Part Number
612.6001-o



INTER-TEL®

# GLX

# INSTALLATION AND FIELD MAINTENANCE MANUAL

Issue 1, November 1965

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## FCC REGULATIONS

**IMPORTANT:**

1. Customers connecting this equipment to the telephone network shall, before such connection is made, give notice to the telephone company of the particular line(s) to which such connection is to be made, and shall provide the telephone company with the following information:

   - Complies with Part 68, FCC Rules
   - FCC Registration Number, BE287V-15678-KF-E
   - Ringer Equivalence Number, 0.2A
   - Type of jack to be ordered from the telephone company, RJ14 (C or W) or RJ21X

   The telephone company should also be given notice upon final disconnection of this equipment from the particular line(s).

   It is also the responsibility of the customer to provide the telephone company with registration numbers of any other devices which are configured for connection to the telephone network.

2. It is prohibited to make connections to party lines.

3. Under certain circumstances the telephone company may temporarily discontinue service and make changes in facilities and services which may affect the operation of this equipment; however, the customer shall be given adequate notice in writing to allow the customer an opportunity to maintain uninterrupted service.

4. Users should not make adjustments or repairs or attempt to service this equipment. In the event that a problem originates, contact the local authorized factory service representative.

   In the event of trouble with the telephone line(s), this equipment must be disconnected from the telephone line(s). If trouble ceases, the equipment must be repaired by an authorized factory service representative. If the trouble continues to occur with the equipment disconnected, the telephone company should be notified that they have a problem. If this is the case, repairs or adjustments made by the telephone company will be made at their expense.

NOTICE

THIS SYSTEM INCLUDES HEARING AID-COMPATIBLE HANDSETS THAT ARE IN COMPLIANCE WITH SECTION 68.316 OF THE FCC RULES.

**IMPORTANT:**

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna.
- Relocate the KSU with respect to the receiver.
- Check that the KSU and receiver are not on the same circuit: the KSU must be powered from an isolated, dedicated, AC outlet.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet, prepared by the Federal Communications Commission, helpful:

"How to Identify and Resolve Radio-TV Interference Problems"

This booklet (Stock No. 004-000-00398-5) is available for approximately $5.00 from the U.S. Government Printing Office, Washington, D.C. 20402.

If radio frequency interference (RFI) problems persist, refer to page 5-15 in the TROUBLESHOOTING section of this manual.

## UL REGULATIONS

**********
* At the date of this publication, Inter-Tel's GLX System was *
* in the process of applying for a UL listing. If your GLX KSU *
* has a UL label, this indicates that the system was approved *
* after this publication date. If you receive a GLX System *
* prior to approval, you may call Inter-Tel at a later date to *
* inquire about the final date of approval. Contact the *
* Customer Support Department at (602) 961-9000. *
*
* BEFORE INSTALLATION, CHECK YOUR LOCAL ELECTRICAL CODES FOR *
* INSTALLATION OF TELEPHONE AND ELECTRONIC EQUIPMENT. *
**********

The following safety information is reprinted from the Underwriter's Laboratory specification governing telephone equipment.

# IMPORTANT SAFETY INSTRUCTIONS

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

1. Read and understand all instructions.

2. Follow all warnings and instructions marked on the product.

3. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

4. Do not use this product near water, for example, near a bath tub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool.

5. Do not place this product on an unstable'cart, stand, or table. The product may fall, causing serious damage to the product.

6. Slots and openings in the cabinet and the back or bottom are provided for ventilation, to protect it from overheating; these openings must not be blocked or covered. The openings should never be blocked by placing the product on the bed, sofa, rug, or other similar surface. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation unless proper ventilation is provided.

7. This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power to your home, consult your dealer or local power company.

8. This product is equipped with a three-wire grounding type plug, a plug having a third (grounding) pin. This plug will only fit into a grounding type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the grounding type plug.

9. Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.

10. Do not use an extension cord for the product's AC power cord. The AC outlet for the product should not be used for any other electrical equipment.

11. Never push objects of any kind into the product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on the product.

12. To reduce the risk of electric shock, do not disassemble this appliance, but take it to a qualified serviceman when some service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the appliance is subsequently used.

13. Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

    A. When the power supply cord or plug is damaged or frayed.

    B. If liquid has been spilled into the product.

    c. If the product has been exposed to rain or water.

    D. If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions because improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.

    E. If the product has been dropped or the cabinet has been damaged.

    F. If the product exhibits a distinct change in performance.

S A V E  T H E S E  I N S T R U C T I O N S

## ONE-YEAR LIMITED WARRANTY

For a period of one (1) year from the date of shipment to Buyer, INTER-TEL warrants the Equipment (except for fuses and lamps) to be free from defects in material, workmanship or both, and to comply with specifications for the Equipment, as set forth in the GLX Installation and Field Maintenance Manual. Buyer's sole and exclusive remedy for breach of this Limited Warranty shall be to have the defective Equipment (or parts) repaired or replaced. Shipping costs incurred returning warranty work to INTER-TEL shall be paid for by the Buyer. This Limited Warranty extends only to the Buyer, not to any customer, user, or third party. This Limited Warranty does not apply to Equipment (or parts) damaged by improper handling, normal wear and tear, accidents, lightning damage, negligence, or improper use or maintenance, and does not apply to Equipment altered without authorization by INTER-TEL. This Limited Warranty does not extend to any claims, suits, damages, liabilities, costs, and expenses arising from any act, action, or inaction of Buyer. Although the Moss-Magnuson Act should not apply, in the event that it is held to apply by a court of competent jurisdiction, the implied warranty of fitness for a particular purpose shall extend for the one-year period from the date of the Equipment shipment to buyer.

THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THIS LIMITED WARRANTY. IN NO EVENT SHALL INTER-TEL BE LIABLE FOR LOSS OF ANTICIPATED PROFITS, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSS OF TIME OR OTHER LOSSES INCURRED BY BUYER IN CONNECTION WITH THE PURPOSE, POSSESSION, OPERATION, OR USE OF THE EQUIPMENT, SUCH CLAIMS BEING EXPRESSLY WAIVED BY THE INSTALLING COMPANY.

# OVERVIEW

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## 1. INTRODUCTION

**1.01** The Inter-Tel GLX System is a versatile, electronic key telephone system designed to meet the needs of small businesses. The system is easy to install and maintain, and it offers a variety of features usually found on more expensive systems. Highlights of the system's design include:

- Advanced microprocessor technology.
- Flexible programming to customize system and station features.
- Capacity for up to 6 central office (C.O.) lines, 12 keysets, and 2 private intercom channels.

## 2. HARDWARE SUMMARY

2.01 The SPECIFICATIONS section of this manual describes the hardware, including the Key Service Unit (KSU), keysets, and the additional equipment needed for optional features.

## 3. INSTALLATION AND MAINTENANCE SUMMARY

3.01 The INSTALLATION section contains instructions for assembling the main distribution frame and installing the KSU, keysets, and optional equipment. The PROGRAMMING section describes the procedures for programming the data base. The TROUBLESHOOTING section contains instructions for correcting system problems. Part numbers and a recommended inventory list are located in the REPLACEMENT PARTS section.

3.02 Strict quality control standards for manufacturing and thorough field testing provide the system with the reliability demanded by today's high-technology market.

## 4. FEATURES SUMMARY

**4.01** A list of features appears below. Features marked with an asterisk (*) are programmable. For detailed descriptions and operating instructions, refer to the FEATURES section of this manual.

NOTE: Additional equipment is required for some features. Refer to the SPECIFICATIONS and INSTALLATION sections for more information.

### System Features

- * Flexible incoming ring assignments (alternate point answering)
- * Flexible night ringing arrangement (night ring mode)
- Data base battery back-up
- System battery back-up
- Dual-tone multi-frequency (DTMF) signalling
- Music-on-hold
- Background music
- Call privacy
- * C.O. line restriction
- * Toll restriction
- * System timers
- Internal and external paging
- Conference calls
- Call forwarding (internal and to the public network)
- Do-not-disturb

### Keyset Features

- 6 line keys
- Feature keys (6 on Standard Keyset, 12 on Executive Keyset)
- LED indications
- Direct station selection/busy lamp field (DSS/BLF) keys on the Executive Keyset
- Immediate ringing
- Off-hook ringing
- Volume controls
- Handset amplifier compatible
- Integrated speakerphone
- Headset compatible
- Data device interface on the Executive Keyset

**Intercom Features**

- Handsfree answering of intercom calls
* • Ring intercom first
- Private intercom calls
- DSS/BLF key skipping on the Executive Keyset
- Intercom camp-on and call waiting

**Outside Call Features**

- Direct line key selection
☒ • Outside dial tone restore
☒ • Timed hookflash
- Line key skipping
- On-hook dialing
- Speed dialing
- Last number redial
- System hold
- Individual hold on the Executive Keyset
☒ • Automatic recall timers
- Outside call waiting
- Call transfer from the Executive Keyset

**4.02** Some of the features have maximum capacities that are dependent on the availability of speech channels and/or circuits. The features that have capacities include the following:

| | |
|---|---|
| **Paging** | |
| Internal zone | 1 |
| External zone | 1 |
| **Speed dialing** | |
| Numbers per keyset | 9 |
| Numbers per system | 30 |
| Digits per number | 32 |
| **Conference calls** | **2** |
| Parties per conference | 5 |
| **Call waiting** | |
| Intercom calls waiting per station | 1 |
| Intercom calls initiated per station | 1 |
| Outside calls ringing in per station | 6 |
| **Last number redial** | |
| Number per keyset | 1 |
| Digits per number | 32 |

# SPECIFICATIONS



CONTENTS PAGE



## 1. INTRODUCTION

1.01 This section describes the system hardware:

- Cabling and the Main Distribution Frame (MDF)
- Key Service Unit (KSU)
- Keysets
- Optional Equipment

1.02 The GLX System has a basic capacity for 3 C.O. lines and 8 keysets. Installing the optional Expansion printed circuit board (PCB) increases the system.capacity to 6 C.O. lines and l2 keysets. There are two keyset models: the Executive Keyset and the Standard Keyset.

1.03 Optional equipment which can be installed with the GLX KSU includes a paging amplifier and speakers, a music source for music-on-hold and background music, a battery back-up source, and a surge/spike protector for the AC power source. Optional equipment for both keyset models includes a handset amplifier and a headset. The Executive Keyset also is compatible with a data device equipped with a direct-connection modem.

## 2. CABLING AND THE MAIN DISTRIBUTION FRAME (MDF)

**2.01 Main distribution frame (MDF):** The MDF is the point where the KSU, keysets, and C.O. lines are connected to one another. A 3 X 4-foot (0.9 X 1.2-meter), 3/4-inch plywood backboard is required to provide support for the KSU, connecting block(s), and modular jack assemblies.

**2.02 Station cabling:** 2-pair twisted cable is run in a star (home-run) configuration from the KSU to each keyset location. All station cables are terminated on the 66M1-50-type connecting block 'that is mounted on the MDF backboard. The other end of each station cable is terminated on a 4-conductor modular jack assembly at the keyset location. As an interface between the station block and the KSU, one end of a 25-pair cable is terminated on the block; the other end has a female amphenol-type connector which attaches to the male connector on the KSU. Finally, bridging clips are installed to complete the connections on the block.

**2.03 C.O. line terminations:** As specified in FCC regulations, the C.O. lines should be terminated on telephone company RJ14 (C or W) jacks or on an RJ21X block. It is recommended that gas discharge tubes be installed on the C.O. lines for additional lightning protection. Three methods of terminating C.O. lines are provided in the INSTALLATION section, with complete details about needed supplies and procedures. The three methods are as follows:

- **If the C.O. lines are terminated on RJ14 jacks mounted near the MDF:** Every two C.O. lines are connected directly to the corresponding C.O. jacks on the KSU, using 2-pair mod-to-mod line cords.

- **If the C.O. lines are terminated on RJ14 jacks mounted away from the MDF:** Using a 2-pair line cord, every two C.O. lines are first terminated from the RJ14 jacks onto modular jack assemblies that are mounted next to the RJ14 jacks. Using 2-pair cable, the lines are extended to modular jack assemblies that are mounted on the MDF backboard. A 2-pair mod-to-mod line cord completes the connection from the jack assembly to the corresponding C.O. jack on the KSU. For a diagram of this method, turn to page 3-11.

- **If the C.O. lines are terminated on an RJ21X block:** A 25-pair cable terminates the C.O. lines from the RJ21X block onto a 66M1-50-type connecting block on the MDF backboard. For every two C.O. lines, a 2-pair cable (or cross-connect cable) is connected from the block to a 4-conductor modular jack assembly that is mounted next to the KSU. Then a 2-pair mod-to-mod line cord completes the connection from each jack assembly to the corresponding C.O. jack on the KSU. For a diagram of this method, turn to page 3-13.

## 3. KEY SERVICE UNIT (KSU)

### A. KSU DESCRIPTION

**3.01** The KSU is a compact, wall-mounted unit that houses the system power supply, the Main Control PCB, and the optional Expansion PCB. The KSU performs all control and switching activities for the system, including detecting incoming C.O. calls, storing speed-dial numbers, processing data-controlled features, and controlling the interaction between keysets, C.O. lines, and intercom channels. Refer to the next page for a photograph of the KSU.

**3.02** The system is a microprocessor-controlled, space-division switching system. The 14 audio channels include:

| | |
|---|---|
| C.O. lines | 6 |
| Intercom | 2 |
| Music-on-hold | 2 |
| External page | 1 |
| Conference | 2 |
| Background music | 1 |

**3.03** The KSU dimensions and weight are:

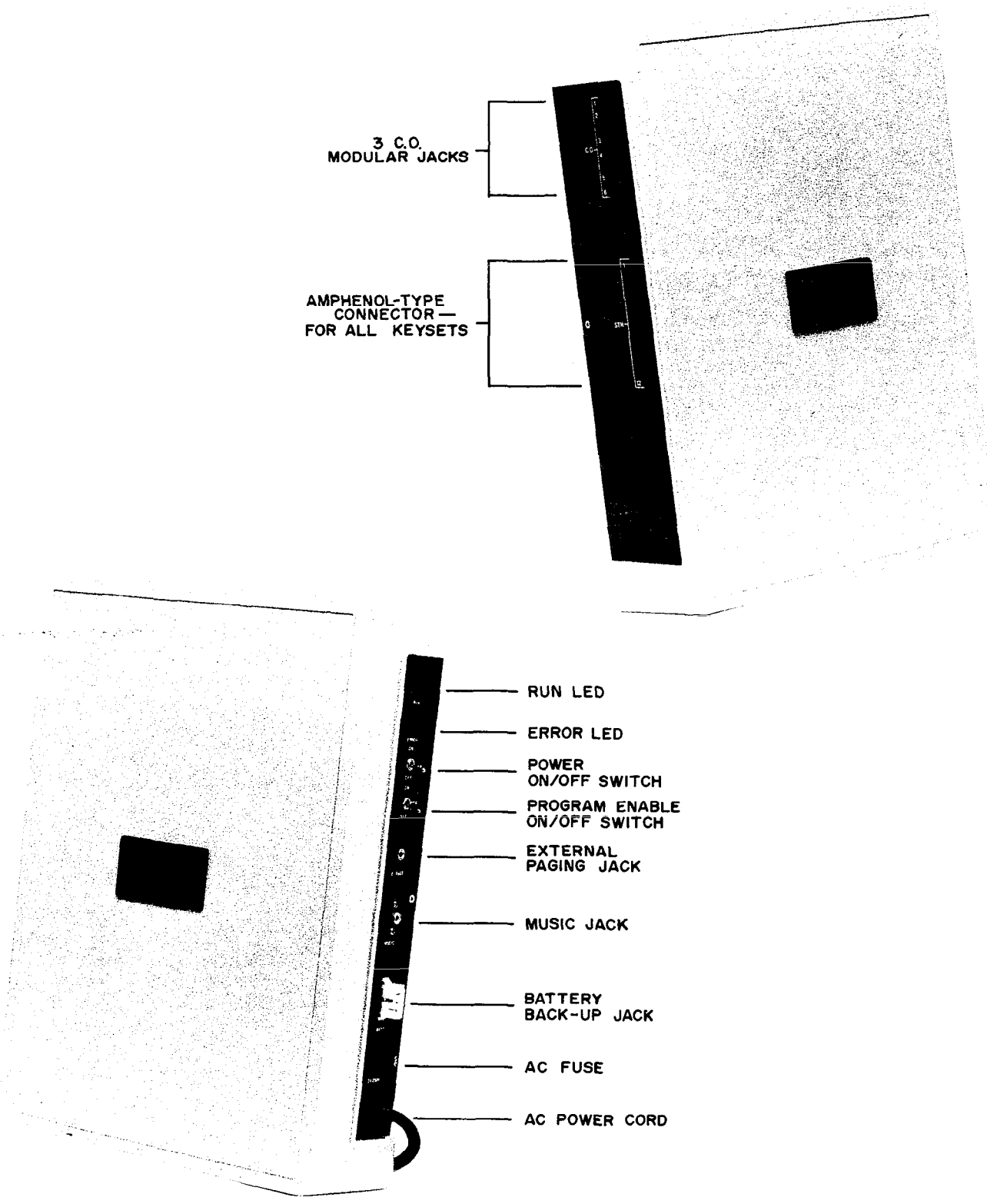
| | |
|---|---|
| Height | 15 in. (38.1 cm.) |
| Width | 11.5 in. (29.2 cm.) |
| Depth | 4.25 in. (10.8 cm.) |
| Weight | 12 lbs. (5.4 kg.) |

**3.04** Inputs and outputs on the KSU side panels are as follows:

- Three C.O. line modular jacks (C.O. 1-2, 3-4, 5-6) serve as inputs for two C.O. lines each.
- The male amphenol-type connector (STN 1-12) serves as the input for all keysets.
- The external paging jack (E-PAGE), a 1/8-inch mini-phone jack, is the output to a customer-provided paging amplifier.
- The music jack (an RCA-type phono jack) is the input for a customer-provided external music source, such as a radio, tape player, etc.
- The battery back-up jack (BATT 30V) is the input for a customer-provided battery charger and/or 30V battery pack.

**NOTE:** Refer to page 2-12 for specifications on the optional equipment mentioned above.

FIGURE 2-1. KEY SERVICE UNIT (KSU)



## B. ENVIRONMENTAL REQUIREMENTS

**3.05** The environmental requirements for the KSU are as follows:

| Requirements | In Operation | In Storage |
|---|---|---|
| Temperature | 32° to 80° F (0° to 26.5° C) | 4° to 185° F (-15.5° to 85° C) |
| Humidity | 20% to 85% | 0% to 85% |
| Altitude | Up to 10,000 ft. (3,048 m.) | Up to 40,000 ft. (12,192 m.) |

## C. CENTRAL OFFICE (C.O.) LINE CHARACTERISTICS

**3.06** The following information may be requested by the telephone company before the system is installed. The system is designed for use in areas served by DTMF central offices and cannot be used in areas served by dial pulse central offices unless a DTMF-to-rotary converter is installed on each of the C.O. lines.

| Characteristics | |
|---|---|
| Transmission loss through system, excluding conference calls | 0dB |
| Ringer equivalence number | 0.2A |
| Ringing voltage required | 40VRMS minimum |

| System Protection from C.O. Line Surges | |
|---|---|
| Tip to Ring | 250VRMS transient |

## D. POWER SUPPLY

**3.07** The KSU power supply converts the AC input voltage to the DC voltages required by the system. The AC power source must be an isolated, dedicated, 105-125VAC, 15A, 57-63Hz, single-phase, commercial power source. Inter-Tel recommends that the system be installed with a surge/spike protector with RFI/EMI noise filtering for the AC power line. (Refer to page 2-12 for information.) A 2A, 250V, slow-blow fuse protects the system from excessive current draw. For continued system protection, replace only with a fuse of the same type and rating.

## E. MAIN CONTROL PRINTED CIRCUIT BOARD (PCB)

**3.08** The Main Control PCB contains the main controlling microprocessor and its associated control logic and memory circuitry, a battery for data base protection, system timers, circuitry for music-on-hold and external paging, and circuitry for three C.O. lines and eight keysets. Refer to Figure 2-2 on the next page for a photograph of the PCB.

**3.09** The Main Control PCB functions under the control of a program that is activated when the KSU is powered up. The PCB is in constant communication with the microprocessor in each keyset.

**3.10** There are 8K bytes of random-access memory (RAM) and a minimum of 16K bytes of read-only memory (ROM) for use by the Main Control PCB. The software code for the main generic program is stored in the non-volatile ROM memory, and the programmed data base and speed-dial numbers are stored in the RAM memory.

**3.11** The RAM memory is protected by a lithium battery. The battery will protect the programmed data base until the accumulated system downtime exceeds one year. Under normal system use, the battery should last approximately 10 years. The PCB is shipped with a piece of paper between the battery and the battery clip to prevent any discharge until the KSU is installed.

**3.12** The system timers provide timeout limits for nine system features. All timers are preset during initialization and seven of the timers are programmable. The timers are described in the PROGRAMMING section.

**3.13** If a customer-provided music source is installed, the music-on-hold circuitry provides two channels of music for two C.O. lines on hold. Refer to page 7-4 for more information. In addition, the music source can be heard through keyset speakers as background music, and camped-on intercom callers hear the music while waiting. The music-on-hold circuitry automatically holds the volume to a predetermined level that is slightly lower than normal voice volume, as required by FCC regulations. The optimum input level is 1.0VRMS.

**3.14** There are three 1A, 250V, fast-acting fuses on the PCB to protect the KSU and keysets from excessive current flow. For continued protection, replace only with fuses of the same type and rating.

## F. EXPANSION PCB

**3.15** Circuitry for an additional 3 C.O. lines and 4 keysets can be added to the Main Control PCB to expand the system's capacity to 6 C.O. lines and 12 keysets. The circuitry is contained on an optional Expansion PCB that plugs into the Main Control PCB. Refer to Figure 2-3 on page 2-6 for a photograph of the PCB.

