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KSX 32i

INSTALLATION MANUAL

KEY SYSTEM U.S. LIMITED WARRANTY

Key System US warrants to its authorized members and to the original retail customer of a Key System US product, for a period of one year from the date of shipment of the product from Key System US's warehouse, that the "product", except consumable items, will be free from defects in material and workmanship when used in a normal and common manner.

The sole obligation of Key System US under this warranty is at the sole option of Key System US, the repair or replacement, with new or refurbished parts, of the defective or missing parts that are causing the malfunction and which are determined to be defective by Key System US.

The authorized dealer shall be responsible to pay for shipment of the defective parts to Key System US or Key System US's authorized representative and for any and all expenses connected with their removal or re-installation. In lieu of repair or replacement, Key System US at its sole option and in full satisfaction of its warranty obligations, refund the price charged by Key System US to its members for such parts as are determined by Key System US to be defective and which are returned to Key System US through an authorized dealer within the warranty period and no later than 30 days after such malfunction, whichever occurs first.

This warranty does not cover defects as arise from accidents, neglect, misuse, failure of electric power, air conditioning, humidity control, or causes beyond ordinary use. All warranty claims shall be waived unless reported, in writing to Key System US prior to the expiration of the applicable warranty period.

Key System US makes no other warranties, expressed or implied, and specifically disclaims any implied warranty of merchantability or fitness for a particular purpose. These warranties are the authorized dealer's sole remedies and in lieu of all obligations or liabilities on the part of Key System US for damages, including, but not limited to special, incidental, or consequential damages arising out of or in connection with the use of the products, or any damages whatsoever resulting from loss of use, data, or profits, arising out of or in connection with the performance of the products. Whether in a contract or tort action, including negligence, even if Key System US has been advised of the possibility of such damages. The total maximum liability of Key System US for breach of warranty shall be limited to a refund of the cost of the defective product.

No person other than an officer of Key System US may extend or modify this warranty, and no modification or extension of this warranty shall be effective unless in writing signed by the authorized officer of Key System US.

INTRODUCTION

The **KSX** 32i comes with two manuals. This manual which contains a step by step explanation of the installation process, with diagrams. And the *Programming Guide* which introduces the programming process, by which the system can be programmed through the Keyphones.

The procedures and methods provided in this manual have been prepared in a step by step manner to assist the installer in planning and performing the installation task, system operation, and feature operation.



Caution

This product must be installed by qualified personnel

Notice

The information contained in this document is believed to be correct and accurate in all respects. The information in this document is subject to change without notice. Periodic changes may be made to, the information contained in this document without any obligation to notify any person of such changes. No responsibility is assumed for any errors or omissions in this document.

NOTICE

This equipment has been manufactured with components and parts specifically and carefully selected to provide safe operation and a high standard of performance; therefore, only parts and components listed in this manual should be used for replacement, if and when required.

The adjustment and settings mentioned in this manual should be carried out strictly by personnel who have been trained for the operation of this equipment and have also received instructions in regard to the safe handling of electrical equipment.

While this device is designed to be reasonably secure against intrusions from fraudulent callers, it is by no means invulnerable to fraud. Therefore, no expressed or implied warranty is made against such fraud.

When programming Emergency numbers and (or) making test calls to Emergency numbers:

1. Remain on the line and briefly explain to the dispatcher the reason for the call.
 2. Perform such activities in the off-peak hours; such as early morning or late evenings.
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Protection of this equipment from hazardous voltages is the responsibility of the customer / owner of the equipment.

Note: The exclamation point within an equilateral triangle is intended to alert the user or service personnel to important operating and servicing instructions.



Important Safety Instructions

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of damage, 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 the product from the wall outlet before cleaning. Do **NOT** use liquid or aerosol cleaners. Use a damp cloth for cleaning.
4. Do **NOT** use this product near water. For example, near a bath, wash bowl, kitchen sink, 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. This product should **NEVER** be placed near or cover a radiator or heat register.
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 supply to your or office, consult your dealer or local power company.
8. Do **NOT** allow anything to test the power cord. Do **NOT** locate this product where the cord will be abused by people walking on it.
9. Do **NOT** overload wall outlets and extensions cords as this can result in the risk of fire or electric shock.
10. **NEVER** push objects of any kind into this product through the cabinet slots as they may touch dangerous voltage points or short out parts that could result in the risk of fire or electric shock. **NEVER** spill liquid of any kind on the product.
11. To reduce the risk of electric shock, do **NOT** disassemble this product, but take it to a qualified serviceman when some service or repair work is required. Opening or removing covers may expose you to dangerous voltage or other risks. Incorrect reassemble can cause electric shock when the appliance is subsequently used.
12. Unplug the 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.
 - 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 when you follow the operating instructions. Adjust those controls that are covered by the operating instruction manual because improper adjustments of other controls may result in damage and will often require work by a qualified technician to restore the product to normal operation.
13. Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
14. Do **NOT** use the telephone to report a gas leak while you are in the vicinity of the leak.

TABLE OF CONTENTS

	Page
Introduction	01
System Overview	01
Equipment Summary.....	02
Central Office Requirements.....	03
Incidence of Harm.....	03
Technical Specifications	04
System Capacity	04
Power Requirements	04
Environmental Conditions	05
Cable Requirements	05
Cable (Station Loop) Length	05
Communication Links.....	05
Circuit Control	05
Number Dialing Requirements	06
Power Failure.....	06
Equipment Description.....	07
Main Cabinet (KSU)	07
Main Control Board (MCB).....	08
Power Supply Unit (PSU).....	10
Trunk Card (COU).....	11
Keyphone Card (LNU)	13
Keyphone.....	13
Single-line Telephone Card (SLU).....	14
Universal Station Card (Universal).....	15
Hardware Options	16
Backup Battery.....	16
SMDR Unit	16
Door Phone Unit	17
External Music Source	17
Paging Amplifier.....	17
External Paging Amplifier Power Control	18
Loud Bell / Music Source Power Control	18

TABLE OF CONTENTS Continued

Auto Attendant	18
Facsimile / Answering Machine	19
Modem	19
Installation Procedure	20
Precautions	20
Handling Static-Sensitive Devices	20
Installing Station Wiring	21
Connecting Power Cords	21
Complying with EMI Filter Requirements	21
Site Planning	22
Trunk Terminations	22
Power Requirements	22
Grounding Requirements	22
Environmental Requirements	23
Equipment Location	24
Unpacking and Inspecting	25
Main Cabinet (KSU) Installation	26
Installation of Cards	27
Keyphone Station Wiring	32
Station Cable	33
Installing the Keyphones	33
To Wall Mount a Keyphone	37
DSS Unit Installation	38
Off-hook Voice Announce (OHVA)	38
Optional Equipment Connections	40
External Music Source	41
External Paging Amplifier	41
Loud Bell Ringer	41
Door Phone Unit	42
Battery Backup	42

TABLE OF CONTENTS Continued

SMDR Operation	43
SMDR DIP Switch.....	44
SMDR Serial Output (RS-232C)	44
SMDR to Serial Printer Connections.....	45
SMDR Format.....	45
Explanation	46
Case Explanation.....	46
Start-Up Procedure	47
Power-Up Procedure	47
Initialisation Procedure.....	48
Battery Backup Connection	48
System Test Procedure	49
Station Equipment	49
Trunk Lines	50
Diagrams Tables	51

Introduction

- 1.01. This document describes the Atlas IIE KSX 32i hybrid PABX. It provides an overview of system configuration and system capabilities.
- 1.02. This document is separated into sections providing a detailed outline of the capabilities of the KSX 32i.

System Overview

- 2.01. The KSX 32i is a 4-wire communications system that operates as a Keyphone system or as a multi-functional PABX.
- 2.02. The system is controlled by a 16 bit 80C188XL micro-processor that performs all logical operations.
- 2.03. The system uses CMOS technology space-division switching to assure non-blocking operation.
- 2.04. The system is available in various hardware configurations. The system cabinet has a minimum capacity of 4 trunks and 8 stations expanding to a maximum capacity of 8 trunks and 24 stations. The capacity is in the form of 4 port trunk cards (COU) and 8 port station cards (LNU or SLU, or Universal). Up to 22 stations of the full capacity can be industry-standard 2500 type single-line telephones.
- 2.05. The system is electrically compatible with most types of:
 - single-line telephones
 - proprietary Keyphone sets
 - key telephone systems
 - PBX telephone systems
 - central office exchanges

Equipment Summary

- 2.06. The Main Cabinet (KSU) of the KSX 32i is modular in design. It houses the Power Supply Unit (PSU), the Main Control Board (MCB), one to two Trunk Cards (COU), and one to three Station Cards (LNU or SLU, or Universal).
- 2.07. The two Trunk Cards (COU) are stacked over the Main Control Board and the three Station Cards (LNU or SLU, or Universal) are stacked at the top of the cabinet.
- 2.08. The Main Control Board (MCB) controls all system operations and works under the control of a 16 bit 80C188XL micro-processor. The system software in EPROM and stored-program database in battery-protected RAM is located on the MCB.
- 2.09. The system can be equipped with one or two Trunk Cards (COU). Each Trunk Card supports 4 trunk interface circuits for loop-start trunk applications.
- 2.10. The system can be equipped with one, two, or three Keyphone Cards (LNU) or Universal Cards. Each Keyphone Card supports 8 Keyphone interface circuits for proprietary Keyphone connections. Each Universal card supports 8 universal interface circuits supporting either Keyphone or single-line telephones.
- 2.11. The system can be equipped with up to two Single-line Telephone Cards (SLU). Each SLU Card supports 8 industry-standard single-line telephone interface circuits. The system can only use a maximum total of three Station Cards of all types. First Station Card must be either LNU or Universal.
- 2.12. Optional equipment that can be supported by the system include:
 - Connecting terminals and control circuitry for a backup battery package.
 - Connection of a proprietary door phone unit equipped with relay control for a door lock.
 - Connection of a proprietary Station Message Detail Recording (SMDR) unit.
 - Connecting terminals and power relay control for an external music source.
 - Connecting terminals and power relay control for external paging amplifier.
 - Connecting terminals and relay control for a loud bell ringer.

Incidence of Harm

- 2.13. When practical, the telephone company must inform the customer that service may be temporarily discontinued if the equipment he is using should cause harm to the telephone network. The telephone company must attempt to inform the customer that service is to be discontinued prior to actually terminating service. The telephone company must also provide customers with an opportunity to correct the problem and must advise customers of their right to bring complaint procedures.

Central Office Requirements

Rules and regulations for the operation and installation of telephone equipment have been established. As the owner you must give the following information to the operating telephone company before connection and disconnection of system:

- Notice of your intention to use privately owned telephone equipment.
- Lines to be used by the system (tel. numbers xxx - xxx)
- Model No Atlas IIE KSX 32
FCC Registration No. DOE632-15594-MF-E
DOE TAI-61985-KF-E
Ringer Equivalency 0.2A
- The type of connection RJ-14X

Technical Specifications

System Capacity

System capacity:	Main Cabinet
Trunk lines	8
Stations (Max.)	24
Single-line Telephones (Max.)	16 if SLU (23 if Universal)

Power Requirements

Input Voltage:	110±10 Volt. 50/60Hz single phase
	220±20 Volt. 50/60Hz single phase
Power supply Output (KSU):	1) 5 Volt 2.1 Amp
	2) 24 Volt 1.5 Amp
	3) 12 Volt 0.2 Amp

Environment Conditions

Surrounding temperature : 0 - 40 °
32 - 104 °
Surrounding humidity : 10 - 85 %

Cable Requirements

Keyphone Station cable, 2-pair twisted-pair
Station loop resistance = 40 ohms max.

Single-Line Telephone Station cable, 1 pair (2 wire).
Station loop resistance = 800 ohms max.

Cable (Station Loop) Length

Keyphone	Diameter = 0.4 mm	(26 gauge)
	Max. effective length = 140 m	(460 feet)
	Diameter = 0.5 mm	(24 gauge)
	Max. effective length = 230 m	(750 feet)
	Diameter = 0.65 mm	(22 gauge)
	Max. effective length = 350 m	(1150 feet)
Single-Line Telephone	800 ohms at diameter of 0.65 mm	(22 gauge)
	Max. effective length = 1600 m	(5250 feet)

Communication Links

CMOS cross point switching
Electret transmitter
Dynamic receiver

Circuitry Control

16 bit 80C188XL micro-processor and custom designed 8051 microcomputer with multiprocessing technology.

