Linear ACCESS ™

AM3Plus
Access Controller

Installation Instructions

Linear ®

Contents

Throughout this manual, multiple-unit networks are referenced. Depending on the programming method used, networks can contain the following model units:

NETWORK MODEL OPTIONS	
With AccessBase2000 Programming	**With AXNET Programming**
AM3Plus	AM3Plus
AE1000Plus	AE1000Plus
AE2000Plus	AE2000Plus
AM-3	
AE-1000	
AE-2000	

Introduction

The AM3Plus Access Controller is designed for use as a primary access control device for gated communities, parking garages, office buildings, apartments, dormitories, hotels/motels, commercial buildings and recreational facilities.

Housed in a lockable, plastic enclosure, the AM3Plus features a 2-digit LED display, nine status indicators, four relay indicators with four relay activation pushbuttons. Three programming buttons, a reset button, and a power indicator are present. The enclosure is monitored with a magnetic "tamper" switch.

The system controls its four output relays by responding to various input devices that react to proximity cards, transmitters, and entry codes. The four relay output channels can be programmed to control electric door strikes, magnetic locks, door & gate operators, or barrier gates.

Access is granted or denied depending on the current user's authorization to gain access and system settings that control groups of users or all users. Complete access control event logging, access time restriction, access location restriction, and administration functions are also available to manage the installation.

The AM3Plus is network ready. Multiple units can be interconnected on a 3-wire RS-485 network or through modems. The AM3Plus can be used in mixed networks with its sister products, the AE1000Plus and AE2000Plus.

Two sets of Wiegand inputs are available for connection to 26, 30, or 31-bit Wiegand devices (card readers, etc.). Two sets of PBUS inputs are available for connection to Linear's line of remote accessories.

The AM3Plus can be powered from a 12-24 Volt AC or DC source. DC power can be obtained from the access device or AC power from a separate power transformer. The system supports and charges a 12-volt backup battery for operation during power outage. Low battery detection circuitry monitors the backup battery's condition. The EEPROM memory retains all entry codes and programming, even without power.

Operation

In a typical installation, the unit's memory would be programmed with each resident's name and entry code number. Arriving visitors would use a remote keypad to enter their entry code. Also proximity receivers, swipe card readers, and other remote devices can be used with the system.

Block coded MegaCode® transmitters can be used to gain access through a remote radio receiver connected to the AM3Plus PBUS. Each transmitter can be individually suspended or re-activated.

The system's clock/calendar can control access based on specific times and dates. Automatic relay activation can be scheduled. Access can be restricted to certain times and dates. Holiday access can be scheduled.

The system's event log records system activity for future reference.

Programming and Cardholder Maintenance

Two programming methods can be used with the system: Linear's AXNET or AccessBase2000. Each has its advantages, but only one must be chosen at the onset for each installation. Once a unit is programmed with one method, all programming data will be lost if a decision is made to switch to the other method.

Linear's AXNET software is built into each unit. It allows connecting to the unit using common browser software from any PC at any location. Each unit's database is stored in the unit's memory.

Linear's AccessBase2000 software installs in one dedicated PC and is designed with many extra features usually for large network installations. The database for the entire system is stored in the dedicated PC.

Hardware Features

✓ **FOUR FORM "C" (N.O. & N.C) RELAYS**
Each relay has 3-amp @ 24-volt rating with a status indicator and relay latching pushbutton

✓ **FOUR REQUEST-TO-EXIT INPUTS**
Activates access device for exiting using a hardwired switch

✓ **FOUR SENSING INPUTS**
For sensing door position to control door-ajar and alarm features, or for access inhibit timer

✓ **NINE STATUS INDICATORS**
Display access, reader, and system information

✓ **OPTIONAL MODEM**
Compatible with the Model ACM-1 plug-in modem for telephone communications with system

✓ **RS-232 COMMUNICATIONS PORT**
RS-232 port for direct connection to printer or computer

✓ **NETWORK SUPPORT**
Multiple units can be connected together to share data

✓ **EXPANSION INTERFACE SUPPORT**
Model AM-MIO accessory adds additional input and outputs to the AM3Plus

✓ **ON-BOARD CLOCK/CALENDAR CIRCUIT**
Stamps the event log data as it is stored in the system's memory

✓ **WIEGAND INPUTS**
Two Wiegand format card reader inputs for connection to external devices

✓ **LINEAR PBUS SUPPORT**
Two PBUS input/output ports for connection to Linear accessories

✓ **BACKUP BATTERY SUPPORT**
Built-in backup battery charging circuit

✓ **POWER FAILURE MONITOR**
AC power input is monitored, power outages are recorded in the event log

Software Highlights

✓ **COMPUTER PROGRAMMABLE**
No dedicated programmer required, program with a computer and a modem

✓ **LARGE ENTRY CODE CAPACITY**
Up to 20,000 entry codes can be used for gaining access

✓ **2-8 DIGIT ENTRY CODE LENGTH**
Flexible code length for different applications

✓ **LARGE TRANSMITTER CAPACITY**
Up to 45,600 block coded and 20,000 individually enrolled Linear transmitters can be used for gaining access

✓ **TRANSMITTER FACILITY CODE SUPPORT**
Identifies wireless transmitters by installation

✓ **LARGE CARD CAPACITY**
Up to 45,600 block coded and 20,000 individually enrolled cards can be used for gaining access

✓ **FOUR INDEPENDENT RELAY CHANNELS**
Each output's action is programmable

✓ **PROGRAMMABLE TIME SCHEDULED RELAY ACTIVATION**
Activation for up to four time periods for each of the 31 system time zones

✓ **PROGRAMMABLE TIME ZONE ACCESS VALIDATION**
Validation during four time periods for each of the 31 system time zones

✓ **PROGRAMMABLE VALIDATION DAYS**
Select days of the week access is allowed

✓ **PROGRAMMABLE HOLIDAY DAYS**
Select up to 24 expiring & 24 non-expiring holidays for access restriction

✓ **OBSTACLE TRANSMITTER SUPPORT**
Compatible with Linear's Model MGT transmitter

✓ **EVENT LOG**
Stores up to 20,000 system events in memory for record keeping

✓ **DELETED CARDHOLDER DATABASE**
System logs deleted cardholders for future identification

✓ **TIMED OR TRUE ANTI-PASSBACK**
Options to temporarily disable a cardholder's credentials after access for a preset time or depending on the cardholder's access direction

Feature Overview

Relay Outputs
Four 3-amp dry contact relay outputs are provided to activate four access devices, such as door strikes, magnetic locks, automatic doors, barrier gates, and automatic sliding gates. The relay outputs can also be used for alarm contact shunting, operator obstacle triggering, and alarm activation. Each of the four relays can also be manually activated from buttons on the front of the AM3Plus. LED indicators display the status of each relay.

Request-to-Exit Inputs
Each relay channel has a request-to-exit input. These inputs are supplied for hardwire activation of the access devices. Typically a request-to-exit input is wired to a pushbutton inside of the access controlled area. When a person desires to exit, pressing the pushbutton will activate the output relay channel and trigger the access device. A loop detector for automatic gate operation can be connected to a request-to-exit input.

Sensing Inputs
The sensing inputs connect to door switches that monitor whether the controlled door is open or closed. The sensing inputs may alternately be programmed as "access inhibit" inputs for use with an external timer or service switch.

Optional Modem
A modular connector is provided for telephone line connection to the unit's optional 33.6K baud modem. The system can be accessed remotely for programming and control over the standard telephone system using a personal computer with a modem. For system backup, a computer connected through the modem can store and retrieve the AM3Plus memory data.

RS-232 Communications Port
A modular connector is provided for the bi-directional 38.4K baud RS-232 port. The AM3Plus RS-232 port connects to a personal computer's COM port. System programming can be performed locally with a computer connected to the RS-232 port.

Obstacle Detection
Linear's Model MGT safety edge transmitter is compatible with the AM3Plus. The MGT detects and transmits obstacle events to a remote receiver connected to the AM3Plus.

Programming Memory
The AM3Plus flash memory retains all entry codes, transmitter information, card access, and programming, even without power.

Battery Backup
The system supports a 12-volt battery backup for operation during power outage. The system will charge the backup battery when AC power is present.

Network Support
Multiple AE1000Plus, AE2000Plus, & AM3Plus units can be networked together via three-wire RS-485 cables or through modems allowing information sharing between the units. A common event log is retained for all of the networked units.

Linear PBUS Ports
Two 6-wire Linear PBUS input/output ports are available to connect to several accessories (keypads, proximity readers, remote receivers). A typical application for a remote keypad or reader would be to control additional doors or gates.

Accessory Overview

AM-RRR
REMOTE
RADIO
RECEIVER

AM3PLUS
ACCESS CONTROLLER

PBUS
ASSESSORIES

AM-KPI
INTERIOR
KEYPAD

AM-KP
EXTERIOR
KEYPAD

AM-RPR
RADIO
PROXIMITY
RECEIVER

AM-CRI
CARD
READER
INTERFACE

WIEGAND
ACCESSORIES

AM-PR
PROXIMITY
READERS

WIEGAND
CARD
READERS
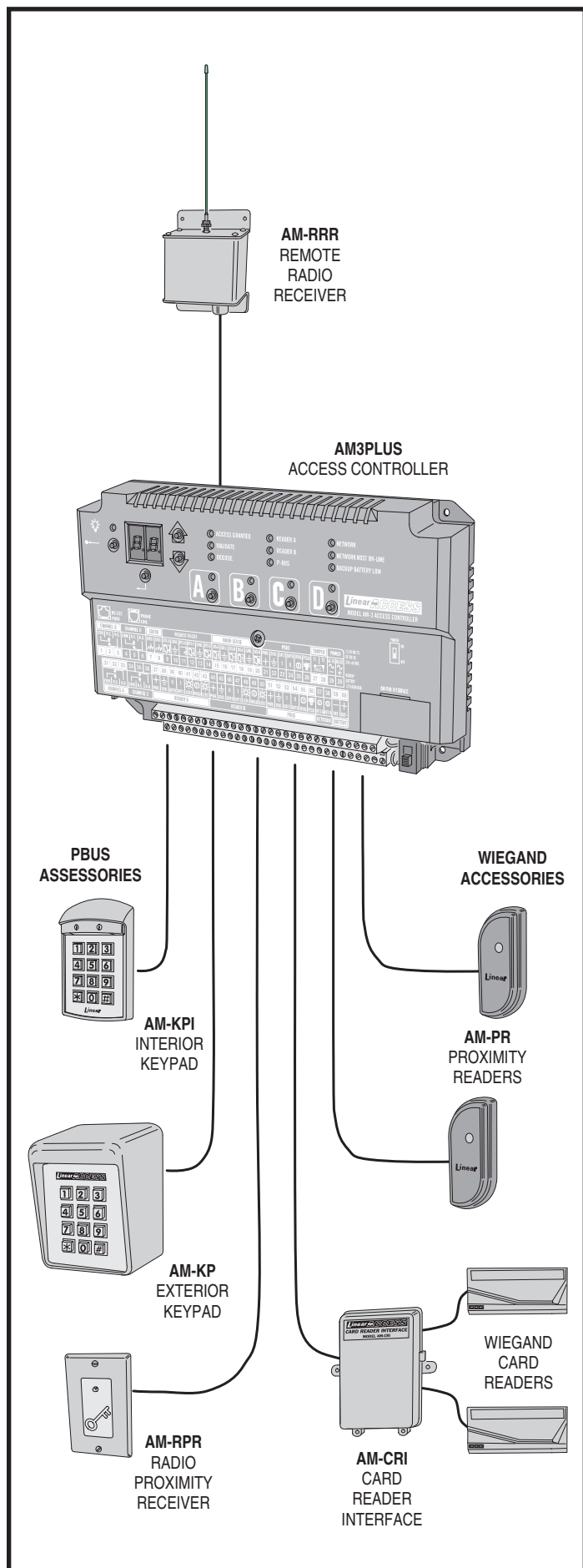
PBUS Accessories

Several compatible accessories are available to connect to the two 6-wire communications "PBUS" inputs. Up to six PBUS accessories can be used with each AM3Plus unit.