FIGURE 2-2. MAIN CONTROL PCB

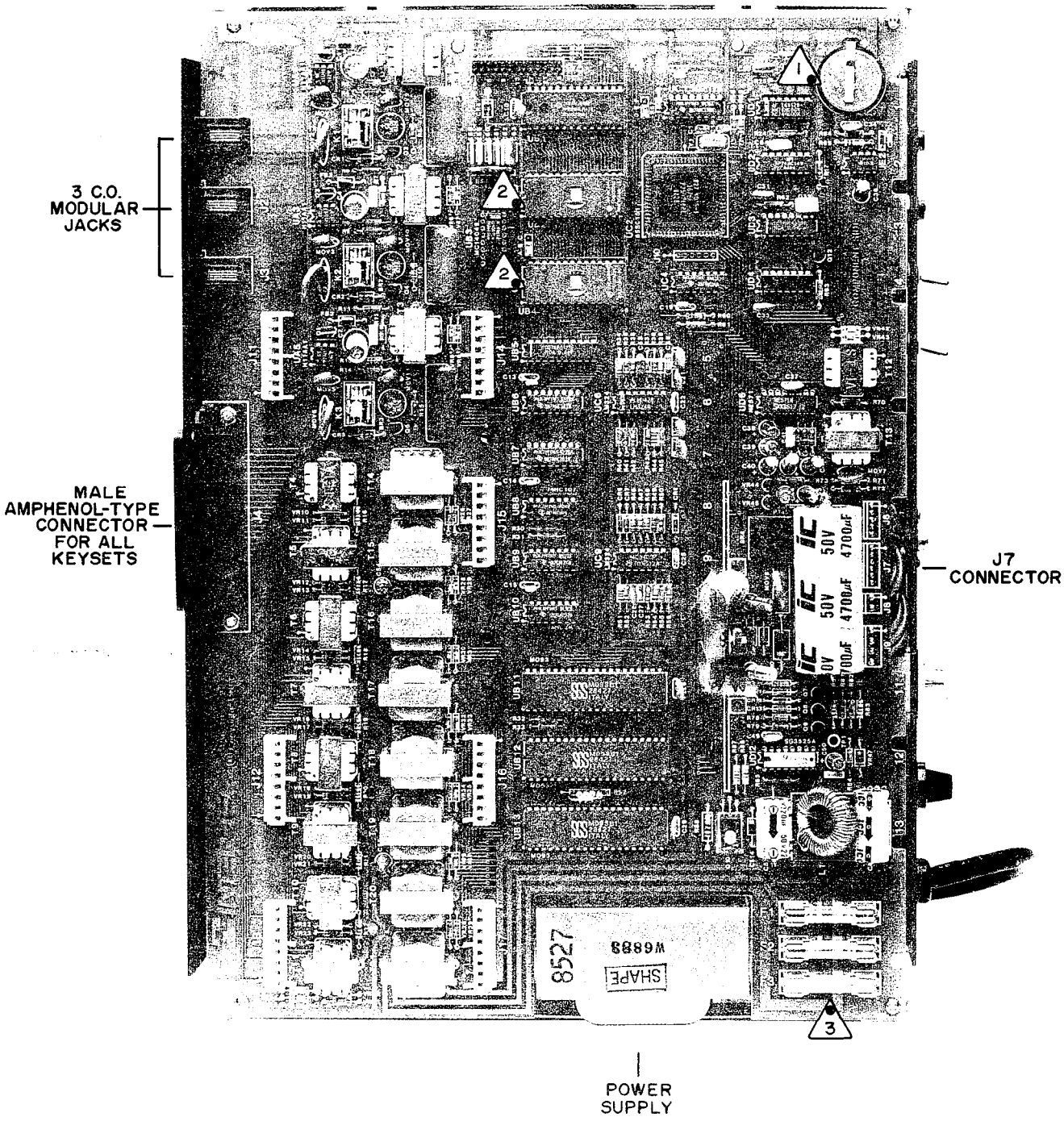
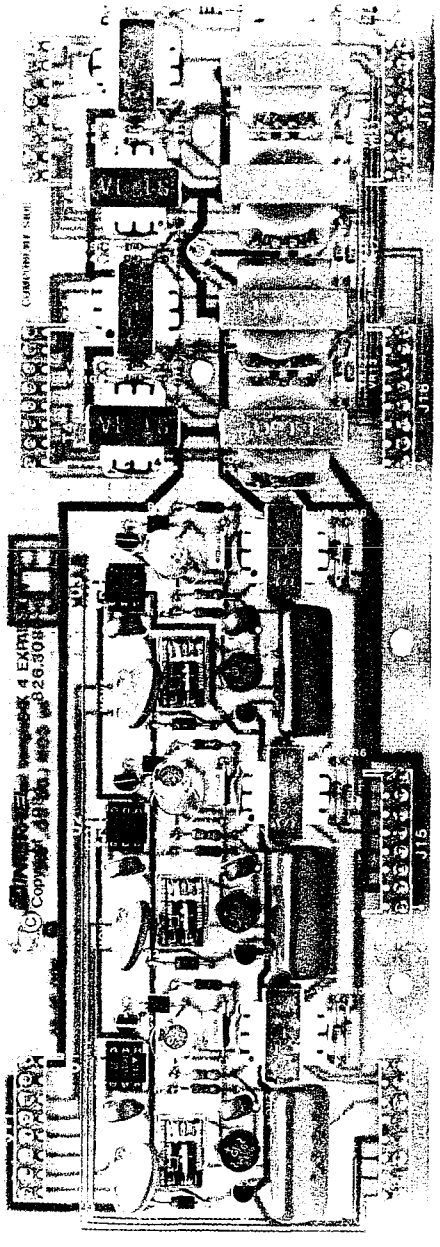


FIGURE 2-3. EXPANSION PCB



## 4. KEYSETS

**4.01** Two models of keysets are available for use on the system: the Executive Keyset and the Standard Keyset. Photographs of the keysets appear on pages 2-10 and 2-11.

**4.02 Features on both keysets:**

- 12-key pushbutton keypad
- 6 C.O. line keys
- Integrated (built-in) speakerphone
- Hearing aid-compatible (HAC) handset
- Voice volume and ring volume controls
- Reversible baseplate for wall mounting the keyset
- 6 feature keys (on the Standard Keyset)

**4.03 Features on the Executive Keyset only:**

- 6 additional feature keys, totalling 12
- 12 direct station selection/busy lamp field (DSS/BLF) keys
- 4-conductor modular jack for a data device equipped with a direct-connection modem

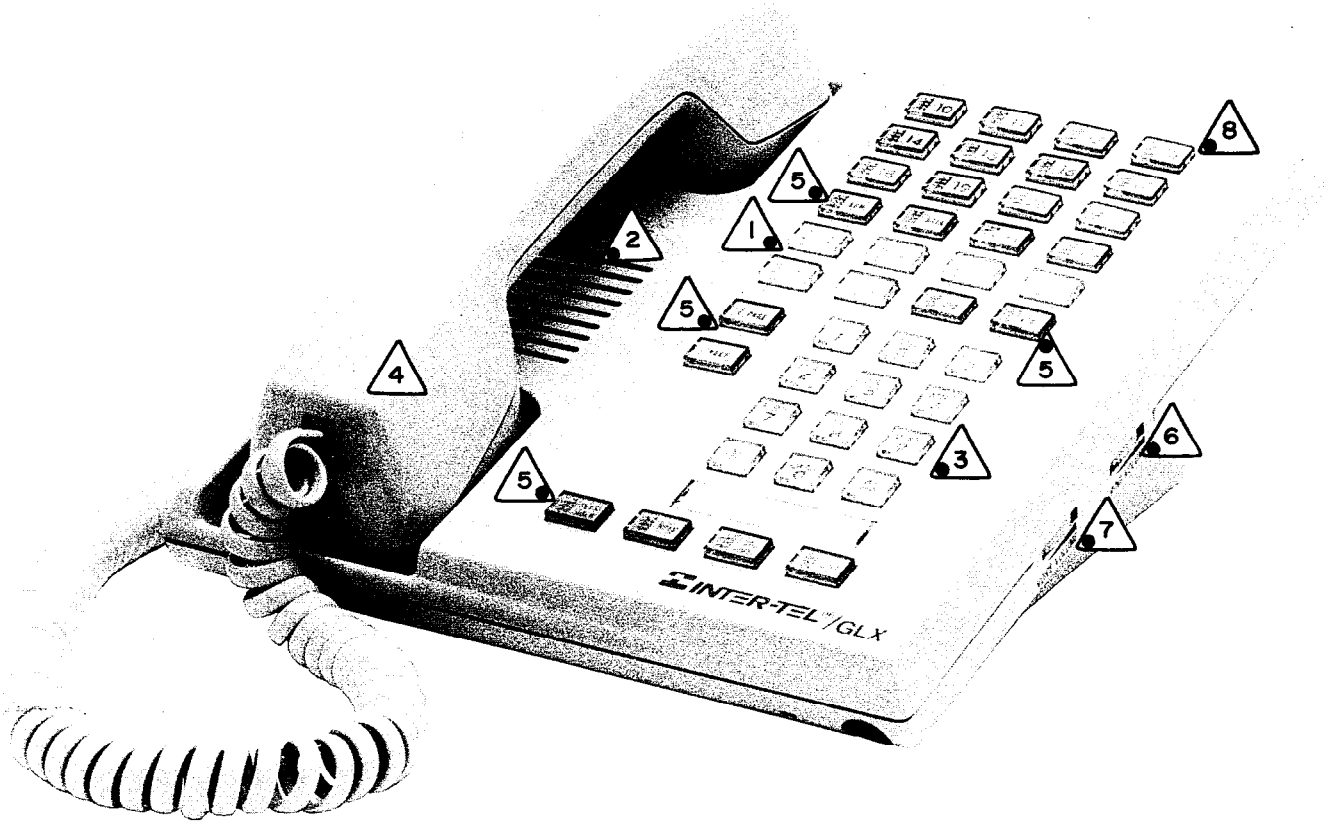
**4.04** The DSS/BLF keys provide one-key access to any keyset. The lamps under the DSS/BLF keys create the busy lamp field, which indicates the status of each keyset (idle, busy, call recalling from hold, forwarding calls, in do-not-disturb, in lock-out) by different flash rates.

**4.05** An integrated (built-in) speakerphone is standard in all keysets. It allows users to receive and place outside calls and to receive intercom calls without lifting the handset. Once a call is connected, the keyset user can switch back and forth between the handset and the speakerphone using the ON/OFF key.

**4.06** The keyset dimensions and weight are:

| | |
|---|---|
| Height | 3.5 in. (8.9 cm.) |
| Width | 7.5 in. (19 cm.) |
| Depth | 9 in. (22.9 cm.) |
| Weight | 2.5 lbs. (1.1 kg.) |

FIGURE 2-4. GLX EXECUTIVE KEYSET




1. 6 C.O. LINES
2. SPEAKER
3. 12-KEY PUSHBUTTON KEYPAD
4. HEARING AID - COMPATIBLE HANDSET
5. 12 FEATURE KEYS
6. RING VOLUME CONTROL
7. VOICE VOLUME CONTROL
8. DIRECT STATION SELECTION/ BUSY LAMP FIELD KEYS

FIGURE 2-5. GLX STANDARD KEYSET


1. 6 C.O. LINES
2. SPEAKER
3. 12-KEY PUSHBUTTON KEYPAD
4. HEARING AID-COMPATIBLE HANDSET
5. 6 FEATURE KEYS
6. RING VOLUME CONTROL
7. VOICE VOLUME CONTROL

## 5. OPTIONAL EQUIPMENT

### 5.01 Optional equipment for keysets:

- **Headset:** A headset can be attached by unplugging the handset from the base, plugging the headset into the handset jack, and entering a feature code at the keyset to enable the device. Calls are processed using the ON/OFF key. The GLX keysets are compatible with industry-standard, 4-conductor, modular headsets that have dynamic microphones or with carbon microphone headsets that have an external AC power source. Refer to page 7-13 for installation and operation procedures.

- **Handset amplifier:** Although GLX keysets are equipped with hearing aid-compatible (HAC) handsets, hard-of-hearing users may wish to have an adjustible amplifier installed. An amplifier also may be requested when the keyset is located in a noisy area where users need to increase the receiver volume. Inter-Tel recommends the Walker Modular Handset Amplifier (part no. W10), an external device that is installed between the keyset and the handset (refer to page 3-20 for installation instructions). The amplifier is equipped with a transformer that requires a 110VAC outlet, and receiver voice volume is controlled by turning the amplifier thumbwheel. This is available from Walker Equipment Corporation, P.O. Box M, Highway 151 South, Ringgold, Georgia 30736, (404) 935-2600. When ordering, specify the color: ivory, black, or pearl.

- **Modem-equipped data device:** The Executive Keyset has a 4-conductor modular jack to connect a data device, such as a data terminal or a personal computer, that is equipped with a direct-connection modem. To be compatible, the modem must have an RJ11 C.O. line interface. It is used to communicate with remote data equipment. Refer to page 7-13 for installation and operation instructions.

**5.02 AC voltage surge/spike protection:** Inter-Tel recommends that a protection device be installed with the KSU to suppress AC spikes and transient voltage surges, whether the hot wire, neutral wire, or both wires are simultaneously carrying a surge to your equipment. Without the device, the system is more susceptible to damage from AC power line surges and spikes, which could cause system malfunctions, false logic, and/or damage to the electronic components. The cost of a surge/spike protector is small compared to the cost of repairs and replacements. The device is a three-prong, 15A unit which plugs into the designated AC outlet for the KSU. It must comply with the ANSI/IEEE Standard C62.41-1980 (IEEE 587) and must be equipped with RFI and EMI noise filtering in the general range of 5KHz to 30MHz at greater than 20 dB of loss.

**5.03 Battery back-up:** To prevent loss of service in the event of a power failure or a brownout condition, there are three possible sources for battery back-up. Inter-Tel recommends the use of the following customer-provided equipment. Refer to page 3-22 for installation instructions.

- A **30V battery pack** can be connected to the KSU, using the input labeled BATT 30V. The input requires a Molex 3-conductor connector (Molex part number 19-09-1032) and three terminals (Molex part no. 02-09-1118) or their equivalents to be attached to 18AWG wires. Under normal conditions, the KSU is powered from the designated AC outlet. During a power outage, the system is powered by the DC voltage supplied by the batteries. The DC input represents a 1.5A load at 30V under normal operation. After the batteries have been used several times, they must be recharged or replaced. Consult your battery representative for assistance in choosing the proper batteries.

- A **30V battery pack and battery charger** can be connected to the KSU input labeled BATT 30V, using the same connector as described above. The KSU AC power cord is left unplugged with this installation. During normal operation, the charger (which is powered from an AC outlet) charges the batteries and operates the system. During a power outage, the batteries alone support the system. The DC input represents a 1.5A load at 30V under normal operation. Consult your back-up power representative for assistance in choosing the proper charger and batteries.

- An **Uninterrupted Power Source (UPS) unit** can be connected between the AC outlet and the KSU's AC power cord. The unit must be rated at 50 watts or more with a switching time of 25 milliseconds or less. A unit with a slower switching time may result in calls being dropped when back-up power is switched on. During a power outage or brownout condition, the UPS unit supports the system.

**5.04 External music source:** The KSU has an input for a radio, tape player, or other music source. For additional specifications and installation information, refer to page 3-20.

**5.05 Paging amplifier and speakers:** The KSU has an output to a paging amplifier. For additional specifications and installation information, refer to page 3-21.

# INSTALLATION

CONTENTS

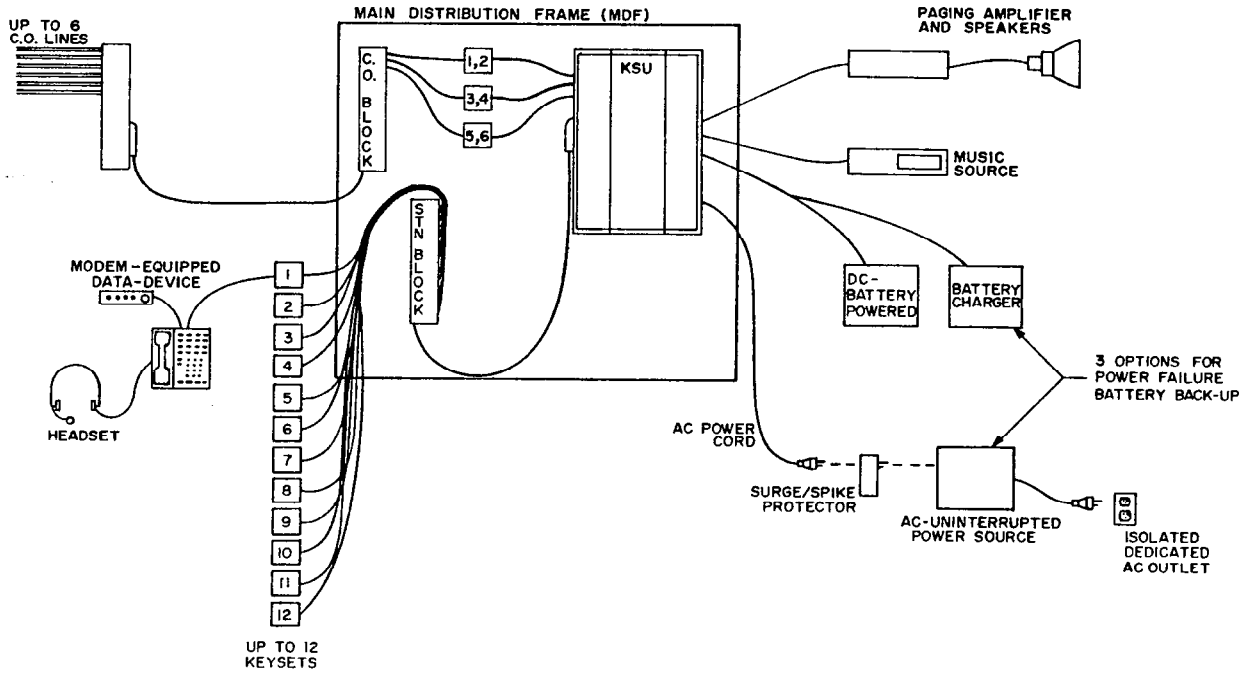
## 1. INTRODUCTION

**1.01** This section describes the recommended procedures for installing the system hardware. For hardware descriptions, refer to the SPECIFICATIONS section of the manual.

## 2. PRE-INSTALLATION PLANNING

**2.01** Before installing the system, plan the location for the equipment, develop a floor plan to show all keyset locations, and collect the necessary tools and supplies, as described on pages 3-3 to 3-5.

**FIGURE 3-1. SYSTEM LAYOUT**



## A. SITE PLANNING CHECKLIST

____ Select the KSU location to minimize station cable run lengths. DO NOT exceed measurements of 40 ohms or 800 feet (243 meters), using 24AWG wire. The ohm value is the loop measurement; the foot (meter) length is the maximum one-way measurement from the KSU.

____ Prepare a floor plan for the keyset locations, using a star (home-run) configuration. Include each keyset's intercom number (10-21). Intercom number 10 is assigned to the system attendant.

____ The main distribution frame (MDF) requires a 3 X 4-foot (0.9 X 1.2-meter), 3/4-inch plywood backboard. The KSU is mounted on this backboard, along with connecting block(s) and modular jack assemblies.

____ Select a wall that is strong enough to support twice the weight of the equipment and plywood to be mounted.

____ Allow room near the KSU for the paging amplifier, battery back-up equipment, and the external music source, if used. To avoid interference, the music source should be placed 5 to 10 feet (1.5 to 3 meters) away from the KSU.

____ Place the KSU within 9 feet (3 meters) of an isolated, dedicated, 105-125VAC, 57-63Hz, 15A, single-phase, commercial power source. DO NOT use an extension cord.

This MUST be an isolated, dedicated, AC circuit for proper operation. The ground wire must be dedicated to this outlet. Run the power, neutral, and ground wires directly from a separate circuit in the breaker box to the KSU outlet. DO NOT plug any other equipment into this outlet.

**NOTE:** Inter-Tel recommends that the system be equipped with a surge/spike protector with RFI and EMI noise filtering for the AC power line. Refer to page 2-12 for specifications.

____ Make sure there are AC outlets for a music source and a paging amplifier, if they are to be installed. These outlets MUST NOT be on the same circuit as the outlet for the KSU.

____ The equipment must be located in a climate-controlled room, not to exceed $80^{O}$ F. Refer to page 2-5 for the required environmental conditions.

____ The equipment location should not be exposed to direct sunlight, high humidity, heat, dust, or strong magnetic fields (such as heavy motors or large copy machines).

____ Ample air space should be provided for the KSU since the power supply is convection cooled. DO NOT block the cooling vents located on the top and bottom of the KSU. Never place anything on top of the KSU.

____ If keysets are wall mounted, the wall should be able to support twice the weight of the keyset. A keyset weighs 2.5 pounds (1.13 kilograms).

## B. TOOLS AND SUPPLIES CHECKLIST

____ A high-impedance, digital multimeter with an accuracy of ±0.5% or better is required to ensure the correct wiring and voltage on the keyset modular jack assemblies.

____ Standard telephone hand tools.

____ Gas discharge tubes to provide additional lightning protection on the C.O. lines.

____ Recommended surge/spike protector with RFI and EMI noise filtering for the AC power line. Refer to page 2-12 for specifications.

**NOTE:** Supplies needed for optional equipment are listed in the SPECIFICATIONS section or are included with the installation instructions.

**For Keyset Installations:**

____ 2-pair (4-conductor) twisted cable to run from the MDF to each keyset location.

____ 4-conductor modular jack assemblies for terminating the station cables at keyset locations.

____ One 66M1-50-type connecting block and a supply of bridging clips.

____ 25-pair cable, a 50-pin female amphenol-type connector, and a connecting machine.

**For C.O. Lines -- if terminated on RJ14 jacks away from the MDF:**

For a better understanding of the supplies needed, refer to Figure 3-4 on page 3-11.

____ Two 4-conductor modular jack assemblies for every two C.O. lines installed.

____ Two 2-pair mod-to-mod line cords for every two C.O. lines.

____ 2-pair cable to extend from the RJ14 jack location to the MDF.

**For C.O. Lines -- if terminated on RJ14 jacks near the MDF:**

____ For every two C.O. lines installed, one 2-pair mod-to-mod line cord to connect from the RJ14 jack to the corresponding KSU C.O. jack.

**For C.O. Lines -- if terminated on an RJ21X block:**

For a better understanding of the supplies needed, refer to Figure 3-6 on page 3-13.

