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HARDWARE INSTALLATION GUIDELINES
1 Inputs, Outputs and Interface Signals

Hardware products operate from various power sources and communicate via a variety of I/O interfaces. Understanding the power requirements and interface signals, their characteristics, merits and limitations will insure successful installation and a reliable system.

1.1 Power Inputs

1.1.1 AC Power

Some B.A.S.I.S. hardware products can use an AC power source.

The AC power wiring to power supplies consists of the AC LINE (L), AC NEUTRAL (N), and SAFETY GROUND (G). These lines from the AC power source to the power input terminals must not be interchanged.

Interchange of the AC LINE and AC NEUTRAL exposes components within the power supply to the hot side of the input power even if the AC line switch is turned off. This presents a safety hazard.

Interchange of the AC LINE and SAFETY GROUND places the supply chassis to an AC potential equal to the input voltage. This could result in a lethal shock hazard or equipment damage.

The interchange of the AC NEUTRAL and SAFETY GROUND may result in ground current flowing through the power supply chassis and other ground paths, causing unreliable/improper system operation.

The AC LINE input to Hardware power supplies is appropriately fused and switched. Local safety regulations may require an additional switch/fuse to be installed in the NEUTRAL input.

Do not apply greater than 12 VAC ± 15% to any hardware product.

1.1.2 DC Power

All B.A.S.I.S. hardware products can use a DC power source.

When using a DC power supply for a hardware product, the DC power must be isolated electrically from the AC input side and non-switching, regulated DC power. Readers require +5 or +12 VDC, and all other panels require either 12 VDC or 12 VAC (except the BAS-1300 and BAS-8000 which require only 12 VDC).

DC power must be supplied through a diode for reverse polarity protection, and must be filtered and regulated for the electronics. Products intended to be powered from DC should never be powered with an AC transformer with rectifiers.

The Multiplexer requires a regulated, low ripple (under 20 mV P/P). The power input is fused and protected from polarity reversal, and a crowbar over-voltage circuit protects against application of wrong voltages.

Do not apply greater than 12 VDC ±15% to any hardware product.

To insure reliable operation of all components of the system, it is important that all power supplies used to power the devices are completely isolated from the AC power source.
1.2 Alarm Inputs

1.2.1 Unsupervised Alarms

Unsupervised alarm inputs sense simple contact closure. Open circuit results in an alarm condition. These inputs are protected by pull-ups, series limiting resistors, and clamp diodes against transients, like ElectroStatic Discharge. The signal is then buffered to reduce the effect of noise.

Open contacts should result in terminal voltages of 3.5 to 5 VDC. Closed contact terminal voltage should be between 0 and 0.8 VDC.

1.2.2 Supervised Alarms

Various B.A.S.I.S. hardware products provide contact supervision. These inputs require an end-of-line (EOL, 1K±10%) terminator to be installed with the contact to be monitored. This can be configured within the software. Input protection is similar to that of the unsupervised input, however the input is also filtered to reject 50/60 Hz AC coupling.

The supervised input can sense contact conditions of SAFE, ALARM, and FAULT. It also accommodates normally closed (NC) and normally open (NO) contacts, which is configurable within the application.

1.3 Reader Inputs/Outputs

1.3.1 Reader Data Input

Reader data input is similar to unsupervised alarm input. It interfaces to reader DATA 1/DATA 0 (WD1/WD0) open collector signals and produces a nominal signal swing of 0 to 5 volts.

1.3.2 Open Collector Output

Open collector output is used by readers to send reader data DATA1/DATA0 (WD1/WD0) and to control external LEDs. Pull-up resistors and diode clamps are provided for reader data outputs. This type of interface is limited to 500 feet.

1.4 Relay Outputs

Some of the hardware products provide form C relay contact outputs. These are dry contacts that are capable of switching signals as well as higher current loads. However, once they are used to switch current (e.g. a door strike), they can not be used reliably to switch small signals (e.g. dialer input.)

1.5 RS-485 Interfaces

1.5.1 RS-485 Communication Overview

The EIA RS-485 standard defines an electrical interface for multi-point communication on bus transmission lines. It allows high-speed data transfer over extended distance (4000 feet/1219 m.) The RS-485 interface
uses a balanced differential transmitter/receiver to reject common mode noise. The following table is a comparison of interfaces commonly used in access/alarm systems.

<table>
<thead>
<tr>
<th>Mode of Operation:</th>
<th>RS-485</th>
<th>RS-232C</th>
<th>Modem</th>
<th>20mA Loop</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Isolated:</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Usually Isolated</td>
</tr>
<tr>
<td>Distance:</td>
<td>4000 feet</td>
<td>50 feet</td>
<td>Phone Line</td>
<td>1000 feet</td>
</tr>
<tr>
<td>No. of Devices on 1 Line:</td>
<td>32</td>
<td>2</td>
<td>2</td>
<td>Limited by Loop Voltages</td>
</tr>
<tr>
<td>Data Rate:</td>
<td>10M bps</td>
<td>20K bps</td>
<td>19.2K bps</td>
<td>2400 bps</td>
</tr>
</tbody>
</table>

Unlike the RS-232C or current loop interfaces, the RS-485 interface allows multiple devices to communicate at high data rates on a single cable, over long distance. Obviously, the RS-485 interface provides advantages in cost savings for installation and improved system performance, but it also brings about problems which would not commonly be seen on systems using RS-232C or current loop interfaces.

Using long communication cable with multiple devices often necessitates powering devices from different power sources. This can result in ground faults and ground loops, which can cause communication problems and possible equipment damage. Because the RS-485 interface communicates in the base band and provides no DC isolation, ground fault places devices at different electrical ground levels and causes large ground currents to flow. Possibilities of ground fault call for careful system planning and installation verification.

Communication cables exceeding 4000 feet can also create noise and signal reflection problems if proper cable is not used or if the cable is not correctly terminated.

**Belden Wire Specifications**

<table>
<thead>
<tr>
<th>Trade Number</th>
<th>Number of Pairs</th>
<th>Nominal D.C. R. Conductor</th>
<th>Shield</th>
<th>Nominal Impedance (Ohms)</th>
<th>Nominal Capacitance pF/feet</th>
<th>pF/meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>9841 NEC CM CSA</td>
<td>1</td>
<td>24.0 ohms/M 78.7 ohms/ km</td>
<td>3.35 ohms/M 11.0 ohms/K</td>
<td>120</td>
<td>12.8</td>
<td>42</td>
</tr>
<tr>
<td>9842 NEC CM CSA</td>
<td>2</td>
<td>24.0 ohms/M 78.7 ohms/ km</td>
<td>2.2 ohms/M 7.2 ohms/K</td>
<td>120</td>
<td>12.8</td>
<td>2</td>
</tr>
<tr>
<td>88102 NEC CMP CSA</td>
<td>2</td>
<td>24.0 ohms/M 78.7 ohms/ km</td>
<td>15.5 ohms/M 50.9 ohms/km</td>
<td>100</td>
<td>12.95</td>
<td>2</td>
</tr>
</tbody>
</table>
1.5.2 RS-485 Cable

Field hardware products use 4-wire or 2-wire RS-485 full communication between devices. The main run RS-485 cable used must be shielded, low capacitance, two twisted pairs with 100-ohm characteristic impedance or better (Belden 9842 4-wire or 9841, 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). Wire size is 24 AWG minimum. Total length of the communication cable must not exceed 4000 feet (1219 m) for 24 AWG wire size per leg of the communication tree.

Drops (down leads or stubs) to readers and other devices must be kept as short as possible (no longer than 10 feet). Use shielded 24 AWG cable (Belden 9502, or equivalent), when terminating to the 3-position for 2-wire RS-485 or the 5-position for 4-wire RS-485, insulation displacement connector.

1.5.3 Use of Signal Ground (SG)

The signal ground (SG) provides a common mode signal reference for the communicating devices. Each device must connect its SG to the cable shield drain wire. Failure to use the SG connection may cause communication errors. If the environment is known to be noisy, an additional wire may be used for the signal ground. The shield can then be grounded at one end only (to prevent ground loops) as a signal ground.
1.5.4 Device to Device Connection

Communication cables for RS-485 should be laid out in a daisy chain. Long stubs (T connection) should be avoided because they create discontinuities and degrade signals. DO NOT connect devices in STAR configuration unless using the BAS-8000 Star Multiplexer. STAR connection creates long stubs and causes difficulty in cable termination.

1.5.5 Cable Termination

RS-485 communications is designed for higher data transmission speeds and also simplifies installation by allowing each device to be multi-dropped from a single communication line or bus. With the increase data speeds and transmitting and receiving the data over a single communications line, there is higher risk of external noise. External noise could be in the form of line impedance, line ringing, or RF interference. When using the specified communications cabling the risk of noise is all but eliminated. To ensure that the data is sent and received without error, some End-of-Line termination of the RS-485 bus may be required.

- RS-485 Cable termination from Host to ISC The device used to convert RS-232 communication to RS-485 determines the termination necessary for this segment of the RS-485 communication bus. These communications devices, pre-bias the RS-485 signal, which marks the state of the signal being sent and allows the line to flow for reliable communications. This is true for most devices that are used for Host to ISC communications, but any device that has been approved by Stanley will indicate how termination should be configured for proper operation in its documentation. Refer to the specific device diagrams being used in the following sections of this hardware manual.

- RS-485 Cable termination from ISC to downstream modules (BAS- 500X, 1100, 1200, 1300, 1320, 4000, 8000) Termination of this section of the RS-485 bus always remains the same. Each end of the RS-485 bus must be terminated using the on-board jumpers provided with each piece of B.A.S.I.S. hardware. Please refer to the termination drawings for each component being installed in this hardware manual.

- RS-485 Cable termination from BAS-500X to Third-party hardware devices Termination may be different for each RS-485 hardware device that is connected to the BAS-500X interface gateway module. Please refer to the gateway model being used for the hardware installation application.

1.6 RS-232 Interfaces

A number of products provide RS-232C interface for communication. This interface is intended for short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15m.) If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables.
2 System Wiring and Other Considerations

Proper installation is essential to the safe and reliable operation of the B.A.S.I.S. system. Improper or incorrect wiring will lead to unreliable operation or damage to system components. When system components are powered by different power sources, great care must be exercised in planning and wiring the system. The following paragraphs provide some guidelines for successful system interconnection.

2.1 General Wiring Considerations

There are different system wiring considerations for different groups of wiring, depending on the signal levels the wires are to carry. System wires can be generally separated into the following groups:

- Power distribution wires
- Data communication wires (RS-485, RS-232)
- Sensor wires.

To avoid cross-talk, follow the wire requirements for each type of communication, or use different conduit for different signal groups.

2.1.1 Device Placement

Observe the distance limitation of each type of signal when planning device placement. Modems and line extenders can be used for extended distance.

Do not run any wires near utility AC power wiring, lightning rod grounding wire, etc. to avoid externally generated transients. Grounding is required for ESD protection and safety.

2.1.2 Power Requirements

When planning a system, know the power requirement of each device. If multiple devices are to share a common power supply, care must be exercised to avoid excessive voltage loss on the wires. Voltage loss can lead to communication problems when devices are talking/listening on different grounds.

Voltage loss is directly proportional to wire resistance and the current the wire carries. Place the power supply as close to the equipment as possible. Select appropriate wire size for the load.

2.1.3 Current Overload

When designing any system, you must know the power requirement of each component being used within that system (refer to power chart below) as well as the actual output of the power supplies being used. If multiple devices are to share a common power supply, care must be taken to avoid excessive voltage loss through the power transmitting wires. Voltage loss can lead to intermittent communications problems when devices are consuming more power than the power supply is able to give. Other causes of voltage loss are directly proportional to wire resistance and current that the wire carries. When designing a system, place the power supply as close to the equipment as possible. The farther away the equipment is from the power supply, the larger the gauge of wire needed to ensure adequate current is being supplied at the device. Be sure to select the appropriate wire size for the distance between the power source and the equipment.
When choosing a power supply be sure never max out the current load of the supply. Always use a 25% overage factor when sizing your supply as a safety operation. Always use an isolated, non-switching, regulated power supply.

### 2.1.4 Power Requirements Table

<table>
<thead>
<tr>
<th>Device</th>
<th>Power Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCESS HARDWARE</td>
<td></td>
</tr>
<tr>
<td>BAS-500</td>
<td>12 VAC (10.2-13.8 V), 400 mA RMS or 12 VDC (10.8-13.2 V), 250 mA</td>
</tr>
<tr>
<td>BAS-1000</td>
<td>12 VAC (10.2-13.8 V), 600 mA RMS or 12 VDC (10.8-13.2 V), 350 mA</td>
</tr>
<tr>
<td>BAS-2000</td>
<td>12 VAC (10.2-13.8 V), 650 mA RMS (800 mA RMS with NIC) or 12 VDC (10.8-13.2 V), 400 mA (550 mA with NIC)</td>
</tr>
<tr>
<td>BAS-2220</td>
<td>12 to 24 VDC ±10%, 500mA maximum (plus reader current)</td>
</tr>
<tr>
<td></td>
<td>12 VDC @ 250mA (plus reader current) nominal</td>
</tr>
<tr>
<td></td>
<td>24 VDC @ 150mA (plus reader current) nominal</td>
</tr>
<tr>
<td>BAS-3300</td>
<td>12 to 24 VDC ±10%, 300 mA maximum</td>
</tr>
<tr>
<td></td>
<td>12 VDC @ 240mA (325mA with CoBox-Micro) nominal</td>
</tr>
<tr>
<td></td>
<td>24 VDC @ 135mA (175mA with CoBox-Micro) nominal</td>
</tr>
<tr>
<td>BAS-1100</td>
<td>12 to 24 VDC ±10%, 350mA maximum</td>
</tr>
<tr>
<td></td>
<td>12 VDC @ 300 mA nominal</td>
</tr>
<tr>
<td></td>
<td>24 VDC @ 220 mA nominal</td>
</tr>
<tr>
<td>BAS-1200</td>
<td>12 to 24 VDC ±10%, 1100mA maximum</td>
</tr>
<tr>
<td></td>
<td>12 VDC @ 850mA nominal</td>
</tr>
<tr>
<td></td>
<td>24 VDC @ 450mA nominal</td>
</tr>
<tr>
<td>BAS-1300</td>
<td>12 to 24 VDC ±10%, 150mA maximum (plus reader current)</td>
</tr>
<tr>
<td></td>
<td>12 VDC @ 110mA (plus reader current) nominal</td>
</tr>
<tr>
<td></td>
<td>24 VDC @ 60mA (plus reader current) nominal</td>
</tr>
<tr>
<td>BAS-1320</td>
<td>12 to 24 VDC ±10%, 550mA maximum (plus reader current)</td>
</tr>
<tr>
<td></td>
<td>12 VDC @ 450mA (plus reader current) nominal</td>
</tr>
<tr>
<td></td>
<td>24 VDC @ 270mA (plus reader current) nominal</td>
</tr>
<tr>
<td>BAS-2005W</td>
<td>12 VDC (10.2 to 13.8VDC), 50 mA</td>
</tr>
<tr>
<td>BAS-2010W</td>
<td>12 VDC (10.2 to 13.8VDC), 80 mA</td>
</tr>
<tr>
<td>Device</td>
<td>Power Required</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>BAS-2020W</td>
<td>12VDC (10.2 to 13.8VDC), 80 mA</td>
</tr>
<tr>
<td>BAS-8000</td>
<td>12 VDC, 250 mA</td>
</tr>
<tr>
<td><strong>Indala Proximity</strong></td>
<td></td>
</tr>
<tr>
<td>ASR-505</td>
<td>5-14 VDC, 45 mA</td>
</tr>
<tr>
<td>ASR-110</td>
<td>10.5-14 VDC, 180 mA</td>
</tr>
<tr>
<td>ASR-112</td>
<td>10.5-14 VDC, 180 mA</td>
</tr>
<tr>
<td>ASR-603</td>
<td>4 -16 VDC, 350 mA</td>
</tr>
<tr>
<td>ASR-605</td>
<td>4 -16 VDC, 350 mA</td>
</tr>
<tr>
<td>ASR-610</td>
<td>4 -14 VDC, 500 mA</td>
</tr>
<tr>
<td>ASR-620</td>
<td>12 - 24VDC, 900 mA-1.2 A</td>
</tr>
<tr>
<td>ASR-136</td>
<td>24 VDC, 400 mA</td>
</tr>
<tr>
<td>ASR-500</td>
<td>5-14 VDC, 45 mA</td>
</tr>
<tr>
<td>ARK-501</td>
<td>5-14 VDC, 50 mA</td>
</tr>
<tr>
<td><strong>Essex Keypads</strong></td>
<td></td>
</tr>
<tr>
<td>KTP-16212SLI</td>
<td>12 VDC, 15 or 85 mA</td>
</tr>
<tr>
<td>KTP-163SN</td>
<td>12 VDC, 15 or 85 mA</td>
</tr>
<tr>
<td><strong>HID Proximity</strong></td>
<td></td>
</tr>
<tr>
<td>5365</td>
<td>5-16 VDC, 160 mA</td>
</tr>
<tr>
<td>5355</td>
<td>10-28 VDC, 160 mA</td>
</tr>
<tr>
<td>5395</td>
<td>4-16 VDC, 160 mA</td>
</tr>
<tr>
<td>5375</td>
<td>24 VDC, 1.7 A</td>
</tr>
<tr>
<td>5385</td>
<td>24 VDC, 50 mA</td>
</tr>
<tr>
<td>6000</td>
<td>24 VDC, 2.0 A</td>
</tr>
<tr>
<td>6030</td>
<td>10-28 VDC, 150 mA</td>
</tr>
<tr>
<td><strong>HID Wiegand</strong></td>
<td></td>
</tr>
<tr>
<td>SRE-3100500</td>
<td>5-12 VDC, 40 mA</td>
</tr>
<tr>
<td>SRE-3100130</td>
<td>5-12 VDC, 40 mA</td>
</tr>
<tr>
<td>SRE-3102500</td>
<td>5-12 VDC, 60 mA</td>
</tr>
<tr>
<td><strong>HID iCLASS</strong></td>
<td></td>
</tr>
<tr>
<td>6100</td>
<td>10-16 VDC, 80-300 mA @ 12 VDC</td>
</tr>
<tr>
<td>6110</td>
<td>10-16 VDC, 80-300 mA @ 12 VDC</td>
</tr>
</tbody>
</table>
*Typical door strike power is estimated at 24 VDC, 300 mA, consult manufacturer specifications for actual values.

Note: Device power requirements are subject to change without notice. These tables are intended only as a guide.

### FIELD HARDWARE POWER SUPPLIES AVAILABLE: See power supplies section for full details

<table>
<thead>
<tr>
<th>Part #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAS-AL400ULX</td>
<td>UL Listed Power Supply - 12 VDC (4A output) or 24 VDC (3A output), switch selectable, 120 VAC input, continuous supply current with enclosure, lock and open frame transformer, UPS capable (battery optional). The AL400ULX is a power limited supply/chargers that will convert a 28 VAC input, into a power limited 12 VDC or 24 VDC output</td>
</tr>
<tr>
<td>BAS-AL600ULX-4CB6</td>
<td>UL Listed Power Supply - 12 VDC or 24 VDC 6A output (switch selectable), 120 VAC input, continuous supply current with enclosure, lock and open frame transformer, UPS capable (battery optional)</td>
</tr>
<tr>
<td>BAS-CTX</td>
<td>Hardware enclosure (12 x 16 x 4.5 inches) with lock and tamper switch support up to two Stanley access hardware modules (UL approved)</td>
</tr>
<tr>
<td>BAS-CTX-6</td>
<td>Hardware enclosure (18 x 24 x 4.5 inches) with lock and tamper switch support up to six Stanley access hardware modules (UL approved)</td>
</tr>
<tr>
<td>ABT-12</td>
<td>Battery Kit, 12 VDC, 12AH Battery (PS-12120)</td>
</tr>
</tbody>
</table>

For a complete listing of our products, consult the Stanley Price Book.
2.2 Mounting

Most modules are 6 x 8 inches in size, with mounting holes along the long edge. Up to two (2) units can be mounted in a single BAS-CTX enclosure. The BAS-CTX-6 allows for up to six (6) modules.
For smaller modules, only four of the mounting holes are used, the last two holes need support standoffs which come installed from the factory. The exception is the single reader interface module — up to eight (8) units can be mounted in any standard 2-gang or 3-gang junction enclosure.

The standoffs for the hardware come in a separate package. The diagram below illustrates positioning.
BAS-CTX knockout diagram

Backbox Mounting Hole Configuration

- 0.375" Clearance Hole
- 0.1875" Slots nominal

- 3/4" and 1" Knock Outs

- 3/4" and 1" Knock Outs
2.3 Ground Wiring

Each hardware product must be grounded to provide ESD protection, personnel safety, and signal reference for devices which communicate with each other. Grounding provides a good shield against external transients. See the installation manuals for the grounding point of each product.

There are three types of circuit grounds in systems using hardware products:

- DC negative
- RS-485 signal ground
- Safety ground

2.3.1 DC Negative

The DC ground provides signal reference for devices to communicate. It is the DC return from the power supply.

2.3.2 RS-485 Signal Ground (SG)

The RS-485 signal ground is connected to the DC ground internal to a device through a current limiting resistor. It provides a signal reference for the RS-485 interface.

2.3.3 Grounding System

A grounding system can be viewed as two subsystems: the DC system and the ground system. The DC system consists of all interconnected power supply returns, DC distribution wiring, and load devices. The
The principal function of the DC system is to provide signal reference for communication. The ground system consists of all chassis grounds for power supplies and other devices, safety grounds, and AC grounds. Ground connection should be made to avoid ground loop problems. Ideally, there should be ONLY ONE ground return point in a power supply system.

### 2.3.4 Safety Ground

Safety ground (copper wire of 16 AWG minimum) is part of the AC power system. To avoid ground loop current, there must be NOT more than one point at which the safety ground connects to the DC ground.

The RS-485 signal ground must be isolated from the safety ground. This means that the RS-485 cable shield must be insulated so that it will NOT accidentally short circuit to the conduit in instances where the conduit is connected to the safety ground.

The National Electrical Code and other safety regulations require that all equipment chassis and or enclosures be grounded in order to prevent shock hazards. Each device must have a green wire safety ground. The function of the green wire safety ground is to provide a redundant path for fault currents and to insure that the circuit breaker will open in the event of a fault. In addition, grounding the enclosure provides a path for ESD dissipation, thus protecting sensitive electronic devices.

### 2.4 Alarm Input Wiring

All alarm inputs require twisted pair wires. An end-of-line (EOL) resistor terminator is required for each supervised alarm input. Both supervised and unsupervised alarm inputs can support single or multiple contacts per loop. Connect normally closed (NC) contacts in series and normally open (NO) contacts in parallel.
2.5 RS-485 Communication Wiring

Proper wiring for RS-485 communication interfaces is critical for successful system turn-up and operation. The following guidelines apply for all RS-485 wiring.

1. Use low capacitance shielded cable with 2 twisted pairs, characteristic impedance 120 ohms (Belden 9842 or equivalent) for the main RS-485 run.
2. Keep the main run maximum end-to-end distance below 4000 feet.
3. Use daisy chain configuration, NOT star configuration, to connect devices.
4. Use shielded 24 AWG cable with 2 twisted pair (Belden 9502 or equivalent.) for down leads (drops or stubs).
5. Keep down leads as short as possible (no longer than 10 feet).

6. Terminate cables at both ends with RS-485 terminators (hardware has on-board terminators for RS-485 termination).
7. Always use the signal ground (SG) connection. Carefully insulate the SG wire for a reliable installation. Use 24 GA plastic sleeving over the SG wire when terminating the cable to the 5-position insulation displacement mating connector.

Each RS-485 communication line can have any number of DEPENDENT devices, but must have only one MASTER device. The transmit lines of the MASTER device are connected to the receive lines of the DEPENDENT devices and the receive lines of the MASTER device are connected to the transmit lines of the DEPENDENT devices. Observe the + and the - of each pair (NOTE: only applies to 4-wire RS-485 wiring).

Refer to the following diagrams for RS-485 Signal Ground and Termination.
RS-485 Multi-drop Wiring and EOL Termination

= On Board Termination

Earth Ground, one point only per ISC

- Shield

PVC Cover Wire

PVC Cover Wire or Drain Wire

Dual Reader Interface

Biometric Reader

Gateway

Enclosure Ground

Downstream ports 2 & 3 typical
RS-485 Multi-drop Wiring and EOL Termination: ISC and BAS-500B

RS-485 Multi-drop Wiring and EOL Termination
ISC and Biometric Gateway Mid RS-485

- Earth Ground, one point only per ISC
- Shield
- PVC Cover Wire
- PVC Cover Wire or Drain Wire
- Enclosure Ground

T+  T- SG
Biometric Reader
Gateway
T+  T- SG
Dual Reader Interface

T = On Board Termination

= Indicates RS-485 in and out or less than 10 foot drop

Downstream ports 2 & 3 typical

Enclosure Ground

Enclosure Ground

Enclosure Ground
2.6 RS-232 Communication Wiring

Observe the distance limitation or use suitable cable if the distance is greater than 50 feet. Remember to strap the control lines (RTS, CTS, etc.) if required.

2.7 Weatherproofing

The circuit board compartment of small readers should be sealed to protect from harsh environment.

Be sure to clean the read head(s).

The leading cause of accelerated readhead wear is contamination in the read head slot. To maximize the life of the read head, it is important to clean the reader periodically to remove any contamination. The frequency depends on the environment in which the reader is located. Indoor readers in controlled environments will need to be cleaned much less often than an outdoor reader exposed to airborne dirt and debris. Dirt and debris are also transferred from cardholder cards that have been contaminated with sticky substances. Read head cleaning cards are available to clean the readers.

For heavy traffic areas, extended life read heads are also available from the factory at the time of order which will extend the read head life up to 1 million card swipes. For heavy traffic, outdoor readers should be cleaned at least once per month. A good indication as to how often a reader needs to be cleaned is when using a cleaning card, if the card has no visible signs of contamination, the reader could be serviced less
often. Another indication is if the card reader, starts to give invalid card reads, the reader may need to be serviced more often. A read head that is starting to fail due to exceeding the maximum number could cause this or card reads on the read head (std. 600,000 or extended 1million).

- **Weather Shield Option** even though the Magnetic swipe card readers are fully weatherized, there are still times when the card reader may need more protection from the environment. If a reader has been installed at a remote parking lot or on a build with no overhang to prevent rain, ice or snow from building up in the reader throat, you may want to install the weather shield (BAS-WS10). This weather shield can be used with all BAS-2005W, 2010W, and 2020W readers.

![Weather Shield – part #BAS-WS10](image)

1. **EXPOSED EDGES (FRONT AND TOP) MUST BE ROUNDED/SMOOTHED, RADIUS 0.015 TYP.**
2. **FINISH: CLEAN AND DEBUR. SAND TO BREAK ALL EDGES. BRUSH FINISH TOP/SIDE SURFACES (200 GRIT). GRAIN VERTICAL.**
3. **MATERIAL: STAINLESS STEEL, TYPE 304-2B, 18GA**

**NOTES:** UNLESS OTHERWISE SPECIFIED

### 2.8 Relay Contact Protection

The relays used by B.A.S.I.S. hardware products have a contact life in excess of 500,000 operations at full rating. Lighter loads, and appropriate contact protection, extend relay life.
2.8.1  DC Inductive Load

Contacts for DC inductive loads can be effectively protected using clamp diodes. Select diodes with reverse breakdown voltage 10 times the circuit voltage.

2.8.2  AC Inductive Loads

Contacts for AC inductive loads can be protected using metal-oxide varistors (MOVs.) MOVs are effective when the load voltage is 100V to 200V. (MOVs are also suitable for DC operation.)

MOVs must be installed as close to the load as possible (within a few inches) to be effective. Mounted in this fashion, MOVs can also reduce the effects of EMI on sensitive electronic circuits.
3 System Turn-Up Considerations

A system should never be wired up and powered up all at once. For successful system turn-up, the following step-by-step procedures should be performed.

1. Make sure that no power is applied to any system device.
2. Check all wiring and device switch settings.
3. Disconnect all devices from the RS-485 communication line.
4. Power up the controller. (Check voltage requirement first.)
5. Configure the controller, and verify that it is working properly.
6. Connect one port of the RS-485 communication line to the multiplexer.
7. Power up a DEPENDENT device, and verify that it passes its own power-up self-test. (Check voltage requirement first.)
8. Check for ground fault between the DEPENDENT device and the RS-485 communication line. If applicable, find the fault and clear it.
9. Connect the DEPENDENT device to the RS-485 line and bring in on-line.
10. Verify all functions of the DEPENDENT device.
11. Verify the RS-485 line voltage in reference to the signal ground (SG.)
12. For each additional DEPENDENT device, repeat steps 7 through 11.
13. Verify the RS-485 line voltage for the controller, and mark the readings on the inside of the controller panel for future reference.

3.1 Device Configuration Checks

Common device configuration problems include mismatched baud rates and incorrect device addresses. No two devices on the same RS-485 line should have the same device address. Check all switch settings before attempting to bring the device on-line.

System programming must include the order of priority signals described below:

1. Hold-up or panic alarm.
2. Burglar alarm.
4. Industrial supervision where a risk of injury to persons, or damage or destruction of property will not be involved.
5. Other supervisory services.

Items (1) and (2) may have equal priority. Items (4) and (5) may have equal priority.
3.2 Ground Potential Difference Checks Before Connecting

Before a device can be connected to the RS-485 communication line, it must be checked for ground fault. Uncorrected ground fault can damage all devices connected to the RS-485 communication line.

To check if there is ground fault for a new unit, follow the steps below.

1. Apply power to all devices already successfully connected to the RS-485 line.
2. Power up the new unit, but DO NOT connect it to the RS-485 line.
3. Connect the signal ground (SG) of the RS-485 line through a 10K limiting resistor.
4. Measure the AC and DC voltage across the resistor. There should NOT be more than 1 volt across the resistor. Otherwise find and clear the fault.
5. Connect the new unit to the RS-485 line if no ground fault is found.
4 Firmware Updates

Firmware download is only supported for models and versions of Stanley hardware.

**Firmware Download Capabilities (for current version of B.A.S.I.S.)**

<table>
<thead>
<tr>
<th>Module</th>
<th>Is firmware download supported?</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller (BAS-500, 1000, 2000)</td>
<td>Yes</td>
<td>Firmware version 3.094 is recommended</td>
</tr>
<tr>
<td>Controller (BAS-3300, 2220)</td>
<td>Yes</td>
<td>Firmware version is 1.00 or higher</td>
</tr>
<tr>
<td>Input Control Module (BAS-1100) Series 2</td>
<td>Yes</td>
<td>Firmware version is 1.25 or higher</td>
</tr>
<tr>
<td>Output Control Module (BAS-1200) Series 2</td>
<td>Yes</td>
<td>Firmware version is 1.25 or higher</td>
</tr>
<tr>
<td>Single Reader Interface Module (BAS-1300)</td>
<td>No</td>
<td>Currently, firmware version 1.27. Firmware download is not possible. In order to update the firmware, a chip replacement is required.</td>
</tr>
<tr>
<td>Dual Reader Interface Module (BAS-1320)</td>
<td>Yes</td>
<td>Firmware version is 1.26 or higher, and the board is rev. B</td>
</tr>
<tr>
<td>Command Keypad (BAS-CK)</td>
<td>Yes</td>
<td>Firmware version 1.5x</td>
</tr>
<tr>
<td>Gateways (BAS-500B, 500W)</td>
<td>Yes</td>
<td>These have other firmware requirements, depending on their downstream devices.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For RSI readers, the BAS-500B requires firmware version 1.13.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For Identix readers, the BAS-500B requires firmware version 1.12.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• For Bioscrypt V-Series readers, the BAS-500B requires firmware version 1.04.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• To use Recognition Source readers, the BAS--500W requires firmware version 1.08</td>
</tr>
</tbody>
</table>

The most current version of the firmware is shipped with your B.A.S.I.S. software and was installed during the initial software installation. Each subsequent software release you receive will also include the most current version of the firmware.
Do the following to update the firmware on your system. You must have the “ADMIN” permission level.

1. Install the new version of the B.A.S.I.S. software.
2. In the Main Alarm Monitor window of the Alarm Monitoring module, right-click on the name of an access panel.
3. Select the **Download Firmware** choice from the popup menu.
4. B.A.S.I.S. will initiate the firmware update then perform a full download to the access panel and to all devices connected to it.

You must update each access panel in the system. Although it is not necessary to shutdown the application to perform the updates, note that the selected access panel is placed in a degraded off-line mode during the process. During this process, the readers connected to the panel are put into their off-line mode (“facility code only,” “locked,” etc.), which is configured on the Reader form of the System Administration module. It is strongly recommended that you perform the update on the panel during a time when no one will be accessing it.

Firmware can be simultaneously downloaded to multiple panels at once. However, it is recommended to do so one at a time to prevent any problems from occurring until you become familiar with the impact on system performance.

### 4.1 AES/Extended Firmware

The ISC (BAS-500, 1000, and 2000) supports encryption and asset management with use of AES/Extended firmware. The controller must have a 256 KB chip.

If you wish to use this feature and have a controller with a 128 KB chip, it must be upgraded. Typically, this upgrade would be required for the BAS-500 serial number 6352 or lower or the BAS-1000 serial number 12862 or lower.

Encryption is controlled by a DIP switch setting. Turn DIP switch 8 ON to enhance security. When a host system attempts to communicate with an encryption-enabled controller, a proper master key is required.

| Note: | The controller only reads DIP switch settings when it is powered up. If DIP switch settings are changed, the controller must go through a power cycle before the changes are seen. |

Asset management can be done with any standard Wiegand output asset reader. Assets are stored in the controller and linked to cardholders.
## 5 Troubleshooting

<table>
<thead>
<tr>
<th>System Problem:</th>
<th>Possible Causes:</th>
</tr>
</thead>
</table>
| Software Connection Error in Alarm Monitoring | 1. TCP/IP Connection Errors – TCP/IP must be configured on all workstations running Alarm Monitoring. Use a static IP address, not DHCP.  
2. The Access Control Driver may not be running, or was started improperly. Close Alarm Monitoring and start driver.  
3. Workstation running Alarm Monitoring is not in the monitoring zone for the access panel.  
4. Workstation name is incorrect in software configuration for access panel. |
| Access granted causes a communications loss to the reader | Make sure that you have not exceed the maximum current draw of your power supply. |
| Client workstation unable to connect with the access database | Use the standard naming convention for database location (instead of mapped drive) in your ODBC settings (e.g. `\Server\accessset.mdb`). This eliminates the need for mapped drives. Make sure the drive where the database resides is shared. |
| Unstable communication with system hardware | Check end of line termination jumpers. Only the first and the last device on each RS-485 communication line should be terminated. |
| Intelligent System Controller | |
| Panel is offline | 1. Port 1 communication wiring is incorrect. Use meter to check pin-outs, do not rely on coloring schemes.  
2. Panel address does not match software configuration.  
3. In software configuration, verify that the panel has been set “online.”  
4. Also verify that the baud rate is set for 38400.  
5. Check for software connection error and see above. |
| Dial-up communication errors | 1. Panel address must be set to “1.”  
2. Check communication wiring per diagram.  
3. Use recommended modems only; check dip switch settings on modem. |
| Lantronix communication errors | 1. Clear Lantronix memory and follow setup procedures *exactly* as written.  
2. Check wiring between the ISC and the Lantronix box.  
3. Dip switch 5 must be set to the “on” position.  
4. “Autobaud” setting must be disabled. |
<table>
<thead>
<tr>
<th>System Problem:</th>
<th>Possible Causes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry denied on valid badges</td>
<td>Panel memory in the software configuration must match the physical memory on the board. If unsure of panel memory, use “display panel capacity” in the Alarm Monitoring options menu to verify proper configuration.</td>
</tr>
</tbody>
</table>

**Reader Interface Modules, Readers**

<table>
<thead>
<tr>
<th>Keypad is not responding, or “invalid badge” appears with each numeric entry</th>
<th>“Keypad type” in reader software configuration is incorrect. Refer to reader documentation for output format.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reader is offline</td>
<td>“Reader type” in software configuration is incorrect. If using the dual interface module, be sure to specify RDR2 in the settings for RDR1. If interface module is incorrect (dual configured as a single), you will need to delete the reader entirely and add it again as a new reader. Restarting Alarm Monitoring may be necessary to view the reader online.</td>
</tr>
<tr>
<td>Reader settings have changed for no apparent reason</td>
<td>When using the “allow multiple selection” feature, all settings for the selected readers will be configured identically, not just the ones you modify. Use with caution.</td>
</tr>
<tr>
<td>“Invalid Card Format” alarm on magnetic cards encoded with application software</td>
<td>Check magnetic format setting in Badge Configuration. The sum of all field lengths should match the “total characters on track 2” setting. Verify field length setting for facility code correlates with what is being encoded on stripe.</td>
</tr>
</tbody>
</table>
BAS-500
INTELLIGENT
SYSTEM
CONTROLLER
6 Overview of the BAS-500

This installation guide is intended for use by technicians who will be installing and maintaining the Intelligent System Controller (BAS-500).

The ISC provides real time processing for the I/O interfaces to which it is connected. It holds the database for the subsystem configuration and cardholders, the event log buffer in battery-backed memory.

6.1 Interfaces

The ISC interfaces upstream with the Access Control software on a host system and downstream with the following field hardware components:

![Intelligent System Controller Communications Overview]

- **Downstream Communications**
  - Two 2-wire ports
  - One 4-wire port

6.2 The Intelligent System Controller Board

The ISC board contains the following components: two (2) unsupervised alarm inputs, one (1) RS-232 or RS-485 interface, two (2) RS-485 interfaces (which can consist of two 2-wire or one 4-wire interfaces), one...
(1) power-in input, eight (8) dip switches, and eleven (11) jumpers. It also contains a set of three (3) status LEDs and one (1) memory backup (3 volt lithium) battery.

**Note:**
The Cobox connector is only present on BAS-500 boards rev. A, SN 002002 or higher.
7 Installation

To install the ISC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the upstream host communication.
3. Wire the power input.
4. Wire the downstream device communication.
5. Remove the plastic safety strip from the memory backup battery.

7.1 Wiring

7.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The ISC features two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the Input 2 (IN2) and Input 1 (IN1) contact terminals on the ISC board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Wire the Input 2 and Input 1 contacts using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

---

**Note:** If either of these inputs is not used, a shorting wire should be installed.

---

**Unsupervised Alarm Input Wiring**

---

7.1.2 Upstream Host Communication

The ISC uses Port 1 to communicate to the host system. Port 1 can be wired as an RS-232 interface for direct one-to-one (or modem) communication, or as an RS-485 interface for multi-drop or extended distance communication.
Direct-connect RS-232 cables should be no longer than 50 feet. Leased lines or fiber optics can also be used.

For RS-485 communication, the following type of RS-485 cable is required: **24 AWG (minimum) twisted pair** (with shields). Either 2-wire or 4-wire RS-485 cable configuration can be used. The RS-485 cable should be no longer than 4000 feet (1219 m), 120 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent.) The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

**RS-232 Communications**

The RS-232 communications interface is for short distance wiring or point-to-point communications. A number of products provide RS-232 interfaces such as connections to local printer, modem, PC, etc. This interface is intended for a short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15m). If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables. The optimal cable is a Belden 9610 or equivalent wire.

**RS-485 Communications**

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distance (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances end-of-line (EOL) termination is required.

**RS-485 Line Termination**

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. It is up to the installer to determine which device is at the End of the communication line. (see diagram below)

Belden (24 gauge wire – (7x32) Stranded Conductors – Polyethylene Insulated)

### Belden Wire Specifications

<table>
<thead>
<tr>
<th>Trade Number</th>
<th>Number of Pairs</th>
<th>Nominal D.C. R. Conductor</th>
<th>Shield</th>
<th>Nominal Impedance (Ohms)</th>
<th>Nominal Capacitance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>pF/feet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>pF/meter</td>
</tr>
<tr>
<td>9841 NEC CM CSA</td>
<td>1</td>
<td>24.0 ohms/M</td>
<td>3.35 ohms/M</td>
<td>120</td>
<td>12.8 4</td>
</tr>
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</table>
**Hardware Installation Guide**

**Belden Wire Specifications**

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<th>Nominal Capacitance pF/feet</th>
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</tr>
</thead>
<tbody>
<tr>
<td>88102 NEC CMP CSA</td>
<td>2</td>
<td>24.0 ohms/M</td>
<td>15.5 ohms/M</td>
<td>100</td>
<td>12.95</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>78.7 ohms/km</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**  
If RS-485 communication is used, an RS-232 to RS-485 converter is required at the host workstation.  
The 2-wire configuration is recommended over the 4-wire for RS-485.

---

**Upstream Host Communication Wiring (Port 1) for direct connect and Lantronix**

**PORT 1, CONFIGURED AS RS-232**

1. TXD/TR1+  
2. RXD/TR1-  
3. RTS/R1+   
4. CTS/R1-   
5. GND

**PORT 1, CONFIGURED AS RS485**

1. TXD/TR1+  
2. RXD/TR1-  
3. GND

**TERMINATE RS-485 END OF BUS**

Port 1 – wiring configuration. This configuration will work for direct connect (RS-232) and Lantronix Ethernet network communications. With direct connect and with Lantronix, DIP switch 5 needs to be ON.

**ISC**

<table>
<thead>
<tr>
<th>9-pin connector</th>
<th>25-pin connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXD/TR1+</td>
<td>pin 2</td>
</tr>
<tr>
<td>RXD/TR1-</td>
<td>pin 3</td>
</tr>
<tr>
<td>RTS/R1+</td>
<td>not used</td>
</tr>
<tr>
<td>CTS/R1-</td>
<td>pin 7</td>
</tr>
<tr>
<td>GND</td>
<td>pin 5</td>
</tr>
<tr>
<td>Jumper together</td>
<td>4, 6 &amp; 8</td>
</tr>
<tr>
<td></td>
<td>5, 6 &amp; 20</td>
</tr>
</tbody>
</table>
Note: To connect the ISC to Rocket Port via 2-wire RS-485, the toggle RTS low checkbox should be checked in the Rocket Port settings.

2-Wire RS-485 from Host

2-WIRE MULTIDROP RS-485 FROM HOST
(Maximum of 8 control panels)

Wire Configuration – Switch #5 must be off for all panels in this configuration.

7.1.3 Power

The ISC accepts either a 12 VDC or 12 VAC ± 15% power source for its power input. The power source should be located as close to the ISC as possible.

Wire the power input with 18 AWG (minimum) twisted pair cable.

For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 400 mA RMS current is required for AC power supplies.

For DC power sources, isolated and non-switching, regulated DC power is required. A 250 mA current is required for DC power supplies.

Note: If using a 12 VDC power source, be sure to observe polarity.
7.1.4 Downstream Device Communication

The ISC can be configured to communicate downstream with up to 8 input/output devices, using **Port 2 and Port 3**. Each of these ports can be wired only as an RS-485 interface, for multi-drop communication on a single bus of up to 4000 feet.

For Ports 2-3, the following type of RS-485 cable is required: **24 AWG (minimum) twisted pair** (with shields.) Either 2-wire or 4-wire RS-485 cable configuration can be used. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

Each RS-485 line should contain only 2 terminators, one at each end.

`Downstream Device Communication Wiring (Ports 2-3)`

Ports 2 - 3
RS-485

2-WIRE

4-WIRE
To configure all four downstream ISC ports as 2-wire RS-485, follow the 2-wire diagram and repeat on each set of three terminators, TRX+, TRX-, GND.

To configure as two 4-wire RS-485 ports, follow the 4-wire diagram:

<table>
<thead>
<tr>
<th>Port 2/3:</th>
<th>(Transmit)</th>
<th>(Receive)</th>
<th>GRD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TR2+, TR2-</td>
<td>TR3+, TR3-</td>
<td></td>
</tr>
</tbody>
</table>

Notes: The ISC can be located anywhere along the RS-485 line. Install an RS-485 terminator for each end-of-line device.

7.1.5 Other

Remove the factory-installed plastic safety strip from the memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, all volatile RAM is protected.

Note: You must first remove the plastic strip to enable the battery.
8 Configuration

The ISC board contains 8 DIP switches and 12 jumpers that must be configured appropriately for your system.

8.1 Setting DIP Switches

DIP Switches (illustrated: default address of 0, CTS enabled, baud rate = 38400)

The following chart describes the use of each DIP switch.

<table>
<thead>
<tr>
<th>DIP SWITCH(ES)</th>
<th>USED TO CONFIGURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4</td>
<td>Processor address (0 – 7)</td>
</tr>
<tr>
<td>5</td>
<td>Communication handshake status (“CTS enabled” or “none”)</td>
</tr>
<tr>
<td>6, 7</td>
<td>Communication baud rate (38400, 19200, 9600 bps)</td>
</tr>
<tr>
<td>8</td>
<td>Communication password status (“required”, “not required”)</td>
</tr>
</tbody>
</table>

8.1.1 Processor Address

To configure the processor address, set DIP switches 1, 2, 3, and 4 according to the following table.

<table>
<thead>
<tr>
<th>Address</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1:</td>
</tr>
<tr>
<td>0 (default)</td>
<td>off</td>
</tr>
<tr>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td>2</td>
<td>off</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
</tr>
<tr>
<td>4</td>
<td>off</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
</tr>
<tr>
<td>6</td>
<td>off</td>
</tr>
<tr>
<td>7</td>
<td>ON</td>
</tr>
</tbody>
</table>
8.1.2 Communication Handshake Status

To configure the communication handshake status, set DIP switch 5 according to the following table. Leave this feature set to ON for Lantronix, dial-up, and RS-232, and OFF for RS-485 communication.

<table>
<thead>
<tr>
<th>HANDSHAKE STATUS</th>
<th>DIP SWITCH 5:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmit enabled by CTS (default)</td>
<td>ON</td>
</tr>
<tr>
<td>None</td>
<td>off</td>
</tr>
</tbody>
</table>

8.1.3 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. This feature controls the baud rate for upstream communication.

<table>
<thead>
<tr>
<th>BAUD RATE</th>
<th>DIP SWITCH 6:</th>
<th>7:</th>
</tr>
</thead>
<tbody>
<tr>
<td>38400 bps (default)</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>off</td>
<td>ON</td>
</tr>
<tr>
<td>9600 bps</td>
<td>ON</td>
<td>off</td>
</tr>
<tr>
<td>(not used)</td>
<td>off</td>
<td>off</td>
</tr>
</tbody>
</table>

8.1.4 Communication Password Status

DIP switch 8 controls the utilization of encryption.

The ISC supports encryption with use of AES firmware. The controller must have a 256 KB chip. If you wish to use this feature and have a controller with a 128 KB chip, it must be upgraded.

<table>
<thead>
<tr>
<th>PASSWORD STATUS</th>
<th>DIP SWITCH 8:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encryption is optional</td>
<td>off</td>
</tr>
<tr>
<td>Encryption is required</td>
<td>ON</td>
</tr>
</tbody>
</table>

Turn DIP switch 8 ON to enhance security. When a host system attempts to communicate with an encryption-enabled controller, a proper master key is required.

Note: The controller only reads DIP switch settings when it is powered up. If DIP switch settings are changed, the controller must go through a power cycle before the changes are seen.
8.2 Installing Jumpers

The following diagram describes the use of each jumper on the ISC board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.

8.2.1 RS-485 Cable Termination from Host to ISC

The device used to convert RS-232 communication to RS-485 determines the termination necessary for this segment of the RS-485 communication bus. These communications devices, pre-bias the RS-485 signal, which marks the state of the signal being sent and allows the line to flow for reliable communications. This is true for most devices that are used for Host to ISC communications, but any device that has been approved by Stanley will indicate how termination should be configured for proper operation in its documentation.

8.2.2 RS-485 Cable Termination from ISC to Downstream Modules

Termination of this section of the RS-485 bus always remains the same. Each end of the RS-485 bus must be terminated using the on-board jumpers provided with each piece of hardware. Please refer to the termination drawings for each component being installed in this hardware manual.

Note: This applies to Ports 2 and 3.
9 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

9.1 Verification

The ISC board contains three Status LEDs (LED A, LED B, LED C) that can be used to verify correct installation after power up.

The following chart describes the purpose of each LED on the ISC board.

<table>
<thead>
<tr>
<th>LED</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>This LED blinks rapidly whenever the ISC is powered up and is operating normally.</td>
</tr>
<tr>
<td>B</td>
<td>This LED is on when upstream communication to host computer is in process.</td>
</tr>
<tr>
<td>C</td>
<td>This LED is on when downstream communication to reader interfaces or input/output modules is in process.</td>
</tr>
</tbody>
</table>

9.2 Replace Memory Backup Battery

The ISC contains a Memory Backup battery that is used to backup configuration data and event buffer data in the event of a power failure.

A 3 V lithium ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the Memory Backup. This battery should be replaced annually.

Caution: There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.
10 Specifications

** The BAS-500 is for use in low voltage, class 2 circuits only.

- Primary Power: (DC or AC)
  - DC input: 12 VDC ± 10%, 250 mA
  - AC input: 12 VAC ± 15%, 400 mA RMS

- Memory and Clock Backup:
  - 3 V lithium, type BR2325

- Communication Ports:
  - Port 1: RS-232 or RS-485, 9600 to 38400 bps async
  - Ports 2-3: RS-485 (2-wire), 9600 to 38400 bps async

- Inputs:
  - Cabinet Tamper Monitor: unsupervised, dedicated
  - Power Fault Monitor: unsupervised, dedicated

- Wire Requirements:
  - Power: 1 twisted pair, 18AWG
  - RS-485: 24AWG twisted pair(s) with shield, 4000 feet (1219 m) maximum
  - RS-232: 24AWG, 25 feet (7.6 m) maximum
  - Alarm Input: twisted pair, 30 ohms maximum

- Environmental:
  - Temperature: Operating: 0° to +70° C (32° to 158° F)
  - Humidity: 0 to 95% RHNC

- Mechanical:
  - Dimension: 6 x 5 x 1 in. (152 x 127 x 25 mm)
  - Weight: 8 oz. (227 g) nominal

- Data Memory: 512 KB

- CE marking

- RoHS compliant

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Note: These specifications are subject to change without notice.
BAS-1000
INTELLIGENT
SYSTEM
CONTROLLER
11 Overview of the BAS-1000

This installation guide is intended for use by technicians who will be installing and maintaining the Intelligent System Controller.

The Intelligent System Controller (ISC) serves as the predominant access control engine. The ISC provides power, performance, and flexibility for the most demanding applications. Multiple combinations of Alarm Input Control Modules, Output Control Modules, and card reader interface modules can be configured.

The ISC can communicate upstream at 38.4 Kbps via RS-232, RS-485 multi-dropped configurations, modem dial-up communications, Ethernet TCP/IP networks, or Token Ring networks. The standard ISC can store 5,000 cardholders and 100,000 events, with expansion capabilities for up to 250,000 cardholders and 1 million events. The ISC has four downstream 2-wire RS-485 channels or two 4-wire RS-485 channels. In either configuration you may connect up to 64 readers or 32 devices on a single Intelligent System Controller. Each SRI, DRI, ICM and OCM takes up one device address.

11.1 Interfaces

The ISC interfaces upstream with the Access Control software on a host system, and downstream with the following field hardware components:

*Intelligent System Controller Communications Overview*

![Diagram of intelligent system controller communications overview]

- **Access Control System**
- **Communications from Host to Controller**
  - RS-232, RS-485, Ethernet, Dial-up, Fiber, etc...
- **Intelligent System Controller**
- **32 Downstream Devices Total**
- **RS-485 Multi-drop 2 or 4 wire**
- **Downstream Communications**
  - Four 2-wire ports
  - Two 4-wire ports
  - Combination 2 and 4 wire ports
- **Single Reader Interface Module**
  - Up to 32 Single Reader Interface Modules (32 readers)
- **Dual Reader Interface Module**
  - Up to 32 Dual Reader Interface Modules (64 readers)
- **Input/Output Control Module(s)**
  - Up to 16 Output Control Modules
  - Up to 16 Alarm Input Control Modules
11.2 The ISC Board

The ISC board contains the following components: two (2) unsupervised alarm inputs, one (1) RS-232 or RS-485 interface, four (4) RS-485 interfaces (which can consist of four 2-wire, two 4-wire, or one 4-wire and two 2-wire interfaces), one (1) power-in input, eight (8) dip switches, and sixteen (16) jumpers. It also contains a set of three (3) status LEDs and one (1) memory backup (3 volt lithium) battery.
12  Installation

To install the ISC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the upstream host communication.
3. Wire the power input.
4. Wire the downstream device communication.
5. Remove the plastic safety strip from the memory backup battery.

12.1  Wiring

12.1.1  Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The ISC features two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the Input 2 (IN2) and Input 1 (IN1) contact terminals on the ISC board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Wire the Input 2 and Input 1 contacts using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

Note: If either of these inputs is not used, a shorting wire should be installed.

Unsupervised Alarm Input Wiring.

12.1.2  Upstream Host Communication

The ISC uses Port 1 to communicate to the host system. Port 1 can be wired as an RS-232 interface for direct one-to-one (or modem) communication, or as an RS-485 interface for multi-drop or extended distance communication.
Direct-connect RS-232 cables should be no longer than 50 feet. Leased lines or fiber optics can also be used.

For RS-485 communication, the following type of RS-485 cable is required: **24 AWG** (minimum) **twisted pair** (with shields.) Either 2-wire or 4-wire RS-485 cable configuration can be used. The RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent.) The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

### RS-232 Communications

The RS-232 communications interface is for short distance wiring or point to point communications. A number of products provide RS-232 interfaces such as connections to local printer, modem, PC, etc. This interface is intended for a short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15m). If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables. The optimal cable is a (Belden 9610) or equivalent wire.

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### RS-485 Line Termination

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each has an on-board terminator. It is up to the installer to determine which device is at the End of the communication line (see diagram).

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<td>.8</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
## Belden Wire Specifications

<table>
<thead>
<tr>
<th>Trade Number</th>
<th>UL NEC Type</th>
<th>CSA Certification</th>
<th>Number of Pairs</th>
<th>Nominal D.C. R. Conductor</th>
<th>Shield</th>
<th>Nominal Impedance (Ohms)</th>
<th>Nominal Capacitance pF/feet</th>
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<tbody>
<tr>
<td>88102</td>
<td></td>
<td>NEC CMP CSA</td>
<td>2</td>
<td>24.0 ohms/M</td>
<td>15.5 ohms/M</td>
<td>100</td>
<td>12.95</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>78.7 ohms/km</td>
<td>50.9 ohms/km</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- If RS-485 communication is used, an RS-232 to RS-485 converter is required at the host workstation.
- The 2-wire configuration is recommended over the 4-wire for RS-485.

### Upstream Host Communication Wiring (Port 1)

**Port 1 –** wiring configuration. This configuration will work for Direct connect (RS-232) and Lantronix Ethernet network communications. With direct connect and with Lantronix, DIP switch 5 needs to be ON.

<table>
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<td>pin 2</td>
<td>pin 3</td>
</tr>
</tbody>
</table>
To connect the ISC to Rocket Port via 2-wire RS-485, the toggle RTS low checkbox should be checked in the Rocket Port settings.

### 2-WIRE MULTIDROP RS-485 FROM HOST
(Maximum of 8 control panels)

<table>
<thead>
<tr>
<th>ISC</th>
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<th>25-pin connector</th>
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<td>pin 2</td>
</tr>
<tr>
<td>RTS/R1+</td>
<td>not used</td>
<td>not used</td>
</tr>
<tr>
<td>CTS/R1-</td>
<td>pin 7</td>
<td>pin 4</td>
</tr>
<tr>
<td>GND</td>
<td>pin 5</td>
<td>pin 7</td>
</tr>
<tr>
<td>Jumper together</td>
<td>4, 6 &amp; 8</td>
<td>5, 6 &amp; 20</td>
</tr>
</tbody>
</table>

**Note:**

**Wire Configuration** – Switch #5 must be off for all panels in this configuration.

<table>
<thead>
<tr>
<th>Panel 1</th>
<th>Panel 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jumper</td>
<td>Setting</td>
</tr>
<tr>
<td>J7, J8</td>
<td>Off</td>
</tr>
<tr>
<td>J9, J10, J11, J12, J13</td>
<td>RS-485</td>
</tr>
<tr>
<td>J14</td>
<td>2-wire J14</td>
</tr>
</tbody>
</table>
12.1.3 Power

The ISC accepts either a 12 VDC or 12 VAC ± 15% power source for its power input. The power source should be located as close to the ISC as possible.

Wire the power input with 18 AWG (minimum) twisted pair cable.

For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 600mA RMS current is required for AC power supplies.

For DC power sources, isolated and non-switching, regulated DC power is required. A 350mA current is required for DC power supplies.

Note: If using a 12 VDC power source, be sure to observe polarity.

12.1.4 Downstream Device Communication

The ISC can be configured to communicate downstream with up to 16 input/output devices, using Port 2, Port 3, Port 4, and Port 5. Each of these ports can be wired only as an RS-485 interface, for multi-drop communication on a single bus of up to 4000 feet.

For Ports 2-5, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields.) Either 2-wire or 4-wire RS-485 cable configuration can be used. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102 or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

Each RS-485 line should contain only 2 terminators, one at each end.
To configure all four downstream ISC ports as 2-wire RS-485, follow the 2-wire diagram and repeat on each set of three terminators, TRX+, TRX-, GND.

To configure as two 4-wire RS-485 ports, follow the 4-wire diagram:

<table>
<thead>
<tr>
<th>Port 2/3:</th>
<th>(Transmit)</th>
<th>(Receive)</th>
<th>GRD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TR2+, TR2-</td>
<td>TR3+, TR3-</td>
<td></td>
</tr>
</tbody>
</table>
or combine 2-wire and 4-wire RS-485:

<table>
<thead>
<tr>
<th>Port 2/3: 4-wire</th>
<th>(Transmit)</th>
<th>(Receive)</th>
<th>GRD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TR2+, TR2-</td>
<td>TR3+, TR3-</td>
<td></td>
</tr>
<tr>
<td>Port 4: 2-wire</td>
<td>TR4+, TR4-</td>
<td></td>
<td>GRD</td>
</tr>
<tr>
<td>Port 5: 2-wire</td>
<td>TR5+, TR5-</td>
<td></td>
<td>GRD</td>
</tr>
</tbody>
</table>

Notes: The ISC can be located anywhere along the RS-485 line.

Install an RS-485 terminator for each end-of-line device.

12.1.5 Other

Remove the factory-installed plastic safety strip from the Memory Backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, all volatile RAM is protected.

Note: You must first remove the plastic strip to enable the battery.
13 Configuration

The ISC board contains 8 DIP switches and 16 jumpers that must be configured appropriately for your system.

13.1 Setting DIP Switches

_DIP Switches (illustrated: default address of 0, CTS enabled, baud rate = 38400)_

<table>
<thead>
<tr>
<th>DIP SWITCH(ES)</th>
<th>USED TO CONFIGURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4</td>
<td>Processor address (0 – 7)</td>
</tr>
<tr>
<td>5</td>
<td>Communication handshake status (“CTS enabled” or “none”)</td>
</tr>
<tr>
<td>6, 7</td>
<td>Communication baud rate (38400, 19200, 9600 bps)</td>
</tr>
<tr>
<td>8</td>
<td>Communication password status (“required”, “not required”)</td>
</tr>
</tbody>
</table>

13.1.1 Processor Address

To configure the processor address, set DIP switches 1, 2, 3, and 4 according to the following table.

