trunks. Each T card supports four trunks. A total of 4 trunk cards may be installed in the 1632C, and 7 trunk cards in the 2864C.

B.4 MATRIX CARDS

Each matrix card provides 8 communication links for 32 inputs. The following table shows functions of matrix cards:

B.4.1 The following table shows matrix card funtions in the 2864C:

Matrix Card Number	Connects Extensions	To Trunks
1	20 - 51	25 - 28 and DTMF receivers
2	20 - 51	17 - 24
3	20 - 51	9 - 16
4	20 - 51	1 - 8
9	52 - 83	1 - 8
10	52 - 83	9 - 16
11	52 - 83	17 - 24
12	52 - 83	25 - 28 and DTMF receivers

In addition,

- Matrix 5 -- for intercom calls for extensions 20 - 51
- Matrix 8 -- for intercom calls for extensions 52 - 83
- Matrix 6 -- for handsfree calls for stations 20 - 51
- Matrix 7 -- for handsfree calls for stations 52 - 8

B.4.2 The following table shows matrix card functions in the 1632C:

Card	Function
1	Connects all extensions to trunks 9-16
2	Connects all extensions to trunks 1-8
3	Intercom audio links for all extensions and DTMF receivers
4	Handsfree links for all extensions

Telrad Telecommunication and Electronic Industries, Ltd., is the largest designer and manufacturer of telecommunications equipment in the Near East. For more than 30 years, it has been the principle supplier of telephone switching and terminal equipment for Israel; in the last five years, it has become a leading exporter of telecommunications technology, with markets on five continents. Its products include digital multiplex Central Office equipment, electronic PABX exchanges, key systems, and a wide variety of telephone sets. It is a leading developer of office systems which integrate voice and data communications in a single network.

Telrad

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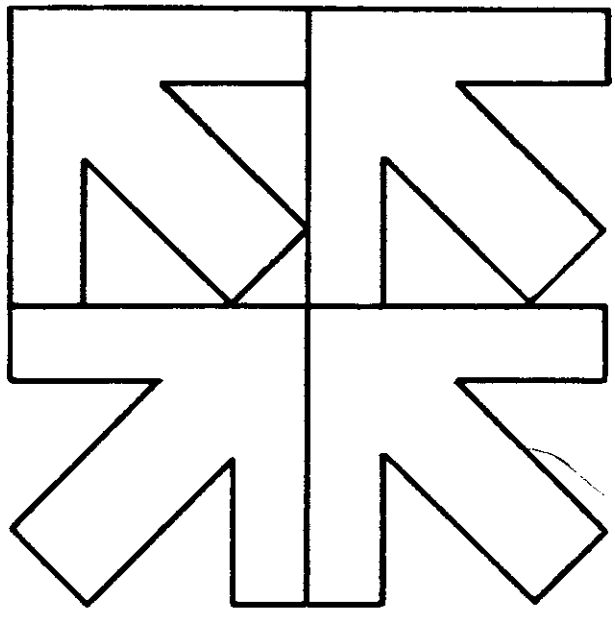
Telrad

Issue 1, March 1985

Key bx 1632C/2864C Office Telephone Systems Customer Service Manual



II. Operating Instructions

TLRD-104-262-115

NOTICE

This manual is applicable to the key bx 1632 and 2864, software versions C. Telrad, Ltd. reserves the right to make changes in the equipment described, and in this manual, without notification. However, changes in the equipment do not necessarily render this manual invalid.

Additional copies of this manual may be obtained from Telrad, Ltd. Reproduction of this manual, without written permission from Telrad, Ltd., is strictly prohibited.

CONTENTS

FIGURES

Section 1
INTRODUCING THE key bx

1.1 MEET YOUR key bx STATION

You may have one of several types of telephone stations at your desk. The Standard Station (see Figure 1-1) has a dial pad, a keypad for special functions, and two rows of outside line keys at the bottom. In the key bx 1632C system, each of these buttons accesses one outside line. In the key bx 2864C system, the last two buttons at the right end of these rows are shift buttons. Using the shift button lets you use up to 28 outside lines using the 14 remaining buttons of the station. Section 2.4.1 of this booklet explains how to use the shift buttons.

The Featurephone (see Figure 1-2) is similar to the standard station, except for two differences:

- the special function keypad consists of only two buttons -- hold and function;
- there is only one row of buttons at the bottom of the station.

Yet, despite its simplicity, the Featurephone can perform all the functions which the standard station can perform, by a simple trick: pressing the function button turns the dialpad into the equivalent of the standard station's function keypad. For example, on the standard station there is a special conference button for making conference calls (the leftmost button in the second row). To make a conference call with the Featurephone, press func and 4 -- the equivalent button on the dialpad.

The bottom row of the Featurephone shifts between the first and second rows of outside line buttons (see Sections 2.4.2 and 2.4.3).

