P R E F A C E

This document is a complete reference manual for Corby SYSTEM 4 and SYSTEM 5 Access Control units, expansion modules, hardware, and software which are manufactured, designed, or distributed by Corby Industries, Inc., USA. **It is assumed that the user of this manual is expert in the installation of high security devices and has professional knowledge in electronics and security related installations.**

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For over 20 years we have been a major supplier to alarm dealers and locksmiths around the world. Users of Corby products include the FBI, Secret Service, and Department of Defense. Corby has over 200 authorized distributor locations in the USA and 17 foreign countries.

At Corby, our customer is the most important person in our business. We constantly strive to serve our customers with quality and service which is second to none. At Corby, we always try to be the best!

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CHAPTER 1 SYSTEM OVERVIEW

1.1 Introduction

The universal adaptability of SYSTEM 4 and 5 satisfy requirements for a high performance card and digital keypad access control system that allows precise control of all users in the system and provides a printed audit trail of their actions with a time & date stamp. The system is based on user codes or PINs (Personal Identification Numbers) being entered at a secure, easy to use digital keypad. The system can also use high security Corby*Cards with swipe or insertion style card readers. The special 30 data bit Corby*Cards are manufactured using superior Wiegand effect technology and are approximately a billion times more secure than 26 Wiegand bit cards. You can use and mix keypads and card readers in the same system or use them together at the same door for double security. The system also supports short and/or long range proximity cards, vehicle ID tags, and mag-stripe cards.

1.2 The Z-80 Microprocessor Design

The system utilizes a Z-80 microprocessor combining all control electronics and port (door) relays on a single printed circuit board and deliver reliable performance. All software is stored in a nonvolatile EPROM which maintains its data even with power disconnected. As enhancements are made to the system, most updates and new features can be added to older systems by simply inserting a new EPROM and/or adding additional hardware.

The systems low power CMOS circuits with a standby battery can maintain operation for up to 55 hours. The memory for the user data has its own internal battery and can retain the user data for up to 10 years. The system microprocessor is constantly monitored by a "watchdog" circuit which maintains the operational integrity of the system.

1.3 Programming Features

SYSTEM 4 is designed for easy and simple setup using the supplied programming keypad and the supplied 80 column dot matrix printer. All instructions and user prompts are printed directly on the printer paper in crisp, clear, easy to understand English text. SYSTEM 5 is an enhanced version of the SYSTEM 4 and programming is done with a standard Video Display Terminal (VDT).

If this is your first experience with an access control system, we hope you will find it a delight... ONLY IF YOU READ THE MANUAL FIRST! Get familiar with the system hardware, terms used, and its basic operation. Only then can you start programming and use the software routines as an expert. After the hardware is installed, it will take about 30 minutes to set up a basic system for four doors and about 50 users using the auto-code generation program. If you have more doors, special user codes, or are using time or relay schedules, it will take more programming time. If you don't read this manual, it will take you twice (maybe five times) as long!

Thousands of hours have been spent by Corby programmers to ensure this is a "user friendly" system. Hundreds of hours have been spent in writing this manual which includes "Everything You Ever Wanted To Know About The System". The information is here. All you have to do is..... read.

A Glossary is included in the Appendix Section to explain some of the terms or words used in this manual.

1.4 SYSTEM 4 & 5 Standard Features

The system MCU (Master Control Unit) is shipped ready to use. All you need to supply is hookup wire, electric type locks for the doors, and power for the electric door locks. The following features and equipment are included in both the SYSTEM 4 and SYSTEM 5 MCUs.

☐ Supports Proximity Cards and Readers

☐ Smart Socket Provides Internal Memory Battery Back-up

☐ Automatic or Manual Programming of Digital Codes or Cards

☐ Battery & Low Power CMOS Circuits Provide Standby Reserve

☐ UL Listed Fused Transformer, 120VAC Input, 16.5VAC Output @ 40VA

☐ Electronic Watchdog Circuit Monitors Internal Memory Conditions and AC Power

☐ Controls One to Four Doors, Relays, Alarm Systems, or Other Electrical Equipment

☐ Supports High Security 30+ Bit Wiegand Corby*Cards and Insertion or Swipe Readers

☐ Four Programmable SPDT Five Amp Heavy Duty Relays With Separate 12VDC LED Drivers

☐ The Supplied 80 Column RS-232C Printer Can Print All Security Events for Audit Trail

☐ One Programmable SPST Relay to Signal Duress, Door Ajar, or Activate Alarm Systems Automatically

☐ All Relays Are Programmable For Either Latching or Momentary Operation (1 to 250 Seconds)

☐ All System Events Are Recorded/Printed With a Time - Date - Location Stamp For Tracking

☐ Access Cards and Digital Codes Can Be Programmed to Activate the Duress Relay Output

☐ User Friendly Software With All Programming Instructions Displayed in Plain English

☐ Programmable Digital User Codes With a Choice of 1, 2, 3, 4, or 5 Digits

☐ MCU is Housed in a Locking 11" X 15" Painted Steel Cabinet With Key

☐ Door Time Cancel Feature Limits Unauthorized "Follow Throughs"

☐ SYSTEM 4: Supports up to 500 Users Identified by User Numbers

☐ SYSTEM 4: Command Prints LAST 25 EVENTS, ALL USER CODES, CURRENT SYSTEM STATUS, HOLIDAYS

☐ SYSTEM 4: CMOS Z-80 Based Computer With 32K Of EPROM and 8K Of Battery-Backed CMOS RAM

☐ SYSTEM 4: Uses a 12 Digit Desktop Keypad For System Programming

☐ SYSTEM 5: Supports up to 750 Users Identified by Name and Title

☐ SYSTEM 5: CMOS Z-80 Based Computer With 32K Of EPROM and 32K of Battery-Backed CMOS RAM

☐ SYSTEM 5: Uses a VDT Terminal and Full Keyboard For System Programming

1.5 MCU Advanced Features

The MCU also contains these advanced features:

☐ 16 Holidays Which Can Be Programmed in Advance

☐ Automatic Leap Year Adjustment Every February 29th Programmed to the Year 2086

☐ Immediate Expansion to Eight Doors Plus Four Reporting Alarm Zones By Adding an SCU

☐ Programmable Automatic Switch-over of Daylight Savings Time Every April and October.

☐ Eight Programmable Relay Schedules to Automatically Control Any Relay up to 16 Times a Day

☐ Programmable Anti-Passback Prevents a User From Passing a Code or Card to Someone Else

☐ Eight Programmable Time Schedules to Control Any User to the Exact Minute of Any Day

☐ Supports "Normally-Open" Request-To-Exit Switches Located Inside a Secure Area

☐ SYSTEM 5: Supports IBM PC Back-up / Restore

☐ SYSTEM 5: Supports Off-Site Programming, Door Control, Recurring Revenue

1.6 SCU Eight Door Expansion

One Corby SCU Slave Control Unit will connect to the MCU using three wires + shield. All the features of the MCU are retained but now the system will:

☐ Control Passage Through Eight Doors by Person - Date - Time

☐ Automatically Activate Any One of Nine Different Relays at Any Time on Any Date

☐ Events Stored in the Event Buffer Can Be Printed With Time - Date - Location Audit Trails

☐ Activate a SPST Relay Output if Any Zone Has Been Violated and provide a Time & Date Stamp

☐ Also Print: SCU AC FAILURE SCU AC RESTORED SCU RESET ZONE (n) VIOLATED ZONE (n) OK

☐ Interface Zones with IR Beams, Ultrasonics, and Energy Management Devices

☐ Monitor & Reports Status of Each of the Four Normally Closed Alarm Zones

1.7 Differences Between SYSTEM 4/5

SYSTEM 5 is an enhanced version of SYSTEM 4. The SYSTEM 5 does everything the SYSTEM 4 does plus:

1. User capacity is increased to 750 users.
2. Programming is made easier with the use of a VDT instead of keypad.
3. Telecommunications/Back-up /Restore capabilities are built in.
4. Names can be used instead of just users numbers.
5. Descriptions can be added to doors.

1.8 ASP Proximity Reader

Advantage $eries Proximity (ASP) is a trademarked name for a type of proximity card reader system. This proximity card reader system consists of three major parts: Proximity readers, proximity cards and/or tags, and a Corby card reader interface. Programming, wiring, and setup is similar to Corby Wiegand card systems.

Corby ASP cards are read when they are brought within reading distance of a card reader, typically three inches to three feet, depending upon the style of the reader. It is not necessary for the card to have physical contact with the card reader for a read to occur, hence the name proximity.

When a Corby ASP proximity card is presented to the reader, it is triggered into a transmission mode and the card transmits a 30+ bit digital signal to the reader by means of an electrostatic coupling. Corby ASP cards do not have batteries to restrict their life but instead receive power to transmit as part of the trigger signal from the card reader.
Unlike other proximity systems which use resonant circuits as code elements, Corby ASP cards actually contain miniature CMOS circuits. Corby ASP cards can be read while still in a wallet or purse, providing added convenience. In addition, readers may be installed behind walls for enhanced security, and some models may even be mounted on a solid metal surface.

1.9 Telecommunications Module

The telecommunications module is standard on SYSTEM 5 and optional on the SYSTEM 4. It plugs onto the MCU and supports two channels of telecommunications and data transfer. Use this module with any VDT terminal for fast programming on or off site. If access to the SYSTEM 4/5 will be by "dial up" phone lines, modems are required at the MCU location and the programming location. Corby approved modems are highly recommended.

☐ Access Security Requires Password up to 12 Characters in Length

☐ Baud Rates Of 300/1200/2400/9600 Are Programmable For Both Channels

☐ Supports Some 300/1200/2400/9600 Baud Modems Including All Corby Modems

☐ Operates With Most TELCO or Four Wire Lines and Short Haul Modems up to 10 Miles

☐ Operates With Most "Dial Up" Standard Telephone Lines Including AT&T, MCI, and Sprint

☐ Lock/Unlock Doors or Arm/Disarm Systems From Any Remote Location Including a Central Station

☐ Channel A Supports Full Duplex (Two-Way) RS-232C Communications For a Modem or CRT

☐ Channel B Supports Half Duplex (Output Only) RS-232C Communications For Printers

☐ Add, Change, Delete Users From Any Remote Location Including Central Stations

1.10 Wiegand Corby*Card Features

Wiegand Corby*Cards are credit card size or key shaped and designed to withstand many years of hard service. They are the ultimate in high security devices and are custom manufactured to strict Corby standards and specifications. A card reader interface module (RIM) is required to use cards with the SYSTEM 4/5.

☐ Each Card Is Unique and Duplicate Cards Do Not Exist

☐ Each Card Contains 30+ Data Bits and Other Secret Data

☐ The Five Digit Card Number Is the Same as the User's PIN Number

☐ High Security Wiegand Effect Wires Are Embedded Inside the Vinyl

☐ Cards May Be Inserted Frontwards or Backwards in Swipe Type Card Readers

☐ If Programmed to Do So, a Card Inserted Backwards Will Produce a Duress Signal

☐ Swipe Type Readers May Be Mounted in Any Position and Are Available in Beige Or Black

☐ Laminator and Photo ID Equipment Are Available on a Rental Basis From Corby

☐ Photo ID Cards Are Available in Two Formats With Optional Badge Clips

☐ Corby Can Supply Custom Designed Cards in About 16 Weeks

☐ Key Style Readers and Wiegand Keys Are Available

☐ Insertion Type Card Readers Are Available

1.11 Mag-stripe Features

☐ Photo ID's are Available

☐ Swipe readers are Available

☐ Laminators and Cameras are Available on a Rental Basis from Corby

☐ The Five Digit Card Number is the Same as the User's PIN Number

☐ Duplicate Magnetic Stripe Cards are Available

☐ Custom Card Design in About 30 Days

NOTE: Duplicate Mag-Stripe Cards May Exist

1.12 Data Chip Features

☐ Stainless Steel, Coin Shaped Canister Replaces Cards

☐ Life Span is Practically Forever

☐ Vandal and Weather Resistant Reader

☐ Instant "Touch" Transfer of Data from Data Chip to Reader

☐ Three Wire Reader Connection Up To 500 Feet

☐ Attach Data Chips to Existing Photo ID Cards

☐ Extremely Low Cost Reader

☐ Instant Visual Feedback of a Good "Read"

CHAPTER 2 HARDWARE OVERVIEW

2.1 Terms Used In This Manual

This manual is a comprehensive discussion of the entire SYSTEM 4/5 product line. Your specific system may or may not include all of the products and/or features discussed on the following pages. For a review of the different system products and most of their major features, please refer to pages 1 through 6 of this manual.

If your installation consists of four doors or less, an SCU expansion unit is probably not included or needed in this system and you should ignore any references made to the SCU. In most cases the term keypad is used but you can usually substitute a card reader in its place. The terms ports, relays, and doors are used interchangeably. An access control system would control the "doors" using the relay contacts of the system. If the system was being used as an energy management system, it would use the relays to automatically or manually control "air conditioning or lights".

Input ports can accept digital keypads, card readers, zone inputs, a programming keypad, Request-To-Exit switches, and Door Ajar switches. Although this manual is written from a security point of view dealing with access control of personnel, there is virtually no limit on what the system can do including using it as a process controller which can open valves on an oil rig at specific times of the day.

2.2 System Programming Keypad (SYSTEM 4 Only)

A desktop keypad is supplied with every SYSTEM 4 Master Control Unit. It's a small, compact, single-gang, 12 button Corby key mounted on a small plastic housing with rubber feet which can be placed up to 500 feet (170m) away from the SYSTEM 4 (MCU).

If this is an installation with more than four doors, a Slave Control Unit (SCU) is required to be connected to the (MCU). The programming keypad is only connected to the MCU. Two programming keypads are not required nor are two printers required.

This keypad is designed to be placed on a desk next to the Corby printer. This placement makes programming the SYSTEM 4 fast and simple because all instructions and programming prompts are displayed directly on the printer paper in clear English text. A LED is not installed on this keypad or required for programming. This keypad requires a five wire multiconductor cable with shield. Do not use twisted pair type wire.

This programming keypad is necessary to program the SYSTEM 4 MCU/SCU and add/change/delete employee or user access data. If the "password" option has been invoked, the password must be entered at this keypad prior to entering the program mode.

2.3 Digital Keypads

If a keypad is to be used for primary access control, a 12 button keypad similar to the system keypad described above is recommended. It is designed to be flush mounted on a wall about 60 inches above the floor level. It has one green LED factory installed to provide the end user with visual feedback of the door/relay status.

This keypad and LED require an eight wire multiconductor cable with shield to be run between the MCU and each keypad. Do not use "twisted pair" type cable. Installation requires two wires for the LED, four wires for the keypad BCD output data, one wire for the keypad common which is known as the "strobe" line, and one wire for the Request-To-Exit (RTE); this eight conductor shielded wire is available from Corby.

One keypad is supplied with each system MCU. Each of the four data input ports (1-2-3-4) on the MCU and (5-6-7-8) on the SCU will accept data from any one of three programmable methods: **[1]** Keypad or Data Chip
[2] Card reader only **[3]** Keypad and card reader combination. BCD data outputs from any keypad are identical and keypads may be substituted or interchanged anywhere in the system including the programming keypad.

2.3.1 Digital Keypad Status LEDS

Each MCU and SCU supply four (12VDC @ 25 ma) voltage outputs to drive indicator LEDs at the keypad remote location. NO OTHER AC/DC AUXILIARY POWER IS AVAILABLE FROM THE SYSTEM. The green LED installed in the keypad is rated 12VDC @18 ma. The current limiting resistor is sealed AND MOUNTED INSIDE the plastic LED housing which also has two six inch leads for connection to any 12VDC source. The yellow lead on all Corby LEDs is negative. The red lead is positive. Corby supplies replacement LEDs in 12VDC versions.

2.3.2 Planning For Anti-Passback Digital Keypads

Each code and/or card is programmable for anti-passback. If a code or card is programmed during "set-up" to have an anti-passback restriction, the system records the code/card used by the person entering and prevents anyone else from using that same code/card to enter, while the original person is still in the protected area. It prevents passing the card back to another person for unauthorized entry.

The anti-passback feature and "in-out" reporting require two keypads or two card readers to be used at each door (one inside the protected area and one outside).

2.3.3 Planning For Back To Back Keypads

It is also possible to install two keypads back to back at the same door by wiring both keypads in parallel and connecting both of them (with only one home run) to the same MCU or SCU input port. This type of installation will open the door anytime a valid code is used at either of the keypads but the printer will only show the port used as a single port. This specific type of installation does not support anti-passback or in/out reports and requires the use of a digital code to open the door from any direction.

2.3.4 Weatherproof & Special Purpose Keypads

Corby manufactures several different types of "7000 Series" keypads in single and double gang styles with up to seven multicolor LEDs and speaker holes installed. These additional red, green, and yellow LEDs are useful in providing the user with information about the current status of alarm systems, protective zones, and other conditions. Installing a SYSTEM 4/5 decoder on the rear of these unique keypads allows them to be connected to the SYSTEM 4 or 5.

There is an outdoor-weather resistant version with the most popular being the flush mounted model which has two LEDs and a built-in night light. All keypads require an eight multiconductor cable w/shield. See Corby's current Parts List for ordering details.

2.3.5 Optional Keypad Tamper Methods

Normally the installation of any system keypad, card reader, or Reader Interface Module (RIM) does not require any tamper schemes as the keypad and/or card data is BCD encoded, multiplexed, and sampled hundreds of times per second. It is almost impossible for anyone to duplicate a valid code/card condition by crossing or switching any of the five wires which return encoded keypad or reader data to the MCU or SCU. For added protection, the 12 volt LED output line is fused at 1/2 amp.

IT SHOULD BE NOTED THAT IF ANY OF THE FIVE DATA LINES ARE SHORTED TOGETHER, ANY OTHER KEYPAD OR READER IN THE SYSTEM WILL NOT FUNCTION.

If the keypad will be mounted outside in a public area subject to vandalism, or if it could be removed from the original installation site by unauthorized personnel, it is recommended that a Corby backbox complete with the backbox tamper switch(s) be used in conjunction with an alarm circuit to secure the installation. Use a Corby Model 11, 12 or 14 backbox. Readers should be bolted to the wall using Corby's optional mounting kit for swipe readers.

2.4 What Are Wiegand Corby*Cards

Corby*Cards are designed to stand up to many years of hard service. Hundreds of engineering hours have been spent to ensure that they are the best. The Corby Access System will only accept Wiegand Corby*Cards as valid cards. These cards are the ultimate in high security and are manufactured to exact Corby specifications.

2.4.1 Superior Card Security

Corby*Cards use high security Wiegand effect wires embedded inside the vinyl. Each card is unique and contains 30+ high security data bits in a random pattern. Duplicate Corby*Cards do not exist. They are virtually impossible to counterfeit or duplicate. Each card contains a site code, the encoded card number, and other secret data. The five digit number of the card is also the cardholders PIN for the system. These numbers are placed on the card with a printed label during distribution and may be removed prior to putting the card into use. Duplicate Wiegand cards are not available in any form. Cards are available in standard Corby*Card two color format, and two Photo ID formats. Custom cards with unique artwork on either side are also available.

2.4.2 Sequential Numbering Of Cards

Cards are shipped using sequential numbering and the starting or ending numbers cannot be specified prior to ordering. Our quality control department rejects about eight percent of all cards before they are shipped and consecutive card numbers are not guaranteed. One copy of a computerized listing of all cards shipped to you is included in worksheet form. To keep programming easy and simple, be sure to complete the form prior to programming. A card reader is NOT required for programming cards into the system. Cards are programmed automatically.

2.4.3 How To Use Hostage/Duress Cards

Wiegand Corby*Cards may be used with a swipe type card reader backwards (white side facing user) and the card will operate normally. If the card number has been programmed for emergency duress mode and it is swiped white side out, it will operate the system normally AND also activate the MCU aux relay (#9) to transmit a duress signal. This feature is NOT available with insertion readers, Proximity Card readers, or mag-stripe readers.

2.4.4 Proximity Readers

Standard size readers are beige, one piece units which measure 5.5 X 4.5 inches. They are surface mountable and protrude 1.375 inches from the mounting surface. Typical read distance is three - six inches but this will always vary depending on the installation. An outdoor weatherproof version in UV resistant black is available. Both units have a built in LED indicator that may be disconnected and both of these units can be mounted on a metal surface.
A switch plate size reader is also available. This two piece reader assembly consists of a remote read head and a remote electronics unit. The remote read head measures 3 X 4.625 inches and protrudes .5 inches from the mounting surface. The remote electronics unit is the same size as the standard size reader, and can be located up to 50 feet from the remote read head with read distance being approximately two - five inches. This reader is architecturally designed to blend into executive office areas, is beige in color, has a LED indicator, and may also be used on outside exterior surfaces. This unit is designed to be mounted on a single gang electrical junction box. It will not operate on a solid metal surface.

Mullion size readers are only 1.687 inches wide and 3.625 inches high which means they will fit most 1.75 inch wide aluminum storefront door frames. They are two piece reader assemblies similar to the switchplate type described above and protrude .5 inches from the door frame. Typical read distance is one - four inches. The remote read head has a built in LED indicator and is molded into a black UV resistant package. These units are specifically designed to operate outdoors on a metal surface but will also operate on non-metallic surfaces.

2.4.5 Proximity Cards And Tags

Corby proximity cards and tags consist of three elements: power receiver, code generator, and electrostatic transmitter. Cards are credit card size: 1.125 X 3.375 X .1 inches. Tags are 1/2 the size of cards but are slightly thicker and have a hole for a key chain. Like Corby Wiegand cards, each Corby proximity card contains 30+ bits of unique high security data. Duplicate Corby proximity cards are not available. Corby proximity cards are programmed into the system exactly the same way as standard Corby*Cards and have a five digit code which is the card holder's PIN number for the access system.

2.5 Card Reader Interface Module (RIM)

The SYSTEM 4/5 MCU or SCU cannot accept card readers directly on their data input terminals. A reader interface module (RIM) is required. The RIM powers the card reader and converts the card reader output to a BCD data format suitable for the MCU or SCU input data ports. There are no relays or other devices on the printed circuit board.

RIMs have two jumpers(resistors) that select the type of cards that will be accepted. These jumpers are labeled R1 and R2. If R1 and R2 are uncut the RIM will accept 30 bit Corby Wiegand cards. If R1 is cut and R2 uncut the RIM will accept Corby Mag stripe cards. If R1 is uncut and R2 is cut the RIM will accept any 26 bit Wiegand card. Both R1 and R2 cut is not a valid selection.

RIMs have two LEDs and a push button to help you troubleshoot if any problem does occur. There is a strobe LED which flashes continuously to show that the strobe output from the system is being received. The reader LED flashes when data is received from a reader. The push button, when pressed, will send a test code back to the system. For more details see chapter 12 "Troubleshooting".

2.5.1 RIM Specifications

The RIM is small printed circuit board that measures 3.45" X 2.3" X 1.25" and mounts inside the MCU/SCU cabinet.

A separate 12VDC power supply capable of handling 120ma is required by each RIM. One power supply can power more than one RIM or a door strike/magnetic lock if the power supply is big enough. **Note:** When using 12VDC proximity readers, the reader is powered directly from the power supply not from the 5VDC output of the RIM.