AM-RRR Remote Radio Receiver
For wireless transmitters, connect the Model AM-RRR high-gain superheterodyne UHF receiver. The receiver is housed in a weather-resistant enclosure and can be mounted indoors or outdoors. Gaskets and a weather-tight wiring strain relief seal the unit from the elements.

AM-RRR

AM-RPR Remote Proximity Receiver
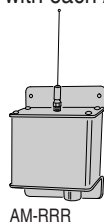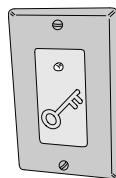The Model AM-RPR functions as a remote device that supplies localized radio reception for the AM3Plus In a typical installation, the AM-RPR would be mounted in a plastic single-gang electrical box next to the controlled opening. When the user requires access, their transmitter must be activated within three inches of the AM-RPR faceplate.

AM-RPR

AM-KP Exterior Keypad
The Model AM-KP is housed in a rugged cast aluminum enclosure designed for exterior installations. The die-cast keys have bright, easy-to-read yellow graphics. The keypad can be mounted to a pedestal or directly to a wall. A keylock secures the keypad to the mounting backplate.

AM-KP

AM-KPI Interior Keypad
The Model AM-KPI keypad is housed in a rugged, plastic enclosure designed to be mounted indoors in a standard single-gang electrical box. Tamper resistant screws secure the keypad to its mounting plate. The die-cast keys have bright, easy-to-read yellow graphics and is illuminated with white LEDs. The keypad is supplied with a satin-chrome bezel and three interchangeable colored bezels (white, ivory, & bronze) to customize the keypad appearance for the installation.
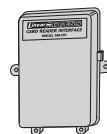
AM-KPI

AM-CRI Card Reader Interface
The Model AM-CRI expands the standard two AM3Plus Wiegand inputs by supporting one or two additional 26-bit Wiegand input devices per AM-CRI interfaces used.

AM-CRI

Wiegand Accessories

The two WIEGAND format inputs connect WIEGAND devices to the AM3Plus. Linear offers a Wiegand format proximity reader. Most other manufacturer's 26, 30 & 31-bit WIEGAND output devices can also be used with the AM3Plus.

AM-PR Proximity Reader
The Model AM-PR is a radio-based reader that works with either proximity tags (Model AM-PT) or proximity cards (Model AM-PC), both of which are slotted to attach to key rings. Upon reading a user's tag or card, the reader sends the entry data via a Wiegand output to the AM3Plus. An integral LED confirms to the user that access is granted.

AM-PR

Component Locations

STATUS/PROGRAM
DISPLAY

ARROW
BUTTONS

STATUS
INDICATORS

POWER
INDICATOR

**AM3PLUS
ACCESS CONTROLLER**

ACCESS GRANTED

VALIDATE

DECODE

READER A

READER B

P-BUS

NETWORK

NETWORK HOST ON-LINE

BACKUP BATTERY LOW

RELAY
INDICATORS (4)

RESET
BUTTON

ENTER
BUTTON

A B C D

Linear **ACCESS**
MODEL AM-3 ACCESS CONTROLLER

RELAY LATCH
BUTTONS (4)

COM PORT
CONNECTOR

TELEPHONE LINE
CONNECTOR

TERMINAL
BLOCKS

AM-MIO INTERFACE
CONNECTOR (HIDDEN)

POWER
SWITCH

Wiring Diagram

RELAY RATING:
3 AMPS @ 30 VOLTS
AC/DC MAXIMUM

TERMINALS 1-30

CHANNEL B			CHANNEL D			EARTH			REQUEST-TO-EXIT					DOOR SENSE						PBUS						TAMPER		POWER	
COM.	N.C.	N.O.	COM.	N.C.	N.O.	GND.	GND.	RTE-A	GND.	RTE-B	RTE-C	GND.	RTE-D	DS-A	GND.	DS-B	DS-C	GND.	DS-D	PWR.	GND.	DAT1	DAT0	DVAL	PCLK	T1	T2	AC-DC	AC-DC
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

POWER INPUT
12-24 VOLTS
AC OR DC
250 mA MIN.

PBUS DEVICE

PWR / GND / DAT1 / DAT0 / DVAL / PCLK

UP TO SIX PBUS
DEVICES CAN BE
USED WITH EACH AM3PLUS

ELECTRIC DOOR STRIKE

DOOR STRIKE POWER SUPPLY

GATE OPERATOR — OPEN

CABINET TAMPER SWITCH

EARTH GROUND STAKE

DOOR EXIT REQUEST BUTTON "A"

DOOR EXIT REQUEST BUTTON "B"

GATE EXIT LOOP SENSOR

DOOR "B" SENSE CONTACT

DOOR "A" SENSE CONTACT

16 VAC 20 VA TRANSFORMER

AM3Plus

THIS WIRING EXAMPLE SHOWS:
DOOR ACCESS WITH A DOOR STRIKE ON RELAY CHANNEL "A"
DOOR ACCESS WITH A MAGNETIC LOCK ON RELAY CHANNEL "B"
GATE ACCESS WITH A GATE OPERATOR ON RELAY CHANNEL "C"

GATE OPERATOR — OPEN

NETWORK UNIT **NETWORK UNIT** **NETWORK UNIT**

MULTIPLE NETWORK UNITS
REFER TO NETWORK SECTION
FOR WIRING OPTIONS

TWO WIEGAND
DEVICES CAN BE
USED WITH EACH AM3PLUS

UP TO SIX PBUS
DEVICES CAN BE
USED WITH EACH AM3PLUS

MAGNETIC DOOR LOCK

DOOR LOCK POWER SUPPLY

WIEGAND DEVICE
PWR / GND / DAT0 / DAT1 / LED1 / HOLD / LED2

WIEGAND DEVICE
PWR / GND / DAT0 / DAT1 / LED1 / HOLD / LED2

PBUS DEVICE
PWR / GND / DAT1 / DAT0 / DVAL / PCLK

12 VOLT BATTERY

BACKUP
BATTERY
12V LEAD-ACID

RS-232 PORT

PHONE LINE

TERMINALS 31-60

31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
COM.	N.C.	N.O.	COM.	N.C.	N.O.	PWR.	GND.	DAT0	DAT1	LED1	HOLD	LED2	PWR.	GND.	DAT0	DAT1	LED1	HOLD	LED2	PWR.	GND.	DAT1	DAT0	DVAL	PCLK	NET-A	NET-B	BAT-	BAT+
CHANNEL A			CHANNEL C			READER A							READER B							PBUS						NETWORK		BATTERY	

TO DEDICATED TELEPHONE LINE
(OPTIONAL MODEL ACM-1 MODEM REQUIRED)

FOR LOCAL COMPUTER CONNECTION
USE LINEAR MODEL A2C
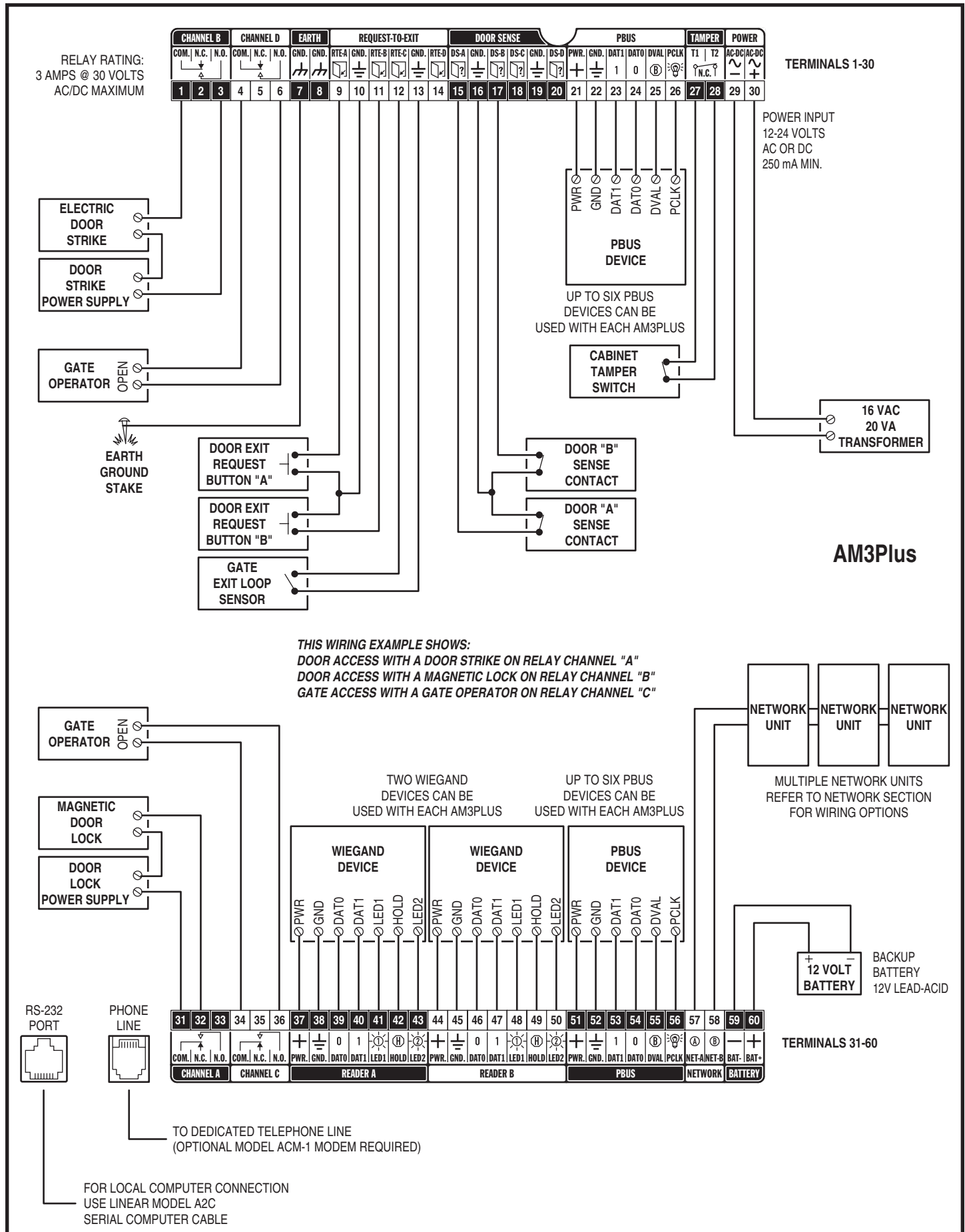SERIAL COMPUTER CABLE

6

Important Mounting Requirements

The AM3Plus Access Control System can be installed for public or private use. The mounting requirements for remote keypads will vary depending on the installation. Review the following information before starting the installation.