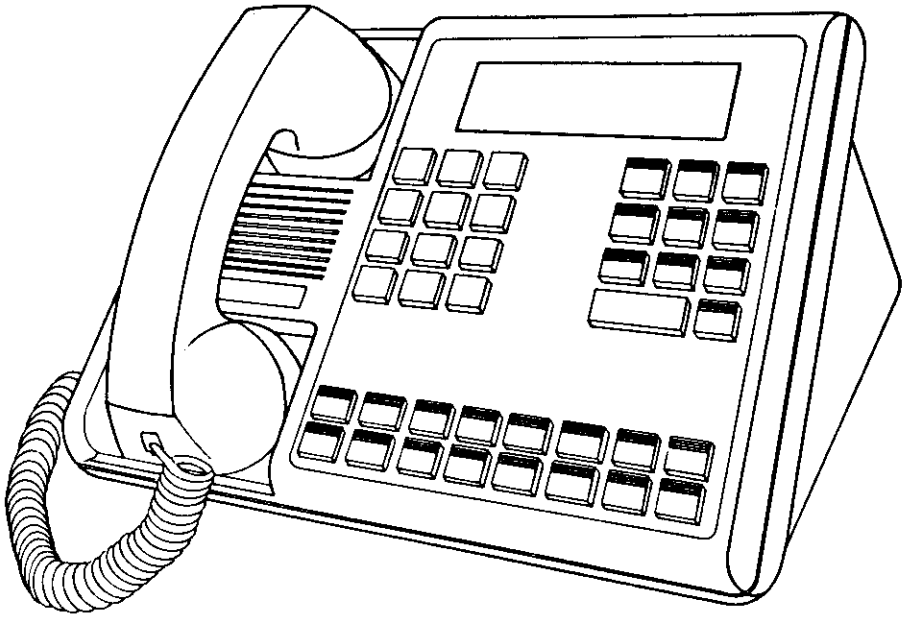


Figure 1-1 Standard Station with display

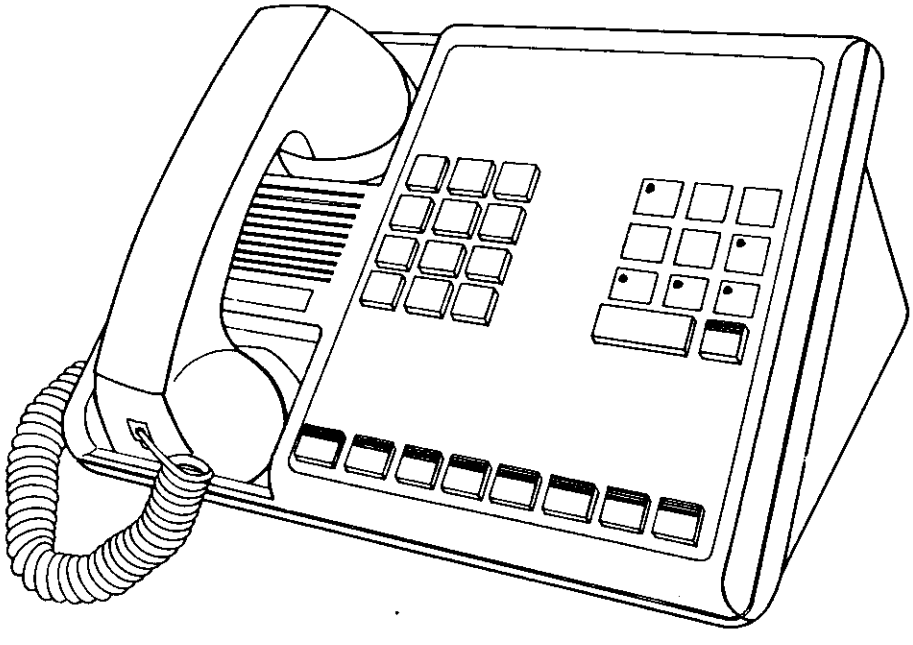


Figure 1-2 Featurephone

You may have an ordinary telephone -- a pushbutton telephone or a telephone with a rotary dial. Even though you have no special feature buttons, you can still use many of the features described in this booklet, by dialing special codes. Section 3 explains how to use your telephone with the key bx.

1.2 WHAT YOUR key bx IS TELLING YOU

When your station rings like this:	it means:
_____ _____	There is an external call for you.
__ __ __ __	There is an internal call for you. or an internal telephone where you left a message is calling you back automatically;
- - - - - - - - - -	This is a callback signal: an outside line you asked for is available; or you left a call on hold for too long; or a call is being transfered to you from another extension; or a call you transfered was not answered, and the call is ringing back automatically at your station or there is an incoming call on a DISA line.
_____	This is a tone burst. It means someone is trying to reach you: there is an internal call which you can answer HANDS-FREE; or there is an outside call for you but your telephone is busy. The operator has put the call on camp-on, and it will ring you automatically when you finish your conversation.
_____ _____	You are being paged.
_____	No one is calling! The key bx alarm clock has gone off.

When you are dialing or using a key bx special feature, and you hear this sound:

..... ----------

(a series of short beeps -- like a fast busy tone -- followed by a dial tone) it means you have made a mistake. Check what you are doing, and try again.

When an external line button lights like this:	it means:
_____	Someone else is using the line.
_____ _____ _____	You are using the line.
_____ _____	The line is on hold.
_ _ _ _ _ _	Someone is calling you on this line.

Section 2
OPERATING INSTRUCTIONS: STATIONS AND FEATUREPHONES

2.1 INTRODUCTION

This section describes how to operate key bx stations and Featurephones. As explained in Section 1.1, both telephone sets are similar; the main difference between them is that whereas the standard station has dedicated function buttons, the Featurephone uses a func button together with one of dialpad keys. Thus, throughout this section, whenever a dedicated function button (such as dnd or conf) is mentioned, it should be understood as refering also to the Featurephone func button combined with the relevant dialpad key. Furthermore, unless stated otherwise, all directions in this section apply to both the standard station and the Featurephone.

2.2 TO MAKE AN OUTSIDE CALL

2.2.1 Dialing out:

Lift the handset.

Press the button of an available outside line (any button which is not lit). The button lights (it also lights at all other stations).

When you hear the dial tone, dial the number on the dial pad. As you dial, the number appears on your display (if you have one). About 15 seconds after you have finished dialing, the display shows elapsed time, so you can tell the approximate duration of your call.

IF YOU HEAR AN ERROR TONE

you have probably tried to dial on an outside line on which you do not have access (if you have no access, the button in the line button will not light), or you have tried to dial an international, long-distance, or toll call on a station with limited service. Check with your telephone attendant to see what types of calls you may make from your telephone and on which lines.

Here is another method of accessing an outside line -- the exact method depends on your system setup:

Dial 9 (for hybrid systems with one trunk group);

or

dial 9 and the number of the trunk group you want to use (for hybrid systems with more than one trunk group);

or

dial 9 and the number of the trunk you want to use (for key systems).

2.2.2 Account coding

You can enter an account code during your call, for billing purposes. A periodic tone during your call warns you to enter the account code. When you hear the tone, dial [*], your account code (up to 11 digits) and [#].

2.3 TO ANSWER AN OUTSIDE CALL:

When an outside line rings at your station, the button of that line flashes, and the number of the line appears on the display. Depending on system setup, the line may ring and the button flash at other stations too; any of those stations can answer the call by pressing the outside line button.

Lift the handset and, if necessary, press the flashing button.

Some outside lines may only flash and not ring at your station. You can still answer the call, even if the phone does not ring.

2.4 SELECTING OUTSIDE LINES WITH THE SHIFT BUTTONS

2.4.1 Using shift with the key bx 2864C station

The rightmost buttons on both outside line button rows perform the shift function: shift button 1 (the upper one) shifts between outside line buttons 1-7 and 15-21; shift button 2 shifts betweeen outside line buttons 8-14 and 22-28.

When an outside line button row is shifted, its shift button is lit.

The shift buttons can be programed to operate in either of two ways:

Single shift: pressing one of the shift buttons will only shift the corresponding row.

Double shift: pressing one of the shift buttons will shift both rows.

Figure 2-1 shows the operation of the shift buttons in a key bx station connected to a key bx 2864C system.

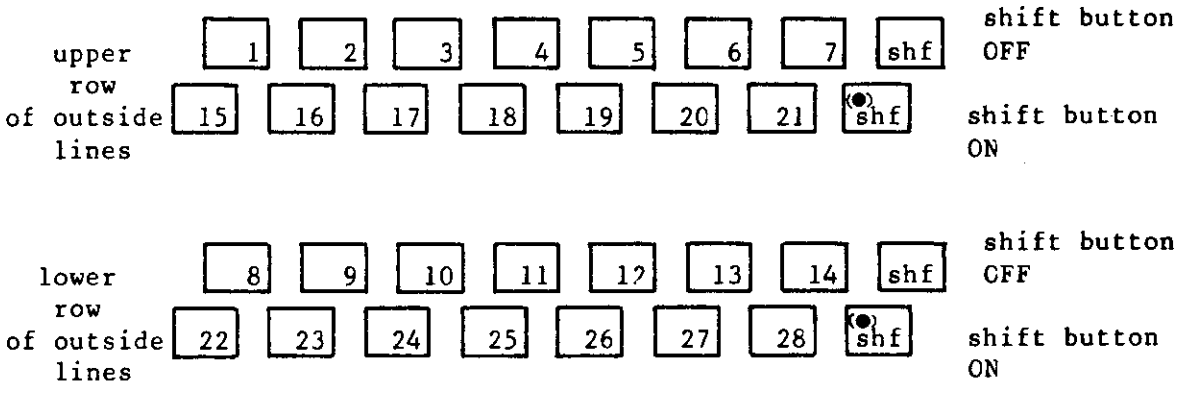


Figure 2-1: how the shift button operates in the key bx 2864C station

2.4.2 Using shift with the 2864C Featurephone

The Featurephone has only one row of outside line buttons. The shift function allows you to switch between four states, according to the desired outside line row.

