



NORTHCOM™

1A3™

ELECTRONIC KEY SYSTEM

**GENERAL DESCRIPTION,
INSTALLATION AND
MAINTENANCE MANUAL**



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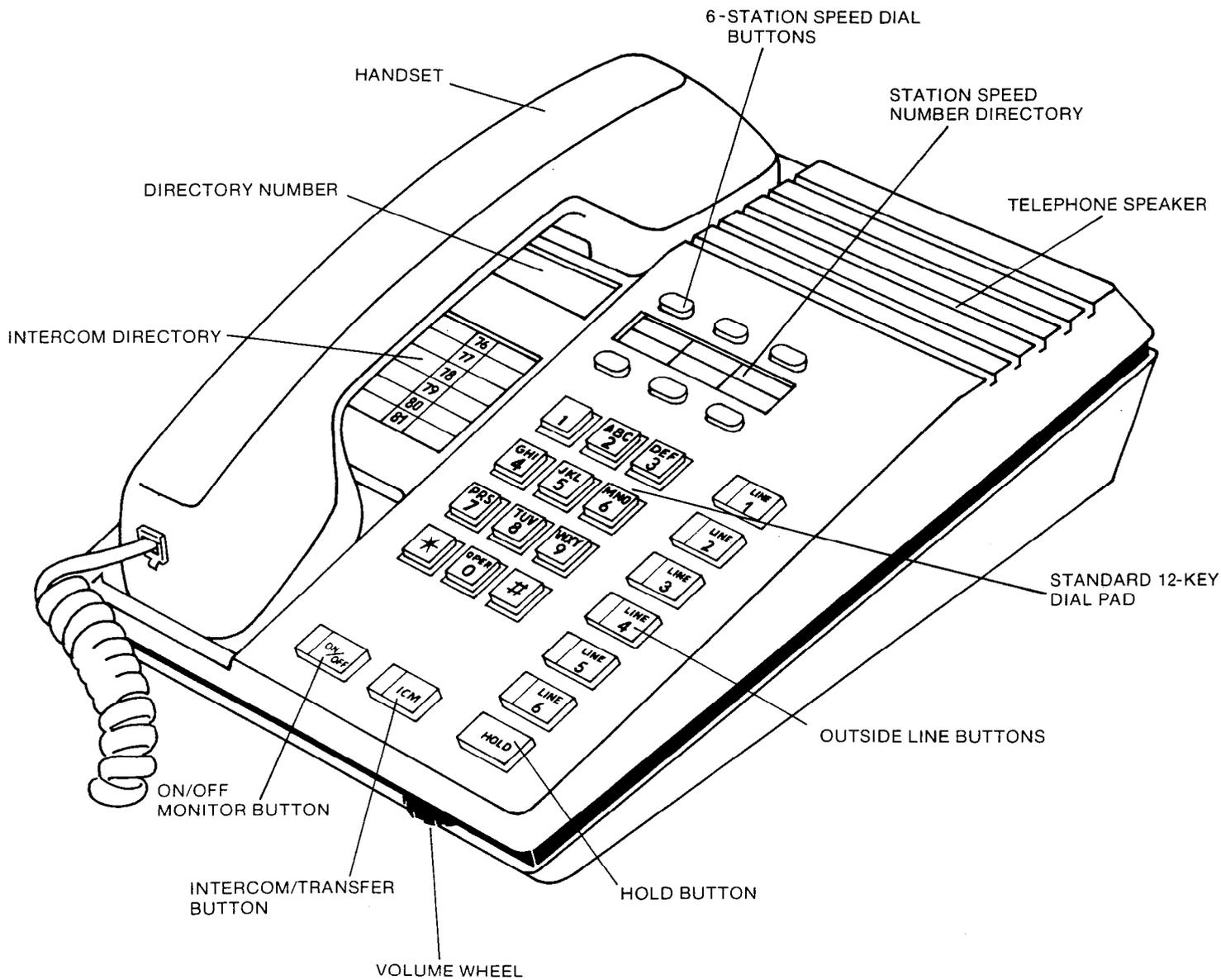
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1A3 ISSUE CONTROL

ISSUE	DATE	CHANGE
1	1 NOV 84	First draft.
2	1 FEB 85	Incorporated feature enhancements as well as corrections to grammatical and typographical errors.



1A3™ KEY TELEPHONE
FIGURE 1.1

100 INTRODUCTION

100.10 PURPOSE

This manual provides the information necessary to install, operate and maintain the 1A3™ Key Telephone System. It is designed to be a comprehensive guide to installation and maintenance personnel covering installation procedures, maintenance steps and other technical matters.

100.20 REGULATORY INFORMATION (FCC)

The Federal Communications Commission (FCC) has established rules which allow the direct connection of the 1A3™ Key Telephone System to the telephone network. Certain actions must be undertaken or understood before the connection of customer provided equipment is completed.

A. TELCO NOTIFICATION

Before connecting the 1A3™ Key Telephone System to the telephone network, the local serving telephone company must be given advance notice of intention to use customer provided equipment (CPE) and provided with the following information:

1. The telephone numbers to be connected to the system.
2. The FCC Registration Number located on the Key Service Unit (KSU). **DLP82V-13793-KF-E**
3. The Ringer Equivalence Number also located on the Key Service Unit (KSU). **0.3A**
4. The USOC jack required for direct interconnection with the telephone network. (Individual **RJ11C** or **W** modular jacks.)

B. INCIDENCE OF HARM

If the telephone company determines that the customer provided equipment (CPE) is faulty and possibly causing harm or interruption to the telephone network, it should be disconnected until repair can be effected. If this is not done, the telephone company may temporarily disconnect service.

C. CHANGES IN SERVICE

The local serving telephone company may make changes in its communications facilities or procedures. If these changes should affect the use of the 1A3™ or compatibility with the network, the serving telephone company must give written notice to the user to allow uninterrupted service.

D. MAINTENANCE LIMITATIONS

Maintenance on the 1A3™ Key Telephone System is to be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs except as specifically noted in this manual. If unauthorized alterations or repairs are performed, any remaining warranty may be voided.

E. NOTICE OF COMPLIANCE

The 1A3™ Key Telephone complies with rules regarding radiation and radio frequency emission by Class A computing devices. In accordance with FCC Standard 15 (Subpart J) the following information must be supplied to the end user:

"WARNING

This equipment generates and uses R.F. energy, and if not installed and used in accordance with the Instruction Manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device, pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference, when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference."

F. HEARING AID COMPATIBILITY

The 1A3 Key Telephone is Hearing Aid Compatible, as defined in Section 68.316 of Part 68 FCC Rules.

200 GENERAL DESCRIPTION

200.10 TECHNOLOGY

The 1A3™ Key Telephone System uses proven microprocessor and solid state electronic technology to distribute communications and features. All control and switching circuitry is condensed onto a single printed circuit board (PCB). Located on this PCB are the interface circuits for connecting six (6) central office (CO) lines and twelve (12) 1A3 Key Telephones. The switching is accomplished via a cross point matrix that provides voice path connections for six (6) central office lines, twelve (12) key stations and two (2) Intercom paths. The central microprocessor (Z-80) controls the crosspoints and central office line relays. It also interprets data transmission signals received from the Key Telephones. Also located on the PCB is the system memory. There is 16K of Read Only Memory (ROM) and 4K of Random Access memory (RAM). The RAM is subdivided so that 2K is used as CPU working area and 2K is used for customer data base. The customer data base memory is protected by a long life lithium battery.

The system power is regulated by a switching power supply. The use of switching power technology provides high efficiency with low heat. A shielded transformer converts the 117 VAC into logic voltages on a separate power supply PCB, mounted within the KSU cabinet.

Software instructions are performed according to a "state event" format. With this design, changes or enhancements to software are easily accomplished.

200.20 CAPACITY

The 1A3™ basic system comes fully configured to provide six (6) CO/PBX lines, twelve (12) Key Telephones and two (2) Intercom paths. Since the 1A3™ is fully configured, no expansion cards or additional equipment are required. Any unused CO/PBX line circuit can be used to provide interface to externally provided paging equipment.

200.30 SYSTEM COMPONENTS

There are three components that make up the 1A3™ Key Telephone System: 1A3 Basic System, 1A3 Key Telephone and 1A3 Wall Mount Kit.

1A3 BASIC SYSTEM (431551)

The KSU is a sealed, self-contained unit that has no user serviceable components. All connections are accomplished externally through RJ11-type jacks, amphenol-type plug, and a phono jack for Music-On-Hold interface (Refer to Figures 2.2 and 2.3).

1A3 KEY TELEPHONE (475131)

The Key Telephone is a fully modular instrument. It is a multi-line set with six (6) central office line buttons, three (3) function buttons, dial pad, and six (6) station speed dial buttons. The telephone provides feature access and operation via non-locking buttons (Refer to Figure 1.1).

1A3 WALL MOUNT KIT (483017)

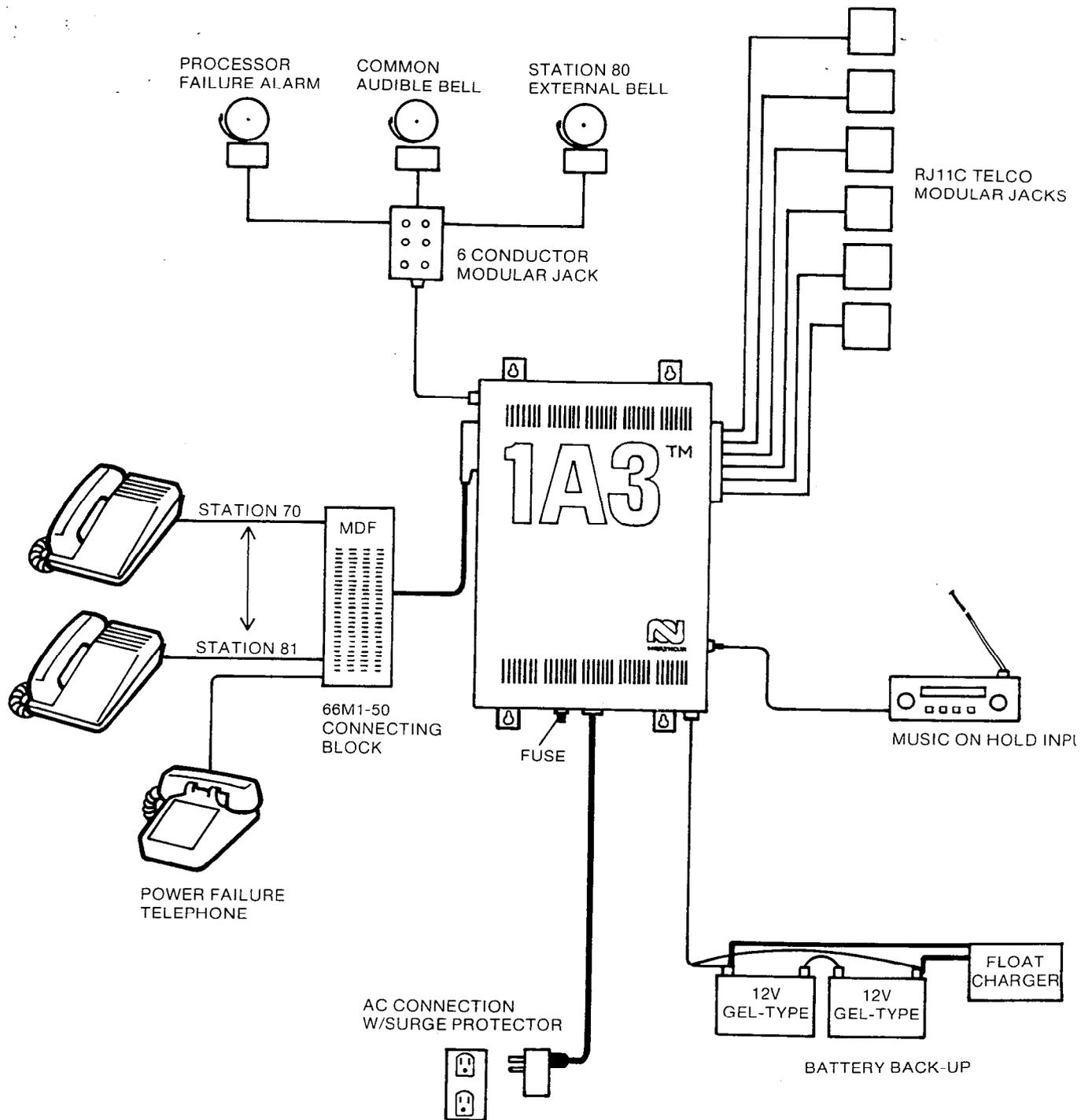
The 1A3 Wall Mount Kit provides an attractive, modular means of attaching the 1A3 Key Telephone to a vertical surface.

200.31 EXTERNAL APPARATUS

The 1A3™ is designed to easily interface many common types of external apparatus. External bells can be connected for common audible signaling. Also an external bell can be provided for use with Station 80 as a loud alerting signal. An alarm device can be activated in the event of a power failure or a processor failure. Music-On-Hold is provided with an external music source. The system operation can be maintained during a power failure with external batteries and a float charger. Refer to Figure 2.1 for external apparatus examples.