2.5.2 Wire Requirements

Eight wires with overall foil shield are necessary to connect the reader interface module (RIM) to the MCU or SCU. If "Request-To-Exit" is not required, use seven wires. Wire must be 22 or 24 gauge multiconductor, not twisted pairs. You may use Corby eight conductor cable.

The card reader may be located 500 feet from the RIM, and the RIM may be located up to 50 feet from the MCU or SCU.

Seven wires of the RIM are connected to the MCU or SCU in the same fashion as a keypad, the eighth wire is for Request-To-Exit. See the wiring diagrams. Because all the BCD lines from the keypads and RIMs are wired in parallel, only two wires identify a "port": the "common strobe INPUT line " and the specific OUTPUT terminal that supplies 12VDC to the LED at that keypad or card reader location.

2.6 Data Chip

Corby Data Chips can be used as an alternative to cards and keypads. Each Data Chip contains an IC and is bonded to the inside of a stainless steel canister. This packaging allows the Data Chip to resist dirt, moisture, corrosion and static discharge. It can be attached to any surface including existing ID badges. When the Data Chip is touched to the reader, 48 bits of digital data is transferred from the Data Chip to the reader.

The reader contains no electronics and can be located up to 500 feet from the adapter module. The adapter module converts Data Chip information into keypad-like data that the SYSTEM 4/5 can recognize. This module mounts inside the SYSTEM 4/5 control cabinet and one is required for each port. Up to four readers can be connected to a single adapter module however, readers connected this way will act as one. Reads are available in flush mount single-gang versions or flush mount slim-line versions with one or two LEDs. The read head is also sold separately. For surface mount applications, a reader is available with a bi-color LED and night light.

2.6.1 Wire Requirements

The Data Chip adapter module connects to the reader with a minimum of 3 conductor, shielded, 22GA, non-twisted pair cable. Additional conductors are required for Request-to-Exit and Door Ajar/Time Cancel. Data Chip readers may be located up to 500 feet from the Adapter and the Adapter can be up to 500 feet from the MCU/SCU.

2.6.2 Power Requirements

A separate 12 volt DC power supply capable of handling 75ma. is required for the adapter module. One power supply can power more than one RIM or a door strike/magnetic lock if the power supply is big enough.

2.7 Planning For Card Readers

Wiegand card readers normally supplied for the system are swipe-style, and are designed to be surface mounted. Swipe means there is an open slot in the unit where the card is passed through sideways in a very rapid fashion. It is "swiped" through the reader slot. This type of reader is noted for durability and lack of maintenance problems and it is very difficult to jam this style of reader.

All card readers must be connected to a card Reader Interface Module (RIM) before they may be connected to the system. For ease of reader installation, the use of a Corby mounting kit is recommended.

2.7.1 Other Wiegand Card Reader Styles And LED Information

The standard Wiegand swipe readers have a dual color LED that is normally red indicating that the reader is not active. When a valid card is inserted through the swipe slot, the red LED changes its color to green for the duration of the door release time. It then changes back to red when the "door open time" has elapsed or is canceled by a system "door closed" sense switch.

A different Wiegand reader version is also available with just one red LED that glows only when a valid card activates the unit. If the card reader is to be mounted outside, this version may be the best choice because the LED is not on constantly to attract attention. These readers are waterproof and may be mounted in any position. Two styles of faceplate decals are supplied with each reader to enable the installer to mount the unit upside down (keeping the snow and ice out of the slot) and still have the arrows and instructions reading correctly. A flush mounted insertion reader is also available.

2.7.2 Using Keypads & Readers Together

Not counting Request-To-Exit or manual and programmed relay operation, there are three user modes of door or relay activation with the system: **[1]** Keypad or Data Chip **[2]** Card reader only **[3]** Keypad AND card reader. These three modes are programmed into memory using the Door - Relay Data menu. The default status is keypad only operation. If mode [3] is selected for a port, a valid card must first be used at the card reader and then the user has 15 seconds to enter the correct five digit PIN which will be the same five digits of the card. If cards are used in the system, all users must have a five digit PIN even if digital keypads are used on ports by themselves.

Mode 2 and 3 cannot be used with Data Chips. Data Chip data comes into the system as keypad data so the port must be setup for mode **[1]** Keypad or Data Chip. This will allow a Data Chip reader and a keypad to be connected to the same port in an "either or" mode.

2.7.3 Planning For Anti-Passback Readers

If the anti-passback feature or printed in/out reports are desired for a door, two readers must be used (one inside/one outside). This "two reader" installation only requires a total of nine wires with common shield to be run to the MCU/SCU. Two ports are required for a single door anti-passback application.

2.7.4 Planning For Back To Back Readers

It is possible to install two readers back to back at the same door and connect both of them to one port. This type of installation only uses seven wires with shield. It will open the door any time a valid card is used at either of the card readers but the printer will only show the port used as a single port. Of course, all other system data including the user ID and location will be recorded and/or printed. A maximum of four card readers may be connected to a RIM or Adapter module.

2.8 Relays And How They Work

Each system MCU and SCU has four independently controlled SPDT "C" form heavy duty relays with contacts rated five amps at 30 volts. They are fully programmable and may be activated by keypads, cards, Request-To-Exit switches, programmable relay time schedules, and/or using the "manual mode" from any programming location including off-site remote locations using modems.

These "dry" relay contacts may be used to activate door strikes, electromagnetic door holders, alarm system controls, or to control any momentary or on/off device including energy management devices, lights, and air conditioning systems. Each time a relay is activated/deactivated, an event is created, stored in the security buffer, and printed with event data including time & date. Because they are "C" form, they may be wired "fail-safe" or "fail-secure". The MCU relays are numbered 1, 2, 3, and 4. The MCU also has an auxiliary relay rated at one amp, SPST, normally open. THIS RELAY IS REFERRED TO AS RELAY #9. In an eight door system, relays 5, 6, 7, and 8 will be located on the optional SCU (Slave Control Unit).

2.8.1 Understanding Momentary Relay Operation

All relays including the auxiliary relay are fully programmable. The default (standard) mode is a momentary two second (002) relay contact closure which can be programmed from 001 - 250 seconds, or each relay can be programmed to be "latching". If the relay is programmed for momentary operation, the relay is normally "off" and the relay coil is de-energized. If the system "sees" a valid keypad code, valid card, or Request-To-Exit, the relay(s) will be energized for the programmed period of time. A momentary relay is retriggerable IF it receives another activation command while still in the timing mode. There is no limit to the number of retriggers.

2.8.2 How Latching Relays Work

In the latching mode, relays are normally "off" and coils are de-energized. Any valid code, card, Request-To-Exit, or automatic relay schedule will activate the relay(s) "on". Any relay now activated will continue to remain in the active condition until another valid code/card/Request-To-Exit/automatic relay schedule command is received by the system. This latching relay mode is also known as ratchet-type/bi-stable/toggle-type operation.

2.8.3 Understanding The MCU Auxiliary Relay

A SPST auxiliary relay (printed and programmed as relay #9) rated one amp at 30 volts WILL ALWAYS BE ACTIVATED BY ANY DURESS CODE/CARD. This function cannot be changed. Take note that if a door is opened automatically by a time schedule in the System, the reader or keypad on that door is disabled and duress will not work. It can also be programmed to activate and provide silent signaling for a door open-ajar condition. This relay is fully programmable for either timed momentary contact closure or latching contact closure. If it is programmed for the latched mode and is activated, it can only be unlatched (reset) using the automatic relay mode or by entering the system program mode and manually deactivating it. It will also unlatch anytime an automatic relay schedule assigned to it encounters a valid "stop" time cell.

This is the only relay in the system that retains its momentary timed operation when activated by an automatic relay schedule. This enables it to automatically arm/disarm security systems that require a one or two second momentary pulse to operate.

2.8.4 The Four SCU Main Relays

The four main relays of the SCU are identical in ALL RESPECTS to the MCU. No further explanation is necessary except to say they are referred to as relays #5, #6, #7, and #8.

2.8.5 How The SCU Zone Relay Works

The SCU zone relay is SPST and is rated one amp. It is designed to report (with "dry" contacts) the violation of any of the four zone inputs (on the SCU). The contacts of this relay will be closed ONLY if all four zones of the SCU are secure. This relay does not have a number and cannot be programmed. It is for zone violation signaling only. Each zone is monitored by the SCU and any action will be printed with zone ID, status, and a time & date stamp. IR beams, ultrasonics, and other devices can be monitored with ease. A typical report is printed: ZONE 3 VIOLATED 17:52:29 11/21/91 and ZONE 3 OK 17:52:35 11/21/91. Additional details are located in this chapter in the section dealing with the Slave Control Unit (SCU).

2.8.6 Understanding Relay Operation

In the default, normal relay mode, relay #1 can only be operated by a valid code/card entered at keypad/reader location #1. Relay #2 can only be activated by a valid code/card entered at keypad/reader location #2. This same condition applies for relays #3 and #4 and, if this is an eight door system, relays #5, #6, #7, and #8. This default relay mode is called "normal mode" (follow mode). This mode of operation may be changed in the "DOOR - RELAY DATA" sub-menu section. See the next section for details of the "elevator control mode" (independent mode).

2.8.7 Understanding Elevator Control Mode (Independent Mode)

When changed (programmed) from the default relay mode, each relay/s will operate independently and ANY VALID code or card entered at <u>any</u> keypad-reader can operate any relay/s. Using this "elevator control mode", only one keypad-reader is needed to activate any combination of the four (eight with an SCU) available relays and enables the user to control up to five (nine with an SCU) different functions from any keypad or card reader. It also enables the user to activate any or all relays simultaneously with just one code or card from any location.

An example of this feature is using a code or card (programmed for duress) at location Lobby #1 that simultaneously: **[A]** Activates a door release strike for 10 seconds at door #1; **[B]** Places a constant shunt across a protective alarm loop using relay #2; **[C]** Activates a video tape recorder for 60 seconds using relay #9. The printed record will not show the actual relays activated but will show the user ID and the location ID which was used to enter the code/card. Additional details are located in the Programming Codes & Relays Chapter.

2.9 How To Use Door Position Sense Switches

The system can sense if a door is open seven seconds longer than its programmed momentary "door release" time. If the door is held open, it prints a "DOOR AJAR" message with the location ID, time & date, and IF SPECIFICALLY PROGRAMMED, it can also activate the MCU auxiliary relay #9 when the seven second time delay expires. When the door is closed, it will print "DOOR CLOSED" with the location ID# and time & date stamp. No additional wires are required to be run to the MCU or SCU. Connections are only made at the keypad or through the RIM.

To enable the "Door Ajar" function, the specific door must be programmed for a momentary time 1-250 seconds (or the default two seconds) and an open circuit magnetic switch must be installed on the door jam and connected with two wires to the adjacent keypad or RIM which controls the door. If the wire run exceeds 10 feet use shielded wire, connect the magnetic switch to the red and white wires of the keypad. Or if using a card reader, connect it to the RIMs red and white wires. To program the MCU relay #9 to activate upon a Door Ajar signal, use the Door - Relay Data menu and the Enable Door Ajar Alarm sub-menu.

2.9.1 Using A Sense Switch To Cancel Remaining Time

The system can sense when a controlled door is first "opened", and then "closed". As soon as the door is closed, the system will cancel any remaining door release time and reset it to zero. Even if the door release time is set to 250 seconds, as soon as the person enters and the door is closed, the door will be re-locked. This means the keypad/card reader can be located very far away from the door it controls.

Install a magnetic switch (that the contacts are open when the door is closed) on the door jam and connect it for Door Ajar operation. Remember that this time cancel feature is disabled if the relay for that port is programmed for latching operation.

A valid code or card will activate the door release device. If the door-ajar switch is installed, when the door opens and then closes, any excess door-release time remaining will be canceled preventing unauthorized "follow-Throughs". In addition, if the door is not closed when the programmed strike/release activation time has elapsed (plus seven seconds), a "DOOR AJAR" Message will print, and IF SO PROGRAMMED, the MCU auxiliary relay #9 will activate.

2.9.2 Bypassing Protected Alarm Systems

To shunt the "door" out of an active alarm system loop during a valid entry, use a Corby Model #25 SPST relay wired across (in parallel with) the DC door strike coil. Wire the relay contacts of the #25 so they "shunt" the alarm contact of the protected door whenever the door strike is active. If you are using magnetic door holders, wire the relay contacts so they shunt the alarm contact while the door magnetic holder is deactivated. As soon as the door is opened and then closed, the door control device will be deactivated, the Model #25 relay will remove the "shunt", and the alarm system will return to the normal state.

2.10 Using The Auxiliary Input Terminal Of The MCU

Terminal #18 of the MCU may be used to monitor an alarm system, door, or other electrical device or condition. Each time the event occurs it will print "MCU AUX ON" or "MCU AUX OFF" with a time & date stamp. The SCU does not have this feature. When this option is invoked and programmed active, the Request-To-Exit (RTE) option described in the next section will be disabled on the MCU only. To disable this option and enable the RTE function, use the Door - Relay Data menu.

2.10.1 How The AUX Terminal Normally Works

The MCU aux terminal #18 is normally high (positive +), and is triggered by a momentary connection to MCU terminal #5 (-). When terminal #18 is forced "low" or negative (-) by a switch or other device, "MCU AUX ON" will print. When terminal #18 is allowed to go open or float positive, "MCU AUX OFF" will print. Any negative going signal can be used to trigger this input BUT the system and the source of the trigger must share a common DC negative. Response time is 750 ms.

Terminal (#18) can monitor almost any device including the status of the arm/disarm condition of an alarm control panel, and in some cases, protective loops. For complete isolation, use the relay contacts of an optional Corby Model #78 (a very low-level electronic relay module) which has both positive and negative trigger inputs and only requires microamps to trigger/activate.

2.10.2 Planning For Request-To-Exit (RTE) Switches

The Request-To-Exit (RTE) function is used to allow emergency exit from a locked area without having a necessary keypad code (PIN) or card. This function can also be activated from a remote guard location to open or close doors on command. The system supports up to eight "normally open" RTE switches wired between the auxiliary input (terminal #18) and the four common strobe data inputs (terminals #11-#12-#13-#14) located on each MCU and SCU. Example: A momentary electrical closure between terminal #18 and terminal #11 will activate relay (door) #1 of the MCU. If the same terminals are used on the SCU, relay (door) #5 will activate. Relays 1 through 8 can be controlled in this fashion.

If RTE is desired, terminal #18 MAY NOT be connected to, or used with, terminal #5. If a relay is programmed to be latching, the RTE switch will activate the relay (toggle) each time the switch is used. This option for the MCU must be selected and programmed using the Door - Relay Data menu. It is always enabled for a SCU unit. If the relay is timed momentary, it can be retriggered using a RTE button. Switch response time is 750 ms. If installed, a Door Ajar sense switch will cancel any remaining time as usual. This function is disabled while you are in the programming mode.

RTE requires computing time to the MCU process and if an SCU is used, one or two second delays are common and are usually objectionable. The solution is to add a special Corby RTE switch which instantly supplies/disables the door strike or magnetic door holder and at the same time, activates the RTE circuit for event recording/printing.

This installation only requires eight wires + shield. Use 22 or 24 AWG wire with shield connected to terminal #1. Connect terminal #18 through the local switch to the keypad "red" wire or to the RIM terminal #11. **NEVER ALLOW THE WIRE FROM TERMINAL #18 NEAR THE KEYPAD. SOMEONE COULD REMOVE THE KEYPAD FROM THE WALL AND SHORT THE TERMINAL #18 WIRE TO THE RED WIRE WHICH WILL OPEN THE DOOR!**

2.11 Power Transformer

For systems distributed in the USA, the main power source for the SYSTEM 4/5 MCU and SCU are UL listed, class II, plug in type, step-down transformers. They are rated 120VAC @ 60hz, with a fused secondary output voltage of 16.5VAC @ 40VA. These transformers are only designed to supply power to the system MCU or SCU. They may not be used to power any other devices such as door-strikes or electromagnetic locks.

CAUTION: This Transformer Has An Internal Fuse Which Cannot Be Repaired Or Replaced

BECAUSE THESE TRANSFORMERS SUPPLY POWER TO A SYSTEM Z-80 BASED COMPUTER, A LIGHTNING AND HIGH VOLTAGE SURGE SUPPRESSION DEVICE IS REQUIRED TO BE INSTALLED BETWEEN THE TRANSFORMER AND ITS SOURCE OF AC VOLTAGE. ONLY USE A HIGH QUALITY DEVICE WHICH HAS A STAGE RATED AT ONE NANOSECOND CLAMP TIME. DO NOT USE 20 NANOSECOND DEVICES AS THEY ARE TOO SLOW AND PROVIDE NO PROTECTION TO THE MCU OR SCU. A CORBY SURGE DEVICE PART # 4240 IS APPROVED.

Ensure there is at least 10 feet of class II wire between the surge protected transformer and the MCU/SCU.

2.12 Standby Battery

Up to 55 hours of emergency standby power is supplied to the MCU or SCU by a 12VDC four amp-hour, maintenance-free, lead acid type, standby battery. If installed with this system, a separate battery is supplied for the SCU. This battery is designed to be mounted inside the metal cabinet and connects to the MCU and SCU charging circuits with two six inch wires and quick disconnect tabs. The battery should be replaced every 36 months to keep these specifications. See the Technical Data Chapter for more details.

2.13 Security Event Printer

The system is shipped with a hi-speed dot-matrix security event printer that prints 80 columns of data and uses standard plain perforated tractor feed paper. This paper is available from any computer supply or office supply store. The printer is UL listed and requires 110/120VAC @ 60HZ, .7AMP. It requires a three prong grounding outlet and comes with a five ft. cord.

For SYSTEM 4 users, serial data is sent to the printer via an RS-232C data link which requires a three conductor shielded cable. Connection to the printer is through a male 25 pin "D" computer connector which is supplied. SYSTEM 4 sends data to the printer at 600 baud (bits per second).

The printer measure 16.9" X 12.6" and weighs 11 lbs. It is designed to sit on a desk top and paper feeds from the back or bottom. FOR MORE INFORMATION ABOUT THE PRINTER, CONSULT THE USERS MANUAL THAT IS SHIPPED WITH THIS SYSTEM. TO PROTECT THE PRINTER A ONE NANOSECOND SURGE PROTECTION DEVICE IS RECOMMENDED.

2.14 Master Control Unit (MCU)

The basic MCU is a complete low power CMOS Z-80 based computer with 32K of non-volatile EPROM and 8K/32K of battery-backed CMOS RAM. It controls four main relays for personnel access, energy management, or alarm security control; one auxiliary relay for duress code or door-ajar signals, accepts data from one to four user keypad and/or card reader locations, monitors one auxiliary input, and supports Requests To Exit. The SYSTEM 4 is programmed using the supplied digital keypad and printer. The SYSTEM 5 is programmed using the supplied VDT terminal. The printer provides hard-copy reports of all events in simple to understand English text.

The MCU is housed in a 18 ga. steel locking cabinet and weighs about 12 pounds. It should be located in a secure remote location that has a 110/120VAC unswitched power source. The only time the MCU will need to be accessed is to replace fuses, test or replace the battery, or use the system RESET button.

2.15 Slave Control Unit (SCU)

The Slave Control Unit (SCU) connects to the MCU with three conductor shielded wire. The SCU expands the capabilities of the system by adding more ports and relays for four additional doors and four independent monitoring zones. The Slave Control Unit (SCU) is identical to the MCU in appearance and has the same electrical specifications. The two difference are noted below:

The software EPROM dictates that the SCU is a "slave" to the MCU "master". If the EPROMs are switched, the SCU will become a MCU and the MCU would become a SCU. This may be handy if you ever encounter an equipment failure and need at least four (out of eight) doors to operate.

The MCU and SCU "talk" to each other in a secure format using a RS-232C transmission protocol. If they will be located more than 1000 feet from each other, a short-haul or standard modem is required. Short-haul modems are available from Corby and can drive RS-232C signals up to 10 miles. If the SCU becomes inoperative, the MCU will continue to operate in a normal manner except it will only support the original four doors in the system.

2.15.1 The SCU Supports Four Alarm Zones

The SCU supports four normally closed zones for monitoring. If all four zones are closed and secure, the SCU auxiliary relay contacts will also be closed. This feature is not found on the MCU.

Be sure to look at the wiring diagram of the SCU prior to installing zones. SCU zones will NOT work without diodes. If the diodes are not installed, all keypads and card readers connected to the SCU will be inoperative. We ship four 1N4002 diodes with every SCU. You will also have problems if the diodes are installed backwards. The stripe goes towards the "loop".

One side of each zone is connected to terminal #10 (strobe common "0"). The other side of the zone is connected to any one of the four keypad BCD data input ports, terminals #6-#7-#8-#9. You cannot hang IR beams, ultrasonics, and magnetic contacts directly on the SCU zone inputs. We suggest that you use a Corby Model 78 sensitive relay module. This device responds to both positive and negative voltages and monitors almost any circuit AND reports the condition of that circuit to the SCU. At that point, the system is able to print the status of each zone and open the SCU zone relay (#10) which will send an alarm signal to any control panel. The zone relay contacts are located on the SCU terminals #31 and #32. The use of Model 78's with zones is included with the SCU wiring diagram.

All four zones of the SCU MUST be closed before the zone relay contacts will close. This is known as an "AND" condition: Zone 1 "and" Zone 2 "and" Zone 3 "and" Zone 4 must be secure before the zone relay will close. It's the same as a normally closed "loop", only this one is reportable with a printed audit trail. Response time is 750 ms.

2.16 What Is The Telecommunications Module

The telecommunications module is (optional for the SYSTEM 4) included feature of SYSTEM 5. It is a small printed circuit board which measures 2.5" X 4.5". It provides communications between a VDT, or other compatible communications device. Corby Industries will not support other methods of communication between these devices without Corby's telecommunications module.

The telecommunications module also allows off-site access to the system via modems. All programming menus of the system may be entered by the user and initialized or revised as necessary. You may add or delete users, change codes and PIN numbers, invalidate cards, set access levels and time zones, or program holiday dates and relay functions. With a VDT (Corby P/N 4100), two modems (Corby P/N 4120/4121), and a simple telephone call, the alarm system in the building can be disarmed and doors unlocked on command. If the options are enabled and installed on the system, a check can be made to see if the alarm system was armed and by whom. If zones are being used, they can see exactly which zones were violated along with a time & date stamp.

The system is protected with an optional personal password that can be up to 12 characters in length.

There are two RS-232C communication channels available: Channel [A] is used for all full duplex operations. Channel [B] is available for output mode only and is designed to output direct to a VDT display terminal or printer.
Baud rates available are 300, 1200, 2400, and 9600. THE BAUD RATES FOR EACH CHANNEL MUST BE SET! Even if there is nothing connected to channel B, it must be set to one of the baud rates. Baud rates for channel A may be different than channel B. The module supports RXD, TXD, and signal ground signals.

CHAPTER 3 INSTALLATION

3.1 Planning The Installation

PLAN THE JOB UNDERSTAND THE EQUIPMENT READ THE MANUAL

This short section is included in this manual to aid you in analyzing the job requirements to ensure that the system will perform to specifications and that the job will be completed successfully.

MCU/SCU LOCATIONS should be in a secure area. Unswitched 110VAC must be available. Wires from the MCU/SCU to door strikes or door controls should be secure and protected from tampering. A one nanosecond surge protection device is required (Corby P/N 4240).