Number Dialing Requirements

- 1) Pulse dial
 - A) Speed: 10 pps or 20 pps (programmable)
 - B) Ratio: $60\pm 3\%$ or $67\pm 3\%$ (programmable)
 - C) Pause: 1000 ms

- 2) DTMF
 - A) Frequency range:
 - High group: 1209Hz, 1336Hz, 1477Hz
 - Low group: 697Hz, 770Hz, 852Hz, 941Hz
 - B) Frequency uncertainty 1.5% and less
 - C) Tone level:
 - Low level: $-10\text{dBm}\pm 2\text{dBm}$
 - High level: $-8\text{dBm}\pm 2\text{dBm}$
 - D) Duration: 70 ms
 - E) Digit period: 70 ms

- 3) Memory dial:
 - Two types: Last Number Redial and Speed Dial
 - System speed dial: 400 (100~499) numbers
 - Station speed dial: 9 (001~009) numbers
 - Max digits per number: 16 for Station and 24 for system

Power Failure

An optional backup battery can be installed for power outage prevention. Length of time usable depends on battery capacity. During most communication situations a 24 (12 x 2) Volt 1.2 AH battery can be used for 1 hour. Battery charger is built in.

Recommended: 24 Volt Battery Pack with 3.15 Amp circuit breaker.

Equipment Description

Main Cabinet (KSU) Refer to Figure 1.

- 4.01. The KSU is housed in a convection-cooled, metal enclosure with a removable front cover. The cabinet dimensions are 280 mm wide, 675 mm high, and 105 mm deep (20 inches wide, 26.5 inches high, and 4.25 inches deep).
- 4.02. The KSU contains the Power Supply Unit (PSU), the Main Control Board (MCB), up to two Trunk Cards (COU), and up to three Station Cards (LNU or SLU, or Universal). Providing the maximum capacity of 8 trunks and 24 stations.
- 4.03. Two metal brackets are used to attach the cabinet to a vertical surface. They are attached to the back of the cabinet and positioned to extend above the top of the cabinet for access to keyhole slots for mounting screws.
- 4.04. Connections to the system are made on the inside of the cabinet, on either side of the cabinet, and on the bottom of the cabinet.

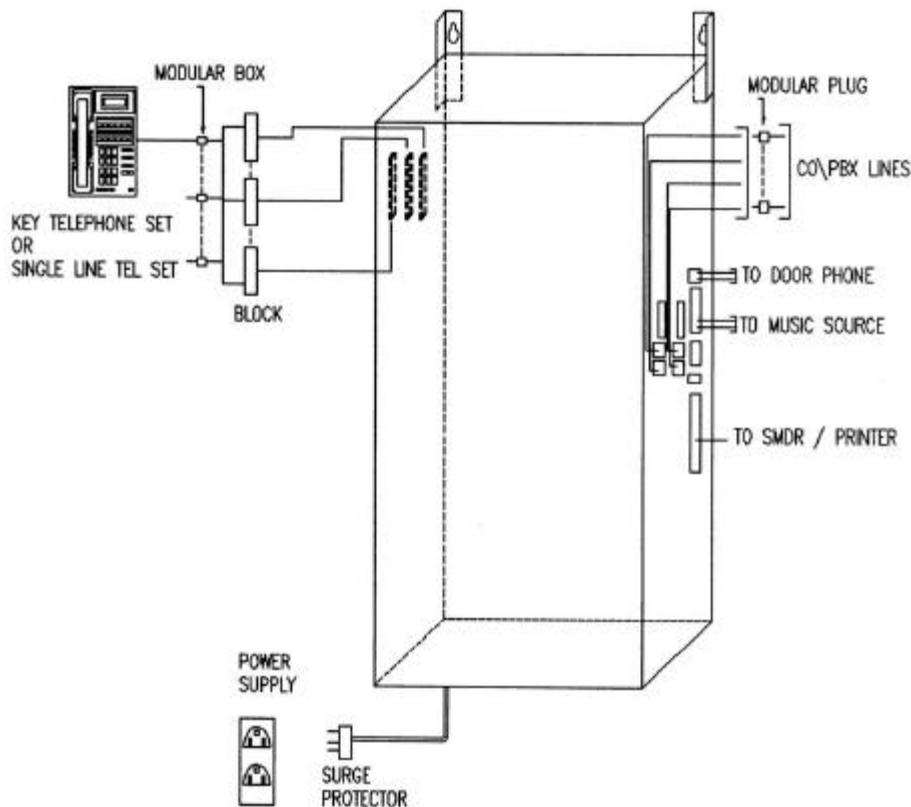


FIGURE 1:
System
Configuration

Main Control Board (MCB) Refer to Figure 2.

- 4.05. The MCB is the main controller card of the system. It performs all logical operations, call processing, and uses control signals to control the other cards in accordance with system demands.
- 4.06. The MCB uses a 20 MHz 16 bit 80C188XL micro-processor and has a memory capacity of 256Kb of ROM, and 128 Kb of RAM. The system uses a 24 MHz oscillator.
- 4.07. The system control software is in a 256 Kb EPROM (2 Mbit), which can be upgraded, and the stored-program database is in battery-protected RAM.
- 4.08. The following are located on the MCB (refer to Figure 2):
 - A) Memory battery protection and disconnect switch.
 - B) Terminal block for external connections to Loud Bell, Page, Page Relay, and External Music Source.
 - C) Ribbon cable connector to SMDR Unit.
 - D) Switch to select Music source (internal or external)
 - E) LED's indicating system operation and memory backup.
 - F) 8 element DIP switch for hardware programming.
 - G) Modular Jack for connection to external Door Phone control unit.

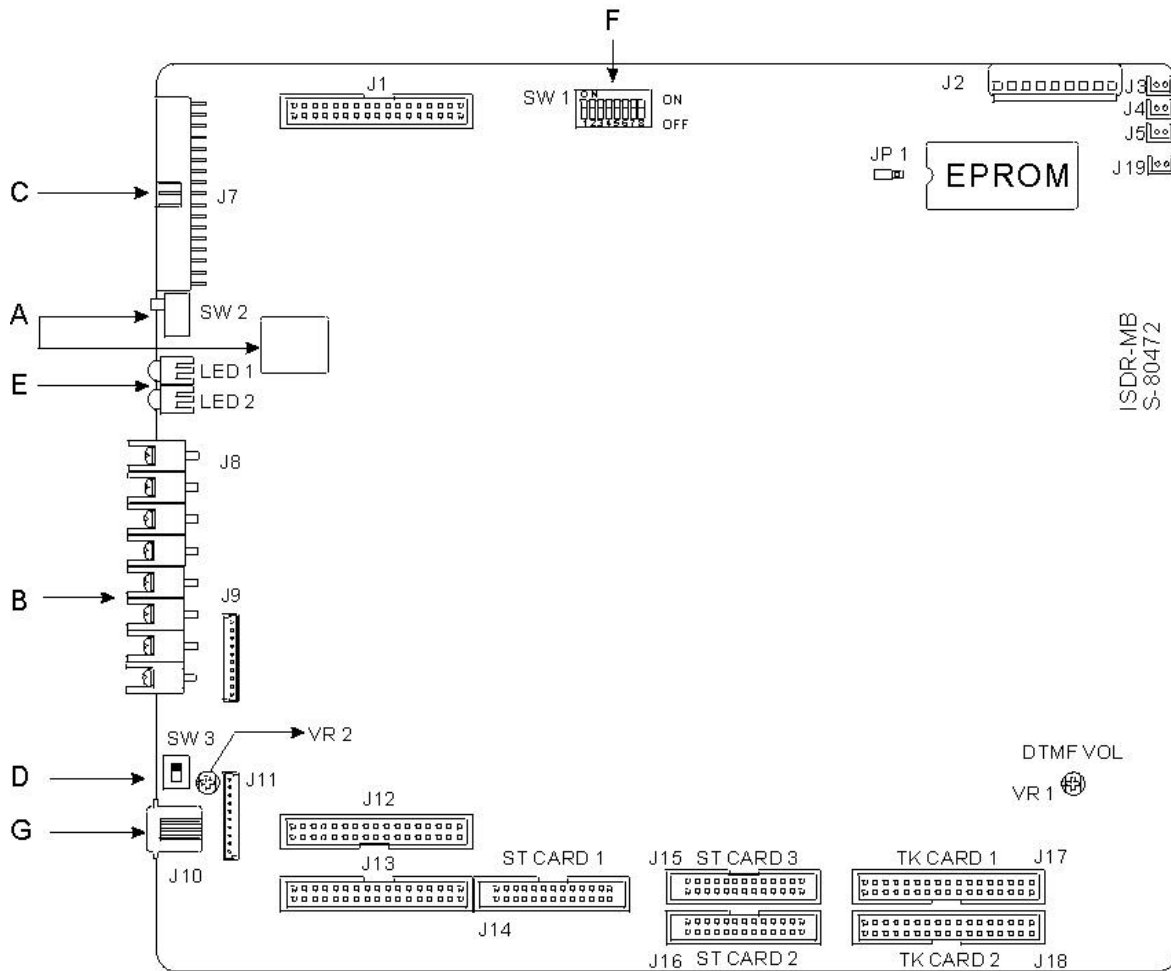


FIGURE 2: Main Control Board (MCB)

Power Supply Unit (PSU)

4.09. The power supply unit is housed in the main cabinet. The power distribution circuit must be a dedicated, single phase, 3-wire type of either 110 Volt AC (60Hz) or 220 Volt AC (50Hz). The Power Supply Unit is switchable (SW1).

WARNING! Using a incorrect voltage source may lead to permanent damage of the equipment.

4.10. The fuse protection for system circuit protection is as following.

Fuse by Power Cord connection

Power module input phased line	1.5 Amp	/ 250 Volt
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Power Supply Unit

F1	Battery input	3.15 Amp	/ 250 Volt
F2	5 Volt DC power distribution	3.15 Amp	/ 250 Volt
F3	12 Volt DC power distribution	1.6 Amp	/ 250 Volt
F4	28 Volt DC Keyphone power distribution	3.15 Amp	/ 250 Volt
F5	Single-line Telephone power distribution	1.6 Amp	/ 250 Volt

WARNING! Correct fuse replacement is essential for proper system circuit protection.

Trunk Card (COU)

- 4.11. The system can be equipped with one or two Trunk Cards (COU). Each Trunk Card supports 4 trunk interface circuits for loop-start trunk applications. Each trunk requires a 1-pair connection.
- 4.12. Each Trunk Card contains the circuitry for ring detection, DTMF and pulse dialing, and music-on-hold distribution.
- 4.13. Each trunk interface circuit includes a two-way dual amplifier. If amplification is required on the trunk, move the jumper JP1 to the 'amp' position.
- 4.14. Trunk line connections are accessible on the right side of the cabinet through modular jacks.
- 4.15. There are a number of programmable trunk functions.
 - Trunk Types: Trunks can be connected to Central Office or PABX lines (Mode 11). When connected to a PABX, the access code is ignored for toll restriction.
 - Trunk Signaling: Trunk dialing output can be DTMF or pulse (Mode 11). For pulse dialing, the pulse-per-second rate (Mode 13) and make/break ratio (Mode 14) can be set. For DTMF dialing, the tone duration is adjustable (Mode 17).
 - Flash Duration: The timed-line disconnect sent to the distant office can be set (Mode 15) for proper recognition.
 - Trunk Ringing at Loud Bell: Each trunk can be assigned to ring at the loud bell (Mode 11) for both day service and night service.
 - Trunk Access as Private Line: Each trunk can be designated as a private line (Mode 21) and assigned with access allowed only by selected stations (Mode 22). Individual trunk ringing (Mode 39, 40, 41, 42), call pickup (mode 24), and common ring night service (Mode 23) are available features.
 - Trunk Hunt Groups: Trunks can be assigned to hunt groups (1 - 8) for outgoing call access (Mode 25). Trunks are accessed in terminal or distributed mode (Mode 28). A trunk hunt group can be accessed using a dial code (Mode 27) or automatically selected at station off-hook.