____ One 66M1-50-type connecting block and a supply of bridging clips.

____ 25-pair cable to extend from the RJ21X block to the MDF.

____ A 50-pin male amphenol-type connector and a connecting machine.

____ One 4-conductor modular jack assembly for every two C.O. lines installed.

____ 2-pair cable or cross-connect cable.

____ One 2-pair mod-to-mod line cord for every two C.O. lines.

## 3. MOUNT THE MAIN DISTRIBUTION FRAME (MDF)

**3.01** Using the proper hardware, mount the 3 X 4-foot (0.9 X 1.2-meter), 3/4-inch plywood backboard on the wall. Plan the MDF layout; instructions for mounting connecting blocks, modular jack assemblies, and the KSU are included with the respective procedures throughout this section of the manual. Also included are detailed diagrams of the MDF layout. Refer to the system layout on page 3-2.

## 4. STATION CABLING

### A. RUN THE STATION CABLES

**4.01** Using the floor plan developed in pre-installation planning, run 2-pair twisted cable from the MDF to each keyset location. Label both ends of every cable with the keyset intercom number (10-21). Follow these guidelines when running cable:

- Avoid cable runs parallel to fluorescent light fixtures or AC lines not in conduit. If these obstacles are unavoidable, run the cable across them at right angles.
- DO NOT run station cables inside electrical conduit already occupied by AC power cable. To do so is a violation of the National Electrical Code.
- DO NOT run station cables near equipment with electric motors or past strong magnetic fields (copy machines, heavy motors, arc welding equipment, etc.).
- DO NOT place station cables where they can be rolled over by office furniture or stepped on.
- DO NOT allow the station cable length to exceed 40 ohms or 800 feet (243 meters), using 24AWG wire. The ohm value is the loop measurement; the foot (meter) length is the maximum one-way measurement from the KSU. Refer to page 3-9 for loop resistance information.

### B. TERMINATE STATION CABLES AT THE MDF

**4.02** Terminate each station cable at the MDF as described below. Refer to Figure 3-2 on the next two pages.

(1) Mount the 66M1-50-type connecting block on the MDF backboard.

(2) Ensure that each station cable is correctly labeled with the keyset intercom number.

(3) Terminate each station cable on the <u>right</u> side of the station block.

(4) Using enough 25-pair cable to run from the station block to the left side of the KSU, make the termination cable: (a) Attach a 50-pin female amphenol-type connector to one end of the cable. (b) Terminate the other end of the 25-pair cable on the <u>left</u> side of the station block. The connector will be attached to the KSU later.

(5) DO NOT attach bridging clips on the station block until you perform the loop resistance test (see page 3-9).

**FIGURE 3-2. TERMINATE STATION CABLES AT THE MDF**

See detailed chart of the individual wire terminations on the next page.

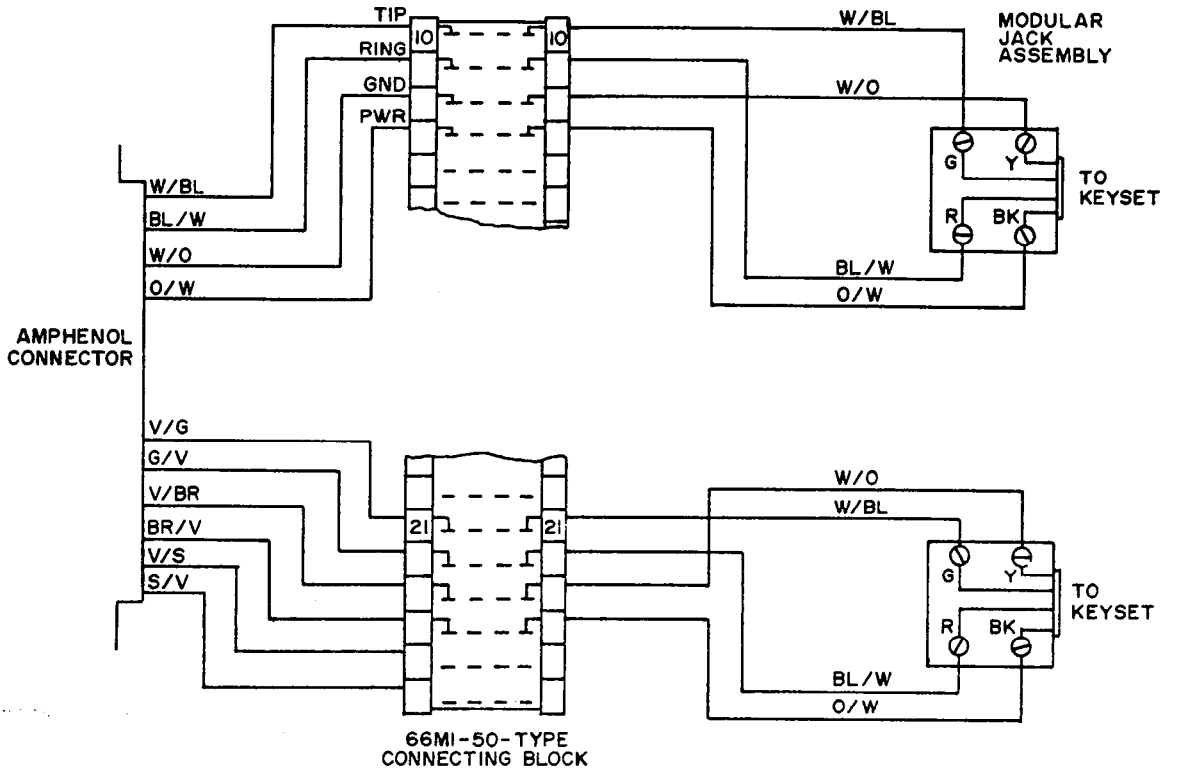
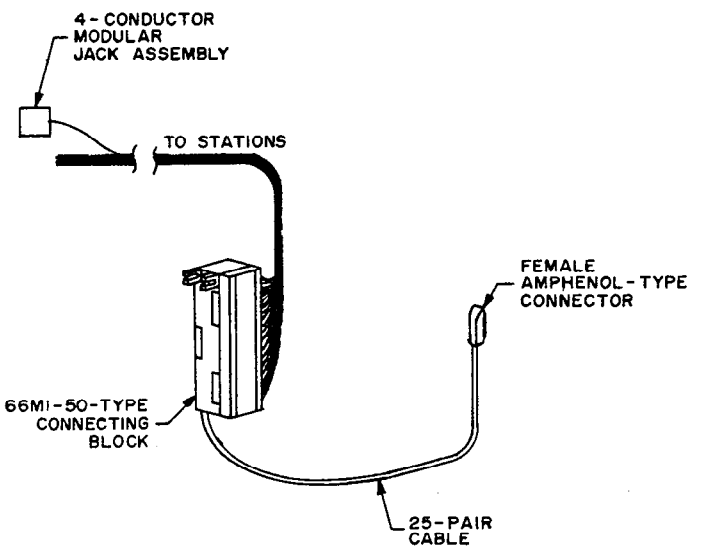



Diagram of the station block above.



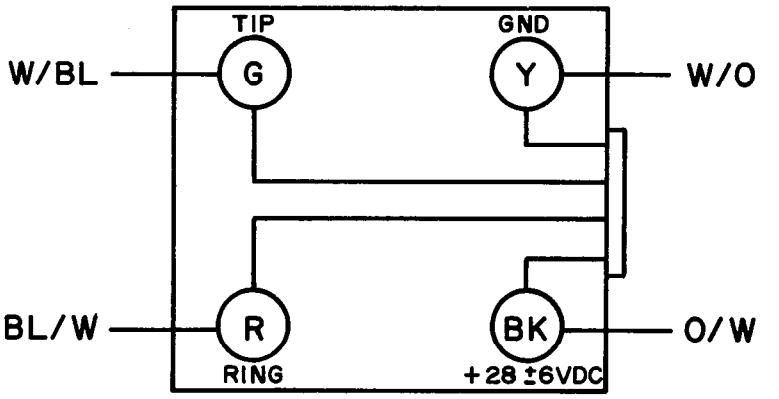
## FIGURE 3-2. TERMINATE STATION CABLES AT THE MDF (CON'T.)

| TERMINAL NUMBER | CABLE PAIR | FUNCTION | KEYSET NUMBER | INTERCOM NUMBER |
|---|---|---|---|---|
| 26 | W-BL | TIP | 1 | 10 |
| 1 | BL-W | RING | | |
| 27 | W-O | GND | | |
| 2 | O-W | +28VDC | | |
| 28 | W-G | TIP | 2 | 11 |
| 3 | G-W | RING | | |
| 29 | W-BR | GND | | |
| 4 | BR-W | +28VDC | | |
| 30 | W-S | TIP | 3 | 12 |
| 5 | S-W | RING | | |
| 31 | R-BL | GND | | |
| 6 | BL-R | +28VDC | | |
| 32 | R-O | TIP | 4 | 13 |
| 7 | O-R | RING | | |
| 33 | R-G | GND | | |
| 8 | G-R | +28VDC | | |
| 34 | R-BR | TIP | 5 | 14 |
| 9 | BR-R | RING | | |
| 35 | R-S | GND | | |
| 10 | S-R | +28VDC | | |
| 36 | BK-BL | TIP | 6 | 15 |
| 11 | BL-BK | RING | | |
| 37 | BK-O | GND | | |
| 12 | O-BK | +28VDC | | |
| 38 | BK-G | TIP | 7 | 16 |
| 13 | G-BK | RING | | |
| 39 | BK-BR | GND | | |
| 14 | BR-BK | +28VDC | | |
| 40 | BK-S | TIP | 8 | 17 |
| 15 | S-BK | RING | | |
| 41 | Y-BL | GND | | |
| 16 | BL-Y | +28VDC | | |
| 42 | Y-O | TIP | 9 | 18 |
| 17 | O-Y | RING | | |
| 43 | Y-G | GND | | |
| 18 | G-Y | +28VDC | | |
| 44 | Y-BR | TIP | 10 | 19 |
| 19 | BR-Y | RING | | |
| 45 | Y-S | GND | | |
| 20 | S-Y | +28VDC | | |
| 46 | V-BL | TIP | 11 | 20 |
| 21 | BL-V | RING | | |
| 47 | V-O | GND | | |
| 22 | O-V | +28VDC | | |
| 48 | V-G | TIP | 12 | 21 |
| 23 | G-V | RING | | |
| 49 | V-BR | GND | | |
| 24 | BR-V | +28VDC | | |
| 50 | V-S | NOT USED | | |
| 25 | S-V | NOT USED | | |

## C. TERMINATE STATION CABLES AT KEYSET LOCATIONS

**4.03** Terminate the keyset end of each station cable on a 4-conductor modular jack assembly as shown in Figure 3-3 below. DO NOT mount them on the wall at this time.

**FIGURE 3-3. KEYSET MODULAR JACK ASSEMBLY WIRING**




## D. PERFORM THE STATION LOOP RESISTANCE TEST

**NOTE:** If performing the loop resistance test after the system is installed, unplug the keyset from the jack assembly. Then either unplug the 25-pair station cable from the KSU or remove the bridging clips for the desired keyset(s) from the station block.

(1) Place a short across the RED and GREEN wires on the keyset's modular jack assembly.

(2) On the station block, measure the resistance across the WHITE/BLUE and BLUE/WHITE wires. For proper keyset operation, the resistance must not exceed 40 ohms, which is equivalent to a 24AWG cable run of 800 feet (243 meters).

**NOTE:** Excessive and/or high resistance connections increase the resistance of a cable, which reduces the allowable cable run length.

(3) Remove the short after the test is completed. DO NOT mount the jack assembly on the wall at this time. It will be mounted when the keyset is installed.

(4) Repeat this procedure for each station cable.

(5) Install bridging clips on the station block to complete the cable connections.

## 5. CONNECT THE C.O. LINES

**5.01** The installation procedure used to terminate C.O. lines at the MDF is dependent on the type of jack used by the telephone company and how close their jacks are to the MDF. The C.O. lines may be terminated on RJ14 (C or W) jacks or on an RJ21X block. Follow one of the three methods (A, B, or C) below.

**IMPORTANT NOTES:**

- The first C.O. jack on the KSU connects lines 1 and 2, the second connects lines 3 and 4, and the third connects lines 5 and 6. Lines must be connected in that sequence. For example, if three lines are installed, lines 1 and 2 would terminate on the first C.O. jack, and line 3 would terminate on the second C.O. jack.

- For additional lightning protection, install gas discharge tubes to ground on each C.O. line. To ensure that this is done external to the system, install the tubes between the telephone company jacks and the modular jack assemblies that will be mounted next to the KSU. This protection should give energy absorption and filter low-level surge potentials on the C.O. lines. If method B (direct KSU connection) is used, gas discharge tubes cannot be installed; use method A instead.

### A. C.O. LINES TERMINATED ON RJ14 JACKS AWAY FROM THE MDF

(1) Refer to Figure 3-4 on the next page for the layout. Mount one 4-conductor modular jack assembly next to each RJ14 jack.

(2) For each jack assembly mounted in step 1, also mount a corresponding jack assembly on the MDF backboard next to the KSU location.

(3) To interface between the jack assemblies mounted in steps 1 and 2:

a. Run one 2-pair cable from each jack assembly by the RJ14 jacks to each jack assembly on the MDF backboard.

b. Wire each end of the 2-pair cables onto the respective jack assemblies. Refer to Figure 3-5 on the next page for wiring instructions.

(4) On each RJ14 jack, plug in a 2-pair mod-to-mod line cord; plug the other end into the corresponding jack assembly beside it.

(5) On each jack assembly on the MDF backboard, plug in one end of a 2-pair mod-to-mod line cord. The other end will be plugged into the KSU later.

FIGURE 3-4. C.O. LINE TERMINATIONS FROM RJ14 JACKS

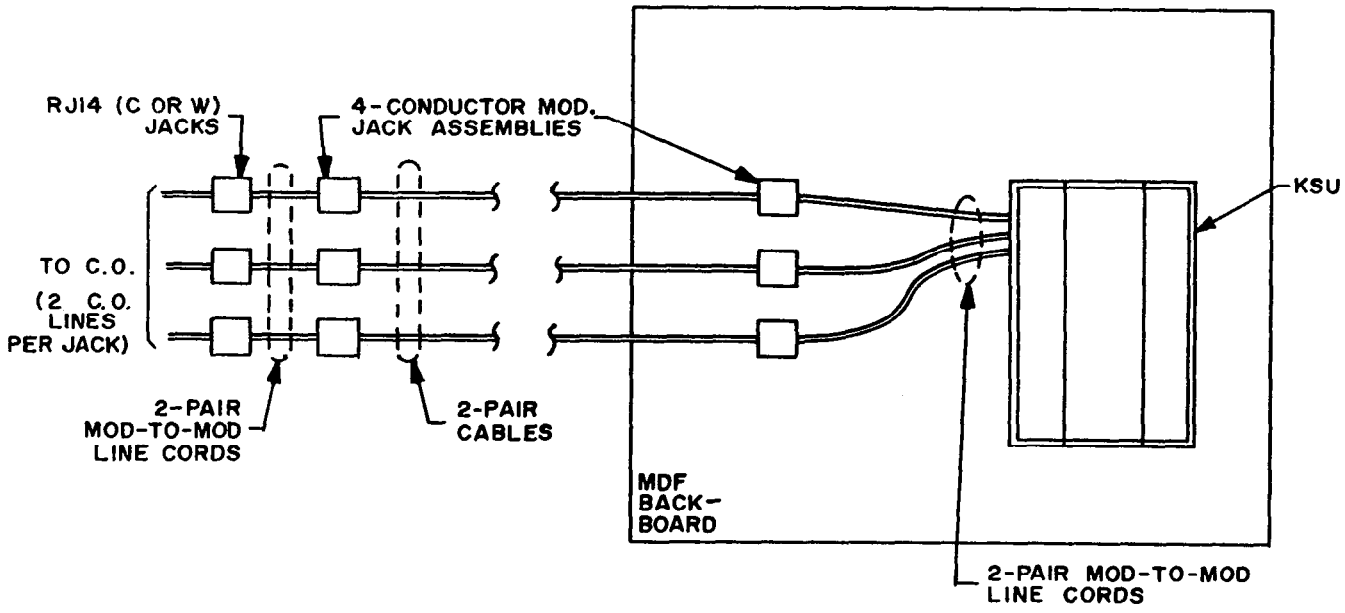
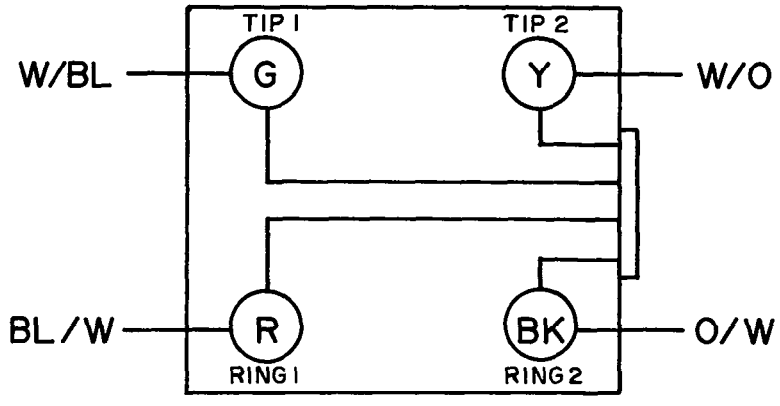



FIGURE 3-5. MODULAR JACK ASSEMBLY WIRING FOR C.O. LINES



## B. C.O. LINES TERMINATED ON RJ14 JACKS NEAR THE MDF

**5.02** Before using this procedure, read the IMPORTANT NOTES on page 3-10. Plug one end of a 2-pair line cord into each RJ14 jack. The other end of each line cord will be plugged into the corresponding C.O. jack on the KSU after it is installed.

## C. C.O. LINES TERMINATED ON AN RJ21X BLOCK

**5.03** Before using this procedure, read the IMPORTANT NOTES on page 3-10. Refer to Figure 3-6 on the next page for the layout.

(1) Mount a 66M1-50-type connecting block on the MDF backboard.

(2) For every two C.O. lines, mount a 4-conductor modular jack assembly on the MDF backboard. They should be positioned between the C.O. line block (mounted in step 1) and the KSU location.

(3) For each jack assembly (mounted in step 2), connect a 2-pair cable (or cross-connect cable) from it to the C.O. line block as follows:

a. Terminate one end of a 2-pair cable on each jack assembly. Refer to Figure 3-5 on the previous page.

b. Terminate the other end of the 2-pair cable on the right side of the C.O. line block, with C.O. line 1 tip and ring first, then C.O. line 2 tip and ring, etc.

(4) On each jack assembly on the MDF backboard, plug in one end of a 2-pair mod-to-mod line cord. The other end will be plugged into the KSU later.

(5) To interface between the C.O. line block and the RJ21X block:

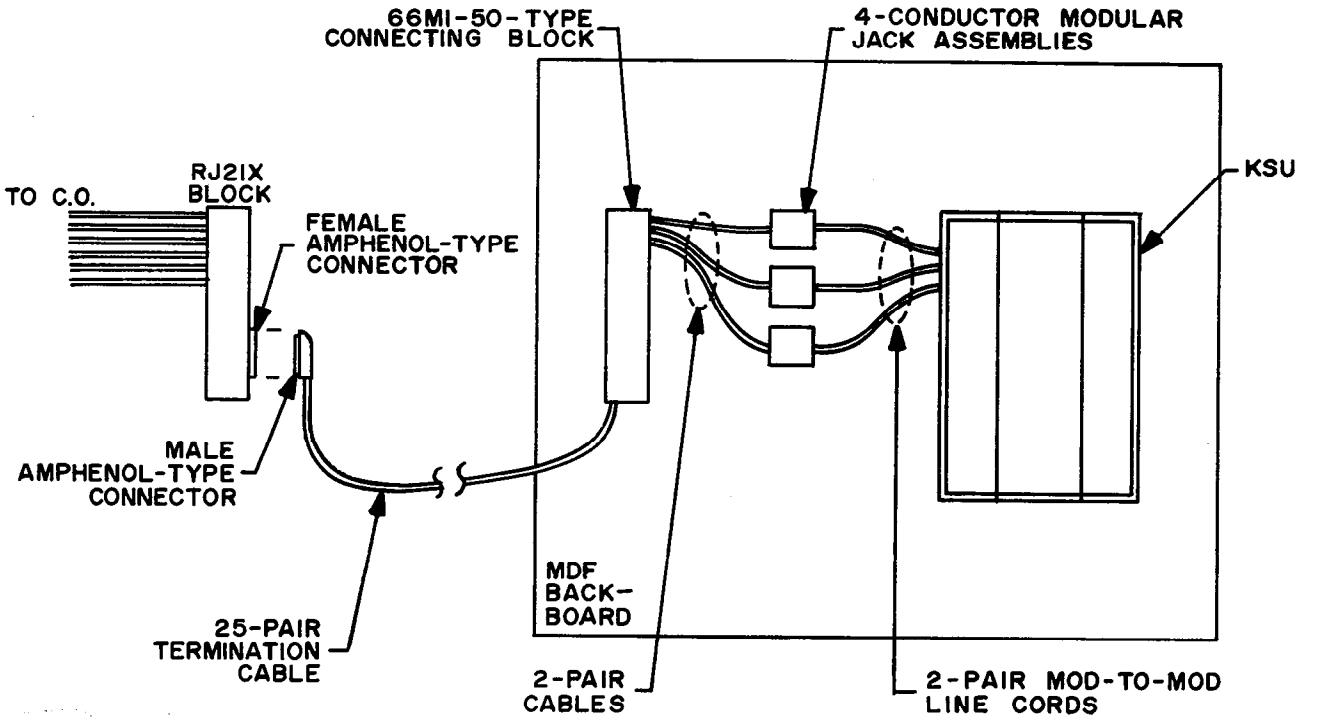
a. Run a 25-pair cable from the MDF to the RJ21X block location.

b. Terminate the MDF end of the 25-pair cable on the left side of the C.O. line block. Install bridging clips to complete the connections there.

c. On the RJ21X end of the 25-pair cable, attach a 50-pin male amphenol-type connector.

d. Plug the male connector into the female connector on the RJ21X block.