The shift function is performed in the 2864C Featurephone by means of the rightmost button (shift) of the outside line row:

- Normally (when the shift button is not operated) the outside line row stands for lines 1-7. The light in the shift button is off.
- With the handset lifted or the speaker on, pressing shift shifts the outside line row to lines 8-14. The light in the shift button flashes.
- Pressing shift sets the outside line row to lines 15-21. The light in the shift button flashes fast.
- Pressing shift shifts to outside lines 22-28. Shift button is steadily lit.

Figure 2-2 shows the operation of the shift function in the 2864C Featurephone.

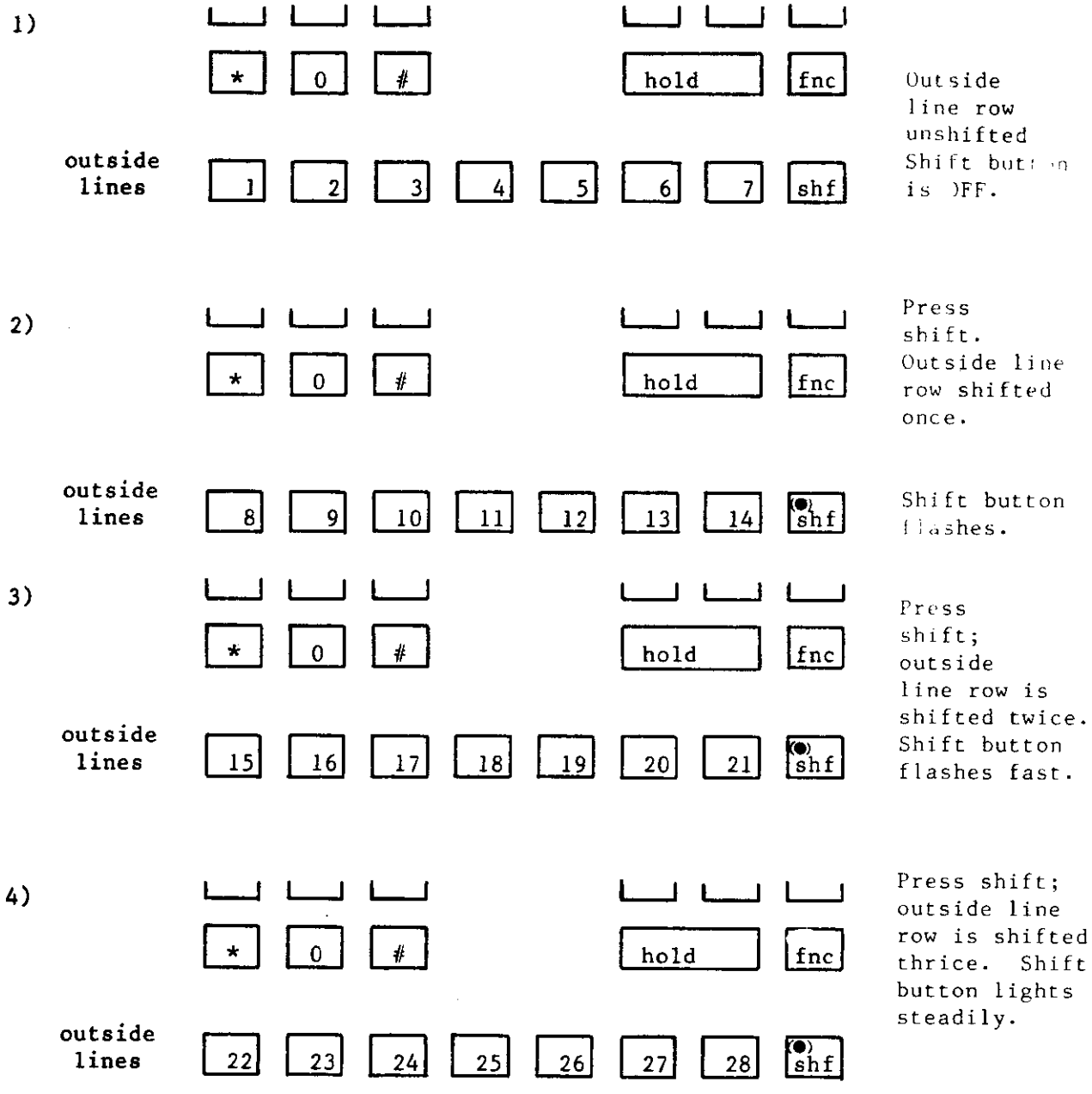


Figure 2-2: How the shift function operates in the 2864C Featurephone.

2.4.3 Using the shift function with the 1632C Featurephone

Since the key bx 1632C has 16 outside lines, the outside line row of the Featurephone may be shifted only once, between outside lines 1-8 and 9-16. Therefore, there is no shift button, and the shift function is performed by pressing func [*]. The light inside the func button turns on when the outside line buttons are shifted.

Figure 2-3 describes the operation of the shift function in the 1632C Featurephone.

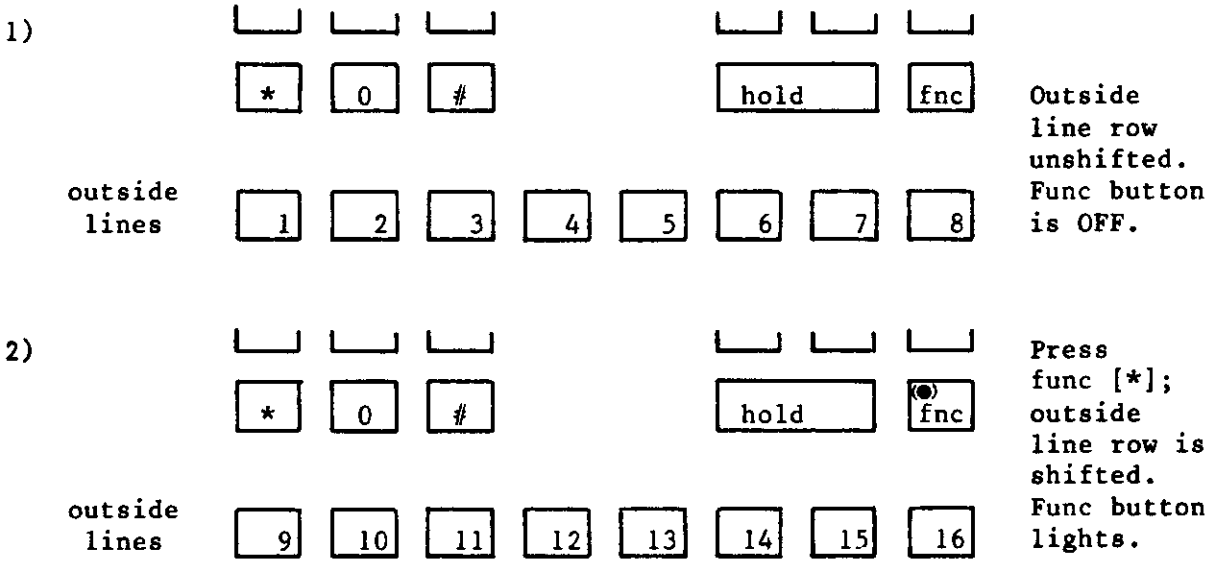


Figure 2-3: How the shift function operates in the 1632C Featurephone.