<table>
<thead>
<tr>
<th>Address</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (default)</td>
<td>off off off off</td>
</tr>
<tr>
<td>1</td>
<td>ON off off off</td>
</tr>
<tr>
<td>2</td>
<td>off ON off off</td>
</tr>
<tr>
<td>3</td>
<td>ON ON off off</td>
</tr>
<tr>
<td>4</td>
<td>off off ON off</td>
</tr>
<tr>
<td>5</td>
<td>ON off ON off</td>
</tr>
<tr>
<td>6</td>
<td>off ON ON off</td>
</tr>
<tr>
<td>7</td>
<td>ON ON ON off</td>
</tr>
</tbody>
</table>
13.1.2 Communication Handshake Status

To configure the communication handshake status, set DIP switch 5 according to the following table. Leave this feature set to ON for Lantronix, dial-up, and RS-232, and OFF for RS-485 communication.

<table>
<thead>
<tr>
<th>HANDSHAKE STATUS</th>
<th>DIP SWITCH 5:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmit enabled by CTS (default)</td>
<td>ON</td>
</tr>
<tr>
<td>None</td>
<td>off</td>
</tr>
</tbody>
</table>

13.1.3 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. This feature controls the baud rate for upstream communication.

<table>
<thead>
<tr>
<th>BAUD RATE</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>38400 bps (default)</td>
<td>6: ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>7: ON</td>
</tr>
<tr>
<td>9600 bps</td>
<td>6: ON</td>
</tr>
<tr>
<td>(not used)</td>
<td>7: off</td>
</tr>
</tbody>
</table>

13.1.4 Communication Password Status

DIP switch 8 controls the utilization of encryption.

The ISC supports encryption with use of AES firmware. The controller must have a 256 KB chip. If you wish to use this feature and have a controller with a 128 KB chip, it must be upgraded.

<table>
<thead>
<tr>
<th>PASSWORD STATUS</th>
<th>DIP SWITCH 8:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encryption is optional</td>
<td>off</td>
</tr>
<tr>
<td>Encryption is required</td>
<td>ON</td>
</tr>
</tbody>
</table>

Turn DIP switch 8 ON to enhance security. When a host system attempts to communicate with an encryption-enabled controller, a proper master key is required.

Note: The controller only reads DIP switch settings when it is powered up. If DIP switch settings are changed, the controller must go through a power cycle before the changes are seen.
13.2 Installing Jumpers

The following diagram describes the use of each jumper on the ISC board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.

- **[J9]**
  Control for Port 1, RS-232 or RS-485

- **[J14]**
  Control for Port 1, 2-wire or 4-wire

- **[J7, J8]**
  OFF: Port 1 RS-485 EOL termination is not on
  ON: Port 1 RS-485 EOL termination is on

- **[J10, J11, J12, J13]**
  Control for Port 1, RS-232 or RS-485

- **[J15, J16, J17, J18]**
  Off: RS-485 EOL termination is not on
  On: RS-485 EOL termination is on

- **[J2, J3, J4]**
  By default, these jumpers are set to 512K and should not be changed.

- **[J6]**
  PROM: By default, this is pre-configured and should not be changed.
13.2.1 Memory Expansion Board (OPTIONAL)

The Memory Expansion card for the ISC processor allows for additional memory to be added when the database requirement exceeds the capacity of the base memory on the ISC processor. The Memory card accommodates 3 banks of low power static RAMs for up to a total of 3 MB. The memory is backed up by the lithium cell on the ISC processor.

### Memory Expansion Card

<table>
<thead>
<tr>
<th>Part #</th>
<th>Size</th>
<th>Bank1 –U1,2</th>
<th>Bank2 –U3,4</th>
<th>Bank3 –U5,6</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAS-1001-MK</td>
<td>1 MB</td>
<td>512 K x8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAS-1003-MK</td>
<td>3 MB</td>
<td>512 K x8</td>
<td>512 K x8</td>
<td>512 K x8</td>
</tr>
</tbody>
</table>

SRAM type – Low power, low volt data retention, Samsung KM684000BLP-10L (or equivalent) for the 512K chip, or Samsung KM681000BCP-7 (or equivalent) for the 128K chip.
13.2.2 RS-485 Cable Termination from Host to ISC

The device used to convert RS-232 communication to RS-485 determines the termination necessary for this segment of the RS-485 communication bus. These communications devices, pre-bias the RS-485 signal, which marks the state of the signal being sent and allows the line to flow for reliable communications. This is true for most devices that are used for Host to ISC communications, but any device that has been approved by Stanley will indicate how termination should be configured for proper operation in its documentation.

13.2.3 RS-485 Cable Termination from ISC to Downstream Modules

Termination of this section of the RS-485 bus always remains the same. Each end of the RS-485 bus must be terminated using the on-board jumpers provided with each piece of hardware. Please refer to the termination drawings for each component being installed in this hardware manual.

Note: This applies to Ports 2, 3, 4, and 5.
Typical Downstream Communication Configuration
(note where EOL terminators are required)

Intelligent System Controller
Downstream Communications
• Four 2-wire ports
• Two 4-wire ports
• Combination 2 and 4 wire ports

32 Downstream Devices Total

RS-485 Multi-drop 2 or 4 wire

Single Reader Interface Module
EOL Termination Required

Dual Reader Interface Module

Input/Output Control Module(s)
EOL Termination Required

32 Downstream Devices Total

RS-485 Multi-drop 2 or 4 wire

Single Reader Interface Module

Dual Reader Interface Module

EOL Termination Required

Input/Output Control Module(s)
14 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

14.1 Verification

The ISC board contains three Status LEDs (LED A, LED B, LED C) that can be used to verify correct installation after power up.

The following chart describes the purpose of each LED on the ISC board.

<table>
<thead>
<tr>
<th>LED</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>This LED blinks rapidly whenever the ISC is powered up and is operating normally.</td>
</tr>
<tr>
<td>B</td>
<td>This LED is on when upstream communication to host computer is in process.</td>
</tr>
<tr>
<td>C</td>
<td>This LED is on when downstream communication to reader interfaces or input/output modules is in process.</td>
</tr>
</tbody>
</table>

14.2 Replace Memory Backup Battery

The ISC contains a Memory Backup battery that is used to backup configuration data and event buffer data in the event of a power failure.

A 3V lithium ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the Memory Backup. This battery should be replaced annually.

Caution: There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.
15 Specifications

** The ISC is for use in low voltage, class 2 circuits only.
- Primary Power: (DC or AC)
  - DC input: 12VDC ± 15%. 350mA
  - AC input: 12VAC ± 15%. 600mA RMS
- Memory and Clock Backup: 3 V lithium, type BR2325
- Communication Ports:
  - Port 1: RS-232 or RS-485 (2-wire or 4-wire), 9600 to 38400 bps async
  - Ports 2-5: RS-485 (2-wire or 4-wire), 9600 to 38400 bps async
- Inputs:
  - Cabinet Tamper Monitor: unsupervised, dedicated
  - Power Fault Monitor: unsupervised, dedicated
- Wire Requirements:
  - Power: 1 twisted pair, 18AWG
  - RS-485: 24AWG twisted pair(s) with shield, 4000 feet (1219 m) maximum
  - RS-232: 24AWG, 25 feet (7.6 m) maximum
  - Inputs: twisted pair, 30 ohms maximum
- Environmental:
  - Temperature: Operating: 0° to 70° C (32° to 158° F)
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 6 in. (152 m) W X 8 in. (203 mm) L X 1 in. (25 mm) H
  - Weight: 10 oz. (290 g) nominal
- CE marking
- RoHS compliant

Note: These specifications are subject to change without notice.
16 Overview of the BAS-2000

This installation guide is intended for use by technicians who will be installing and maintaining the BAS-2000 Intelligent System Controller (ISC).

The BAS-2000 provides the real time processing for the I/O interfaces connected to it. It holds the database for the subsystem configuration and cardholders, the event log buffer in battery-backed memory.

16.1 Interfaces

The ISC interfaces upstream with the Access Control software on a host system and downstream with the following Stanley field hardware components.

BAS-2000 Communications Overview

- **Dual Path Communications from Host to Controller**
  - RS-232, RS-485, Ethernet, Dial-Up, Token Ring, etc...

- **Downstream Communications**
  - Four 2-wire ports
  - Two 4-wire ports
  - Combination 2 and 4 wire ports

- **32 Downstream Devices Total**

- **RS-485 Multi-drop 2 or 4 wire**

- **Single Reader Interface Module**
  - Up to 32 Single Reader Interface Modules (32 Readers)

- **Dual Reader Interface Module**
  - Up to 32 Dual Reader Interface Modules (64 Readers)

- **Input/Output Control Module(s)**
  - Up to 16 Output Control Modules
  - Up to 16 Alarm Input Control Modules
16.2 The BAS-2000 Board

The ISC board contains the following components: two (2) unsupervised alarm inputs, two (2) RS-232 or RS-485 interface, four (4) RS-485 interfaces (which can consist of four 2-wire, two 4-wire, or one 4-wire and two 2-wire interfaces), one (1) power-in input, eight (8) dip switches, and twenty-three (23) jumpers. It also contains a set of three (3) status LEDs and one (1) memory backup (3 volt lithium) battery.
17 Installation

To install the ISC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the upstream host communication.
3. Wire the power input.
4. Wire the downstream device communication.
5. Remove the plastic safety strip from the memory backup battery.

17.1 Wiring

17.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The BAS-2000 features two alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the Input 2 (IN2) and Input 1 (IN1) contact terminals on the ISC board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Note: If either of these inputs is not used, a shorting wire should be installed.

Unsupervised Alarm Input Wiring

17.1.2 Upstream Host Communication

Configuration data and event/status reports are communicated via port 1 (primary) or port 6 (secondary), the host ports. RS-232 interface is for direct one to one connection to a host computer port, via modem or a plug-in ethernet module. When the ethernet module is used, port 1 must be configured as a RS-232 interface. I/O devices are connected via port 2 through port 5.

Port 1 may be set up as a RS-232 interface or a RS-485 interface. RS-485 interface may be 2-wire or 4-wire type.
Port 6 may be set up as RS-232 interface or a RS-485 interface. RS-485 interface may be 2-wire or 4-wire type.

Direct-connect RS-232 cables should be no longer than 50 feet. Leased lines or fiber optics can also be used.

**RS-232 Communications**

The RS-232 communications interface is for short distance wiring or point to point communications. A number of products provide RS-232 interfaces such as connections to modem, PC, etc. This interface is intended for a short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15m). If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables. The optimal cable is a (Belden 9610) or equivalent wire.

For direct connections (via RS-232) between the BAS-2000 and the host, 115,200 baud is not recommended unless the third-party hardware devices used support a CTS/RTS hardware handshake at the UART level. The Microsoft serial device drivers do not support hardware handshaking at this level. The 115,200 baud rate can be used for the RS-232 connection between the BAS-2000 and the Lantronix devices that support 115,200 baud.

**RS-485 Communications**

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multiport communications on a bus transmission line. It allows for high-speed data transfer over extended distance (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances End-of-line (EOL) termination is required.

RS-485 communication requires a 24 AWG (minimum) twisted pair (with shields) cable. Either a 2-wire or 4-wire RS-485 cable configuration can be used. The RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms minimum impedance (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). Install a termination jumper only for end of line unit(s).

When connecting to the host via RS-485 (2-wire or 4-wire), do not use the 115,200 baud rate because there is no hardware handshake capability. For reliable communication with this baud rate, CTS on the host must be connected to RTS on the controller; RS-485 communication does not provide this.

When connecting a controller to a Lantronix device, do not use RS-485 communication. This particular configuration also lacks hardware handshake signals. RTS on the Lantronix must be connected to CTS on the controller. At 115,200 baud, CTS on the Lantronix must be connected to RTS on the controller as well, which is not provided via RS-485.

**RS-485 Line Termination**

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling.
Each component provided has an on-board termination. It is up to the installer to determine which device is at the end of the communication line.

**Belden Wire Specifications**

<table>
<thead>
<tr>
<th>Trade Number UL NEC Type CSA Certification</th>
<th>Numbe r of Pairs</th>
<th>Nominal D.C. R. Conductor</th>
<th>Shield</th>
<th>Nominal Impedance (Ohms)</th>
<th>Nominal Capacitance pF/feet</th>
<th>pF/meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>9841 NEC CM CSA</td>
<td>1</td>
<td>24.0 ohms/M</td>
<td>3.35 ohms/M</td>
<td>120 12</td>
<td>.8</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>78.7 ohms/ km</td>
<td>11.0 ohms/K</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9842 NEC CM CSA</td>
<td>2</td>
<td>24.0 ohms/M</td>
<td>2.2 ohms/M</td>
<td>120</td>
<td>12.8</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>78.7 ohms/ km</td>
<td>7.2 ohms/K</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>88102 NEC CMP CSA</td>
<td>2</td>
<td>24.0 ohms/M</td>
<td>15.5 ohms/M</td>
<td>100</td>
<td>12.95</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>78.7 ohms/ km</td>
<td>50.9 ohms/km</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** If RS-485 communication is used, an RS-232 to RS-485 converter is required at the host workstation. Use part # HO-2064.

The 2-wire configuration is recommended over the 4-wire for RS-485.

---

**Upstream Host Communication Wiring**

- **PORTS (1 & 6) CONFIGURED AS RS-232**
- **2-WIRE**
  - TXD/TR1+
  - RXD/TR1-
  - RTS/R1+
  - CTS/R1-
  - GND
- **4-WIRE**
  - TXD/TR1+
  - RXD/TR1-
  - RTS/R1+
  - CTS/R1-
  - GND

---

*revision 1 — 85*
Ports 1 and 6-wiring configuration. This configuration will work for Direct connect (RS-232) and Lantronix Ethernet network communications. With direct connect and with Lantronix, DIP Switch 5 needs to be ON using connection cables provided by Stanley.

<table>
<thead>
<tr>
<th>ISC</th>
<th>9-pin connector</th>
<th>25-pin connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXD/TR1+</td>
<td>pin 2</td>
<td>pin 3</td>
</tr>
<tr>
<td>RXD/TR1-</td>
<td>pin 3</td>
<td>pin 2</td>
</tr>
<tr>
<td>RTS/R1+</td>
<td>This is used for 115,200 baud rate.</td>
<td></td>
</tr>
<tr>
<td>CTS/R1-</td>
<td>pin 7</td>
<td>pin 4</td>
</tr>
<tr>
<td>GND</td>
<td>pin 5</td>
<td>pin 7</td>
</tr>
<tr>
<td>Jumper together</td>
<td>4,6 &amp; 8</td>
<td>5,6 &amp; 20</td>
</tr>
</tbody>
</table>

**2-Wire RS-485 from Host**

**2-WIRE MULTIDROP RS-485 FROM HOST**
(Maximum of 8 control panels)

Wire Configuration- Switch #5 must be off for all panels in this configuration.

<table>
<thead>
<tr>
<th>Panel 1</th>
<th>Panel 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jumper</td>
<td>Setting</td>
</tr>
<tr>
<td>J4, J6, J7, J10</td>
<td>ON pin 1 &amp; 2</td>
</tr>
<tr>
<td>J8</td>
<td>ON 2W pins 2 &amp; 3</td>
</tr>
</tbody>
</table>
17.1.3 Power

The ISC accepts either 12 VDC or 12 VAC.

- Locate power source as close to the unit as possible.
- Connect power with minimum of 18AWG power cable.
- For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 650 mA RMS current is required for AC power supplies.
- For DC power sources, isolated and non-switching, regulated DC power is required. A 400 mA current is required for DC power supplies.

**Note:** Observe polarity for 12 VDC applications.

### Power Source Wiring

```
<table>
<thead>
<tr>
<th>Panel 1</th>
<th>Panel 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jumper</td>
<td>Setting</td>
</tr>
<tr>
<td>J5</td>
<td>ON 485 pins 1 &amp; 2</td>
</tr>
<tr>
<td>J9, J11</td>
<td>Termination ON</td>
</tr>
</tbody>
</table>
```

17.1.4 Downstream Device Communication

The ISC can be configured to communicate downstream with up to 16 input/output devices, using Port 2, Port 3, Port 4, and Port 5. Each of these ports can be wired only as an RS-485 (2-wire) interface, for multi-drop communication on a single bus of up to 4000 feet. If 4-wire communication is required, ports 2/3 and ports 4/5 may be setup as two 4-wire interface via host configuration.

Ports 2-5 are defaulted to 2-wire, RS-485 communications that may be configured for either 2-wire or 4-wire operation. The interface allows a multi-drop communication on a single bus of up to 4000 feet (1,200 m). Use twisted pairs (minimum 24 AWG) with shield for the communication. Install termination jumper only for end of line unit(s) only.

Each RS-485 line should contain only 2 terminators, one at each end of the bus.
To configure all four downstream ISC ports as 2-wire RS-485, follow the 2-wire diagram and repeat on each set of three terminators, TRX+, TRX-, GND.

To configure as two 4-wire RS-485 ports, follow the 4-wire diagram:

<table>
<thead>
<tr>
<th>Port 2/3:</th>
<th>(Transmit)</th>
<th>(Receive)</th>
<th>GRD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TR2+, TR2-</td>
<td>TR3+, TR3-</td>
<td></td>
</tr>
<tr>
<td>Port 4/5:</td>
<td>(Transmit)</td>
<td>(Receive)</td>
<td>GRD</td>
</tr>
<tr>
<td></td>
<td>TR4+, TR4-</td>
<td>TR5+, TR5-</td>
<td></td>
</tr>
</tbody>
</table>
or combine 2-wire and 4-wire RS-485:

<table>
<thead>
<tr>
<th>Port 2/3:</th>
<th>(Transmit)</th>
<th>(Receive)</th>
<th>GRD</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-wire</td>
<td>TR2+, TR2-</td>
<td>TR3+, TR3-</td>
<td></td>
</tr>
<tr>
<td>Port 4:</td>
<td>TR4+, TR4-</td>
<td></td>
<td>GRD</td>
</tr>
<tr>
<td>2-wire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Port 5:</td>
<td>TR5+, TR5-</td>
<td></td>
<td>GRD</td>
</tr>
<tr>
<td>2-wire</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
The ISC can be located anywhere along the RS-485 line.
Install an RS-485 terminator for each end-of-line device.

### 17.1.5 Other

Remove the factory-installed plastic safety strip from the memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, all volatile RAM is protected. This should be the last step when installing the ISC.

- A 3 V Lithium Ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the memory backup.

**Note:** You must first remove the plastic strip to enable the battery.
18 Configuration

The ISC board contains 8 DIP switches and 23 jumpers that must be configured appropriately for your system.

18.1 Setting DIP Switches

DIP Switches (default)

The following chart describes the use of each DIP Switch

<table>
<thead>
<tr>
<th>DIP SWITCH(ES)</th>
<th>USED TO CONFIGURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3</td>
<td>Processor address (0 - 7)</td>
</tr>
<tr>
<td>4</td>
<td>Port 6: Hardware Flow Control (ON, by default)</td>
</tr>
<tr>
<td>5</td>
<td>Port 1: Hardware Flow Control (ON, by default)</td>
</tr>
<tr>
<td>6, 7</td>
<td>Communication baud rate (115200, 38400 - default, 19200, 9600 bps)</td>
</tr>
<tr>
<td>8</td>
<td>Communication password status (“required”, “not required”)</td>
</tr>
</tbody>
</table>

18.1.1 Processor Address

To configure the processor address, set DIP switches 1, 2, and 3 according to the following table.

<table>
<thead>
<tr>
<th>Address</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1:</td>
</tr>
<tr>
<td>0 (default)</td>
<td>off</td>
</tr>
<tr>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td>2</td>
<td>off</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
</tr>
<tr>
<td>4</td>
<td>off</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
</tr>
<tr>
<td>6</td>
<td>off</td>
</tr>
<tr>
<td>7</td>
<td>ON</td>
</tr>
</tbody>
</table>
18.1.2 Hardware Flow Control

To configure the hardware flow control status, set DIP switches 4 and 5 according to the following table. Leave this feature set to ON for Lantronix, dial-up, and RS-232, and OFF for RS-485 communication.

<table>
<thead>
<tr>
<th>HANDSHAKE STATUS</th>
<th>DIP SWITCH 4 (for port 6):</th>
<th>DIP SWITCH 5 (for port 1):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Flow Control</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>None</td>
<td>off</td>
<td>off</td>
</tr>
</tbody>
</table>

18.1.3 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. DIP switches 6 and 7 control the communication baud rate for port 1 only. Port 6 is fixed at 38400 bps.

<table>
<thead>
<tr>
<th>BAUD RATE</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6:</td>
</tr>
<tr>
<td>38400 bps</td>
<td>ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>off</td>
</tr>
<tr>
<td>9600 bps</td>
<td>ON</td>
</tr>
<tr>
<td>115,200 bps*</td>
<td>off</td>
</tr>
</tbody>
</table>

Note: The 115,200 baud rate is supported for use with a Lantronix device. If using a direct connection to the host workstation, the operating system must be Windows 2003.

In order to communicate with an ISC at 115,200 bps, an extra wire is required in the RS-232 cable, connected to RTS/R1+.

For a 9-pin cable,
- Jumper pins 4 and 6 together.
- Connect pin 8 to RTS/R1+ on the BAS-2000.
For a 25-pin cable,

- Jumper pins 6 and 20 together.
- Connect pin 5 to RTS/R1+ on the BAS-2000.

18.1.4 Communication Password Status

DIP switch 8 controls the utilization of encryption.

The ISC supports encryption with use of AES firmware. The controller must have a 256 KB chip. If you wish to use this feature and have a controller with a 128 KB chip, it must be upgraded.

<table>
<thead>
<tr>
<th>PASSWORD STATUS</th>
<th>DIP SWITCH 8:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encryption is optional</td>
<td>off</td>
</tr>
<tr>
<td>Encryption is required</td>
<td>ON</td>
</tr>
</tbody>
</table>

Turn DIP switch 8 ON to enhance security. When a host system attempts to communicate with an encryption-enabled controller, a proper master key is required.

Note: The controller only reads DIP switch settings when it is powered up. If DIP switch settings are changed, the controller must go through a power cycle before the changes are seen.
18.2 Installing Jumpers

The following diagram describes the use of each jumper on the ISC board. The jumper is indicated by brackets [ ]. The default shipping position is shown.
18.2.1 RAM Chip Size

The BAS-2000 comes with permanently mounted 1 MB RAM installed.

18.2.2 Memory Expansion Board (Optional)

The Memory Expansion card allows for additional memory to be added when the database requirement exceeds the capacity of the base memory on the ISC. The Memory card accommodates 3 banks of low power static RAMs for up to a total of 3 Megabytes. The memory is backed up by the lithium cell.

Memory Expansion Card

<table>
<thead>
<tr>
<th>Part #</th>
<th>Size</th>
<th>Bank1-U1,2</th>
<th>Bank2-U3,4</th>
<th>Bank3-U5,6</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAS-1001-MK</td>
<td>1 MB</td>
<td>512 K x8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BAS-1003-MK</td>
<td>3 MB</td>
<td>512 K x8</td>
<td>512 K x8</td>
<td>512 K x8</td>
</tr>
<tr>
<td>BAS-1007-MK</td>
<td>7 MB</td>
<td></td>
<td></td>
<td>Fixed memory</td>
</tr>
</tbody>
</table>
SRAM type- Low power, low volt data retention, Samsung KM684000BLP-10L (or equivalent) for the 512 K chip.

**18.2.3 RS-485 Cable Termination from Host to ISC**

The device used to convert RS-232 communication to RS-485 determines the termination necessary for this segment of the RS-485 communication bus. These communications devices, pre-bias the RS-485 signal, which marks the state of the signal being sent and allows the line to flow for reliable communications. This is true for most devices that are used for Host to ISC communications, but any device that has been approved by Stanley will indicate how termination should be configured for proper operation in its documentation.

**18.2.4 RS-485 Cable Termination from ISC to Downstream Modules**

Termination of this section of the RS-485 bus always remains the same. Each end of the RS-485 bus must be terminated using the on-board jumpers provided with each piece of hardware. Please refer to the termination drawings for each component being installed in this hardware manual.

---

**Note:** This applies to Ports 2, 3, 4, and 5.

---

**18.2.5 Baud Rate Default**

Jumper J25 is used to configure the default baud rate for port 1 on the ISC board. This jumper should be set to 115 Kbps, which is setting 2-3 on the ISC board. This jumper should be set for 2-3 and should not be changed to anything else.
Typical Downstream Communication Configuration (note where EOL terminators are required)

32 Downstream Devices Total

Intelligent System Controller

Downstream Communications
- Four 2-wire ports
- Two 4-wire ports
- Combination 2 and 4 wire ports

RS-485 Multi-drop 2 or 4 wire

EOL Termination Required

Single Reader Interface Module

EOL Termination Required

Dual Reader Interface Module

Input/Output Control Module(s)

32 Downstream Devices Total

Intelligent System Controller

EOL Termination Required

RS-485 Multi-drop 2 or 4 wire

Single Reader Interface Module

EOL Termination Required

Dual Reader Interface Module

Input/Output Control Module(s)
19  Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

19.1  Verification

The board contains three Status LEDs (LED A, LED B, LED C) that can be used to verify correct installation and power up.

The following chart describes the purpose of each LED on the BAS-2000 board.

<table>
<thead>
<tr>
<th>LED</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>This LED blinks rapidly whenever the ISC is powered up and is operating normally.</td>
</tr>
<tr>
<td>B</td>
<td>This LED is on when upstream communication to host computer is in progress.</td>
</tr>
<tr>
<td>C</td>
<td>This LED is on when downstream communication to reader interfaces or input/output modules is in process.</td>
</tr>
</tbody>
</table>

19.2  Replace Memory Backup Battery

The ISC contains a memory backup battery that is used to backup configuration data and event buffer data in the event of a power failure.

A 3V lithium ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the memory backup. This battery should be replaced annually.

Caution: There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.
**The BAS-2000 is for use in low voltage, class 2 circuits only.**

- **Primary Power:** (DC or AC)
  
  DC input: 12 VDC ± 10%, 400 mA (550 mA with NIC) recommended  
  AC input: 12 VAC ± 15%, 650 mA RMS (800 mA RMS with NIC)

- **Memory and Clock Backup:** 3 Volt Lithium, Rayovac BR2325 or Wuhan Lixing CR2330

- **Data Memory:** 1 MB standard (optional memory module) available

- **Ports:**
  
  Port 1, 6: RS-232 or RS-485, 9600 to 115,200 bps, async  
  Port 2-5: RS-485, 2-wire, 2400 to 38400 bps, async

- **Inputs:** two unsupervised, dedicated, for local tamper

- **Wire requirements:**
  
  Power: 1 twisted pair, 18 AWG  
  RS-485: 24 AWG, 4000 feet (1200 m) max., twisted pair(s) with shield.  
  RS-232: 24 AWG, 25 feet (7.6m) max.  
  Alarm input: 1 twisted pair, 30 ohms max.

- **Environmental:**

  Temperature: 0 to 70 °C operating, -55 to +85 °C storage  
  Humidity: 0 to 95% RHNC

- **Mechanical:**

  Dimensions: 6 x 8 x 1 in. (152 x 203 x 25 mm) H  
  Weight: 10 oz. (284 g) nominal

- **CE marking**

- **RoHS compliant**

---

**Note:** These specifications are subject to change without notice.
21 Overview of the BAS-2220

This installation guide is intended for use by technicians who will be installing and maintaining the BAS-2220 Intelligent Dual Reader Controller (IDRC).

The IDRC provides a single board solution to control two doors, or a single door in paired mode. It holds the database for the hardware configuration, and card holder database in nonvolatile memory. The event log buffer is stored in battery backed memory.

Each reader port can accommodate a readhead that utilizes wiegand, magnetic stripe, or 2-wire RS-485 electrical signaling standards, one or two wire LED controls, and buzzer control (one wire LED mode only). Four form-c relay outputs may be used for strike control or alarm signaling. The relay contacts are rated at 5A @ 30VDC, dry contact configuration. Eight supervised inputs are provided for monitoring the door contacts, exit push buttons and alarm contacts. Inputs can be configured to meet Grade A Supervision requirements. The BAS-2220 requires 12-24 VDC for power. It is recommended that the board be mounted 0.25 inch minimum above any conductive surface.

21.1 Interfaces

The IDRC interfaces upstream with the access control software on a host system.

Configuration data and event/status reports are exchanged with the host via port 0, 10BaseT/100BaseTX Ethernet interface or port 1, RS-232 interface. Additional I/O devices are communicated to via the downstream communication port, 2-wire RS-485. It supports 32 downstream devices.

The BAS-2220 has an onboard reader interface device capable of supporting up to two readers. A Bioscrypt reader can be connected directly to the BAS-2220 (this does not count as one of the 32 downstream devices).
21.2 The IDRC Board

The IDRC board contains the following components: one (1) host Ethernet interface, one (1) RS-485 interface, one (1) power-in input, two (2) unsupervised alarm inputs, eight (8) unsupervised/supervised inputs, two (2) reader interfaces, four (4) output relays, four (4) DIP switches, and eight (8) jumpers. It also contains a set of 22 status LEDs and one (1) memory backup (3 volt lithium) battery.

The BAS-2220 Board
21.3 Default Settings

Each board ships with the following default configuration.

- All DIP switches are off.
- IP Addressing: DHCP
- DNS Name: “MAC” followed by the 12-character MAC address.
- Device address: 0. This must match the setting in System Administration for successful IP or serial communications
- Primary host port: Ethernet (serial port is disabled)
- Serial port settings: No flow control
- Data security: None
- Baud Rate: 9600
- Login Name: admin
- Login Password: password (The password is case-sensitive.)
22 Installation

To install the IDRC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Supply power to the controller and wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the device for communication.
3. Wire readers, if applicable.
4. Wire the input circuit.
5. Wire the relay circuit.
6. Remove the plastic safety strip from the memory backup battery.
7. Configure the correct settings using the jumpers and DIP switches.
8. Set the board for the desired initial IP addressing mode.
9. Configure the network and port settings using the embedded web server.

22.1 Wiring and Setup

Refer to the following table for wiring and setup of the BAS-2220.

<table>
<thead>
<tr>
<th>Connection</th>
<th>Power input</th>
<th>VIN: 12 to 24 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>GND</td>
</tr>
<tr>
<td></td>
<td>Cabinet tamper input</td>
<td>TMP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GND</td>
</tr>
<tr>
<td></td>
<td>Power fault input</td>
<td>FLT</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GND</td>
</tr>
<tr>
<td>TB2</td>
<td>Host port 1</td>
<td>TXD (RS-232)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RXD (RS-232)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RTS (RS-232)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CTS (RS-232)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GND (RS-232)</td>
</tr>
<tr>
<td>TB3</td>
<td>Downstream port</td>
<td>TR+ (2-wire RS-485)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TR- (2-wire RS-485)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GND(2-wire RS-485)</td>
</tr>
<tr>
<td>Connection</td>
<td>Description</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>-------------</td>
<td>-------------</td>
</tr>
<tr>
<td>TB4</td>
<td>Input 1</td>
<td>IN 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Door 1 door contact</td>
</tr>
<tr>
<td></td>
<td>Input 2</td>
<td>IN 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Door 1 REx</td>
</tr>
<tr>
<td>TB5</td>
<td>Input 3</td>
<td>IN 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Door 1 Aux 1</td>
</tr>
<tr>
<td></td>
<td>Input 4</td>
<td>IN 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Door 1 Aux 2</td>
</tr>
<tr>
<td>TB6</td>
<td>Input 5</td>
<td>IN 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Door 2 door contact</td>
</tr>
<tr>
<td></td>
<td>Input 6</td>
<td>IN 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Door 2 REx</td>
</tr>
<tr>
<td>TB7</td>
<td>Input 7</td>
<td>IN 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Door 2 Aux 1</td>
</tr>
<tr>
<td></td>
<td>Input 8</td>
<td>IN 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Door 2 Aux 2</td>
</tr>
<tr>
<td>TB8</td>
<td>Reader 1 (current maximum: 150mA)</td>
<td>GND: Ground</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data/Data 0/RS-485 TR-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clock/Data 1/RS-485 TR+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BZR: Reader buzzer/LED 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LED: Reader LED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VO: Reader power</td>
</tr>
<tr>
<td>TB9</td>
<td>Reader 2 (current maximum: 150mA)</td>
<td>GND: Ground</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data/Data 0/RS-485 TR-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clock/Data 1/RS-485 TR+</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BZR: Reader buzzer/LED 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LED: Reader LED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VO: Reader power</td>
</tr>
<tr>
<td>TB10</td>
<td>Out 1</td>
<td>NO: Normally open contact</td>
</tr>
<tr>
<td></td>
<td>Door 1 strike</td>
<td>C: Common</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NC: Normally closed contact</td>
</tr>
<tr>
<td></td>
<td>Out 2</td>
<td>NO: Normally open contact</td>
</tr>
<tr>
<td></td>
<td>Door 1 Aux</td>
<td>C: Common</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NC: Normally closed contact</td>
</tr>
</tbody>
</table>
### 22.1.1 Power and Alarm Inputs

The BAS-2220 requires 12-24 VDC power. Locate power source as close to the unit as possible. Connect power with minimum of 18AWG wire.

**Note:** Connect the GND signal to earth ground in ONE LOCATION within the system! Multiple earth ground connections may cause ground loop problems and is not advised.

Observe POLARITY on 12-24 VDC input!

There are two dedicated inputs for cabinet tamper and UPS fault monitoring. Normal (safe) condition is a closed contact. If these inputs are not used, install a jumper wire.

### 22.2 Communication Wiring

The controller communicates to the host via the onboard 10-BaseT/100Base-TX Ethernet interface (port 0) or RS-232 interface (port 1). The RS-232 interface is for direct one to one connection to a host computer port or via modem, 25 feet maximum.

There are a few options for establishing communication to configure the settings for the first time. For initial configuration prior establishing a LAN connection, a CAT 5 crossover cable can be used to connect directly to a PC. In this scenario, the controller has a static IP address and the web browser-enabled PC is connected directly to the controller using a crossover cable.

The downstream communication port (TB3) is a 2-wire RS-485 interface which can be used to connect additional I/O panels. The interface allows multi-drop communication on a single bus of up to 4000 feet (1200m). Use twisted pairs (minimum 24 AWG) with an overall shield for communication.
**Important:** Install the termination jumper ONLY on the panel at each end of the RS-485 bus. Failure to do so will compromise the proper operation of the communication channel!

---

**Communication wiring**

---

### 22.3 Reader Wiring

Each reader port supports wiegand, magnetic stripe, and 2-wire RS-485 electrical interfaces. Voltage at the reader port (VO) is passed-through from the input voltage of the controller (TB1-VIN) and is current limited to 150mA for each reader port. Readers that require different voltage or have high current requirements should be powered separately. Refer to the reader manufacturer specifications for cabling requirements. In the 2-wire LED mode the Buzzer output is used to drive the second LED. Reader port configuration is set via the host software.

---

**DATA1/DATA0 – CLOCK/DATA**
22.3.1 Open Supervised Device Protocol

Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control.

Wiring for OSDP readers

TYPICAL SOFTWARE SETTINGS
Reader Type: IDRC ONBOARD READER1 (OSDP PROTOCOL)
Keypad: EIGHT BIT OUTPUT KEYPAD
LED Mode: 1 or 2-WIRE LED CONTROL

22.3.2 Command Keypad

The command keypad (BAS-CK) can also be connected to the IDRC.
22.3.3 Bioscrypt Readers

The Bioscrypt V-Flex, V-Smart, and V-Station can be connected to the IDRC according to the following diagram.

Bioscrypt readers wired to IDRC onboard reader ports 1 and/or 2 should be configured in the Readers form as IDRC Onboard Reader 1/2 (Bioscrypt RS-485) alternate readers associated with any type of primary readers. Bioscrypt readers wired to IDRC Onboard Reader ports 1 and/or 2 should be configured in the VeriAdmin Unit Parameters form for Network ID (0) only.

22.4 Input Circuit Wiring

Typically, these inputs are used to monitor door position, request to exit, or alarm contacts. Input circuits can be configured as unsupervised or supervised. When unsupervised, reporting consists of only the open or closed states. When configured as supervised, the input circuit will report not only open and closed, but also open circuit, shorted, grounded, and foreign voltage. This implementation exceeds the UL 294 Requirement for Grade A Supervision.
A supervised input circuit requires two resistors be added to the circuit to facilitate proper reporting. The standard supervised circuit requires 1K Ohm, 1% resistors and should be located as close to the sensor as possible. Custom EOL resistances may be configured via the host software.

22.5 Relay Circuit Wiring

Four relays are provided for controlling door lock mechanisms or alarm signaling. The relay contacts are rated at 5A @ 30Vdc, dry contact configuration. Each relay has a Common pole (C), a Normally Open pole (NO) and a Normally Closed pole (NC). When you are controlling the delivery of power to the door strike, the Normally Open and Common poles are used. When you are momentarily removing power to unlock the door, as with a mag lock, the Normally Closed and Common poles are used. Check with local building codes for proper egress door installation.

Door lock mechanisms can generate feedback to the relay circuit that can cause damage and premature failure of the relay. For this reason, it is recommended that either a diode or MOV (metal oxide varistor) be used to protect the relay.
Wire should be of sufficient gauge to avoid voltage loss.

• **Diode Selection:** Diode current rating: 1x strike current. Diode breakdown voltage 4x strike voltage. For 12 VDC or 24 VDC strike, diode 1N4002 (100V/1A) typical.

• **MOV Selection:** Clamp voltage: 1.5x V AC RMS. For 24 VAC strike, Panasonic ERZC07DK470 typical.

### 22.6 Memory Backup Battery

Remove the factory-installed plastic safety strip from the memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, event memory is protected.

### 22.7 Configuration

The IDRC board is configured through jumpers, DIP switches, and web browser.
22.7.1 Setting Dip Switches

Set DIP switches as required. The following chart describes the use of each DIP switch.

Some switch settings behave differently at power up than they do after initialization. Keep this in mind when changing settings.

<table>
<thead>
<tr>
<th>Switch</th>
<th>Selection:</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1</td>
<td>When SW1 is on, use the default login username and password. (This can be changed without resetting the board.) Username: admin Password: password</td>
</tr>
<tr>
<td>SW2</td>
<td>During power up, when SW2 is on (and SW1 is off) for the first 10 seconds, the default static IP address is 192.168.0.251, and the primary path is configured for IP Server. The serial port is disabled, since the IDRC can only communicate via the LAN or the serial port (but not both).</td>
</tr>
<tr>
<td>SW3</td>
<td>By default this switch is off and SSL is enabled. Turn SW3 ON to disable SSL settings.</td>
</tr>
<tr>
<td>SW4</td>
<td>Not used.</td>
</tr>
</tbody>
</table>

Resetting the Controller

The controller can be reset to its factory default state. Performing this procedure will erase any configured IP address, usernames, and passwords as well.

To clear the flash and ram on the board using DIP switches:

1. Set SW1 and SW2 to ON.
2. Power up the board or press the reset button.
3. While LEDs D1, D2 and D3, D4 light up as alternating pairs (duration of about 10 seconds), drop either of the switches (SW1 or SW2) to off.
4. While the memory is being cleared, LED D2 blinks slowly. Do nothing to the board while this is occurring. When it is completed, D1 flashes briefly, and all the input lights will flash. The board will then reset itself.
5. Turn SW2 ON and log into board using default IP address 192.168.0.251.
6. Once at the login screen, turn off SW2 and turn on SW1 to enable the default login. After power up or board reset, the board will not respond to web communications request for about 15 seconds. Please allow this much time.

To verify that the board has been reset, you may check that the users have been removed and that the network setting is configured as DHCP.
22.7.2 Installing Jumpers

The following chart describes each jumper.

<table>
<thead>
<tr>
<th>Jumpers</th>
<th>Set at</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>n/a</td>
<td>Factory use only</td>
</tr>
<tr>
<td>J2</td>
<td>n/a</td>
<td>10base-T/100base-Tx Ethernet Connection (Port 0)</td>
</tr>
<tr>
<td>J3</td>
<td>n/a</td>
<td>Factory use only</td>
</tr>
<tr>
<td>J4</td>
<td>n/a</td>
<td>Factory use only</td>
</tr>
<tr>
<td>J5</td>
<td>off</td>
<td>Port 2 RS-485 EOL terminator is off.</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>Port 2 RS-485 terminator is ON.</td>
</tr>
<tr>
<td>J6</td>
<td>n/a</td>
<td>Factory use only</td>
</tr>
<tr>
<td>J7</td>
<td>Reader power select * See Note 1 *</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12V</td>
<td>12 VDC at reader ports</td>
</tr>
<tr>
<td></td>
<td>PASS</td>
<td>VIN pass through to reader ports</td>
</tr>
<tr>
<td>J8-1</td>
<td>n/a</td>
<td>Remote status LED #1 ** See Note 2 **</td>
</tr>
<tr>
<td>J8-2</td>
<td>n/a</td>
<td>Remote status LED #2 ** See Note 2 **</td>
</tr>
<tr>
<td>J8-3</td>
<td>n/a</td>
<td>Remote status LED #3 ** See Note 2 **</td>
</tr>
<tr>
<td>J8-4</td>
<td>n/a</td>
<td>Remote status LED #4 ** See Note 2 **</td>
</tr>
</tbody>
</table>

* Note 1: The input power (VIN) must be 20 VDC minimum if the 12 VDC selection is to be used.

** Note 2: Observe POLARITY connection to LED. External current limiting is not required.

22.8 Initial IP Addressing Mode

Set the board for the desired initial IP addressing mode. The board can be initially configured using a fixed static IP address or an IP address automatically assigned by a DHCP server.

- **Automatic Address Assignment** By default, the IP address will be assigned by a DHCP server. The DNS name is “MAC” followed by the characters of the unit’s MAC address.

- **Fixed Static IP Address** In order to use a fixed static IP address, Power up the board with DIP switch 2 ON and DIP switch 1 off. This default address cannot be changed. If this is chosen, the default static IP address is 192.168.0.251.

To communicate with the board using this address, the computer must also be on the same subnet. Usually, this requires changing the computer’s network interface card settings.

**Note:** Ensure that DIP switch 1 is off and DIP switch 2 is ON before rebooting to keep board in default static IP address mode.
22.9 Embedded Web Server

Instead of using DIP switches or jumpers to define communication and addressing, the BAS-2220 can be configured through the web interface.

22.9.1 Logging in for the First Time

There is one pre-defined user always available by turning DIP switch SW1 ON after power up. When logging on for the first time, since no other users are defined yet, the default username and password are required for configuring this board.

After configuring ports and users, be sure to turn SW1 off to enable the settings you’ve configured.

---

**Note:** All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website’s security certificate. Although it is not recommended, proceed to the website.

---

22.9.2 Configuration via Web Page

The Configuration Web Page can be launched from within System Administration (only if an IP address or host name is specified) or by using a browser to access the programmed IP address. Depending on your proxy settings, you may have to allow this web page. (For more information, consult your browser’s online help or system administrator for assistance.)

1. In System Administration in the Access Panels folder, click [Configuration Web Page]. This page will launch in a browser. (You may also access this page by going to the device IP address from within the browser.)

2. Click the link to go to the login page. Log in using your username and password. If DIP switch 1 is ON, then the default username and password is used (admin, password). If DIP switch 1 is off, use the login that was programmed in the device. Click [Login].

3. The Home page indicates the type of device and has a Notes field. You may type in a description here. Click [Save].

4. To configure network settings, click [Network].
   - If you are using DHCP, specify a host name. By default, the host name consists of “MAC” followed by the numbers of the device MAC address. With DHCP, IP settings will be configured automatically.
   - For a static IP address, specify the IP address, subnet mask, and default gateway.
   - Click [Accept].

5. To configure the host, click [Host Comm].
   a. Specify the controller’s communication address.
   b. Configure the following under Primary Host Port:
      - **Connection Type:** Choose IP Server, Serial-RS232, or Serial-modem. Currently, the IP Client connection type is not supported. Serial-RS485 and Serial-Cobox are only available for use with the BAS-3300.
      - **Data Security:** The controller is capable of Password/AES encryption.
      - **Port Number** (default 3001) Must match setting in the access control software.
When using an IP Server connection, the controller may be configured to allow all IP addresses or only authorized IP addresses.

c. Click [Accept].

6. To view information, click [Device Info]. You may view the time and product ID, as well as properties that have been configured, such as firmware version, serial number, device name, DIP switches, etc.

7. For users configuration, click [Users]. User accounts may be created, edited or deleted. Each user account has an associated username and password, as well as a level and notes.

   a. One of three different levels may be assigned to users.
      - Level 1 — Full control
      - Levels 2 and 3 have the following permissions:

<table>
<thead>
<tr>
<th>Access</th>
<th>View allowed</th>
<th>Edit allowed</th>
</tr>
</thead>
</table>
| Home page               | Level 2: Yes (cannot edit notes)  
                        | Level 3: Yes (cannot edit notes)  | Level 2: No  
                        | Level 3: No                 |
| Network page            | Level 2: Yes                  | Level 2: No  
                        | Level 3: No                 |
| Host Port page          | Level 2: Yes                  | Level 2: No  
                        | Level 3: No                 |
| Device Info page        | Level 2: Yes                  | n/a           |
|                        | Level 3: Yes                  |              |
| Users page              | Level 2: No                   | Level 2: No  
                        | Level 3: No                 |
| Restore/Default page    | Level 2: No                   | Level 2: No  
                        | Level 3: No                 |
| Apply Setting page      | Level 2: No                   | Level 2: No  
                        | Level 3: No                 |

For pages that cannot be viewed, the message is displayed when users attempt to access the page: “This page is unavailable due to one of the following reasons: your user level is not authorized to view this page, or another level 1 user is logged in at this time.”

b. Specify the Session Timer (5 to 60 minutes). Click [Save Session Timer].

c. You may disable the web server by selecting the check box. When this option is selected and SW1 is off, all ports except for the host communication port will be disabled. The configuration web page cannot be used to access the device.

8. For configuration of auto-save, click [Auto-Save Config].

   a. On this page, you may restore the last save or clear all the settings.

   b. Choose to disable or enable Auto-Save. If Auto-Save is enabled, volatile memory is written to flash. The frequency of this action is specified in the timer (30 seconds to 30 minutes). Click [Save Settings].

9. You may click [Restore/Default] if you need to reload the factory settings or the current operating settings.
10. When you have completed configuring the device, click [Apply Settings], [Apply Settings, Reboot], and then [Log Out].
23 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

23.1 Verification

Power-up: All LEDs OFF.

Initialization: LEDs are sequenced during initialization.

The following chart describes the purpose of each LED on the IDRC board.

<table>
<thead>
<tr>
<th>LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Off-line/On-line and battery status</td>
</tr>
<tr>
<td></td>
<td>Off-line = 20% ON, On-line = 80% ON</td>
</tr>
<tr>
<td></td>
<td>Double flash if battery is low</td>
</tr>
<tr>
<td>2</td>
<td>Primary host communication activity (serial port 1)</td>
</tr>
<tr>
<td>3</td>
<td>Internal downstream communication activity</td>
</tr>
<tr>
<td>TMP</td>
<td>External downstream communication activity</td>
</tr>
<tr>
<td>FLT</td>
<td>Undefined</td>
</tr>
<tr>
<td>R1</td>
<td>Reader 1:</td>
</tr>
<tr>
<td></td>
<td>Clock/Data or D1/D0 mode = flashes when data is received, either input.</td>
</tr>
<tr>
<td></td>
<td>RS-485 mode = flashes when transmitting data</td>
</tr>
<tr>
<td>R2</td>
<td>Reader 2:</td>
</tr>
<tr>
<td></td>
<td>Clock/Data or D1/D0 mode = flashes when data is received, either input.</td>
</tr>
<tr>
<td></td>
<td>RS-485 mode = flashes when transmitting data</td>
</tr>
<tr>
<td>D16</td>
<td>Flashes with host communication (Ethernet port 0)</td>
</tr>
<tr>
<td>YEL</td>
<td>Ethernet Speed: OFF = 10Mb/S, ON = 100Mb/S</td>
</tr>
<tr>
<td>GRN</td>
<td>Off = no link, ON = good link, Flashing = Ethernet activity</td>
</tr>
<tr>
<td>IN1</td>
<td>Input IN1 Status: Off = Inactive, ON = Active, Flash = Trouble</td>
</tr>
<tr>
<td>IN2</td>
<td>Input IN2 Status: Off = Inactive, ON = Active, Flash = Trouble</td>
</tr>
<tr>
<td>IN3</td>
<td>Input IN3 Status: Off = Inactive, ON = Active, Flash = Trouble</td>
</tr>
<tr>
<td>IN4</td>
<td>Input IN4 Status: Off = Inactive, ON = Active, Flash = Trouble</td>
</tr>
<tr>
<td>IN5</td>
<td>Input IN5 Status: Off = Inactive, ON = Active, Flash = Trouble</td>
</tr>
<tr>
<td>IN6</td>
<td>Input IN6 Status: Off = Inactive, ON = Active, Flash = Trouble</td>
</tr>
<tr>
<td>IN7</td>
<td>Input IN7 Status: Off = Inactive, ON = Active, Flash = Trouble</td>
</tr>
</tbody>
</table>
23.2 Replace Memory Backup Battery

The event log buffer and the real time clock are backed up by a 3V lithium battery. Without power being applied to the BAS-2220, the battery will retain events and transactions for 3 months.

This battery should be replaced annually to insure that proper backup functionally is maintained. Remove the insulator from the battery holder after installation. Battery type: Rayovac BR2325 or Wuhan Lixing CR2330.

<table>
<thead>
<tr>
<th>LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN8</td>
<td>Input IN8 Status: Off = Inactive, ON = Active, Flash = Trouble</td>
</tr>
<tr>
<td>K1</td>
<td>Reader 1 Strike</td>
</tr>
<tr>
<td>K2</td>
<td>Reader 1 Aux output 1</td>
</tr>
<tr>
<td>K3‘</td>
<td>Reader 2 Strike</td>
</tr>
<tr>
<td>K4</td>
<td>Reader 2 Aux output 1</td>
</tr>
</tbody>
</table>
24 Specifications

** The IDRC is for use with UL Listed access control power limited power supplies.

- **Primary Power:** 12 to 24 VDC ±10%, 500mA maximum (plus reader current)
  - 12 VDC @ 250mA (plus reader current) nominal
  - 24 VDC @ 150mA (plus reader current) nominal
- **Memory and Clock Backup:** 3V Lithium, Rayovac BR2325 or Wuhan Lixing CR2330
- **Host communication:** Ethernet: 10BaseT/100Base-TX, and RS-232 9600 to 115,200 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
- **Downstream communication:** 2-wire RS-485, 2400-38400 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
- **Inputs:**
  - 2 unsupervised, dedicated for tamper and UPS fault monitoring
  - 8 unsupervised/supervised, standard EOL: 1k/1k ohm. Four custom EOL’s are available (host software dependent).
- **Relays:** Four, Form-C, 5A @ 30 DVC, resistive
- **Reader interface:**
  - Reader power (jumper selectable):
    - 12 VDC ±10% regulated, current limited to 150mA for each reader or
    - 12 to 24 VDC ±10% (input voltage passed through) current limited to 150mA for each reader.
  - Data inputs: TTL compatible inputs, mag stripe and wiegand standards supported
  - RS-485 mode: 9600 bps, asynchronous, half-duplex, 1 start bit, 8 data bits, and 1 stop bit.
  - LED output: TTL levels, high > 3V, low < 0.5 V, 5mA source/sink max.
  - Buzzer output: TTL levels, high > 3V, low < 0.5 V, low=active, 5mA source/sink max.
- **Cable Requirements:**
  - Power: 1 twisted pair, 18 AWG
  - Ethernet: CAT 5
  - RS-485: 24 AWG, twisted pair(s) with an overall shield, 4000 feet (1219 m) maximum
  - RS-232: 24 AWG, 25 feet (7.6 m) maximum
  - Alarm Input: twisted pair, 30 ohms maximum, typically 22 AWG @ 1000 feet (300 m)
- **Environmental:**
  - **Temperature:**
    - Operating: 0° to +70° C (32° to 158° F)
    - Storage: -55° to 85° C (-67° to 185° F)
  - **Humidity:** 0 to 95% RHNC
- **Mechanical:**
  - Dimensions: 8 x 6 x 1 in. (203.2 x 152.4 x 25 mm)
  - Weight: 9 oz. (255 g) nominal, board only
- **UL294 Listed, UL1076 pending**
• CE marking
• RoHS compliant

Note: These specifications are subject to change without notice.
BAS-3300
INTELLIGENT
SYSTEM
CONTROLLER
25 Overview of the BAS-3300

This installation guide is intended for use by technicians who will be installing and maintaining the Intelligent System Controller.

The BAS-3300 provides the real time processing for the I/O interfaces connected to it. The database for the subsystem configuration and card holders are stored in flash memory. The event log buffer is stored in battery-backed memory. Configuration data and event/status reports are communicated to the host via onboard 10BaseT/100BaseTX Ethernet port or port 1.

25.1 Interfaces

The ISC interfaces upstream with the access control software on a host system. This communication occurs through an onboard 10BaseT/100BaseTX Ethernet port or port 1. Port 1 may be set up as RS-232, 2-wire RS-485 or an optional 10BaseT/100BaseTX using a Lantronix CoBox-Micro interface daughter board. Dual path communication from the host to the controller may be set up via RS-232, RS-485, Ethernet, dial-up, etc.

Downstream devices are connected via ports 2 and 3 using 2-wire RS-485.

25.2 The ISC Board

The ISC board contains the following components: two (2) unsupervised alarm inputs, one (1) host Ethernet interface, one (1) RS-232 or RS-485 interface, two (2) RS-485 interfaces (2-wire), one (1) power-in input, four (4) DIP switches, and sixteen (16) jumpers. It also contains a set of six (6) status LEDs and one (1) memory backup (3 volt lithium) battery.
25.3 Default Settings

Each board ships with the following default configuration.

- All DIP switches are off.
- IP Addressing: DHCP
- DNS Name: “MAC” followed by the 12-character MAC address.
- Device address: 0. This is the RS-485 address, but also must match setting in System Administration for successful IP communications.
- Serial port settings: No flow control
- Data security: None
- Baud Rate: 9600
- Login Name: admin
- Login Password: password (The password is case-sensitive.)
26 Installation

To install the ISC, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Supply power to the controller and wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the device for communication.
3. Remove the plastic safety strip from the memory backup battery.
4. Configure the correct settings using the jumpers and DIP switches.
5. Set the board for the desired initial IP addressing mode.
6. Configure the network and port settings using the embedded web server.

26.1 Power and Alarm Inputs

The BAS-3300 accepts 12 to 24 VDC for power. Locate power source as close to the unit as possible. Connect power with minimum of 18 AWG wires. Inputs TMP and FLT are used for monitoring cabinet tamper and power failure with normally closed contacts. These two inputs are for contact closure monitoring only, and do not use EOL resistor(s). If these inputs are not used, install a short piece of wire at the input to indicate safe condition.

Observe POLARITY on VIN!

Wiring for power, power fault, and cabinet tampering

![Wiring Diagram]

26.2 Communication Wiring

The ISC communicates to the host via: onboard Ethernet 10Base-T/100Base100-TX port or on port 1. Dual path communication from the host to the BAS-3300 is supported. Port 1 may be configured as RS-232, 2-wire RS-485 or optional Lantronix Ethernet 10baseT/100Base-TX CoBox-Micro interface. RS-232 interface is for direct one to one connection to a host computer port, or a modem.
There are a few options for establishing communication to configure the settings for the first time. For initial configuration prior establishing a LAN connection, a CAT 5 crossover cable can be used to connect directly to a PC. In this scenario, the controller has a static IP address and the web browser-enabled PC is connected directly to the controller using a crossover cable.

Ports 2 and 3 utilize 2-wire RS-485 interface only. The interface allows multi-drop communication on a single bus of up to 4000 feet (1,200 m). Use twisted pair (minimum 24 AWG) with shield for the communication with 120 ohm impedance. Install termination jumpers only at the end of line unit.

26.3 Memory Backup Battery

Remove the factory-installed plastic safety strip from the memory backup battery. This plastic strip prevents the battery from being effectively seated. The battery will not function properly until the plastic strip is removed. When the battery is enabled, event memory is protected.

26.4 Configuration

The controller is configured through jumpers, DIP switches, and web browser.
26.4.1 Setting DIP Switches

Set DIP switches as required. The following chart describes the use of each DIP switch.

Some switch settings behave differently at power up than they do after initialization. Keep this in mind when changing settings.

<table>
<thead>
<tr>
<th>Switch</th>
<th>Selection:</th>
</tr>
</thead>
<tbody>
<tr>
<td>SW1</td>
<td>When SW1 is on, use the default login username and password. (This can be changed without resetting the board.) Username: admin Password: password</td>
</tr>
<tr>
<td>SW2</td>
<td>During power up, when SW2 is on (and SW1 is off) for the first 10 seconds, the default configuration is as follows: Static IP address: 192.168.0.251 Primary path: configured for IP Server Secondary path: configured for RS-232 at 38400 bps No handshake, no encryption.</td>
</tr>
<tr>
<td>SW3</td>
<td>By default this switch is off and SSL is enabled. Turn SW3 ON to disable SSL settings.</td>
</tr>
<tr>
<td>SW4</td>
<td>Not used.</td>
</tr>
</tbody>
</table>

Resetting the Controller

The controller can be reset to its factory default state. Performing this procedure will erase any configured IP address, usernames, and passwords as well.

To clear the flash and ram on the board using DIP switches:

1. Set SW1 and SW2 to ON.
2. Power up the board or press the reset button.
3. While LEDs D1, D2 and D3, D4 light up as alternating pairs (duration of about 10 seconds), drop either of the switches (SW1 or SW2) to off.
4. While the memory is being cleared, LED D2 blinks slowly. Do nothing to the board while this is occurring. When it is completed, D1 flashes briefly, and all the input lights will flash. The board will then reset itself.
5. Turn SW2 ON and log into board using default IP address 192.168.0.251.
6. Once at the login screen, turn off SW2 and turn on SW1 to enable the default login. After power up or board reset, the board will not respond to web communications request for about 15 seconds. Please allow this much time.

To verify that the board has been reset, you may check that the users have been removed and that the network setting is configured as DHCP.
26.4.2 Installing Jumpers

The following chart describes each jumper.

<table>
<thead>
<tr>
<th>Jumpers</th>
<th>Set at</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>J2</td>
<td>n/a</td>
<td>Factory use only</td>
</tr>
<tr>
<td>J3</td>
<td>n/a</td>
<td>Factory use only</td>
</tr>
<tr>
<td>J4</td>
<td>off</td>
<td>Port 2 RS-485 EOL terminator is off.</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>Port 2 RS-485 terminator is ON.</td>
</tr>
<tr>
<td>J5</td>
<td>off</td>
<td>Port 3 RS-485 EOL terminator is off.</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>Port 3 RS-485 terminator is ON.</td>
</tr>
<tr>
<td>J6</td>
<td></td>
<td>Connector for Lantronix CoBox-micro connection - port 1</td>
</tr>
<tr>
<td>J7, J8, J9</td>
<td>232</td>
<td>Port 1 is RS-232</td>
</tr>
<tr>
<td></td>
<td>485</td>
<td>Port 1 is RS-485</td>
</tr>
<tr>
<td>J10</td>
<td>off</td>
<td>Port 1 RS-485 EOL terminator is off.</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>Port 1 RS-485 terminator is ON.</td>
</tr>
<tr>
<td>J11</td>
<td>n/a</td>
<td>Factory use only</td>
</tr>
<tr>
<td>J12</td>
<td>n/a</td>
<td>Factory use only</td>
</tr>
<tr>
<td>J13</td>
<td>n/a</td>
<td>Factory use only</td>
</tr>
<tr>
<td>J14</td>
<td>n/a</td>
<td>Remote status LED #1 (see note below)</td>
</tr>
<tr>
<td>J15</td>
<td>n/a</td>
<td>Remote status LED #2 (see note below)</td>
</tr>
<tr>
<td>J16</td>
<td>n/a</td>
<td>Remote status LED #3 (see note below)</td>
</tr>
<tr>
<td>J17</td>
<td>n/a</td>
<td>Remote status LED #4 (see note below)</td>
</tr>
</tbody>
</table>

Note: Observe POLARITY connection to LED. External current limiting is not required.