PROGRAMMING KEYPAD, PRINTER should be located in the system manager's office for easy programming and to ensure the printed reports of user events remain confidential. Maximum distance from the MCU to the printer is 500 feet of three conductor shielded cable. The programming keypad requires five wires with shield. 110VAC is required for the printer cord which is five feet long. A one nanosecond surge protection device is required.

KEYPAD WIRE runs should be limited to 4000 feet total, for each MCU or SCU. It must be multiconductor (not twisted pairs) and MUST be shielded. If you are using eight conductor cable, Corby LEDs and RTE switches may use the extra wires. You may not use the extra wires for any AC device, door strike power, or the RS-232C printer feed line. These devices require an additional wire run. Do not connect unused wires to the ground or shield.

RIM WIRE runs should be limited to 50 feet for each RIM. It must be multiconductor (not twisted pairs) and MUST be shielded. If you are using eight conductor cable, Corby LEDs and RTE switches may use the extra wires. You may not use the extra wires for any AC device, door strike power, or the RS-232C printer feed line. These devices require an additional wire run. Do not connect unused wires to the ground or shield.

DATA CHIP ADAPTER WIRE runs should be limited to 500 feet for each adapter. It must be multiconductor (not twisted pairs) and MUST be shielded. If you are using eight conductor cable, Corby LEDs and RTE switches may use the extra wires. You may not use the extra wires for any AC device, door strike power, or the RS-232C printer feed line. These devices require an additional wire run. Do not connect unused wires to the ground or shield.

BACK-TO-BACK KEYPADS are possible with this system. To mount keypads on both sides of the door, connect the five BCD output wires together inside the wall. These keypads will report as one.
CARD READERS require a minimum of five wires with shield to the Reader Interface Module (RIM). Maximum distance is 500 feet. If distances greater than 500 feet are necessary a Line Extender Module (Corby P/N 4056) must be installed. Use eight wires with shield if Door Ajar and or RTE is needed.

DATA CHIP READERS require a minimum of three wires with shield to the Data Chip Adapter. Maximum distance is 500 feet. Use eight wires with shield if Door Ajar and or RTE is needed.

PRINTER WIRE is three conductor shielded limited to 500 feet.

DOOR AJAR/TIME CANCEL SWITCH requires a switch that is "open" when the door is closed. When the door opens, the switch contacts close. Shielded one pair cable is required. This connection can be made utilizing the same cable as the card reader or keypad provided that the eight conductor shielded cable is used.

DOOR STRIKES may be used but AC strikes are not recommended. Electromagnetic door holders almost never wear out, and rarely need service. External power supplies are required for all door lock devices. A two conductor 16 or 18 gauge is suggested for door lock wire, it is OK to use shielded wire but it is not required. **Be sure to install a diode across the coil of the DC powered door lock... at the lock.**

AUXILIARY INPUT TERMINAL requires two conductor shielded wire from the device/equipment to the MCU.

PASSWORD/SOFTWARE SERIAL NUMBER is necessary to program or test the system.

Request-To-Exit SWITCHES are normally open and require two wires with a shield between the exit switch and the MCU or SCU. If the switch will be near the door, the eighth wire in the multiconductor cable can be used to provide closure between the red strobe wire of the keypad or terminal #11 of the RIM and terminal #18. It is also recommended to break power to electromagnetic door holders with a separate set of switch contacts in the RTE switch.

SWIPE READER MOUNTING KIT is designed to make installation easy. Use it when possible (Corby Part #4060).

CARD READERS CAN BE MOUNTED BACK TO BACK with a maximum of four readers connected to one Reader Interface Module (RIM). All of these readers will report as the same reader.

DATA CHIP READERS CAN BE MOUNTED BACK TO BACK with a maximum of four readers connected to one Data Chip Adapter. All of these readers will report as the same reader.

MOUNT KEYPADS AT LEAST 60 INCHES ABOVE FLOOR LEVEL to prevent fingernail damage to the keypad bezel in high usage areas.

COMPLETE THE TIME SCHEDULES located in the rear of this manual. They will help you plan the installation.

CARD READERS & KEYPADS can be used at the same door for added security. The keypad connects directly to the MCU/SCU. The RIM requires One 12VDC 1 amp continuous power supply (Corby P/N 4094). This power supply has a built-in battery back up and can be used to power up to four RIM.

A TELECOMMUNICATIONS LINE is necessary for "dial up" modem communications.

If you follow the instruction sequence outlined in this chapter, installation will be relatively easy and fast. Specific details are NOT covered here but are located elsewhere in this manual.

During installation, refer to the wiring diagrams located at the back of this manual

3.2 What Kind Of Wire To Use

Determine the quantity and the type wire your installation requires and plan all wire runs before actual installation. The printer, card readers, card reader interfaces, and all keypads require dedicated shielded cables with a wire size of 24 or 22 AWG.

- ☐ The printer requires three conductors w/shield
- ☐ The system program keypad (SYSTEM 4 only) requires five conductors w/shield
- ☐ The user control keypads require eight conductors w/shield for data, LED and RTE connections
- ☐ The card reader requires eight conductors w/shield to be run to the card Reader Interface Module (RIM). Maximum distance is 500 feet. (If distances more than 500 feet are needed use a Corby Line Extender Module to get an additional 500 feet of distance. The LEM goes in the middle of the wire run.)
- ☐ The Reader Interface Module (RIM) requires eight conductor wire with shield to the MCU or SCU. The RIM should be located inside MCU/SCU cabinet. It requires a separate constant source of 12 VDC.

We recommend eight multiconductor w/shield 22 AWG because it's common and generally available. Plenum cable is available from Corby also. Do not use four pairs of twisted type cable. Always spare out unused wires and do not connect these spares (at either end). Total cable length for all keypads in the system should not exceed 4000 feet. Cable length for the printer should not exceed 500 feet. See the Technical Chapter for exceptions and specifications.

WARNING! Class II wiring practices must prevail as defined by the National Electrical Code. If metal conduit is used, door strike wires or any AC voltage may not be run in the same conduit with keypad/card reader or printer wires. Depending on voltages and the actual type cable used, electrical noise will be a problem at any distance greater than five feet. Do not run wires on or near fluorescent light fixtures.

3.3 Planning For Door Strikes and Mag Locks

Direct current door strikes or DC magnetic door holding devices (mag locks) require a diode installed across the door lock coil. A 1N4001 diode or equivalent is wired at the door lock, parallel to the coil with the striped end (cathode) to the positive side of the coil.

3.4 Handling Static Sensitive Parts

C A U T I O N !

STATIC SENSITIVE PARTS ARE USED ON THE MCU PRINTED CIRCUIT BOARD!

Before handling any part of the PCB or terminal strips.....

DISCHARGE YOURSELF BY TOUCHING A GROUNDED OBJECT

and...

NEVER WIRE THIS UNIT WHILE IT IS POWERED!

ALWAYS DISCONNECT AC POWER AND BATTERY

If the temperature and/or humidity conditions are low, it is common for a person to build up a static charge in excess of 20,000 volts. This high voltage, if discharged directly into an integrated circuit, can destroy the device. Extreme caution should be taken to prevent inducing any static charge to the MCU printed circuit board or its components. This warning does not apply to the keypads because they only contain diodes and are not sensitive to static.

3.5 Mounting The MCU/SCU

Choose a suitable location in a secure area for the MCU/SCU. The locking cabinet, circuit board, and battery weigh 12 lbs. (4.5 kg). It is usually not necessary to gain access to the MCU/SCU after installation except to use the manual RESET button, replace fuses, and replace the battery every three to five years. It is not necessary to remove the printed circuit board from the cabinet for installation.

3.6 Using The MCU/SCU Mounting Template

Corby supplies an actual size paper mounting template. Position the template in place and mark the exact center of all four mounting screws. Installation is easier if you pre-drill the screw holes. Using #8 pan-head screws, install the top two screws and tighten to within 1/16 in. (about the thickness of a penny). Hang the MCU/SCU on the top two screws and slide the MCU down so the screws align in the cabinet slots. Install the bottom two screws and tighten securely. Do not attempt to adjust or tighten the top two screws. Five 3/4 in. knockout holes are provided in the lower half of the cabinet for installation of interconnect wires. Do not use the top five knockout holes around the circuit board because wires on or near the PCB components may provide you with experimental results.

3.7 Desktop System Program Keypad (SYSTEM 4 Only)

The desktop system program keypad and the printer are required for programming. Install both of these devices at the same time and in the same area. These devices require separate cable runs. Use a three conductor shielded cable for the printer and a five conductor shielded cable for the desktop system program keypad. You may NOT use one multiconductor cable run for both the printer and this keypad due to of crosstalk. You may run two separately shielded cables in the same conduit. Select a final location for the equipment remembering that the printer requires 110VAC and only has a five ft. cord.

3.8 Wiring The System Program Keypad (SYSTEM 4 Only)

Carefully pull the white plastic header/wire harness from the side of the PCB. Use wire nuts and connect the five data wires of your cable to the five BCD data wires of the quick-disconnect harness. So you can keep track of your color codes used in this installation, write in the color match below:

Corby Color: RED GREEN WHITE YELLOW BLACK

Your Color: _____

Carefully trim the shielding material from the cable and attach the shield drain wire to the ground screw on the printed circuit board. Do not attach the shield drain to the keypad metal plate.

BE CAREFUL! SHIELD SHORTS TO THE PCB WILL CAUSE UNPREDICTABLE OPERATION

Any wire shorts between the BCD data wires will affect all keypads in the system including the system program keypad. The PCB must be attached to the keypad with the 13 pin header and matching connector assembly. Connect the white five pin wire harness to the five pin header on the PCB. The plastic base of the keypad assembly has "knockouts" for a cable to exit. If these are too large, you can cut a small notch in the plastic for your wire to exit. We recommend that you install a "ty-rap" around the wire to provide a strain relief and prevent accidental damage to the internal connections. Assemble the unit with the two screws provided. The cable that runs back to the MCU may exit the front or rear of the keypad depending on the requirements of your installation.

3.9 Installing The Security Printer

The system's security printer is UL listed, requires 110/120VAC, 60hz at 0.7A, and requires a three prong grounded outlet. Cord length is five feet. Serial data to the printer is via RS-232C data link. For a SYSTEM 4, install the printer next to the system programming keypad because instructions are printed on the printer and responses and program data must be entered using the program keypad. You may not use one multiconductor cable run for both the printer and the system keypad. For a SYSTEM 5, install the security printer next to the VDT terminal with the supplied data cable.

3.9.1 Wiring The Printer Connector (SYSTEM 4 Only)

Locate the 25 pin "D" male computer connector. It is necessary to solder this connector to the printer side of the MCU three conductor shielded cable. Use a good soldering iron, small tip, suitable for electronic components. For an RS-232C line, SIGNAL GROUND IS NOT THE SAME AS EARTH GROUND! Do not connect the shield of the printer cable to terminal #1 of the 25 pin "D" connector. This printer is factory preset at 600 BAUD when it is shipped with a SYSTEM 4. Connections are as follows:

Printer	MCU Connection	Your Wire Color
25 Pin "D" #20	To MCU terminal #15 (Printer Status Line)	_____
25 Pin "D" #7	To MCU terminal #16 (Signal Ground Line)	_____
25 Pin "D" #3	To MCU terminal #17 (Printer Data Line)	_____

3.9.2 Connecting The Printer To The VDT Terminal (SYSTEM 5 Only)

Locate the 10 ft. data cable with 25 pin "D" computer connectors on each end. Plug one end into the VDT terminal connector marked AUX. Plug the other end of the data cable into the printer connector on the right side of the printer. The printer and VDT terminal are factory set at 9600 BAUD when shipped with a SYSTEM 5.

The baud rate may be changed to a lower rate if long cable lengths are required or use of a modem is required, provided the same rate is programmed into the VDT terminal and the telecommunications board.

3.9.3 Turning The Printer ON/OFF Through The VDT Terminal (SYSTEM 5 Only)

The printer may be turned ON/OFF through the VDT terminal. For a WYSE 55 terminal press the CTRL, SHIFT and PRINT buttons simultaneously to turn the printer ON/OFF. When the printer is on, the VDT will display an "AUX" message at the top center of the screen.

3.9.4 Changing The Baud Rate Of The Printer (SYSTEM 5 Only)

Access to the baud rate switches are obtained by removing the cover located on the right side of the printer, above the data input cable.

Set the baud rate as follows on the serial adapter: for 9600, SW3 position 4 is on. For 2400, SW3 positions 2 and 4 are on. For 1200, SW3 positions 1,2 and 4 are on. For 300, SW3 positions 1,3 and 4 are on.

3.9.5 Setup And Testing The Printer

Locate the CITIZEN GSX-190 User's Manual supplied with the system and turn to Chapter 1. This chapter refers to setup, installing the ribbon, installing the tractor feed, loading paper, and self test.

3.9.6 Installing The Video Display Terminal VDT (SYSTEM 5 Only)

Unpack and inspect the terminal shipping box. Included are a terminal, a keyboard with coiled cable, a power cord, and a VDT Users Guide. The VDT is UL listed, requires 120VAC, 50/60 hz at 0.7A and requires a three prong grounding outlet. It is supplied with a five foot power cord.

Serial data is sent to and received from the terminal via a RS-232C data link which requires a three conductor shielded cable. It may be located up to 500 ft. from the SYSTEM 5 depending on the baud rate. Connection to the SYSTEM 5 is through the TELCOM RS-232C board which is supplied with the SYSTEM 5. The baud rate is factory set at 9600 and it may be changed to a lower rate if longer wire runs are necessary. Refer to the VDT Terminal Users Guide, Setup Section. The number of data bits is 8, there is one stop bit and no parity.

3.9.7 Wiring The VDT Connector (SYSTEM 5 Only)

Locate the 25 pin "D" computer connector supplied with the system. It is necessary to solder this connector to the terminal side of the three conductor shielded cable. Use a good soldering iron suitable for electronic components. Refer to the wiring diagram in the appendix section for a schematic of the connector pinout.

For an RS-232C line, signal ground is not the same as earth ground. DO NOT CONNECT THE FOIL SHIELD TO PIN #1 OF THE 25 PIN "D" CONNECTOR. The foil shield should only be connected to the earth ground screw terminal on the TELCOM RS-232C board installed in the upper right hand corner of the MCU.

Plug the 25 pin "D" connector into the MODEM input on the rear of the terminal. It is the connector on the left side as you look at the back of the terminal.

VDT Terminal	MCU Connection	Your Wire Color
25 pin "D" # 2	RED of TELCOM (RXD)	_____
25 pin "D" # 3	WHT of TELCOM (TXD)	_____
25 pin "D" # 7	BLU of TELCOM (sig GND)	_____

3.10 User Control Keypads

A control keypad is any Corby digital key that will be operated by a user to activate a door or security system and has a system decoder interface PCB attached to the rear of the keypad. The recommended keypad for controlling single doors has one green LED factory installed just above the 12 digit keypad. Keypads may be mixed with card readers. Corby also has 15 other keypads which will operate with this system.

Control keypads should be installed at a height of about 60 inches. Outdoor-weatherproof keypads with covers should be mounted six (6) inches higher. If they are installed at a lower distance in high usage areas, fingernails will damage the black plastic bezel surrounding the "key" and the keys may tend to stick.

They may be located any reasonable distance from a port/portal/door as port activation time can be programmed from 1-250 seconds. They may be installed in standard electrical back boxes or on surface boxes using standard electrical hardware. Use the supplied mounting template, nylon or lead plugs, and screws if mounting the keypad directly to the wall.

Keyboard data is BCD encoded and multiplexed making code duplication virtually impossible by shorting or crossing data lines. But if the BCD data lines are shorted, all keypads in the system will not operate unless four diodes are inserted in each data line at the MCU/SCU. Therefore, tamper-proofing schemes are recommended if unauthorized personnel or vandals have access to the keypad site. Tamper-proof back boxes are available from Corby.

3.10.1 Understanding Anti-Passback Keypads/Cards

The system anti-passback is classified as "hard". This means if a "code" or "card" is used to enter an area, that "code" or "card" may never be used again until that user exits that area by using an approved exit keypad or card reader. That unique "code" or "card" may not be used by anyone else while the original user is inside the protected area!

3.10.2 How Anti-Passback Works With The System

The system will support up to eight keypad/card reader locations. Each is numbered on the MCU wiring diagram as keypad/RIM "one", "two", "three", and "four". The SCU expands the keypads/RIM's to include locations "five", "six", "seven", and "eight". Keypads/RIM's "one", "three", "five", and "seven" are 'odd' and the rest are "even". If anti-passback is programmed for a user code/card, that code/card must first be used at any "odd" keypad/card reader and then, to exit, be used at any "even" keypad/card reader.

3.10.3 Anti-Passback Example

If a user code of 1-2-3-4-5 (Card #12345) has the anti-passback option programmed to it and it is used at keypad/card reader #1 to gain entry to a restricted area, that code/card # of 1-2-3-4-5 can never be used at keypads/card readers 1, 3, 5, 7 unless this code is used at keypad/card reader 2, 4, 6, or 8 to reset the exit "flag". To explain this further, if an anti-passback user code/card is used on any "odd" numbered keypad or reader, that code/card will be invalid until it is entered on an "even" numbered keypad or reader.

Anti-passback codes are a powerful control feature. Personnel with anti-passback restrictions attached to their code/card are forced to use exact keypads or card readers and entry/exit is recorded and controlled. This feature can also be used successfully in guard watchtowers requiring the guard to go from one location to the next. Caution! Anti-passback is not forgiving! If you intend to use anti-passback, plan your "odd" and "even" keypad/card reader locations carefully.

3.10.4 Wiring User Control Keypads

Run an eight conductor cable with shield, non twisted pair to each location. The keypad uses five wires, the LED uses two wires, and the RTE uses the eighth wire. The door locking device uses a separate two conductor cable.

The MCU or SCU can supply 12VDC @ 25 ma to each keypad location whenever the port relay is activated. You can use this voltage to provide visual feedback to the user by activating the green LED on the control keypad. This 12 volt LED has a built-in current limiting resistor. Using two additional wires, connect them to the yellow lead (negative -), and red lead (positive +) of the LED.

Carefully pull the white plastic header/wire harness from the side of the PCB. Carefully trim the shielding material from your cable and attach the shield drain wire to the ground screw on the PCB. Do not attach the shield drain to the keypad metal plate.

Ensure the PCB is securely attached to the keypad via the 13 pin header and connector assembly. Connect the white five pin connector to the five pin header assembly of the PCB. The unit is ready to be attached to the wall.

So you can keep track of your color codes used in this installation, write in the color match below:

Corby Color: RED GREEN WHITE YELLOW BLACK LED(YEL-) LED(RED+) RTE

Your Wire #1: _____

Your Wire #2: _____

Your Wire #3: _____

Your Wire #4: _____

Your Wire #5: _____

Your Wire #6: _____

Your Wire #7: _____

Your Wire #8: _____

3.10.5 Wiring Door Ajar & Time Cancel Option

The system can sense when a door (or switch) is opened, the length of time it remains open, when it's closed, print the keypad/card reader location ID, TIME & DATE, and IF PROGRAMMED TO DO SO, activate the auxiliary relay.

Attach a magnetic switch contact, in which the contacts are open when the door is closed, inside the protected area. Connect the two terminals of this switch to the red and white wires of the adjacent keypad. If card readers are used, the two terminals of the switch connect to terminals #11 and #14 of the RIM (Reader Interface Module). A 1N4002 diode is needed for each Door Ajar switch, consult the wire diagrams for the specific location.

When a proper code is entered into the control keypad and the door is opened and then closed, any programmed "door strike" activation time remaining will be canceled preventing unauthorized "follow-Throughs". In addition, if the door is not closed when the programmed strike time has elapsed, a message will print seven seconds later with keypad/card reader location ID, DOOR AJAR, TIME & DATE. If programmed, the auxiliary relay (9 on the MCU) will activate. When the door is closed, the message prints keypad/card reader location ID, DOOR CLOSED, TIME & DATE. If the auxiliary relay is programmed to "latch", it will "latch-up" and remain in that state until it is reset by a relay time cell, telecommunications command, or by you entering the system program mode. This feature will not operate if the relay ID matching the keypad/card reader ID is programmed to operate in the latching mode.

IMPORTANT: The system only has one auxiliary relay (MCU relay 9). It may be programmed to activate upon receiving a valid hostage-duress code and/or a Door Ajar signal. The installer MUST ensure that a conflict of reporting by the auxiliary relay does not occur. This can be done by only letting the auxiliary relay respond to one condition. Don't mix "duress" with "Door Ajar"!

3.11 Wiring The Auxiliary Input Terminal

Terminal #18 of the MCU may be used to monitor an external device and print its status. Messages are "MCU AUX ON" and "MCU AUX OFF". The SCU does not have this option.

The printed report is triggered by a momentary connection between MCU terminal #5 (negative -) and MCU Terminal #18. When terminal #18 is forced "low" or negative (-) with a switch or other device, "MCU AUX ON" will print. When terminal #18 is allowed to go open (float positive +), "MCU AUX OFF" will print. Any negative going signal can be used to trigger this input provided the system and the source of the trigger share a common negative; i.e., Terminal #5 (-) must be connected to the negative of the triggering device (alarm equipment, etc.). This terminal can monitor the status of the arm/disarm condition of an alarm control panel and provide printed reports of the TIME & DATE when a system was armed or disarmed. The event is also stored in the buffer for later recall. Response time is 750 ms.

IF THIS OPTION IS PROGRAMMED ACTIVE, THE Request-To-Exit FEATURE WILL BE DISABLED ON THE MCU ONLY. The Request-To-Exit feature is always available on the SCU. Use Main menu selection #3 to enable or disable this function for the MCU.

3.12 How To Install Surge Protection

For the systems distributed in the USA, the factory tested 18VAC plug-in transformer is UL listed and has a built-in fast-acting fuse which CANNOT be replaced. If the 18VAC secondary output is shorted, EVEN FOR AN INSTANT, the entire transformer must be replaced. Always choose an "unswitched" 110VAC wall outlet.

A VOLTAGE SURGE SUPPRESSION DEVICE RATED AT ONE NANOSECOND MUST BE USED

Single stage 20 nanosecond devices are far too slow for any computerized device. If the specifications are not listed on the surge suppression device... don't use it. For best results, use a Corby quality three stage suppression device. In this area it pays to buy the very best. Lightning and Voltage spikes are NOT covered under any Corby system warranty program!

Always make connections to the MCU or SCU terminals #2 & #3 before making connections to the transformer. If the wire is connected to the transformer, do not plug it into the wall outlet at this time.

3.12.1 Wiring Surge Protection

The wire between the transformer and the MCU or SCU should be two conductor, stranded or solid, low voltage wire of at least 20 AWG for runs up to 25 ft. and 18 AWG over 25 ft. Using a one nanosecond surge protection device installed at the 110VAC outlet, the wire between the 18VAC transformer and the system must be at least ten feet long. The reason is high voltage travels about one foot per nanosecond. A one nanosecond device will require at least one nanosecond for it to "start" clamping the surge and in one nanosecond, the destructive voltage has already traveled five feet towards the system. The idea is to have the clamping action in place before the high voltage gets into the equipment.