2.5. TRUNK QUEUING

You may occasionally find that all outside lines are busy when you want to make a call. You may be able to order an outside line so that when one becomes available for your use your telephone will ring and the line will be provided to you.

Lift the handset.

Press tk que, and any of your outside line buttons. The tk que button lights.

Hang up. When a line becomes available for you, your station will ring.

Queuing for one line is enough. The system will provide you with any available line out of a group assigned to you by programming.

Queuing priorities are assigned according to station numbers. The lower the number of an extension, the higher its priority for being handed a line it queued for. Therefore, when setting up the system, it is advisable to allot the lowest numbers to the senior people.

2.6 TO MAKE AN INTERNAL CALL

2.6.1 To call someone through his speaker (hands-free call)

Lift the handset.

Dial the extension on the dial pad. If your station has a display, the dialed number appears.

Talk after you hear the splash tone. The person called will talk to you through his microphone (provided his extension is a standard station; Featurephone users can answer hands-free calls only by lifting the handset.

2.6.2 To call someone through his handset

Lift the handset.

Dial 1 and the extension number.

The called party's telephone will ring. When he answers, talk.

2.6.3 Executive intercom calling

The **sec'y** button of your station acts as an executive intercom -- it lets you access up to eight other stations directly, without dialing their numbers. The stations dialed are preset when the system is programmed -- they can be changed only by programmer. To use the executive intercom,

Lift the handset.

Press sec'y.

If your station is programmed to have more than one executive intercom link, press sec'y and a digit 1 to 8. Each digit selects a different extension.

To make a handset-to-handset call, dial 1 and then press sec'y.

If the extensions called are SLTs, there is no need to dial 1.

The light in the sec'y button (when provided) indicates the status of your executive intercom station. The indications are:

- rapid flashing -- extension is speaker-busy (no call is possible);
- steady light -- extension is off-hook. Hands-free call is still possible;
- slow flashing -- extension is in DND;

- short flashes with long pause -- extension is in DND, but also offhook;
- off -- not in use.

2.7 TO DISCONNECT A CONVERSATION

Hang up, or press flash. The latter enables you to keep the line in order to dial again.

2.8 USING YOUR key bx HANDS-FREE

One of the most useful features of your key bx telephone is its HANDS-FREE operating mode. Besides a handset like other telephones, your key bx has a built-in speaker and microphone. This enables you

- to answer internal hands-free calls and use most of the key bx features, without lifting the handset;
- to receive announcements and answer urgent calls, while you are carrying on a conversation with the handset.

2.9 TO DIAL AN OUTSIDE OR INSIDE CALL HANDS-FREE

Press spkr.

Place the call as you would normally. You will hear the telephone ring through the key bx speaker. When you hear someone answer, lift the handset and talk.

2.10 TO ANSWER AN INTERNAL CALL HANDS-FREE

When you hear a tone burst coming out of your standard station, you can converse without lifting the handset. The spkr button on your station will light automatically.

You can converse hands-free, even though you are engaged with someone else through the handset. In this case, if you wish to terminate the handset-to-handset call, just hang up. The hands-free call will go on for the preprogrammed time, or until the calling party hangs up.

After a while (depending on your system setup), the hands-free call will be automatically disconnected. To avoid this, if you wish to talk longer, lift the handset. The call will become a normal handset-to-handset one.

> NOTE: The feature is not available for Featurephones, but you can still answer by lifting up the handset and talking.

2.11 TO USE A key bx FEATURE HANDS-FREE

Press spkr. The spkr button turns on and you hear the internal dial tone.

Follow the same procedure you would follow if you had lifted the handset.

When you finish, press spkr again. The spkr button will turn off.

2.12 TO PUT AN EXTERNAL CALL ON HOLD

Press hold. The outside line button will flash slowly.

While the call is on hold, you can use your key bx to make other calls. To terminate other calls, however, do not hang up. Instead, press the flash button. (If you hang up, the call on hold will recall).

To pick up a call on hold at your station, lift the handset and press the flashing outside line button. You can do this from any key bx station in the system.

If you do not pick up the call, after a short time the line on hold will ring back (the time depends on your system setup). If you do not answer, the call will be automatically transfered to the attendant (or dropped, if the system is in night service).

2.13 TO PICK UP A CALL ON HOLD OR RINGING AT ANOTHER STATION

Press pick up and press the outside line button that is ringing or on hold. Talk.

Or

lift the handset. Press pick up and the number of the extension where a call is ringing or on hold. Talk.

2.14 TO PICK UP A CALL TRANSFERED BY PAGE

The key bx attendant, or a station, may transfer a call to you by page (see Section 2.16.3 in this booklet). You will hear the page announcement, and then see the CO line which is ringing for you flash. To pick up the call,

lift the handset.

Press the flashing CO line button;

or

dial 8 and [*] while your station is in paging mode.

You can use this function - also called "meet me page" - to place a call to someone when you do not know which extension he is at.

2.15 GROUP PICKUP

Your station may belong to a pickup group with other extensions. You can pick up a call ringing at another extension in your group simply by pressing pick up and [*]. You don't have to know which trunk or extension is ringing.

2.16 TO PICK UP A CALL CAMPED ON AT YOUR STATION

If you are talking on the phone when another call for you comes, the key bx attendant can put the call on Camp-on at your station. You will hear a warning tone burst in the station speaker, and the CO line which is ringing for you will flash. When you finish your first call, or if you place it on hold, the camped-on call will ring automatically at your station.

2.17 TO TRANSFER AN OUTSIDE CALL TO ANOTHER key bx STATION

2.17.1 To make an unscreened transfer

Press hold.

Dial the number of the extension you want to transfer to, or 1 and the number.

Hang up. The call will ring at the new extension.

If the extension does not answer the call, it will ring back at the attendant station after a short time. If the system is in night service (see Section 4.2, System Description), the call will ring back at your extension after a short time.

If no one answers the transfered call (you can tell because the outside line button continues to flash), you can always pick up the call yourself, by pressing the outside line button.

2.17.2 To make a screened transfer

Press hold.

Dial the number of the extension you want to transfer to; or dial 1 and the extension.

When someone answers, (or when you hear the tone burst, if you dialed handsfree) announce the call.

If called party wants to accept the call, hang up -- the call is transfered automatically.

If called party does not want to accept the call, press the flashing outside line button of the call on hold. Now, instead of transfering the call, you have returned to the outside caller.

2.17.3 To transfer a call using Page

If the person you want to transfer to is not at his extension, press hold, and dial 84 to 87 -- the codes for internal paging.

(Before placing the call on hold, tell the caller it may take a while before the person he requested answers the call).

After the double tone burst, announce the call. Be sure to say which CO line the call is on.

Hang up. The call is now on hold at all the stations in the page group. The person you sought can pick up the call

at any station by pressing the button of the outside line calling him.

If no one answers the transfered call (you can tell because the outside line button continues to flash), you can always pick up the call yourself, by pressing the outside line button.

After announcing the call, if you do not hang up, the person can dial 8 and [*] from any extension, and then you hang up and transfer the call.