26.5 Initial IP Addressing Mode

Set the board for the desired initial IP addressing mode. The board can be initially configured using a fixed static IP address or an IP address automatically assigned by a DHCP server.

- **Automatic Address Assignment** By default, the IP address will be assigned by a DHCP server. The DNS name is “MAC” followed by the characters of the unit’s MAC address.

- **Fixed Static IP Address** In order to use a fixed static IP address, Power up the board with DIP switch 2 ON and DIP switch 1 off. This default address cannot be changed. If this is chosen, the default static IP address is 192.168.0.251.
To communicate with the board using this address, the computer must also be on the same subnet. Usually, this requires changing the computer’s network interface card settings.

**Note:** Ensure that DIP switch 1 is off and DIP switch 2 is ON before rebooting to keep board in default static IP address mode.

### 26.6 Embedded Web Server

Instead of using DIP switches or jumpers to define communication and addressing, the BAS-3300 can be configured through the web interface.

#### 26.6.1 Logging in for the First Time

There is one pre-defined user always available by turning DIP switch SW1 ON after power up. When logging on for the first time, since no other users are defined yet, the default username and password are required for configuring this board.

After configuring ports and users, be sure to turn SW1 off to enable the settings you’ve configured.

**Note:** All boards have a static certificate that reflects a static IP address. This causes a warning to appear initially when trying to log in that states a problem with this website's security certificate. Although it is not recommended, proceed to the website.

#### 26.6.2 Configuration via Web Page

The Configuration Web Page can be launched from within System Administration (only if an IP address or host name is specified) or by using a browser to access the programmed IP address. Depending on your proxy settings, you may have to allow this web page. (For more information, consult your browser’s online help or system administrator for assistance.)

1. In System Administration in the Access Panels folder, click [Configuration Web Page]. This page will launch in a browser. (You may also access this page by going to the device IP address from within the browser.)

2. Click the link to go to the login page. Log in using your username and password. If DIP switch 1 is ON, then the default username and password is used (admin, password). If DIP switch 1 is off, use the login that was programmed in the device. Click [Login].

3. The Home page indicates the type of device and has a Notes field. You may type in a description here. Click [Save Notes].

4. To configure network settings, click [Network].
   - If you are using DHCP, specify a host name. By default, the host name consists of “MAC” followed by the numbers of the device MAC address. With DHCP, IP settings will be configured automatically.
   - For a static IP address, specify the IP address, subnet mask, and default gateway.
   - Click [Accept].

5. To configure the host, click [Host Comm].
a. Specify the controller’s communication address. This is the address used for RS-485, also must match the setting in the access control software, even for IP communications.

b. Configure the following:
   - **Connection Type**: Choose IP Server, Serial-RS232, or Serial-modem, Serial-RS485 (BAS-3300 only) and Serial-Cobox (BAS-3300 only). Currently the IP Client connection type is not supported.
   - **Data Security**: The controller is capable of Password/AES encryption.
   - **Port Number** (default 3001) Must match setting in the access control software.

   When using an IP Server connection, the controller may be configured to allow all IP addresses or only authorized IP addresses.

c. Configure an alternate host port if needed. Dual path communication is available on the BAS-3300 only. If you opt NOT to use dual path communication, set this to **Disabled**.

d. Click [Accept].

6. To view information, click [Device Info].

   You may view the time and product ID, as well as properties that have been configured, such as firmware version, serial number, device name, DIP switches, etc.

7. For users configuration, click [Users].

   User accounts may be created, edited or deleted. Each user account has an associated username and password, as well as a level and notes.

   a. One of three different levels may be assigned to users.
      - **Level 1** — Full control
      - **Levels 2 and 3** have the following permissions:

<table>
<thead>
<tr>
<th>Access</th>
<th>View allowed</th>
<th>Edit allowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home page</td>
<td>Level 2: Yes (cannot edit notes)</td>
<td>Level 2: No</td>
</tr>
<tr>
<td></td>
<td>Level 3: Yes (cannot edit notes)</td>
<td>Level 3: No</td>
</tr>
<tr>
<td>Network page</td>
<td>Level 2: Yes</td>
<td>Level 2: No</td>
</tr>
<tr>
<td></td>
<td>Level 3: No</td>
<td>Level 3: No</td>
</tr>
<tr>
<td>Host Port page</td>
<td>Level 2: Yes</td>
<td>Level 2: No</td>
</tr>
<tr>
<td></td>
<td>Level 3: No</td>
<td>Level 3: No</td>
</tr>
<tr>
<td>Device Info page</td>
<td>Level 2: Yes</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>Level 3: Yes</td>
<td></td>
</tr>
<tr>
<td>Users page</td>
<td>Level 2: No</td>
<td>Level 2: No</td>
</tr>
<tr>
<td></td>
<td>Level 3: No</td>
<td>Level 3: No</td>
</tr>
<tr>
<td>Restore/Default page</td>
<td>Level 2: No</td>
<td>Level 2: No</td>
</tr>
<tr>
<td></td>
<td>Level 3: No</td>
<td>Level 3: No</td>
</tr>
<tr>
<td>Apply Setting page</td>
<td>Level 2: No</td>
<td>Level 2: No</td>
</tr>
<tr>
<td></td>
<td>Level 3: No</td>
<td>Level 3: No</td>
</tr>
</tbody>
</table>

   For pages that cannot be viewed, the message is displayed when users attempt to access the page: “This page is unavailable due to one of the following reasons: your user level is not authorized to view this page, or another level 1 user is logged in at this time.”

b. Specify the Session Timer (5 to 60 minutes). Click [Save Session Timer]
c. You may disable the web server by selecting the check box. When this option is selected and SW1 is off, all ports except for the host communication port will be disabled. The configuration web page cannot be used to access the device.

d. Click [Submit].

8. For configuration of auto-save, click [Auto-Save Config].
   a. On this page, you may restore the last save or clear all the settings.
   b. Choose to disable or enable Auto-Save. If Auto-Save is enabled, volatile memory is written to flash. The frequency of this action is specified in the timer (30 seconds to 30 minutes). Click [Save Settings].

9. You may click [Restore/Default] if you need to reload the factory settings or the current operating settings.

10. When you have completed configuring the device, click [Apply Settings], [Apply Settings, Reboot], and then [Log Out]. If the IP address has changed, you will need to log in with the new IP address to continue.
27 Maintenance

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading firmware.

27.1 Verification

The ISC board contains six status LEDs that can be used to verify correct installation after power up. The following chart describes the purpose of each LED on the ISC board.

Initialization:

<table>
<thead>
<tr>
<th>LED 1</th>
<th>LED 2</th>
<th>LED 3</th>
<th>LED 4</th>
<th>LED 5</th>
<th>LED 6</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>Basic processor initialization</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>Internal SRAM test</td>
</tr>
<tr>
<td>ON</td>
<td>off</td>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>External flash test</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>External SDRAM, first chip test</td>
</tr>
<tr>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>External SDRAM, second chip test</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>off</td>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>External SRAM test</td>
</tr>
<tr>
<td>ON</td>
<td>off</td>
<td>ON</td>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>External EEPROM test</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>External RTC test</td>
</tr>
<tr>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>off</td>
<td>ON</td>
<td>off</td>
<td>Backup battery ABD reset circuit test</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>off</td>
<td>off</td>
<td>ON</td>
<td>off</td>
<td>UART test</td>
</tr>
<tr>
<td>ON</td>
<td>off</td>
<td>ON</td>
<td>off</td>
<td>ON</td>
<td>off</td>
<td>Ethernet interface, MII</td>
</tr>
</tbody>
</table>

Run time:

<table>
<thead>
<tr>
<th>LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Off-line/on-line and battery status</td>
</tr>
<tr>
<td></td>
<td>Off-line = 20% ON. On-line = 80% ON</td>
</tr>
<tr>
<td></td>
<td>Double flash if battery is low</td>
</tr>
<tr>
<td>2</td>
<td>Primary host communication activity (Ethernet or port 1)</td>
</tr>
<tr>
<td>3</td>
<td>Port 2 communication activity</td>
</tr>
<tr>
<td>4</td>
<td>Port 3 communication activity</td>
</tr>
<tr>
<td>5</td>
<td>ON = writing to flash memory. Do not remove power when ON.</td>
</tr>
<tr>
<td>6</td>
<td>TBD</td>
</tr>
</tbody>
</table>
Run time:

<table>
<thead>
<tr>
<th>LED</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPD</td>
<td>Onboard Ethernet speed: off = 10 Mb/S, ON = 100 Mb/S</td>
</tr>
<tr>
<td>ACT</td>
<td>Off = no onboard Ethernet activity, ON = Ethernet activity (yellow LED)</td>
</tr>
<tr>
<td>LNK</td>
<td>Off = no link, ON = good link (green LED)</td>
</tr>
</tbody>
</table>

27.2 Replace Memory Backup Battery

The ISC contains a memory backup battery that is used to back up event and transaction data in the event of a power failure.

A 3V lithium ion battery (Rayovac BR2325 or Wuhan Lixing CR2330) is used for the memory backup. This battery should be replaced annually.

Caution: There is a danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with the manufacturer's instructions.
**The ISC is for use with UL Listed access control power limited power supplies.**

- **Primary Power:** 12 to 24 VDC ±10%, 300 mA maximum
  - 12 VDC @ 240mA (325mA with CoBox-Micro) nominal
  - 24 VDC @ 135mA (175mA with CoBox-Micro) nominal
- **Memory and Clock Backup:** 3V Lithium, Rayovac BR2325 or Wuhan Lixing CR2330
- **Communication Ports:**
  - Port 1: RS-232 or 2-wire RS-485: 9,600 to 115,200 bps, async
  - Ports 2 and 3: 2-wire RS-485: 2,400 to 38,400 bps, async
- **Inputs:** two non-supervised, dedicated for cabinet tamper and power fault monitoring
- **Cable Requirements:**
  - Power: 1 twisted pair, 18AWG
  - RS-485: 24AWG twisted pair(s) with shield, 4000 feet (1219 m) maximum, 120 Ohm
  - RS-232: 24AWG, 25 feet (7.6 m) maximum
  - Ethernet: Cat 5
  - Alarm inputs: twisted pair, 30 ohms maximum
- **Environmental:**
  - Temperature: Operating: 0° to 70° C (32° to 158° F). Storage: -55° to 85° C (-67° to 185° F)
  - Humidity: 0 to 95% RHNC
- **Mechanical:**
  - Dimension: 5 in. x 6 in. x 1 in. (127 x 152.4 x 25mm)
  - Weight: 4.1 oz. (115 g) nominal
- **Lantronix NIC support:** Standoff size - Diameter .125 inch x 7/16 inch long. Richco Plastics part number LMSP-7-01, 3 pieces (Not supplied)
- **UL294 Listed, UL1076 pending**
- **CE marking**
- **RoHS compliant**

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**Note:** These specifications are subject to change without notice.
ISC
COMMUNICATIONS
29 ISC Communication

The following information can be used to configure communication for Stanley controllers unless otherwise stated.

29.1 LAN Connections

For LAN panels, any baud rate set on an ISC (BAS-500, 1000, or 2000 primary path (port 1) via DIP switches 6 and 7) will work as long as the baud rate on the Lantronix box is set to match (via the “change speed” command).

primary path of the BAS-2000 connected to a Lantronix box can have its baud rate set to the highest (115,200) baud rate. The Lantronix box simply needs to have its serial speed at 115,200 as well. In order for 115,200 baud to work reliably on any connection (direct serial, dedicated LAN, or dial-up on a dedicated phone line), a wire from CTS to RTS1/R1+ on the BAS-2000 Port 1 is required.

The speed of the secondary path (port 6) on the BAS-2000 is always 38400 baud. This is not configurable at the hardware level. Also, the MSSLITE currently only supports 38400 baud with the BAS-2000, regardless of the port.

29.1.1 Lantronix Devices

The EZWebCon management utility software may be used to configure Lantronix devices and update their firmware. Instead of entering commands at the Local prompt, configuration can be done through on-screen menus.

The latest version of EZWebCon can be downloaded from the Lantronix website (www.lantronix.com). For detailed information, refer to the Lantronix documentation.
29.2 BAS-ETHLAN (MSS1/MSS100 Ethernet Controller)

This procedure can also be used for the MSS-VIA network adapter.

(A NULL MODEM CABLE IS REQUIRED)

29.2.1 Establish Serial Communication with the ETHLAN

The controller-to-MSS100 or MSS1-T cable is now available, part number HOC-ETHLAN.

1. With the power OFF to the ETHLAN devices, establish a serial connection from the ETHLAN to the PC’s Serial Communication Port, for example, using the HyperTerminal. (A Null Modem cable is required).
2. Start HyperTerminal.
3. Change the Communication settings to 9600 Baud, 8 data bits, 1 stop bit, and Parity None.
4. Plug in power to the ETHLAN. The following messages should appear in the terminal window.

   Lantronix Telnet session

5. At this point, press the <Enter> key. (It may take a few seconds to complete booting).
   • Power should be cycled to the device while connected to it in order to see the “Load Completed...” message.
   • If it appears that nothing changes after pressing the <Enter> key, it is possible that the Lantronix MSS1 or MSS100 device was already configured once. If this occurs, you need to press the <Enter> key before the phrase, “Load Completed-Boot in Progress” appears. If this still does not allow you to enter into the command mode, you may also telnet into the Lantronix device.
   • If the device was configured previously, it may be best to do a hard reset and configure it from scratch. To do this:
     a. Using the end of a paper clip, or a similar small object, hold down the reset button.
b. Cycle power to the device.

- A prompt that says `Local_1>` should appear. If the prompt says `Boot>`, then the Ethernet Address has not been defined and you must enter one.
  
a. At the `Boot>` prompt, type:

```
change hardware n
```

where `n` represents the last three digits of the Ethernet Address located on the bottom of the Lantronix box (Example: `change hardware 21-01-65`).

b. Reboot for the change to take effect.

c. Wait for it to finish loading. Once it’s done, you should see a screen resembling the picture on the previous page.

6. You will be prompted for a user name. Enter any name.

### 29.2.2 Establishing Network Communications

After a factory default reset, the following changes must be made:

1. At the prompt, type:

```
set privileged
```

and press <Enter>.

2. Type in the password:

```
system
```

and press <Enter>.

3. Determine and set the IP address. Type:

```
change ipaddress [IP ADDRESS] and press <Enter>.
```

4. Set the Gateway. Type:

```
change gateway [GATEWAY] and press <Enter>.
```

5. Set the boot flags. Type:

```
change bootp disabled and press <Enter>
change dhcp disabled and press <Enter>
change rarp disabled and press <Enter>
```

6. Set the access type to remote. Type:

```
change access remote and press <Enter>
```

7. At the prompt, type:

```
logout and press <Enter>.
```

8. Exit from HyperTerminal and cycle power to the device.

### 29.2.3 Configuring the ETHLAN

Any additional changes specific to the hardware that the Lantronix box is connecting to should be made now. These may include, but are not limited to, baud rate, parity, stop bit, byte size, and flow control.

1. Make sure the device is powered, completely booted, and connected to the network. Start HyperTerminal.

2. You will be prompted for a session name. Enter a name of your choice.
3. Connect to the device using the IP address, port address of 7000.

4. A HyperTerminal session starts. Type:
   access
   and press <Enter>. The access command will not echo.

5. You will be prompted for a user name. Enter any name. There should be a command prompt.

6. Type:
   set privileged
   and press <Enter>.

7. The password prompt will appear. The password is system.

8. For baud rate, type:
   change speed [SPEED]
   and press <Enter> where [SPEED] = the baud rate (9600, 2400, etc.)

9. For parity, type:
   change parity [PARITY]
   and press <Enter>, where [PARITY] = none, even, odd, mark, or space.

10. For stop bits, type:
    change stopbits [BITS]
    and press <Enter>, where [BITS] = 0, 1, or 2.

11. For byte size, type:
    change charsize [SIZE]
    and press <Enter>, where [SIZE] = 7 or 8.

12. For flow control, type:
    change flow control [FLOW CONTROL]
    and press <Enter>, where [FLOW CONTROL] = xonoff, ctsrts, slowcts, or none.

13. Type
    change dedicated tcp port=3001
    and press <Enter>. 
14. (Optional) If you are going to connect to the device from across subnets or routers, you will need to program the subnet mask and gateway. The commands are:
   • change subnet mask [your subnet mask]
   • change gateway [your gateway]

15. Type in the following to disable BOOTP and RARP, depressing the <Enter> key after each line.
   LOCAL>>CHANGE BOOTP DISABLE
   LOCAL>>CHANGE RARP DISABLE

16. Type change access remote and press <Enter>.

17. Disconnect from the device and exit.

18. If a subnet mask and gateway was programmed (step 9), you must recycle power to the device (the device must be rebooted) in order for the settings to take effect.

19. At this point, make sure that switch 5 on the ISC is configured correctly for hardware flow control. It should be set to “ON.”

20. To verify that the device is talking on the network you can “ping” the device from a command prompt by typing ping <IP address>.

### 29.3 BAS-ETHLAN-MICR (Micro Serial Server)

The ETHLAN-LITE/ETHLAN-MICR device plugs directly into the ISC panel. It should be labeled with its Ethernet/hardware address (example: 00-80-a3-2b-02-3b).

Assign this address to a TCP/IP address over the network by using the ARP utility. In order to do this, the ARP table on the Windows PC must have at least one IP address other than its own defined. If the ARP table is empty, the command will return an error message saying that the ARP table addition failed.

1. At the command prompt, type ARP-A to verify that there is at least one entry in the ARP table. If there is at least one entry, proceed to step #3.

2. If there is no other entry listed in the ARP table besides the local machine, ping another IP machine on the network to build the ARP table. You must ping a host other than the machine on which you are working.

3. After the entry is listed in the ARP table, use the following command to ARP the IP address:
   
   arp -s <IP Address> <Ethernet/Hardware Address>

   where the <IP address> is the numerical address (example: 192.168.002.203) and the <Ethernet/Hardware Address> is the address labeled on the Micro Serial Server device (example: 00-80-a3-2b-02-3b).

   **Note:** The ARP/ping method only works during the first two minutes of BAS-ETHLAN-MICR operation. If this process is not completed in time, then the BAS-ETHLAN-MICR must be rebooted and the ARP/ping process redone.

4. Ping the IP address to have the device acknowledge the IP assignment. There should be replies from the IP address if the ARP command was accepted.

   **Note:** The ETHLAN-MICR will not save this learned IP address permanently; this procedure is intended as a temporary measure to allow an administrator to Telnet into the BAS-ETHLAN-
MICR for configuration. Once the power is recycled on the device, the IP programming that is
done with the arp command will be lost.

After doing this, telnet into the IP address to complete the rest of the device configuration starting from
Section 29.2.2, Establishing Network Communications. It is critical to perform line item 3 (change
ipaddress <your ip address> in order to lock in the temporary IP address assigned by the ARP
process. This step makes the IP address static within the device.

Note: BOOTP and RARP are disabled using commands when configuring the device for use. DHCP
is disabled when the device is shipped from Stanley. However, if an NVR reset is performed on
the device, DHCP, BOOTP, and RARP will all be re-enabled and if there is a DHCP server on
the network the unit will obtain an IP address automatically and you will not be able to use the
ARP command for programming. If there is no DHCP server on the network, the DHCP option
within the device will be disabled again once a static IP address is successfully programmed
into the device.

At this point you must completely power down the BAS-2000 controller for 15 seconds and then turn it back
on.

Once this is done, use the access control software to define the ISC as a LAN panel at the IP address that was
assigned. The panel will come online.

29.3.1 ETHLAN-MICR Standoffs

The standoffs for the ETHLAN-LITE/ETHLAN-MICR come in a separate package. The following diagram
illustrates the positioning.

Richco plastic P/N LMSP-7-01

Standoffs for ETHLAN
LITE to ISC

INSERT
STANDOFFS
HERE

DO NOT DISPOSE
[Qty 3]
29.4  CoBox Micro 100

The CoBox Micro 100 device plugs directly into the BAS-2000 or the BAS-500 ISC. Jumper J13 must be in the OFF position for the device to communicate on the BAS-500 and jumper J26 must be in the OFF position for the device to communicate with the BAS-2000. If it is not in the OFF position, the ISC will be unable to detect the CoBox Micro 100. The jumper should be ON for all other communications methods.

It should be labeled with its Ethernet/hardware address (example: 00-20-4a-2b-02-3b).

The CoBox Micro 100 can communicate on a 10/100 base-T network.

Assign a TCP/IP address over the network by using the ARP utility. In order to do this, the ARP table on the Windows PC must have at least one IP address other than its own defined. If the ARP table is empty, the command will return an error message saying that the ARP table addition failed.

1. At the command prompt, type `ARP -A` to verify that there is at least one entry in the ARP table. If there is at least one entry, proceed to step #3.

2. If there is no other entry listed in the ARP table besides the local machine, ping another IP machine on the network to build the ARP table. You must ping a host other than the machine on which you are working.

3. After the entry is listed in the ARP table, use the following command to ARP the IP address:
   ```
   arp -s <IP Address> <Ethernet/Hardware Address>
   ```
   where the `<IP address>` is the numerical address (example: 192.168.002.203) and the `<Ethernet/Hardware Address>` is the address labeled on the Micro Serial Server device (example: 00-20-4a-2b-02-3b).

4. Telnet to the assigned IP address and port 1, this should fail quickly (2-3 seconds). This will force CoBox Micro 100 to take the new assign IP address temporary.
   i.e.) TELNET 192.168.2.203 1

5. You now need to Telnet into the IP address to complete the rest of the device configuration.
   i.e.) TELNET 192.168.2.203 9999

The CoBox Micro 100 will not save this learned IP address permanently; this procedure is intended as a temporary measure to allow an administrator to Telnet into the CoBox Micro 100 for configuration. Steps 4 and 5 have to be performed quickly after each other.

29.4.1  Configuring a CoBox Micro 100 using Telnet

The CoBox Micro 100 can be configured via Telnet or Lantronix’s DeviceInstaller. The recommended method for configuration is Telnet. For more information about using DeviceInstaller, refer to the manufacturer documentation.

From the command prompt, type the following to enter the CoBox Micro 100 configuration menu:
```
    telnet <IP Address> 9999
```

This command will open the IP Address using port 9999, which is reserved for configuration. Once the port is open, choose option 0 for Server configuration.

Once you are in the server configuration, you can set up the IP address, default gateway, and subnet mask to match your specific network configuration.
You will also need to enter a configuration password for the device. The password can be a maximum of 4 characters only, unless enhanced password is enabled. For more information, refer to the CoBox Micro 100 documentation.

**Note:** Stanley recommends that you increase the security by enabling enhanced passwords. This allows for a maximum of 16 characters in the password.

After the Server configuration is complete, choose option 1 for Channel 1 configuration. Make the following changes in the configuration menu:

- a. Baud rate = 38400
- b. I/F mode = 4C. See Common I/F Mode Values on page 166.
- c. Flow Control = 02. See Common Flow Control Values on page 166.
- d. Port Number = 3001
- e. Connection Mode = C0
- f. Send ‘+++’ in Modem Mode = Y
- g. Auto Increment Source Port = N
- h. Remote IP Address = (000). (000). (000). (000)
- i. Remote Port = 00000
- j. DisConnMode = 00
- k. Flush Mode = 00
- l. Disconnect Time = 00:00
- m. Send Char 1 = 00
- n. Send Char 2 = 00

When these changes have been made, type ‘9’ at the main screen to save the changes and exit. The changes will be stored in the CoBox Micro 100 and the connection will be terminated.

To verify that the changes were stored correctly, cycle the power on the CoBox Micro 100 and when it has rebooted, go to the command prompt and Telnet to the IP Address that was just given to the device and port 9999 (example: TELNET 192.168.2.203 9999).

The configuration page will display a summary of current settings. Verify that all settings are configured properly and exit the Telnet session.
MAC address 00204183503E
Software version V6.1.0.2 (060404) H100

Press Enter for Setup Mode

*** basic parameters
Hardware: Ethernet TPI
IP addr 10.112.6.26, no gateway set

*** Security
SNMP is enabled
SNMP Community Name: public
Telnet Setup is enabled
TFTP Download is enabled
Port 77FEH is enabled
Web Server is enabled
Web Setup is enabled
ECHO is disabled
Enhanced Password is disabled

*** Channel 1
Baudrate 38400, I/F Mode 4C, Flow Q2
Port 03001
Connect Mode: CO
Send '+++ in Modem Mode enabled
Auto increment source port disabled
Remote IP Addr: --- none ---, Port 00000
Disconnect Mode: 00
Flush Mode: 00

*** Channel 2
Baudrate 9600, I/F Mode 4C, Flow 00
Port 10002
Connect Mode: CO
Send '+++ in Modem Mode enabled
Auto increment source port disabled
Remote IP Addr: --- none ---, Port 00000
Disconnect Mode: 00
Flush Mode: 00

*** Expert
TCP Keepalive: 45s
ARP cache timeout: 600s
Monitor Mode & bootup: enabled
HTTP Port Number: 80
MTU Size: 1400
Alternate MAC: disabled
Ethernet connection type: auto-negotiate


29.4.2 Security Enhancements

Past installations may have contained vulnerabilities which could lead to unauthorized access to the CoBox Micro 100. The recommended security settings are not necessary for the unit to work correctly; however, they are highly recommended to bridge any security gaps left open from previous installations.

In order to configure the security settings, telnet into the unit to access the setup options:

telnet <IP Address> 9999

This command will open the unit using port 9999, which is reserved for configuration.

**Note:** Beyond securing the following internal settings of the Lantronix CoBox Micro 100, networking firewalls should be used to mask services that should not be publicly exposed. Many security problems can be avoided if servers and networks are appropriately configured.

---

**Enhanced Password**

By default, the Cobox Micro 100 does not have a password assigned. In Server Options, you may assign a 4-digit password. While a 4-digit password is a step toward securing the unit, it is highly recommended to enable Enhanced Passwords, which will allow for a maximum of 16 digits. This can be set under Security (option 6).

**Port 77FE**

It is recommended that you disable port 77FE. This is an IP port that allows DeviceInstaller, Web-Manager, and custom programs to configure the unit remotely. Disabling this port prevents unauthorized access to this unit. If this is not done, it is possible to find this open port using a port scan tool. In addition, any networked user who installs DeviceInstaller on their machine may be able to change settings to the unit. Note: Port 77FE must be enabled for DeviceInstaller Software to detect the unit.

**Web Server**

After configuration is completed, it is recommended that you disable Web Server. While it is helpful to configure the unit via the Web Server, it does not support enhanced password protection. So it is a good idea to turn this feature off.

---

29.4.3 Firmware

To ensure that enhanced security is in place, download the latest firmware. Download the latest firmware from the Lantronix website, [www.lantronix.com](http://www.lantronix.com). There are two recommended methods to update the unit’s internal operational code: via DeviceInstaller or via TFTP.

**Upgrading Firmware via DeviceInstaller**

Use the correct version of DeviceInstaller with the correct version of the firmware. For more information, refer to the DeviceInstaller documentation. Microsoft .NET Framework version 1.1 is also required.

Upon running DeviceInstaller, the software searches for any devices on the LAN. If there are devices present but they are not detected by the software, you must assign an IP address to it. Assign a TCP/IP address over the network by using the ARP utility. If it is already configured but still does not show up in the DeviceInstaller search, verify that port 77FE is enabled.
After the firmware upgrade has been completed, disable port 77FE to prevent unauthorized access to this device.

Otherwise, the device should show up in DeviceInstaller. To upgrade the firmware:

1. Select the device. The line will be highlighted.
2. Click [Upgrade].
3. The Device Upgrade Wizard will appear. Select **Create a custom installation by specifying individual files**. Click [Next].
4. Enter the path for the downloaded firmware by either typing it in or clicking [Browse...]. Click [Next].
5. If you wish to upgrade the internal Web Server, select **Install files contained in COB partitions**. If you do NOT wish to upgrade the internal Web Server, select **Do not copy or replace any files** and proceed to step 6. Click [Next].
   a. Select the partition number and click [Set Partition...].
   b. Locate the .cob file. Click [OK].
   c. Click [Next].
6. You may save this installation for later use, if you wish, by clicking [Save Installation...]. This is particularly useful for upgrading multiple devices.
7. Click [Next] to begin updating the device. A status bar indicates the progress of the update.
8. After the update completes successfully, the device will reboot and there will be a temporary loss of communication to the ISC.
9. Click [Close].
   • If communications are not restored, power down the ISC for at least 10 seconds, then power it up once again.

**Upgrading the Firmware via TFTP**

1. Before upgrading, verify communication with the device. At the command prompt, type:  
   `ping <IP address>`
2. To upgrade the firmware, type:  
   `tftp-i <ip address> put <firmware source> 3L`  
   For example: `tftp-i 10.112.5.92 put d:\lantronix\micro\ltx5801.rom 3L`
3. After the update completes successfully, the device will reboot and there will be a temporary loss of communication to the ISC.
4. If you wish to upgrade the internal web interface, type:  
   `tftp-i <ip address> put <internal web interface> WEB6`  
   For example: `tftp-i 10.112.5.92 put d:\lantronix\micro\cbx360.cob WEB6`
5. Upon successful upgrade, a confirmation message will be displayed.

**29.4.4 Troubleshooting Micro 100 Products**

There may be a problem with the latest version of the on-board Ethernet devices for the BAS-500 and BAS-2000. A change was made to the device during production that will cause the following problems. This applies to the BAS-ETHLAN-MICR ONLY. It does not apply to the older 10 MB version of the units, only the latest units that are 10/100 MB and have been shipping since March 2004.
• **BAS-ETHLAN-MICR with firmware version 5.4** If Micro-100 unit's power is cycled, the unit will not restore communications unless the reset button on the Micro is pressed.

• **BAS-ETHLAN-MICR with firmware version 5.5** If Micro-100 unit's power is cycled, the unit will fail to restore communications 1/20 times.

In all cases, Lantronix and our Quality Assurance Group have confirmed that removal of Pin 10 will eliminate all communication failures due to power cycling. Setup and unit configuration remain the same as documented.

### 29.4.5 Removal of Reset Pin

Use the following procedure to remove Pin 10 from the Micro 100 product.

1. Using an ESD grounding strap, ground yourself and remove the Micro 100 from the anti-static bag or the housing.
2. Locate Pin 10 of Conn1 on the back side of the Micro 100 unit.
4. Replace the Micro 100 into the anti-static bag, or to the equipment that houses the Micro 100.

### 29.5 CoBox Token Ring Serial Server (BAS-COBOX-201TR)

**(A STRAIGHT THROUGH CABLE IS REQUIRED)**

#### Network Requirements:

Token Ring hub

#### Machine Requirements:

A PC is needed to configure the CoBox Token Ring Serial Server. The machine must have the following installed:

- Token Ring Network Interface Card (NIC)
- B.A.S.I.S. Software
- HyperTerminal Software

#### To Configure the CoBox Token Ring Serial Server (part # BAS-COBOX-TR201):

**Step 1: Establish Serial Communication with CoBox**

1. With the power OFF to the CoBox device and the network disconnected, establish a serial connection from the CoBox to the PC’s Serial Communication Port, for example, using HyperTerminal. (A straight through cable is required).
2. Start HyperTerminal. The Connection Description window will open with the “New Connection” setting. (Choose **New Connection** from the **File** menu if the Connection Description window does not open).
3. In the **Name** field, type **COBOX** and click [OK].
4. Select **Direct Connect** and choose the COM port to which the cable is connected on the computer.

5. Change the Communication settings to: 9600 Baud, 8 data bits, 1 stop bit, and No Parity.

6. Once in Terminal mode, hold down the `<x>` key on the keyboard and plug in power to the CoBox device. The following will appear on the screen (version and serial numbers may be different):

7. Press `<Enter>` to go into the CoBox device’s setup mode. The CoBox device’s current configuration will be displayed. It will look similar to the following:

8. Type `0` and then press the `<Enter>` key to enter the basic setup for the CoBox device.

9. Enter the IP address for the CoBox device in the form of 10.11.12.13. The currently configured address will appear as you get to each part of the IP address as you are typing; just continue to type the new number.

10. The software will next ask you if you wish to set the gateway. Answer yes and type the gateway IP address just as you did for the IP address of the device. As it did for the device’s IP address, the current configuration information will display at each segment of the IP address.
11. You now need to enter a subnet mask. You CANNOT enter a number here as you are used to, you must use the following table to determine what to type into this field.

<table>
<thead>
<tr>
<th>Subnet Mask</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>255.255.255.252</td>
<td>02</td>
</tr>
<tr>
<td>255.255.255.248</td>
<td>03</td>
</tr>
<tr>
<td>255.255.255.240</td>
<td>04</td>
</tr>
<tr>
<td>255.255.255.224</td>
<td>05</td>
</tr>
<tr>
<td>255.255.255.192</td>
<td>06</td>
</tr>
<tr>
<td>255.255.255.128</td>
<td>07</td>
</tr>
<tr>
<td>255.255.255.0</td>
<td>08</td>
</tr>
<tr>
<td>255.255.254.0</td>
<td>09</td>
</tr>
<tr>
<td>255.255.252.0</td>
<td>10</td>
</tr>
<tr>
<td>255.254.0.0</td>
<td>17</td>
</tr>
<tr>
<td>255.252.0.0</td>
<td>18</td>
</tr>
<tr>
<td>255.248.0.0</td>
<td>19</td>
</tr>
<tr>
<td>255.240.0.0</td>
<td>20</td>
</tr>
<tr>
<td>255.224.0.0</td>
<td>21</td>
</tr>
<tr>
<td>255.192.0.0</td>
<td>22</td>
</tr>
<tr>
<td>255.128.0.0</td>
<td>23</td>
</tr>
<tr>
<td>255.0.0.0</td>
<td>24</td>
</tr>
<tr>
<td>255.252.255.248</td>
<td>11</td>
</tr>
<tr>
<td>255.252.248.0</td>
<td>12</td>
</tr>
<tr>
<td>255.252.240.0</td>
<td>13</td>
</tr>
<tr>
<td>255.252.224.0</td>
<td>14</td>
</tr>
<tr>
<td>255.252.192.0</td>
<td>15</td>
</tr>
<tr>
<td>255.252.128.0</td>
<td>16</td>
</tr>
<tr>
<td>255.252.0.0</td>
<td>17</td>
</tr>
<tr>
<td>255.255.255.0</td>
<td>20</td>
</tr>
<tr>
<td>255.255.0.0</td>
<td>21</td>
</tr>
<tr>
<td>255.254.0.0</td>
<td>22</td>
</tr>
<tr>
<td>255.252.0.0</td>
<td>23</td>
</tr>
<tr>
<td>255.248.0.0</td>
<td>24</td>
</tr>
<tr>
<td>255.240.0.0</td>
<td>25</td>
</tr>
<tr>
<td>255.224.0.0</td>
<td>26</td>
</tr>
<tr>
<td>255.192.0.0</td>
<td>27</td>
</tr>
<tr>
<td>255.128.0.0</td>
<td>28</td>
</tr>
<tr>
<td>255.0.0.0</td>
<td>29</td>
</tr>
</tbody>
</table>

12. You will be prompted to change the Telnet configuration password. Answer Yes to the prompt.

13. Enter SYST for the password when prompted.

14. When asked to use a token-ring administered address answer NO.

15. You will now be at the setup screen. Make sure the information displayed at the top matched the information you just typed into the unit.

**Step 2: Entering the Serial Port Setup Menu**

1. Type 1 and then press the <Enter> key to enter the serial port setup menu. For each item, enter the following value:

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud rate</td>
<td>38400</td>
</tr>
<tr>
<td>I/F mode</td>
<td>4C</td>
</tr>
<tr>
<td>Flow control</td>
<td>00</td>
</tr>
<tr>
<td>Port #</td>
<td>03002</td>
</tr>
<tr>
<td>Connect mode</td>
<td>C1</td>
</tr>
<tr>
<td>Remote IP address</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>Remote port</td>
<td>00000</td>
</tr>
<tr>
<td>Disconnect mode</td>
<td>00</td>
</tr>
<tr>
<td>Flush mode</td>
<td>11</td>
</tr>
<tr>
<td>Disconnect time</td>
<td>00:00</td>
</tr>
<tr>
<td>Send char 1</td>
<td>00</td>
</tr>
<tr>
<td>Send char 2</td>
<td>00</td>
</tr>
</tbody>
</table>

Information is available for hexadecimal values. See Commonly Used Values on page 166.
2. You will now be back at the setup screen. Type 2 and then press the <Enter> key to enter the serial port setup menu. For each item, enter the following value.

<table>
<thead>
<tr>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud rate</td>
<td>38400</td>
</tr>
<tr>
<td>I/F mode</td>
<td>4C</td>
</tr>
<tr>
<td>Flow control</td>
<td>00</td>
</tr>
<tr>
<td>Port #</td>
<td>03001</td>
</tr>
<tr>
<td>Connect mode</td>
<td>C1</td>
</tr>
<tr>
<td>Remote IP address</td>
<td>0.0.0.0</td>
</tr>
<tr>
<td>Remote port</td>
<td>00000</td>
</tr>
<tr>
<td>Disconnect mode</td>
<td>00</td>
</tr>
<tr>
<td>Flush mode</td>
<td>11</td>
</tr>
<tr>
<td>Disconnect time</td>
<td>00:00</td>
</tr>
<tr>
<td>Send char 1</td>
<td>00</td>
</tr>
<tr>
<td>Send char 2</td>
<td>00</td>
</tr>
</tbody>
</table>

3. You will now be back at the setup screen. Type 9 and then press the <Enter> key to save the setup information and exit the CoBox setup menus.

4. The device is now configured to work with the network. Power the machine down, connect it to the network, and then power it up.

**Step 3: Connecting the ISC to the CoBox Device**

1. Connect the ISC to the CH2 port of the CoBox device using a direct connection cable according to the cable pinout table below.

<table>
<thead>
<tr>
<th>Cable Pinouts</th>
<th>9-pin female</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISC</td>
<td>TXD/TR1+</td>
</tr>
<tr>
<td></td>
<td>RXD/TR1-</td>
</tr>
<tr>
<td></td>
<td>RTS/R1+</td>
</tr>
<tr>
<td></td>
<td>CTS/R1-</td>
</tr>
<tr>
<td></td>
<td>GND</td>
</tr>
<tr>
<td>Jumper together</td>
<td>4, 6 &amp; 8</td>
</tr>
</tbody>
</table>

2. Add the panel in the System Administration application, using the IP address of the CoBox. This is the same IP address that was entered in Step 1, procedure number 10.

3. Run the Access Control Driver and Alarm Monitoring applications. Verify that the panel came online.
ISC to Lantronix CoBox Token Ring Serial Server Configuration

CoBox Token Ring Serial Server (COBOX-TR201)

TOKEN RING NETWORK

DIRECT CONNECTION CABLE

CH 2
9-pin female

Jumper together 4, 6 & 8

Intelligent System Controller

15V Power Supply

not used
29.6 **Lantronix CoBox-DR**

The ISC can alternatively be connected to the Lantronix CoBox-DR unit. Use the following information to set up the CoBox-DR unit and the ISC.

### 29.6.1 DSTni-Xpress DR RS-232 Configuration for the ISC

Connection to the ISC can either be through screw terminals or RJ-45 serial port.

![Diagram of CoBox-DR configuration]

For RS-232 communication, jumpers must be configured properly. Refer to Hardware Installation guide for specific ISC.
To configure the server and channel 1, refer to the following screenshots.

Information is available for hexadecimal values. See Commonly Used Values on page 166.

**Server configuration**

```
*************** Channel 1 ***************
Baudrate 38400, I/F Mode 4C, Flow 02
Port 3001
Remote IP Addr: --- none ---, Port 00000
Connect Mode: C0 Distconn Mode: 00
Flush Mode: 00

*************** Expert ***************
TCP Keepalive : 45s
ARP cache timeout : 600s
Change Setup : 0 Server configuration
   1 Channel 1 configuration
   5 Expert settings
   6 Security
   7 Factory defaults
   8 Exit without save
   9 Save and exit
Your choice ? 0
IP Address : <206>.<152>.<245>.<159>
Set Gateway IP Address (Y) Y
Gateway IP addr <206>.<152>.<245>.<254>
Netmask: Number of Bits for Host Part (0=default) <8>
Change telnet config password (N) N
```

**Channel 1 configuration**

```
Change Setup : 0 Server configuration
   1 Channel 1 configuration
   5 Expert settings
   6 Security
   7 Factory defaults
   8 Exit without save
   9 Save and exit
Your choice ? 1
Baudrate <38400> ?
I/F Mode <4C> ?
Flow <02> ?
Port No <3001> ?
ConnectMode <C0> ?
Remote IP Address : <000>.<000>.<000>.<000>
Remote Port <0> ?
DistConnMode <00> ?
FlushMode <00> ?
DistConnTime <00:00> ?:
SendChar 1 <00> ?
SendChar 2 <00> ?
```

### 29.7 Lantronix SecureBox SDS1100/1101

Connect the SDS device with an ISC. As of September 2005, the firmware version is 5.6, with an AES library version 1.8.2.1.
SDS1100 to ISC, 2-wire RS-485

Ports 1 & 6 Wiring Configuration

<table>
<thead>
<tr>
<th>ISC</th>
<th>25-Pin Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXD/TR1+</td>
<td>Pin 14 and 21</td>
</tr>
<tr>
<td>RXD/TR1-</td>
<td>Pin 15 and 22</td>
</tr>
<tr>
<td>RTS/R1+</td>
<td>Not Used</td>
</tr>
<tr>
<td>CTS/R1-</td>
<td>Not Used</td>
</tr>
<tr>
<td>GND</td>
<td>Pin 7</td>
</tr>
</tbody>
</table>

ISC:
Communications Interface Type = RS-485
RS-485 Type = 2-Wire RS-485
(Refer to the ISC documentation for more information.)
**Ports 1 & 6 Wiring Configuration**

<table>
<thead>
<tr>
<th>ISC</th>
<th>25-Pin Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXD/TR1+</td>
<td>Pin 2</td>
</tr>
<tr>
<td>RXD/TR1-</td>
<td>Pin 3</td>
</tr>
<tr>
<td>RTS/R1+</td>
<td>Not Used</td>
</tr>
<tr>
<td>CTS/R1-</td>
<td>Pins 4 &amp; 5</td>
</tr>
<tr>
<td>GND</td>
<td>Pin 7</td>
</tr>
<tr>
<td>Jumper Together</td>
<td>6, 8 &amp; 20</td>
</tr>
</tbody>
</table>

**ISC:**

*Communications Interface Type* = RS-232  
*RS-232 Type* = 4-Wire RS-232  
(Refer to the ISC documentation for more information.)
29.7.1 Configuration of the SDS1100/1101/CoBox-FL

To configure this Lantronix device, perform the following procedures. You may configure through a telnet connection over the network, or a terminal program over a serial connection. For more information, refer to the Lantronix User Guide.

Notes: These instructions also apply for the CoBox-FL, with the exception of encryption. Encryption is not available on the CoBox-FL.

Encryption using the Lantronix SDS is supported only for third-party devices, and not Stanley access panels. Ensure that encryption is turned off for use with Stanley access panels.

**Using Telnet**

1. From the command prompt, type the following to enter the configuration menu:
   
   telnet <IP Address> 9999
   
   Or, in Unix:
   
   telnet <IP Address>:9999
   
   This command will open the IP Address using port 9999, which is reserved for configuration.

   Lantronix SDS settings

   *** Lantronix Secure Device Server ***
   MAC address 00204080A747
   Software version V5.8.0.1 (041014) SDS1100
   AES library version 1.8.2.1
   Press Enter for Setup Mode

2. Press <Enter> to go into the setup mode. The Change Setup menu is displayed.

   Change Setup menu

   Change Setup:
   0 Server
   1 Channel 1
   5 Expert
   6 Security
   7 Factory defaults
   8 Exit without save
   9 Save and exit

3. Type the number of the option you would like to access. Press <Enter>.

4. Select the option which you would like to change and type in the new value. If you would like to just confirm the current setting, do not type anything. Press <Enter>.

5. Select 0 for Server, the device’s current settings are displayed.
Server configuration

- **IP Address**: If DHCP is not used to assign IP addresses, enter the IP address manually. The IP address must be set to a unique value in the network. Enter each octet and press <Enter> between each section. The current value displays in parentheses.

- **Gateway IP Address**: The gateway address, or router, allows communication to other LAN segments. The gateway address should be the IP address of the router connected to the same LAN segment as the unit. The gateway address must be within the local network. The default setting is N (No), meaning the gateway address has not been set. To set the gateway address, type Y and enter the address.

- **Netmask: Number of Bits for Host Part**: A netmask defines the number of bits taken from the IP address that are assigned for the host part.

  **Note**: Class A: 24 bits; Class B: 16 bits; Class C: 8 bits

  The unit prompts for the number of host bits to be entered, then calculates the netmask, which appears in standard decimal-dot notation (for example, 255.255.255.0) when the saved parameters are shown. The default setting is 0.

- **Change telnet config password**: Setting the telnet configuration password prevents unauthorized access to the setup menu through a telnet connection to port 9999 or through web pages. The password must have four characters. The default setting is N (No). (You do not need a password to access the Setup Mode window by a serial connection.) This setting is optional.

6. You will need to configure the serial port to communicate with the third party hardware devices. (Some of the characters need to be entered in hexadecimal notation.) Select 1 for Channel 1 define how the serial port responds to network and serial communications.

Channel 1 configuration

- **Baudrate**: The unit and attached serial device, such as a modem, must have matching speed or baud rates to use for the serial connection. Valid baud rates are 300, 600, 1200, 2400, 4800, 9600 (default), 19200, 38400, 57600, 115200, and 230400 baud.

- **I/F Mode**: The Interface (I/F) Mode is a bit-coded byte entered in hexadecimal notation. The default setting is 4C. See Common I/F Mode Values on page 166.
c. **Flow.** Flow control sets the local handshaking method for stopping serial input/output. The default setting is 00. See Common Flow Control Values on page 166.

d. **Port No.** The port number setting represents the source port number in TCP connections. It is the number that identifies the channel for remote initiating connections. The default is port 10001. The range is 1-65535. This should always be set to 3001 in order to communicate with third party hardware devices.

e. **Connect Mode.** Connect Mode defines how the unit makes a connection, and how it reacts to incoming connections over the network. The default setting is C0 and should be used to communicate with third party hardware devices.

The following may be left at default settings:

- Remote IP Address.
- Remote Port.
- DosConnMode.
- FlushMode.
- DisConnTime.
- SendChar 1.
- SendChar 2.

7. When the configuration is complete, type 9 in the Change Setup menu to save your settings and exit. The device will reboot. Or, to exit without saving any of your changes, type 8.

### Using a Terminal Program

Use a terminal program to configure the device through a serial connection.

1. Connect the device to a console terminal or PC running a terminal emulation program using the serial port. The default serial port settings are 9600 baud, 8 bits, no parity, 1 stop bit, no flow control.

2. Reset the device by cycling the unit's power (turning the power off and back on). Immediately upon resetting the device, type xxx.

3. At this point, the screen display is the same as a telnet connection. To continue, go to step 2 under Using Telnet.

### 29.8 Lantronix UDS-10/UDS100/UDS200/UDS1100

#### Step 1: Establish a serial connection with ETHLAN

With the power OFF on the UDS device, establish a serial communication from the UDS to the PC’s serial communication port, for example, using HyperTerminal.

1. Start HyperTerminal.

2. Select the correct PC port and change the communication settings to 9600 baud, 8 data bit, and parity none.
3. Hold down the <X> key on your keyboard and plug the power back into the UDS device. This will allow you to enter the setup mode on the ETHLAN.

4. At this point, type <Enter>, and follow the onscreen instructions for programming.

5. When prompted for a password, please use UDS and press <Enter>.

---

**Step 2: Establish network communication**

1. Determine the IP address that will be programmed into the UDS.

2. Enter the Server Configuration menu by typing 0 and hitting <Enter>.

3. Follow the onscreen instructions and enter all your necessary network settings.

4. Refer to the manufacturer manual when entering the subnet mask information. Note: for standard class C subnet, enter an 8.

5. Once you have finished entering all your custom network settings, type a 9 at the prompt. This will save all your network configurations and reboot the UDS.

6. You can close your current HyperTerminal session.
Step 3: Configure the UDS ETHLAN

Make sure that the device is powered up, completely booted, and connected to the Network.

1. Start Telnet.
2. From the connect menu, connect to the device using the IP address, Port address of 9999, and terminal type of VT100.
3. You will see the same configuration screen as before, now hit <Enter> and go into the setup.
4. At the selections prompt, type 1 and hit <Enter> to go into the Channel Configurations menu.
5. Once you are in the setup for channel 1 configuration, please make the following changes:
   a. Baud rate = 38400
   b. I/F mode = 4C. See Common I/F Mode Values on page 166.
   c. Flow Control = 02. See Common Flow Control Values on page 166.
   d. Port Number = 3001
   e. Connection Mode = C0
   f. Remote IP Address = (000). (000). (000). (000)
   g. Remote Port = 00000
   h. DisConnMode = 00
   i. Flush Mode = 00
   j. Disconnect Time = 00:00
   k. Send Char 1 = 00
   l. Send Char 2 = 00
6. Once these settings have been properly configured, enter 9 at the prompt to save changes and exit.
7. Close the Telnet session.
8. Cycle the power manually on the UDS and let it reboot.
9. At this point, make sure that switch 5 on the ISC is configured correctly for hardware flow control. It should be set to “ON.”
10. To verify that the device is talking on the network you can “ping” from the command prompt by typing ping IP address.
29.8.1 Wiring Configuration for Custom DB25 Serial Cable

The cable for the UDS must be a straight through cable. The Other LANTRONIX devices, such as the MSS-100, require a null cable for serial communication to the ISC. The cable is also different because the MSS-100 uses a serial cable with a female DB25 connector. The UDS custom cable must have a male connector because the fixed serial port on the device has a female adapter.

<table>
<thead>
<tr>
<th>TXD</th>
<th>Pin 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>RXD</td>
<td>Pin 3</td>
</tr>
<tr>
<td>RTS</td>
<td>Pin 4</td>
</tr>
<tr>
<td>CTS</td>
<td>Pin 5</td>
</tr>
<tr>
<td>GND</td>
<td>Pin 7</td>
</tr>
</tbody>
</table>

Note: Refer to the manufacturer installation manual for more information on the custom cable and pin out information.

29.8.2 Connecting the UDS with an ISC

These units operate on 10-base T. Make sure that if connected to a hub, that it is 10 base T or auto-sensing 10/100.

Wiring for RS-232 4-wire.

Ports 1 and 6 wiring configuration for 4-wire (RS-232)

<table>
<thead>
<tr>
<th>ISC</th>
<th>25-pin connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>TXD/TR1+</td>
<td>Pin 2</td>
</tr>
<tr>
<td>RXD/TR1-</td>
<td>Pin 3</td>
</tr>
<tr>
<td>RTS/R1+</td>
<td>Not used</td>
</tr>
<tr>
<td>CTS/R1-</td>
<td>Pins 4 and 5</td>
</tr>
<tr>
<td>GND</td>
<td>Pin 7</td>
</tr>
<tr>
<td>Jumper together</td>
<td>6, 8, and 20</td>
</tr>
</tbody>
</table>
Configuring UDS-10 to ISC 4-Wire (232)

ISC:
Communications Interface Type = RS-232
RS-232 Type = 4-Wire RS-232
(Refer to ISC documentation for more information)
**Unit Setup (RS-232 4-wire)**

As of March 2004, the current firmware version is 4.5. Connect to the unit via Telnet through port 9999. The Channel 1 configuration is shown below.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baudrate</td>
<td>38400</td>
</tr>
<tr>
<td>I/F Mode</td>
<td>4C</td>
</tr>
<tr>
<td>Flow</td>
<td>02</td>
</tr>
<tr>
<td>Port No</td>
<td>03001</td>
</tr>
<tr>
<td>ConnectMode</td>
<td>00000</td>
</tr>
<tr>
<td>Remote IP Address</td>
<td>(000) (000) (000) (000)</td>
</tr>
<tr>
<td>Remote Port</td>
<td>000000</td>
</tr>
<tr>
<td>Disconnect Mode</td>
<td>00</td>
</tr>
<tr>
<td>Flush Mode</td>
<td>00</td>
</tr>
<tr>
<td>Disconnect Time</td>
<td>00:00</td>
</tr>
<tr>
<td>SendChar 1</td>
<td>00</td>
</tr>
<tr>
<td>SendChar 2</td>
<td>00</td>
</tr>
</tbody>
</table>

**Wiring for RS-485 2-wire**

**Ports 1 and 6 wiring configuration for 2-wire (RS-485)**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISC</td>
<td>25-pin connector</td>
</tr>
<tr>
<td>TXD/TR1+</td>
<td>Pins 14 and 21</td>
</tr>
<tr>
<td>RXD/TR1-</td>
<td>Pins 15 and 22</td>
</tr>
<tr>
<td>RTS/R1+</td>
<td>Not used</td>
</tr>
<tr>
<td>CTS/R1-</td>
<td>Not used</td>
</tr>
<tr>
<td>GND</td>
<td>Pin 7</td>
</tr>
</tbody>
</table>

**Note:** The pinouts in the earlier UDS-10 Installation Guide are incorrect! The correct pinout for an RS-485 connection are as follows:

- 7 — Ground
- 14 — TX+
- 15 — TX-
- 21 — RX+
- 22 — RX-
Configuring UDS -10 to ISC 2-Wire (485)

**ISC:**
Communications Interface Type = RS-485
RS-485 Type = 2-Wire RS-485
(Refer to ISC documentation for more information)
**Unit Setup (RS-485 2-wire)**

As of March 2004, the current firmware version is 4.5. Connect to the unit via Telnet through port 9999. The Channel 1 configuration is shown below.

```
Bandrate <38400> ?
I/F Mode <4F> ?
Flow <02> ?
Port No <03001> ?
ConnectMode <00> ?
Remote IP Address : <000> . <000> . <000> . <000>
Remote Port <00000> ?
DisconnectMode <00> ?
FlushMode <00> ?
DisconnectTime <00:00> ? :
SendChar 1 <00> ?
SendChar 2 <00> ?
```

### 29.9 Commonly Used Values

Interface (I/F) mode is a bit-coded byte entered in hexadecimal notation, as is flow control.

**Common I/F Mode Values**

<table>
<thead>
<tr>
<th>I/F Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F8</td>
<td>RS-232, 2 stop bits, even parity, 7-bit byte size</td>
</tr>
<tr>
<td>78</td>
<td>RS-232, 1 stop bit, even parity, 7-bit byte size</td>
</tr>
<tr>
<td>4C</td>
<td>RS-232, 1 stop bit, no parity, 8-bit byte size</td>
</tr>
<tr>
<td>5C</td>
<td>RS-232, 1 stop bit, odd parity, 8-bit byte size</td>
</tr>
</tbody>
</table>

**Common Flow Control Values**

<table>
<thead>
<tr>
<th>Flow Control</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>No flow control</td>
</tr>
<tr>
<td>02</td>
<td>Hardware handshake with RTC/CTS lines</td>
</tr>
</tbody>
</table>
Black Box Settings:

Jumper:
- W5 - should be on B-C to set RTS/CTS/CD
- W6 - should be on A-B to set 4-wire
- W9 - should be on D to set ON
- W15 - should be on A-B to set RTS/CD Enabled
- W16 - should be on A to set 0 ms Turn Around Delay
- W17 - should be on E to set 0.15 ms Driver Enable Hold
- W19 - NO JUMPER. This is for test purposes only.
- XW1A - Jumper-block must be installed here to set DCE Emulation Mode
- XW1B - Jumper-block must NOT be installed here (this would change mode to DTE Emulation).

Switches:
- S1 - Out to set Normal
- S2 - ON to set Terminated or OFF to set Not Terminated
- S3 - OFF to set Not Biased

ISC:

Communications Interface Type = RS-485
RS-485 Type = 4-Wire RS-485
Port 1 RS-485 EOL Termination = Termination ‘OFF’
(Refer to ISC documentation for more information)
29.11 BAS-IC108A/IC109A RS-232 to RS-485 Converter (2-Wire)

**Black Box Settings:**

**Jumpers:**
- W5 - should be on A-B to set RTS/CTS
- W8 - should be on B-C to set 2-wire
- W9 - should be on C to set 0-msec
- W15 - should be on B-C to set DATA Enabled
- W16 - should be on B to set 0.1 msec Turn Around Delay (This may need to be changed depending on the distance of the RS-485 line. Refer to Black Box Manual)
- W17 - should be on D to set 0.7 ms Driver Enable Hold
- W19 - NO JUMPER. This is for test purposes only.
- XW1A - Jumper-block must be installed here to set DCE Emulation Mode

**Switches:**
- S1 - Out to set Normal
- S2 - ON to set Terminated or OFF to set Not Terminated
- S3 - OFF to set Not Biased

**Wiring:**
- *TxA and RxA must be jumpered together on the terminal strip inside the converter (see diagram)*
- *TxB and RxB must be jumpered together on the terminal strip inside the converter (see diagram)*

**ISC:**
- Communications Interface Type = RS-485
- RS-485 Type = 2-Wire RS-485
- Port 1 RS-485 EOL Termination = Termination 'OFF'
  (Refer to ISC documentation for more information)

---

**Diagram:**

- I/O panel and connection points labeled
- Connection between ISC and Black Box IC108A/IC109A
- Transformer indicated
- Connection to Workstation (PC) via DB 9 Pin Male or 25 Pin Female connector

---

ISC Communications
29.12 BAS-IC108A RS-232 to RS-485 Converter (2-Wire RS-485) to S711D FiberOption Converter to an ISC

29.12.1 Black Box Settings

**Jumpers**

- W5 should be on A-B to set RTS/CTS
- W8 should be on B-C to set 2-wire
- W9 should be on C to set 0-msec
- W15 should be on B-C to set DATA Enabled
- W16 should be on B to set 0.1 msec Turn Around Delay (This may need to be changed depending on the distance of the RS-485 line. Refer to Black Box manual.)
- W17 should be on D to set 0.15 ms Driver Enable Hold
- W19: NO JUMPER. This is for test purposes only.
- XW1A: Jumper-block must be installed here to set DCE Emulation Mode

**Switches**

- S1: Out to set Normal
- S2: ON to set Terminated of OFF to set Not Terminated
- S3: OFF to set Not Biased

**Wiring**

- *TxA and RxA must be jumpered together on the terminal strip inside the converter (see diagram).
- *TxB and RxB must be jumpered together on the terminal strip inside the converter (see diagram).