DO NOT POWER UP THE TRANSFORMER AT THIS TIME

DO NOT MAKE ANY CONNECTIONS TO THE MCU OR SCU IF THEY ARE POWERED UP

YOU MAY NOT POWER ANY AUXILIARY DEVICES OR DOOR STRIKES WITH THIS TRANSFORMER

3.13 Standby Battery Wiring

The maintenance-free lead acid standby battery should be installed last. REMOVE THE BATTERY FUSE NOW. Observe polarity and, using the supplied battery leads, connect the positive (+) battery terminal to terminal #4 of the MCU or SCU using the red lead. Connect the negative (-) battery terminal to terminal #5 of the MCU or SCU using the black lead. **Do not install the battery now because a battery shorted with a screwdriver may explode in your face!**

3.14 Power Supply Design

The system power supply and standby battery are NOT designed to supply DC power to any device other than the standard 12VDC LEDs in each control keypad. To do so will reduce the charging capacity of the system, drain the battery, reduce the standby capacity below minimum specifications, and possibly damage the system. Therefore, it is important that you:

DO NOT POWER ANY AUXILIARY DEVICES FROM THIS SYSTEM BATTERY

DO NOT INSTALL THE BATTERY FUSE AT THIS TIME

DO NOT INSTALL THE BATTERY AT THIS TIME

3.15 Final Wire Connections To The MCU Or SCU

It is good professional practice to use insulated spade lugs when attaching wires to the MCU/SCU terminal strips. It reduces the chance of shorts and assures a good electrical connection and neat appearance. Make connections to the MCU and/or SCU in the following sequence:

3.15.1 Connect Earth Ground To The MCU And SCU

Connect a good earth ground to terminal #1. FAILURE TO CONNECT AN EARTH GROUND WILL VOID ALL LIGHTNING AND TRANSIENT MOV PROTECTION BUILT INTO THE SYSTEM. The ground connection should be made to a dedicated metal stake or cold water pipe as close as possible to the MCU or SCU. Use 12 ga. or larger solid copper wire. Do not use electrical conduit, gas, or telephone grounds. If included in this installation, the SCU requires a separate ground wire.

3.15.2 Connect The BCD Data Lines

Connect the four BCD data lines (blk, yel, wht, grn) from the keypad, RIM or Data Chip adapter to the MCU - SCU terminals #6-#7-#8-#9. Depending on how many keypads and/or readers are installed in the system, you may wind up with 20 or more wires connected to these four terminals. Therefore, the use of spade lugs is recommended. Connect as follows:

KEYPAD, RIM, DATA CHIP ADAPTER	CONNECTION
BLACK wire to	MCU/SCU #6
YELLOW wire to	MCU/SCU #7
WHITE wire to	MCU/SCU #8
GREEN wire to	MCU/SCU #9

3.15.3 Connect The Keypad & RIM Strobe Lines

Connect each keypad common strobe line, (the "red" wire) to a port. Strobe input ports on the MCU and SCU are terminals #10 through #14. The common strobe line from the RIM exits from the red wire of the wire harness and this line should be connected to the MCU or SCU the same way as a keypad does. Connect these strobe lines only to MCU or SCU terminals #11, #12, #13, or #14. As an example, if a strobe line is connected to MCU terminal #12, that keypad or card reader will be reported as port 2 and/or location ID 2. If it was connected to the SCU, it would be reported as port 6 and/or location ID 6.

If a digital keypad and a card reader will be used together to operate a door, the keypad strobe line and RIM strobe line must be connected to the same strobe input terminal #. That port should be programmed to recognize both units. The default port setting is keypad. To operate the system in this manner, the card must be used first and then the user has 15 seconds to enter the correct five digit PIN in the keypad.

The system programming keypad (SYSTEM 4 only) strobe line ("red wire") MUST be connected to MCU terminal #10. This is the ONLY terminal that will accept programming instructions from a keypad.

System Keypad "0"		to	MCU #10
Ports	"1/5"	to	MCU/SCU #11
Ports	"2/6"	to	MCU/SCU #12
Ports	"3/7"	to	MCU/SCU #13
Ports	"4/8"	to	MCU/SCU #14

3.15.4 Connect The Zone Wires To The SCU

If zones will be used with the SCU, one "side" of all the zones must be tied together as a common. Connect this "common" strobe line to SCU terminal #10 which is "port 0". If zones will be used, the diodes MUST be used as shown in the wiring diagram. Otherwise, the SCU unit will not work because all the strobe lines will be shorted together.

Zone 0 "Common"	to	SCU #10	
Zone 1		to	SCU #7
Zone 2		to	SCU #9
Zone 3		to	SCU #8
Zone 4		to	SCU #6

3.15.5 Connect The Printer Cable To The MCU (SYSTEM 4 only)

Connect the shield drain wire only to MCU terminal #1. DO NOT connect it to terminal #16. Do not connect any printer wires to the SCU.

25 Pin "D" Pin #3	to	MCU #17
25 Pin "D" Pin #7	to	MCU #16
25 Pin "D" Pin #20	to	MCU #15
Shield	to	MCU #1

3.15.6 Wiring The AUX Input

If the auxiliary input is used to monitor the status of another system or device, make connections to MCU terminals #18 and #5. This will provide "MCU AUX ON" and "MCU AUX OFF" reports. This is the default message. This feature is NOT supported on the SCU. If this feature is selected, Request-To-Exit on the MCU will be disabled.

3.15.7 Connect Request-To-Exit (RTE) Switches

RTE switches from a remote location or guard post are installed between MCU or SCU terminal #18 and MCU/SCU terminals #11, #12, #13, or #14. Switches must be normally open devices. Do not common any lines between the MCU and SCU. If the switch is "local" and located at the door location, connect the RTE switch wire to terminal #18. It is a standard feature for the SCU and does not have to be programmed.

YOU MUST ENSURE THAT THE WIRE FROM TERMINAL #18 NEVER CAN BE ACCESSED BY UNAUTHORIZED PERSONNEL AT ANY LOCATION WHERE THE KEYPAD OR RIM COMMON STROBE LINE IS AVAILABLE. IF INSTALLING A KEYPAD, BREAKOUT THE TERMINAL #18 WIRE PRIOR TO THE KEYPAD SITE AND RUN IT DIRECT TO THE RTE SWITCH. IF THE TERMINAL #18 WIRE IS SHORTED TO THE "RED" COMMON STROBE LINE, THE DOOR WILL OPEN!

3.15.8 Connect All Door Strikes And Other Devices

Connect all door strikes, electromagnetic door controls, security systems, or other devices using MCU/SCU relay terminals #19 through #30. For DC door locks make sure a diode is installed across the coil. See wiring diagrams.

3.15.9 Connections For Hostage/Duress Signals

If hostage-duress codes will be used, connect MCU auxiliary relay terminals #31 and #32 to a digital dialer or security alarm control. A duress code will always activate the MCU auxiliary relay (reported as 9). This feature cannot be disabled. If these terminals are going to be used to report "Door Ajar", connect them to a suitable reporting device.

3.15.10 Connections To The LED Drivers

If LEDs are used at the readers/keypads, connect all the yellow wires (negative -) of the LEDs to MCU/SCU terminal #5 and connect each red LED wire (positive +) to MCU/SCU terminals #33 through #36 keeping readers/keypads "1", "2", "3", "4", "5", "6", "7", and "8" in order. BEFORE PROCEEDING...

SYSTEM 4 ONLY: THE PRINTER MUST BE WIRED, PAPER INSTALLED, AND ONLINE

3.15.11 Powering Up The System MCU

Connect the secondary 18VAC output to MCU terminals #2 and #3.

DO NOT CONNECT THE SCU TO THE MCU AT THIS TIME!
DO NOT REPLACE THE BATTERY FUSE!

Remember the transformer is fused and ANY shorts across the output will blow the internal fuse and disable the transformer. If connections to terminals #2 and #3 are correct, plug the transformer into an approved surge device which should be plugged into an unswitched 110/120VAC electrical outlet.

DO NOT insert the battery fuse or connect the SCU at this time.

3.15.12 How To "Boot" The System

ANY STANDARD TEXT THAT IS PRINTED BY THE SYSTEM PRINTER (SYSTEM 4); VDT (SYSTEM 5) AND APPEARS IN THIS TYPE FACE - MCU RESET

Versions 1.5N (SYSTEM 4); 1.6F (SYSTEM 5) or higher have internally battery backup memory, because of this the "cold boot" message should not appear on the printer on initial power up only a reset message will appear.

MCU RESET (date will not be correct)

It takes up to 30 seconds for the initial reset message to appear. If the start up message does not appear on the printer (SYSTEM 4); VDT (SYSTEM 5), use a meter and ensure you have 18VAC across MCU terminals #2 and #3. Check the AC fuse located at the bottom left of the MCU PCB. Press the manual RESET button which is located directly above the fuses. If the start up message still does not appear, STOP here, unplug the transformer and check all your wiring.

If memory is manual cleared or if memory becomes corrupted and is automatically cleared the "cold boot" message will appear.

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V 1.5P (version may be different)
SYSTEM 4

Enter Serial Number

3.15.13 Connecting The SCU To The MCU

If:

You are installing an SCU
The system MCU has "booted" successfully
The printer is working

UNPLUG THE MCU TRANSFORMER (battery should not be connected yet). Look closely at the SCU wiring diagram and locate the master unit to slave unit wiring diagram at the bottom left. Use three conductor shielded wire (or four conductor shielded) and connect the two wire harness' together. Please note that the orange and white wires must be "crossed" at one side only. Press the four position connector on to the three pins marked "H1" located at the center right of the MCU and SCU printed circuit boards. THE WIRE CONNECTORS ARE INSTALLED ON THE HEADER WITH THE WIRES FACING TOWARDS THE CENTER OF THE CIRCUIT BOARD.

3.15.14 ReBooting The MCU With SCU Attached

Plug the MCU AC transformer in and supply 18VAC to the MCU only. The system should "boot" again and the start-up message should appear on the printer. If it does, plug in the transformer for the SCU. Press the MCU RESET button. "MCU RESET" should print. Press the SCU RESET button. "SCU RESET" message should print.

If you are NOT installing a telecommunications module (SYSTEM 4 only), carefully install the battery in the MCU/SCU and replace the battery fuse. With a DC volt meter measure the DC voltage across terminals #4 and #5, there should be at least 13.2VDC present. If the voltage is not present check your wiring. If the voltage is correct, proceed to the Programming Chapter.

3.16 Installing Proximity Readers

A Reader Interface Module (RIM) is required for Corby proximity readers when used with a Corby access control system. It is possible to operate two proximity readers from one card reader interface. When this is done, both proximity readers will report as one.

Corby Proximity readers require 12VDC power. They connect directly to the 12VDC power supply used by RIM, do not use the 5VDC output on the RIM.

DO NOT CONNECT A 5VDC WIEGAND READER DIRECTLY TO THE RIM 12VDC POWER SUPPLY.

3.16.1 Wiring Proximity Readers

Wiring proximity readers to the system requires 22 or 24 gauge multiconductor cable with an overall foil shield. DO NOT use twisted pair cable. It should be noted, however, that all multiconductor cable has some twist to it which is fine.

Use five conductor shielded cable to make the connection from the card Reader Interface Module (RIM) to the proximity reader. Use eight conductor shielded cable if Door Ajar and/or Request-To-Exit functions are needed. The maximum length is 500 feet. Use six conductor shielded to make connections from the proximity reader's remote electronics unit to the remote read head, maximum distance is 50 feet. NOTE: Models with remote read heads have two negative (-) connections; BLK wire and ORG wire. The BLK and ORG wires connect to terminal A of the remote electronics unit only. Connecting these wires together at any other point will cause a reduction in the read range.

Use eight conductor shielded cable to make the connections from the card Reader Interface Module (RIM) to the Corby access system.

Grounding of all shields is required. An earth ground must be connected to all the foil shields in the system. DO NOT connect an earth ground to terminal #1 or A on the proximity reader or terminal #5 of the RIM because these terminals are electrical negative (-) not earth ground.

Back to back mounting for anti-passback is possible if done properly. Standard size readers cannot be mounted directly back to back unless they are offset at least eight inches so that one is well outside the shadow of the other.

3.16.2 Operation Of Proximity Readers

Corby proximity cards operate exactly the same as Corby Wiegand cards except physical contact between card and reader is not necessary. The distance required for a read to occur varies with the type and style of the proximity reader, but is typically in the range of two to seven inches.

Switch plate size and mullion style readers have narrow capture beams and fastest reading will occur by moving the card or tag at any convenient angle toward the reader rather than swiping it across. A slight read delay of approximately one second is normal.

3.17 Programming Batch Number into Data Chip Adapter

Along with the five digit code number there is also a batch number in the Data Chips. This batch number must be programmed into each Data Chip adapter. To program the batch number into the adapter, install the jumper across the two pins of jumper J1 on the adapter then touch one of the Data Chips to the reader or the test point on the adapter. The LED will flash on the adapter and at the reader to indicate the batch number was accepted. The jumper should then be removed from J1 and placed over only one of the two pins. This will put the adapter into normal mode.

CHAPTER 4 INSTALLING TELECOMMUNICATIONS

4.1 Installing The Telecommunications Option

If you are installing a telecommunications module and if the system has "booted" successfully, and the printer is connected and working, you are ready to install the telecommunications module printed circuit board.

YOU MUST REMOVE ALL AC AND/OR DC POWER SOURCES TO THE MCU AND SCU

If you install the telecommunications board while the MCU is powered "hot", you stand an excellent chance of destroying one or two printed circuit boards.

4.1.1 Remove The Screw From The PCB (SYSTEM 4 Only)

With a straight edge screwdriver, remove the screw located at the top right hand corner of the MCU printed circuit board. The screw is directly above a black 50 pin expansion header marked "H3". Locate a small metal "standoff" in the parts package. Using your fingers, screw the threaded end of the standoff into the threaded hole which had the screw in it. Do not install the telecommunications module on an SCU. It will only operate if installed correctly on an MCU.

4.1.2 Set The Baud Rate

Locate the telecommunication module. Set the baud rate dip switch for COMM1 Channel A. Your choices are 300, 1200, 2400, or 9600. Then set the baud rate of COMM2 Channel B to the desired baud rate. The baud rates may be the same or may be different but, there must be one switch per channel. The baud rate is set by moving one DIP switch to the "on" position for Channel "A" and one DIP switch for Channel "B". All other DIP switches MUST be "off". NOTE: one DIP switch must be set on each port for this board to operate.

4.1.3 Plug The Telecommunications Module PCB On The Header (SYSTEM 4 Only)

Grasp the printed circuit board and carefully align the telecommunications board 50 pin female header with the MCU 50 pin male header. When aligned, press the two units together. Use extreme caution when mating the male/female. If the connectors are incorrectly positioned, you can destroy both the telecommunications module and the MCU.

You must replace the screw which holds the top board (telecommunications module) to the bottom board (MCU) because this screw completes the necessary earth ground circuit.

4.1.4 Reboot The System With Telecommunications

If you are positive the telecommunications module board is installed correctly, connect the AC transformer(s) and supply 18VAC to the MCU or MCU/SCU combination. The system should "boot" again and print "MCU RESET" with an incorrect time and date. If it does not appear, remove the AC voltage, wait five seconds and then connect AC voltage again. If you still experience problems, Press the MCU RESET button and if installed, the SCU RESET button.

If the system will not "boot", remove all voltage from the MCU or MCU/SCU, remove the telecommunications module and attempt to do a cold boot without the installed telecommunications board.

4.2 Connecting A Video Display Terminal (VDT)

Use the pin assignment below to connect a VDT to the system's telecommunications module. Channel A must be used for full duplex operations and interactive programming with the VDT keyboard and the system. Channel B may be used for an optional high-speed printer or a "display only" VDT. If a VDT is connected to Channel B, it will display all data from the system but you cannot use it for programming.

VDT TERMINAL		MODEL 4021 PORT A OR B	
PIN	SIGNAL	WIRE	SIGNAL
2	Transmit Data	Red	Receive Data
3	Receive Data	White	Transmit Data
7	Ground	Blue	Ground

Set the VDT to :

No Parity
8 Data Bits
1 Stop Bit

You must set the VDT and the COMM port baud rate to the same number. The higher the baud rate... the higher the speed. Baud rates available are: 300, 1200, 2400 or 9600.

A baud rate MUST be selected for BOTH Channel A and Channel B. Failure to do so will make both channels inoperative.

4.2.1 Connecting A VDT Terminal To The Printer Port (SYSTEM 4 Only)

In some cases it may be desirable to eliminate the SYSTEM 4 printer and send the data directly to a VDT. This may be done using the following PIN assignments. Please note that the baud rate is fixed at 600 baud.

VDT TERMINAL		SYSTEM 4		
PIN	SIGNAL		TERMINAL #	SIGNAL
3	Receive Data		17	Transmit Data
7	Ground	16		Ground

The VDT must be set to :

No Parity
8 Data Bits
1 Stop Bit
600 Baud Rate

*In order to prevent "screen burn-in", we recommend that you set the VDT's screen-saver option to ON. This will cause the screen to shut off after several minutes of inactivity. The screen will be reactivated when a key is struck or a new message is sent.

4.3 How To Boot With A VDT

If the telecommunications module and VDT are installed correctly, a "cold boot" should produce the same message that is normally printed by the printer. When the prompt says "ENTER SYSTEM CODE", enter "#" (this clears any garbage on any of the buffers) and your software serial number for this system. Do not press <RETURN>.

4.3.1 Using The VDT And Modems With Telecommunications

The system can be programmed from a VDT hard-wired to the COMM1 port (channel A) on the telecommunications module PCB or from a remote location using two modems and a standard dial-up phone line. Programming with a VDT is similar to programming with the system keypad and security printer with only two exceptions. First, the menus and prompts appear on the screen of the VDT rather than on the system printer and data is entered from the VDT's keyboard rather than from the program keypad. Anything entered on the VDT must be followed with a carriage return also known as <RETURN>.

4.3.2 Telecommunications Passwords & Security

Caution should be used in setting passwords! If a password of 1234567890 is used, it may be entered from the VDT AND the system program keypad. If a password of Chair+LOVER is used, it NEVER can be entered using the system program keypad!

To enter a password from the system program keypad, the password must contain only numbers. After the password is entered on the programming keypad, press "*" to enter it in the system. If you wish to program 1234567890 and your password, touch 1234567890* The * is the last digit in your password... your password is 1234567890*.

If the system is accessed via a telecommunications line and modem, the on-site printer stops regular printing and only prints changes to the system status. Items that ARE PRINTED include the time & date the program mode was entered, any relay that was changed while in the program mode, any time or date change, and system "on-line". This function provides a printed audit trail of important changes to the system data.

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CHAPTER 5 INSTALLING EPROMS

5.1 Installing EPROMS In The MCU/SCU

An EPROM contains 32,000 bytes or 125 pages of non-volatile computer software. It is serialized and may only be used in a single system. When replacing the EPROM, the following "power down" procedure should be followed.

1. **Remove the battery fuse** (F2) or remove the battery from terminals #4 and #5.

2. **Unplug or disconnect the 18VAC transformer.**

3. **Wait 120 seconds** for all power supply capacitors to discharge. Voltage across terminals #4 (+) and terminal #5 (-) must be below 0.05 volts DC.

4. **Locate the EPROM**. It is located in the top right corner, just left of the Z-80 microprocessor. It is installed in a 28 pin socket identified on the PCB as "U6".

DO NOT WIRE HOT STATIC SENSITIVE PARTS BEFORE DISCHARGING YOURSELF TO GROUND

5. **Touch Earth Ground** (terminal #1) to discharge any static electricity on yourself before touching any portion of the MCU.

6. **Remove the old EPROM** from its socket. This is accomplished using a professional-type DIP extractor or it can be removed by using a very small screwdriver. Carefully insert the blade of the screw driver or DIP extractor between the EPROM and its socket. With a rocking-pulling motion, work the EPROM loose from the socket.

7. **Align the EPROM pins.** As shipped to you, the EPROM will not fit into the 28 pins of the socket. Ensure you are "static free". Grasp the EPROM at both ends and lay one row of pins on a flat surface. Gently apply pressure in a slight rocking motion until one side (14 pins) are perpendicular to the EPROM body. Then, do the same procedure to the other side. The main objective is to align all 28 pins so they are perpendicular to the EPROM body.

8. **The notch in the EPROM body must be at the "TOP".**

9. **Line up the pins of the EPROM with the socket** and using your fingers, gently press into place with a slight rocking motion. After the pins are aligned, the EPROM should press into the socket approximately 1/16 inch. Sometimes a pin will bend inward under the EPROM and not be readily noticeable. If this happens, remove the EPROM and reinsert it correctly.

10. **Ensure the printer or VDT is switched "ON"**.

11. **Connect the 18VAC transformer** to power up the unit.

12. **Replace the battery fuse** and/or reconnect the standby battery.

13. **"MCU RESET" should appear on the printer.**

14. **Enter the system software serial number and CLEAR ALL MEMORY.** All user codes will be cleared and all system values will be set to default (factory standard) condition.

15. **If the EPROM is installed backwards,** or if it is handled improperly, it will be damaged.

16. **Reprogram all codes, time schedules and system settings.**

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CHAPTER 6 PROGRAMMING

6.1 Before You Start

There are a few simple but important details you should know before you start to program or enter data in the system. This section will outline them for you.

1. You must know the software serial number (SSN). This unique five digit number is enclosed with the software warranty registration form and is included with the instruction manual and equipment. TO MAINTAIN A VERY HIGH LEVEL OF SECURITY AND FOR YOUR PROTECTION, CORBY WILL NOT DIVULGE A SSN TO ANYONE! For continued warranty and customer service on this unit after 90 days, the license agreement must be signed and returned to Corby Industries.

2. The system keypad must be next to the printer.

3. The "#" button clears the keypad buffer and signals the system that any numbers touched immediately after the "#" should be considered valid. So, if your software serial number (SSN) is 1 2 3 4 5, you should enter "# 1 2 3 4 5". This function is also valid on user keypads elsewhere in the system and we suggest other users of the system enter a "#" prior to entering their personal identification number (PIN) in a keypad.

4. A default value is a preset value. The system comes with certain default values that will remain constant unless you change them while in the program mode. Each default value is explained in the section pertaining to its use.

5. When you enter the program mode, all relays will remain in the "state" they are in. While you are in the program mode, all other ports (keypads, card readers, etc.) are disabled and they will not operate any part of the system. The system keypad has priority over all other keypads in the system. While in the program mode, failure to touch a key within 140 seconds will automatically exit you from the program mode and return the system to its operational mode. To re-enter the program mode, simply enter "#" and your SSN.

6. All information, text, prompts, and instructions are displayed for you on the printer. So that you can tell the difference between the text in this instruction manual and that text which is produced by the printer/VDT, the type face will be resemble - PROGRAM MODE. Any comments or instruction aids included with this text will be enclosed in parenthesis ( ).

7. Most prompts which require a response from you will be followed by a question mark. The most common prompt will be **ENTER SELECTION** When you see a prompt or question mark, you have 140 seconds to touch the desired button.

8. If you find you made a mistake when you are entering data or if you decide you just don't want to continue in a particular area, touch the * button. Except in the automatic code mode, manual change code mode, and listing events, this * button aborts the immediate program and returns you to the last valid menu or function available. When you first start programming, you will find this * button very useful in escaping back to a safe area.