2.18 TO MAKE A CONFERENCE CALL

You can make conference calls from your key bx station with up to five participants, two of whom may be calls from outside.

2.18.1 Placing a Conference Call

Place the first call.

Press conf. You will hear a dial tone.

Call the next conferee.

Press conf again. Now you and both conferees are on the line.

You can add up to four parties to the call.

2.18.2 Exiting a conference temporarily

Press conf. You will hear a dial tone.

You may now use your key bx station to make other calls, answer incoming calls, and use any other key bx feature.

DON'T HANG UP THE TELEPHONE. If you do, you will be permanently disconnected from the conference. If you wish to disconnect a conversation, press flash.

When you want to return to the conference call, press conf.

2.18.3 Trunk-to-trunk patch

This is one of the most versatile features of key bx conferencing. You can let two outside callers carry on a conversation, without your participation.

To set up a trunk-to-trunk patch, establish a conference call with two outside lines from the station.

Press the conf button again and hang up.

If you want to reenter the conversation, press pick up and conf. A warning tone will be heard to signal that you have joined the conference.

If you did not reenter, then after a short time (the exact patch time depends on your system setup) your station may ring back. This is a sign that you should check that the parties are still talking.

Lift the handset. Make sure the parties are still talking, then press [conf] and hang up. If you hang up without pressing [conf] you will disconnect the trunk patch.

To learn how to use the trunk-to-trunk patch feature from an outside DTMF telephone, see Section 5.6.

NOTE: This feature does not exist in all versions of the key bx.

2.19 TO PAGE SOMEONE

You can use your key bx station to make a general announcement or to page someone.

Lift the handset.

Dial the page zone code. Zone codes for internal paging (through the speakers of key bx stations and external speakers) are 84 and 87. External speakers can be accessed by codes 184-187. Find out which speakers are activated by each code.

Make your announcement after the double tone burst.

IF YOU HEAR AN ERROR TONE: .....

You have probably dialed the code of a zone which you are not permitted to dial from your station. Some page zones can be dialed only from certain telephones, depending on the system setup.

2.20 MESSAGES

If you try to call another station and the line is busy or there is no answer, you can leave a message.

Press msg before you hang up.

When someone -- say station 23 -- leaves a message at your station, the msg button lights and on the display appears the message

CALL 23

To answer the message,

lift the handset.

Press msg. Your station automatically dials the extension that left the message.

If no one answers, and you hang up, the message remains at your station. You can return the message, by pressing your msg button.

You cannot leave a message at an extension which has an ordinary telephone (instead of a key bx station). You can, however, use the msg key to request automatic ringback if the extension is busy. This means that, as soon as both your extension and the extension you called are available, the key bx will ring you, and connect you automatically to the extension you wanted, as soon as you pick up.

If there is an old message at your station, you can cancel it:

Press [#] msg and [*].

If the message is from the attendant (the msg button flashes and the display shows "CALL 0") press [#] msg 0 .

2.21 REDIAL

You can automatically redial the last number you dialed.

Lift the handset and select an outside line.

Press [*].

2.22 SPEED DIALING

The key bx system has a built-in telephone directory memory, which allows you to dial frequently called outside numbers with codes of only two digits. You can make your own personal directory, with up to seven numbers; and you may be able to use the key bx system speed dial directory, which may have up to 90 numbers.

Codes for your personal speed-dial numbers are 00 to 06. System speed-dial numbers are from 10 to 99.

2.22.1 To dial a speed-dial number

Lift the handset, and press an outside line button.

Press [#] and the two-digit code of the number you want to dial.

2.22.2 To enter a speed-dial number in your directory

Press spkr.

Press [#] and the code you want to use for the number you are entering. The code must be from 00 to 06. If a code has already been assigned a number, the number appears on the display of your station.

Enter the number on the dialpad. The old number is erased and the new number appears in the display.

You can enter up to 16 digits in a single number.

Press [*]. This locks the number in the speed-dial memory.

If you make a mistake, press flash. This aborts the process, and you will hear a dial tone in the station speaker.

If your key bx system is connected to an enhanced telephone network service, or to a private branch exchange, you may have to pause while dialing a number (for example, after dialing an access code). You can include pauses when you enter a speed-dial number, by pressing the [#] key. Each press causes the key bx to pause for a few seconds before dialing the rest of the number. You can enter several consecutive pauses for a long break.

[#] appears a A in the display.

Section 5 in this volume explains how to use your key bx station with enhanced telephone networks.

2.23 SAVE/REPEAT DIALING

Your key bx has a special memory for a telephone number which you must call frequently. This number is stored in the save-repeat memory, and you dial it using the save-repeat button. To use the save-repeat function;

lift the handset, select an outside line, and dial a number.

Before you hang up, press save/rpt. This stores the number in the save-repeat memory.

Whenever you wish to dial that number, lift the handset, select the outside line, and simply press save/rpt. The system dials the number automatically.

The number will remain in the save-repeat memory until you replace it with another number.

2.24 DO NOT DISTURB

If you are busy and do not wish to be disturbed, you may be able to mute or silence all incoming calls, and you may be able to forward calls to another station.

2.24.1 To mute incoming calls

Press dnd. All voice announcements are now blocked. Internal calls ring twice quietly, and then the caller hears a busy signal. You may answer the call during the first two rings. External calls still ring at your station, but with a muted ring. If your station is set up for call forwarding, all calls to your extension will be automatically transfered to the forward extension.

To resume normal telephone service, press dnd again.

2.24.2 Canceling recalls

If your station is ringing with a recall signal (because a call has been on hold too long, or a call has been transfered to you), or if you are being paged or called handsfree, you can cancel the speaker intrusion or extend the recall for another period of time.

Press dnd. No need to lift the handset.

2.24.3 Call forwarding with "follow me"

You may be able to forward calls to your station to another key bx extension.

Press spkr or lift the handset.

Press dnd and dial the extension you want to forward to, then hang up. The dnd button will flash.

You can cancel "follow me" from your own extension, or from the extension which you assigned. At your extension, press the flashing dnd button. From the follow me extension, press dnd and dial your own extension number -- your phone will ring and follow me will be canceled.

If several extensions have forwarded their calls to your station; or if you don't know which calls are forwarded to you; you can cancel all call forward to your station by pressing dnd and [*].

2.25 OPENING THE FRONT DOOR

If a door unit is installed as part of your key bx system, you can talk to people at the front door, and open the door using your key bx station.

If you hear the front door unit ring (either the door bell, or the buzzer of the attendant's console), dial 187. This connects you to the speaker at the front door.

Talk to the person at the door. If you want to open the door, press the [*] key on your station. This opens the electric lock.

2.26 TO ADJUST VOLUME

Use the adjustment wheel on the front of the telephone set to change the volume of the speaker and ringing of your station.

2.27 SETTING THE ALARM CLOCK

Press spkr.

Press [#] and time.

Enter the time you want the alarm to ring on the dialpad. Use two digits for the hour two digits for the minutes.

Press time again. Press spkr.

When the alarm rings, stop it by lifting the handset, or pressing [time].

For example to set the alarm to 2:30 PM, key in the following sequence:

spkr [#] time 1 4 3 0 time

You can also use the time button to see the time and date in the display of your station while you are talking.