**ISC**

- Communication Interface Type = RS-485
- RS-485 Type = 2-wire RS-485
- Port 1 RS-485 EOL Termination = BAS-2000 and BAS-500 termination set to ON; BAS-1000 termination turned OFF. (Refer to ISC documentation for more information.)
29.13 Configuring Two BAS-838A RS-232 to RS-485 Converters

Use the following information to set up black boxes BAS-838A (LD485A).

ISC panels can be multidropped on the RS-485 line using this configuration.
29.13.1 Black Box Settings for 2-wire RS-485 Configuration

**Jumpers**

W5 should be on A-B to set RTS/CTS.
W8 should be on B-C to set 2-wire
W9 should be on C to set 0-msec
W15 should be on B-C to set DATA Enabled
W16 should be on B to set 0.1 msec Turn Around Delay. This may need to be changed depending on the distance of the RS-485 line. Refer to the Black Box manual.
W17 should be on D to set 0.15 ms Driver Enable Hold
W19 - NO JUMPER. This is for testing purposes only.
XW1A - Jumper-block must be installed here to set DCE Emulation Mode.

**Switches**

S1 - Out to set Normal
S2 - ON to set Terminated
S3 - OFF to set Not Biased

**ISC**

Communication Interface Type: RS-485
RS-485 Type: 2-wire RS-485
Port 1 RS-485 EOL Termination: Termination OFF

29.13.2 Wiring

TxA and RxA must be jumpered together on the terminal strip inside the converter (see diagram). TxB and RxB must be jumpered together on the terminal strip inside the converter (see diagram).
ISC panels can be multidropped on the RS-485 line using this configuration. Follow typical EOL termination.
29.13.3  Black Box Settings for 4-wire RS-485

Jumpers

- W5 should be on A-B to set RTS/CTS.
- W8 should be on B-C to set 4-wire
- W9 should be on C to set 0-msec
- W15 should be on B-C to set DATA Enabled
- W16 should be on B to set 0.1 msec Turn Around Delay. This may need to be changed depending on the distance of the RS-485 line. Refer to the Black Box manual.
- W17 should be on D to set 0.15 ms Driver Enable Hold
- W19 - NO JUMPER. This is for testing purposes only.
- XW1A - Jumper-block must be installed here to set DCE Emulation Mode.

Switches

- S1 - Out to set Normal
- S2 - ON to set Terminated
- S3 - OFF to set Not Biased

ISC

- Communication Interface Type: RS-485
- RS-485 Type: 4-wire RS-485
- Port 1 RS-485 EOL Termination: Termination OFF

29.13.4  Wiring

TxA and RxA must be jumpered together on the terminal strip inside the converter (see diagram). TxB and RxB must be jumpered together on the terminal strip inside the converter (see diagram).
29.14 Dial-Up Configuration for the ISC

Refer to the following diagram for dial-up configuration. Note: ALL DIAL-UP PANELS MUST BE SET TO ADDRESS 1 OR DIAL-BACK CAPACITY WILL FAIL. Modem DIP Switches 1, 3, 4, 5, and 8 should be ON. DIP Switches 2, 6, and 7 should be OFF.
Dial-Up Configuration

US Robotics Sportster 56Kbps Modem
25 Pin Female Connector
2 3 4 5 6 7 8 20

US Robotics Sportster 56Kbps Modem
25 Pin Male Connector

Modem Configuration: 8 Data, 1 Stop, No Parity

 Intelligent System Controller

9Vac (1000mA) Power Supply

Modem-controller cable, part #HOC-56KEXT

Standard Modem Cables

Black Box Part # BC00301 (DB9F/DB25M)
1............8
2............3
3............2
4............20
5............7
6............6
7............4
8............5
9............22
shell...1,shell

Black Box Part # BC00401 (DB25M/DB25F)
1.............1
2.............2
3.............3
4.............4
5.............5
6.............6
7.............7
8.............8
9.............22
20...........20

Host PC with Access Control Driver
9 or 25 Pin Connector Communication Ports
The US Robotics Sportster 56Kbps modems (BAS-56KEXT) have eight DIP switches which need to be configured. They are located on the back of the modem.

<table>
<thead>
<tr>
<th>DIP Switch</th>
<th>Position</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UP</td>
<td>Data Terminal Ready normal</td>
</tr>
<tr>
<td></td>
<td>DOWN</td>
<td>Data Terminal Ready Override</td>
</tr>
<tr>
<td>2</td>
<td>UP</td>
<td>Verbal result codes</td>
</tr>
<tr>
<td></td>
<td>DOWN</td>
<td>Numeric result codes</td>
</tr>
<tr>
<td>3</td>
<td>UP</td>
<td>Suppress result codes</td>
</tr>
<tr>
<td></td>
<td>DOWN</td>
<td>Display result codes</td>
</tr>
<tr>
<td>4</td>
<td>UP</td>
<td>Echo offline commands</td>
</tr>
<tr>
<td></td>
<td>DOWN</td>
<td>No echo, offline commands</td>
</tr>
<tr>
<td>5</td>
<td>UP</td>
<td>Auto answer on first ring, or higher if specified in NVRAM</td>
</tr>
<tr>
<td></td>
<td>DOWN</td>
<td>Auto answer off</td>
</tr>
<tr>
<td>6</td>
<td>UP</td>
<td>Carrier detect normal</td>
</tr>
<tr>
<td></td>
<td>DOWN</td>
<td>Carrier detect override</td>
</tr>
<tr>
<td>7</td>
<td>UP</td>
<td>Load NVRAM defaults</td>
</tr>
<tr>
<td></td>
<td>DOWN</td>
<td>Load factory defaults</td>
</tr>
<tr>
<td>8</td>
<td>UP</td>
<td>Dumb mode</td>
</tr>
<tr>
<td></td>
<td>DOWN</td>
<td>Smart mode</td>
</tr>
</tbody>
</table>

The default configuration for the ISC modem and panel end modem DIP Switches are as follows (notice DIP switch #1 is down):

The default configuration for the ISC and host end modem DIP Switches are as follows (notice DIP switch #1 is up):
The Sportster modem also has a row of indicator lights in the front:

<table>
<thead>
<tr>
<th>ARQ/FAX</th>
<th>Error control</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS</td>
<td>Clear to send</td>
</tr>
<tr>
<td>TR</td>
<td>Terminal ready</td>
</tr>
<tr>
<td>SD</td>
<td>Send Data</td>
</tr>
<tr>
<td>RD</td>
<td>Received Data</td>
</tr>
<tr>
<td>CD</td>
<td>Carrier Detect</td>
</tr>
<tr>
<td>AA</td>
<td>Auto Answer</td>
</tr>
</tbody>
</table>

### 29.14.1 Courier 3Com U.S. Robotics 56K (external) Modem

Features of this modem include:

- Up to 56K bps download capability using ITU V.92 technology.
- Ultra-fast throughput with 230.4K bps DTE port.
- If a loss of carrier is detected, the modem automatically redials the last number called.
- Modem settings can be configured from a remote location.
- Dial security (including dial back) – authorized callers and modems are verified prior to passing a remotely originating call. Dial back can also be initiated based on device configuration.
- Future proof with Flash ROM and Flash DSP for software enhancements and upgrades.
- Supports two-wire leased line applications.

**Note:** Installing the US Robotics ControlCenter will allow flash updates of the modem firmware. For more information, refer to the US Robotics documentation.

For the access control software to function properly, the DIP switches must be configured as follows.

```
DIP switch settings
```

![DIP switch settings diagram]

Once the modem is set up, you must send the following “AT” command sequences for the modem to work with the access control software.

1. Connect to the modem via a terminal program, such as HyperTerminal.
2. Enter the following commands:
   AT+F0<Enter>
   AT+PIG=1+PMH=1+FQC=3<Enter>
   ATY0X4T&A3&B1&H1&R2&W0<Enter>

3. Exit the terminal program.

29.15 Securcomm Uniflex DC336 Modems (12 VDC)

The Securcomm Uniflex DC336 modem (BAS-DC336) is the recommended modem for (ISC) dial-up configurations for the ISC end. Refer to the following diagram for wiring the modem and panel.
<table>
<thead>
<tr>
<th>Connector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RJ-11 Connector</td>
<td>Used to connect the modem to a normal dial circuit or a dedicated 2-wire leased circuit</td>
</tr>
<tr>
<td>Power Connector</td>
<td>Provides DC voltages to the modem (rack mount versions)</td>
</tr>
</tbody>
</table>
This modem functions best when using DTR override with command echo disabled. The factory default setting is “DTR drop causes the modem to hang up, auto-dial is inhibited.” To configure these settings, do the following:

1. Connect to the modem using a terminal program, such as HyperTerminal.
2. Type `AT&F0` to restore factory configuration 1.
3. Type `ATE0&D0&W0` to disable the command echo, override DTR, and store these settings to profile 0.
4. Disconnect from the modem and exit the terminal program.

For more information, refer to the Securcomm Uniflex modem operating instructions and programming manual.

### 29.16 Fiber Options

#### 29.16.1 Wiring for Fiber Optic Direct Connect

The following wiring method uses Fiber Options hardware (part number S711D-EST2). Two optical fiber cables and two 12 VDC power supplies are also required. The Data Select settings for both Fiber Options converters must be set to two.
The main benefit of this fiber optic configuration is the capability to increase the distance between the PC and the ISC from 4000 feet to 42,240 feet (8 miles).

Note: The Fiber Options devices are supported in an RS-232 to RS-232 connection from host to ISC and in an RS-485 to RS-485 connection from host to ISC. The system does not support RS-232 to RS-485 or RS-485 to RS-232 from host to ISC.

### 29.16.2 Wiring for Fiber Optic Communication

The following wiring method uses Fiber Options hardware (part number S711D-EST2). Two Optical Fiber cables and two 12 VDC power supplies are also required. This diagram shows wiring downstream devices off the ISC using Fiber Optics. This specific diagram is connecting the Single Reader Interface Module to the ISC. The Data Select settings for both Fiber Options convertors must be set to six.
29.17 Comtrol RocketPort Hub Si

Three RocketPort Serial Hubs are supported. They are LAN attached serial hubs, using DB9 connectors.

The two-port hub has 10/100base-T input, with two selectable output ports. It is certified for up to eight ISCs on each of the two downstream ports in an RS-485 configuration.

The four-port hub has a 10base-T only input, with four selectable output ports (RS-232, RS-422, or RS-485). It is certified for a maximum of 16 ISCs on each RocketPort hub.

The eight-port hub has a 10base-T only input, with eight selectable output ports (RS-232, RS-422, or RS-485). It is certified for a maximum of 16 ISCs on each RocketPort hub.
29.17.1  RocketPort Hub Settings

Note: These settings can be modified in Device Manager.

Port RS Mode = RS-485
Override and Lock Baud Rate To = None
Timeout on transmit data on port close = 1 sec.
Inactive Timeout Period = 120 sec.
Map 2 stop bits to 1 = Off
Wait on physical transmission before completing write = Off
Emulate modem hardware RING signal = Off
Override and lock to RTS toggle mode = Off
RTS Toggle RTS low = On

ISC:

Communications Interface Type = RS-485
RS-485 Type = 2-wire RS-485
Port 1 RS-485 EOL Terminations = BAS-2000 and BAS-500 termination set to ON; BAS-1000 terminations turned OFF. For more information, please refer to the ISC documentation.

29.17.2  Wiring the RocketPort Si Hub

Refer to the following diagram for wiring the RocketPort Si Hub to the ISC.
The PIN assignments are as follows:

<table>
<thead>
<tr>
<th>Control female DB-9 connector</th>
<th>ISC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 3 (TRX-)</td>
<td>RXD</td>
</tr>
<tr>
<td>Pin 7 (TRX+)</td>
<td>TXD</td>
</tr>
<tr>
<td>Pin 5 (GND)</td>
<td>GND</td>
</tr>
</tbody>
</table>

ISC panels can be multidropped on the RS-485 line using this configuration.
### ISC Settings

#### Jumper Settings

<table>
<thead>
<tr>
<th>Jumper</th>
<th>BAS-500</th>
<th>BAS-1000</th>
<th>BAS-2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jumper 1</td>
<td>na</td>
<td>1</td>
<td>na</td>
</tr>
<tr>
<td>Jumper 2</td>
<td>na</td>
<td>512 K</td>
<td>na</td>
</tr>
<tr>
<td>Jumper 3</td>
<td>485</td>
<td>512 K</td>
<td>na</td>
</tr>
<tr>
<td>Jumper 4</td>
<td>485</td>
<td>512 K</td>
<td>485</td>
</tr>
<tr>
<td>Jumper 5</td>
<td>485</td>
<td>na</td>
<td>485</td>
</tr>
<tr>
<td>Jumper 6</td>
<td>485</td>
<td>not used</td>
<td>485</td>
</tr>
<tr>
<td>Jumper 7</td>
<td>2W</td>
<td>off</td>
<td>485</td>
</tr>
<tr>
<td>Jumper 8</td>
<td>ON</td>
<td>off</td>
<td>2W</td>
</tr>
<tr>
<td>Jumper 9</td>
<td>485</td>
<td>485</td>
<td>ON</td>
</tr>
<tr>
<td>Jumper 10</td>
<td>ON</td>
<td>485</td>
<td>485</td>
</tr>
<tr>
<td>Jumper 11</td>
<td>ON</td>
<td>485</td>
<td>ON</td>
</tr>
<tr>
<td>Jumper 12</td>
<td>ON</td>
<td>485</td>
<td>na</td>
</tr>
<tr>
<td>Jumper 13</td>
<td>ON</td>
<td>485</td>
<td>485</td>
</tr>
<tr>
<td>Jumper 14</td>
<td>na</td>
<td>2W</td>
<td>485</td>
</tr>
<tr>
<td>Jumper 15</td>
<td>na</td>
<td>ON</td>
<td>485</td>
</tr>
<tr>
<td>Jumper 16</td>
<td>na</td>
<td>ON</td>
<td>485</td>
</tr>
<tr>
<td>Jumper 17</td>
<td>na</td>
<td>ON</td>
<td>2W</td>
</tr>
<tr>
<td>Jumper 18</td>
<td>na</td>
<td>ON</td>
<td>ON</td>
</tr>
<tr>
<td>Jumper 19</td>
<td>na</td>
<td>na</td>
<td>485</td>
</tr>
<tr>
<td>Jumper 20</td>
<td>na</td>
<td>na</td>
<td>ON</td>
</tr>
<tr>
<td>Jumper 21</td>
<td>na</td>
<td>na</td>
<td>ON</td>
</tr>
<tr>
<td>Jumper 22</td>
<td>na</td>
<td>na</td>
<td>ON</td>
</tr>
<tr>
<td>Jumper 23</td>
<td>na</td>
<td>na</td>
<td>ON</td>
</tr>
<tr>
<td>Jumper 24</td>
<td>na</td>
<td>na</td>
<td>ON</td>
</tr>
<tr>
<td>Jumper 25</td>
<td>na</td>
<td>na</td>
<td>2-3</td>
</tr>
<tr>
<td>Jumper 26</td>
<td>na</td>
<td>na</td>
<td>ON</td>
</tr>
</tbody>
</table>
29.17.3  RocketPort Driver

Be sure to install the driver for the RocketPort Si Hub from Comtrol. When finished, you will need to restart the computer.

29.17.4  Configuring the RocketPort Hub

*Configure the RocketPort*

1. Turn on the RocketPort.
2. In the Device Manager, expand Multi-port serial adapters. Right-click the RocketPort Serial Hub port and select *Properties*.
3. On the Main Setup tab, select the RocketPort Serial Hub Si Port and click [Properties].
4. Click on the Device tab. In the Device Window, notice that the MAC address is incomplete.
5. Enter the MAC address as found on the bottom of the Comtrol unit. Click [OK].
6. Click [OK] for the Properties window.
7. Restart the computer.

*Configure the IP Address*

1. In the Device Manager, expand Multi-port serial adapters. Right-click the RocketPort Serial Hub port and select *Properties*. On the Advisor tab, the summary box should say “Uninitialized.”
2. Click on the IP Programming tab.
3. In the Device Control Box, click [Retrieve]. A confirmation message will be displayed. Click [OK] to populate the TCP/IP setting field boxes.
4. Click [Program]. A confirmation message will be displayed. Click [OK] to begin programming the device.
5. The unit must be reset. Click [Reset] and the unit programming will be completed.
6. Restart the computer.

**Configure Ports**

1. In the Device Manager, expand Multi-port serial adapters. Right-click the RocketPort Serial Hub port and select **Properties**.
2. On the Main Setup tab, select the port being used for communication and click [Properties].
3. For RS-485 2-wire communication, use the following settings:

<table>
<thead>
<tr>
<th>Port Setup</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>RS mode:</td>
<td>485</td>
</tr>
<tr>
<td>Override and lock baud rate to:</td>
<td>None</td>
</tr>
<tr>
<td>Timeout on transmit data on port close:</td>
<td>0 sec</td>
</tr>
<tr>
<td>Inactive Timeout Period:</td>
<td>120 sec</td>
</tr>
<tr>
<td>Map 2 stop bits to 1</td>
<td>unchecked</td>
</tr>
<tr>
<td>Wait on physical transmission before completing write</td>
<td>unchecked</td>
</tr>
<tr>
<td>Emulate modem hardware TRING signal</td>
<td>unchecked</td>
</tr>
<tr>
<td>COM name:</td>
<td>Select appropriate name</td>
</tr>
</tbody>
</table>

4. On the RTS Toggle tab, select **RTS Toggle RTS Low**.
5. Click [OK].
BAS-1100 INPUT CONTROL MODULE
30 Overview of the BAS-1100

The Input Control Module (ICM) provides the access control system with high-speed acknowledgment of critical alarm points in monitored areas. It has sixteen configurable input control points and two output control relays. The ICM supports normally open, normally closed, supervised and non-supervised circuits.

The input circuits are scanned at a rate of sixty (60) times per second, with a debounce timing of 64 mS. The digitized input status signal is software monitored and controlled, resulting in the ability for each input point to be programmed as a supervised or non-supervised alarm point, normally open or normally closed monitoring point.

The output relays can also be configured for fail-safe or fail-secure. The relays support “On,” “Off,” and “Pulse” controls.

Both the BAS-1100 series 1 (serial numbers 40,000 or less) and series 2 (serial numbers greater than 40,000, labeled revision D) are supported. The series 2 board differs slightly from the series 1 boards. Where series 2 is indicated, the information only applies to series 2 boards. Otherwise, the information applies to both series 1 and 2 boards.

30.1 Interfaces

The Input Control Module interfaces upstream with the Intelligent System Controller.

Intelligent System Controller Communications Overview

- RS-485 Multi-drop 2 or 4 wire
- Up to 32 Single Reader Interface Modules (32 readers)
- Up to 32 Dual Reader Interface Modules (64 readers)
- Up to 16 Output Control Modules
- Up to 16 Alarm Input Control Modules

Communications from Host to Controller
- RS-232, RS-485, Ethernet
- Dial-up, Fiber, etc...
30.2 The Input Control Module (Series 2)

The series 2 Input Control Module board contains the following components: sixteen (16) software configurable alarm inputs, two (2) non-supervised alarm inputs, two (2) alarm output relays, one (1) RS-485 interface, one (1) power input, eight (8) dip switches, jumpers, and status LEDs.

30.2.1 Status LEDs

The series 2 Input Control Module contains LEDs that can be used to verify correct installation after power up.

Power-up: All LED’s OFF.

Initialization: Once power is applied, initialization of the module begins.

The A LED is turned on at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The MR-16IN is waiting for firmware to be downloaded.

When initialization is completed, LEDs 1 through 16, CT and BA are briefly sequenced ON then OFF.
Run time: After the above sequence, the LEDs have the following meanings:

A LED: Heartbeat and On-Line Status:
• Off-line: 1 second rate, 20% ON
• On-line: 1 second rate, 80% ON

B LED: SIO Communication Port Status:
• Indicates communication activity on the SIO communication port

1 LED: Input Status: 1
2 LED: Input Status: 2
3 LED: Input Status: 3
4 LED: Input Status: 4
5 LED: Input Status: 5
6 LED: Input Status: 6
7 LED: Input Status: 7
8 LED: Input Status: 8
9 LED: Input Status: 9
10 LED: Input Status: 10
11 LED: Input Status: 11
12 LED: Input Status: 12
13 LED: Input Status: 13
14 LED: Input Status: 14
15 LED: Input Status: 15
16 LED: Input Status: 16
CT: Cabinet Tamper
BA: Power Fault

Input in the inactive state: OFF (briefly flashes ON every 3 seconds)

Input in the active state: ON (briefly flashes OFF every 3 seconds)

Input in a fault state: Rapid Flash

LED K1 and K2: correspond to output relay RLY 1 (K1) or RLY 2 (K2) is energized.
31 Installation

To install the Input Control Module, perform the installation procedures described in the following sections, in the order in which they are presented.

31.1 Wiring

1. Wire the non-supervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the software configurable alarm inputs.
3. Wire the upstream host communication.
4. Wire the power input.
5. Wire the relay outputs.

31.1.1 Non-supervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The Input Control Module features two non-supervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the BA (power fault) and CT (cabinet tamper) contact terminals on the Input Control Module board.

The BA and CT inputs are simple N/C (normally closed) contact closure monitors.

Wire the BA and CT inputs using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

Note: If either of these inputs is not used, a shorting wire should be installed.

31.1.2 Software Configurable Alarm Inputs

The Input Control Module contains sixteen (16) software configurable alarm inputs that can be used for alarm device monitoring. Each of these inputs can be configured, via the Access Control software, as either N/O (normally open) or N/C (normally closed) in combination with either supervised or non-supervised wiring.
These alarm inputs are connected using **Inputs 1-16**.

Wire the Inputs 1-16 contacts using **twisted pair cable, 30 ohms** maximum, **24 AWG** minimum. The gauge of the wire may vary, depending on distance and line resistance.

Each input that is configured as a **supervised** alarm must also be terminated with two (2) **1000-ohm resistors** (1% tolerance - 0.25 watt. N/O and N/C alarms are terminated identically).

<table>
<thead>
<tr>
<th></th>
<th>Alarm Zone Contact N/C</th>
<th>Alarm Zone Contact N/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>1K ± 25%</td>
<td>2K ± 25%</td>
</tr>
<tr>
<td>Alarm</td>
<td>2K ± 25%</td>
<td>1K ± 25%</td>
</tr>
<tr>
<td>Fault – Line Short</td>
<td>0 – 50</td>
<td>0 – 50</td>
</tr>
<tr>
<td>Fault – Line Open</td>
<td>15K – ∞</td>
<td>15K – ∞</td>
</tr>
</tbody>
</table>

**Software Configurable Alarm Input Wiring (Inputs 1-16)**

![Diagram](image-url)

**31.1.3 Upstream Controller Communication**

The Input Control Module uses **Port 1** to communicate to the Intelligent System Controller.

Port 1 is an **RS-485** interface that requires the following type of RS-485 cable: **24 AWG** (minimum) **twisted pair** (with shields). Either 2-wire or 4-wire RS-485 cable configuration can be used. The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842, West Penn, or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than Ten (10) feet (Belden 9502 or equivalent).

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.
31.1.4 Power

For the BAS-1100 series 2, the power source should be located as close to module as possible.

Wire the power input with an **18 AWG** (minimum) twisted pair cable.

---

**Note:** Be sure to observe polarity.

---

31.1.5 Relay Outputs

Two form-C contact relays are provided for controlling door strikes or other devices. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, contact protection circuit must be used. The following two circuits are recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30cm]), as the effectiveness of the circuit will decrease if it is located further away.
Use sufficiently large gauge of wires for the load current as to avoid voltage loss.

31.2 Elevator Control

B.A.S.I.S. hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

The application software must be configured for elevator control. This can be done on the Elevator Hardware tab in the Readers window of the System Administration software. The “Elevator” box should be checked. The reader’s type, name, port, address, access panel, can all be defined here.

With elevator control on the BAS-1300 reader, door strike and contact are not available, and REX (Request to EXit) has been disabled.
Addresses assigned to input/output panels do not have to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.
32 Configuration

The Input Control Module board contains 8 DIP switches and 3 jumpers that must be configured for your system.

32.1 Setting DIP Switches

DIP Switches (shown in factory default positions: Address 00; 38400 bps)

The following chart describes the use of each DIP switch.

<table>
<thead>
<tr>
<th>DIP SWITCH(ES)</th>
<th>USED TO CONFIGURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4, 5</td>
<td>Device communication address (0 - 31)</td>
</tr>
<tr>
<td>6, 7</td>
<td>Communication baud rate (38400, 19200, 9600, or 2400 bps)</td>
</tr>
<tr>
<td>8</td>
<td>Not used</td>
</tr>
</tbody>
</table>

32.1.1 Device Address

To configure the device communication address, set DIP switches 1, 2, 3, 4, and 5 according to the following table.

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1:</td>
</tr>
<tr>
<td>0</td>
<td>off</td>
</tr>
<tr>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td>2</td>
<td>off</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
</tr>
<tr>
<td>4</td>
<td>off</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
</tr>
<tr>
<td>6</td>
<td>off</td>
</tr>
<tr>
<td>7</td>
<td>ON</td>
</tr>
<tr>
<td>8</td>
<td>off</td>
</tr>
</tbody>
</table>
### 32.1.2 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table.

<table>
<thead>
<tr>
<th>BAUD RATE:</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>38400 bps</td>
<td>ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>off</td>
</tr>
</tbody>
</table>

### Table: Communication Baud Rate

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>ON off off ON off</td>
</tr>
<tr>
<td>10</td>
<td>off ON off ON off</td>
</tr>
<tr>
<td>11</td>
<td>ON ON off ON off</td>
</tr>
<tr>
<td>12</td>
<td>off off ON ON off</td>
</tr>
<tr>
<td>13</td>
<td>ON off ON ON off</td>
</tr>
<tr>
<td>14</td>
<td>off ON ON ON off</td>
</tr>
<tr>
<td>15</td>
<td>ON ON ON ON off</td>
</tr>
<tr>
<td>16</td>
<td>off off off ON ON</td>
</tr>
<tr>
<td>17</td>
<td>ON off off off ON</td>
</tr>
<tr>
<td>18</td>
<td>off ON off off ON</td>
</tr>
<tr>
<td>19</td>
<td>ON ON off off ON</td>
</tr>
<tr>
<td>20</td>
<td>off off ON off ON</td>
</tr>
<tr>
<td>21</td>
<td>ON off ON off ON</td>
</tr>
<tr>
<td>22</td>
<td>off ON ON off ON</td>
</tr>
<tr>
<td>23</td>
<td>ON ON ON off ON</td>
</tr>
<tr>
<td>24</td>
<td>off off off ON ON</td>
</tr>
<tr>
<td>25</td>
<td>ON off off ON ON</td>
</tr>
<tr>
<td>26</td>
<td>off ON off ON ON</td>
</tr>
<tr>
<td>27</td>
<td>ON ON off ON ON</td>
</tr>
<tr>
<td>28</td>
<td>off off ON ON ON</td>
</tr>
<tr>
<td>29</td>
<td>ON off ON ON ON</td>
</tr>
<tr>
<td>30</td>
<td>off ON ON ON ON</td>
</tr>
<tr>
<td>31</td>
<td>ON ON ON ON ON</td>
</tr>
</tbody>
</table>
Currently, B.A.S.I.S. only supports a baud rate of 38400 bps, so be sure to set both dip switches 6 and 7 to the ON position.

32.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject
common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.
33 Specifications

**The BAS-1100 series 2 is for use in low voltage, class 2 circuits only. These specifications are subject to change without notice.**

- **Primary power:** 12 to 24 VDC ± 10%, 350mA maximum
  - 12 VDC @ 300 mA nominal
  - 24 VDC @ 220 mA nominal
- **Output:** Two (2) outputs, Form-C, 5A @ 28 VDC resistive
- **Inputs:**
  - Sixteen (16) unsupervised/supervised, standard EOL: 1k/1k ohm, 1%, 1/4 watt
  - Two (2) unsupervised, dedicated for cabinet tamper and UPS fault monitoring
- **Communication:** RS-485, 2-wire, 2400 to 38400 bps
- **Cable requirements:**
  - Power: 18 AWG, 1 twisted pair
  - RS-485: 24 AWG, 120 ohm impedance, twisted pair with shield, 4000 feet (1219 m) maximum
  - Alarm inputs: 1 twisted pair, 30 ohms maximum
  - Outputs: as required for the load
- **Mechanical:**
  - Dimension: 6 x 8 x 1 in. (152 x 203 x 25 mm)
  - Weight: 9 oz. (280 g) nominal
- **Environmental:**
  - Temperature: -55 to +85° C storage, 0 to +70° C operating
  - Humidity: 0 to 95% RH
- **Approvals:**
  - UL 294 & UL 1076 Listed
  - CE marking
  - RoHS compliant
BAS-1200 OUTPUT CONTROL MODULE
34 Overview of the BAS-1200

The Output Control Module (OCM) communicates directly with the Intelligent System Controller (ISC) either by 2-wire RS-485 or 4-wire RS-485 communication. Each OCM is an individually addressed device, with a maximum of sixteen OCMs on each ISC.

The OCM, like most other Stanley hardware products, can be powered by 12 to 24 VDC power. Dedicated tamper and power failure input contacts are included with every OCM.

The OCM has 16 programmable output relays that can be configured for fail-safe or fail-secure. Each relay supports “On,” “Off,” and “Pulse” software commands.

Both the BAS-1200 series 1 (serial numbers 20,000 or less) and series 2 (serial numbers greater than 20,000, labeled revision C) are supported. The series 2 board differs slightly from the series 1 boards. Where series 2 is indicated, the information only applies to series 2 boards. Otherwise, the information applies to both series 1 and 2 boards.

34.1 Interfaces

The Output Control Module interfaces upstream with the Intelligent System Controller.

Intelligent System Controller Communications Overview

![Diagram of Intelligent System Controller with interfaces](image)

- 32 Downstream Devices Total
- RS-485 Multi-drop 2 or 4 wire
- Single Reader Interface Module
  - Up to 32 Single Reader Interface Modules (32 readers)
- Dual Reader Interface Module
  - Up to 32 Dual Reader Interface Modules (64 readers)
- Input/Output Control Module(s)
  - Up to 16 Output Control Modules
  - Up to 16 Alarm Input Control Modules

Downstream Communications
- Four 2-wire ports
- Two 4-wire ports
- Combination 2 and 4 wire ports

Communications from Host to Controller
- RS-232, RS-485, Ethernet
- Dial-up, Fiber, etc...
34.2 The Output Control Module (Series 2)

The BAS-1200 series 2 board contains the following components: sixteen (16) alarm output relays with sixteen (16) corresponding status LEDs, two (2) unsupervised alarm inputs, one (1) RS-485 interface, one (1) power input, eight (8) DIP switches, and jumpers.
34.2.1 Status LEDs

The series 2 Output Control Module contains a total of 20 LEDs to verify correct installation after power up.

Power-up: All LED’s OFF.

Initialization: Once power is applied, initialization of the module begins.

The A LED is turned on at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The OCM is waiting for firmware to be down loaded.

When initialization is completed, LEDs A, B, CT and BA are briefly sequenced ON then OFF.

Run time: After the above sequence, the LEDs have the following meanings:

A LED: Heartbeat and Online Status:
- Offline: 1 second rate, 20% ON.
- Online: 1 second rate, 80% ON.

B LED: SIO Communication Port Status:
- Indicates communication activity on the SIO communication port.

CT: Cabinet Tamper.

BA: Power Fault.

Input in the inactive state: OFF (briefly flashes ON every 3 seconds).

Input in the active state: ON (briefly flashes OFF every 3 seconds).

LEDs 1 through 16: correspond to output relay OUT 1 (K1) through OUT 16 (K16).
35 Installation

To install the Output Control Module, perform the installation procedures described in the following sections, in the order in which they are presented.

35.1 Wiring

1. Wire the unsupervised alarm inputs for power fault and cabinet tamper monitoring.
2. Wire the upstream host communication.
3. Wire the power input.
4. Wire the relay outputs.

35.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The Output Control Module features two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the BA (power fault) and CT (cabinet tamper) contact terminals located on the Output Control Module.

The BA and CT inputs are simple N/C (normally closed) contact closure monitors.

Wire the BA and CT inputs using twisted pair cable, 30 ohms maximum (No EOL resistors are required).

Unsupervised Alarm Input Wiring (BA and CT contacts)

Note: If either of these inputs is not used, a shorting wire should be installed.

35.1.2 Upstream Communication to the Intelligent System Controller

The Output Control Module uses Port 1 to communicate to the Intelligent System Controller. Port 1 is an RS-485 interface that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842, West Penn, or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet (Belden 9502 or equivalent).

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.
35.1.3 Power

For its power input, the series 2 Output Control Module accepts either a 12 to 24 VDC ± 10% power source. The power source should be located as close to the Output Control Module as possible.

Wire the Power In input with 18 AWG (minimum) twisted pair cable.

<table>
<thead>
<tr>
<th>Power Source</th>
<th>Requirements</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC power source</td>
<td>Isolated, non-switching, regulated DC power</td>
<td>500 mA</td>
</tr>
</tbody>
</table>

Note: Be sure to observe polarity.

35.1.4 Relay Outputs

The Output Control Module contains sixteen (16) form-C dry-contact relay outputs, Output 1 through Output 16, which each provide up to 5A 30 VDC, or 125 VAC current (resistive). Each output is an SPDT (single pole, double throw) contact.
To wire the Output 1 - Output 16 relay contacts, use sufficiently large wires for the load to avoid voltage loss.

Transient clamping must be provided to protect the output contacts and to reduce EMI emissions. For AC-powered devices, use MOV across the load. For DC-powered devices, use a diode across the load.

**Relay Output Wiring (Ports 2-5)**

35.2 Elevator Control

B.A.S.I.S. hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

The application software must be configured for elevator control. This can be done on the **Elevator Hardware** tab in the **Readers** window of the System Administration software. The “Elevator” box should be checked. The reader’s type, name, port, address, access panel, can all be defined here.

With elevator control on the BAS-1300 reader, door strike and contact are not available, and REX (Request to EXit) has been disabled.

Addresses assigned to input/output panels do not have to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.
Overview of Elevator Control

Access Control System

Intelligent System Controller

Output Control Module
Input Control Module

Single Reader Interface Module

Single Reader Interface
Up to 128 Outputs - eight Output Control Modules
Up to 128 Inputs - eight Input Control Modules

Maximum: 4000 feet
5 conductors

Single Reader Interface Module

Elevator Reader (inside cab)
36  Configuration

The Output Control Module board contains 8 DIP switches and 3 jumpers that must be configured for your system.

36.1  Setting DIP Switches

DIP Switches (shown in factory default position: Address 00; 38400 bps)

The following chart describes the use of each DIP switch.

<table>
<thead>
<tr>
<th>DIP SWITCH(ES)</th>
<th>USED TO CONFIGURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4, 5</td>
<td>Device communication address (0 - 31)</td>
</tr>
<tr>
<td>6, 7</td>
<td>Communication baud rate (38400, 19200, 9600, or 2400 bps)</td>
</tr>
<tr>
<td>8</td>
<td>Not used</td>
</tr>
</tbody>
</table>

36.1.1  Device Address

To configure the device communication address, set DIP switches 1, 2, 3, 4, and 5 according to the following table.

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1: 2: 3: 4: 5:</td>
</tr>
<tr>
<td>0</td>
<td>off off off off off</td>
</tr>
<tr>
<td>1</td>
<td>ON off off off off</td>
</tr>
<tr>
<td>2</td>
<td>off ON off off off</td>
</tr>
<tr>
<td>3</td>
<td>ON ON off off off</td>
</tr>
<tr>
<td>4</td>
<td>off off ON off off</td>
</tr>
<tr>
<td>5</td>
<td>ON off ON off off</td>
</tr>
<tr>
<td>6</td>
<td>off ON ON off off</td>
</tr>
<tr>
<td>7</td>
<td>ON ON ON off off</td>
</tr>
<tr>
<td>8</td>
<td>off off off ON off</td>
</tr>
</tbody>
</table>
### 36.1.2 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table.

<table>
<thead>
<tr>
<th>BAUD RATE:</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>38400 bps (default)</td>
<td>ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>off</td>
</tr>
</tbody>
</table>
Currently, B.A.S.I.S. only supports a baud rate of 38400 bps, so be sure to set both dip switches 6 and 7 to the ON position.

### 36.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.

<table>
<thead>
<tr>
<th>BAUD RATE:</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>9600 bps</td>
<td>ON</td>
</tr>
<tr>
<td>2400 bps</td>
<td>off</td>
</tr>
</tbody>
</table>

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances.
(4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has on-board terminators. The installer should determine which devices are at the end of the communication line.
37 Specifications

** The BAS-1200 series 2 is for use in low voltage, class 2 circuits only. These specifications are subject to change without notice.

- **Primary Power:**
  - 12 to 24 VDC ± 10%, 1100mA maximum
  - 12 VDC @ 850mA nominal
  - 24 VDC @ 450mA nominal
- **Relay contacts:** 16 Form-C, 5A @ 28 VDC, resistive
- **Inputs:** 2 unsupervised, dedicated for cabinet tamper and UPS fault monitoring
- **Communication:** RS-485, 2-wire, 2400 to 38400 bps async
- **Cable Requirements:**
  - Power: 1 twisted pair, 18 AWG
  - RS-485: 24 AWG, 120 ohm impedance, twisted pair(s) with shield, 4000 feet (1200 m) maximum
  - Inputs: twisted pair, 30 ohms maximum
  - Outputs: as required for the load
- **Mechanical:**
  - Dimension: 6 x 8 x 1 in. (152 x 203 x 25 mm)
  - Weight: 14 oz. (435 g) nominal
- **Environmental:**
  - Temperature: -55 to +85°C storage, 0 to +70°C operating
  - Humidity: 0 to 95% RHNC
  - CE marking
  - RoHS compliant
BAS-1300 SINGLE READER INTERFACE MODULE
38 Overview of the BAS-1300

Stanley offers a Single Reader Interface (SRI) module for business access control solutions. Access control card readers, keypads, or readers with keypads that use standard data1/data0 and clock/data Wiegand communications are supported. Lock/unlock and facility code, off-line access modes are supported on all readers connected to the SRI. Each SRI supports up to 8 different card formats as well as issue codes for both magnetic and Wiegand card formats.

The SRI provides a vital link between the Intelligent System Controller (ISC) and the card reader attached to the interface. As many as 32 SRI modules can be multi-dropped using RS-485 two-wire communication up to 16,000 feet (4000 per port) away from the ISC. Each SRI module is individually addressed for increased reporting capabilities with Access Control software applications. The SRI includes two (2) programmable inputs that support normally open, normally closed, supervised and non-supervised circuits and two (2) output relays support fail-safe or fail-secure operation.

Both the BAS-1300 series 1 (serial numbers 150,000 or less) and series 2 (serial numbers greater than 150,000, labeled revision D) are supported. The series 2 board differs slightly from the series 1 boards. Where series 2 is indicated, the information only applies to series 2 boards. Otherwise, the information applies to both series 1 and 2 boards.

38.1 Interfaces

The Single Reader Interface Module interfaces upstream with the Intelligent System Controller, and downstream with a card reader.

Intelligent System Controller Communications Overview

- Communications from Host to Controller: RS-232, RS-485, Ethernet, Dial-up, Fiber, etc...
- Downstream Communications:
  - Four 2-wire ports
  - Two 4-wire ports
  - Combination 2 and 4 wire ports
- RS-485 Multi-drop
  - 2 or 4 wire
- Single Reader Interface Module: Up to 32 Single Reader Interface Modules (32 readers)
- Dual Reader Interface Module: Up to 2 Dual Reader Interface Modules (64 readers)
- Input/Output Control Module(s): Up to 16 Output Control Modules, Up to 16 Alarm Input Control Modules
38.2 The Single Reader Interface Module Board (Series 2)

The series 2 Single Reader Interface Module board contains the following components: two (2) supervised alarm inputs, one (1) RS-485 two-wire interface, two (2) relay outputs, one (1) power input, and nine (9) jumpers. It also contains two (2) status LEDs. In older models of this board, there is one (1) TTL modular jack for reader interface.

### Status LEDs

The series 2 Single Reader Interface Module board contains two (2) status LEDs.

**Power-up:** All LEDs off.

**Initialization:** Once power is applied, initialization of the module begins.

The A LED is turned ON at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The MR-50 is waiting for firmware to be down loaded.

**Run time:** After a successful initialization, the LEDs have the following meanings:

- A LED: Heartbeat and On-Line Status:
• Offline: 1 second rate, 20% ON
• Online: 1 second rate, 80% ON

B LED: SIO Communication Port Status:
• Indicates communication activity on the SIO communication port.
39 Installation

To install the SRI, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the supervised alarm inputs for door position and REX exit push button monitoring.
2. Wire the upstream host communication.
3. Wire the power input.
4. Wire the relay outputs.
5. Wire the downstream interface for the keypad or card reader (for older models of the SRI, a TTL interface is used).

39.1 Wiring

39.1.1 Supervised Alarm Inputs

The Single Reader Interface Module contains two (2) supervised alarm inputs that can be used for door position and REX exit push button monitoring. These alarm inputs are connected using the I1 and I2 inputs. Wire the I1 and I2 inputs using twisted pair cable, 30 ohms maximum. Terminate each of these inputs with two (2) 1000-ohm resistors (1% tolerance – 0.25 watt).
Door contact and REx are selectable through the access control software (by default, door contact is normally closed and REX is normally open).

### 39.1.2 Upstream Communication

The Single Reader Interface Module uses **Port 1** to communicate to the Intelligent System Controller.

Port 1 is a 2-wire **RS-485** interface, that requires the following type of RS-485 cable: **24 AWG** (minimum) **twisted pair** (with shields). The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9841, West Penn, or equivalent). The drop cables (to downstream devices) should be kept as short as possible, no longer than 10 feet.

The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.

**Note:** If the Single Reader Interface Module is at the end of the RS-485 line, the J4 termination jumper must be set.
39.1.3 Power

The Single Reader Interface Module requires a filtered 12 VDC ± 15% power source for its power input. The power source must provide isolated and non-switching, linear regulated DC power, with 125 mA current.

Wire the power input with 18 AWG (minimum) twisted pair cable.

Notes:
- Be sure to observe polarity.
- Do not use an AC transformer to directly power the Single Reader Interface Module.
- The 12VDC is passed to the TTL modular jack and is available for powering a keypad or reader (80 mA maximum).

39.1.4 Relay Outputs

The Single Reader Interface Module contains two (2) form-C dry-contact relay outputs, K1 and K2. K1 provides up to 5A 30VDC; K2 provides up to 1A 30VDC.

To wire the K1 and K2 outputs, use sufficiently large wires for the load to avoid voltage loss.

Transient clamping must be provided to protect the output contacts and to reduce EMI emissions. For AC-powered devices, use MOV across the load. For DC-powered devices, use a diode across the load.
39.1.5 Downstream Reader Communication

The Single Reader Interface Module can communicate downstream with one (1) keypad or card reader. The J1 interface is a six-wire interface that includes a buzzer control wire and an LED control wire. The buzzer wire is an open collector that produces 5 VDC open circuit maximum, and 10 mA sink maximum. The LED wire provides between 0.05 and 3 V, 5 mA source/sink maximum.

Wire the J1 interface using a 24 AWG (minimum) cable at a maximum of 500 feet.
The reader power is a maximum of 80 mA. If the reader requires additional current, connect the reader power to a +12 VDC terminal on the Single Reader Interface Module.

If you are connecting the reader to a dual reader interface module, each wire should be attached to the associated connection on the Dual Reader Interface Module board (BAS-1320).

All readers that have a buzzer will beep during pre-alarm when in extended held open mode. This includes primary and alternate readers. If the reader has two-wire LED control, this feature is disabled. The reader starts beeping at pre-alarm time and continues to do so until the door is closed or the held open time is hit.

---

**39.1.6 Open Supervised Device Protocol**

Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control.
39.2 Elevator Control

B.A.S.I.S. hardware is capable of supporting elevator control for up to 128 floors. An elevator reader has an input/output module that controls the access to floors via an elevator.

The application software must be configured for elevator control. This can be done on the Elevator Hardware tab in the Readers window of the System Administration software. The “Elevator” box should be checked. The reader’s type, name, port, address, access panel, can all be defined here.

With elevator control on the BAS-1300 reader, door strike and contact are not available, and REX (Request to EXit) has been disabled.

Addresses assigned to input/output panels do not have to be consecutive. On the first panel, the inputs/outputs represent the first sixteen floors (e.g.: Input 1 = first floor, Input 2 = second floor, etc.). The second panel represents the next sixteen floors (floor 17 through 32), etc.
40 Configuration

The Single Reader Interface Module board contains 9 jumpers that must be configured for your system.

40.1 Installing Jumpers

The following chart describes the use of each jumper.

<table>
<thead>
<tr>
<th>JUMPER(S)</th>
<th>USED TO CONFIGURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2,3,4,5</td>
<td>Device communication address (0 - 31)</td>
</tr>
<tr>
<td>6,7</td>
<td>Communication baud rate (38400, 19200, 9600, or 2400 bps)</td>
</tr>
<tr>
<td>8</td>
<td>Not used. This jumper must be open for normal operation.</td>
</tr>
</tbody>
</table>

The diagram below shows the Jumper(s) configuration for the device communication address, communication baud rate, and RS-485 termination status.
### 40.1.1 Device Address

To configure the device communication address, set jumpers 1, 2, 3, 4, and 5 according to the following table.

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>JUMPER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:</td>
<td>2:</td>
</tr>
<tr>
<td>0</td>
<td>off</td>
</tr>
<tr>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td>2</td>
<td>off</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
</tr>
<tr>
<td>4</td>
<td>off</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
</tr>
<tr>
<td>6</td>
<td>off</td>
</tr>
<tr>
<td>7</td>
<td>ON</td>
</tr>
<tr>
<td>8</td>
<td>off</td>
</tr>
<tr>
<td>9</td>
<td>ON</td>
</tr>
<tr>
<td>10</td>
<td>off</td>
</tr>
<tr>
<td>11</td>
<td>ON</td>
</tr>
<tr>
<td>12</td>
<td>off</td>
</tr>
<tr>
<td>13</td>
<td>ON</td>
</tr>
<tr>
<td>14</td>
<td>off</td>
</tr>
<tr>
<td>15</td>
<td>ON</td>
</tr>
<tr>
<td>16</td>
<td>off</td>
</tr>
<tr>
<td>17</td>
<td>ON</td>
</tr>
<tr>
<td>18</td>
<td>off</td>
</tr>
<tr>
<td>19</td>
<td>ON</td>
</tr>
<tr>
<td>20</td>
<td>off</td>
</tr>
<tr>
<td>21</td>
<td>ON</td>
</tr>
<tr>
<td>22</td>
<td>off</td>
</tr>
<tr>
<td>23</td>
<td>ON</td>
</tr>
<tr>
<td>24</td>
<td>off</td>
</tr>
<tr>
<td>25</td>
<td>ON</td>
</tr>
<tr>
<td>26</td>
<td>off</td>
</tr>
</tbody>
</table>
40.1.2 Communication Baud Rate

To configure the communication baud rate, set jumpers 6 and 7 according to the following table.

<table>
<thead>
<tr>
<th>BAUD RATE:</th>
<th>JUMPER</th>
</tr>
</thead>
<tbody>
<tr>
<td>38400 bps</td>
<td>6: ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>6: off</td>
</tr>
<tr>
<td>9600 bps</td>
<td>6: ON</td>
</tr>
<tr>
<td>2400 bps</td>
<td>6: off</td>
</tr>
</tbody>
</table>

Currently, B.A.S.I.S. only supports a baud rate of 38400 bps, so be sure to set both 6 and 7 to the ON position.

40.1.3 Cabinet Tamper

Jumper J3 is used to configure cabinet tamper. There are two possible configuration options: On or Off. When J3 is on, cabinet tamper is bypassed. When it is off, it must be wired in order to work.

- **J3 in ON position (Cabinet Tamper is bypassed)**
  
- **J3 in OFF position (requires wiring)**

40.1.4 EOL Termination

Jumper J4 is used to configure the EOL termination status the Single Reader Interface Module board. There are two possible configuration options that can be used to install this jumper: “On” and “Not On.”
Termination ON position for J4

Termination OFF position for J4
41 Specifications

**The BAS-1300 series 2 is for use in low voltage, class 2 circuits only. These specifications are subject to change without notice.**

- **Primary power:** 12 to 24 VDC + 10%, 150mA maximum (plus reader current)
  - 12 VDC @ 110mA (plus reader current) nominal
  - 24 VDC @ 60mA (plus reader current) nominal
- **Outputs:** Form-C contacts: K1: 5A @ 28 VDC, K2: 1A @28 VDC
- **Inputs:**
  - 2 supervised, End of Line resistors, 1k/1k ohm, 1% 1/4 watt standard
  - 1 unsupervised, dedicated for cabinet tamper
- **Reader Interface:**
  - Reader power: 12 to 24 VDC ± 10% (input voltage passed through)
  - Reader LED output: TTL compatible, high > 3V, low < 0.5V, 5mA source/sink maximum
  - Buzzer output: Open collector, 5Vdc open circuit maximum, 10mA sink maximum
  - Reader data inputs: TTL compatible inputs or 2-wire RS-485
- **Communication:** RS-485, 2-wire. 2400, 9600, 19200, or 38400bps
- **Cable requirements:**
  - Power: 18 AWG, 1 twisted pair
  - RS-485 24 AWG, 120 ohm impedance, twisted pair with shield, 4000 feet (1219 m) maximum
  - Alarm Inputs: 1 twisted pair per input, 30 ohms maximum
  - Outputs: As required for the load
  - Reader data (TTL): 18 AWG, 6 conductor, 500 feet (150 m) maximum
  - Reader data (RS-485): 24 AWG, 120 ohm impedance, twisted pair with shield, 4000 (1,219 m) maximum
- **Mechanical:**
  - Dimension: 4.25 x 2.75 x 1.4 in. (108 x 74 x 36 mm)
  - Weight: 4 oz. (120 g) nominal
- **Environmental:**
  - Temperature: -55 to +85° C storage, -35 to +75° C operating
  - Humidity: 0 to 95% RHNC
- **Approvals**
  - UL 294 & UL 1076 Listed
  - CE marking
  - RoHS compliant
42 Overview of the BAS-1320

Stanley offers a Dual Reader Interface (DRI) module for business access control solutions. Up to 64 access control card readers, keypads, or readers with keypads that use standard data1/data0 and clock/data Wiegand communications are supported. Lock/unlock and facility code, off-line access modes are supported on all readers connected to the DRI. Each DRI supports up to eight different card formats as well as issue codes for both magnetic and Wiegand card formats.

The DRI provides a vital link between the Intelligent System Controller (ISC) and the card reader attached to the interface. As many as 32 DRI modules can be multi-dropped using RS-485 2-wire communication up to 4000 feet per port away from the ISC. Each DRI module is individually addressed for increased reporting capabilities with Access Control software applications. The DRI includes eight (8) programmable inputs that support normally open, normally closed, supervised and non-supervised circuits. Six (6) output relays support fail-safe or fail-secure operation.

Both the BAS-1320 series 1 (serial numbers 20,000 or less) and series 2 (serial numbers greater than 20,000, labeled revision C) are supported. The series 2 board differs slightly from the series 1 boards. Where series 2 is indicated, the information only applies to series 2 boards. Otherwise, the information applies to both series 1 and 2 boards.

42.1 Interfaces

The Dual Reader Interface Module interfaces upstream with the Intelligent System Controller, and downstream with two (2) card readers (with or without keypads communicating in either data1/data0 or clock and data).

*Intelligent System Controller Communications Overview*

- **Communications from Host to Controller**
  - RS-232, RS-485, Ethernet
  - Dial-up, Fiber, etc...

- **Downstream Communications**
  - Four 2-wire ports
  - Two 4-wire ports
  - Combination 2 and 4 wire ports

- **32 Downstream Devices Total**
  - Up to 32 Single Reader Interface Modules (32 readers)
  - Up to 32 Dual Reader Interface Modules (64 readers)
  - Up to 16 Output Control Modules
  - Up to 16 Alarm Input Control Modules
The Dual Reader Interface Module (Series 2)

The series 2 Dual Reader Interface Module board contains the following components: eight (8) supervised/non-supervised alarm inputs, one (1) RS-485 interface, two (2) reader interfaces, six (6) relay outputs, one (1) power input, one (1) cabinet tamper, jumpers and eight (8) DIP switches. It also contains several status LEDs and six (6) relay LEDs.
42.2.1 Status LEDs

The series 2 Dual Reader Interface Module board contains LEDs that can be used to verify correct installation after power up.

The A LED is turned on at the beginning of initialization. If the application program cannot be run, the A LED will flash at a rapid rate. The dual reader interface module is waiting for firmware to be downloaded.

When initialization is completed, LEDs A through R2 are briefly sequenced ON then OFF.

After the above sequence, the LEDs have the following meanings:

<table>
<thead>
<tr>
<th>LED</th>
<th>Purpose</th>
</tr>
</thead>
</table>
| A   | This LED is the heartbeat and online status.  
|     | Offline: 1 second rate, 20% ON  
|     | Online: 1 second rate, 80% ON  |
| B   | Indicates communication activity on the SIO communication port.  
| 1   | IN1 input status  |
| 2   | IN2 input status  |
| 3   | IN3 input status  |
| 4   | IN4 input status  |
| 5   | IN5 input status  |
| 6   | IN6 input status  |
| 7   | IN7 input status  |
| 8   | IN8 input status  |
| TMP | Cabinet tamper  |
| PFL | Power fault  |

Input in the inactive state: OFF (briefly flashes ON every 3 seconds).

Input in the active state: ON (briefly flashes OFF every 3 seconds).

Input in a trouble state (default): Rapid Flash.

**R1: reader port 1:**

- Clock/Data Mode: Flashes when data is received, either input.
- Data 0/Data 1 Mode: Flashes when data is received, either input.
- RS-485 Mode: Flashes when transmitting data.

**R2: reader port 2:**

- Clock/Data Mode: Flashes when data is received, either input.
• Data 0/Data 1 Mode: Flashes when data is received, either input.
• RS-485 Mode: Flashes when transmitting data.

LED K1 through K6: Illuminates when output relay RLY 1 (K1) through RLY 6 (K6) is energized.
43  Installation

To install the Dual Reader Interface Module, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the supervised alarm inputs.
2. Wire the upstream host communication.
3. Wire the Power Fault and Cabinet Tamper Monitors.
4. Wire the power input.
5. Wire the relay outputs.
6. Wire the downstream TTL interface for the keypads and/or card readers.

43.1  Wiring

43.1.1  Supervised Alarm Inputs

The Dual Reader Interface Module contains eight (8) supervised inputs that can be used for door position monitoring, REX exit push button monitoring, and alarm control.

These inputs are connected using the IN1, IN2, IN3, IN4, IN5, IN6, IN7, and IN8 inputs. The standard wiring configuration is as follows:
Inputs 1-4 are for Door #1, Inputs 5-8 for Door #2

DRI Alarm Input Contact Wiring

<table>
<thead>
<tr>
<th>Door Contact</th>
<th>In 1</th>
<th>In 2</th>
<th>In 3</th>
<th>In 4</th>
<th>In 5</th>
<th>In 6</th>
<th>In 7</th>
<th>In 8</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Door Contact</th>
<th>Selectable through software (default – normally closed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REX</td>
<td>Selectable through software (default – normally open)</td>
</tr>
<tr>
<td>Aux.</td>
<td>Selectable through software</td>
</tr>
</tbody>
</table>

Wire the IN1 - IN8 inputs using twisted pair cable, 30 ohms maximum.

Terminate each of these inputs with two (2) 1000-ohm resistors (1% tolerance – 0.25 watt) for supervised inputs.
43.1.2 Upstream Communication

The Dual Reader Interface Module uses Port 1 to communicate to the Intelligent System Controller.

Port 1 is a 2-wire RS-485 interface that requires the following type of RS-485 cable: 24 AWG (minimum) twisted pair (with shields). The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 for 4-wire or Belden 9841 for 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). The drop cables (to downstream devices) should be kept as short as possible, no longer than 10 feet.

Upstream Controller Communication Wiring (2-wire)

RS-485 2-WIRE COMMUNICATIONS
The RS-485 communication is asynchronous, half-duplex, using 1 start bit, 8 data bits, 1 stop bit.

### 43.1.3 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

The Output Control Module features two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the **BA** (power fault) and **CT** (cabinet tamper) contact terminals located on the Output Control Module.

The BA and CT inputs are simple N/C (normally closed) contact closure monitors.

Wire the BA and CT inputs using **twisted pair cable, 30 ohms** maximum (No EOL resistors are required).

Wire the BA and CT inputs using twisted pair cable, 30 ohms maximum (No EOL resistors are required).

---

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multi-port communications on a bus transmission line. It allows for high-speed data transfer over extended distances (4000 feet/1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances, End-Of-Line (EOL) termination is required.

RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.

---

The RS-485 (2-wire or 4-wire) must be terminated at both ends of the RS-485 line (bus). Terminating the line provides a more reliable communication by minimizing the signal reflection and external noise coupling. Each component provided has an on-board terminator. The installer should determine which device is at the end of the communication line.
43.1.4 Power

The DRI accepts 12 to 24 VDC for power. Locate the power source as close to the DRI as possible.

Observe POLARITY on VIN!

Wire the power input with 18 AWG (minimum) twisted pair cable.

Supply Power to the Interface

43.1.5 Control Output Wiring

Six form-C contact relays are provided for controlling door strikes or other devices. Load switching can cause abnormal contact wear and premature contact failure. Switching of inductive loads (strike) also causes EMI (electromagnetic interference) which may interfere with normal operation of other equipment. To minimize premature contact failure and to increase system reliability, contact protection circuit must be used. The following two circuits are recommended. Locate the protection circuit as close to the load as possible (within 12 inches [30cm]), as the effectiveness of the circuit will decrease if it is located further away.

Use sufficiently large gauge of wires for the load current as to avoid voltage loss.
Control Output Wiring

12 VDC

DC STRIKE

DIODE CURRENT RATING > 1X STRIKE CURRENT
DIODE BREAK DOWN VOLTAGE > 4X STRIKE VOLTAGE
FOR 12 OR 24 VDC STRIKE, DIODE 1N4002 (100V/1A) TYPICAL

AC XFMR

AC STRIKE

CLAMP VOLTAGE > 1.5 X VAC RMS
FOR 24 VAC STRIKE, PANASONIC ERZCO7DK470 TYPICAL
43.1.6 Downstream Reader Communication

Each reader port supports a reader with TTL or RS-485 interface. Power to the reader is selectable: 12 VDC, or input voltage passed through (PT), 125mA maximum per reader port. This selection is made via jumper J2 and is made for both reader ports. For the selection of 12Vdc, the BAS-1320 must be powered by a 20Vdc minimum source. For readers requiring a different voltage or current capability, they must be powered separately.

To fully utilize each reader port, a 6-conductor cable (18AWG) is required when TTL signaling is used. RS-485 signaling requires two 2-conductor cables. One cable for power (18AWG) and one cable for communication (24AWG). Reader port configuration is set via host software.
All readers that have a buzzer will beep during pre-alarm when in extended held open mode. This includes primary and alternate readers. If the reader has two-wire LED control, this feature is disabled. The reader starts beeping at pre-alarm time and continues to do so until the door is closed or the held open time is hit.