9. All the menus are in logical order. You start with the Main Selections menu and then work down deeper into sub-menus and "routines" inside the sub-menus. If you are in a "routine" and are finished with that function, just touch "0" and the program returns you to the menu which is just above it in logical order, which is a sub-menu. Then another "0" returns you to the Main Selections menu. If you are in the Main Selections menu and you touch "0" again, you will return the system "ON-LINE" and the program session will be finished. With this simple method, you can enter the program mode, browse around, make changes anywhere and always return by simply touching * to abort and "0" to quit and end the programming session.

10. We suggest that you break up your programming sessions into manageable portions if you will be entering large numbers of users.

11. If you are using the system keypad and Corby security printer, touch # and the software serial number to enter the program mode.

6.1 Before You Start (Continued)

12. The SYSTEM 4 can be programmed from an optional VDT hard-wired to the COMM1 port on the optional telecommunications module PCB or from a remote location using two modems and standard dial-up phone lines. Programming SYSTEM 4 with a VDT is similar to programming via the system keypad and security printer except the menus and prompts appear on the screen of the VDT rather than on the system printer and data is entered from the VDT's keyboard rather than from the system keypad. Entries from the VDT must be followed with a carriage return also known as <RETURN> or <ENTER>.

6.2 Main Selections Menu Overview

In program mode, the following Main Selections menu is displayed by the printer or VDT screen:

```
PROGRAM MODE  15:26:5109/14/91          (System message to you)
SYSTEM 4  V 1.5P
© 1993 Corby Ind

ALL PORTS DISABLED

MAIN SELECTIONS:                              (Items 1 through 4 are your choices)
1  Times/Dates - Schedules
2  User Data
3 Relay/Port Settings
4  List Last 25 Events                        (SYSTEM 5 = 250 events)
0  Return On-Line                       (Enter zero to quit)

ENTER SELECTION >                             (Prompt!  Expects a number 0 through 4)
```

Note that ALL system ports have been disabled. You now have control of the system and no one else can use it.

Enter Selection appears. Now, the program expects a button on the programming keypad or VDT keyboard to be touched. If you touch "0" it will return the system back ON-LINE and the system will become operational for all users except the programming keypad.

TOUCH 1 Times/Dates - Schedules and you will enter the set of sub-menus which enables you to: **[1]** Set/change the system time in 24 hour format **[2]** Set the system date, software programmed to the year 2086 **[3]** Set the daylight savings mode **[4]** Program holiday dates **[5]** Program time schedules for codes or automatic relay operation **[5]** Printout all the time schedules.

TOUCH 2 User Data and you will enter the sub-menu which enables you to: **[1]** Set the code length 1, 2, 3, 4, or 5 digits **[2]** Program new user codes by manual or automatic modes **[3]** Change user code data by code number or name (SYSTEM 5 only) **[4]** Print all codes entered into the system **[5]** Delete an individual code or card
[6] Change the system password **[7]** Set the range of facility codes **[8]** Clear All Memory

TOUCH 3 Relay/Port Settings and you will enter the sub-menu that enables you to: **[1]** Print out / Program of current relay data **[1a]** Set the relay time **[1b]** Assign time schedules to relays for automatic operation
[1c] Select the relay input for keypad, card, or both **[2]** Enable the aux relay to activate when a valid Door Ajar occurs on any port **[3]** Select "normal operating mode" (follow mode) or "elevator control mode" (independent mode) **[4]** Enable either Request-To-Exit (RTE) or aux input **[5]** Manually turn on or off a relay

6.2 Main Selection Menu Overview (continued)

TOUCH 4 List Last 25 (SYSTEM 4)/250 (SYSTEM 5) Events and you will print the last 25 (SYSTEM 4 only); 250 (SYSTEM 5 only) events which occurred including any events not normally programmed to print. This function is useful if AC was disconnected from the printer, there was a major power outage, or the printer was switched off or out of paper.

When assigning an active schedule to relay, all input strobes are disabled during the auto relay activation - input strobes include Request-To-Exit (RTE), Door Ajar, and/or keypad or card inputs.

TOUCH 0 Return On-Line while in the Main Selections menu and you will exit this menu, end the programming session, return the system ON-LINE, and allow all users access to the system. When you touch "0" the following message will be printed:

SYSTEM ON-LINE 15:26:42 09/14/91 (System Message)

6.3 Change Times & Dates

TOUCH 1 while the Main Selections menu is displayed on the printer or VDT screen. The Times - Dates - Time Schedules - Holidays sub-menu will print:

TIMES/DATES - SCHEDULES	(Sub-Menu Title)
1 Set Time	(Sets system time in 24 hr format)
2 Set Date	(Sets System date)
3 Set Daylight Savings	(Enables or disables DST mode)
4 Program Holidays	(Assigns selected dates for Holiday operation)
5 Program Schedules	(Set time schedules you select)
6 Print All Schedules	(Prints all eight schedules)
0 Return to Previous Function	(Returns to Main menu)
ENTER SELECTION >	(Prompt! Expecting a number: 0 through 6)

TOUCH 1 to enter new clock time or change current clock time.

Use 24 Hour Format (hhmmss)	(Needs six digits)
Enter Time >	

You must enter six digits in military time with the hour, minutes, and seconds. The clock is set when the sixth digit is entered. If you are using the telecommunications module and a VDT to program, be sure to enter a <RETURN>.
If the time is before 12:59:59 in the afternoon, just enter the six digits of the current time. Example: current time is 11:37:07 AM (in the morning), TOUCH 113707. If the current time is in the afternoon, add 12 to the current hour. Example: Current time is 2:15 PM, military time would be 14:15:00 and you would TOUCH 141500. The time you selected is printed:

Time: 14:15:00

The system uses military time format for all functions. When you have finished setting the time, the system will return to the last sub-menu you were in and reprint it.

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CHAPTER 7 USER TIME SCHEDULES

Time schedules control employee/user codes time of access and/or activate relays automatically. If you want a user to have 24 hour access, no schedule is required.

We will first describe the use of time schedules for controlling access of employee/user codes or cards. In the next chapter, automatic relay activation will be discussed.

7.1 Eight Schedules Available

This is what a system time schedule looks like:

[Programmable]
[Time Zone] (Contains two Time Cells)

#	Day	Start	End	
1	SUNDAY	00:00	00:00	(This is a sample Time Schedule)
2	MONDAY	08:00	18:00	
3	TUESDAY	08:00	18:00	
4	WEDNESDAY	08:00	18:00	
5	THURSDAY	08:00	18:00	
6	FRIDAY	08:00	18:00	
7	SATURDAY	07:00	12:00	
8	HOLIDAY	07:00	13:00	

There are eight complete time schedules available. Each time schedule has the seven days of the week plus one holiday. Each day is numbered, with Sunday as day #1, Monday as day #2, ..., Saturday as day #7, and any holiday as day #8. For each day, there is a "START" time and an "END" time. The "START" time is the time when a user code becomes valid. The "END" time is the time when the user code becomes invalid. Each time schedule contains eight time zones (each containing two cells; i.e., "START" and "END") for a total of 64 time zones. Each time zone is fully programmable. Any time schedule or combination of schedules (maximum total of eight) may be assigned to any user code for time control. Assigning a time schedule to a user code/card is optional and is done when you assign a unique code to a user. If no time schedule(s) is assigned to a user code/card, the system will ignore these schedules when dealing with that user code/card. The user will then have 24 hour access.

If an employee's "END" time for a time-zone is listed as 15:15:00 (in military time), the latest this employee can use that code is 59 seconds past 3:15 PM or 15:15:59. The code will not function at 3:16:00 PM. If one or more time schedules have been assigned to a user code or card and this code/card is used "outside" all time zones in the assigned time schedules, the system will refuse access and the printer will report that code/card as being invalid usage along with a location and time & date stamp.

If the cells of a day's time zone have a "START" time of 00:00 and an "END" time of 00:00, access will be denied. But, if a time zone is set to a "START" time of 17:00 and an "END" time of 17:00, access will be granted for all 24 hours of that day. 17:00 is only used as an example. Any other numbers (except 00:00) may be used as long as they are identical.

If a time schedule is NOT assigned to a user code or card, then that code or card WILL NOT have any time or date restrictions attached to it. It will be valid 24 hours a day.

7.2 Using A Single Time Schedule

For this programming example, we will set up a time schedule that allows a maintenance crew to enter a protected area ONLY on Tuesdays and Thursdays between the hours of 5:45:00 PM and 11:45:59 PM, AND on holidays from 5:45:00 AM until 12:00:59 (noon).

These instructions assume you are using the time schedule worksheets located in the Appendix Section of this manual and will only cover setting up one time schedule because the procedure is identical for all eight time schedules. While the Times - Dates - Time Schedules - Holidays sub-menu is displayed:

TOUCH 5 to set up a new time schedule or change an existing schedule. System prints this message:

```
Enter Schedule #  (1 - 8, 0 to Quit)          (Enter 1 through 8 or zero to end)
```

TOUCH 1 to change time schedule #1. If data has not been previously entered or changed, it will contain the system default values of 00:00 and 00:00 and print as follows:

```
#       Day             Start   End             (This is Time Schedule #1)
1       SUNDAY  00:00   00:00
2       MONDAY  00:00   00:00
3       TUESDAY         00:00   00:00
4       WEDNESDAY       00:00   00:00
5       THURSDAY        00:00   00:00
6       FRIDAY   00:00  00:00
7       SATURDAY        00:00   00:00
8       HOLIDAY 00:00   00:00

Enter Day (1 - 8, 0 To Quit)   6          (Expects numbers 0 - 8 or abort [*])
```

TOUCH 3 to enter and set times for Tuesday (day #3). The following is printed:

```
Enter Start Time                           (Sub-Menu routine heading)
Use 24 Hour Format (hhmmss)
Enter Time >                                   (Six digits are required or abort [*])
```

TOUCH 174500 to enter Tuesdays "START" time for the maintenance crew to enter building.

After 174500 is entered, the system responds with this printed message:

```
Time 17:45:00

Enter End Time                             (Sub-Menu routine heading)
Use 24 Hour Format (hhmmss)
Enter Time >                                   (Six digits required or abort [*])
```

TOUCH 234500 which is the "END" time for the maintenance crew to leave. System prints message:

```
Time 23:45:00
Enter Day # (1 - 8, 0 to Quit)             (Enter the next day # to change or 0 to quit)
```

TOUCH 5 which is day #5, Thursday. Set the "START" time for 17:45 and the "END" time for 23:45. Repeat the process for day #8 which is the holiday. Set the holiday "START" time for 05:45:00 and the "END" time for 12:00:00. Programming the maintenance crew time schedule #1 is done.

7.2 Using A Single Time Schedule (Continued)

TOUCH 0 and the new time schedule for the maintenance crew will be printed:

#	Day	Start	End	
1	SUNDAY 00:00	00:00		(This is revised Time Schedule #1)
2	MONDAY 00:00	00:00		
3	TUESDAY	17:45	23:45	(Active Time Zone)
4	WEDNESDAY	00:00	00:00	
5	THURSDAY	17:45	23:45	(Active Time Zone)
6	FRIDAY 00:00	00:00		
7	SATURDAY	00:00	00:00	
8	HOLIDAY 05:45	12:00		(Active Time Zone)

Enter Day # (1 - 8, 0 to Quit) (Expects numbers 0 - 8 or abort [*])

If you inspect the revised time schedule #1, you will see the limits placed on any user code/card which has this schedule assigned to it. If someone from the maintenance crew tries to use their digital code or card, for example, at 8:00 PM on a Monday night, access will be denied and an invalid usage report will be printed.

7.3 Using a Schedule to Cross Midnight

In a manufacturing company, individual time schedules can be set up for the 7-3 shift, 3-11 shift, 11-7 shift, and the 9-5 office staff, etc. It should be noted that if an employee's work schedule crosses the midnight hour of 00:00:00, the time schedule will be different from the regular schedules. Example: For the 11-7 midnight shift, access is desired from 23:00:00 (11:00 PM) on Monday evening until 07:00:59 (7:00 AM) Tuesday morning and this shift continues until Saturday morning. Time schedule number two is shown here:

SCHEDULE NUMBER TWO

#	Day	Start	End
1	SUNDAY 00:00	00:00	
2	MONDAY 23:00	00:00	
3	TUESDAY	23:00	07:00
4	WEDNESDAY	23:00	07:00
5	THURSDAY	23:00	07:00
6	FRIDAY 23:00	07:00	
7	SATURDAY	00:00	07:00
8	HOLIDAY 00:00	00:00	

If two or more time schedules are assigned to a user, one or more time zones may overlap. A user will be valid IF, at the exact time and day the code is used, it matches a valid time zone in ANY of the time schedules assigned to that user. If you have overlapping time zones, use the day schedule worksheets located in the rear of this manual.

WARNING: Care must be used if holidays are programmed into the system. Holiday time zone restrictions take precedence over a normal "day of the week" time zone. If a holiday falls on a Wednesday, the "Wednesday" in the assigned time schedule will be replaced with the holiday time zone times. If the holiday time cells are set to the default value of 00:00 and 00:00, access will be denied.

7.4 Using Holiday Time Zones

The time control software supports 16 programmable holidays. The system default date is 12/31/84 and this date does not affect any dates added to the data file, nor will it affect operation. Dates can be programmed into the future up to the year 2086 and can be added to the list in any order and at any time.

When the internal clock and calendar reach one second after midnight, (00:00:01), the new day is considered a holiday if the new current date matches a programmed holiday date. If holiday dates are programmed, check the time schedules to ensure access will be allowed if so desired. If a holiday has a time of 00:00 to 00:00, no access will be granted to users with that schedule. A holiday date takes precedence over a normal time schedule "day". If a holiday falls on a Wednesday, any normal time zone for day #4 (Wednesday) will not be valid.

TOUCH 4 The following current holidays will be printed:

#	Holiday	#	Holiday
01	12/31/84	09	12/31/84
02	12/31/84	10	12/31/84
03	12/31/84	11	12/31/84
04	12/31/84	12	12/31/84
05	12/31/84	13	12/31/84
06	12/31/84	14	12/31/84
07	12/31/84	15	12/31/84
08	12/31/84	16	12/31/84

Enter ## to Change: (0 to Quit)? (Requires two digits)

For this holiday example, we will change holiday slot #07. Slot #07 presently holds a system default date of 12/31/84. We will change it to Christmas, 1992 and program the new date into the holiday listing position #07.
TOUCH 07 and the following will print:

Enter Date (mmddyy)? (Requires six digits)

TOUCH 122592 to enter the date 12/25/92 in holiday slot #07. The system responds and prompts you for the next holiday slot # to change (if any). For this example, we will TOUCH 00, quit the holiday dates programming routine, and return to the Times - Dates - Time Schedules - Holidays sub-menu.

Enter ## to Change (0 to Quit)? (End holiday sequence by pressing 00)

TOUCH 00, the holidays will be printed with the new data followed by the TIME/DATES menu:

#	Holiday	#	Holiday	
01	12/31/84	09	12/31/84	
02	12/31/84	10	12/31/84	
03	12/31/84	11	12/31/84	
04	12/31/84	12	12/31/84	
05	12/31/84	13	12/31/84	
06	12/31/84	14	12/31/84	
07	**12/25/92**	15	12/31/84	(Active holiday date in 1992)
08	12/31/84	16	12/31/84	

TIMES/DATE - SCHEDULES
1 Set Time
2 Set Date
3 Set Daylight Savings
4 Program Holidays
5 Program Schedules
6 Print All Schedules
0 Return to Previous Function
ENTER SELECTION > (Prompt! Expecting a number: 0 through 6)

7.5 How To Test Time Zones

Complete the written day schedule worksheets located in the rear of this manual. Using these worksheets, start with the 1st active day on the schedule. Go back to the Main Selections menu, enter the Times - Dates - Time Schedules - Holidays sub-menu, and set the internal system date to match a valid date that falls on that "DAY". Be sure to use a calendar. Otherwise the system will catch you using invalid dates and print an "invalid" message.

This test procedure assumes that you are familiar with the system AND you already have test codes/cards programmed in the data file along with one or more active relays. If you do not have any valid user codes, cards, or relays programmed, you may proceed direct to the chapter titled "Programming Codes & Relays" and enter actual or test data.

Set the system time two minutes before a time zone will go into effect. Note the time on your watch and to make it easy, do this at the "top of the minute". Also note the time at the printer to keep track of the "valid" and "invalid" time reports. After all, you are checking for valid times & dates. Go to a valid keypad location and enter a user code or card that has a valid time schedule assigned to it. The code must be a valid user code. Wait two minutes and try the code/card again. It should be invalid.

The security printer should print data similar to this:

```
USER 1001            2      09:31:03  10/13/91      (Valid Code   User #1001 Location # )
USER 1025            3      09:32:01  10/13/91      (Valid Code   User #1025 Location # )
USER 0075            1      10:33:46  10/16/91      (Valid Code   User #75   Location # )
INVALID USE 12345    2      13:20:33  10/17/91      (Invalid Code 12345      Location # )
INVALID USE 12345    2      13:21:04  10/17/91      (Invalid Code 12345      Location # )
DURESS USER 1012     2      13:22:01  10/17/91      (Duress Code  User #1012 Location # )
```

You can do this with all codes or cards, all time schedules, and all dates. When you are finished, be sure to set the correct time & date into the system.

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CHAPTER 8 AUTOMATIC RELAY TIMED OPERATION

8.1 Overview

It is assumed that you understand the concept of time schedules covered in the previous chapter. If not, please back up and review it.

You can automatically activate any of the five relays on the MCU and, if installed, the four relays on the SCU at the precise time and day specified by ANY time cell in ANY time schedule. A Time schedule which is currently empty and in this example, does not contain any valid time data is shown:

#	Day	Start	End	(This is one Time Schedule)
1	SUNDAY 00:00	00:00		(There are a total of eight schedules)
2	MONDAY 00:00	00:00		
3	TUESDAY	00:00	00:00	
4	WEDNESDAY	00:00	00:00	
5	THURSDAY	00:00	00:00	
6	FRIDAY 00:00	00:00		
7	SATURDAY	00:00	00:00	
8	HOLIDAY 00:00	00:00		

There are eight different time schedules available for your use, each containing seven weekdays, and each weekday contains two time cells. In most cases, these two time cells will be referred to as a time zone. For the purpose of this discussion, a holiday is considered to be valid ONLY on its assigned date.

CAUTION ! BEFORE USING THESE RELAY TIME SCHEDULES... READ CAREFULLY !

Automatic relay operation is a very powerful security management tool. It can be used to automatically lock/unlock doors and gates, arm/disarm alarm systems, control energy management systems, or control any other system or device at any time, in any day, week, month, or year.

Extreme care must be used when using this relay option. As the number of automatic relay operations per week increases, the chance of you programming errors into a time schedule increases dramatically. There are several time schedule and day schedule worksheets located in the Appendix Section of this manual, **Please use them**! Use caution because it can get very complicated, very fast. When a time schedule is active, all inputs for that port are non functional. The inputs become active after a valid end cell has taken place. If you remove a time schedule from a relay the port will turn the relay off by itself.

This is a powerful tool that can work for you but it will also work against you if done incorrectly.

8.1.1 Sharing Time Schedules

Any or all time schedules can be assigned to any or all relays. In addition, any or all relays CAN SHARE ANY OR ALL time schedules which may or may not be assigned to a user code or card. Normally there are only two possible modes of system relay configuration: **[1]** Momentary, where a relay is programmed to operate for a specific period of time ranging between 1 - 250 seconds, or; [2] Latching, where the relay operates identical to a toggle switch which is latched "on" and latched "off". **TIME SCHEDULES WILL CHANGE THIS NORMAL OPERATION.**

8.1.2 Default Status Of The Time Schedules

The default status of the system ensures that time schedules are not initially assigned to any relays. For automatic relay operation, YOU must assign the valid time schedules to a relay.

8.1.3 The Momentary Relay AUX #9

For the purpose of automatic relay operation, the MCU auxiliary relay is unique because it is the only relay that always maintains its independent status as being fully programmable for EITHER momentary or latching operation. This is not true of the other relays in the system if the AUX #9 relay is programmed "momentary", AUX #9 will be activated (contacts momentarily close for the programmed time) with ANY valid START or END time cell in ANY assigned time schedule. Time schedules, time zones, and time cells MAY overlap. This is a valid condition.

Therefore, it is possible to activate this relay twice on Monday (or any other day) using only one time schedule. If all eight time schedules are assigned to relay #9 and each time schedule has DIFFERENT time cells for Monday, it is possible to activate this relay at 16 different times each Monday. AUX Relay #9 may also be activated with a duress/hostage code/card or, if programmed, with Door Ajar sense switches. It is NOT RECOMMENDED to use this relay in a latching time mode with any schedule to open a door lock.

8.1.4 How To Arm & Disarm Security Systems With Relay #9

Most alarm systems require a momentary closure across their "keyswitch" terminals to arm or disarm. The MCU AUX Relay #9 is the only relay in the system that can provide this momentary function. It should be programmed for about two seconds momentary time and the relay contacts are located on MCU terminals #31 and #32.

8.1.5 Automatic Relay Operation With Latching Relays

A relay which has been programmed to be latching will also be activated (latched) by ANY valid START time cell and be deactivated (unlatched) by any valid END time cell.

NOTE: If a relay is assigned to a time schedule for automatic operation, the port disables it's input strobe during the on-time of the relay. While the strobe line is disabled, RTE, Door Ajar, keypads and/ or readers will not operate.

8.1.6 Momentary Relays Will Change To Latching

If relays 1,2,3 or 4 of the MCU and/or relays 5,6,7, or 8 of the SCU are programmed to normally be momentary operation, they will automatically be changed to latching operation as soon as they encounter a valid START cell in any assigned time schedule. When they encounter a valid END cell, they will revert back to their programmed momentary status.

8.2 Understanding Relay Operation

It is very important for you to read and understand exactly what the system automatic relay mode WILL and WILL NOT do. Otherwise you can end up with a completed access system installation that will require a great deal of your time to "debug". This should not happen if you understand how automatic relays work, keep your time & day schedules simple, use the worksheets, and plan the entire installation.

A system relay is considered "active" if there is internal power being applied to the relay and its associated LED terminal. A latching system relay in the latched state is just a momentary relay with constant internal power being applied to it. The only real difference is how they are programmed to operate.

If a LATCHING relay is currently in the active state and a valid START time cell occurs in ANY time schedule assigned to that relay, the system will ignore the START time cell but it will print AUTO RELAY - START. There will be no change in the relay state and it WILL NOT be relatched or unlatched.

This is NOT TRUE for momentary relays. If it's a momentary relay numbered 1 through 8, the auto relay function will latch it up. It will stay latched until the END time call disables the relay. It then resumes momentary operation.

If a LATCHING relay is currently unlatched (deactivated state), the system WILL ignore any valid END time cell but is will print AUTO RELAY - END. This feature allows manual override at any time and ensures the system will not reverse any manual setting. This concept is easy to understand working with latching relays. If the system encounters any valid START or END time cell AND a latching relay is ALREADY in the state it is supposed to be in, the START or END command is ignored.

Caution should be used to inspect all time schedules assigned to any relay to ensure there never will be a conflict. There are several relay day schedule worksheets located in the Appendix Section of this manual. Please fill them out and use them. Keep them on file so if you have a time conflict problem, you can refer to them.