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Section 3
OPERATING INSTRUCTIONS: SINGLE-LINE TELEPHONES

3.1 MEET YOUR SMART key bx TELEPHONE

The key bx extension on your desk may look like an ordinary telephone -- but it has all the flexibility and virtually all the call features of the more elegant key bx station.

The exact way your telephone operates depends on how your key bx system has been set up:

- whether your telephone is pulse dialed (usually with a rotary dial), or tone dialed (most pushbutton phones are tone, or DTMF, dialed). You can tell if your telephone is a tone-dialed, if you hear tones when you press the buttons;

- whether your key bx works as a "key" or "hybrid" system. In a "key" setup, you can select which outside line you want to make a call on. In a "hybrid" setup, you need not select the outside line; but you may be able to select a group of outside lines.

You need not know how your system is set up in order to work your telephone. Just be aware that if a feature fails to work the way you expected, it may be due to the key bx configuration.

In some of the instructions that follow, you may have several choices, depending on your system setup. The possibilities are

- setup 1 -- hybrid configuration with one trunk group defined;
- setup 2 -- hybrid configuration with more than one trunk group defined;
- setup 3 -- key configuration.

Only one of the choices will work at your phone. If you wish to understand the exact differences between these setups, you can read Section 3.9 of the System Description.

3.2 OPERATING INSTRUCTIONS

3.2.1 To call another key bx extension

Dial 1 and the number of the extension.

(You cannot dial an extension handsfree, like you can from a key bx station.)

3.2.2 To Make an Outside Call

Dial 9. When you hear the dial tone of the outside line, dial the number you want (hybrid configuration with one trunk group defined);

or

dial 9 and the number of the trunk group you want to dial on (1 through 8). When you hear a dial tone, dial the number (hybrid configuration with more than one trunk group defined);

or

dial 9 and the number of the outside line you want to dial on (01 through 28). When you hear a dial tone, dial the number (key configuration).

> NOTE: If you hear an error tone, it may be because you do not have access to the outside line you selected.

3.2.3 Dialing Behind PABX

If your key bx is connected to a larger private telephone exchange, you may have to dial 9 twice -- once for the key bx and once for the large exchange.

3.2.4 Hold and Conference

To place a call on hold use hookflash -- that is, hang up momentarily -- and you will hear an internal dial tone.

If you have a pulse telephone (usually with a rotary dial), dial 1 to place a call on hold.

While the call is on hold, you may use your extension to make other internal calls, or use a **key bx** feature. You cannot, however, make another outside call.

When you want to return to the call on hold, do another hookflash. If you have pulse dialing, dial 11.

If you hang up the phone while a call is on hold, the phone will immediately ring. This is the call on hold, calling you back.

You can make a conference call by placing a call on hold with hookflash, dialing another extension, and then pressing hookflash again. You can include up to four participants, plus yourself, in a conference call. (You cannot add an outside line to a conference call, but if you are already talking on an outside line, you can add extensions to the call.)

3.2.5 Pickup

To pick up a call ringing at another extension, dial 3 and the number of the extension which is ringing.

You can pick up a call ringing at any other telephone in your pick-up group (if your phone is programmed for this) by dialing 3 [*].

3.2.6 Call Transfer

To transfer a call to another **key bx** extension, put the call on hold, using hookflash or 1 , and dial the number of the extension. Wait for someone to answer, and then hang up -- the call will be automatically transfered.

You cannot transfer a call unscreened, as you can with a key bx station (unscreened transfer is explained in Section 2.16.1).

3.2.7 Paging

You can page a group of key bx stations by dialing the codes 84 to 87. You can make external page announcements by dialing 184 to 187. (These options may not exist from your telephone, due to system setup).

3.2.8 Messages and Trunk Queuing

You can leave a message at another station if there is no answer; or you can request automatic ringback if an extension you called is busy. Call the extension. If you have a tone-dialing telephone (DTMF), press hookflash and, after hearing the dial tone, dial 4. If you have pulse dialing, simply dial 4 .

If there was no answer at the station, then the key bx writes a message in the station's display to call you back. If the extension was busy, then as soon as it becomes available, the key bx will ring you back, and automatically dial the extension.

You cannot leave a message at an extension which is not a key bx station.

If you have tried to make an outside call, but all the key bx outside lines are busy, you can have the trunk you want ring you back automatically when it becomes available. After dialing the code for the trunk you want (9 or 9 and the trunk group or trunk number), hookflash and, after you hear a dial tone, dial 4, or dial 4 on your rotary dial phone.

3.2.9 Redial

You can redial the last number by dialing 6 (hybird configuration with one trunk group defined);

or

6 and the trunk group you want to use (hybrid configuration with more than one trunk group defined);

or

6 and the outside line you want to use (key configuration).

3.2.10 Speed Dialing

You can speed dial by dialing 5, and the speed dial code (setup 1 only);

or

dial 5, the trunk group you want, and the speed dial code (setup 2 only);

or

dial 5 and an outside line number, and then the speed dial code (setup 3 only).

You can use the system speed dial directory, or your personal speed dial directory. If you have a tone-dialing telephone, you can also store speed dial numbers. Dial # , the speed dial code you want to use, and the number you want to store, followed by * .

If you have a pulse dial telephone, you cannot store speed dial numbers. In this case, you can temporarily install a tone-dialing phone, enter the speed dial number, and reinstall your phone. Your extension must be defined (by system programming) as tone or pulse dial each time you replace the telephone.

3.2.11 Follow me

If you are going to be away from your telephone, you can reroute incoming calls to another key bx extension. Dial 2 and the number of the "follow me" extension.

To cancel follow me from your own telephone, dial 2 .

You can cancel follow me from the follow me extension, by dialing 2 and your own extension number.

You can cancel all follow me to your extension by dialing 2 and [*].

3.2.12 Account Coding

You can account code a telephone call. Hookflash, then dial [*] and your account code, followed by [#]. You can record your account code either during a call, or before dialing.

If you have a pulse dialing telephone, you cannot enter account codes.

You may have account code reminder. This means that during a conversation you will hear a periodic, annoying beep in the handset. To stop the beeping, you must enter the account code.

Section 4
OPERATING INSTRUCTIONS: ATTENDANT CONSOLE

4.1 MEET YOUR key bx ATTENDANT CONSOLE

Your key bx attendant station has two units -- your key bx station, and the Direct Station Select (DSS) console. Two DSS consoles can be installed in the system. One always works with station 20; the other can work with any other selected station.

The attendant's station has certain special functions which set it apart from other extensions. Calls which were put on hold and forgotten, or transfered and left unanswered, ring back there; the attendant can use the station to perform serial calls, camp-on, and other special call routing functions; and the DSS console makes it possible to see the status of every extension at a glance, and call anyone with the press of a single button. In addition, a number of special functions -- such as entering the key bx time and date, and entering system speed dial numbers -- are usually performed by the attendant.

The DSS console associated with station 20 is also used for configuring the key bx. Instructions for performing this function are contained in the Configuration Guides for the 1632C and 2864C systems (TLRD-104-262-116 and TLRD-104-263-123). As key bx attendant, system configuration is usually not considered part of your job.

Aside from its special features, your telephone works like any other key bx station. Read Sections 1 and 2 of this manual to learn how to operate the station.