43.1.7 Open Supervised Device Protocol

Open Supervised Device Protocol (OSDP) uses bi-directional communications between readers and the reader interface, providing constant monitoring of reader health, improved control of reader operation and configuration in real-time, and additional communications capabilities over a single connection, including biometric template download and LCD reader display control.
43.2 Elevator Control

Currently, elevator control is supported for up to six floors on the Dual Reader Interface Module.

In order to use Elevator Control, your software must be configured for it. This can be done in System Administration on the Readers window.

On the Dual Reader Interface card, Reader 2 is not used. Only Reader 1 is used. The six aux outputs are used to control the six corresponding floor buttons.
Contact Wiring for Elevator Control

<table>
<thead>
<tr>
<th>DRI Alarm Input Contact Wiring</th>
<th>DRI Alarm Output Contact Wiring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reader Aux 1</td>
<td>![Floor Output 1]</td>
</tr>
<tr>
<td>Reader Aux 2</td>
<td>![Floor Output 2]</td>
</tr>
<tr>
<td>Reserved for Future Use</td>
<td>![Floor Output 3]</td>
</tr>
<tr>
<td>Reserved for Future Use</td>
<td>![Floor Output 4]</td>
</tr>
<tr>
<td>Reserved for Future Use</td>
<td>![Floor Output 5]</td>
</tr>
<tr>
<td>Reserved for Future Use</td>
<td>![Floor Output 6]</td>
</tr>
</tbody>
</table>

- **In 1**
- **In 2**
- **In 3**
- **In 4**
- **In 5**
- **In 6**
- **In 7**
- **In 8**
- **In 9**
- **In 10**

- **Reader Aux 1**
- **Reader Aux 2**
- **Reserved for Future Use**
- **Reserved for Future Use**
- **Reserved for Future Use**
- **Reserved for Future Use**
- **Reserved for Future Use**
- **Reserved for Future Use**

- **Cabinet Tamper**
- **Power Failure**

- **GND**

- **RLY 1**
- **RLY 2**
- **RLY 3**
- **RLY 4**
- **RLY 5**
- **RLY 6**
44  Configuration

The Dual Reader Interface Module board contains 8 DIP switches and 3 jumpers that must be configured for your system.

44.1  Setting DIP Switches

DIP Switches (shown in factory default position: Address 00; 38400 bps)

The following chart describes the use of each DIP switch.

<table>
<thead>
<tr>
<th>DIP SWITCH(ES)</th>
<th>USED TO CONFIGURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4, 5</td>
<td>Device communication address (0 - 31)</td>
</tr>
<tr>
<td>6, 7</td>
<td>Communication baud rate (38400, 19200, 9600, or 2400 bps)</td>
</tr>
<tr>
<td>8</td>
<td>Not used</td>
</tr>
</tbody>
</table>

44.1.1  Device Address

To configure the device communication address, set DIP switches 1, 2, 3, 4, and 5 according to the following table.

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1: 2: 3: 4: 5:</td>
</tr>
<tr>
<td>0</td>
<td>off off off off off</td>
</tr>
<tr>
<td>1</td>
<td>ON off off off off</td>
</tr>
<tr>
<td>2</td>
<td>off ON off off off</td>
</tr>
<tr>
<td>3</td>
<td>ON ON off off off</td>
</tr>
<tr>
<td>4</td>
<td>off off ON off off</td>
</tr>
<tr>
<td>5</td>
<td>ON off ON off off</td>
</tr>
<tr>
<td>6</td>
<td>off ON ON off off</td>
</tr>
<tr>
<td>7</td>
<td>ON ON ON off off</td>
</tr>
<tr>
<td>8</td>
<td>off off off ON off</td>
</tr>
<tr>
<td>ADDRESS</td>
<td>DIP SWITCH</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td></td>
<td>1:</td>
</tr>
<tr>
<td>9</td>
<td>ON</td>
</tr>
<tr>
<td>10</td>
<td>off</td>
</tr>
<tr>
<td>11</td>
<td>ON</td>
</tr>
<tr>
<td>12</td>
<td>off</td>
</tr>
<tr>
<td>13</td>
<td>ON</td>
</tr>
<tr>
<td>14</td>
<td>off</td>
</tr>
<tr>
<td>15</td>
<td>ON</td>
</tr>
<tr>
<td>16</td>
<td>off</td>
</tr>
<tr>
<td>17</td>
<td>ON</td>
</tr>
<tr>
<td>18</td>
<td>off</td>
</tr>
<tr>
<td>19</td>
<td>ON</td>
</tr>
<tr>
<td>20</td>
<td>off</td>
</tr>
<tr>
<td>21</td>
<td>ON</td>
</tr>
<tr>
<td>22</td>
<td>off</td>
</tr>
<tr>
<td>23</td>
<td>ON</td>
</tr>
<tr>
<td>24</td>
<td>off</td>
</tr>
<tr>
<td>25</td>
<td>ON</td>
</tr>
<tr>
<td>26</td>
<td>off</td>
</tr>
<tr>
<td>27</td>
<td>ON</td>
</tr>
<tr>
<td>28</td>
<td>off</td>
</tr>
<tr>
<td>29</td>
<td>ON</td>
</tr>
<tr>
<td>30</td>
<td>off</td>
</tr>
<tr>
<td>31</td>
<td>ON</td>
</tr>
</tbody>
</table>
44.1.2 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table.

<table>
<thead>
<tr>
<th>BAUD RATE:</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>38400 bps</td>
<td>ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>off</td>
</tr>
<tr>
<td>9600 bps</td>
<td>ON</td>
</tr>
<tr>
<td>2400 bps</td>
<td>off</td>
</tr>
</tbody>
</table>

Currently, B.A.S.I.S. only supports a baud rate of 38400 bps, so be sure to set both dip switches 6 and 7 to the ON position.
44.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.

[J2]
Reader power:
12V = 24 VDC reduced to 12 VDC at reader ports.
Do not use if VIN is less than 20 VDC
PT = VIN passed through to reader ports

[J3]
2-wire select: Must install in 2W position.

[J5]
RS-485 EOL termination:
Jumper = termination.
No jumper = no termination
45 Specifications

**The DRI is for use in low voltage, class 2 circuits only. These specifications are subject to change without notice.**

- Power: 12 to 24 VDC ± 10%, 550mA maximum (plus reader current)
  - 12 VDC @ 450mA (plus reader current) nominal
  - 24 VDC @ 270mA (plus reader current) nominal
- CE marking
- RoHS compliant
BAS-8000 STAR
MULTIPLEXER
46 Overview

The Star Multiplexer was designed to implement star topology on a single downstream port (ports 2 through 5) of the Intelligent System Controller, to eight RS-485 (2-wire) ports or four RS-485 (4-wire) channels. The Star Multiplexer requires 12 VDC for power. It allows conversion of communication protocol, and provides connection with alternate communication devices to extend effective distance.

46.1 Interfaces

The master or host interface can be either RS-232 or RS-485 (2-wire) communication. The Star Multiplexer interfaces upstream with the Intelligent System Controller, and downstream with one or many RS-485 products (Input Control Module, Output Control Module, Single Reader Interface Module, Dual Reader Interface Module) on each downstream port (ports 2-9). A maximum of eight (8) devices are allowed per port.
46.2 The Star Multiplexer Board

The Star Multiplexer board contains the following components: one (1) power input, one (1) host communication RS-232/RS-485 input, eight (8) RS-485 (2-wire) Star Legs or four (4) RS-485 (4-wire), one (1) communication speed DIP Switch four-position selector and seventeen (17) jumpers.

### Status LEDs

There are ten (10) status LEDs on the Star Multiplexer.

<table>
<thead>
<tr>
<th>LED</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>This LED is the heartbeat of the circuit board. In its powered-up normal condition, the LED will blink rapidly. If there is no power, the LED will be off.</td>
</tr>
<tr>
<td>1</td>
<td>This LED indicates data coming from the upstream or host port. When data is being sent to the Star Multiplexer, this light will blink rapidly.</td>
</tr>
<tr>
<td>2–9</td>
<td>These LEDs indicate data coming from downstream devices. When data is being sent from a downstream device to a Star Multiplexer port, the corresponding LED will blink rapidly.</td>
</tr>
</tbody>
</table>
47 Installation

To install the Star Multiplexer, perform the installation procedures described in the following sections, in the order in which they are presented.

47.1 Wiring

1. Wire the upstream host communication.
2. Wire the downstream device communication.
3. Wire the power input.

47.1.1 Upstream Controller Communication

The Star Multiplexer can communicate to the Intelligent System Controller by one of four downstream ports, either by RS-485 (2-wire) communications or RS-232 to RS-485 converters. The recommended configuration is with RS-485 (2-wire) communications.

Each port of the Intelligent System Controller (ports 2-5) can support up to four (4) Star Multiplexers within 1000 feet of the Intelligent System Controller. The Intelligent System Controller ports are not limited to only the Star Multiplexer. The controller is capable of other addressable devices (such as the Input Control Module, Output Control Module, Single Reader Interface Module, or Dual Reader Interface Module) on the same port as the Star Multiplexer. However, the same distance limitation applies.

Upstream Host Communication Wiring

The RS-232 communications interface is for short distance wiring or point to point communications. This interface is intended for a short distance communication because its high impedance is more susceptible to noise. Cable length is generally limited to 50 feet (15m). If required, this distance may be extended to a few hundred feet by using low capacitance shielded cables (the optimal cable is a Belden 9610 or equivalent wire) or line signal converters.
The main run RS-485 cable should be no longer than 4000 feet (1219 m), 120 ohms maximum (Belden 9842 for 4-wire or Belden 9841 for 2-wire, or plenum cabling Belden 88102, West Penn, or equivalent). The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

**Note:** If the Star Multiplexer is configured at the end of the RS-485 line, an RS-485 terminator is required.

**FiberOption Converter**

The Star Multiplexer can optionally be connected to the ISC via an S7111D FiberOption Converter. Use the following diagram to configure the devices.

<table>
<thead>
<tr>
<th>ISC Settings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Interface Type</td>
</tr>
<tr>
<td>RS-485 Type</td>
</tr>
<tr>
<td>Port 1 RS-485 EOL Termination</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Star Multiplexer Settings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jumpers 1, 5, 6, 7</td>
</tr>
<tr>
<td>Jumper 2</td>
</tr>
<tr>
<td>Jumpers 3, 4, 8,17</td>
</tr>
<tr>
<td>DIP switch settings</td>
</tr>
</tbody>
</table>
ISC panels can be multidropped on the RS-485 line using this configuration.

To 12 V Power Supply
47.1.2 Downstream Device Communication

The Star Multiplexer topology is capable of eight different downstream directions in RS-485 (2-wire) communications (using Belden 9841, West Penn, or equivalent) or four different downstream directions with RS-485 (4-wire) communications (using Belden 9842, West Penn, or equivalent).

Each Leg of the star, in either configuration, has a maximum wire distance of 4000 feet. Each leg supports up to eight (8) hardware RS-485 devices (Input Control Module, Output Control Module, Single Reader Interface Module, or Dual Reader Interface Module) in many configurations.

47.1.3 Power

The Star Multiplexer accepts a 12 VDC ± 15% power source for its power input. The power source should be located as close to the Star Multiplexer as possible.

Wire the power input with an 18 AWG (minimum) twisted pair cable.

<table>
<thead>
<tr>
<th>Power Source</th>
<th>Requirements</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC power sources</td>
<td>Isolated, non-switching, regulated DC power</td>
<td>250 mA</td>
</tr>
</tbody>
</table>

Note: When using a 12 VDC power source, be sure to observe polarity.
47.2 Wiring and Termination

The following diagrams depict possible combinations of devices and recommended termination for each. Note that these examples are common across all ports.

Wiring and Termination (from the ISC to downstream devices)

- **Access Control System**
- **Intelligent System Controller**
- **Star Multiplexer**
- **Input/Output Control Module**
- **Single Reader Interface Module**
- **Dual Reader Interface Module**

- **RS-232**: 50 feet max.
- **RS-485**: 1000 feet max.

**Note**: Examples common across all ports.
Wiring and Termination (from the ISC to the BAS-8000)

1000 feet max.

1000 feet max.

1000 feet max.

T indicates termination

Note: Examples common across all ports
48 Configuration

48.1 Setting DIP Switches

The Star Multiplexers DIP switches are used to control the communication speed setting.

*DIP Switches (shown in default positions: 38400 bps)*

The communication speed is determined by the speed at which the Intelligent System Controller is communicating to the downstream devices. Use the following table to configure your selection:

<table>
<thead>
<tr>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>2400 bps</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>4800 bps</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>9600 bps</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>19200/38400 bps</td>
</tr>
</tbody>
</table>

Currently, B.A.S.I.S. only supports 38400 bps. Set the communication speed DIP switches in the default position of 38400 bps.

When connecting the star multiplexer directly to a host computer for multi-drop configuration, the DIP switch settings should be set to all ON - this setting is 38400 BPS Fast.
48.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.

- **[JP2]**
  - OFF: Port 1 RS-485 EOL termination is not on
  - ON: Port 1 RS-485 EOL termination is on

- **[JP1, JP6, JP5, JP7]**
  - Control for Port 1, RS-232 or RS-485

  - Control for Ports 2, 4, 6, 8, respectively.
  - OFF: Port is receive only for 4-wire RS-485
  - ON: Port is (2-wire) RS-485

  - RS-485 Termination Status for ports 1-9, respectively.
  - OFF: Not terminated
  - ON: terminated
**The Star Multiplexer is for use in low voltage, class 2 circuits only.**

- **Primary Power:**
  - DC input: 12 VDC ± 15%. 250 mA
- **Interfaces:**
  - Port 1: RS-232/RS-485, selectable
  - Ports 3, 5, 7, 9: RS-485, Transmit/Receive
  - Ports 2, 4, 6, 8: RS-485, Transmit/Receive or Receive Only
- **Wire Requirements:**
  - Power: 1 twisted pair, 18 AWG
  - RS-485: 24 AWG twisted pair(s) with shield, 4000 feet (1200 m) maximum
  - RS-232: 24 AWG, 50 feet (15 m) maximum
- **Environmental:**
  - Temperature: 0 to 70°C operating, -55 to +85°C storage
  - Humidity: 0 to 95% RHNC
- **Mechanical:**
  - Dimension: 5 x 6 x 1 in. (127 x 152 x 25 mm)
  - Weight: 4 oz. (114 g) nominal
- **CE marking**

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**Note:** These specifications are subject to change without notice.
BAS-2005W
MAGNETIC CARD ACCESS READER
Overview

This installation guide is intended for use by technicians who will be installing and maintaining BAS-2005W Magnetic Card Access Readers.

B.A.S.I.S. Magnetic Card Access Readers are durable, dependable, convenient and competitively priced. The Magnetic Card Access Readers are available in both 5 VDC and 12 VDC models. The reader’s are in fully weatherized metal casing shells, which provide strength and durability. The readers are first treated with an anti-corrosion film and then coated with a tough abrasion resistant finish, available with a beige or black textured finish, which compliments any interior or external decor. The readers accept low and high coercivity magnetic stripe cards. Track 2 magnetic readers are standard with optional Track 1 or Track 3 readers available.

The reader communicates to the Intelligent System Controller (ISC) through one of two reader interface modules. The single or dual reader interface modules interpret the Wiegand communication (Data 1/Data 0 or Clock and Data) from the reader and sends the signal via RS-485 back to the ISC. The reader can be located up to 500 feet away from the reader interface module.
51 Installation

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

51.1 Wiring

The reader has an RJ-45 modular jack for easy field connection. A small piece of pre-terminated cable is supplied with each standard reader for field wiring. The pre-terminated cable has non-standard color. Refer to pin number if the pre-terminated cable is not used. Cable with wires of 24AWG or larger, 6 conductor (Belden 9536 or equivalent) are recommended for field wiring.

51.2 Mounting the Reader

Find a suitable location to anchor the reader mounting bracket. The reader may be mounted vertically or horizontally. See recommended orientation. The mounting of the reader does not require a junction box. However, rigid conduit is required for outdoor application. A single gang junction box may used to provide transition to rigid conduit. If a single gang junction box is used, a wall plate (optional) may be used to cover the junction box. The reader is then secured to the mounting bracket using a screw. Refer to figures for reader dimensions and typical junction box usage.

51.3 Weatherproofing the Reader

The reader is rated to operate over extended temperature. All readers are shipped weatherized, and the electronics are conformal-coated against moisture. A tube of dielectric grease is supplied for the installer to coat field connections. After field connection/configuration is made, the grease is to be applied on the DIP switch slides, keypad connection, the RS-485 termination, and the RJ-45 jack to seal off moisture.
Do not use sealant to seal reader case to wall. Doing so will trap water in the reader and may cause damage to the reader.

Be sure to clean the read head(s).

The leading cause of accelerated read headwear is contamination in the read head slot. To maximize the life of the read head, it is important to clean the reader periodically to remove any contamination. The frequency depends on the environment in which the reader is located. Indoor readers in controlled environments will need to be cleaned much less often than an outdoor reader exposed to airborne dirt and debris. Dirt and debris are also transferred from cardholder cards that have been contaminated with sticky substances. Read head cleaning cards are available to clean the readers.

For heavy traffic areas, extended life read heads are also available from the factory at the time of order which will extend the read head life up to 1 million card swipes. For heavy traffic, outdoor readers should be cleaned at least once per month. A good indication as to how often a reader needs to be cleaned is when using a cleaning card, if the card has no visible signs of contamination, the reader could be serviced less often. Another indication is if the card reader, starts to give invalid card reads, the reader may need to be serviced more often. A read head that is starting to fail due to exceeding the maximum number could cause this or card reads on the read head (std. 600,000 or extended 1 million).

Weather Shield Option – even though the Magnetic swipe card readers are fully weatherized, there are still times when the card reader may need more protection from the environment. If a reader has been installed at a remote parking lot or on a build with no overhang to prevent rain, ice or snow from building up in the reader throat, you may want to install the weather shield (BAS-WS10). This weather shield can be used with all BAS-2005W, 2010W, and 2020W readers.
52 Configuration

52.1 DIP Switch/Jumper Setting

All reader models are equipped with DIP switches for configuration/parameter setting. DIP switches are set by moving the slide to on/off position using a small tool (may be made from a paper clip). Remove the top mounting bracket to access the DIP switches.

Set DIP switches 2, 3, and 4 to OFF. DIP switch 1 should be configured according to the output.

<table>
<thead>
<tr>
<th>DIP SWITCH</th>
<th>SELECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>OFF DATA INTERFACE</td>
</tr>
<tr>
<td></td>
<td>clock/data (magnetic stripe) output</td>
</tr>
<tr>
<td></td>
<td>data 1/data 0 (Wiegand) output</td>
</tr>
</tbody>
</table>

52.2 TTL Interface

The TTL interface has the standard 6-wire interface widely used in access control applications. In addition, an input to control the buzzer is provided. Cable with minimum of 24AWG wires should be used.

MODULAR PLUG:

- 6 (BLK) GND
- 5 (ORG) BUZZER/(LED)
- 4 (BRN) LED
- 3 (WHT) DATA 1/CLOCK
- 2 (GRN) DATA 0/DATA
- 1 (RED) +5 OR +12 VDC
  depends on model
52.3 **Grounding the Reader**

To avoid having ESD (electrostatic discharge) interfere with the operation of the reader, the reader casing shall be grounded. This can be accomplished be connecting the mounting bracket to earth ground locally (e.g. grounded conduit).

52.4 **Reader Verification**

The reader performs a self-test when power is first applied to the unit. If power-on test is successfully completed, The reader will turn on both LEDs for approximately 1 second and sound the buzzer for 1 short beep; then the reader is ready for normal operation.

52.5 **Status LEDs**

The reader has two blinking LEDs which signify its status:

<table>
<thead>
<tr>
<th>Mode or Status</th>
<th>Behavior of LEDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card and PIN</td>
<td>Blinking red light</td>
</tr>
<tr>
<td>Card Only</td>
<td>Blinking red light</td>
</tr>
<tr>
<td>Card or PIN</td>
<td>Blinking red light</td>
</tr>
<tr>
<td>Cipher Lock Emulation</td>
<td>Blinking red light</td>
</tr>
<tr>
<td>Facility Code</td>
<td>Blinking red light</td>
</tr>
<tr>
<td>Locked</td>
<td>Steady red light</td>
</tr>
<tr>
<td>Unlocked</td>
<td>Steady green light</td>
</tr>
<tr>
<td>Access Granted</td>
<td>Blinking green light, two beeps</td>
</tr>
<tr>
<td>Access Denied</td>
<td>Steady red light, three beeps</td>
</tr>
<tr>
<td>Waiting for PIN</td>
<td>Both green and red lights blink simultaneously at half intervals for ten seconds</td>
</tr>
<tr>
<td>Waiting for second card</td>
<td>Green and red lights blink alternately at half intervals for ten seconds</td>
</tr>
</tbody>
</table>

52.6 **Maintenance**

The readers are designed to provide continuous service with minimal routine maintenance. However, contaminants (such as magnetic oxides from badges and dirt) tend to accumulate on the read head. Without regular cleaning, these contaminants will shorten the read head life and increase the probability of card read error. A maintenance schedule should be developed base on the card reader environment (dirty or clean) and the usage frequency (light traffic or heavy traffic). Extreme case may require daily cleaning.

Head cleaning may be done by using disposable, pre-saturated magnetic head cleaning card. These cards are readily obtainable from a number of sources (e.g., Clean Team Co., (805) 581-1000).
The reader exterior surface is covered with high strength polymer and polyester membrane. It may be cleaned with a soft cloth and mild detergent if required.

52.7 Product Identification

Reader product identification is provided on labels. These labels have information on program ID, revision, product ID, supply voltage, and copyright notice. These labels are located on the circuit board and the back of the reader.

<table>
<thead>
<tr>
<th>PN: 3012-0000</th>
<th>Model: 2005W</th>
</tr>
</thead>
<tbody>
<tr>
<td>SN: 00100</td>
<td>DATE: 9502</td>
</tr>
<tr>
<td>RATED: 12 Vdc</td>
<td>80mA</td>
</tr>
<tr>
<td>FOR INSTRUCTION, SEE: 10107-0000</td>
<td></td>
</tr>
<tr>
<td>REV: 06/94</td>
<td>MADE IN USA</td>
</tr>
</tbody>
</table>

OUTDOOR USE
ACCESS CONTROL
UNIT ACCESSORY

LISTED
6T32 BP6565
## Specifications

The reader is for use in low voltage, class 2 circuits only.

<table>
<thead>
<tr>
<th>Power:</th>
<th>Voltage</th>
<th>5 Volt Model: 5.8 VDC (4.9 to 6.4 VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current</td>
<td>80 mA (25 mA typical.)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 Volt Model: 12 VDC (10.2 to 13.8 VDC)</td>
</tr>
<tr>
<td>Data output</td>
<td>Data 1/0 pair or clock/data</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Timing - clock/data -</td>
<td>1 mS period</td>
</tr>
<tr>
<td></td>
<td></td>
<td>400 μS setup/hold time typical</td>
</tr>
<tr>
<td></td>
<td>- data 1/0 -</td>
<td>3 mS period</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20 μS pulse width typical</td>
</tr>
<tr>
<td>LED input</td>
<td>input not driven: LEDs off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>input &gt; 3.5 Vdc: Red LED on</td>
<td></td>
</tr>
<tr>
<td></td>
<td>input &lt; 0.8 Vdc: Green LED on</td>
<td></td>
</tr>
<tr>
<td>Buzzer input:</td>
<td>input not driven or &gt;3.5Vdc: buzzer off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>input &lt; 0.8Vdc: buzzer on</td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td>Dimension</td>
<td>1.95 W x 1.30 H x 5.50 L inches</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(50 W x 33 H x 140 L mm)</td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>10 oz. (284 g) nominal</td>
</tr>
<tr>
<td></td>
<td>Material</td>
<td>Case, Die cast aluminum, gray powder coat standard</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mounting, stainless steel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wall plate, 18 CRS, gray powder coat standard</td>
</tr>
<tr>
<td>Card</td>
<td>75 bpi, ANSI X4.16, Track 2 standard, Speed 3 to 50 ips</td>
<td></td>
</tr>
<tr>
<td>Read Head</td>
<td>500,000 passes typical, standard. Optional high-wear head available.</td>
<td>To order the high-wear read head, add “-OH” to the part number when you place your reader order.</td>
</tr>
<tr>
<td>Distance</td>
<td>500' (152m) with 18 AWG wires</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>Temperature:</td>
<td>Operating: -40° to +75° C (-40° to +167° F)</td>
</tr>
<tr>
<td></td>
<td>Humidity:</td>
<td>0-95% RHNC, standard 100% (-OW option)</td>
</tr>
</tbody>
</table>
53.1 Reader Mounting Dimensions

Optional Wall Plate, WP-10

Fitting Rigid Conduit to Junction Box
WALL OPENING FOR J-BOX

WALL STUD

½" RIGID CONDUIT

1-GANG BOX

2.3 (57)

4.2 (107)
53.2 Reader Weather Shield

Weather Shield – part number BAS-WS10

1. MATERIAL: STAINLESS STEEL, TYPE 304-2B, 18GA

NOTES: UNLESS OTHERWISE SPECIFIED

- EXPOSED EDGES (FRONT AND TOP) MUST BE ROUNDED/SMOOTHED, RADIUS 0.015 TYP.

2. FINISH: CLEAN AND DEBUR. SAND TO BREAK ALL EDGES.
   BRUSH FINISH TOP/SIDE SURFACES (200 GRIT), GRAIN VERTICAL.
BAS-2010W/2020W/2020W-NDK/NDKV2
MAGNETIC CARD ACCESS READER
Overview

This installation guide is intended for use by technicians who will be installing and maintaining BAS-2010W, BAS-2020W, BAS-2020W-NDK, BAS-2020W-NDKV2 Magnetic Card Access Readers.

B.A.S.I.S. Magnetic Card Access Readers are durable, dependable, convenient and competitively priced. The Magnetic Card Access Readers are available in both 5 VDC and 12 VDC models. The BAS-2010W is magnetic swipe only and the BAS-2020W/NDK/V2 includes a twelve-position keypad. The reader’s are in fully weatherized metal casing shell, which provides strength and durability. The readers are first treated with an anti-corrosion film and then coated with a tough abrasion resistant finish, available with a beige or black textured finish, which compliments any interior or external decor. The readers accept low and high coercivity magnetic stripe cards. Track 2 magnetic readers are standard with optional Track 1 or Track 3 readers available.

The reader communicates to the Intelligent System Controller (ISC) through one of two reader interface modules. The single or dual reader interface modules interprets the Wiegand communication (Data 1/Data 0 or Clock and Data) from the reader and sends the signal via RS-485 back to the ISC. The reader can be located up to 500 feet away from the reader interface module.
55  Installation

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference
received, including interference that may cause undesired operation.

55.1  Wiring

The reader has an RJ-45 modular jack for easy field connection. A small piece of pre-terminated cable is
supplied with each standard reader for field wiring. The pre-terminated cable has non-standard color. Refer
to pin number if the pre-terminated cable is not used. Cable with wires of 24 AWG or larger, 6 conductor
(Belden 9536 or equivalent) are recommended for field wiring.

55.2  Mounting the Reader

Find a suitable location to anchor the reader mounting bracket. The reader may be mounted vertically or
horizontally. See recommended orientation. The mounting of the reader does not require a junction box.
However, rigid conduit is required for outdoor application. A single gang junction box may used to provide
transition to rigid conduit. If a single gang junction box is used, a wall plate (optional) may be used to cover
the junction box. The reader is then secured to the mounting bracket using a screw. Refer to figures for
reader dimensions and typical junction box usage.

55.3  Connecting the Keypad (BAS-2020W/NDK/V2 only)

Some reader models provide a 12-key keypad for PIN entry. The flex tail of the keypad is connected to the
electronic board via a ZIF (Zero Insertion Force) connector. The contacts are engaged/disengaged by a
moving slide. Care must be exercised when connecting and disconnecting the keypad. When connecting the
keypad to the board, open the slide as shown. Insert the electronics into the housing and insert flex tail in the
ZIF connector. Then, close the slide to engage the contacts. To disconnect the keypad, follow the previously described steps in reverse.

**Caution:** DO NOT DISCONNECT KEYPAD WITHOUT DISENGAGING THE CONNECTOR!

### 55.4 Weatherproofing the Reader

The reader is rated to operate over extended temperature. All readers are shipped weatherized, and the electronics are conformal coated against moisture. A tube of dielectric grease is supplied for the installer to coat field connections. After field connection/configuration is made, the grease is to be applied on the DIP switch slides, keypad connection, the RS-485 termination, and the RJ-45 jack to seal off moisture.

**Do not use sealant to seal reader case to wall.** Doing so will trap water in the reader and may cause damage to the reader.

Be sure to clean the read head(s).

The leading cause of accelerated read headwear is contamination in the read head slot. To maximize the life of the read head, it is important to clean the reader periodically to remove any contamination. The frequency depends on the environment in which the reader is located. Indoor readers in controlled environments will need to be cleaned much less often than an outdoor reader exposed to airborne dirt and debris. Dirt and debris are also transferred from cardholder cards that have been contaminated with sticky substances. Read head cleaning cards are available to clean the readers.
For heavy traffic areas, extended life read heads are also available from the factory at the time of order which will extend the read head life up to 1 million card swipes. For heavy traffic, outdoor readers should be cleaned at least once per month. A good indication as to how often a reader needs to be cleaned is when using a cleaning card, if the card has no visible signs of contamination, the reader could be serviced less often. Another indication is if the card reader, starts to give invalid card reads, the reader may need to be serviced more often. A read head that is starting to fail due to exceeding the maximum number could cause this or card reads on the read head (std. 600,000 or extended 1 million).

Weather Shield Option – even though the Magnetic swipe card readers are fully weatherized, there are still times when the card reader may need more protection from the environment. If a reader has been installed at a remote parking lot or on a build with no overhang to prevent rain, ice or snow from building up in the reader throat, you may want to install the weather shield (BAS-WS10). This weather shield can be used with all BAS-2005W, 2010W, 2020W, and 2020W-NDK readers.
56 Configuration

56.1 Standard Format Code Summary

The following formats are supported in standard models.

Unless otherwise indicated, the LED input line controls both LEDs (low=green, high=red); the BUZZER input controls the buzzer (low = activate); a good read is signaled by a flash of the green LED; a bad read is signaled by a flash of the red LED and a double beep of the buzzer.

<table>
<thead>
<tr>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>32-bit Wiegand compatible output from standard Northern Computer mag card. 16-bit facility code and 16-bit user ID. Reverse read and error filter is enabled. No tamper monitor.</td>
</tr>
<tr>
<td>1</td>
<td>basic magnetic data output: send track 2 data without any verification or formatting using clock/data signaling. (All reads are “good,” card data is sent as is.) Tamper monitor is disabled.</td>
</tr>
<tr>
<td>2</td>
<td>magnetic data output with zero trim using clock/data signaling. (All reads are “good,” trims excess zero bits, otherwise sends data as is.) Tamper monitor is enabled.</td>
</tr>
<tr>
<td>3</td>
<td>magnetic data output with zero trim, reverse read correction, and error filter enabled using clock/data signaling. Tamper monitor is disabled.</td>
</tr>
<tr>
<td>4</td>
<td>26-bit Wiegand (8-bit facility code and 16-bit ID) compatible output from cards with 8 or more digits or AMC encoding. See Format 5 for digit usage.</td>
</tr>
<tr>
<td>5</td>
<td>34-bit Wiegand (12-bit facility code and 20-bit ID) compatible output from cards with 8 or more digits or AMC encoding.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Digits in mag card</th>
<th>Facility Code</th>
<th>User ID</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Digits 26-bit Range</td>
<td>34-bit Range</td>
</tr>
<tr>
<td>8</td>
<td>1-3</td>
<td>000-255</td>
</tr>
<tr>
<td>9</td>
<td>1-3</td>
<td>000-255</td>
</tr>
<tr>
<td>10</td>
<td>1-4</td>
<td>0000-0255</td>
</tr>
<tr>
<td>11 or more</td>
<td>1-5</td>
<td>00000-00255</td>
</tr>
<tr>
<td>AMC card</td>
<td>1-6</td>
<td>000000-000255</td>
</tr>
<tr>
<td>Format 6</td>
<td>26-bit Wiegand compatible output from standard Northern Computer magnetic card. The lower 8 bits of the 16-bit facility code is used as facility code. The 16-bit user ID is unaltered. Reverse read and error filter is enabled. No tamper monitor.</td>
<td></td>
</tr>
<tr>
<td>Format 7</td>
<td>magnetic data output with zero trim and reverse read correction using data 1/data 0 signaling. The tamper monitor is disabled.</td>
<td></td>
</tr>
</tbody>
</table>
56.2 DIP Switch/Jumper Setting

All readers are equipped with DIP switches for configuration/parameter setting. DIP switches are set by moving the slide to on/off position using a small tool (may be made from a paper clip). Remove the top mounting bracket to access the DIP switches.

The DIP switches/jumpers on the BAS-2010/2020 reader are used to select a preset format. This preset format determines how the card is interpreted, the functions for the LED and buzzer, and the output signal format, etc. Refer to format specification for details.

<table>
<thead>
<tr>
<th>FORMAT</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td>format 0</td>
<td>ON</td>
</tr>
<tr>
<td>format 1</td>
<td>ON</td>
</tr>
<tr>
<td>format 2</td>
<td>ON</td>
</tr>
<tr>
<td>format 3</td>
<td>ON</td>
</tr>
<tr>
<td>format 4</td>
<td>ON</td>
</tr>
<tr>
<td>format 5</td>
<td>ON</td>
</tr>
<tr>
<td>format 6</td>
<td>ON</td>
</tr>
<tr>
<td>format 7</td>
<td>ON</td>
</tr>
<tr>
<td>format T (factory reserved)</td>
<td>off</td>
</tr>
</tbody>
</table>
All other combinations are reserved.

ON = switch is set to ON or jumper is uncut.

## 56.3 Keypad Data and Tamper Monitor Signaling

Keypad data and tamper monitor status are transmitted on the data lines as 8-bit blocks. They are encoded and sent using the same signaling method as selected for the card data output (clock/data or data 1/data 0). Card data, tamper status data, and keypad data blocks are separated by a minimum of 100 milliseconds. See following for codes:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10110000 - 0</td>
<td>ASCII '0', odd parity, MSB first</td>
</tr>
<tr>
<td>00110010 - 2</td>
<td>ASCII '2', ...</td>
</tr>
<tr>
<td>00110100 - 4</td>
<td>ASCII '4', ...</td>
</tr>
<tr>
<td>10110110 - 6</td>
<td>ASCII '6', ...</td>
</tr>
<tr>
<td>00111000 - 8</td>
<td>ASCII '8', ...</td>
</tr>
<tr>
<td>00101010 - *</td>
<td>ASCII '*', ...</td>
</tr>
<tr>
<td>11010011 - SAFE</td>
<td>ASCII 'S', ...</td>
</tr>
<tr>
<td>00110001 - 1</td>
<td>ASCII '1', ...</td>
</tr>
<tr>
<td>10110011 - 3</td>
<td>ASCII '3', ...</td>
</tr>
<tr>
<td>10110101 - 5</td>
<td>ASCII '5', ...</td>
</tr>
<tr>
<td>10111001 - 9</td>
<td>ASCII '9', ...</td>
</tr>
<tr>
<td>00100011 - #</td>
<td>ASCII '#', ...</td>
</tr>
<tr>
<td>01010100 - ALARM</td>
<td>ASCII 'T', ...</td>
</tr>
</tbody>
</table>

### 56.4 TTL Interface

The TTL interface has the standard 6-wire interface widely used in the access control application. In addition, an input to control the buzzer is provided. Cable with minimum of 24AWG wires should be used.

![MODULAR PLUG](image)

6 (BLK) GND
5 (ORG) BUZZER/(LED)
4 (BRN) LED
3 (WHT) DATA 1/CLOCK
2 (GRN) DATA 0/DATA
1 (RED) +5 OR +12 VDC

depends on model

### 56.4.1 Use with a WRI Reader

To use the BAS-2020W with a Recognition Source reader, this reader must be set to format 3 (DIP switches 3 and 4 are turned on).

In System Administration, configure the reader as Mag w/ Wiegand output.
56.5  Grounding the Reader

To avoid having ESD (electrostatic discharge) interfering with the operation of the reader, the reader casing shall be grounded. This can be accomplished by tying the mounting bracket to earth ground locally (e.g. grounded conduit).

56.6  Reader Verification

The reader performs a self-test when power is first applied to the unit. If power-on test is successfully completed, the reader will turn on both LEDs for approximately one second and sound the buzzer for one short beep. Then the reader is ready for normal operation.

If further verification of the reader hardware is needed, the reader may be temporarily set to format T. With this format selected, the reader will read and verify standard ANSI track 2 encoded card. If no read error is detected, the green LED will flash. Otherwise, the red LED will flash and the buzzer will sound two short beeps to indicate error. The LED input can be used to verify the LED function, and the buzzer input for the buzzer function. For MR-20, the reader will echo a key press with a brief flash of both LEDs and a short beep of the buzzer. Reset to the required format for normal operation after test.

56.7  Status Indicators

The reader has two blinking LEDs which signify its status:

<table>
<thead>
<tr>
<th>Mode or Status</th>
<th>Behavior of LEDs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Card and PIN</td>
<td>Blinking red light</td>
</tr>
<tr>
<td>Card Only</td>
<td>Blinking red light</td>
</tr>
<tr>
<td>Card or PIN</td>
<td>Blinking red light</td>
</tr>
<tr>
<td>Cipher Lock Emulation</td>
<td>Blinking red light</td>
</tr>
<tr>
<td>Facility Code</td>
<td>Blinking red light</td>
</tr>
<tr>
<td>Locked</td>
<td>Steady red light</td>
</tr>
<tr>
<td>Unlocked</td>
<td>Steady green light</td>
</tr>
<tr>
<td>Power Up Condition</td>
<td>Green, red, and beep</td>
</tr>
<tr>
<td>Access Granted</td>
<td>Blinking green light, two beeps</td>
</tr>
<tr>
<td>Access Denied</td>
<td>Steady red light, three beeps</td>
</tr>
<tr>
<td>Waiting for PIN</td>
<td>Both green and red lights blink simultaneously at half intervals for ten seconds</td>
</tr>
<tr>
<td>Waiting for second card</td>
<td>Green and red lights blink alternately at half intervals for ten seconds.</td>
</tr>
<tr>
<td>Extended held open mode</td>
<td>Beeps during pre-alarm</td>
</tr>
</tbody>
</table>
56.8 Maintenance

The readers are designed to provide continuous service with minimal routine maintenance. However, contaminants (such as magnetic oxides from badges and dirt) tend to accumulate on the read head. Without regular cleaning, these contaminants will shorten the read head life and increase the probability of card read error. A maintenance schedule should be developed based on the card reader environment (dirty or clean) and the usage frequency (light traffic or heavy traffic). Extreme cases may require daily cleaning.

Head cleaning may be done by using disposable, pre-saturated magnetic head cleaning cards. These cards are readily obtainable from a number of sources (e.g., Clean Team Co., (805) 581-1000).

The reader exterior surface is covered with high-strength polymer and polyester membrane. It may be cleaned with a soft cloth and mild detergent if required.

56.9 Product Identification

Reader product identification is provided on labels. These labels have information on program ID, revision, product ID, supply voltage, and copyright notice. These labels are located on the circuit board and the back of the reader.

| PN: 3012-0000 | Model: 2005W |
| SN: 00100 | DATE: 9502 |
| RATED: 12 Vdc 80mA | |
| FOR INSTRUCTION, SEE: 10107-0000 | |
| REV: 06/94 | LISTED |
| MADE IN USA | 6T32 BP6565 |

[UL Listed]
## Specifications

The reader is for use in low voltage, class 2 circuits only.

<table>
<thead>
<tr>
<th>Power:</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 Volt Model: 5.8 VDC (4.9 to 6.4 VDC)</td>
</tr>
<tr>
<td></td>
<td>12 Volt Model: 12 VDC (10.2 to 13.8 VDC)</td>
</tr>
<tr>
<td></td>
<td>Current 80mA (25mA typical.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data output</th>
<th>Data 1/0 pair or clock/data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Timing - clock/data -</td>
</tr>
<tr>
<td></td>
<td>1 mS period</td>
</tr>
<tr>
<td></td>
<td>400 uS setup/hold time typical</td>
</tr>
<tr>
<td></td>
<td>- data 1/0 -</td>
</tr>
<tr>
<td></td>
<td>3 mS period</td>
</tr>
<tr>
<td></td>
<td>20 µS pulse width typical</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LED input</th>
<th>input not driven: LEDs off</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>input &gt; 3.5 Vdc: Red LED on</td>
</tr>
<tr>
<td></td>
<td>input &lt; 0.8 Vdc: Green LED on</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Buzzer input:</th>
<th>input not driven or &gt; 3.5Vdc: buzzer off</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>input &lt; 0.8Vdc: buzzer on</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>Dimension 1.95 W x 1.30 H x 5.50 L inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(50 W x 33 H x 140 L mm)</td>
</tr>
<tr>
<td></td>
<td>Weight 10 oz. (284 g) nominal</td>
</tr>
<tr>
<td></td>
<td>Material Case, Die cast aluminum, gray powder coat standard</td>
</tr>
<tr>
<td></td>
<td>Mounting, stainless steel</td>
</tr>
<tr>
<td></td>
<td>Wall plate, 18 CRS, gray powder coat standard</td>
</tr>
</tbody>
</table>

| Card                 | 75 bpi, ANSI X4.16, Track 2 standard, Speed 3 to 50 ips |

<table>
<thead>
<tr>
<th>Read Head</th>
<th>500,000 passes typical, standard. Optional high-wear head available.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To order the high-wear read head, add “-OH” to the part number when you place your reader order.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tamper Switch</th>
<th>(Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To order the tamper switch, add “-OT” to the part number when you place your reader order.</td>
</tr>
</tbody>
</table>

| Distance             | 500' (152m) with 18 AWG wires                                      |

<table>
<thead>
<tr>
<th>Environmental</th>
<th>Temperature:Operating: -40° to +75° C (-40° to +167° F)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Humidity:0-95% RHNC, standard 100% (-OW option)</td>
</tr>
</tbody>
</table>
57.1 Reader Mounting Dimensions

Mounting dimensions for the BAS-2020W-NDK

DIMENSION: INCH (mm)

Mounting dimensions for the BAS-2020W-NDK

DIMENSION: inch (mm)
Optional Wall Plate, WP-10

Fitting Rigid Conduit to Junction Box

WALL OPENING FOR J-BOX

1-GANG BOX

1/2" RIGID CONDUIT

WALL STUD

2.3 (57)

4.2 (107)

1.2 (31)

2X 0.18 (45)

3.3 (84)

1.4 (35)

6.3 (160)

2.75 (70)

4.0 (102)

1.4 (36)
57.2 Reader Weather Shield

EXPOSED EDGES (FRONT AND TOP) MUST BE ROUNDED/SMOOthed, RADIUS 0.015 TYP.

2. FINISH: CLEAN AND DEBUR. SAND TO BREAK ALL EDGES.
   BRUSH FINISH TOP/SIDE SURFACES (200 GRIT). GRAIN VERTICAL.

1. MATERIAL: STAINLESS STEEL, TYPE 304-2B, 18GA

NOTES: UNLESS OTHERWISE SPECIFIED
LENELPROX
READERS
58 LenelProx Readers

LenelProx readers are radio-frequency proximity readers (with or without integrated keypads). B.A.S.I.S. currently supports the following models:

- LenelProx LPMM-6800
- LenelProx LPSP-6820
- LenelProx LPKP-6840 and BT-LPKP-NDK
- LenelProx LPSR-2400
- LenelProx LPRKP-4600
- LenelProx LPMR-1824 and LPMR-1824 MC
- LenelProx LPLR-911

The RFID (Radio Frequency Identification) readers, or proximity readers, use radio frequency to identify, locate, and track people and objects that carry the appropriate transponders. Proximity readers can work in non-line-of-sight situations.

A typical proximity system consists of three components – an interrogator (reader), a transponder (card, keytag, etc.), and a data processing panel and/or computer combination. Most RFID readers have an internal micro-controller, a transmitter, a receiver and a shared transmit/receive antenna.

The credential is usually passive and consists of an antenna and an RFID ASIC (Application Specific Integrated Circuits). During operation, the reader sends out an electromagnetic wave to establish a zone of surveillance. When a card enters this zone, the electromagnetic energy from the reader interacts with the IC in the tag. Once the IC is energized, it goes through an initialization process and begins to broadcast its identity. This process utilizes a low-energy back-scattering technology that selectively reflects or back-scatters the electromagnetic energy back to the reader. The circuits in the reader receive and decode this back-scattered signal and determine the identity of the tag.

58.1 Read Range

To measure the read distance between the reader and card, grasp the card by the corner or near the slot and move the card slowly toward the reader, with the card surface parallel to the reader until a beep occurs. The beep indicates that the reader detects and reads the card. In order the read again, the card must be fully withdrawn from the reader’s field of surveillance and then presented again. During normal operation, the card can be presented at any angle relative to the reader; however, this will result in slight variation of read range.

Note: Waving the card in front of the reader will result in a diminished read range.

58.2 Installation Guidelines

Conduct a site survey before starting installation to avoid possible sources of interference. If the reader is not installed properly, the performance will be degraded. Reader damage is also possible.
• Do not install the reader in an area where sources of broadband noise may exist. (Examples of broadband noise sources: motors, pumps, generators, AC switching relays, light dimmers, CRTs, induction heater, etc.)

• Do not bundle the reader wires together in one conduit with the AC power cables, lock power, and other signal wiring.

• Keep all the reader wiring at least 12 inches (30 cm) away from all other wiring, which includes, but it not limited to, AC power, computer data wiring, telephone wiring, and wiring to electrical locking devices.

• Do not install the reader within 24 inches (60 cm) of a computer CRT terminal.

• Make sure that the supply voltage of the reader is within specification. As a rule of thumb, higher supply voltage results in longer read range but at the expense of higher power consumption.

• Use cables with overall shield (screen).

• For best results, run the cable in an individual conduit with at least 12 inches distance from the AC power, computer data cables, and cables for electrical locking devices.

• Use recommended cable. Do not use any unshielded “twisted pair” type cable.

• Use the largest wire gauge possible.

• Use dedicated and linearly regulated power supply, where applicable.

• Use Single Point Grounding (Earthing). Do not use ground loops.

58.2.1 General Wiring Requirements

All the reader wiring must be continuously shielded. Use #22 AWG up to #18 AWG, six or seven-conductor shielded cables. Longer distances and higher current consumption on the power supply line will require larger gauge wires.

58.2.2 Power

The operating frequency of a typical power supply ranges from 15 to 50 kHz. It will usually generate wideband-switching noises. Some of its harmonics may fall on or near the operating frequency of the reader, 125 kHz. Therefore, avoid using a switching power supply at all times. Void using a single power supply for reader and the magnetic lock. Doing so will affect reader operation and may cause damage to the reader.

Note: When using an external power supply, always use a linear power supply. Do NOT use a switching power supply.

If a LenelProx reader is disconnected from the power supply and then reconnected, the readers will not read the initial card presented. Subsequent cards will be read as usual.

58.2.3 Grounding

Grounding is critical for proper operation of the reader. When installing the reader, it is crucial to assure that the earth ground is the best ground available. If you elect to use the AC main power ground, conduct a test by measuring its resistance relative to a known good ground, such as a cold water pipe or a structural steel member that is in direct contact with the ground. This resistance should be less than 50 ohms. If you find that the AC main power does not provide adequate earth ground, try using a solid connection to a cold water pipe or for best results drive your own copper-clad ground rod into the earth for the ground point.
For multiple reader installations, it is critical that all readers are connected to a single ground point. Using multiple ground points will create secondary current paths or ground loops that can affect the performance and cause damage to the reader.

58.2.4 Wiring

Some of these readers are designed for Wiegand and RS-232 standard communication formats. If an external power supply is being used, leave the panel’s Ground and Power terminals open and connect the readers Ground (Black) and 5-12 VDC (Red) terminals to the external power supply.

58.3 LenelProx LPMM-6800

The LenelProx LPMM-6800 mullion mount reader is a radio-frequency proximity reader. The reader consists of a transmit/receive antenna, associated electronics, and a polycarbonate housing that encloses the antenna and the electronics. The housing is potted with epoxy to protect the components. The reader may be mounted on a metal door frame or flat surface (wall, housing, etc.).

58.3.1 Installation

1. Position the reader at the desired mounting height on the metal door frame. Observe ADA height requirements. Drill two 7/64 (0.109)-inch holes for the reader, and one clearance hole for the cable.
2. Clip off the white connector from the end of the reader’s cable. Keep the wires as long as possible.

3. Connect the reader to the access control panel according to the following figure. Tape or cap the unused wires singly.

4. Use a regulated linear power supply, between 5 volts (50 mA peak) and 12 volts DC (80 mA peak).

5. Align the reader with the screw holes in the frame. Attach the reader to the frame with screws.

6. Power up the reader. The LED is steady amber (the beeper does not sound).

7. Present any Lenel proximity credential (card, keytag, or wafer) briefly to the reader. This initializes the reader and prepares it for reading cards authorized for the door or gate. The reader sounds a single short beep. The LED is steady red to indicate standby mode.

8. The LED color in standby may be changed from red to green, or from green to red, using a Color Changer card, available from Lenel.
   Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the Color Changer card to toggle the LED color at standby.

9. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card, available from Lenel (part # LB-E).
   Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the LED Mode Changer card to toggle the LED mode at standby.
Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

10. When installation is complete, insert screw-hole plugs into the screw clearance holes to conceal the screw heads. Screw-hole plugs are for one-time use. After they are seated, they cannot be removed without damaging the plugs.

58.3.2 Specifications

- UL 294 Listed
- Complies with FCC Part 15

Cable to Controller
- 6 conductor (not twisted pair), stranded, 22 AWG, color-coded insulation, overall shielded
- Length: up to 500 feet

Read Range (metal compensated)
- 5 VDC: typically 6 inches (15 cm)
- 12 VDC: typically 8 inches (20 cm)

Operating Parameters
- Operating temperature: -35° to 65° C (-31° to 150° F)
- Operating humidity: 0 to 95% non-condensing
- Excitation frequency: 125 kHz
- Wiegand output: 26 to 50 bits (determined by code in credentials)

Notes: The beeper sounds as described even if the yellow wire is not connected to the controller. The Beeper, Hold, and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a high level (3.6 to 5.0 VDC) when not used.

LPMM-6800 readers have both Wiegand and RS-232 interfaces.

58.4 LenelProx LPSP-6820

The LPSP-6820 reader is a radio-frequency proximity switchplate reader. The reader consists of a transmit/receive antenna, associated electronics, and a polycarbonate housing that encloses the antenna and the electronics. The housing is potted with epoxy to protect the components. The reader may be mounted like a cover plate on a single-gang electrical utility box, or on a flat surface (wall, housing, etc.).
58.4.1 Installation

1. Install a single-gang utility box, or drill two no. 27 (0.144)-inch clearance holes for the reader and one hole for the cable, at the desired mounting height. Observe ADA height requirements.

2. Snap open the reader’s top cover by inserting a screwdriver blade into the slot at the bottom edge of the cover, then twisting the blade gently.

3. Connect the reader to the access control panel according to the following figure(s). Tape or cap the unused wires singly.

   - Wiring with reader interface modules:
     Use the following diagrams to wire the LenelProx LPSL-6820 with either the single or dual reader interface module. Since the current requirements for these readers range from 40 to 120 mA, this means that the readers can be powered from the reader interface modules.

   Wiring the LPSP-6820 and the BAS-1300

   TYPICAL SOFTWARE SETTINGS
   1. Reader Type = WIEGAND/PROX
   2. Keypad = NO KEYPAD
   3. LED Mode = 1-WIRE LED CONTROL

   Single Reader Interface Module

   - GND
   - BZR
   - LED
   - CLK/D1
   - DATA/D0
   - VO

   - Black
   - Yellow
   - Brown
   - White
   - Green
   - Red

   LenelProx LPSP-6820
For the Dual Reader Interface Module, make sure that jumper J2 is set to unregulated power mode. This will allow the maximum amount of current for the readers.

Wiring the LPSP-6820 and the BAS-1320

4. Use a linear and regulated power supply, between 5 volts (50 mA peak) and 12 volts DC (80 mA peak).
5. Align the reader with the electrical utility box. Attach the reader to the electrical box with screws.
6. Put the reader's top cover in place and snap the housing closed.
7. Power up the reader. The LED is steady amber. (The beeper does not sound.)
8. Present any Lenel proximity credential (card, key tag, or wafer) briefly to the reader. The beeper sounds a single short beep. The LED is steady red to indicate standby mode. This initializes the reader and prepares it for reading cards authorized for this door or gate.

Note: You must use Lenel credentials.

9. If the LED color in standby is green (instead of red), it may be changed to red using a Color Changer card, available from Lenel.
   Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED color at standby.
10. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card, available from Lenel (part # LB-E).
Remove power from the reader for a few seconds, then restore power. While the LED is amber, present
the LED Mode Changer card to toggle the LED mode at standby.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the
LenelProx readers do not have this feature and cannot be upgraded.

58.4.2 Specifications

• UL 294 Listed
• Complies with FCC Part 15

Cable to Controller

• 5 to 7 conductors (not twisted pairs), stranded, 22 AWG, color-coded insulation, overall 100% shielded
• Length: up to 500 feet

Read Range (metal compensated)

• 5 VDC: typically 6 inches (15 cm)
• 12 VDC: typically 8 inches (20 cm)

Operating Parameters

• Operating temperature: -35° to 65° C (-31° to 150° F)
• Operating humidity: 0 to 95% non-condensing
• Excitation frequency: 125 kHz
• Wiegand output: 26 to 50 bits (determined by code in credentials)

Notes: The beeper sounds as described even if the yellow wire is not connected to the controller.

The Beeper, Hold, and LED lines are logic levels. Never apply power to them. They may be
pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a height level
(3.6 to 5.0 VDC) when not used.

LPSP-6820 readers have both Wiegand and RS-232 interfaces.

58.5 LenelProx LPKP-6840 and BT-LPKP-NDK

The LenelProx LPKP-6840 reader is a radio-frequency switchplate proximity reader with integrated keypad.
The reader consists of a 12-key keypad, transmit/receive antenna, associated electronics, and a
polycarbonate housing that encloses the antenna and the electronics. The housing is potted with epoxy to
protect the components. The reader may be mounted like a cover plate on a single-gang electrical utility box,
or on a flat surface (wall, housing, etc.). The BT-LPKP-NDK has the same features, with an indestructible
housing.
58.5.1 Installation

1. Install a single-gang utility box, or drill two no. 27 (0.144 inch) clearance holes for the reader and one hole for the cable, at the desired mounting height. Observe ADA height requirements.

2. Snap open the reader’s top cover by inserting a small screwdriver blade into the slot at the bottom edge of the cover, then twisting the blade gently. Do not remove the keypad from the reader.

3. Clip off the white in-line connector from the end of the reader's cable. Keep the wires as long as possible.

4. Connect the reader to the access control panel according to the following figure.
   
   - Wiring the reader interface modules:
     
     The reader operates at 5 to 12 VDC and has a current draw requirement of 50 to 120 mA. The reader can be powered directly from the dual reader interface module. The keypad uses an 8-bit output burst and meets all Lenel functionality requirements. The reader uses a single wire LED control and the LED functionality also meets all Lenel specifications.
**Wiring the LPKP-6840/BT-LPKP-NDK and the BAS-1300**

**TYPICAL SOFTWARE SETTINGS**

1. Reader Type = WIEGAND/PROX
2. Keypad = 8-Bit Output
3. LED Mode = 1-WIRE LED CONTROL

**Wiring the LPKP-6840/BT-LPKP-NDK and the BAS-1320**

**TYPICAL SOFTWARE SETTINGS**

1. Reader Type = WIEGAND/PROX
2. Keypad = 8-Bit Output
3. LED Mode = 1-WIRE LED CONTROL

- Connect the yellow wire only if used for Beeper control by the panel. In steps 9 and 10, let the
yellow wire float.

- Connect the blue wire only if used for Hold control by the panel.
- Tape or cap the unused wires singly.

5. Use a linear regulated power supply, between 5 volts (60 mA peak) and 12 volts DC (120 mA peak).

6. Align the reader with the electrical utility box. Attach the reader to the electrical box with the screws provided.

7. Place the reader's top cover in place and snap the housing closed.

8. Power up the reader. The beeper sounds a single short beep. The LED should be steady amber.

9. While the LED is amber, enter the 10-digit password (914 369 8800). There is a short beep with each keystroke. (For security, record this password and store it in a safe place.)

10. Immediately enter the 5-character code (#ABC#) for the site code (or facility code) that you will program into the host system to identify keypad PIN entry. ABC represents the 3-digit site code. There is a short beep with each keystroke. Note:
   - Program the host system for 26-bit Wiegand format from keypad entry. The site code must be between 000 and 255.
   - If you do not enter the keypad's site code, the BT-LPKP-NDK Keypad enters a default site code of 000.
   - The site code for the keypad may be the same as or different from the site code of the credentials (cards, keytags or wafers), depending on requirements of the host system or application.

11. If programming is successful, the beeper sounds one long beep. Then the LED is red to indicate standby mode.

12. If the beeper doesn't sound and the LED doesn't change to red, repeat steps 8 to 11, above. Enter the password and the site-code selection code with a steady hand, pressing each key for at least 0.5 second. Do not pause between the password and the 5-character code. Also, be sure that the yellow wire is disconnected from the panel and floating.

13. If the LED color in standby is green (instead of red), it may be changed to red using a Color Changer card, available from Lenel. Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED color at standby.

14. The LED standby mode may be changed from blinking-Red to steady-Red, or from steady-Red to blinking-Red, using an LED Mode Changer card, available from Lenel (part # LB-E). Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the LED Mode Changer card to toggle the LED mode at standby.

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**58.5.2 Operating Modes**

The LPKP-6840/BT-LPKP-NDK supports the following operating modes:

- **Prox-plus-PIN.** Present proximity card first, then enter PIN on keypad (default).
- **PIN-plus-Prox.** Enter PIN on keypad first, then present proximity card.
LenelProx Readers

- **Prox-Only.** Present proximity card only. The read cycle is terminated when the controller sends out an acknowledgment signal by pulling the LED control line low momentarily. The reader resets and is ready for the next read.

- **PIN-Only.** Enter PIN on keypad only. The read cycle is terminated when the controller sends out an acknowledgment signal by pulling the LED control line low momentarily. The reader resets and is ready for the next PIN entry.

For 26-bit Wiegand format, enter between 1 and 5 keystrokes. The PIN must be between 0 and 65535.

To cancel keypad PIN entry before completing the number, press the [*] key.

To terminate keypad PIN entry after all keys have been pressed, press the [#] key.

**58.5.3 Notes**

1. A special feature of the LKP-6840/BT-LPKP-NDK Reader-Keypad is the ability to convert it easily to an LPSP-6820 proximity reader (without keypad), and later convert that LPSP-6820 back to a LKP.
   - To convert from LKP-6840/BT-LPKP-NDK to LPSP-6820: Snap off the LKP-6840/BT-LPKP-NDK's front cover. Unplug the keypad assembly by pulling it straight forward. Snap an LPSP-6820 cover (available from Lenel) on the base card reader.
   - To return that LPSP-6820 to the original LKP-6840/BT-LPKP-NDK: Snap off the SP-6820's front cover. Plug the original keypad assembly into the base reader, aligning the six pins and pressing straight in firmly. Snap the original LKP-6840/BT-LPKP-NDK cover on the base card reader.