Mounting Environment

Consider the environmental factors at the desired mounting location. Although the exterior keypads are designed for direct outdoor installations, it is necessary to protect the AM3Plus from extreme exposure to sun, driving rain, or snow. Mounting the unit in a kiosk can provide extra environmental protection. Use a Model CAB-3 (P/N ACP00913) cabinet for mounting the AM3Plus outdoors.

Follow Building Codes

Check all local building codes and ordinances prior to installing the system. Proper installation of the AM3Plus conforming to the local building codes for access control equipment is a regulatory requirement. The AM3Plus and remote keypad installation is an extremely important and integral part of the overall access control system.

Mounting Location

If the AM3Plus is used to control a door or pedestrian gate, locate the remote keypad as near as practical to the entry point. If the unit is mounted on or in a wall adjacent to the entry point, be sure the wall is sturdy. The repeated shock and vibration from a slamming access door or spring-loaded pedestrian gate must be isolated from the keypad. **NEVER MOUNT THE KEYPAD DIRECTLY TO A MOVING DOOR OR GATE!**
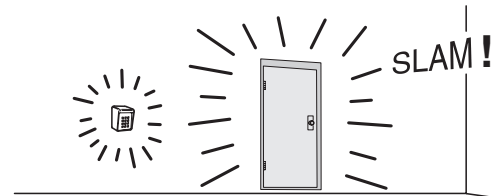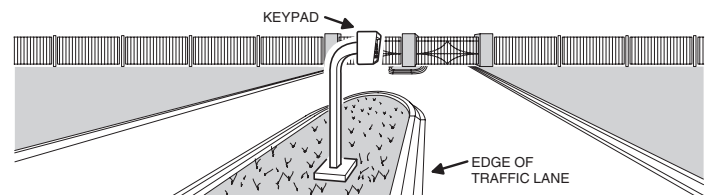
Gate Installations

If the AM3Plus is used to control a gate operator connected to a vehicular gate, the remote keypad MUST be mounted AT LEAST 10 feet away from the gate (open and closed) and gate operator. **AT NO TIME SHOULD A PERSON BE ABLE TO TOUCH THE GATE OR GATE OPERATOR AND THE KEYPAD AT THE SAME TIME.**
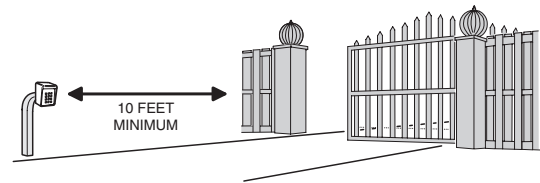
Vehicle Traffic

Do not mount the remote keypad where it extends into any traffic lane. Locate the gooseneck pedestal or entry kiosk so all parts of the keypad are outside the traffic lane. Locate the keypad clear of any turn-around lanes vehicles use when access is denied.

Americans with Disability Act (A.D.A.) Requirements

THE FOLLOWING WHEELCHAIR ACCESS REQUIREMENTS ARE FOR PUBLIC DOOR CONTROL INSTALLATIONS ONLY.

1. If the clear floor space allows only forward approach to the keypad, the maximum high forward reach allowed is 48" above grade to the top of the keypad.
2. If the high forward reach to the keypad is over an obstruction of greater than 20" but less than 25", the maximum high forward reach allowed is 44" above grade to the top of the keypad.
3. If the clear floor space allows parallel approach by a person in a wheelchair, the maximum high side reach shall be 54" above grade to the top of the keypad.
4. If the high side reach is over an obstruction of 24" or less, the maximum high side reach allowed is 46" above grade to the top of the keypad.

AM3Plus Mounting

Standard Cabinet

The AM3Plus cabinet is designed to be mounted directly to a wall or flat surface.

Wiring access for power, telephone, earth ground, control output must be available at the mounting location. For easier wiring, choose a well lit location. Wiring access for remote accessory cables must also be available at the mounting location.
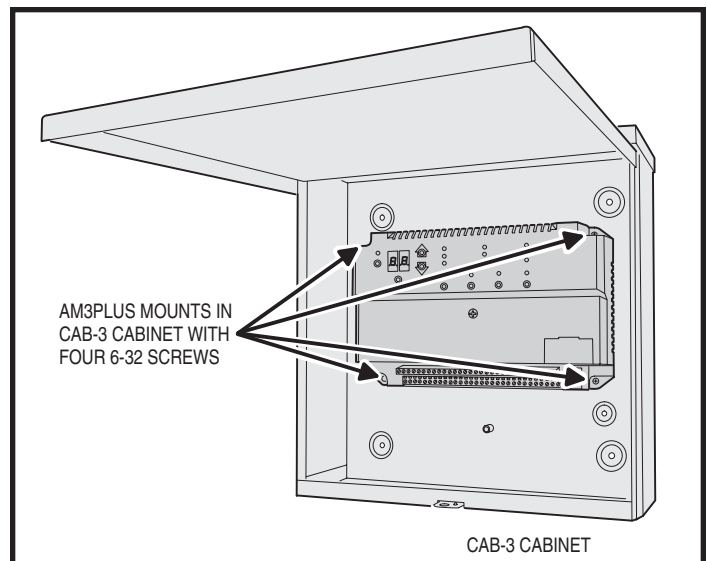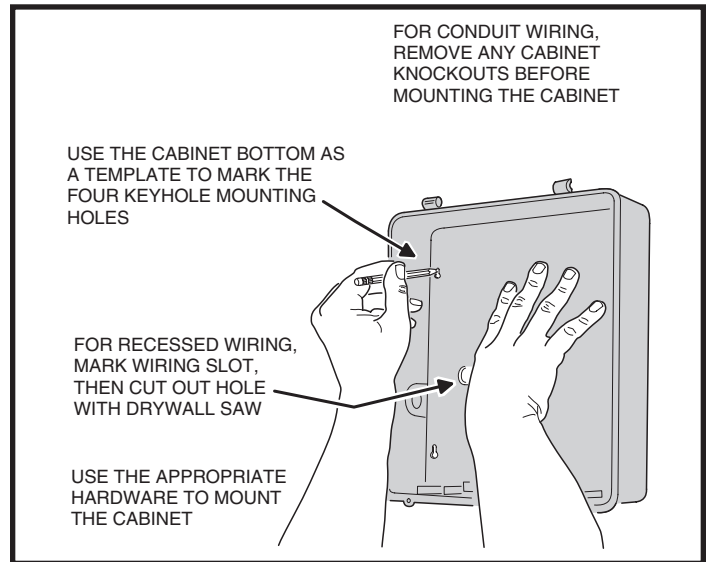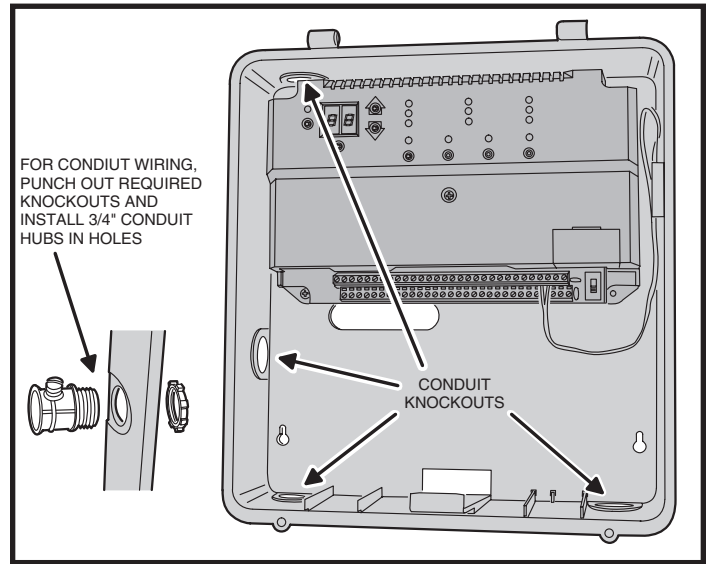
1. Flip the cabinet's cover up to unlock the hinges and remove the cover from the case.
2. To make cabinet mounting easier, the AM3Plus can be removed from the cabinet (optional).
3. If using conduit for wiring, punch out the selected cabinet wiring knockouts.
4. Use the cabinet as a template and mark the locations for the four cabinet mounting screws in the keyhole slots.
5. Mark the wiring access slot if the wiring is being routed from behind the cabinet.
6. Use a hole saw to cut out the location for the wiring access slot (if used).
7. Use four screws and appropriate screw anchors to mount the cabinet to the wall.
8. If the AM3Plus was removed to mount the cabinet, replace the AM3Plus.
9. After the installation's wiring and programming are complete, replace the cabinet's cover and secure it with the two screws provided.

Outdoor Cabinet

To protect the unit outdoors, the AM3Plus can be mounted inside a Linear Model CAB-3 (P/N ACP000913) outdoor metal cabinet.

Wiring access for power, telephone, earth ground, control output must be available at the mounting location. For easier wiring, choose a well lit location. Wiring access for remote accessory cables must also be available at the mounting location.

1. Open the cabinet's cover and push it in to latch it open.
2. Punch out the selected cabinet wiring knockouts.
3. Use the cabinet as a template and mark the locations for the four cabinet mounting screws.
4. Use four screws and appropriate screw anchors to mount the cabinet to the wall.
5. Mount the AM3Plus inside the cabinet with four 6-32 screws.
6. After the installation's wiring and programming are complete, lower the cabinet's cover and secure it with a lock.

FOR CONDIUT WIRING, PUNCH OUT REQUIRED KNOCKOUTS AND INSTALL 3/4" CONDUIT HUBS IN HOLES

CONDUIT KNOCKOUTS

FOR CONDUIT WIRING, REMOVE ANY CABINET KNOCKOUTS BEFORE MOUNTING THE CABINET

USE THE CABINET BOTTOM AS A TEMPLATE TO MARK THE FOUR KEYHOLE MOUNTING HOLES

FOR RECESSED WIRING, MARK WIRING SLOT, THEN CUT OUT HOLE WITH DRYWALL SAW

USE THE APPROPRIATE HARDWARE TO MOUNT THE CABINET

AM3PLUS MOUNTS IN CAB-3 CABINET WITH FOUR 6-32 SCREWS

CAB-3 CABINET

Relay Output Wiring

Any of the four relay outputs channels (A-D) can be used to control access devices on doors or gates.

Door or Pedestrian Gate Control

1. Install a low voltage electric door strike or magnetic lock as a locking device for the door or pedestrian gate.
2. Install the power supply or transformer for the locking device. **DO NOT POWER THE AM3Plus FROM THIS POWER SUPPLY.**
3. Connect one wire from the power supply to one wire from the locking device.
4. Route two wires between the locking device and the AM3Plus. Connect one wire to the remaining wire of the locking device. Connect the other wire to the remaining wire of the power supply.
5A. For a door strike, connect the wires to the AM3Plus relay **COM** & **N.O.** terminals.
5B. For a magnetic lock, connect the wires to the AM3Plus relay **COM** & **N.C.** terminals.