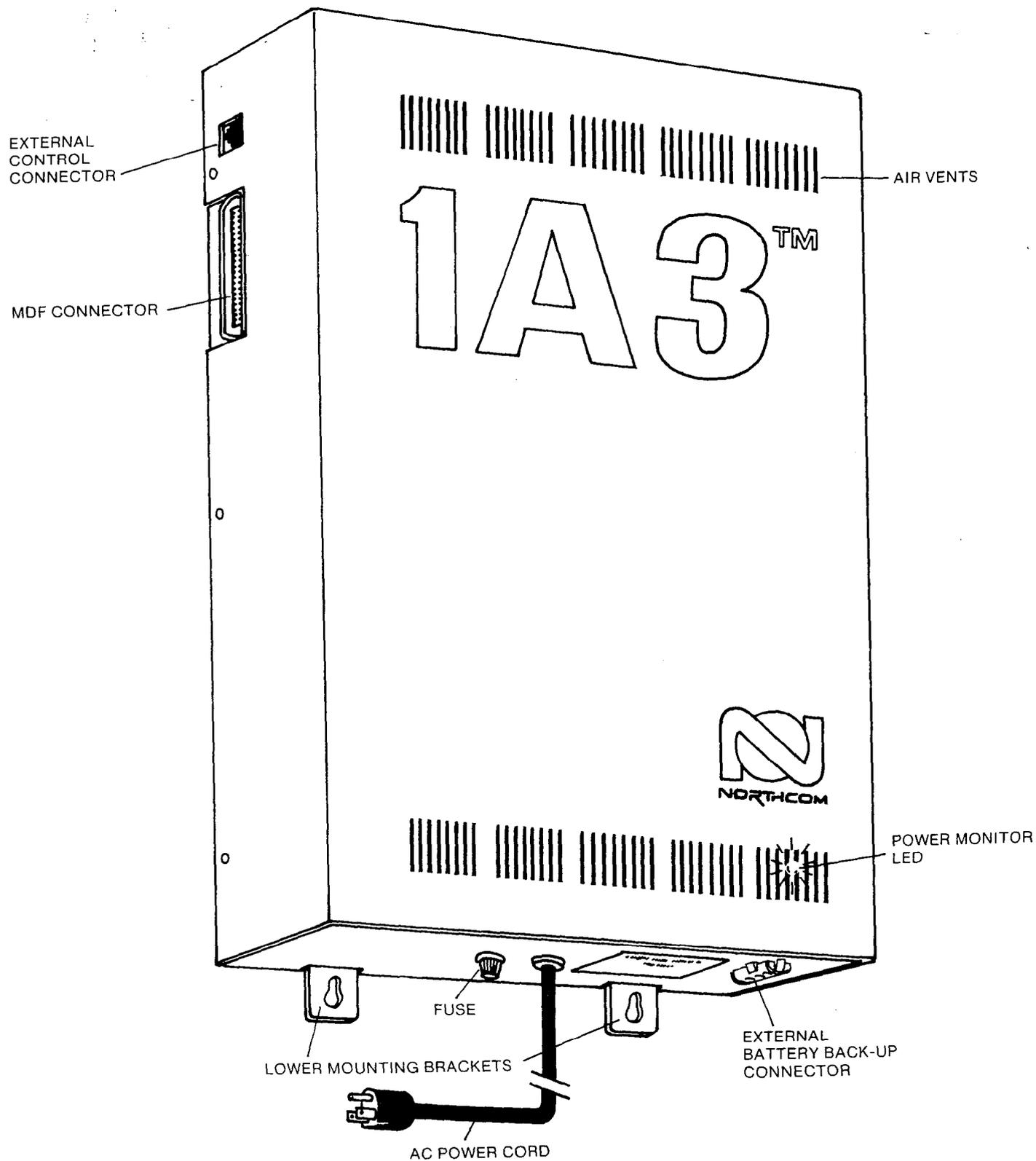
The Common Audible loud bell contacts provide ringing indication for all CO lines, regardless of CO line assignments in programming. The loud bell contacts associated with Station 80 provide ringing in accordance with the ringing assignments for Station 80 programming. Intercom ringing and transferred CO line ringing to Station 80 are also indicated by the Station 80 loud bell contacts.

200 GENERAL DESCRIPTION (Cont.)



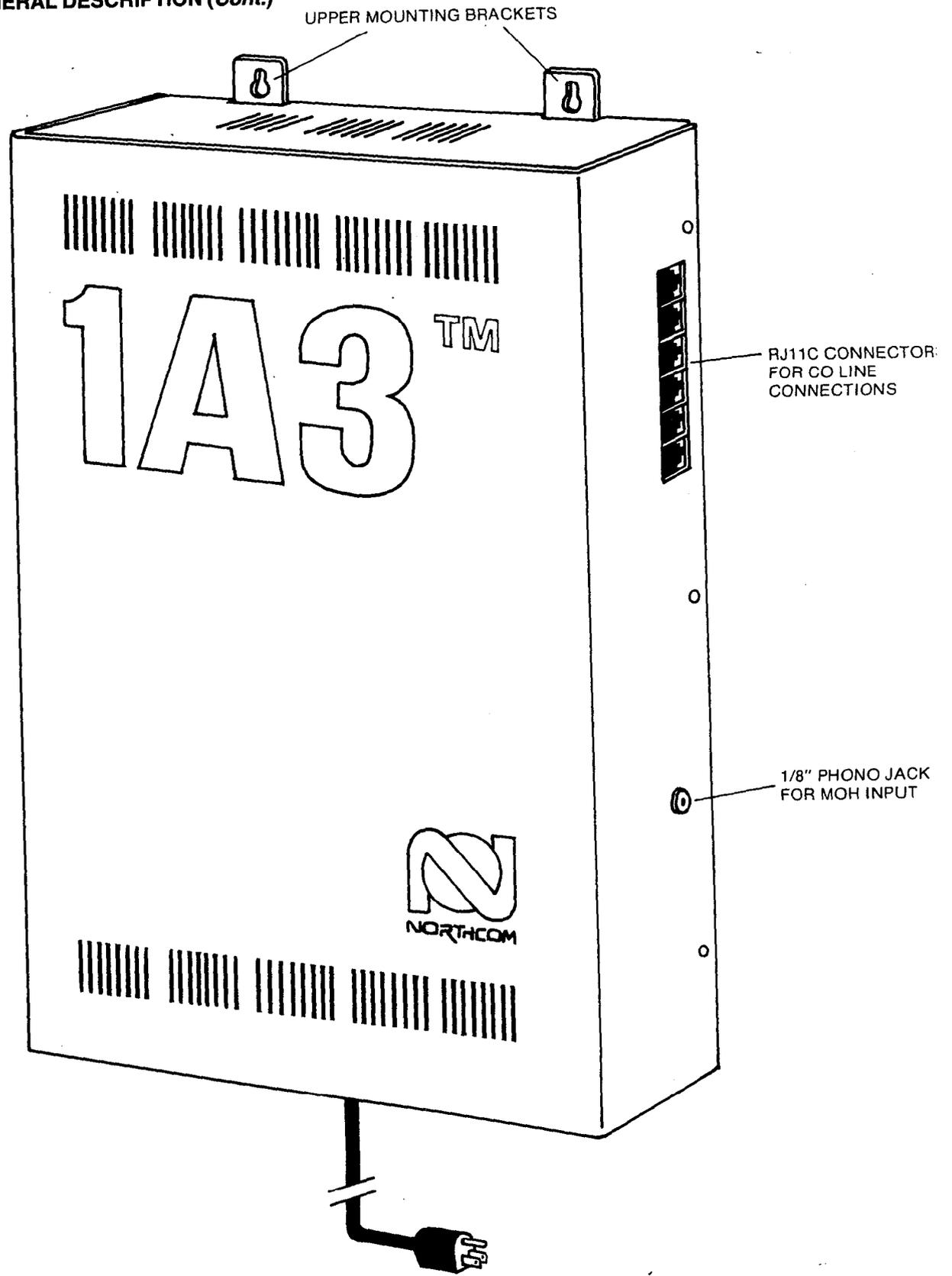
1A3™ SYSTEM
with all external connections
FIGURE 2.1

200 GENERAL DESCRIPTION (Cont.)



KEY SERVICE UNIT
FIGURE 2.2

200 GENERAL DESCRIPTION (Cont.)



KEY SERVICE UNIT
FIGURE 2.3

200 GENERAL DESCRIPTION (Cont.)**200.40 SYSTEM SPECIFICATIONS****200.41 CABLE SPECIFICATIONS**

The cable that connects each 1A3 Key Telephone with the KSU must be two (2) pair twisted. The maximum distance from the Key Telephone to the KSU is:

22 AWG 2 pr. twisted cable – 2000 ft.

24 AWG 2 pr. twisted cable – 1800 ft.

200.42 ELECTRICAL SPECIFICATIONS

AC input to Power Supply	117 VAC 60Hz ± 15%
Power Consumption	60 Watts
Output Voltages	5V, 24V
Fuse	3 AG, 250V, 0.5 Amp., UL Listed
Music Source (input)	600 ohms @ OdBm
External Contacts	0.5 Amp. @ 24 VDC

200.43 DIALING SPECIFICATIONS

DTMF DIALING	
Frequency Deviation	± 1%
Rise Time	3ms.
Duration DTMF Signal	75ms.
Interdigit Time	75ms.

DIAL PULSE SENDING	
Pulses Per Second	Programmable
Ratio Break/Make	Programmable
Interdigit Interval	750ms.

200.44 SIGNALING SPECIFICATIONS

The 1A3™ provides various audible and visual signals to assist the user. The use of symmetrical arrangements of flash rates for visual signals and distinctive tones for audible signals allow system activity to be monitored, and eliminates confusion.

Visual signals consist of Light-Emitting Diodes (LED's) using many common 1A2 standard flash rates located within buttons on the Key Telephones. Through the use of various patterns produced in the timer circuit in the station microprocessor, it is easy to identify line status on central office line and ICM buttons. The patterns are identified in Table 2-1.

Audible tones are used to indicate call status for both the called and the calling parties. The called party hears distinctive ringing that indicates incoming activity on lines or on the intercom circuits. The audible signals are emitted through a speaker within the 1A3 Key Telephone. A volume wheel is provided for adjusting the volume and controls the intensity of the audible tones.

The calling party hears the call progress via the handset receiver (off-hook) or from the speaker (on-hook). Different tones identify the status of the call; i.e. busy tone, error tone, dial tone. Tabel 2-2 lists these tones.

200 GENERAL DESCRIPTION (Cont.)

**Table 2-1
Visual Signal Specifications**

Type of Signal	Condition*	Visual Name
Busy Line	Lit continuous	Steady
Exclusive Hold	On 40ms Off 130ms	Flicker
Common Hold	On 520ms Off 80ms	Wink
I-Hold	On 125ms Off 40ms	Flutter
CO Line Ringing	On 500ms Off 500ms	Flash
Intercom Ringing	On 500ms Off 500ms	Flash

* Times are approximate

**Table 2-2
Audible Signal Specifications**

Audible Signal	Sound	Occurrence
CO Audible	1215.9/1471.9 Hz	.5s On/.5s Off/.5s On/1.5s Off Repeated
ICM Audible	1215.9/1471.9 Hz	.5s On/2.5s Off – Repeated
ICM Announced	771.4 Hz	Two 80ms bursts
Busy Tone	701 Hz	.5s On/.5s Off – Repeated
Error Tone	701 Hz	.25s On/.25s Off – Repeated
Dial Tone	701 Hz	Continuous

200.45 ENVIRONMENTAL SPECIFICATIONS

Temperature 32° – 122° (0° – 50°C)
 Humidity 5% – 95% (Non-condensing)

200.46 DIMENSIONS AND WEIGHTS

KSU

Height 51 cm 18 in.
 Width 28.7 cm 11.25 in.
 Depth 7.5 cm 2.5 in.
 Weight Approximate 12 lbs.

KEY TELEPHONE

Height 5.5 cm 2.4 in.
 Width 17.8 cm 7 in.
 Depth 22.2 cm 8.75 in.
 Weight Approximate 2 lbs.

200 GENERAL DESCRIPTION (Cont.)**200.47 NUMBERING PLAN**

1 – Station Speed Bin 1	80 – Station 80
2 – Station Speed Bin 2	81 – Station 81
3 – Station Speed Bin 3	90 – System Speed Bin 1
4 – Station Speed Bin 4	91 – System Speed Bin 2
5 – Station Speed Bin 5	92 – System Speed Bin 3
6 – Station Speed Bin 6	93 – System Speed Bin 4
70 – Station 70	94 – System Speed Bin 5
71 – Station 71	95 – System Speed Bin 6
72 – Station 72	96 – System Speed Bin 7
73 – Station 73	97 – system Speed Bin 8
74 – Station 74	98 – System Speed Bin 9
75 – Station 75	99 – System Speed Bin 10
76 – Station 76	0 – Station 70
77 – Station 77	* – Last Number Redial
78 – Station 78	# – Conference
79 – Station 79	

300 FEATURE DESCRIPTIONS**300.10 ALPHABETICAL LISTING OF FEATURES****ADD-ON CONFERENCE**

Any station connected to a central office line can add-on another internal station to form a 3-party conference. This add-on is connected by dialing the # (Pound) key.

ATTENDANT TELEPHONE

Station 70 serves as the system attendant. From Station 70 the system can be programmed, system speed dial numbers entered, and night service activated. The Hold Recall will ring the attendant as the second recall. Stations can dial "0" and ring the attendant's telephone.

BATTERY BACK-UP

The system is equipped for optional connections to an externally provided battery and charger that will provide full system operation in the event a power failure occurs.

CALL ANNOUNCE INHIBIT

Any station has the option to select the type of intercom signaling he receives over his key telephone. For privacy the call announce can be inhibited allowing only tone ringing to the station.

CALL TRANSFER

An established central office line can be transferred from one Key Telephone to another. The transfer can be announced or unannounced. If unanswered, will recall the originator in 30 seconds.