This section explains how to use the telephone attendant station. Note that two of the functions described here -- setting the key bx clock and entering speed dial numbers -- can also be done from another designated station (the station depends on your system setup).

There are two sets of buttons on the DSS console. The top four rows of buttons in the 1632C and the eight rows of buttons on both sides of the display in the 2864C are direct station select buttons. Pressing one is like dialing an extension number. The light in the button tells you if the extension is

- idle -- no light;
- busy -- steady light. You may still be able to make a hands-free announcement to the station;
- speaker busy -- rapid flashing. The speaker of the station is in use, and you cannot call it (you can, however, camp a call on the station);

The buttons in the bottom two rows perform special functions. These functions are explained in the rest of this section.

On the rear of the DSS console there is a switch, marked PROG and DSS. When the console is used as an attendant station, the switch must be in the DSS position. The console can also be used to program system configuration and telephone features and services; this is done with the switch at PROG. See the Configuration Guide for an explanation of how to use the DSS console as a programming station.

4.2 CALL TRANSFERING

There are four ways you can transfer a call using the DSS console.

4.2.1 Screened or unscreened transfer

Press the DSS button of the extension you want to transfer to. There is no need to place the call on hold. When you press the button, it starts to flash, indicating that that station is speaker-busy (because you are talking to it through its speaker). If the extension is a SLT, the flashing DSS button on your console means the station is ringing (a lit button means the associated extension is busy).

You may announce the call, through the handset of your station, or through the headset, if your attendant station is equipped with one.

Disconnect, by hanging up the handset or by pressing rls if you are using the headset. The call is automatically transfered to the new station.

4.2.2 Page transfer

Suppose you try calling the station, but there is no one there. You can transfer the call using the page feature of the key bx.

Press one of the buttons for internal page (z1/84 to z1/87), in the bottom set of buttons. This lets you page a group of stations around the office (which stations depends on your system setup). In the DSS button field, all the buttons in the page group begin to flash.

Announce the call. Make sure to announce which line the call is on. Terminate, by hanging up your handset or pressing rls if you are using a headset. The call is now on hold at all the stations in the page group.

The person whom you paged can pick up the call at any station in the page group by pressing the CO line button of the call on hold, or by dialing 8 and [*], if page mode continues, i.e., before the attendant has hung up.

4.2.3 Tone transfer

If the call is personal, or you do not wish to disturb the person you are trying to reach with a handsfree

announcement, you can ring the person's station.

Press tone and the DSS button for his station. Instead of making a handsfree call, the system will now ring his extension with the normal internal ring.

4.2.4 Camp-On

If the person you want to reach is talking on his extension, you can put the call on camp-on at his station.

Press the DSS button for his station, and then the camp on button. A warning tone burst will tell him that a call is camped on at his station, and the call will be placed on hold at his station. When he completes his first call and hangs up, the call will ring at his station. If he does not hang up, his display shows the appropriate CO line (after transfer time) and still if he doesn't answer, it will recall at the attendant station.

4.3 SERIAL CALLS

Suppose a caller wishes to speak to several people in the office; or he doesn't know exactly to whom he wants to speak, but asks for someone "in the accounts department". You can make a serial transfer, so that when he finishes talking with the first person, the call is automatically transfered back to your station, and you can pass the call on to the next person.

Press **serial**, and then the DSS button for the first station. When the first extension hangs up, the call rings back at your station and the serial button flashes. Press serial again to answer the call.

Repeat this procedure as long as the caller wants to talk with people in the office.

4.4 DAY ALERT

If you have to leave your desk, or if there is exceptionally heavy telephone traffic during the day -- more than you can handle alone -- you can assign another key bx station to help out.

Press spkr.

Press day alert, and the DSS button of the station you want to help.

The light in the day alert button lights with a steady light. Now the following will happen:

- All CO lines that ring at your station also ring at the day alert station;
- All recalls ring at the day alert station, as well as at the attendant position.

When you return to your desk, or telephone traffic slows, you can cancel day alert.

Press the lit day alert button again. The light in the button goes out.

> NOTE: If you are working at a second attendant station, day alert which you assigned may be automatically canceled if the first attendant station is put into programming mode.

4.5 NIGHT SERVICE

The key bx has a special night service mode. Incoming calls are routed to extensions which are manned during the night, and other features are changed to

make it easier to answer and make calls when only a few people are in the office. Night service is explained in detail in Section 4.3, System Description.

To initiate night service, dial 88. If you want to cancel all key bx messages left during the day, dial 188. To resume ordinary day service, dial 89.

The DSS console has a special night button to initiate night service. Simply press the button to set the key bx in night service mode. The button lights. If you want to cancel messages, you must first lift the handset of station 20 (or press the speaker button). Then press tone and night.

To return to day service, press the night button again. The light in the button goes out.

4.6 THE BUZZER

The DSS console has an internal buzzer, which supplements the speaker in station 20. The buzzer sounds when someone tries to dial your station, but it is speaker-busy.

To silence the buzzer, press the **mute** button on the DSS. To reactivate the buzzer, press mute again.

4.7 HEADSET

The DSS console can be equipped with an optional headset, which you can use instead of the handset. This can be a real convenience during periods of heavy telephone traffic.

If you want to use the headset, press the heads button on the DSS. Now all audio signals are rerouted from the handset of station 20 to the headset. The light in the heads button goes on.

When you have a headset, pressing rls disconnects a call and turns off the sound of the dial tone.

4.8 SETTING THE TIME

The attendant station is usually the station designated to set the time and date of the key bx display clock. However, another station may be assigned this privilege, depending on the system setup. The time must be set if there is a power failure.

To set the time press spkr, [#], and time on the station. In the display you see the following:

t AL

Now enter the date and time in the following order:

- the month, two digits (for months January to September, enter 01 to 09);
- the day of the month, two digits (01 to 31);
- the time, using four digits, from 0001 to 2400.

Press time again. This enters the date into the system memory, and starts the clock running from the time you entered.

If you hear an error tone, it probably means that you have not entered enough digits (did you use only one digit for the month or day?) or that you entered an invalid value.

NOTE 1: If you have tenant service, with two attendant consoles serving two different organizations, you should know that when you change the time for the stations in your part of the exchange, you change it for the stations in the other half of the key bx as well.

NOTE 2: If you enter only four digits, the key bx understands you are only setting the alarm for the attendant station. In this case, system time and date remain unchanged.

4.9 ENTERING SPEED DIAL NUMBERS

The attendant station is usually the station that is assigned to enter speed dial numbers in the system speed dial directory. (This privilege may be assigned to a different extension, depending on the system setup.) You enter system speed dial numbers exactly as you would for your personal speed dial list (see Section 5.5, System Description).

Press **spkr** and [#]. In the display you see the letter A.

Enter the speed dial code you want to use, from 10 to 99. Then enter the number.

Press [*]. This locks the number in the key bx memory.

NOTE: There is only one list of system speed dial numbers for the key bx, even though two organizations may be sharing the exchange. You may not have access to the list at all, or you may find numbers in the list which don't belong to you.

4.10 RECALLS

Calls which are unanswered or forgotten are automatically transfered to the attendant station. If an outside call is transfered to another extension, and no one answers at that extension, the call rings automatically at your station after a programmable transfer recall time. If a call is placed on hold, after the hold time, it rings back at the extension which put the call on hold for the day recall time. Then, if no one answers, it is automatically transfered to the attendant station, or to the extension assigned as day alert station, if there is one (during night service, calls do not ring back at the attendant station.)