Gate Control

1. Route two wires between the gate and the AM3Plus.
2. Connect the gate operator's **OPEN** terminals to the AM3Plus relay **COM** & **N.O.** terminals.
✦ *NOTE: For operator wiring specifics, refer to the gate operator's wiring diagram.*
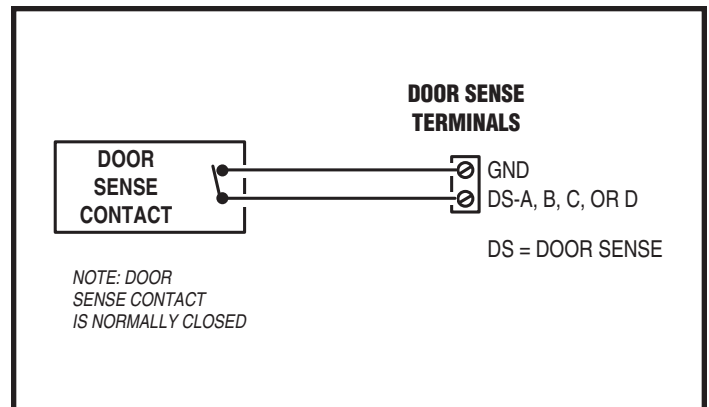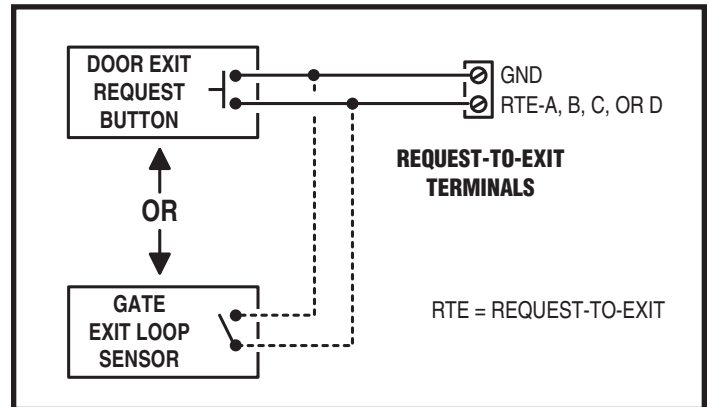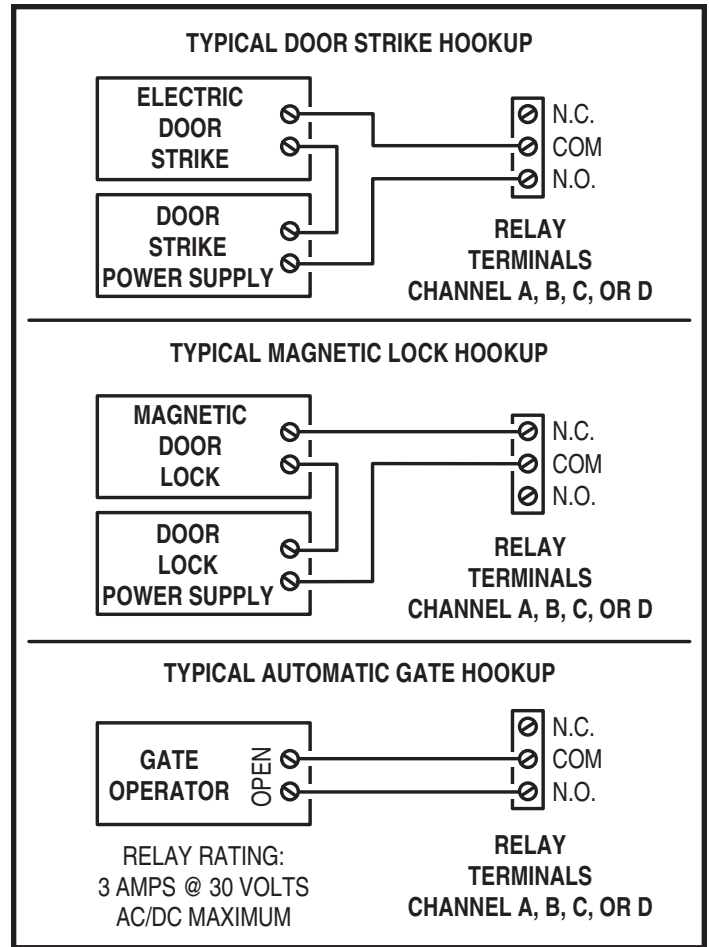
Request-to-Exit Inputs

Each of the four relay outputs has a request-to-exit input terminal. Grounding this terminal will activate the associated relay. Exit request inputs are typically used with push bars, loop sensors, or pushbuttons.

1. Install the pushbutton or device to signal an exit request.
2. Route two wires from the device to the AM3Plus.
3. Connect the device's normally open output to the wires.
4. To activate a relay channel, connect the wires to the associated relay request-to-exit terminal (**RTE-A, RTE-B, RTE-C,** or **RTE-D**) and a **GND** terminal.

Sensing Inputs

The sensing inputs can connect to a door switch that monitors whether the controlled door is open or closed.

1. To use the door sense feature to detect forced entry or door ajar conditions, install a normally closed door switch on the door or pedestrian gate and route two wires from the switch to the AM3Plus.
2. Connect the sensing device wires to the associated relay sensing terminal (**DS-A, DS-B, DS-C,** or **DS-D**) and a **GND** terminal.

TYPICAL DOOR STRIKE HOOKUP

ELECTRIC DOOR STRIKE

DOOR STRIKE POWER SUPPLY

N.C.
COM
N.O.

RELAY TERMINALS CHANNEL A, B, C, OR D

TYPICAL MAGNETIC LOCK HOOKUP

MAGNETIC DOOR LOCK

DOOR LOCK POWER SUPPLY

N.C.
COM
N.O.

RELAY TERMINALS CHANNEL A, B, C, OR D

TYPICAL AUTOMATIC GATE HOOKUP

GATE OPERATOR — OPEN

N.C.
COM
N.O.

RELAY RATING: 3 AMPS @ 30 VOLTS AC/DC MAXIMUM

RELAY TERMINALS CHANNEL A, B, C, OR D

DOOR EXIT REQUEST BUTTON

OR

GATE EXIT LOOP SENSOR

GND
RTE-A, B, C, OR D

REQUEST-TO-EXIT TERMINALS

RTE = REQUEST-TO-EXIT

DOOR SENSE TERMINALS

DOOR SENSE CONTACT

GND
DS-A, B, C, OR D

DS = DOOR SENSE

*NOTE: DOOR SENSE CONTACT IS NORMALLY CLOSED*

Power, Battery, & Ground Wiring

Power Wiring

✦ *NOTE: DO NOT APPLY POWER UNTIL THE INSTALLATION IS COMPLETE. TURN MASTER POWER SWITCH OFF BEFORE WIRING.*

1. Route two wires between the AM3Plus and the power transformer.
   - For power wire runs up to 100 feet, use 18 AWG, 600-volt insulated wire.
   - For power wire runs up to 200 feet, use 16 AWG, 600-volt insulated wire.
2. Connect the wires to the transformer. Connect the other end of the wires to the AM3Plus **AC1** & **AC2** terminals.
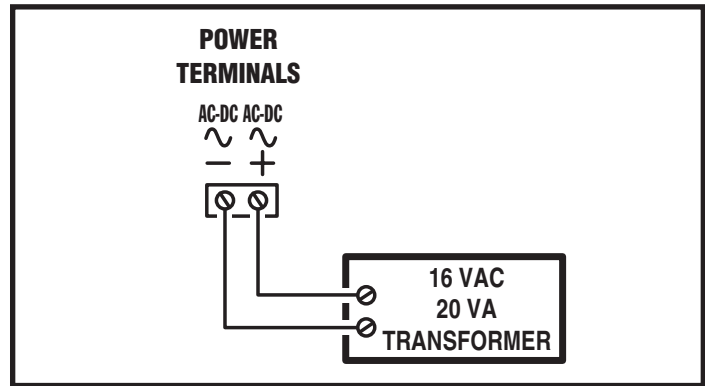
Backup Battery

Use of battery backup is optional. It will allow the AM3Plus to operate for short periods of time without AC power. The door or gate access device must use some type of battery backup of its own for the entire system to be functional.

Use a 12-volt gel-cell type battery. Up to a 7-amp/hr. battery will fit into the AM3Plus cabinet. Do not use a 6-volt battery.

✦ **NOTE:** *A backup battery is not required to maintain the AM3Plus clock/calendar and programming memory during power outages.*

1. Route two battery leads between the AM3Plus and the backup battery.
2. Connect the Battery positive to the AM3Plus **BAT+** terminal and the negative to the **BAT-** terminal.

✦ **NOTE:** *The AM3Plus supplies battery charging current. An external battery charger is not required to maintain the battery.*
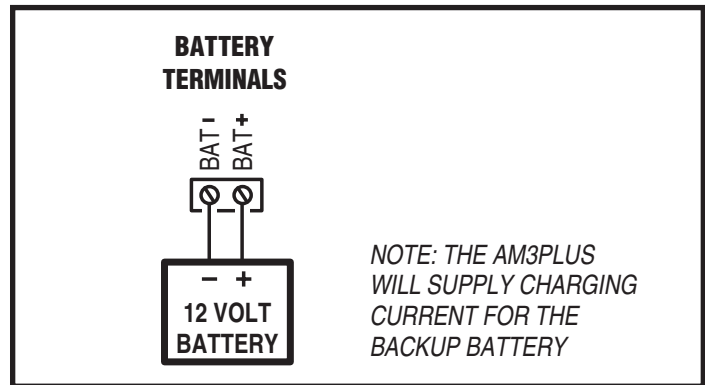
Earth Ground

For the best ground, use size 12 gauge solid wire or larger to connect the to an 8-foot copper ground rod. Locate the ground rod next to the Power and Telephone company rods and bond the rods together with a new clamp. Do not disturb the clamps installed by the Power or Telephone Company. Alternately, connect to a metallic cold water pipe for the earth ground.

1. Connect the wire from the earth ground to the AM3Plus **EARTH GROUND** terminal.

POWER TERMINALS

AC-DC AC-DC

16 VAC
20 VA
TRANSFORMER

BATTERY TERMINALS

BAT -   BAT +

– +
12 VOLT
BATTERY

NOTE: THE AM3PLUS WILL SUPPLY CHARGING CURRENT FOR THE BACKUP BATTERY

EARTH GROUND TERMINALS

GND. GND.