2. When the yellow wire is not used, the beeper remains active and under the reader's internal control.

3. The Beeper, Hold, and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function. They must float at a high level (3.6 to 5.0 VDC) when not used.

4. LKP-6840/BT-LPKP-NDK Readers have both Wiegand-protocol and RS-232 serial interfaces. RS-232 data output applies to the card reader output only (not the keypad).

**58.5.4 Specifications**

- Complies with FCC Part 15

Cable to Controller

- 5 or 6 conductor (not twisted pair), stranded, 22 AWG, color-coded insulation, overall shielded
- Length: up to 500 feet

Read Range (metal compensated)

- 5 VDC: typically 6 inches (15 cm)
- 12 VDC: typically 8 inches (20 cm)

Operating Parameters

- Operating temperature: -35° to 65° C (-31° to 150° F)
- Operating humidity: 0 to 95% non-condensing
- Excitation frequency: 125 kHz
• Wiegand output: 26 to 50 bits (determined by code in credentials)
• Keypad: 26 bits only

58.6 LenelProx LPSR-2400

The LenelProx LPSR-2400 reader is a radio-frequency proximity reader. The reader consists of a transmit/receive antenna, reader electronics, in a polycarbonate housing. The housing is potted with epoxy resin to protect the components. The reader may be mounted on a metal door frame or flat surface (wall, housing, etc.).

58.6.1 Installation

1. Position the reader at the desired mounting height. Observe ADA height requirements. Drill two 7/64 (0.109)-inch holes for the reader, and one clearance hole for the cable.

2. Clip off the white connector from the end of the reader’s cable. Keep the wires as long as possible.

3. Connect the reader to the access control panel according to the following diagram.

   Connect the yellow wire only if used for Beeper control by the panel.
   Do not connect the orange, blue and violet wires to anything; do not let them touch ground.
   Tape or cap all unused wires singly.
4. Use a linear and regulated power source, between 5 volts (40 mA peak) and 12 volts DC (70 mA peak).

5. Install the reader on the door frame or other surface. Attach the reader to the door frame with supplied screws or with adhesive or sealant.

6. Power up the reader. The LED is steady amber. (The beeper does not sound.)

7. Present any Lenel proximity credential (card, keytag, or wafer) briefly to the reader. The beeper sounds a single short beep. The LED is then steady red to indicate standby mode. The reader is now initialized and prepared to read cards.

Note: All credentials must be Lenel's products.

8. The LED color in standby may be changed from red to green, or from green to red, using a Color Changer card, available from Lenel. Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED color at standby.

9. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card, available from Lenel. Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the LED Mode Changer card to toggle the LED mode at standby.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.
10. When installation is complete, insert screw-hole plugs into the screw clearance holes to conceal the screw heads. Screw-hole plugs are for one-time use. After they are seated, they cannot be removed without damaging the plugs.

58.6.2 Specifications

- UL 294 Listed
- Complies with FCC Part 15

Cable to Controller

- 5 or 6 conductor (not twisted pair), stranded, 22 AWG, color-coded insulation, overall 100% shielded
- Length: up to 500 feet

Read Range (metal compensated)

- 5 VDC: typically 4 inches (10 cm)
- 12 VDC: typically 5.5 inches (14 cm)

Operating Parameters

- Operating temperature: -35° to 65° C (-31° to 150° F)
- Operating humidity: 0 to 95% non-condensing
- Excitation frequency: 125 kHz
- Wiegand output: 26 to 50 bits (determined by code in credentials)

Notes:

- When the yellow wire is not used, the beeper remains active and under the reader's internal control.
- The Beeper and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a high level (3.6 to 5.0 VDC) when not used.
- LPSR-2400 readers have Wiegand-protocol electrical interface only. (There is no RS-232 interface.)

58.7 LenelProx LPRKP-4600

The LenelProx LPRKP-4600 reader is a radio-frequency proximity reader with a virtually indestructible integrated keypad for access control systems. The reader consists of a 12-key piezoelectric keypad, transmit/receive antenna, and reader electronics, in a slim plastic housing. The reader electronics are potted with epoxy resin to protect against the environment. The reader may be mounted on a single-gang electrical utility box, or on any surface (wall, cabinet, etc.).

58.7.1 Installation

1. Install a single-gang electric utility box, or drill two no. 27 (0.144 inch) clearance holes for the reader's screws and one hole for the cable, at the desired mounting location. Observe ADA height requirements.
2. Place the plastic foam pad behind the reader’s plastic housing. Line up the opening in the plastic foam pad with the opening in the reader's housing where the cables pass through the housing.

3. Pull the reader’s short cable (with the 12-pin connector) through the opening in the housing and out the front of the housing. Pull the long cable (with pigtails) out the back of the housing toward the wall.

4. Wire the reader’s 15-inch-long cable (with gray plastic sheath and 10 pigtails) to the cable from the reader location to the controller panel. The reader's orange wire must be floating - no connection to anything.
5. Place the reader’s plastic housing on the mounting location. Align the two large screw holes in the housing with the holes in the utility box or in the wall. Use appropriate fasteners (supplied). Tighten the screws firmly.

6. Plug the reader’s 12-pin female connector, on the short cable, into the 12-pin male connector on the back of the keypad. The connectors’ shells are mechanically keyed.

7. Place the keypad on the top of the plastic housing. Use the two no. 6-32 X 5/8” flat-head screws to fasten the keypad to the threaded brass inserts in the plastic housing. Tighten the screws firmly.

8. Use a linear regulated power supply, 12 volts DC +/- 3.0 volts (90 mA peak load). Power may be supplied by the controller panel; connect to the +12 VDC and ground terminals on the reader input port.

9. Power up the reader. There are two sets of LEDs - separate red and green LEDs on the keypad, and a combined red/green/amber LED for the card reader at the bottom of the reader's housing.

10. To start, the keypad’s red LED is on, blinking red-off, and the reader's LED is steady amber. (The beeper does not sound.)

11. Present a valid Lenel proximity credential (card, keytag or wafer) briefly to the reader. This initializes the reader. To read a credential, hold it over the indent in the lower-end of the plastic housing. To enter a keystroke, press the marked key firmly. Either action makes an LED change color and a beeper sound.

12. The reader sounds a Short-Long-Short-Short <pause> Long-Short-Short-Short sequence. The reader's LED is blinking-red to indicate Standby mode. The reader is now prepared to read cards.

13. Test the card reader and the keypad on the host system. Then attach the strip label with two small openings over the keypad’s LEDs. Attach the other strip label over the keypad's lower screw hole. Attach the larger label over the plastic housing's bottom screw hole; insert this label into the housing's indentation.

14. The reader’s LED color in Standby may be changed from red to green, or from green to red, using a Color Changer card, available from Lenel. Remove power from the LPRKP-4600 for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED's Standby color.
15. The reader’s LED Standby mode may be changed from blinking-red to steady-red, or from steady-red to blinking-red, using an LED Mode Changer card (Lenel part # LB-E). Remove power for the LPRKP-4600 for a few seconds, then restore power. While the LED is amber, present the LED Mode Changer card to toggle the LED's Standby mode.

**Operation Modes**

LPRKP-4600 Revision LB supports the following operation modes of the host system:

- Prox-plus-PIN. Present proximity card first, then enter PIN on keypad.
- Prox-Only. Present proximity card only.
- Pin-plus-Prox. Enter PIN on keypad first, then present proximity card.
- PIN-Only. Enter PIN on keypad only.

The keypad’s red LED blinks once each time that the user presses any key.

The number of PIN keystrokes allowed is determined by the host system (not by the reader).

If the host system is programmed for this command, terminate keypad PIN entry by pressing the # key.

**58.7.2 Specifications**

Cable to Controller:
- 6 conductor (not twisted pair), stranded, 22 AWG, color-coded insulation, overall shielded
- Length: up to 500 feet

Read Range (at 12 VDC): typically 4-6 inches (10-15 cm)

Characteristics:
- Temperature: -35° to 65°C (-31° to 150°F) operating
- Humidity: 0 to 95% non-condensing
- CE Marking
- UL 294 Listed
- FCC Part 15 certified

Operating Parameters:
- Excitation frequency: 125 kHz
- Wiegand output:
  - Card reader: 26 to 50 bits (determined by code in credentials)
  - Keypad: 8-bit code for each keystroke
Notes:  Two readers at the same door may need to be separated physically or shielded from each other for best operation.

The beeper has no external control. The beeper operates under the reader’s internal control.

The LED lines are at TTL logic levels. Never apply power to them. They may be pulled to low level (0 to 1.2 VDC) to enable their function, and float at high level (3.6 to 5.0 VDC) when not used.

FCC Compliance: This equipment has been tested and found to be in compliance with the limits for FCC part 15, Class A digital device. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The users are prohibited from making any change or modification to this product. Any modification to this product shall void the user's authority to operate under FCC Part 15 Subpart A Section 15.21 regulations.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Compliance: Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

58.8  LenelProx LPMR-1824 and LPMR-1824 MC

The LenelProx LPMR-1824 reader is a medium-range radio-frequency proximity reader for gate control and access control systems. The reader consists of a transmit/receive antenna, associated electronics, and a polycarbonate housing that encloses the antenna and electronics. The housing is potted with epoxy to protect the components. The reader may be mounted on a flat surface (wall, plate or housing). “MC” designates the metal-compensated version of this reader that must be mounted on a metal surface larger than the reader.

58.8.1  Installation

1. Position the reader at the desired mounting position. Observe ADA height requirements, if applicable. Drill four holes for the screws or anchors, and one clearance hole for the cable. The installer determines the size of mounting holes and cable clearance hole.
**Notes:**

Use the LPMR-1824 MC, the metal-compensated form of the LPMR-1824 reader only when nearby metal will reduce the performance of the standard LPMR-1824 reader. When using the LPMR-1824 MC reader, it should be mounted on a metal surface that is larger than the 8 x 8 inch reader housing. Lenel recommends a metal surface of 12 square inches or larger.

2. If you are installing the LPMR-1824, SKIP THIS STEP and proceed to step 3!
   
   To mount the LPMR-1824 MC reader on the metal surface:
   
   a. Remove the four screws through the front of the reader’s plastic housing. This releases the four ferrite tiles from the back of the reader.
   
   b. Use the ferrite tiles as templates for mounting holes on the wall or other surface. These holes are at the center of each 4 x 4-inch tile. The center of the hole is two inches from each edge.
   
   c. If necessary, enlarge the hole in the ferrite tiles slightly by drilling or reaming.
   
   d. Screw the reader’s plastic base and the ferrite tiles to the wall by inserting the 4 screws first through the inside of the plastic base, then through the holes in the ferrite tiles, then into the mounting holes in the wall.
   
   e. Reattach the reader’s plastic cover using the screws that were removed in step a.

3. Clip off the white in-line connector from the end of the reader's cable. Keep the wires as long as possible.
4. Connect the reader to the controller panel according to the following figure.

4. Connect the reader to the controller panel according to the following figure.

Connect the yellow wire only if used for Beeper control by the panel.
Connect the blue wire only if used for Hold control by the panel.
Do not connect the orange and violet wires to anything. Tape or cap the unused wires singly.

5. Use a Lenel regulated power supply with linear output, between 5 volts (250 mA) and 12 volts DC maximum (600 mA peak). Do not power the LPMR-1824 from the panel’s reader input port. Tie the ground side of all DC power supplies together – including the reader, the panel’s input port, and the door/gate release.

6. To install the reader's cable through the surface directly behind the reader, insert both cable slot plugs in the sides of the reader's top cover. To run the cable exiting from the side of the reader, press-fit the cable into the curved channel and guide the cable out of the desired side of the reader. Then insert the cable slot plug in the other side of the top cover.

7. Install the reader on the mounting surface, using screws and anchors as necessary.

8. Power up the reader. The LED is steady amber. (The beeper does not sound.)

9. Present any valid Lenel proximity credential (card, key tag or wafer) briefly to the reader. The beeper sounds a single short beep. The LED is steady red to indicate standby mode. The reader is initialized and prepared to read cards.

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**Note:** All credentials must be Lenel's own products.

10. The LED color in standby mode may be changed from red to green, or from green to red, using a Color Changer card, available from Lenel. Remove power from the reader for a few seconds, then restore power. While the LED is amber, present the Color Changer card to toggle the LED color at standby.
11. The LED standby mode may be changed from blinking red to steady red, or from steady red to blinking red, using an LED Mode Changer card, available from Lenel (part # LB-E). Remove power from the reader for a few seconds, then restore power. While the LED is Amber, present the LED Mode Changer card to toggle the LED mode at standby.

Note: In order to use this feature, the reader must be rev. LB. Previous revisions (C8, D, L, LA) of the LenelProx readers do not have this feature and cannot be upgraded.

12. When installation is complete, insert screw-hole plugs into the screw clearance holes to conceal the screw heads. Screw-hole plugs are for one-time use. After they are seated, they cannot be removed without damaging the plugs.

58.8.2 Maximum Read Range

Following the listed recommendations will assure that LenelProx LPMR-1824 readers perform at the published read range rating (18-24 inches).

Wiring

- The reader cable may be 6 conductor, 22 gauge, up to 500 feet long. It MUST be high quality, overall-shielded. It does not have to be twisted pair.
- If the cable is twisted pair, assign the connections to avoid data crosstalk - pair one of the data lines (say, D0) with the power hot wire in one twisted pair. The reader’s paired wire colors will then be green with red, and white with black.

Power Supply - Voltage

- Use a REGULATED DC power supply with LINEAR output current. Do not use a switching power supply.
- Use a power supply that delivers not more than 12.0 volts DC at the reader's power connections. (The applied voltage at the reader may be as low as 5 VDC, but this may reduce the read range by about 25%.)
- Connect power common (ground) to the black wire in the reader's cable, and connect positive power to the red wire.

Power Supply - Current

- Do not draw reader power from the host controller's internal power source, such as the reader input port, unless it meets all of the requirements above, and its current rating is sufficient for the peak power requirement of the LPMR-1824 (600 mA at 12 VDC, or 250 mA at 5 VDC).
- Use a DC millimeter in series with the reader power supply to measure the current capacity.
- If using an external power supply, Stanley recommends its PS12-1A DC Power Supply, which has excess power for 1 MR-1824 reader.

Distance from Metal

- Mount the MR-1824 reader on a non-metallic surface. Metal sheets, screens, plates, studs, posts, structural members, etc. should be about one foot away from the reader, in all directions.
• If there is metal behind the MR-1824 reader, such as the mounting plate on a gooseneck post or pedestal, use a non-metallic housing for easy installation and wiring. Or use plaster or plastic or wood spacers for at least 4 inches between reader and metal.

• Do not mount the reader inside a metal housing, enclosure or room. Do not recess the reader in an opening in a metal surface.

**Metal Compensation**

• If the reader must be mounted on metal, use the LPMR-1824 MC metal-compensated version.

• The LPMR-1824 MC reader must be installed on a metal sheet or plate that is larger than the 8 x 8 inch reader case. A plate that is 12 inches square to 24 inches square is effective.

• If the metal-compensated LPMR-1824 MC reader is used, the plastic housing or spacers are not necessary.

• The effective read range of the metal-compensated MR-1824 MC, with the Lenel cards, is approximately 16 inches due to the compensation factors.

**Distance between Readers**

• Multiple LPMR-1824 readers should be at least 8 feet apart.

• If LPMR-1824 readers must be closer together than 8 feet, place metal sheet, foil or screen between them, to isolate their fields.

• If the installation combines an MR-1824 with other proximity readers having shorter read range than LPMR-1824, the distance between these readers can be less than 8 feet.

• Connect just one reader to the terminals of each reader-input port on the host controller or panel.

**Credentials**

• Use only Lenel’s 125 kHz proximity cards, key tags and wafers. (Cards or tags from another manufacturer will not be read by Lenel’s proximity readers.)

• For best read range, use Lenel’s Prox-Linc CS clamshell cards. For rated read range, use GR or GRMAG cards. KT key tags have read range that is about 75% of the GR cards’ range. PW proximity wafers have read range that is about 40% of the GR cards’ range.

**Environment**

• LPMR-1824 readers may be mounted where they are exposed to weather (but observe Lenel’s specifications for operating temperature and humidity, in the MR-1824 data sheet).

• Keep computer monitors several feet away from the LPMR-1824 reader.

• Mount the LPMR-1824 reader in an electrically quiet environment. Avoid heavy electrical machinery.

• Stay away from RF fields, like radio transmission antennas and microwave.

**Field Test**

1. Carry the MR-1824 reader to a remote outdoor area not subject to electrical noise and RF fields.

2. Power the reader with a fully charged battery, 12 volts, 7 ampere-hours or larger.

3. Connect only the 2 power wires - black to ground, and red to +12V.
4. Present a Lenel card to the reader. The LED will change from red to amber for about 1 second, then back to steady red when the card is removed.

5. Experiment with the maximum distance from the reader at which the card reads. Record the test results.

6. If the reader fails to meet Stanley’s specifications, contact Stanley’s Technical Support.

**Site Test**

Interchange two MR-1824 readers - Does the problem stay at the location or move with the reader?

### 58.8.3 Specifications

- UL 294 Listed
- Complies with FCC Part 15

**Mounting Surface**

- **LPMR-1824**: Non-metallic material only (Keep reader at least 3 inches from all metal)

- **LPMR-1824 MC**: Metallic material only (Metal plate, sheet or housing with surface at least 12 square inches; reader centered in area)

**Cable to Controller**

- 5 to 7 conductors (not twisted pairs), stranded, 22 AWG, color-coded insulation, overall 100% shielded (Number of conductors depends upon use of optional features - Beeper, Hold and LED.)
- Length: up to 500 feet

**Read Range**

- LPMR-1824:
  - 5 VDC: typically 12 inches (30 cm)
  - 12 VDC: typically 18 to 24 inches (45 to 60 cm)

- LPMR-1824-MC:
  - 5 VDC: typically 8 inches (20 cm)
  - 12 VDC: typically up to 16 (40 cm)

**Operating Parameters**

- Operating temperature: -35° to 65° C (-31° to 150° F)
- Operating humidity: 0 to 95% non-condensing
- Excitation frequency: 125 kHz
- Wiegand output: 26 to 50 bits (determined by code in credentials)
Notes:
The Beeper sounds as described without connecting the yellow wire to the controller. Beeper, Hold, and LED lines are logic levels. Never apply power to them. They may be pulled to a low level (0 to 1.2 VDC) to enable their function, and left floating at a high level (3.6 to 5.0 VDC) when not used.

Use the LPMR-1824-MC (the metal-compensated form of the LPMR-1824) only when nearby metal will reduce the performance of the standard LPMR-1824 reader.

When using the LPMR-1824-MC reader, it should be mounted on a metal surface that is larger than the 8 x 8 inch reader housing. Lenel recommends a metal surface 12 square inches or larger.

LPMR-1824 and LPMR-1824 MC readers have both Wiegand and RS-232 interfaces.

58.9 LenelProx LPLR-911

The LPLR-911 reader is a long-range (9 to 11 feet) reader that works with paper-thin passive windshield-mounting tags or surface-mounting tags. This reader comes with a unique combination of long read range, small size, and low power consumption. The LPLR-911 has an internal power converter, allowing it to work with a wide range of supply inputs without affecting its performance. With a 12 VDC supply, its current consumption is less than 450 mA, making it possible to be powered directly from the supply in the access control panel, thereby eliminating the need for an external supply. LPLR-911 has simultaneous Wiegand and RS-232 outputs. Its primary applications are automated parking garage entrance control, hands-free access control, asset tracking, and asset management applications.

58.9.1 Preparing for Installation

Always conduct a site survey before starting installation. Avoid any possible sources of interference. If the reader is not installed properly, the performance will be degraded or more seriously the reader may be damaged. The following is a list of installation procedures that should be followed during installation:

- Do not install the reader in an area where sources of broadband noise may exist. Avoid mounting the reader facing a cellular phone tower or in close proximity to the base station of a 900 MHz wireless telephone.
- Keep all of the reader wiring at least 12 inches (30 cm) away from all other wiring, including, but not limited to, AC power, computer data wiring, telephone wiring, and wiring to electrical locking devices.
- Do not operate the reader in close proximity to any 900 MHz wireless equipment.
- Avoid mounting the reader under direct sunlight. Sunlight in some locations may cause the reader to operate at a temperature above the 65 degrees Celsius upper limit.
- Make sure that the supply voltage of the reader is within specification.
- Use cables with over-all shield (screen).
- For best results, run the cable in an individual conduit with at least 12 inches distance from the AC power, computer data cables and cables for electrical locking devices.
- Use recommended cable. Do not use any unshielded “Twisted Pair” type cable.
- Use the largest wire gauge possible.
- Use dedicated power supply, where necessary.
• Use Single Point Grounding (Earthing). No ground loops.

The LPLR-911 has a uni-directional antenna with an antenna beam width of about 60-70 degrees. The radiation pattern is an oval-shaped beam, which should be aimed toward where the transponders will pass. For best results, the antenna should be mounted on a post, about 6 to 7 feet above pavement, with the antenna angled slightly downward toward a vehicle passing through the drive lane. The 11 foot tip of the antenna radiation pattern should reach the windshield directly in front of the passenger or driver. Install readers for neighboring vehicle lanes so that the effective areas for detecting tags do not intersect. Only one reader should be able to read a tag at any location of the tag. Be sure to elevate the antenna slightly to accommodate sport utility vehicles, minivans and trucks.

Note: An additional installation kit (part number LPLRIN) is required for the LPLR-911.

Wiring Requirements

All the reader wiring must be continuously shielded. Use #22 AWG up to #18 AWG, six or seven-conductor shielded cables. Longer distances and higher current consumption on the power supply line will require larger gauge wires. Due to system data termination differences, contact your panel manufacturer for the proper wire sizes to meet the specific requirements.

Power Supply

For consistent performance, choose a high-efficiency switching power supply with remote sense and use the voltage sense wire to ensure consistent performance. Alternatively, use a linear, regulated power supply with sufficient current capacity.

Grounding

Grounding is critical for proper operation of a system with LPLR-911 readers. When installing the controllers, it is crucial to assure that the earth ground is the best ground available. If you elect to use the 120 VAC power ground, conduct a test by measuring its resistance relative to a known good ground, such as a cold water pipe or structural steel that is in direct contact with the ground. The resistance should be less than 50 ohms. If you find that the AC power line does not provide adequate earth ground, try using a solid connection to a cold water pipe.

For multiple controller installations, it is critical that all panels are connected to the same grounding system. Using different grounding systems will create secondary current paths or ground loops that can affect the performance and cause damage to the readers.

The Shield (Drain) wire of the reader cable should be connected to the shield of the extender cable between the reader and the panel. If there is no extender cable, the reader’s Shield (Drain) wire should be connected to nothing. Do not connect the extender cable’s shield to ground at either end – not at the reader and not at the panel.

Measuring Reader Distance

The WS transponder for this reader is designed for windshield mounting. To measure the read range between the reader and the transponder, the transponder must be placed behind a piece of glass about 0.25 inches thick and the transponder must be flat against the glass. Grasp the transponder by the edges and hold the transponder so that the copper circuit faces the reader. Move the transponder toward the reader, with the card surface parallel to the reader, until a BEEP occurs (using the SP-6820-LR test unit). The BEEP indicates that
the reader detects and reads the transponder. Optional firmware allows the user to select read repetition rates of about 3 per second, 1 per second, or 1 per 3 seconds.

**Important:** FAILURE TO FOLLOW THE INSTALLATION GUIDE MAY RESULT IN POOR PERFORMANCE OR EVEN CAUSE PERMANENT DAMAGE TO THE READER, THUS VOIDS THE PRODUCT WARRANTY.

### 58.9.2 Installation

1. Locate the reader at the desired mounting position on a mounting post or a mounting surface. For mounting on a flat surface, drill four small holes through the aluminum plate behind the reader housing for mounting screws, and one clearance hole for the reader cable. For flexible mounting, use a video camera adjustable mount or clamps. The installer determines the size of the mounting holes and the clearance hole. Consider the following:
   - **Metal plate:** The reader is equipped with an aluminum plate attached on the back surface, which provides a flange that may be used as desired to install the reader. The flange may be drilled for screw holes, or may be clamped to an adjustable bracket. Do not remove this plate.
   - **Reader orientation:** The reader may be mounted in any orientation – at any angle.
   - **Mounting material:** The surface or the device that supports the reader may be any material, including metal.
   - **Environment:** There must be no material between the reader and the tag (except for the windshield glass when using the WS tag). Avoid strong RF fields, such as nearby radio transmitters. Avoid HVAC motors with improper shielding.
   - **Multiple readers:** Maintain at least 12-foot spacing between adjacent readers. Aim the readers so that the fields from adjacent readers are parallel (not overlapping within the read range). This will prevent a given tag from being detected by two readers simultaneously.
   - **Mapping a reader’s field:** The field in which a long-range tag can be detected is a circular oval emitted from the front of the reader. The oval’s apex is at the center of the reader. Maximum read range occurs close to the axis of the cone.
2. Install the tags on the selected surface, for example, inside vehicle windshields or on the side of bins, pallets, truck trailers, etc. The tags must be firmly attached on the inside of vehicle windshield glass, to assure rated read range. Do not use plastic pouches, attach to window glass, hold by hand, or place on dashboard. There are two types of tags that can be used: WS tags and MT tags.

- For WS tags:
  a. Selecting the location for WS tags: Choose a location on the vehicles' windshields where there is minimal or no tinting, and no embedded wires for defrosting or radio antenna. The location should be closest to the LPLR-911 reader and "facing" the reader, that is, with the surface of the tag parallel to the front surface of the reader.
  b. Preparing a tag: Clean the inside of the windshield where the tag will be applied. Carefully peel off the front of the tag (the unprinted side), exposing the adhesive and the copper circuit.
  c. Applying the tag: Press the adhesive side of the tag on the inside of the windshield. Rub the tag so that it is tightly attached to the glass, as flat as possible, without wrinkles. This is a onetime application – the tag can not be removed from the glass and re-applied.
  d. Caution: Any metal content in or on the windshield can severely limit the reader's capability.

- For MT tags,
  a. Selecting the location for MT tags: Choose a flat surface large enough for the entire tag to be supported. The material of this surface may be metal or other material. The tag should not be subject to mechanical damage. The location should be closest to the LPLR-911 reader and "facing" the reader, that is, with the surface of the tag parallel to the front surface of the reader.
  b. Preparing a tag: Clean the surface where the tag will be applied. Carefully peel off the pink paper from the back of the tag, exposing the adhesive.
c. Applying the tag: Press the adhesive side of the tag to the mounting surface. Rub the tag lightly so that it is tightly attached to the surface, as flat as possible. This is a one-time application – the tag can not be removed from the surface and re-applied.

d. Securing the tag: When MT tags are installed outdoors, add a bead of silicone adhesive around the entire perimeter of the tag. This adds to the adhesion and excludes moisture.

3. Use the Installation Kit to provide audible and visible feedback as the tags are attached and the reader is aimed at the tags.

4. For Wiegand or RS-232 outputs, see the following wiring diagrams.
   - Reader cable: Use high-quality cable, 6 conductors, 22 gauge, stranded, color-coded insulation, overall-shielded. Maximum cable length from the reader to the host controller is – For Wiegand interface, 500 feet. For RS-232 serial interface, 50 feet.
   - Electric power: Voltage may be between +6.5 VDC and +15 VDC, regulated, either linear or switched. Power rating must be sufficient to supply 1.0 ampere at 6.5 volts, 0.5 ampere at 12 volts, or 0.4 ampere at 15 volts.
   - Data connection: The LPLR-911 reader has wires for both Wiegand and RS-232 interfaces, with simultaneous output. For Wiegand Interface, the data format is the same as the bit format used in programming the tags (between 26 bits and 56 bits). For RS-232 interface, connect the reader’s Receive line (violet) to the TXD terminal, and the reader’s Transmit line (orange) to the RXD terminal.

![Wiring diagram for Wiegand output format](image-url)
5. Complete the following steps for verification.
a. Connect the LPSP-6820-LR test unit, which is part of the Installation Kit, to the reader cable. Use the wiring list in the Installation Instructions. Apply power to the reader and the test unit, using the plug-in DC power module in the Installation Kit.

b. Use either a WS tag that is attached firmly by its adhesive to a rectangle of windshield glass, or a MT tag for verification. Hold the tag so that the hand does not interfere with direct line-of-sight between the tag and the reader.

c. Move the tag into the field. Observing the LPSP-6820-LR test unit, there is a brief LED color change and a beep to indicate each read of the tag by the reader. Reads will repeat at a rate that is determined by the reader’s firmware.

d. Move the tag from side to side, and at varying distances from the front of the reader housing, to determine the space in which the tag and reader are active.

6. Mount the reader.
   a. Check to ensure that all connections are secure. Feed all wires through the cable access hole to the rear or the side of the mounting position.
   b. Mount the reader using fasteners on the aluminum plate to which the LPLR-911 reader is attached. Drill holes through the plate as required by the application, or attach flexible mounting devices or clamps.
   c. Adjust the position or the angle of the reader so that the tags (which have been fastened by adhesive to the windshield or other surface) are detected and read at the desired distance from the reader.

58.9.3 LPLRIN Installation Kit

The installation kit consists of the following components:

- one LPSP-6820-LR test unit with LED and beeper, and cable with three spring-clips
- one LPWS tag, mounted on a windshield glass square
- one LPMT tag
- one LPPS12-1A power supply for LPLR-911 with cable and two spring-clips
- one RS-232 adapter cable with 9-pin “D” serial connector, and cable with three spring-clips

The LPSP-6820-LR test unit is connected to the LPLR-911 reader only during test and alignment of the reader. It has a red-green LED and a buzzer, providing visible and audible feedback to the installer every time that the tag is read.

Use the tag that is attached to the windshield glass sample to test the installation. The glass must be in between the reader and the tag. Be sure that the fingers and the hand do not come between the reader and the tag.

Hold the glass with the LPWS tag in the approximate position where tags will be mounted inside the vehicles' windshields. Adjust the reader on its adjustable mounting until the LED and beeper indicate repeated reading (at a rate of about three per second).

58.9.4 Specifications

Complies with FCC Part 15

UL 294 Listed

Cable to Controller: 9 conductor stranded, 22 AWG, with continuous shield for typical installation
LenelProx Readers

Read Range: 9-11 feet (2.75-3.35 meters)

Weight: 37.5 oz.

Operating Parameters

- Operating temperature: -35° to 65°C (-31° to 150°F)
- Operating humidity: 0 to 95% non-condensing
- Transmitting frequency: 902 to 928 MHz
- Voltage: 6.5 VDC to 15 VDC
- Current requirement: 1.0 A to 0.4 A
- Output format: Wiegand and RS-232
LENEL KEYPADS
59 Lenel Keypads

These keypads are available in two styles: 3 x 4 keypads (part number LNL834S121NN) and 2 x 6 keypads (part number LNL826S121NN).

59.1 LNL826S121NN 8-bit Output Keypad Reader

The reader requires a 12-28 VDC power source and has a current draw of 30 mA. Therefore, the reader can be powered directly from either of the reader interface modules.

The wiring diagrams describe wiring if the keypad is being connected in line with another Stanley supported reader and the LED support for the keypad is being used. The keypad features a 2-Wire LED configuration. If the LED support for this keypad is not being used, omit the connections for those two wires. The reader is using a standard 8-bit output format.
Important: Make sure that the LED control is connected for only one reader. Both reader LEDs cannot be connected at the same time.

59.1.1 Wiring the BAS-1300

The wiring diagram has the 2 x 6 keypad depicted. A 3 x 4 keypad may also be used.

**Typical Software Settings**

1. Keypad = 8-Bit Output
2. LED Mode = 2-WIRE LED CONTROL
3. Wiegand/Prox data type
59.1.2 Wiring the BAS-1320

The wiring diagram has the 2 x 6 keypad depicted. A 3 x 4 keypad may also be used.

TYPICAL SOFTWARE SETTINGS
1. Keypad = 8-Bit Output
2. LED Mode = 2-WIRE LED CONTROL
3. Wiegand/Prox data type

59.2 Reader Specifications

- Protocol: 8 bit word output
- Power: 12 to 28 VDC
- Current: 30 mA
- Environment: IP68; 100% RH
- Temperature: -40° to +70° C
- FCC Certified
- Brushed aluminum construction; other colors available optionally
LENEL OPENCARD READERS
60 Lenel OpenCard Readers

Use the following diagrams to wire (single wire LED control) Single/Dual Reader Interface Modules and OpenCard readers.

60.1 OpenCard ISO-X Readers

The ISO-X reader model LNL-XF1100D (mullion mount) operates at 6-16 VDC with an average current draw of 95mA.

Model LNL-XF2100D (wall mount) operates at 8-16 VDC with an average current draw of 95mA.

Model LNL-XF2110D (wall mount) has a keypad and operates at 8-16 VDC with an average current draw of 120 mA.

Model LNL-XF1050K (mini-mullion) operates at 5-16 VDC.
60.1.1 Wiring the BAS-1300

TYPICAL SOFTWARE SETTINGS

1. Reader Type = WIEGAND/PROX
2. Keypad = No Keypad/8-bit Output Keypad on XF 2110 Only
3. LED Mode = 2-WIRE LED CONTROL
60.1.2 Wiring the BAS-1320

TYPICAL SOFTWARE SETTINGS
1. Reader Type = WIEGAND/PROX
2. Keypad = No Keypad/8-bit Output Keypad on XF 2110 Only
3. LED Mode = 2-WIRE LED CONTROL

60.2 OpenCard XF1550/XF1560

Models XF1550/XF1560 operate at 5-16 VDC with an average current draw of 110mA, 160mA peak. They can be powered from the reader port of a Series 2 dual reader interface module or intelligent dual reader controller.

Note: When connected to a Series 1 dual reader interface module, they should not be powered from the reader port.
60.2.1 Wiring the BAS-1300

This reader cannot be powered from the single reader interface module.

TYPICAL SOFTWARE SETTINGS
1. Reader Type = WIEGAND/PROX
2. Keypad = No Keypad
3. LED Mode = 2-WIRE LED CONTROL

5-16VDC External Power Supply

Single Reader Interface Module

Wiring From Reader

TIE TO EARTH GROUND

Drain Tan

Tamper Input

1k, 1%
60.2.2 Wiring the BAS-1320

This reader can be powered from the reader port only when using a Series 2 dual reader interface module or intelligent dual reader controller.

Dual Reader Interface Module or Intelligent Dual Reader Controller

TYPICAL SOFTWARE SETTINGS
1. Reader Type = Wiegand/Prox
2. Keypad = No Keypad
3. LED Mode = 2-Wire LED Control

Wiring From Reader

Drain Tan
Tie to Earth Ground

1k,1%

Tamper Input
BAS-500B
BIOMETRIC
READER
INTERFACE
61 Overview of the BAS-500B

This installation guide is intended for use by technicians who will be installing and maintaining the Biometric Reader Interface Gateway (BAS-500B). The BAS-500B provides real time processing gateway for biometric readers such as the RSI HandKey series and Identix readers. Readers currently supported include the RSI HandKey CR, HandKey II, ID3D-R, Identix FingerScan V20, Bioscrypt V-Pass FXand V-Station.

61.1 Interfaces

The Biometric Reader Interface Gateway (BRI) interfaces upstream with the Intelligent System Controller, BAS-2000, BAS-3300, or BAS-2220 only. The BRI is NOT supported by the BAS-500 or BAS-1000.

For builds 5.10.309 and earlier, when using a BRI on any downstream port, the address must be set to 0. Other devices can be used on the same downstream port as the BRI; however, the device addressing must be 8 or higher.

For later builds, the BRI can be used with any address. When configuring the reader in B.A.S.I.S., a unique reader number will be specified according to the port and address of the BRI. The first reader MUST always be present and be identified as reader number 0.

All readers are consecutively assigned from 0-3 on port 2, and 4-7 on port 3 (be sure to set the address from 0-7 on the biometric readers).

Communications Overview (note that the BRI needs to be at address 0 only with builds 5.10.309 or earlier)
61.2 The Biometric Reader Interface Board

The hardware contains the following components: two (2) unsupervised alarm inputs, one (1) upstream RS-232 or RS-485 interface, two (2) downstream RS-485 interfaces (which can consist of two 2-wire or one 4-wire interfaces), one (1) 12 VDC or 12 VAC power-in input, eight (8) DIP switches, and eleven (11) jumpers. It also contains a set of three (3) status LEDs and one (1) memory backup (3 volt lithium) battery.
62 Installation

To install the BRI, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the upstream host communication.
2. Wire the power input.
3. Wire the downstream device communication.
4. Cycle power to the device.

62.1 Wiring

62.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

On the biometric reader interface, there are two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the Input 2 (IN2) and Input 1 (IN1) contact terminals on the BRI board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Wire the Input 2 and Input 1 contacts using twisted pair cable, 30 ohms maximum. (No EOL resistors are required.)

Note: If either of these inputs is not used, a shorting wire should be installed.

Unsupervised Alarm Input Wiring.

62.1.2 Upstream Host Communication

The BRI uses Port 1 to communicate to the ISC. Port 1 should be wired as 2-wire RS-485 interface for multi-drop or extended distance communication.

For RS-485 communication, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields). 2-wire RS-485 cable configuration should be used. The RS-485 cable should be no
longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent.) The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

**RS-485 Communications**

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multiport communications on a bus transmission line. It allows for high-speed data transfer over extended distance (4000 feet, 1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances End-of-line (EOL) termination is required.

Belden (24 gauge wire – (7x32) Stranded Conductors – Polyethylene Insulated).

**Belden Wire Specifications**

<table>
<thead>
<tr>
<th>Trade Number</th>
<th>Number of Pairs</th>
<th>Nominal D.C. R. Conductor</th>
<th>Nominal Impedance (Ohms)</th>
<th>Nominal Capacitance pF/feet</th>
<th>Nominal Capacitance pF/meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>9841 NEC CM CSA</td>
<td>1</td>
<td>24.0 ohms/M 78.7 ohms/km</td>
<td>3.35 ohms/M 11.0 ohms/K</td>
<td>120 12.8</td>
<td>42</td>
</tr>
<tr>
<td>9842 NEC CM CSA</td>
<td>2</td>
<td>24.0 ohms/M 78.7 ohms/km</td>
<td>2.2 ohms/M 7.2 ohms/K</td>
<td>120</td>
<td>12.8 4</td>
</tr>
<tr>
<td>88102 NEC CMP CSA</td>
<td>2</td>
<td>24.0 ohms/M 78.7 ohms/km</td>
<td>15.5 ohms/M 50.9 ohms/km</td>
<td>100</td>
<td>12.95 4</td>
</tr>
</tbody>
</table>

**Upstream Host Communication Wiring (Port 1)**

```
0  Ø  TXD/TR1+
0  Ø  RXD/TR1-
0  Ø  RTS/R1 +
0  Ø  CTS/R1 -
0  Ø  GND

2-WIRE

PORT 1, CONFIGURED AS RS-485
```
**Wire Configuration** – Switch #5 must be off for all panels in this configuration.

### 62.1.3 Power

The BRI accepts either a 12 VDC or 12 VAC ± 15% power source for its power input. The power source should be located as close to the BRI as possible.

Wire the power input with 18 AWG (minimum) twisted pair cable.

For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 400 mA RMS current is required for AC power supplies.

For DC power sources, isolated and non-switching, regulated DC power is required. A 250 mA current is required for DC power supplies.

**Note:** If using a 12 VDC power source (*preferred*), be sure to observe polarity.

#### Power Source Wiring

![Power Source Wiring Diagram]

### 62.1.4 Downstream Device Communication

The BRI can be configured to communicate downstream with up to 8 input/output devices, using Port 2 and Port 3. Each of these ports can only be wired only as a 2-wire RS-485 interface, for multi-drop communication on a single bus of up to 4000 feet.

For Ports 2-3, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields.) The main run RS-485 cable should be no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent). The 485 device drop cables off the main 485 bus (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

Each RS-485 line should contain only 2 terminators, one at each end of the bus. For proper operation, these terminators should be removed.

#### Termination

The typical recommendation calls for termination at each end of the line. The link between the BAS-500B and the biometric devices is fairly short. There may be a need for termination in some unusual cases.
To configure the two downstream BRI ports as 2-wire RS-485, follow the 2-wire diagram and repeat on each set of three connectors, TRX+, TRX-, GND.

**Notes:**
- The BRI can be located anywhere along the RS-485 line.
- Remove the RS-485 terminator for each device that is not an end-of-line device.
63 Configuration

The BRI board contains 8 DIP switches and 11 jumpers that must be configured for your system.

63.1 Setting DIP Switches

The following chart describes the use of each DIP switch.

<table>
<thead>
<tr>
<th>DIP SWITCH</th>
<th>USED TO CONFIGURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4, 5</td>
<td>Interface address</td>
</tr>
<tr>
<td>6, 7</td>
<td>Communication baud rate</td>
</tr>
<tr>
<td>8</td>
<td>Downstream baud rate (varies depending on firmware type)</td>
</tr>
</tbody>
</table>

63.1.1 Interface Address

To configure the interface address, set DIP switches according to the following table.

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1:</td>
</tr>
<tr>
<td>0</td>
<td>off</td>
</tr>
<tr>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td>2</td>
<td>off</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
</tr>
<tr>
<td>4</td>
<td>off</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
</tr>
<tr>
<td>6</td>
<td>off</td>
</tr>
<tr>
<td>7</td>
<td>ON</td>
</tr>
<tr>
<td>8</td>
<td>off</td>
</tr>
<tr>
<td>9</td>
<td>ON</td>
</tr>
<tr>
<td>10</td>
<td>off</td>
</tr>
<tr>
<td>11</td>
<td>ON</td>
</tr>
<tr>
<td>12</td>
<td>off</td>
</tr>
<tr>
<td>13</td>
<td>ON</td>
</tr>
<tr>
<td>14</td>
<td>off</td>
</tr>
<tr>
<td>15</td>
<td>ON</td>
</tr>
<tr>
<td>16</td>
<td>off</td>
</tr>
</tbody>
</table>
### 63.1.2 Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. This feature controls the baud rate for upstream communication.

<table>
<thead>
<tr>
<th>BAUD RATE</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6:</td>
</tr>
<tr>
<td>38400 bps</td>
<td>ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>off</td>
</tr>
<tr>
<td>9600 bps</td>
<td>ON</td>
</tr>
<tr>
<td>2400 bps</td>
<td>off</td>
</tr>
</tbody>
</table>
63.1.3 Downstream Baud Rate

DIP switch 8 controls the downstream baud rate. The setting of DIP switch 8 causes the BRI to behave differently, depending on the type of firmware in use.

<table>
<thead>
<tr>
<th>DIP SWITCH 8:</th>
<th>Baud rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>RSI</td>
</tr>
<tr>
<td>off</td>
<td>19200 bps</td>
</tr>
<tr>
<td>ON</td>
<td>9600*</td>
</tr>
</tbody>
</table>

* As of RSI firmware version 1.12, DIP switch 8 in the ON position was 9600. In previous versions, this was 38400 bps.

** For Identix firmware versions 1.14 or greater, set DIP switch 8 to off for 38400 bps. For versions prior to 1.14, set DIP switch 8 to off for 9600 bps.

63.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.
64  Maintenance

64.1  Verification

The BRI board contains three Status LEDs (LED A, LED B, LED C) that can be used to verify correct installation after power up.

*BRI Status LEDs*

- **A**: This LED blinks rapidly whenever the BRI is powered up and is operating normally.
- **B**: This LED is on when upstream communication to the ISC is in process.
- **C**: This LED is on when downstream communication to biometric readers is in process.

The following chart describes the purpose of each LED on the BRI board.

<table>
<thead>
<tr>
<th>LED</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>This LED blinks rapidly whenever the BRI is powered up and is operating normally.</td>
</tr>
<tr>
<td>B</td>
<td>This LED is on when upstream communication to the ISC is in process.</td>
</tr>
<tr>
<td>C</td>
<td>This LED is on when downstream communication to biometric readers is in process.</td>
</tr>
</tbody>
</table>

64.2  Memory Backup Battery

Use of the memory backup battery (3 V lithium ion battery, Rayovac BR2325 or Wuhan Lixing CR2330) does not apply to this hardware.

64.3  Firmware

Refer to Firmware Updates in the Hardware Installation Guidelines section for instructions for downloading.
65  Supported Biometric Readers

It is required that biometric readers be linked to a primary reader using B.A.S.I.S. software. But it is also possible to set up the reader for PIN and biometric verification.

If the biometric reader is used without a primary reader, it is still necessary to install a standard reader interface module (BAS-1300 or BAS-1320), even though a primary reader is not being used. For this type of configuration, simply do not install the primary reader. Configure the software for card or PIN mode (the biometric reader will still be marked as an alternate reader). Configure the keypad for eight-bit output. In this mode, you may use the keypad of the biometric reader to enter your PIN.

Currently, the following readers are supported for communication with the biometric reader interface gateway:

- RSI HandKey CR
- RSI HandKey ID3D-R
- RSI HandKey II
- Identix FingerScan V20
66 Specifications

** The BAS-500B is for use in low voltage, class 2 circuit only.

- **Primary Power: (DC or AC)**
  - DC input: 12 VDC ± 10%. 250 mA
  - AC input: 12 VAC ± 15%. 400 mA RMS

- **Memory and Clock Backup:** 3 V lithium (does not apply to this hardware)

- **Communication Ports:**
  - Port 1: RS-232 or RS-485, 2400 to 38400 bps async
  - Ports 2-3: RS-485 (2-wire), 2400 to 38400 bps async

- **Inputs:**
  - Cabinet Tamper Monitor: unsupervised, dedicated
  - Power Fault Monitor: unsupervised, dedicated

- **Wire Requirements:**
  - Power: 1 twisted pair, 18 AWG
  - RS-485: 24 AWG twisted pair(s) with shield, 4000 feet (1219 m) maximum
  - RS-232: 24 AWG, 25 feet (7.6 m) maximum
  - Alarm Input: twisted pair, 30 ohms maximum

- **Environmental:**
  - Temperature: Operating: 0° to 70° C (32° to 158° F)
  - Humidity: 0 to 95% RHNC

- **Mechanical:**
  - Dimension: 6 x 5 x 1 in. (152 x 127 x 25 mm)
  - Weight: 8 oz. (290 g) nominal

- **Data Memory:** 512 KB

- **CE marking**

- **RoHS compliant**

---

**Note:** These specifications are subject to change without notice.
67 Identix Readers

B.A.S.I.S. supports the Identix FingerScan V20 reader.

Identix FingerScan V20 Reader Voltage: 1.25A @ 12 VDC or 0.65A @ 24 VDC

Note: In order for the reader to function properly, set the baud rate to 19200.

67.1 Enrollment with the FingerScan V20

The Identix FingerScan V20 enrollment kit ships with the reader, power supply, and serial connection cable.
### 67.1.1 Wiring

Plug one end of the serial connection cable into the connector on the circuit board inside the unit. Connect the other end to a serial cable. This cable is to be connected to the workstation.

Wire up the power to PWR and GND (terminals 17 and 18). Power up the unit.

### 67.1.2 Configuration

To use the FingerScan V20 as an enrollment reader, certain properties must be configured. For more information about Identix reader functions, refer to the Identix user guide. You must have Manager, Supervisor, or Enroller status to enroll new users.

**Note:** A null modem cable is needed to connect the Identix reader to a host computer.

1. If you already have a system user enrolled, skip this step and proceed to step #2. If you do not have a system user enrolled:
   a. The system will display the message “ENROLL YOURSELF.” Press keys until “NEW ENROLLMENT PRESS ANY KEY” is displayed and press any key.
   b. You will be prompted with “ENROLLEE ID No.” Enter an ID.
   c. You will then be prompted with “1, 2, or 3 FINGERS.” Select the number of fingers you wish to enroll.
   d. Select which finger when prompted with “Select Finger.”
   e. Follow the steps on the unit to complete enrollment.
2. Press the [C] button (SYSTEM).
3. You will be prompted with “SYSTEM ACCESS ENTER ID NO.” Enter the System Access ID number that you originally used when setting up the system account.
4. You will be prompted to place your finger for verification.
5. After a successful verification, you may be prompted with “NEW ENROLLMENT PRESS ANY KEY.” Press [*] (Alt) to access the menu.
6. At the main menu, you will be presented with the following options:
   1: TEMPLATE Dbase  
   2: SETUP  
   3: MGR  
9. The first option is the HOST type (RS232/RS485). Select RS232. Press [A] (YES) or [B] (NO) to indicate if you would like the change the option.
10. The next option is HOST BAUD. Use the keypad to punch in the baud rate. Press the [A] (YES) button after this has been entered.
11. The next option is NETWORK NODE. Enter 5 for the network node.
12. The next option is MODEM CTRL. Make sure this option is off.
13. The last option is PASSWORD. This option should also be off.
14. When you are finished, press [D] (CLEAR) until you are out of the menu.

You should end up with the following settings:
- Host: RS232
- Host Baud: selectable
- Network Node: 5
- Modem Ctrl: Off
- Password: Off

### 67.2 Hints for Successful Enrollments

Be sure to follow the instructions on the reader. Placing your finger on the platen before indicated to do so may result in an invalid enrollment. A good enrollment will cause the user's identity to be quickly verified, while a poor enrollment will result in increased False Rejections and user frustration. To increase the number of good quality enrollments, observe the following recommendations.

**The most common causes of unsuccessful or poor quality enrollments**

<table>
<thead>
<tr>
<th>Good enrollment</th>
<th>A good enrollment gets a score between 250 and 400. Anything above or below this range will most likely more have problems verifying (i.e. more false rejections than normal.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using a dry or dusty finger</td>
<td>Do not use water to moisten the finger. The recommended method to counteract dry skin is to rub the finger in the palm of the hand or on the forehead as this adds body oil to the finger. Do not wet the finger with water. Do not wash the hands unless they are extremely dirty as this removes necessary body oil.</td>
</tr>
<tr>
<td>Failing to apply correct amount of pressure</td>
<td>When the finger is placed on the platen the user should apply downward, horizontal pressure. The amount of pressure required should be the same as the amount required to push a button on the keypad.</td>
</tr>
<tr>
<td>Choice of finger</td>
<td>Choose a finger that has well-defined ridges and valleys and is scar and scuff-free. While index fingers are most frequently chosen, for some people the middle or ring finger is more appropriate as it is less likely to be scarred or damaged. If a user has very small fingers, choose a thumb. If a user is left-handed, use a finger on the left hand unless the position of the Fingerscan V20 makes this uncomfortable. If a user has arthritis and cannot straighten a finger, try to use a thumb, although for most people, a thumb is not easy to use. If you are also enrolling an alternate finger, choose a finger which is least susceptible to injury or damage, such as a ring finger.</td>
</tr>
<tr>
<td>Position of finger</td>
<td>Make sure that the user places their finger horizontally down on the platen with a firm, measured downward pressure and then repeats the same style for verification. Ensure that the maximum finger area is placed on the platen and ensure that the tip of the finger touches the rear section of the optic cover. Do not 'dive bomb' the platen with the finger partially vertical. Do not stab quickly at the platen. Do not slide the finger along the platen.</td>
</tr>
<tr>
<td>Familiarity</td>
<td>Often a user will perform their first enrollment in a particular way and will subsequently present their finger for verification in a different way. This may be a gradual change over a week or more of use. It is often good practice to re-enroll users who may be having difficulties after a week or so.</td>
</tr>
</tbody>
</table>
The most common causes of unsuccessful or poor quality enrollments

<table>
<thead>
<tr>
<th>Poor quality enrollments</th>
<th>Despite every effort, every now and then there is someone for whom a good quality enrollment is impossible. In these cases, depending upon the perceived security threat to the organization, you may wish to consider lowering the user's security threshold.</th>
</tr>
</thead>
</table>

Incorrect finger placement on the FingerScan V20

**Finger Placement**

- Too much to left
- Too much to right
- Only small surface exposed. Finger should be placed flat on platen. Do not rock finger back and forth during the scan.
- Finger placement is not flat

Recommended finger placement on the FingerScan V20

**Finger Placement**

- If placing the Thumb, the tip of the thumb should be here... about ¼ inches over the scanning lens
- The finger tip should go here
- Finger is centered and flat
- The finger should rest in this groove.
67.3  Wiring the FingerScan V20 and the BAS-500B

Reader Addressing

The BRI can have up to eight Identix readers attached. The readers have Network Nodes rather than addresses. The network nodes do not map directly to addresses 0-7. They are offset by 8, so the reader that is at “address 0” will have a Network Node of 8. Port 2 of the BAS-500B you would have Identix readers with Network Nodes 8, 9, 10, 11 and on port 3 of the BAS-500B you would have Identix readers with Network Nodes 12, 13, 14, 15.

67.4  Using the FingerScan V20 Readers for Verification

Identix readers must be configured for use as a verification reader for biometric information for cardholders. To use the reader, certain properties must be configured. For more information about Identix reader functions, refer to the Identix user guide.

1. If you already have a system user enrolled, skip this step and proceed to step #2. If you do not have a system user enrolled:
   a. The system will display the message “ENROLL YOURSELF.” Press keys until “NEW ENROLLMENT PRESS ANY KEY” is displayed and press any key.
   b. You will be prompted with “ENROLLEE ID No.” Enter an ID.
   c. You will then be prompted with “1, 2, or 3 FINGERS.” Select the number of fingers you wish to enroll.
   d. Select which finger when prompted with “Select Finger.”
   e. Follow the steps on the unit to complete enrollment.

2. Press the [C] button (SYSTEM).
3. You will be prompted with “SYSTEM ACCESS ENTER ID NO.” Enter the System Access ID number that you originally used when setting up the system account.

4. You will be prompted to place your finger for verification.

5. After a successful verification, you may be prompted with “NEW ENROLLMENT PRESS ANY KEY.” Press [*] (Alt) to access the menu.

6. At the main menu, you will be presented with the following options:
   1: TEMPLATE Dbase
   2: SETUP
   3: MGR


9. The first option is the HOST type (RS232/RS485). Select RS485; Press [A] (YES) or [B] (NO) to indicate if you would like the change the option.

10. The next option is HOST BAUD. You will use the keypad to punch in the baud rate. The baud rate can be either 38400 or 19200. This setting must match the setting of DIP switch 8 on the biometric reader interface. After typing 38400 or 19200, press the [A] (YES) button.
    If you are using firmware version 2.08 for the Identix unit, this MUST be set to 19200 baud.

11. The next option is NETWORK NODE. This will need to be the address of the reader. You may enter values 8 through 15. The values correspond to address 0 through 7.

12. The next option is MODEM CTRL. Make sure this option is off.

13. The last option is PASSWORD. This option should also be off.

14. When you are finished, press [D] (CLEAR) until you are out of the menu.

You should end up with the following settings:
   Host: RS485
   Host Baud: 38400 or 19200
   Network Node: 8-15 (address 0-7)
   Modem Ctrl: Off
   Password: Off

**Additional Notes**

If you forget the system template and are unable to access the menu, the templates will have to be deleted from the database so that the system will automatically enroll the system user upon powering up.

If the unit beeps after being powered up and the display remains blank, the memory module may have come loose. Make sure that the memory is seated properly.

**67.5 FingerScan V20 Keypad**

The FingerScan V20 keypad can be enabled only if:

- BAS-500B has firmware version 1.12 minimally (in releases prior to 5.10.309, this device was called BAS-500BI and the firmware displayed as .012) AND
the Identix FingerScan V20 has at least firmware version 2.06. The recommended version is 2.09h. Do not load firmware versions that are later than this.

If the unit has firmware prior to 2.00, the firmware needs to be updated by replacing the chip. If it has version 2.00 or higher, it can be updated via the utility distributed on the Supplemental disc.

**Enabling the Keypad**

In order to use the keypad as part of the verification process, enable the feature, KTRANS, in the firmware. It can be accessed through a hidden menu in the FingerScan V20 system configuration.

1. To access the hidden menu in the Identix unit, you will first need to access the system menu.
   a. Press [SYSTEM]. When prompted, enter the system code.
   b. Once you enter the system code, you will be prompted to verify your finger.
   c. You will then be prompted with “NEW ENROLLMENT, PRESS ANY KEY.” Press [*] at this prompt to access the main system menu.
   e. The SETUP menu will have the following options: 1:SYSTEM, 2:COMMS, 3:CLOCK, 4:ZONES. Press [*] to access the hidden menu.

2. Once at the hidden menu you will be prompted with: “OPTIONS v2.06, CHANGE YES/NO?” Press [YES]. This allows you to edit any of the hidden menu options.

3. You will be prompted with additional options to change. Pressing [YES] will toggle the option on or off. Pressing [NO] will advance to the next option. Pressing [CLEAR] will exit this menu and return you to the setup menu.

4. To turn on the keypad, enable KTRANS (which, in version 2.06, is the 9th choice in the hidden menu).

5. After enabling the KTRANS feature, exit the menus by pressing [CLEAR] until the prompt displays the time and prompts for your code.

### 67.6 Identix Reader Operation

For more detailed information, please refer to your Identix FingerScan manual.

The reader is ordinarily used in conjunction with a primary reader. To gain access, cardholders must present their badge and then place their finger on the reader’s sensor.

If the access control software is configured for use of card or PIN, the keypad may alternately be used. Enter the PIN, followed by the [#] key or [Enter] key. The reader will then prompt users to place their finger on the sensor. The unit supports up to 9 digits for the PIN code. Leading zeroes are not supported.

### 67.7 FingerScan V20 Firmware

The latest firmware for the Identix unit is version 2.09h. The firmware can be installed from the Supplemental disc.

In order to perform a firmware upgrade, you will need:

- DOS utility FS_Host.exe or wFSHost version 44 (Windows utility)
The reader(s) becomes inoperable while performing a firmware upgrade. While the firmware upgrade is in progress, the cycle must not be interrupted (i.e. turning power on/off).

If the cycle is interrupted, the V20 unit will be disabled and memory will become corrupted. The only way to fix the corrupted memory is to erase all data. The firmware will have to be reloaded by Identix. Perform a “manager’s reset” on the unit(s) to make certain that the memory is free from errors, and always have a backup of your templates.

Please follow these steps to upgrade your reader(s) using FS_Host:

1. Press [C] for Configuration, to set up the proper communication parameters.
4. Press [Enter], while the firmware version and type are displayed.
5. Choose starting and ending node numbers.
6. After all chosen nodes come on-line, press “Y” to update all nodes.

After the unit(s) reboot, you may perform normal functions.

As an alternative, the Windows utility wFSHost may be used. When using wFSHost, select the baud rate and COM port so that communications may be established. After doing so, you will be able to update the firmware, specifying the firmware file to be used.

These configuration settings can also be specified in an INI file. Locate the file C:\Program Files\Identix\wFSHost\wfsHost.ini. The settings should be configured as follows:

```
[PC_Config]
BaudRate=9600
PcCommPort= <enter number of COM port to which the unit is connected>
StartNode=5
EndNode=5
PollRate=1
IPAddress= <fill in IP address>
TempPath=c:\\
NewMsgFormat=FALSE
```

The StartNode and EndNode match the node number of the Identix unit. These numbers will be the same if there is only one unit connected.
RSI BIOMETRIC READERS
68 RSI HandKey Readers

B.A.S.I.S. supports the RSI HandKey CR, ID3D-R, and HandKey II. The HandKey with iCLASS and MIFARE readers are also supported.

68.1 HandKey CR, II, and ID3D-R

The RSI HandKey CR, II, and ID3D-R are hand geometry readers that can be used for identity verification. These readers interface with the biometric reader interface gateway (BAS-500B).