8.3 Software Logic Description

A few words should be said about the internal software programs of the system to help you understand the logic of time schedules. The system always knows what time it is and every sixty seconds, at the "top" of each minute, the system checks its calendar to get the current day of week, date, and any holiday date.

In logical order, the system first looks at relay #4 or, in the case of expansion, relay #8 (it will get to the other relays later) to see if there are any time schedules assigned to it and whether it is programmed for momentary or latching operation. For the purpose of this discussion only, we will assign to relay #4 time schedules seven (#7), three (#3), and five (#5). With this information, it starts to "read" in ascending order (#3, #5, #7) only the assigned time schedules for this relay.

As it reads the first (lowest numbered) assigned time schedule (#3), it goes directly to the proper day # to execute one or both time cells. The system will ignore any time cell in any time schedule which contains 00:00.

For this discussion, the current day is Monday and the system first looks at day #2 (Monday's) START cell. It compares the START cell to the END cell. If they contain identical times, both cells are invalid because the system cannot START and END a relay at the same time!

In this example under discussion, the system sees the 13:00 - 13:00 invalid time cells and the program immediately exits time schedule #3 and proceeds directly to the next assigned time schedule (#5) and again, only looks at Monday, day #2 for this relay (#4). If the START and END times are NOT identical, the system will execute the START instruction. If relay #4 is NOT active, a control signal will be sent to the relay and it will activate in accordance to its individual programmed function.

If relay #4 was programmed to be LATCHING and IF it WAS NOT active at the current moment, a START control signal would be sent to latch it in the active position. If it WAS already active and in the latched position, the START control signal will have no effect. The system will proceed directly to the END time cell. Even if the START time in the next time schedule (#7) is identical to the START time in time schedule #3, the system will ignore it because it has already done its "START" job for relay #4... for this minute.

Remember, at this exact point in time, we are still working in time schedule #3 and only on relay #4. The actual time spent by the program is only microseconds. It checks relays in this order: 4, 3, 2, 1, 5. It checks time schedules in this order: 1, 2, 3, 4, 5, 6, 7, 8. It reads the START time and then the END time in each schedule. For each relay, it sifts through all eight time schedules including holidays and then proceeds to the next relay in logical order.

In the next example, only Tuesday is shown for all eight time schedules and all eight schedules are assigned to the SAME system latching relay. This is what will happen each Tuesday for this relay. Invalid time cells and cells that are ignored are shown in BOLD:

		(Time Zones) Start Cell	End Cell	
(Weekday)				
#	SCHEDULE	Start	End	
1	TUESDAY **00:00**	**00:00**		
2	TUESDAY 08:00	**00:00**		(Relay latched at 08:00)
3	TUESDAY 08:30	**00:00**		
4	TUESDAY **00:00**	08:30	(Relay unlatched at 08:30)	
5	TUESDAY **00:00**	09:00		
6	TUESDAY 08:45	**00:00**		(Relay latched at 08:45)
7	TUESDAY 10:00	18:00		(Relay unlatched at 6:00 PM)
8	TUESDAY **00:00**	**00:00**		

8.4 Limitations

This section assumes that any time schedule discussed or used as an example IS assigned to one or more relays. If a time schedule is not assigned, the system ignores it for automatic relay operation.

8.4.1 Midnight

00:00 may be used and is not considered an invalid time cell, but this time CANNOT be used to activate ANY relay in ANY time schedule. The system WILL ignore any 00:00 in any time cell and a relay cannot be activated exactly at 00:00 (midnight).

8.4.2 Identical Cells & Holidays

If a START cell is identical to an END cell in ANY assigned time schedule for ANY single day, the cells are invalid and WILL BE IGNORED by the system if the number of identical cells is divisible by the number 2. If there are 3, 5, 7, 9, etc. identical cells, only the last cell in logical order will be valid. This applies only to the "day". In other words, any time cell for Monday will never conflict with a Tuesday. The only exception is a holiday because a holiday "day", if invoked, has priority and will override any time cells programmed on that day.

8.4.3 Time Tolerance

23:59, 00:01, and most other times are valid time cells. The actual timing for any valid time cell relay activation depends on exactly how "busy" the system is when it encounters a command from a time cell within a time schedule to operate a relay. Typical response time ranges from a few milliseconds to a maximum of 10 seconds. If two or more relays are programmed to operate at the same time, each relay WILL actually operate at different times. The difference may only be milliseconds but the system tolerance is "on the minute" plus 10 seconds. Relays WILL activate in a 4, 3, 2, 1, 5 order. All five relays can be activated within 10 seconds after a valid time cell but keep the tolerance in mind if you are planning super critical timing.

8.4.4 Extended Relay Times

Be careful if you have exotic time schedules assigned to any relay. Use the time & day worksheets and ensure any overlapping time schedules do not conflict. Momentary relays set in excess of 59 seconds may cause problems because each valid START and END cell re-triggers a momentary relay and it restarts with a fresh time range. If your programmed times are high, stay with times which are 10 seconds away from both sides of 60, 120, 180, and 240 seconds.

8.4.5 Door Ajar

All input functions associated with a common strobe input are disabled when a time schedule takes control of a port relay. This means that when a relay is activated by a time schedule; Door Ajar, Request-To-Exit, and keypads or card readers associated with that port cannot deactivate the relay. Also, events are not recorded. The system acts like nothing is connected to that port input common strobe (terminals #11, #12, #13, #14).

8.5 How To Test Auto Relays

You can set the system clock for any valid time or date.

Complete the day worksheets located in the rear of this manual. The worksheets will give you a "snapshot" of when each relay will be "on" or "off". Enter the system serial number in the program keypad to enter the program mode. Start with the 1st active day and set the internal date to match a valid date that falls on that "day". Be sure to use a calendar.

Set the time one minute before a time zone will go into effect. Note the time on your watch and it's best to do this at the "top of the minute".

In the next example we have a time schedule cells programmed for 09:00 and 17:00. This time schedule is assigned to all five relays.

Here is part of a test program so you can see the printout:

AUTO RELAY - START	1	09:00:00	03/26/92
AUTO RELAY - START	2	09:00:01	03/26/92
AUTO RELAY - START	3	09:00:02	03/26/92
AUTO RELAY - START	4	09:00:03	03/26/92
AUTO RELAY - START	9	09:00:04	03/26/92
AUTO RELAY - END	1	17:00:00	03/26/92
AUTO RELAY - END	2	17:00:01	03/26/92
AUTO RELAY - END	3	17:00:02	03/26/92
AUTO RELAY - END	4	17:00:03	03/26/92
AUTO RELAY - END	9	17:00:04	03/26/92

When you are finished, be sure to set the correct time & date into the system.

CHAPTER 9 DAYLIGHT SAVINGS TIME

9.1 Programming

This system has a real time clock and time control software to enable the internal clock and calendar to automatically set the clock ahead one hour on the 1st Sunday of each April, and set the clock back one hour on the 4th Sunday in October.

The system default is NOT to automatically change the time. To "enable" this function, you must enter the Times - Dates - Time Schedules - Holidays sub-menu. When the menu is displayed, select option #3. The following message will be printed:

DST ENABLED (Will change time automatically)

The Times - Dates - Time Schedules - Holidays sub-menu will then be printed. If you **TOUCH 3** again, the message printed will be:

DST DISABLED (Will not change time automatically)

This function "toggles" or "switches" between "enabled" and "disabled". Whatever "message" prints last will be the condition of the Daylight savings time function.

After you **TOUCH 3**, the Times/Date - Schedules sub-menu will be displayed:

TIMES/DATE - SCHEDULES
1 Set Time
2 Set Date
3 Set Daylight Savings
4 Program Holidays
5 Program Schedules
6 Print All Schedules
0 Return to Previous Function
ENTER SELECTION > (Prompt! Expecting a number: 0 through 6)

TOUCH 0 to return to the Main Selections menu and end this programming session.

If you are going to test this function, and change the system time using the "set time" function, you must let the internal clock normally pass through 02:00:00 hours. Otherwise, your results may be experimental.

If you set the internal clock to 01:59:00, the change will occur at 01:59:59. In April it will jump ahead to 03:00:00 and in October it will jump back to 01:00:00. If you are using time & relay schedules, read those chapters for limitations in using this option with those functions.

Remember that the "default" flag is "off". For the daylight savings time to automatically adjust it's internal clock requires action on your part. If political changes cause the dates to be revised, please contact Corby Industries for software updates.

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CHAPTER 10 PROGRAMMING CODES, CARDS & RELAYS

10.1 Setting Access Code Length

TOUCH 2 while you are in the Main Selections menu to set the number of digits in the user codes.
The following will be printed:

SYSTEM 4 ONLY

PROGRAM USER DATA:	(Sub-Menu Title)
1 Set Code Length	(Choose 1, 2, 3, 4, or 5 digits)
2 Program New Users	(Issue new Codes)
3 Change User Data by Code	(Change Configuration of Code)
4 Print All Users	(Prints all codes in System)
5 Delete User	(Deletes a current User Code)
6 Set Facility Code	(Set facility code range)
7 Program Password	(Change or Assign Password)
8 Clear ALL Memory	(Clears All System Memory)
0 Return to Previous Function	(Return to the Main Menu)
ENTER SELECTION >	(Enter a number, 0 through 7)

SYSTEM 5 ONLY

PROGRAM USER DATA:	(Sub-Menu title)
1 Set Code Length	(Choose 1, 2, 3, 4, or 5 digits)
2 Program New Users	(Issue New Codes)
3 Change User Data by Name	(Change Configuration by Name)
4 Change User Data by Code	(Change Configuration by Code)
5 Print All Users	(Prints all Codes in System)
6 Delete a User	(Deletes a Current User Code)
7 Set Facility Code	(Set facility code range)
8 Program Password	(Change or Assign Password)
9 Clear ALL Memory	(Clears ALL System memory)
0 Return to Previous Function	(Return to the Main Menu)
ENTER SELECTION	(Enter a number, 0 through 8)

TOUCH 1 to set the code length. When you touch "1", the system responds with the current system status. If this is the first time you are using this portion of the system, the following will be displayed:

CURRENT DATA:	(Sub-Menu heading title)
Code Length: 5	(Five digit Code now in use)
Users Available: 500	(SYSTEM 4) 750-(SYSTEM 5)
Facility Code: 00 through 00	
ENTER CODE LENGTH (1-5)	(Enter 1 through 5 or abort [*])

The system default is an access code length of five digits. You can change the code length to any length between one and five digits. Increasing the number of digits in the access code also increases the level of security. A five digit code length produces 99,999 possible combinations.

WARNING: If there are user codes already programmed into the user code data list, changing the code length will **IMMEDIATELY erase all existing codes**. The system is looking for this possible error and if there are existing codes in the data file, it will notify you of such. IF YOU DO NOT WANT TO ERASE THEM, **TOUCH * TO ABORT.** This feature also allows you to get familiar with the system by entering test codes and when you are ready to enter your final code set, erase all the old ones simply by resetting the code length.

10.1 Setting Access Code Length (Continued)

If you have ports programmed as card only and change code length from five to four digits, ports automatically change to keypad only inputs. Even if you change back to five after going to four digits, the relays will not change back. You will have to reprogram the relay section.

10.2 Assign User Codes

This section deals with user codes (PIN [personal identification number]). The system is digital and requires a sequence of numbers to be entered into a keypad in an exact order. The number of digits that must be entered depends on the software that is supplied with the system. Typically it will accept one, two, three, four, or five digits. Needless to say, the more digits in a user code, the higher level of security you will have. If you only use one digit, the maximum number of possible combinations is 10. Use five and this rises to about 100,000! If your system uses cards readers, you must use a five digit Code.

There cannot be a duplication of any code in the system. Each code is assigned to a "user" and a "user" may have more than one code. A code can never be assigned to more than one "user".

10.2.1 Valid Codes

A code can be as valid as you want it to be. It can be valid for all times and all events, or it can be restricted to do "nothing". We recommend that a code never be deleted. Just change the access levels down to zero. That way there is always an "audit" trail on who "owned" the code, even two years from now.

10.2.2 Keypad Buffer

At each digital keypad there is a "buffer" which stores the digits being entered. If a wrong code is entered, the system will deny access and a printed report will be made. If someone enters six digits, the system only looks at the first five digits and the sixth will remain in the buffer. Even if the next five digits are perfect, the system will reject the code as invalid because that sixth digit was still in the buffer and was "read" as digit number one. In computer terms, this is known as an infinite loop. (one that will last forever).

It is suggested that all users of the system enter a # prior to entering their code. The # (pound sign) always clears the buffer and any digits entered after the # will be considered as valid digits by the system.

IMPORTANT! PLEASE READ

Before you assign codes to users, ensure the entire system including all keypads, readers and other equipment is working. Verify this with several test codes/cards that do not have schedules and/or anti-passback assigned to them. If for some reason you must power down the system to replace components, you may lose all data which will require a complete reprogramming of the system.

10.2.3 Ways To Assign Codes

There are two ways to assign a digital code to a user: YOU DO IT in the manual mode, one at a time, or you can let the system do it for you in the automatic mode.

In the manual mode, you have complete control of everything including who gets which number for a code. In the automatic mode, you still have complete control of everything except who gets which code. The system will select the digital code for you.

If you are only programming a dozen codes, you may elect to program them all in the manual mode. After the first dozen, it is usually faster to do it in the automatic mode and then go back in and change the few that are not liked (for whatever reason). Now that we have covered how the system handles digital codes, we are ready to go back to the programming session.

NOTE: Data Chips must be programmed using the Manual mode (option 1). This is because Data Chips come from the manufacture with random numbers.

While in the User Data menu, **TOUCH 2** to assign or change existing codes. The system responds with:

PROGRAM NEW USERS:	(Sub-Menu title)
1 Load Manually	
2 Batch Load Codes	(Automatic Mode)
3 Batch Load Cards	(Automatic programming of cards)
ENTER SELECTION >	(Prompt! Enter 0 - 3)

The system is now ready to operate in the manual or automatic mode. The system programmer has the option of manually entering user codes or allowing the system to automatically generate codes for all users. The system also allows each user to have several codes including a duress code that will activate the auxiliary relay. When entering codes in the manual mode, there is a three second delay while the system performs a memory test.

TOUCH 1 to enter the manual programming mode.
Current Code data is displayed by the printer:
SYSTEM 4 ONLY

CURRENT DATA:	(Sub-Menu heading title)
Code Length: 5	(Four digit Code in use)
Users Available: 500	(500 Codes are available)
Facility Code: 01 through 04	
How many in This Group (###) >	(Enter # of codes to enter 005, 050, etc)
Enter User # (#### 0000 to Quit) >	(Needs 4 digits 0001, 0002, etc)
Enter Code Digits or Card # >	(Enter code or card #)
Is This a Duress User?	
Press 1 for Yes 2 for No	(Enter 1 for duress, 2 for no duress)
Allow Access to Doors/Ports 0 - 4 >	(Enter the door #(s), followed by 0)
Allow Access by Time Schedules 0-8 >	(Enter schedule(s) # followed by 0)
Restrict with Anti-passback?	(Enter 1 for Yes, 2 for no)
Press 1 for Yes 2 for No >	(Needs 5 digits 13790, 53790, etc)
Working...	(System is thinking)
Code User Ports	Duress Schedules AP

10.2.3 Ways To Assign Codes (Continued)

SYSTEM 5 ONLY

CURRENT DATA:	(Sub-Menu heading title)
Code Length: 5	(Four digit Code in use)
Users Available: 750	(750 Codes are available)
Facility Code: 01 through 04	(Displays the Facility Code Range)
How many In This Group?	(Enter the # of codes needed)
Enter User Name (0 to quit)	(Enter up to 15 digits)
Enter User Data	(Enter up to 9 digits)
Enter Code Digits or Card #	(Enter Code or Card #)
Is this a Duress User? Press <Y>es or <N>o	(Enter Y for duress, N for no duress)
Allow Access to Doors/Ports 0 - 4	(Enter the door #(s), followed by 0)
Allow Access by Time Schedules 0-8	(Enter schedule(s), followed by 0)
Restrict with Anti-passback? Press <Y>es or <N>o	(Enter Y for yes, N for no)
Working...	(System is thinking)

Code User Name User Data Port Access Duress Schedules AP

When the system asks: How Many In This Group?, it needs to know how many codes you intend to enter so it can check to see if that many codes are available and allocate space in memory. If you have a SYSTEM 4, always enter a three digit number. So, for five users you would enter 005. If you have a Special SYSTEM 4 (2000 User Version) you must enter four digits. If you have a SYSTEM 5 you need only enter the number and press (enter). If you are going to enter five users and each one will have a duress code, then you would enter 10 - or on a SYSTEM 4 it would be 010 - for 10 codes as each user will have two codes.

When the SYSTEM 4 asks: Enter User Number? (#### 0000 TO QUIT) it can be any four digit number that will be used to identify a single user. If you have a SYSTEM 5 it asks: Enter User Name (0 to quit)?, enter the user's name or number which can be up to 15 characters. There is no limit on the number of different codes one employee or user can have. If at any time you want to stop programming users, enter **0000** at the user number prompt for SYSTEM 4 or **0** at the user name prompt for SYSTEM 5.

The SYSTEM 5 has one extra step the SYSTEM 4 does not: Enter User Data You may enter any 9 characters to identify the user i.e. employee number or social security number.

When either system asks: Enter Code Digits or Card # it is looking for the digits that make up the access Code.
Reminder, card readers use only a 5 digit code. Keypad codes can use 1 to 5 digits, we recommend using 5 digits for the highest level of security. Example: **TOUCH 1 2 3 4 5** for a code of 12345, **TOUCH 5 1 5 7 0** for a code of 51570

The SYSTEM 4 and 5 support duress codes, The SYSTEM 4 asks: IS THIS A DURESS CODE / CARD? Press 1 for Yes 2 for No. Press 1 if duress is needed or 2 if it is not needed.

The SYSTEM 5 asks: Is This a Duress Code/Card? Press (Y)es or (N)o Press Y if duress is needed or N if it is not needed.

10.3 Assign Relays To Codes

There are four main relays available in the MCU and one auxiliary relay. In the case of expansion(SCU), there are eight main relays and one auxiliary relay available. The system will ask: Allow Access to Doors/Ports 0 - 4, enter the door/port #(s) the user can access followed by zero. If you enter 1, 2, 6, 0, That user will have access to doors 1, 2 and 6. A user can also be assigned "zero" relays which will not allow that code to activate any relay. A zero after the door #'s are entered so the system knows this is the end of this sequence. Example: **TOUCH 1 2 4 8 0** This will allow this code/card to enter doors 1, 2, 4 and 8, the zero tells the system there are no more doors for this code.

10.4 Assign Time Schedules

The time schedules should be setup prior to reaching this point. There are eight time schedules available, you may assign any number of valid schedules to any code or group of codes. When the system asks: Allow Access by Time Schedules 0-8 enter the schedule #, followed by zero. After the schedule #'s are entered, a 0 must be entered so the system knows the sequence is complete. You may also elect not to assign ANY schedule to any code which would allow access any time that code/card is entered.

Example: **TOUCH 1 0** to restrict this code/card by the times assigned in schedule # 1, the zero tells the system there are no more schedules for this user.

The SYSTEM 4 and 5 support antipassback. The system will ask: Restrict with Anti-Passback? If you select yes, the user must enter his code/card for entry and exit to the building. If you have a SYSTEM 4 press 1 for Yes or 2 for No. If you have a SYSTEM 5 press Y for yes or N for no.

Example: **TOUCH 1(SYSTEM 4) or Y(SYSTEM 5)** for antipassback, **TOUCH 2(SYSTEM 4) or N(SYSTEM 5)**

The system will either request another code or return you to the CHANGE CODES AND ACCESS DATA menu.

10.5 Automatic User Codes

The system can automatically generate random main codes and optional duress codes for each user. It is recommended that users be broken into groups having identical security levels.

For example, if there are 20 people who work in the computer operations area and they all start work at the same time and they all go through the same doors, etc.,etc., then you can "batch load" them in the automatic mode. Remember that all the details for all users must be identical for each "batch load".

User numbers are assigned sequentially beginning with the first user number entered. It is recommended that a method be devised prior to starting the code generation that will keep all user groups separate. For example, management can have user numbers 1 through 20, office personnel could have user numbers 100 through 199, etc. This method is recommended because the security printer only prints the user number, NOT valid codes. If all personnel are separated into number groups, it is easy to identify users from the printed copy. If you select all users in a "batch" to have a duress code, the system will assign a main code first and then add 1 to the last digit of the main code for the optional duress code. The system produces true duress codes. In a hostage situation the only thing that changes is the last digit of the code. If the main code is 1234, the duress code is 1235. Remember to instruct the users to always enter # (to clear the keypad buffer) prior to entering their user code. (#1234 and #1235)

While in the User Data menu, **TOUCH 2** to assign or change existing codes. The system responds with:

PROGRAM NEW USERS:	(Sub-Menu title)
1 Load Manually	
2 Batch Load Codes	(Automatic Mode)
3 Batch Load Cards	(Automatic programming of cards)
ENTER SELECTION >	(Prompt! Enter 0 - 3)

TOUCH 2 to enter the Batch Loading of Codes, this is for keypads only option 3 is for cards only.

This example shows 20 users allowed access to doors 2,4 and 7, with no anti-passback or duress, and restricted by time schedule 1.

SYSTEM 4 ONLY

CURRENT DATA:	(Sub-Menu heading title)
Code Length: 5	(Four digit Code in use)
Users Available: 500	(500 Codes are available)
Facility Code: 01 through 04	
How many in This Group (###) >20	(Enter # of codes to enter 005, 050, etc)
Enter First User # (####) >001	(Needs 4 digits 0001, 0002, etc)
Activate Duress?	
Press 1 for Yes 2 for No 2	(Enter 1 for duress, 2 for no duress)
Allow Access to Doors/Ports 0 - 8 >2470	(Enter the door #(s), followed by 0)
Allow Access by Time Schedules 0-8 >10	(Enter schedule(s) # followed by 0)
Restrict with Anti-passback?	(Enter 1 for Yes, 2 for no)
Press 1 for Yes 2 for No >2	(Needs 5 digits 13790, 53790, etc)
Working...	(System is thinking)

This example shows 20 users allowed access to doors 1,2,5 and 8, with no anti-passback, with duress, and 24 hour access.

SYSTEM 5 ONLY

CURRENT DATA:	(Sub-Menu heading title)
Code Length: 5	(Four digit Code in use)
Users Available: 750	(750 Codes are available)
Facility Code: 01 through 04	(Displays the Facility Code Range)
How many In This Group? 20	(Enter the # of codes needed)
Assign Names?	(Press Y for yes or N for no)
Press <Y>es or <N>o y	

If you press N for no the system will ask: Enter First User # (####), you must enter the first user # of this sequence, the system will then proceed. If you press Y for yes it continue and ask for names after it asks you for Anti-passback.

Activate Duress?	(Enter Y for duress, N for no duress)
Press <Y>es or <N>o y	
Allow Access to Doors/Ports 0 - 8 12580	(Enter the door #(s), followed by 0)
Allow Access by Time Schedules 0-8 0	(Enter schedule(s), followed by 0)
Restrict with Anti-passback?	(Enter Y for yes, N for no)
Press <Y>es or <N>o n	
Working...	(System is thinking)

If you selected yes to assign names the system will now ask:

Enter User Name (0 to quit) John Smith	(Enter up to 15 characters)
Enter User Data Sales	(Enter up to 9 characters)

Repeat the above sequence for any additional batches of users. The card programming option (option # 3) is the same as the automatic programming option with the exception that codes are generated sequentially and you are asked for a starting card #. This is because Corby*Cards are distributed sequentially.