EARTH
GROUND
STAKE
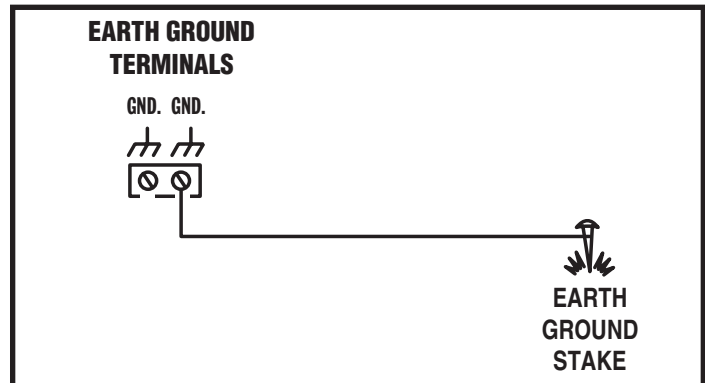
Telephone Wiring

For programming, the AM3Plus connects to a standard telephone line.

✦ **NOTE:** *The optional Model ACM-1 modem is required for telephone communications to the AM3Plus controller.*

Important Telephone Wiring Tips

- **DO NOT ROUTE TELEPHONE AND AC WIRING INSIDE THE SAME CONDUIT.** Route all telephone wires inside a dedicated conduit that is at least six inches away from any AC line wiring.
- All telephone wiring must be made on the "building" side of the telephone company's demarcation device (the terminal block where the telephone line connects to the building).
- If any security system or personal alert system at the installation is connected to the telephone line, be sure that it is connected to the line ahead of the AM3Plus using a RJ-31X interface.
- Use only high-quality telephone wire. All telephone wire should be twisted-pair with a minimum size of 24 AWG.

Typical Telephone Wiring

1. Connect a double-ended modular cable between the AM3Plus's **PHONE LINE** jack and the modular telephone jack wired to the installation's telephone line.

AM3PLUS
TELEPHONE
LINE JACK

INCOMING
DEDICATED
TELEPHONE
LINE JACK

DOUBLE-ENDED
MODULAR
TELEPHONE CORD
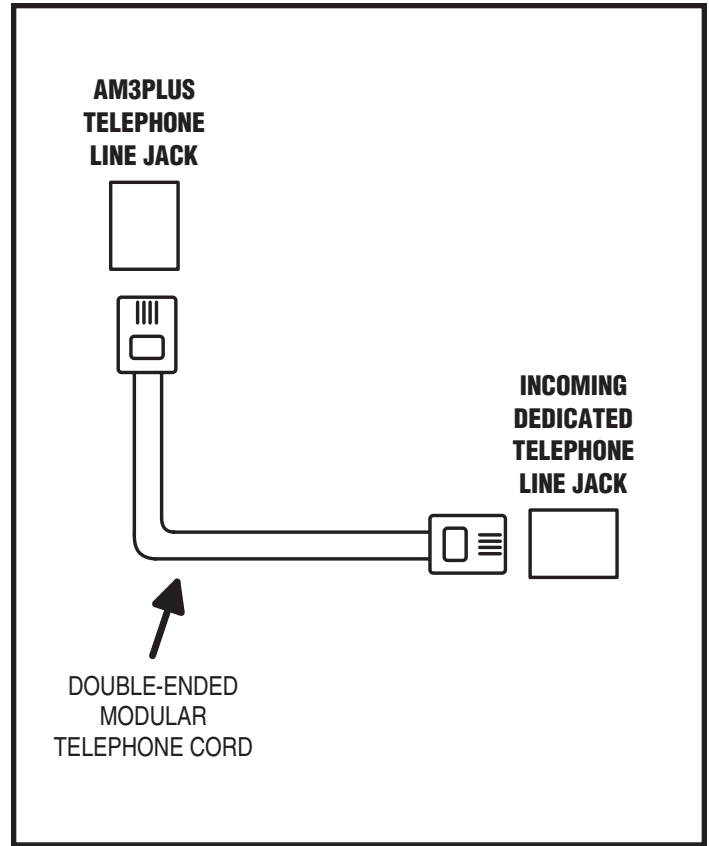
PBUS Accessories

Up to six accessories (keypads, proximity readers, remote receivers) can be connected to the two PBUS input/output ports. A typical application for a remote keypad would be to control a second door or gate.
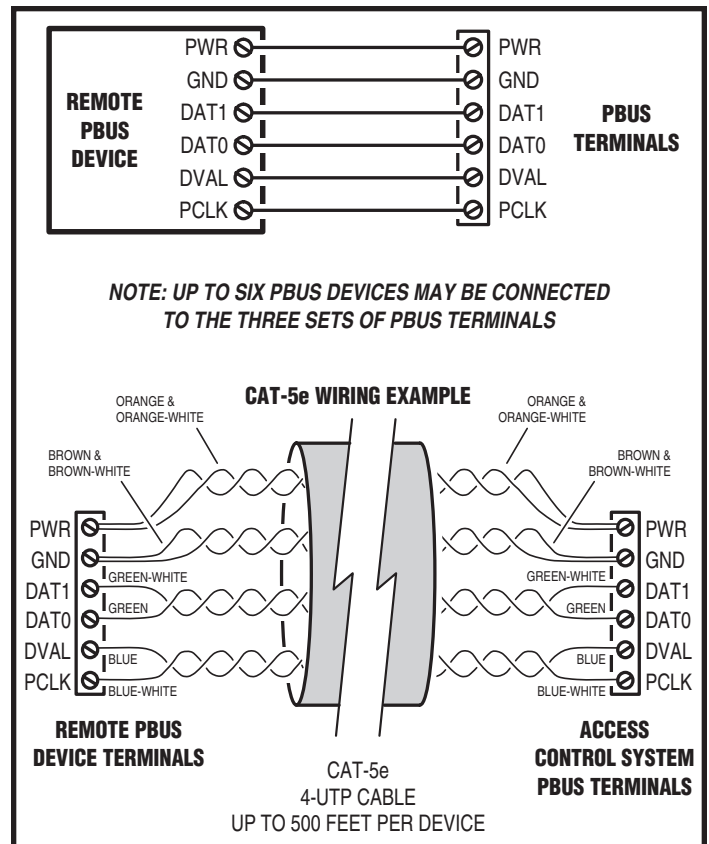
Linear's PBUS devices compatible with the AM3Plus are:

- AM-RRR Remote Radio Receiver
- AM-RGR Remote Radio Receiver
- AM-RPR Radio Proximity Receiver
- AM-KP Exterior Keypad
- AM-KPI Interior Keypad
- AM-CRI Card Reader Interface

Conventional cable or commonly available Cat-5e Ethernet cable can be used to connect PBUS remote devices to the AM3Plus. When using Cat-5e cable, note that the PWR and GND connections use two wires each to enhance the current carrying capacity for powering the remote device.

Cable choices:

- Cat-5e Ethernet cable for wire runs up to 500'.
- 24 AWG Belden Type 9931 or equivalent for wire runs up to 300'.
- 20 AWG Weico Type 9405 or equivalent for wire runs up to 600'.

1. Mount and install the accessory as described in its instructions.
2. Route cable from the AM3Plus to the accessory.
3. Set the **DEVICE ADDRESS** rotary switch in the accessory to a unique address number. When programming the system, the device address number will identify each PBUS accessory to the AM3Plus.
4. Connect the cable to the accessory and the AM3Plus (see PBUS wiring diagram).

REMOTE
PBUS
DEVICE

PWR
GND
DAT1
DAT0
DVAL
PCLK

PWR
GND
DAT1
DAT0
DVAL
PCLK

PBUS
TERMINALS

NOTE: UP TO SIX PBUS DEVICES MAY BE CONNECTED TO THE THREE SETS OF PBUS TERMINALS

CAT-5e WIRING EXAMPLE

ORANGE &
ORANGE-WHITE

BROWN &
BROWN-WHITE

ORANGE &
ORANGE-WHITE

BROWN &
BROWN-WHITE

PWR
GND
DAT1
DAT0
DVAL
PCLK

GREEN-WHITE
GREEN
BLUE
BLUE-WHITE

GREEN-WHITE
GREEN
BLUE
BLUE-WHITE

PWR
GND
DAT1
DAT0
DVAL
PCLK

**REMOTE PBUS
DEVICE TERMINALS**

CAT-5e
4-UTP CABLE
UP TO 500 FEET PER DEVICE

**ACCESS
CONTROL SYSTEM
PBUS TERMINALS**

Wiegand Accessories

The two AM3Plus Wiegand inputs (READER A & B) can connect to a large variety of 26, 30, and 31-bit Wiegand output accessories. The Wiegand format is a common standard for access control equipment. A typical application would be to add swipe card or proximity readers to the system.

✦ **NOTE:** *Depending on the Wiegand accessory used, the LED1, LED2, and HOLD connections may not be required.*

• LED1 output is switched to ground during non-access time.

• LED2 output is switched to ground for one second during access time.

1. Mount and install the Wiegand accessory as described in its installation instructions.
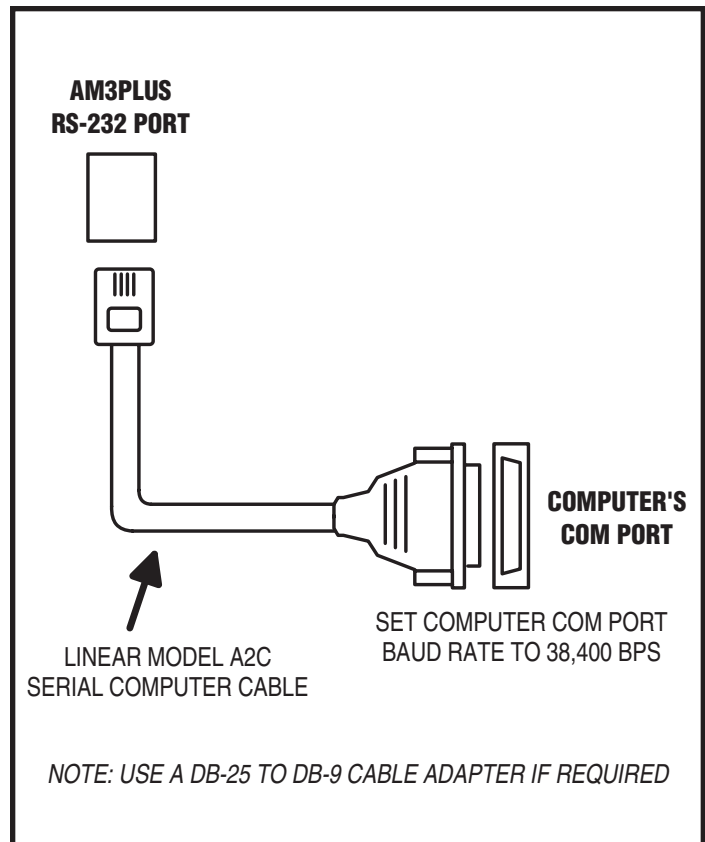
2. Route a cable from the AM3Plus to the accessory.

• For wire runs up to 300 feet use 24 AWG Belden 9931 or equivalent.

• For wire runs up to 500 feet use 20 AWG Weico 9405 or equivalent.