FIGURE 3-6. C.O. LINE TERMINATIONS FROM AN RJ21X BLOCK




## 6. UNPACK AND INSPECT THE KSU

(1) Unpack the KSU and lay it on a flat surface with the cover facing up. Open it by removing the four retaining screws and lifting off the cover.

```
**********************************************************
*                        CAUTION                         *
* The PCBs contain static-sensitive components.  Lift    *
* them only by the edges and carefully handle the com-   *
* ponents while inspecting them in the next step.        *
**********************************************************
```

(2) Inspect the fuses for the correct voltage and current rating. The AC fuse (2A, 250V, slow-blow) is accessible from the outer right side of the KSU. The three station fuses (1A, 250V, fast-acting) are mounted on the lower right corner of the Main Control PCB. Ensure that the ROM integrated circuits are properly seated in their sockets. Refer to Figure 3-7 on the next page for locations.

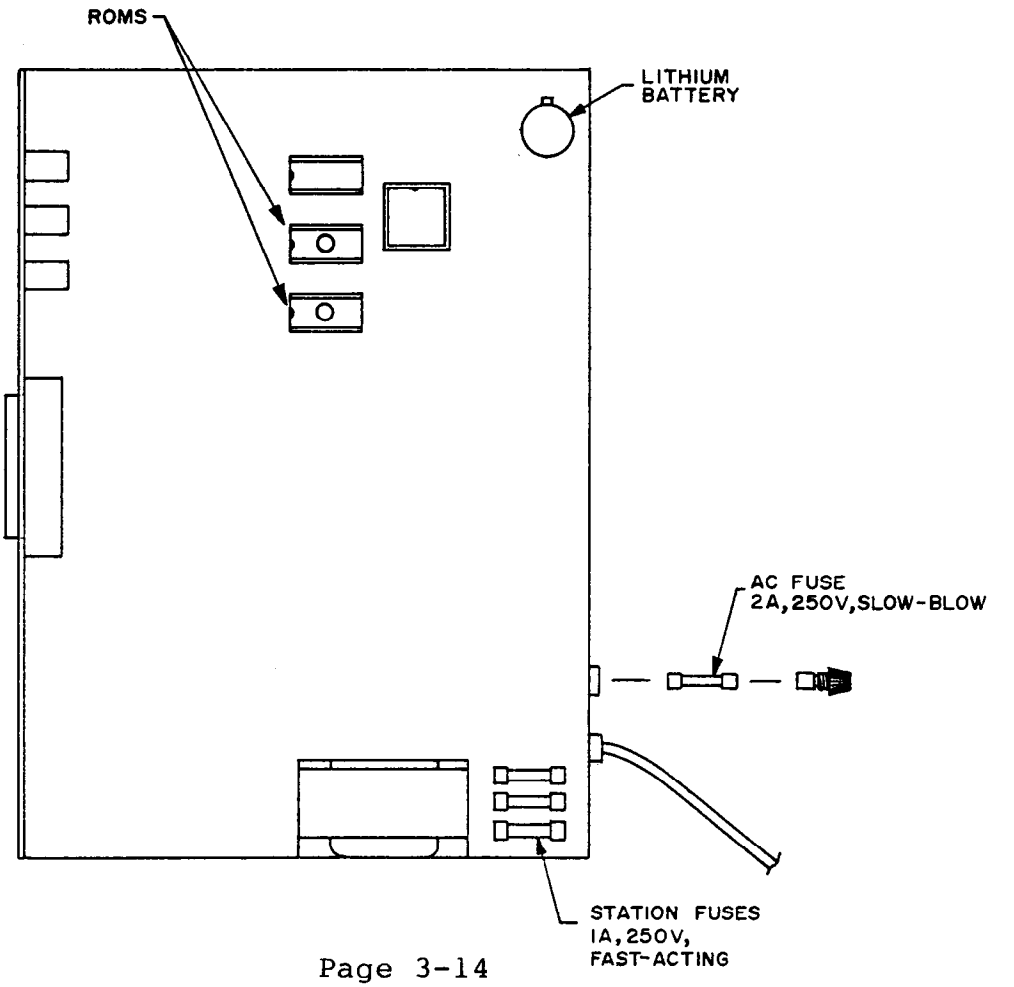
(3) If the KSU or any of its components are damaged, contact Inter-Tel's Order Processing Department immediately.

(4) You MUST activate the lithium battery by removing the red piece of paper located between it and the battery clip. Otherwise, the data base memory will not be protected during a power outage.

(5) If you are installing the Expansion PCB, proceed to the next page. Otherwise, replace the KSU cover and secure it with the four screws; then proceed to page 3-15, MOUNT THE KSU.

**********
* **CAUTION** *
* If the KSU is taken out of service, be sure to insert a piece *
* of paper between the battery and the clip to break the *
* contact. Otherwise, the battery will continue to discharge *
* and will eventually have to be replaced. *
**********

**FIGURE 3-7. KSU COMPONENT LOCATIONS**



## 7. INSTALL THE EXPANSION PCB INTO THE KSU

**7.01** The Main Control PCB has circuitry for 3 C.O. lines and 8 keysets. The Expansion PCB adds circuitry for 3 C.O. lines and 4 keysets, completing the 6 X 12 configuration.

**NOTE:** If you are adding the Expansion PCB after the system has been installed, turn off the KSU AC power switch (PWR), unplug the KSU AC power cord, and unplug the 25-pair station cable and C.O. line cords from the KSU. Remove the KSU from the wall and open it according to the instructions on the previous page.

(1) Remove the four screws holding the Main Control PCB to the KSU housing. Handle PCBs by the edges only. They contain static-sensitive components.

(2) Carefully lift the PCB, turn it over, and hold it by the edges. Take care not to dislodge any of the wires that connect the components to the switches or connectors.

(3) With the solder sides of the two PCBs facing each other, carefully insert the Expansion PCB's seven 8-pin connectors and the five stand-offs into the corresponding sockets and holes on the Main Control PCB as shown in Figure 3-8 on the next page.

(4) To ensure that the Expansion PCB is properly seated, press firmly on the back of each connector and stand-off.

(5) Carefully turn the Main Control PCB over and return it to its original position in the KSU housing. Replace the four screws.

(6) Replace the KSU cover and the four retaining screws.

## 8. MOUNT THE KSU

(1) Refer to Figure 3-9 on the next page. On a large sheet of paper, trace the outline of the back of the KSU and the two mounting screw holes.

(2) Transfer the mounting hole markings to the MDF backboard where the KSU will be positioned.

(3) Drive a #8 pan-head screw into the center of each marking, allowing the head of the screw to protrude 1/4 to 1/2 inch (0.6 to 1.2 centimeters).

(4) Hang the KSU on the screws. Adjust the screws if necessary to ensure that the KSU is securely mounted.

(5) DO NOT plug in the AC power cord at this time.

FIGURE 3-8. INSTALL THE EXPANSION PCB

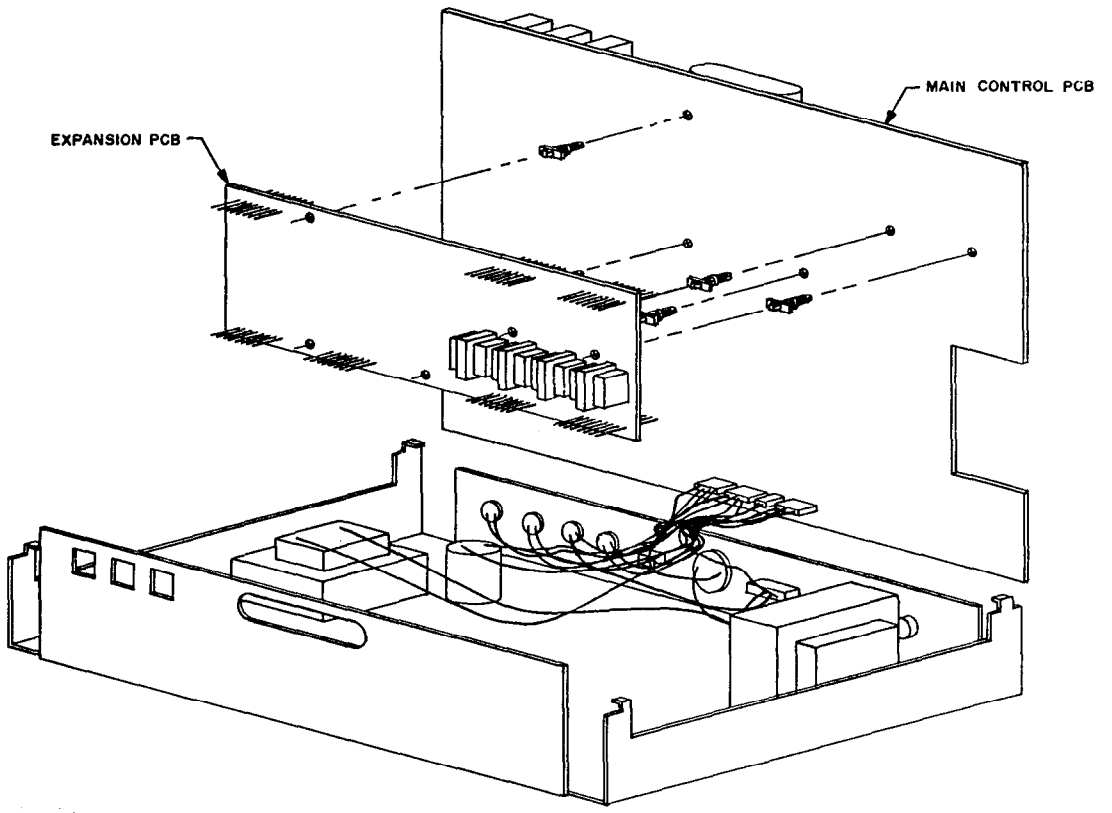
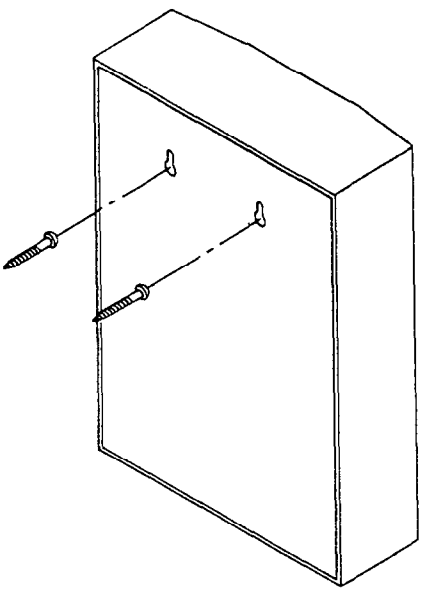



FIGURE 3-9. WALL MOUNT THE KSU



## 9. COMPLETE ALL CONNECTIONS FOR THE KSU

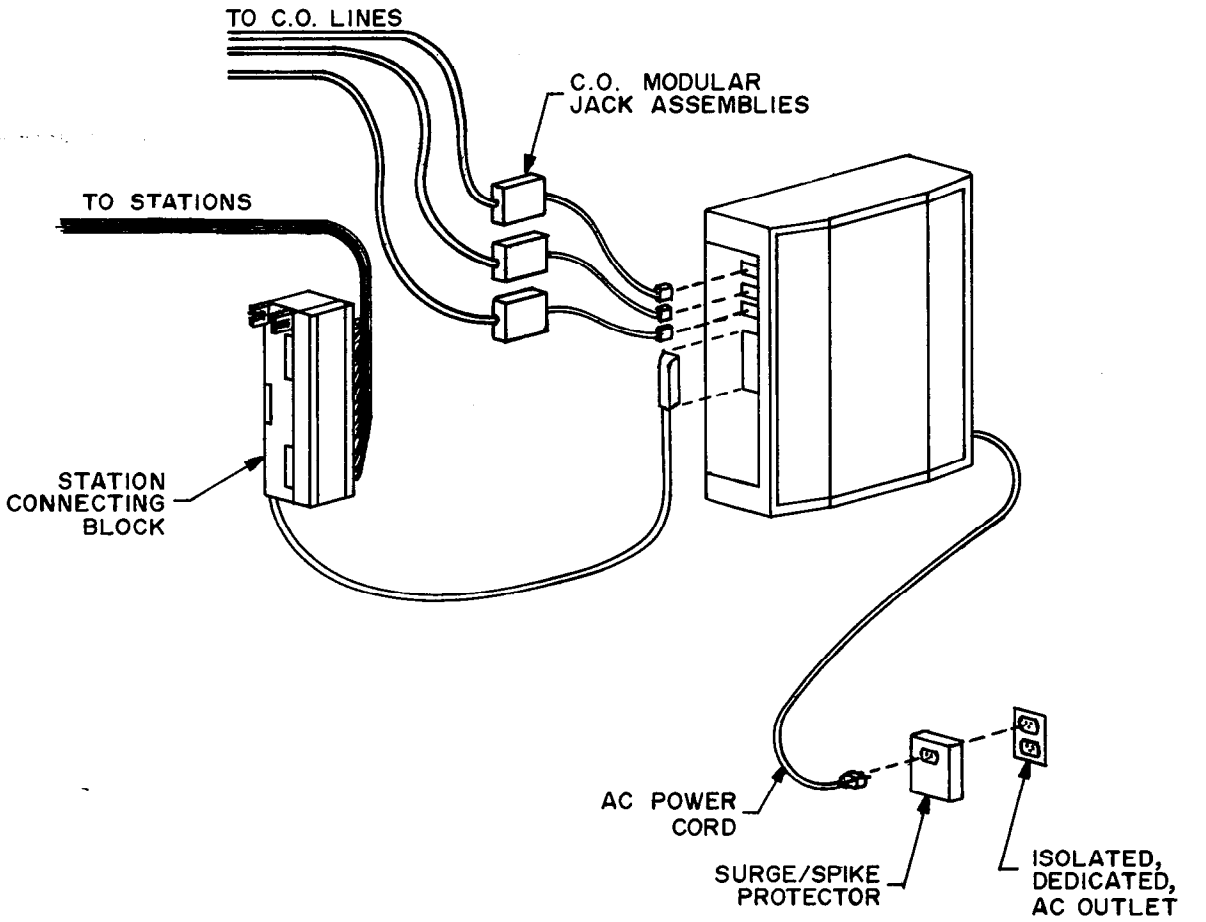
(1) Attach the female connector that is on the 25-pair cable on the station block to the male connector on the left side of the KSU. This completes the keyset connections.

(2) To complete C.O. line connections from the modular jack assemblies mounted next to the KSU, plug the loose end of each line cord into the corresponding C.O. jack on the KSU. Remember, the first jack connects lines 1 and 2, the second jack connects lines 3 and 4, and the third jack connects lines 5 and 6.

(3) Plug the recommended surge/spike protector into the designated AC outlet. Then plug the KSU AC power cord into the protector. (Specifications for the protector are on page 2-12.)

(4) Turn the AC power switch (PWR) to the ON position.

FIGURE 3-10. COMPLETE THE KSU CONNECTIONS



## 10. INSTALL THE KEYSETS

**10.01** Ensure that the station loop resistance test has been performed before installing the keysets.

(1) Unpack and inspect each keyset for damage. Along with the keyset, the box should contain a 6-foot line cord, a coiled handset cord, a handset, and a plastic bag of key designation tabs. If items are missing or damaged, contact Inter-Tel's Order Processing Department.

(2) With KSU AC power on, check the voltage on each modular jack assembly as follows:

a. Measure the voltage on the BLACK (+28) terminal with respect to the YELLOW (GND) terminal. (Place the common probe of the voltmeter on the YELLOW terminal.) It must measure +28 ±6VDC. If -28VDC is measured, check the cabling for a reversed pair.

b. Check that there is no voltage across the other pair (on the GREEN and RED terminals). If there is voltage, trace the wires back to the KSU and correct the problem.

**********
* **CAUTION** *
* Incorrect voltage polarity will result in a blown *
* fuse if the keyset is connected, which affects the *
* operation of other keysets connected to the KSU. *
**********

(3) After testing all modular jack assemblies, turn the KSU AC power switch (PWR) to the OFF position to avoid shorting components while mounting the jack assemblies in the next step.

(4) For each keyset:

a. Mount the jack assembly on the wall.

b. Plug one end of the keyset line cord into the jack assembly. Plug the other end into the keyset jack labeled KSU.

c. Plug one end of the coiled handset cord into the jack on the left side of the keyset. Plug the other end into the handset.

(5) After all keysets are installed, turn the KSU AC power switch (PWR) to the ON position.

(6) After the system has been programmed, check that the keysets function properly.

**10.02 Optional keyset equipment:** Three optional items can be connected to keysets. For information about a headset, refer to page 2-12. A data device equipped with a direct-connection modem can be connected to an Executive Keyset; refer to page 7-13. Refer to page 3-20 for information about a handset amplifier.

**10.03 To wall mount the keysets:**

(1) Remove the keyset baseplate by pressing down on the bottom edge of the baseplate and pulling it off. Set the keyset aside.

(2) Reverse the baseplate so that the mounting holes are at the top. Position the plate in the desired location on the wall.

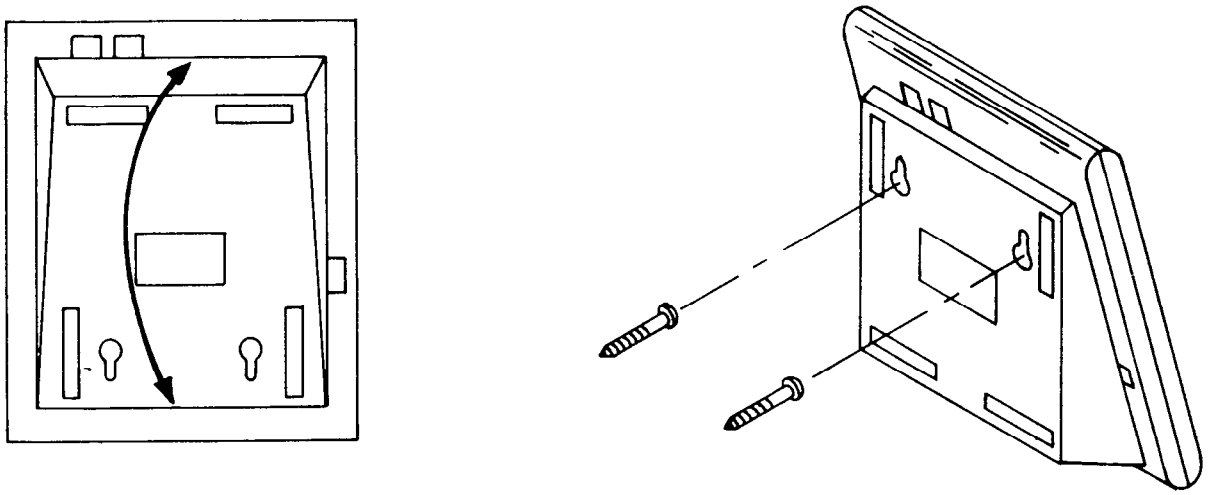
(3) Mark the location of the keyset mounting holes on the wall. Set the baseplate aside.

(4) Drive a #8 pan-head screw (or proper hardware for the wall) into the center of each mounting hole marking. The head of the screw should protrude approximately 1/4 to 1/2 inch (0.6 to 1.2 centimeters).

(5) Replace the baseplate on the keyset with the mounting holes toward the top.

(6) Mount the keyset on the wall. Adjust the screws if necessary to ensure that the keyset is securely mounted.

**FIGURE 3-11. WALL MOUNT THE KEYSET**



## 11. INSTALL A HANDSET AMPLIFIER

**11.01** Users may request to have a handset amplifier installed to be able to adjust the volume of the receiver. Refer to page 2-12 for specifications. Install the amplifier as follows:

(1) Unplug the coiled handset cord from the keyset.

(2) Plug the coiled handset cord into the amplifier jack labeled HANDSET.

(3) Plug the amplifier line cord (coming from the jack labeled TELEPHONE) into the keyset handset jack.

(4) Plug the amplifier power supply cord into an AC outlet.

(5) The handset receiver volume can be increased or decreased, using the thumbwheel located on the amplifier. Verify that the amplifier is functioning correctly by placing a call and adjusting the volume from low to high.

## 12. CONNECT THE EXTERNAL MUSIC SOURCE

**12.01** A jack on the right side of the KSU is the input for the optional external music source (radio, tape player, etc.). If a radio is being used, an external antenna is recommended to prevent station drift. Refer to Figure 3-12 on the next page.

**NOTE:** The music source should be placed 5 to 10 feet (1.5 to 3.0 meters) away from the KSU to avoid interference.

(1) Attach the RCA-type phono plug to one end of a 5- to 10-foot (1.5- to 3.0-meter) length of coaxial cable.

(2) **EITHER,** connect the other end of the cable to the speaker output terminals of the music source.

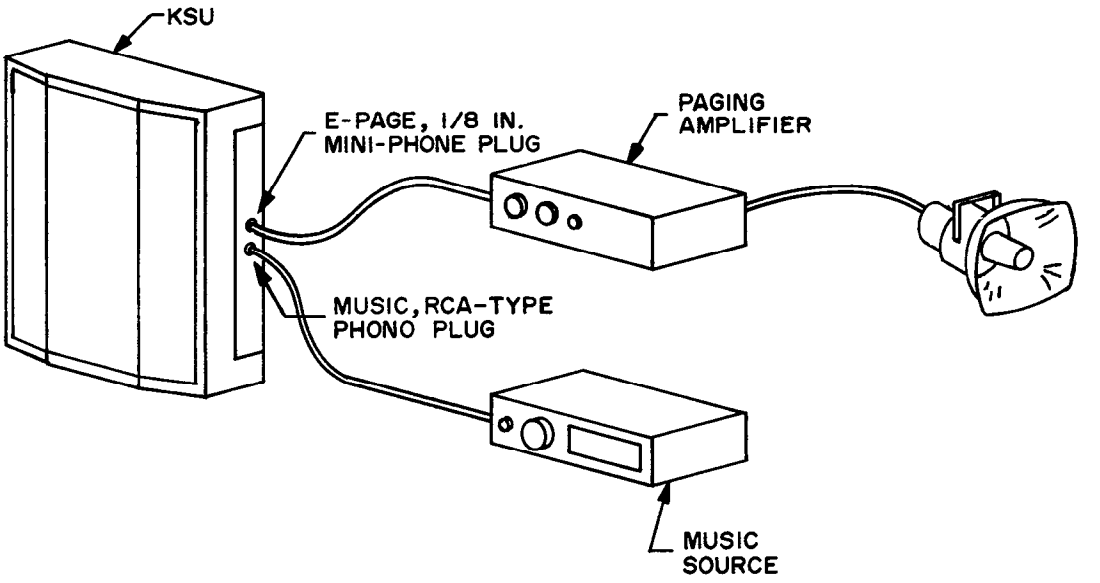
**OR,** attach a 1/8-inch mini-phone plug to the other end of the cable, and plug it into the earphone jack of the music source.