68.1.1 Diagnostic Mode

To enter diagnostic mode of the RSI HandKey reader, press the star [*] key 10 times. The reader will then run through the following:

- LED and beeper test
- Display the serial number
- Display the onboard memory
- Display the baud rate settings
- Display the date settings
- Display the version of firmware
RSI HandKey Reader Voltage: 12-24 VDC 50/60 Hz 1 A max.

The Hand Key reader requires termination on the downstream RS-485 ports from the BRI.

### 68.1.2 RSI Enrollment

At least one RSI reader must be configured for use as an enrollment reader for biometric information for cardholders. The enrollment reader should be connected directly to the host PC via RS-232 (RJ-45) communication. For the HandKey CR (version F3), a custom cable is provided that connects to the 4-pin Molex connector on the left side of the PCB and to a DB-9 serial input on the enrollment station PC.

Handkey CR readers with firmware revision A.2xx have a 3-pin enrollment RS-232 connector which should be connected to a host machine COM port as follows:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND to DB9F pin 5</td>
</tr>
<tr>
<td>2</td>
<td>Tx Data to DB9F pin 3</td>
</tr>
</tbody>
</table>
Configure the HandKey (II, CR) reader for enrollment

To use the reader, certain properties must be configured. Refer to the HandKey Installation Manual for these procedures.

1. For HandKey units (version F1), all five of the RSI DIP switches must be in the OFF position. If you need to reset the default configuration, set DIP switches 4 and 5 to the ON position and power up the RSI unit. After five seconds, the switches must be set to OFF again before cycling power or you will lose any configurations that have been changed. HandKey units with version F3 do not have DIP switches.

2. Perform the following procedure to erase the setup programs but retain the user database:

<table>
<thead>
<tr>
<th>Pin 3</th>
<th>Rx Data to DB9F pin 2</th>
</tr>
</thead>
</table>

RSI provides a custom cable that connects to the 4 pin Molex connector on the left side of the PCB and to a DB-9 serial input on the enrollment station.
a. While the system power is off, press the Reset switch.

b. Turn system power ON and wait 5 seconds, then release the switch.

c. The reader's LCD screen will display
   
   
   RESET: 1. SET UP
   9. ALL!!!

d. Press [1].

3. Enter the Command Mode to complete the following steps. To do so, press both the [Clear] and [Enter] keys at the same time.

4. When you are prompted for a password, enter [2], which is the default for the Setup Menu, and press [Enter].

   To set the following properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [No] button will bypass the setting and take you to the next menu option. Pressing the [Yes] button will allow you to change the current setting.

5. Set the language (You will also need to do this for verification readers). The default is English. Enter [Yes] at the prompt to set the language. Once you do this, selecting [No] will allow you to pass each current language setting. When your preferred language is displayed, press the [Yes] button.

   The display will return to the start of the SET LANGUAGE command. Select [No] to move onto the next menu.

6. Set the date format (You will also need to do this for verification readers).

   Enter [Yes] at the prompt to set the date format. Once you do this, selecting [No] will allow you to pass each current date format. When the preferred date format is displayed, press the [Yes] button.

   The display will return to the start of the SET DATE FORMAT command. Select [No] to move onto the next menu.

7. Set the time and date (You will also need to do this for verification readers).

   Time is kept using a 24 hour clock. The hour is represented by two digits, 00 to 23. The minute is represented by two digits, 00 to 59.

   The date is also numerical. The month is represented by two digits (January=01, incrementing to December=12). The day is represented by two digits, 01 through 31. The year is represented by two digits corresponding to the last two digits of the current year.

   Enter [Yes] at the prompt to set the time and date. You will then be asked for the month. Enter the number for the month and press [Yes]. After this, you will be asked for the day. Enter the number, followed by the [Yes] button.

   Do the same for the year, hour, and minute.

   The display will then return to the start of the SET TIME & DATE command.

8. Set Address, Set ID Length, Set Facility, and Set Aux Out Control are not used for enrollment. Press [No] to pass through these menu options.

9. Set the reader mode to remote. If the reader is not already set to remote reader mode, do so. Press the [No] button to move through the menus until SET READER MODE appears on the display. Then press [Yes].

   When TO MASTER appears on the display, press [No]. When TO REMOTE appears on the display, press [Yes]. If you are prompted for an address, enter zero (0).

---

**Note:** A single dash (–) on either side of the READY prompt on the display indicates that the reader is in remote mode. A double dash (=) on either side of the READY prompt on the display indicates that the reader is in master mode.
10. Set the serial to RS-232.
   Enter [Yes] at the prompt to set the serial. Once you do this, the option for RS-485/RS-422 will be displayed. Enter [No]. When the option for RS-232 is displayed, enter [Yes]. The display will now prompt you to set the baud rate.

11. Set the baud rate to match the settings in the software, according to the hand geometry capture screen. It is recommended that you use a baud rate of 28.8 Kbps.
   Enter [No] to pass each baud rate. When the preferred baud rate is displayed, press the [Yes] button.

12. The display will return to the start of the RS-232 option. Press the [No] button to move onto the next menu.

13. The Printer/PC option appears on the display. Select the option to use RS-232 for 1-Host.
   Once the selection has been made, the display returns to the start of the SET SERIAL option.

14. To exit from the menu, press the [Clear] button.

RSI HandKey ID3D-R

To use the reader, certain properties must be configured. Refer to the HandKey Installation Manual for these procedures.

1. DIP switches SW 1, SW 2, and SW 4 must be in the OFF position and SW 3 must be in the ON position. If you need to reset the default configuration, set DIP switch SW 4 to the ON position and power up the RSI unit. Memory will be reset. After five seconds, SW 4 must be set to OFF again before cycling power or you will lose any configurations that have been changed.

2. Enter the Command Mode to complete the following steps. To do so, press the [#] key after the unit has been powered up and displays “READY.”

3. When you are prompted for a password, enter [3], which is the default password for the Management Menu, and press [Enter].
   To set the following properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [No] button will bypass the setting and take you to the next menu option. Pressing the [Yes] button will allow you to change the current setting.

4. Set the time and date (You will also need to do this for verification readers).
   Time is kept using a 24 hour clock. The hour is represented by two digits, 00 to 23. The minute is represented by two digits, 00 to 59.
   The date is also numerical. The month is represented by two digits (January=01, incrementing to December=12). The day is represented by two digits, 01 through 31. The year is represented by two digits corresponding to the last two digits of the current year.
   Enter [Yes] at the prompt to set the time and date. You will then be asked for the month. Enter the number for the month and press [Yes]. After this, you will be asked for the day. Enter the number, followed by the [Yes] button.
   Do the same for the year, hour, and minute.
   The display will then return to the start of the SET TIME & DATE command.

5. Exit the Command Mode. When the * NO YES # prompt is shown on the display, pressing any number will exit the Command Mode.

6. Enter the Setup Menu by pressing the [#] key when this unit is displaying “READY” and enter [2] for the password when prompted. This is the default password for the Setup Menu.
RSI Biometric Readers

7. Set the reader mode to remote. If the reader is not already set to remote reader mode, do so. Press the [No] button to move through the menus until SET READER MODE appears on the display. Then press [Yes].

When TO MASTER appears on the display, press [No]. When TO REMOTE appears on the display, press [Yes]. If you are prompted for an address, enter zero (0).

Note: A single dash (–) on either side of the READY prompt on the display indicates that the reader is in remote mode. A double dash (=) on either side of the READY prompt on the display indicates that the reader is in master mode.

8. Set the serial to RS-232.

9. Set the baud rate to match the settings in the software, according to the hand geometry capture screen. You will be prompted for a baud rate code. Enter a single digit for the desired baud rate according to the following table.

<table>
<thead>
<tr>
<th>BAUD RATE</th>
<th>CODE</th>
<th>BAUD RATE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.4 K</td>
<td>0</td>
<td>19.2 K</td>
<td>1</td>
</tr>
<tr>
<td>9600</td>
<td>2</td>
<td>4800</td>
<td>3</td>
</tr>
<tr>
<td>2400</td>
<td>4</td>
<td>1200</td>
<td>5</td>
</tr>
<tr>
<td>600</td>
<td>6</td>
<td>300</td>
<td>7</td>
</tr>
</tbody>
</table>

10. To exit from the menu, press the any number button when the reader displays the * NO YES # prompt.
68.1.3 Identity Verification using the HandKey

The 500B can be interfaced with the HandKey-II, HandKey-CR, or ID3D-R.
Wire the HandKey for Verification

HandKey version F1

Biometric Reader Interface

Power (plug-in transformer)

DIP Switches

J7

Jumper
J7: backup battery

12-24 VDC or VAC power supply

RJ-45 jack

connect if using RSI power adapter

Back of RSI Handkey unit
For RSI readers, the address for verification readers must be set initially. For more information about RSI reader functions, refer to the HandKey Installation Manual.
**Configure the HandKey (II, CR) for Verification**

RSI readers must be configured for use as a verification reader for cardholder biometric information. To use the reader, certain properties must be configured. Refer to the HandKey Installation Manual for these procedures.

1. From the default configuration, enter the Setup Menu by pressing both the [Clear] and [Enter] keys at the same time. When prompted for the password, enter the default, [2], followed by the [Enter] button. To set the following properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [No] button will bypass the setting and take you to the next menu option. Pressing the [Yes] button will allow you to change the current setting.

2. Set the language. The default is English. Enter [Yes] at the prompt to set the language. Once you do this, selecting [No] will allow you to pass each current language setting. When your preferred language is displayed, press the [Yes] button. The display will return to the start of the SET LANGUAGE command. Select [No] to move onto the next menu.

3. Set the date format. Enter [Yes] at the prompt to set the date format. Once you do this, selecting [No] will allow you to pass each current date format. When the preferred date format is displayed, press the [Yes] button. The display will return to the start of the SET DATE FORMAT command. Select [No] to move onto the next menu.

4. Set the time and date. Time is kept using a 24 hour clock. The hour is represented by two digits, 00 to 23. The minute is represented by two digits, 00 to 59. The date is also numerical. The month is represented by two digits (January=01, incrementing to December=12). The day is represented by two digits, 01 through 31. The year is represented by two digits corresponding to the last two digits of the current year. Enter [Yes] at the prompt to set the time and date. You will then be asked for the month. Enter the number for the month and press [Yes]. After this, you will be asked for the day. Enter the number, followed by the [Yes] button. Do the same for the year, hour, and minute. The display will then return to the start of the SET TIME & DATE command.

5. Set the address. Each reader must have a unique address. When the option to set address is displayed, press [Yes] to set the reader address. The current address will appear on the display. To set a new address, type in the number followed by [Yes] to set it. The display will return to the start of the SET ADDRESS command.

6. SET ID LENGTH, SET FACILITY, and SET AUX OUT CONTROL are not used for verification. Press [No] to pass through these menu options.

7. Set the reader mode to remote. If the reader is not already set to remote reader mode, do so. Press the [No] button to move through the menus until SET READER MODE appears on the display. Then press [Yes]. When TO MASTER appears on the display, press [No]. When TO REMOTE appears on the display, press [Yes]. If you are prompted for an address, enter zero (0).

---

**Note:** A single dash (−) on either side of the READY prompt on the display indicates that the reader is in remote mode. A double dash (=) on either side of the READY prompt on the display indicates that the reader is in master mode.
8. Set the serial to RS-485.
   Enter [Yes] at the prompt to set the serial. Once you do this, the option for RS-485/RS-422 will be displayed. Press the [Yes] button. The display will now prompt you to set the baud rate.

9. Set the baud rate to match the BAS-500B DIP switch setting. 19200 baud rate is recommended.
   Enter [No] to pass each baud rate. When 19200 baud is displayed, press the [Yes] button.

10. The display will return to the start of the RS-485/RS-422 option. Press [No] to move onto the next menu.
    Once the selection has been made, the display will return to the start of the SET SERIAL option.

11. SET DURESS CODE, SET BEEPER, and UPGRADE are not used for verification. Press [No] to pass through these menu options and return to the beginning of the menu or you may exit from the menu, by pressing the [Clear] button.

12. To exit, press the [Clear] button.

   Note: All users initially have the lowest authority level, 0. It is recommended that you set a user authority level of 5 (which is the highest) for the master service code.

**HandKey II Reader DIP Switches**

If you are using HandKey (II or CR) version F1, the DIP switches need to be set properly for RS-485 communication.

<table>
<thead>
<tr>
<th>Switch</th>
<th>Description</th>
<th>ON</th>
<th>OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EOL termination</td>
<td>Enable</td>
<td>Disable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EOL</td>
<td>termination</td>
</tr>
<tr>
<td>2</td>
<td>EOL termination</td>
<td>Enable</td>
<td>Disable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EOL</td>
<td>termination</td>
</tr>
<tr>
<td>3</td>
<td>Communication method</td>
<td>2-wire</td>
<td>4-wire</td>
</tr>
<tr>
<td></td>
<td>(Leave switch 3 in the ON position for all verification readers)</td>
<td>RS-485</td>
<td>RS-485</td>
</tr>
<tr>
<td>4</td>
<td>Erase hand reader setup</td>
<td>To erase</td>
<td>To erase</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the setup</td>
<td>both the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>programs</td>
<td>hand reader</td>
</tr>
<tr>
<td></td>
<td></td>
<td>but retain</td>
<td>setup and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the user</td>
<td>user</td>
</tr>
<tr>
<td></td>
<td></td>
<td>database:</td>
<td>database:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With system</td>
<td>With system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>power OFF,</td>
<td>power OFF,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>set switch</td>
<td>set both</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 ON.</td>
<td>switches</td>
</tr>
</tbody>
</table>
|        |                                                                  | Turn system | 4 and 5 ON.
|        |                                                                  | power ON  | Turn system |
|        |                                                                  | and wait  | power ON   |
|        |                                                                  | 5 seconds.| wait 5     |
|        |                                                                  |            | seconds.   |
|        |                                                                  |            |            |
| 5      | Erase hand reader setup and database                             | To erase  | To erase   |
|        |                                                                  | both the  | both the   |
|        |                                                                  | hand reader| hand reader|
|        |                                                                  | setup and | setup and  |
|        |                                                                  | user       | user       |
|        |                                                                  | database:  | database:  |
|        |                                                                  | With system | With system |
|        |                                                                  | power OFF, | power OFF, |
|        |                                                                  | set both   | set both   |
|        |                                                                  | switches   | switches   |
|        |                                                                  | 4 and 5 ON.| 4 and 5 ON.|
|        |                                                                  | Turn system | Turn system |
|        |                                                                  | power ON   | power ON   |
|        |                                                                  | and wait 5 | and wait 5 |
|        |                                                                  | seconds.   | seconds.   |
|        |                                                                  |            |            |

**Resetting the HandKey Reader**

1. Remove power and battery jumper, if a back up battery is being used.
2. Press down on the reset button and apply power.

3. Release button after LCD displays “Erase Memory.”
   • Press [1] to erase settings i.e. address, outputs, passwords, but retain database/users
   • Press [9] to erase everything i.e. factory defaults, settings and database

68.1.4 Wire the HandKey ID3D-R for Verification

The following table lists the wiring connections needed for verification. The readers should be wired for either port 2 or 3 on the biometric reader interface.

<table>
<thead>
<tr>
<th>BAS-500B</th>
<th>ID3D-R Reader</th>
</tr>
</thead>
<tbody>
<tr>
<td>TR2+ (or TR3+)</td>
<td>7</td>
</tr>
<tr>
<td>TR2- (or TR3-)</td>
<td>6</td>
</tr>
<tr>
<td>GND</td>
<td>11</td>
</tr>
<tr>
<td>ACDC</td>
<td>1</td>
</tr>
<tr>
<td>GND</td>
<td>2</td>
</tr>
</tbody>
</table>

Configure the HandKey ID3D-R for Verification

To use the reader for verification purposes, certain properties must be configured. Refer to the HandKey Installation Manual for these procedures.

1. DIP switches SW 1, SW 2, and SW 4 must be in the OFF position and SW 3 must be in the ON position.
   If you need to reset the default configuration, set DIP switch SW 4 to the ON position and power up the RSI unit. Memory will be reset. After five seconds, SW 4 must be set to OFF again before cycling power or you will lose any configurations that have been changed.

2. Enter the Command Mode to complete the following steps. To do so, press the [#] key after the unit has been powered up and displays “READY.”

3. When you are prompted for a password, enter [3], which is the default password for the Management Menu, and press [Enter].
   To set the following properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [No] button will bypass the setting and take you to the next menu option. Pressing the [Yes] button will allow you to change the current setting.

4. Set the time and date (You will also need to do this for verification readers).
   Time is kept using a 24 hour clock. The hour is represented by two digits, 00 to 23. The minute is represented by two digits, 00 to 59. The date is also numerical. The month is represented by two digits (January=01, incrementing to December=12). The day is represented by two digits, 01 through 31. The year is represented by two digits corresponding to the last two digits of the current year.
   Enter [Yes] at the prompt to set the time and date. You will then be asked for the month. Enter the number for the month and press [Yes]. After this, you will be asked for the day. Enter the number, followed by the [Yes] button.
   Do the same for the year, hour, and minute.
   The display will then return to the start of the SET TIME & DATE command.

5. Exit the Command Mode. When the * NO YES # prompt is shown on the display, pressing any number will exit the Command Mode.
6. Enter the Setup Menu by pressing the [#] key when this unit is displaying “READY” and enter [2] for the password when prompted. This is the default password for the Setup Menu.

7. Set the reader mode to remote. If the reader is not already set to remote reader mode, do so. Press the [No] button to move through the menus until SET READER MODE appears on the display. Then press [Yes]. When TO MASTER appears on the display, press [No]. When TO REMOTE appears on the display, press [Yes].

8. If you are prompted for an address, enter the address for the reader (0-7).

Note: A single dash (–) on either side of the READY prompt on the display indicates that the reader is in remote mode. A double dash (=) on either side of the READY prompt on the display indicates that the reader is in master mode.

9. Set the serial to RS-232.

10. You will then be asked to set the baud rate for channel 0 (RS-485 baud rate). Set the baud rate to match the setting of the biometric reader interface. You will be prompted for a baud rate code (the default is usually 19.2 Kbps). Enter a single digit for the desired baud rate according to the following table.

<table>
<thead>
<tr>
<th>BAUD RATE</th>
<th>CODE</th>
<th>BAUD RATE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>38400</td>
<td>0</td>
<td>19200</td>
<td>1</td>
</tr>
<tr>
<td>9600</td>
<td>2</td>
<td>4800</td>
<td>3</td>
</tr>
<tr>
<td>2400</td>
<td>4</td>
<td>1200</td>
<td>5</td>
</tr>
<tr>
<td>600</td>
<td>6</td>
<td>300</td>
<td>7</td>
</tr>
</tbody>
</table>

11. You will also be prompted for the baud rate of channel 1 (RS-232 baud rate). This is not applicable for verification mode on this reader.

12. To exit from the menu, press the any number button when the reader displays the * NO YES # prompt.

HandKey ID3D-R Reader DIP Switches

The DIP switches need to be set properly for RS-485 communication. For more information, please refer to the HandKey Installation Manual.

<table>
<thead>
<tr>
<th>ID3D DIP Switch</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EOL termination for RS-422 (To enable EOL termination, turn this DIP switch ON.)</td>
</tr>
<tr>
<td>2</td>
<td>EOL termination for RS-485 (To enable EOL termination, turn this DIP switch ON.)</td>
</tr>
<tr>
<td>3</td>
<td>Selects RS-485 (This DIP switch should be ON for all verification readers.)</td>
</tr>
<tr>
<td>4</td>
<td>Erases configuration</td>
</tr>
</tbody>
</table>

68.1.5 HandKey Reader Operation

For more detailed information, please refer to your RSI HandKey Installation and Operation Manual.
The hand reader is ordinarily used in conjunction with a primary reader. To gain access, cardholders must present their badge and then place their hand on the hand reader’s platen.

If the access control software is configured for use of card or PIN, the keypad of the hand reader may alternately be used. Enter the PIN, followed by the [#] key or [Enter] key. The hand reader will then prompt users to place their hand on the platen. The RSI unit supports up to 9 digits for the PIN code. Leading zeroes are not supported.

Note: Currently, keypad commands using the [*] key are not supported.

68.2 MIFARE/iCLASS HandKey Reader

Along with the hand geometry, the readers have the added MIFARE or iCLASS functionality.

Capture biometric information using the HandKey CR with firmware version HKC-A.122D or higher.

MIFARE cards can be encoded with one of the following devices:

- GemEasyAccess 332 encoder
- GemEasyLink 680S encoder
- DigiOn24 encoder

iCLASS cards can be encoded with one of the following devices:

- HID iCLASS programmer that supports serial protocol 1.0.6
- DigiOn24 iCLASS with encoder module firmware version 2.0.0 or higher

These devices can be configured according to the instructions in the OEM Device Configuration Guide. Once cards are encoded, they can be used on the MIFARE or iCLASS HandKey readers.

68.2.1 Encoding

The device used to encode the card must be configured in B.A.S.I.S. under Workstations in the Encoders/Scanners tab.

Encoder Configuration

1. In the General tab:
   a. Under Name, type in a unique name for the device.
   b. Select the workstation to which it is connected.
   c. For the Device type, select one of the following:
      - GemEasyLink680/GemEasyAccess332 for the GemEasyAccess 332 encoder or GemEasyLink 680S encoder
      - DigiOn24 (MIFARE) or DigiOn24 (iCLASS) for the DigiOn24 encoder
      - HID iCLASS for HID iCLASS encoders
   d. For the Credential technology, select MIFARE or iCLASS.
2. In the Location tab, configure the encoder to be a standalone device or an in-line device.
3. In the Communications tab, configure the COM port settings. The settings should match those of the encoder.

**Capturing the Hand Geometry Template**

A hand geometry template must be captured and associated with an encoded card. Connect and configure a HandKey CR to the workstation.

1. In the Cardholders screen, under the Biometrics tab, select the Hand Geometry (RSI) tab.
2. Select the radio button to use the system threshold value, or you may enter a customized individual reject threshold.
3. Select the correct COM port and baud rate for the HandKey CR. Click [Connect]. The connection status will display “Connected.”
4. Click [Start Capture].
5. Select which hand you would like to capture. Click [OK].
6. Follow the instructions displayed on the HandKey CR. At any time, if you wish to cancel, click [Abort Capture].
7. When the status displays, “Biometric template capture completed,” click [OK].
8. After exiting the capture screen, click [OK] again to save the biometric template.

**Card Format**

Now that the encoder has been set up and the hand geometry template was captured, the card format must be configured. Configure a Wiegand card format for the HandKey reader. This will be used to configure the smart card.

**Configuring the Smart Card Format**

1. Under the Card Format tab:
   a. Type in a unique name for the card format.
   b. For Application, select HandKey (MIFARE) or HandKey (iCLASS).
   c. If Store Reject Threshold is checked and the custom reject threshold was set during capture, then the custom value will be encoded as well. During verification, the reader will check if there is a custom threshold encoded on the card. The custom threshold will be used if it is available; otherwise, it will use its pre-programmed default reject threshold.
   d. Type in the Application Key that matched the key hard-coded in the reader. They key must be entered in a 12-digit hex format for MIFARE, or 16-digit hex format for iCLASS.
   e. For MIFARE, the Application Sectors should be 2,3.
   For iCLASS, the memory configuration should be one of the following:
      - 2K Bits/2 Application Areas
      - 16K Bits/2 Applications Areas
      - 16K Bits/16 Application Areas
   f. Leave the default setting for the card layout (for both MIFARE and iCLASS).
2. Assign the smart card format to the badge type.
RSI Biometric Readers

a. On the Badge Type screen, select the badge type and click [Modify].
b. Under the Encoding tab, click [Add].
c. Select the card format configured in the previous step. Click [OK].
d. On the Badge Type screen, click [OK]. The badge type is now configured for the HandKey application.

3. Encode the MIFARE or iCLASS card with HandKey.
   a. Once a cardholder has a hand geometry template captured and the correct badge type assigned, click [Encode].
   b. Select the HandKey application.
   d. Choose the encoder and click [Encode]. Follow the instructions displayed on the screen.
   e. Once encoding is complete, a message box will appear to confirm. Click [OK].

68.2.2 Wiring the MIFARE/iCLASS HandKey for Verification

The MIFARE/iCLASS HandKey reader must be wired to a single or dual reader interface module (BAS-1300 or 1320). It will NOT function when wired to the biometric gateway.
**Configure the MIFARE/iCLASS HandKey Reader for Verification**

In order to function properly with B.A.S.I.S., the MIFARE HandKey reader must be running firmware version HK2-11045A.247 or higher. The iCLASS HandKey reader must be running firmware HK2-11142A.175 or higher.

To set the properties, you will be asked a series of Yes/No questions. Follow the prompts on the display. Pressing the [*/No] button will bypass the setting and take you to the next menu option. Pressing the [#/Yes] button will allow you to change the current setting.

1. To enter the Setup Menu, press both the [Clear] and [Enter] keys at the same time. When prompted for the password, enter the default, [2], followed by the [Enter] button.

2. Set the language.
   - The default is English. If this is acceptable, press [*/No] to move onto the next option.
   - If you wish to change it, enter [#/Yes] at the prompt to set the language. Once you do this, selecting [*/No] will allow you to pass each current language setting. When your preferred language is displayed, press the [#/Yes] button. The display will return to the start of the SET LANGUAGE command. Select [*/No] to move onto the next menu.

3. Set the date format.
   - If the date format is acceptable, press [*/No] to move onto the next option.
   - Or enter [#/Yes] at the prompt to set the date format. Once you do this, selecting [*/No] will allow you to pass each current date format. When the preferred date format is displayed, press the [#/Yes] button. The display will return to the start of the SET DATE FORMAT command. Select [*/No] to move onto the next menu.

4. Set the time and date.
   - If you do not need to set the time and date, press [*/No] to move onto the next option.
   - Time is kept using a 24 hour clock. The hour is represented by two digits, 00 to 23. The minute is represented by two digits, 00 to 59. The date is also numerical. The month is represented by two digits (January=01, incrementing to December=12). The day is represented by two digits, 01 through 31. The year is represented by two digits corresponding to the last two digits of the current year.
   - Enter [#/Yes] at the prompt to set the time and date. You will then be asked for the month. Enter the number for the month and press [#/Yes]. After this, you will be asked for the day. Enter the number, followed by the [#/Yes] button.
   - Do the same for the year, hour, and minute.
   - The display will then return to the start of the SET TIME & DATE command.

5. Set the address. Each reader must have a unique address.
   - When the option to set address is displayed, press [#/Yes] to set the reader address. The current address will appear on the display. To set a new address, type in the number followed by [#/Yes] to set it. The display will return to the start of the SET ADDRESS command.

6. For SET ID LENGTH, press [*/No] to pass through this menu option.

7. Set the reader mode.
   - Cycle through the options by pressing [*/No] until you reach SET READER MODE. The device will cycle through the options for SET FACILITY, LOCK/SHUNT TIME, AUX OUT CONTROL; to which you will press [*/No] to get to SET READER MODE. Press [#/Yes].
   - When the unit displays TO MASTER, press [#/Yes]. The display will then return to the start of the SET READER MODE command. Press [*/No] to move onto the next setting.
8. Set beeper.
   Cycle through the options by pressing [*/No] until you reach SET BEEPER. The device will cycle through the options for SET SERIAL (the default baud rate is 9600), SET DURESS CODE, PRINT OPTIONS; TO WHICH YOU WILL PRESS [*/No] to get to SET BEEPER. Press [#Yes]. Cycle through the following settings:
   a. TURN BEEPER OFF, press {*/No}.
   b. SET BEEPER, press [*/No].

9. When UPGRADE is displayed, press [*/No].

10. After cycling through all of these options, you will be returned to SET LANGUAGE. Press [Clear] to exit the menu.

### 68.2.3 MIFARE/iCLASS HandKey Reader Operation

The MIFARE/iCLASS HandKey reader has a small slot located on the left side of the device by the reader.

To use the reader:

1. Place the card into the slot on the left side of the device.

2. Once the card is read, the display will ask for biometric verification. Follow the instructions displayed.
   a. Place your hand on the platen when instructed to do so.
   b. You may be instructed to place your hand a second time.
   c. Access is granted/denied, depending on the results of the badge number and hand geometry data from the MIFARE/iCLASS HandKey reader, as well as on the System or Individual Reject Threshold for hand geometry templates selected for the settings to store minimum score per template.

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**Note:** This biometric score will not be displayed in Alarm Monitoring, since the reader interface module is not transmitting biometric information to the host.
BIOCENTRIC SOLUTIONS
69 Overview

This installation guide is intended for use by technicians who will be installing and maintaining the B.A.S.I.S. system with Biocentric Solutions, Inc. (BSI) readers (with biometric templates stored on smart cards). The BAS-1300/1320 provides real time processing for the GuardDog and CombiSmart Reader.

69.1 Interfaces

The access readers interface upstream via a Wiegand 72-bit data format with the Reader Interface Module (BAS-1300 or 1320). Multiple Biocentric Solutions devices may be connected in a single network.

The Biocentric Solutions devices are intelligent devices that can verify the identity of an individual by scanning his or her actual fingerprint and comparing the scanned print with fingerprint data (called a template) printed or stored on a personal identification credential (smart card). The validation is performed at the Combi-device, so no fingerprint data need be stored on or transmitted to a central database.

The reader uses a smart card to provide the highest level of security and functionality. All sensitive information about an individual is securely stored on the smart card. As with the memory card, transactional data can be collected and stored, but it can now be used directly by the smart card in conjunction with a variety of security applications. Using the most modern cryptographic tools, the smart card can deter any effort to compromise the security or privacy of individuals holding the card.

The smart cards used for the readers may utilize any of the following smart chips:

- Multiflex 8K; ISO 7816-4 file structure
- Cryptoflex 8K; RSA DES, 3DES; ISO 7816-4
- Cryptoflex for Windows 2003

**Note:** Different readers are required for enrollment and access control.
70 Enrollment Readers

For enrollment, there are three options:

- Axalto Reflex 72 Serial Smart Card Reader used in conjunction with the AuthenTec FingerLock AF-S2 Sensor (USB interface)
- Axalto Reflex USB reader (For installation instructions, refer to the manufacturer documentation.)
- Biocentric Solutions CombiSmart reader (serial interface)
- Biocentric Solutions GuardDog reader (serial interface)

70.1 Wiring Enrollment Readers

Enrollment readers are directly connected to the PC workstation. The following readers may be used for enrollment.

70.1.1 Axalto Reflex Smart Card Readers

The Reflex readers work with all leading ISO 7816-compatible microprocessor cards, including:

- Cryptographic cards
- Java cards
- Subscriber Identity Modules (SIMs)
- Axalto e-gate™ cards

**Reflex 72 Serial Interface Reader**

The Reflex 72 reader communicates with the workstation through a USB interface. You will need to install the driver before connecting the Reflex 72 reader. Follow the instructions in the Reflex Installation Manual. Once it is connected and the computer is booted up, new hardware will be detected.

**Reflex USB Interface Reader**

The Reflex USB reader is connected to the USB port. After connecting the reader, you may then install the driver. Follow the instructions in the Reflex USB Installation Guide.

70.1.2 AuthenTec FingerLoc AF-S2 Sensor

The FingerLoc sensor communicates with the workstation through its USB port. Again, new hardware will be detected. Follow the instructions on the screen. The driver for this device can be found on the Supplemental disc.

70.1.3 Biocentric Solutions CombiSmart/GuardDog

The CombiSmart and GuardDog readers communicate with the workstation via RS-232. For GuardDog readers, the desk unit is used for enrollment. Once the reader is connected and the computer is booted up, new hardware will be detected.
The CombiSmart/GuardDog readers work with any card that uses the Philips Electronics MIFARE standard, complies with the ISO/IEC 14443, and has at least 1-KByte (*-Kbit) of memory, such as the following:

**Philips Electronics Standard**
- Contactless MIFARE smart card (1-KByte/8-Kbit)
- Contactless MIFARE smart card (4-KByte/32-Kbit)

**HID Corp.**
- 13.56 MHz MIFARE and 125 kHz Proximity contactless smart card (1-KByte/8-Kbit)

You will need the Enrollment Kit to configure the reader. The Enrollment and Encryption keys have already been downloaded to the reader. There is a possibility that you will have to upgrade the firmware.
**CombiSmart/GuardDog Configuration**

**Note:** To configure the CombiSmart/GuardDog reader, the Admin.exe program must be taken off the Supplemental disc and installed in the same access control Program File folder.

1. Run the Admin.exe program from the B.A.S.I.S. Program File folder.
2. When prompted for the password, enter prokupets.
3. Ping the port to verify the connection.
4. Click [Enumerate]. The unit will run through a series of tests. Upon completion, it will state, “Found 1 Unit, Combi ID #1.”
5. Set the time and date. Click [Get] to retrieve the current time from the host workstation or click [Set] to program the time/date into the unit.
6. The Command Mode should be set to “Directed.”
7. On the Configuration tab, click [Load].
8. Navigate to the file, LnlConfiguration.qcp located on the Supplemental disc.
9. Click [Download] to load the configuration files.
10. After the unit has been programmed, “Verification passed” will be displayed at the bottom.

### 70.2 Configuring Enrollment Readers

Be sure to select the correct COM port to which the reader is connected. You will also need to set up the card format for these readers and assign them to an active badge type.

<table>
<thead>
<tr>
<th>Reader type</th>
<th>Card technology</th>
<th>Card format type</th>
</tr>
</thead>
<tbody>
<tr>
<td>CombiSmart</td>
<td>Contact Smart Chip</td>
<td>Smart card</td>
</tr>
<tr>
<td>GuardDog</td>
<td>MIFARE</td>
<td>Smart card</td>
</tr>
</tbody>
</table>

### 70.3 Encoding Smart Cards

The CombiSmart and GuardDog readers can be used to encode cardholder data to a smart card. In order to encode smart cards, System Administration must be used for proper configuration.

1. Create the appropriate smart card format.
2. In the **Badge Types** folder, under the **Encoding** form, add the card format to be encoded.
3. In the **Workstations** folder, under the **Encoders/Scanners** form, add the reader being used to encode the smart card.

**Note:** For more information, refer to the System Administration User Guide.
Biocentric Solutions

71 Verification Readers

Biocentric Solutions GuardDog and CombiSmart readers are used as access readers. They interface with the Reader Interface Module (BAS-1300 or BAS-1320). Use the following diagrams to connect them properly.
71.1 Wiring CombiSmart Readers

CombiSmart Reader Voltage: 12 VDC 0.25A

TYPICAL SOFTWARE SETTINGS
1. Reader Type = WIEGAND/PROX
2. Keypad = NO KEYPAD

Labeled on wire terminal on inside of reader

Alternate 12 V Power Supply
250 mA Current Draw

Chassis Ground
71.1.1 CombiSmart Reader Configuration

The configuration which supports B.A.S.I.S. integration with the reader is stored in the file, LenelConfiguration.qcp. It is loaded on the device by the manufacturer.

Note: All readers supplied by Stanley are already configured and ready for installation.

The configuration can be downloaded to the specified Combi device(s) with Admin.exe provided by Stanley. You can find this on the Supplemental disc of the B.A.S.I.S. disc set, under the BiocentricSolutions directory.

For configuration, the CombiSmart reader must be hooked up to the workstation via RS-232.
These devices will accept only software distributed by Stanley and configuration records digitally signed with the distributor key.

**Configuration tab**

Use the Date/Time area on the Configuration tab to set the date and time for the specified Combi-device. Ordinarily, the entry fields contain the system date and time for the system on which Setup is running. You can use the scroll buttons to modify the date and time. Pressing Set downloads the new date and time to the Combi-device.

Other values should NOT be changed.

---

### 71.1.2 CombiSmart Reader Operation

![CombiSmart Reader Operation Diagram]

**Power Up Sequence**

When power is applied to a Combi-device, the unit performs an internal self-test and initialization procedure. When initialization completes, INSERT CARD is displayed.

**Standard Operation**

When the unit is in the ready state (INSERT CARD is displayed), a user inserts an ID card into the card slot. For a CombiSmart reader, the card must be inserted with the chip facing the bottom of the Combi-device.

Once the Combi-device successfully reads the card, it displays the PLEASE PLACE FINGER ON THE SENSOR message. The operator must use a finger that was used during the enrollment process and encoded on the identification card.

The user should ensure that the finger touches both the finger guide and the sensor material and that the finger is not placed at an angle to the sensor.
Once the sensor detects the finger, a SCANNING… message appears. The user should not move the finger until the PROCESSING… REMOVE FINGER message appears.

When the unit confirms that the fingerprint image matches the information encoded on the identification card, it displays the ID VERIFIED message, along with the user’s name as encoded on the ID card. (Note: The second line can be changed by the application, so something other than the user’s name may be displayed.)

At this point the unit will beep three times, log the appropriate information, and provide a pre-configured external validation signal (for example, a signal that causes a door to open). The unit then returns to the ready state.

**Button Operation**

The programmable buttons located on either side of the status light are enabled after the unit has completed the power up initialization and is in the ready state.

**Right Button** – Pressing the right button causes the Combi-device to reread the card.

**Left Button** – Pressing the left button displays the Combi-device software version information.

**Both Buttons** – Pressing both buttons simultaneously resets the Combi-device.

**Normal Error Conditions**

The following errors occur during normal use of the reader. Often, the end user can take an action that corrects the situation. If the user action is unsuccessful, the user should notify the system administrator for assistance. If the system administrator cannot resolve the problem, he or she will generally call for authorized service.

<table>
<thead>
<tr>
<th>Error Display</th>
<th>Probable Cause</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARD NOT READ REINSERT CARD</td>
<td>• Card not inserted with proper orientation</td>
<td>• If using a CombiReader, make sure the card is clean and the patch faces the device. If ambient light level is high, try shading the reader with your hand.</td>
</tr>
<tr>
<td>This message is displayed for several seconds before the PLEASE REMOVE CARD message appears.¹</td>
<td>• Card not fully seated</td>
<td>• Ensure the card is fully seated.</td>
</tr>
<tr>
<td></td>
<td>• Card is dirty or damaged</td>
<td>• Inspect the card for damage.</td>
</tr>
<tr>
<td></td>
<td>• For a CombiReader, the ambient light level is too high</td>
<td>• Correct any problem and reinsert the card.</td>
</tr>
<tr>
<td></td>
<td>• Card not yet enrolled</td>
<td>• If the error still appears, call the System Administrator.</td>
</tr>
<tr>
<td></td>
<td>• Card was enrolled in a different system</td>
<td></td>
</tr>
</tbody>
</table>
Abnormal Error Conditions

The following table details error conditions and messages that may be encountered and that indicate an abnormal error. Generally, end users will not see these errors. If they do, they should be instructed to contact their system administrator. Each error indication also lists a probable cause and actions that might correct the problem.

<table>
<thead>
<tr>
<th>Error Display</th>
<th>Probable Cause</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO FINGER DETECTED PLACE FINGER ON UNIT</td>
<td>The Combi-device did not detect a finger. This can be caused by:</td>
<td>• Repeat the process with proper finger placement.</td>
</tr>
<tr>
<td>This message is displayed three times or until a finger is detected. If a finger is not detected after three tries, the PLEASE REMOVE CARD message appears.²</td>
<td>• Finger not properly placed</td>
<td>• Clean the sensor.</td>
</tr>
<tr>
<td></td>
<td>• Dirty sensor material</td>
<td>• If the error still appears, call the System Administrator.</td>
</tr>
<tr>
<td></td>
<td>• Fingerprint sensor failure</td>
<td></td>
</tr>
<tr>
<td>ID NOT VERIFIED</td>
<td>The Combi-device could not verify the identity of the user. This can be caused by:</td>
<td>• Repeat the process with proper finger placement.</td>
</tr>
<tr>
<td>This message is displayed when the maximum number of print verification attempts have failed.² It displays for 3 seconds before the PLEASE REMOVE CARD message appears.¹</td>
<td>• Finger not properly placed</td>
<td>• If your finger is dry, try applying lotion. If it is damp, dry it and try again.</td>
</tr>
<tr>
<td></td>
<td>• Finger too dry or damp</td>
<td>• Ensure that the same finger was used as was used for enrollment.</td>
</tr>
<tr>
<td></td>
<td>• Wrong finger placed on sensor</td>
<td>• Clean the sensor.</td>
</tr>
<tr>
<td></td>
<td>• Dirty sensor material</td>
<td>• If the error still appears, contact the System Administrator.</td>
</tr>
<tr>
<td></td>
<td>• Fingerprint sensor failure</td>
<td></td>
</tr>
<tr>
<td>DOOR OPEN ALARM CLOSE DOOR</td>
<td>The door has been left open for longer than the configured time.³</td>
<td>Close the door.</td>
</tr>
</tbody>
</table>

1. The time delay between the current message and the next message is part of system configuration and is specified in seconds.
2. The number of fingerprint match attempts is part of system configuration. The default is 3.
3. The door open delay time is specified in seconds and is part of system configuration.
71.2 Wiring GuardDog Readers for Verification

The wall-mounted unit can be used for access verification. A reader interface module is required for connection.

<table>
<thead>
<tr>
<th>Error Display</th>
<th>Probable Cause</th>
<th>Corrective Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>INVALID SECURITY KEY</td>
<td>The card is not valid at this reader. Generally, the security key identifies the company. That means the user is attempting access with a card from another company.</td>
<td>Update the user’s card, if appropriate.</td>
</tr>
<tr>
<td>UNEXPECTED FORMAT ID</td>
<td>This card is not in a format that can be read by your system.</td>
<td>Update the user’s card, if appropriate.</td>
</tr>
<tr>
<td>NOT VERIFIED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERROR INITIALIZING FPM DEVICE</td>
<td>An error occurred while the device was being powered up. The device is not operational.</td>
<td>Retry device initialization.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If the error still occurs, call for service.</td>
</tr>
<tr>
<td>RESETTING PLEASE WAIT…</td>
<td>This is a device initialization message and should appear only briefly during power up or after both buttons have been pressed to reset the device. If it is displayed long enough to be seen, the device is probably locked up.</td>
<td>Power off and restart the device.</td>
</tr>
</tbody>
</table>

Connect the wires of the GuardDog to the reader interface module according to the following table.

<table>
<thead>
<tr>
<th>Color</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>GND</td>
</tr>
<tr>
<td>Brown</td>
<td>Power +12 VDC</td>
</tr>
</tbody>
</table>
### 71.2.1 GuardDog Reader Operation

The contactless GuardDog, similar to the CombiSmart reader, operates with a MIFARE contactless smart card, which is the industry standard. This card complies with ISO 14443A. For more detailed information, please refer to the GuardDog documentation.

To use the contactless GuardDog for authentication:

1. Hold the smart card close to the top of the GuardDog. The card must be 4 cm (2 inches) or closer. The LED turns amber when the GuardDog is reading the card.
2. After the “chirp” and when the Fingerprint Sensor LED is blinking green, place your finger on the sensor. The LED turns amber when the GuardDog is scanning your finger.
3. After the chirp and when the LED turns off, remove your finger.
   - The GuardDog emits three very quick chirps and both LEDs blink green to indicate that you have been successfully verified.
   - If the GuardDog emits only a single chirp and the Fingerprint Sensor LED starts to blink green again, the GuardDog was unable to verify you. Reposition your finger and repeat step 3. If, after three tries, the GuardDog cannot make a verification, both LEDs blink red and the unit emits three long beeps.

<table>
<thead>
<tr>
<th>Color</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Digital input</td>
</tr>
<tr>
<td>Orange</td>
<td>RS-232 TxD/RS-485 Data +</td>
</tr>
<tr>
<td>Yellow</td>
<td>RS-232 RxD/RS-485 Data -</td>
</tr>
<tr>
<td>Green</td>
<td>Wiegand zero</td>
</tr>
<tr>
<td>Blue</td>
<td>Wiegand one</td>
</tr>
<tr>
<td>White</td>
<td>GND</td>
</tr>
</tbody>
</table>
72 Maintenance

The Biocentric Solutions devices are designed for operation within facilities that may or may not be air-conditioned. They should be protected from environmental extremes.

The fingerprint sensor needs to be protected from getting excessively wet. While the water will not damage the sensor or Combi, excessive moisture can interfere with the Combi’s ability to authenticate a fingerprint.

In addition to the specifications below, you also want to consider the available light where the unit will be placed. Avoid areas where bright sunlight or other lighting will shine directly on the unit—this makes the LCD difficult to read.

Regular cleaning can help prevent authentication failures. The fingerprint sensor, in particular, should be regularly cleaned because dirt, dust, and other grime on the sensor can interfere with fingerprint imaging. Use a damp cloth to remove loose dirt and dust from the external surfaces of the Combi. Use a cotton swab and rubbing alcohol to clean the card slot. Use a cotton wipe and rubbing alcohol to clean the fingerprint sensor. Use a cotton wipe and rubbing alcohol to clean the display.

72.1 Tips and Tricks

Accurate enrollment is important and has a direct impact on verification. There are trade-offs between security and false acceptance and false rejection rates.

72.1.1 Ensuring Accurate Enrollment and Fast Verification

The quality of the enrollment data (biometric templates) affects the success and failure rates of verification. High quality data helps ensure that legitimate users are accepted and impostors are rejected. Low quality data leads to more false rejections. Because of the importance of the quality of the data, allow enough time to capture multiple prints from an enrollee so you can select the ones with the highest quality.

Train the enrollees on proper finger placement and let them practice a few times. Dissimilar finger placement is one of the biggest factors in verification failures, so make sure the enrollee can be verified on the enrollment reader. Allowing the enrollee to practice also tests the template and makes sure the data was properly written to it.

If an enrollee cannot be verified after several tries, re-enroll him or her. If the individual has problems with the enrollment or practice reader, he or she will also have problems with other access readers.

Common Problems and Solutions

Most verification failures occur because of the following:

- Finger positioned incorrectly
- Finger moved during reading
- Pressing too heavily or lightly
- Wrong finger - using one that doesn’t have a template stored
- Finger too wet or dry (You may want to include towels and hand lotion in your enrollment station supplies.)
- Cut finger or otherwise changed
All these problems are easily solved or avoided with proper training during enrollment and capturing quality prints from more than one finger or thumb.

### 72.1.2 Finger Selection and Placement Tips

If an individual’s thumbs have good prints, use his or her left and right thumbs for enrollment. (It’s easier for someone to remember to use a thumb rather than one of eight fingers.) For example, if the enrollee is right handed, acquire two images from his or her right thumb and one from the left. Refer to the next section for determining if a thumb print has acceptable quality.

For each enrollee, always capture prints from more than one finger or thumb, and preferably at least one from each hand. By using multiple fingers or thumbs, the enrollee has a backup in case he or she is injured and can’t use the usual finger for verification.

The enrollee should place his or her finger or thumb on the sensor so the cuticle is about in the center of the sensor.

An enrollee’s finger or thumb should:
- Lie flat on the sensor
- Cover the entire sensor area so it is touching the edges of the sensor area (individuals with small fingers should use thumbs if at all possible)
- Be parallel to the sensor’s sides
- Be placed so the cuticle is aligned with center of the sensor
- Not be wet
- Not be moved during scanning

New enrollees tend to position their fingers too low with the tip of the finger touching the top of the sensor. The top of the finger should be above the sensor and touching the plastic inset of the reader.

*The whorl should be located in the center of the fingerprint.*
72.1.3 Fingerprint Pressure

Pressure too, affects the quality of a fingerprint image. When positioning a finger or thumb on the sensor, some pressure needs to be applied but not so the fingerprint is flattened and can’t be scanned. The following figure illustrates the relationship between pressure and its effects on the fingerprint image.

*Pressure effects on fingerprint images*
72.1.4  **Trade-offs**

Two measurements, False Acceptance Rate (FAR) and False Rejection Rate (FRR), are often referred to in biometric systems. The first, FAR, refers to the number of times a person who is not enrolled is accepted by the system. The second, FRR, refers to the number of times a person who is enrolled is rejected by the system.

Typically, the more secure a system is, the higher the FRR—more people are rejected who shouldn’t be. You can lower the FRR but you will also lower the security of the system by increasing the FAR — more people are accepted who shouldn’t be.

You may want to experiment with the various settings to help you determine what the optimal threshold should be for the application.

72.1.5  **Specifications**

The following specifications are generally for most readers. Please refer to your manufacturer owner’s manual for more detailed information.

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**Note:** These specifications are subject to change without notice.

72.1.6  **CombiSmart**

- **Mechanical:**
  - Height: 7.5 in (19.05 cm)
  - Width: 5.5 in (13.97 cm)
  - Depth: 4.65 in, wall mounted (11.81 cm)
  - Weight: 2.5 lbs. (1.134 kg)

- **Primary Power:**
  - DC input: 12 VDC (250 mA)
The reader operates from externally supplied DC power of 12 VDC (8 - 16 VDC), regulated with a maximum ripple of 50 mV p-p. Under worst-case conditions, the reader should not require more than 10.0 watts.

For wall-mounted devices, the power, along with all other wiring, is connected through a cable port in the wall mount. For desktop devices, power is provided by a 12VDC adaptor that plugs into any standard receptacle and connects directly to the Combi-device.

- Memory and Clock Backup:
  Not applicable
- Environmental:
  Temperature: Operating: 5° to +45° C; Storage -20° to 70° C
  Humidity: 0 to 90% RHNC
  Altitude: Operating: between sea level and 10,000 feet; Storage: between sea level and 50,000 feet

72.1.7 GuardDog

- Mechanical:
  Height: 4.38 in (11.11 cm)
  Width: 2.63 in (6.67 cm)
  Depth: 1.25 in, wall mounted (3.17 cm)
  Weight: less than 1 lb. (0.45 kg)
- Primary Power:
  DC input: 12 VDC (250 mA)
- Digital Interface Signals
    • RS-232
      – 38400 baud
      – Complies with EIA/TIA-232E, V.28 specification
      – Recommended maximum cable length is 15 m (about 50 feet)
    • RS-485
      – 38400 baud
      – Maximum of 32 units on each RS-485 network
      – Recommended maximum cable length is 1219 m (about 4000 feet)
- Wiegand Serial Data Output (Wall-Mount Only)
  – 26-bit standard (others available on request)
  – 50 mA maximum output current drive (output low)
  – Recommended maximum cable length is 15 m (about 50 feet)
- Environmental:
  Temperature: Operating: -20° to 70° C; Storage -20° to 70° C
  Humidity: 0 to 90% RHNC
- Altitude: Operating: between sea level and 10,000 feet; Storage: between sea level and 50,000 feet
BIOSCRYPT
READERS
73 Overview

This installation guide is intended for use by technicians who will be installing and maintaining the B.A.S.I.S. system with Bioscrypt readers. These readers (V-Pass FX, V-Smart, and V-Station) are part of Bioscrypt’s Veri-Series line of fingerprint authentication readers.

73.1 V-Pass FX and V-Station

The V-Pass FX is a fingerprint reader. To use this reader, it must be configured as an alternate reader and linked (through the software) to a primary reader. This is necessary for door control. Controller-based templates are used, so verification occurs through comparing the fingerprint with the biometric data (called a template) stored on the ISC.
V-Pass FX readers interface upstream with the Biometric Reader Interface Gateway (BAS-500B). It can also interface with the intelligent dual reader controller (BAS-2220) or series 2 reader interface modules (BAS-1300, BAS-1320). Multiple V-Series devices may be connected in a single network.

*Communications overview for the V-Pass FX readers using the biometric reader interface gateway*

The V-StationA has a fingerprint reader as well as a keypad. Like the V-Pass FX, it also uses controller-based templates. This model does not have a smart card reader.
73.2 V-Smart and V-StationG/H

The V-Smart has a fingerprint reader as well as a contactless smart card reader (MIFARE or HID iCLASS™ model R10). The V-SmartA-G reader is for MIFARE; the V-SmartA-H reader is for HID iCLASS.

The V-Smart access readers interface upstream with the reader interface module (BAS-1300, 1320) as well as the intelligent dual reader controller (BAS-2220). These readers use card-based templates. They verify the identity of an individual by scanning his or her actual fingerprint and comparing the scanned print with fingerprint data stored on a smart card. The readers use a smart card to provide the highest level of security and functionality. This is also true of V-StationA-G and V-StationA-H readers.

The V-StationA-G (MIFARE) and V-StationA-H (iCLASS) have capabilities for reading smart card and fingerprint verification. The keypad on this unit is reserved for future use.
Communications overview for the V-Smart/V-Station (G/H) readers

- LAN/WAN
- Intelligent System Controller
- Serial Interface
- Enrollment Workstation
- V-Smart Enrollment Kit
- Single Reader Interface Module
- Dual Reader Interface Module
- Enrollment Kit
- Workstation
- Intelligent System Controller
74 Installation

Use the following information to install V-series readers (for either enrollment or access verification). For these readers to function with B.A.S.I.S., software option SWG-1402 is required.

74.1 Reader Power Requirements

The Bioscrypt readers (V-Smart, V-Pass FX, V-Station) require an Earth ground connection to dissipate ESD (electrostatic discharge).

---

Important: Do not use power ground as a substitute for Earth ground.

---

Sensor damage is often a result of ESD. Be sure that every unit that is installed has a connection to Earth ground using pin 15 of the pigtail. Pin 15 should be connected to an Earth ground such as a cold water copper pipe or building ground using a 14-18 AWG single conductor. In addition to the Earth ground connection, the ridge-lock should be used consistently during finger placement to ensure a safe path to discharge the electrostatic. The sensor should NOT be the first point of contact.

74.2 Enrollment Readers

At least one V-series reader must be configured for use as an enrollment reader for biometric information for cardholders. The primary communications port is wired through the pigtail in the rear of the unit. An auxiliary RS-232 port is located at the bottom of the unit. The serial cable is included with the reader (part number B440-0002-00). For more detailed information, refer to the V-Series manual.
Connection of enrollment reader (using V-Smart)

1. Using the cable included with the reader, plug the RJ-11 connector into the aux port on the reader.
2. Plug the serial connector into a free port on the host PC.

The reader will then have to be configured. For more information, refer to Reader Configuration on page 418.

74.2.1 Reader Configuration

The computer to which the V-Series reader is connected will be used to configure the reader. This computer must have VeriAdmin software. This software is included on a CD which comes with the reader. It can also be obtained from the Supplemental disc or from the manufacturer website (www.bioscrypt.com). Enrollment is done through the Multimedia Capture Module.

74.2.2 Firmware

If there are encoded cards that previously existed for this particular build and the fingerprint template is configured to default to global security during capture, these cards will have to be re-encoded. Set the template security level to a configuration other than “Default to Global Security” for re-encoding. Capturing new templates is not necessary.
The template security level may be set to “Default to Global Security.”

The readers should be running firmware version 7.4 or higher. It will take several (at least 15) minutes to complete this process. Firmware should be updated before configuring the settings for the reader.

1. Open the VeriAdmin.exe application.
2. Select **Configure > Update Firmware > Update Veri-Series Firmware**.
3. Then select **Configure> Update Firmware > Update ESI Firmware**.

**Note:** The Biometric Mismatch capability requires VeriAdmin version 5.4 and Veri-Series firmware version 7.4.

### 74.3 V-Pass FX

Bioscrypt V-Pass FX and standard V-StationA readers should be connected to the BAS-500B, series 2 BAS-1300 or BAS-1320, or BAS-2220 (RS-485 2-wire multi-drop).


The V-Pass FX requires driver software MV1610 version 9.20 as well as VeriAdmin Management software version 7.40. It operates at 9-24 VDC with an average current draw of 200mA, 400mA peak. The reader must be powered by an external power supply with a common ground to the reader interface.
Wiring of V-Pass FX readers with BAS-500B

<table>
<thead>
<tr>
<th>Board</th>
<th>Reader</th>
<th>Pin</th>
<th>Signal</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>TR+</td>
<td>Pin 8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TR-</td>
<td>Pin 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GND</td>
<td>Pin 12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ACDC</td>
<td>Pin 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GND</td>
<td>Pin 11</td>
</tr>
</tbody>
</table>

12 VDC Power Supply
Pigtail from Back of Reader
Connected to Earth Ground
Note: Do not use Power Ground as a substitute for Earth Ground
Wiring of V-Pass FX with Series 2 BAS-1300

Network Identification Number **MUST** be set to 0.

**9-24 VDC Power Supply**
DC- must tie into Signal Ground

**Single Reader Interface Module**

**Green/Yellow**
Tie to Earth Ground

**TYPICAL SOFTWARE SETTINGS**
(Note: Software version 5.12.12 or higher required for Series 2 single reader interface module.)
1. Reader Type = (Bioscrypt RS-485)
Network Identification Number MUST be set to 0.

9-24 VDC
Power Supply
(DC- must tie into Signal Ground)

Pigtail from reader

Tie to Earth Ground

**TYPICAL SOFTWARE SETTINGS**
(Note: Software version 5.12.12 or higher required for Series 2 dual reader interface module. Software version 5.12.110 or higher required for intelligent dual reader controller.)

1. Reader Type = (Bioscrypt RS-485)

### 74.3.1 Termination

RS-485 supports distances of up to 4000 feet (1219 m) and/or 31 readers. Typically, no end-of-line termination is required unless the total run exceeds 2000 feet.
It is recommended that the RS-485 transmission line be terminated at both ends. The recommended termination at the PC end of the line is called fail-safe termination.

This terminator ensures that there is a proper bias voltage across the receiver inputs. This, in turn, ensures that the receiver is in a known state and puts less of a strain on the driver to provide that bias. This termination is typically built into the RS-232/RS-485 converters and internal PC add-on boards – you should confirm that such a termination exists, but you likely don’t have to supply it yourself.

The termination at the opposite end of the transmission line should be parallel (or passive) termination.

The value of R in the figure is chosen to correspond to a proper parallel termination, RT, and it is chosen to be slightly larger than the characteristic impedance of the cable, ZO. Over-termination tends to be more desirable than under-termination since over-termination has been observed to improve signal quality. RT is typically chosen to be equal to ZO. When over-termination is used RT is typically chosen to be up to 10% larger than ZO. The elimination of reflections permits higher data rates over longer cable lengths.

74.4 V-StationA

Communication between the V-StationA reader and the BAS-500B/1300/1320/2220 is done via RS-485 connection. Wire power separately.
On the back of the unit, jumper TX(+) and RX(+) together, and jumper TX(-) and RX(-) together. Then wire these to TR+ and TR- respectively on the BRI.
74.4.1 V-Pass FX and V-StationA Configuration

In order for the V-Pass FX (MV1610) readers to function properly, the firmware must be version 9.20. In order for the V-StationA readers to function properly, the firmware must be version 7.4. The firmware for
these units must be upgraded using VeriAdmin. The reader must be configured using VeriAdmin software (version 7.40).

1. Configure the LED Table Settings for the reader in Idle, Enroll, or Verify modes as shown in section 74.5.2 LED Settings. To access the LED Table, select LED Table Settings from the Configure menu.

2. Enable the port using the Unit Parameter Settings window. The settings will be different for enrollment readers and verification readers.

3. The General tab displays the product, firmware, communication, and template information for the current reader.

4. On the Communication tab, select Enable Port. The settings for an enrollment reader are shown below.
   a. Network Identification Number: Assign the unit a network ID number. This can be any value from 0-7. This value corresponds to the address of the reader. IDs 0-3 will be connected to port 2 on the BRI and IDs 4-7 will be connected to port 3 on the BRI. For the reader interface (BAS-1300/1320/2220), the Network Identification Number must be 0.
   b. Host Port Protocol: This needs to be set to RS-485.
   c. Host Port Baud Rate: This can be set to either 38400 or 9600 baud. This needs to match the setting of the reader interface.