10.6 Change User Information

If you have a SYSTEM 4: Touch 3 to change a code when in the Program User Data menu.

```
Enter code >12345                                   (Enter the code # to change)

Code    User    Ports    Duress  Schedules          (Prints the current user info)
12345   0001    12--                --------

Change User #?                                      (Enter 1 to change, 2 to leave as is)
Press 1 for Yes  2 for No 2

Change Duress?                                      (Enter 1 to change, 2 to leave as is)
Press 1 for Yes  2 for No

Change Doors?                                       (Enter 1 to change, 2 to leave as is)
Press 1 for Yes  2 for No >1

Change Time Schedules?                              (Enter 1 to change, 2 to leave as is)
Press 1 for Yes  2 for No 2

Change Antipassback?                                (Enter 1 to change, 2 to leave as is)
Press 1 for Yes  2 for No

12345   0001    12--                --------        (Displays new user info)
Working...                                          (System is thinking)
```

If you have a SYSTEM 5: Touch 3 to change the user info by knowing the user Name or Touch 4 to change the user info but knowing the user code. This example shows changing data by code.

```
Enter code #12345                                   (Enter the code # to change)

Code    User Name       User Data       Port Access     Duress  Schedules       AP
12345   Tom Smith       Sales           123-----                --------

Change User Name and Data:                          (Enter Y to change, N to leave as is)
Press <Y>es or <N>o

Change Duress?                                      (Enter Y to change, N to leave as is)
Press <Y>es or <N>o

Change Doors?                                       (Enter Y to change, N to leave as is)
Press <Y>es or <N>o

Change Time Schedules?                              (Enter Y to change, N to leave as is)
Press <Y>es or <N>o

Change Antipassback?                                (Enter Y to change, N to leave as is)
Press <Y>es or <N>o

12345   0001    12--            --------            (Displays new user info)
Working...                                          (System is thinking)
```

10.7 Delete Codes

While in the Program User Data menu:

If you have a SYSTEM 4, touch 5 to delete a user code, the system will ask: Enter Code/Card to Delete. Enter the code # to delete, the system will print the user info and ask: Delete? Press 1 for Yes 2 for No, if you press 1 that user code will be deleted if 2 is pressed it remains in memory.

If you have a SYSTEM 5, touch 6 to delete a user code, the system will ask: Enter Code/Card To Delete. Enter the code # to delete, the system will print the user info and ask: Delete? Press <Y>es or <N>o, if you press <Y> that user code will be deleted if <N> is pressed it remains in memory.

10.8 Set Facility Codes

Every Corby*Card has a unique code which will never be duplicated. This code is comprised of a five digit card # and a two digit facility code #. Corby adds one to the facility code after every 100,000 cards. So, there may be more than one card with the same card #, NO two cards will ever have the same facility code #. The SYSTEM 4 and 5 allow a range of facility codes to work in a system. This is useful if there is a long period of time between your initial card order and subsequent orders. This range consists of a low range and a hi range, any valid card within that range will work, any card outside that range will be ignored. Example: if you select a range of 02 to 03, any valid card in your system with a facility code of 02 or 03 will be read. If a card with a facility code of 04 was entered at a reader it will not read and there will be no print out because the card is ignored. The default facility code range is 00 - 00. This allows any card to work in your system, we recommend that it be changed if you cards all have the same facility code for higher security.

While in the Program User Data menu:

If you have a SYSTEM 4, touch 6 to set the range of facility codes for your SYSTEM 4. Your facility code is printed on the back of your Corby*Cards. If you have a SYSTEM 5, touch 7 to set the range of facility codes for your SYSTEM 5. Your facility code is printed on the back of your Corby*Cards.

The sequence looks like this:

Enter Low Facility Code (00 - 31) (Enter the lowest facility code #)

Enter Hi Facility code (Enter the highest facility code #)

Note: To ensure all your cards have the same facility code, order extra cards needed for future users.

10.9 Change Password

If an extra level of security is needed a 12 digit password, which must be entered in addition to the SSN, can be added. The SYSTEM 4 allows a numeric password only. First enter the SSN then the digits of the password, followed by a star (*). The SYSTEM 5 allows a alpha-numeric password. First enter the SSN, then the password followed by the enter key. Reminder enter the # symbol before entering the SSN to clear the keyboard or keypad buffer.

While in the Program User Data menu:

If you have a SYSTEM 4, touch 7 to set the password, it must be entered two times. After each time the star (*) key must be entered. If you have a SYSTEM 5, touch 8 to set the password, it must also be entered two times.

Enter New Password (* to quit) (Enter the new password)

Re-enter (* to quit) (Enter the same password again)

If a password is already in the system it will prompt the user for both the old password and the new password. This is to prevent someone who doesn't know the password to change it to one that he does know.

10.10 Set Relay Functions

Select Main menu option # 3, RELAY/PORT SETTINGS to program the following data.

TOUCH 3 this menu will be displayed:

```
RELAY/PORT SETTINGS:

1  Set Port Data                    (Change Data for Relays Input and Output)
2  Set Door Ajar Alarm                    (Enable Door Ajar Relay system wide)
3  Set Port Mode                    (Normal or Elevator Mode)
4  Manually Override Relays               (Manually Turn On or Off Relays)
5  Select Aux/RTE                         (Choose Aux Input or Request-To-Exit)
0  Return To Previous Function

ENTER SELECTION
```

SYSTEM 4

TOUCH 1 to Set the port data (SYSTEM 4 shown):

```
Port Relay      Access Mode          Time Mode      Activated by Scheds
    1           Keypad or Data Chip   002 Secs          - - - - - - - -
    2           Keypad or Data Chip   002 Secs          - - - - - - - -
    3           Keypad or Data Chip   002 Secs          - - - - - - - -
    4           Keypad or Data Chip   002 Secs          - - - - - - - -
    9                                 002 Secs          - - - - - - - -

Port # to Change (0 to Quit) >1      (Enter the port to change data for)

IS PORT:                             (Asks which 1 of 3 selections)
1 Keypad or Data Chip                      (Enter 1 for keypad operation only)
2 Card                                     (Enter 2 for card reader operation only)
3 Both                                     (Enter 3 for keypad and card reader operation)
ENTER SELECTION >2

SET RELAY FOR:                       (Asks if this port is momentary or latching)
1 Momentary                                (Enter 1 for a timed relay, 1-250 seconds)
2 On/Off                                   (Enter 2 for latching or on/off operation)
ENTER SELECTION >1

Enter Time (001 - 250 sec) >005      (If momentary, enter time 1-250 seconds ###)

Activate by Schedule (0 - 8, 0 to Quit) >10   (Enter schedule #(s), followed by 0)

Port # to Change (0 to Quit) >0      (Enter next port # or 0 to get menu)

Port Relay      Access Mode          Time Mode      Activated by Scheds
    1            Card Only            005 Secs      1 - - - - - - -
    2           Keypad or Data Chip   002 Secs          - - - - - - - -
    3           Keypad or Data Chip   002 Secs          - - - - - - - -
    4           Keypad or Data Chip   002 Secs          - - - - - - - -
    9                                 002 Secs          - - - - - - - -
```

SYSTEM 5

TOUCH 1 to Set the port data (SYSTEM 5 shown):

Description	Port Relay	Access Mode	Time Mode	Activated by Scheds
	1	Keypad or Data Chip	002 Secs	- - - - - - - -
	2	Keypad or Data Chip	002 Secs	- - - - - - - -
	3	Keypad or Data Chip	002 Secs	- - - - - - - -
	4	Keypad or Data Chip	002 Secs	- - - - - - - -
	9		002 Secs	- - - - - - - -

Port # to Change (0 to Quit) >1 (Enter the port # to change data for)

Enter Description Front Door (Enter 15 characters for port description)

IS PORT: (Asks which 1 of 3 selections)
1 Keypad or Data Chip (Enter 1 for keypad operation only)
2 Card (Enter 2 for card reader operation only)
3 Both (Enter 3 for keypad and card operation)
ENTER SELECTION >2

SET RELAY FOR: (Asks if this port is momentary or latching)
1 Momentary (Enter 1 for a timed relay, 1-250 seconds)
2 On/Off (Enter 2 for latching or on/off operation)
ENTER SELECTION >1

Enter Time (001 - 250 sec) >005 (If momentary, enter 1-250 seconds ###)

Activate by Schedule (0 - 8, 0 to Quit) >10 (Enter schedule #(s), followed by 0)

Port # to Change (0 to Quit) >0 (Enter next port # or 0 to get menu)

Description	Port Relay	Access Mode	Time Mode	Activated by Scheds
Front Door	1	Card Only	005 Secs	1 - - - - - - -
	2	Keypad or Data Chip	002 Secs	- - - - - - - -
	3	Keypad or Data Chip	002 Secs	- - - - - - - -
	4	Keypad or Data Chip	002 Secs	- - - - - - - -
	9		002 Secs	- - - - - - - -

Select option #1 to set port/relay data, the system will print the current port settings. The system prompts you to "enter the port # to change data for". Select the port # 1,2,3 or 4 (if slave is connected up to 8) to change, The SYSTEM 5 allows up to 15 digits to be assigned for a port name, the SYSTEM 4 does NOT have this feature. The system will now ask: Is Port: 1 Keypad or Data Chip, 2 Card, 3 Both enter 1 for keypad only, 2 for card reader only, or 3 if you for card AND keypad. Note: if both is selected a card and a keypad code # entry must be entered to gain access. If card or keypad is needed to open the same door, two ports must be used, one set for card only and the other set for keypad only. The output relays for the two ports must be tied together so either will open the door.

The system will now ask: Set Relay For: 1 Momentary (1-250 secs) 2 On/Off enter 1 if a momentary relay closure is needed, enter 2 if On/Off or latching operation is needed. If momentary is selected the system will ask: ENTER TIME (1 - 250 SEC) enter the time in seconds that you want the relay contacts to activate for each time a valid code/card is entered. For the SYSTEM 4 enter three digits, i,e, for 6 seconds enter 006. The last option for a port is automatic time schedule selection. If a relay time schedule is needed the schedule #(s) must be entered followed by 0. The system asks: ACTIVATE BY SCHEDULE (0 - 8). If schedule 1 is to be used enter 1 followed by 0.

TOUCH 2 to enable the auxiliary relay to close upon any Door Ajar condition.

DOOR AJAR ALARM ON

TOUCH 2 AGAIN to toggle the Door Ajar alarm OFF

TOUCH 3 to set the relay operating mode. Relays can operate in conjunction with a matching keypad or Independently of any keypad. Select 1 for normal operating mode or 2 for elevator control mode.

SYSTEM 4 OR 5

SET OPERATING MODE: (Asks which mode of operation to use)

1 Normal Operation Mode (Default setting used most of the time)
2 Elevator Control (Use for elevator control)

ENTER SELECTION

TOUCH 4 to manually override a given port. Note: the manual override toggles the port relay to the opposite position and keeps it there until either, a time schedule start or end time occurs, or you manually change the relay back. The port input will NOT operate if the relay is toggled on. This option also allows a time schedule to be turned off early (snow, etc).

Relay 1 IS OFF (current status of port/door 1 relay)
Relay 2 IS OFF (current status of port/door 2 relay)
Relay 3 IS OFF (current status of port/door 3 relay)
Relay 4 IS OFF (current status of port/door 4 relay)
Relay 9 IS OFF (current status of the aux relay)

Enter Port to Toggle (0 to Quit) 1 (Enter the port # to Toggle to opposite state)

MANUAL RELAY ON 1 01:05:57 03/30/92

Enter Port to Toggle (0 to Quit) 0 (Enter next port # or 0)

Relay 1 IS On (new status of port 1 relay)
Relay 2 IS OFF (new status of port 2 relay)
Relay 3 IS OFF (new status of port 3 relay)
Relay 4 IS OFF (new status of port 4 relay)
Relay 9 IS OFF (new status of aux relay)

TOUCH 5 to select AUX input or Request-To-Exit (RTE) option (RTE is the default setting).

AUX ACTIVE! (aux input is now active)

TOUCH 5 AGAIN to toggle the Request-To-Exit ON (this option is a toggle type, each time its pressed it will change from one state to the other).

RTE ACTIVE! (RTE input is now active)

10.11 Recall Last 25/250 Events

Select menu option no. 4 to display the last events that have taken place. The SYSTEM 4 will recall the last 25 events and the SYSTEM 5 will recall the last 250 events.

CHAPTER 11 TECHNICAL DATA

11.1 Importance Of Earth Ground

This system is a modern computing device and the Z-80 microprocessor operates millions of times per second. Voltage transients and lighting must be kept out of the system for proper, successful, and continued operation. This can only be done by diverting these high-voltage transients to a good earth ground. Therefore:

DO NOT OPERATE THIS SYSTEM WITHOUT A GOOD EARTH GROUND

Run at least a 12 ga. wire from a cold water pipe or ground rod to terminal #1 of the system. Ensure that the cold water pipe is, in fact, an electrical earth ground. In many cities, local building codes allow the use of PVC pipe which is NOT an electrical conductor. A fast check is to measure the difference in ohms between electrical ground and your earth ground. If it exceeds 10 ohms, one of the two grounds is not a good earth ground. Do not use conduit, gas pipe, or telephone-equipment grounds. Do NOT use an existing electrical equipment ground. In MOST cases this type of ground is worse than no ground at all. Ground wire runs should be as straight and direct as possible avoiding sharp bends.

Failure to properly install and use an earth ground renders all lightning, static and noise protection useless. Loss of programmed memory and erratic operation may also occur.

11.1.1 Keypads

All system keypads have an earth ground screw terminal for attaching the foil shield drain wire of the multiconductor cable. Do not connect this drain wire to the metal keypad plate. Connecting a separate earth ground at both ends of the multiconductor keyboard cable is UNDESIRABLE. The foil shields of all keypads should only be connected to terminal #1, which is an earth ground.

11.1.2 Printer

The foil shield of the printer is an earth ground. Attach the foil shield drain wire from the printer only to terminal #1 of the system.

11.2 Using Proper Wire

Typical wire specifications for keypads, card readers, and Data Chips is an eight conductor, 22 AWG stranded multiconductor with overall foil shield; .032 in. (.81mm) PVC jacket, insulation thickness .010 in. (.25mm), mutual capacitance per ft. 25-30 pf/ft. 300v, 80 degrees (C), UL style No. 2464, CSA type SR-PVC. This wire must be multiconductor and not multitwisted pair. It should be noted that all multiconductor wire has some overall twist, which is fine. The use of any other wire is experimental and not supported by Corby. The unused conductors can be spared but may not be connected to ground or doubled up with active wires. In some applications where not all features are used a cable with a smaller number of conductors can be used.

11.2.1 Keypad Wiring

The SYSTEM 4 programming keypad requires a minimum five conductors. Since the printer and system keypad are generally located at the same location, the temptation to combine these two items into one cable must be avoided.

Door/Port keypad installations require five conductors for the keypad, two conductors for LED, and one more conductor for Request-To-Exit. This is a total of eight. The Two conductors that provide power to the door lock must be in a separate cable.

Maximum combined length for a keypads in the system is limited to 4000 ft.

11.2.2 Card Reader Wiring

Card reader installations require five conductors for the reader, and three conductors for Door Ajar and Request-To-Exit. This is a total of eight. The Two conductors that provide power to the door lock must be in a separate cable. The maximum wire length between a reader and a RIM is 500.

11.2.3 Data Chip Reader Wiring

Data Chip reader installations require two conductors for the reader, one conductor for the LED, and three conductors for Door Ajar and Request-To-Exit. This is a total of six. The two conductors that provide power to the door lock must be in a separate cable. The maximum wire length between a reader and an adapter is 500.

11.2.4 Door Strike Wiring

Door strikes that draw less than 1 amp can be wired to the system with 20 AWG solid or stranded wire for runs up to 50 ft. For longer runs or for door strikes that draw more than one amp, use 18 AWG, or larger, wire. **For DC door strikes wire a diode across the coil. The stripe side of the diode must go to the positive side of the DC coil, or you will place a dead short across out power supply.** See wiring diagrams. Power for all door locking devices must be supplied from external power sources, no aux power is available from the panel. AC door strikes are not recommended.

11.2.5 Printer Wiring (SYSTEM 4 Only)

The SYSTEM 4 security printer requires a three conductor, 24 AWG or 22 AWG, stranded wire with overall foil shield. Typical wire specifications are: Jacket thickness, .032 in. (81mm); insulation thickness, .010 in. (.25mm); temperature rating, 80 degrees (C), UL style 1061, CSA type SR-PVC. Typical capacitance per ft. is 30 pf or less. Maximum wire length is 500 ft. Lengths longer than 500 ft. are dependent on installation practices and operating environment and are experimental.

11.2.6 Printer Wiring (SYSTEM 5 Only)

The SYSTEM 5 security printer connects to the VDT terminal with a 6 ft. RS-232C cable supplied by Corby. It is not necessary to run a separate cable from the SYSTEM 5 to the printer. Event only information is available at port "B" of the telecom module. Port B requires a two (2) conductor, 24 AWG or 22 AWG, stranded wire with overall foil shield. Connect the white wire (TxD) from port B to pin 3 on a 25 pin D subminiature connector and connect the blue (GND) from port B to pin 7 on a 25 pin D subminiature connector. An A-B switch may be used to select the printer source from either the VDT or port B.

11.3 Master Control Unit (MCU)

The MCU is a Z-80 based computer with 32K of EPROM and 8K of RAM (SYSTEM 4); 32K of RAM (SYSTEM 5). It controls four relays for access or alarm security control, accepts data from one to eight keypads or card readers, monitors one auxiliary input on MCU terminal #18, and provides one additional relay which will activate on any valid duress/hostage code and/or door open/ajar condition. The "and/or" condition described above is fully programmable and caution should be used in selecting the "and" condition. It also provides a printed report of any or all events via a RS-232C data line to any printer which operates at 600 baud and meets the printer specifications.

11.3.1 Serialization

All software is licensed, serialized, and contained on 32K of EPROM. It is impossible to enter the system program mode without knowing the software serial number. The serial number is printed on a label that is attached to a plain white business card. The card is attached to the warranty registration form. If you loose this number, you need to power your system down, send the chip to Corby, then we can read the serial number from the EPROM and reprint the label set. If it is a problem to take the system down, you can buy a new EPROM at your expense.

11.3.2 Housing

The MCU is housed in an 18 ga. painted metal cabinet which measures 15 in x 11 in x 4 in (381mm x 279mm x 101mm). It weighs 12 pounds (4.5 kg.). The locking cover is hinged on the right side, and one key is provided. A 8.5 in x 10 in (216mm x 254mm) circuit board (PCB) contains all necessary electronics and two 18 position terminal blocks are mounted inside the cabinet on 1 inch standoffs, with six #4-40 screws. Connections to the system are made through the terminal blocks which utilize #6-32 pan head screws located on .312 in. (7.93mm) centers. A 50 position dual row header assembly is located in the upper right corner of the PCB, and is for the telecom board.

11.3.3 Fuses

There are three fuses located at the bottom left side of the PCB. F1 is the AC fuse rated two amps. F2 is the battery fuse rated three amps. F3 is the LED fuse rated 1/2 amp. These ratings are calculated to provide protection to the MCU. Inserting fuses with different ratings can only cause problems and will void any existing warranty.

11.3.4 System RESET

A "watchdog" circuit constantly checks random areas of RAM and "checksums" current data. On occasion, this circuit will perform a "system RESET" which can be noted with the printing of a system error message: MCU RESET. This is known as a "warm/hard boot" and is a normal condition. It is rare but, if a problem occurs, a manual system RESET (warm/hard boot) can be performed by pressing the system RESET button located at the bottom left of the PCB. Memory is not affected by a "warm boot".

11.4 Keypads

Keypads used in the system consist of a three part assembly:

1. A 12 button keypad with a black plastic bezel, white plastic keytops with a double-shot molded insert. Buttons are numbered 0 through 9 plus * and #. Button layout is standard touch-tone telephone format. MTBF is in excess of 1,000,000 cycles using conductive rubber technology with gold-plated PCB contacts. Decimal output is via a 13 pin header which mates to a BCD interface module.

2. BCD interface module. This interface PCB snaps on the rear of the keypad and converts the keypad decimal output to a negative common BCD output which is required by the MCU. Interface boards designed for use with Corby outdoor-weatherproof keypads are shipped with a plastic barrier which must be used during installation to weatherproof the electronics. It should be noted that the entire keypad assembly is a passive device with little, if anything, to fail.

3. A metal or plastic housing to support the keypad assembly. Corby manufactures over 12 different styles of housings including but not limited to a single-gang plate with no LEDS, a double-gang plate with seven multicolor LEDS and speaker holes, hidden-view housings, and three different types of outdoor weatherproof models.

11.4.1 LEDs & Wires

Any keypad connected to the MCU requires five wires plus shield for BCD data input to the MCU. Two additional wires are necessary for each LED.

LEDS for indoor keypads include a built-in current limiting resistor in the plastic housing with operation designed for 10 to 14 VDC. For special installations, Corby also stocks LEDS in the same type plastic package in 6 VDC, 24 VDC, and non-resistor 1.5VDC.

11.4.2 Program-System Keypad (SYSTEM 4 Only)

A desktop programming keypad is supplied as standard equipment with every SYSTEM 4 MCU. This keypad does not have a green LED installed because none is required for programming. All instructions and system feedback to the user are displayed in easy-to-understand English text on the printer. This keypad is mounted on a plastic housing with four small rubber feet and should be placed next to the printer. Do not run the RS-232C printer data wires in the same cable as the keypad wires unless both sets of wires are in individual shields and the shields are not conducting with each other.

Any Corby key can be used to program the system but it must mate to the BCD interface module, and the red wire (BCD common negative) must be connected to the MCU terminal #10, keyboard common input "0". It is impossible to enter the program mode or to change any part of memory from any keypad not connected to terminal #10 of the MCU. To maintain the security of the system and the data base, we suggest that the system keypad and printer be located in a secure area. It should also be noted that knowledge of the software serial number is necessary to place the MCU in the program mode.

A minimum of five wire shielded cable is required (eight conductor can be used but the extra wires can not be used for printer connections). Do not connect the metal decorative plate to earth ground. The drain wire of the shield is only connected to terminal #1. This keypad measures 2.75" wide, 4.5" long and, 1.25" high (70 x 115 x 32).

11.5 Printers (SYSTEM 4 Only)

You may replace the standard Corby event printer with another make or model provided your equipment conforms to the following specifications:

1. RS-232C serial input.
2. ASCII character set.
3. Be able to receive data at 600 baud.
4. Accept data format of 1 start bit, 8 data bits, and 1 stop bits.
5. Must generate line feed for every CR received (CR+LF), on this RS-232C line, Corby does not furnish a LF to the receiving end.