CALL WAITING

A busy station can be signaled by a tone over the handset, that a call is waiting. This programmable tone is provided on intercom and incoming CO Lines.

COMMON CO AUDIBLE RINGING (EXTERNAL)

Incoming central office line ringing can be signaled to an externally equipped audible source. All central office lines are signaled to the audible source during both Day and Night Modes. An external power source is required.

DIAL PULSE/DTMF SIGNALING

The 1A3™ Key System can be programmed to provide dial pulse or tone sending on a per-line basis.

DISTINCTIVE RINGING

A call ringing at a Key Telephone is identified as central office or intercom through distinctive audible ringing signals.

EXTERNAL RINGING STATION 80

All intercom calls and central office lines programmed to ring at Station 80 can be directed to an external ringing source. If Station 80 is programmed for night ringing, an incoming call indication is provided for external ringing applications. The external ringing device is connected to the KSU and requires an external power source.

FLASH

A central office line can be re seized without hanging up the handset. Also PBX lines can be transferred via the flash. Flash times are programmable. The ability to have the Flash feature is also programmable.

FLASH (SPEED DIAL)

A station or system speed dial bin can contain a command that will initiate a flash (open loop) over the CO line. This allows speed bins to work with PBX and CENTREX as feature buttons. The ability to allow this flash with speed dial is programmable.

HANDS FREE REPLY

When an intercom call announce to another Key Telephone has been initiated, the calling station can allow a hands free reply by the called station.

HOLD AND RECALL

Each Key Telephone is equipped with a red HOLD button, that is used to place central office calls in a temporary waiting condition (Hold). There are two (2) HOLD conditions: I-Hold and Exclusive Hold.

I-Hold

This is a common HOLD where a call placed on I-Hold can be answered by any station normally allowed access to that central office line. The line button LED at the Key Telephone that placed the call on I-Hold will flutter, while on all other stations the affected CO line will indicate a common HOLD wink signal.

Exclusive Hold

Exclusive Hold is used to prevent that call from being retrieved by any other station in the system. The CO line button LED at the station placing the call on Exclusive Hold will flicker. On all other stations the affected CO line button will remain lit in a steady condition.

Recall

Any line placed on HOLD will start the recall timer sequence. When the timer expires, the central office line will signal the station that placed the call on HOLD. If not answered, the ringing CO line will alert the attendant station. If still not answered, all stations that are allowed access to the line will begin ringing. The recall timer is programmable.

INTERCOM

Intercom provides voice communications from one Key Telephone to another Key Telephone in the 1A3™ system. An intercom call can be initiated from any station in the system. Intercom calls can be handset to

300 FEATURE DESCRIPTIONS (Cont.)

handset, or voice announce with hands free response. Two intercom calls can be in progress at one time.

LAST NUMBER REDIAL

The last number dialed on a central office line will be stored. The stored number can be redialed automatically by dialing the * key.

MEMORY BACK-UP

The system data base memory is protected from power loss by a long life lithium battery.

MONITOR

The station monitor feature enables the user to hang up the handset while on HOLD with an outside party. The user can monitor the call while the handset is on-hook. The user can hear through the telephone speaker and can tell when the other party returns to the call. By lifting the handset, normal two-way conversation is restored.

MULTI-LINE CONFERENCE

An internal station can connect with two (2) central office lines to form a 3-party conference. Either central office party can be removed from the conference without disrupting the connection. The transmission quality of the conference is governed by the quality of each central office line connected.

MUSIC-ON-HOLD

The system contains internal circuitry that allows outside parties placed on HOLD to hear music from a customer provided music source. Connection is made via a "phono" type jack on the KSU.

NIGHT RINGING

Individual stations, with access and ringing restriction during the day, can be programmed to receive and access ringing CO lines during night service.

NIGHT SERVICE

The 1A3™ Key System can be arranged for night time operation. The attendant's station (70) can activate or deactivate the night service mode. During night service, both Key Telephones that ring during the day and those Key Telephones designated to ring at night will ring.

OFF-HOOK SIGNALING

When Station 70 is busy and CO lines with assigned ringing at Station 70 start to ring, a beep signal will be provided through the handset of Station 70. This signal will be repeated every 15 seconds. This feature is programmable to be allowed or denied.

PAGING CONNECTION

An external paging amplifier (one way or talkback) can be accessed from the system by substituting a central office line circuit. Using external paging reduces the

number of central office lines available from six (6) to five (5). The central office line(s) used for paging access should be programmed as "PAGE" to prevent accidental access during automatic speed dialing.

POWER FAILURE TRANSFER

In the event of a commercial AC power failure or processor failure, automatic connections are made to allow operation of a single line telephone, until power is restored. The first CO line appearance (Line 1) is pre-designated as the emergency line. The single line telephone used with Power Failure Transfer can be rotary or tone depending on the signaling capability of CO Line 1.

PROCESSOR OR POWER FAILURE ALARM

The system provides a means to operate an external alarm. This alarm indicator alerts the customer of a power outage or system processor failure.

PRIVATE LINE

Any central office line can be programmed to be accessed at only one station. The "private line" cannot be answered or used by the other stations.

PRIVATE REPLY

Intercom signals or voice announcements can be answered privately by lifting the handset.

PROGRAMMING CONFIRMATION TONE

Each time an attempt is made to program (Station Speed, System Speed, CO and Station Configuration, System Parameters, or Night Service) a double beep confirmation tone is passed to the programmer if the programming attempt was successful.

PULSE/TONE SWITCH-OVER

Output (rotary) dialing CO lines can be programmed to automatically switch-over for tone. Calls made over dial pulse CO lines can be directed to send tones for use with network and computer service. The switch-over occurs when the user dials the digit "#". The switch-over can be programmed with speed dialing.

STATION SPEED DIAL

There are six (6) buttons available at each Key Station for speed dialing. Each Key Telephone is equipped with six (6) Speed Dial buttons that allow one button access to the stored numbers. Each bin can store up to 16 digits. Bins can be sequentially activated to accommodate network services (OCC's) requiring numbers with more than 16 digits. Toll restriction applies to speed numbers.

SYSTEM SPEED DIAL

The system can be programmed to store ten (10) frequently dialed numbers. Each stored number can contain up to sixteen (16) digits. Speed numbers can be

300 FEATURE DESCRIPTIONS (Cont.)

manually chained for use with OCC's. Toll restriction applies to system speed numbers.

TELEPHONE DIRECTORY

Intercom station numbers and assigned station speed numbers are conveniently displayed on the exterior of the instrument. A handy hinged cover allows access to these directories to accommodate changes.

TOLL RESTRICTION

Selected stations can be limited to dialing non-toll calls only. Restrictions include 0 as the first digit, 1 as the first digit, or 0 and 1 as the first digit dialed. Even when toll restricted, the station user may dial the following:
1 + 800 + 7 digits, 1 + 911, 1+411.

VOICE ANNOUNCE

Intercom calls can be voice announced to a Key Telephone over the integrated speaker of the dialed Key Telephone. The voice announce is activated by the calling party placing the intercom call by pressing and holding the ICM button.

VOLUME CONTROL

Each Key Telephone has a volume adjustment for the voice announcements and tones received by the internal speaker of the instrument. The volume control wheel is located in the front recess of the Key Telephone.

12FT HANDSET CORD

Each Key Telephone is provided with a convenient 12ft handset cord.

300.20 STATION USER GUIDE**LINE PRESELECT**

A station user can select and press a line button before lifting the handset.

The appropriate line button will light along with the ON/OFF button. The speaker is activated for monitor dialing.

MAKING AND ANSWERING CALLS

To make an outside call:

- Press an idle line button before or after lifting handset.
- Dial desired telephone number.

To answer an outside call:

- Lift handset and press the flashing line button.

INTERCOM CALL/STATION TO STATION

To place an intercom call:

- Lift handset.
- Press ICM button.
- Dial station number (70-81). Ringing will be heard.

To answer an intercom call:

- You will hear ringing tone over the speaker.
- Lift handset.
- Press ICM button.
- When conversation is complete, replace handset.

To place a voice announced intercom call:

- Lift handset.
- Press ICM button.
- Dial station number (70-81). Ringing will be heard.
- Press and hold ICM button to speak. Double burst of tone is heard at both stations.
- Release ICM button. Allows called station to reply handsfree.

To reply to a call announce:

- Call announcement is heard. ICM button remains lit
- ON/OFF button lights, reply handsfree to caller.

Note: The caller controls the conversation by pressing the ICM button, turning the called station speaker on and off.

PLACING A CALL ON HOLD

System-Hold can be picked up from any station in the system.

While connected to an outside line:

- Press the HOLD button once. The outside line will flutter (I-Hold) at your telephone and wink (System Hold) at all other stations.

Exclusive Hold prevents other stations from picking up your holding line.

While connected to an outside call:

- Press the HOLD button twice. The outside line will flicker at your telephone and appear steady at all other stations.

Note: When the outside party has remained on HOLD for an extended period of time, you will be reminded with a recall ring. If the call is not answered, the button will automatically go to common HOLD flashing and begin ringing at the attendant's station (70).

CALL TRANSFER

An outside call can be transferred to another station.

Transfer announced:

- Press ICM button. Outside line is placed on I-Hold, Intercom dial tone is heard.
- Dial station number (70-81). Ringing will be heard.
- Press and hold the ICM button, announce the call and the outside line number.
- Release ICM button and replace handset.

300 FEATURE DESCRIPTIONS (Cont.)

Transfer unannounced:

- Press ICM button, outside line is placed on I-Hold, intercom dial tone is heard.
- Dial station number (70-81). Ringing will be heard.
- Hang up handset. Outside line will begin to ring at called station.

Note: If not answered in programmed time the call will return to the transferring station.

CALL WAITING (CAMP-ON) SIGNAL

Upon receiving a busy indication while attempting to CALL TRANSFER an outside line or while placing an INTERCOM call, the busy station can be signaled.

- Press ICM button. Called station receives two bursts of tone over the handset.

Note: A station connected on an intercom call cannot receive Camp-On signal. Data base programming can also exclude stations from receiving Camp-On signal. In either case, busy signal will be heard after pressing the ICM button.

Answering a Call Waiting (Camp-On) signal:

- Press the flashing ICM button. The outside line in use is automatically placed on I-Hold.
- Receive Call Waiting announcement.
- Choose call of importance.

CONFERENCE

Multi-Line (Two outside parties and one internal party)

- Lift handset.
- Place first call.
- Press the HOLD button twice, placing that outside line on Exclusive HOLD.
- Place second call.
- Press the HOLD button twice, placing that outside line on Exclusive HOLD.
- Dial # (Pound) key. Both outside lines are conferenced.

Note: If you wish to continue speaking with only one of the outside lines, press that outside line button. That call will continue and the other line will terminate.

By pressing HOLD, both parties are placed on HOLD. To reestablish a conference with both outside parties press # (Pound) key.

Add-On (Two internal and one outside party).

To add-on internal party to an outside line:

While connected to an outside line:

- Press ICM button. Outside line goes on I-Hold.
- Dial station number (70-81). Ringing will be heard.
- When the called party answers, announce

conference.

- Dial the # (Pound) key. Conference is established.

Note: The requested internal party must:

- Lift the handset to be connected to the conference.

STORING SPEED NUMBERS

Station Speed Numbers

- Lift handset.
- Press ICM button, intercom dial tone is heard.
- Press # (Pound) key. Intercom dial tone is removed.
- Press a Speed Dial button (1-6). Dial tone is heard.
- Dial telephone number to be stored (Up to 16 digits).
- Hang up. Confirmation tone is heard through speaker.

Where a specific outside line is to be programmed to be accessed with speed numbers:

- Press the desired line button.
- Press ICM button. Outside line goes on I-Hold, intercom dial tone is received.
- Press # (Pound) key. Intercom dial tone is removed, ICM light extinguishes and outside line on HOLD extinguishes.
- Press a Speed dial button (1-6). Dial tone is heard.
- Dial telephone number to be stored (Up to 16 digits).
- Hang up. Confirmation tone is heard through speaker.

System Speed Numbers

Up to 10 frequently dialed numbers, 16 digits in length, can be stored in the System Speed Dial bin (90-99). The programming is done at Station 70.

Dialing a System Speed number:

- Lift handset.
- Dial system bin location (90-99). Outside line is automatically selected.
- Number is automatically dialed.

Dialing a Station Speed number:

- Lift handset.
- Press the Speed button (1-6). Outside line is automatically selected.
- Number is automatically dialed.

Chaining Speed dial bins:

- Lift handset.
- Select the first Speed Dial button (wait for digits to be dialed).
- Press ICM button. Outside line is placed on I-Hold.
- Select another Speed Dial button.

Notes: If operating behind a PBX you must store the appropriate access code (usually a "9") followed by a pause. A pause can be stored by pressing

300 FEATURE DESCRIPTIONS (Cont.)

the * (Asterisk) key. Each pause counts as one of the 16 maximum digits. Digits (1-6) on the dial pad may also serve as Speed buttons.

Chaining is possible between Station Speed Dial and System Speed dial numbers.

Conversion from dial pulse to tone can be accomplished by inserting a # (Pound) as a Speed dial digit. The # also provides a pause as it converts to tone. This is utilized to access OCC's (common carriers) from a dial pulse line.

LAST NUMBER REDIAL

The last number dialed will be remembered and can be automatically dialed by pressing the * (Asterisk) key.

Redialing the last number:

- Lift handset.
- Dial *(Asterisk) key. The original outside line is automatically seized and the number is dialed.

Redialing the last number using a particular outside line.