   The settings for a V-Pass FX enrollment reader are shown below.

   For a verification reader, the mode and baud rate must be changed. These settings must match the settings configured on the gateway and in the access control software.

5. On the Wiegand tab, set the Fail Site Code to 254 in order to report a Biometric Mismatch within Alarm Monitoring.
6. On the Biometrics tab,
   a. Select the Global Security Threshold.
   b. Make sure that the Biometric Verification is **Enabled**, and that **Finger Required** is selected.
   c. Select the number of fingers required and enter the Inter-Finger Timeout in seconds.
   d. The Duress Finger Mode may be **Disabled**.

   ![Biometrics Tab](image)

   e. Under Unit Mode:
      i. select **Verify**.
      ii. For the Enrollment Type, select **1:1 Template**.
   f. Duress Finger Mode should be **Disabled**.
   g. On the Verification Response tab, make sure Verification Polling Mode is **Disabled**.

7. The default settings may be left on the General Purpose I/O tab (GPO 0=No Action).

8. On the Misc. tab:
   a. UNCHECK **Send Verification Result** for both the Host Port and Aux Port.

   ![Misc Tab](image)

   **Important**: These checkboxes must be UNCHECKED. Leaving **Send Verification Result** checked (the Veri-Admin default) will result in a possibility of false access grants.

   b. Uncheck **Line Trigger**.
   c. Select **Disabled** for the Verification Polling Mode.
V-Smart readers can be used as access readers, connected to the Reader Interface Module (BAS-1300, BAS-1320) or intelligent dual reader controller (BAS-2220).

**Typical Software Settings**
1. Reader Type = Wiegand/Prox
2. Keypad = No Keypad

**Wiring the V-Smart reader with the Single Reader Interface Module**

- Power Ground (11)
- Power In (8-12VDC 400 mA) (13)
- GND
- BZR
- LED
- CLK/D1
- DATA/D0
- VO

**Single Reader Interface Module**

**Smart Card reader**
Wiring the V-Smart reader with the Dual Reader Interface Module

**TYPICAL SOFTWARE SETTINGS**
1. Reader Type = Wiegand/Prox
2. Keypad = No Keypad
3. Use unregulated mode for the 1320 (jumper J2)
Wiring the V-Smart reader with the Dual Reader Interface Module

74.5.1 Establish Communication

1. Establish communication with the reader. Connect the cables according to the Veri-Series Setup Guide.
2. Install the VeriAdmin software and start it.
3. If you are configuring a new unit, the Network Setup screen will automatically be displayed. Click [OK] to access the Network Configuration Manager. If this screen is not automatically displayed, from the Configure menu, select Network Setup.
4. Select the COM port to which the reader is connected.
5. Click [Add unit]. The new reader will appear online. Be sure to verify its status on the screen.

74.5.2 LED Settings

1. From the Configure menu, select LED Table Settings.
2. Configure the LED Table Settings for the reader in Idle, Enroll, or Verify modes. Configure the settings for the V-Smart reader as shown in the following screenshots.
LED Table Settings for Idle mode

<table>
<thead>
<tr>
<th>Veri-Series Products</th>
<th>Line 1</th>
<th>Line 2</th>
<th>Line 3</th>
<th>Duration</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting State</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>4000</td>
</tr>
<tr>
<td>Wave Card</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Place Finger</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Remove Finger</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Finger Not Detected</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pass</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fail</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Error</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

LED Table Settings for Enroll mode

<table>
<thead>
<tr>
<th>Veri-Series Products</th>
<th>Line 1</th>
<th>Line 2</th>
<th>Line 3</th>
<th>Duration</th>
<th>Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting State</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wave Card</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Place Finger</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Remove Finger</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Finger Not Detected</td>
<td></td>
<td></td>
<td></td>
<td>600</td>
<td>0</td>
</tr>
<tr>
<td>Pass</td>
<td></td>
<td></td>
<td></td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Fail</td>
<td></td>
<td></td>
<td></td>
<td>400</td>
<td>200</td>
</tr>
<tr>
<td>Error</td>
<td></td>
<td></td>
<td></td>
<td>600</td>
<td>0</td>
</tr>
</tbody>
</table>
74.5.3 Smart Card Settings

If the Smart Card Manager shows an error, this means that the reader is not properly connected.

1. Configure the Smart Card settings via the Smart Card Manager. This is accessed by clicking the smart card button in the toolbar. For Reader Type, the smart card technology (MIFARE or iCLASS) should be stated here.
### Smart Card Manager (MIFARE shown)

<table>
<thead>
<tr>
<th>Reader Information</th>
<th>Smart Card Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESI Status: Idle</td>
<td>Security Settings</td>
</tr>
<tr>
<td>ESI Type: V-Smart</td>
<td>Max Templates per Card: One, Two</td>
</tr>
<tr>
<td>ESI Version: E2.000</td>
<td>Configure Card Layout</td>
</tr>
<tr>
<td>Reader Type: MIFARE</td>
<td>ESI Verification Timeout: 15 (s)</td>
</tr>
<tr>
<td>Write Status: Read/Write</td>
<td>Use Wiegand String</td>
</tr>
</tbody>
</table>

#### Biopscript

**V-Smart Biop Card**

**Templates Stored**

**Primary:**

**Secondary:**

**Card Type:**

**Serial Num:**

#### Smart Card Actions

- Secure Card
- Delete Template (1)
- Delete Wiegand String (1)
- Reset Card
- Delete Template (2)
- Delete Wiegand String (2)

**OK**

**Cancel**
2. Click [Security Settings] to configure the smart card security settings.

![Smart Card Security Settings for MIFARE](image)

**a.** In the ESI SiteKey Security section, if you are using a MIFARE reader, **Key B Read/Write** should be selected. If you are using an iCLASS reader, this field will be blank.

**b.** Note that all units should be configured to these specifications for the Smartcard Administrator SiteKey:

- **Primary SiteKey:** C5RH9kV17yDzSQu
- **Secondary SiteKey:** blank
- **“Use software HASH”** should NOT be selected

**c.** After typing in the site key, click [Change SiteKey].

**d.** A confirmation message will be displayed. Click [Accept].

**e.** You will be asked to enter the current sitekey. If you have a brand new reader, there is no sitekey assigned yet and you may leave this field blank. Otherwise, enter the current sitekey.

**f.** Click [SAVE Settings].

3. Click [Configure Card Layout] to access the Smart Card Layout Manager. If you have a MIFARE V-SmartA-G reader, configure the smart card layout to match the layout shown under “Current Layout.”

- **Sector 7, blocks 0 and 1** should be configured as user data.
- **Sector 8, block 0** should be a layout block.
- **Sector 8, block 2** should be template (1). For sectors 9 through 15, blocks 0, 1, and 2 should also be template (1).
For iCLASS readers, cards should already be encoded. If you require encoding, use an iCLASS encoder for the enrollment workstation. Using Bioscrypt tools will create a 1K card, which is not practical.

### 74.5.4 Unit Parameter Settings

1. From the **Configure** menu, select **Unit Parameters**.

2. The Unit Parameter Settings window appears.
   a. The General tab displays the product, firmware, communication, and template information for the current reader.
b. On the Communication tab, assign the network ID, select port mode and baud rate. Select **Enable Port**. The settings for an enrollment reader are shown below.

For the MV1200 VeriSeries Port MODE, mode 0 should be selected. You will lose communication to the reader if you select mode 2!

The default baud rate for the host port (on an enrollment/capture station) is 57600.

Initially, the Aux Port is disabled and protected by a password. In order to use any of the V-Smart units for enrollment in B.A.S.I.S., the Aux Port must be enabled with this password: **95186274**. The software will then recognize this password, and enable the Aux Port without user intervention.

---

For the MV1200 VeriSeries Port MODE, mode 0 should be selected. You will lose communication to the reader if you select mode 2!

The default baud rate for the host port (on an enrollment/capture station) is 57600.

Initially, the Aux Port is disabled and protected by a password. In order to use any of the V-Smart units for enrollment in B.A.S.I.S., the Aux Port must be enabled with this password: **95186274**. The software will then recognize this password, and enable the Aux Port without user intervention.
c. On the Wiegand tab, set the **Pass-Thru Format**. Enable Input and Selective Output under Wiegand I/O.

With B.A.S.I.S. ET690, Alarm Monitoring has the capability of displaying biometric mismatch events. If you are planning to enable the Biometric Mismatch capability:

- Select the **Pre-Defined Format** radio button.
- In the format drop-down list, select **Lenel64**. This custom format can be found on the Supplemental disc. Click [Upload Custom Format] and navigate to the Lenel64.wgf file (found on the Supplemental disc) to select it.

The card format corresponding to the Lenel64 custom format must be 64 bits long. The issue code start bit should be 56, and the number of bits should be 8. Bits 0 through 55 can be configured in any way you choose. The recommended format is Lenel 64-bit Wiegand (0/8, 8/48, 56/8).

- In the **On Failure** section, check the box for **Fail Site Code**. Enter the code (254) next to it.
If you are using Pass-Thru Format, the Wiegand tab must be configured as follows:

![Wiegand tab configuration interface](image)

**Note:** The ID bits defined in VeriAdmin correspond to the template ID (which is not utilized by the access control software), and not the B.A.S.I.S. badge ID.
d. On the Biometrics tab,
   - Change the Global Security Threshold to **Very High**.

**Note:** If a level of security is defined in B.A.S.I.S. other than “Very High,” it will override this reader configuration.

   - Make sure that the Biometric Verification is **Enabled**, and that **Finger Required** (under Template Security) is selected.
   - Select the number of fingers required and enter the Inter-Finger Timeout in seconds.
   - If you wish, you may enable Password Verification (this will only apply to V-Station-G and V-Station-H units).

**Note:** Remember that if a cardholder PIN is modified in B.A.S.I.S., it must also be re-encoded on the smart card!

   - The Duress Finger Mode may be **Disabled**.

e. On the Verification Response tab, make sure Verification Polling Mode is **Disabled**.

f. The default settings may be left on the General Purpose I/O tab (GPO 0=No Action).
74.5.5 Card Format Configuration

Once the reader has been configured using the VeriAdmin software, exit the program. You will then need to set up card format and encoding for the V-Smart using the access control software. For more information, please refer to the System Administration User Guide.

A Wiegand card format must be created prior to configuring a smart card format with a Bioscrypt access control card format. This configuration must match the Wiegand format that the V-Smart reader will output. The following is the suggested Wiegand 64-bit card format configuration to use with a Bioscrypt access control application.

Note: Access control card formats for Bioscrypt smart cards must have the maximum of 64 total number of bits on card.

After the Wiegand card format is created, define a smart card format to be used during card encoding.

74.5.6 V-Smart Reader Operation

Before using the V-Smart reader, a Wiegand card format must be created for Bioscrypt smart cards, having a maximum of 64 total number of bits on card.

1. Present the smart card to the reader.
2. When the light turns yellow, place your finger on the sensor. For enrollment and verification processes, remember to use the RidgeLock for finger placement consistency.
3. When the light turns off, remove your finger.

**Indicator Light**

<table>
<thead>
<tr>
<th>Light</th>
<th>Means...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Place finger</td>
</tr>
<tr>
<td>Off</td>
<td>Remove finger</td>
</tr>
<tr>
<td>Green</td>
<td>Success</td>
</tr>
<tr>
<td>Red</td>
<td>Failure</td>
</tr>
</tbody>
</table>

Note: For more information, refer to the Bioscrypt V-Smart manual(s).

**74.6 V-StationA-G and V-StationA-H**

The V-StationA-G (MIFARE model) and V-StationA-H (iCLASS model) readers handle card and fingerprint verification. Communication between the V-StationA (G or H) reader and the BAS-1300/1320/2220 is done via Wiegand connection.
V-StationA-G and V-StationA-H Configuration

In order for the V-Station readers to function properly, the firmware must be version 7.4. The firmware for these units must be upgraded using VeriAdmin.

The reader must be configured using VeriAdmin software.

1. Configure the LED Table Settings for the reader in Idle, Enroll, or Verify modes as in the previous section. To access the LED Table, select LED Table Settings from the Configure menu.
2. Enable the port using the Unit Parameter Settings window. The settings will be different for enrollment readers and verification readers.
   a. The General tab displays the product, firmware, communication, and template information for the current reader.
   b. On the Communication tab, select **Enable Port**. The settings for an enrollment reader are shown below.
      - Network Identification Number: Assign the unit a network ID number. This can be any value from 0-7. This value corresponds to the address of the reader.
      - Host Port Protocol: This needs to be set to RS-485.
      - Host Port Baud Rate: This can be set to either 38400 or 9600 baud.

For a verification reader, the mode and baud rate must be changed. These settings must match the settings configured on the gateway and in the access control software.
c. On the Wiegand tab, set the **Pass-Thru Format**. Enable Input and Selective Output under Wiegand I/O.

With B.A.S.I.S., Alarm Monitoring has the capability of displaying biometric mismatch events. If you are planning to enable the Biometric Mismatch capability:

- Select the **Pre-Defined Format** radio button.

- In the format drop-down list, select **Lenel64**. This custom format can be found on the B.A.S.I.S. Supplemental disc. Click [Upload Custom Format] and navigate to the Lenel64.wgf file to select it.

  The card format corresponding to the Lenel64 custom format must be 64 bits long. The issue code start bit should be 56, and the number of bits should be 8. Bits 0 through 55 can be configured in any way you choose. The recommended format is Lenel 64-bit Wiegand (0/8, 8/48, 56/8).

- In the **On Failure** section, check the box for **Fail Site Code**. Enter the code (254) next to it.
If you are using Pass-Thru Format, the Wiegand tab must be configured as follows:

<table>
<thead>
<tr>
<th>General</th>
<th>Communication</th>
<th>Wiegand</th>
<th>Biometrics</th>
<th>General Purpose I/O</th>
<th>LED Table</th>
<th>Misc.</th>
</tr>
</thead>
</table>
| Pre-Defined Format
Lenel64a
Upload Custom Format
On Success
At Site Code: 0
On Failure
Fail ID Code: 0
Fail Site Code: 0
Invert Parity Bits
| Pass-Thru Format
CUSTOM
Total Bits: 64
ID Start Bit: 0
Num ID Bits: 0
| Pulse Width
40 (usec)
Use Default
| Pulse Interval
2000 (usec)
Use Default
| Wiegand I/O
Enable Input
Enable Output: Always Output (regardless of input source)
d. On the Biometrics tab,
   - Change the Global Security Threshold to **Very High**.

   **Note:** If a level of security is defined in B.A.S.I.S. other than “Very High,” it will override this reader configuration.

   - Make sure that the Biometric Verification is **Enabled**, and that **Finger Required** (under Template Security) is selected.
   - Select the number of fingers required and enter the Inter-Finger Timeout in seconds.
   - If you wish, you may enable Password Verification (this will only apply to V-Station-G and V-Station-H units).

   **Note:** Remember that if a cardholder PIN is modified in B.A.S.I.S., it must also be re-encoded on the smart card!

   - The Duress Finger Mode may be **Disabled**.


e. On the Verification Response tab, make sure Verification Polling Mode is **Disabled**.

f. The default settings may be left on the General Purpose I/O tab (GPO 0=No Action).
74.6.2 Encoding Smart Cards

The V-Smart and V-Station readers can be used to encode cardholder data to a smart card. In order to encode smart cards, System Administration must be used for proper configuration.

1. Create the appropriate smart card format.
2. In the Badge Types folder, under the Encoding form, add the card format to be encoded.
3. In the Workstations folder, under the Encoders/Scanners form, add the reader being used to encode the smart card.

Note: For more information, refer to the System Administration User Guide.

74.6.3 Additional V-Station Options

The V-Station keypad has the capability of accepting PIN entries. The [Enter] button corresponds to [#]. This functionality applies to card and PIN mode, biometric verify, and cipher mode.

Commands may be executed using [Clear] in place of the [*] key.

For units that have a smart card reader, a cardholder PIN can be encoded on the smart card. When entering your PIN, press the sequence of numbers followed by the [Enter] button.

1. User VeriAdmin to configure the following settings.
   a. In Unit Parameters, under the Wiegand tab
      - Total Bits: 32
      - ID Start: 0
      - Number ID: 32
   b. In the Unit Parameters, under the Biometrics tab
      - Password Verification: Enabled
   c. For MV1200 and MV1610 devices that are connected to biometric gateway or reader interface modules and configured as Bioscrypt RS-485 readers in B.A.S.I.S., enable PIN capability by doing the following:
      - In the Unit Parameters, under the Misc. tab
      - Verification Polling Mode: Enabled
      - Polling Mode: Keypad Only
   d. In the Smart Card Manager, check the Use Wiegand String combo-box.
2. Open the Card Formats form in System Administration.
3. Configure V-Smart (iCLASS/MIFARE) card formats with the corresponding Wiegand Access Control card format (maximum of 32 total number of bits on card).

Note: Currently, Wiegand formats longer than 32 bits are incompatible with the V-Station's Password option.

This will result in the cardholder’s PIN being encoded and stored in the template’s password field.
74.7 PIV-Station

The average reader current draw is 0.50 amps at 12 VDC with a maximum draw of 1.00 amp at 12 VDC. General power requirements: +12.5 to 24 VDC. This reader cannot be powered from a reader interface module reader port.

74.7.1 PIV-Station Wiring

Wire the reader as follows.

Wiring diagram of the reader and single reader interface module

<table>
<thead>
<tr>
<th>Single Reader Interface Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
</tr>
<tr>
<td>BZR</td>
</tr>
<tr>
<td>LED</td>
</tr>
<tr>
<td>CLK/D1</td>
</tr>
<tr>
<td>DATA/D0</td>
</tr>
<tr>
<td>VO</td>
</tr>
<tr>
<td>DRAIN</td>
</tr>
<tr>
<td>TIE to Earth Ground</td>
</tr>
<tr>
<td>12-24 VDC Power Supply</td>
</tr>
</tbody>
</table>

TYPICAL SOFTWARE SETTINGS

1. Reader Type = Depends on Card Format
2. Keypad = Eight Bit Output Keypads
3. LED Mode = 1-WIRE LED CONTROL
74.7.2 PIV-Station Configuration

Use VeriAdmin to configure the reader. In the Unit Parameters, under the Wiegand tab, there are two possible configurations:

**TYPICAL SOFTWARE SETTINGS**
1. Reader Type = *Depends on Card Format*
2. Keypad = None (keypad is not controlled by the software)
3. LED Mode = 1-WIRE LED CONTROL
• **FASC-N 75 MSB Low Assurance Wiegand Output** If you are using FASC-N 75 MSB Low Assurance Wiegand Output, in the access control software, for the Reader Type, select Wiegand/Prox.

• **FASC-N 200 MSB Low Assurance Wiegand Output** If you are using FASC-N 200 MSB Low Assurance Wiegand Output, in the access control software, for the Reader Type, select Mag w/ Wiegand Output.
LNL-BIO007/BIO-NDK READERS
75 Overview

The LNL-BIO007 reader combines three forms of authentication: proximity reader, PIN pad, and fingerprint sensor. The PIN and fingerprint authentication are standard; the proximity reader is optional. All three reader modes can be configured to support timezone control. The reader is designed to work in the following modes: PIN only; Card only; Card and PIN; Card or PIN; PIN and fingerprint; Card and fingerprint; Card, PIN, and fingerprint.

The indestructible keypad is based on BaranTec’s patented Piezo Switch technology. The power-driven fingerprint sensor, Bioscrypt’s MV1200, utilizes the powerful DSP TI processor. Unlike all other biometric products, this sensor is hidden until a valid credential and/or PIN is presented. The fingerprint sensor door is opened. After verification occurs, the fingerprint sensor door is closed into a secure vandal-resistant position.

75.1 Interfaces

The reader communicates to the BAS-2000 through the biometric reader interface gateway using RS-485 and one of two reader interface modules via Wiegand communication. The ISC must be a BAS-2000. One of two reader interface modules may be used: BAS-1300 or BAS-1320.
76 Installation

The reader comes with a ferrite. Use the ferrite for electromagnetic protection of the wires. Use the following information to install the reader.

76.1 Wiring the LNL-BIO007-HID

This reader operates at 12 VDC. The reader consumes 550 mA with current surges up to 1.6 A at 12 VDC. You must have B.A.S.I.S. version 5.10.309 or later. This reader must be wired to the Biometric Reader Gateway and a Single/Dual Reader Interface Module.

**Wiring the reader with the Single Reader Interface Module**

![Wiring Diagram](image)

**TYPICAL SOFTWARE SETTINGS**

1. Reader Type = WIEGAND/PROX
2. Keypad = 8-bit Output Keypad
3. LED Mode = 1-WIRE LED CONTROL

**Supervision:** Not Supervised, Normally Open
Wiring the reader with the Dual Reader Interface Module

1. Reader Type = WIEGAND/PROX
2. Keypad = 8-bit Output Keypad
3. LED Mode = 1-WIRE LED CONTROL

TYPICAL SOFTWARE SETTINGS
1. Reader Type = WIEGAND/PROX
2. Keypad = 8-bit Output Keypad
3. LED Mode = 1-WIRE LED CONTROL
76.2 Reader Mounting

A mounting plate is included with the reader. Use the screws to mount the reader on the wall or single gang mounting box.
You may order a wall mount enclosure:

LNL-B10007-ENC Wall Mount Enclosure

[Diagram of wall mount enclosure]
76.3 LNL-BIO007 Reader Configuration

The LNL-BIO007 reader comes pre-configured to work with all B.A.S.I.S. systems 5.10.309 or later. It only requires configuration of the RS-485 address (0-7). By default the address is set to 0. Each address must be unique. Be sure to set the correct address for the LNL-BIO007 reader. The settings for the baud rate must also match what is configured on the BAS-500B and the BAS-1300/1320. This is done through an RS-232 connection between the reader and a workstation. Use the Bioscrypt VeriAdmin program (found on the Supplemental disc) to configure your settings.

*LED Table settings for Enroll mode*
### LED Table settings for Verify mode

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<th>Line 3</th>
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<th>Interval</th>
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<tbody>
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<tr>
<td>Waiting State</td>
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<td>0</td>
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</tr>
<tr>
<td>Wave Card</td>
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<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Place Finger</td>
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<td></td>
<td></td>
<td>0</td>
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<tr>
<td>Remove Finger</td>
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<tr>
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### LED Table settings for Make Enroller mode

**LED Table**

**Make Vprox Enroller**

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### LED Table settings for Make Deleter mode

**LED Table**

**Make Vprox Deleter**

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# LED Table settings for Vprox Admin mode

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<td>Veri-Series Products:</td>
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<td>RED</td>
<td>BUZZER</td>
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<td>Waiting State</td>
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# LED Table settings for Vprox Enroll mode

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**LED Table settings for Vprox Verify mode**

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**LED Table settings for Vprox Delete mode**

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<td></td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pass</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fail</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td></td>
<td></td>
<td>✔</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
76.4 LNL-BIO007 Reader Operation

Operation of this reader will be dependent upon the reader configuration in the software.

**Note:** When power is cycled, the reader door will automatically close.

1. Present the prox card to the reader (if the reader is configured for a mode that requires a card).
2. Enter a PIN, followed by [#] (if the reader is configured for a mode that requires a PIN).
3. When the reader opens to reveal the fingerprint sensor, place your finger on the sensor.
4. When the light turns off, remove your finger.
   The indicator lights are determined by the settings configured in the VeriAdmin LED Table Settings.
5. The sensor door will close on its own. There is no need to push or pull the door.
Specifications

- Primary Power (DC)
  DC input: 12 VDC @ 1.6 amps (12 VDC @ 1.8 amps with use of thermal heat kit)

- Environmental:
  Temperature: 0° to 50° C operating (-20° to +70° C with use of thermal heat kit)
  Humidity: 0 to 95% RHNC

- Mechanical
  Case: brushed aluminum construction, anodized (also available in black or gold)
  Dimensions: 3.94 x 8.92 x 2.6 in. (10 x 22.66 x 6.06 cm)
  Weight: 4.71 lbs. (2.1365 kg) nominal
  Read range: 1 to 2 inches

- Technology
  Supported: Encoding, 125 KHz HID proximity cards
  Sensor: AF-S2 AuthenTec
  FAR (False Acceptance Rate): 0.2%
  FRR (False Rejection Rate): 1.0%

- Complies with FCC

- CE mark
BIO-NDK Reader

This reader operates at 8-24 VDC. The average current draw is at 12VDC is 200mA, peak is 400mA.

Wiring the reader with the BAS-1300

TYPICAL SOFTWARE SETTINGS
1. Reader Type = WIEGAND/PROX
2. Keypad = EIGHT BIT OUTPUT KEYPADS
3. LED Mode = 2-WIRE LED CONTROL

Connector Pin Block on Back of Reader

GND — Pin 7
BZR — Pin 1
LED — Pin 2
CLK/D1 — Pin 4
DATA/D0 — Pin 3
VO — 8-24 VDC

Tie to Earth
Ground

External Power Supply
(Reader cannot be powered from single reader interface module)
Wiring the reader with the BAS-1320

TYPICAL SOFTWARE SETTINGS

1. Reader Type = Wiegand/Prox
2. Keypad = Eight Bit Output Keypads
3. LED Mode = 2-Wire LED Control

Connector Pin Block on Back of Reader

Pin 8
Pin 2
Pin 1
Pin 4
Pin 3
Pin 7
GND

8-24 VDC External Power Supply

Tie to Earth Ground

Dual Reader Interface Module
WYRELESS READERS
79  Overview of Wyreless Reader Interfaces

This installation guide is intended for use by technicians who will be installing and maintaining the Wyreless Reader Gateway (BAS-500W).

The BAS-500W interfaces with the PIM-485-16-OTD and provides real time processing gateway for Wyreless readers. The PIM-OTD is connected to a standard reader interface module (BAS-1300 or 1320).

79.1  Interfaces

The Wyreless Reader Gateway interfaces upstream with the Intelligent System Controller (BAS-500, 1000, or 2000). It communicates downstream with the Recognition Source PIM-485-16-OTD. Only one PIM can be used per Wyreless reader gateway. One PIM (panel interface module) supports up to 16 Wyreless readers in many combinations.

The gateway can be used with any address. When configuring the reader in B.A.S.I.S., a unique reader number will be specified according to the port and address of the gateway. The first reader MUST always be present and be identified as reader number 0.

Communications Overview

Intelligent System Controller
Maximum 64 readers / 32 devices
*WRI counts as (1) device

Wireless Reader Interface

PIM 485-16

Up to 16 wireless readers

Single Reader Interface Module
Dual Reader Interface Module
Input/Output Control Module
80 Installation of the Gateway

To install the gateway, perform the installation procedures described in the following sections, in the order in which they are presented.

1. Wire the upstream host communication.
2. Wire the power input.
3. Wire the downstream device communication.
4. Cycle power to the device.

80.1 Wiring

80.1.1 Unsupervised Alarm Inputs: Power Fault and Cabinet Tamper Monitors

On the Wyreless reader gateway, there are two unsupervised alarm inputs that can be used for power fault and cabinet tamper monitoring. These inputs are connected using the **Input 2 (IN2)** and **Input 1 (IN1)** contact terminals on the Wyreless reader gateway board.

Input 2 and Input 1 are both simple N/C (normally closed) contact closure monitors.

Wire the Input 2 and Input 1 contacts using **twisted pair cable, 30 ohms** maximum. (No EOL resistors are required.)

---

**Note:** If either of these inputs is not used, a shorting wire should be installed.

---

![Unsupervised Alarm Input Wiring](image)

80.1.2 Upstream Host Communication

The Wyreless reader gateway uses Port 1 to communicate to the ISC. Port 1 should be wired as 2-wire RS-485 interface for multi-drop or extended distance communication.

For RS-485 communication, the following type of RS-485 cable is required: 24 AWG (minimum) twisted pair (with shields). 2 twisted pair RS-485 cable configuration should be used. The RS-485 cable should be
no longer than 4000 feet (1219 m), 100 ohms maximum (Belden 9842 4-wire or 9841 2-wire, plenum cabling Belden 88102, West Penn, or equivalent.) The drop cables (to readers and other devices) should be kept as short as possible, no longer than 10 feet.

**RS-485 Communications**

The (EIA) Electronic Industries Association standard defines RS-485 as an electrical interface for multiport communications on a bus transmission line. It allows for high-speed data transfer over extended distance (4000 feet, 1219 m). The RS-485 interface uses a balance of differential transmitter/receiver to reject common mode noise. For increased reliability over the extended distances End-of-line (EOL) termination is required.

Belden (24 gauge wire – (7x32) Stranded Conductors – Polyethylene Insulated).

### Belden Wire Specifications

<table>
<thead>
<tr>
<th>Trade Number</th>
<th>Number of Pairs</th>
<th>Nominal D.C. R. Conductor</th>
<th>Shield</th>
<th>Nominal Impedance (Ohms)</th>
<th>Nominal Capacitance pF/feet</th>
<th>Nominal Capacitance pF/meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>9841 NEC CM CSA</td>
<td>1</td>
<td>24.0 ohms/M 78.7 ohms/km</td>
<td>3.35 ohms/M 11.0 ohms/K</td>
<td>120 12.8</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>9842 NEC CM CSA</td>
<td>2</td>
<td>24.0 ohms/M 78.7 ohms/km</td>
<td>2.2 ohms/M 7.2 ohms/K</td>
<td>120</td>
<td>12.8 4 2</td>
<td></td>
</tr>
<tr>
<td>88102 NEC CMP CSA</td>
<td>2</td>
<td>24.0 ohms/M 78.7 ohms/km</td>
<td>15.5 ohms/M 50.9 ohms/km</td>
<td>100</td>
<td>12.95 4 2</td>
<td></td>
</tr>
</tbody>
</table>

**Upstream Host Communication Wiring (Port 1)**
Wire Configuration – Switch #5 must be off for all panels in this configuration.

80.1.3 Power

The Wyreless reader gateway accepts either a 12 VDC or 12 VAC ± 15% power source for its power input. The power source should be located as close to the Wyreless reader gateway as possible.

Wire the power input with 18 AWG (minimum) twisted pair cable.

For AC power sources, the following lines are required: AC Line (L), AC Neutral (N). These lines must not be interchanged. A 400 mA RMS current is required for AC power supplies.

For DC power sources, isolated and non-switching, regulated DC power is required. A 250 mA current is required for DC power supplies.

Note: If using a 12 VDC power source (preferred), be sure to observe polarity.

80.1.4 Downstream Device Communication

The Wyreless reader gateway can be configured to communicate downstream with one PIM-485-16-OTD. Each PIM-485-16-OTD supports up to 16 Wyreless readers. Set the PIM-485-16-OTD to address 0. Connect the two as follows:
**Termination**

The typical recommendation calls for termination at each end of the line. The link between the BAS-500W and the Wyreless devices is fairly short. There may be a need for termination in some unusual cases.

**Notes:**
- The Wyreless reader gateway can be located anywhere along the RS-485 line.
- Remove the RS-485 terminator for each device that is not an end-of-line device.
81 Configuration

The Wyreless reader gateway board contains 8 DIP switches and 11 jumpers that must be configured for your system.

81.1 Setting DIP Switches

The following chart describes the use of each DIP switch.

<table>
<thead>
<tr>
<th>DIP SWITCH</th>
<th>USED TO CONFIGURE:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4, 5</td>
<td>Interface address</td>
</tr>
<tr>
<td>6, 7</td>
<td>Communication baud rate</td>
</tr>
<tr>
<td>8</td>
<td>Downstream baud rate (varies depending on firmware type)</td>
</tr>
</tbody>
</table>

81.1.1 Interface Address

To configure the interface address, set DIP switches according to the following table.

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1:</td>
</tr>
<tr>
<td>0</td>
<td>off</td>
</tr>
<tr>
<td>1</td>
<td>ON</td>
</tr>
<tr>
<td>2</td>
<td>off</td>
</tr>
<tr>
<td>3</td>
<td>ON</td>
</tr>
<tr>
<td>4</td>
<td>off</td>
</tr>
<tr>
<td>5</td>
<td>ON</td>
</tr>
<tr>
<td>6</td>
<td>off</td>
</tr>
<tr>
<td>7</td>
<td>ON</td>
</tr>
<tr>
<td>8</td>
<td>off</td>
</tr>
<tr>
<td>9</td>
<td>ON</td>
</tr>
<tr>
<td>10</td>
<td>off</td>
</tr>
<tr>
<td>11</td>
<td>ON</td>
</tr>
<tr>
<td>12</td>
<td>off</td>
</tr>
<tr>
<td>13</td>
<td>ON</td>
</tr>
<tr>
<td>14</td>
<td>off</td>
</tr>
<tr>
<td>15</td>
<td>ON</td>
</tr>
</tbody>
</table>
81.1.2 Upstream Communication Baud Rate

To configure the communication baud rate, set DIP switches 6 and 7 according to the following table. This feature controls the baud rate for upstream communication.

<table>
<thead>
<tr>
<th>BAUD RATE</th>
<th>DIP SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>38400 bps</td>
<td>ON</td>
</tr>
<tr>
<td>19200 bps</td>
<td>off</td>
</tr>
<tr>
<td>9600 bps</td>
<td>ON</td>
</tr>
<tr>
<td>2400 bps</td>
<td>off</td>
</tr>
</tbody>
</table>
### 81.1.3 Downstream Baud Rate

DIP switch 8 controls the downstream baud rate.

<table>
<thead>
<tr>
<th>DIP SWITCH 8:</th>
<th>Baud rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
<td>9600 bps</td>
</tr>
<tr>
<td>ON</td>
<td>not supported</td>
</tr>
</tbody>
</table>

### 81.2 Installing Jumpers

The following diagram describes the use of each jumper on the board. The jumper is indicated by brackets [ ]. The default shipping position is shown below.

- **[J13]**
  - OFF: Port 1, Ethernet (Cobox-micro)
  - ON: Port 1, serial (RS-232/RS-485)

- **[J4]**
  - Control for Port 1, RS-232 or RS-485

- **[J7]**
  - Control for Port 1, 2-wire or 4-wire

- **[J8, J10]**
  - OFF: Port 1 RS-485 EOL termination is not on
  - ON: Port 1 RS-485 EOL termination is on

- **[J3, J5, J6, J9]**
  - Control for Port 1, RS-232 or RS-485

- **[J11]**
  - OFF: Port 2 RS-485 EOL termination is not on
  - ON: Port 2 RS-485 EOL termination is on

- **[J12]**
  - OFF: Port 3 RS-485 EOL termination is not on
  - ON: Port 3 RS-485 EOL termination is on

### 81.3 Firmware

Refer to **Firmware Updates** in the Hardware Installation Guidelines section for instructions for downloading firmware.
82 Wyreless Configuration

This section contains information for installing and wiring the PIM-485-16-OTD or the PIM-OTD.

82.1 PIM-485-16-OTD

The RS-485 address of the PIM-485-16-OTD needs to be set to 0. This may also be referred to as the ‘PIM Addr.’

Each reader communicating with the PIM-485-16-OTD also has an address. This range cannot exceed 16 addresses. The first address must be set to 0. The PIM-485-16-OTD should be configured for as “Addr Lo” of 0 and “Addr Hi” of 15.

82.2 Configuration and Demonstration Tool

The CDT (Configuration and Demonstration Tool) is a software program used to configure the Recognition Source PIM-485-16-OTD and readers.

Note: An RS-232 and RS-485 cannot be connected simultaneously. If you are using an RS-232 connection (standard RS-232 cable) to configure, any RS-485 connection must be disconnected for the CDT to operate properly. Remember to re-connect the RS-485 when you are done configuring.
1. Once the PIM-485-16-OTD is powered and connected to the PC and the CDT is running, press and hold either the SA or SB switch on the PIM-485-16-OTD while pressing and releasing the Reset switch.

2. When running the CDT, select the serial port you are using before putting the PIM-485-16-OTD into the CDT mode.

Once the PIM-485-16-OTD is in CDT mode, a status message will be displayed (example: PIM Connected on COM1).

3. Once LEDs CR7 & CR10 start to flash, the SA/SB switch can be released. This places the PIM-485-16-OTD in the CDT communication mode.

If the CDT is shut down and restarted, the PIM-485-16-OTD must be reset as indicated above to return to the CDT communication mode.

4. To change the PIM address and the address range you will need to go to the **Addresses** tab. Set the proper Addr Lo, Addr Hi, and Pim Addr values as follows:

![Diagram of PIM Status and Addresses settings](image)

**82.3 PIM-OTD**

Use the following diagrams to wire the PIM-OTD to single/dual reader interface module.
83 Readers

Wyreless access readers are designed to eliminate the wiring from doors to panels. This minimizes the wiring required at or around the door. B.A.S.I.S. supports a number of integrated locks and readers. Once the PIM-485-16-OTD is connected, Wyreless readers may be used. For more information, refer to the Wyreless Access System documentation.

The following Wyreless Access Point Modules are supported:

- PIM-OTD Panel Interface Module
- WRI-OTD Wyreless Reader Interface
- MIRL Modular Integrated Reader Lock
- IRL Integrated Reader Lock
- WPR Wyreless Portable Reader
- ANT-REM Remote antenna for PIMs
- PIM-485-16-OTD RS-485 panel interface module for up to 16 readers

83.1 Use with the BAS-2020W

To use a WRI reader with a BAS-2020W with a Recognition Source reader, the BAS-2020W must be set to format 3 (DIP switches 3 and 4 are turned on).

In System Administration, configure the reader as Mag w/ Wiegand output.

83.2 B.A.S.I.S. Configuration

In order to use the Wyreless readers with B.A.S.I.S., you must be running version 5.10.423 or later.

The Recognition Source Wyreless readers are configured similar to other readers in System Administration. Since these readers are configured on a gateway, specify a reader number for these readers that corresponds to the address on the gateway. The reader at address 0 (reader number 0) must be the first reader configured.

Be sure to select the proper reader type for your configuration: either Recognition Source (Mag w/ Wiegand output) or Recognition Source (Wiegand/Prox).

83.2.1 Strike Time

The strike times cannot be configured from B.A.S.I.S.; these would need to be configured using the Recognition Source software if you wish to have different values besides the default values. However, the strike time in B.A.S.I.S. MUST be configured to match the setting in the CDT. The valid range for the strike time for Recognition Source is from 1 to 255 with a default of 3 seconds.
83.2.2 Reported Trouble Alarms

These alarms are specific to Wyreless readers:

- **Loss of communications.** A break in RF communications can be detected within minutes, even seconds sometimes.

- **Low power (battery life).** When low power has been indicated, the reader can continue to function for another 5000 to 10,000 swipes.

- **Tamper at the doors.** This means that the reader has been removed.

- **Stalled motor.** The lock motor has stopped running.
84 Specifications

** The BAS-500W is for use in low voltage, class 2 circuits only.

- Primary Power: (DC or AC)
  - DC input: 12 VDC ± 10%. 250 mA
  - AC input: 12 VAC ± 15%. 400 mA RMS
- Memory and Clock Backup: 3 V lithium (does not apply to this hardware)
- Communication Ports:
  - Port 1: RS-232 or RS-485, 2400 to 38400 bps async
  - Ports 2-3: RS-485 (2-wire), 2400 to 38400 bps async
- Inputs:
  - Cabinet Tamper Monitor: unsupervised, dedicated
  - Power Fault Monitor: unsupervised, dedicated
- Wire Requirements:
  - Power: 1 twisted pair, 18 AWG
  - RS-485: 24 AWG twisted pair(s) with shield, 4000 feet (1219 m) maximum
  - RS-232: 24 AWG, 25 feet (7.6 m) maximum
  - Alarm Input: twisted pair, 30 ohms maximum
- Environmental:
  - Temperature: Operating: 0° to 70° C (32° to 158° F)
  - Humidity: 0 to 95% RHNC
- Mechanical:
  - Dimension: 6 x 5 x 1 in. (152 x 127 x 25 mm)
  - Weight: 8 oz. (290 g) nominal
- Data Memory: 512 KB
- CE marking

---

Note: RoHS compliantThese specifications are subject to change without notice.
COMMAND

KEYPAD
85 Command Keypad Overview

The LNL-CK command keypad integrates a 32-character back-lit LCD display with a 16-position keypad and a reader port. It serves as a command reader, with programming being accomplished using B.A.S.I.S. This device features time display (in either 12-hour or 24-hour clock format, based on the Windows setting of the Communications Server) and text feedback during reader operations. For example, when using the extended held open command, the command keypad displays the time countdown before the held open time is reached. It also displays status, such as access granted, access denied, enter PIN, etc. Features supported include:

- Card/PIN access
- Function execution
- Extended held open time
- Global arm and disarm

With build 5.12.1XX, the following features will be supported:

- Instant commands
- Advanced arm and disarm

Features enabled in B.A.S.I.S. 5.12.1XX are NOT backwards-compatible.

Note:

85.1 Communication

The command keypad communicates with the controller via a 2-wire RS-485 interface or as a reader device through a reader interface module. There are three possible scenarios:

1. The LNL-CK can be installed as a stand-alone device. It can be connected via RS-485 and may be used to execute command programming (*4-15#) or the extended held open command. With the optional reader connected, all reader modes are supported. The keypad supports PIN entry; however, there is no door hardware connection capability.
Command Keypad installed as stand-alone device

**RS-485 Communication**

**Typical Software Configuration:**
Reader Type: RS-485 Command Keypad (Reader Type)

**Setup configuration:**
- RS-485 Device
- Address (0-31)
- Reader (Wiegand or Magnetic)
- Termination (EOL only)
- Keypad possible

**Optional Reader**
Wiegand or Magnetic
2. The LNL-CK can be connected via RS-485 and used as an alternate reader device along with a primary reader (associated with a single/dual reader interface module) for door inputs and outputs from the primary reader interface device. In this scenario, it will support all reader modes. It may be used to execute command programming (Card Reader Cipher Mode, Extended Held Open Time, User Command Programming ability) as well as PIN entry.

Command Keypad installed as alternate reader device

Typical Software Configuration:
- Reader Type: RS-485 Command Keypad
- Alternate reader

Setup configuration:
- RS-485 Device
- Address (0-31)
- Reader (Wiegand or Magnetic)
- Termination (EOL only)
3. The LNL-CK can be connected as a primary reader device on the reader interface module along with any type of alternate reader (for example, a biometric device). The LNL-CK will support all reader modes. It may be used for PIN entry or execution of command programming. The reader interface allows door hardware connection capability.

The keypad communicates to a controller via a half duplex multi-drop 2-wire RS-485 interface. The total cable length is limited to 4000 feet (1219 meters). It can also communicate via Wiegand interface, with a maximum cable length of 500 feet. Shielded cable of 24 AWG with characteristic impedance of 120 ohm is specified for the RS-485 interface. If the LNL-CK is the last device on each end of the cable, it should have the termination enabled (set DIP1=ON).
85.1.1 Hardware Revision and Firmware

The hardware revision can be determined in one of two ways:

- Check the circuit board revision label located on the backside of the board.
- Simultaneously press the center two keys of the top row on the keypad. The last character on the right of the top line is the hardware revision.

In order for the command keypad to function properly, the following firmware is required:

- LNL-CK rev. A uses firmware 1.2x through 1.3x.
- LNL-CK rev. B uses firmware 1.4x or higher.
- Reader interface module (1.31 for the BAS-1300 or 1.27 for the BAS-1320) or intelligent dual reader controller (1.0)
- Controller (BAS-500, 1000, 2000) firmware 3.099 or higher (1.00 or higher for the BAS-2220 or 3300)

85.1.2 Wiring the LNL-CK

The LNL-CK requires 12 VDC ± 15% for power. The power source must be regulated and isolated.

When plugging the connector into the pin block, line up the red wire with pin #1 and the black wire with pin #14 (as marked on the back of the board).
Use the following table to connect the wires properly.

Wires connected to pins 1-2 are for power.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Color</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>12 VDC in</td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Wires connected to pins 3-4 are used for units wired via 2-wire RS-485.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Color</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Blue</td>
<td>RS-485 TR +</td>
</tr>
<tr>
<td>4</td>
<td>Gray</td>
<td>RS-485 TR -</td>
</tr>
</tbody>
</table>

*For the Series 1 Reader Interface Modules*

Wires connected to pins 5-8 are used for units connecting to the series 1 reader interface module.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Color</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Green</td>
<td>DAT/D0 on the reader interface module</td>
</tr>
<tr>
<td>6</td>
<td>White</td>
<td>CLK/D1 on the reader interface module</td>
</tr>
</tbody>
</table>
If you are using the Intelligent Dual Reader Controller or Series 2 Dual Reader Interface Module, the wiring is different from the Series 1 board. Use the following chart.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Color</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Brown</td>
<td>LED on the reader interface module</td>
</tr>
<tr>
<td>8</td>
<td>Orange</td>
<td>BZR on the reader interface module</td>
</tr>
</tbody>
</table>

*(For Series 2 Reader Interface Modules and Intelligent Dual Reader Controllers)*

If you are using the Intelligent Dual Reader Controller or Series 2 Dual Reader Interface Module, the wiring is different from the Series 1 board. Use the following chart.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Color</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red</td>
<td>READER VO 12 VDC</td>
</tr>
<tr>
<td>3</td>
<td>Blue</td>
<td>READER D1/CLK TR+</td>
</tr>
<tr>
<td>4</td>
<td>Gray</td>
<td>READER D0/DAT TR-</td>
</tr>
<tr>
<td>2</td>
<td>Black</td>
<td>READER GROUND</td>
</tr>
</tbody>
</table>

The Command Keypad should have the following settings:

- RS-485 mode
- 9600 baud
- Address 0

Wires connected to pins 9-14 are used for readers wired to this unit.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Color</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Red</td>
<td>12 VDC pass through for reader</td>
</tr>
<tr>
<td>10</td>
<td>Green</td>
<td>READER DATA (DATA 0)</td>
</tr>
<tr>
<td>11</td>
<td>White</td>
<td>READER CLOCK (DATA 1)</td>
</tr>
<tr>
<td>12</td>
<td>Brown</td>
<td>READER LED</td>
</tr>
<tr>
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When connecting this device via RS-485, there are no door inputs/outputs unless the following conditions are met:

- it is configured as an alternate reader and
- it is linked to a primary reader which is connected to a reader interface module.
85.1.3 DIP Switches

This command keypad has four DIP switches that must be configured.

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<th>Setting</th>
<th>Used to configure:</th>
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<td>1</td>
<td>OFF</td>
<td>RS-485: no termination</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>RS-485: 120 Ohms termination</td>
</tr>
<tr>
<td>2</td>
<td>OFF</td>
<td>Use configuration settings (done using programmable keypad)</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>Force the use of 38400 baud rate and address 31</td>
</tr>
<tr>
<td>3</td>
<td>OFF</td>
<td>Allow software configuration at startup</td>
</tr>
<tr>
<td></td>
<td>ON</td>
<td>Disable software configuration at startup.</td>
</tr>
<tr>
<td>4</td>
<td>OFF</td>
<td>not used</td>
</tr>
</tbody>
</table>

Proper termination is required for proper operation. If the LNL-CK is the first or last device on the RS-485 bus, DIP switch 1 should be ON.

Set DIP switch 3 to the ON position to disable the ability to use the keypad for changing the configuration during power-up. This decreases the possibility of unauthorized persons from altering the configuration.

85.1.4 Jumpers

Jumper J1, J5, and J6 are for factory use only. By default, this device is shipped with this jumper open and should not be changed.

Jumper J4 is for firmware flash upgrade. To allow flash upgrades on revision A boards, jumper pins 1-2. To disable this feature, jumper pins 2-3. If you have a revision B board, J4 is not present and no action is required to enable the programming of flash memory.

85.1.5 LNL-CK Configuration

Configuration of the LNL-CK is usually performed at the keypad during the startup process. When power is applied, the screen will flash a message: “Press two keys for Setup.” If the two keys indicated are pressed simultaneously, the setup screen will appear. Follow the instructions on the LCD. Selections include:

- **Communication** Choose RS-485 or reader port. If reader port is chosen, the baud rate and communication address settings will be skipped.

- **Baud rate** This selection should match with the baud rate of the controller (typically 38400 bps).

- **Communication Address** The communication address should be set to a unique value. The valid range is 0-31.

- **Backlight** This setting defines the behavior of the display backlight. 00=always off, 99=always on, 01-98=number of seconds the backlight remains on after no activity.

- **LED** This setting selects the LED drive type to match the reader connected to the reader port. 1-Wire: standard 1-wire interface (High=RED, Low=GREEN). 2-Wire: BRN wire controls red LED (High=Off,
Low=On), ORG wire controls green LED (High=Off, Low=On), No Buzzer. 2-Wire/Special: corresponds to Dorado LED control.

85.1.6 Status Display

The command keypad can display a status report so that you can confirm settings, check the serial number, firmware revision number, or hardware settings. It also displays a communication status (on-line or off-line). To view the status display, simultaneously press the two center keys of the top row on the keypad:

(top line)
AAAAAABBBB
(lower line)
CCCCCSCSW-X234 D

- A represents the unit’s ten-digit serial number
- B represents the firmware revision level. The right-most character represents the PCB revision level.
- C represents the current operating mode.
  - Reader port mode = rdr port
  - RS-485 mode = baud rate-address
- SW-X234 represents the current S1 DIP switch setting. X
- D represents the communication status (On-line = o).

85.1.7 B.A.S.I.S. Configuration

When connecting the command keypad using RS-485, B.A.S.I.S. allows for three possible choices to select for the reader type:

- RS-485 Command Keypad (BAS-1300T).
  The BAS-1300T is no longer available for sale. This selection is available in the software for legacy support.
- RS-485 Command Keypad (All Other Readers)
- RS-485 Command Keypad (Wiegand/Prox)
- RS-485 Command Keypad (Mag w/ Wiegand Output)

Use this field to configure the card reader that is wired into the command keypad. The LED mode for this type of reader will automatically be configured as LCD Command Keypad by the system and cannot be modified. This LED mode setting indicates that the attached reader is capable of LED/text. This is configured when attaching the LNL-CK to a reader interface module. Choosing “LCD Command Keypad” tells the system that it is the LNL-CK being connected to the reader interface module. The reader type in this case is the normal “Dual reader 1...” or “Dual reader 2...” reader type that is typically selected for the reader interface module, depending on if the reader is connected to the reader 1 port or the reader 2 port. The type of card reader connected into the LNL-CK determines which type is selected.

When connecting the command keypad using the dual reader interface module (Dual Interface Rdr 1/Dual Interface Rdr 2), the reader type must also be selected according to the card reader wired to the command keypad (All Other Readers, Wiegand/Prox, or Mag w/ Wiegand Output). Select LCD Command Keypad for the LED mode to identify the device connected to the reader interface module as an LCD-capable device, and not a typical card reader.

All door inputs (aux inputs, REx, door contact) and door outputs (aux outputs, strike) are controlled by reader interface module.
**Text Display Options**

The text displayed on the command keypad is configurable through the access control software. The display may include the time, status of default area, or any user definable text strings. It is limited to 8 strings, a maximum of 16 characters each.

**Multi-level Command Authority**

Commands may be enabled globally, or at a more advanced level. The authority levels may be configured as No authority, Level 1, or Level 2. These levels apply to the commands to view, disarm, arm, and force arm.

**Macros**

Macros may be used to define a key sequence. It is limited to the characters found on the keypad (0-9, *, #) and the function keys. Up to eight macros may be defined using the following combinations of function keys:

- Individual keys: F1, F2, F3, F4
- F1 F2
- F3 F4
- F1 F4
- F2 F3

*Note:* For detailed information, refer to the System Administration User Guide.

**85.1.8 Command Programming**

The command keypad allows PIN entry on standard keypad readers. If your PIN is shorter than the maximum length, press [#] after entering the PIN number.

*Note:* The typical [*] key on the keypad is labeled with an arrow and the [#] key is labeled with [COMMAND].

Commands are programmed in System Administration. The standard command string is [*], followed by a number (4-15), followed by [#]. Commands are executed according to the configuration of Local I/O function list(s).

**85.1.9 Command Keypad Behavior**

The LNL-CK supports two formats for time display: a 12-hour clock or 24-hour clock display. This is configured based on the Windows regional settings of the machine running the Communication Server.

- When the device is in Locked mode, “Locked” is displayed on line 1. The current time is displayed on line 2. This is an IDLE mode.
- When the device is in Unlocked mode, “Unlocked” is displayed on line 1. The current time is displayed on line 2. This is an IDLE mode.
• When the device in any mode other than locked or unlocked and waiting for input, “Ready” is displayed on line 1. The current time is displayed on line 2. This is also an IDLE mode.

• When an access or other attempt is denied, “Denied” is displayed on line 1. The current time is displayed on line 2. This text is displayed for 3 seconds. It is displayed in the following scenarios:
  - Access Denied on card/PIN access attempt
  - Timeout of second card request
  - Timeout while waiting for biometric verification
  - The [#] key is pressed while waiting for a pin, but no keys have been entered
  - Timeout during PIN or user command entry

• When access is granted, “Access Granted” is displayed on line 1. The current time is displayed on line 2.

• When there is a valid card swipe at a reader in card and PIN mode, “Enter PIN” is displayed on line 1. “?” is displayed on line 2. As keys are entered, a “*” is shown for each keystroke.

• When a valid PIN is entered at a reader in card and PIN mode, “Enter Badge” is displayed on line 1. This state only exists when using controller firmware 3.050 or higher. In previous versions, no prompt is displayed here after entering the PIN.

• Whenever additional credentials are needed, “Next Badge” is displayed on line 1. The current time is displayed on line 2. Additional credentials can be required due to two-card control and APB occupancy issues (such two-man area control).

• When an access attempt is awaiting host based decision (global APB), “…” is displayed on line 1. This state only exists when using controller firmware 3.050 or higher. In previous versions, “Enter Badge” would be displayed here.

• When there is an access attempt awaiting biometric data, “Enter Biometric” is displayed on line 1 in version 5.10.419. Or, if you are using a previous version of B.A.S.I.S., “Biometric Test” is displayed instead. This state only exists when using controller firmware 3.050 or higher.

• When an extended held open command is denied due to invalid credentials or if it is not supported at the given reader, “Not Authorized” is displayed on line 1. The current time is displayed on line 2.

• When an extended held command is denied due to arguments entered out of range, “Invalid Data” is displayed on line 1. The current time is displayed on line 2.

• When the reader has entered extended held open mode, “Timed Door Open:” is displayed on line 1. The remaining number of minutes and seconds to alarm is displayed on line 2.

• Whenever a command has been entered and accepted for processing, “Command Accepted” will be displayed on line 1 and the current time on line 2. This simply means that a key stream has been sent to the controller for processing as a potential command sequence. It is simply verification that the entered data has been seen by the system and is NOT an indication of a command being executed.

**Alarm Mask Groups**

The control of alarm mask groups is accessible through command keypad devices. The command will allow a user to arm/disarm an alarm mask group from the keypad with visual feedback on the LCD.

Note: For arming/disarming alarm mask groups, the LNL-CK must have firmware version 3.081 or higher.
To issue the command, you must receive a valid access grant at the reader and also have arm/disarm command authority. To use the feature:

1. Press [*] (on the command keypad, this is equivalent to the arrow key).
2. Enter the command sequence as programmed (defined in System Administration), followed by a two-digit alarm mask group ID.
3. To finalize the command press [#] (on the command keypad, this is represented with the [COMMAND] key).
4. Follow the prompts displayed on the LCD. They will be different, depending on if the alarm mask group was already armed or disarmed.

### If it is armed...

If you would like to disarm the alarm mask group, press [1]. The LCD will then display:

```
*** DISARMED ***
```

The system will check to see if any points are active.

- If no points are active, the LCD will display:
  - **ALL SECURE**
  - Press [2] to ARM
- **ARMING, EXIT NOW**
- Otherwise, do not press anything (or if you press key other than [2]), it will remain disarmed.

- If points are active, the LCD will display:
  - **nn ZONES FAULTED**
  - Press [4] to scroll through and view active points.
  - After it is done, the LCD will display:
    - **nn ZONES FAULTED**
    - Press [3] to force-arm the alarm mask group. The LCD will display:
      - **ARMING, EXIT NOW**
    - Do nothing (or if you press any key other than [3]) to leave it disarmed.

### If it is disarmed...

Advanced permission control allows the following commands to be enabled or disabled on a per-keypad basis:

- **Default Alarm Mask Group Intrusion Commands**
  - No mask group ID needs to be specified
  - Arm the default area.
  - Force-arm the default area (auto bypass).
  - Disarm the default area.
  - View faulted zones in the default area.

- **Any Alarm Mask Group Intrusion Commands**
  - Mask group ID from 00 to 99 must be appended to the command.
  - Arm the specified area.
  - Force-arm the specified area (auto-bypass)
  - Disarm the specified area.
  - View faulted zones in the specified area.
85.2 Specifications

** The command keypad is for use in low voltage, class 2 circuits only.

- **Primary Power**: (DC)
  - DC input: 12 VDC ± 15%, 175 mA

- **Reader Ports**:
  - Power: pass through
  - Interface: 2-wire, clock/data or data 1/data 0
  - LED control: 2-wire or 1-wire bi-color
  - Buzzer control: available only in 1-wire LED control mode

- **Communication**:
  - RS-485: 24 AWG, 4000 feet (1200 m) maximum, 120 ohms impedance
  - TTL: 18 AWG, 500 feet (152 m) maximum

- **Environmental**:
  - Temperature: 0º to 50º C operating, -20º to +70º C, storage
  - Humidity: 0 to 95% RHNC

- **Mechanical**:
  - Dimension: 6.75 x 5 x 1 in. (172 x 127 x 25 mm)
  - Weight: 14 oz. (400 g) nominal

- **UL294 Listed, UL1076 pending**

These specifications are subject to change without notice.
CYPRRESS TIMER
The Cypress Timer (LNL-CCK-1201-M/LNL-CCK-1204-M/LNL-CCK-1401) is ideal for Time and Attendance applications where the Access Control System’s time must be displayed. Up to 32 clocks can be driven from one time source over a single twisted pair network. The enclosure is weather resistant making it ideal for exterior installation.

- Adds time of day displays to Access Control and Time & Attendance Systems.
- Low profile facilities mounting at reader location.
- Can be used indoor or outdoor.
- Standard or Military Time Formats.
86.1 System Level Wiring

Multi-Drop, Central Power

Multi-Drop, Local Power

Multi-Drop, Daisy-Chain and Home-Run
86.2 DIP Switches

DIP switches are used to control the protocol. B.A.S.I.S. uses Mercury Protocol 2. This means that DIP switches 1 and 2 should be in the ON position. DIP switches 3, 4, 5, 6, and 7 should be off.
DIP switch 8 is used for the time mode. Turn DIP switch 8 ON for 24-hour mode; off for 12-hour mode.

If an undefined format is selected, the display will read --:--.

### 86.3 Time Displays: Functional Description

The clocks are used to display the time from the ISC. When the ISC sends a time stamp to the clock, the clock’s internal time base is updated; however, the clock’s time stamp is not used. The time stamp that comes directly from the ISC is still used. In other words, the clock's internal time base is updated but is not used unless nothing is received from the ISC or there is a loss of clock information. In order to use DST (Daylight Savings Time), this option must be turned on in the software application for that panel.

If there is a communication loss between the ISC and the clock, the clock uses its internal time base to update the clocks. A loss of communication is defined as 1 minute and 10 seconds without receiving a valid time stamp from the ISC. In normal operation, the colons “::” blink at 1 second intervals. This indicates that the clock is communicating with its Clock Driver. If the colons are steady, this indicates a communication failure.
86.4 Wall Mounting

Mount enclosure to wall with electrical box (single gang).

Top View

CCK-1201
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