(3) Insert the phono plug into the KSU jack labeled MUSIC.

(4) Plug in the AC power cord for the music source. DO NOT use the outlet for the KSU.

(5) Turn on the AC power to the music source. From a keyset, select a C.O line and dial the telephone number of one of the other lines to call back into the system. Put the call on hold to hear the music. Adjust the volume on the music source to the desired level. The optimum input level is 1.0VRMS.

FIGURE 3-12. CONNECT THE EXTERNAL EQUIPMENT




## 13. CONNECT THE EXTERNAL PAGING EQUIPMENT

**13.01** A jack on the right side of the KSU is the output for the optional external paging equipment. Refer to Figure 3-12 above.

(1) Cut a length of coaxial cable to run from the amplifier to the KSU.

(2) Attach a 1/8-inch mini-phone plug to one end of the cable.

(3) Connect the other end of the cable to the amplifier high-impedance input.

(4) Insert the plug into the KSU jack labeled E-PAGE.

(5) Connect the speaker(s) to the amplifier, using speaker cable.

(6) Plug in the amplifier's AC power cord. DO NOT use the outlet for the KSU.

(7) Turn on AC power to the amplifier. From a keyset, make a page by lifting the handset and pressing the E-PAGE key. Adjust the amplifier volume to the desired level.

## 14. INSTALL BATTERY BACK-UP EQUIPMENT

**14.01** There are three options for installing battery back-up on the GLX System, as described on page 2-13.

**14.02 BATTERIES MUST BE FULLY CHARGED AND OF THE SAME AMP-HOUR RATING AND AGE.** Since batteries give off explosive and corrosive gases, place them in a well-ventilated room and coat the terminals with an anti-corrosive agent. Check with your back-up power representative to ensure that the batteries and charger are compatible.

### A. INSTALL A 30V BATTERY PACK

**NOTE:** To form the 30V battery pack, five 6V batteries can be used in place of the batteries specified below.

(1) To form a 30V battery pack, use 18AWG wire to connect two 12V batteries and one 6V battery in series as shown in Figure 3-13 on the next page. Connect from the "-" terminal on the first 12V battery to the "+" terminal on the second 12V battery. Then connect from the "-" terminal on the second 12V battery to the "+" terminal on the 6V battery.

(2) To make the battery connector used to connect the batteries to the KSU:

a. Crimp each of the three Molex terminals (Molex part no. 02-09-1118) onto 18AWG wires. Make the wires long enough to reach from the batteries to the KSU.

b. Attach the terminals to the Molex connector (Molex part no. 19-09-1032). (An equivalent connector and terminals may be used.)

(3) Connect the +30V wire to the "+" terminal on the first 12V battery.

(4) Connect the +30V RETURN wire to the "-" terminal on the 6V battery.

(5) Connect the ground wire to an earth ground.

(6) Plug the battery connector into the KSU input labeled BATT 30V.

(7) Turn the KSU AC power switch (PWR) to the OFF position. The system should continue to operate.

(8) Turn the KSU AC power switch (PWR) to the ON position.

## B. INSTALL A 30V BATTERY PACK AND BATTERY CHARGER

(1) Follow steps 1 through 5 on the previous page to form the battery pack and make the battery connector.

(2) Connect a length of 18AWG wire from the battery charger's "+" terminal to the same "+" battery terminal used for the +30V contact.

(3) Connect a length of wire from the charger's "-" terminal to the same "-" battery terminal used for the +30V RETURN contact.

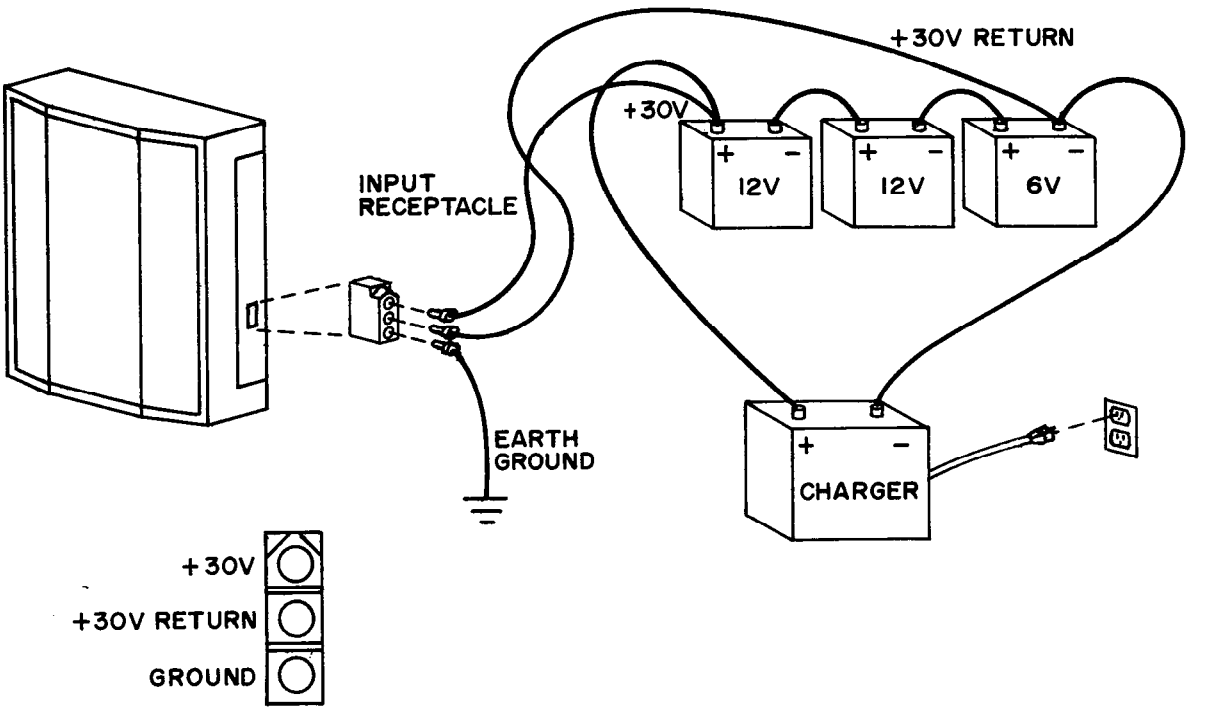
(4) Unplug the KSU AC power cord. It will remain unplugged.

(5) Plug the battery connector into the KSU input labeled BATT 30V.

(6) Plug the battery charger's AC power cord into the AC outlet for the KSU. Turn on the charger's power.

(7) Turn off the battery charger to ensure that the batteries support the system. Then turn the charger back on.

**FIGURE 3-13. INSTALL BACK-UP BATTERIES AND CHARGER**



## C. INSTALL AN UNINTERRUPTED POWER SOURCE (UPS) UNIT

(1) Turn the KSU AC power switch (PWR) to the OFF position and unplug the AC power cord.

(2) Plug the UPS unit into the KSU AC outlet.

(3) Plug the surge/spike protector into the UPS unit.

(4) Plug the KSU AC power cord into the surge/spike protector.

(5) Turn the KSU and UPS unit power switches to the ON positions.

# PROGRAMMING

CONTENTS PAGE





## 1. INTRODUCTION

**1.01** This section describes the initialization and programming procedures for the GLX System. For proper operation, the system must be initialized when it is installed. Programming allows the system and keyset features to be customized to meet each user's needs.

## 2. PROGRAM PLANNING SHEETS

**2.01** Programming is easier, quicker, and more accurate when it is planned in advance. Refer to the program planning sheets on the next two pages. Make copies of the program planning sheets and fill in the blanks as you read through this section. When the sheets are completed, you will have all the necessary information to program the system. Save copies of the sheets at the system site and in the installer's records for future reference.

FIGURE 4-1. PROGRAM PLANNING SHEETS

## SYSTEM FEATURES

Performed from the attendant's keyset (intercom number 10).

**SYSTEM TIMERS:** Enter numbers in seconds. If the timer is not desired, enter 0.

| Timer | Code | Desired Value | Default | Range |
|---|---|---|---|---|
| Attendant Recall | * 1 1 | _____ | 180 sec. | 0, 60-600 sec. |
| Hold Recall | * 1 2 | _____ | 60 sec. | 0, 15-300 sec. |
| Inactivity | * 1 3 | _____ | 15 sec. | 0, 15-60 sec. |

**FEATURE TIMERS:** Enter numbers in tenths of a second (2 = 0.2 sec., 20 = 2.0 sec., etc).

| Timer | Code | Desired Value | Default | Range |
|---|---|---|---|---|
| C.O. Flash | * 2 1 | _____ | 0.7 sec. | 0.2-1.2 sec. |
| C.O. Delay | * 2 2 | _____ | 2.5 sec. | 0.1-5.0 sec. |
| Speed-Dial Pause | * 2 4 | _____ | 3.0 sec. | 1.0-5.0 sec. |
| Memory-dial Speed | * 2 5 | _____ | 0.1 sec. | 0.1 or 0.2 sec. |
| C.O. Ring Duration | * 2 7 | _____ | 0.4 sec. | 0.2-2.0 sec. |
| Abandoned Call | * 2 8 | _____ | 6.0 sec. | 4.0-20.0 sec. |

**EXCLUDE C.O. LINE FROM TOLL RESTRICTION:** Enter desired line key number(s). No line is preset when the system is initialized.

| Code | Desired Line(s) |
|---|---|
| # 4 | ____ ____ ____ ____ ____ ____ |

**SYSTEM OPTIONS:** Enter desired option numbers. When the system is initialized, option 1 is preset.

| Code | Desired Options |
|---|---|
| # 5 | ____ ____ |

Options are:

1 - Restrict calls beginning with 0 or 1.
2 - Restrict calls beginning with 0 or 1 or >8 digits long.
3 - Restrict calls beginning with 0 or 1 or >8 digits long, but allow 1411, 1911, 1-555-XXXX, 1-XXX-555-XXXX, 800-XXX-XXXX, and 1-800-XXX-XXXX.
4 - Allow system speed-dial numbers to bypass toll restriction.

**CALL FORWARD TO PUBLIC NETWORK C.O. LINE:** Enter desired line key number. No line is preset when the system is initialized.

| Code | Desired Line |
|---|---|
| # 6 | _____ |

## FIGURE 4-1. PROGRAM PLANNING SHEETS (CONT'D)

### KEYSET FEATURES

Performed at individual keysets. (Place check marks in the appropriate boxes.)

| Keyset Intercom Number | # 1 Restricted Lines | | | | | | # 2 Ring-In Lines | | | | | | # 3 Keyset Options* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 6 |
| 10 | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | |
| 21 | | | | | | | | | | | | | | | | | |

*Keyset options are:
1 - Incoming Page Disable
2 - Ring Intercom First
3 - Night Answer
4 - Speakerphone Activation Pre-select Disable
6 - Toll Restrict

## 3. OUTLINE FOR PROGRAMMING NEW SYSTEMS

**3.01** A newly installed system is programmed as follows:

1. Place the KSU PWR and PRG EN switches in the ON position.
2. Initialize the system as described below.
3. Program the system and keyset features as described on the following pages.
4. Place the PRG EN switch in the OFF position when programming is completed.

   **NOTE:** It is important to return the PRG EN switch to the OFF position when finished. If the switch is left in the ON position, users could inadvertently change programming while using their keysets. Also, the on/off feature codes for headsets, background music, call forwarding, and do-not-disturb cannot be used when the PRG EN switch is in the ON position.

## 4. INITIALIZE THE SYSTEM

**4.01** The system must be initialized when it is first installed and may require a reset or initialization if a data base error occurs (refer to page 5-2 in TROUBLESHOOTING). The system features are initialized with the following default values. Each feature is described in this section or in the FEATURES section of the manual.

- The attendant's intercom number is 10. (This is not programmable.)
- Only the attendant's keyset rings for incoming calls; however, the corresponding line keys flash on all keysets for incoming calls.
- The timers are set as follows. Programmable timers are marked with an asterisk.

  * Abandoned call timer: 6 seconds
  * Attendant recall timer: 180 seconds
  Attendant's abandoned call timer: 10 minutes
  * C.O. delay timer: 2.5 seconds
  * C.O. flash timer: 0.7 second
  * C.O. ring duration: 0.4 second
  * Hold recall timer: 60 seconds
  * Inactivity timer: 15 seconds
  * Memory-dial speed: 0.1 second
  * Speed-dial pause timer: 3 seconds
  Unsupervised conference release timer: 90 minutes

- System option 1 is enabled.
- All C.O. lines are subject to toll restriction.
- A call forward C.O. line is not preset.
- All keysets can access all C.O. lines for outgoing calls.
- No keyset options are preset.
- System speed-dial numbers are erased.

**4.02** To initialize the system:

**CAUTION:** This function returns the data base to default values.

(1) Place the KSU PRG EN switch in the ON position.

(2) From the attendant's keyset (intercom number 10): While on hook, dial #012. You will hear a confirmation tone as each key is pressed. You will hear a fifth confirmation tone when the system initialization is completed.

(3) If no other programming is necessary, place the PRG EN switch in the OFF position.

## 5. PROGRAM THE SYSTEM AND KEYSET FEATURES

**5.01** Some general programming procedures include the following:

- Programming is performed using the keyset keypad and line keys while the handset is on hook. Lifting and replacing the handset stores the programmed information and completes the programming sequence for each station.
- You will hear a confirmation tone every time you lift and replace the handset if you have completed a valid programming sequence.
- If you make a mistake, lift and replace the handset and start over.
- If you enter invalid information, you will hear four short ring tones and the keyset will return to the idle state. Simply re-enter the programming code and the correct information; then lift and replace the handset.

## A. SYSTEM FEATURES PROGRAMMING

**5.02** The following procedures are used for programming the system features from the attendant's keyset. For further explanations of the timers and features, refer to the FEATURES section.

(1) Place the KSU PRG EN switch in the ON position.

(2) From the attendant's keyset (intercom number 10), program the system features as follows:

a. Attendant recall timer: A call recalling from hold will ring at the keyset where the call was placed on hold until this timer expires; it then recalls the attendant. The timer is preset to 180 seconds during initialization. If this feature is not desired, enter "0" or skip step 2; the timer value will be 0.

1. While on hook, dial *11.

2. Enter the attendant recall time in seconds (0, 60-600).

3. Lift and replace the handset.

b. Hold recall timer: When a call is placed on hold, it does not signal the keyset until this timer expires. Then, it recalls the keyset where it was placed on hold and rings until the attendant recall timer expires. The timer is preset to 60 seconds during initialization. If the timer is not desired, enter "0" or skip step 2; the timer value will be 0.

1. While on hook, dial *12.

2. Enter the hold recall time in seconds (0, 15-300).

3. Lift and replace the handset.

c. Inactivity timer: This limits the amount of time a keyset can remain off hook and inactive before the system locks it out. The user must then press and release the the hookswitch or lift and replace the handset before using the keyset again. The timer is preset to 15 seconds during initialization. If the timer is not desired, enter "0" or skip step 2; the timer value will be 0.

1. While on hook, dial *13.

2. Enter the inactivity time in seconds (0, 15-60).

3. Lift and replace the handset.

d. C.O. flash timer: This is the duration of the hookflash generated when a line key or the FLASH key is pressed. A timed hookflash is used to disconnect calls without hanging up; it also allows users to access PBX or telephone company features. The timer is preset to 0.7 seconds during initialization.

1. While on hook, dial *21.

2. Enter the C.O. flash time in tenths of a second (2-12). (2 = 0.2 sec., 12 = 1.2 sec.)

3. Lift and replace the handset.

e. C.O. delay timer: When a keyset user wishes to redial a telephone number while still on the line, this timer inserts a delay between the time the user presses the SPDL and * keys or the REDL key and the time the system dials the number. The delay ensures that the central office has restored dial tone before the number is dialed. The timer is preset to 2.5 seconds during initialization.

1. While on hook, dial *22.

2. Enter the C.O. delay time in tenths of a second (1-50). (1 = 0.1 sec., 50 = 5.0 sec.)

3. Lift and replace the handset.

f. Speed-dial pause timer: When a series of telephone numbers or codes is entered in one speed-dial location (for example, an SCC access number, an account code number, and a telephone number), a pause can be entered between the numbers to allow time for each number or code to be processed. When a pause is entered in a speed-dial location, this timer is the length of the pause. It is preset to 3 seconds during initialization.

1. While on hook, dial *24.

2. Enter the speed-dial pause time in tenths of a second (10-50). (10 = 1.0 sec., 50 = 5.0 sec.)

3. Lift and replace the handset.

g. Memory-dial speed timer: Some central offices and PBX systems cannot process speed-dialed and redialed numbers as quickly as the GLX System sends them (0.1 seconds per digit). This timer allows a 0.1 second pause to be added after each digit to slow the dialing speed to 0.2 seconds per digit. The length of the DTMF tone is not affected; only the duration of the pause between digits is changed. The timer is preset to 0.1 second during initialization.

(1) While on hook, dial *25.

(2) Enter the memory-dial speed time in tenths of a second (1 or 2). (1 = 0.1 sec., 2 = 0.2 sec.)

(3) Lift and replace the handset.

h. C.O. ring duration timer: When the system detects an incoming ring signal, it causes the programmed keysets to ring. The system will only recognize ring signals that are equal to or longer than this timer. This prevents C.O. line noise from causing false ring-in. The timer is preset to 0.4 second during initialization.

(1) While on hook, dial *27.

(2) Enter the C.O. ring duration time in tenths of a second (2-20). (2 = 0.2 sec., 20 = 2.0 sec.)

(3) Lift and replace the handset.

i. Abandoned call timer: This is the time that an unanswered incoming C.O. call will continue to ring in to the system after the central office stops sending ring signal. The timer is preset to 6 seconds during initialization.

1. While on hook, dial *28.

2. Enter the abandoned call time in tenths of a second (40-200). (4 = 4.0 sec., 200 = 20.0 sec.)

3. Lift and replace the handset.

j. Exclude C.O. line from toll restriction: If a C.O. line is excluded from toll restriction, toll restricted keyset users can access the C.O. line for placing calls that would normally be denied. No C.O. lines are preset during initialization.

1. While on hook, dial #4.

2. Press the line key(s) of the C.O. line(s) that will not be subject to toll restriction. (To return to default status, skip this step.)

3. Lift and replace the handset.

k. System options: Option 1 is preset during initialization. The following options apply only to keysets enabled with keyset option 6 (toll restrict).

**NOTE:** If more than one of the three options (1-3) below are enabled, the system will compare the number dialed to only the lowest-numbered option. The call is dropped as described below, unless option 4 is enabled.

1. While on hook, dial #5.

2. Dial the desired option(s) (1, 2, or 3; 4). For example, dialing #514 will enable options 1 and 4. (To return to default status, skip this step.)

Option 1 - Restrict calls with 0 or 1 as first digit: Prevents toll calls from being made if the first digit dialed is a "0" or "1".

Option 2 - Restrict calls with 0 or 1 as first digit, or more than eight digits long: Prevents toll calls from being made if the first digit dialed is a "0" or "1", or if the number is more than eight digits long.

Option 3 - Restrict calls with 0 or 1 as first digit, or more than eight digits long, but allow 1411, 1911, 1-555-XXXX, 1-XXX-555-XXXX, 800-XXX-XXXX, and 1-800-XXX-XXXX: Prevents toll calls from being made if the first digit dialed is a "0" or "1", or if the number is more than eight digits long. But it allows directory assistance (1411, 1-555-XXXX, 1-XXX-555-XXXX), emergency (1911), and toll-free (800-XXX-XXXX and 1-800-XXX-XXXX) numbers to be dialed.

Option 4 - Allow system speed-dial numbers to bypass toll restriction: Permits system speed-dial numbers to bypass the toll restrictions enabled by option 1, 2, or 3. Because option 4 modifies the other options, it is never used by itself.

3. Lift and replace the handset.

1. Call forward to public network: To allow keyset users to forward intercom and transferred calls to outside telephone numbers, one of the six C.O. lines must be designated for call forwarding to the public network. No C.O. lines are preset when the system is initialized. To designate a C.O. line, follow the procedures shown below.

   1. While on hook, dial #6.

   2. Press the line key of the C.O. line that will be used to forward calls to the public network. (To return to default status, skip this step.)

   3. Lift and replace the handset.

(3) If no other programming is required for the system or keysets, place the PRG EN switch in the OFF position.

## B. KEYSET FEATURES PROGRAMMING

**5.03** For more information on these features, refer to the FEATURES section. Program entries as described below. Refer to page 4-5 for general programming information, if needed.

(1) Place the PRG EN switch in the ON position.

(2) From the desired keyset, program the keyset features as follows.

a. C.O. line restriction: Designates the C.O. line(s) that cannot be used to make outgoing calls from the keyset. Only incoming calls, calls on hold, and recalls may be accessed on these C.O. lines. No C.O. lines are restricted during initialization.

1. While on hook, dial #1.

2. Press the line key(s) that will be restricted. For example, dialing #1 and pressing line keys 2 and 3 will prevent the keyset user from using C.O. lines 2 and 3 for outgoing calls. (To return to default status, skip this step.)

3. Lift and replace the handset.

b. C.O. line ring-in assignment: An incoming call on any line will cause the associated line key to flash on all keysets. If desired, this program can be used to designate the C.O. line(s) that will ring for incoming calls at the keyset. For example, if C.O. lines 1 and 2 are designated, calls will audibly ring in on those lines, but not on lines 3-6. When the system is initialized, only the attendant's keyset (intercom number 10) is assigned ring-in for all C.O. lines.

1. While on hook, dial #2.

2. Press the line key(s) that are to audibly ring for incoming calls at this keyset. (To return to default status, skip this step.)

3. Lift and replace the handset.

c. Keyset options: No options are preset during initialization.

1. While on hook, dial #3.

2. Dial the desired option(s). For example, dialing #3123 will enable options 1, 2, and 3. (To return to default status, skip this step.)

Option 1 - Incoming page disable: Internal pages will not be heard through this keyset's speaker.