- Automatic Route Selection: Trunk hunt groups can be assigned to Automatic Route Selection (ARS) call routing tables (Mode *4) to be accessed when the least expensive call route is selected.
- Trunk Ringing at Station Hunt Group: Each trunk can be set to ring a station hunt group during day service (Mode 39) and night service (Mode 40).
- Trunk Ringing at Flexible Ring Stations: Each trunk can be assigned to immediately ring at up to eight flexible ring stations during day service (Mode 41) and night service (Mode 42). Ringing can be simultaneous or ring one station at a time in a step pattern (Mode 43).
- Trunk Ring at Common Ring Stations: Up to sixteen common ring stations can be assigned to ring during day service (Mode 47) and night service (Mode 48) after a programmable delay time (Mode 46).
- Trunk Call Duration: Trunk calls can be limited to a maximum duration before they are automatically terminated (Mode 63).

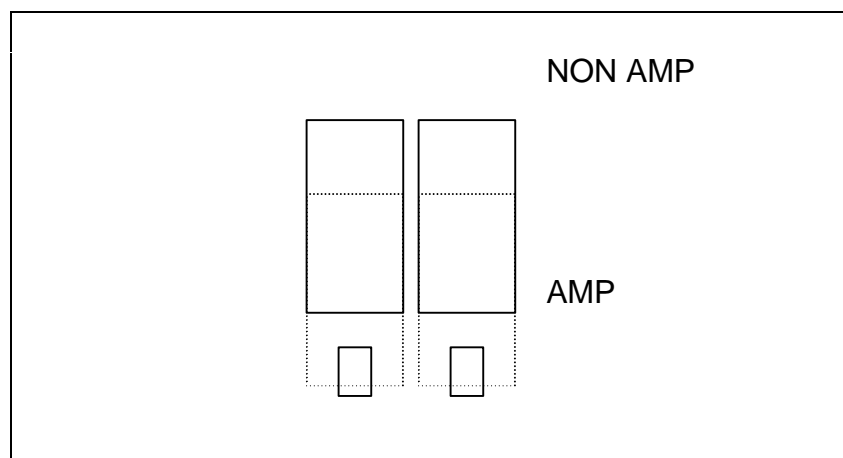


FIGURE 3: Trunk Card - Setting Amplifier

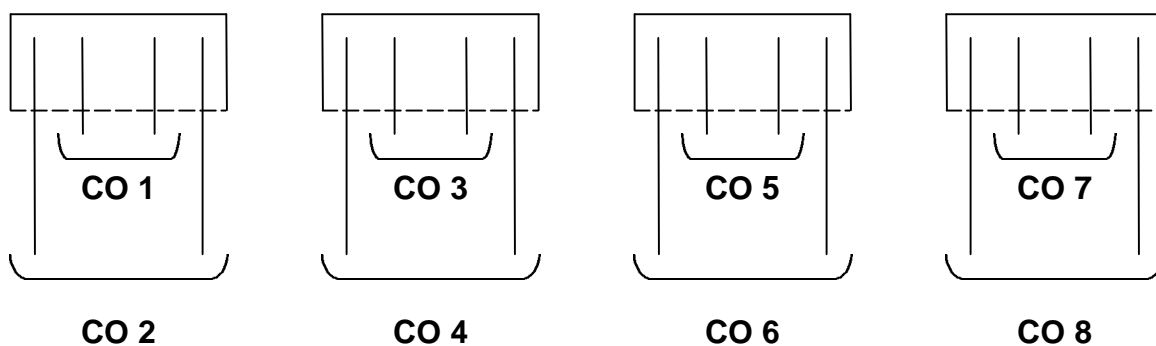


FIGURE 4: Trunk Line Modular Jack

Keyphone Card (LNU)

- 4.16. The system can be equipped with one, two, or three Keyphone Cards (LNU). Each Keyphone Card supports 8 Keyphone interface circuits for proprietary Keyphone connections. Each port requires a 2-pair connection.
- 4.17. Each Keyphone Card contains the circuitry to transmit and receive digital control signals using a proprietary data protocol, and current limiting circuits to protect against an accidental short during Keyphone installation.
- 4.18. The Keyphone Card can connect to several different types of Keyphone sets, a DSS Unit, or proprietary Auto Attendant.
- 4.19. Keyphone line connections are accessible on the left side of the cabinet through an amphenol connection.

Keyphone

- 4.20. Keyphones used with the system are proprietary to the Atlas IIE range of systems. They are micro-processor controlled and have a high degree of functionality.
- 4.21. All Keyphones have softkeys equipped with dual-color LEDs (red & green) which can be programmed for a range of features. There are also set function keys, which have a range of common uses.
- 4.22. All Keyphones are equipped with a speaker and microphone for handsfree operation and Executive Keyphones have full speakerphone capability. However handsfree operation may be limited in environments with a high noise level.
- 4.23. A Keyphone allows full program access to the system and there are a number of programmable station functions.
 - Operator Console: A Keyphone can be designated as the system operator console (Mode 31). The operator console has parameters for incoming call ringing (Mode 44), hold recall (Mode 07), system hold recall delay (Mode 34), and system hold recall release (Mode 35).
 - Second Operator Console: A second station can optionally be designated as a backup system operator console (Mode 32). The second operator console has parameters for incoming call ringing (Mode 45), and second operator console delay (Mode 33).
 - Station Numbers: Each station can be assigned a unique station number for intercom calling and identification (Mode 70). Each station number can be one, two, three, or four digits.
 - Station Hunt Groups: Stations can be assigned to hunt groups (1 - 7) for trunk

ringing and idle station access (Mode 67). Stations are accessed in terminal or distributed mode (Mode 68). A station hunt group can be accessed using a dial code. The operator console destination can also be set to a station hunt group (Mode 69).

- Softkey Programming: Each Keyphone has a different softkey plan which can be programmed for direct trunk selection, trunk hunt group access, direct station selection, and one-touch speed dial (Mode 73).
- Automatic Outside Line: Stations can be assigned to automatically access an idle trunk (Mode 03) from an assigned trunk hunt group (Mode 74) when going off-hook.
- Intercom Calling: A Keyphone can be assigned to automatically turn the speaker on, for voice announce calls. The microphone can also be assigned to automatically turn on for immediate response.
- Call Pickup: A station has three options when answering a call ringing on another station in the system. There is a general system pickup, a station group pickup, and a direct station pickup.
- Locking a Station: Stations can be set by the use to restrict usage. When locked a station can only make intercom calls and answer incoming calls that ring on the station.
- DSS Unit: A Keyphone can be accompanied by one or two DSS units which occupy the following Keyphone ports. The softkeys on the DSS unit can be programmed for direct trunk selection, direct station selection, or one-touch speed dial (Mode 73).

Single-line telephone Card (SLU)

- 4.24. The system can be equipped with up to two Single-line Telephone Cards (SLU). Each SLU Card supports 8 industry-standard single-line telephone (2500 type) interface circuits. SLU Cards can only be used as the second and third Station Card, the first must be Keyphone (LNU). Each port requires a 1-pair connection.
- 4.25. Each SLU Card contains the circuitry for two DTMF receivers allowing two single-line telephone ports to receive dial tone simultaneously. While pulse dialing is supported on all ports.
- 4.26. Single-line telephone line connections are accessible on the left side of the cabinet through an amphenol connection.
- 4.27. There are a number of programmable station functions available for single-line telephone ports.

- House Phone: A station can be designated as a house phone (Mode 03) which automatically calls the operator console when going off-hook.
- Door Phone: A station can be designated as a door phone (Mode 03) which rings all station assigned to ring for the door phone (Mode 03) when going off-hook.
- Voice Mail Port: A station can be designated as a voice mail port (Mode 03) to work with a connected voice mail system.
- Paging Port: A single-line telephone port can be designated as a zone paging port (Mode 89) to used in addition to the built-in paging port.

Universal Station Card (Universal)

- 4.28. The system can be equipped with one, two, or three Universal Station Cards (Universal). Each Universal Card supports 8 universal interface circuits for connection to proprietary Keyphones or to industry standard single-line telephones. Each port requires a 2-pair connection for Keyphone or 1-pair connection for single-line telephone.
- 4.29. Each Universal Card contains the circuitry to transmit and receive digital control signals using a proprietary data protocol, and current limiting circuits to protect against an accidental short during Keyphone installation. Each Universal Card also contains the circuitry for two DTMF receivers allowing two single-line telephone ports to receive dial tone simultaneously.
- 4.30. Universal station connections are accessible on the left side of the cabinet through an amphenol connection.

Hardware Options

- 5.01. The KSX 32i has a variety of different hardware options for additional equipment that can be attached to the system to provide greater functionality.

Backup Battery

- 5.02. The system power supply (PSU) supports a backup battery package rated at 24 (12 x 2) Volt 1.2 AH. A trickle-charge circuit maintains the battery at 95% efficiency, applies system cut over to battery when main power is removed, and provides system shutdown when battery power falls below a specified level.
- 5.03. The battery leads connect at terminals located on the power supply unit card inside the cabinet. Length of time system operation is maintained under battery power depends on battery capacity. Normal life expectancy for a 24 volt battery is 1 hour.

SMDR Unit Refer to Figure 15.

- 5.04. The SMDR unit is an optional proprietary unit for providing Station Message Detail Records. The SMDR unit is a small box and the dimensions are 128 mm wide, 260 mm high, and 60 mm deep (5.25 inches wide, 10.75 inches high, and 2.5 inches deep). It connects to the right side of the main cabinet and is placed outside the system.
- 5.05. The SMDR unit allows the user to analyze the systems telephone activity. The information is provided through either a parallel or serial port connection to a printer or computer. This information includes station number, trunk, telephone number dialed, account code, day and month, start time, duration and ring time.
- 5.06. The output of the SMDR unit is programmed by an 8 element DIP switch located on the SMDR unit and by system programming.

Door Phone Unit

- 5.07. The door phone unit is an optional proprietary unit that has a dedicated 6-pin modular jack connection on the right side of the cabinet. The door phone unit consists of a control box and a door phone box. The door phone box contains a speaker, a microphone, and a push-to-signal button.
- 5.08. When the signal button on the door phone box is pressed, all station assigned to ring for the door phone (Mode 03) will ring. When a station answers, the door phone user can converse handsfree with the answering station.
- 5.09. The control box contains a relay for control of a door lock. When a door lock is installed it can be controlled by pressing '0' when conversing with the door phone.

External Music Source

- 5.10. The system can support a customer-supplied music source. The optional external source is connected at the optional equipment terminal block (MOHS) located on the right side of the cabinet. The impedance of the music source must be less than 32 ohms with a power level of approximately 100 mW.
- 5.11. When an external music source is connected to the system, set to external using the music select switch located on the MCB.

Note: In some cases there may be broadcast restrictions associated with the use of the external music source. Check with the music's original distributor and/or the radio station for copyright and broadcast restrictions concerning background music and music-on-hold.

Paging Amplifier

- 5.12. The system can support a customer-supplied paging amplifier for paging zone 8. The optional page amplifier is connected at the optional equipment terminal block (PAGE) located on the right side of the cabinet.
- 5.13. The page output is for zone 8. The output for zones 1 - 7 must be connected through station ports assigned by system programming (Mode 89).

External Paging Amplifier Power Control

- 5.14. When the system is equipped with an external paging amplifier for page zone 8, it is possible to use a power control relay to turn the paging amplifier off when not in use. The optional paging amplifier power control is connected at the optional equipment terminal block (CK1) located on the right side of the cabinet. The power control relay is rated at a maximum of 3 amperes.
- 5.15. In the default state, the relay is open. When a paging call is made to page zone 8, the relay closes, enabling the power circuit to the external paging amplifier. When the paging call is terminated, the relay opens, disconnecting the power circuit.

Loud Bell / Music Source Power Control

- 5.16. The system has a power control relay which support two options. The function of the power control relay is set by element 2 of the system DIP switch located on the MCB. The optional power control is connected at the optional equipment terminal block (CK2) located on the right side of the cabinet. In the default state, the relay is open.
- 5.17. When DIP switch element 2 is set ON, it is used as Dry Contact closure for power control relay for a loud bell which rings for incoming calls, etc. When an incoming call is ringing the system, the relay closes, enabling the power circuit to the loud bell. When the incoming call is answered or the ringing stops, the relay opens, disconnecting the power circuit. Each trunk can be set to ring the loud bell in system programming (Mode 18).
- 5.18. When DIP switch element 2 is set OFF, it is used as Dry Contact closure for the external music source, etc. When background music or music-on-hold is used, the relay closes, enabling the power circuit to the external music source. When the music is not required, the relay opens, disconnecting the power circuit.