3. Connect the cable to the accessory and the AM3Plus as shown in the figure.
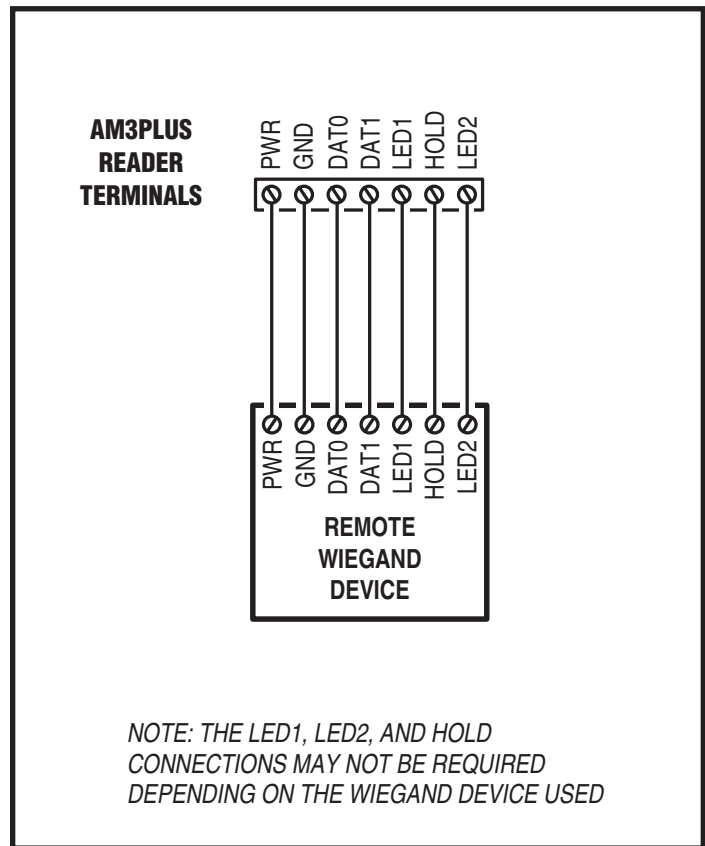
AM3PLUS READER TERMINALS

PWR GND DAT0 DAT1 LED1 HOLD LED2

PWR GND DAT0 DAT1 LED1 HOLD LED2

REMOTE WIEGAND DEVICE

NOTE: THE LED1, LED2, AND HOLD CONNECTIONS MAY NOT BE REQUIRED DEPENDING ON THE WIEGAND DEVICE USED

RS-232 Port

A modular connector is provided for the bi-directional 38.4K baud RS-232 port. The AM3Plus RS-232 port connects to a personal computer's COM port. System programming can be performed locally with a computer connected to the RS-232 port.

AM3PLUS RS-232 PORT

COMPUTER'S COM PORT

SET COMPUTER COM PORT BAUD RATE TO 38,400 BPS

LINEAR MODEL A2C SERIAL COMPUTER CABLE

NOTE: USE A DB-25 TO DB-9 CABLE ADAPTER IF REQUIRED
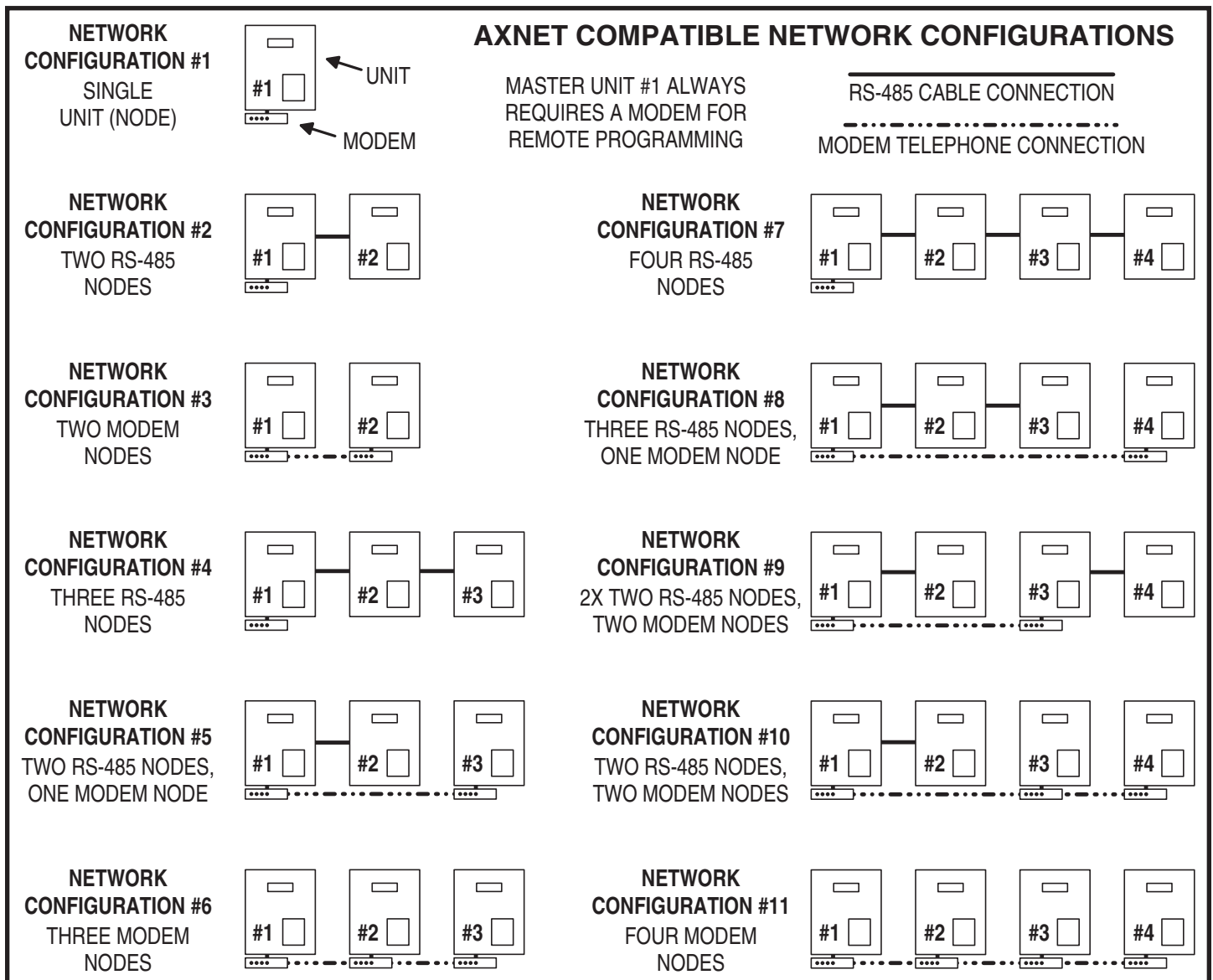
Optional Network Connections

Linear's AM3Plus, AE1000Plus, & AE2000Plus Access Control Systems can be connected together in a network. A network will allow sharing programming and user information between the systems. Program each unit to a different network Node Address (see Page 16).

✦ **IMPORTANT COMPATIBILITY NOTE:** *Linear's previous access control Models AE-1000, AE-2000, & AM3 can be used in networks with the Models AE1000Plus, AE2000Plus, & AM3Plus **only using AccessBase2000 software**. The built-in AXNET Browser Interface included in the "Plus" models is only compatible with the Models AM3Plus, AE1000Plus, and AE2000Plus.*

Network Configurations for AXNET Programming

If the system is going to be programmed using Linear's AXNET Browser Interface, units can communicate with each other on the network through modems or RS-485 cable connections.

Refer to the figure below for details of the 11 supported AXNET network hardware configurations and associated Network Configuration Numbers. After choosing a network layout that best suits the installation, note the Network Configuration Number. This number is required to be entered during setup of the AXNET Browser Interface in the Global Settings for Networking area.

AXNET COMPATIBLE NETWORK CONFIGURATIONS

NETWORK CONFIGURATION #1
SINGLE UNIT (NODE)

MASTER UNIT #1 ALWAYS REQUIRES A MODEM FOR REMOTE PROGRAMMING

RS-485 CABLE CONNECTION
MODEM TELEPHONE CONNECTION

NETWORK CONFIGURATION #2
TWO RS-485 NODES

NETWORK CONFIGURATION #3
TWO MODEM NODES

NETWORK CONFIGURATION #4
THREE RS-485 NODES

NETWORK CONFIGURATION #5
TWO RS-485 NODES, ONE MODEM NODE

NETWORK CONFIGURATION #6
THREE MODEM NODES

NETWORK CONFIGURATION #7
FOUR RS-485 NODES

NETWORK CONFIGURATION #8
THREE RS-485 NODES, ONE MODEM NODE

NETWORK CONFIGURATION #9
2X TWO RS-485 NODES, TWO MODEM NODES

NETWORK CONFIGURATION #10
TWO RS-485 NODES, TWO MODEM NODES

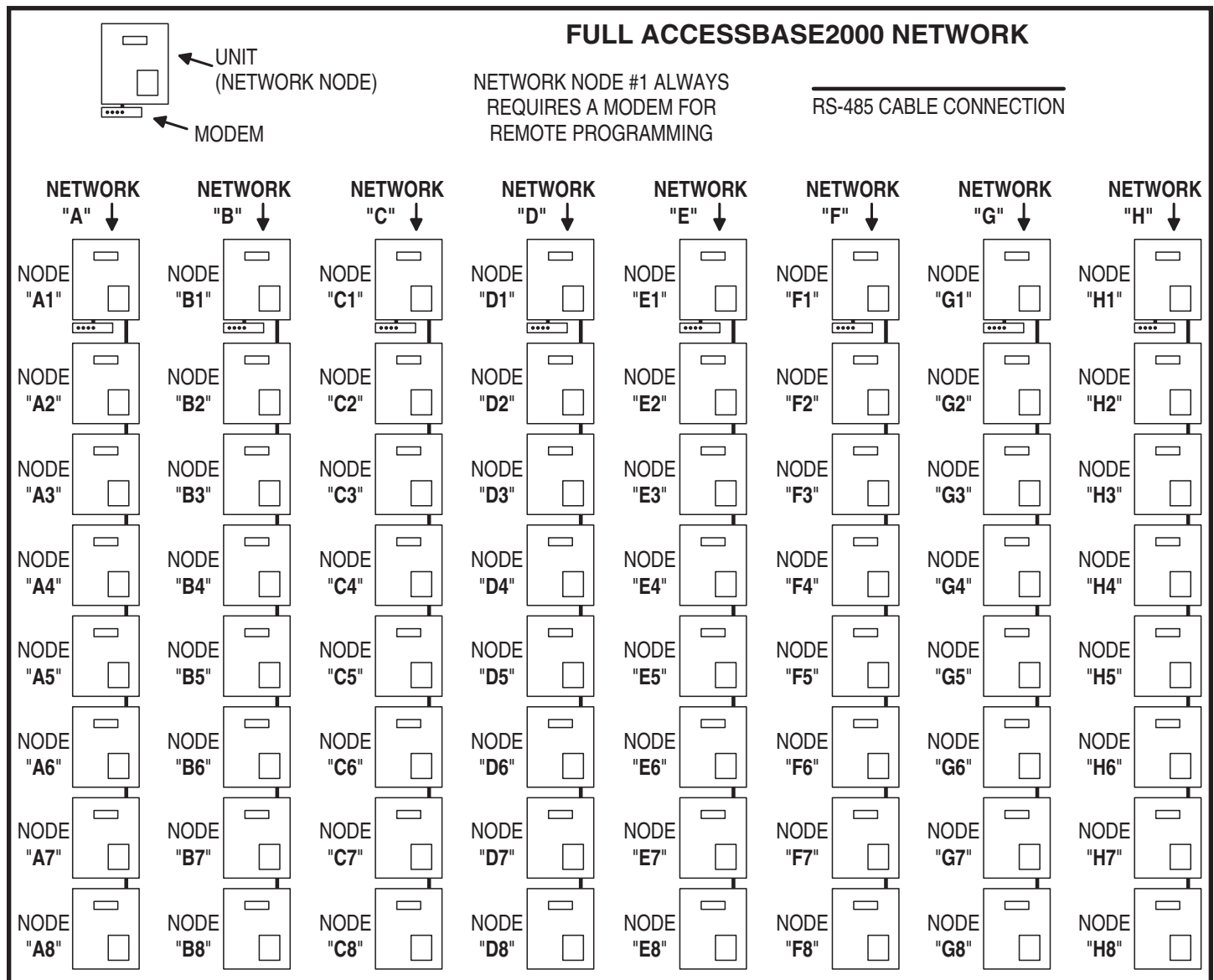**NETWORK CONFIGURATION #11**
FOUR MODEM NODES

Optional Network Connections (Continued)

Network Configuration for AccessBase2000 Programming

If the system is going to be programmed using Linear's AccessBase2000 software, units communicate with each other on the network through RS-485 cable connections.