- Lift handset.
- Press desired outside line button.
- Press ICM button. Outside line goes on I-Hold.
- Dial *(Asterisk) key. The outside line is removed from I-Hold and the number is dialed.

FLASH

Allows station user to generate a PBX flash or outside line recall.

If programmed for outside line recall, while connected to an outside line:

- Press that outside line button. You will be returned to outside dial tone.

If programmed for PBX transfer, while connected to an outside line:

- Press that outside line button. You will hear PBX confirmation tone.
- Dial extension number.
- Hang up to complete transfer.

EXTERNAL PAGING

External paging requires the use of a CO line button and external paging equipment.

Making a page:

- Lift handset.
- Press the dedicated paging line button.
- Make announcement.
- Hang up to terminate.

NIGHT RING

Allows assigned stations to ring on all incoming lines when in Night Mode.

To enter the Night Mode (At Station-70):

- Lift handset.
- Press ICM button.
- Dial #(Pound) key.
- Dial 831.
- Hang up. Confirmation tone is heard.

To exit the Night Mode (At Station 70):

- Lift handset.
- Press ICM button.
- Dial #(Pound) key.
- Dial 830.
- Hang up. Confirmation tone is heard.

DIALING SHORTCUTS

All features mentioned below are done while handset is in the cradle (on-hook) position. You must lift the handset to converse.

OUTSIDE

- Press outside line button. Dial tone is supplied, ON/OFF button is lit and monitor is activated.
- Dial desired number.
- Lift handset to converse.

STATION SPEED DIAL

- Press Station Speed button. Outside line is accessed, dial tone is supplied and number is dialed, ON/OFF button is lit, monitor is activated.
- Lift handset to converse.

STATION INTERCOM

- Dial Intercom number (70-81). Ringing is heard, ICM button is lit, ON/OFF button is lit.
- Lift handset to converse.

STATION LAST NUMBER REDIAL

- Press * (Astrisk) for Last Number Redial. Outside line is accessed, dial tone is supplied and number is dialed, ON/OFF button is lit, monitor is activated.
- Lift handset to converse.

SYSTEM SPEED DIAL

- Dial System Speed number (90-99). Outside line is accessed, dial tone is supplied and number is dialed, ON/OFF button is lit, monitor is activated.
- Lift handset to converse.

400 INSTALLATION

400.10 SITE PLANNING

The 1A3™ Key Telephone System, like most electronic office equipment, should not be subjected to harsh environmental conditions. To assure easy servicing and reliable operation, several factors must be considered when planning the system installation. Always consider the following BEFORE installing the wiring or KSU.

- A) The KSU is designed for wall mounting only.
- B) The integrated power supply operates on 117 VAC, 60Hz, single phase electricity. A 3-wire (parallel blades with ground) receptical must be provided within 10 ft. of the KSU. The receptacle should be a dedicated circuit with a 15 Amp. fused circuit.
- C) The KSU should be located in a well ventilated area having a temperature range of 32 to 122 degrees Fahrenheit (0° to 50°C), and a humidity range of 5 to 95% (non-condensing).
- D) Accessibility of KSU for servicing and lighting.
- E) Protection from flooding, flammable materials, excessive dust and vibration.
- F) Location of the Key Telephones.
- G) Location (s) of conduit or cable runs.

400.20 UNPACKING THE 1A3 KSU

Remove the KSU from the shipping carton and place it on a level working surface, face up. Inspect the KSU for physical damage. The KSU has no serviceable parts. Do not remove the KSU cover or warranty may be voided.

400.30 KSU INSTALLATION

400.31 KSU MOUNTING

The KSU is designed for wall mounting only. The KSU should not be mounted directly to a masonry surface. A wooden backboard of sufficient size should be attached to the masonry wall and the KSU mounted on the backboard along with cable connecting blocks.

The KSU has two mounting tabs located at the top. Place the KSU against the backboard at the desired mounting location, and mark with a pencil the location where the mounting tabs will be held by screws. Remove the KSU and insert the mounting screws into the locations previously marked. Leave enough of the screws protruding to allow the KSU mounting tabs to be slipped over the screws. Tighten the screws once the KSU has been hung. Insert the remaining two screws into the mounting tabs located at the bottom of the KSU. Tighten all screws securely (Refer to Figure 4.1).

400.32 KSU CABLING

A male Amphenol-type connector is provided on the upper left side of the KSU (Refer to Figure 2.2). Twenty-five pair cable must be prepared with a mating female connector to extend the KSU interface circuits to the MDF. This cable is then terminated on an industry standard 66M1-50 type punch-down connector block. The use of 66M1-50 split blocks with bridging clips is recommended by the manufacturer to simplify trouble shooting. After plugging in the connectorized cable be sure to insert the retaining clip to retain the connector (Refer to Table 4-1 for MDF cable layout).

400.33 KSU GROUNDING

The KSU is grounded with the third wire (green) of the AC power cord. In some cases the ground from the power cord will not be sufficient. In such cases, an earth ground from a metallic cold water pipe, ground rod, or other source may be used.

400.34 KSU POWER

The KSU power supply is located within the KSU. Because the KSU is a sealed unit, all electrical connections are provided externally. The power cord exits the KSU at the bottom. Also at the bottom is a fuse holder that contains a 0.5 Amp., slow-blow fuse. A "Power ON" monitor LED is visible through the lower ventilation slots in the KSU cover. Power for the system is distributed internally (Refer to Figure 2.2).

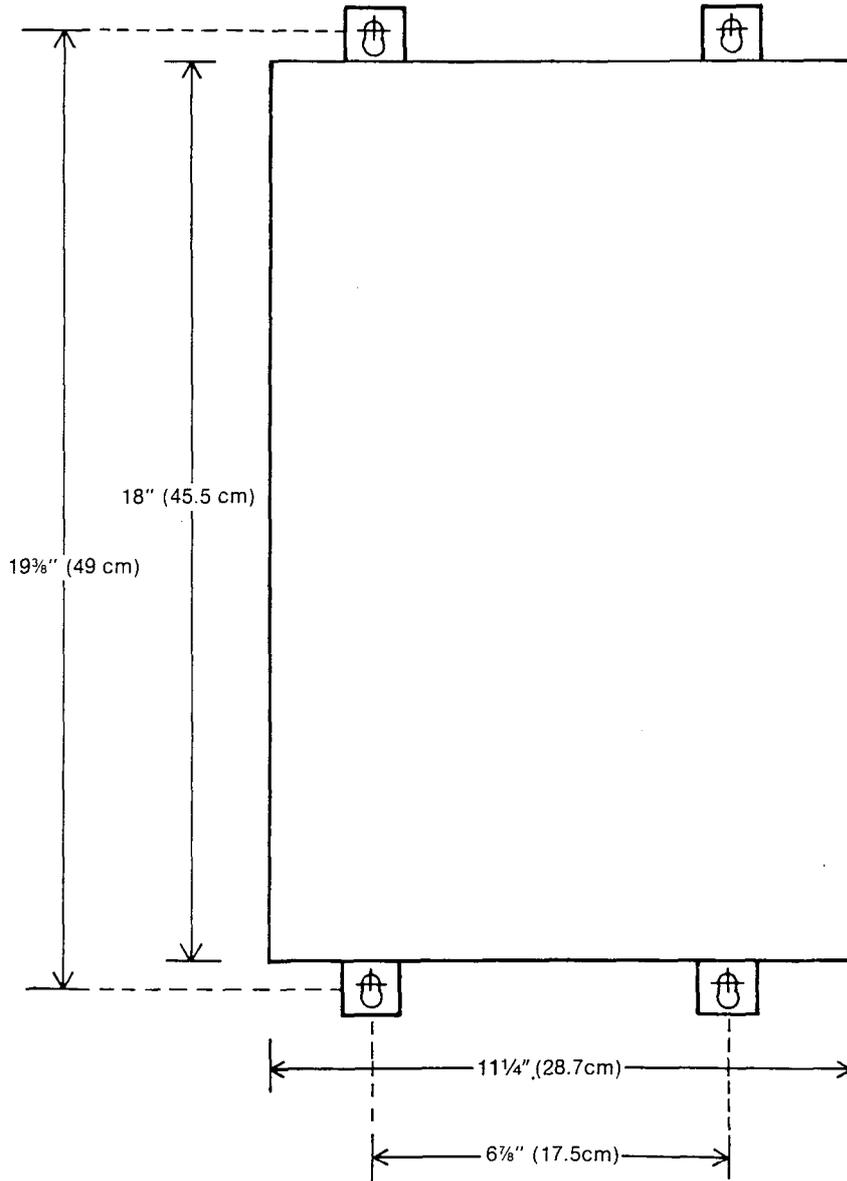
The power cord should not be used with a 3-wire-to-2-wire plug adapter. A surge protector (Tii 428 or equivalent) should be used to protect the power supply from electrical surges. The surge protector should be installed in accordance with the manufacturer's instructions and applicable local electrical codes.

400.35 LIGHTNING PROTECTION

The 1A3™ should have central office lines protected with proper lightning surge arrestors. The central office lines are exposed to damaging surges induced by direct or non-direct lightning strikes.

The protection should contain a complement of 3-element gas discharge tubes which ground high potential surges, and associated circuits to absorb and filter lower-level surge potentials. This type of lightning protection is available through telephone equipment supply houses. Care should be taken to ensure that not more than one set of protectors be installed on central office lines at installation premises. Improper installation of line protection can present a serious safety hazard.

400 INSTALLATION (Cont.)



KSU MOUNTING DIMENSIONS
FIGURE 4.1

400 INSTALLATION (Cont.)

Table 4-1
Connecting Block Layout

Station #	Telephone Line Cord	2 pr. Twisted Station Cable	Function	MDF Cable	Connector Pin
Station 70	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	WH/BL BL/WH WH/OR OR/WH	26 1 27 2
Station 71	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	WH/GN GN/WH WH/BN BN/WH	28 3 29 4
Station 72	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	WH/SL SL/WH RD/BL BL/RD	30 5 31 6
Station 73	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	RD/OR OR/RD RD/GN GN/RD	32 7 33 8
Station 74	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	RD/BN BN/RD RD/SL SL/RD	34 9 35 10
Station 75	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	BK/BL BL/BK BK/OR OR/BK	36 11 37 12
Station 76	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	BK/GN GN/BK BK/BN BN/BK	38 13 39 14
Station 77	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	BK/SL SL/BK YL/BL BL/YL	40 15 41 16
Station 78	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	YL/OR OR/YL YL/GN GN/YL	42 17 43 18
Station 79	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	YL/BN BN/YL YL/SL SL/YL	44 19 45 20
Station 80	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	VI/BL BL/VI VI/OR OR/VI	46 21 47 22
Station 81	GREEN RED BLACK YELLOW	WH/BL BL/WH WH/OR OR/WH	VT VR DT DR	VI/GN GN/VI VI/BN BN/VI	48 23 49 24
Power Failure	GREEN RED	WH/BL BL/WH	PFT PFR	VI/SL SL/VI	50 25

400 INSTALLATION (Cont.)

400.40 BATTERY BACK-UP

The 1A3™ system can be fully supported for complete operation during a power failure. An externally provided 24VDC battery package (Gel Type) and float charger is required. A convenient plug for battery connection is located on the lower right bottom of the KSU (Figure 2.2).

The connector used to connect the batteries is referred to as a Mate-N-Lok connector. This is a universal connector. The connector mounted in the KSU is called a cap (female) connector. The cap is wired with pins. Therefore, the battery cable should have a Mate-N-Lok Plug (male) with the wires terminated into socket (female) terminals. The connector requires two (2) wires for battery connections. The black wire is negative (-) and the red wire is positive (+).

The 1A3™ has no circuitry to charge batteries, therefore a float charger must be connected to recharge the batteries.

Normally a 6.5 A.H. battery package will support the system for 2 hours and an 8 A.H. package will support 4 hours. Connections should be made in accordance with the national electric code and local codes where applicable. Figure 2.1 shows battery and charger connections.

400.50 CO/PBX LINE CONNECTIONS

The central office lines are connected to the KSU with individual RJ11C type jacks. These jacks are vertically located along the upper right side of the KSU. Line 1 is at the top and Line 6 is at the bottom. The central office lines are connected to the KSU using industry standard 4 conductor modular ended line cords. The selection of these jacks determines the actual order of appearance on the 1A3 Key Telephone.

The serving telephone company must be notified, prior to installation, of the data detailed in Section 100.20. The central offices lines must be located within 25 ft. of the KSU and terminated in individual RJ11C or W connectors (Refer to Figure 2.3).

400.51 EMERGENCY TRANSFER

During a power or processor failure to the system, central office Line 1 will be transferred to rows 49 and 50 (VI/SL & SL/VI pair) of the 66M1-50 connecting block. From this location a connection is made to a jack and single line telephone. This telephone can be DTMF (2500 type) or rotary dial (500 type) with a straight line (20Hz) ringer, dependent upon the type of central office

lines designated for system operation (Refer to Figure 4.2).

400.60 KEY TELEPHONE INSTALLATION

The 1A3 Key Telephone is fully-modular. Each Key Telephone requires 2-pair cabling to the MDF. The modular plug on the end of the telephone line cord must be plugged into a modular jack (625 type or equivalent).

The cabling used to extend the Key Telephones should be 2-pair twisted cable. Each pair has a distinct function. Pair 1 (White/Blue, Blue/White) is the voice tip and ring. Pair 2 (White/Orange, Orange/White) is the data and power pair. It is essential that correct polarity be observed throughout all cabling. A reversal in polarity will cause the affected Key Telephone to duplicate another Key Telephone's identity (Table 4-2 lists the pair assignments).