These calls ring with a special ring, twice as fast as the normal ringing. This way you know that the call has been unattended, and you should answer it immediately.

If an outside call recalling at the DSS is not answered within a programmable DSS recall time, it is disconnected.

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Section 5
OPERATING INSTRUCTIONS: SPECIAL FEATURES

5.1 GENERAL

Your key bx has many advanced features, designed to make maximum use of all the telecommunications services available in your area, and to help streamline use and control costs. This section explains how to use these special features.

5.2 DIALING RESTRICTIONS

Frequently, dialing restrictions are placed on some outside lines. You may be unable to access certain lines, and on others you may be unable to dial long distance numbers. This is especially important when using special value-added network services, explained in Section 5.3.

If you attempt to access a line which is blocked to your extension, you will hear an error tone:

..... _____

If you try to dial a number prohibited by the key bx, you will hear the error tone, and you will lose the outside line. This will alert you that you have attempted a restricted action. Check with the telephone attendant or office manager to find out what outside lines and toll calls are permitted at your extension.

5.3 VALUE-ADDED NETWORKS

One or more of your key bx outside lines may be special lines. A line may be a Foreign Exchange (FX), which is directly connected to the telephone network of another city or area. It may be a WATS line, which enables you to make long-distance calls at reduced rates. Or it may be a Common Carrier Specialized Access (CCSA) line, which lets you make certain long-distance calls after dialing access and other codes. The key bx has the features for helping you use all these enhanced telephone network services.

5.4 SPEED DIALING CCSA CODES

Some CCSA lines, like those provided by SPRINT and MCI in the United States, require the dialing of digit, access, and authorization codes to place a call. You can store some of these codes in the key bx speed dial memory, and dial others using the dial pad. If you are required to pause after dialing a telephone number, and before entering the authorization code, you can enter pauses in the key bx memory, along with the number. This is done with the [#] key.

For example, suppose you must dial the number 771-9900, and then a four-digit access code, 1234. You must pause between the number and the access code. Enter the number as follows:

Press [#] and the two-digit speed dial code you want to use (00 to 06 for personal speed dial, or 10 to 99 for system speed dial).

Enter the number -- 771-9900 -- using the dial pad. In the display appears the speed-dial code and the number.

Press [#]. This enters a pause in the speed-dial memory. When the number is dialed, the system will pause for a short time (the exact time depends on your system setup), before continuing. In the display there appears an A, indicating a pause.

Enter your authorization code -- 1234 -- and [*] on the dial pad.

When you wish to speed-dial the number and authorization code, press the outside line button, and dial [#], and the two-digit speed-dial code. On the display appears only the number. Your authorization code (the digits after the pause) does not appear on the display, so no one can peek and copy it.

If you wish, you can store your authorization code using a separate speed-dial code. Then you can dial a speed-dial number as follows:

Select the outside line.

Dial [#] and the two-digit code of the number you want. The number appears in the display.

Wait for the confirmation tone on the line. Then dial [#] and the speed-dial code for your authorization code.

5.5 TRUNK PATCH

You can call the key bx from an outside telephone, and ask to be connected to another outside number via the key bx. This lets you make long-distance calls on the key bx telephone bill. Instructions for the key bx station user for making a trunk patch call are included in Section 2.17.3; they are repeated here.

To establish the trunk patch, call the key bx and ask the attendant (or anyone else) to make a conference call with the outside number you want to reach.

The key bx user establishes the conference call, and hangs up. You are now trunk patched to the other number.

After a period, you will hear a tone in your handset. This is the key bx checking to make sure you are still on the line. Dial any digit on your DTMF telephone, to alert the key bx that you are still talking.

If you don't dial any digit after hearing the tone, the key bx station that established the patch will ring back. The key bx user must answer, and press conference, if the call is to continue.

If the key bx user wants to join the patch, he only has to lift the handset, press pick-up and conf. The outside parties hear a warning tone indicating somebody is entering their conversation.

5.6 DIRECT INWARD SYSTEM ACCESS (DISA)

Direct Inward System Access, or DISA, lets you call from an outside DTMF telephone to the key bx, and have your call treated just as though it was from a key bx extension. You can dial extensions or make outside calls charged to the key bx telephone bill.

Any key bx trunks can be defined as the DISA trunk. The trunks are selected during system configuration, and are programmable. When an outside caller dials this number, he receives an internal key bx dial tone. He can then dial extensions. If an extension is busy, then dial [*] and try another.

An outside caller can also make outgoing calls on other key bx DTMF trunks. To do this, once he hears the key bx dial tone, he must dial a special Executive Credit Code (ECC), made up of a key bx extension number and a four-digit security code. To dial out on a trunk:

Dial the ECC.

Wait for the internal dial tone.

Dial 9, and the CO number (01 to 28, or 01 to 16) or group number (1 to 8 or 1 to 4), according to system configuration.

If the requested CO line is busy, simply dial [#] (no need to reenter your ECC) and try another CO line. When you hear

the external dial tone you can dial your number.

A DISA call has a limited duration (as the patch time). When this time is over, the caller hears a warning tone, indicating that he must dial a digit (any digit) in order to continue with his conversation. If he doesn't dial this digit within 15 seconds, the call is disconnected.

5.7 ENTERING ECCs

Executive Control Codes are entered into the system from a key bx station selected during system setup. One ECC for each extension can be entered: 64 in the key bx 2864C, and 32 in the key bx 1632C.

To enter an ECC:

Put the DSS console in programming mode, and select the ECC station, following the procedure in the 1632C Programming Manual and 2864C Programming Manual.

From the ECC station, for each ECC you want to enter,

dial [#] [*] xx yyyy [*]

where xx is the two-digit extension number, and yyyy is the four-digit ECC code.

When you are finished, hang up.

To modify an existing ECC:

lift the handset at the ECC station;

listen for dial tone;

dial [#] [*] the new ECC, and [*].

Note: When attempting to add or modify an ECC code, it is necessary to enter a known one first.

5.8 CALL DETAIL RECORDING

Your **key bx** may have a printer attached, which records all outside calls dialed. The printout indicates what type of call it was, which extensions spoke on the outside line during the call (in case the call was a conference call or transfered from one extension to another), and other information. This information is encoded in a simple code. The codes are as follows:

Code	Explanation
I	Incoming. Indicates an incoming call.
O	Outgoing. Indicates an outgoing call. The number dialed appears in the seventh column of the printout.
S	Start. The listed extension started the call.
S-E	Start-End. The extension listed in column 2 initiated the call, and terminated it.
S-C	Start-Continued. The extension indicated initiated the call, and transfered it to another extension.
C	Continued. The call was transfered to this extension, which then transfered it to yet another extension.
C-E	Continued-End. The call was transfered to this extension, which terminated it.
C-R	Continued-Recall. The call was transfered to this extension, but no one answered. The call rang back at the attendant station or at the initiating extension (during night service).
S-R	Start-Recall. The call was put on hold, and never picked up again. After a set time, the key bx automatically cut off the call.
D	DISA. A call initiated by an outside telephone, using the Direct Inward System Access facility.
R	Reset. The DISA call was terminated, and the DISA line reset, so that is again available for another DISA call, or an ordinary outgoing call.

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