AccessBase2000 does not support unit-to-unit network communications through modems, only RS-485 cable. AccessBase2000 does support modem communications from the PC to the eight Node #1 "master" units on an AccessBase2000 network.

Refer to the figure below for design details of a fully implemented AccessBase2000 network. The figure shows eight networks, each with eight nodes, for a total of 64 units.

FULL ACCESSBASE2000 NETWORK

UNIT (NETWORK NODE)

MODEM

NETWORK NODE #1 ALWAYS REQUIRES A MODEM FOR REMOTE PROGRAMMING

RS-485 CABLE CONNECTION

NETWORK "A"	NETWORK "B"	NETWORK "C"	NETWORK "D"	NETWORK "E"	NETWORK "F"	NETWORK "G"	NETWORK "H"
NODE "A1"	NODE "B1"	NODE "C1"	NODE "D1"	NODE "E1"	NODE "F1"	NODE "G1"	NODE "H1"
NODE "A2"	NODE "B2"	NODE "C2"	NODE "D2"	NODE "E2"	NODE "F2"	NODE "G2"	NODE "H2"
NODE "A3"	NODE "B3"	NODE "C3"	NODE "D3"	NODE "E3"	NODE "F3"	NODE "G3"	NODE "H3"
NODE "A4"	NODE "B4"	NODE "C4"	NODE "D4"	NODE "E4"	NODE "F4"	NODE "G4"	NODE "H4"
NODE "A5"	NODE "B5"	NODE "C5"	NODE "D5"	NODE "E5"	NODE "F5"	NODE "G5"	NODE "H5"
NODE "A6"	NODE "B6"	NODE "C6"	NODE "D6"	NODE "E6"	NODE "F6"	NODE "G6"	NODE "H6"
NODE "A7"	NODE "B7"	NODE "C7"	NODE "D7"	NODE "E7"	NODE "F7"	NODE "G7"	NODE "H7"
NODE "A8"	NODE "B8"	NODE "C8"	NODE "D8"	NODE "E8"	NODE "F8"	NODE "G8"	NODE "H8"

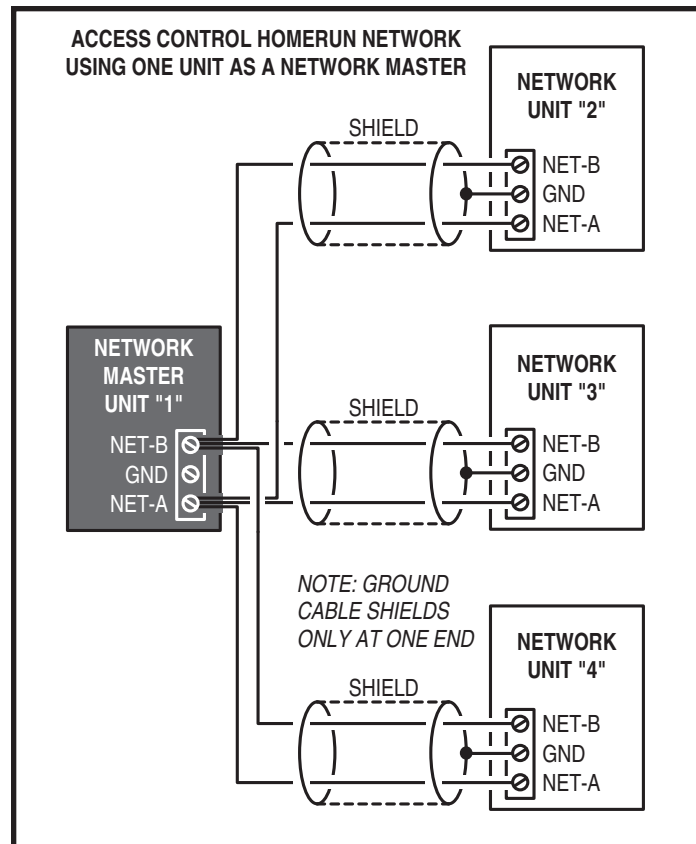# Optional Network Connections (Continued)

RS-485 Network Wiring

Network wiring conforms to 3-wire RS-485 electrical specifications. Units connected in the network can be wired using one unit as a "hub" or by wiring from one unit to the next in "daisy-chain" fashion. See the figures for wiring options.

- Use Belden 9925 or Carol C0600 shielded cable or equivalent. Maximum wire run distance is 4000 feet.
- ✦ **NOTE:** *Be sure to connect the cable's shield to one of the **GND** terminals.*
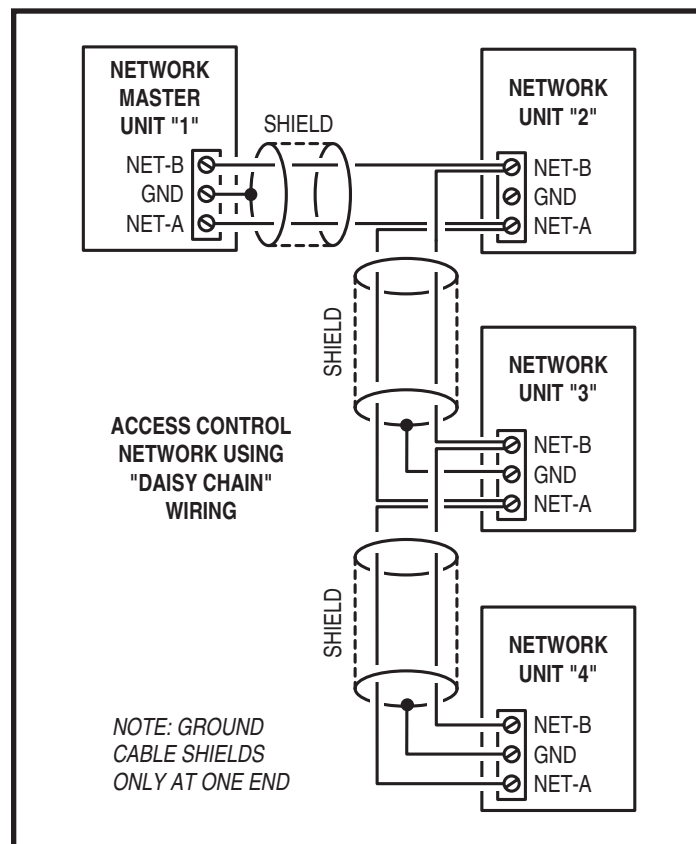
Network Wiring with Hub

1. Mount and install the units for the network.
2. Choose one unit to be the Network Hub. Usually this would be a centrally located or "master" unit.
3. Route 3-conductor shielded cable from the hub unit to one of the other units. Repeat this step to connect the hub unit to each of the other units.
4. Connect the 3-conductor cable to each unit's **NETWORK** terminals.

ACCESS CONTROL HOMERUN NETWORK USING ONE UNIT AS A NETWORK MASTER

NETWORK UNIT "2"
SHIELD
NET-B
GND
NET-A

NETWORK MASTER UNIT "1"
NET-B
GND
NET-A

NETWORK UNIT "3"
SHIELD
NET-B
GND
NET-A

NOTE: GROUND CABLE SHIELDS ONLY AT ONE END

NETWORK UNIT "4"
SHIELD
NET-B
GND
NET-A

Network "Daisy-chain" Wiring

1. Mount and install the units for the network.
2. Route 3-conductor shielded cable from one unit to the next unit until there is cabling run to all of the units.
3. Connect the 3-conductor cable to each unit's **NETWORK** terminals.

NETWORK MASTER UNIT "1"
NET-B
GND
NET-A
SHIELD

NETWORK UNIT "2"
NET-B
GND
NET-A

SHIELD

ACCESS CONTROL NETWORK USING "DAISY CHAIN" WIRING

NETWORK UNIT "3"
NET-B
GND
NET-A

SHIELD

NOTE: GROUND CABLE SHIELDS ONLY AT ONE END

NETWORK UNIT "4"
NET-B
GND
NET-A

System Controls

Pushbuttons

Refer to the figure for the location of each of the eight pushbuttons.

- **UP** button adds one to the value on the STATUS/PROGRAM display.
- **DOWN** button subtracts one from value on the STATUS/PROGRAM display. Press with the UP button for one second to enter Programming Mode.
- **ENTER** button accepts the value on the STATUS/PROGRAM display during programming, clears an indication during the supervisory display.
- **RELAY "A" LATCH** press to latch relay "A", press again to unlatch.
- **RELAY "B" LATCH** press to latch relay "B", press again to unlatch.
- **RELAY "C" LATCH** press to latch relay "C", press again to unlatch.
- **RELAY "D" LATCH** press to latch relay "D", press again to unlatch.
- **SYSTEM RESTART BUTTON** will reboot the system's microcontroller. NO SYSTEM INFORMATION WILL BE ERASED.

Display

The STATUS/PROGRAM display will shows the current system conditions and is used for system setup.

Power-up

When power is applied, the display will show the current mode of operation (AXNET "An" or AccessBase2000 "Ab") and the version number of the firmware installed. The default mode of operation is AccessBase2000.

Program Mode

Program Mode uses the display and the UP, DOWN, and ENTER pushbuttons. The setting the network node address, operation mode, and clearing the memory can be performed in Program Mode.

Refer to the following steps to change the system settings:

1. To enter Program Mode, press and hold the UP and DOWN pushbuttons together for one second. While in Program Mode, both decimal points on the display are lit.
2. The display shows the current network node number setting.
3. Press the UP or DOWN button to cycle the display through the options that can be selected (see Program Mode Display Table).
4. When the desired option is displayed, press the ENTER button to select the option.

✦ **NOTE:** In network installations, a unique network address (1-8 for AccessBase2000, 1-4 for AXNET) must be set before communicating with network.