11.6 Transformer

The main power source for this system is a UL listed transformer manufactured by Basler Electric Co., Part No. BE116340CAA. Primary 120V, 60hz, .48A / Secondary 18VAC, 40 VA. If the 18VAC output terminals are shorted, the fuse will open and the transformer will be useless. It should be noted that the fuse is almost impossible to repair as the case is ultrasonically welded and the correct fuse wire can never be found. Attempting to repair it is dangerous and also voids the UL Listing! It measures 2.75" x 2.625" x 3.875" (69.8 mm x 66.6 mm x 98.4 mm).

Outside of the United States, a different transformer may be supplied or used with the system. In no case may the transformer exceed the following specifications:

1. 16VAC to 18VAC
2. 20VA to 40VA

It should be noted that the 40VA transformer will operate at a much lower temperature than the 20VA unit and therefore, a rating of 40VA is recommended.

11.7 Standby Battery

Upon loss of AC power, a 4.0 Amp/hr fully charged standby battery will supply power to the system for up to 55 hours (almost 2 1/2 days). A message indicating power loss will be printed unless power has also been lost at the printer. If loss of AC power does occur at the printer, the system manager can enter the program mode to get a printed report of the last events that occurred during loss of power.

11.7.1 Standby Time

If AC power is lost, the system will operate normally at MAXIMUM usage for 5 1/2 hours. Then the battery voltage will be too low for relays and ports to work. This assumes that all relays are "pulled in" for the entire 5 1/2 hours.
If your system uses door strikes with intermittent operation, the stand by time will increase to a maximum of 55 hours. Relay contacts that are electrically being held "closed" will "open". The memory will retain programmed data because the RAM is backed by an on board lithium battery socket (smart socket).

When AC power is restored, a message is displayed on the printer.

11.7.2 Battery Replacement

Modern maintenance-free sealed lead acid rechargeable batteries have an approximate life of three to five years, or 1000 charge/discharge cycles. When replacement is necessary, the battery must be replaced with a lead acid type of the same capacity (i.e. = 12 volts, 4 amp/hrs.). The connecting wires require .187 inch quick disconnect tabs. The recommended battery measures 3.5 in. x 2.75 in. x 4.0 in. and is manufactured by YUASA Battery Co., LTD., Part No. NP4-12. Installing a battery with less capacity will degrade the standby performance times and likewise installing a battery with more capacity will increase stand by time.

CAUTION! Do not use dry cell or ni-cad type batteries. They may explode if connected to this system.

11.7.3 Testing The Battery

After the battery has been charged for at least 24 hours, the voltage measured across the battery terminals with the charging circuit still connected should be 13.5 to 13.8 volts. A digital voltmeter is required for this measurement.

To test the quality of the battery, disconnect the battery from the system and attach a 33 ohm, 10 watt resistor to the battery terminals with jumper leads or test clips. Measure the battery voltage with a voltmeter. If after 60 seconds, the voltage falls below 12.0 volts, the battery should be replaced. CAUTION! The 33 ohm resistor will get hot if the battery has a full charge!

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CHAPTER 12 TROUBLE SHOOTING

12.1 Before You Start

Connect an AC ammeter in series with the 18VAC transformer and MCU terminal #2. Apply AC power to the MCU. If the AC current exceeds 800 ma, **abort the test** and check carefully for shorts and/or mis-wires. Typical AC current for an MCU or SCU is only in the range of 60 to 120 ma with no relays active. If you are outside the USA and using a 16VAC transformer, the current readings should be the same.

In the Appendix section of this manual, locate a picture of the system printed circuit board. The MCU and the SCU unit use the same circuit board and all test points are identical. The only difference is that the SCU does not accept a program keypad (SYSTEM 4); VDT (SYSTEM 5). This picture has all test points marked and is necessary if you will be taking any voltage measurements other than AC voltage and current.

To clear the system keypad buffer, touch #. Now, enter the software serial number into the system keypad or VDT keyboard. The "hardware" serial number printed on the circuit board will NOT allow you into the program mode.

The first test is a "no load" test. For accurate voltage and current data, there may not be any relays activated or in the latched position. If you are testing a system that is already in full operation, caution should be taken in testing because any latched relay will be tuned off. If the optional anti-passback feature is installed and activated in this system, all active data "flags" WILL be lost. When you bring the system back "on-line", your end results may be experimental because a person in an area may not be able to exit.

12.2 Check Volts And Current

Checking the AC current at this time is optional. This should have been done during the initial wiring of the transformer. An AC ammeter should already be in series with the AC transformer and MCU or SCU terminal #2. If current exceeds 800 milli-amps disconnect AC and DC power. Check for shorts & mis-wires.

Relays or LEDs may or may not be active while taking these measurements. Using the picture of the circuit board, locate the exact test point locations required. Place a digital voltmeter between MCU or SCU terminal #5 and the following test points on the next page.

Test Points	Voltmeter	Description
1	12.90 TO 14.50	PCB regulated supply
2	13.40 TO 13.60	Battery charge - do not change!
3	4.80 TO 5.20	Regulated five volt supply
4	-11.70 TO -12.20	Negative 12VDC

AC current should be 0.060 - 0.120 Amps. This ends the no-load voltage tests.

12.3 RESET

To test RESET, press the white button located on the left side of the PCB above fuses. The system prints:

MCU RESET (Correct system message)

NOTE: System is now ON-LINE and ready to accept user keypad data.

12.4 Testing User Keypads

The following is a "run time" test and it checks all the user keypads in the complete system. System keypads use a negative BCD encoding scheme and it is only necessary to test keypad digits 0-1-2-4-8 to verify the data lines. This test assumes the default code length of five digits is in use but it is possible to run this test with a four digit code by not using the digit "zero" in the code sequence. You must use the "#" to clear the keypad buffer. There may NOT be a user code of 01248 or 1248 currently programmed in memory.

To ensure all wires are intact and connected properly, you must go to each keypad in the system and clear that keypad buffer by touching the #. Then enter the code of 0-1-2-4-8.

If the interconnect between the user keypad currently under test is correct, the SYSTEM 4 will respond by printing CODE ERROR 01248 (SYSTEM 5 will respond by printing INVALID USER 01248) plus the number to which that keypad is connected plus current time & date information. Example:

```
CODE ERROR 01248      3     14:12:39 11/15/91 (SYSTEM 4)
INVALID USER 01248    3     14:12:39 11/15/91 (SYSTEM 5)
```

In the last example, keypad #3 was activated and all control lines are wired correctly. To test the entire keypad, enter #-1-2-3-4-5 and the printer should print CODE ERROR 12345 (SYSTEM 4) INVALID USER 12345 (SYSTEM 5). Enter #-6-7-8-9-0, the printer should print CODE ERROR 67890 (SYSTEM 4) INVALID USER 67890 (SYSTEM 5). Enter #-*-*-*-*-*, the printer should print CODE ERROR 13371 (SYSTEM 4) INVALID USER 13371 (SYSTEM 5). The time & date stamp will only be correct if the data stored in memory is valid. Otherwise you may get "garbage" for time & date which does not affect this test. The below example shows a keypad wired incorrectly.

```
CODE ERROR 02148      3     15:32:49 11/15/91
```

CODE ERROR 02148 is the code that the MCU read from user keypad #3. If a code of 0-1-2-4-8 was entered in user keypad #3 then BCD wires are switched. There are 16 possible combinations of 1-2-4-8 which will print if BCD lines are switched. But, if wires are not connected at all or a keypad decoder module is defective, the situation can be a real problem to sort out. If you get erratic codes, it is probable that the wire used for installation is not within specifications or the total length of wire exceeds specifications.

* * * THIS ENDS THIS KEYPAD TEST SEQUENCE * * *

12.5 Auxiliary Terminal Test

This test sequence checks the auxiliary terminal on the MCU and SCU terminal #18 to ensure it is active and prints correctly. This function will not work unless it is selected in menu 3, option 5.

Place a wire jumper between terminal #18 and terminal #5. The message printed should read MCU AUX ON with a time & date stamp.

When the wire jumper is removed the message should read MCU AUX OFF (or stored message). If a SCU is being tested, the procedure is identical but the message will carry the ID number of the SCU under test.

12.6 Testing the RIM

The RIM has two LEDs and a push button to help in troubleshooting card reader problems. The facility code must be set at 00 for this test to work properly. If wiring is correct the message “code error 01248" should appear.

The Strobe LED should flash continuously. This shows that the RIM is receiving the Strobe output from the MCU/SCU. If this LED is "on solid" or "off", check that the blue wire from the RIM is connected to terminal 5 on the MCU/SCU and that the RED wire from the RIM is connected to MCU/SCU terminals 11, 12, 13, or 14. Also, if the LED is off, check to see that there is 12VDC on the first two terminals of the RIM labeled "+12 IN" and "(–)".

The RIM is a microprocessor based module and does not decide whether the card is valid or not. The validity of a card is decided by the MCU. However, the RIM can determine if the data is the in the correct format, if the parity is correct, and if the fixed fields within the data are correct. From these checks the RIM can determine if the data is good or not and will send out the proper flash pattern to the reader LED.

The Reader LED should flash when a card is read at the reader. The flash is also sent to the LED output terminal on the RIM so it can be seen at the reader. There are two types of flashes, a "good read" flash and a "bad read" flash. The good read flash is one burst of quick flashes about one second long. The bad read flash is four bursts of quick flashes about a half a second long, each separated by one second of the LED being off. Listed below are the three possible LED flash patterns:

Bad Read Flash - the RIM received data but the data was bad. The problem could be at the reader, in the wiring between the reader and the RIM, or the type of card being used. Check: 1. That the reader and the type of card used match the jumper setting on the RIM. 2. That Data 0 (D0) and Data 1 (D1) are not reversed. 3. That there are no shorts or opens in the wiring between the reader and the RIM. 4. That the shield from the cable between the reader and the RIM goes to earth ground. 5. That the reader voltage is correct.

Good Read Flash - the RIM received data and it determined that the data was good. If no event is recorded at the SYSTEM 4/5/10 check the system programming: 1. That the port is set up for card only. 2. That the port is not under time schedule control. 3. That the facility code is set for the cards you are using. 4. That the five digit code number on the card is programmed as a valid user.

Good Read Flash followed by the LED turning on solid for the relay time - the RIM received good data and the SYSTEM 4/5/10 recognized a valid code and operated its relay.

12.7 Testing the Data Chip Adapter

The Data Chip adapter has a LED and a Test Point to help in troubleshooting. The LED on the adapter will flash several times whenever a Data Chip is successfully read, provided the Batch ID number was already programmed in the adapter. The LED flash is also at the reader LED. The Test Point can be used at anytime in place of the reader and consists of a vertical metal contact next to an exposed pad area on the printed circuit board of the adapter, labeled TP1. To read a Data Chip or set its batch ID number, place the edge of the Data Chip on the pad and lean the smaller flat surface against the vertical metal contact.

If the LED does not flash, check that the adapter has 12VDC power on the (+) and (–) terminals. Try reentering the batch ID number. Check the wiring between the reader and the adapter for shorts or opens. Try using the Test Point instead of the reader with the wire on the Data terminal disconnected. If none of these steps correct the problem, try a cold reset of the adapter. First, remove power then install jumper J1. Next power up the adapter. This will reset the adapter and erase all batch ID numbers. The batch ID numbers must be programmed again before the adapter will read Data Chips.

If the LED flashes but the port relay never moves and no event is recorded, check the programming of the SYSTEM 4/5/10 and the wiring between the adapter and the SYSTEM 4/5/10. The programming steps necessary for the Data Chips to be read by the SYSTEM 4/5/10 are that the port must be set to keypad or data chip mode and the port must not be under time schedule control. Also, the five digit code number on the Data Chip must be programmed as a valid user in order for the relay to operate.

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APPENDIX A GLOSSARY

A.1 Terms Used In This Manual

AC Alternating Current used to power devices.

AWG American Wire Gauge, usually denotes the size of wire used in system.

CODE A sequence of digits which are sensed by the system when the user touches the numbered keypad buttons.

CORBY*CARD A plastic card containing user ID information using imbedded high-security Wiegand wires. This card is inserted in a Corby*Card reader instead of a keypad.

COMMAND An instruction. Tell the system to perform a function.

CPU Central Processing Unit usually a microprocessor and in the system, it is a Zilog Z-80.

CSA Canadian Standards Association which sets standards for conductor style and temperature ratings.

DATA CHIP A stainless steel, coin shaped canister containing an integrated circuit that transfers 48 bits of digital data when touched to a compatible reader. Used in place of magnetic stripe, proximity or Wiegand card technologies for access control.

DC Direct Current usually specified as having a positive and negative source and is rectified AC.

DISABLED Turned off. Not Active.

DEFAULT Preset values in the software program which will be used by the system if the programmer does not change them.

EMULATOR A software program that configures a personal computer (PC) to act as a Video Display Terminal (VDT).

ENABLED Turned on. Activated. Also enable.

ENTER To touch a keypad button in response to a system prompt.

EPROM A non-volatile memory chip used in the system which contains all instructions and operates the system. EPROMs retain all information without the need for backup power.

FAIL-SAFE If and when power to the portal (door) fails, the portal will be made permanently-open and allow entrance or exit without need of access control codes.

FAIL-SOFT If and when power to the portal (door) fails, the portal will be made permanently-closed and will not allow entrance and/or exit.

GROUND A direct electrical path to earth ground. Usually a cold water pipe, the steel beams of a building, or a steel rod which is driven six feet into the ground. Earth ground IS NOT the same as "electrical ground"

LED A solid-state diode that emits red, green, or yellow light. Also referred to as LEDS or LEDs. Corby LEDS usually have a built-in current limiting resistor.

MCU Master Control Unit. Steel locking cabinet which contains the CPU, PCB, RAM, EPROM, standby battery, and connection terminals.

PCB Printed Circuit Board

PROMPT A cue. While in the program mode, the usual "prompt" or instruction is ENTER SELECTION? At this point, the system is looking for the user to enter a number or a * to abort the current program mode.

RS-232 Data transmission standard using +,- 12 volt voltage transitions to transmit digital data.

SERIAL NUMBER A unique combination of digits and/or letters. All system software (firmware) and hardware is serialized.

SPDT Single Pole Double Throw Relay Contacts.

UL Underwriters Laboratories.

WATCHDOG A circuit in the system that prevents microprocessor latch up. The watchdog minimizes the harmful effects of lightning and high voltage transients.

MTBF Mean Time Between Failures.

BCD Binary Coded Decimal.

A.2 FCC Compliance

This equipment generates and uses radio frequency energy. If it is not installed and used properly in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications of 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.

1. Reorient the TV or radio antenna.

2. Relocate or move the system away from the receiver.

3. Plug the transformer for the system into a different outlet so that the receiver and the system are on different branch circuits.

4. If necessary, the user should consult the alarm dealer, installer, 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 is available from the U.S. Government Printing Office, Washington, DC 20402, Stock #004-000-00345-4.

APPENDIX B SYSTEM 5 BACK-UP/RESTORE/EMULATE SYSTEM

B.1 Back-up/Restore Overview

Although the SYSTEM 5 is user-friendly and easy to program, entering a large number of users can often be quite time consuming. Corby has included a complete back-up/restore software package which allows you to easily save and restore all SYSTEM 5 programmed data.

The use of the back-up/restore/software requires only an IBM PC or XT or equivalent and an interconnect cable. All data entered in the SYSTEM 5 is sent to the computer and stored on disk for later use. In the event of a data loss on the SYSTEM 5, the previously stored data can be sent from the computer to the SYSTEM 5 in far less time than would be required to enter it manually.

B.2 Terminal Emulation Overview

The Emulate function will make the PC look like the VDT that comes with the SYSTEM 5. This will let you program, monitor, and print from the PC. There is also a capture feature which will store the in-coming data into a file on the PC.

B.3 Back-up/Restore/Emulate Over The Telephone

The back-up/restore/emulate function can be used with the PC at the same physical location as the SYSTEM 5. A far more powerful configuration is to have the PC call a SYSTEM 5 at a remote location. All that is necessary to accomplish this is a modem at the SYSTEM 5 site and a modem at the computer site. The back-up/restore/emulate software can dial a remote SYSTEM 5 and allow you to make programming changes, monitor the system, or perform a back-up/restore function. In this way, a single back-up/restore/emulate system can manage a large number of remote SYSTEM 5's from one central location.

B.4 Installation of The Back-up/restore/emulate Software

Before using the back-up/restore/emulate software, it must be installed onto a hard drive or floppy disk. A user-friendly installation program is provided to make the installation process even easier.

To install the back-up/restore/emulate software, follow the simple steps listed below:

1) Insert the back-up/restore/emulate diskette into drive A.

2) Type INSTALL at the A> prompt,

3) Enter the source disk of the back-up/restore/emulate (the drive containing the back-up/restore/emulate disk - A)

4) Enter the path you wish to install the back-up/restore/emulate to.
   If you wish to install the back-up/restore/emulate to C type C:\

5) Select a color or monochrome monitor.

6) Press <ENTER> at START INSTALLATION to start the installation,

7) - To run, Enter the directory back-up/restore/emulate is installed into and type DOWNLOAD.

After a restore, be sure to do the following:

1. Set time (menu 1 option 1)
2. Set date (menu 1 option 2)

B.5 Required Equipment

PC REQUIREMENTS:

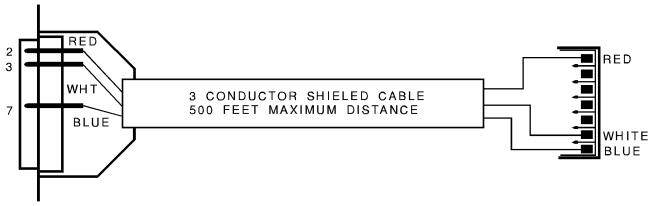
100% IBM PC/XT/AT compatible with 640K RAM minimum
3 1/2" floppy drive, hard disk is optional
At least 1 serial port, (COMM1 through COMM4 can be used)
Either Color or Monochrome video adapter and monitor
DOS 3.3 or greater

B.6 Cable Hook Up

B.6.1 Connecting SYSTEM 5 To An On Site PC

Male 25 pin "D" subminiature connector with hood.

7 pin wire harness supplied with CORBY 4021 module.

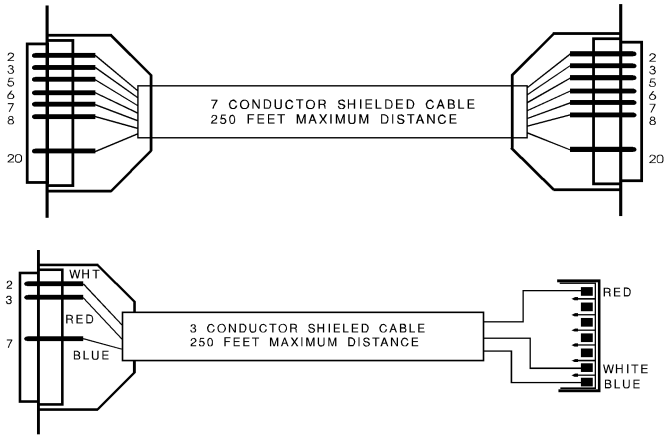


Connect pin 2 to the RED wire (Receive Data). Connect pin 3 to the WHITE wire (Transmit Data). Connect pin 7 to the BLUE wire (Ground).
Use ONLY the RED, WHITE, and BLUE wires from the wire harness.

B.6.2 Connecting SYSTEM 5 To A Modem

Male 25 pin "D" subminiature connector with hood.

7 pin wire harness supplied with CORBY 4021 module.



B.6.3 Connecting A Modem To A PC

Male 25 pin "D" subminiature connector with hood.

Male 25 pin "D" subminiature connector with hood.

Connect pin 2 to the WHITE wire (Transmit Data). Connect pin 3 to the RED wire (Receive Data). Connect pin 7 to the BLUE wire (Ground).
Use ONLY the RED, WHITE, and BLUE wires from the wire harness.

Use Pins 2, 3, 5, 6, 7, 8, and 20. All connections are straight through.

For PCS with 9 pin connecters use a 9 pin to 25 pin adapter.

B.7 System Configuration

Set Port "A" to the same baud rate as set in database section of the back-up/restore/emulate software. If you are using modems the PC and the SYSTEM 5 must be set to a baud rate the modems can handle. A baud rate must be selected for both SYSTEM 5 Ports "A" and "B" even if only one port is being used.

Connect the SYSTEM 5 to any IBM PC XT/AT compatible using hardwired connections or via Hayes compatible modems. All Hayes compatible modems are not created equally, some have dip switches some do not and the default setting from different manufactures are not all the same. If you purchase your own modem, you should be prepared to read the modem manual, change dip switch setting and or hook the modem to a VDT or a PC to program the modem. The modem at the SYSTEM 5 must support a baud rate which is selectable on Port A on the SYSTEM 5 telecommunications board. We recommend using a modem which supports 9600 baud. This will supply the fastest response.

The modem at the SYSTEM 5 side should be set to: Auto Answer, Ignore DTR , and set to "dumb mode" (will ignore commands). The mode at the PC side must be set to "smart mode" (will recognize commands) the back-up/restore/emulate software will configure the modem for the reset of the settings.

***NOTE: This software works only with SYSTEM 5 EPROM software versions 1.6F or greater.**

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APPENDIX C WIRING DIAGRAMS

C.1 Wiring Diagram Table of Contents

CAUTION!!!

If you use this system to operate a DC door strike, magnetic lock, relay, or any device that has a coil (inductive load) that is powered from a DC source; you MUST install a diode, in parallel, across the coil terminals. Use a 1N4001, 1N4002 or equivalent. Connect the stripe side of the diode to the coil terminal that becomes positive (+). Connect the other side of the diode to the other end of the coil. Proper installation of this diode will prevent the high voltage spike that occurs whenever a coil is de-energized. If you do not use this diode, you will eventually damage the system and any other electronic device attached to it. Corby supplies the necessary diodes
with this product, please use them.

TIME SCHEDULE WORKSHEET

This time schedule worksheet is provided so that you have a permanent copy of the eight available time schedules showing the day, starting time, and ending time for user code access or relay operation. This worksheet is only used with optional time control software. **Use 24 hr. (military) time format only.**

SCHEDULE 1

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

SCHEDULE 2

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

SCHEDULE 3

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

SCHEDULE 4

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

TIME SCHEDULE WORKSHEET
PAGE 2

SCHEDULE 5

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	**DAY**	**START**	**END**	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

SCHEDULE 6

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	**DAY**	**START**	**END**	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

SCHEDULE 7

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	**DAY**	**START**	**END**	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

SCHEDULE 8

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	**DAY**	**START**	**END**	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

DAY SCHEDULE WORKSHEET

This day schedule worksheet is provided so that you will have a permanent copy of all the days in all eight available time schedules showing the day, starting time, and ending time for user code access or relay operation. If you are programming complex or exotic automatic relay operations, you MUST use this worksheet and list all times prior to the actual programming. **Use 24 hr. (military) time format only.**

SUNDAY

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

MONDAY

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

TUESDAY

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

WEDNESDAY

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

DAY SCHEDULE WORKSHEET
PAGE 2

THURSDAY

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

FRIDAY

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

SATURDAY

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

HOLIDAY

Description:

[ ] Time Schedule **[ ]** Relay Schedule

#	DAY	START	END	COMMENTS
1	SUNDAY	:	:	
2	MONDAY	:	:	
3	TUESDAY	:	:	
4	WEDNESDAY	:	:	
5	THURSDAY	:	:	
6	FRIDAY	:	:	
7	SATURDAY	:	:	
8	HOLIDAY	:	:	

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