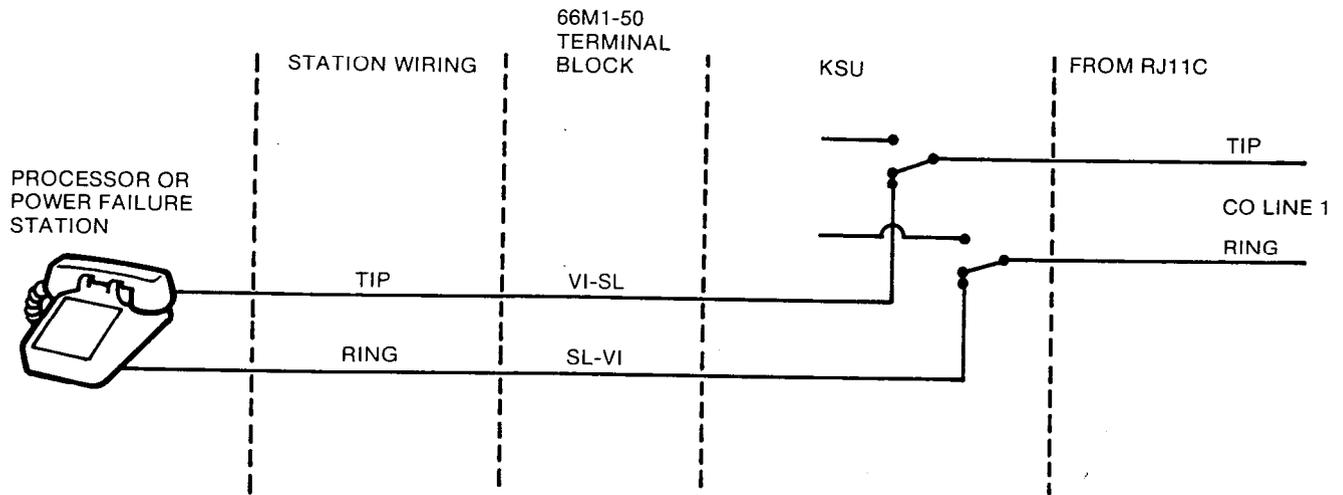
**Table 4-2
Cabling and Line Cord Arrangements**

2 pr. Twisted	Line Cord	Function
WH/BL	GREEN	TIP
BL/WH	RED	RING
WH/OR	BLACK	DATA TIP
OR/WH	YELLOW	DATA RING

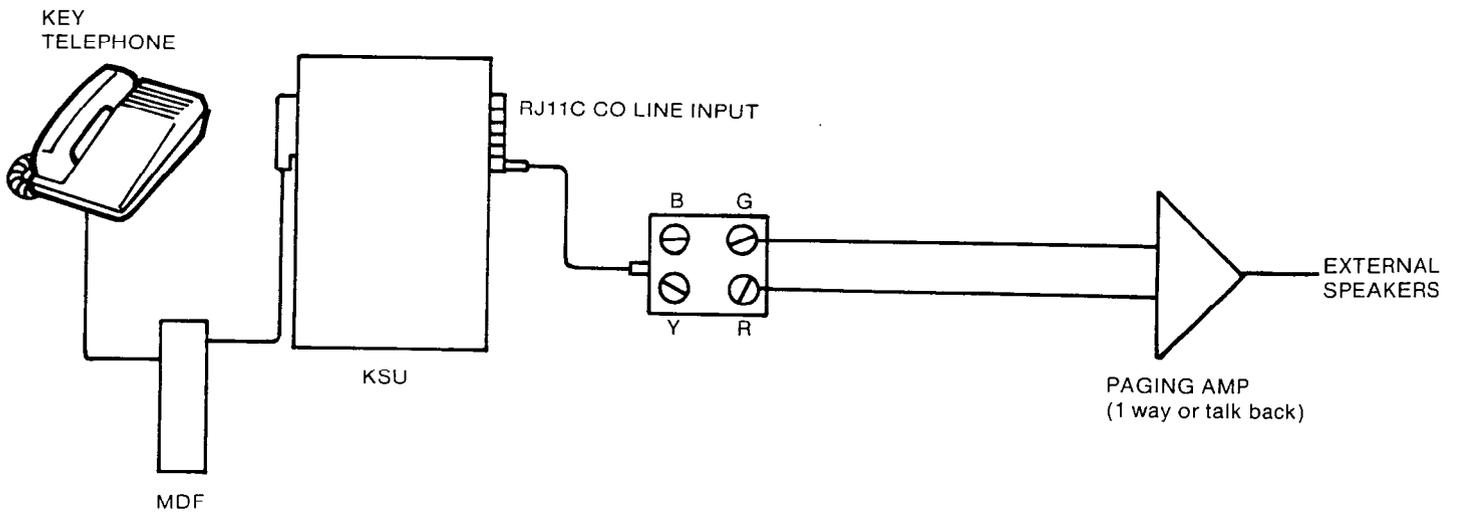
Caution should be taken when using modular connectors to ensure that polarity is maintained. Many modular wire connections will reverse polarity.

Since the Key Telephone gets its power over the data pair, no transformer or external power device is required at the telephone location. The interface circuits for all twelve (12) Key Telephones are contained in the KSU; therefore no additional equipment is necessary to expand the system to its maximum configuration (Refer to figure 4.4).

400 INSTALLATION (Cont.)

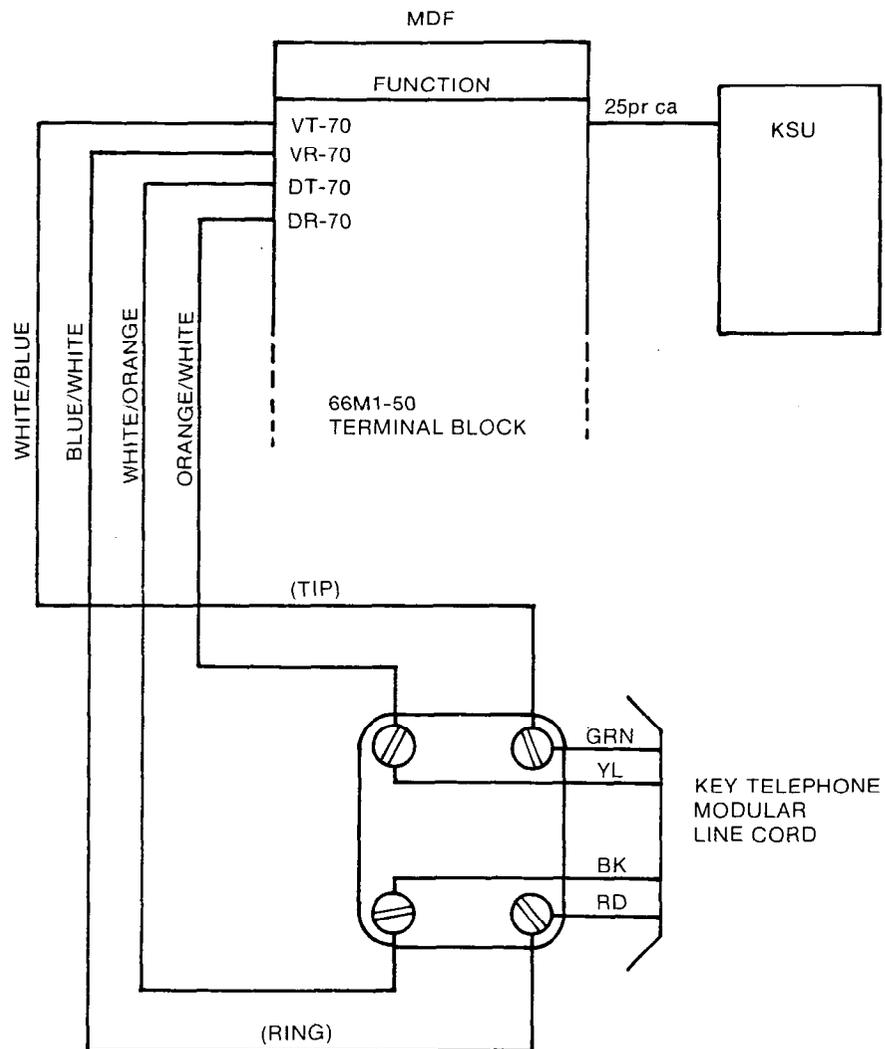


**PROCESSOR OR
POWER FAILURE TRANSFER
FIGURE 4.2**



**VOICE PAGING
FIGURE 4.3**

400 INSTALLATION (Cont.)



KEY TELEPHONE WIRING
FIGURE 4.4

400 INSTALLATION (Cont.)**400.61 WALL MOUNT KIT INSTALLATION**

All connections to the Key Telephones are fully-modular. To wall mount the Key Telephone, it is necessary to have one (1) 1A3 Wall Mount Kit and one (1) standard 630-A type jack assembly, designed for normal wall hanging applications.

- A) Unplug the line cord from the Key Telephone. This line cord will not be required and should be retained as a future maintenance replacement item.
- B) Substitute the short modular cord from the 1A3 Wall Mount assembly into the modular connector vacated by the line cord.
- C) Lift the plastic number retainer upwards and expose the screw underneath. Remove the screw and reverse the handset tab so that the protrusion faces the hookswitch. This will allow the handset to remain secure when the telephone is on the wall. Replace the screw and snap the number retainer into place.
- D) Align the wall mount base plate with holes on the bottom of the Key Telephone. Snap in place and fasten with screw.
- E) Now mate the two (2) key hole slots on the base plate with the lugs on the 630-A type jack. Align modular connector and press telephone into place (Refer to Figure 4.5).

400.70 EXTERNAL APPARATUS CONNECTIONS**400.71 EXTERNAL PAGING**

When connecting to an external paging amplifier, a central office line position must be used. This will reduce the available number of central office line circuits available by one. Using a modular 4-conductor line cord, plug into the selected central office line position and terminate the cord into an RJ11C type jack. Cabling between the jack and the amplifier must be provided.

The interface to the paging amplifier is 600ohm. The selected central office line should be programmed as a paging line in the customer data base. The ability for stations to be allow/denied access to the external paging, is determined by customer data base programming (Refer to Figure 4.3).

400.72 STATION 80 LOUD BELL CONTROL

The ringing assignments of Key Station # 80 are extended to a set of contacts that will activate external signaling equipment. The contacts are available through the modular connector located on the left side of the KSU. The contacts provide an electrical closure that follows the ring assignment at Key Station #80. Intercom calls to Station #80 will ring at the external source. CO lines assigned to ring will ring distinctively (Refer to Figure 4.6 for connections).

The contacts are rated at 0.5 Amp. 24VDC "Do not connect 117VAC through the contacts".

400.73 COMMON AUDIBLE CONTROL

Incoming ringing on all central office lines is extended to a set of contacts that will activate external signaling equipment. The contacts are available through the modular connector located on the left side of the KSU (Refer to Figure 4.6 for connections).

The Common Audible Control provides dry contact closure in the sequence that makes it distinctive to CO Lines ringing.

The contacts are rated at 0.5 Amp. 24VDC "Do not connect 117 VAC through the contacts".

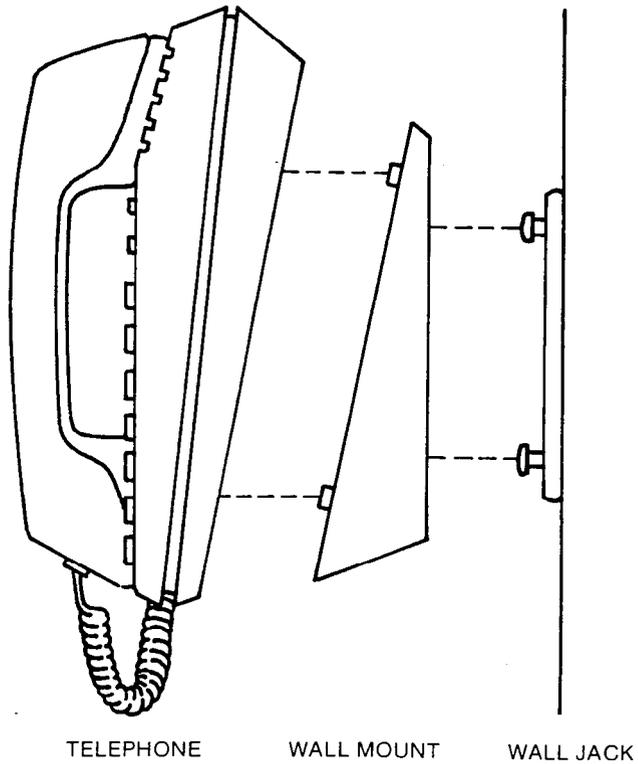
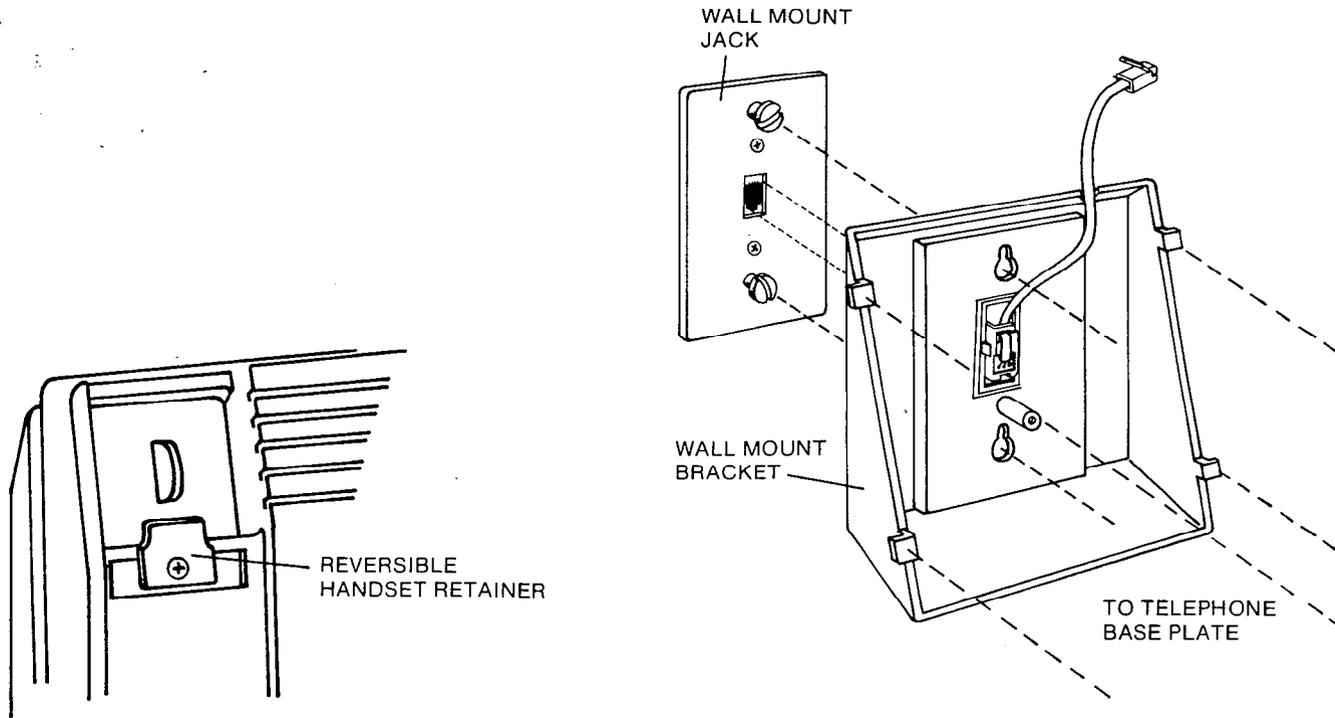
400.74 MUSIC-ON-HOLD