✦ **NOTE:** If using AXNET for programming the system, select the An programming option, for AccessBase2000 select Ab.
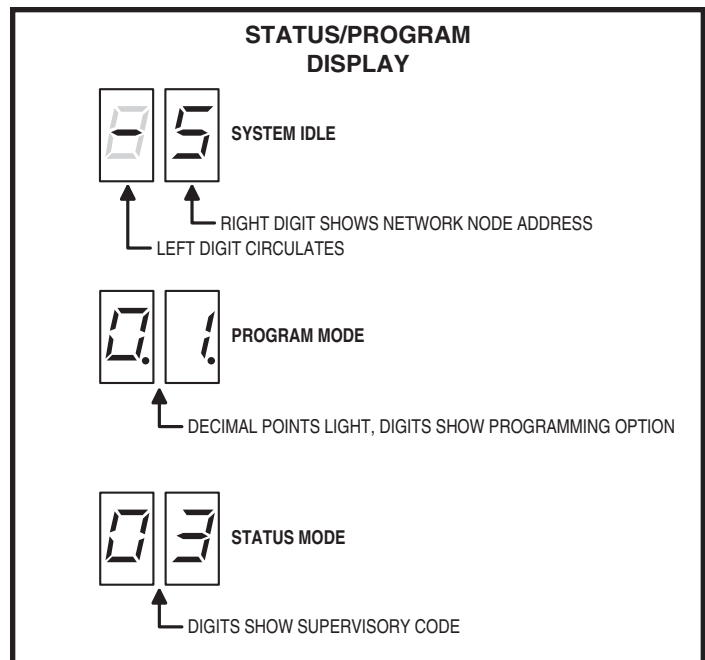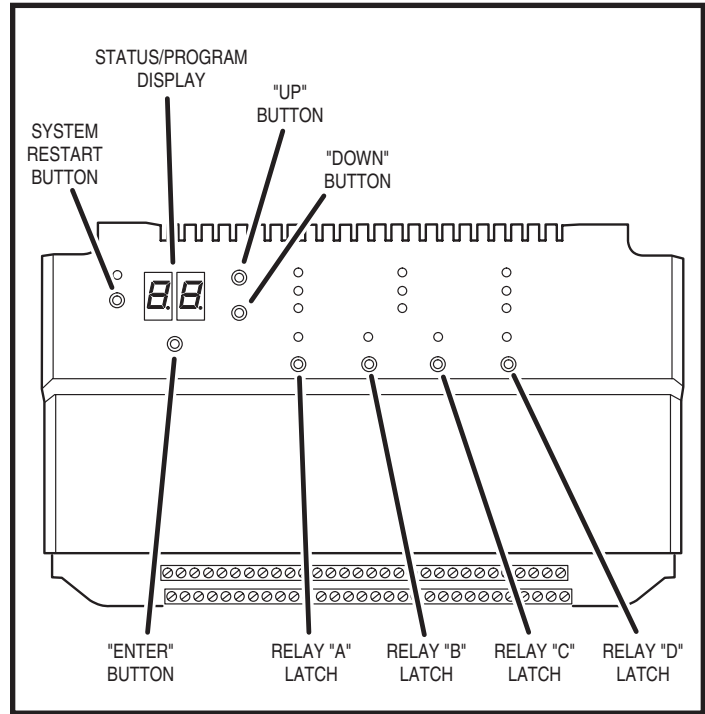
After the option is selected, the system will restart.

Status Mode

While the system is running, the display will show the current system status. Normally the left digit will show a moving pattern and the right digit will show the unit's Network Node number.

When a supervisory condition exists, the display will cycle to show the condition(s). When an item is displayed, press the ENTER button to clear the display (clears the display only, the condition may still exist). Refer to the following table for the supervisory condition display codes.

STATUS MODE DISPLAY	
DISPLAY	CONDITION
01	MGT TRANSMITTER STATUS EXCEPTION
02	MGT TRANSMITTER LOW BATTERY
03	MGT TRANSMITTER TAMPER
04	AC POWER FAIL (BACKUP BATTERY REQUIRED)
05	CHANNEL "A" LOCKED CLOSED
06	CHANNEL "B" LOCKED CLOSED
07	CHANNEL "C" LOCKED CLOSED
08	CHANNEL "D" LOCKED CLOSED
09	MODEM FAILURE

STATUS/PROGRAM DISPLAY, "UP" BUTTON, "DOWN" BUTTON, SYSTEM RESTART BUTTON, "ENTER" BUTTON, RELAY "A" LATCH, RELAY "B" LATCH, RELAY "C" LATCH, RELAY "D" LATCH

STATUS/PROGRAM DISPLAY

SYSTEM IDLE — RIGHT DIGIT SHOWS NETWORK NODE ADDRESS, LEFT DIGIT CIRCULATES

PROGRAM MODE — DECIMAL POINTS LIGHT, DIGITS SHOW PROGRAMMING OPTION

STATUS MODE — DIGITS SHOW SUPERVISORY CODE

| PROGRAM MODE DISPLAY		
AccessBase2000 MODE	AXNET MODE	FUNCTION
$0.1.$	$0.1.$	SET UNIT TO NODE #1
$0.2.$	$0.2.$	SET UNIT TO NODE #2
$0.3.$	$0.3.$	SET UNIT TO NODE #3
$0.4.$	$0.4.$	SET UNIT TO NODE #4
$0.5.$		SET UNIT TO NODE #5
$0.6.$		SET UNIT TO NODE #6
$0.7.$		SET UNIT TO NODE #7
$0.8.$		SET UNIT TO NODE #8
$A.n.$	$A.b.$	SWITCH OPERATION MODE
$b.L.$	$b.L.$	RESERVED (DO NOT USE)
$C.L.$	$C.L.$	CLEAR UNIT'S MEMORY

System Diagnostics

Several indicators on the AM3Plus are for monitoring the system during operation. When calling for technical assistance, Linear's Technical Services Department may ask the installer to use these indicators to diagnose the system.

Indicators

15 LED indicators are on the AM3Plus. Refer to the figure for the location of each indicator.

- **POWER** lights when AC or DC power is present.
- **STATUS/PROGRAM DISPLAY** shows supervisory and status conditions, also used for some local programming.
- **DECODE** lights when a credential has been successfully decoded.
- **VALIDATE** lights when a credential is determined to be valid.
- **ACCESS GRANTED** lights when a credential is validated and access is granted.
- **PBUS** blinks when any PBUS device is successively decoded.
- **READER "A"** flashes when Wiegand A device is successively decoded.
- **READER "B"** flashes when Wiegand B device is successively decoded.
- **NETWORK** flashes in response to network traffic.
- **NETWORK HOST ON-LINE** lights when the Host PC is connected to the Master Node.
- **BACKUP BATTERY LOW** lights when backup battery measures low.
- **RELAY "A" ACTIVE** lights when the Channel "A" relay is energized.
- **RELAY "B" ACTIVE** lights when the Channel "B" relay is energized.
- **RELAY "C" ACTIVE** lights when the Channel "C" relay is energized.
- **RELAY "D" ACTIVE** lights when the Channel "D" relay is energized.

17
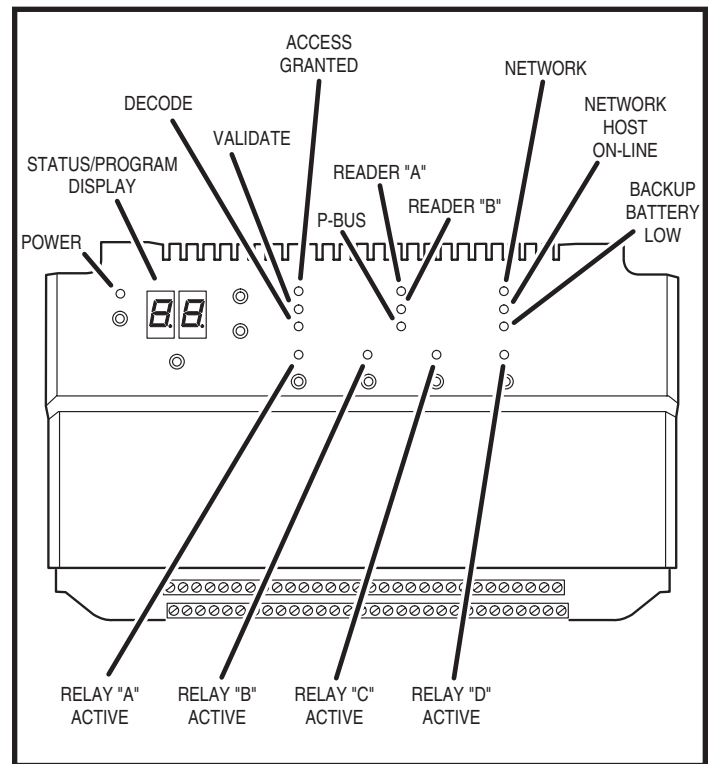
Specifications

Case dimensions: 11.5" W x 12.5" H x 3.5" D

ELECTRICAL

Voltage:	16-24 Volts AC or 12-24 Volts DC
Current:	850 mA maximum @ 12 Volts DC
Backup Battery:	12 Volt DC
Outputs:	Relay Channels A-D
	Form "C" 3 Amps @ 30 Volts maximum
Inputs:	Four normally closed door sense inputs
	Four normally open request-to-exit inputs
	Two WIEGAND reader inputs
	Two PBUS inputs
Network:	Three-wire network

ENVIRONMENTAL

Temperature:	-22°F to 149°F (-30°C to 65°C)
Humidity:	5% to 95% non-condensing

Troubleshooting

System completely dead

1. No power from transformer. Check voltage at AM3Plus transformer terminals.

System will not answer an incoming call

1. Automatic telephone answer disabled.
2. AM3Plus telephone line trouble.
3. ACM-1 Modem not installed or not installed correctly (check that all the modem pins are correctly in the modem socket).

Entry code will not activate relay

1. Entry code not set up for proper relay.

Remote PBUS device does not work

1. Check remote device address switch setting.
2. Check remote device for power.

Remote keypad will not activate a relay

1. Entry code is not assigned.
2. Keypad may be in lockout from too many incorrect attempts. Wait one minute for lockout to clear and try again.

Transmitter does not activate relay

1. Transmitter button setting programmed to "no relay" (would effect all transmitters).
2. Transmitter block not enrolled.
3. Specific transmitter is deactivated in the system.

Linear Limited Warranty

This Linear product is warranted against defects in material and workmanship for twenty-four (24) months. This warranty extends only to wholesale customers who buy direct from Linear or through Linear's normal distribution channels. Linear does not warrant this product to consumers. Consumers should inquire from their selling dealer as to the nature of the dealer's warranty, if any. **There are no obligations or liabilities on the part of Linear Corporation for consequential damages arising out of or in connection with use or performance of this product or other indirect damages with respect to loss of property, revenue, or profit, or cost of removal, installation, or reinstallation.** All implied warranties, including implied warranties for merchantability and implied warranties for fitness, are valid only until the warranty expires. **This Linear Corporation Warranty is in lieu of all other warranties express or implied.**

All products returned for warranty service require a Return Product Authorization Number (RPA#). Contact Linear Technical Services at 1-800-421-1587 for an RPA# and other important details.

FCC Notice

Changes or modifications not expressly described in this manual or approved by the manufacturer could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Linear ACCESS™

227542 A