Auto Attendant

- 5.19. The system can be equipped with a proprietary Auto Attendant unit to respond to incoming calls and direct them to a station from a hunt group, an individual station, or the operator console. The auto attendant occupies a Keyphone port and requires a 2-pair connection.

Facsimile / Answering Machine

- 5.20. Facsimile and answering machines can be connected to single-line telephone ports and arranged for automatic answer of incoming calls.
- 5.21. Incoming calls can be assigned to ring them for day and/or night service. They can be assigned to ring for specific trunks using flexible ring (Mode 41 and 42), or for all trunks using common ring (Mode 47 and 48). If there are multiply facsimile or answering machines, assign specific lines to ring at specific machines or select a machine from a station hunt group (Mode 67) and set it to ring (Mode 39 and 40).
- 5.22. Outgoing calls can be set to one line exclusively, or simply any available line. Automatic outside line (Mode 03) can be used to automatically access an idle trunk from an assigned trunk hunt group (Mode 74) when the machine goes off-hook.

Modem

- 5.23. Single-line telephone ports can support the use of a PC modem. This enables both internal and external data communications.
- 5.24. The normal maximum speed for modem transmission is 9600 baud depending on the quality of the Central Office connection.

Installation Procedure

6.01. The installation procedure of the KSX 32i is very important. Incorrect installation will not only cause the system to not function correctly, but also lead to permanent damage of the equipment. Installation must be done by experienced personnel trained to install the system.

Precautions

6.02. There are a number of precautions which should be observed to safeguard the installer, the system equipment, and the users of the equipment. Please observe all these precautions at all times when handling the equipment.

Handling Static-Sensitive Devices

WARNING! The system equipment contains static-sensitive components. Handling of printed circuit boards and wiring requires knowledge of proper handling techniques, and the use of safeguard equipment necessary for protecting static-sensitive devices.

6.03. Static electricity can easily accumulate a high-voltage charge in the human body. Precautions must be taken to prevent this charge from damaging static-sensitive devices.

- Touch the cabinet (or similarly-grounded item) to dissipate any stored charge immediately before removing, inserting, or otherwise handling a system card or static-sensitive device.
- Hold the system card by the edge and avoid touching component pins or edge connectors.
- Cover work surfaces with conductive material connected to earth ground. A ground clip connected to a static-protective shipping bag provides an adequately protective work surface.
- Use flexible ground straps to continuously discharge static electricity.
- Store system cards in static-protective shipping bags.

Installing Station Wiring

DANGER: TO REDUCE THE RISK OF ELECTRICAL SHOCK AND PERSONAL INJURY, USE CARE WHEN INSTALLING STATION WIRING.

6.04. Observe the following precautions when installing station wiring:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Connecting Power Cords

WARNING! Do not attach power supply cords to building surfaces.

6.05. The basic system is supplied with a detachable power supply cord. The cord should be dressed for appearance and safety, but never attached to the building surface.

Complying with EMI Filter Requirements

Caution! This equipment has been tested and found to comply with requirements, designed to provide reasonable protection against radio frequency energy when operated in a commercial environment.

6.06. The front panel cover for the cabinet is designed to meet EMI filter requirements when installed and secured to the cabinet using retaining screws. Prior to operation, the front panel cover must be installed and secured in place using the retaining screws.

Site Planning

- 6.07. In selecting a suitable system installation site, requirements for facilities availability, primary power, grounding, and equipment accessibility are important considerations. The following are important considerations for site preparation and installation planning.

Trunk Terminations

- 6.08. All trunk lines connect to the system through modular jacks located on the right side of the main cabinet. All lines should be terminated in modular jacks within 1.8 m (6 feet) of the main cabinet.

Power Requirements

- 6.09. Main power for the system must be available through standard AC receptacles located within 1.8 m (6 feet) of the bottom of the cabinet. Separate AC outlets for the music source or paging amplifier if installed.
- 6.10. The power distribution circuit must be a dedicated, single phase, 3-wire type, protected by a dedicated 1.5 Amp circuit breaker for 110 / 220 Volt AC. The third-wire grounding conductor of the power distribution circuits must be connected to the single-point grounding bus in the power distribution panel. The circuit must be free of any type of switching device between the circuit breaker and the AC receptacle, and it must not be shared with any other equipment.

Grounding Requirements

WARNING! To avoid equipment damage, do not attempt to connect or operate the equipment before a proper ground has been installed.

- 6.11. An approved earth ground must be located within 7.5 m (25 feet) of the main cabinet. It is important that all grounding connections comply with the system grounding scheme. Improper grounding techniques can impair operation, causing maintenance problems.
- 6.12. The ground wire used for chassis ground must be #12 AWG, or larger, standard copper wire. Ground wire used for single-point ground must conform to local building codes. There is a ground lug located on inside of the KSU.

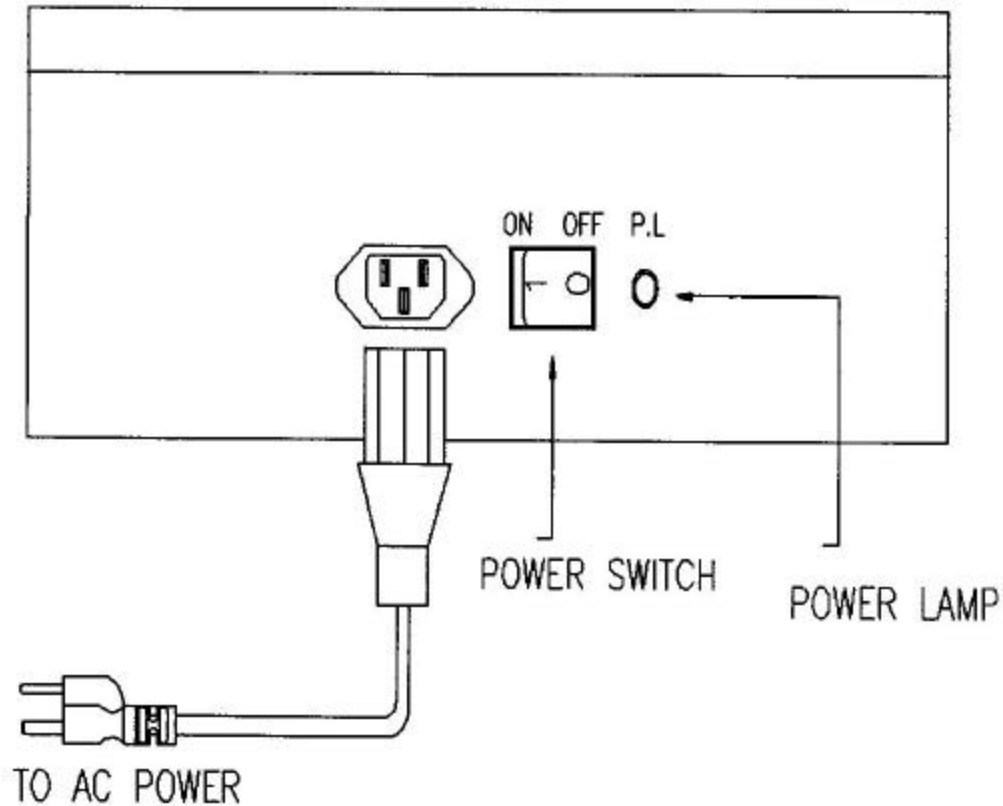


FIGURE 5: Power Connection and Cable

Environmental Requirements

Caution! *The equipment is susceptible to RFI (Radio Frequency Interference). Use of the system in strong RF fields may cause operational difficulties. Avoid installation near radio and television transmitting equipment, or in buildings adjacent to broadcast antennas.*

- 6.13. The selected location for the equipment and MDF should be clean (no dust), dry, static-free (grounded or not carpeted), away from direct sunlight, well ventilated, temperature within the range of 0-40° (32-100°), 10 - 85% relative, non-condensing humidity, and accessible only to authorized personnel.

6.14. The following locations are to avoided as installation sites:

- In an extremely dusty atmosphere.
- Areas with extremes of temperature or humidity.
- Near heat-producing or steam-producing equipment.
- Near a passageway or aisle used for moving machinery or vehicles.
- Away from utility or building maintenance areas.
- Near a reproduction or copying machine, microwave ovens, electric welding equipment, or near strong magnetic or RF fields.

Equipment Location

6.15. The equipment area should be large enough to house the equipment backboard. The backboard will contain the cabinet and MDF. There must be sufficient space for routing cables, servicing the equipment, and possible future expansion.

WARNING! The area should not be carpeted or have curtains or other material that may generate static electricity. See Environmental Requirements in this section.

6.16. The main cabinet is designed for wall mounting and must be installed so that it is suspended from a vertical supporting surface. The cabinet should be mounted on a backboard. A backboard of 1.2 m by 1.2 m (48 x 48 inches) is the minimum size recommended for a full capacity system.

6.17. The wall-mounting screws used to attach the cabinet to the backboard must be located 260 mm (10-3/16 inches) on horizontal center and must be a minimum of 710 mm (28 inches) above any obstruction.

6.18. Optional equipment should be located near the cabinet. The optional equipment requires space for installing, so allow ample space when positioning the main cabinet. Consider the heat generated by the equipment when calculating cooling requirements.

Unpacking and inspecting

- 6.19. The system is packaged for shipment with all equipment installed in the cabinet. The system package also contains a power supply cord and a copy of the system documentation.
- 6.20. All equipment is packaged in corrugated cardboard containers. All equipment options are packaged separately in individual cartons. Each telephone is packaged separately in an individual carton. However, an outer slip or larger container may be used to group quantities of telephones.
- 6.21. Check all items received against the packing slip. Examine cartons for visual signs of damage. If cartons appear to be damaged, make a note of such damage on the packing slip and on the carrier way bill, if available.
- 6.22. Open the carton containing the main cabinet (KSU). Remove the packaging material from the carton. Remove the cabinet and lay it face-up on a level work surface. Check the exterior of the cabinet. Make a note of any damages.
- 6.23. Observing electronic equipment handling precautions, remove each piece of equipment from its shipping container. As each item is unpacked, place it on a level work surface. Remove packaging material and inspect the equipment for physical damage. Make a note of any damages.
- 6.24. Report all damages noted to your supplier or distributor.

Main Cabinet (KSU) Installation

- 6.25. Mount the main cabinet so that all cables and power cords are neatly arranged. Do not mount the cabinet directly on masonry, concrete, or other wall surfaces subject to moisture or condensation. Use a plywood backup board. Locate the two mounting hardware screws 260 mm (10 1/4 inches) apart on-center and assure a minimum of 700 mm (27 1/2 inches) above any obstruction.

Note: The recommended screw size for attaching the cabinet wall mounting brackets on a 20 mm plywood backboard is 6 mm x 19 mm (#10 x 3/4 inches) pan-head screws.

- 6.26. Immediately connect the main cabinet to an approved earth ground facility, using a #12 AWG or larger stranded copper wire of sufficient length. A ground post is

located on the bottom of the main cabinet to ensure the system is properly grounded.

- 6.27. Adjust the wall mounting brackets on the main cabinet, using the ten 3 mm x 6 mm screws. The two keyhole slots for hanging the brackets should be above the main cabinet. The power switch and power cable should be at the bottom of the cabinet. Once the brackets are set, simply hang the unit using the two mounting screws on the wall or prepared backboard.

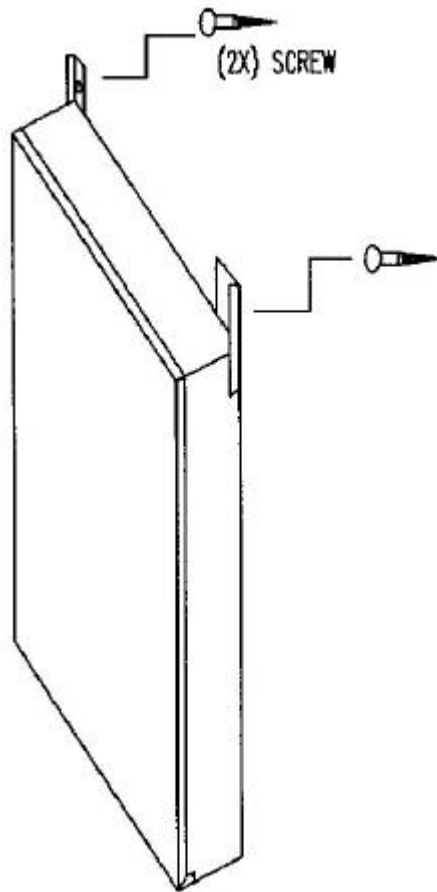


FIGURE 6: Mounting the Main Cabinet (KSU)

Installation of Cards

6.28. The main cabinet (KSU) provides the maximum capacity of 8 trunks and 24 stations (2 Trunk Cards and 3 Station Cards).