Option 2 - Ring intercom first: Incoming intercom calls will ring until they are answered. The keyset user must press the ON/OFF key or lift the handset to answer intercom calls.

Option 3 - Night answer: Incoming calls programmed to ring in at the attendant's keyset will audibly ring in at this keyset when the system is in night ring mode. C.O. lines that are programmed to audibly ring only at keysets other than the attendant's keyset are not affected by night ring mode. An incoming call causes the associated line key to flash on all keysets in both day and night ring modes.

Option 4 - Speakerphone activation pre-select disable: Prevents the speakerphone from being activated automatically when a line key or an Executive Keyset's DSS/BLF key is pressed. When this option is enabled, the keyset user must press the ON/OFF key to activate the speakerphone.

Option 6 - Toll restrict: Restricts toll-call dialing at the keyset, depending on the system options that were enabled.

3. Lift and replace the handset.

(3) Repeat the programming sequence for each keyset. Remember to complete each programming sequence by lifting and replacing the handset.

(4) When all of the keysets have been programmed, return the PRG EN switch to the OFF position.

# TROUBLESHOOTING

CONTENTS PAGE



## 1. INTRODUCTION

**1.01** This section describes the troubleshooting procedures to follow in the event of a system or keyset malfunction.

## 2. DEFECTIVE UNIT RETURN POLICY



**2.01** If it is necessary to return defective equipment after performing the troubleshooting procedures in this section, follow the instructions below. To aid record keeping, order a box of two-part material return authorization (MRA) tags in advance from Inter-Tel's Order Processing Department.

**NOTE:** When returning the KSU for repairs, place a piece of paper between the battery and its clip to prevent it from discharging.

(1) Obtain an MRA number from Inter-Tel's Order Processing Department. Write it on an MRA tag.

(2) Identify the unit by the equipment name, part number, and serial number.

(3) Describe the defect and, if applicable, identify the intercom number or C.O. line related to the defect.

(4) Document the estimated length of time the item had been in service prior to the failure.

(5) Attach the upper portion of the MRA tag to the item. Retain the bottom portion for your files.

(6) Write the MRA number and ATTN: MRA on the outside of the shipping box.

# 3. TROUBLESHOOTING

## A. PRE-TROUBLESHOOTING CHECKLIST

**3.01** Use this troubleshooting checklist before you start the system troubleshooting procedures. It may save you time and possibly eliminate the need for detailed troubleshooting.

**NOTE:** In locations where there is low humidity, static can build up. This often causes small shocks or sparks when metal objects are touched. Although the internal metal components of the system are well insulated, a large static charge could cause an interruption in the system's digital signals. If this occurs, the system would perform a reset, which may cause dropped calls or reset features. If the KSU or keysets are located in high-static areas, take precautions to eliminate the static. If problems persist, contact Inter-Tel's Customer Support Department.

(1) Is the problem caused by user errors? Use the feature according to the instructions in FEATURES.

(2) Has the equipment been disconnected? Are the integrated circuits, PCBs, and equipment cables securely seated and connected? Refer to INSTALLATION for more information.

(3) Is the RUN LED flashing or unlit?

a. If the RUN LED does not light:

1. Check the AC fuse that is accessible from the right side of the KSU. If open, replace it (2A, 250V, slow-blow).

2. Check the breaker to the isolated, dedicated, AC power source. If tripped, reset it.

3. Connector J7 on the Main Control PCB is not connected properly. Refer to page 2-7 for the location of the connector.

b. If the RUN LED is flashing:

1. There may be insufficient voltage available from the AC power source. Measure the AC voltage. If it is low, contact an electrician.

2. If the AC power is sufficient, there is a problem on the Main Control PCB. Replace the KSU.

(4) If the problem involves a programmable feature, place the PRG EN switch in the ON position and check the ERROR LED for an indication of a data base error. (The ERROR LED will not flash unless the PRG EN switch is ON.)

**NOTE:** If the LED is not flashing, there may still be an error. Place the PWR switch in the OFF position for 10 seconds; then return it to the ON position. (Turning the PWR switch off drops all calls in progress.) If the LED flashes, a software error has occurred. Follow the procedures given below.

a. If the ERROR LED is flashing, an error has occurred in the system. Count the number of flashes between the 3-second pauses. Refer to the chart below to determine the type of error.

| Flashes | Reset Indication |
|---|---|
| 1 | **ROM failure:** A major system error has occurred. Place the PWR switch in the OFF position for 10 seconds, then return it to the ON position. If the flashing does not stop, replace the KSU. |
| 6 | **System/station programming:** An error has been detected in one of data base programming areas. Either initialize the data base or reprogram the areas that are affected. (User-programmable features such as call forwarding and night ring mode can be corrected by the keyset user or attendant.) Possible effects of the error include:<br>• All lines are subject to toll restriction.<br>• No line is programmed for call forward to the public network.<br>• Keyset options are incorrect.*<br>• Ring-in assignments are incorrect.*<br>• Call forward mode is incorrect.*<br>• C.O. line restriction is incorrect.*<br>• Timers, night ring mode, and the system toll restriction option have been returned to default status.<br><br>*Can affect more than one keyset. |
| 7 | **System/station speed dialing:** An error has been detected in one or more system or station speed-dial numbers. The faulty number has been erased and can be reprogrammed by the attendant or the keyset user. |

b. Initializing the system will cause the ERROR LED to stop flashing for errors 6 and 7. If you do not wish to initialize and prefer to reprogram the affected area, manually stop the flashing LED by placing the PRG EN switch in the OFF position and then returning it to the ON position.

## B. SYSTEM TROUBLESHOOTING PROCEDURES

**3.02** The troubleshooting procedures for correcting equipment failures have been divided into four categories:

- Feature Failure
- Intercom Call-Related Problems
- Outside Call-Related Problems
- System Malfunctions

**3.03** The troubleshooting charts list symptoms, possible causes, and corrective actions. Look for the problem reported and perform the corrective actions in the order given.

### Feature Failure

**3.04** If the problem involves system or keyset features:

(1) Determine if the problem is due to user error. Perform the procedures as described in the FEATURES section.

(2) If the feature still does not operate properly, proceed to Figure 5-1, Feature Failure Troubleshooting Chart, on page 5-5.

### Intercom Call-Related Problems

**3.05** If the problem is associated with intercom calls only, refer to Figure 5-2, Intercom Troubleshooting Chart, on page 5-8.

### Outside Call-Related Problems

**3.06** If the problem is associated with outside calls only, refer to Figure 5-3, C.O. Line Troubleshooting Chart, on page 5-10.

### System Malfunctions

**3.07** If the problem appears throughout the system, refer to Figure 5-4, System Malfunctions Troubleshooting Chart, on page 5-13.

**FIGURE 5-1. FEATURE FAILURE TROUBLESHOOTING CHART**

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| Cannot place a call on hold | User error | Refer to page 7-24. |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |
| Last number redial does not work | User error | Refer to page 7-23. |
| | Dialing speed too fast for PBX or central office | Change the memory-dial speed timer to 0.2. Refer to page 4-8. |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |
| Speed-dial memory lost or not working | User error | Refer to page 7-20. |
| | Dialing speed too fast for PBX or central office | Change the memory-dial speed timer to 0.2. Refer to page 4-8. |
| | System error has occurred | Check the ERROR LED according to the instructions on page 5-2. |
| | Defective keyset | Replace keyset. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |

*Applicable only if problem occurs at keyset 18, 19, 20, or 21.

FIGURE 5-1. FEATURE FAILURE TROUBLESHOOTING CHART (CONT'D)

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| Headset enable, do-not-disturb, background music and call forward codes do not work | PRG EN switch is in the ON position | PRG EN switch must be in the OFF position for these features to be used. |
| Cannot initiate a conference | User error | Refer to page 7-27. |
| | Conference circuits are busy | There are two conference circuits. When both are busy, the initiating party hears a busy signal. Inside parties are disconnected and outside parties are placed on individual hold. |
| | Intercom channels are busy | The initiating party must hang up and try again before adding an intercom call to the conference. |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |
| Cannot initiate a page | User error | Refer to page 7-29. |
| | All keysets have keyset option 1 enabled | Reprogram keysets to receive incoming pages (refer to page 4-12). |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |

*Applicable only if problem occurs at keyset 18, 19, 20, or 21.

FIGURE 5-1. FEATURE FAILURE TROUBLESHOOTING CHART (CONT'D)

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| Speakerphone not operating properly | User error | Refer to page 7-12 and 7-19. |
| | Automatic speakerphone is disabled | Speakerphone will not activate automatically when keyset option 4 is enabled. Refer to page 4-12. |
| | Headset is enabled | When a headset is enabled, the speakerphone will not operate. When disconnecting a headset, enter the headset feature code to return the keyset to normal operation. |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB | Replace Expansion PCB. If if problem occurs at keyset 18, 19, 20, or 21. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |
| Call is not forwarded to public network. Caller hears a fast busy signal. | Call is toll-restricted or line is restricted | If both keysets are toll-restricted or restricted from accessing the C.O. line, the call is restricted. |
| | Line is not programmed for call forwarding | A C.O. line must be programmed as the call forward to the public network line. Refer to page 4-10. |
| | Call forward line is busy | Caller must hang up and try the call again later. |
| | Forward requests form a loop | If call forward requests form a loop (keysets are forwarded to each other), incoming calls will not be forwarded. |
| | Keyset not programmed correctly | Refer to page 7-30 for correct procedure. |

**NOTE:** Direct ring-in and transferred outside calls will not forward to the public network. Refer to page 7-30 for procedures.

## FIGURE 5-2. INTERCOM TROUBLESHOOTING CHART

**NOTE:** These symptoms are isolated to one keyset only. For identical problems involving more than one keyset, refer to Figure 5-4, System Malfunctions Troubleshooting Chart, on page 5-13.

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| No intercom dial tone | Defective station cabling | Check cable connections. |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |
| Cannot place intercom call. Intercom dial tone is present. | Invalid or unequipped intercom number dialed | Verify that a valid and equipped intercom number was dialed (10-21). |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |
| Keyset does not receive intercom calls handsfree | Keyset option 2 is enabled | This option causes all incoming calls to ring in as private calls. The keyset user must press the ON/OFF key or lift the handset to answer. |
| | Defective keyset | Replace keyset. |

*Applicable only if problem occurs at keyset 18, 19, 20, or 21.

FIGURE 5-2. INTERCOM TROUBLESHOOTING CHART (CONT'D)

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| Data noise heard through speakerphone or handset | System does not have an isolated, dedicated, AC outlet | The ground wire must be dedicated to the outlet. Run the power, neutral, and ground wires directly from a separate circuit in the breaker box to the outlet. Install a surge/spike protector with RFI and EMI noise filtering. |
| | Defective or loose cable connections | Check for loose, open, or crossed wires, and correct. |
| | Station cable exposed to interference | Ensure proper station cable runs. Refer to page 3-6. |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |
| Keyset has no power | Defective station fuse on Main Control PCB | Check the three fuses. Replace defective fuse (1A, 250V, fast-acting). Each fuse affects up to four keysets. F1 protects keysets 10-13, F2 protects 14-17, and F3 protects 18-21. |
| | Defective keyset | Replace keyset. |
| | Defective cabling | Check cabling for shorts or open connections, and correct. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |

*Applicable only if problem occurs at keyset 18, 19, 20, or 21.

FIGURE 5-3. C.O. LINE TROUBLESHOOTING CHART

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| C.O. lines will not ring for incoming calls | C.O. ring duration timer is set too long | Attach a lineman's test set to one of the lines at the RJ connector. Place an outgoing call that will ring in on the line with the test set. Check for ring signal. If you hear ring signal, set the timer to a shorter duration. Refer to page 4-8. If you do not hear ring signal, notify the telephone company. |
| C.O. line rings when a call is not ringing in (false ring-in) | C.O. ring duration timer is set too short | Noise on the C.O. line is causing false ring-in. Set the timer to a longer duration. Refer to page 4-8. |
| Cannot obtain C.O. dial tone | Keyset has been restricted from C.O. line(s) for placing calls | Check the programming for the keyset and reprogram if necessary. Refer to page 4-11. |
| | Central office is not supplying dial tone | Attach a lineman's test set to each line at the RJ and check for C.O. dial tone. If not present, contact the telephone company. |
| | C.O. line(s) disconnected | Check every C.O. line connection between the RJ and the KSU. |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |

*Applicable only if problem occurs on C.O. line 4, 5, or 6, or at keyset 18, 19, 20, or 21.

FIGURE 5-3. C.O. LINE TROUBLESHOOTING CHART (CONT'D)

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| Cannot place an outside call. C.O. dial tone is present and intercom works. | C.O. line uses dial pulse signal | The system is compatible with DTMF signal C.O. lines unless a DTMF-to-rotary converter is installed on each of the C.O. lines. |
| | Keyset is toll restricted (keyset option 6 enabled) | Check the programming for the keyset and reprogram if necessary (refer to page 4-12). |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |
| Other conversations can be heard on the line | Defective C.O. line(s) | Attach a lineman's test set to each line at the RJ connector and check for crosstalk. If present, contact the telephone company. |
| | C.O. lines miswired | Check every C.O. line connection between the RJ connector and the KSU. |
| | Defective Expansion PCB* | Replace Expansion PCB. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |

*Applicable only if problem occurs on C.O. line 4, 5, or 6, or at keyset 18, 19, 20, or 21.

FIGURE 5-3. C.O. LINE TROUBLESHOOTING CHART (CONT'D)

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| Outside call dropped upon answering or during conversation | User error (line key pressed after initial connection is made) | Pressing a line key after the connection has been made will automatically drop the call in progress and reseize that C.O. line. |
| | User error (digit key pressed after connection is made) | The system counts the number of digits dialed when the keyset is toll restricted. If the user dials more digits than are allowed by toll restriction, the call will be dropped (even if the call is in progress). |
| | Data base error | Refer to the ERROR LED procedures on page 5-2. |
| | Defective keyset | Replace keyset. |
| | Defective Expansion PCB | Replace Expansion PCB if the problem occurs on C.O. line 4, 5, or 6, or at keyset 18, 19, 20, or 21. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |

**FIGURE 5-4. SYSTEM MALFUNCTIONS TROUBLESHOOTING CHART**

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| All keysets in the system are inoperative. No LEDs light when a C.O. line key is pressed. | KSU AC power cord is not plugged in | Plug cord into isolated, dedicated, AC outlet. |
| | Dedicated breaker has tripped | Reset breaker. |
| | AC fuse is open | Replace fuse (2A, 250V, slow-blow). |
| | Station fuse(s) are open | Check the three fuses on the Main Control PCB. Replace fuse(s) (1A, 250V, fast-acting). Each fuse affects up to four keysets. F1 protects keysets 10-13, F2 protects 14-17, and F3 protects 18-21. Check station cabling for error (refer to page 3-6). |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |
| | Defective power supply | Replace KSU. |
| **NOTE:** If the system is operating on system battery back-up power, the batteries may not have enough charge to power the system. | | |
| Several keysets are inoperative. No LEDs light when C.O. line key is pressed. | Defective station fuse(s) on Main Control PCB | Check the three fuses. Replace defective fuse (1A, 250V, fast-acting). Each fuse affects up to four keysets. F1 protects keysets 10-13, F2 protects 14-17, and F3 protects 18-21. |
| | Missing or defective Expansion PCB | Install or replace Expansion PCB if problem occurs at keyset 18, 19, 20, or 21. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |

FIGURE 5-4. SYSTEM MALFUNCTIONS TROUBLESHOOTING CHART (CONT'D)

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| C.O. line is inoperative throughout the system | Defective C.O. line from central office | Attach a lineman's test set the line at the RJ connector and check for C.O. dial tone. If not present, contact the telephone company. |
| | C.O. lines mis-wired | Check C.O. line connections between the RJ and the KSU. |
| | All keysets have been restricted from accessing C.O. line | Check programming for every keyset and reprogram if necessary. Refer to page 4-11. |
| | Defective or missing Expansion PCB | Replace or install Expansion PCB if problem occurs at keyset 18, 19, 20, or 21. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |
| Repeated occurrence of dropped calls | AC outlet is not isolated and dedicated | The ground wire must be dedicated to the outlet. Run the power, neutral, and ground wires directly from a separate circuit in the breaker box to the outlet. A surge/-spike protector with RFI and EMI noise filtering should be installed. |
| | The KSU is near a strong magnetic field (heavy motor, copy machine, etc.) | Relocate the KSU so that it is not affected by the magnetic field. |
| | Data base error | Refer to the ERROR LED procedures on page 5-2. |
| | Defective power supply | Replace KSU. |
| | Defective Main Control PCB | Replace KSU or contact Inter-Tel Customer Support for assistance. |

**FIGURE 5-4. SYSTEM MALFUNCTIONS TROUBLESHOOTING CHART (CONT'D)**

| SYMPTOM | PROBABLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| Radio frequency interference (RFI) or electromagnetic interference (EMI) present over conversations | AC power circuit is not grounded properly | Refer to page 3-3. If correctly grounded, unplug AC power cord from outlet and insert a ground isolation plug into outlet. Plug AC power cord into ground isolation plug. If RFI/EMI stops, the ground is the cause. Call an electrician to correct the problem. |
| | AC power source is causing RFI/EMI | Unplug AC power cord from outlet and plug into an outlet that is on another breaker. If RFI/EMI stops, the AC power source is the cause. Install an EMI filter on the AC outlet. |

**NOTE:** For further assistance, contact Inter-Tel Customer Support. You will need to provide the following information:

1. Modulation - AM, FM, or other
2. Frequency - MHz or KHz
3. Broadcast power
4. Distance between KSU and broadcast antenna
5. Where RFI is heard:
   - Outside call - inside party only
   - Outside call - outside party only
   - Outside call - both parties
   - Intercom call - one or both parties

| | | |
|---|---|---|
| Music-on-hold not present when outside call is placed on hold | Music-on-hold channels are in use | The system has two music-on-hold channels. If two outside calls are placed on hold, a third caller will not hear music if placed on hold. |
| | Music source is not working | Check the music source. |
| | Defective cabling to the KSU | Check the cable to the music jack; repair if needed. |
| | Defective KSU | Replace KSU or contact Inter-Tel Customer Support for assistance. |

## 4. CUSTOMER SUPPORT DEPARTMENT

**4.01** If problems persist, contact Inter-Tel's Customer Support Department for assistance. They can be reached between 8:00 AM and 5:00 PM Mountain Standard Time (MST) at 602-961-9000 or 1-800-523-8180.

**4.02** **For emergencies only:** After office hours and on weekends, call 602-961-0277 and leave your message with the operator. A Customer Support Product Specialist will return your call as soon as possible, usually within an hour. Please remember that this is an emergency number. Sales questions, equipment orders, etc., can only be processed during normal business hours.

## 5. ISIS

**5.01** Inter-Tel Systems Information Service (ISIS) is available to authorized Inter-Tel distributors 24 hours a day. Following the instructions given by ISIS, you can access the latest news, Tech Tips, and sales information. You may access ISIS for up to 30 minutes per call before being automatically disconnected.

**5.02** To access ISIS, you will need a terminal and a modem with the following characteristics:

A. Bell 103 or 212 standard modem or equivalent.

B. 0-300 or 1200 baud rate.

C. Full-duplex communication capability (parity is not checked).

**5.03** Accessing ISIS:

(1) Dial 602-961-1825.

(2) When you hear the modem tone, activate your modem according to the manufacturer's instructions.

(3) Press the RETURN key repeatedly (at approximately 1 second intervals) until the terminal responds with USERNAME.

(4) Enter ISIS and press RETURN.

(5) Your terminal will print ENTER ACCESS CODE.

(6) Enter 150377 and press RETURN.

(7) Your terminal will print ENTER DISTRIBUTOR CODE.

(8) Enter your distributor code (Inter-Tel account number as it appears on your monthly invoice) and press RETURN.

(9) Your terminal will print WELCOME TO ISIS, followed by a series of menus that will guide you to the information you need.

(10) When you are finished, select EXIT ISIS (option G) from the main menu and terminate your call according to the instructions for you modem.

**NOTE:** If you have any problems, please exit ISIS and report the problem to Customer Support between 8:00 AM and 5:00 PM (MST).

# REPLACEMENT PARTS

CONTENTS PAGE



## 1. INTRODUCTION

**1.01** This section provides the information necessary to order replacement parts for the Inter-Tel GLX System.

## 2. ORDERING PROCEDURE

**2.01** When ordering equipment for the Inter-Tel GLX System, provide the following information to your order processing clerk:

- Company name
- Purchase order number
- Required date of shipment
- Part number(s) of equipment ordered
- Quantity required

## 3. REPLACEMENT PARTS LIST

**3.01** Figure 6-1 on the next page lists every part available that is authorized for replacement on the Inter-Tel GLX System.

## 4. RECOMMENDED SPARE PARTS

**4.01** Figure 6-2 on the next page lists the quantities of spare parts recommended to adequately maintain and service 10 Inter-Tel GLX Systems.

## FIGURE 6-1. REPLACEMENT PARTS

| PART DESCRIPTION | PART NUMBER |
|---|---|
| **Keysets** | |
| Standard Keyset | 612.3000 |
| Executive Keyset | 612.3100 |
| **KSU** | |
| KSU Assembly | 612.1000 |
| Expansion PCB (3 X 4) | 612.2010 |
| **User Documentation** | |
| Installation & Maintenance Manual | 612.8001 |
| Standard Keyset User Guide | 612.8002 |
| Executive Keyset User Guide | 612.8003 |
| Owner's Guide | 612.8004 |

## FIGURE 6-2. RECOMMENDED SPARE PARTS

| PART DESCRIPTION | PART NUMBER | QUANTITY |
|---|---|---|
| KSU Assembly | 612.1000 | 1 |
| Expansion PCB | 612.2010 | 1 |
| Standard Keyset | 612.3000 | 2 |
| Executive Keyset | 612.3100 | 2 |

# FEATURES

CONTENTS

## 1. INTRODUCTION

**1.01** The GLX System has many easy-to-use features. This section describes the features and provides detailed instructions on their use. Refer to the user guide shipped with each keyset for simplified instructions on using keyset features.

**1.02** The system has one attendant. Intercom number 10 is assigned to the system attendant's keyset. It has the following capabilities:

- Responds to "0" as an intercom number.
- Receives attendant recalls.
- Is used to place the system in night ring mode.
- Is used for system feature programming.
- Is used for programming system speed-dial numbers.