A customer provided music source may be connected to the 1A3 Key System for providing music to outside parties that have been placed on HOLD. Connections are made from the music source to the KSU with a 1/8" phono type plug (Refer to Figure 2.3).

400.75 EXTERNAL ALARM CONTROL

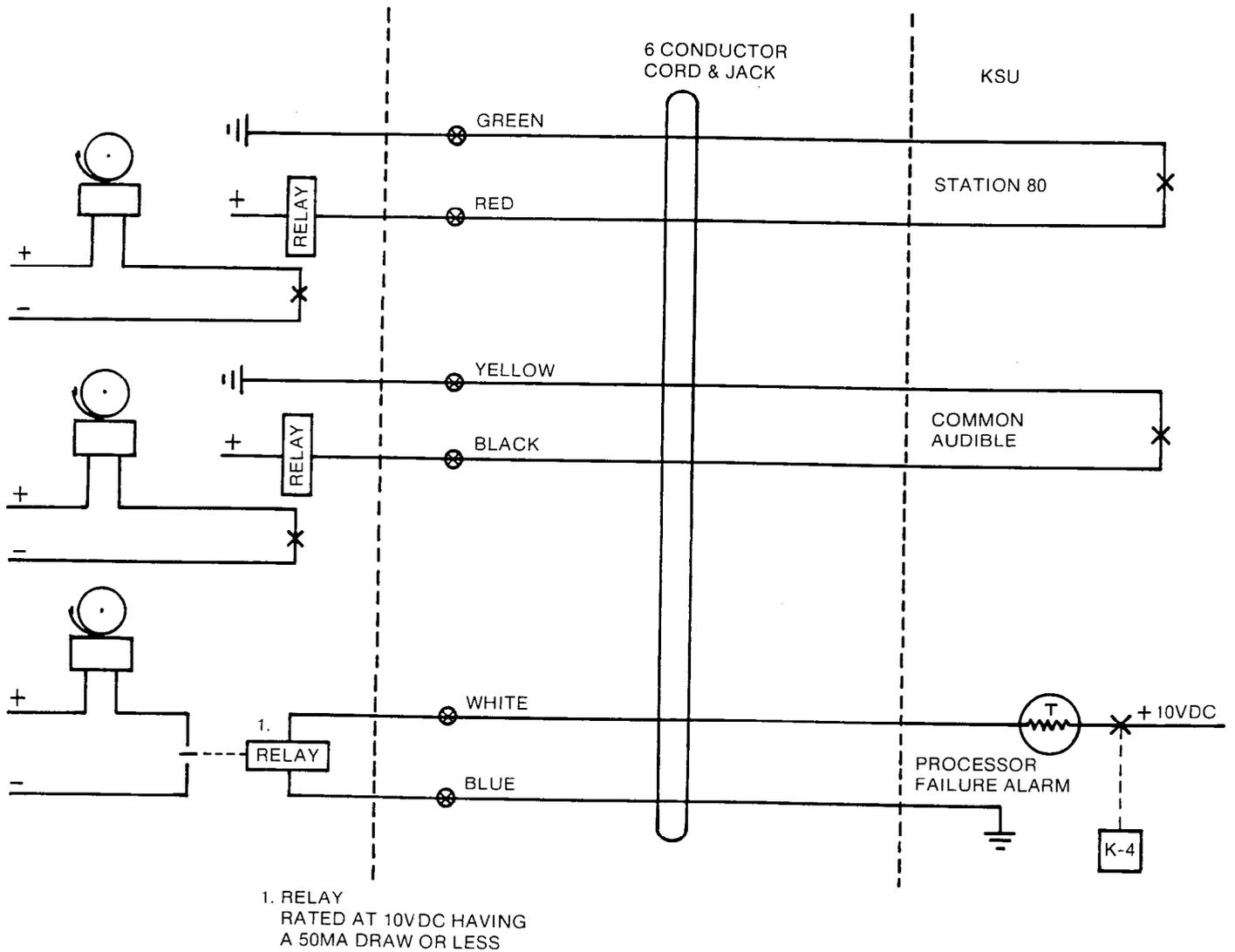
An externally provided alarm device can be interfaced with the system. In the event of a power or processor failure, the alarm device will be activated. The alarm signaling terminals provide a constant 10V/50MA output that is removed during alarm conditions (power outage or CPU failure). The control is interfaced through the modular connector located on the left side of the KSU (Refer to Figure 4.6 for connections).

400 INSTALLATION (Cont.)



WALL MOUNT KIT
INSTALLATION
FIGURE 4.5

400 INSTALLATION (Cont.)



EXTERNAL CONNECTIONS
FIGURE 4.6

500 INITIALIZATION**500.10 INSTALLATION CHECKLIST**

Prior to actual power-up and initialization, the 1A3™ Key System should be checked to avoid start up delays. Provided for convenience is a step-by-step check list.

- A) Verify that the AC input fuse is good and inserted properly.
- B) Ensure the KSU is grounded according to instructions in Section 400.33.
- C) Verify that all connectorized connections are plugged in securely and in the proper location. The amphenol-type connector should be secured with the retention clip.
- D) Inspect the MDF for shorted wiring or improper polarity that would affect Key Telephone operation.
- E) Inspect the Key Telephone cord connections to ensure that modular plugs are securely positioned and wired properly.

500.20 POWER UP SEQUENCE

The power up sequence involves the proper application of AC power (plugging in the AC cord) and observing the LED power monitor. With a successful power up the LED is on and the system is ready to be initialized.

500.30 DTMF INITIALIZATION

To ensure all default system data base instructions are arranged for proper order, it is necessary to initialize the system. To initialize the system so that all central office lines send DTMF signals, the following sequence should be followed:

- Lift the handset at Station 70.
- Press the ICM Key.
- Dial the # (Pound) Key.
- Dial 09.
- Hang up the handset.

With the system initialized DTMF, the customer data base will be arranged as follows:

1. All central office lines will transmit signal tone output (DTMF).

2. All central office lines will be in Line Group 1.
3. All stations will receive incoming call ringing for all lines.
4. All central office lines may be accessed by all stations.
5. No recall for holding lines.
6. No toll restriction assigned.
7. System is in day mode.
8. All stations have the Call Waiting feature.
9. All stations will ring during Night Service mode.
10. Off-Hook signaling enabled.

500.40 DIAL PULSE INITIALIZATION

To ensure all default system data base instructions are arranged in proper order, it is necessary to initialize the system. To initialize the system so that all central office lines send dial pulse signals, the following sequence should be followed:

- Lift the handset at Station 70.
- Press the ICM button.
- Dial the # (Pound) Key.
- Dial 08.
- Hang up the handset.

With the system initialized dial pulse the customer data base will be arranged as follows:

1. All central office lines will transmit dial pulse output.
2. All central office lines will be in Line Group 1.
3. All stations will receive incoming call ringing for all lines.
4. All central office lines may be accessed by all stations.
5. No recall for holding lines.
6. No toll restriction assigned.
7. System is in day mode.
8. All stations have the Call Waiting feature.
9. All stations will ring during Night Service mode.
10. Off-Hook signaling enabled.
11. Dial pulse speed set at 10PPS, and Break/Make ratio set at 60/40.

600 CUSTOMER DATA BASE PROGRAMMING

600.10 INTRODUCTION

The customer data base consists of the parameters necessary to configure a customers' system for specific applications. The data entry function is performed at the Key Telephone assigned as Intercom Directory Number 70.

Following completion of the customer data work sheet, the programming procedure can begin. This procedure includes the following steps:

- Activating Station 70 for programming service.
- Entering the data base for a specific field, according to the programming work sheet.
- Returning Station 70 to normal call processing service.
- Repeat the above for the remaining fields.

During programming, system operation is not affected. However, as each data field is entered, its data becomes active. The customer data base is stored in 2K RAM that is battery protected. Information written over previous data is maintained. If errors in programming occur, simply re-enter the correct data into the field.

There is no way to display the customer data. However, while programming, a confirmation tone is returned over the telephone speaker to indicate that the data field was accepted. If no tone is presented, the programming attempt was not accepted. If error tone is presented

through the handset, then either erroneous data was given or the digit field was exceeded. If the correct number of digits for a particular field is not entered then none of the data will be accepted and confirmation tone will not be presented.

600.20 CUSTOMER DATA WORK SHEET

Before any attempt at programming is initiated, the customer data work sheet should be prepared. This work sheet should become the permanent record of the customer data base. Figure 6.1 is an example of the customer data work sheet. When preparing the customer data work sheet, refer to Section 600.30 for information on specific data fields.

600.30 DATA BASE FIELDS

The data fields provide for system timing parameters, central office line configuration, and Key Telephone configuration. Table 6-1 lists the data fields and default values.

When entering data into a field, an entry less than the required digits will not be accepted. Also, any digit entry greater than the number required or entry other than the designated digits will result in error tone. The data fields are further described in Sections 600.31 through 600.39.

**Table 6-1
Data Fields and Default Values**

Field Description	Data field No.	Default Entry
Flash Enable	00	0
Pause Timer	01	0000 0011
Break / Make	02	1060
Flash Timer	03	00000110
Hold Recall	04	1111 1111
Station Configuration	70 thru 81	0011111110111111
CO Line Configuration	84 thru 89	000001XX

600 CUSTOMER DATA BASE PROGRAMMING (Cont.)

George

DATA FIELD	ACTIVITY	ENTRY
00	Flash Enable	<u>2</u>
01	Pause Timer	<u>-----</u>
02	Break/Make	<u>-----</u>
03	Flash Timer	<u>-----</u>
04	Hold Recall	<u>11111111</u>
70	Station 70 Configuration	<u>0000011110001111</u>
71	Station 71 Configuration	<u>0000000010001111</u>
72	Station 72 Configuration	<u>0100010001000</u>
73	Station 73 Configuration	<u>0000000010000111</u>
74	Station 74 Configuration	<u>-----</u>
75	Station 75 Configuration	<u>-----</u>
76	Station 76 Configuration	<u>-----</u>
77	Station 77 Configuration	<u>-----</u>
78	Station 78 Configuration	<u>-----</u>
79	Station 79 Configuration	<u>-----</u>
80	Station 80 Configuration	<u>-----</u>
81	Station 81 Configuration	<u>-----</u>
84	CO Line 1 Configuration	<u>-----</u>
85	CO Line 2 Configuration	<u>-----</u>
86	CO Line 3 Configuration	<u>-----</u>
87	CO Line 4 Configuration	<u>-----</u>
88	CO Line 5 Configuration	<u>-----</u>
89	CO Line 6 Configuration	<u>-----</u>
90	System Speed Bin 1	<u>-----</u>
91	System Speed Bin 2	<u>-----</u>
92	System Speed Bin 3	<u>-----</u>
93	System Speed Bin 4	<u>-----</u>
94	System Speed Bin 5	<u>-----</u>
95	System Speed Bin 6	<u>-----</u>
96	System Speed Bin 7	<u>-----</u>
97	System Speed Bin 8	<u>-----</u>
98	System Speed Bin 9	<u>-----</u>
99	System Speed Bin 10	<u>-----</u>

CUSTOMER DATA WORK SHEET
FIGURE 6.1

600 CUSTOMER DATA BASE PROGRAMMING (Cont.)

600.31 FLASH ENABLE (00)

This data field allows or denies the flash feature. When flash is enabled depressing an active central office line button will provide an open loop flash. The duration of this flash is determined by data field 03 (Flash Timer). The flash can be used to signal a PBX transfer when the 1A3 is behind a PBX.