WARNING! Before installing or removing cards, make sure the power is switched OFF!

6.29. The Main Control Board (MCB) is fixed to the bottom of the main cabinet. Next up is a Trunk Card (COU) and then a second Trunk Card (COU). These cards are stacked in a vertical fashion and secured using four copper studs and all connections are run directly to the exterior of the cabinet. Each Trunk Card (COU) has a single flat cable that must be connected in the correct way for the Trunk Cards to work correct.

6.30. Above the Main Control Board (MCB) are positions designed for holding up to three Station Cards stacked in a vertical fashion and secured using four copper studs. All connections can be run directly to the exterior of the cabinet. The Station Cards must line up so that the amphenol connector for connection to Keyphone or Single-line stations fits securely into the hole in the left side of the expansion module. Attach the appropriate ribbon cables. (Refer to Figure 7)

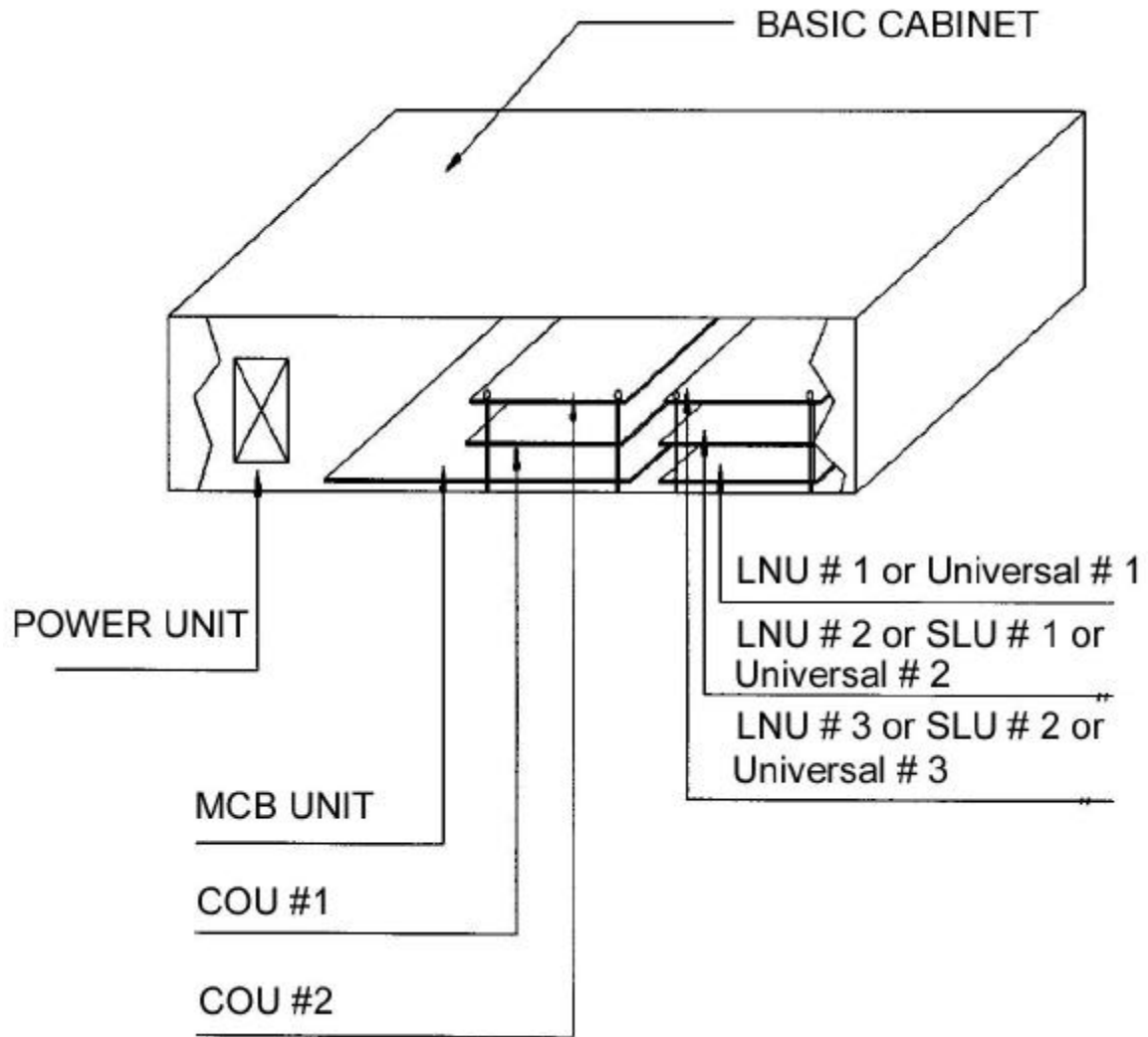


FIGURE 7: Card Installation

6.31. The three Station Cards can be any card combination of Keyphone (LNU), Single-line Telephone (SLU), or Universal. The exception being the first (bottom of stack) must be either Keyphone (LNU) or Universal. The common ribbon cable requires that any Universal Card be installed at the bottom of the stack to ease installation.

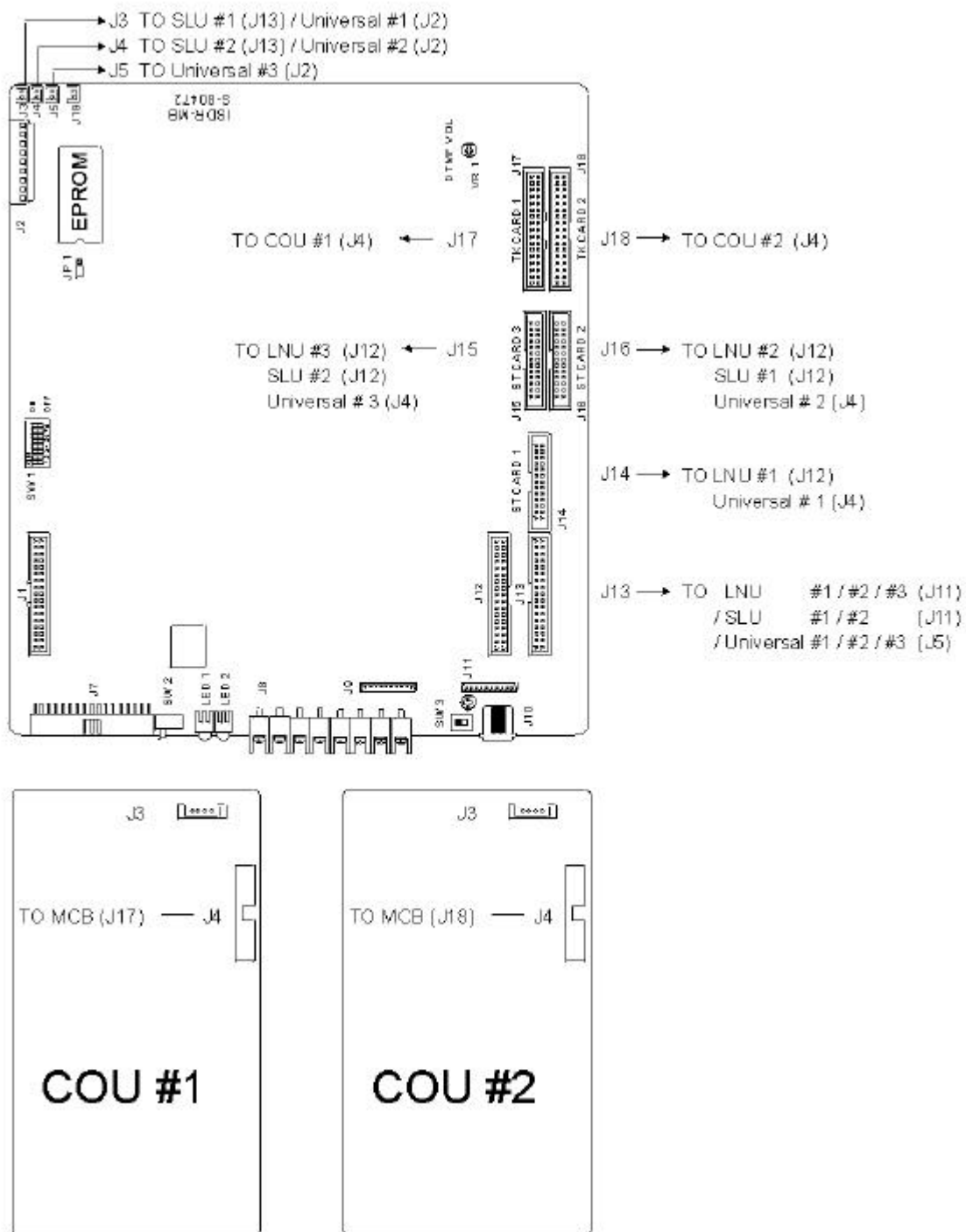


FIGURE 8: Main Control Board (MCB) and COU Cable Attachments

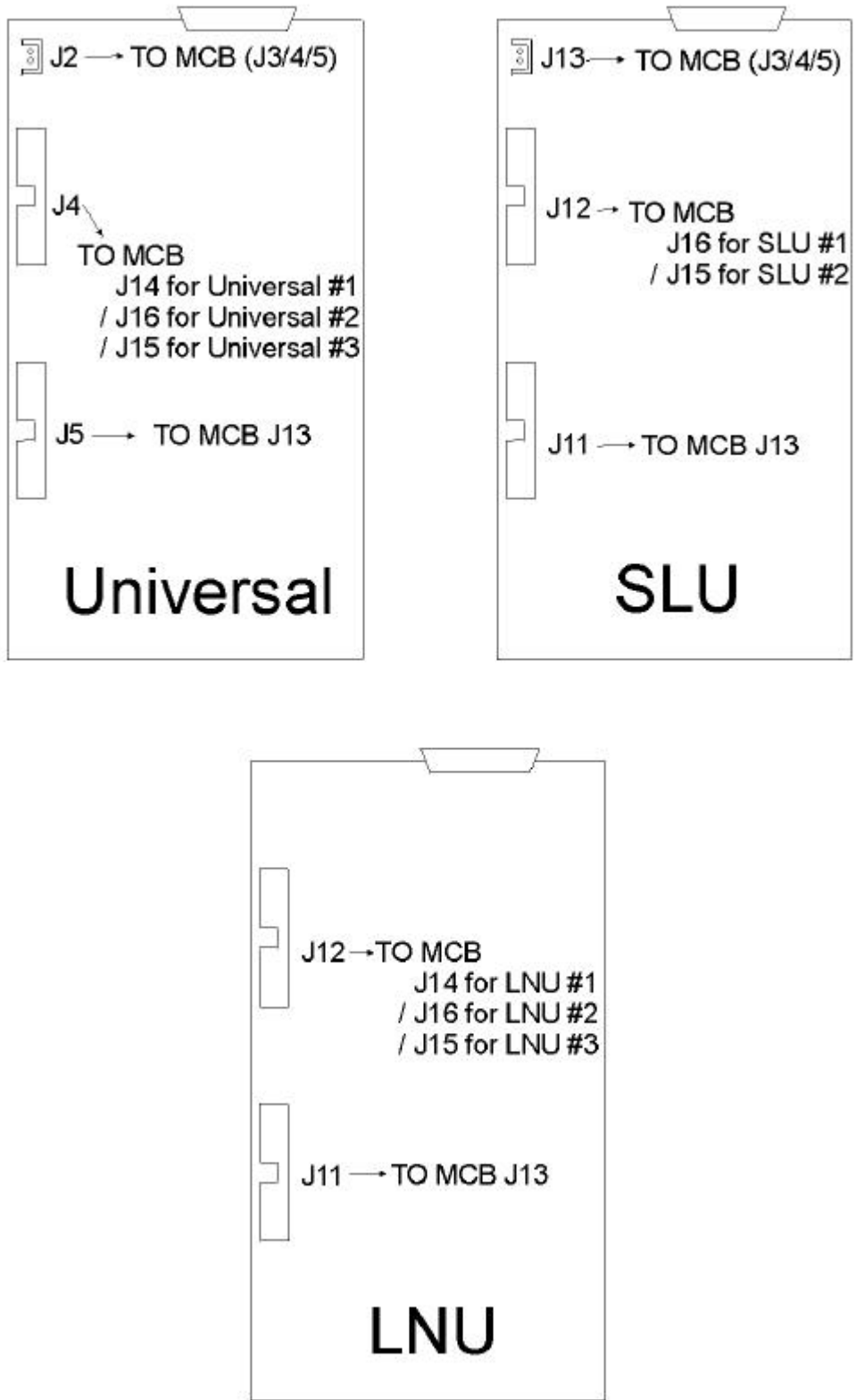


FIGURE 9: Station Card Cable Attachments

6.32. All Trunk and Station cards must be connected to the Main Control Board (MCB).

Trunk Cards (COU)

Each COU card connects to the MCB via a 34 pin flat cable.