## 2. SYSTEM FEATURES

**2.01** System features include the following:

A. Flexible Incoming Ring Assignment (Alternate Point Answering)
B. Flexible Night Ringing Arrangement (Night Ring Mode)
C. Protection Against Power Failure
D. Dual-Tone Multi-Frequency (DTMF) Signalling
E. Music-On-Hold and Background Music
F. Call Privacy
G. C.O. Line Restriction
H. Toll Restriction
I. System Timers

### A. FLEXIBLE INCOMING RING ASSIGNMENT (ALTERNATE POINT ANSWERING)

**2.02** When the system is initialized, only the attendant's keyset (intercom number 10) rings for incoming calls on the C.O. lines. However, the associated line key flashes on all keysets and any keyset user may answer an incoming call by pressing the flashing line key. Using keyset feature programming, C.O. lines can be programmed to ring in on any or all keysets. C.O. lines can ring in at any keyset, without ringing in at the attendant's keyset.

## B. FLEXIBLE NIGHT RINGING ARRANGEMENT (NIGHT RING MODE)

**2.03** C.O. lines that ring in at the attendant's keyset can be programmed to ring in at one or more alternate keysets when the system is placed in night ring mode. Refer to page 4-12 for programming information. C.O. lines that are not programmed to ring in at the attendant's keyset are not affected by night ring mode and continue to ring in as programmed. Attendant recalls continue to ring at the attendant's keyset when the system is in night ring mode.

**2.04** To place the system in night ring mode (from the attendant's keyset):

(1) Lift the handset.

(2) Press the SYS HOLD key.

(3) Press the asterisk (*) key on the keypad. You hear intercom dial tone and the SYS HOLD key flashes slowly.

(4) Replace the handset.

**2.05** To cancel night ring mode (from the attendant's keyset): Lift the handset and press the slow-flashing SYS HOLD key. Replace the handset. The SYS HOLD key is unlit.

## C. PROTECTION AGAINST POWER FAILURE

**2.06** **Data base battery back-up:** The Main Control PCB contains a lithium battery that protects the programmed data base, system and station speed-dial numbers, redial memory, and call forward requests in the event of a power failure. Headsets, do-not-disturb, background music, and the data device interface are returned to default status (disabled) if a power failure occurs. The battery can protect the data base for 10 years of normal system operation, or until the accumulated system downtime exceeds one year.

**2.07** **System battery back-up:** To prevent loss of service in the event of a power failure or brownout condition, the GLX System may be equipped with customer-provided back-up batteries. Refer to page 2-13 for details.

## D. DUAL-TONE MULTI-FREQUENCY (DTMF) SIGNALLING

**2.08** All keysets are equipped with pushbutton keypads that generate DTMF signals for dialing. The GLX System is compatible with DTMF central offices. It cannot be used in areas served by dial pulse central offices unless a DTMF-to-rotary converter is installed on each of the C.O. lines.

## E. MUSIC-ON-HOLD AND BACKGROUND MUSIC

**2.09** The system can be equipped with an external music source (radio, tape player, etc.) for calls on hold and calls waiting. This feature not only makes the wait as pleasant as possible, but it assures the waiting party that the call is still connected.

**2.10** There are two music-on-hold channels for outside calls on hold. When both channels are in use, a third outside call on hold will not receive music. A channel is considered in use as long as the call is in progress, even after the call is no longer on hold. This ensures that an outside caller who has received music will hear music if the call is placed on hold again.

**2.11** Camped-on intercom calls always receive music if the music source is installed. Music can also be heard through the keysets' speakers, using the background music feature code (or BGM key on the Executive Keyset). Background music is interrupted when the keyset is in use, being programmed, ringing, or receiving a page.

**2.12** To turn music on or off (Standard Keyset): While on hook, dial #06.

**2.13** To turn music on or off (Executive Keyset): While on hook, press the BGM key. The BGM key lights when music is on.

## F. CALL PRIVACY

**2.14** This feature ensures the privacy of calls in progress by preventing keyset users from accessing intercom channels or C.O. lines already in use. Users attempting to access a busy intercom channel or C.O. line hear a busy signal.

**2.15** A keyset user may access and gain control of an outside call if it is ringing in, has been placed on system hold, or if it is recalling from system hold or individual hold.

## G. C.O. LINE RESTRICTION

**2.16** As a means of restricting outgoing calls, keysets can be prevented from having access to one or more C.O. lines for placing calls. This is performed during keyset feature programming. Users attempting to place a call using a restricted C.O. line hear a busy signal; however, they can answer incoming calls, calls on system hold, or recalls on the restricted C.O. line.

## H. TOLL RESTRICTION

**2.17** As a means of controlling costs, the system can be programmed to restrict specific keysets from being used to dial toll calls. The toll restrictions and exceptions include:

- Basic Toll Restrictions
- Allow System Speed-Dial Numbers to Bypass Toll Restriction
- Exclude C.O. Line(s) from Toll Restriction

### Basic Toll Restrictions

**2.18** There are three system programming options available that are used with keyset option 6 (toll restrict) to cause the system to analyze and/or count the digits dialed at the keyset.

**2.19** System option 1 prevents a keyset user from placing a call when the number dialed has a "0" or "1" as the first digit. If the first digit is a "0" or "1", the call is dropped immediately. System option 1 is enabled during initialization. System speed-dial numbers are not toll restricted when system option 4 is enabled.

**2.20** System option 2 prevents a keyset user from placing a call when the number dialed begins with a "0" or "1", or when the number exceeds eight digits. If the first digit is a "0" or a "1", the call is dropped immediately; if the call exceeds eight digits, it is dropped when the ninth digit is dialed. The eight-digit limit is in effect throughout the call. If a ninth digit is dialed while the call is in progress, the call is dropped. System speed-dial numbers are not toll restricted when system option 4 is enabled.

**2.21** System option 3 is identical to option 2 except that a keyset user may dial directory assistance (1411, 1-555-XXXX, XXX-555-XXXX, or 1-XXX-555-XXXX), emergency (1911), and toll-free (1-800-XXX-XXX or 800-XXX-XXXX) numbers.

**2.22** If any of the above options are enabled, the system only checks the lowest-numbered option. If a restriction is found, the call is dropped even if there are other options remaining. Selecting no options during programming disables the toll restriction feature.

### Allow System Speed-Dial Numbers to Bypass Toll Restriction

**2.23** System option 4 permits system speed-dial numbers to bypass the toll restrictions enabled by option 1, 2, or 3. Because this option is an exception to the other options, it is never used by itself.

## Exclude C.O. Line(s) from Toll Restriction

**2.24** The system can be programmed to allow access to one or more C.O. lines for placing calls that would otherwise be denied by system option 1, 2, or 3. The unrestricted C.O. line can be a local line, WATS line, FX line, PBX line, etc.

## I. SYSTEM TIMERS

**2.25** System timers provide minimum and/or maximum timeout limits for certain features. The timers ensure that the duration of each feature is suitable for the proper operation of the system or outside services. They also prevent circuits from being tied up indefinitely with the hold, recall, and conference features or if a calling party has hung up before the call was answered. All timers are preset during initialization and several of the timers may be changed through system features programming. Each timer is listed below; programmable timers are described on pages 4-6 through 4-8.

| Timer | Preset Value | Variable Range |
|---|---|---|
| Abandoned Call | 6.0 sec. | 4.0-20.0 sec. |
| Attendant Recall* | 180 sec. | 0, 60-600 sec. |
| Attendant's Abandoned Call | 10 min. | -- |
| C.O. Delay | 2.5 sec. | 0.1-5.0 sec. |
| C.O. Flash | 0.7 sec. | 0.2-1.2 sec. |
| C.O. Ring Duration | 0.4 sec. | 0.2-2.0 sec. |
| Hold Recall* | 60 sec. | 0, 15-300 sec. |
| Inactivity Timer* | 15 sec. | 0, 15-60 sec. |
| Memory-Dial Speed | 0.1 sec. | 0.1-0.2 sec. |
| Speed-Dial Pause | 3.0 sec. | 1.0-5.0 sec. |
| Unsupervised Conference Release | 90 min. | -- |

*If these timers are not desired, they can be disabled by specifying "0" during programming.

## 3. KEYSET FEATURES

**3.01** Two types of keysets are available for use on the GLX System: the Executive Keyset and the Standard Keyset. The Executive Keyset differs from the Standard Keyset in that it has 6 additional feature keys, 12 Direct Station Selection/Busy Lamp Field (DSS/BLF) keys, and a jack for connecting a data device. Each of the keyset features is described below. Features marked with an asterisk (*) are available on the Executive Keyset only.

A. Line Keys
B. Feature Keys
C. Light-Emitting Diode (LED) Indications
* D. Direct Station Selection/Busy Lamp Field (DSS/BLF) Keys
E. Audible Signals
F. Volume Controls
G. Speakerphone
H. Headset Connection and Operation
* I. Data Device Interface

### A. LINE KEYS

**3.02** The six line keys provide direct access to the C.O. lines. Each line key is equipped with an LED that indicates the status of the C.O. line (in use, holding, recalling, etc.).

### B. FEATURE KEYS

**3.03** All but four of the keyset features are accessed by the feature keys. The four features that are accessed by entering a feature code are: call forward (#02), do-not-disturb (#03), headset enable/disable (#04), and background music (#06). (Executive Keysets have a feature key for background music.)

**3.04** The Standard Keyset has 6 feature keys and the Executive Keyset has 12. The keys found on both Standard and Executive Keysets are described below:

| Key | Function |
|---|---|
| ON/OFF | Controls the speakerphone or headset for handsfree operation.<br>Disconnects a C.O. line when dialing on hook. |
| SPDL | Stores and dials speed-dial numbers.<br>Inserts pauses in speed-dial numbers.<br>When used with the asterisk (*) key, redials the last number dialed (Standard Keyset). |
| CNF | Places calls on conference hold, then establishes a conference. |

| Key | Function |
|---|---|
| SYS HOLD | Places an outside call on system hold. When used with the asterisk (*) key at the attendant's keyset, places the system in night ring mode. |
| PAGE | Initiates an internal page. |
| E-PAGE | Initiates an external page. |

**3.05** The following keys are found on the Executive Keyset only:

| Key | Function |
|---|---|
| BGM | Allows music to be heard through the keyset's internal speaker. |
| DATA | Connects the modem-equipped data device (computer, data terminal, etc.) while on a C.O. or intercom call. |
| SPCL | Reserved for future applications. |
| FLASH | Sends a timed hookflash to access PBX or telephone company features, or releases and reseizes a C.O. line. |
| REDL | Redials the last number dialed. |
| HOLD | Places an outside call on individual hold. |

## C. LIGHT-EMITTING DIODE (LED) INDICATIONS

**3.06** The keyset line keys and feature keys (except PAGE and E-PAGE) are equipped with LEDs. The LED flash rates, shown in Figure 7-1 on the next page, indicate the status of the C.O. lines and features. The rates are described below in interruptions per minute (IPM).

| | |
|---|---|
| STEADY | - Lamp on, no flashing. |
| CONSTANT FLUTTER | - Flutters at 300 IPM. |
| MEDIUM FLASH | - Single flash at 60 IPM. |
| DOUBLE FLASH | - Double flash at 60 IPM. |
| SLOW FLASH | - Single flash at 30 IPM. |
| FLUTTER WITH PAUSE | - Flashes at 30 IPM with a 300-IPM flutter. |

FIGURE 7-1. LED INDICATIONS

| | STEADY<br>0 IPM | CONSTANT FLUTTER<br>300 IPM | MEDIUM FLASH<br>60 IPM | DOUBLE FLASH<br>60 IPM | SLOW FLASH<br>30 IPM | FLUTTER W/PAUSE<br>30/300 IPM |
|---|---|---|---|---|---|---|
| ON/OFF | Speaker-phone or headset in use | | | | | |
| SPDL | Speed-dial number being dialed | Speed-dial number being programmed | | | | |
| SYS HOLD | Your keyset is in do-not-disturb | | Your keyset is in call forward mode | | IC call waiting<br>---<br>Attendant: System in night ring mode | |
| CNF | Keyset in conference | | Unsupervised conference | | | |
| BGM* | Background music on | | | | | |
| REDL* | Number being redialed | | | | | |
| DATA* | | | | | Data device in use | |
| LINE KEYS | Line in use | Call is recalling attendant on this line | Call on system hold from another keyset | Call on individual, system, or conference hold at this keyset | Call is ringing in on this line | Call is recalling from hold on this line |

*Executive Keyset only

## D. DIRECT STATION SELECTION/BUSY LAMP FIELD (DSS/BLF) KEYS (EXECUTIVE KEYSET ONLY)

**3.07** The Executive Keyset has 12 DSS/BLF keys that provide one-key intercom access to each of the 12 keysets. The LEDs under the DSS/BLF keys create a busy lamp field and flash at different rates to indicate the status of each keyset. Each flash rate has a distinct meaning, as described below. Flash rates are given in interruptions per minute (IPM) or seconds on/off.

| Flash Rate | Indication |
|---|---|
| STEADY (constantly lit) | The keyset is busy. |
| LOCK-OUT FLASH (0.5 sec. on/3.5 sec. off) | The keyset is in lock-out (off hook with no activity or unplugged). |
| SLOW FLASH (30 IPM) (1.0 sec. on/1.0 sec. off) | An outside call is recalling. |
| DND FLASH (3.5 sec. on/0.5 sec. off) | The keyset is in do-not-disturb. |
| MEDIUM FLASH (60 IPM) | The keyset is in call forward mode. |

## E. AUDIBLE SIGNALS

**3.08** There are several types of audible signals that are heard through the keyset's internal speaker or handset. The signals and related features are described below.

### Ring Tones and Busy Signals

**3.09** Ring tones and busy signals are heard through the handset or the keyset's internal speaker. When the speakerphone is in use (keyset is on hook), ring tones and busy signals normally heard through the handset are heard through the keyset's internal speaker.

| Tone/Signal | Indication |
|---|---|
| Long ring tone every 6 seconds (- - -) | Incoming or transferred outside call is ringing in.<br>Outside call is recalling from hold. |
| One double ring tone (--) | Incoming intercom call can be answered handsfree. |

| Tone/Signal | Indication |
|---|---|
| Double ring tone every 2 seconds (-- -- --) | Private intercom call ringing in. |
| One triple ring tone (---) | You have accessed the paging equipment. |
| Busy signal (- - - - - - - -) | C.O. line is busy.<br>Your keyset is restricted from accessing the selected C.O. line.<br>All conference circuits are busy when you attempt to establish a conference with an outside call. |
| Five busy signal (- - - - -), then music, if available | You are camped on to a busy keyset. |
| Triple ring tone every 15 seconds (--- --- ---) | Unsupervised conference (initiated by you) still in progress. |
| Four fast ring tones every 2 seconds (---- ---- ----) | The called keyset is in do-not-disturb. |
| Fast busy signal (---------) | You dialed an invalid or unequipped intercom number.<br>Your keyset is toll restricted.<br>The inactivity timer expired.<br>Another keyset is camped on to the busy keyset you are calling.<br>All intercom channels are busy.<br>All conference circuits are busy when you attempt to establish a conference with an intercom call.<br>Call forward cannot be completed. |

## Off-Hook Ringing for Call Waiting

**3.10** When the keyset is in use, it will ring every 6 seconds to notify the user that an intercom or transferred call is waiting. A short ring tone and a slow-flashing line key indicate an outside call waiting; a double ring tone and a slow-flashing SYS HOLD key indicate an intercom call waiting.

**Immediate Ringing**

**3.11** A called keyset rings immediately after the keyset circuit is tested and found to be idle. Outside calls ringing in at more than one keyset ring at the keysets simultaneously to avoid a random-ringing effect.

**Confirmation Tones**

**3.12** The system produces a confirmation tone to acknowledge that a key has been pressed on the keyset. These tones are heard through the handset or internal speaker for as long as the key is depressed. DTMF tones are heard while dialing or when a speed-dial number is dialed. A confirmation tone is heard each time a key is pressed while programming.

## F. VOLUME CONTROLS

**3.13** The ringer volume and speaker volume are controlled by separate thumbwheels on the side of the keyset.

**3.14** To increase the handset receiver volume, Standard and Executive Keysets can be equipped with handset amplifiers. Inter-Tel recommends the Walker Equipment Corporation Modular Handset Amplifier, model W10. This is an external device that is placed between the keyset and the handset. Refer to page 2-12 for specifications and page 3-20 for installation instructions.

## G. SPEAKERPHONE

**3.15** Every keyset has an integrated speakerphone that allows handsfree operation on outside calls and handsfree answering of intercom calls. The speakerphone is automatically activated by incoming intercom calls or when a line key is pressed while the keyset is on hook. The ON/OFF key is used to transfer the voice path between the handset and the speakerphone and to hang up from handsfree calls.

**3.16** There are two keyset programming options that can affect the speakerphone. Keyset option 2 disables the handsfree feature on incoming intercom calls. Keyset option 4 disables the feature that automatically activates the speakerphone when a line key is pressed. With either option enabled, the ON/OFF key is used to control the speakerphone.

## H. HEADSET CONNECTION AND OPERATION

**3.17** Two types of 4-conductor, modular headsets can be attached to the keysets: headsets that have dynamic microphones or headsets with carbon microphones that have an external AC power source. When the headset is attached, the headset feature code (#04) must be entered to enable it. The headset is activated when the keyset user receives a handsfree intercom call, presses the ON/OFF key, or presses a line key. The ON/OFF key is also used to disconnect calls.

**NOTE:** The speakerphone cannot be used when a headset is enabled (headset code #04 has been entered).

**3.18** To connect a headset:

(1) Disconnect the handset by unplugging the coiled handset cord from the base of the keyset. Leave the handset in the cradle.

(2) Insert the headset plug into the vacant handset jack.

(3) While on hook, dial #04 to enable the headset feature.

**3.19** To disconnect the headset:

(1) Reattach the handset.

(2) While on hook, dial #04 to disable the headset feature.

## I. DATA DEVICE INTERFACE (EXECUTIVE KEYSET ONLY)

**3.20** The Executive Keyset has a 4-conductor, modular jack (labeled DATA) that can be used for connecting a data device (such as a data terminal or personal computer) that has a direct-connection modem with an RJ11 C.O. line interface. The keyset is used to dial an outside or intercom number; the keyset user then presses the DATA key to connect the C.O. line or intercom channel to the data device.

**3.21** While the data device is connected to a C.O. line or intercom channel, the keyset user cannot place or receive calls. The keyset appears busy for incoming intercom calls. If an outside call rings in or an intercom call camps on to the busy keyset, the call waiting signals do not interfere with the data transmission.

**3.22** To connect the data device to the Executive Keyset:

(1) Locate the interface cable coming from the data device. If necessary, refer to the device's user manual for the location of the cable. The RJ11 connector on the end of the cable must be compatible with the keyset DATA jack.

(2) Insert the connector end of the data device interface cable into the keyset DATA jack.

**3.23** To access a remote computer using a C.O. line:

(1) Lift the handset and press an unlit line key.

(2) Dial the telephone number of the computer to be accessed.

(3) When you hear the modem tone, press the DATA key. The DATA key flashes slowly.

(4) Replace the handset and operate the data device according to the manufacturer's instructions.

**3.24** To access a remote computer using an intercom channel:

(1) Lift the handset and press the desired DSS/BLF key.

(2) Notify the called party that you wish to connect the data device.

(3) When the called party activates the remote computer by pressing the DATA key, you hear modem tone. Press your DATA key. Both DATA keys flash slowly.

(4) Replace the handset and operate the data device according to the manufacturer's instructions.

**3.25** To terminate the connection with the computer:

**EITHER,** press the DATA key. The C.O. line or intercom channel is disconnected and the DATA key is unlit.

**OR,** if you wish to speak to the party at the computer site after the data has been transmitted, lift the handset and press the DATA key. This can only be done if the modem at the computer site can be turned off without dropping the C.O. line.

## 4. INTERCOM CALLS

**4.01** The GLX System has two intercom channels that allow keyset users to place calls to one another. Intercom calls can be placed by dialing a two-digit intercom number (10-21), pressing a DSS/BLF key on an Executive Keyset, or dialing "0" to call the attendant. Intercom numbers are assigned to keysets in the order that the station cables are connected to the KSU (refer to page 3-6). Intercom calls ring in handsfree unless keyset option 2 is enabled (refer to paragraphs 4.03 and 4.04 below). If desired, a keyset user can camp on to a busy keyset and wait until the keyset is available. Other features that apply to intercom calls (call waiting, conferencing, paging, do-not-disturb, and call forwarding) appear on pages 7-26 through 7-30.

**4.02** The following intercom features are described in this section:

A. Ring Intercom First
B. Private Intercom Calls
C. Receiving and Placing Intercom Calls
D. DSS/BLF Key Skipping (Executive Keyset Only)

### A. RING INTERCOM FIRST

**4.03** Incoming intercom calls activate the keyset's speaker and microphone to allow the user to answer handsfree. The handsfree intercom feature can be disabled for a specific keyset by enabling keyset option 2. This causes all incoming calls to ring in as private intercom calls. The keyset user hears a double ring tone every 2 seconds and must lift the handset or press the ON/OFF key to answer.

### B. PRIVATE INTERCOM CALLS

**4.04** When desired, a keyset user can place a private (non-handsfree) call to another keyset by dialing "8" before dialing the intercom number or before pressing a DSS/BLF key on the Executive Keyset. This causes the call to ring in as a private intercom call instead of ringing in handsfree. The called party hears a double ring tone every 2 seconds and must lift the handset or press the ON/OFF key to answer.

## C. RECEIVING AND PLACING INTERCOM CALLS

**NOTE:** Procedures apply to both Standard or Executive Keysets unless otherwise specified.

**4.05** To receive an intercom call: If you hear one double ring tone and a call announcement and the ON/OFF key is lit:

**EITHER,** respond handsfree.

**OR,** lift the handset for privacy. The ON/OFF key is unlit.

**4.06** To receive a private intercom call: If you hear a double ring tone every 2 seconds:

**EITHER,** lift the handset.

**OR,** press the ON/OFF key to speak handsfree. The ON/OFF key lights. You hear a confirmation tone and a double ring tone.

**4.07** To place an intercom call:

**NOTE:** When placing an intercom call, begin dialing before the inactivity timer expires. If the timer expires, the system locks out the keyset; if the handset is off hook, the system also sends a fast busy signal until you hang up.