The field requires a single digit entry. An entry of "0" will enable the flash (default). An entry of "1" will disable the flash. Write the desired entry on the Customer Data Worksheet.

600.32 PAUSE TIMER (01)

When using speed dial, at times it is necessary to pause during dialing. This pause is programmed in speed dialing by entering a "*" (Asterisk). The length of the pause time is variable. Table 6-2 lists the pause times and the data code.

When speed dialing a pause will always be inserted by the system prior to the start of digit sending to allow the central office dial tone to be received. The entry field for pause times is eight digits. Write the desired pause time on the Customer Data Worksheet. The default value is 1.5 sec.

**Table 6-2
Pause Times**

UNITS	ENTRY		UNITS	ENTRY
0.5 Sec.	0000 0001		10.5 Sec.	0001 0101
1.0 Sec.	0000 0010		11.0 Sec.	0001 0110
1.5 Sec.	0000 0011		11.5 Sec.	0001 0111
2.0 Sec.	0000 0100		12.0 Sec.	0001 1000
2.5 Sec.	0000 0101		12.5 Sec.	0001 1001
3.0 Sec.	0000 0110		13.0 Sec.	0001 1010
3.5 Sec.	0000 1111		13.5 Sec.	0001 1011
4.0 Sec.	0000 1000		14.0 Sec.	0001 1100
4.5 Sec.	0000 1001		14.5 Sec.	0001 1101
5.0 Sec.	0000 1010		15.0 Sec.	0001 1110
5.5 Sec.	0000 1011		15.5 Sec.	0001 1111
6.0 Sec.	0000 1100		16.0 Sec.	0010 0000
6.5 Sec.	0000 1101		16.5 Sec.	0010 0001
7.0 Sec.	0000 1110		17.0 Sec.	0010 0010
7.5 Sec.	0000 1111		17.5 Sec.	0010 0011
8.0 Sec.	0001 0000		18.0 Sec.	0010 0100
8.5 Sec.	0001 0001		10.5 Sec.	0010 0101
9.0 Sec.	0001 0010		19.0 Sec.	0010 0110
9.5 Sec.	0001 0011		19.5 Sec.	0010 0111
10.0 Sec.	0001 0100		20.0 Sec.	0010 1000

600 CUSTOMER DATA BASE PROGRAMMING (Cont.)

600.33 BREAK/MAKE (02)

When dial pulse central office lines are used, it is necessary to determine the Break/Make Ratio and the Pulses Per Second (PPS) required to be sent to the serving Central Office or PBX.

The data field for Break/Make is four (4) digits in length. The first two (2) digit entries are Pulses Per Second (PPS), the second two (2) are the Break/Make Ratio. Table 6-3 lists the data field and entries. The default data value is 10 pps and 60/40 B/M.

**Table 6-3
Break/Make Options**

Data Field 02 <u>p</u> <u>p</u> <u>b</u> <u>b</u>	
p = Pulses Per Second	
b = The Break Ratio of Break/Make	
PPS (p)	10 = 10 PPS 20 = 20 PPS 30 = 30 PPS 40 = 40 PPS
Break/Make (b)	60 = 60/40 B/M 64 = 64/36 B/M 68 = 68/32 B/M 70 = 70/30 B/M

When entering the data any number between 10 to 40 PPS can be entered. When entering Break/Make ratios, any number from 60 to 70 can be used to set the Break/Make ratio. Write the desired Break/Make entry on the Customer Data Worksheet.

600.34 FLASH TIMER (03)

The flash timer data field determines the duration of the "open loop" flash. When the flash is used to transfer PBX lines, it should be set to the timing requirements of the PBX. Certain central offices require longer flash times for disconnect. The flash time is dependent upon the function it is to perform.

Table 6-4 lists the flash times and the data entries. The field is eight (8) digits in length. The default value is 720 ms. Write the desired flash timer entry on the Customer Data Worksheet.

**Table 6-4
Flash Times**

UNITS	ENTRY	
120 ms.	0000	0001
240 ms.	0000	0010
360 ms.	0000	0011
480 ms.	0000	0100
600 ms.	0000	0101
720 ms.	0000	0110
840 ms.	0000	0111
960 ms.	0000	1000
1.08 Sec.	0000	1001
1.20 Sec.	0000	1010
1.32 Sec.	0000	1011
1.44 Sec.	0000	1100
1.56 Sec.	0000	1101
1.68 Sec.	0000	1110
1.80 Sec.	0000	1111
1.92 Sec.	0001	0000
2.04 Sec.	0001	0001
2.16 Sec.	0001	0010
2.28 Sec.	0001	0011
2.40 Sec.	0001	0100
2.52 Sec.	0001	0101
2.64 Sec.	0001	0110
2.76 Sec.	0001	0111
2.88 Sec.	0001	1000
3.00 Sec.	0001	1001
3.12 Sec.	0001	1010
3.24 Sec.	0001	1011
3.26 Sec.	0001	1100
3.38 Sec.	0001	1101
3.50 Sec.	0001	1110

600 CUSTOMER DATA BASE PROGRAMMING (Cont.)

600.35 HOLD RECALL (04)

The hold recall data field controls the time a call will remain on hold before it recalls. Calls placed on HOLD will activate the recall timer.

The entry field is eight (8) digits in length. Table 6-5 lists the Hold Recall times and the data entries. Select the desired recall time and enter the data. Default value is set at no recall. Write the desired Hold Recall timer entry on the Customer Data Worksheet.

A transferred CO line will recall after 30 sec. This is not programmable.

**Table 6-5
Hold Recall Times**

UNITS	ENTRY	
30 Sec.	0000	0001
1.0 Min.	0000	0010
1.5 Min.	0000	0011
2.0 Min.	0000	0100
2.5 Min.	0000	0101
3.0 Min.	0000	0110
3.5 Min.	0000	0111
4.0 Min.	0000	1000
4.5 Min.	0000	1001
5.0 Min.	0000	1010
5.5 Min.	0000	1011
6.0 Min.	0000	1100
6.5 Min.	0000	1101
7.0 Min.	0000	1110
No Recall	1111	1111

600.36 STATION CONFIGURATION (70-81)

The data required for each station is determined by station configuration data field. There is a data field for each of the twelve (12) stations. The data field corresponds with the station number, i.e. Station 70 is data field 70. The data field requires a sixteen (16) digit field. Table 6-6 lists the data field and entries.

The individual data for each station is as follows:

STATION TOLL RESTRICTION (T)

Toll restriction is assignable on a per station basis. There are four classes of service that a station can be assigned:

- Class 0 = No restrictions
- Class 1 = Restricted from dialing 0 as first digit
- Class 2 = Restricted from dialing 1 as first digit
- Class 3 = Restricted from dialing 0 & 1 as first digit

When central office lines are marked as PBX, the toll restriction will be applied to the second digit dialed.

When restricted from dialing 1 the following numbers are always allowed, 1 + 800 + 7 digits, 1 + 911, 1 + 411.

The data entries for the classes of service are as follows:

Class of Service	Data Entry	Restriction
COS 0	00	None
COS 1	01	0 as 1st dialed digit
COS 2	10	1 as 1st dialed digit
COS 3	11	0 or 1 as 1st dialed digit

**Table 6-6
Station Configuration**

Station configuration (70-81)	<u>T</u> <u>A</u> <u>A</u> <u>A</u> <u>A</u> <u>A</u> <u>A</u> <u>W</u> <u>N</u> <u>R</u> <u>R</u> <u>R</u> <u>R</u> <u>R</u> <u>R</u> <u>R</u> <u>R</u>
T = Toll Restriction	2 digits
A = CO Line Access	6 digits
W = Call Waiting	1 digit
N = Night Ringing	1 digit
R = CO Line Ringing	6 digits

600 CUSTOMER DATA BASE PROGRAMMING (Cont.)

**Table 6-7
Access and Ring
Day & Night Operation**

Station Assignment Program	Access & Ring	Access & No Ring	No Access & Ring	No Access & No Ring
Day	Outdialing Incoming LED Flash Incoming Ring LED's Follow System Activity Can Flash Can Receive Transfer	Outdialing Incoming LED Flash No Incoming Ring LED's Follow System Activity Can Flash Can Receive Transfer	No Outdialing Incoming LED Flash Incoming Ring LED's Follow System Activity Can Not Flash Can Receive Transfer	No Outdialing No Incoming LED Flash No Incoming Ring LED's Do Not Follow System Activity Can Not Flash Can Receive Transfer
Night Service (Marked Night Ringing)	Outdialing Incoming LED Flash Incoming Ring LED's Follow System Activity Can Flash Can Receive Transfer	Outdialing Incoming LED Flash Incoming Ring LED's Follow System Activity Can Flash Can Receive Transfer	No Outdialing Incoming LED Flash Incoming Ring LED's Follow System Activity Can Not Flash Can Receive Transfer	No Outdialing Incoming LED Flash Incoming Ring LED's Follow System Activity Can Not Flash Can Receive Transfer

CO LINE ACCESS (A)

Access to central office lines is designated on a per station/per line basis. This arrangement allows for private lines to be assigned. A station denied access will receive error tone when the central office line button is depressed. Also, the central office line button will not light when access is denied.

The data field for CO line access is six (6) digits in length. One digit for each CO line. The first entry is CO line 6; the other CO's are in descending order. An entry of "1" allows access to the CO line and an entry of "0" denies access to the CO line. Default data allows access to all CO lines. (See Table 6-7 for additional line access information.)

CALL WAITING (W)

The Call Waiting feature can be allowed or denied on a per station basis. A station allowed Call Waiting, will receive a burst of splash tone over the handset signifying a call is waiting. This call waiting indication is initiated by a station attempting to transfer or place an intercom call. Also, if assigned to receive CO Line ringing, a call waiting signal will be presented to the station when the CO Line rings in. A station denied Call Waiting will not receive the call waiting tone.

NIGHT RINGING (N)

When the system is placed in Night Service, stations can be assigned to ring. This night ringing will allow stations not allowed access to lines or not assigned to

600 CUSTOMER DATA BASE PROGRAMMING (Cont.)

ring during the day to ring as night stations. The data field for night ringing is the 10th digit of the sixteen (16) digit field. An entry of "0" disables night ringing. To assign night ringing a "1" is entered. Default data disables night ringing. (See Table 6-7 for additional information on line access, ringing and night service.)

CO LINE RINGING (R)

Ringing of CO lines is assigned on a per line/per station basis. This allows for distributed ringing. A station assigned to ring will ring during day or night operation. The data field is digits 11 through 16 of the sixteen (16) digit field. An entry of "1" enables CO line ringing and an entry of "0" disables CO line ringing. Digit eleven (11) is for CO line 6 and the other CO lines are in descending order. (See Table 6-7 for additional information on line access, and ringing.)

Write the desired station configuration information for each station (70-81) on the Customer Data Worksheet.

600.37 CO LINE CONFIGURATION (84-89)

The data required for each CO line is determined by CO Line Configuration data fields. There is a data field for each CO line. Data field 84 is for CO line 1, 85 is for CO Line 2 and etc. The data field is eight (8) digits in length. Table 6-8 lists the data field and entries. Enter the desired CO Line Configuration for each line (84-89) on the Customer Data Work Sheet.

Table 6-8
CO Line Configuration

COLINE CONFIGURATION (84-89)	<u>F</u> <u>F</u> <u>F</u> <u>O</u> <u>G</u> <u>G</u> <u>S</u> <u>T</u>
F = Future	3 digits
O = Restriction Override	1 digit
G = CO Line Group	2 digits
S = CO Line Signaling	1 digit
T = CO Line Type	1 digit

The individual data is broken down as follows:

FUTURE USE (F)

This three (3) digit group is held for future use. An entry of "0" is required in this three (3) digit field.

RESTRICTION OVERRIDE (O)

The CO line can be set to override restrictions applied through class of service assignments. This would be necessary where special lines are used, i.e. PBX line

where the PBX stations are 100's. This override is assigned per CO line. The fourth digit of the eight (8) required is for CO Line Configuration. An entry of "0" disables restriction override. The entry of "1" enables restriction override. The default data disables override.

CO LINE GROUPS (G)

There are four (4) assignable CO line groups. Grouping of CO lines prohibits speed dialing from accessing the wrong CO line. The groups and their corresponding data are listed in Table 6-9. For paging access or where CO lines are not used, the paging group should be used. Default data assigns all lines in group 1. The CO Line Group data is the 5th and 6th digits of the eight (8) required.

Table 6-9
CO Line Group

CO Line Group	Data
Paging (Unused Line)	00
Line Group 1	01
Line Group 2	10
Line Group 3	11

CO LINE SIGNALING(S)

The method of CO Line signaling is determined by this data field. To specify the CO Line signal dial pulse, enter a "0" in the seventh data bin. To specify DTMF CO Line signaling, enter a "1". When CO Lines are marked dial pulse be sure the Break/Make data is programmed to match the serving central office.

CO LINE TYPE(T)

This entry defines the CO Line type. The types available are CO Line or PBX. When marked PBX, toll restriction will ignore the first digit dialed. To specify a line as CO, enter "0". To specify a line as PBX, enter "1".

600.38 SYSTEM SPEED NUMBERS (90-99)

System Speed Dial numbers are entered via the system data base from Station 70. There can be up to 16 digits in each Speed Dial Bin. Each numerical entry is counted as a digit. The "*" (Asterisk) key is used to program a pause, the "#" (Pound) key is used to program an automatic switch-over from dial pulse to DTMF and the CO line 1 button is used to program a flash command. Each of these entries also count as a digit. CO lines can

600 CUSTOMER DATA BASE PROGRAMMING (Cont.)

be programmed to be automatically selected with a Speed Dial number. Speed Dial numbers are subject to the class-of-service and line access restriction assigned to the station where the number was selected.