J4 on COU #1 connects to J17 on MCB

J4 on COU #2 connects to J18 on MCB

The first COU card must be connected to J17.

Station Cards (LNU, SLU and Universal)

There is a common cable which connects the MCB to all Station cards installed in the system. The cable is a 34 pin flat cable with 4 evenly spaced connectors. Placing Universal cards at bottom of Station card stack makes it easier to install the common cable.

Common cable connects to J13 on MCB

Common cable connects to J11 on LNU (if installed)

Common cable connects to J11 on SLU (if installed)

Common cable connects to J5 on Universal (if installed)

Each Station card installed requires an individual 26-pin flat cable, which connects to the MCB. This cable controls the configuration order for the stations in the system. A Keyphone (LNU) or Universal Card must be connected as the first Station Card.

First Station card:

J14 on MCB connects to J12 on LNU or J4 on Universal

Second Station card (if installed):

J16 on MCB connects to J12 on LNU, J12 on SLU, or J4 on Universal

Third Station card (if installed):

J15 on MCB connects to J12 on LNU, J12 on SLU, or J4 on Universal

Each Single-line Telephone (SLU) card and Universal card installed requires a Ring Strap (2-wire) to provide Ring voltage to the cards.

3 connectors J3, J4 J5 on MCB provide ring voltage

Ring strap connects to J2 on Universal

Ring strap connects to J13 on SLU

Keyphone Station Wiring

- 6.33. All stations are line run to common 66 type connecting blocks. Keyphones require 2-pair twisted-pair industry standard cable. The maximum cable length is 350 m (1150 feet) with 0.65 mm (22 gauge) wire, 230 m (750 feet) with 0.5 mm (24 gauge) wire, and 140 m (460 feet) with 0.4 mm wire (26 gauge). Single-line telephones can use a cable length of up to 1600 m (5250 feet) using 0.65 mm (22 gauge) cable.
- 6.34. Each Keyphone is supplied with a four-wire, fully modular line cord. A 625 QA jack assembly or equivalent should be mounted where each telephone will be installed. Cable pairs should not be crossed or get reversed during installation. Polarity must be maintained for correct operation of Keyphones.

Station Cable

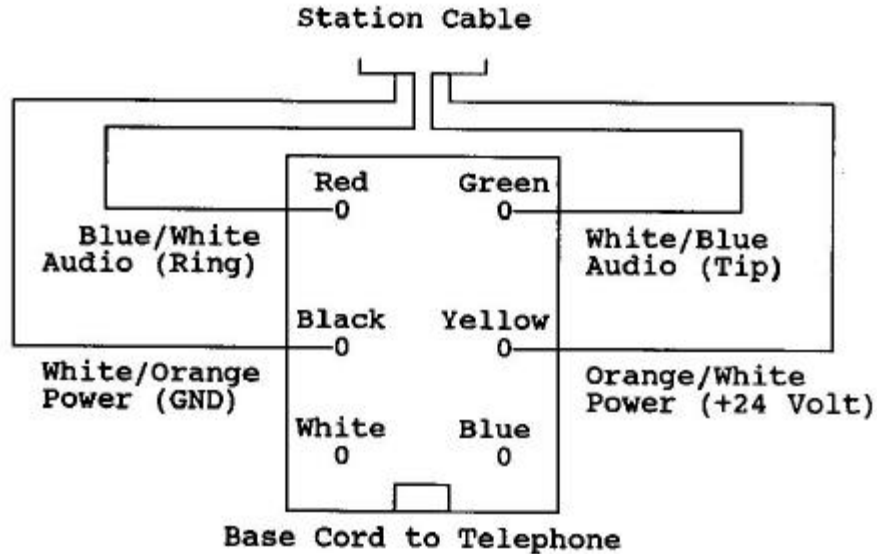


FIGURE 10: Wiring to Modular Box

- 6.35. Connections from the blocks to the KSU are made using 25-pair cable with amphenol connectors. The connectors can be attached directly to the KSU on one end and the block on the other.
- 6.36. Some guidelines for running station cable:
- Avoid cable runs parallel to fluorescent light fixtures or power lines. 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 a reproduction or copying machine, microwave ovens, electric welding equipment, or near strong magnetic or RF fields.
 - DO NOT place station cables where they can be stepped on, or rolled over by office chairs.

Installing the Keyphones

- 6.38. Unpack and inspect each Keyphone for damage. In each Keyphone box, there should be a Keyphone, a 1.8 m (12 foot) line cord, a coiled handset cord, and a handset. Connect the coiled handset cord to the handset and to the side of the Keyphone.

6.39. Before connecting the Keyphone to the modular jack, check for the correct voltage (24 Volt) across the black and yellow terminals on each modular jack assembly. (Refer to Figure 10)

WARNING! If the black and yellow pair is reversed, the Keyphone will not function.

6.40. Install the Keyphones by plugging the 1.8 m (12 foot) base cord into the back of the Keyphone and also into the modular wall jack assembly.

Note: If the Keyphone is equipped with an LCD display then the day, date, time, and station number will appear on the display.

Table I: Keyphone Block Connections

25-PAIR CABLE		CONNECTING BLOCK		STATION CABLE	LINE CORD	STATION NO.
PIN	COLOR CODE	TERM	FUNCTION	2 PR CABLE	TEL.	
26	WHT-BLU	1	Tip	WHT-BLU	GRN	STATION 1
1	BLU-WHT	2	Ring	BLU-WHT	RED	
27	WHT-ORN	3	DA1R	WHT-ORN	BLK	
2	ORN-WHT	4	DA1T	ORN-WHT	YEL	
28	WHT-GRN	5	Tip	WHT-BLU	GRN	STATION 2
3	GRN-WHT	6	Ring	BLU-WHT	RED	
29	WHT-BRN	7	DA2R	WHT-ORN	BLK	
4	BRN-WHT	8	DA2T	ORN-WHT	YEL	
30	WHT-SLT	9	Tip	WHT-BLU	GRN	STATION 3
5	SLT-WHT	10	Ring	BLU-WHT	RED	
31	RED-BLU	11	DA3R	WHT-ORN	BLK	
6	BLU-RED	12	DA3T	ORN-WHT	YEL	
32	RED-ORN	13	Tip	WHT-BLU	GRN	STATION 4
7	ORN-RED	14	Ring	BLU-WHT	RED	
33	RED-GRN	15	DA4R	WHT-ORN	BLK	
8	GRN-RED	16	DA4T	ORN-WHT	YEL	
34	RED-BRN	17	Tip	WHT-BLU	GRN	STATION 5
9	BRN-RED	18	Ring	BLU-WHT	RED	
35	RED-SLT	19	DA5R	WHT-ORN	BLK	
10	SLT-RED	20	DA5T	ORN-WHT	YEL	
36	BLK-BLU	21	Tip	WHT-BLU	GRN	STATION 6
11	BLU-BLK	22	Ring	BLU-WHT	RED	
37	BLK-ORN	23	DA6R	WHT-ORN	BLK	
12	ORN-BLK	24	DA6T	ORN-WHT	YEL	
38	BLK-GRN	25	Tip	WHT-BLU	GRN	STATION 7
13	GRN-BLK	26	Ring	BLU-WHT	RED	
39	BLK-BRN	27	DA7R	WHT-ORN	BLK	
14	BRN-BLK	28	DA7T	ORN-WHT	YEL	
40	BLK-SLT	29	Tip	WHT-BLU	GRN	STATION 8
15	SLT-BLK	30	Ring	BLU-WHT	RED	
41	YEL-BLU	31	DA8R	WHT-ORN	BLK	
16	BLU-YEL	32	DA8T	ORN-WHT	YEL	

Table II: Single-Line Telephone Block Connections

25-PAIR CABLE		CONNECTING BLOCK		STATION NO.
CONN PIN	COLOR CODE	BLOCK TERM.	FUNCTION	
26 1 27 2	WHT-BLU BLU-WHT WHT-ORANGE ORANGE-WHT	1 2	Tip Ring	STATION 1
28 3 29 4	WHT-GRN GRN-WHT WHT-BRN BRN-WHT	5 6	Tip Ring	
30 5 31 6	WHT-SLT SLT-WHT RED-BLU BLU-RED	9 10	Tip Ring	STATION 3
32 7 33 8	RED-ORANGE ORANGE-RED RED-GRN GRN-RED	13 14	Tip Ring	
34 9 35 10	RED-BRN BRN-RED RED-SLT SLT-RED	17 18	Tip Ring	STATION 5
36 11 37 12	BLK-BLU BLU-BLK BLK-ORANGE ORANGE-BLK	21 22	Tip Ring	
38 13 39 14	BLK-GRN GRN-BLK BLK-BRN BRN-BLK	25 26	Tip Ring	STATION 7
40 15 41 16	BLK-SLT SLT-BLK YEL-BLU BLU-YEL	29 30	Tip Ring	

To Wall Mount a Keyphone

6.41. A base stand is used to wall mount a Keyphone. (Refer to Figures 12 and 13)

- Position the base stand on the wall where the Keyphone is to be located with the large wedge down, and mark on the wall the location of the two keyhole slots.
- Install a 6 mm x 12 mm (#8 x 0.5 inch) pan-head screw at each marked location. Partially tighten the screws leaving approximately 6 to 8 mm protruding (approx. 0.25 inch).
- Attach the base stand to the underside of the Keyphone with the large wedge down. Position the Keyphone over the two mounting screws, with the screws inserted into the large slots in the keyholes. Slide the Keyphone down until it is tight and stable. Adjust the handset hanger clip.

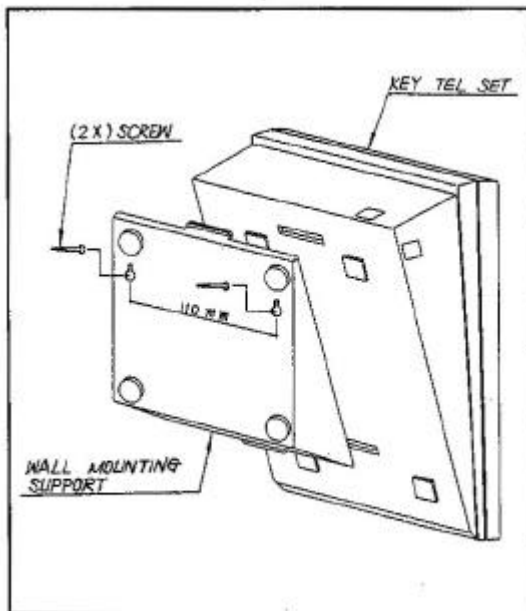


FIGURE 11: Mounting the Keyphone

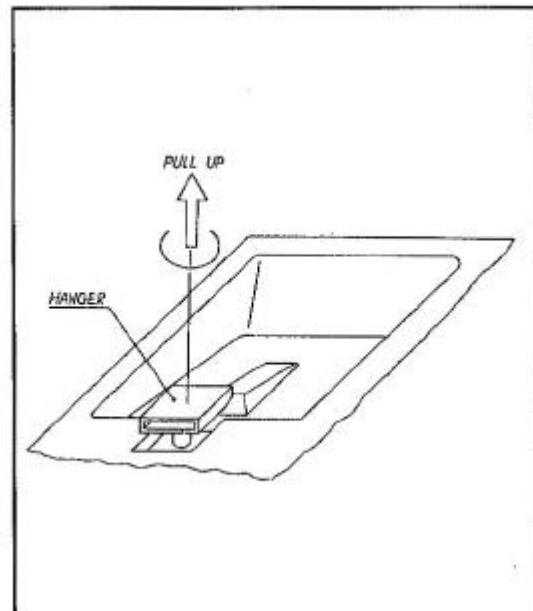


FIGURE 12: Adjusting the Clip

DSS Unit Installation

6.42. The installation of a DSS Unit requires one Keyphone port. The DSS Unit is installed in the adjacent Keyphone port along from the Keyphone which the DSS Unit will work with.

e.g. Keyphone is port 11, then DSS Unit is port 12. Keyphone is port 18, then DSS Unit is port 19.