(1) Lift the handset.

(2) If you want to place a private intercom call, dial "8".

(3) Dial the desired intercom number or press the desired DSS/BLF key (Executive Keyset only). The DSS/BLF key lights.

a. If you called a handsfree keyset, speak after you hear the double ring tone.

b. If you placed a private intercom call or called a keyset with the handsfree feature disabled, you hear a double ring tone every 2 seconds until answered.

c. If you dialed an invalid intercom number or if both intercom channels are busy, you hear a fast busy signal.

**4.08** If the desired keyset is busy, you can press the lit DSS/BLF key or dial the intercom number and camp on until the party is available. If the keyset has a previous intercom call waiting, you hear a continuous fast busy signal.

**4.09** To initiate intercom camp-on: When you hear a busy signal, do not hang up. After the fifth busy signal, you camp on and hear music, if available. (If you hear a continuous fast busy signal, another keyset is camped on to the keyset. Hang up and try later.) When the keyset is available, your call rings in as usual.

## D. DSS/BLF KEY SKIPPING (EXECUTIVE KEYSET ONLY)

**4.10** Executive Keysets have DSS/BLF keys that can be used to place intercom calls. If an Executive Keyset user presses a DSS/BLF key while on an intercom call, the current call is dropped and a call is placed to the keyset associated with the pressed DSS/BLF key. This is faster than pressing and releasing the hookswitch and then pressing the desired DSS/BLF key.

**4.11** To use DSS/BLF key skipping: When you are finished with an intercom call and wish to place another intercom call, do not hang up. Press the DSS/BLF key of the party you wish to call. You are disconnected from the first call and hear the second call ring as usual.

**NOTE:** Pressing a DSS/BLF key and hanging up while on an outside call transfers the outside call to the called keyset. Refer to page 7-25.

## 5. OUTSIDE CALLS

**5.01** The following outside call features are described in this section:

A. Receiving and Placing Outside Calls
B. Outside Dial Tone Restore and Timed Hookflash
C. Line Key Skipping
D. On-Hook Dialing of Outside Calls
E. Speed Dialing
F. Last Number Redial
G. Placing Calls on Hold
H. Automatic Recall Timers
I. Call Transfer (Executive Keyset only)

### A. RECEIVING AND PLACING OUTSIDE CALLS

**5.02** To receive an outside call: When you see a slow-flashing line key and hear a ring tone every 6 seconds (at your keyset or another keyset), lift the handset and press the slow-flashing line key. The call is connected and the line key is steadily lit.

**5.03** To place an outside call:

(1) Lift the handset and press an unlit line key. If you hear a busy signal, you tried to access a busy C.O. line or the C.O. line you selected is restricted. Line key is lit when the line has been accessed.

(2) Dial the desired telephone number. You may manually dial the number or use the speed-dial or redial features. If you hear a fast busy signal after dialing, your keyset is toll restricted.

### B. OUTSIDE DIAL TONE RESTORE AND TIMED HOOKFLASH

**5.04** The GLX System is designed to send a timed hookflash when the keyset user presses the line key (or the FLASH key on the Executive Keyset) while on an outside call. This allows the user to disconnect from one call and restore dial tone on the same C.O. line to place a second call. This is faster than pressing and releasing the hookswitch and then pressing the line key to make a call. The duration of the hookflash is controlled by the programmable C.O. flash timer (refer to page 4-7).

**5.05** A timed hookflash may be required when the system is used behind a PBX system or to access telephone company features such as call waiting or call forwarding. If so, the keyset user simply presses the line key (or FLASH key) instead of the hookswitch when a hookflash is needed.

**5.06** To restore outside dial tone: After you are finished with the call, do not hang up. Press the same line key (or FLASH key on an Executive Keyset). You hear dial tone and can place an outgoing call.

## C. LINE KEY SKIPPING

**5.07** Line key skipping allows keyset users to disconnect from one outside call and access another C.O. line by pressing another line key. This is faster than pressing and releasing the hook-switch and pressing a line key. If the system is used behind a PBX, this feature will re-access PBX dial tone instead of access-ing C.O. dial tone.

**5.08** To use line key skipping: After you are finished with an outside call, do not hang up. Press an unlit line key to place a call or press a flashing or fluttering line key to answer a ringing, holding, or recalling outside call. The selected line key lights.

## D. ON-HOOK DIALING OF OUTSIDE CALLS

**5.09** A keyset user can place an outside call without lifting the handset, using the integrated speakerphone. This method allows the user to speak handsfree once the call is connected.

**5.10** To dial while on hook:

**NOTE:** If your keyset speakerphone has been disabled by keyset option 4, you must press the ON/OFF key to turn on the speaker-phone before you press the unlit line key.

(1) While on hook, press an unlit line key. The line key and ON/OFF key light. You hear outside dial tone.

(2) Dial the desired telephone number.

(3) When the called party answers,

**EITHER,** respond handsfree.

**OR,** lift the handset for privacy. The ON/OFF key is unlit.

**NOTE:** At any time during a handsfree call, you may lift the handset for a private conversation. To return to the speakerphone, press the ON/OFF key and replace the handset.

(4) To disconnect, press the ON/OFF key (if on hook) or hang up (if off hook).

## E. SPEED DIALING

**5.11** Speed dialing allows keyset users to store frequently dialed numbers. There are two types of speed dialing available on the GLX System: station speed dialing and system speed dialing.

**5.12** Up to nine station speed-dial numbers can be stored by keyset users for their personal use. Up to 30 system speed-dial numbers can be stored from the attendant's keyset for use by any keyset user. Both station and system speed-dial numbers are stored in the data base, which is protected by the data base back-up battery. In the event of a power failure, they will not be erased.

**5.13** Speed-dial numbers can contain up to 32 digits, including pauses. For example, the number can contain an SCC local telephone number, a pause, the access code, a pause, and the desired telephone number. The duration of each pause is determined by the programmable speed-dial pause timer, which is preset at 3 seconds during initialization. Each pause is counted as one digit.

### Station Speed Dialing

**5.14** Station speed-dial numbers are identified by a one-digit memory location code (1-9). Location code 1 is also used for the call forwarding feature (see page 7-29 for details).

**5.15** To store or change station speed-dial numbers:

**NOTE:** If you make a mistake while dialing the number, press any line key. If you press an invalid key or dial an invalid location code, you hear four fast tones and the keyset returns to the idle state. In either case, the original number is retained.

(1) While on hook, press the SPDL key. The SPDL key flutters.

(2) Dial the one-digit memory location code (1-9).

(3) Dial the telephone number (up to 32 digits, including pauses). To include pauses in the number, press the SPDL key once for each pause. If more than 32 digits are entered, only the last 32 digits are retained.

(4) Lift and replace the handset. You hear a confirmation tone and the SPDL key is unlit.

**5.16** To dial station speed-dial numbers:

(1) Lift the handset and press an unlit line key.

(2) Press the SPDL key. The SPDL key lights.

(3) Dial the one-digit memory location code (1-9). The number is dialed and the SPDL key is unlit. If you dial an invalid location code, you hear a busy signal and the C.O. line is placed on hold.

**5.17** To erase a station speed-dial number without entering a new number:

(1) While on hook, press the SPDL key. The SPDL key flutters.

(2) Dial the memory location code (1-9) to be erased.

(3) Press the SPDL key again.

(4) Lift and replace the handset. You hear a confirmation tone and the SPDL key is unlit.

## System Speed Dialing

**5.18** System speed-dial numbers are identified by a three-digit memory location code (001-030).

**5.19** To store or change system speed-dial numbers:

**NOTE:** System speed-dial numbers can only be stored or changed from the attendant's keyset. If you make a mistake while dialing the number, press any line key. If you press an invalid key or dial an invalid location code, you hear four fast tones and the keyset returns to the idle state. In either case, the original number is retained.

(1) While on hook, press the SPDL key. The SPDL key flutters.

(2) Dial the three-digit memory location code (001-030)

(3) Dial the telephone number (up to 32 digits, including pauses). To include pauses in the number, press the SPDL key once for each pause. If more than 32 digits are entered, only the last 32 digits are retained.

(4) Lift and replace the handset. You hear a confirmation tone and the SPDL key is unlit.

**5.20** To dial system speed-dial numbers:

(1) Lift the handset and press an unlit line key.

(2) Press the SPDL key. The SPDL key lights.

(3) Dial the three-digit memory location code (001-030). The number is dialed and the SPDL key is unlit. If you dial an invalid location code, you hear a busy signal and the C.O. line is placed on hold.

**5.21** To erase a system speed-dial number without entering a new number:

**NOTE:** System speed-dial numbers can only be erased at the attendant's keyset (intercom number 10).

(1) While on hook, press the SPDL key. The SPDL key flutters.

(2) Dial the three-digit memory location code (001-030).

(3) Press the SPDL key again.

(4) Lift and replace the handset. You hear a confirmation tone and the SPDL key is unlit.

## Speed Dialing Special Common Carrier (SCC) Numbers Stored in Separate Locations

**5.22** A keyset user may chain speed-dial numbers together for dialing SCC services. SCC dialing requires the SCC local telephone number, your access code, and the long distance telephone number you want to dial. If desired, these numbers can be stored separately as station or system speed-dial numbers and can be dialed in the order needed.

**5.23** To speed dial SCC numbers:

(1) Lift the handset and press an unlit line key.

(2) Press the SPDL key. The SPDL key lights.

(3) Dial the memory location code (1-9 or 001-030) for the SCC local telephone number. The number is dialed and the SPDL key is unlit.

(4) After the special dial tone, press the SPDL key. The SPDL key lights.

(5) Dial the memory location code (1-9 or 001-030) for the SCC access code. The number is dialed and the SPDL key is unlit.

(6) **EITHER,** press the SPDL key (the SPDL key lights) and dial the memory location code of the long distance number (1-9 or 001-030). The number is dialed and the SPDL key is unlit.

**OR,** manually dial the long distance number if it is not stored in speed-dial memory.

## F. LAST NUMBER REDIAL

**5.24** This feature stores the last phone number dialed (up to 32 digits) in the battery-protected data base memory. When a keyset user is unable to complete a call and wants to dial the number again, the last number redial feature can be used as described below.

**5.25** The programmable C.O. delay timer inserts a delay between the time the SPDL and asterisk (*) keys or REDL key is pressed and the time the system redials the number. This delay ensures that the central office has restored dial tone before the number is dialed.

**5.26** To redial the last number dialed while still on the line (Standard Keyset):

(1) When you reach an outside number that is busy or there is no answer, do not hang up.

(2) Press the SPDL key. The SPDL key lights.

(3) Press the asterisk (*) key on the keypad. The C.O. line is dropped and reseized and the number is redialed. The SPDL key is unlit.

**5.27** To redial the last number dialed after disconnecting (Standard Keyset):

(1) Lift the handset and press an unlit line key.

(2) Press the SPDL key. The SPDL key lights.

(3) Press the asterisk (*) key on the keypad. The number is redialed and the SPDL key is unlit.

**5.28** To redial the last number dialed while still on the line (Executive Keyset):

(1) When you reach an outside number that is busy or there is no answer, do not hang up.

(2) Press the REDL key. The REDL key lights. The C.O. line is dropped and reseized and the number is redialed. The REDL key is unlit.

**5.29** To redial the last number dialed after disconnecting (Executive Keyset):

(1) Lift the handset and press an unlit line key.

(2) Press the REDL key. The REDL key lights while the number is dialed.

## G. PLACING CALLS ON HOLD

**5.30** There are two ways to place outside calls on hold: system hold and individual hold. While on hold, callers hear music, if available. The automatic recall timers limit the amount of time a call can remain on hold (refer to paragraph 5.37).

### System Hold

**5.31** System hold is available to both Standard and Executive Keyset users. The keyset user who put the call on hold sees a double-flashing line key; other keyset users see a medium-flashing line key. Any keyset user can access a call placed on system hold.

**5.32** To place a call on system hold: While on an outside call, press the SYS HOLD key. You hear intercom dial tone and see a double-flashing line key.

**5.33** To access a call on system hold: Lift the handset and press the double-flashing or medium-flashing line key.

### Individual Hold (Executive Keyset Only)

**5.34** Individual hold is available to Executive Keyset users only. It differs from system hold in that calls placed on individual hold are accessible only from the keyset where the call was placed on hold. Other keysets show a steadily lit line key, which indicates a busy C.O. line that cannot be accessed.

**5.35** To place a call on individual hold: While on an outside call, press the HOLD key. You hear intercom dial tone and the line key double flashes.

**5.36** To return to the call on individual hold: Lift the handset and press the double-flashing line key.

## H. AUTOMATIC RECALL TIMERS

**5.37** Three timers ensure that calls placed on system hold or individual hold are not forgotten. They are the hold recall timer, the attendant recall timer, and the attendant's abandoned call timer (refer to page 4-6 for programming information).

**5.38** If an outside call remains on system or individual hold until the hold recall timer expires, it recalls the keyset. If a hold recall is not answered before the attendant recall timer expires, the call then recalls the attendant and rings for up to 10 minutes (attendant's abandoned call timer) before the call is dropped. Attendant recalls continue to signal the attendant's station when the system is placed in night ring mode. During a recall, the party on hold continues to hear music, if available, and does not hear the call ringing.

**5.39** **Hold recall:** You hear a ring tone every 6 seconds (and your DSS/BLF key flashes slowly on your keyset if you are using an Executive Keyset). The associated line key flutters (with a pause) on every keyset. Any keyset user can access the call by pressing the fluttering line key; you can press either the fluttering line key or the flashing DSS/BLF key.

**5.40** **Attendant recall:** The attendant hears a ring tone every 6 seconds (and the associated DSS/BLF key flashes slowly at the attendant's keyset if it is an Executive Keyset). The associated line key flutters constantly (no pause) on all keysets. Any keyset user can access the call by pressing the fluttering line key; the attendant can press either the fluttering line key or the flashing DSS/BLF key.

## I. CALL TRANSFER (EXECUTIVE KEYSET ONLY)

**5.41** Executive Keyset users can transfer outside calls to other keysets. The transferred party hears music, if available. The receiving party hears a ring tone every 6 seconds and sees a double-flashing line key. All other keyset users see a medium-flashing line key.

**5.42** If the call remains unanswered at the receiving keyset until the hold recall timer expires, it recalls that keyset. If the recall is unanswered when the attendant recall timer expires, it recalls the attendant.

**5.43** To transfer an outside call to another keyset:

(1) While on an outside call, press the DSS/BLF key of the party that is to receive the transfer. The outside call is placed on system hold.

(2) **If the receiving keyset is idle,** announce the call and hang up. The receiving party sees a double-flashing line key and hears a long ring tone every 6 seconds.

**If the receiving keyset is busy,** hang up. The receiving party sees a double-flashing line key and hears a short ring tone every 6 seconds. When the busy party hangs up, the transferred call rings in.

**5.44** To answer a call transferred to your keyset: When you see a double-flashing line key and hear a long ring tone (if idle) or a short ring tone (if busy) every 6 seconds, press the double-flashing line key.

## 6. CALL WAITING

**6.01** There are two types of call waiting: intercom call waiting and outside call waiting. An incoming intercom call or transferred outside call camps on and the caller hears music (if available) until the busy party hangs up; direct outside call rings in and the caller hears ringing.

### Intercom Call Waiting

**6.02** The busy keyset user is alerted to the call waiting by a double ring tone every 6 seconds and a slow-flashing SYS HOLD key.

**6.03** To respond to an intercom call waiting while on an intercom call: Press the slow-flashing SYS HOLD key. You are disconnected from the current call and connected to the waiting call.

**6.04** To respond to an intercom call waiting while on an outside call:

**EITHER,** hang up; the waiting intercom call rings in.

**OR,** place the outside call on hold by pressing the slow-flashing SYS HOLD key. Executive Keyset users can press the HOLD key. The waiting intercom call is connected and the line key double flashes. To disconnect from the intercom call and reconnect to the outside call on hold, press the double-flashing line key.

## Outside Call Waiting

**6.05** The busy keyset user hears a short ring tone every 6 seconds. If the waiting call is a direct ring-in call, the keyset user sees a slow-flashing line key. If it is a transferred outside call, the user sees a double-flashing line key.

**6.06** To answer an outside call waiting while on an intercom call: Press the flashing line key. You are disconnected from the intercom call and connected to the waiting call.

**6.07** To answer an outside call waiting while on another outside call:

**EITHER,** press the flashing line key; you are disconnected from the current call and connected to the waiting call.

**OR,** press the SYS HOLD or HOLD key to place the current call on hold. The line key for that call double flashes. Press the flashing line key to answer the waiting call. To return to the holding call, press the double-flashing line key.

## 7. CONFERENCE CALLS

**7.01** Keyset users can establish a three- to five-party conference without operator assistance, using one of the two conference channels. The conference can consist of up to four inside or outside parties in addition to the initiating inside party. When a conference consists solely of inside parties, an intercom channel is required to establish the conference.

**7.02** There can be two conference calls in progress at a time. If a conference is attempted when both conference circuits are busy, the initiating party hears a busy signal, inside parties are disconnected, and outside parties are put on individual hold. If an intercom call is attempted when all intercom channels are busy, the initiating party hears a busy signal and must hang up and wait for an available intercom channel before adding an intercom call to the conference.

**NOTE:** During a five-party conference, some reduction in voice volume may be noticed.

**7.03** To place a conference call:

(1) While on an intercom or outside call, press the CNF key. The party is placed on individual hold. If the call is to an outside party, the associated line key double flashes.

(2) Place intercom or outside calls to the other parties. For each call, press the CNF key to place the party on hold. If the call is to an outside party, the associated line key double flashes.

**NOTE:** If the conference consists of five parties, the conference is connected automatically when the last party is placed on hold. If the conference consists of less than five parties, proceed to the next step.

(3) When all parties are on hold, press the CNF key again to connect the conference. The CNF, DSS/BLF, and line keys light.

**7.04** To exit the conference and leave other parties connected in an unsupervised conference: Hang up. You hear a triple ring tone every 15 seconds and see the medium-flashing CNF key. To re-enter the conference, lift the handset and press the medium-flashing CNF key.

**NOTE:** If the conferenced parties hang up, the conference circuit remains busy until it is released by the initiating party. If the circuit is not released when the unsupervised conference timer expires (90 minutes), the circuit is dropped and any conferenced parties are disconnected.

**7.05** To end the conference and release the conference circuit (initiating keyset only): During the conference, press the asterisk (*) key. All parties are disconnected and the conference circuit is dropped.

**7.06** To end the conference and place outside parties on hold:

**NOTE:** Executive Keyset users cannot use the HOLD key for this feature.

(1) During the conference, press the SYS HOLD key. The conference circuit and any inside parties are dropped, the outside parties are put on individual hold, and the line keys double flash.

(2) To return to each party on hold, press the corresponding double-flashing line key.

(3) To re-establish the conference, refer to paragraph 7.03 above.

## 8. PAGING

**8.01** Keyset users can make pages to one internal zone or one external zone. Internal zone pages are heard through the speaker of every idle keyset. External pages are heard through the customer-provided external paging network. If desired, individual keysets can be removed from the internal paging zone by enabling keyset option 1 during keyset features programming.

**8.02** To make a page:

(1) Lift the handset.

(2) **EITHER,** press the PAGE key for an internal page.

**OR,** press the E-PAGE key for an external page.

(3) After the triple ring tone, make your announcement.

## 9. DO-NOT-DISTURB

**9.01** Placing a keyset in do-not-disturb halts all pages and all incoming intercom and transferred calls to that keyset. (Calls recalling from hold and direct ring-in calls are not blocked by do-not-disturb.) The keyset's DSS/BLF key flashes at the do-not-disturb rate on all Executive Keysets. A user who calls a keyset while it is in do-not-disturb hears four fast ring tones and a pause repeatedly.

**9.02** To enable or disable do-not-disturb: While on hook, dial #03. The SYS HOLD key lights while the keyset is in do-not-disturb.

## 10. CALL FORWARDING

**10.01** A keyset user can forward all incoming intercom and transferred calls to another keyset. In addition, if the system has a programmed C.O. line for call forwarding, calls can be forwarded to an outside telephone number (public network).

**10.02** The C.O. line ring-in assignment for the receiving station does not change with call forwarding. If the keyset does not audibly ring when receiving a direct ring-in call on a C.O. line, it will not ring when receiving a forwarded call on that line.

**10.03** Toll restriction affects calls forwarded to the public network only if the C.O. line is subject to toll restriction and both keysets involved are toll restricted. C.O. line restriction is also in effect if both keysets are restricted from the line. If either keyset is unrestricted, the call is allowed. If the call is restricted, the caller hears a fast busy signal.

**10.04** When calling a forwarded keyset, the caller's SPDL and REDL keys light if an outside number is being dialed. The number is stored in redial memory on the caller's keyset.

**10.05** Transferred calls automatically forward to keyset intercom numbers, but they will not automatically forward to the public network. Instead, the transferring keyset user must initiate a conference with the outside call and the forwarded keyset, and then allow the call to continue as an unsupervised conference (refer to page 7-28).

**10.06** If the C.O. line is busy when the forward is attempted, the caller hears a fast busy signal. Call forward requests can be chained, but if the forwards form a loop (for example keyset 10 forwards to 11, and 11 to 10), the caller hears a fast busy signal.

**10.07** Call forward mode remains in effect if the keyset is unplugged or there is a power failure. Call forward requests are stored in the battery-backed data base.

**10.08** To enter your call forward number: The receiving keyset or telephone number must be stored in station speed-dial location 1. If it is a telephone number, the speed-dial location code can be used for speed dialing and call forwarding.

(1) While on hook, press the SPDL key. The SPDL key flutters.

(2) Dial 1 for the speed-dial location.

(3) Dial a two-digit intercom number or a telephone number with at least three digits. This is where forwarded calls will be sent. Use "10" for the attendant.

**NOTE:** If you make a mistake, press a line key. The original number is retained. An invalid number is not detected until a forward is attempted. Then, the caller hears a fast busy signal.

(4) Lift and replace the handset. You hear a confirmation tone and the SPDL key is unlit.

**10.09** To turn call forwarding on or off: While on hook, dial #02. When call forwarding is enabled (on), you see a medium-flashing SYS HOLD key. Executive Keyset user's see a medium-flashing DSS/BLF key for your keyset.