600.39 SPECIAL SERVICES

Provided within the 1A3™ System are special services that enhance the system operation and provide unique opportunities to meet special needs and applications. These services are easily programmed by Station 70 or individually at the appropriate station, as applicable. These services are not listed on the Customer Data Worksheet. The mode of programming is detailed with each service.

600.391 STATION SPEED DIAL (Buttons 1-6)

Station Speed Dial numbers are entered by each individual Key Telephone. There can be up to 16 digits in each speed dial bin. Each numerical entry is counted as a digit. The "*" (Asterisk) key is used to program a pause (600.32), the "#" (Pound) key is used to program an automatic switch-over from dial pulse to DTMF signaling, and the CO Line 1 button is used to program an automatic flash (600.34). Each of these entries counts as a digit. CO Lines can be programmed to automatically select a specified CO Line with a speed dial number. Speed dial numbers are subject to the Class of Service and line access restriction assigned to the station.

To program a Station Speed Number:

- Lift handset (at telephone where number is to be entered).
- Press ICM button.
- Dial # key.
- Press Station Speed button (1 through 6).
- Dial the number to be stored (up to 16 digits).
- Hang up (hear confirmation tone).

600.392 CALL ANNOUNCE INHIBIT

Each Key Telephone user can select the signaling mode desired at his station. During normal operation calls can be tone ringing or call announced by the person calling. With call announce inhibit activated only tone ringing is allowed to the key telephone, providing privacy from voice announce interruptions. Normal signaling is provided by default data.

To activate Call Announce Inhibit:

- Lift handset (at telephone desiring the feature).
- Press ICM button.
- Dial # key (first).

- Dial # key (second).
- Hang up (hear confirmation tone).

To return to normal operation:

- Lift handset (at telephone desiring the feature).
- Press ICM button.
- Dial # key.
- Dial * key.
- Hang up (hear confirmation tone).

600.393 NIGHT SERVICE

The 1A3™ System is placed into and taken out of Night Service via programming at Station 70. When the system is in Night Service, stations marked to ring at night (Section 600.36) will function according to the access and ring assignments listed in Table 6-7. The system places the system in day operation by default.

To activate Night Service:

- Lift handset (Station 70).
- Press ICM button.
- Dial # key.
- Dial 831.
- Hang up (hear confirmation tone).

To return to Day Operation:

- Lift handset (Station 70).
- Press ICM button.
- Dial # key.
- Dial 830.
- Hang up (hear confirmation tone).

600.394 OFF-HOOK SIGNALING

Station 70 is provided with a splash tone when off-hook or busy, thereby alerting it that another CO Line is ringing into the system. This tone is repeated every 15 seconds until all ringing lines are answered. This signaling is allowed or denied by programming.

Off-hook signaling is allowed by system default data base.

To activate Off-Hook signaling:

- Lift handset (Station 70).
- Press ICM button.
- Dial # key.
- Dial 833.
- Hang up (hear confirmation tone).

To deactivate Off-Hook Signaling:

- Lift handset (Station 70).
- Press ICM button.
- Dial # key.
- Dial 832.
- Hang up (hear confirmation tone).

600 CUSTOMER DATA BASE PROGRAMMING (Cont.)**600.395 FLASH WITH SPEED DIAL**

The ability to program a flash command into speed dial is activated and deactivated from Station 70. When allowed, a flash command will be stored in speed dial and an open loop flash will be provided. This works in conjunction with flash enable (Section 600.31) and flash timer (Section 600.34). When programming the CO Line 1 button is used to enter the flash command. The system default data denies the flash with speed dial command.

To activate Flash with Speed Dial:

- Lift handset (Station 70).
- Press ICM button.
- Dial # key.
- Dial 835.
- Hang up (hear confirmation tone).

To deactivate Flash with Speed Dial:

- Lift handset (Station 70).
- Press ICM button.
- Dial # key.
- Dial 834.
- Hang up (hear confirmation tone).

600.40 PROGRAM MODE ENTRY

The prepared data is entered into the system memory at Station 70. Once a data field has been entered and accepted, that data is operative. The data is protected from power loss by a lithium battery. When data fields are entered, a double burst of tone is given over the speaker signaling the data was accepted. If the data was not accepted no tone will be heard.

To enter a Data Field and program specific data, take information from Customer Data Work sheet and follow the sequence described below:

From Station 70 –

Lift the handset, press ICM Button
(Dial tone is received)
(ICM button lights)

Dial the # (Pound) key
(Dial tone is removed)
(ICM button extinguishes)

Dial the Data Field
(Dial tone is received)

Dial the program data
(Dial tone is removed)

Hang up the handset
(Confirmation tone is received)

When a program change is made it automatically erases the previous data. Since there is no means to display the data, a test must be made to ensure the proper change was made. Also it is highly recommended that the Customer Data Work Sheet be used as a guide to programming. This becomes the permanent record of programming.

During programming, if a mistake is made, the programmer can press the ICM Button and re-enter the data field and enter the correct data.

700 OPERATIONAL TESTS

700.10 POWER TEST

Table 7-1
Power Test

PROCEDURE	RESULT
1. Inspect installation.	1. CO line connected to proper RJ11C connector. (Figure 2.3) 2. MDF cabling punched down correctly on 66M1-50 block. (Table 4-1) 3. External connections connected properly. (Figure 4.6) 4. Music source plugged into jack securely. (Figure 2.3)
2. Plug in AC cord.	1. Power LED ON. (Figure 2.2) 2. AC power input voltage 106 to 128 VAC. (Section 800.23) 3. MDF voltage for stations. VT(-) to DT(+) = 24 VDC VR(-) to DR(+) = 24 VDC
3. Feature verification.	1. System programming according to desired feature operation. (Section 600.30) 2. Features function as described. (Section 300.20)

700.20 KEY TELEPHONE TEST

Table 7-2
Key Telephone Test

PROCEDURE	RESULT
1. Check telephone installation.	1. Connection at MDF correct. (Table 4-1) 2. Cabling correct. (Figure 4.4)
2A. Dial intercom stations.	1. Observe tone ringing at dialed stations (LED flash). 2. Observe ringback tone at dialing station.
2B. Call announce ICM stations.	1. Observe voice announce over dialed station's speaker (observe LED's). 2. Talk back from dialed station to dialing station (observe LED's).
3. Check feature operation.	1. Features function as described. (Section 300.20)
4. Check CO lines.	1. Observe CO dial tone (observe LED's). 2. Outdial on CO line (DTMF or dial pulse). 3. Incoming ringing (observe LED flash). 4. Check programming access and ringing assignments. (Section 600.36)

800 MAINTENANCE AND TROUBLE SHOOTING**800.10 GENERAL INFORMATION****800.11 INTRODUCTION**

This section provides common maintenance, trouble shooting, and repair instructions for the 1A3™ Key Telephone System. It is advisable to use the latest issue manual and supporting documentation whenever possible.

The 1A3™ architecture is designed such that all solid state circuitry is enclosed in the KSU. There are no modular or replaceable type printed circuit cards located inside the KSU. Therefore, the KSU unit is "sealed" and the cover should not be removed. Fault isolation to the replaceable units (KSU, Key Telephones, or external devices) requires no special knowledge of solid-state electronics or microprocessor programming techniques. The 1A3™ requires no involved or complicated mechanical procedures for installation or removal of peripherals. In troubleshooting, all cables, plugs, and attaching hardware should be removed and reinstalled carefully.

800.12 PREVENTATIVE MAINTENANCE

A systematic preventative maintenance program is essential to reduce the possibility of system failures. The routines for general type servicing, which includes cleaning and inspecting, should be done on an annual schedule. More frequent intervals are required where extreme environmental conditions exist, i.e. high temperature, humidity, dust, etc. These routines should include, but are not limited to, the following:

- Hardware and cabling. Check for general mechanical integrity, loose or broken wires, plugs, or connectors. Tighten or repair as necessary.
- KSU. Inspect air vents located in front and on top of the KSU cabinet for unrestricted air passage.
- MDF/cabling. Inspect the MDF for loose wires, obstructions, dust and dirt.

800.13 TEST EQUIPMENT AND TOOLS

The following test equipment and tools are necessary in performing maintenance and repair on the 1A3™.

- Voltmeter.
- DTMF/dial pulse hand held test telephone.
- Standard telephone repairman's hand tools.

800.14 SPARE PARTS

The trouble shooting and repair instructions are based on the assumption that spare Key Telephones and KSU are available to the repairman either on-site or at a central warehouse/storeroom location.

In addition, spare fuses, jacks, wire and terminal blocks should be available.

800.15 FIELD SERVICE ENGINEERING

The installation, trouble shooting, and repair are described in detail within this manual. However, many field type questions, i.e. application requirements and trouble shooting assistance, arise requiring support. Such services are available at NorthCom Field Service.

800.20 TROUBLE SHOOTING PROCEDURES**800.21 FAULT CLASSIFICATION**

Reported problems come from a variety of people under differing conditions, therefore all trouble reports should be thoroughly examined so that the exact problem is understood. Do not always suspect the 1A3™ equipment. Be sure to check external interface equipment, such as the MDF, interconnection points, cabling, central office, or programming. To help isolate a fault from the reported description, the following information should be investigated to further define the fault source.

- A) Were any changes made recently to the customer data base assignments that could cause the problem?
- B) Were any changes made recently to cabling that could cause the problem?
- C) Is the trouble condition associated with one circuit, a particular section or sections of circuits (i.e. CO lines, stations) or common to all circuits?
- D) Is the trouble intermittent or continuous?
- E) Could the trouble be caused by "cross symptoms" such that two failures mask the expected symptom associated with a particular fault.

800.22 SYSTEM FAILURES

Various problems affect the entire system. These are normally related to power failures, central processor failures, or memory failures. Where central processor or memory failures occur the KSU must be replaced. When loss of power occurs, steps can be taken to localize the problem.

800 MAINTENANCE AND TROUBLE SHOOTING (Cont.)

800.23 POWER FAILURES

The loss of commercial power will shut the system down, unless external battery back-up is provided. This loss of power could come from tripped circuit breakers, AC cords unplugged, or a fuse blown. When a power failure occurs, test for voltage working toward the source. The power monitor LED will remain lit when power is present. Since the processor or power failure will cause switch over to the power failure telephone, the LED should be used to determine whether it is a power or processor failure.

800.24 KEY TELEPHONE FAILURES

Problems with Key Telephones are naturally assumed to be the most prevalent, since there are more telephones in service. The following statements should be considered when isolating and categorizing these failures.

Is the reported fault:

- Present on one telephone only?
Check the wiring, programming, telephone and KSU.
- Common to station numbers in pairs? (70-71, 72-73, 74-75, etc.)
Check the wiring polarity and KSU.
- Common to all station numbers?
Check the programming and KSU.
- Associated with a Key Telephone that was recently moved?
Check the wiring, programming, telephone and KSU.
- Associated with programming changes recently made? (Ringing, CO line access, etc.)
Check for proper and accurate programming.
- Occurring intermittently?
Set up a test to duplicate the problem.
- Accompanying a software feature?
Test the feature operation, programming and KSU.

800.25 CO/PBX LINE FAILURES

Problems with CO/PBX lines can be isolated and categorized with the following statements.

Is the reported fault:

- Present on one CO line only?
Check the affected CO line, wiring, plug connections and KSU.
- Common to two or more CO lines?
Check the CO lines, wiring and KSU.
- Associated with a Key Telephone?
Check the programming, telephone and KSU.

- Associated with signaling (DTMF, dial pulse)?
Check the programming, CO line and KSU.
- Associated with CO incoming ringing?
Check the programming and KSU.
- Occurring intermittently?
Set up test to duplicate problem. Once problem can be duplicated, check the affecting programming, telephone, CO line, or KSU.

800.26 FEATURE OPERATION FAILURES

All operational features are controlled by the software routines and specific data base assignments. Most features are provided exclusively by the software; however, others require supporting equipment. For this reason, data base assignments should be checked before corrective maintenance is performed. Also check for proper usage by the customer, as feature failures are often the fault of the user. Features that utilize supporting equipment could have faulty equipment. This equipment should be checked. The following is the list of features that use additional supporting equipment:

- | | |
|-------------------------------|--------------------------------------|
| Battery Back-Up | - Battery package, charger |
| External Ringing @ Station 80 | - Connections, ringing source, bell. |
| Music-On-Hold | - Music tuner, connections |
| Paging | - Amplifier, speakers, connections |
| Power Failure Transfer | - Telephone, wiring |
| Processor Failure Alarm | - Wiring, alarm indicator |

The remaining features are totally software; therefore, the loss of commands from the CPU and communication with the telephone could be the problem. Check wiring distance and use of 2 pr. twisted wire.

800 MAINTENANCE AND TROUBLE SHOOTING (Cont.)

800.30 SUMMARY OF FAULT CONDITIONS

Table 8-1 contains information relating to fault identification and isolation.

**Table 8-1
Summary of Fault Conditions**

FAULT	PROBABLE CAUSE
No power LED Power LED on, system totally inoperative Telephone Fault Lights out No tones Can't dial out Can't answer Poor transmission Wiring Fault Two telephones ring as same extension No CO lines No external bells Intermittent problems	AC Plug, AC Breaker, Commercial Power Change KSU Change Telephone Polarity reversed RJ11C connectors Wiring connections Loop limits exceeded The use of Quad wire