Refer to the Programming Guide - (Mode 37) DSS Unit Key Plan and (Mode 38) Second DSS Unit Key Plan.

Off-hook Voice Announce (OHVA)

6.43. Off-hook Voice Announce with Answer Back allows for calls to be announced while the user is on-line. The OHVA module takes an additional port on the station card and two extra wires in the base cord. There may be a maximum of 4 OHVA Keyphones per Keyphone Card (LNU).

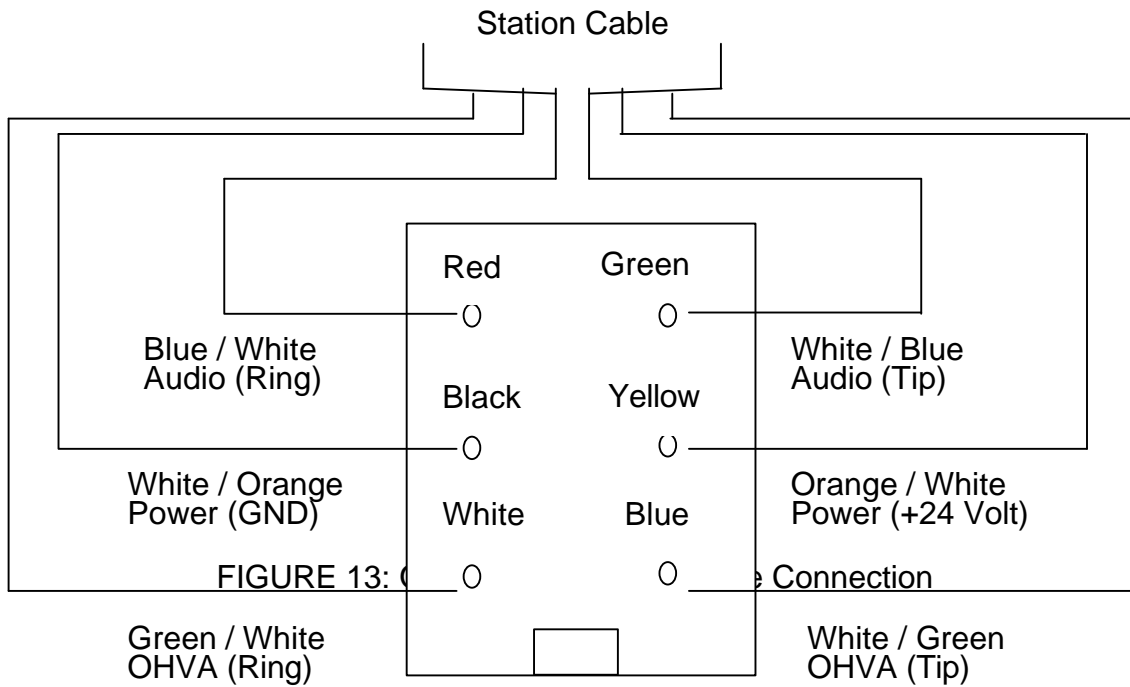
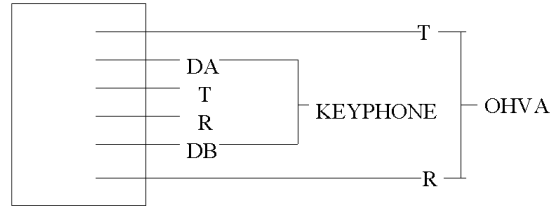
6.44. The Off-hook Voice Announce feature utilizes the tip and ring from an unused station port. It can be wired directly to the base cord jack of any OHVA equipped Keyphone.

Note: *The idle station to be used must be at the opposite end of the station group. (e.g. If Port 01 is to have OHVA, use the tip and ring from Port 08. If Port 09 is to have OHVA, use the tip and ring from Port 16, ...)*

LNU station card:

<u>Phone</u>	<u>OHVA T&R</u>
Port 1	Port 8
Port 2	Port 7
Port 3	Port 6
Port 4	Port 5
Port 5	Port 4
Port 6	Port 3
Port 7	Port 2
Port 8	Port 1

Keyphone jack wiring:



Optional Equipment Connections

7.01. Connections for most optional equipment are made on the right side of the main cabinet.

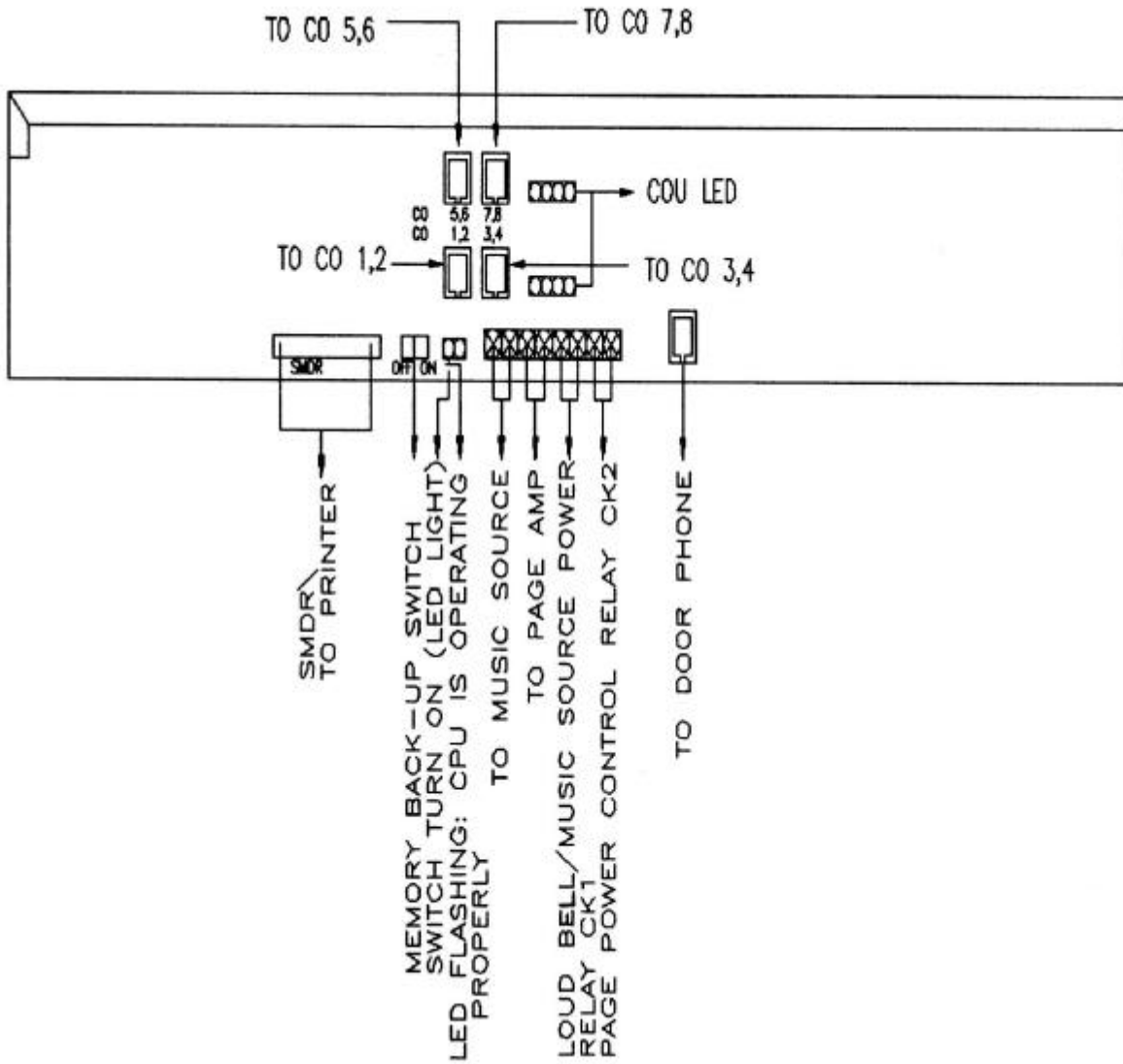


FIGURE 14: KSU Site Panel

External Music Source

- 7.02. The system can use either an internal or external music source. The music source is selected by the switch located on the MCB. (Refer to Figure 2)
- 7.03. Connect the music source output leads to the MOHS terminals on the optional equipment terminal block. If required, connect the external music source controller leads to the CK1 terminals on the optional equipment terminal block. (Refer to Figure 14)

Note: *DIP switch Element 2 controls the use of a set of dry relay contacts for music source power control (set to OFF) or loud bell ringer controller (set to ON).*

Note: *The impedance of the external music source must be less than 32 ohms with a power level of approximately 100 mW.*

Paging Amplifier

- 7.04. Connect the paging amplifier input leads to the PAGE terminals on the optional equipment terminal block. This provides paging output for paging zone 8. The paging output for paging zones 1 - 7 must be connected through station ports assigned by system programming (Mode 89).
- 7.05. Amplifier control is provided only when paging zone 8 is activated. To control the amplifier for paging zone 8, connect the power control leads to the CK2 terminals on the optional equipment terminal block. In the default state, the relay is open. The relay closes when a paging call is made to page zone 8. The power control relay is rated at a maximum of 3 amperes.

Loud Bell Ringer

- 7.06. Connect the loud bell ringer controller leads to the CK1 terminals on the optional equipment terminal block. In the default state, the relay is open.

Note: *DIP switch Element 2 controls the use of a set of dry relay contacts for music source power control (set to OFF) or loud bell ringer controller (set to ON).*

Door Phone Unit

7.07. The door phone unit is connected through the DOOR PHONE modular jack located on the right side of the main cabinet. A 6-wire line cord is furnished with the door phone unit for connecting to the modular jack. (Refer to Figure 14)

Battery Backup

7.08. Install the battery package. Position it with the terminals within 2 feet of the bottom-right corner of the cabinet. Keep the battery dry and clean so avoid damp wet areas or areas where the battery may be easily damaged. DO NOT connect the cable leads at this time.

Note: Use a 24 Volt Battery Pack with 3.15 Amp Circuit Breaker.

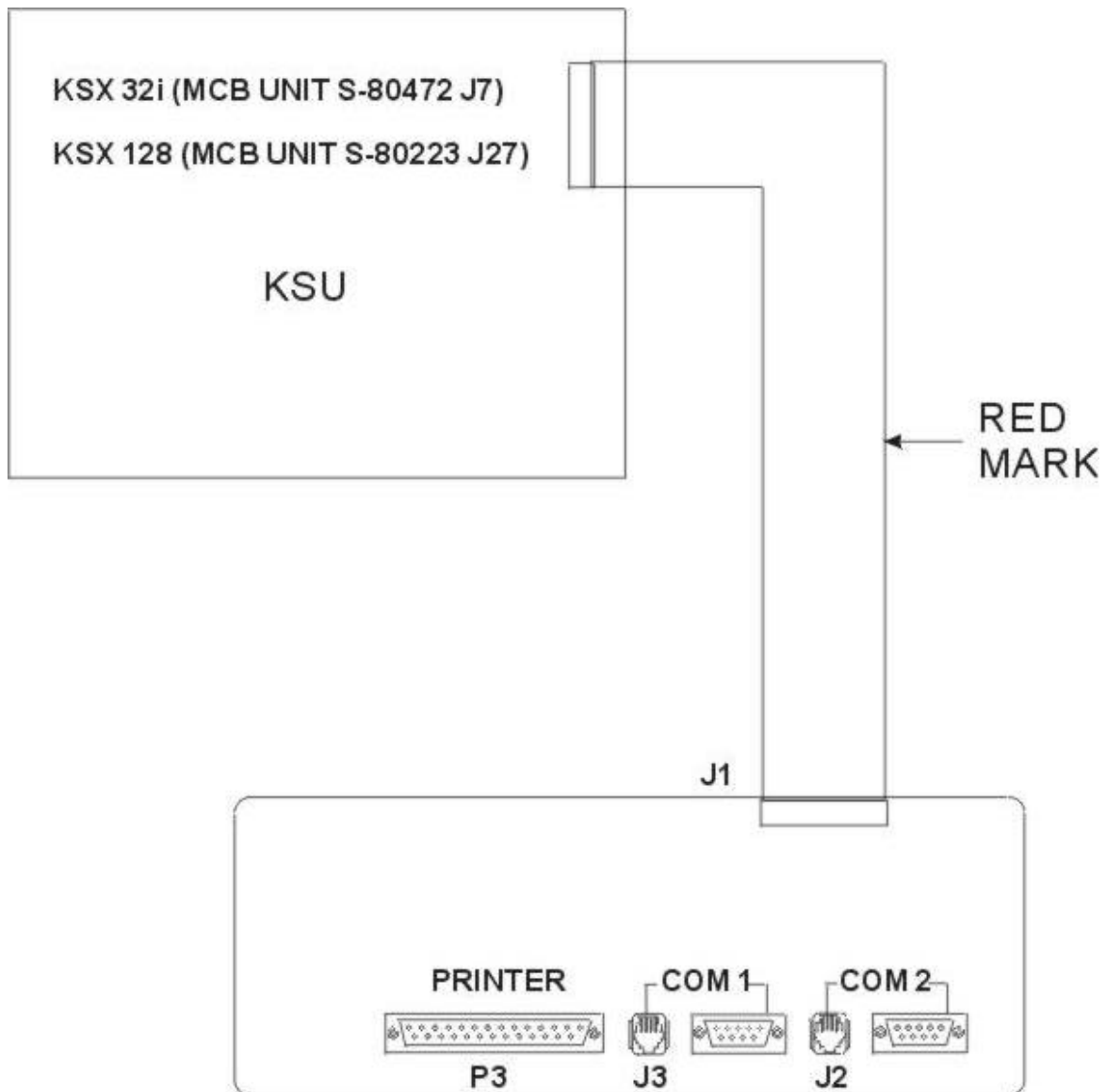
DANGER!!! To reduce the risk of fire or injury to persons, read and follow these instructions:

- Do not dispose of the battery in a fire. The cell may explode. Check with local codes for possible special disposal instructions.
- Do not open the battery. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.
- Exercise care in handling the battery in order not to short the battery with conducting materials such as rings, bracelets and keys. The battery may overheat and cause burns.
- Charge the battery provided with or identified for use with this product only in accordance with the instructions and limitations specified in this manual.
- Observe proper polarity orientation between the battery and the battery connecting terminals on the main cabinet.

SMDR Operation

- 8.01. The SMDR unit is an optional proprietary unit for providing Station Message Detail Records. It allows the user to analyze the systems telephone activity. The information is provided through either a parallel or serial port connection to a printer or computer. This information includes station number, trunk, telephone number dialed, account code, day and month, start time, duration and ring time. A ribbon cable is furnished to connect the SMDR to the right side of the main cabinet.

FIGURE 15: SMDR Unit



COM1 : DB-9 female connector (COM1 also connects to 6 pin modular jack J3).
COM2 : DB-9 female connector (COM2 also connects to 6 pin modular jack J2).
J1 : 34 pin flat cable for connection to main cabinet.
Parallel Port : (P3) DB-25 connector for parallel printer interface.
J4~J9 : Not used.

SMDR DIP Switch

8.02. The output of the SMDR unit is controlled by an 8 element DIP switch located on the SMDR unit and by system programming.

COM 1:

2. **Page Heading** - If DIP switch 2 is ON, the SMDR will do paging with a Page Header at the top of each page. If it is OFF, no paging will be done and the output will be continuous.
3. **Serial / Parallel output** - If DIP switch 3 is ON, the call records from the SMDR will be output via the Serial port. If it is OFF, then the call records will be output via the Parallel port. The call records must be set to Parallel when using PC Programming.
4. **Intercom Calls** - If DIP switch 4 is ON, the SMDR will print a record for each answered Intercom Call.
5. **Station Wake-up / Alarm Calls** - If DIP switch 5 is ON, the SMDR will print Station Wake-up / Alarm Calls.
6. **PC Programming Remote** - If DIP switch 6 is ON, then PC Programming is Remote.

COM 2:

1. **Voice Mail Interface** - If DIP switch 1 is ON, the SMDR will support an SMDI Voice Mail Interface.

DIP switches 7 and 8 are currently not used.

SMDR Serial Output (RS-232C)

8.03. The SMDR unit provides Station Message Detail Records through either a parallel or serial port connection to a printer or computer. The serial port connection is a industry standard RS-232C serial port.

Setting: 1200 baud, 8 data bits, 1 stop bits, no parity

<u>COM1,COM2 (9 PIN)</u>		<u>J2,J3 (modular jack)</u>		<u>RS-232</u>	<u>ADAPTER (9 PIN)</u>
1	CD	1	TX	2	TX WHITE
2	TX	2	RX	3	RX BLACK
3	RX	3	RTS	5	GND BLUE
4	DSR	4	CTS	6	DTR YELLOW
5	GND	5	DTR	7	CTS GREEN
6	DTR	6	GND	8	RTS RED
7	CTS				
8	RTS				
9	RI				

SMDR to serial printer connections

<u>RS-232 Adaptor</u>	<u>Serial Printer</u>
TX	RXD
CTS	REV (Printer ready indication)
GND	GND

SMDR Format

8.04. The SMDR unit allows the user to analyze the systems telephone activity. This information includes station number, trunk, telephone number dialed, account code, day and month, start time, duration and ring time.

ST	TK	Telephone No.	TRF	Acc No.	Date	Start	Duration	Ring	
***	**	*****		***	*****	*****	*****	*****	*****
100	1	29579711		113		10/12	10:10	1:10	
113	1	29579711				10/12	10:10	5:20	
143	4	*****			223344	10/12	11:26	12:16	0:15
***	6	*****				10/12	11:49		0:58
107		<station alarm>				10/12	12:15		
104		<intercom>		143		10/12	12:18		

Explanation

ST	:	Station number.
TK	:	Trunk number.(20 digits)
Telephone No.	:	"*****" represents an internal call.
TRF	:	Transfer the call.
Acc. No.	:	Account number.
Date	:	Date of call (MM/DD).
Start	:	Starting time of call (HH:MM).
Duration	:	Length of calls (HH:MM:SS).
Ring	:	Ring time for incoming call (MM:SS).

Case Explanation

- 1) On October 12, 10:10 AM, Station 100 made an outgoing call on Trunk 1. The number dialed was 29579711. The conversation lasted 1 minute and 10 seconds and then the call was transferred to Station 113.
- 2) Station 113 continued the call on Trunk 1 for 5 minutes and 20 seconds. Total time on Trunk 1 was 6 minutes 30 seconds.
- 3) Incoming call on trunk 4 rang for 15 seconds and was answered by station 143. Account number 223344 was entered and the call lasted 12 minutes and 16 seconds.
- 4) Incoming call rang on Trunk 6 for 58 seconds but was not answered.
- 5) A station alarm rang Station 107 at 12:15 PM.
- 6) Station 104 completed an Intercom Call to Station 143 at 12:18 PM.

Start-Up Procedure

9.01. The following paragraphs provide instructions for applying power to the system, performing initialization, and verifying basic system functions. These procedures should be completed before the system is initialized and the database is changed by system programming to include the customers requirements.

Power-Up Procedure

9.02. Before applying power to the system, ensure that all Installation Configuration changes have been made and switches and straps are in proper position. Also check the interior that no loose or frayed wiring is present. All stations and trunk lines should be connected and wiring checked for circuit continuity.

9.03. To power up the system following installation:

- 1) Set the power 0/1 switch to the off, '0' position. (Refer to Figure 5)
The P.L. indicator lamp (red) is off.
- 2) At the AC wall receptacle and at the power receptacle on the bottom of the main cabinet, plug in the power supply cord.
- 3) Set the power 0/1 switch to on, '1' position. Observe the following:
 - P.L. indicator lamp (red) is on. (Refer to Figure 5)
 - Memory protection indicator on. (Refer to Figure 14)
 - Micro-processor scan indicator is flashing.
 - Trunk idle/busy status indicators are off.

Initialization Procedure

Caution: *This procedure is intended for initial installation only. Performing the following steps will erase the database and load the default values.*

9.04. To initialize the system following installation:

- 1) Set the power 0/1 switch to off, '0' position. (Refer to Figure 5) The P.L. indicator lamp (red) is off.
- 2) Set system DIP switch element 1 to OFF.
- 3) Set the memory battery disconnect selector switch to OFF.
- 4) Set the power 0/1 switch to on, '1' position. Observe the following:
 - P.L. indicator lamp (red) is on. (Refer to Figure 5)
 - Memory protection indicator off as switch is off. (Refer to Figure 14)
 - Micro-processor scan indicator is flashing.
 - Trunk idle/busy status indicators are off.
- 5) Set system DIP switch element 1 to ON.
- 6) Set the memory battery disconnect selector switch to ON (up). Memory protection indicator lamp (red) is on.

Battery Backup Connection

WARNING! *Improper battery connections will damage the power supply. Ensure that the proper polarity is maintained when connecting the battery cable leads to power supply terminal pair + BATTERY -.*

9.05. To connect the battery backup to the system following installation:

- 1) Set the power 0/1 switch to off, '0' position. (Refer to Figure 5) The P.L. indicator lamp (red) is off.
- 2) At the previously installed battery pack, connect the cables at the battery pack and connect the leads at terminals + BATTERY - on power supply unit located at the bottom of the main cabinet. Check the battery leads polarity at the battery and make sure the polarity is matched at the terminals (black = negative and red = positive). Route the cables through an open slot on the side of the cabinet.

3) Set the power 0/1 switch to on, '1' position. Observe the following:

- P.L. indicator lamp (red) is on. (Refer to Figure 5)
- Memory protection indicator on. (Refer to Figure 14)
- Micro-processor scan indicator is flashing.
- Trunk idle/busy status indicators are off.

Note: The system will automatically cut off the power supply from battery when the voltage gets too low, so that the battery can be later recharged.

System Test Procedure

9.06. The system test procedure is used to verify the operation of installed equipment and to provide a confidence check before programming the system. Before starting systems tests, ensure that the system is fully equipped and configured for operation as required by the customer, and that the Power-Up Procedure was accomplished successfully.

Station Equipment

9.07. Verify each telephone station for dial tone, voice transmission, and feature operation as follows:

- 1) Go off-hook. Dial tone should be received and the stations DSS button should be on (red).
- 2) Dial the extension number of another station.

Keyphone calling keyphone when using voice announce.

- Dial tone should be removed when the first digit is dialed.
- The called station should receive a call announce alerting tone.

Station calling another station with normal intercom ringing.

- Dial tone should be removed when the first digit is dialed.
- The called station should ring with ringback tone received at the calling station.
- Transmission should be normal when the call is answered.

- 3) Press the RLS key. Dial tone should be received.
- 4) Go on-hook, all station status indicators on keyphones should be off.

Trunk Lines

9.08. Check trunk lines for incoming ringing, assignment appearances, and line clarity by seizing at outgoing line, and dialing back into the system, as follows:

- 1) Go off-hook at a keyphone. Dial tone should be received and the stations DSS button should be on (red).
- 2) Select trunk line key assigned by default. The trunk key indicator lights green, and outside dial tone is received.
- 3) Dial the directory number of an idle trunk.
- 4) The appropriate trunk line key on all keyphones should light red. The Console (default is port 01 - station 10) should start to ring.
- 5) At the Console, answer the call and check for clarity.
- 6) Put the trunk on hold and listen for the music-on-hold from the station that called in and adjust the volume using the MUSIC VOLUME control.

Diagrams and Tables

Figure 1: System Configuration.....	07
Figure 2: Main Control Board (MCB).....	09
Figure 3: Trunk Card - Setting Amplifier.....	12
Figure 4: Trunk Line Modular Jack.....	12
Figure 5: Power and Earth Ground Cabling	23
Figure 6: Mounting the Main Cabinet (KSU)	26
Figure 7: Card Installation	28
Figure 8: Main Control Board (MCB) and COU Cable Attachments.....	29
Figure 9: Station Card Cable Attachments.....	30
Figure 10: Wiring to Modular Box.....	33
Figure 11: Mounting the Keyphone	37
Figure 12: Adjusting the Handset Clip.....	37
Figure 13: Off-hook Voice Announce Connection	39
Figure 14: Main Cabinet Side Panel.....	40
Figure 15: SMDR Unit	43
Table I: Keyphone Block Connections.....	35
Table II: Single-line Telephone Block Connections	36